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ACB – Cost-Benefit Analysis
Acep – Association of Studies and Research of Ceará
Agefis – Agency of Supervision of Fortaleza
AIS – Integrated Area of Safety
AMF – Fiscal Target Annex
APA – Environmental Protection Area
APPs – Permanent Protection Areas
ARF – Fiscal Risks Annex
Astef – Eng. Paulo de Frontin Technical and Scientific Association
BID – Inter-American Development Bank
BIRD – International Bank for Rebuilding and Development
BNDES – National Bank for Economic and Social Development
BRT – Bus Rapid Transit
CAF – Bank for Latin American Development
Cagece – Ceará State Water and Sewage Company
CAU – Council for Architecture and Urban Planning of Ceará
CDL – Chamber of Shop Managers of Fortaleza
Cedec – State Coordination for Civil Defense
Cefet – Ceará Federal Center for Education, Science, and Technology
Centec – Center for Technology Teaching
CIPP – Pecém Industrial and Docking Complex
Citinova – Foundation for Science, Technology, and Innovation of Fortaleza
CNPq – National Council for Scientific and Technological Development
Cogerh – Company for the Managing of Water Resources
Cohab – Ceará Housing Company
COID – Special Coordination for the Elderly
CPDrogas – Special Coordination for Drug Policies
CPI – Corruption Perceptions Index
CRAs – Welfare Reference Center
CRC CE – Regional Council of Accountacy of Ceará
Crea–CE – Regional Council of Engineering and Agronomy of Ceará
CRP – Regional Council of Psychology
CTI – Science, Technology Innovations, and Communications
Cucas – Urban Centers for Arts, Science, and Sports

CVPL – Plant Complex of the Coastal Plain
DataSUS – SUS (Public Health Care System) Department of IT
DC – Current Expenses
FCPC – Ceará Foundation of Research and Culture
Fecomércio Ceará Trade Federation
Fiec – Ceará Industry Federation-
Finbra – Financial Archive of Brazil
FMI – International Monetary Fund
GIA – Environmental Interest Group
GMF – Fortaleza Municipal Guard
HOI – Human Opportunity Index
IBGE – Brazilian Institute of Geography and Statistics
ICC – International Chamber of Commerce
ICTs – Science and Technology Institutions
Ideb – Basic Education Development Index
HDI – Human Development Index
IDT – Institute of Work Development
IFCE – Ceará Federal Institute of Education, Science, and Technology
IHAB – Waters of Brazil Hydro-Environmental Institute
INCT – National Institutes of Science and Technology
Inep – Anísio Teixeira National Institute of Education Research and Studies
IPCA – National Wide Consumer Price Index
Ipece – Ceará Institute of Research and EconomicStrategy
Iplanfor – Institute for the Planning of Fortaleza
IPM – Municipal Welfare Institute
LDO – Budget Directives Act
LGBT – Lesbian, Gay, Bisexual, Transvestites, Transexuals and Transgender
LOA – Annual Budget Act
LRF – Fiscal Responsibility Act
MTE – Ministry of Work and Employment
NITs – Centers of Technological Innovation
Nutec – Center for Industrial Technology of Ceará
OCDE – Organization for Cooperation and Economic Development
OIT– International Organization of Tourism
OMI – Open Markets Index
WHO – World Health Organization
OSCIP – Civil Society Organization for Public Interest
Padetec – Technological Development Park
EAP – Economically ActivePopulation
GDB – Gross Domestic Product
Plandirf – Plan for the Integrated Development of the Fortaleza Metropolitan Region
Plhis – Social Housing Plan
UNDP – United Nations Development Programme
PPA – Multi-annual Plan Act
PPP – Public-Private Partnership
Pronatec – National Program for Technical Learning and Employment Accessibility
RAIS – Annual Report of Social Indicators
RCL – Net Income
Redecomep – Research and Education Community Network
Redenit – Network for Center of Technological Innovation of Ceará
FMR – Fortaleza Metropolitan Region
ROHC – Robust Header Compression
SAE/PR – Department ofStrategic Presidential Affairs
SDE – Department of Economic Development
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Seuma – Municipal Department of Urban Planning and Environment
Sindieventos CE – Ceará Organizing Events Companies Union
Sindilojas – Fortaleza Trade, Retailers, and Store Owners Union
Sindiônibus – Ceará Passenger Transport Companies Union
Sinepe–CE Union for Private Teaching Establishments of Ceará
Sirecom Ceará – Ceará Sales Representatives Union
Siup – Industrial Services of Public Interest
SME – Municipal Department of Education
SSPDS – Department of Public Safety and Social Defense
STDS – Department of Work and Social Development
STN – Department of National Treasure
ICT – Information and Communication Technology
TOR – Term of Reference
Uece – Ceará State University

UFC – Federal University of Ceará
Unifor – University of Fortaleza
UPAs – Emergency Care Units
Urca – Regional University of Cariri
UVA – Vale do Acaraú University
GVA – Gross Value Added
Zeis – Special Zones of Social Interest

PLAN ABBREVIATIONS

AS – Welfare Plan
AU – Urban Agriculture Plan
CA – Children and Teens Plan Adolescente
CC – Civil ConstructionP lan
CF – Manufacturing Plan
CP – Culture and Heritage Plan
CT – Science Technology and Innovation Plan
EC – Creative Economy Plan
ED – Public Education Plan
EL – Sports and Recreation Plan
EM – Sea Economy Plan
EN – Renewable Energies and Energy Efficiency Plan
GP – Plan for Public Management Development
GV – Plan for Public Management Development
HS – Social Housing Plan
ID – Senior Citizen Plan
IP – Plan for Productive Integration, Entrepreneurship, Employment, and Income
IR – Racial Equality Plan
JV – Youth Plan
LG – LGBT Plan
MA – Environment and Sanitation Plan
ML – Women's Plan
NI – Plan for New Industries and Advanced Services
PD – People with Disabilities Plan
PM – Urban Planning Master Plan - Mobility and Urban Accessibility Plan
RF – Land Regularisation Plan
SA – Health Plan
SC – Culture of Peace and Citizen Security Plan
SH – Water Security Plan
SN – Food Security Plan
TI – Information and Communication Technology (ICT) Plan
TR – Tourism Plan

FORTALEZA**2040**

SUMMARY


PLANO
FORTALEZA 2040
CONSTRUINDO A FORTALEZA
QUE QUEREMOS
FORTALEZA2040
Prefeitura de
Fortaleza
Instituto de Planejamento
de Fortaleza
VOLUME 1 PLANO FORTALEZA 2040
VOLUME 2 EQUIDADE SOCIAL, TERRITORIAL E ECONÔMICA
VOLUME 3 CIDADE CONECTADA, ACESSÍVEL E JUSTA
VOLUME 4 VIDA COMUNITÁRIA, ACOLHIMENTO E BEM-ESTAR
VOLUME 5 DESENVOLVIMENTO DA CULTURA E DO CONHECIMENTO
VOLUME 6 QUALIDADE DO MEIO AMBIENTE E DOS RECURSOS NATURAIS
VOLUME 7 DINAMIZAÇÃO ECONÔMICA E INCLUSÃO PRODUTIVA
VOLUME 8 GOVERNANÇA MUNICIPAL E ANEXOS

INTRODUCTION

After three exhaustive years of work and the broad involvement of society, we are happy to deliver the Fortaleza 2040 Plan to the city of Fortaleza.

This instrument, conceived during my first electoral campaign for Fortaleza's municipal government, was coordinated by the Institute for the Planning of Fortaleza (Iplanfor), with its technical execution carried out by the Ceará Foundation of Research and Culture (FCPC/UFC), through which several experts and consultants were hired, and with the voluntary participation of thousands of citizens who were active during the three stages of elaboration, contributing information, critiques, and proposals.

The main goals of the Fortaleza 2040 Plan are the transformation of Fortaleza into a more accessible, fair, and welcoming city; to increase opportunities supplied by a well-organized network of connections between its private and public spaces; and the attainment of efficient control over the city's economic growth.

Its conception emerged from the need to provide Fortaleza with a long-term plan that establishes a vision of the future, points towards strategies for overcoming challenges, while laying out a set of actions, targets, duties, and costs within the city's reach, without forgetting to propose the model for its management and governance, conditions which are essential for its consolidation as a state plan to be adopted by successive city administrations until its objectives are attained. For this purpose, it has been structured into six quadrennial modules.

The Fortaleza Plan is organized into 8 volumes throughout which the final products of the work is distributed. This volume lays out its structure, starting from a description of the city's current context, with important aspects of its urban evolution discussed, as well as a brief diagnosis of the socioeconomic conditions that were the basis for determining the challenges that will be faced as we build the future we want.

It presents a vision of the future that has been created through extensive consultation of regional groups during thematic and sectoral forums, and

it lays out goals that must be reached as we face the huge challenges that have been identified. This volume also summarizes the Plan's structure by means of six strategic axes, detailing its objectives and determining which thematic and sectoral plans will be developed so that these objectives can be reached.

This volume will also identify the implementation costs for the set of proposed actions, defining a budget and citing sources, analyzing the cost-benefit relationship brought on by their implementation, as well as the proposed governance system designed so that its implementation is assured through the principles of transparency and society's close oversight.

It also contains a proposal for the legal frameworks for its institutionalization in order to ensure the legal strength forits continuity and compliance with future plans.

Finally, this volume introduces a set of considerations arising from what has been learntduring the process as well as the relevant premises for its implementation, recommendations, and propositions.

The overall document is complemented by 8 other volumes containing 32 plans that are part of the set that makes up the Fortaleza 2040 Plan, namely:

VOLUME 1 – **THE FORTALEZA 2040 PLAN**

VOLUME 2 – **SOCIAL, TERRITORIAL, AND ECONOMIC EQUITY**

VOLUME 3 – **A CONNECTED, ACCESSIBLE AND FAIR CITY**

VOLUME 4 – **COMMUNITY LIFE, WELCOMING, AND WELL-BEING**

VOLUME 5 – **DEVELOPMENT OF CULTURE AND KNOWLEDGE**

VOLUME 6 – **ENVIRONMENT AND NATURAL RESOURCE QUALITY**

VOLUME 7 – **ECONOMIC DEVELOPMENT AND PRODUCTIVE INTEGRATION**

VOLUME 8 – **MUNICIPAL GOVERNANCE, MANAGEMENT MODEL AND SOCIETY INVOLVEMENT IN THE PLAN'S CREATION**

Fortaleza 2040 is a development plan for society and the City. Even though the creation process tried hard to mobilize and gather different social actors and public agents around the main development priorities,the municipal government of Fortaleza has a key responsibility in its implementation. The Plan's strategic priorities must be the basis for the creation of the Multi-AnnualMunicipal Plans, while the City Hall shares the responsibility for their execution. However, the commitment of governments to the Fortaleza 2040 plan depends on the involvement of civil society and on society's supervision of municipal management, as well as the involvement of several segments of society in taking on their share of responsibility for the execution of the Plan.

This is the first contribution made by the Municipal Government of Fortaleza, through the Institute for The Planning of Fortaleza (Iplanfor), to the elaboration of an instrument that will facilitate the creation of a Fortaleza with more opportunities, one that is fairer, well cared for and welcoming.

Mayor Roberto Cláudio


EZA2040
AMENTO
PATIVO
FORTALEZA
UNIDADES,
USTA,
DADA
DORA
DURANTE A AULA
CELULAR DESLIGADO

CHAPTER 1

THE METHODOLOGY FOR CREATING THE FORTALEZA 2040 PLAN AND ITS DELIVERABLES

The Fortaleza 2040 Plan results from the efforts of thousands of people who worked for three years to create a planning instrument capable of helping to improve life and guide the city's development and growth through actions that impact several aspects of the lives of citizens.

The process of creating the Fortaleza 2040 Plan was coordinated by the Institute of Planning for Fortaleza (Iplanfor), with the technical and administrative support of the Ceará Foundation of Research and Culture (FCPC), and the logistical support of dozens of public and private institutions from the city of Fortaleza.

PREPARATORY ACTIVITIES

The elaboration of the plan began with the building of an interdisciplinary team, with a universalized structure, that played the role of a task force from the very first stage of the project. The elaboration team worked on all of its stages, organizing them and encouraging continuous talks with society, in order to gather points of view from different segments about the problems, desires, and strategies for reaching the proposed goals.

Organized into three teams - urbanism and mobility; social and economic; and mobilization and social participation -, the task force evolved collectively from the initial convergence stage to technical studies and contributions from talks with society, up until the formulation of the final proposal, which happened in three sequential stages after methodological definitions and the establishment of the necessary teams.

The initial step for the Fortaleza 2040 Plan was the elaboration of the Work Plan, outlining the methodology and indicating the instruments for collecting data and its organization. The documents produced during this stage were:

- Urban and Mobility Master Plan - Product 1.0 - MethodologicalBases / Work Plan and Project Organization

- Economicand Social Development Plan - Sub-product 1.1. of Stage 1 - Work Plan / Methodological Bases - Methodological Proposal Report

STAGE I – THE FORTALEZA THAT WE HAVE

The realization of the stage in which we built a diagnosis of the "Fortaleza That We Have" began with the public launch of the Fortaleza 2040 Plan during a ceremony at the Legislative Assembly of the state of Ceará, when society was presented with a publication entitled "Participative Planning – A Fortaleza that hasmore opportunities, is fairer, well cared for and more welcoming ", in which the objectives and the methodology for the plan's elaboration were presented, along with thoughts from celebrated city scholars meant to foster greater reflection on the importance of a plan of such scope for the life of Fortaleza.

During this stage, the elaboration team split into three working groups:

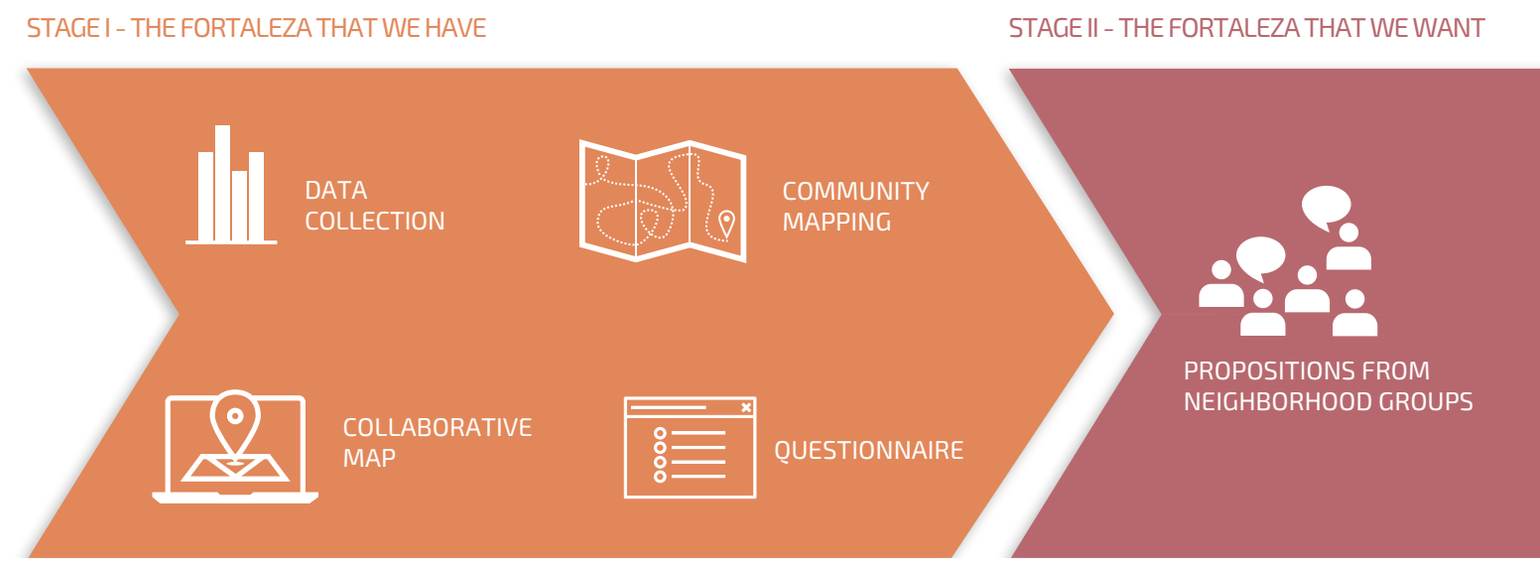
- Urban Planning and Mobility Studies
- Socioeconomic Studies
- Talks with society about the Fortaleza we want.

STUDIES AND RESEARCH OF THE URBAN MASTER PLAN DURING STAGE I

During this stage, existing studies were organized and research was carried out aimed at attaining a cartographic foundation, data on the existing physical structures, an environmental, social and economic diagnosis, statistical data, demographic studies, as well as studies on the road network, so as to produce a set of reports containing:

- An illustrated text with maps about the history and the urban evolution of Fortaleza, including considerations about its demographic growth, the variety of urban planning initiatives, their implementation and their consequences and contributions to the current scenario;
- Texts and maps describing the process of Fortaleza's urban growth, the causes and the impact of the evolution from monocentric to

Stages of the elaboration of the Fortaleza 2040 Plan



polycentric, the progression of urban dispersion and its consequences for the current structuring of spaces and mobilities (soil consumption, environmental destruction, pollution,dismantling of community life, dependency on private motor vehicles,energy consumption, increase in urban aggressiveness,etc.);

- Maps relating to the urban evolution of Fortaleza, highlighting the various development stages of its road system, centralities, soil uses, intensity of the uses, mobilities, natural areas, built cultural heritage, and infrastructure systems.
- Texts and maps showing what is known about: the evolution of the spaces between buildings, considering the system of streets, neighborhood communities, surrounding areas, and how public spaces are connected; the development of built areas; the evolution of patterns of movement of people (on foot, bicycles, motor vehicles, and public transport); the evolution of infrastructure systems and other input and residue flows; the evolution of the urban form and its public spaces;
- Reports from three pieces of research about transport systems and infrastructures (people and cargo), including an analytical record of all transport systems and their infrastructure (road networks, terminals, etc.) including motorized and non-motorized vehicles; networks of pedestrian traffic; bicycle route networks/ parking; public transport systems.

The second stage of this team's work was the analysis and interpretation of the origin, history, and evolution of the urban form, aimed at understanding the ensemble of situations and physical interventions that impacted the natural, original basis of the city of Fortaleza and its metropolitan region, making the process of collective construction of the current urban form clearer. Another important component at this stage was the identification of the forces that guided - and those that are now guiding - the quality of Fortaleza's current urban development within its metropolitan context.

STAGE III - STRATEGIC AND SETORIAL PLANS

The urban analysis with the added evaluation and interpretation of the city's form also translated into a definition of the urban fabric, the mosaic of subcultures existing in said fabric, including knowledge about its origin and evolution. During this stage the maps with schematic representations of the urban flow systems and their relations to locations were created, highlighting the network of installed infrastructure systems.

The study, at this stage, also introduced, in specific maps, the limits for urban re-development by highlighting blocking structures, the prohibitive aspects of structures with historical value, the requirements for mandatory care in relation to natural foundations, the need for urban border demarcations, and the limits that future systems should observe regarding the use of soil and its spatial outcomes.

These are the Products of the Urban Master Plan during this stage:

- PRODUCT 2.0 - Collection / Organization / Analysis of Information for the Project (Preliminary Version) TOME I: SUB-PRODUCT 2.1 - Collection / Organization / Analysis of Information for the Project - Stages I, II, and III (4 volumes);
- PRODUCT 2.0 - Collection / Organization / Analysis of Information for the Project SUB-PRODUCT 2.5 - Research: i. Screenline; ii Cordon Line; III. Pedestrians; iv. Traffic Volume; v. Speed and Lagging; and vi. Volume of Bicycles;
- PRODUCT 2.0 - Collection / Organization / Analysis of Information for the Project Sub-product 2.6 - Research: i. Origin and Destination (TC - Bus); ii. Get on / Get off (TC - Bus); iii Satisfaction (TC - Bus); iv. Visual Occupancy (TC - Bus); v. Get on / Get off (TC - Subway and Train Systems); and vi. Cargo Transportation (Preliminary Version);
- PRODUCT 3;0 - Interpretation of Fortaleza's Urban Form - Urban Planning and Mobility SUB-PRODUCT 3; 1 - Interpretation of Fortaleza's Urban Form - Urban Planning and Mobility - TOMES I, II, III, and IV;
- PRODUCT 3.0 -Interpretation of Fortaleza's Urban Form - Urban Planning and Mobility SUB-PRODUCT 3; 2 - Interpretation of Fortaleza's Urban Form - Urban Planning and Mobility (Compact Preliminary Version) - TOMES I, II, III, and IV.

STUDIES AND RESEARCH FOR THE SOCIAL AND ECONOMIC DEVELOPMENT PLAN

During Stage I, the team working on the elaboration of the Social and Economic Development Plan also worked hard on collecting, organizing, and analyzing information for the project, with the aim of reaching an economic and social diagnosis, statistical data, knowledge about the workings of Fortaleza's chief chains of production, as well as studies on plans, projects or proposals for the economic development of Fortaleza that had already been formulated, as well as plans that had been submitted by other sectors of society.

During the initial stage the collection and organizing of studies and information occurred as follows:

Coleta / organização / análise das informações para o projeto – dados estatísticos oficiais

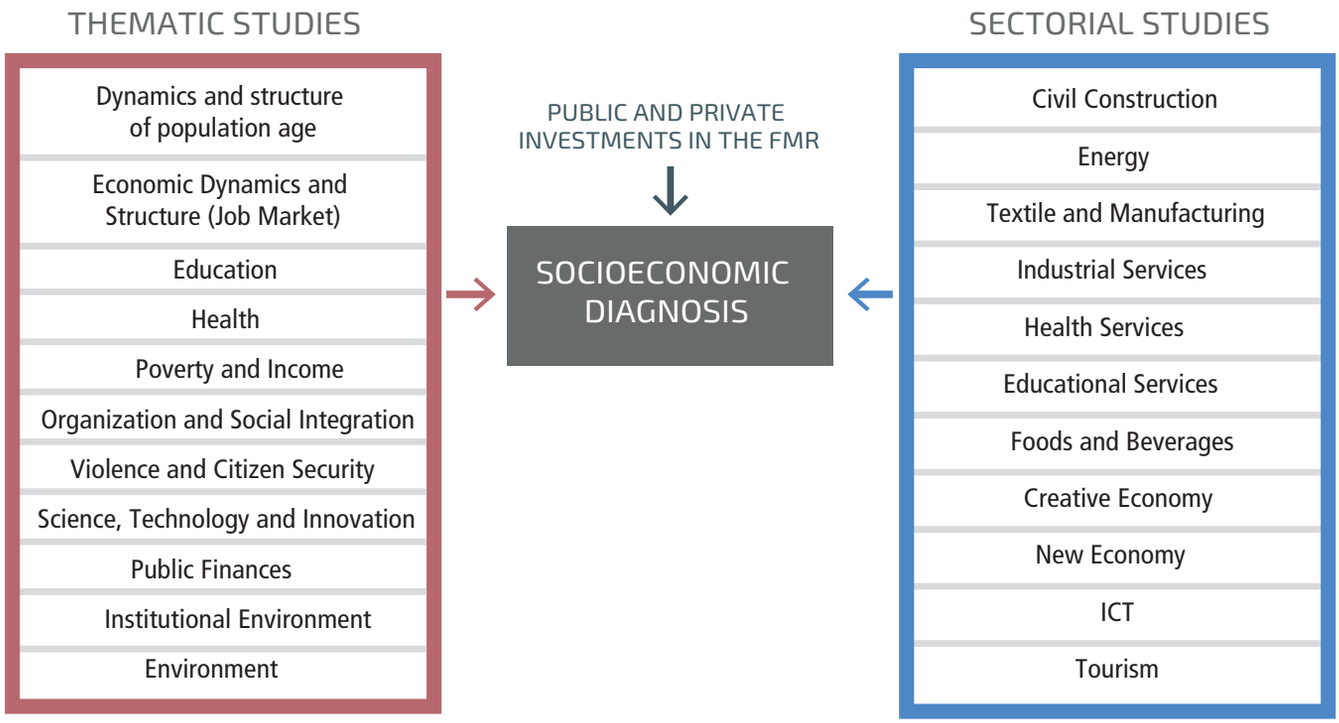
- Reports presented in studies, plans, and information collected from the public authorities with the support of Iplanfor, as noted in the Term of Reference. For this sub-step we

considered items that are mentioned in the TOR that could be classified as official statistical data.
- Organization and interpretation of demographic data and projections;
- Organization and interpretation of economic data from the capital, withproperly linked spatial zoning information;
- Organization and interpretation of social data along with spatial zoning information concerning the city;
- Study on the composition of Fortaleza's GDP (historic series organized into segment and activity, current situation, and trends).

Collection / organization / analysis of the information for the project (step iii) - other sources

- Existing soil usage maps, with densities, formations, and classifications by activity, highlighting the relationships between neighboring areas and related activities (especially education, job centers, and trade centers);
- Updated maps with the localization of abandoned urban zones, urban voids, zones of special social interest, opportunity hot spots, built structures in decline, etc.;
- Updated maps with the distribution of economic activities located in the central and peri-central zones.
- Information from the State Government regarding the development programs planned for the cities of Maracanaú, Pacajus, Eusébio, and Horizonte for the next 25 years;
- Development programs planned for the sites located on Ceará's coast for the next 25 years.
- Development programs planned for sites located in the Maciço de Baturité region for the next 25 years.
- Development Programs for a corridor that will be established due to the implementation of the Arco Metropolitan project of road systems during the next 25 years, and the consequences it will have for the city of Fortaleza;
- Development programs planned for the Mucuripe Port and how they relate to the city of Fortaleza during the next 25 years;
- Economic development programs planned for the city of Fortaleza for the next 25 years;
- Studies of the job market with perspectives for youths with technological training according to the proposed modifications for the existing main activities, as well as addressing the needs stemming from new centers for industry and services;
- Comparative studies of similar competing industrial hubs, both national and international, particularly in the Northeast, highlighting the specific technological factors of each segment impacting competitiveness and attractiveness;
- Studies on the needs, availability, obstacles, mechanisms and successful experiences, in Brazil, in fund-raising and financing to be absorbed by the Plan that will be elaborated and presented;
- Studies on the chains of production that play a larger role in the economy of Fortaleza or its metropolitan region (MRF).
- Maps representing the main metropolitan polarities, areas of everyday convergence, motor vehicle-oriented commercial centers (shopping malls, cargo terminals, service stations and garage services);

Figure 2 – Thematic and sectorial studies



Source: Fortaleza 2040 Plan.

- A report containing the results of the Thematic Studies and minutes from the respective Forums and Seminars which were carried out as part of said studies, addressing subjects such as: Demography and population dynamics; the population's social standing; the Labor Market; Production Structure; Science, Technology, and Innovation; Municipal Public Finances; Institutional Environment; Environment (particularly natural resources); Energy (matrix to be taken into consideration).

In order to diagnose the socioeconomic and environmental circumstances of Fortaleza, addressed in this first stage, 11 thematic studies were carried out - demography, economy, social conditions, environment (including sanitation), violence, science, technology and innovation, public finances, social organization, and institutional environment - and 12 sectoral studies dealing with Fortaleza's most important economic sectors. Aside from these, additional studies were carried out to analyze public and private investments in the Metropolitan Region of Fortaleza - past and future investments, that are laying the groundwork for the municipality's future. During the technical production by the consultants, the themes and sectors were grouped into six group by their relatedness in order to foster interaction between analyses and conclusions, favoring a

systemic understanding of a complex reality. In order to deepen these studies, meetings were carried out with related groups that, through debating their preliminary versions, contributed to the final version of the thematic and sectoral studies.

These were the products created by the Economic and Social Plan at this stage:

- SUB-PRODUCT 1.2 - Collection / Organization / Analysis of Information for the Project(Stage I) - Official Statistical Data;
- SUB-PRODUCT 1.3 - Collection / Organization / Analysis of Information for the Project (Stage III) - Other Sources;
- SUB-PRODUCT 1.4 - Thematic Forums and Seminars (First and Second Cycle);
- PRODUCT 2.4 - Preliminary Version of Socioeconomic Diagnosis.

TALKS WITH SOCIETY DURING STAGE I

The methodology for society's involvement in the elaboration of the Fortaleza 2040 Plan will be thoroughly described in the volume entitled "Society's Involvement in the Fortaleza 2040 Plan", here we will summarize the process that was adopted during the first stage of the Plan's elaboration.

The starting point occured with the organization of three large participation hubs in line with the nature of each segment:

- Territorial - spaces for consultations and talks with the city's inhabitants, institutionalized or otherwise;
- Sectoral - spaces for consultations and talks with private institutions from different segments (businesses, education and research institutions, social movements, non-governmental organizations, professional councils, unions, federations, among others);
- Governmental - municipal, state, and federal public agencies.

During this first stage the biggest effort was directed towards publicizing the project and raising awareness among several segments and sectors so that they could be effectively involved in the plan's construction. For this purpose, three strategies were used, each one directed at a hub:

Territorial Hubs:

Initially we raised awareness amid executive secretaries working in the Regionals, so that we could involve these agencies in our attempt to mobilize society. In each of the Regional Departments we created a mobilizing team that, during four months, visited each neighborhood, identifying existing organizations and leadership and inviting them to the presentation of the project in an open meeting, held at an easily accessible location in each of those regions. During these meetings, the mayor and the Iplanfor team introduced the project's objectives and suggested the creation of discussion groups divided into neighborhoods or communities which, while guided by two resources - a magazine titled "Initiating a Dialogue" and a Workbook with specific questions to diagnose the territory -, led to the creation of 83 groups across the city's 119 neighborhoods. Their reports contributed to a very high quality diagnosis about the five main subjects the Plan was concerned with:

- What characterizes this neighborhood? (physical landmarks, natural heritage, historic and cultural characteristics);
- How would you describe your infrastructure in relation to housing and mobility? (access to drinking water, electricity, garbage collection, sewage collection, paving, transport, housing);

- How do you access basic services? (schools, health facilities, sports, social assistance, cultural facilities);
- How does social integration take place in the neighborhood? (cultural life, areas meant for recreation and meetings – squares, parks, cultural facilities, conflicts, public safety);
- What is the neighborhood's economy like? (job opportunities, employment, income, and entrepreneurship).

The systematization of territorial contributions during stage I was published in the "The Resident's Point of View" magazine, which presents the point of view of thousands of Fortaleza's inhabitants about the city's space.

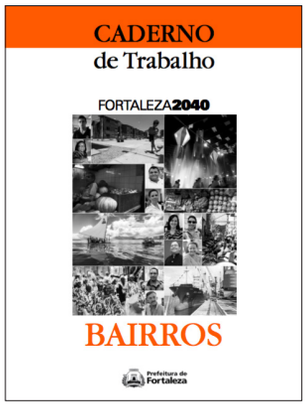
Sectoral Hubs

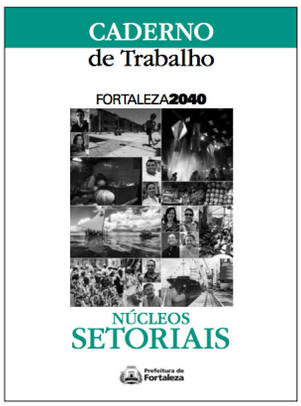
This segment was mobilized to be part of a meeting at the auditorium of the Legislative Assembly of Ceará, where the Plan and its objectives were introduced along with the proposed methodology and an invitation for all to be part of an institutional answer to a series of questions that were organized into a "Sectoral Hub Workbook". These were aimed at getting to know different sector's opinions about things that help or hinder their actions in the city's daily life. Among the questions presented at this stage were:

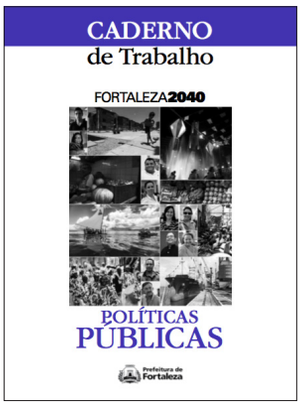
- Citizenship – How does your activity contribute to the city or to improving the life of its inhabitants?
- Extent of dependence on government - On which offices, public agencies or those with public purposes, public programs or systems does the responding organization rely for their development and operation? What kind of actions and resources does it need?
- Networks of associative ties - With which entities and institutions does the responding organization keep ties, is affiliated to, connected or associated with? Which networks, groups, unions or associations is the organization part of?
- Ways the city context impacts organizations - Which opportunities, advantages or strong points, threats, problems or weaknesses does the city of Fortaleza have in relation to the fulfillment of objectives or the development of the responding organization?
- Potential of the city– Which potentials of the city should be better explored or developed? (by potential we mean existing or dormant forces);
- Urban mobility in Fortaleza - How would the organization rate urban mobility in Fortaleza?

The answers from the participating institutions, which are listed below, were organized into a document entitled Summary of Sectoral Contributions for a Diagnosis of the City of Fortaleza, containing systematized points of views about these topics, as answered by the following institutions:

- Architecture and Urban Planning Council of Ceará - CAU;
- Ratio Ltda Higher Learning Center;
- Regional Council of Accounting - CRC CE;
- Regional Council of Nutritionists – 6th Region;
- Regional Council of Psychology of the 11th Region (CRP11);
- Regional Council of Engineering and Agronomy of Ceará - Crea - CE;
- Ceará Trade Federation - Fecomércio;
- Ceará State Industry Federation - Fiec;
- Força Sindical CE;
- Group of Environmental Interest - GIA;







- Waters of Brazil Hydro-Environmental Institute - IHAB;
- Support Service for Micro and Small Businesses of Ceará - Sebrae;
- National Service of Trade Learning - Senac;
- National Service of Trade - Sesc;
- Sest Senat;
- Union for Passenger Transport Companies of Ceará - Sindiônibus;
- Fortaleza Trade, Retailers, and Store Owners Union - Sindilojas;
- Union for Private Teaching Establishments of Ceará - Sinepe-CE;
- Union of Physicians of Ceará;
- Sindieventos CE;
- Sirecom Ceará - Union for Commercial Representatives of Ceará
- University of Fortaleza - Unifor;
- Federal University of Ceará - UFC.

Governmental Hubs

Following the same dynamics of the presentations to other hubs, public agencies were grouped into three governmental levels according to the nature of the policies that fell under their institutional duties;

The involvement of governmental agencies happened after a large meeting with institutional managers and, afterwards, in sectoral meetings divided into policy groups where plans were presented and they were asked to participate by filling out the "Workbook for Governmental Hubs". This questionnaire, which is divided into four parts, sought to gather information about the formulation and implementation of public policies; to diagnose the level of integration between public policies; to retrieve information about the impact public policies have on Fortaleza; and to support a diagnosis of the convergence factors (if they affect the integration or fragmentation of public policies), and the analysis of internal and external ambience in the hope of increasing the results obtained. In the same workbook we would also ask for the problems of the City of Fortaleza that should be addressed by the Fortaleza 2040 Plan to be listed according to their priority;

The involvement of institutions, during stage I, is summarized in Chart I.

METHODOLOGICAL INTEGRATION BETWEEN TEAMS

During the elaboration process of the Work Plan for the Project (Urban and Mobility, and Socioeconomic Development), we held meetings with

technicians and coordinators from the two teams so they could align their methodologies and schedules, as well as align the process with the plan for involvement and communication. In order to integrate the technicians from the Socioeconomic Development Plan, a first seminar was held to introduce and debate the scope and the results of sectoral and thematic studies that guided the formulation of the Terms of Reference. Soon after, two work meetings were held to promote integration between the studies.

The final outcome of Stage I was the publication of three documents:

- "Fortaleza Today", which summarizes the main information used in a concise diagnosis of the city of Fortaleza.
- "The Resident's Point of View" magazine, which systematizes the contributions given by the 83 territorial groups, including collaborative maps;
- "Urbanization Standards" magazine, which didactically organizes several city planning standards embraced by the Plan, with the purpose of reaching a common language between the usual city planning criteria used by the technical team and the participants from several interest groups.

Alongside the many on-site meetings for dialogs carried out during this stage, the website http://fortaleza2040.fortaleza.ce.gov.br, was created, containing several tools that made it possible for citizens to become directly involved through electronic means, such as their contributions to collaborative maps and the spaces for criticisms and suggestions concerning the plans and the results that were made available.

These were the products and tools used for reaching society during Stage I

- "Initiating a Talk" magazine;
- Workbook For Neighborhood Groups;
- Workbook For Sectoral Hubs;
- Workbook For Governmental Hubs;
- "Fortaleza Today" magazine;
- "Urbanization Standards" magazine;
- Fortaleza 2040 website.

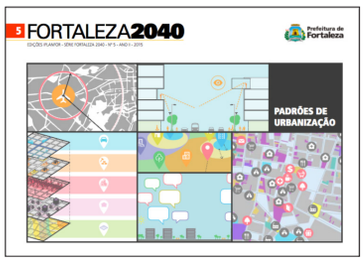


Chart 1 – Participation of Institutions in Stage I

GROUPS	POLICIES	PARTICIPATING INSTITUTIONS
1	Housing and Land Regulations	Cohab
	Public Lands	
2	Environmental Sanitation	Ministério das Cidades
	Environment	Cagece
	Water Resources	Cogerh
		Seuma
		Agefis
3	Mobility and Accessibility	
4	Culture and Heritage	Secultfor
5	Science, Technology, and Innovation	Citinova
6	Economic Development	SAE/PR
	Work, Employment and Income	SDE
	Tourism	MTE
		IDT
		STDS/CE
		Setra
		Setfor
7	Civil Defense	Cedec
	Public Security	Sesec / Cedec
		SSPDS
		Sesec
		Guarda Municipal de Fortaleza – GMF
8	Health	Secretaria Especial sobre Drogas
	Nutritional Security	CPDrogas
	Drugs	Setra
9	Youth	CPJuventude
	Welfare	STDS
	Protection and Defense of Children ar	Setra
	Rights of Senior Citizens	Coordenadoria Especial do Idoso – COID
	People with Disabilities' Rights	
	Women's Rights	
	LGBTT Rights	
	Racial Equality	
10	Education	Seduc/CE
		SME
11	Sports and Recreation	
12	Institutional Political Environment	Sefin
	Governance	Sepog
13	Metropolitan Integration	Seinfra/CE

STAGE II – THE FORTALEZA THAT WE WANT

The second stage was marked by a search for a unanimous vision for the future of Fortaleza and followed the same dynamic used with the many territorial groups, through the carrying out of large regional meetings. During this stage, thematic and sectoral forums were also held with the participation of representatives from various hubs.

DEVELOPING A VISION FOR THE FUTURE

The second stage was launched with a second round of talks with territorial groups, with seven large meetings being held in the Fortaleza Regions in order to present the main findings of the diagnosis, distributing the documents produced, and encouraging the continuity of territorial debates about the city we wish to have in 2040.

The diagnostic summary was presented through a film that summed up the content of the "Fortaleza Today" magazine, after which orientation and a new workbook were distributed to the coordinators of territorial groups who were present. This workbook, which was the same for all groups, contained questions that led to reflections about what city we wish to have in 2040 and what challenges must be faced in order to reach it.

- Social Context and Community Living;
- Urban Development
- Mobility and Accessibility
- Environment and landscape heritage;
- Sanitation and residential infrastructure;
- Involvement and Social Control;
- Economy, labor market, employment, and income.

Thus, this stage's contributions dealt with the identification of objectives that should be pursued and suggestions of possible strategies for reaching them.

Contributions stemming from various territorial groups were systematized and used so that they could form a shared vision for the future of Fortaleza as they were examined along with visions for the future gathered during different sectoral forums. These were the basis for the elaboration of the Fortaleza 2040 Plan, which would be presented and approved during the beginning of the Plan's third stage, during a large meeting at the Ceará Event Center, in Fortaleza.

As work progressed in the neighborhoods, 32 thematic and sectoral forums were staged, dealing with themes and sectors that were relevant to the reality of Fortaleza, with the involvement of 959 technicians, representatives from social segments, and managers from public and private institutions. The forums began with an introduction of the diagnosis for that particular theme or sector and, after a discussion, participants were asked to formulate a vision for the future and the challenges to reach said vision. The outcome from this participative formulation of a vision for the future are presented in the Thematic and Sectoral Forums report.

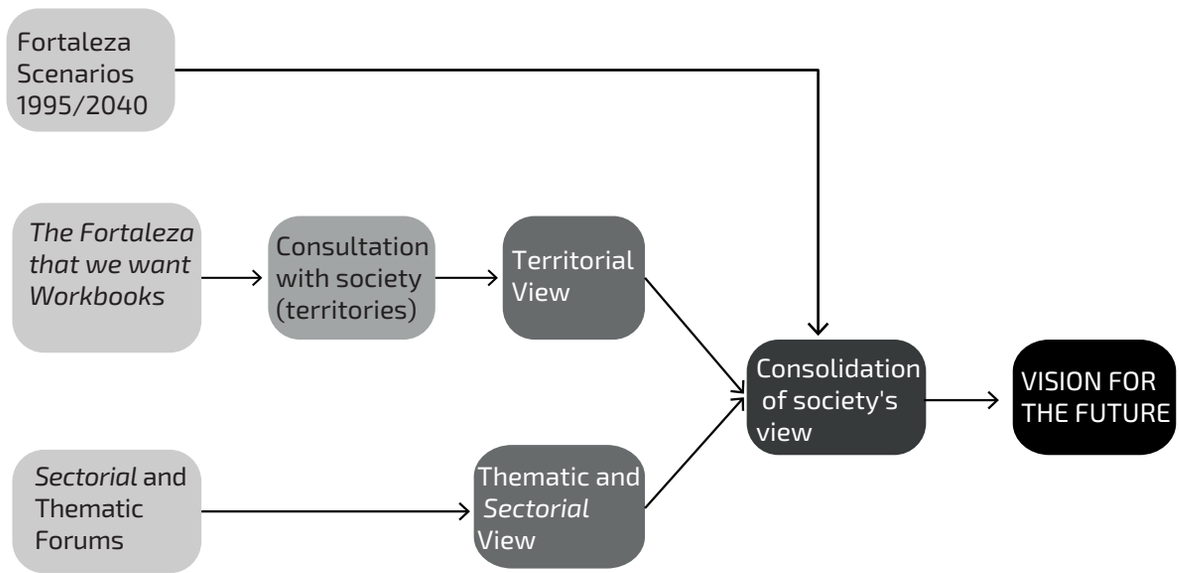
The Thematic and Sectoral Forum took place between October 19 and 23, at the Shop Managers Chamber of Fortaleza (CDL) and, between November 5 and 16, at the Meeting Hall of the Iplanfor annex building, where the following themes were addressed:

- Opening Forum;
- Urban Agriculture;
- City Center;
- Science, Technology, and Innovation;
- Commerce;
- Street and Informal Commerce;
- Civil Construction;

- Creative Economy;
- Health Economy;
- Maritime Economy;
- Education;
- Energy;
- Sports and Recreation;
- Finances and Public Investments; Governance, Involvement, and Social Control; Habitability;
- Cultural Identity;
- Senior Citizens;
- Racial Equality;
- Food Industry;
- Textile Industry and Manufacturing;
- Youth;
- LGBT;
- Environment;
- Women;
- People with Disabilities;
- Poverty and Inequality;
- Re-Industrialization/New Economies;
- Solid Waste;
- Public Health;
- Water Security;
- Information and Communication Technology;
- Tourism and Big Events;
- City Planning and Mobility;
- Violence and Citizen Security;

The elaboration of a proposal for a Vision for the Future combined society's general expectations and that of technicians with Fortaleza's scenarios, which limit the possibilities of reaching these desired objectives during the next 25 years. As Figure 2 shows, the work process follows three complementary lines that meet at the consolidation of a territorial and technical (Forums) view, intersecting with the scenarios.

Figure 3 – Flow Chart - Construction of a proposal for a Future Vision



Source: Fortaleza 2040 Plan.

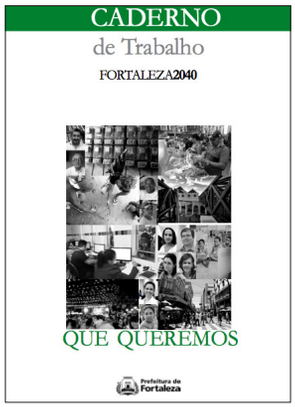
While the Plan was still in Phase II, a Seminar for Strategic Definitions was held, in which technicians involved in the project carried out a reflection on the information that had been generated during the previous stages. They also discussed where we are, where we want to be, and what we may run into along the way.

- Where we are - which clarifies, in concrete terms, the internal factors of Fortaleza that could be the basis for its development - potentialities– orhindrances to the construction of the future - bottlenecks - extracted from the Diagnosis;
- Where we want to be - a summary of the preliminary Vision for the Future that defines, in qualitative terms, the reality of Fortaleza in 2040 in accordance with wishes and expectations;
- What we may find along the way - describing factors external to Fortaleza that might facilitate development - opportunities - or hamper it - threats - according to scenarios of the external context.

In this seminar, the participants formulated ideas about the strategic objectives which would allow Fortaleza to move towards the Vision for the Future, using or altering reality (potentialities or bottlenecks), while watching out for what we could find along the way. Thisinformation was consolidated and organized by the Project's coordinators so that strategic development Axes could be identified.

Based on the results from the strategic thinking seminars, axes for strategic development were proposed, presented below. They were reorganized until seven axes emerged and prevailed during the final structuring of the Fortaleza 2040 Plan.

- A city that is competitive, dynamic, diversified, and full of great opportunities;
- A city that is healthy, safe and peaceful, egalitarian and inclusive;
- A city of knowledge and education;
- Fortaleza with a high level of education;
- A city with quality of life and habitability.
- A city that is environmentally sustainable.
- A city that is welcoming, peaceful and respects diversity;
- An urban space that is qualified, compact, connected and accessible;
- Institutions that are strong, effective, and involved.



After a more careful analysis, the nine proposed axes were condensed into six axes and, later, seven, as we will see in chapter 4 of this document.

The proposals of a Vision of the Future, axes, and strategic objectives for the Fortaleza 2040 Plan were systematized into the publication "A Vision For The Future: Strategic Axes and Objectives – Version for Discussion", which was the basis for debates during the meeting that launched the third and final stage of the Plan's elaboration.

These are the products and tools from this stage:

- SUB-STEP 3.1 - Definition and structuring of the Study Groups (Reports with objectives from each group, Work Plan and schedule) and the Preliminary Vision for the Future - VOLUME II PRODUCT: Preliminary Vision for The Future for Fortaleza.
- SUB-STEP 4.1 - Disposition of the work groups and definition of the activities plan for each group. PRODUCT: Report for the Strategic Thinking Seminar;
- Follow-up report for the work meetings (First Cycle) and Consolidated Vision for the Future for Fortaleza.
- Urban Planning Master Plan - PRODUCT 4.0 - Modeling the Proposed Alternatives for the Urban Mobility Plan. Subproduct 4.1 - Modeling the Current Scenario;
- Urban Planning Master Plan - PRODUCT 4.0 - Modeling the Proposed Alternatives for the Urban Mobility Plan. Sub-product 4.2 - Modeling the Proposed Scenarios;
- Workbook: The Fortaleza that We Want;
- Reports on the Proposals from Territorial Groups;
- Reports on Thematic and Sectoral Forums;
- Magazine: "Vision for the Future: Strategic Axes and Objectives - Debate Version".

STAGE III - ELABORATION OF THE FORTALEZA 2040 PLAN

The third and final stage of the Plan's elaboration began with a meeting that assembled approximately 1.200 participants from all hubs, segments and sectors, when the proposed Vision for the Future was presented along with the breakdown of strategic axes and their objectives. At that meeting, 33 work groups were assembled and their respective coordinators were

appointed and given the task of elaborating a plan for the group's corresponding theme.

The coordinators of each group received guidance materials regarding the format of the plans, and documents relating to each of the themes, in order to assist the formulation of proposals.

Each group developed the dynamics that were most suited to their composition, and the group charged with the elaboration of the Master Plan chose a format of successive presentations of the proposal that was subsequently perfected through criticism and suggestions received during the work.

On the other hand, several groups chose to carry out workshops with the aid of moderators made available to the project. The following workshops took place between the months of March and April of 2016:

- Welfare;
- Science, Technology, and Information;
- Children and Teens;
- Culture;
- Creative Economy;
- Education;
- Sports and Recreation;
- Participative Governance;
- Racial Equality;
- Youth;
- LGBT;
- Environment;
- Job Market
- Women;
- Governance Observatory
- People with Disabilities;
- Senior Citizens;
- Integrated Sanitation;
- Citizen Security;
- Tourism.

During the elaboration stage, the groups were aided by project technicians as they formulated the components for the proposals, particularly during the elaboration of budgets. The work groups, and their respective consultants, elaborated a first draft of the thematic and sectoral plans, which were systematized into a publication titled "Summary of Strategic Proposals" and used for sending information back to the territorial groups during the third round of meetings.

This third round of meetings in the Regions was launched at the Central Region, where the project for this specific neighborhood was presented by the City Planning and Mobility team. After that, the structure of the plan being develop was presented in each of the other six Regions, a publication with a summary of the strategic proposals was distributed, and the neighborhood groups were asked to give their feedback, as well as evaluate the elaboration process and make suggestions so that they could maintain dialog as they followed the execution of the plan.

During the first weeks of July, 2016, all the plans that are part of the Fortaleza 2040 Plan were presented and submitted to debates with different segments of society, specialists, and technicians during seminars held at the University of the Ceará Parliament.

The last stage of the elaboration focused on the incorporation of contributions stemming from critiques, budget adjustments, the elaboration of propositions for the legal instruments required for implementation, refining the debates about its model for governance, and the final publishing of the documents.

Here it must be observed that each of the plans was summarized and made available on the website

in order tofoster discussions between the municipal election candidates as they elaborated their respective plans for government.

These were the products and tools of this third and final stage:

- Introductory Video to the Plan;
- Magazine: "Summary of Strategic Proposals";
- Master Plan for Mobility and Urbanization Product 5.0 - Propositions for City Planning and Mobility Integrated With Specialty Views. Sub-product 5.1 - Standards for Urbanization and Mobility as the Foundation for Project Development;
- Master Plan for Mobility and Urbanization Product 5.0 - Propositions for City Planning and Mobility Integrated With Specialty Views Sub-product 5.2 - Report on Propositions for City Planning and Mobility Integrated With Specialty Views - TOME I and II;
- Economic and Social Development Plan.

The Fortaleza 2040 Plan was born from the effort and dedication of thousands of people who believed in the possibility of building a better future for the city through an ever deepening knowledge of its problems and potential, defining strategies that have been matured through extensive debates in search of solutions.

CHAPTER 2

IN SEARCH OF A FAIRER AND MORE ACCESSIBLE URBAN FORM FOR FORTALEZA

The cities everyone wants to live in would be clean and safe, possess efficient public services, support a dynamic economy, provide cultural stimulation, and help heal society's divisions of race, class, and ethnicity. These are not the cities we live in. (SENNETT, 2016)

ORIGIN AND URBAN EVOLUTION OF THE CITY OF FORTALEZA AND ITS URBAN PLANNING PROPOSITIONS

Proper understanding of the origins and evolution of the city of Fortaleza unavoidably requires context within the history of the occupation of Ceará itself. During the 16th century, at the time when hereditary captaincies were being handed out, the Portuguese were largely indifferent to the colonization of Ceará, probably because of its limited development potential based on the typical wealth of the time. During its period as the Captaincy of Ceará, the territory never attracted interested donees and, throughout the 16th century, its coast was not featured in any reports by travelers, as it was highly uncertain whether there were explorable riches such as gold or silver. Even so, after some time, the Portuguese arrived in Ceará between 1603 and 1612. The first description of Ceará's coast is by Pero Coelho de Sousa, in 1603. At that time the Portuguese climbed the Ibiapaba mountain range to restrain the French and on his way back decided to create a fort on the banks of the Ceará river (São Tiago Fort). He should therefore be credited with the first attempt to implement, although in a rather thwarted manner, a human enterprise in the place where the capital city of Fortaleza is now located.

Another Portuguese, Martins Soares Moreno, also arrived in Ceará in 1611. His objective was to create a home base for the conquest of Maranhão, which was in the hands of the French, as well as the Pará estuary, in the Amazon region. A document of reports about the area was put together and entitled "Relação do Ceará", on the initiative of Soares Moreno in 1618. This is the oldest document describing the region adjacent

to the Ceará river and it could be considered the first European attempt to establish themselves in local lands. In the 17th century, the strategic value of the Portuguese trading post in Ceará decreased, with the conquest of the North already attained, so the Captaincy of Ceará is incorporated into the Captaincy of Pernambuco. In the 18th century the Vila do Forte was finally created on the 13th of April of 1726.

Although it was the chamber's headquarters, Fortaleza remained isolated from events, forms of occupation, and life in the Ceará's hinterlands, especially in the regions of the valleys of the Acaraú and Jaguaribe rivers. This is because, since the 16th century, the hinterlands of Ceará Grande began to be populated in a way that was different from the coast. Cattle breeding took root in the oriental part of the Northeast and it became the economy that would support the captaincy during the 18th century. In the beginning, the livestock was moved in herds to the east coast of the northeast. Afterwards, the process of salting meats began to be used, and so some localities benefited from their geographic position, their position as crossing points between paths or as components of the basins of the Acaraú and Jaguaribe rivers. Amongst such localities, the cities of Aracati, Icó, and Sobral stood out. Three years of great droughts, from 1790 to 1792, ended up diminishing the importance of cattle breeding in Ceará and of the so called "gold cycle". The only agricultural product alternative to livestock was cotton. With production initially meant for the Recife market, it later reached its climax during the turn of the 19th to the 20th century.

In 1799 Ceará became independent from the Pernambuco Captaincy and, around that same time, the village's port began to export cotton. The introduction of cotton, and its great results, would be a way to face the increasing population and the droughts, which made the economic expectations surrounding livestock unsustainable. That is how cotton became a viable crop and economy for the region. After being exported to Lisbon, and with the opening of ports in 1808, cotton began to be exported to the British Isles.

According to observations written by professor Liberal de Castro, the city of Fortaleza reached its climax in terms of balance, and elegance in relation to its urban form in the last quarter of the 19th century. The cityfitted itself out following the guidance and graphic references of Adolfo Herbster's plan from 1888, where we can see indications for the localization of existing public buildings and others that should be built, such as the Normal School, the José de Alencar Theater, the Lyceo, the Public Library, the Mendicidade Asylum, and the São João Batista cemetery. It was also during the second half of the 19th century that the Paraguayan War (1870) took place, along with its consequences for life in Brazil. Many other political and economic changes happened, and we should highlight the abolition of slavery and its corresponding laws, the 1889 proclamation of the Republic, and immigration. This ensemble of events marked the beginning of the establishment of urban capitalism in Brazil. From then on, cities also began to witness other processes of growth, relying on new technologies such as the introduction of trains, street car tramways, and land division at the initiative of private entrepreneurs. Big changes and remarkable progress happened in Fortaleza's urban landscape during the second half of the 19th century. Construction materials evolved, as well as paving techniques, building standards, street lighting, water service from wells. As well as

the railway to Baturité, horse-drawn trams, and the port, which began to welcome steamboats.

Since the end of the 18th century, the introduction of cotton and its results changed Ceará's economy significantly. The city of Fortaleza transformed into an exporting center, relying, from 1800 onwards, on the seaborne link between Fortaleza and Lisbon. Coffee farming also began at this time and it started to be exported along with leather, carnauba wax, fish oil, and vegetables. This expansion of production ended up creating the demand for the establishment of a railway in 1875. From that moment on, the capital became an irresistible focus of attentionfor all of Ceará.

Confirming the typical influence of roads and railways in urban environments as catalysts or hurdles to the structuring of urbanization, the historic roads converging on the original center and the design of the railway, moving to the south towards the central hinterlands and, later, to the west and the north towards Sobral, permanently strengthened the design of the city itself, as well as that of the future metropolitan region. Thus, it is possible to see that the city's growth was decisively influenced by these components and that its larger urban areasare greatly linked to these directions. Therefore, ever since its primitive layout for occupation and records of its urban structuring schemes, the city of Fortaleza has presented itself as it presents itself today.

Although the early Fortaleza did not offer a considerable amount of jobs or opportunities, there is no doubt that some aspects of its new urbanization formed excessively convergent innovations and alluring features. The strength of thesuccessive droughts would cause an increase in residents coming from central regions, particularly those who became residents of areas near stations or regions suited to the construction of railways and their origin. One could say that the layout of the railways was an element of remarkable influence in defining the urban form and the growth pattern that defined the structuring of the city in its metropolitan context, something which is still in effect.

The effects generated by the export of cotton and other native productsgave rise to the need for an expansion of the facilities of the port. And so, already in the 20th century, starting in 1930, the Port of Mucuripe was built to replace the old central port. The building, whose location lead to controversy within the technical world at the time, ended up leading to the destruction of one of the most sensitive parts of the coast, improperly adding industrial activities there and leading to the current passage of trucks and cargo trains that cross through the town. From 1930 on, industrial neighborhoods also began to appear and their location, further from the central zone, was already made possible by motor vehicles and the accessible use of trucks. In this way, pioneer industries would be located in the Francisco Sá, Parangaba, and Maranguape neighborhoods. With the evolution of industrial standards, other industries emerged, such as fabrics, cotton processing, vegetable oils, soap, leather, furs, and fish handling. The branches of industry that were most successful were that of fabrics, clothing, food, footwear, and leather goods, all focused on the local or regional markets, Fortaleza's city market was the biggest consumer because of the scarce availability of transport links to other national regions.

1812: THE SILVA PAULET PLAN, THE FIRST ORDER OF URBAN DESIGN

The city of Fortaleza's form stems from the occupation that began at a fort on the left dune, near the mouth of the Pajeú river. Its expansion continued in a linear fashion, along the banks of that same river, meeting the need for proximity to the sea and to drinking water. In 1812, engineer Silva Paulet was commissioned to create the design for a central point for the city, properly planned so it could support its first expansion through the use of a "grid" matrix, a pattern that was based on Portuguese guidelines dated from the Marquis of Pombal's administration. The new design laid out major roads from north to south, and that grid, as well as the same block pattern, would be expanded throughout the 19th century. Subsequently, father Manoel de Rego Monteiro expanded the matrix introduced by Silva Paulet.

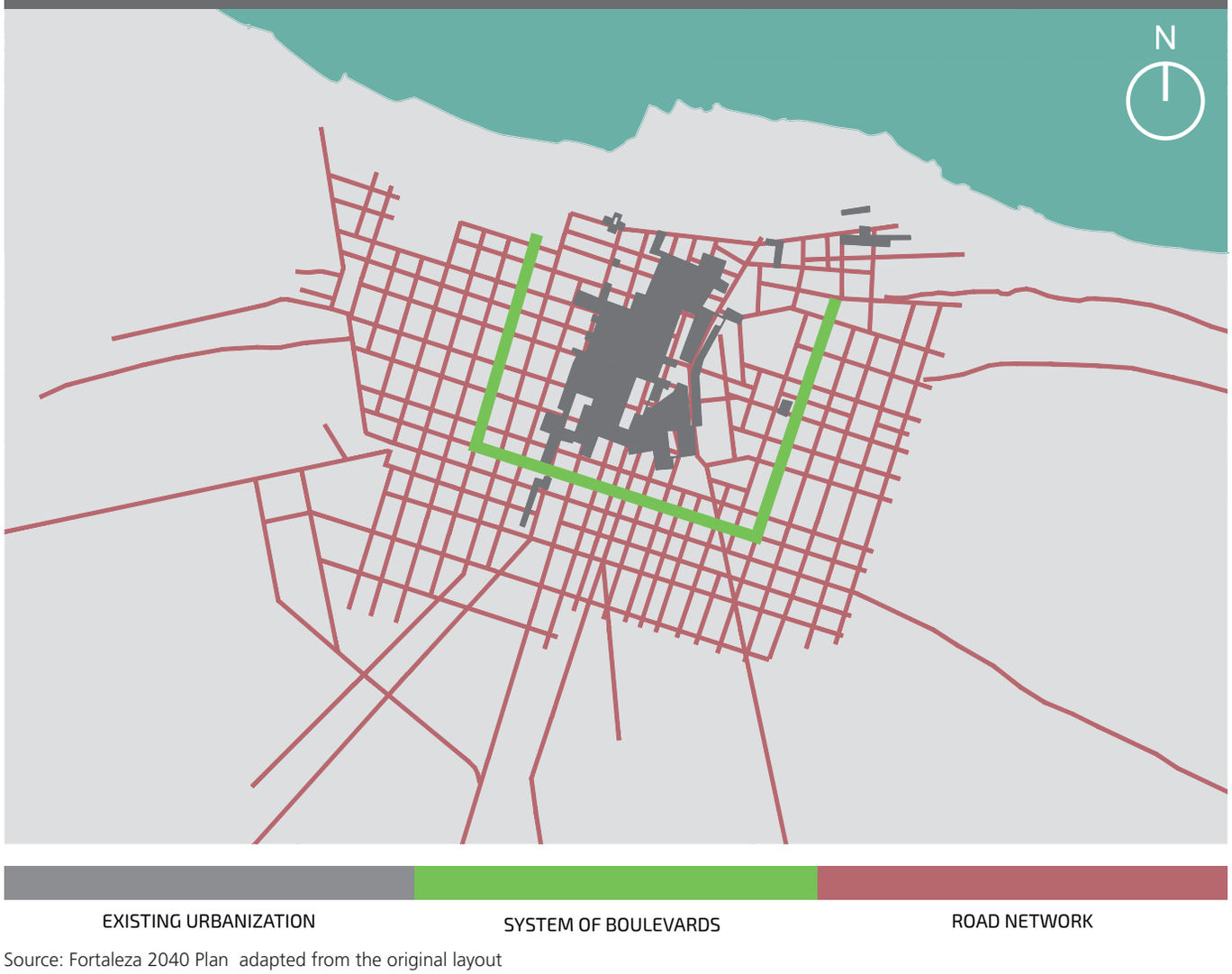
Figure 4 – Silva Paulet Schematic Layout (1812)

Source: Fortaleza 2040 Plan adapted from the original layout

ADOLFO HERBSTER'S CITY PLANS AND EXPANSION OF THE "GRID" MATRIX

The Paulet Plan was followed by various plans drawn up by an engineer from Pernambuco, Adolfo Herbster, who, between 1859 and 1888, elaborated four plans following that same matrix. In 1875, he outlined the "Topographic Layout of the City of Fortaleza", which transformed into a plan for the expansion of roads, including three "boulevards" and significantly highlighted the trend that guided the definition of the city's urban form. The plan also displayed the anticipated purpose of establishing borders for urbanization, in which the rivers Pajeú and Jacarecanga played an important role while making room for potential future growth from the spreading of historic roads going toward the rural and interior periphery. In these drawings it is noticeable that the city accepted that the center's north face would not be defined by yet another

Figure 5 – Adolfo Herbster Layout (1875)



Source: Fortaleza 2040 Plan adapted from the original layout

"boulevard". Quite on the contrary, it seemed to come to the understanding that the sea facing urbanized frontier, besides creating a blockage through a steep drop of around 10 meters, would eventually be occupied by other components that would also create a blockage - such as the railway, the almost impenetrable urban fabric of the Moura Brasil working class neighborhood, the São João Batista cemetery, the Public Detention Center, and the Santa Casa de Misericórdia.

Afterwards, that was also the chosen location for sewage treatment facilities and the Legal Medicine Institute. And that is still the city's structure, without an efficient connection between the urbanization of the higher portion of the city and the stretch of coastline. Along that stretch a heavy traffic lane leading to a shipyard that built small vesselswas also introduced during the 1970's.

The pioneer plans drawn out for Fortaleza did not foresee solutions for the points of conflict between the orthogonal grid and the bundle of originally converging historic roads. The two founding layouts, Paulet's and Herbster's, originated a similar type of grid with blocks and, consequently, a pattern of lots inherited from the Portuguese, excellently adapted to the region's weather conditions, supporting the development of juxtaposed constructions and yards on the back of the lots. Although the 100X100 meter block layout didn't lead to a better geometry in terms of constructive utilization, and did not create a mesh that prioritized facilities that cars would later demand, contemporary urban planning holds it as a highly efficient model. This is because nowadays one considers people's ability to make choices and changes in direction based on a highly connective and highly permeable network. We currentlyalso consider this an excellent grid due to the high degree of connectivity to the network of public spaces within walking distance, especially when the private space limits are established through active frontages, and not blank walls. In other words, in times when the prioritization of pedestrians is on the rise, the grid plan, with its streets originally devoted to people and animal-drawn vehicles, no longer only serves its original purpose, and is later adapted to motor vehicles, being shared in order to facilitate the difficult coexistence between people and vehicles. This pattern of blocks and streets, established by Paulet and Herbster, was repeated on virtually every land subdivision and urban expansion that formed the metropolis we now have, except for new subdivisions that began in the 1970's. It is important to highlight that after the assimilation of motor vehicles, the road networks that resulted from this process were not created carefully enough to establish an indispensable hierarchy of roads to separate local traffic from transit traffic. Anyway, it is evident that, despite a wealth of pedestrian connectivity, the city of Fortaleza suffers from a certain poverty in the formation of urban spatial perspectives. This is the outcome of the predominance of a grid plan without the insertion of a hierarchy of roads that could give a memorable quality to its urban image, which tends to create an isotopic sequence of bland landscapes lacking novelty and in need of remarkable landmarks.

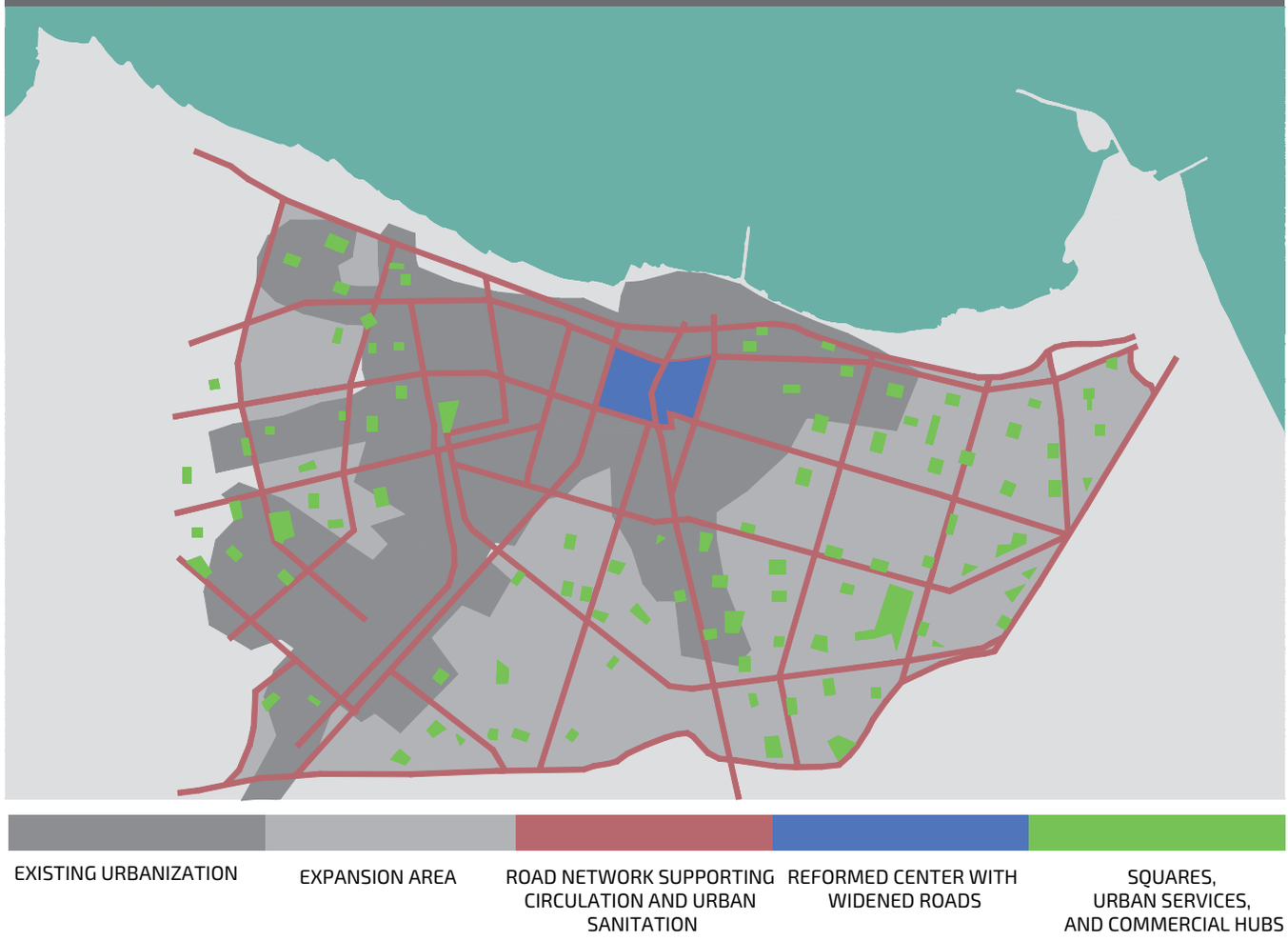
1933: THE NESTOR DE FIGUEIREDO PLAN AND THE ATTEMPT TO ANTICIPATE MOTOR VEHICLE TRAFFIC

Along with the gradual and growing introduction of vehicles in the city's life, emerged the need to adapt the existing city plan and foresee the expansions of this plan, as to allow the anticipation of potential circulation problems. Although it is known that, at that time, urban planning still thought of cities as limited, and so it didn't have means to infer the degree of growth that future cities would achieve, urban planner Nestor de Figueiredo elaborated a road hierarchy proposal on his 1933 plan. It sought to answer the demands brought on by the first increase in traffic density, with a view to establish a systemic road network and meet the desire to break with the tedious aspect brought on by the homogeneous city plan of blocks and streets, without an easily

Figure 6 – Nestor de Figueiredo Layout (1933)

Fonte: Plano Fortaleza 2040 adaptado do Plano de remodelação e extensão da cidade de Fortaleza, 1933

Figure 7 – Saboya Ribeiro's Plan (1947)



Fonte: Plano Fortaleza 2040 adaptado do Plano de remodelação e extensão da cidade de Fortaleza, 1947

discernible bulk variation. At this point the city was still mono-centric and since the biggest blockage happened at the connection between the urban periphery and the converging center, the plan ended up being mostly concerned with solving the road network problems, including the definition of some activity nodes related to the creation of new urban perspectives, advocating the introduction of a road hierarchy and the creation of connectivity between the new neighborhoods.

The plan was named the "Plan for remodeling the extension of Fortaleza", with the purpose of restructuring the "grid" plan, reinforcing the basic form of a concentric system of converging main roads, he added a coordinated system between orbital and radial roads and widening of structuring spines. All of these measures were undoubtedly a foreshadowing of the plan's ability to adapt to unavoidable motor vehicles. In order to meet the inspirations of the time, characterized by the vision of urban planners such

as Alfred Agache and Le Corbusier, the final layout ended up combining aspects of the monumental public spaces and functional zoning with all of the "surgical" consequences that derived from those choices. Since these urban intervention patterns only materialized after unavoidable expropriations, the local elite's interests were mobilized and that was enough to pressure the Municipal Council into objecting to the proposed plans and to stop the work, thanks to initiatives stemming from provincial reactions.

1947: THE SABOYA RIBEIRO PLAN AND THE PERSISTENCE OF TRANSIT RELATED ASPECTS; CREATING A MORE DYNAMIC URBAN LANDSCAPE AND POLI-CENTRIC IDEAS

In 1947 Saboya Ribeiro created a new plan that confirmed that the visions of both plans had the fundamental purpose of trying to anticipate future traffic problems and grant diversity and variation to the components of the constructed urban landscape, with a view of associating dynamic aspects to the city's spatial monotony, caused by its plan. The Saboya Ribeiro plan presents itself almost as a reformulation of Nestor Figueiredo's previous design. In this work the author would observe the persistence of the historic layout and of the old paths and structuring elements, and insisted on proposing a "radial-perimeter" system, adapted to the existing quadrangular fabric. This system configured itself through a hierarchic set of rings with graduated branches, aiding the structural organization of neighborhoods and their relationship to the properly remodeled urban center. The plan also demonstrated foresight regarding the central zone and the potential effects of the future poli-centrality, proposing ways to strengthen the Urban Center's situation through the implementation of an administrative cluster on the banks of the Pajeú river. Saboya Ribeiro's work addressed some issues in an anticipative and pioneering manner, such as the spatial outlay of the city and of its neighborhoods, the configuration of an equi-distant network of public spaces, a system of connected green areas and considerations relating to the intensity of land uses. It's also noticeable that this plan was concerned, as was the case with the previous ones, with understanding the city's expansion requirements, which would gradually rely on the role played by motor vehicles without, however, neglecting a spatial outlay accessible to urban services. Once again, the city could not benefit from an urban plan's positive effects, and the plan drawn up by Saboya Ribeiro was rejected by the same elite.

It's important to note that the city of Fortaleza - since the time when Adolfo Herbster's plans were drawn up and with the two rejections of plans that were characterized by pertinent foresights - began to have their growth governed by the implantation of land subdivisions that were partially juxtaposed to previous ones and occupied environmentally sensitive regions. Undue interventions upon nature were only avoided when their technological and financial viability didn't seem conceivable to the contractor. The absence of a systemic view of the city's process of growth resulted in the fragmented construction of a large portion of the land and road network, which resulted in the present urban form. By rejecting these plans, urban control could not effectively consider urban form plans as a whole, and they ended up combining the effects of loose growth based on low densities, leading to the unfeasibility of a comprehensive and efficient transport system.

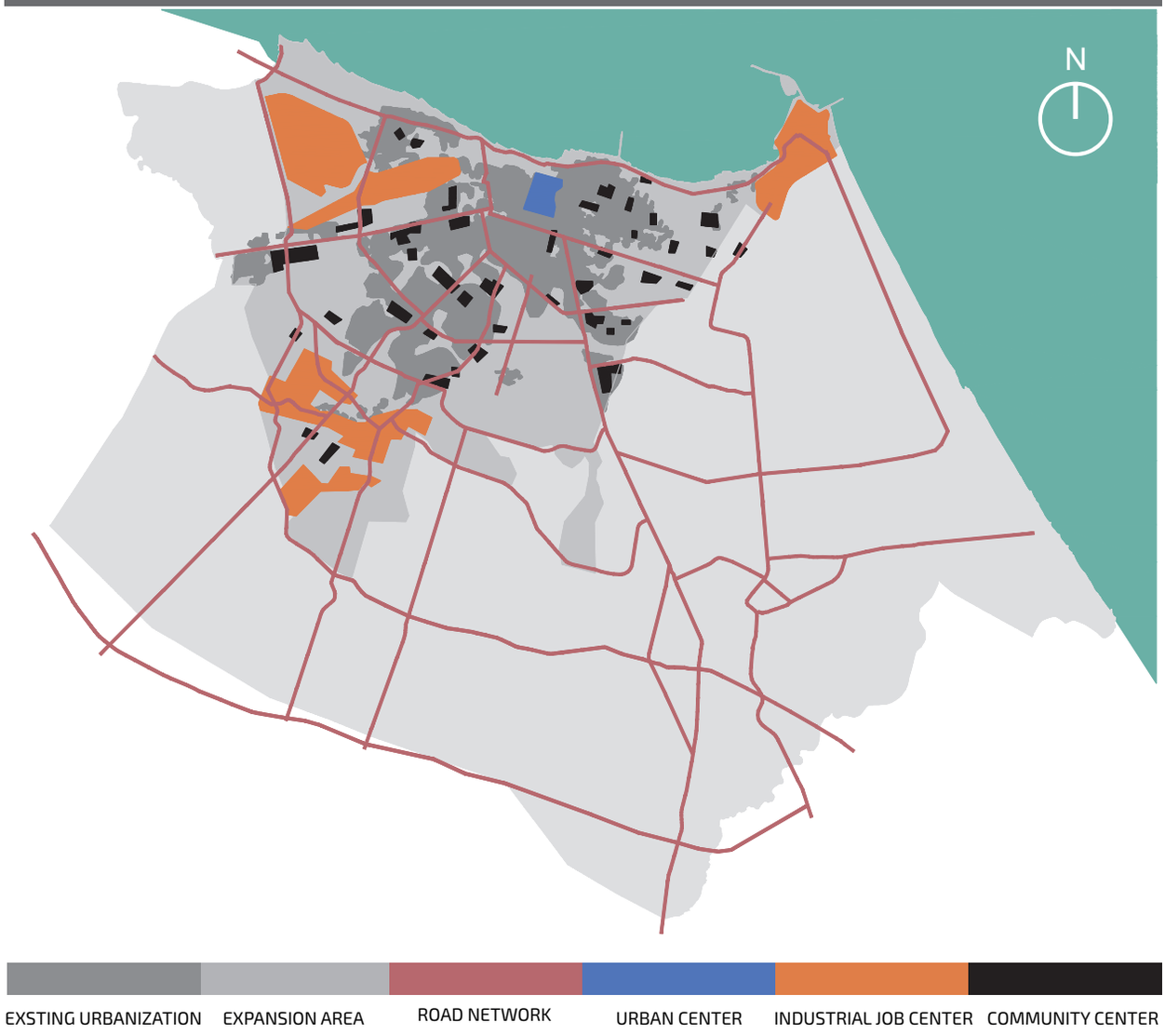
1963: THE HELIO MODESTO PLAN, THE HIGHLIGHTED URBAN CENTER, AND COMMUNITY STRUCTURING

In 1962 the city was presented with the opportunity to prioritize and systematize its components, addressing the social considerations of inhabitants and their need to form communities and accessible surrounding areas. These innovative ideas appeared when city planner Helio Modesto was hired to elaborate yet another plan for the city. This plan happened within the political environment in Brazil that preceded the military coup, when the city of Fortaleza faced the first signs of a population growth that would increase notably throughout the following decades. This quick population growth was nourished by modernizing changes in working relations in rural properties, combined with the development of access between the countryside and the capital as modern highways were added to train transportation. At that time the city welcomed growing migratory inflows and, without effective urban control, it began to fuel the growth of slums and neighborhoods without sanitary conditions, beginning to amass the first outcomes of a growth brought on by urban sprawl. At this stage the difficulties of making public transportation available began to accumulate, and the first signs of the radical socioeconomic gap in society began to appear. The first signs of decline in the urban center began to appear, as well as the difficulties in keeping the proximity between neighborhood units and job centers.

The Helio Modesto plan began and confirmed the need to face some problems that had already been foreseen by the previous planin relation to ongoing issues that the city has accumulated up to the present day: the conflicts of the grid plan with historical radial-concentric roads, the need to support protection of the center, and the organization of peripheral neighborhoods and their connectivity. And so the Hélio Modesto Plan also decided to support the possibility of urban requalification in the center central and get ahead of its potential decline, foreseeing a zone close to the center - in a region that corresponds to the Poço da Draga – whose main planned use was for a mix of spaces devoted to an Administrative Center in harmony with cultural programs. It also demonstrated concern with the structuring of life in peripheral communities. A new vision was presented, supported by elements of centrality and favoring of the local economy - standards that are nowadays praised for their effectiveness in contemporary city planning at the scale of poly-centric metropolises.

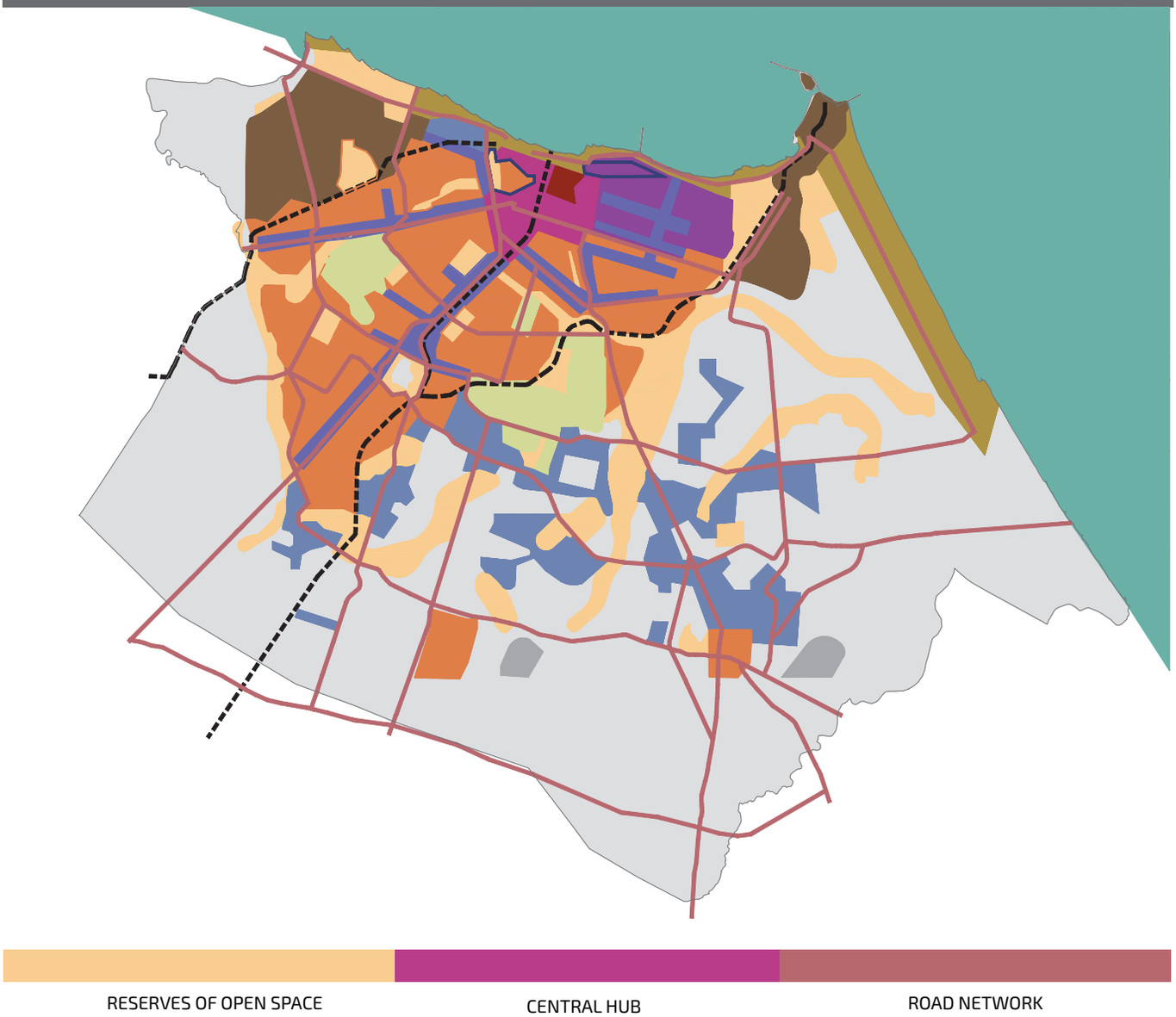
Like the plans that preceded it, this one also exhibited the basic purposes of this sort of planning: supporting urban growth and its expansion, although it did not take into consideration the future outcomes of an urban expansion that relied heavily on motorized transportation, and the beginning of the massive access to cars. Like its two forerunners, the Hélio Modesto Plan ended up not being implemented, and virtually all that remains from it is the introduction of a road in the stretch that is known today as Beira Mar avenue. However, its visionof the Urban Center and the nucleation of accessibility to community neighborhood units are still demands that are unmet today.

Figure 8 – Hélio Modesto Plan (1963)



Source: Fortaleza 2040 Plan adapted from the Fortaleza Master Plan, 1963

Figure 9 – Plandirf Layout (1972)



Source: Fortaleza 2040 Plan adapted from Plandirf, 1972.

1970: INTEGRATED DEVELOPMENT PLAN FOR THE METROPOLITAN REGION OF FORTALEZA (PLANDIRF) - THE INEFFECTIVENESS OF A TECHNOCRATIC VIEW

From the late 1960's until the beginning of the 1970's, the phenomenon of urban sprawl worsened and the initial process of conurbation among peripheral municipalities which make up the Metropolitan Region, especially in Caucaia, Maracanaú, and Aquiraz began. Small peripheral cities began to act as dormitory towns, as their populations looked for jobs in the capital and were subjected to commuter traffic, an already ongoing process. In a time characterized by technocratic urban planning - that is, 1970, 1971 -, the Integrated Development Plan for the Metropolitan Region of Fortaleza (Plandirf) was elaborated after instructions from the federal government. The plan faced quite a few difficulties due to the total lack of updated mapping, which forced the municipal management to perform an aerophotogrametric survey in 1972, later extended to the Metropolitan Region, in 1978. Thus, the Plandirf ended up not offering substantial collaborative policies that could spur on the city's growth and confront the effects that have already been described.

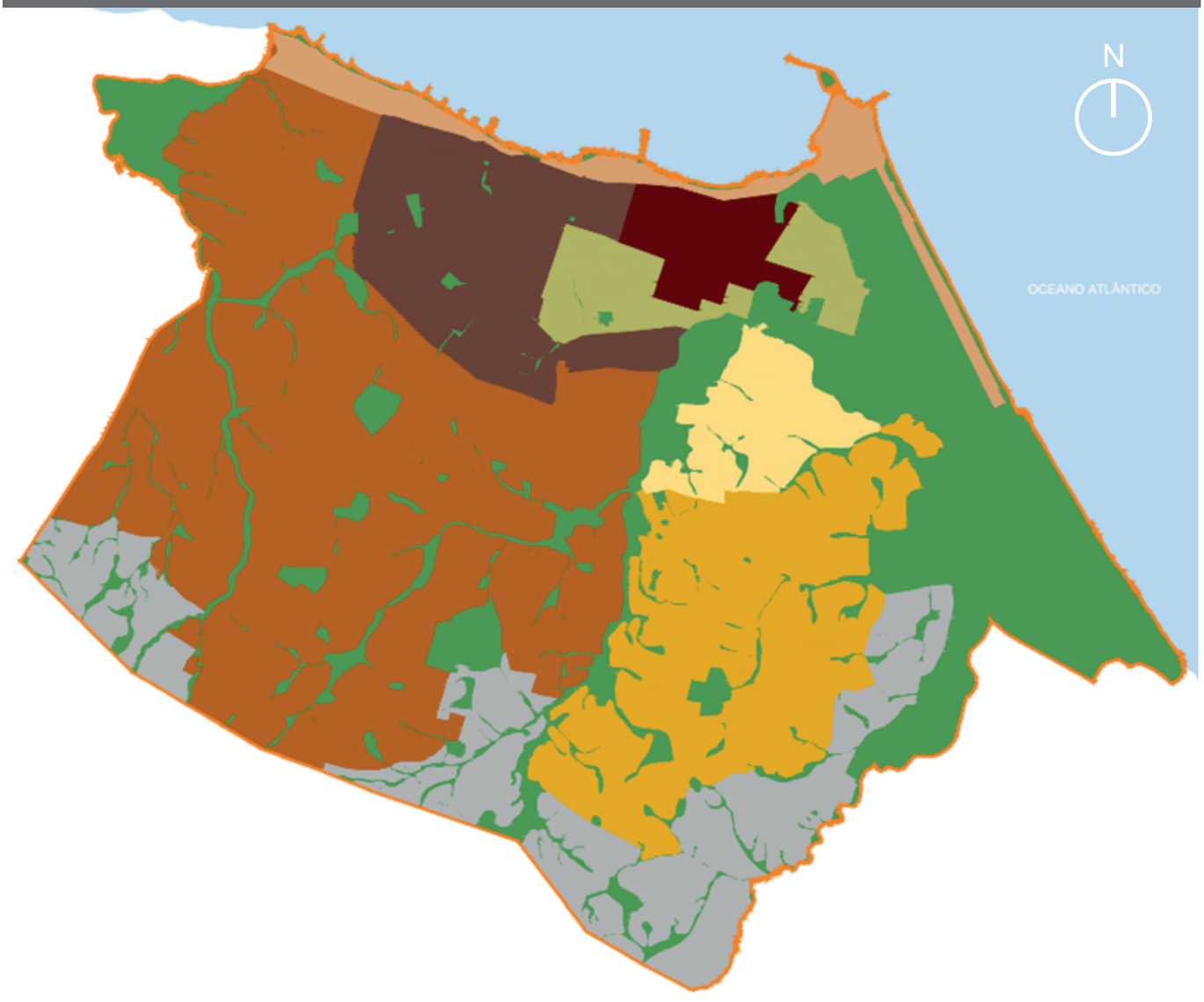
The Plandirf plan was effective in improving the functioning of the bus transport network, however, it did not manage to leave a legacy aside from the questionable occupation of central squares by bus parking spots with all of the consequences of this unsuitable use. At that time, the central zone already presented clear signs of decline, which, from then on, began to lose dynamism by only supporting activities during business hours.

2009: PARTICIPATIVE MASTER PLAN - POPULAR INVOLVEMENT, ATTENTION TO HOUSING, AND THE SECONDARY ROLE OF URBAN PLANNING

At a political moment in which national leadership appointed, from within the federal government itself, a set of instruments that were contained in the City Statute, the national metropolises were required to create Participative Master Plans. In the case of Fortaleza, this pattern of planning was set into motion in 2009, with the Participative Master Plan. Although it was guided by community participation, it didn't reach the desirable universal standard, including the representation of legitimate and diversified points of interests. The plan also lacked deep technical city planning aligned with economic and social aspects in a balanced way.

However, as far as Social Housing goes, the Participative Master Plan's guidelines exhibited a notable concern with housing and land regulations, including democratizing access to urban land, housing assistance for low income populations, respecting the right to housing, identifying unused areas and encouraging their social use and purpose, producing housing for a mass market, among other key points in relation to this matter. The most significant aspect was the emphasis on social housing proposals relating to the demarcation of areas for Special Zones Of Social Interest (Zeis). These tended to be integrated in parts of the guidelines and policies that are proposed on this topic by the 2040 Master Plan. The Participative Master Plan also never managed to elaborate rules for land use and occupation, neither did it change the negative traditionfrom previous plans that sought to promote the content of these rules without regard to coordination with the desired

Figure 10 – Participative Master Plan (2009)



Source: PDP-For, 2009

qualities for the urban form through engagement with the various interests within society. Presently the city is mobilized in processes of constructing and expanding structures, still lacking the support of rules that are coordinated from a set of urban systems that will eventually lead to accessibility and other well distributed conveniences. These should be generated from a rigorous evaluation of the componenets of the urban form and duly agreed with society.

Drawing to an end of this part of the analysis and evaluation of the aspects of the city's urban evolution and its plans, it is inevitable to conclude that Fortaleza, strictly speaking, never benefited from policies and guidelines based on an understanding of urban planning stemming from integrated technical knowledge of its form resulting from the true engagement of those who represent the community's legitimate interests. The city has not yet reacheda process of growth supported by a plan that anticipates the problems that, would later be confirmed. We therefore still face the challenge of coordinating means to make Fortaleza more accessible and restrain the damage that manifests itself in a wide range of areas, among them the environment, culture, social causes, theeconomy, and others that can be construed, such as the loss of opportunities.

FORTALEZA TODAY

In the last turn of the century, the city of Fortaleza kept as much control as it could over its urban growth, and managed to adapt its regulations in the face of countless demands, using the available and pertinent resources suitable to the circumstances. However, in the current scenario that stems from the explosion of unequal forces that nevertheless influence the urban form, city planning becomes even more complex, urgent, and it forces us to seek pressing changes. As the new and the old urban components seek to arrange themselves, they demand a design that collaborates with the following emergencies: dignifying the lives of the many; housing and urban assistance for the elderly; increase in interchanges and opportunities for all; connectivity and intensification of neighborhood living; reduction of urban aggressiveness and support for natural community vigilance; nature conservation and friendly use; distribution of urban uses that support the creation of local economies.

THE URBAN FORM AND THE MOBILITY AND URBAN MASTER PLAN

Interpreting the city's form is a way of explaining and describing the practices, actions, and forces that lead to the construction of an urban landscape by its inhabitants, and the sustainability of its growth and urbanization process. In Fortaleza's case, this process leads to the unavoidable need to consider the great dilemmas of 20th century cities which have fast growth and are located in a developing country. If, on the one hand, urbanization has provided economic outcomes that have improved the quality of life of some, on the other hand the same urbanization has altered the city's values and amenities, dismantled community living, stood between neighborhoods, and hampered access to opportunities. has ended up also contributing to an increase in socioeconomic inequality, and reduced the quality of life of the majority of citizens; On top of all that we have the fact that 20th century urban construction is almost always

linked to the destruction of the environment and cultural heritage. This has led to conflicts between traditional and contemporary patterns of urban form and use of space - especially in relation to the quality of their components.

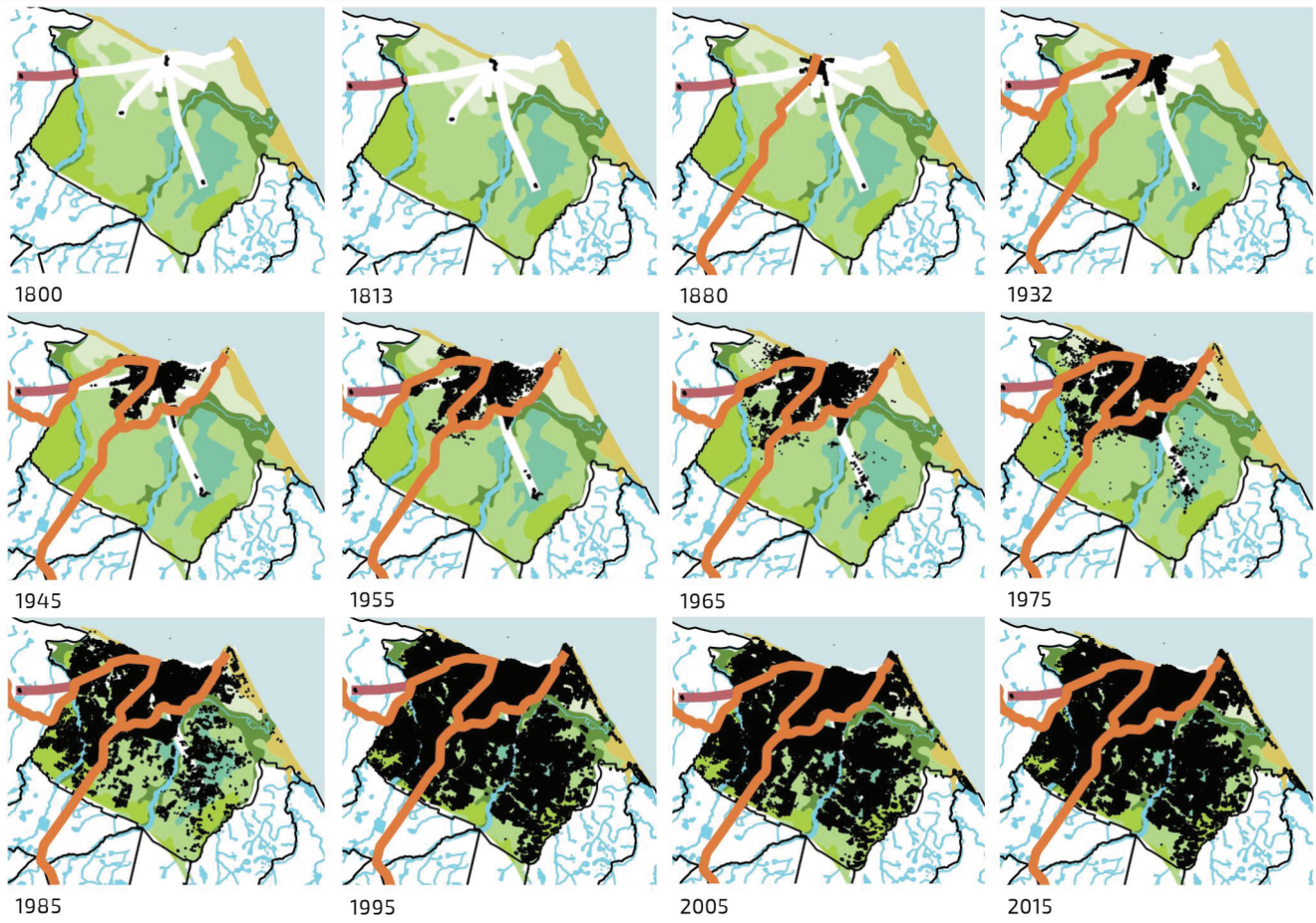
The task of interpreting urban form corresponds to understanding, in a coordinated manner, the component elements of thespatialstructure that results from how the city began and how it developed, without forgetting to understand how it currently works and communicates with its users. This obviously includes statistical analyses, maps, and the typical and traditional quantitative planning methods. But it also includes the need to analyze its form by noticing, within its spatialstructure, the blockages and opportunities to meet both old and future developmental demands. This work of understanding and interpreting the City's form and its evolution also considered the importance of the morphological collection of patterns of built spaces, natural spaces, spaces of public use, and urban structures amassed throughout the city's nearly 200 years of urban history.

If we think about urban development extended over the time a city took to reach its spatial definition, in Fortaleza's case we have to consider its Urban Form (Figure 11) since its early beginning, so that we can interpret its urban design. In order to know the data and the historical reasons behind the city's origin and urban evolution, in the case of Fortaleza the Fortaleza 2040 Plan team partly relied on the remarkable contribution of architect José Liberal de Castro's, through reading his works in which he investigates the city's form through primary reasearch, documents, and available maps. Another important asset was the observations contained in countless academic papers elaborated by architects and professors from the Architecture Faculty of the Federal University of Ceará. From this the Master Plan's team learned the lesson that interpreting the urban form of a city like Fortaleza also involves understanding events that have happened since humans first began to establish themselves,corresponding to the colonial period. At the same time, we need to accept the fact that during the early days of the original settlement, maps commonly carried little information about the city's form. There was always more interest in portraying aspects of maritime bathymetry, or in notes about locations where wealth could be explored, both very different from those we nowadays refer to as urban design. Historical knowledge about Fortaleza tells us that the first idea of the city's urban form to be represented in a map occured in the 19th century. It was directly or indirectly elaborated by Simões Ferreira de Farias, although Prof. Liberal stresses that this attribution could be mistaken.

Architect Adolfo Herbster was the author of the first precise representation of the city's form, based on a reasonably reliable topographic survey titled "Exact Draft of Ceará's capital", executed in 1859. In his noted role as a city planner, Herbster elaborated two plans, one in 1875 and the other in 1888. In 1931/32 the city also received a new updated plan that was based on Herbster's.

In 1945, an excellent graphic document was elaborated by the Army's Geographic Service. Based on aerial photos and with the inclusion of contour lines at every 5 meters, it was entitled the "Map of The City of Fortaleza and Surrounding Areas". It is also important to note that in 1942 Saturnino de

Figure 11 – Urban Evolution of Fortaleza



Source: Fortaleza 2040 Plan.

Brito was hired to design the water and sewage plans using topographic surveys of areas that were to benefit from these services. Several other plans and surveys were carried out in 1960, 1972, 1978, 1996, and 2010, ever expanding the areas covered by these records.

SUMMARY OF THE DEMOGRAPHIC EVOLUTION OF FORTALEZA

- In 1860 the city was presumed to have 8.0000 inhabitants;
- According to the 1872 census, 45.428 inhabitants lived in the municipality of Fortaleza, while only half resided in the urban zone.
- In 1877 there was a great drought and, after three decades without droughts, during which cattle raising and cotton culture progressed, the balance was upset and the capital welcomed so many immigrants that its population leapt to over 100.000 inhabitants, 57.780 of which died from uncontrollable diseases that stemmed from this mass migration. After three years

of drought, the city was ravaged and cotton exports were reduced to 8% of what they were at their prime;

- In 1887, Fortaleza had 27.000 inhabitants;
- During the Federal Census of 1920, the capital had 78.536 inhabitants (before the incorporation of Parangaba and Messejana);
- In the Federal Census of 1940, Fortaleza had a population of 180.185 inhabitants with 140.000 living in the urban zone;
- During the 1945 census, the population reached 220.000 inhabitants;
- In the 1950 Federal Census: 270.169 inhabitants (the city was still mono-centric, but it already showed the first signs of expansions in new centralities);
- Federal Census of 1960: 514.818 inhabitants;
- Federal Census of 1970; 872.702 inhabitants;
- Federal Census of 1980; 1.320.000 inhabitants;
- Federal Census of 1990; 1.766.794 inhabitants;
- Federal Census of 2000: 2.144.402 inhabitants;
- Federal Census of 2010; 2.452.185 inhabitants;

FORTALEZA AND THE EFFECTS OF FRAGMENTED PLANNING

The management of urban growth in Fortaleza, as has been shown throughout its historic process of urbanization, seldom createdconstituent parts of urban form from the perspective of urban planning aligned with a strategic vision, in a systemic and hierarchal manner. The basis for decisions was always guided by the actions of economic forces, typically and predominantly associated with short lived effects of popular initiatives, often of secondary economic importance, nevertheless playing an influential role on the final resulting morphology. The city altered its pace of implementationof changes with the increase in demands brought on by the population increase of the20th century, especially after the boom of migration from the interior combined with the incorporation of motor vehicles to move people and cargo, and the consequent dilation of spatial urbanization. The breadth of Fortaleza's urban fabric developed from the implementation of land subdivisions supported by urban catalysts, the little importance given to natural resources, the creation of roads without a hierarchy between local and through traffic, and a total lack of concern for the creation of a network of public spaces. In a general sense, the city grew while urban control was exercised through building laws created after successive adaptations. The planning unit was always the divided tract of land, without planned spaces for activities that enrich community living and, often, through processes that are characteristic of urban sprawl, with opportunities kept extremely concentrated and convergent.

Complementarily, and linked to the effects of a local culture of urbanization, several habitational areasthat were sponsored, in several stages, bythe many federal authorities with the purpose of offering social housing, ended up creating a pattern known as "housing complexes" and that are now only known as "housing". This is a fragment of urban design whose defining characteristic is the emptiness of community living, the absence of economic anchors for the local economy, the impracticality of transportation services, and the physical mismatching, which was thankfully corrected through the use of "extensions" built by the inhabitants seeking to adapt them. The criteria

Figure 12 – Center of Fortaleza during the 19th

Source: http://fortalezaantiga.blogspot.com.br.

for choosing their locations routinely disregarded the opportunities brought about by urban form, but simply sought the existence and availability of free lots, a criterion that would become ineffective due to the reduced number of free lots within urban Fortaleza.

The process of building social housing in remote zones, without infrastructure, institutional uses, jobs, or public transportation tend to reach their limits as the already completed unsystematic, low density occupations are already making these opportunities rare and the city will then be forced, for reasons other than those justified by good urban planning, to insert new urban spaces upon the existing fabric. In Fortaleza there is, thus, an involuntary reason that contributes to the application of one of principle criteria of the Compact City.

On the other hand, the City continues to coexist with aspects linked to precarious housing occupations in environmentally sensitive areas: regions with dunes or zones where natural water processes occur. Therefore, Fortaleza found its

urban form through a process of repetition and the addition of each typological component. The discontinuous pace of growth and the resulting loose fabric were created through several procedures, and one of the most common is the introduction of public urban catalysts on donated land, attracting infrastructure and the alteration of its value as a counterpart, with the consequent creation of opportunities for land subdivision on isolated private land. This is one of the most alarming effects brought on by the mistaken location of important urban development structures. The texture of the city's construction was formed by the success of this model in obtaining the results expected by these predominant forces, resulting in a wide range of improvised effects.

However, it should be taken into account that the city of Fortaleza at some point presented, in its urban form, balanced elements of urban comfort and the advantages of a shared life.

During its historical development process, especially during the second half of the 19th century, Fortaleza had characteristics of a good matrix for interchange, in which the urban form was capable of distributing facilities in order tolive harmonically with its climate and physical characteristics, as well as creating an urban image that had good legibility and memorability. The spatialized cultural identity of the city fostered diversified accessibility for sharing opportunities, raised its standard of urbanization, enabled trade in goods, services, neighborhood living, information, culture, and knowledge. During this period, the city also adopted advanced technological components in the spheres of construction, transportation, services, and public spaces.

With the coming century, the human experience of habitability of Fortaleza's form began with expansions and with the perspective of building life on a larger scale. This experience is now a little over a century old. However, we cannot neglect to take into account the fact that, in the period corresponding to the early 1970's, Fortaleza almost completed the first wave of single-family homes in the east zone and had virtually begun their replacement by multi-family residential towers in the same urban base. The changes brought on by this new urban scale of emerging construction still needed to be understood and mastered in planning and management terms. This is how several forms of urban growth occurred.

From the standpoint of international urban planning, the accumulation of knowledge that allowed us to overcome the perplexity of facing these never before seen metropolises and their scale took a long time to mature, especially if we take the interwar period's utopias as an initial reference point. Only little over half a century ago, integrated international urban planning and other areas of knowledge began to try to make sense of the spacial conflicts, the paradoxes and the quality control difficulties posed by urban growth, aside from the larger problem of the movement of people and goods on an unseen scale. The urban form became something more complex, and the difficulties in properly controlling and adapting the growth of human establishments of such a magnitude is a problem most metropolises share. Good management of urban growth and efficient control over an agreed urban form pattern suited for the intensification of interchanges is, in fact, what cities have been demanding - and Fortaleza is no exception. In present times, the complaints of users and official actions happen through demands

and answers that come from fragmented services. These are almost always stem from the negative and cumbersome aspects that are more evident in the structuring of the urban form, and are reflected in the daily life of inhabitants. It's true that new technologies seek ways to keep cars moving amid our current life's growing scale; however, there is some acknowledgement of the fact that new energy resources will never take the place of fossil fuel in quantitative terms when it comes to moving vehicles. The time for rationality and reducing urban transit is approaching and will affect everyone indistinctly. In this regard, poorer cities should be the first to quickly anticipate this in order to reduce dependence on motorized transportationdue to their low rates of motorization and urbanization, which is still in progress - such as in the case of Fortaleza.

The idea of rebuilding community living, with all the advantages presented by life in neighborhood units, tends to require the adaptation of the city's existing form. Meeting spatial demands would solidify social capital, restore daily interaction between the diverse parts of the cycle of life, boost the local economy, transmit urban values, and reduce transportation costs for the inhabitants of the city as a whole. Fortaleza's current form isnot an obstacle to its adaptation, but will undoubtedly lead to countless difficulties in achieving the balance of a sustainable and efficient form with respect to its natural basis, its variety of real estate values, its supply of already built structures, its real estate map, its system of roads without hierarchy, and its elements of physical blockage. Even so, it will be necessary to discover new zones of opportunity and new forms of connectivity. This whole system of components searching for coordinated qualification will lead, without doubt, to a need for a change in the set of values prevailing in the local culture, which has a remarkable difficulty when it comes to understanding the cost-benefit relationship, balancing results for the economy, society, and the environment. Therefore it becomes necessary to assert that the objective of the Fortaleza 2040 Urban Mobility Master Plan is to point out the systemic means for the construction of a sustainable scenario that could support a standard of living based on semi autonomous neighborhood units connected through a network. This would avoid moving adult residents to distant job centers, as well as generate an intense, shared local life, boosting security through community control, keeping parents close to the education of their children, and resulting in better creative citizenship and contributions to environmental sustainability.

Recognizing that in order to fulfill the adaptations outlined above we need to approach the matter of Fortaleza's urban form from an urban planning stand point, we still need to deal realistically with how long it would take to adapt to this sort of metropolitan-scale city. We must remember that the majority of projects aimed at radically transforming urban life quality demand a project timeline and continuous implementation over periods that vary between 20 to 30 years - according to the characteristic technical patterns of metropolitan solutions. There is evidence that projects for the large physical transformation of cities - seeking greater convenience and equitable accessibility for urban populations, or creating indispensable structures for the improvement of daily life –are often restricted by the duration of a city government's administration, which usually lasts four years. In Brazil, as municipal urban projects are not shared with and agreed on by representatives of society's interests, they end up being treated as an

administration's project, and never a pact with society itself. This leads to continuous "shelving" of projects every time an administration comes to an end. This fact also explains the population's unavailability when it comes to discussing projects that they know won't be continued and the countless amount of damage that comes from this practice. Therefore, Urban Growth Management, seeking to adapt the city's form to these purposes,has to coordinate actions for shared projects and implementation, while at the same time it becomes indispensable to bequeath control of the project to society, and not to one particular city government administration during its limited 4 year term. This effect can only be attained through the indispensable involvement of society.

Another hypotheses to be considered in a complementary way, is to always combine, on a coordinated basis, the scales of immediate actions, in the form of prototypes, with those that are long-term in order to obtain a reliable future outcome. In this way it is possible to act in a way that favors wide, systemic control with localized actions that can be carried out in the course of four years. Through the materialization and effective use of these prototypes (which are diversified in their geography, income, and urban theme etc.), the population itself, through everyday use, will be able to evaluate these projects and take the initiative regarding their re-application, improvements, and refinement over time.

There is clear evidence that the low level of value achieved by Fortaleza's urban planning is due to the extraordinary speed with which the small town transformed into a metropolis because of the lack of opportunities in the countryside and the large migratory flow to the capital. So it is understandable that one of the values of urban planning, namely the respect for the limit between what is public and what is private, is one of the frailest aspects of the conduct that guides the actions of citizens as they share in the creation of Fortaleza's urban form, which after all is something built over time. It is necessary to direct efforts, whenever possible, and show their positive gradual results, so actions for the improvement of public space can be structured, indispensably balanced by the synergy between the collective domain and private aspects of the built structures that shape it. There is a lack of pedagogy andexplanation. This could be corrected through the definition of good rules and their observation, supported by explanations of the advantages that are offered by a city form that will favor social interchange and sharing. This pedagogy can only be attained through actions that are carried out and supported by the complex interaction between public and private spaces and different forms of mobility and access that are clear in the daily life of the beneficiaries.

In many ways, Fortaleza's urban form is already showing signs of the urgent need for a municipal management that foresees the creation of spaces that are suited for different activities until the criteria that balances the limits between private and community living can be established in a more definitive manner and is permanently.

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THE CITY'S PRESENT FORM, CHRONIC PROBLEMS, AND ADAPTATION REQUIREMENTS

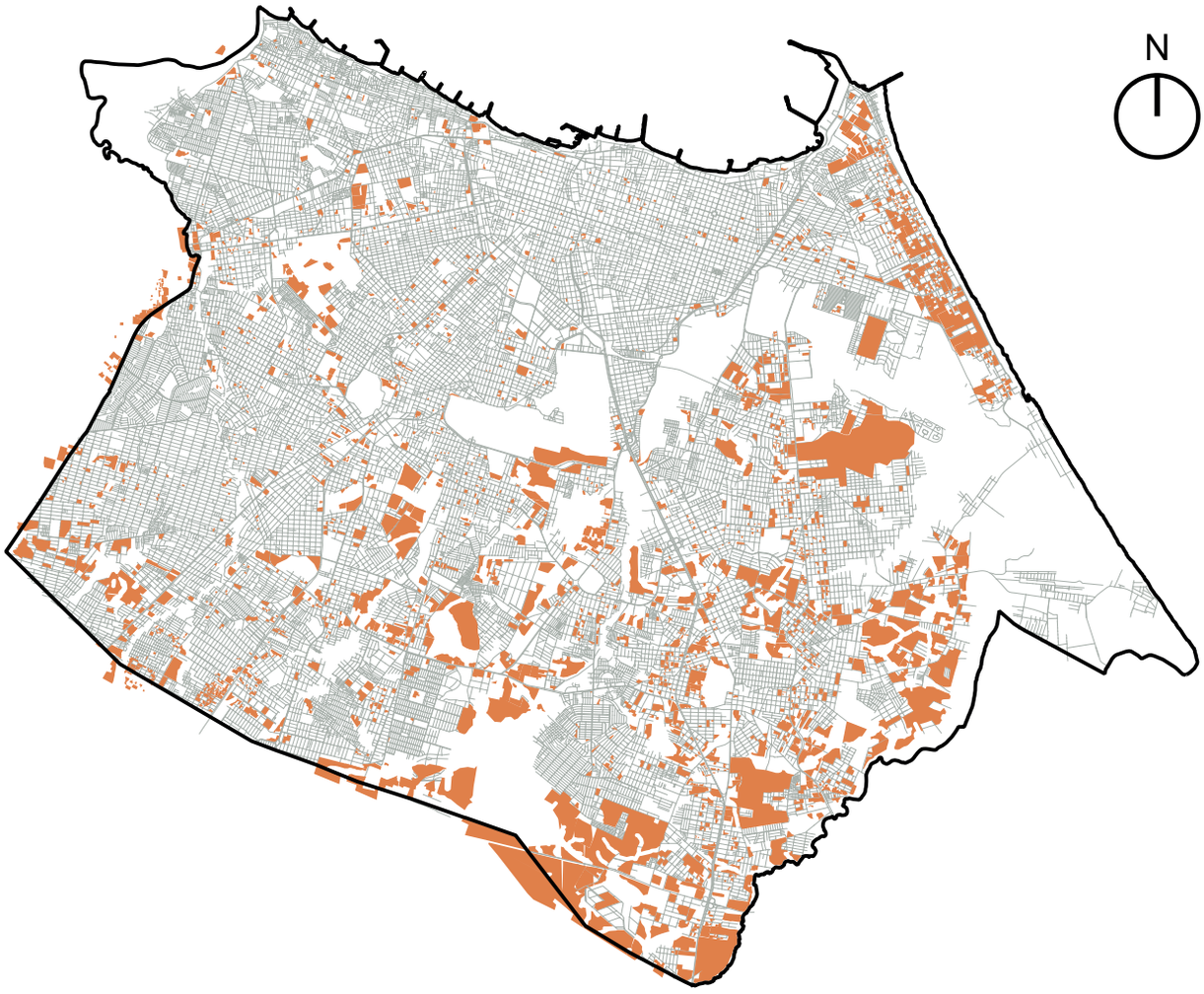
The city of Fortaleza, like most cities of our time, grew in a dispersive process and made its transition from a single center city model to a metropolis with multiple converging centers with countless negative consequences. Among those, we must highlight the corrosion of the set of attributes that characterize community life. The process of growth, the increase in distances, employment zones in locations that are remote from the residencies of workers, and the difficulties resulting from moving people around led to a new form of living among suburban youths: growing up without neighborhood interaction and, thus, not taking in urban values, which are usually transmitted through natural interactions with family members, neighbors, friends, and people of various age ranges. A significant part of the population has been growing up without the citizenship values that would normally be transmitted through life interactions. They therefore grow up without the indispensable support of community life.

The countless public debates carried out by the Master Plan and the records of the City user's opinions show that the population understands these urban deficiencies and longs for change. The complains bycitizens from various social and economic groups and the answers through official actions currently happen in isolated agreements and fragment actions. Dissatisfaction almost always comes from the most clear negative and cumbersome aspects of the urban form's structure, and reveal themselves in the daily

life of the inhabitants themselves. Contemporary metropolises, like Fortaleza, invariably face chronic problems such as:

- The precarious and inefficient configuration of urban regions and sub-centralities when it comes to accessibility and management;
- Local reactions to long-term planning without prejudice to harmonization with emerging works;
- The inequality of the spatial distribution of opportunities;
- The low level of comfort, access, and urban programs devoted to the growing number of elderly citizens;
- The absence of infrastructure networks in a large portion of urbanized areas;
- The destruction of a significant part of the natural environment;
- The precarious urban occupation of the City's seafront with an excessive influx of cars and the inconvenience of "black trails" of sanitary sewage reaching the sea;
- The insistence in forcing the City to keep an obsolete cargo port in a historical center with a sensitive landscape, as well as the storage and transportation of explosive cargo close to the urban environment;
- The demonstrably incompatible obsolete Airport Pinto Martins, which generates huge negative effects on urban traffic, creating depressed urban areas that erupt with insecurity throughout its huge periphery of around 13 KM, hampering urban development that seeks to intensify land use at the focal point of the great urban center;
- Mobility that has complex access is and not operational because of itspoor integration with land uses;
- The definitive extinction of a large portion of rural areas following excessive low density urbanization;
- The unsatisfactory network of cultural, entertainment and recreational spaces found in a viable, accessible and adequate situation;
- The lack of a memorable urban image befitting a metropolis with aspirations of touristic development;
- The accumulated mistakes in relation to the localization of important architectural structures that relate to economic, touristic, institutional, and cultural development;
- The insufficient urban harmonization of the overground areas of the VLT system and the already implemented South Subway, and the bad integration with its own lanes and the physical blockage effect that separates already existing communities;
- The destruction of a large portion of constructed cultural heritage;
- Community decline and the excessive mono-functionality of the Urban Center, with a reduction of its coefficient of use, totally deserted during the night;
- The delay in encouraging the rehabilitation of the Praia de Iracema neighborhood, supporting its constructed cultural heritage and the landscaping aspects needed to create an attractive focus point for business tourism;
- The ongoing improper usage of the Urban Center's north seafront;
- The bad sanitary conditions of peripheral zones;
- The critical situation of drinking water sources, the wastage of rainwater, and urban drainage problems;

Figure 13 – Urban Voids in Fortaleza



Source: Fortaleza 2040 Plan.

- The increase in the time spent in urban journeys;
- The destruction of the characteristics of community life;
- The insecurity of public spaces deriving from the architectural pattern and their adjacent uses;
- The absence of trees in public spaces;
- The increase in homicides and its resulting damage; and
- The growing housing deficit and the low amount of connectivity between neighborhoods with vulnerable residences and other urban zones.

All these issues are linked to the demands for a gradual adaptation of the components of urban form and their arrangements. The idea of rebuilding

community life, with all of the advantages of neighborhood living, tend to require the adaptation of the city's existing form. Meeting the spatial demands would solidify social capital, restoring daily interactions between the many components of daily life, boosting the local economy, transferring urban values, and reducing transportation costs for the inhabitants of the city as a whole. Fortaleza's current form would not be an obstacle to its adaptation, but it will undoubtedly require that it is harmonized with its new components in a sustainable and efficient manner with respect to its natural base, its variety of real estate values, its supply of already built structures, its real estate map, its system of roads without hierarchy, and its elements of physical blockage. It will be necessary to discover ways of giving continuity and fostering the evolution of the existing constructive culture amongstall of the already configured scenarios, promoting adaptations, and creating zones that grant opportunities to new connectivities. This system of components searching for coordinated action will lead, without doubt, to a need for a change in the set of values prevailing in local culture, which has a remarkable difficulty when it comes to understanding the relation between costs and benefits, balancing results for the economy, society, and the environment. In this sense, the Fortaleza 2040 Urban Mobility Master Plan intends to demonstrate the means of implementation that will favor the establishment of endogenous economies during the reconstruction process of the future structures that will receive the foreseen demands of growth, including the innovative integrated incorporation of public transport and the reconstruction of structures adjacent to the future Public Transportation Oriented Urbanization Lanes. This is the way a number of contemporary international cities have successfully performed these adaptations of the urban form to the requirements of growth.

HOW TO INSTALL PHYSICAL COMPONENTS IN ORDER TO MEET PREDICTED GROWTH

Fortaleza's socioeconomic and urban reality is summarized by remarkable income inequality, the growing housing deficit, the jobless zones, by the majority's inability to access employment zones, by the 32% of poor people in vulnerable housing, and by the ubiquity of focus of precarious urban living. Its current urban form reflects its process of physical growth and its relation to nature. During 200 years of urban planning, the City occupied its environment through an intrusive process on two fronts: more solid constructions, carried out by elite groups, and removable constructions, improvised by the poor. As the process of growth was dispersive, along these two centuries the City consumed a remarkable amount of virgin soil, extinguished rural areas, and virtually destroyed the land for new constructions (Figure 16). For its future growth, the City will definitely need to define the kind of spatial occupation that will be created by new works. Since it is no longer possible to offer empty lots for new construction, it is very probable that Fortaleza will need to apply means to contain urban sprawl, creating boundaries for urbanization, compulsorily promoting intensified new land uses within the existing urban fabric to forcibly reach the goals of a compact city, where public transportation will be viable because of these changes. This is how the Urban Mobility Master Plan sees a standard of urbanization, which will articulate the

different types of land uses, their combination and intensities, in coordination with transportation, job centers, public services, and education centers. The solutions for these typical metropolitan problems will finally define, across various urban zones, the way to use spaces and connect them as foreseen in the Public Transportation Oriented Urbanization Lanes standard. This is how 160 cities in the contemporary world are designing metropolitan solutions that enable people to interact, share, move, and gain access to urban opportunities in an equitable way.

FORTALEZA WITHIN THE METROPOLITAN CONTEXT

The area corresponding to the Metropolitan Region of Fortaleza (MRF) is 5.790,703 km2and is located in the north of the state of Ceará, between 3°30' and 4°30' N-S, a little below the line of the Equator, between meridians 39° and 38° E-W. The MRF is limited in the North and East by the Atlantic Ocean; in the South by the municipalities of Palmácia, Redenção, and Cascavel, and in the West by Pentecoste and Caridade.

Since its foundation, through Complementary Act N° 14, of June 8, 1973, the MRF's population has quadrupled and the number of constituent municipalities tripled. The MRF is still greatly dependent on the city of Fortaleza for public services, as well as having poor connectivity and, consequently, an unsatisfactory transport system, with inadequate coverage for the participating municipalities. The MRF's population is around 3.818.380 inhabitants, according to the latest estimate based on data from 2014 collected by the Brazilian Institute of Geography and Statistics (IBGE, 2014). The municipality of Fortaleza, the capital of Ceará State, has a leadership role, with 2.571.896 inhabitants, and is the 5th most populated city in the country. The population concentration in the state capital was caused by a historical imbalance of the urban network across Ceará's territory in relation to quality of life and job opportunities as well as the decline of cotton, which supported rural life in countless municipalities of Ceará. The beginning of industrial development after the 1970's, and the appeal generated by Fortaleza's civil construction boom also contributed to this. This coming together of factors consequently increased the appeal of the city to migrants from the countryside, who previously went to the cities of Rio de Janeiro and São Paulo. And so the MRF's population increase derives, partially, from the dismantling of the rural economy in the countryside and from the volume of secondary and tertiary activities concentrated in the MRF and in its main urban hubs.

The municipality of Fortaleza, because of its industrial growth and the development of other economic activities, especially commerce and services, maintained its supremacy over the remaining MRF municipalities in relation to economic and urban functions. This way, the capital kept on attracting the introduction of large facilities and considerably expanding the offer of specialized services, although it also had to deal with serious economic growth problems, as well as a lack of physical infrastructure and human resources.

This course of evolution led to the consolidation, in a definitive manner, of Fortaleza's supremacy over other metropolitan municipalities in economic as well as political, social, cultural aspects and,

Figure 14 – Fortaleza within a metropolitan context

Source: Fortaleza 2040 Plan.

consequently, in the process of planning and occupying land and its uses. Its expansion guidelines were directly connected to the

Capital's huge economic and urban expansionin relation to the neighboring municipalities. Thus, until this day,the other municipal and district capitals depend on the metropolitan Capital without having been sufficiently strengthened by an equitably distributed economic base. This is because the introductions of physical infrastructure and of human resources were incomplete, without a systemic evolution of the distribution of local economies in the region. Institutional development capable of solving the metropolitan problem in its completeness and complexity also never occurred. So, it is possible to understand that the MRF currently requires an integration of the urban master plans of each municipality with the policies that will be defined for the future growth of Fortaleza.

Presently, there is no such a thing as a planned and managedMetropolitan Region, nor the corresponding and indispensable establishment of a chain of urban policies for attaining some order in the territory, in an effort to manage growth with quality, efficiency, and for the global competitiveness that this new era demands.

The Metropolitan Region of Fortaleza (MRF), like any other, demands growth; however, it is not necessary to foster the kind of urban development that is characterized as "dispersive", which moves forward beyond the existing boundaries of urbanization. This become more evident when we take into account the very low densities distributed across the present urbanized context. If the MRF had primarily adopted strategies for growth based on urban insertions upon the already existing fabric - intensifying these densities, preserving environmental resources, economic investment, infrastructure, social fabric and revitalizing abandoned areas -, this growth could have been organized as neighborhood units, with their own fronteirs of urbanization based on the balance between homes and places of work, and not as dormitory towns.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CHAPTER 3

THE ECONOMIC AND SOCIAL SITUATION

Fortaleza has a population of around 2.5 million inhabitants (an estimate from 2012), which corresponds to 1.29% of the Brazilian population and 29.1% of Ceará's population. It has (2012) a GDP of 43.4 billion, equivalent to less than 1% of the Brazilian economy and around 48% of the state economy. The GDP per capita of R$ 17.359,00 represents only 76,6% of the Brazilian GDP per capita, but it is as much as 110.6% of Ceará's. Fortaleza's HDI was estimated at 0,754 (2010), well above the 0.682 of the average in the State of Ceará.

The city of Fortaleza is Ceará's main urban center, concentrating the largest part of the population and boasts the position of 5th largest city in Brazil (IBGE, 2010). There are 18 municipalities around Fortaleza - Caucaia, Maranguape, Pacatuba, Aquiraz, Maracanaú, Eusébio, Itaitinga, Guaiúba, Chorozinho, Pacajus, Horizonte, São Gonçalo do Amarante, Pindoretama, Cascavel, Trairi, Paraipaba, São Luis do Curu, and Paracuru - forming the Metropolitan Region of Fortaleza[1].

Table 1 – Comparative data on Fortaleza, Ceará, and Brazil

	POPULATION (MILLIONS) – 2012	GDP (R$ BILLIONS) – 2012	GDP PER CAPITA (R$) - 2012	HDI - 2010
Fortaleza	2.5	43.3	17,359.00	0.754
Ceará	8.6	90.13	10,480.23	0.682
Brasil	193.9	4,392.09	22,651.32	0.73
Fortaleza/Ceará (%)	29.1	48.04	165.64	110.6
Fortaleza/Brasil (%)	1.29	0.99	76.64	(.)

Source: IBGE, Pnud, and Inep, 2012.
(*) It is not possible to compare the HDI of Brazil to that of Fortaleza because the country's rate is a comparison to other countries that were analyzed, while Fortaleza's rate is a comparison with other municipalities in Brazil.

[1] These final four were incorporated into the Metropolitan Region of Fortaleza in 2014, during its territorial upscaling.

In the last decade, Fortaleza has been growing less than the Metropolitan Region average, both in terms of its economy and population. From 2000 to 2012, Fortaleza's economy grew 4.8% a year, a little bellow the Metropolitan average which is estimated at 6.4% a year; Fortaleza's population increase was of only 1.4% a year, also below the estimated Metropolitan average of 1.8% a year.

EVOLUTION AND AGE STRUCTURE OF THE POPULATION

In 2010 Fortaleza had a population of 2.45 million inhabitants, according to the Demographic Census (estimated at 2.5 million inhabitants in 2012). Fortaleza is the second largest city of the Northeast population wise, behind Salvador, and has the region's highest population density, with 7.786.52 inhabitants per square kilometer (data from 2010), almost double Salvador's population density (3.859.35 inhabitants per square kilometer).

From 2000 to 2010, the population of Fortaleza grew at about 1.4% a year, more than Salvador's demographic movement, with a growth of 0.9% a year, and higher than Recife's, with an increase of only 0.8% a year. In the same period, Fortaleza's population growth was also slightly superior to Ceará's, which registered growth of only 1.3% a year.

Fortaleza's low population growth was a direct result of a decline in the fertility rate - from 2.06 (births per woman of 10 years or older) in 2000 to only 1.69 in 2010. Even so, the population of the municipality grew more than the average of the State of Ceará which had a fertility rate higher than the Capital's; the difference can be explained by the migratory movement from the interior to the capital. In 2010, the average fertility rate of Ceará was still at 2.21 births, although it has considerably declined since the 2.69 registered in the year 2000. In the municipality: From 2.06 births per woman (aged 10 or older) registered in 2000, the fertility rate dropped to 1.69 in 2010, well below the State's average, which was estimated in 2.21 in this last year.

Although there is now updated data concerning the migratory flow, throughout the decades Fortaleza has been the destination of migrants from the State's interior, especially during periods of drought and disorganization of the rural economy, and even from other States in the Northeast. In 2010, according to the Census, about 28.77% of Fortaleza's resident population were not natives. This movement has been declining in the last decade, so much so that in 1991 the percentage of non-native inhabitants reached around 40%, according to data from Annual Ceará.

In the last decades migration from the rural environment and interior cities to the capital has been restrained due to the combined effect of income redistribution policies, actions for drought mitigation, and the process of urbanization in medium sized countryside towns. The other municipalities of the Metropolitan Region of Fortaleza have also been sharing the absorption of migrants with the capital given the growth of economic activities in those municipalities and the increased employment opportunities. Housing policies, with the spread of housing complexes in the capital's periphery, seem to guide these migrants to the fringes of the city in the neighboring municipalities.

The share of Fortaleza in the overall population of the State has been relatively stable at around 29%, but the Capital's participation in the MRF's population dropped 4 percentage points in ten years: it went from 72% in 2000 to 68% in 2010. The larger metropolitan population growth, when compared to the State, leads to a three percentage point increase in its participation on the total population of Ceará.

AGE STRUCTURE

Similarly to what is happening throughout Brazil and Ceará, the municipality of Fortaleza is going through a "demographic transition", with a significant change in the age structure of the population: a declining share of children and teenagers, a moderate increase of the Working Age Population, and a quick increase in the elderly population. The phenomenon is the result of the combined effect of the drop in the fertility rate and the increase in the population's life expectancy. Despite the reduction in infant mortality (as we will see later on) between 2000 and 2010,the school-aged population (pre-school and elementary school I and II) decreased its share of the total population - from 29.3% (2000) to only 22.6% in 2010. Young people between 15 and 19 years old, high school aged, lowered their share of the municipal population from 11% to 9.1% between 2000 and 2010.

From 2001 to 2012, the population up to 14 years old declined, in absolute terms, and those between 15 to 65increased, especially the senior population, which went from 5.2 thousand people to 6.6 thousand (an increase of 1.4 thousand).

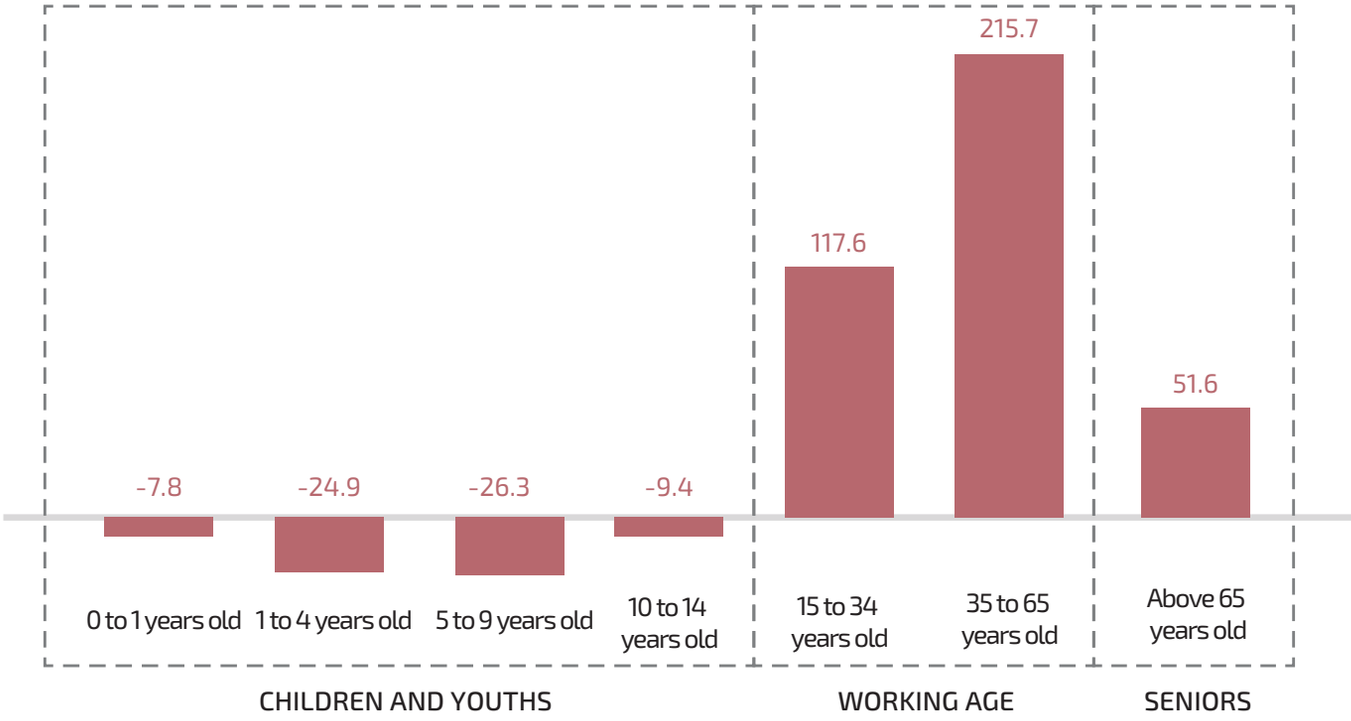
All age groups below 35 registered a reduction in their share relative to the overall population, while the share of the group from 15 to 34 remained practically stable and the following groups grew at the these rates: the group of 35 to 65 year old's grew 5%, the elderly group (above 65 years old) grew at 1.4%. The population's aging strongly pressures social security and the State's health system.

The positive side of this change in age structure is the growth of the group that forms the main base of the working age population. If, on the one hand, this growth creates an added demand for jobs, it also offers a great opportunity for Fortaleza's economy, with the reduction of demographic dependency (active/inactive).

This movement of the age structure highlights a negative rate of growth in the groups below or up to 14 years old: the 0 to 1 year old population decreased 2.6% a year; the 1 to 4 year old group declined to around 1.7% a year, while the 5 to 9 year old group registered a drop of 1.2% a year, and the 10 to 14 years old age range had a reduction of 0.6% a year. On the other hand, in that same period, there was an increase of 3.3% a year of the elderly population (above 65 years old).

Throughout these nine years (2001/2012) there was a decrease (in absolute numbers) of 68.4 thousand children and school-aged young people (0 to 14), which reduced the demand for schools and, which therefore should have facilitated government initiatives for improving education in the municipality. Considering this reduction, in absolute terms, of the school-aged population, the municipality's educational advancements were still modest as the demand declined considerably in this period. On the other

Graph 1 – Population variations per age group (a thousand people) – 2001/2012



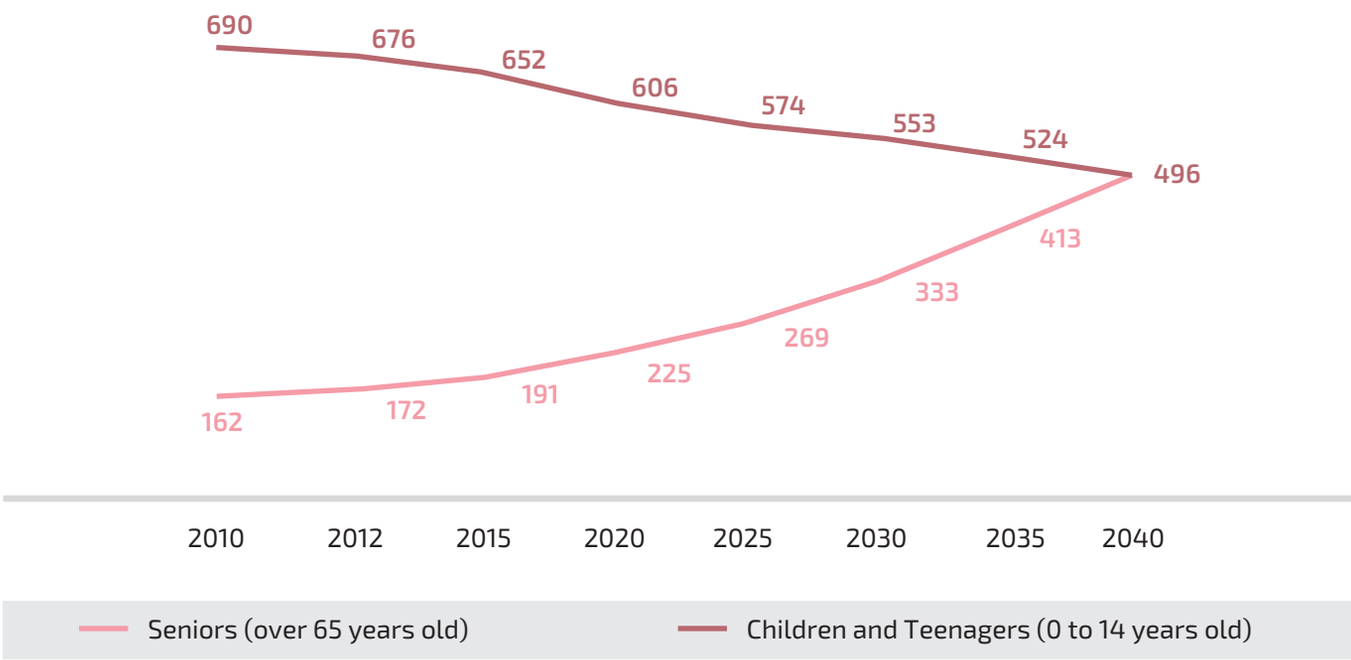
Fonte: Plano Fortaleza 2040 adaptado de Ipece, 2012.

hand, the senior population (over 65 years old) increased by 51.6 thousand people, pressuring social security and health costs (see Graph 1).

This trend will likely intensify during the next decades, combining the effect of the maturing of the current age structure with the low fertility rates and the increase in the population's life expectancy. Considering the structural trends for the evolution of the population and age groups, we will reach 2040 with a senior population (over 65 years old) of 497 thousand people, which would correspond to 15.8% of the municipality's total population, more than doubling the current 6.6%. Since, at the same time, the population of children and teenagers tends to decline, in 2040 it will be practically the same as the senior population. As graph 9 shows, in 2010 Fortaleza has 690 thousand children and teenagers (population between 0 and 14 years old) and 162 thousand seniors, but throughout the years the difference has been rapidly decreasing; so much so that in 2040 there will be 496 thousand and 497 thousand respectively, as shown in Graph 2.

As this movement confirms itself, Fortaleza's demand for schools will fall considerably, with a decrease in enrollments, especially for Elementary School I and II, which already have a high rate of school attendance). On the other hand, the process of population aging is speeding up, along with all of the associated health and social security costs. In 28 years (2012/2040), there should be an increase

Graph 2 – Future projections of senior, child, and teenager populations in Fortaleza



Fonte: Plano Fortaleza 2040 com base em dados do IBGE, 2010.

of almost 325 thousand seniors in Fortaleza, at the same time as the number of children and teenagers (up to 14 years old) will decline by 180 thousand.

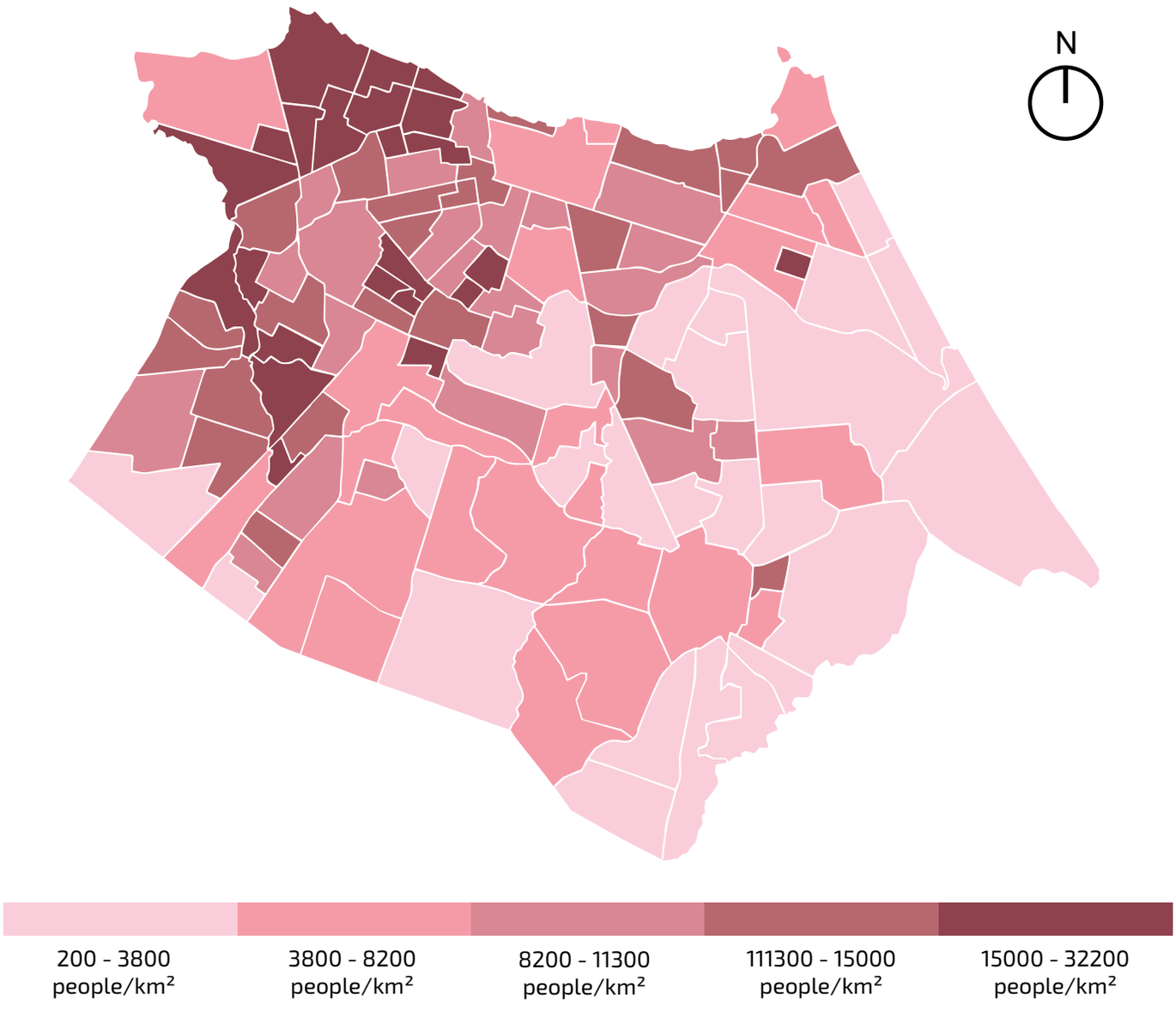
On the other hand, Fortaleza should still benefit from the so called "demographic bonus", with a reduction of demographic dependency due to the increase in the population of working age (people from 20 to 64 years old) when compared to the non-working age population, a combination of the increase in seniors and the decrease in children and young people. Consequently, demographic dependency will drop from 53.6%, in 2010, to around 46.1% in 2040, a reduction deriving from the decline of the number of children and teenagers despite the growth of the senior population.

This positive aspect of the drop in demographic dependency is counterbalanced by the need to generate a large volume of jobs in order to keep up with the rise in the population of working age. Considering the age group between 20 and 64 years (a range smaller than the IBGE's definition of the working age population, which is 14 to 64 years old), there will be an increase of 550 thousand people able to work (from 2010 to 2040). It is also important to consider that the non-working group will be greatly and gradually dominated by the senior population; in 2010 there were 4.3 children and teenagers (population from 0 to 14 years old) for every senior. This number will drop to one child and teenager for every senior in 2040.

POPULATION WITHIN THE TERRITORY

The population of Fortaleza is distributed across the municipal territory with a moderate concentration in two Regions: Region V has the biggest percentage of inhabitants in the city, with 22% of the total (data from 2010), followed by Region VI, with the second highest population concentration with 20% of the total (therefore, together they concentrate 42% of Fortaleza's population). The smaller Region in terms of population is IV, with only 11% of the municipality's total; the other 3 regions concentrate around 15% of Fortaleza's inhabitants.

Figure 15 – Population density in neighborhoods



Source: Fortaleza 2040 Plan.

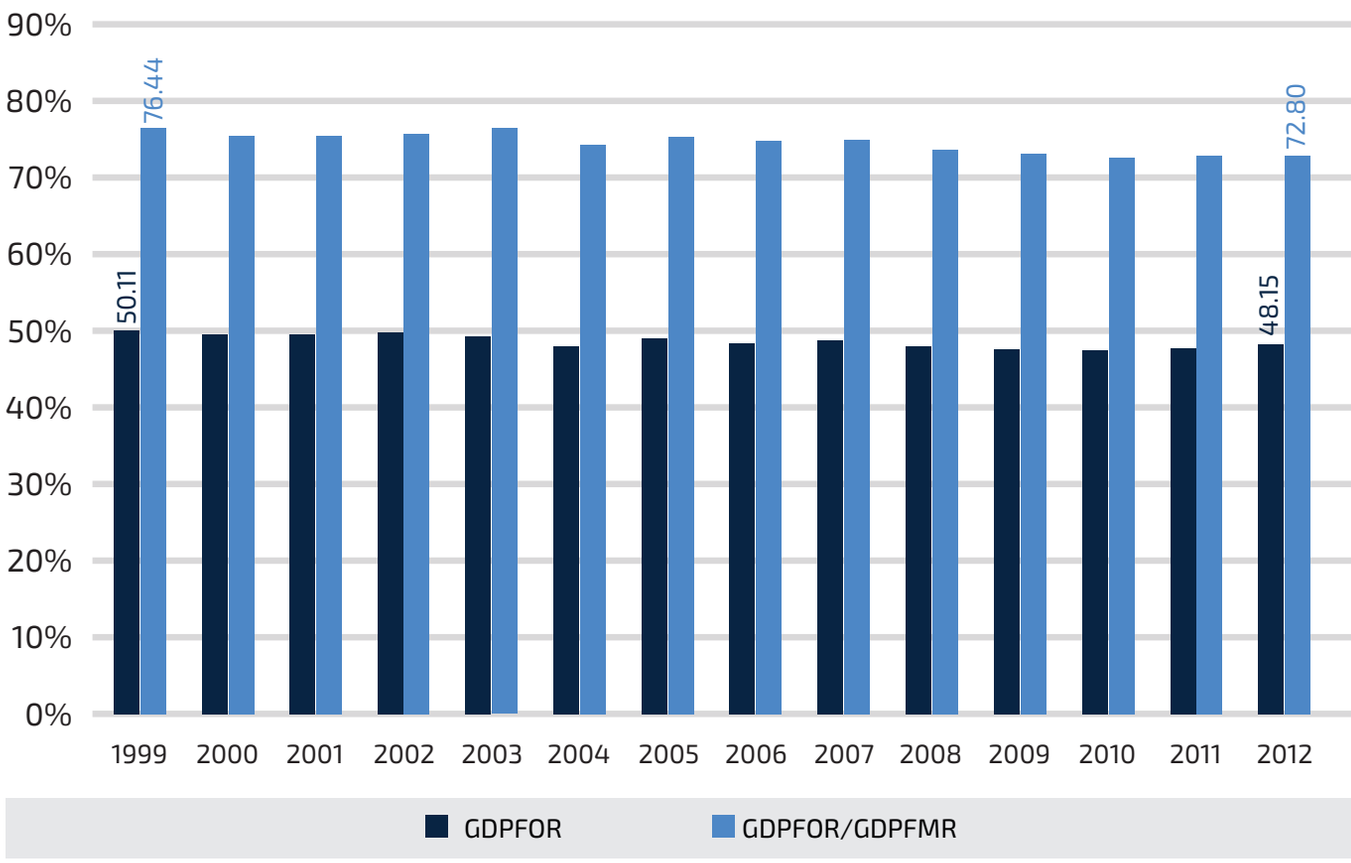
As shown in Figure 15, the Region V and VI neighborhoods, with the biggest number of inhabitants, have a low population density because of their territorial extension. Particularly Region VI, with several neighborhoods with populations higher than 30 thousand inhabitants, these are neighborhoods with lower population density, including Mondubim. The neighborhoods with the highest population density are in Region I, notably the Pirambu neighborhood, with a density of 330 inhabitants per square kilometer, and Barra do Ceará, with 175 inhabitants per square kilometer.

COMPETITIVENESS AND ECONOMIC DYNAMICS

GDP - GROSS DOMESTIC PRODUCT

Fortaleza's Gross Domestic Product (GDP) reached 43.4 billion in 2012 after an average annual growth of 3.5% between 1999 and 2012, making Ceará's capital the Northeast's third economy. Fortaleza's GDP grew continuously in the period from 1999/2012, going from R$ 23.6 billion to 43.4 billion, but suffered a small decline of 2.7% in 2012. In that same year, the Brazilian economy practically stopped, with growth of

Graph 3 – Fortaleza's share in the GDP of the FMR and the state of Ceará – (%)



Source: Fortaleza 2040 Plan based on data from the IBGE, 2012.

only 0.63%, but Ceará suffered a powerful economic downturn (a decline of 2.76% of the GDP). This was another year of drought which, evidently, affected the economy of the entire State, but had its impact in the Capital mitigated by the Commerce and Service activities that grew in 2012. According to Ipece, in 2012 Ceará's farming and cattle raising, badly shaken by the drought, experienced a dramatic reduction in production of around 20%, bringing down Ceará's whole economy.

Even with its economic growth over the course of more than ten years, Fortaleza'sshare of the Metropolitan Region's and the State's economy decreased, as it grew slightly less than them. In 1999 Fortaleza's economy contributed 50.1% of the state's GDP and 76.4% of the Metropolitan Region's. These percentages dropped in 2012 to 48.2% and 72.8% respectively (Graph 3). The loss of this relative weight became more expressive beginning in 2008; although it cannot be considered a trend, the main investments announced for Ceará are concentrated in other municipalities of the Metropolitan Region, and even in the semiarid region.

The GDP per capita of Fortaleza, estimated at R$ 17.359,00(in 2012), is larger than Salvador's but much smaller than Recife's.

COMPETITIVENESS

Despite having economic growth superior to that of other great Northeastern capitals, Fortaleza's competitiveness level is still low and inferior to Recife's and Salvador's. Measured by Endeavor's[2] index of Entrepreneurial Cities, Fortaleza is the 30th city among the total of 32 that were analyzed, with 4.82 on a scale of 0 to 1, ahead only of Teresina and Maceió (Endeavor, 2015).

Fortaleza's competitive capacity is limited by a lag in technology, the modest level and quality of education, although better than in other Northeastern capitals, a deficiency of professional qualifications, a disorganization of space and of urban infrastructure, and inconsistencies in the regulatory and microeconomic system. According to the pillars defined by Endeavor's study (2015), Fortaleza follows the average of the Northeast, except in terms of "Regulatory Environment" and "Innovation", but has a very inferior performance compared to best practice in other areas; Recife, on the other hand, surpasses the Northeast's average in almost all criteria, except Culture, although it also has inferior performance when compared to best practice.

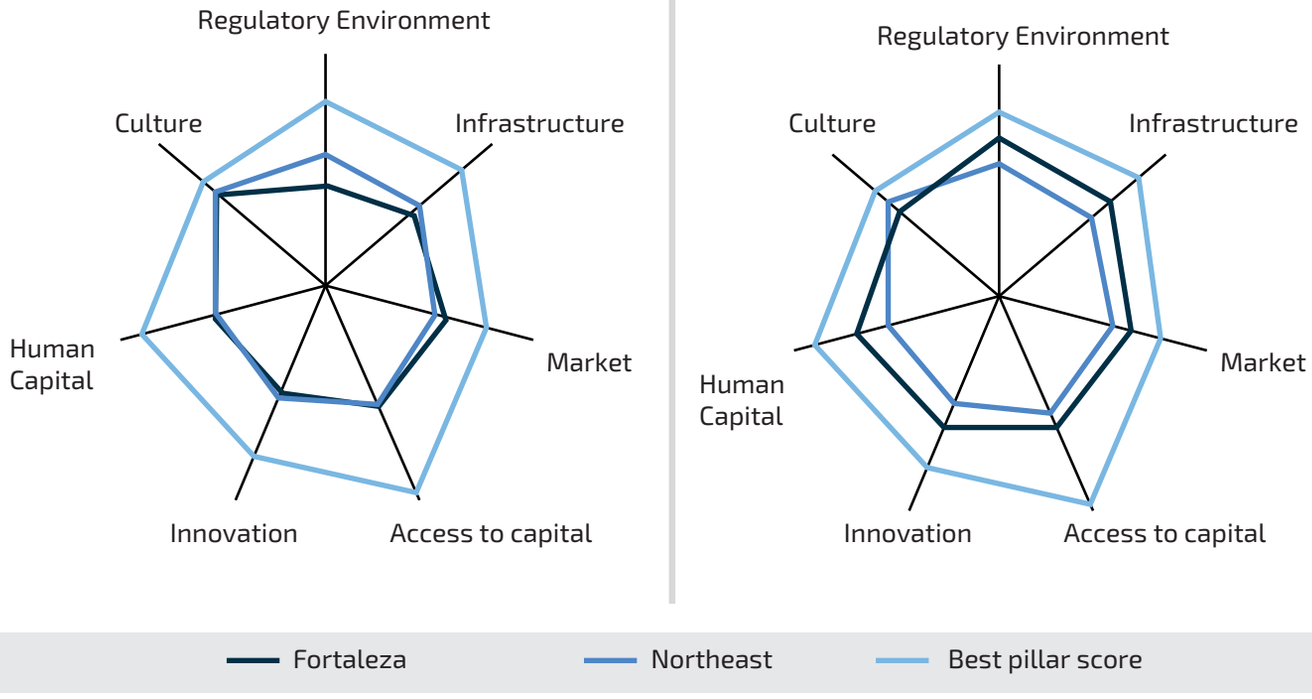
PRODUCTION STRUCTURE

In the last decades, Fortaleza's economy has been going through important changes at its economic base, affirming itself as a city of commerce and services, although it still has an import share of the State's and the Metropolitan Region's industries. Beginning at the turn of the century, the whole of the State of Ceará, and largely Fortaleza, attracted intensive industrial investments in labor, encouraged by a combination of tax incentives, geographic location, and a cheap labor force.

In recent years, the economy of Ceará has been experiencing a diversification of its production structure, with the revitalization and modernization of industry, especially in leather, footwear, textiles,clothing, metal-mechanics, and food and beverages. Aside from changes in the industrial

[2] The Entrepreneurial Cities of Brazil Index uses 60 indicators organized into seven pillars: Regulatory Environment, Infrastructure, Market, Access to Capital, Innovation, Human Capital, and Culture.

Graph 4 – Comparison between entrepreneurship rates – 2015



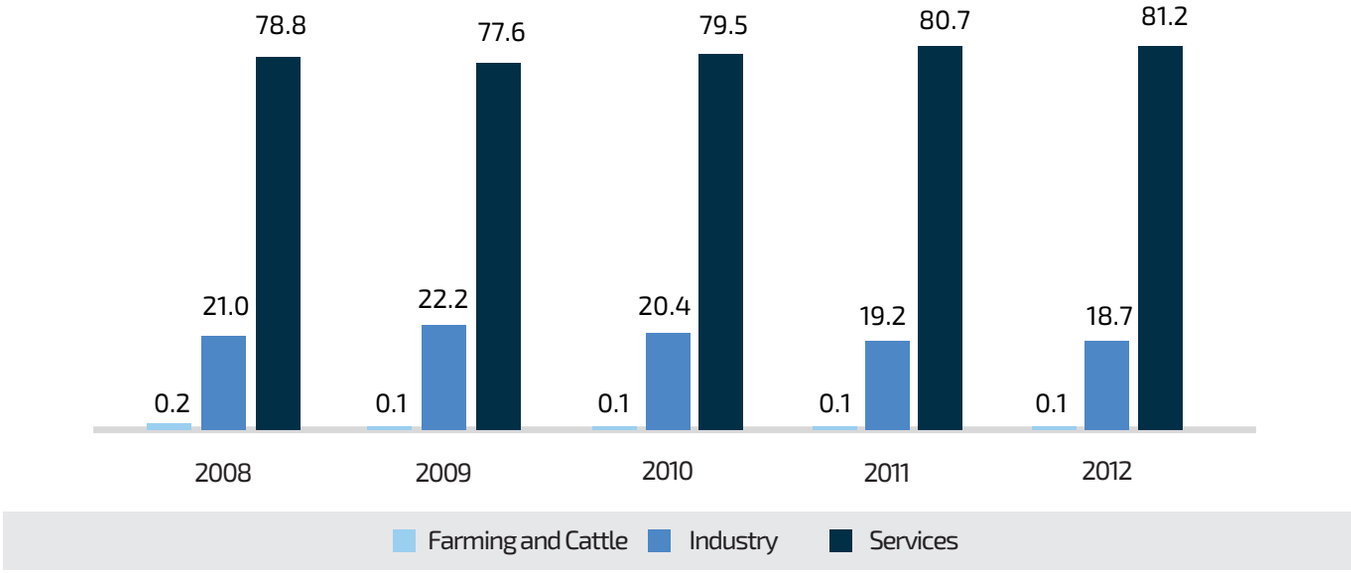
Source: Fortaleza 2040 Plan adapted from Endeavor, 2015

sector, there was also an expansion in tourism, shrimp farming, and fruit farming, contributing to a larger external integrationwithin Ceará's economy. The majority of the productive investments in this period happened outside of Fortaleza, especially in other Metropolitan Region municipalities, on account of tax incentive regulations or the land price differential. Fortaleza's economy affirmed itself as a center for services, but the clothing and food and beverages industries still havesignificant importance in the capital's economic structure.

Fortaleza is a Service and Commerce economy, activities that, together, in 2012 stood for around 81.2% of the municipality's total Gross Value Added (GVA). In the last years, as the economy of Ceará has become more diverse and industrialized, in Fortaleza the Service and Commerce sector's share of the GVAhas grown, going from 78.8% in 2008 to 81.2% in 2012 (see Graph 5).

The industrial sector (comprising the Processing Industry, Civil Construction, Mineral Extraction, and Public Utility Industrial Services - Siup) contributed to 18.7% of Fortaleza's GVA, but has been losing its participation relative to the municipal GVA.

Graph 5 – Production Structure of Fortaleza's Economy – % of GVA per sector



Source: Fortaleza 2040 Plan based on data from the IBGE, 2012.

The Service sector (Commerce, Services, and Public Administration) concentrates 80.02% of Fortaleza's formal jobs, a little less than it contributed to the 2012 GVA (82.1%). Within the sector, the Services segment corresponds to 42.7% of total employment; Commerce is around 19.2%, and Public Administration contributed with 18.08% (2013). Considering that commerce and services have a high percentage of informality, the contribution of these activities to Fortaleza's income is, surely, a lot bigger. Beside its prominent position in the productive structure, commerce and service activities registered increased share relative to the capital's total amount of formal jobs from 2000 to 2013.

Public Administration, an important activity for a state capital, decreased almost 7 percentage points in its share relative to formal jobs in Fortaleza between 2000 and 2013. In 2000, Public Administration was the second largest employer in Fortaleza, superior to Commerce, with 28.0% of formal jobs in Fortaleza, only inferior to Services. But, in 2013, its formal share of jobs dropped to 18.0%, second place to Commerce which reached 19,16% last year. The only activities that increased their share relative to total jobs were Services, Commerce, and Civil Construction, which went from 5.3%, in 2000, to 8% in 2013.

The processing industry is greatly concentrated in two industrial branches that make up around 65% of the activity's formal jobs: the "Textile and Clothing Industry", with over 43% of the total number of jobs in the processing industry, followed by the "Food and Beverages Industry", with 22.4% of total jobs. Although it has slightly reduced its contribution to total formal jobs in the processing segment, the "Textile and Clothing Industry" is still

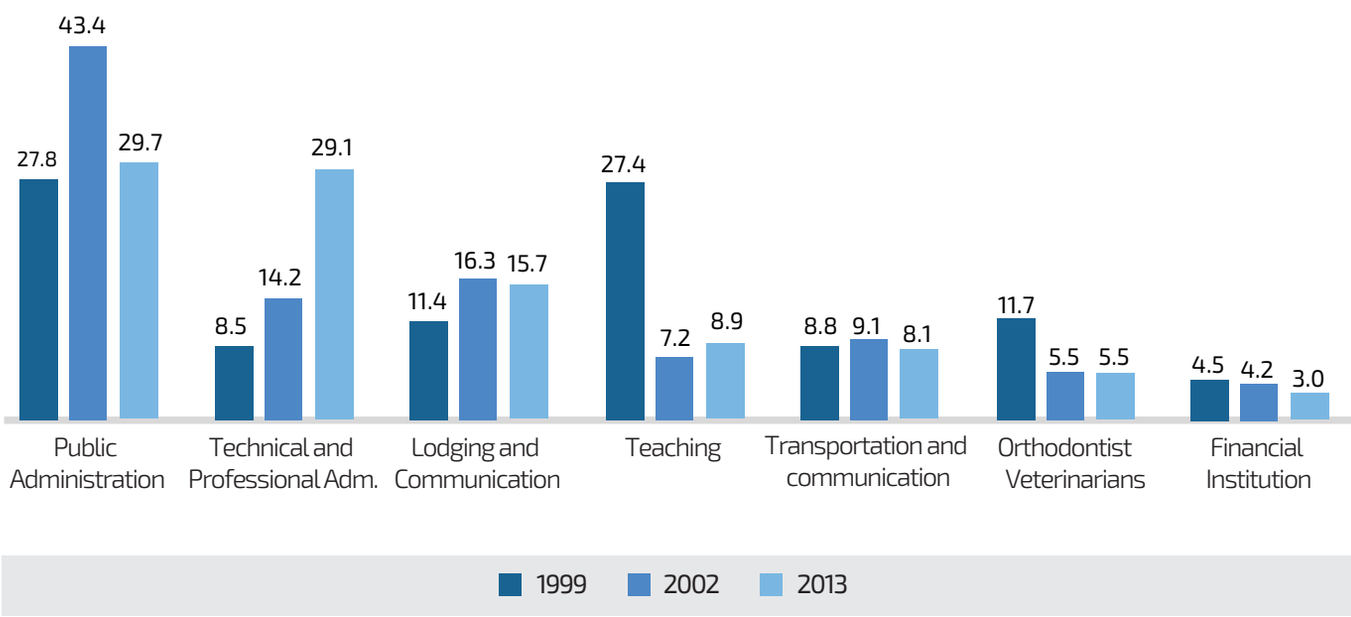
the largest one, and is mostly focused on clothing. It should also be noted that these numbers cannot express the full impact the activity has had on the economy and in the processing industry as it has a very high rate of informality which is not assessed by RAIS data (Annual Report of Social Indicators).

After the "Textile and Clothing Industry" and the "Food and Beverages Industry", the third largest processing industry branch is the "metal industry", with around 7.9% of the formal jobs total, followed by the "Paper and Graphics Industry", with 6% in 2013.

Within the Services sector (Commerce, Services, and Public Administration), Public Administration leads the share of total formal jobs in Fortaleza, with almost 30%, but suffered a meaningful reduction since 2002, when it reached 43.4% (see Graph 6). The only segment in the sector that reported growth was Technical-Professional Administration, which went from 8.5%, in 1995, to 14.2% in 2002, jumping to 29.1% by 2013. The "Lodging and Food" sector, directly linked to tourism, makes up 15.7% of formal jobs in the capital's service sector (or 6.7% of the total jobs in the municipality), a little less than what was attained in 2002 (16.3%), highlighting a decline during a period in which tourism grew.

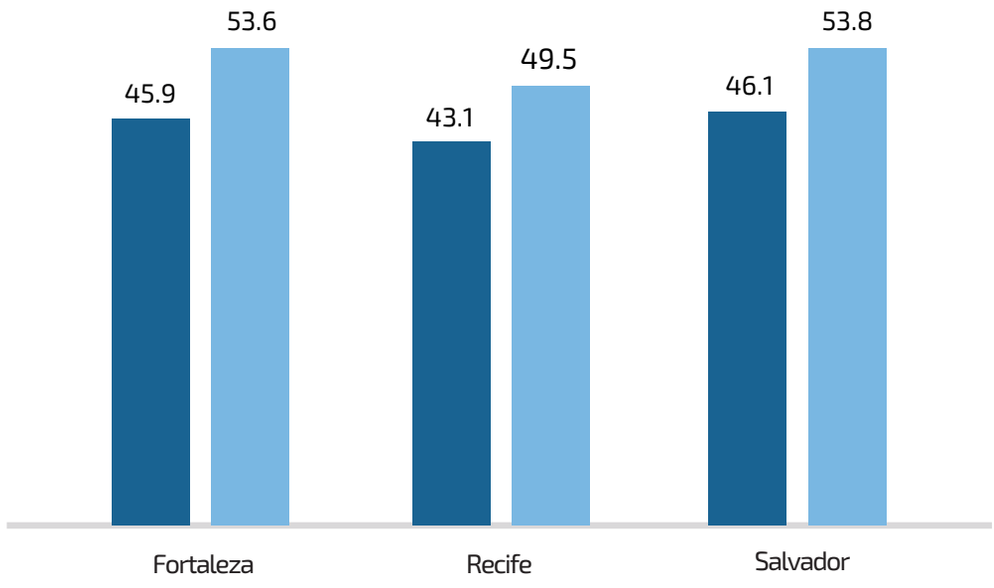
Formal jobs in the "Lodging and Food" sector takes an important share of tourism. But, according to the Department of Tourism of the State of Ceará, tourism is at the core of a production chain that corresponds to 19.85% of the municipality's GDP, measured through the income generated by the many activities that are linked to the arrival of tourists in the capital.

Graph 6 – Structure of Sectorial distribution of jobs in the service sector (%)



Source: Fortaleza 2040 Plan based on data from the RAIS/Mtb, 2014.

Graph 7 – Occupancy rate (number of occupied people/population aged 14 or more)



Source: Fortaleza 2040 Plan based on data from the IBGE, 2010.

In 2012, 3.04 million arrivals were registered at Pinto Martins Airport3 for different reasons, including business, which represents about 3.6% of total arrivals in Brazil and 19.1% of the Northeast's.

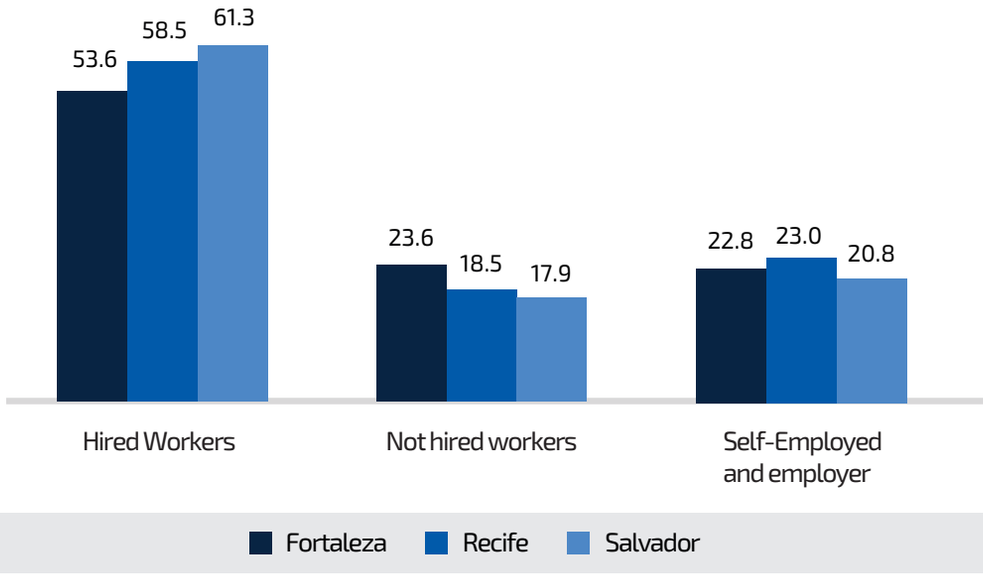
The evolution of the job market is the combined result of the dynamics related to the economy (GDP growth and changes in production structure) - profile and size of job offers - and the population, particularly the age structure which defines the share of active-aged population and ability to work.

In 2010, Fortaleza had an occupancy rate (the coefficient between the number of occupied people and population aged 14 or more) of 53.6%, above Recife's and slightly below Salvador's. During the last decade, Fortaleza's occupancy rate registered meaningful growth, going from 45.90%, in 2000, to 53.60% in 2010, as shown in Graph 7. Fortaleza's occupancy rate therefore registered an increase of 1.6% per year, practically the same as Salvador's, and a little above Recife's (1.4% a year).

The growth of the economy in Fortaleza during the last decade led to a decrease in unemployment. Unemployment in the capital reached 6.7% among the Economically Active Population (EAP) in 2014, declining substantially over the last four years. In

[3] Although Fortaleza is the gateway for tourists, they also visit other municipalities in the State, some in the Metropolitan Region, particularly Caucaia, Beberibe, Aracati, Aquiraz, Jijoca de Jericoacoara, Paraipaba, Trairi, Sobral, Paracuru and São Gonçalo do Amarante.

Graph 8 – Economy formality rate (% of formally or informally employed and self-employed) – 2010



Source: Fortaleza 2040 Plan based on data from the IBGE, 2010.

2010 the unemployment rate in the municipality reached 8.2%, displaying a downward trend that was closely followed by the MRF's average, reaching its lowest level in 2013, with only 6% of the EAP.

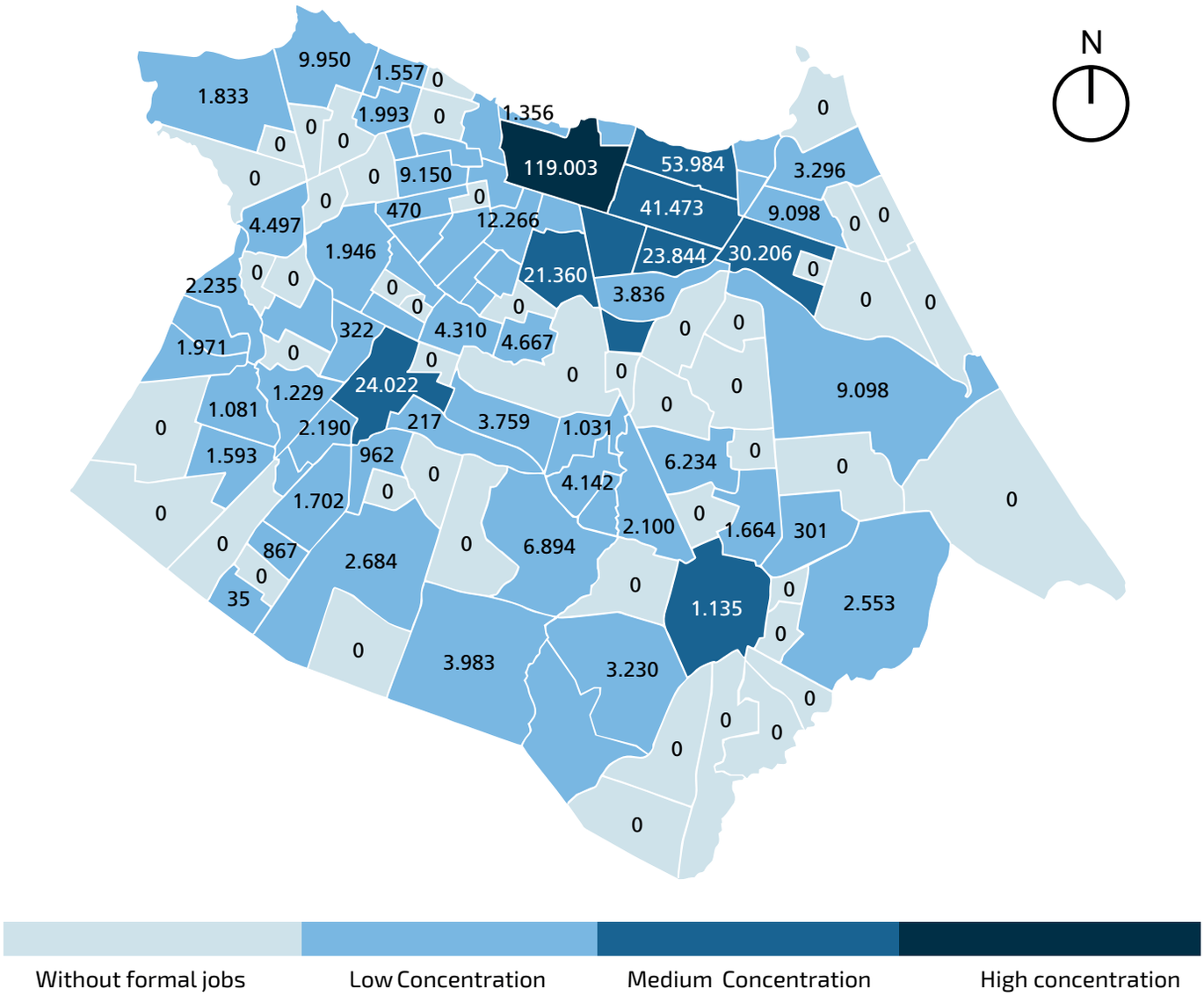
The economy of Fortaleza has a high level of informality. In 2010, around 23.6% of city's occupied population was not formally employed and 22.8% were self-employed and/or informal employers, with a total of 46.4% of the total occupied population working informally. This rate of informality is much higher to what is registered in Recife (41.5%) and in Salvador (38.7%), as shown in Graph 8. Salvador's economy has the highest formality rate of all three capitals, with 61.3% of the population occupied with hired jobs - almost 8 percentage points above Fortaleza (53.6%). Recife has the highest percentage of "Self-Employed and Employer", with 23% of the total, a little above what was registered in Fortaleza (22.8%).

TERRITORIAL CONCENTRATION

Fortaleza's economy is greatly concentrated in the city's Center and in some neighborhoods in Region II, when measured by the number of occupied people or number of businesses. In 2013, the Center had the highest concentration of businesses, with 7.800 formal companies; the second largest density of companies was in the Meireles neighborhood, with 4.211 formal establishments, followed by Aldeota and its 3.291 formal businesses. Although the data is an underestimation due to the economy's high degree of informality, the economic distribution across the territory is likely to be similar and it's likely the Center has a higher density.

The same economic concentration also expresses itself in the distribution of formal jobs across Fortaleza's neighborhoods. Figure 16 shows that the Center has the largest volume of jobs, with 119.003,

Figure 16 – Distribution of formal jobs across neighborhoods (people occupied by formal activities) - 2013

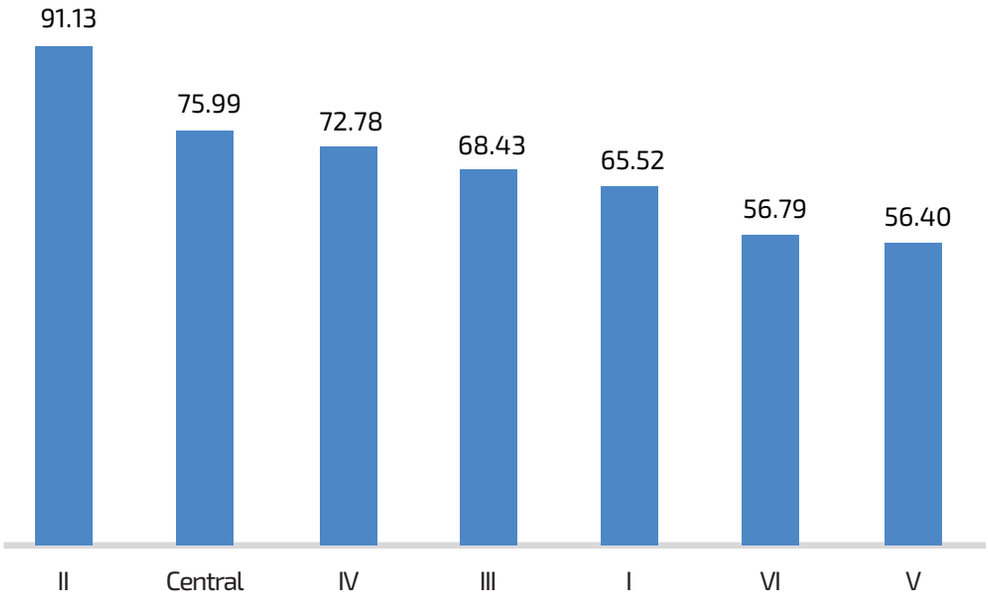


Source: Fortaleza 2014 Plan adapter from the SDE (with data from RAIS/MTE), 2013.

followed by Meireles, with 52.984 and Aldeota, ranking third with 41.473 jobs.

This concentration of jobs does not coincide with the distribution of the population in the territory. The Center, with the municipality's highest employment density, has the smallest population in Fortaleza; and, on the other hand, Regions V and VI, with large populations, have a limited number of people who are formally employed; the most heavily populated neighborhoods in Fortaleza - Mondubim, with 76 thousand inhabitants and Barra do Ceará, with 72.4 thousand, have only 2.684 and 9.950 formal jobs,

Graph 9 – Rate of local competitiveness (per Region)



Source: Fortaleza 2040 Plan based on data from Acep/SDE, 2015.

respectively. The outcome of this unequal territorial distribution of population and jobs has a great impact on the movement of people across the territory.

The economy's distribution in the municipal territory reflects and, at the same time, affirms the municipality's unequal local competitiveness, understood an advantage when it comes to attracting investors and maintaining sustainable economic activity. A study by the Municipal Department of Economic Development of Fortaleza created a local competitiveness index using 15 indicators distributed in four large determinants[4], highlighting the big differences in competitiveness in Fortaleza's territory. Region II has the highest competitiveness in Fortaleza, as shown in Graph 9, with large advantages concerning economic factors and market density, conditions that tend to be reinforced as they attract more investments and increase favorable conditions. The Center appears second in the competitiveness index, surpassing Region II in the indicator that measures the conditions of homes and, although it is not a residential territory, it relies on favorable sanitary sewage indicators.

Regions V and VI have the lowest competitiveness in Fortaleza, confirming the limited presence of businesses and formal jobs, having an especially frail market density indicator. This situation tends to consolidate itself, as it is not attractive for investors, unless governmental actions are implemented for improving competitive advantages.

[4] The Entrepreneurial Cities of Brazil Index uses 60 indicators organized into seven pillars: Regulatory Environment, Infrastructure, Market, Access to Capital, Innovation, Human Capital, and Culture.

ENVIRONMENTAL CHARACTERISTICS

Fortaleza is located in a semiarid region with a tropical wet and dry climate, with a temperature average of 26.6°C,maximums of 31°C and minimums of 22.5°C. Ceará's capital has an average rainfall of 338 millimeters, but it has a very high annual sunshine average of around 2.840 hours per year, and a very low degree of cloudiness. This combination of high sunshine and low cloudiness leads to a high evaporation rate, with an annual average reported at almost 1.500 mm, with average monthly values between 67.5mm in April and 163.9mm in October; leading to high relative humidity.

The municipality of Fortaleza is inserted between the Metropolitan Basins, which form the hydrological region, consisting of a series of independent basins, notably the Choró, Pacoti, São Gonçalo, Pirangi, Ceará and Cocó rivers as the main collectors of drainage and the Ceará/Maranguape and Cocó/ Coaçu systems. These basins correspond to an area of 15.085 km2, 10% of the state of Ceará. In the interior of the metropolitan basin, and more specifically in the territory of Fortaleza, there is a sub-division of smaller basins: the Drainage Basins of the Maranguapinho River, Vertente Marítima, Cocó River and Pacoti River.

Aside from the perennial and semi-perennial rivers - Cocó, Maranguapinho, Ceará, and Pacoti - Fortaleza also has a large variety of lentic bodies of water, which are mostly represented by lagoons and dams, with an undetermined number of lake water bodies existing in Ceará's capital; it is estimate that over fifty water surfaces, either lakes or lagoons, are part of the capital's landscape.

As well as more expressive bodies of water, such as the Cocó and Maranguapinho rivers - which limit the sub-basins of Fortaleza - there are dozens of other rivers and streams, such as the Pajeú river, where only two green areas are left on the banks of the river, the Maceió stream, and the Pacoti river, which marks the border between the municipalities of Fortaleza and Aquiraz. The banks and its mangrove forests now are part of the APA (Environmental Protected Area) of the Pacoti river, with 2.914,93 hectares.

In relation to lakes and lagoons, the municipality of Fortaleza has many water surfaces. The complex of lagoons of Precabura-Sapiranga stands out for its size, as well as for being a natural border between the municipalities of Fortaleza and Eusébio. This water complex has a large water surface of around 3.600.000m2. The Coaçu upstream river constitutes a macro-drainage system that flows to the Precabura lagoon; only half of its water surface (with an area of2.960.000 m2) is located in the municipality of Fortaleza, as the remaining part is found at Eusébio. The margins of the lagoon have been anthropized and urbanized and now a large portion of the margins are devoid of riparian forest, with the occurrence of fruit trees such as cashews, mango, and palm trees and scarce fragments of native forest.

The basins belonging to the Metropolitan Region of Fortaleza have been suffering, historically, from a rapid process of degradation, entailed by the improper use in urban areas as well as the indiscriminate occupation along the drainage network because of the spread of communities (slums, irregular settlements, and small villages) along the margins of water streams and sources. The communities that have settled throughout the

Maraponga Lagoon

decades contribute to the degradation of water quality, given the lack of proper infrastructure and sanitation, directly influencing the quality of the water at Fortaleza's springs.

From the viewpoint of nature and forests, the municipality of Fortaleza comprised, originally, of three phytoecological units, which are: the Plant Complex of the Coastal Plain (CVPL), and the Tableland and Cerrado forests. The original strips of vegetation were gradually suppressed, with only areas that have been deemed Preservation Units, some patches of Permanent Conservation Areas (APPs), and very peripheral areas still partially untouched by the urbanization process.

What can currently be observed is that the natural vegetation has been almost completely replaced by anthropized environments, with only very rare fragments of the territory's native vegetation remaining. In 2012, Fortaleza's green area accounted for only 2.7 square meters per inhabitant, less than one quarter of what is recommended by the UN, that is, 12 square meters per inhabitant. In only ten years, from 2004 to 2014, the natural areas of Fortaleza were reduced from 35.6% of the territory to only 21%.

Unruly urban occupation has resulted in a large impact that jeopardizes the city's environmental quality, making Fortaleza more vulnerable to environmental hazards, particularly floods, inundations, groundwater and soil contamination, and the compromising of its pedological/geological structure. Man-made interventions that neglect the natural structure of the territories lead to serious socio-environmental problems; when combined with the lack of basic sanitation infrastructure, these problems become worse, frequently reaching a status of public calamity.

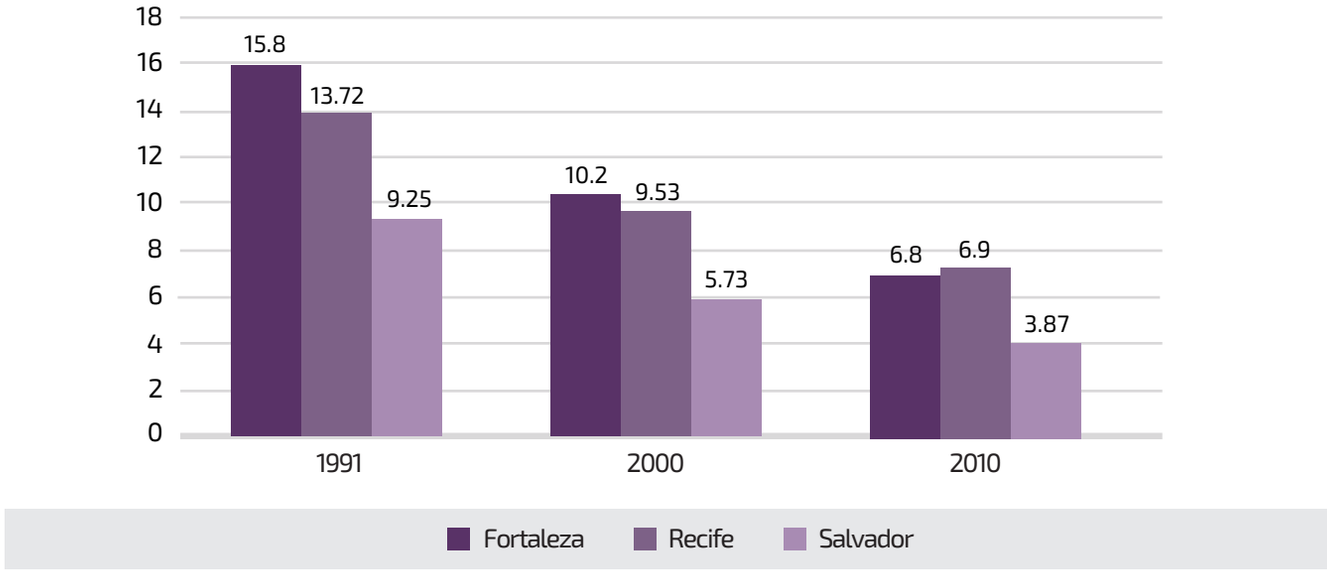
Important considerations included in Green Growth should be focused on water. This asset, essential to human survival, becomes a target for fundamental strategic anticipation when it's found in the urban environment. In the case of Fortaleza, we will have to consider several scales of problems that need to be addressed in advance. After a history of gradual implementation of dams and reservoirs in peripheral regions, the city began to depend mostly on the waters of the Jaguaribe system, whose capacity and sharing, which are essential for agriculture and urban usages in other regions, are pointing to the inevitability of three courses of action: the additional use of water supplied through an interconnection with the São Francisco river basin, combined with efficient use and a culture of reuse.

Aside from these aspects, the future of Fortaleza's water points to the need for urban planning and engineering actions regarding urban drainage and prevention against floods and inundations. And so it will be necessary to solve the existing traditional flooding spots, carry out the restoration of the subsidiary system of water resources, improving the constant maintenance procedures for storm drains, and creating a suitable network of retention basins.

EDUCATION AND INNOVATION

The level and quality of education in Fortaleza are, in general, inferior to those in large South and Southeast cities, but better than those of other Northeastern capitals. Particularly when it comes to grades on the Basic Education Development Index

Graph 10 – Illiteracy rate (% of illiterate population aged 10 years old or more)



Source: Fortaleza 2040 Plan based on data from the Ipece, 2012.

(Ideb), a learning measurement tool, Fortaleza stands out in the region.

The illiteracy rate in Fortaleza has suffered a dramatic reduction during the last decades, largely following the national and regional trend. From 1991 to 2010 (a little under 20 years), illiteracy declined from 15.8% of the population aged 10 or more to 6.8%, less than half of what it used to be. The State of Ceará and the Metropolitan region's performance were similar to Fortaleza's: illiteracy fell by half in Ceará, although it reached 2010 with a rate higher than Fortaleza had in 1991; the same happened with the Metropolitan Region - 36.86% of the population aged 10 or more was illiterate in 1991, a rate that declined to 16.63% by 2010 (see Graph 10).

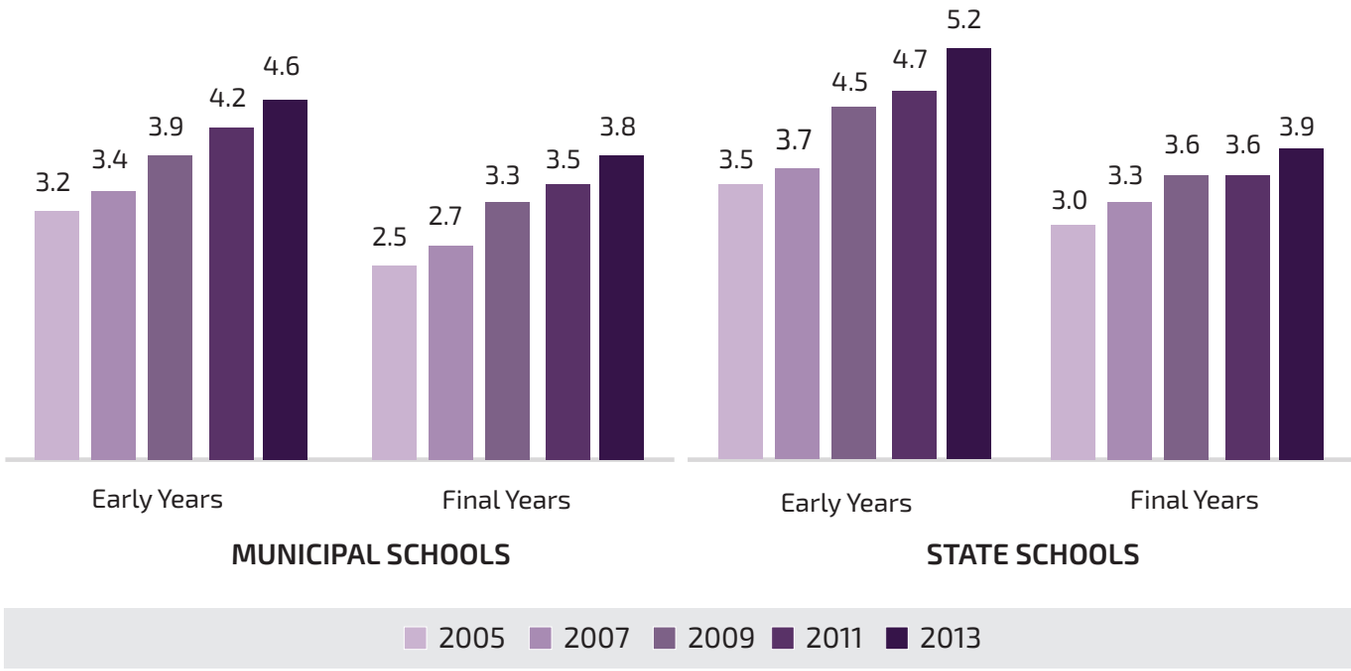
Illiteracy is very low among children and young people, only 2.1% (2010), but it grows in older age groups, reaching its highest rate among seniors (population over 60 years old). This illiteracy distribution across age groups shows the trend of a declining total number of illiterates relative to the total population, even without public actions to deal with illiteracy among older age groups.

The education level (the average number of years of study) of Fortaleza (measured for metropolitan regions) experienced continuous growth between 2001 and 2012, going from 6.63 years to 8,74 years. However, the population of Fortaleza (Metropolitan Region) has less years of schooling than Recife's (9.47 years) and Salvador's (8.90 years), not to mention Florianópolis, with 10.18 years of schooling.

ELEMENTARY SCHOOL

When it comes to the schooling of children and young people, Fortaleza surpasses Recife and

Graph 11 – Evolution of Ideb scores for Municipal and State Schools



Source: Fortaleza 2040 Plan based on data from the Inep, 2013.

Salvador, with better grades in the Basic Education Development Index (Ideb) for the early and final cycles of Elementary School. In the municipal schools as well as state schools of Fortaleza there was a continuous improvement in the quality of teaching and learning along the five years of the analysis (see Graph 11). Although we might observe that this improvement happened similarly throughout Brazil, including Salvador and Recife, the progress registered in the capital of Ceará was more significant.

The Ideb grade for public municipal schools went from 3.2, in 2005, to 4.6, in 2013 for the early cycle, and just 2.5 to 3.8 in the final years. The state schools were, already in 2005, at a stage above that of municipal ones in both levels (early and final years) and kept their lead. In any event, the final years of municipal schools, albeit maintaining a low score (only 3.8 in 2013) grew considerably from the very low 2.5 registered in 2005, almost reaching the state school's score in 2013 (3.8 against 3.9). It becomes clear that the early years of state schools and much as municipal ones are of a much higher quality than that of the final years.

The state's public schools, which have had better quality of teaching, particularly in early years, represents only 21.1% of the total enrollments in Elementary School (2012) in Fortaleza, against the municipality's 58.9%. At a preschool level, the private education sector ranks first with 65% of enrollments (the municipal network is left with 35% of preschool enrollments), highlighting the stark absence of the public sector in the early formation of Fortaleza's children. The state's network increased its share of enrollments as it moved up to higher levels of

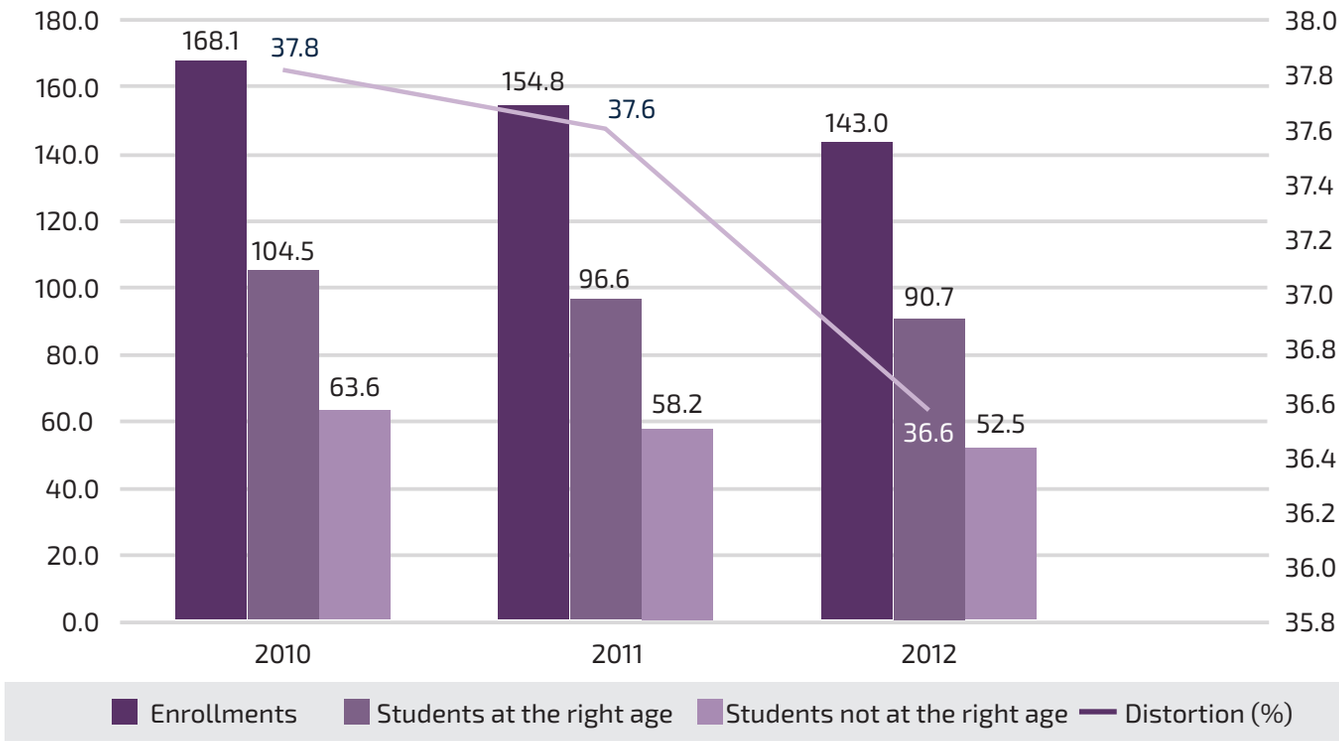
education, reaching 69% in high school (the private sector also has an important role at this level, taking up 29% of enrollments).

The private teaching sector was responsible, in 2014, for 60.8% of enrollments in daycare and 64.4% in preschool, in both instances. Regarding elementary schooling, the private sector represents 50.8% of enrollments in the early years, and 38.1% in the final years. In high school, the private sector's share is lower in all of the examined capitals, reaching 27.9% in Fortaleza.

Since private schools have registered better Ideb scores than public schools, the relative weight of the total number of enrollments is reflected in the resulting quality of the teaching in the capital. Although we do not have data on the municipality, the scores for the state of Ceará show a significant difference compared to the quality of private schooling, which probably also occurs in the capital. In 2013 Ceará's private schools scored 6.1 in the early Elementary years, while the public schools scored only 5.0. The gap between the quality of private and public schools increases as we move up the levels of teaching: there's a 1.9 year difference in final elementary school (a score of 5.8 against 3.9) and 2 years in high school (5.3 against 3.3).

This difference makes up the main base of the social inequality gap, as poorer citizens, who cannot afford private education, will be less prepared and qualified for life and for a job market that is more and more demanding of professional qualifications and proficiency in math and Portuguese.

Graph 12 – Enrollment and age/grade distortion in Fortaleza's municipal network of schools (a thousand enrollments)



Source: Fortaleza 2040 Plan adapted from SME, 2013.

From 2010 to 2012 there was a reduction in the number of elementary school enrollments in the public municipal network. Considering the high degree of schooling at this level of education, even though the age/grade distortion remained practically the same, the decline in enrollments is directly caused by an absolute decrease in the number of school aged children, as seen in the demographic analyses; consequently, from 2000 to 2010, there was a reduction of 29 thousand in the number of children between 5 and 9, and 10 thousand between 10 and 14. It is worth stressing that the number of students at the right age (reflecting the school-aged population that attends municipal schools) has been diminishing as much as the number of students out of school age. Data for recent years, 2010/2012, shows the reduction of the number of enrollments in municipal schools - from 168.1 thousand to 143.0 at the same time as the age/grade distortion also dropped from 63.6%, in 2010, to 52.3% in 2012, still quite a high percentage (see Graph 12).

The improvement in teaching in Fortaleza, measured by increased Ideb scores, coincides with the rise in education expenditures in recent years; however there is not a direct correlation, as the effects of this expenditure only appears over time.

HIGHER LEARNING

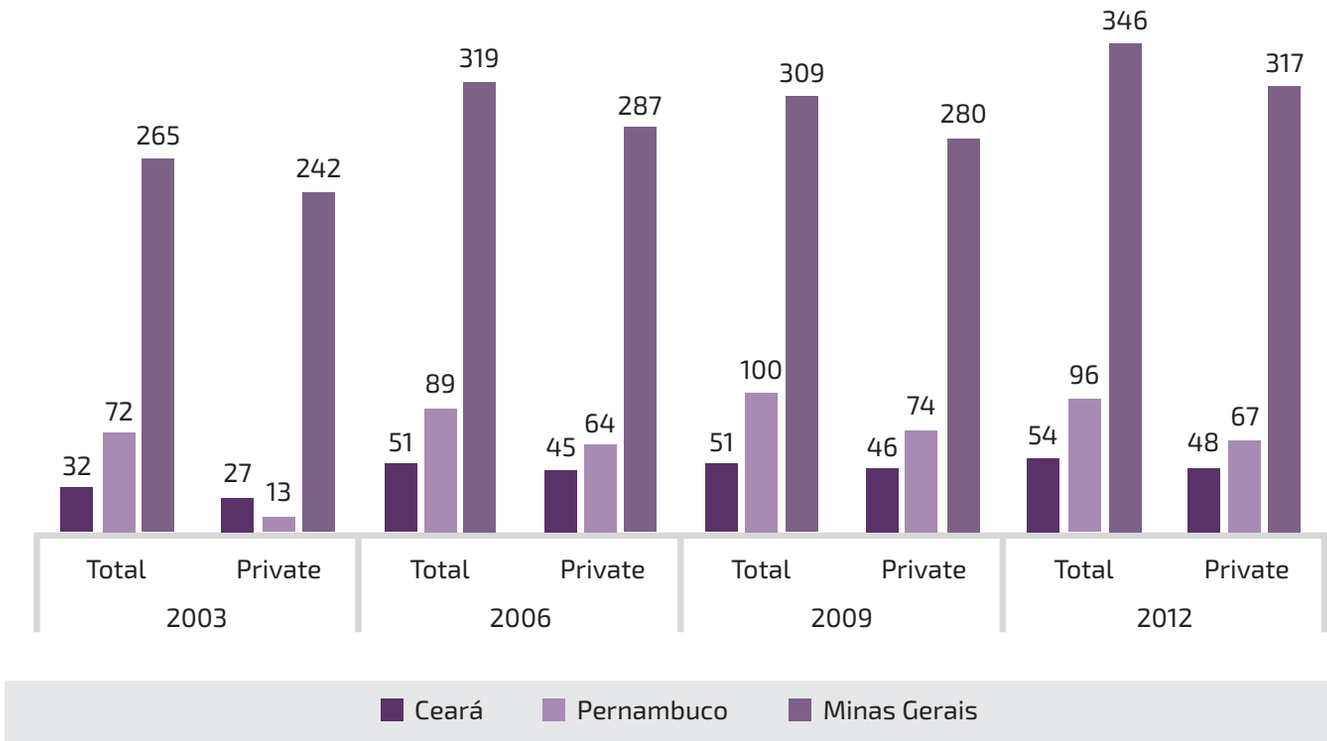
There has been, in the last decades, a continued expansion of higher learning in Ceará, concerning universities concentrated in Fortaleza as well as an important development in the countryside. Federal public education has been growing with the increase and re-qualification of the existing physical structure, as well as the installations of the Federal University of Ceará's (UFC) new campuses, especially with its countryside expansion. The UFC still has its practices mostly focused in Fortaleza's three campuses - Benfica, Pieie, and Porangabuçu - so the process of countryside expansion didn't alter the capital's leadership position in professional training and scientific and technological capacity in Ceará.

The Federal Institute of Education, Science, and Technology of Ceará (IFCE), previously Cefet, also carried out a daring program of investments to extend its activities throughout the state of Ceará, and also Fortaleza. Presently the IFCE has 27 campuses spread across the state's territory, including Fortaleza, thus enabling the vigorous expansion of graduate teaching, as well as technical, higher, post-graduation,correspondence courses, besides the Pronatec and Mulheres Mil programs. There are also post-graduation courses, which are offered as academic and professional master's courses.

Ceará's state universities - Ceará State University (Uece), Vale do Acaraú University (UVA), and the Regional University of Cariri (Urca) –maintained through state funding also expanded their activities, having received a great deal of attention from the State's government in the last eight years. Uece also has a headquarters in Fortaleza and activities in the municipalities of Itapipoca, Pacoti, Crateús, Quixadá, Limoeiro do Norte, Tauá, and Iguatu. UVA has headquarters and carries out activities in the city of Sobral, and Urca's main campus is located in the city of Crato, while it also has activities in the cities of Campos Sales, Iguatu, and Crato.

Higher learning expansion in Fortaleza (as the central part of Ceará) didn't limit itself to quantitative terms, but also qualitative aspects; there was a significant expansion in enrollments for graduation, technical and technological teaching and, above all,

Graph 13 – Evolution of the number of higher learning institutions (total and private) per state



Source: Fortaleza 2040 Plan based on data from MEC - Higher Learning Census, 2012.

post-graduation, which was enhanced with new master's and doctoral courses, located in Fortaleza. The UFC now boasts 39 doctoral courses, 54 academic master's and seven professional master's courses; the Uece has their own eight doctoral courses, an online doctorate and an inter-university doctorate program in partnership with the Uece, UFC, and Unifor, 16 academic master's and 10 professional Master's.

Of the 54 higher learning institutions in Ceará, 48 are private in their different segments (data from 2012), representing 89% of the total. In the last decades there has been a rapid increase in private universities in Fortaleza, like in the rest of Brazil, taking in a large and growing number of enrollments even whilst charging tuition; in 2003, private higher learning institutions represented 84% of the total, a rather high percentage, but still smaller than 2012's 89% (see Graph 13).

As a result of this private university expansion throughout these nine years, their participation in the total number of higher learning enrollments in Ceará also grew. In 2012, private schoolshad 97.190 enrollments, which represented about 56.2% of the total higher learning enrollments.

In general, private universities offer greater ease of access to young people who cannot obtain the results needed in the selection process of public universities; less demanding, private universities

enable the increase of higher learning attendance rates, with access to poorer students coming from public high schools. Through this a highly negative social paradox has been established (in Ceará, but also throughout Brazil):higher income young people going into public universities, free of cost and of better quality, while the poor are enrolling in private universities (non-profit or otherwise), which are paid and are of inferior quality.

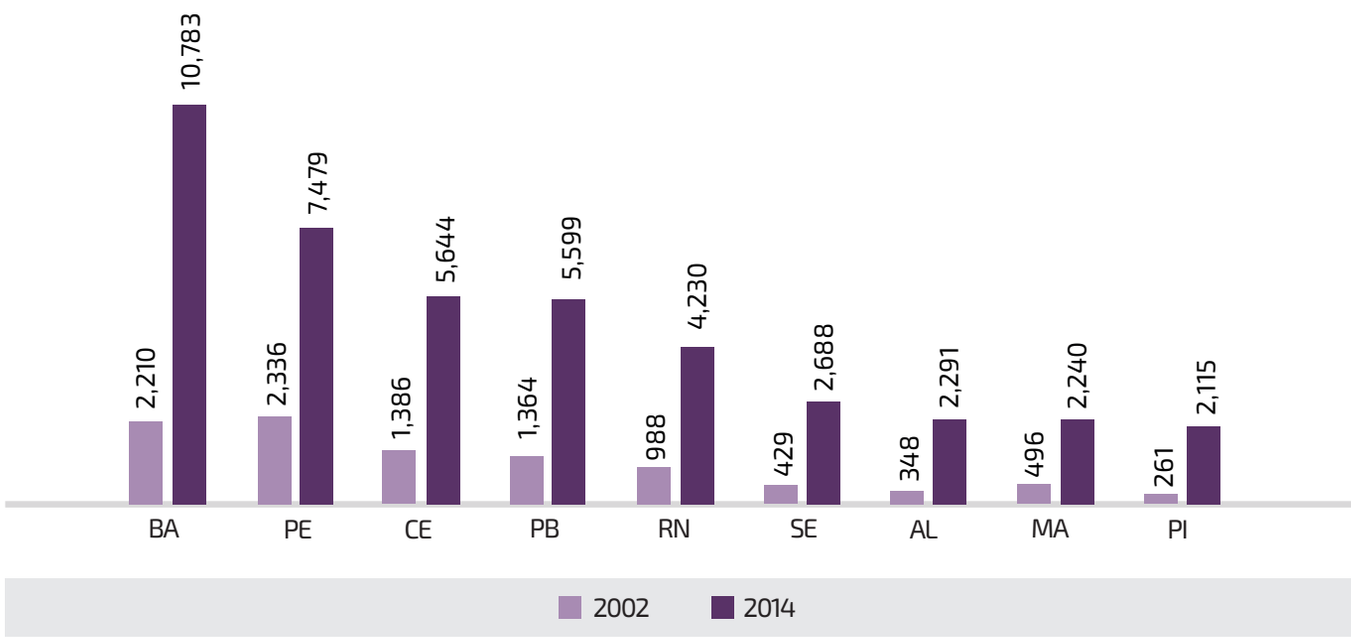
RESEARCH, TECHNOLOGICAL DEVELOPMENT AND INNOVATION

When it comes to scientific and technological research, Ceará had 5.644 active researchers in 2014 (CNPq - Directory of Research Groups of Brazil).

There is no available data per municipality, but it wouldn't be wrong to assume that the large majority of Ceará's researchers work in institutions located in Fortaleza. Although it has registered a significant increase between 2002 a 2014, the number of researchers in Ceará is still nearly half of the number in Bahia, and is only 75% of those who work in the state of Pernambuco. The state of Paraíba, much smaller than Ceará, has nearly the same number of active researchers - 5.599. The number of researchers in Ceará grew 12.4% a year in the period between 2002/2014 leaping from 1.386 to the present day 5.644 (see Graph 14).

Fortaleza is the headquarters of four important National Science and Technology Institutes (INCT): Biomedicine of the BrazilianSemiarid - UFC: Bio-pharmacological and Biomarkers, relating to the industry's drugs segment. Nanobiostructures and Bimolecular Simulation - UFC: characterization

Graph 14 – Number of active researchers in Northeast states



Source: Fortaleza 2040 Plan based on data from the CNPq - Directory of Research Groups of Brazil, 2014.

of interaction between nanomaterials and biomolecules, molecular dynamics, biosensors, dealing with the pharmaceutical industry and health; Material Transferences Continent/Ocean – UFC: Estuary Water Movements Dynamics, addressing themes of interest to environmental and land/sea/river transportation organs; Salinity – UFC: Processes of desalinization and salinity instruments/sensors, relevant to the farming sector.

The technological infrastructure has little interface resources, especially incubators, technological complexes, technological innovation centers, internet network infrastructure, technological extension organisms, among others, in the region of Fortaleza. It's worth highlighting the Technological Development Complex (Padetec), located at the Piei Campus of the Federal University of Ceará, with a Research Center and a Incubator Unit, with 67 incubated businesses. In the area of scientific research of drugs and medication there is already a functioning Center for Medicine Development, linked to the Department of Physiology and Pharmacology of the Federal University of Ceará, located at the Porangabuçu Campus and dedicated to developing research on molecules to human beings. Within the thematic of system integration and automation of system technologies, we should mention the Atlantic Institute, a private institution that provides software system services, in partnership with universities and companies, for the development of new businesses.

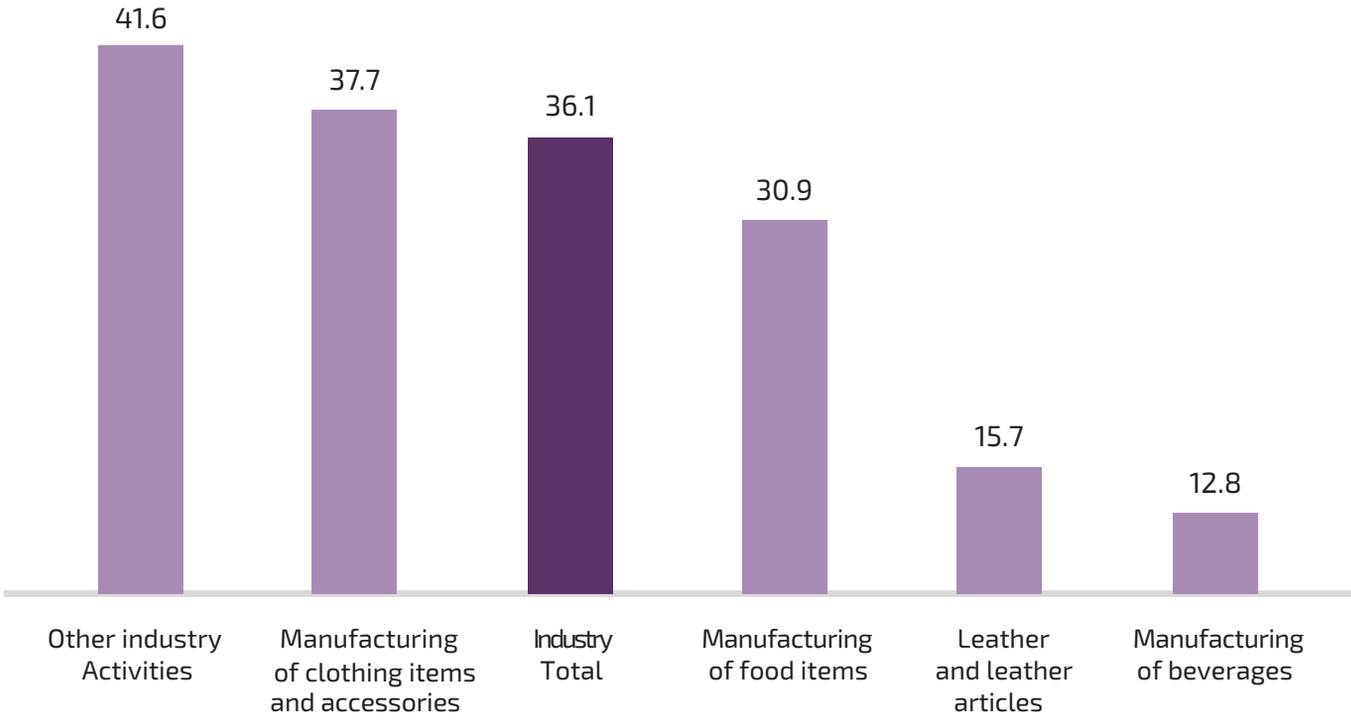
Ceará's innovation system also has, albeit still in a stage of institutionalization and consolidation, the Network of Technological Innovation Centers of Ceará (Redenit - CE), which could play an important role in inducing innovation in local productive systems. Among its objectives are the organization and stimulation of partnerships between the Technology Innovation Centers (NITs) of Science and Technology Institutions (ICTs), public and private, based in Ceará, an agent of technology transference.

There are, in the capital of Ceará, seven calibration laboratories and only three test laboratories approved by Inmetro, all of them concentrated in the Technological Complex of the Industrial Technology Foundation Center of Ceará (Nutec), an institution linked to the state government, which currently holds five incubated companies. Senai implanted and maintains the Technology Institute of the electro-metal-mechanical sector, which provides services to industries, offering solutions for the development and improvement of products and manufacturing and production processes, encouraging productivity and competitiveness in Ceará's industries. There is, also, a project to install the Institute of Building Technologies: Solutions applied to the civil construction field. There is also the Center of Technology Teaching Institute (Centec), a non-profit private entity that deals with teaching, technology extension, research, and innovation.

Businesses from Ceará have a moderately innovative attitude, slightly superior to those from Pernambuco and, especially, Bahia. According to data from the IBGE (2011), 36.1% of selected[5] industrial and service businesses said they have implemented product Innovation processes (2009/2011), above

[5] The Pintec 2011 survey considered industries in extraction, processing, electricity and gas, selected services (Telecommunications, information technology services, architecture and engineering services; test and technical analyses, research and development, data processing, Internet hosting, and other related activities, besides Editing and editing integrated to printing; audio recording and music editing activities).

Graph 15 – Rate of innovation activities among the processing industries of Ceará



Source: Fortaleza 2040 Plan based on data from the IBGE/Pintec, 2011.

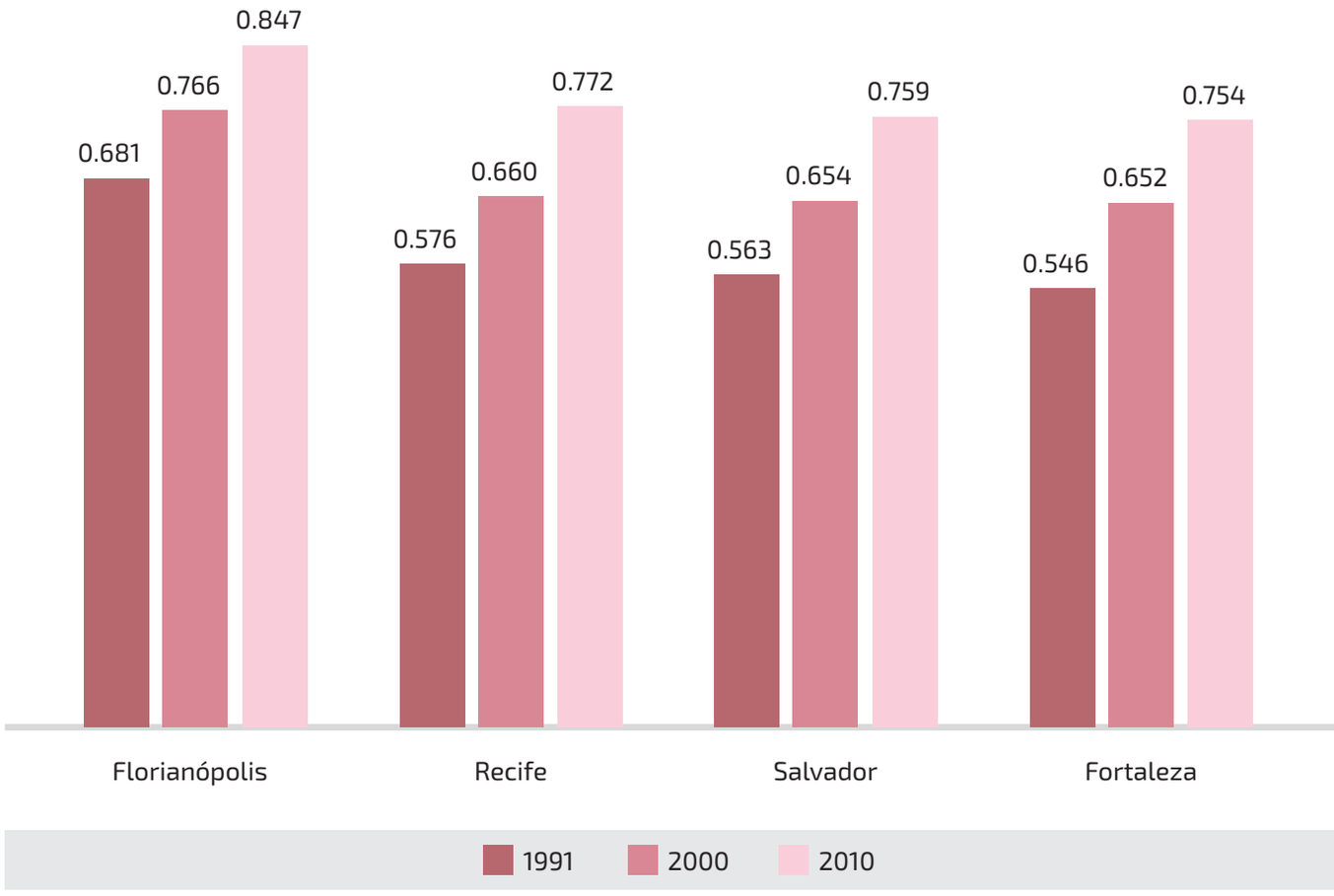
the Brazilian average of 35.6%; Pernambuco had 35.2% of innovative companies, and Bahia had only 33.7% of the total sample.

Companies from Ceará in the "Manufacturing of clothing articles and accessories" segment are the most innovative. 37.7% said that they performed innovations in the 2009/2011 period, a little above the total average of industries from Ceará (see Graph 15). The segment was surpassed by industry groups categorized under "Other Industry Activities"[*Electricity and gas and Selected services (Telecommunications, information technology services, architecture and engineering services; test and technical analyses, research and development, data processing, Internet hosting, and other related activities, besides Editing and editing integrated to printing; audio recording and music editing activities)*] - with 41.6% of the companies having introduced some kind of innovation.

QUALITY OF LIFE

The quality of life of Fortaleza's inhabitants has been improving in various aspects during the last decades, but it is still precarious, with high rates of poverty and social inequality, limited basic sanitation, and a density of subnormal settlements and areas of social interest with big public service limitations.

Graph 16 – Evolution of the Human Development Index (HDI)



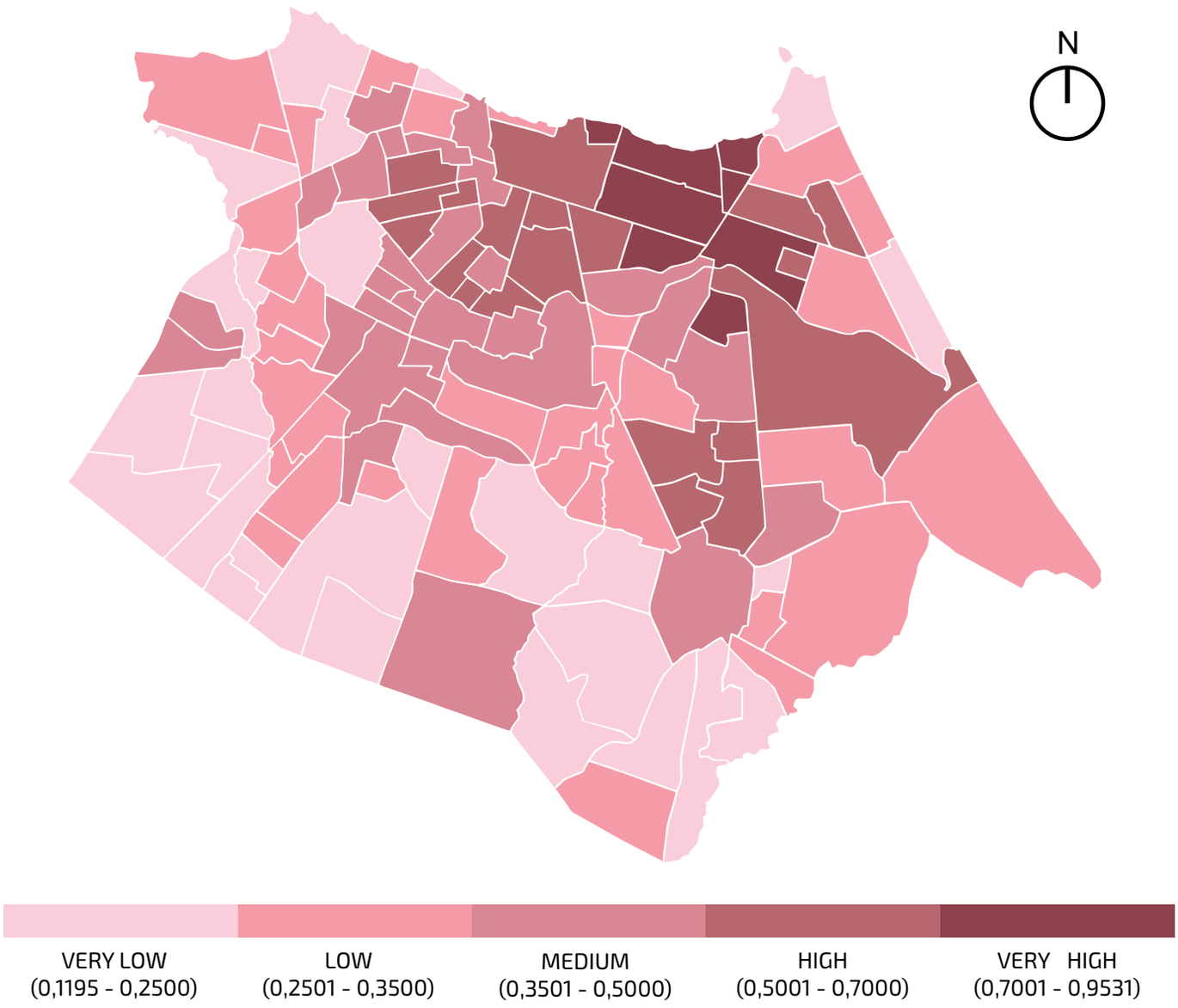
Source: Fortaleza 2040 Plan based on data from the PNUD, 2010.

With a Human Development Index (HDI) of 0.754, Fortaleza is below Salvador, 0.759 and, especially, Recife, 0.772, as shown in Graph 16. Falling under the medium developed[6] classification, during the nearly 20 years of analyses by the UNDP, the HDI of Fortaleza increased significantly, but always following the development of the Northeast's two other capitals: it went from 0.546 in 1991 to 0.653 in 2000. Thus, Fortaleza went from an HDI the UNDP classified as "low" (0.546) to reaching a medium developed category, nearing the threshold of the "highly developed" ranking (starting at 0.80). Fortaleza's HDI is much lower than that of Florianópolis, which is 0.847, reaching a high level of human development.

[6] The HDI methodology for classifying a region is defined, in a range between 0 and 1, in the following way: Below 50% of the index (0.500), falls under the "low human development" ranking; an index between 0.500 and 0.799 falls under "medium human development" and, from 0.800 on, is "high human development".

When Fortaleza's HDI is broken down into its components - Longevity, Education, and Income -, the prominence of "Longevity" becomes clear, the only one to surpass 0.800, contributing to the municipality's ranking. However, the component that grew the most during this period - 1991/2010 - was "Education" and, even so, it is the lowest of the three, with a score of only 0.695. While the HDI increased by 38% between 1991 and 2010, the "Education" index leaped by 89%, going from a modest 0.397 (in 1991) to 0.695 (2010). The "Income" component grew very little in this period,

Figure 17 – Human Development Index (HDI) per neighborhood – 2010



Source: Fortaleza 2040 Plan adapted from SDE, 2015.

but it ranked second in 2010, with 0.749, reflecting the moderate growth of municipal economy.

Human development is unequal across the municipal territory and, as shown in Figure 17, three neighborhoods reached high development (above 0.80): Meireles (HDI of 0.853), Aldeota (0.866), and Dionísio Torres (0.859). Including those high development neighborhoods, only seven neighborhoods registered an HDI above 0.70. Meanwhile, 13 of Fortaleza's neighborhoods have very low development, with an HDI below 0.200; the most dramatic situation is found in the neighborhoods of Parque Presidente Vargas (HDI of 0.135), Canindezinho (0.136), and Genibaú (0.138).

POVERTY AND SOCIAL INEQUALITY

Fortaleza is a very poor municipality. In 2010, Fortaleza had a high rate of extreme poverty at 13.6% of the population[7]. Though smaller than what was registered in Recife and Salvador, it was well above the rate of Florianópolis. There was a reduction in the percentage of poor people in all examined capitals, and the most significant one was precisely Fortaleza; it was the highest in 1991 and 2000 and, in 2010, it was lower than that of the two other Northeastern capitals. In 1991extreme poverty reached about 45.6% of the population (homes with a per capita income of up to 1/4 of a minimum wage), receding to nearly half by the year 2000, and once again declining to less than half by 2010, reaching the current 13.6%.

The distribution of extreme poverty (considering the population with a household income below R$ 70,00) in the territory of Fortaleza shows the huge inequality between neighborhoods (see Figure 18). Nine neighborhoods have 35% of the people in conditions of extreme poverty, which signals a large disparity between the populations living in those places and the total amount of people living in penury. Five of these neighborhoods in extreme poverty are localized in Region V, while the ten neighborhoods with the lowest rate of poverty are located in Region II.

In the last years Fortaleza's social inequality index has been declining, largely following the country's and the state's movement of income decentralization.

HABITABILITY

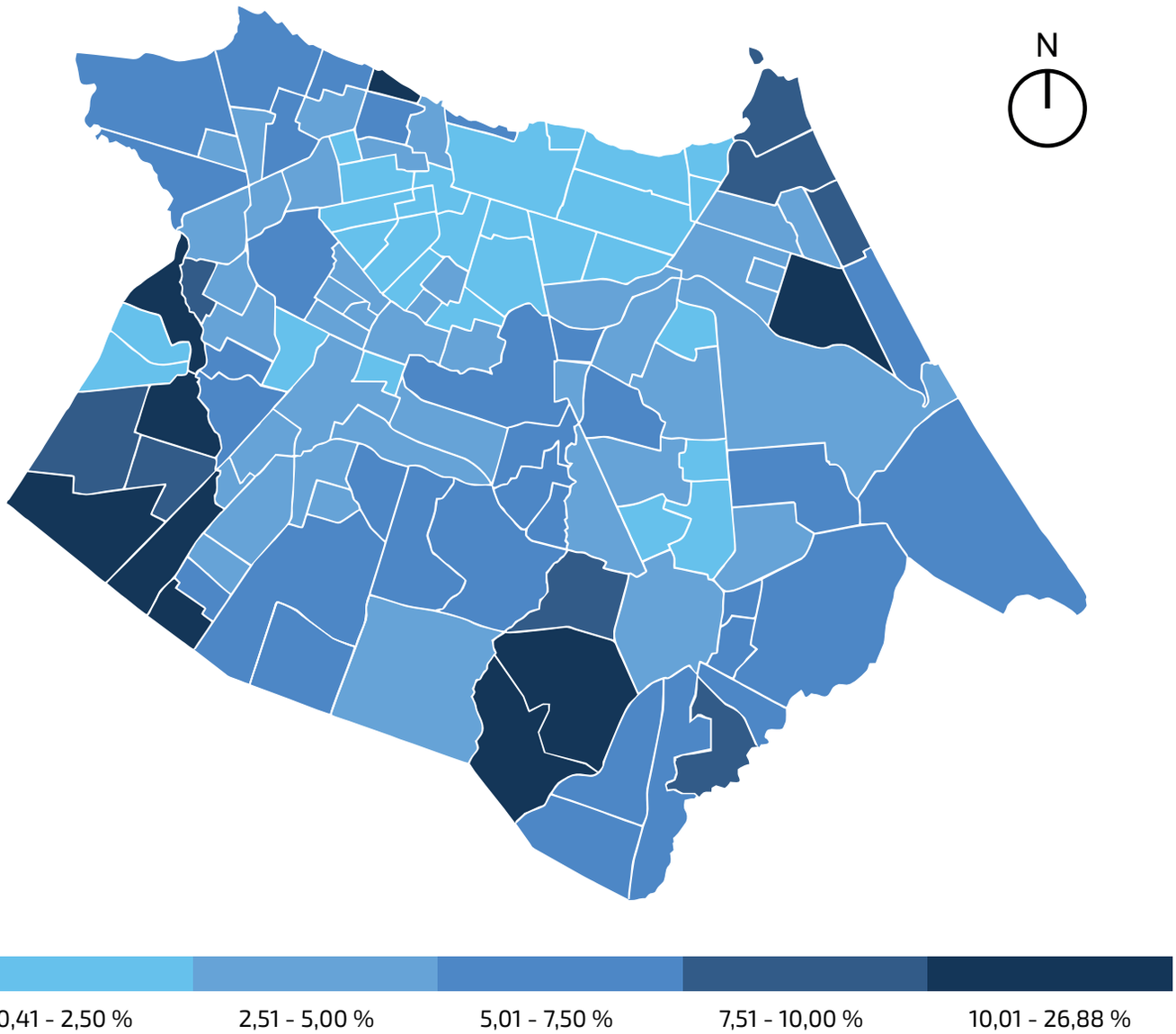
When measured by access to basic services, particularly housing and sanitation, Fortaleza confirms its condition as a poor and extremely unequal city. According to the concept of suitable housing used by the IBGE[8], Fortaleza's scenario improved considerably between 2000 and 2010, but it is still precarious: only 69.2% of the capital's homes have "Suitable housing and sanitation", meaning water supply linked to the main network, sanitary sewage connected to the main network or septic tank, and garbage collection (directly or indirectly). Since access to the sewage system is very low, only 49% of homes, the rate of housing and sanitary suitability is overestimated because of the use of septic tanks.

Regarding water supplying, Fortaleza relies on the Pacoti, Riachão, Gavião, and Acarape reservoirs, which are also responsible for supplying other municipalities that are part of the MRF. Fortaleza is the main beneficiary of the system, with high supply rates among the municipal population. However, it is working at maximum capacity and wouldn't be able to accommodate service extensions. According to data from the Municipal Department of Urban Planning

[7] People residing in private, permanent homes with a monthly household income per capita of up to a ¼ of a minimum wage.

[8] The IBGE's concept of "Suitable housing and sanitation" is defined by water supply linked to the main network, sanitary sewage connected to the main network or septic tank, and garbage collection (directly or indirectly).

Figure 18 – Percentage of extremely poor per neighborhood – 2010

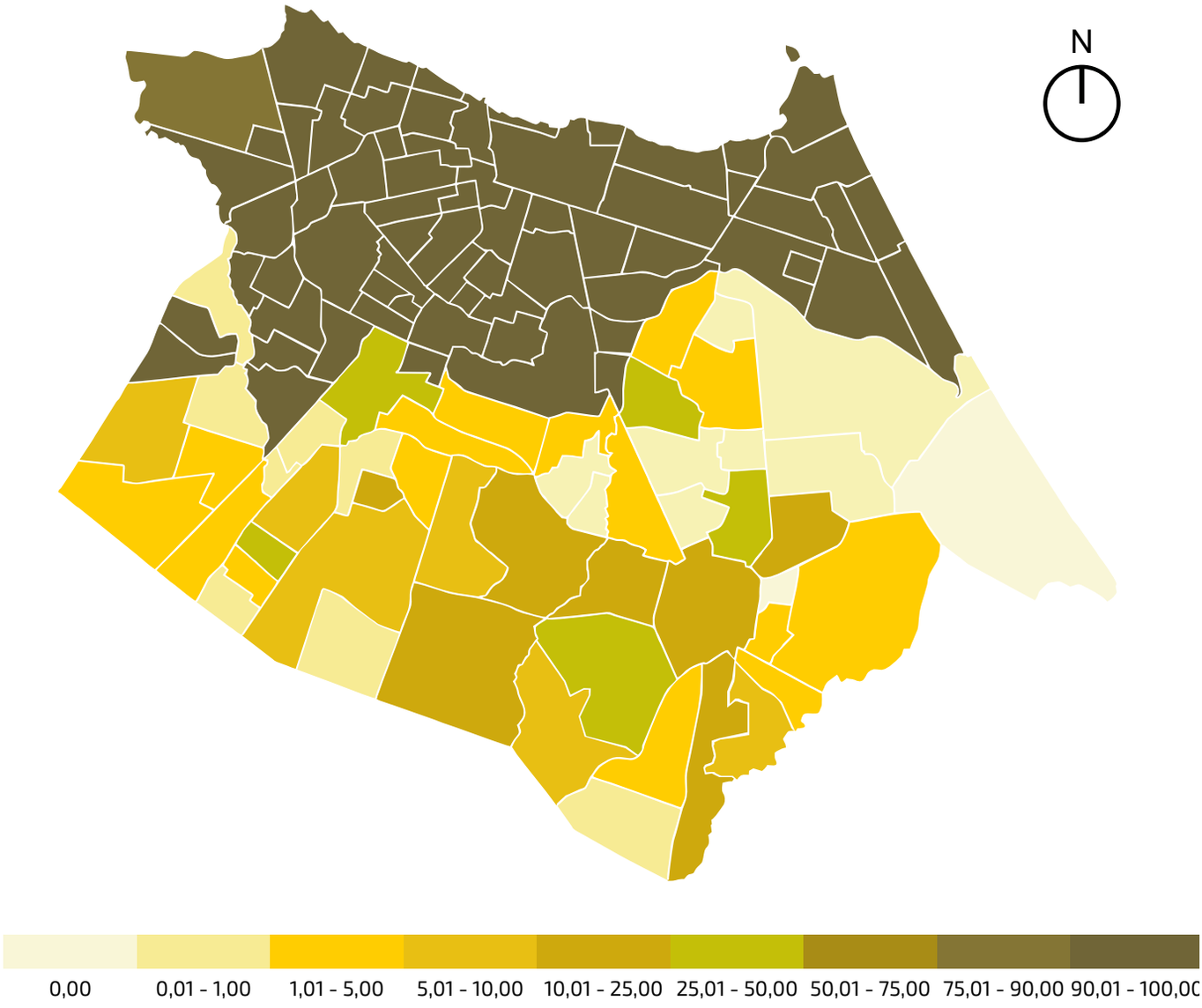


Source: Fortaleza 2040 Plan adapted from Ipece, 2010.

and the Environment, the municipality's water supply network is about 4.667 km long and reaches 98.49% of homes (FORTALEZA, 2014). According to the Trata Brasil Institute (2014), 89% of the capital's homes are connected to the water supply network.

This percentage of water supply through the main municipal network is very irregular throughout Fortaleza's territory. The majority of neighborhoods, including Regions V and VI, have over 95% of homes supplied by the distribution network; nine

Figure 19 – Percentage of neighborhood's area covered by sanitary sewage services – 2010



Source: Fortaleza 2040 Plan adapted from Seuma, 2014.

neighborhoods in Fortaleza have access percentages below 85% - the majority of them located in Region I.

Even considering that around 90% of homes in Fortaleza are connected to the main water supply network, reality shows that it is lacking in various city neighborhoods, with irregular supply caused by interruptions and low system pressure. Conferences with society demonstrated that amassed data cannot correctly express the day-to-day life of the majority of families in Fortaleza - even water supply,

which has some of the best indicators. There are still families in several neighborhoods without access to drinking water. There are frequent irregularities and temporary suspension of supply in many areas, aside from the utter precariousness of slums. Illegal connections were discovered in some homes and artesian well resources in some of the municipality's neighborhoods.

When it comes to sewage, in 2012 Fortaleza had a little less than half of its homes connected to the main network of sewage collection and treatment. The municipality had 49% of its homes with collection services, while 48% had treatment. These numbers do not coincide with the IBGE's definition of suitable sanitation, which considers data on water supply, sewage (and septic tank), and garbage collection and treatment.

When it comes to sanitary sewage, territorial distribution is also uneven. The Cidade 2000, Conjunto Ceará I, Meireles, Bom Futuro and Parreão neighborhoods, for instance, have over 98% of their homes connected to the main sewage network, while the Parque Santa Rosa, Parque Manibura, Curió, Parque Presidente Vargas and Pedras neighborhoods have less than 5% (see Figure 19). The majority of neighborhoods located in Regions I, II, and III contain a good portion of the homes supplied satisfactorily with urban services; meanwhile, the Region IV, V, and VI neighborhoods are, generally, those that have the greatest lack of resources. However, it should be noted that there are still many homes located in areas where the main collection network is present that, nevertheless, are not connected to it.

From society's point of view, the reality of sanitary sewage in Fortaleza is much worse than what is shown by these already precarious numbers, in terms of number of homes supplied. Indeed, even in places where the network is present, there are all kinds of problems, such as obstructions, clogs, and system interruptions, sewage that overflows into the streets, largely caused by the lack of corrective and preventive maintenance by the company that is responsible for this service. It's also common for water tanks to burst in some areas, hampering the population's quality of life.

According to local leaderships, in some neighborhoods there is no sewage system, and the residues from homes are thrown directly into channels, generating pollution and sanitary degradation. Sanitary sewage is complicated through deficiencies in the drainage system, which leads to floods on many streets and the silting up of the collection network and drainage channels. According to the population, the drainage restrictions are reinforced by the clogging of manholes and gratings on the streets that require the attention of citizens and governmental actions for periodic cleaning.

If on the one hand Fortaleza's sanitary sewage services leave much to be desired, the municipality's garbage collection reaches almost 100% of the city's formal areas, resulting in a meaningful growth of homes served in the last few years (in 2010, 98.75% of homes were already served). However, some of the capital's neighborhoods are not totally supplied with garbage collection, as is the case of Ancuri, Canindezinho, Praia do Futuro II, Siqueira, Arraial Moura Brasil, Parque Presidente Vargas, Manuel Dias Branco, Pedras, and Sabiaguaba, with a rate below 95%.

Even the service that is the most widely supplied to the people of Fortaleza suffers from meaningful restrictions in some areas of the city, especially poorer neighborhoods. Despite recognizing the comprehensiveness of garbage collection, the

community highlights different flaws and deficiencies the system presents across several neighborhood and even particular streets. In many neighborhoods, the presence of garbage on the streets an the lack of rubble collection were detected. Part of the population blames society itself for accumulation of garbage on streets, sidewalks, and other inappropriate places.

Almost 100% of Fortaleza's homes have access to the electricity grid (precisely 99.75%) according to Ipea data from 2010 (Social Vulnerability Index). Even so, in society's view, there are frequent power surges, interruptions, and failures. The major deficiency, according to communities, lies in street lighting. In general people have noted the precariousness of the lighting of streets and squares, throughout all Regions of the city, encouraging acts of violence and fostering fear among the population. There are streets in neighborhoods that have no lamp posts or where the bulbs are burned outas a result of a lack of maintenance of street lights, poles, and tree pruning. The general feeling is that the city is dark, because even when there is lighting, the yellow light makes the streets seem dark.

FAVELAS AND PRECARIOUS AREAS

The Social Housing Plan (Plhis) point to a housing deficit[9] of 83.934 thousand homes, the main component of which is due to the "excessive rental burden" paid by the poor population, while "family cohabitation" is the second factor.

[9] The IBGE defines housing deficit as a combination of precarious housing, family cohabitation, excessive rental burden, and over crowding (see Volume 2).

Generally speaking, these housing deficits are concentrated in precarious settlements. Using a wider concept than that of the IBGE, the Social Housing Plan (Plhis) mapped 856 precarious settlements where 271.539 families are living with more than a million people, about 40% of the city's population in a territory that represents only 12% of Fortaleza's area. From this total, 74% are considered slums, 15% are self-built, 6% are housing complexes, 3% are tenements, and 2% are irregular land subdivisions, distributed throughout the territory. The precarious areas are concentrated in Regions I, IV, V, and VI, and are scarcer in Regions II and III, as shown in Figure 20.

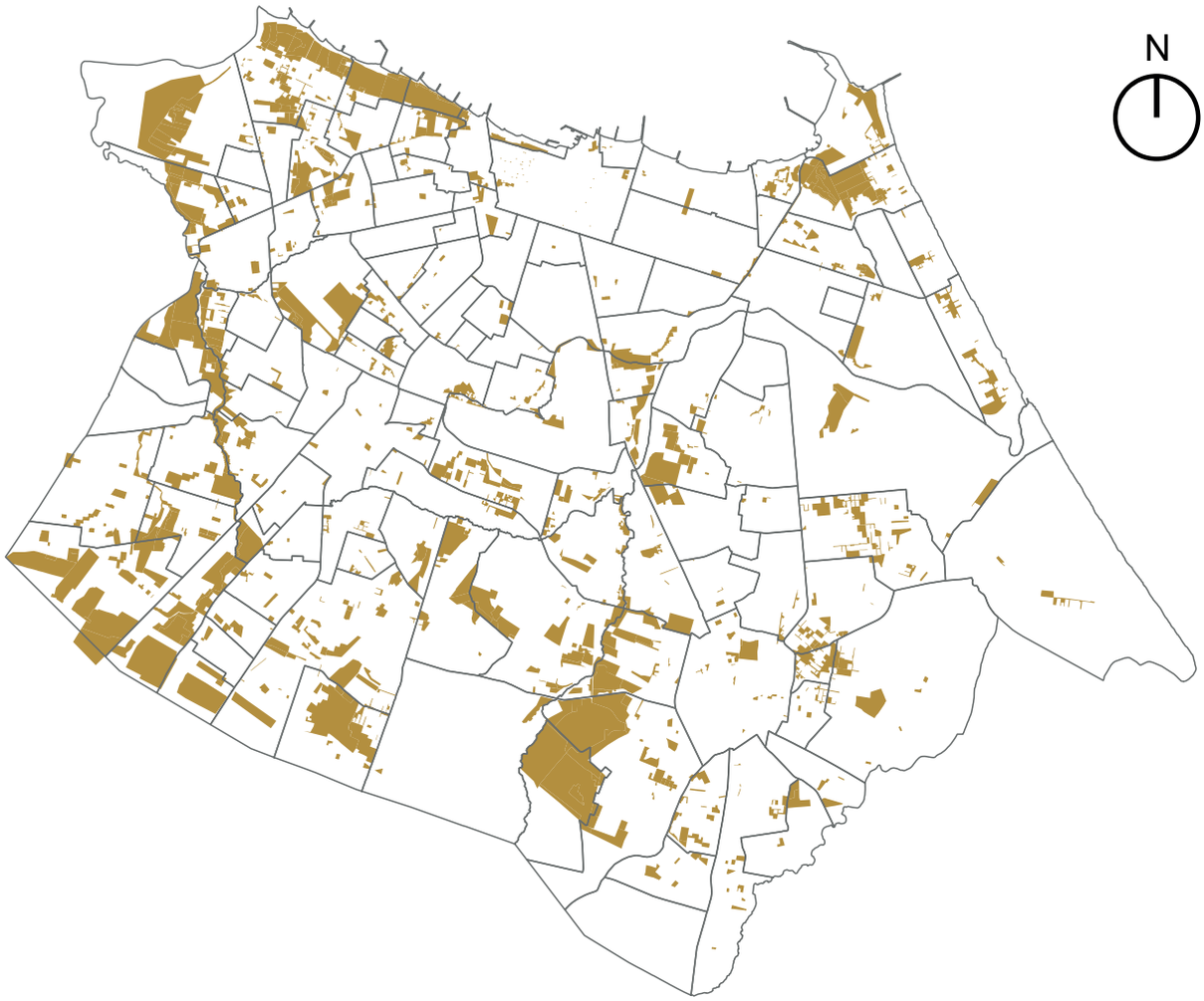
HEALTH

The health of Fortaleza's inhabitants has been improving over the past years, although it still faces the persistence of old ills - some infectious diseases, characterized as diseases of poverty or neglected diseases, such as tuberculosis, leprosy, congenital syphilis, dengue fever, leishmaniosis, and other vector-borne diseases, AIDS, as well as maternal deaths - and the growth of other illnesses brought on by modern life in large cities, including the aging of the population, which generates an epidemiological transition which predominantly worsens the health of seniors.

The improvement in health can be measured by two main indicators: Life expectancy and birth and Infant Mortality. The life expectancy at birth of Fortaleza's inhabitants has gone up five years in a decade, going from 69.6 years, in 2000, to 74.4 in 2010.

Infant mortality is the indicator that has improved more significantly in the last decades, registering a

Figure 20 – Precarious settlements in Fortaleza



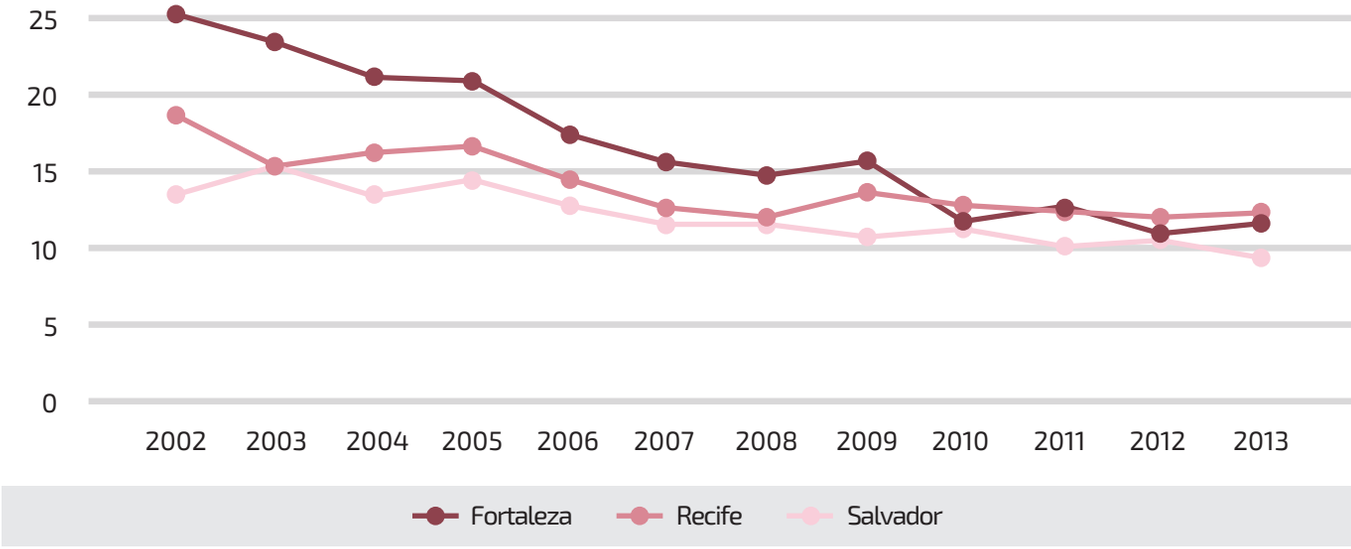
Source: Fortaleza 2040 Plan based on data from Plhis-For, 2012.

drop of 6.5% a year from 2002 to 2013, decreasing from 24.8 deaths in every a thousand live births to only 11.8. Although this decline has been common in Brazil and in the Northeast's large capitals, the decline in Fortaleza was more rapid, as it can be seen in Graph 17.

However, the reduction of infant mortality contrasts with two negative factors concerning pregnancy and childbirthwhichhave a negative impact on mothers and their new-borns. Firstly, the increasein the percentage of young mothers between 10 and 14, which reached 1.01% by 2008. This phenomenon of early pregnancies coincides, on the other hand, with the birth of premature children, with all the negative health repercussions this entails.

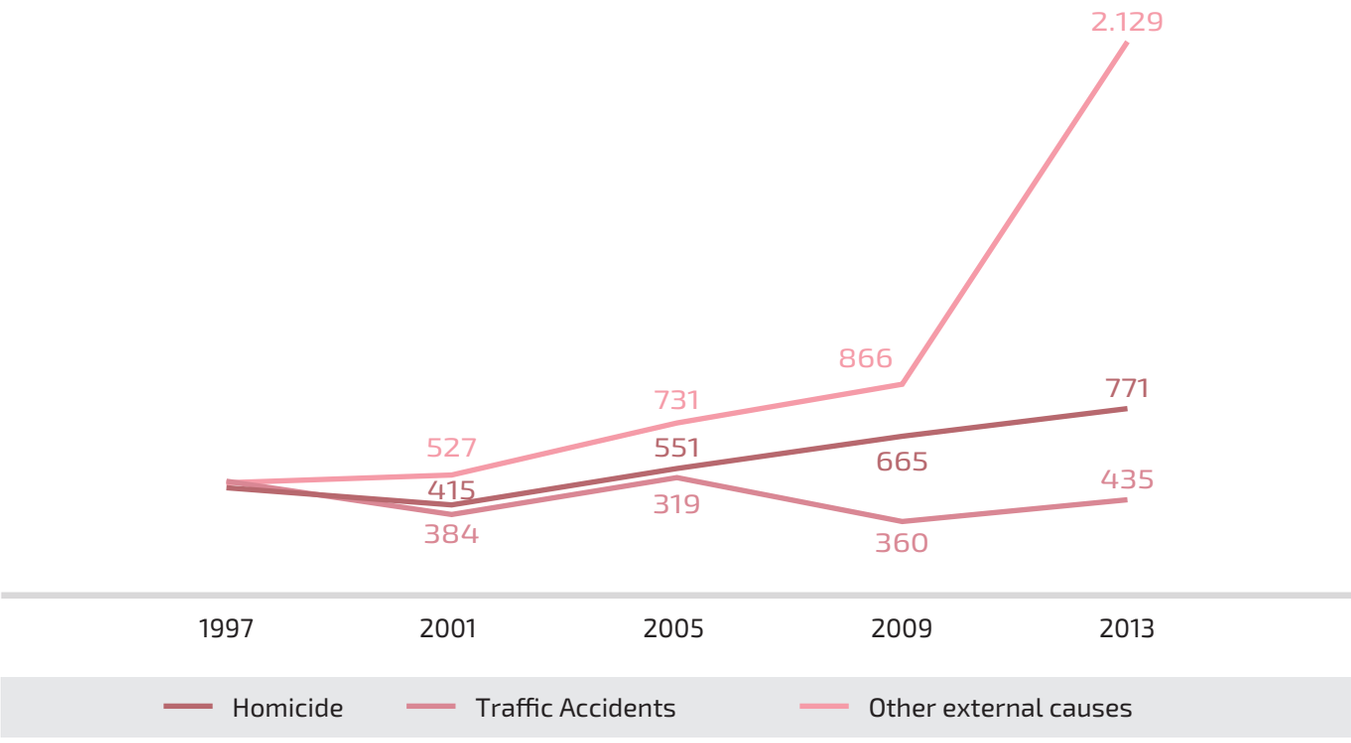
The drop in the infant mortality rate was accompanied by a significant elevation in deaths by external causes, especially homicides, which tend

Graph 17 – Infant Mortality Rate (per a hundred thousand live births)



Source: Fortaleza 2040 Plan based on data from Datasus, 2013.

Graph 18 – Number of deaths by external causes (per kind).



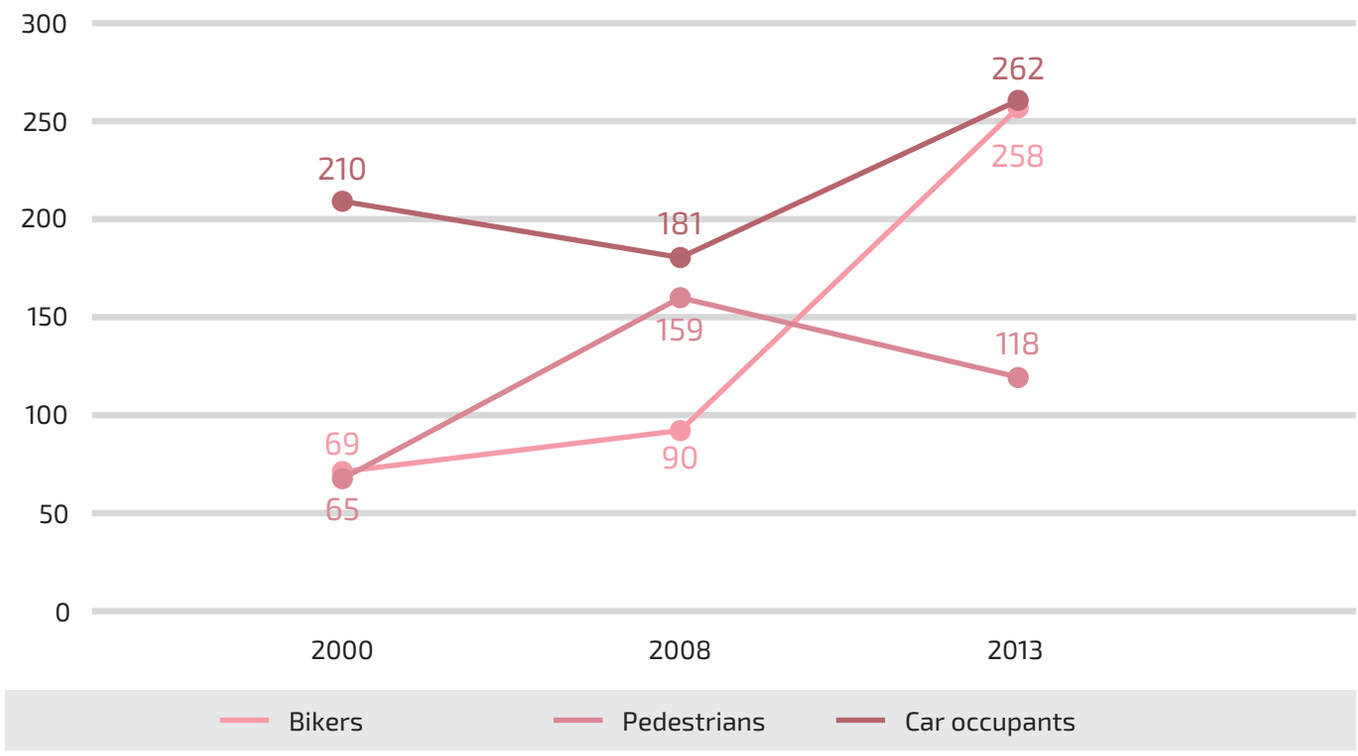
Source: Fortaleza 2040 Plan based on data from Datasus, 2013.

to reduceincreases in life expectancy. On Graph 18 one can notice a leap in the Deaths by Homicide indicator, beginning in 2009; Deaths due to transit accidents have an erratic pattern in that period, but also grew considerably between 2009 and 2013, the same as Deaths by External Causes.

Pedestrians are the main victims of traffic related deaths. In 2013, 262 pedestrian killings were registered, a little above the number of bikers killed in fatal accidents (258 in 2013). From 2000 to 2013 there was an alarming increase in the number of motorcycle deaths in traffic, leaping from 69 to 258, an increase of more than 270% (see Graph 19). Traffic accidents with motorcycles and the high mortality rate of bikers are an urban curse throughout Brazil and in all large cities.

When it comes to deaths brought on by disease, the main affected area is the circulatory system. In 2013 there were 3.099 deaths, although there is a small decline in relation to 2006. The causes of high incidence and with remarkable growth in this period (2006/2013) were neoplasies (tumors), respiratory tract diseases, and diseases with poorly defined causes. Infectious and parasitic diseases - illnesses directly related to the city's sanitary conditions - are the fifth largest cause of death, but experienced a small decline between 2006 and 2013, going from 714 to 677. In this group in 2013, septicemia (28.8%), diseases brought on by the Human Immunodeficiency Virus - HIV (26.5%), tuberculosis (13.6%), and infectious intestinal diseases (8.2%) stand out.

Graph 19 – Causes of Traffic-Related Deaths



Source: Fortaleza 2040 Plan based on data from Datasus, 2013.

The reduction in deaths from respiratory tract diseases could reflect an improvement in the socioeconomic conditions of the population, a greater agility and progress in attention to health, more access to information and antihypertensive drugs in the Basic Health Units. On the other hand, the progressive increase of ischemic heart disease (heart attacks) is a reflection of unhealthy eating habits, inactivity, and the amount of stress of a busy life in a large metropolis.

The improvement of health indicators, and even the increased notification of some illnesses, are a result of the public health system's capacity, offering installations and services for the population of Fortaleza. In 2013, Fortaleza had 3.7 hospital beds for every thousand inhabitants, according to data from the Ipece; we should consider that the structure of hospital beds in Fortaleza, given the presence of complex care units, receives patients from the rest of the Metropolitan Region and even from the state's interior.

CITIZEN SECURITY

Fortaleza is the Brazilian capital with the highest rate of violence, with 77.3 homicides in a hundred thousand inhabitants, according to data from the Violence Map from 2014. This is the result of an increase ingrowth in a little over ten years, gaining momentum after 2009, and is well above what is defined as tolerable by the World Health Organization (WHO), which considers 10 homicides for every 100 thousand inhabitants an "epidemic situation".

As happens in all large cities in Brazil, violence in Fortaleza especially affects the young in poor neighborhoods with poor habitability. In ten years the homicide rates among young people (between 15 and 29 years old) increased rapidly, going from 35.9 homicides in every hundred thousand youths, in 2002, to 164.3 in 2012; this rate is nearly the double of what is registered among the total population of Fortaleza.

There are many causes for the increase of violence in Fortaleza, but one factor that plays a significant role is the large percentage of young people who neither work nor study; which could explain why the high rate of violence affects young people in particular. Idleness among this portion of young people creates an environment that encourages criminality and drugs in particular, which can lead to violence and turn young people into perpetrators or victims of crimes. According to the IBGE, in 2010 around 22.4% of youths in Fortaleza between 15 and 29 years old didn't work nor study.

Violence is also distributed in a very uneven way throughout the territory, concentrated particularly in the poorer areas of the city with an absence of public services, making them prime locations for crime related to the trafficking of drugs and weapons, a breeding ground for violent illegality and sociability, where the use of force seems to be the only possible tool for conflict resolution, social control, and normalization of conduct according to the interests of the acting criminal groups.

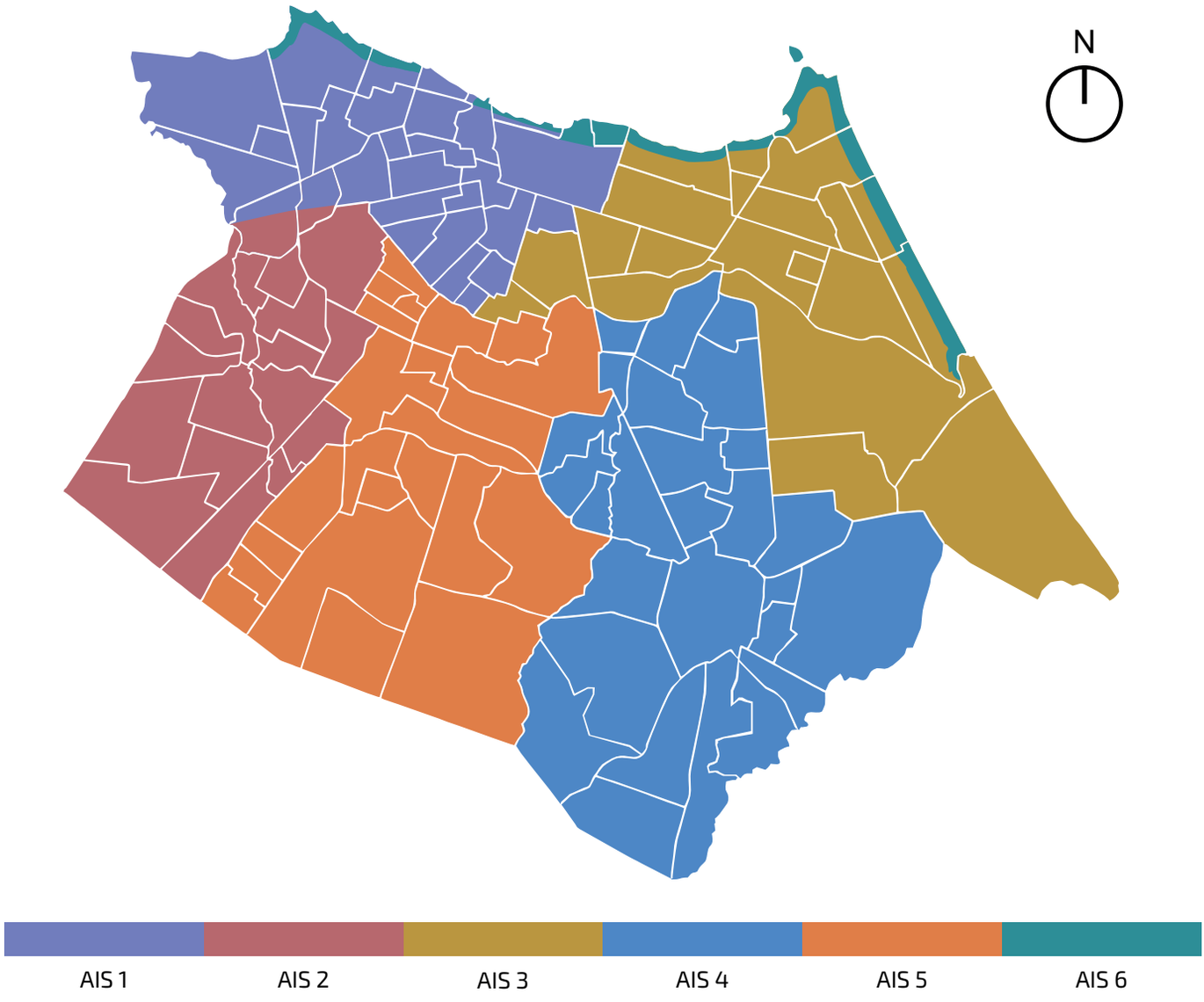
The situation in the peripheries has impacted residents of these territories through the violence that has grown in poor neighborhoods as well as through the discrimination to which they begin to be subjected. The difficulties in securing employment, attaining good work opportunities and being recognized as people with rights were echoed in the complains of people who are victims of violence and prejudice against their social standing. Violence and the proliferation of drugs (use and trafficking) has been pointed out by society as one of Fortaleza's most serious social problems, confirming the data on violence and the homicide rate.

Fortaleza's rate of violence is more heavily concentrated in the neighborhoods of Regions V and VI and in part of Region I, precisely where there is more poverty. The ten Fortaleza neighborhoods with the highest number of homicides are Bom Jardim, Messejana, Jangurussu, Barra do Ceará, Mondubim, Barroso, Jardim das Oliveiras, Passaré, Henrique Jorge, and Prefeito José Walter.

In 2013, 2014, and 2015, the crime rate as measured by Violent Lethal Intentional Crime (CVLI) has been declining slightly in all the Integrated Areas of Safety (AIS) - an operational territorial division created by the Department of Safety and Social Defense of Fortaleza, as shown in Graph 20.

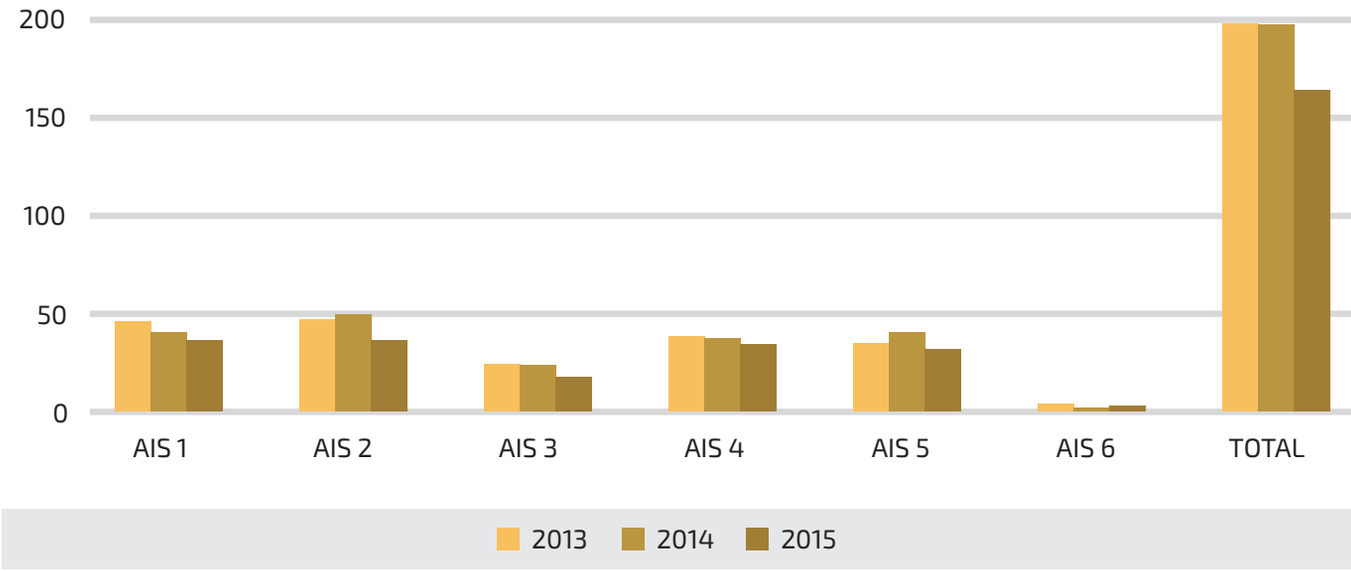
Figure 24 points out the areas in Fortaleza where the AIS operates.

Figure 21 – Areas in Fortaleza where the Integrated Ares of Security (AIS) are operating



Source: Fortaleza 2040 Plan based on data from dhe SSPDS, 2016.

Graph 20 – Evolution of Lethal Violent Crimes per Integrated Area of Security (AIS)



Source: Fortaleza 2040 Plan based on data from dhe SSPDS, 2016.

CAPABILITIES AND BOTTLENECKS

The future of Fortaleza depends on the internal characteristics that offer possibilities for development, or that choke and hamper the city's development.

CAPABILITIES

The city of Fortaleza has a set of factors and characteristics thatcan form a solid foundation for planning the city's future toward sustainable development.

Fortaleza's geographical location is in a privileged position on the tip of Latin America, close to the United States and Europe, facilitating integration and reducing transportation costs. The Panama Canal's expansion broadens the possibilities of commerce and integration between Brazil and the Pacific and, thus, enhances Fortaleza's position in global economic and commercial integration.

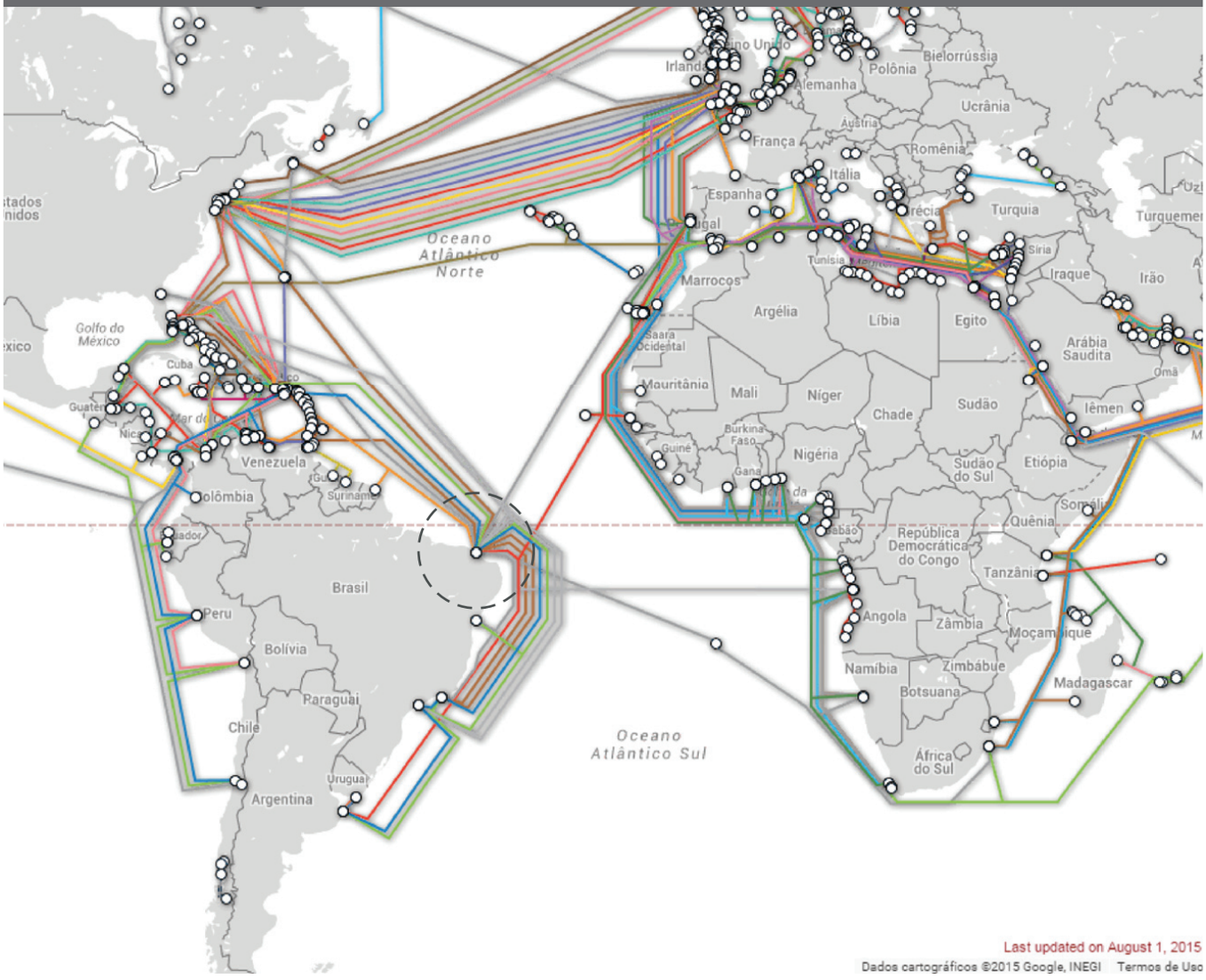
Fortaleza within the city network - Fortaleza is a regional metropolis, making up the core of the northern urban network of the Northeast Region, polarizing two other capitals - São Luís and Teresina - as well as Natal on the eastern northeast. Ceará's capital is an urban network with the third largest population in Brazil, inferior only to São Paulo's and slightly smaller than Rio de Janeiro's. It possesses the second largest influence area in Brazil in terms of number of municipalities, spanning 786 cities, second only to São Paulo. On the other hand, Fortaleza polarizes all the Ceará's territory and several medium-sized towns in the north of Pernambuco.

Demographic Bonus - in the next decades the working age population of Fortaleza will continue grow in numbers superior to the municipality's average, leading to a reduction in demographic dependency (the active population is larger than the inactive population). Demographic dependency should drop from 53.6%, in 2010, to around 46.1%

by 2040, even when considering the growth in the number of seniors, due to the decline in the number of children and teenagers. Taking only into account the group of 20 to 64 year olds (a smaller range than the IBGE's definition of the working age population, which is 14 to 64 years old), in the next 25 years (from 2015 to 2040) there should be a 550 thousand people increase in the working age population.

Undersea cables and communication hub - Fortaleza is the city in Latin America that concentrates all of the undersea cables coming from North America and Europe. Fortaleza is the point of entry of the undersea cables that connect Brazil and the United States, Europe, and also Africa. Until 2017 there will be at least two new cables connecting São Paulo, Fortaleza and New York and other new

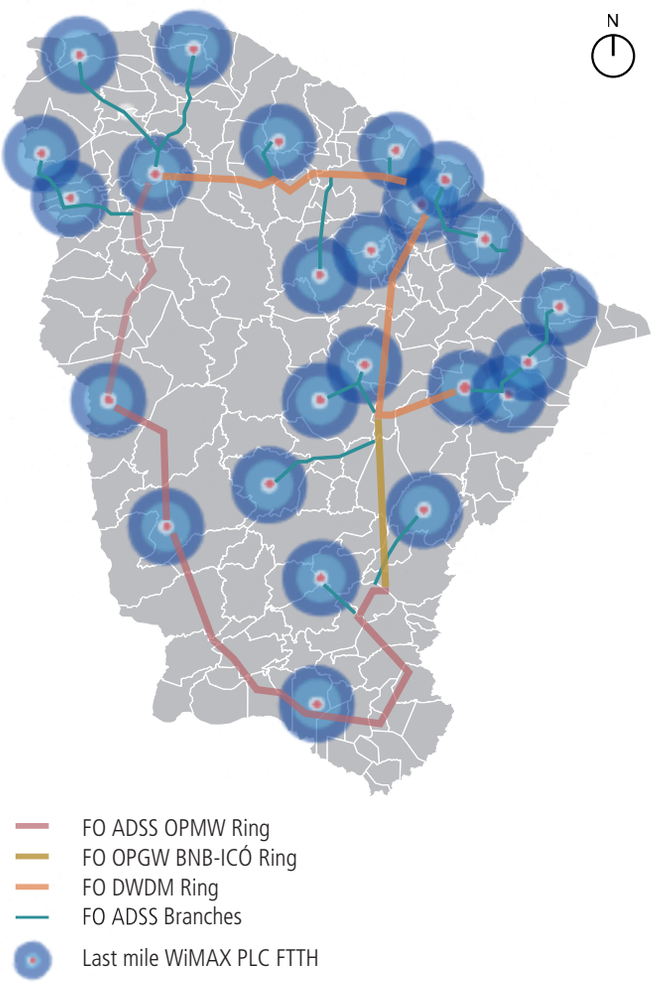
Figure 22 – Undersea cables as entry point to Fortaleza



Source: *www.submarinecablemap.com*, 2015.

undersea cables leaving from Brazil and connecting Fortaleza to Lisbon, going through Cape Verde, the Canary Islands, and Madeira, as well as the first high capacity connection between Brazil and Africa, connecting Fortaleza to Angola's capital, Luanda. All of these undersea cables will have great significance within the infrastructure of high capacity networks, enabling academic and commercial connections between Brazil and other countries in Europe, North America, and Africa (see Figure 22).

Figure 23 – Ceará Digital Belt



Source: Fortaleza 2040 Plan adapted from Etice, 2014

Ceará Digital Belt - the digital network of the state of Ceará forms a digital belt with an infrastructure of 3.000 Km of optical fiber with the capacity to cover 90% of the State's urban population. The Digital Belt is the largest public broadband network in Brazil, integrating Fortaleza with Ceará's territorial ensemble, complementing the global integration of the undersea cables (Figure 23). Gigafor is also part of Ceará's Digital Belt, forming a network of 100 kilometers of optical fiber (Redecomep) with an expected expansion for wide wireless coverage in the city already being coordinated by state public organs operating in the capital.

Wealth of Natural and Cultural Heritage - Fortaleza has large cultural wealth and possesses a historical and architectural heritage with predominantly eclectic architecture with remarkable traces of styles such as art-nouveau, classic, neoclassic, art-deco, and has a massive natural heritage with 34 kilometers of beautiful beaches integrated with the metropolitan coast into one large touristic attraction.

Ceará's entrepreneurship culture - Ceará natives and, notably, Fortaleza's population has displayed a differentiated entrepreneurship culture and recognized creativity, essential elements for growing demands for innovation. This entrepreneurship culture manifests itself clearly in the percentage of businesses in Ceará that carry out process and product innovations, surpassing Pernambuco and, especially, Bahia.

Quality of education - although the quality of education in Fortaleza is still low, Ceará's capital is at a superior level when compared to the two other large Northeastern capitals, Recife and Salvador, which constitutes and important development differential. This distinguishing aspect of Fortaleza can be measured by the Basic Education Development Index

(Ideb) scores of public municipal schools at the level of basic education. Fortaleza is alsoa city with a very intense university life.

Scientific and Technological Capacity - although it does not have a meaningful density of researchers when compared to other Northeastern states, the state of Ceará has the third largest contingent of researchers in the region, intensely concentrated in Fortaleza. The capital hosts the main centers of excellence and research and development institutions in Ceará.

BOTTLENECKS

The city of Fortaleza deals with several bottlenecks that could hamper the city's future development, and that should be faced by the Fortaleza 2040 strategy.

Social and Territorial Inequalities - Fortaleza has one of the largest inequality levels, measured by the Gini index, which also manifests itself on the ground through extremely unequal distribution of income and access to basic social services.In 2010 about13.61% of Fortaleza'spopulation was living in extreme poverty (per capita household income of up to 1/4 of a minimum wage). The concentration of income is also very high - a 0.619 Gini index rate.

On the ground inequality of income and access to social services manifests itself through the formation of precarious neighborhoods that concentrate 40% of the municipal population on a territory equivalent to 12% of the city's total area. The city's average housing deficit data, limited sanitary sewage, and poverty, manifest themselves intensely in these precarious areas of Fortaleza.

Low level of economic competitiveness - Fortaleza's competitiveness (as measured by the Entrepreneur Cities index) is much lower than that of the two other large Northeastern capitals - Recife and Salvador, only surpassing Maceió and Teresina in the same region. This relative position is partially confirmed by the Competitiveness Index of the Department of Economic Development of Fortaleza that, even while using a different methodology, shows that Fortaleza has a disadvantage in the Northeast region, especially when compared with Recife and Salvador.

Educational deficiency - Fortaleza still has some residual illiteracy and the quality of education, even while surpassing Recife and Salvador, is very low when compared with other large Brazilian capitals. Quality decreases as we move up the level of education, as it is lower in high school, which is the gateway to professional qualification that prepares young people for the job market and for higher education.

Aging population - In the next decades the population of Fortaleza will experience significant growth in the number of seniors, in absolute terms as well as a part of the total population, exerting great pressure upon the health care system, with a different set of needs, besides the impact on social security (the age structure of municipal public servants could lead to a large increase in benefits). In 2040 Fortaleza will have almost 500 thousand people over 65 years old, about 15.8% of the municipality's total population, virtually tripling the city's number of seniors. In 2040 the number of seniors will match the population of children and teenagers (0 to 14 years old).

High rate of violence - Fortaleza is the Brazilian capital with the highest rate of violence, particularly affecting young people, in a way that shatters lives and jeopardizes the city's future. In 2015 about

1.994 Fortaleza citizens were murdered, 1.232 of these were youths between 14 and 29 years old, a tragedy for the victims and their families and a serious impediment to the city's human and social development.

Traffic casualties - traffic-related deaths are practically a public health calamity in Fortaleza, with 26 casualties in every hundred thousand inhabitants (2013), a rate that has been growing since 2000, when it reached 20.4 deaths in every hundred thousand inhabitants. The largest part of these casualties are pedestrians but, in the last few years, there has been a significant increase in victims of motorcycle accidents, reaching 5.1 deaths in every hundred thousand inhabitants; This phenomenon, caused by general problems with urban organization and mobility, leads to loss of life and compromises human development. Aside from traffic related deaths, motorcycle accidents have created a serious social and public health problem, with the hospitalization and temporary, or permanent, disability of the victims.

Young people who do not work nor study - almost one fifth of young people (15 to 29) - about 22.4% of young people do not work no study –this constitutes a personal drama caused by the lack of activity and, mainly, perspectives for the future, but also a serious bottleneck in the development of the city because of the loss of this human capacity. It also creates a basis for marginality and drugs in particular, which may lead to violence, turning young people into perpetrators or victims of crimes. Among the poorer population (per capita household income of up to I/2a minimum wage) and in a smaller age group (14 to 24 years old), the percentage of young people who do not work or study reaches 11.48%.

Public Financing limitations - The municipality's public finances are in a relatively comfortable position in relation to the Fiscal Responsibility Law and, particularly, debt capacity, but present two bottlenecks: the municipality's low financial autonomy, much inferior to Recife's and Salvador's, as shown on Graph 21, moderates its autonomous decision making capacity, and the tendency of an increasing pension fund deficit.

EXTERNAL OPPORTUNITIES AND THREATS

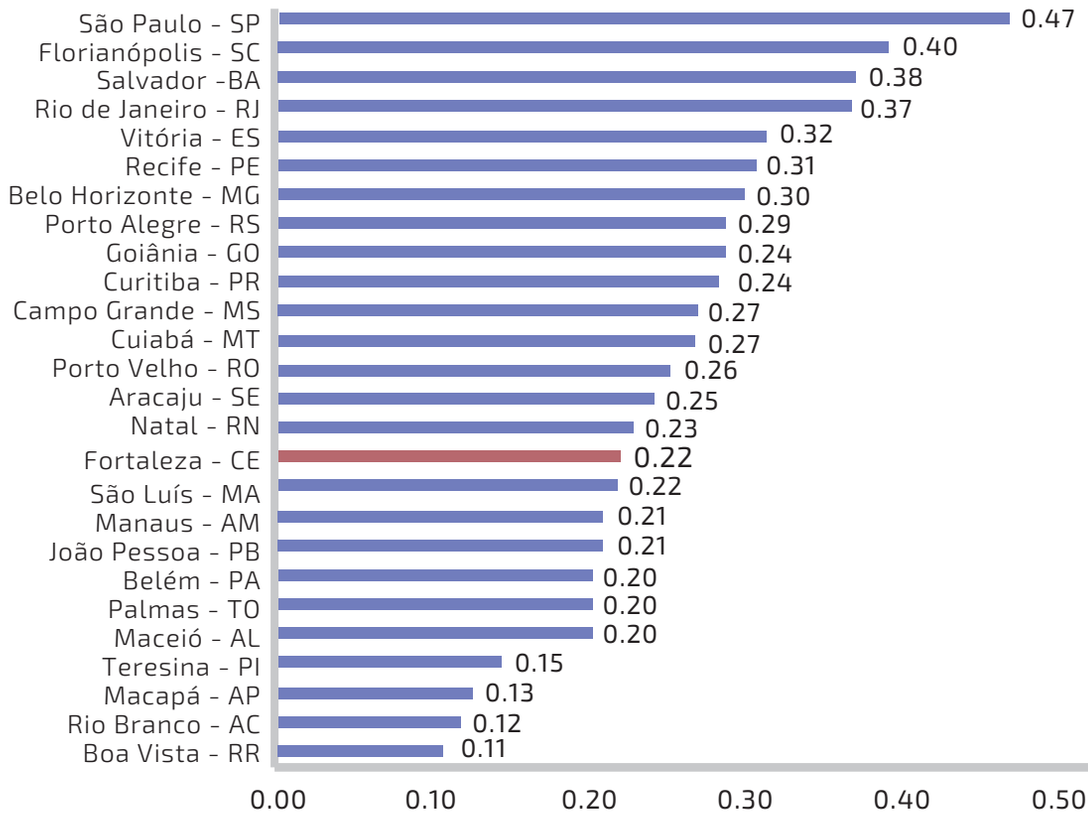
The future of Fortaleza depends on external factors that create opportunities for the city or create threats and restrictions to its development. This chapter succinctly presents the probable future evolution of external opportunities and threats which the city must be prepared to face.

OPPORTUNITIES

The evolution of the external context (global, national, and regional) could lead to different development opportunities, which are understood as external conditions or characteristics, present or future (prospects), that could make a positive contribution to Fortaleza's development and over which the city has no control:

- The aging population, nationally and internationally, could increase tourism, given the number of people with income and free time that will be looking for entertainment, recreation, and culture. The ILO estimates that by 2030 around a billion tourists will choose to visit emerging countries and middle income emerging countries will also tend to become

Graph 21 – Financial autonomy of Brazilian state capitals



Source: Fortaleza 2040 Plan based on datafrom the Sefin/FINBRA/STN, 2014.

generators of tourists. In Brazil's case, the expansion of the middle class with income (especially seniors) increases domestic tourism, extending opportunities for Fortaleza's tourism services.

- The expansion of global commerce creates economic and commercial opportunities for Fortaleza, including the increase in electronic commerce, increasing the capital's ability to attract investments in new export products.
- Quick dissemination of technologies and large global innovations, regulated according to global agreements, could favor Fortaleza's economy as it absorbs technologies that raise productivity and the quality of products (the late adopter's advantage);
- Brazil's activities at the G20 could redefine international conditions in matters of great relevance - reducing greenhouse gas emissions, international commerce rules - which could moderate climate impacts in Fortaleza;
- Energy matrix changes, globally and nationally, expanding the share of new energy sources (wind and solar), favoring Ceará and Fortaleza with resources and technological innovations, considering that the technological and industrial basis of the state are located in its capital;

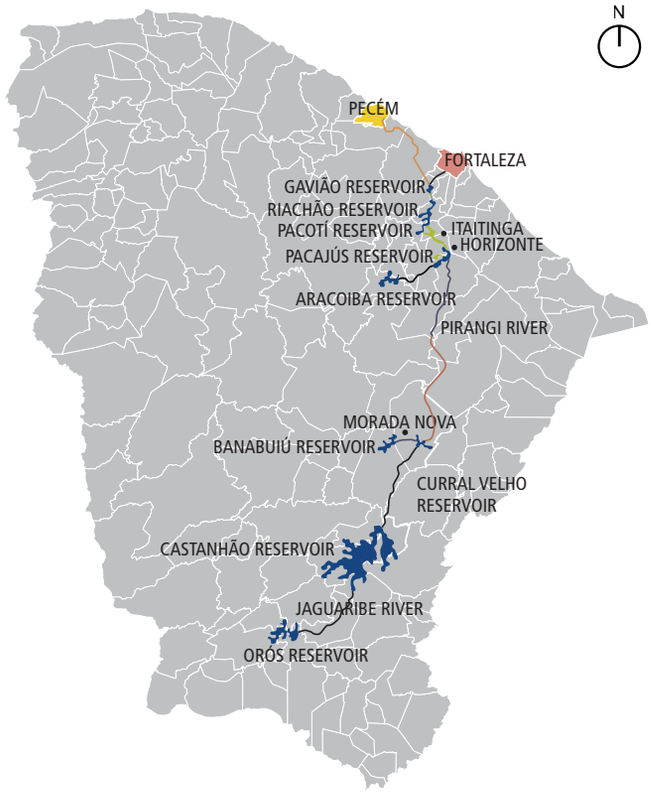
- Consolidation, on a global and national level, of new urban design concepts (compact, intelligent and sustainable cities), favoring the establishment of policies that impact the restructuring of Fortaleza and the absorption of new technologies;
- Social Security Reform in Brazil would enable the restructuring of its system in Fortaleza, reducing the strong pressure pension funds will have on the municipal public finances;
- The Federal Pact Reform should promote the redistribution of revenue between federal entities, expanding the participation of municipalities in total revenue, favoring Fortaleza's expenditures and public investment capacities;
- Structural investments by the Union and the State which are due or being implemented –the transposition of the São Francisco river, the Transnordestina, Water Belt, the Pecém port expansion as well as State industrial and infrastructure projects - which could generate a significant impact on Fortaleza's economy through the irradiation of activities.

THREATS

The evolution of external factors (global, national, and regional) from which new conditions and events could arise with the potential to negatively influence or impact the city of Fortaleza, creating threats to the municipality's development (the threats would unfold as the future evolves toward Scenario 2 of the external scenario - Conflict and Instability).

- Rising sea levels would generate negative economic impacts on Fortaleza from an economic standpoint, creating difficulties for the port system, tourism and fishing, as well as, depending on their intensity, altering areas of flooding and coastal spaces;
- An accentuated drop in farming productivity in Ceará's semiarid region brought on by climate change, would cause economic upheaval, overall decline in the economy and income in the region and the state, with the possible intensification of the migratory influx into medium and large cities, which would put pressure on Fortaleza;
- Limitation of Ceará's water resources, accentuated by alterations in the hydrological cycle brought on by climate change, hampering Ceará's economy, especially farming activity, with effects on Fortaleza's economy, accentuating the water distribution conflict of the Jaguaribe-

Figure 24 – Localization of the Jaguaribe-Metropolitan system



Source: Fortaleza 2040 Plan.

Metropolitan system that supplies the state's capital, threatening the city's water security (see Figure 24);

- Global integration with incremental innovation controlled by powerful nations and companies, intensifying the race for markets that are highly demanding of technology and quality, including strong international competition in the textile and clothing manufacture sector, creating difficulties for the city's businesses;
- Tax reform eliminating the tax incentives the State uses as instruments for investment allocation, diminishing Fortaleza's capacity to attract capital;
- Expansion of Brazil's external opening (reduction of import tariffs) broadens the influx of imported goods and services that would compete with local ones (including Fortaleza's), which would affect municipal production activity;
- Downturn and postponing of structural investments in Brazil would strongly affect Ceará's economy and particularly Fortaleza, leading to a reduction in economic development.

CHAPTER 4

A VISION FOR FORTALEZA'S FUTURE[10], CHALLENGES, AND STRATEGIC GOALS

The vision for the future reflects the City that Fortaleza's society wishes to build and hopes to reach by 2040. The vision for the future is a possible dream, viable expectations that can be reached through present conditions and within external circumstances. As a dream within grasp, the vision for the future should be daring, seeking to distance itself from present restrictions and inertia so it can strive for a high quality city. The vision of the future should be built by society - social actors and governments -, promoting the necessary changes to current reality in order to profit from opportunities and defend against threats. In organizing a vision for the future, society must define and implement a strategy to organize and guide the actions and initiatives of actors and governments. To create a vision for the future of the city in 2040, broad inquiries were made with society11, and the results were testedagainst alternative scenarios for Fortaleza so that the viability of the projects could be verified and fine-tuned.

VISION FOR THE FUTURE

In 2040 Fortaleza will be one of the best cities in Brazil to live in and do business, with a good quality of life, a competitive and dynamic economy, a restored and preserved natural environment, and social equity in access to public services, especially quality education, accompanied by a significant reduction in poverty and equitable distribution of income and economic opportunities. Fortaleza will be a safe city, where people can move and circulate comfortably and safely, without violence and traffic, but with kindness and cordiality.

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[10] An expression of society's desires and expectations, Fortaleza's vision for the future will be more viable as the external context configures itself in a favorable manner. Most importantly, it depends on the attitude of social actors and governments with regards to the deployment of a development strategy combined with public policies for urban restructuring, competitiveness, and the quality of life of the population, with innovative and proactive entrepreneurs.

[11] Two complementary forms of inquiry were devised: territorial inquiries, carried out in meetings in the Regions (with the participation of 93 neighborhoods) using the "Fortaleza That We Want" workbook as a stimulus for reflection and discussion; and thematic and sectoral forums (32 forums were held) that created visions for the future specific to each one of them.

Fortaleza will be a compact and accessible city, free of urban sprawl and with an equitable distribution of economic and service activities, and these will be closer to homes and community life, improving population's access to work, schools, and public services, reducing the need for constant long-distance journeys, stopping the city's fragmentation and the social and urban contrasts. With public spaces and street furniture that is preserved and appreciated, protected historic buildings, safe public environments, with large and well cared for squares with recreation options, quality sidewalks with good accessibility, especially for people with disabilities. The city will be a reference for universal-design, widely accessible to people with disabilities, assuring equal access to public spaces and infrastructure.

Fortaleza will have inclusive and equitable mobility, combining diverse modes of transportation, including bikes and quality public transportation that is efficient, safe, and comfortable, with accessibility for people with disabilities. It will have a quality, electronically managed road network, combined with the expansion of the subway system and an improved bus fleet.

It will be denser, more multi-functional, but permeated by open, public spaces. It will allow for a rational use of space and of infrastructure, especially the accessibility generated by concentrated people and activities, reducing distances and journeys. The city will allow for a greater variety of modes of transport, with lower energy consumption. But transport can be rationalized. Allowing journeys on foot, decreasing the use of private cars.

Fortaleza will be a compassionate society, tolerant, respecting differences and human and civil rights. Organized, with an integrated, participative life, with a social and collective vision, including a big space for community involvement in decisions about the city. The city will be welcoming, with full citizen rights for all social segments (regardless of gender, ethnic/racial-identity, sexual orientation, or creed) and social and civil rights backed by accessible and equitable affirmative actions, respecting diversity, standing up for women and assuring their participation in decision making and administrative positions.

All of Fortaleza's population will have decent homes and legalized habitation supplied with water, sanitary sewage, garbage collection, electric energy, and street lighting; roads and streets that are green and properly drained, and a community life integrated to the city's territory.

Fortaleza's youth will have an ample offer of opportunities for education, sport, recreation, and qualification so they can enter the job market, living and acting as the key players in the city's future, in such a way that, by 2040, the city will no longer have idle young people (who do not work nor study). Fortaleza will be permeated by a culture that considers aging with the guarantee that seniors will be integrated into the city's life socially, culturally, intellectually and professionally, with an active life style.

Fortaleza will be a safe and peaceful city that assures the relaxed enjoyment of public spaces. A well lit and protect place, with low homicide rates and free of drugs (users will be able to rely on treatment through public health organizations), respecting human rights and with an integrated public security system and an effective re-education system for recovering youths and adults involved in crime.

The population of Fortaleza will have a high life expectancy and will rely on ample access to a quality public health system that is universal, interactive, humanized, even-minded, and effective. The health system will focus on life, combining family health services with a network of hospitals, emergency care units, and health clinics that have a good structure, proper equipment, adequate drug supply, prepared doctors and nurses that are committed to humanized care for as long as it takes. The practice of different modalities of sport will be embraced by the population of Fortaleza, who will have suitable installations and equipment (courts, gymnasiums, small arenas, fields etc.), and will be encouraged to participate in competitions.

The people of Fortaleza will have a high level of education through quality courses (measured by high Ideb scores), with all children and youths attending classes and access to good, full-time public teaching at all levels (with proper installations, equipment and pedagogical instruments and healthy food), with qualified teachers that are well-paid and committed, acting in partnership with parents and with the community (while private institutions will play a complementary role in education).

Ample and creative cultural expression by Fortaleza's society, a participative culture that manifests the multi-faced creativity and cultural diversity, respecting and rescuing memory, preserving its material and immaterial heritage and public spaces that are supported by governments and institutions, always counting on the availability of cultural installations and equipment and access to cultural activities and events. Fortaleza will have a social environment charged with creative synergy that encourages the exploration of the city's knowledge, vocation, and potential.

Fortaleza's scientific and technological capacity will reach high rates, with research and development of technologies that foster innovation in the economic, social, and environmental field, with integration between R&D institutions and businesses.

Fortaleza will be a green city with satisfactory vegetation coverage (by the UN's standards) through the recovery and treatment of riparian forest areas around the Maceió creek, lagoons, and rivers Cocó, Maranguapinho, Ceará, Pacoti, and Pajeú. Green areas of public roads will also be restored, landscaping will be preserved, water resources recovered and protected, with good air quality generated by the reduction of atmospheric pollution.

The city will have water security (quantitative, qualitative and regular) through the integration of traditional and alternative water sources, efficient management, and social awareness about the importance of water, thus safeguarding the multiple uses it has in the capital.

In 2040 Fortaleza will be a reference in garbage collection, treatment and recycling, with the separation of solid waste and participation of rubbish collectors, which will enable the use of organic garbage in generating energy, the re-purposing recyclables, and reverse logistics of industrial and toxic waste (including medical waste). In the same way, Fortaleza will be a model capital when it comes to energetic efficiency, and a national reference in distributed microgeneration and in the use of municipal waste for energy production, with ample use of alternative energy sources.

Fortaleza's economy will set to high competitiveness standards for Brazil, streamlining and strengthening its vocational activities, especially tourism, while diversifying its productive base with new high added value segments and a high density of knowledge, such as: marine economy, creative economy, information and communication technology, advanced services, drug and biochemistry (including phytotherapy), metal-mechanic (new materials), and electronics.

The economic activities of Fortaleza will be decentralized with ample presence of industries, craft work, commerce, and services in all neighborhoods, generating local jobs and income while making use of the creativity and entrepreneurship of micro and small businesses, including the formalization of street trading, while also relying on qualified labor that can guarantee quality, productivity, and enhanced income. Urban agriculture will play a socioeconomic environmental role, in an inclusive way, producing fruits and vegetables for local markets with urban farms, and backyard and roof gardens. Street trading in Fortaleza will be organized and regularized through training and coordinating street vendors with the public authorities, so duties and rights can be implemented and observed, such as standardization of their work spaces according to their own specificity and the sectorization of commerce, allowing vendors to work in comfortable and safe conditions.

Fortaleza's economic activities will be socially and environmentally responsible, notably the civil construction industry, which will be committed to a sustainable and competitive urban environment, incorporating new concepts of urban design and understanding how it contributes to adding value to businesses.

Fortaleza's public management will be efficient and effective, based on a competent planning process, with responsive, qualified channels for society involvement, fueled by clear, objective and easily accessible information that can be effortlessly understood by society (transparency and public management). Using innovative, computed-based mechanisms, it will assure that society can be part of decisions on topics of public interest and long-term planning. The government of Fortaleza will have a fair and qualified tax system, with high financial autonomy (its own revenue) that will be subjected to tax citizenship (social awareness).

The metropolis will have an efficient planning model of governance and practice. The urbanization structure and the economy of the MRF will be duly integrated and organized. The new metropolitan complex will be supported by diverse and specific programs for production and economy that are physically accessible, including the various kinds of industries, a zone of excellence of agricultural capacity for fruits and flowers, besides accessible zones for beach tourism, business tourism, tourism in the mountain regions and urban tourism in the capital itself.

THE CHALLENGE OF FORTALEZA 2040 URBAN AND MOBILITY MASTER PLAN IN 2016

Times have changed, very different from the narratives of previous plans and present day society knows that in 2016 the main challenge of the Fortaleza 2040 Urban and Mobility Master Plan is the fulfillment of an urban plan of changes that seek to support the predicted demands of growth, in such a way that the urban form is agreed to

by society. This can only be attained through the application of efficient technical means, policies and guidelines that include the expectations of all citizens and the rules for their participation which should be applied in a flexible and adaptive manner.

Technological evolution has directly influenced the manner in which we build and use cities. The sharable aspects of contemporary urban culture produced never before seen influences upon the urban form. Although these same influences were known during the period of colonization, with the necessary local adaptations to the way cities are built, today we acknowledge that the chain of exchange in urban standards happens more intensely between the world's cities. However, in contrast with the tendency towards technical standardization, the growth of the huge gap between cities persists when talking about their economic development and that of their users.

Nowadays we can safely say that cities will not be improved through "clean slate" actions, contrary to the beliefs of modern pioneers. It is necessary to see them as a Darwinian entanglement in search of an adaptive ecology. They also work as spatial networks that are charged, constantly adapting like functional artifacts obtained through the work of many over a long time. This process is articulated through a collection of patterns, among which there are some that are ubiquitous in any urban civilization found nowadays, and others that are still unique cultural creations. We could highlight that the increase in distances for moving people and assets are a consequence of the use of motor vehicles while it also makes people dependent of them.

Thus, in today's urban planning we can consider, for instance, that a metropolis sized city, built through a dispersive process and relying on the use of low densities, will have a population that tends to be isolated, generating higher infrastructure building costs with more resources devoted to the maintenance and operation of the transport system.

The practice of using integrated patternsalong with spatial arrangements that are universally recognized has also been assimilated when it comes to building cities that are in line with sustainability criteria and a better quality of shared life. These are new instruments and possibilities that may be applied to interpreting the urban form and to propose adaptations with a view to meeting the needs of users. Even so, cities are still unique. Based on this understanding, the technical staff of the Fortaleza 2040 Urban and Mobility Master Plan interpreted the capital's urban form since its historical beginning, understanding its current form and reflecting on its tendencies. All of this so, at last, we could propose solutions that meet the demands of the metropolis' growth over the next 24 years. It all comes down to integrating the cities unique positive features with the reliable results of universal experiences.

When considering the intensity and the blend of land uses, we can conclude that Fortaleza's growth pattern follows a dispersive model. And, like countless other cities across the globe, as it went through the unavoidable process of transitionfrom a small, mono-centric city to the current metropolitan, poli-centric dimension, there was an imbalance amid the components that composed its original urban form - which was compact, accessible, and encouraged intense social sharing. This fragmentation, created by the expansion, separated people, dismantled part of the sceneries of community living and, much as happened in the majority of cities, created a strong dependency on motorized transportation. However, we cannot hope to go back, moved by nostalgia, to the urban situations that preceded the current metropolitan city.

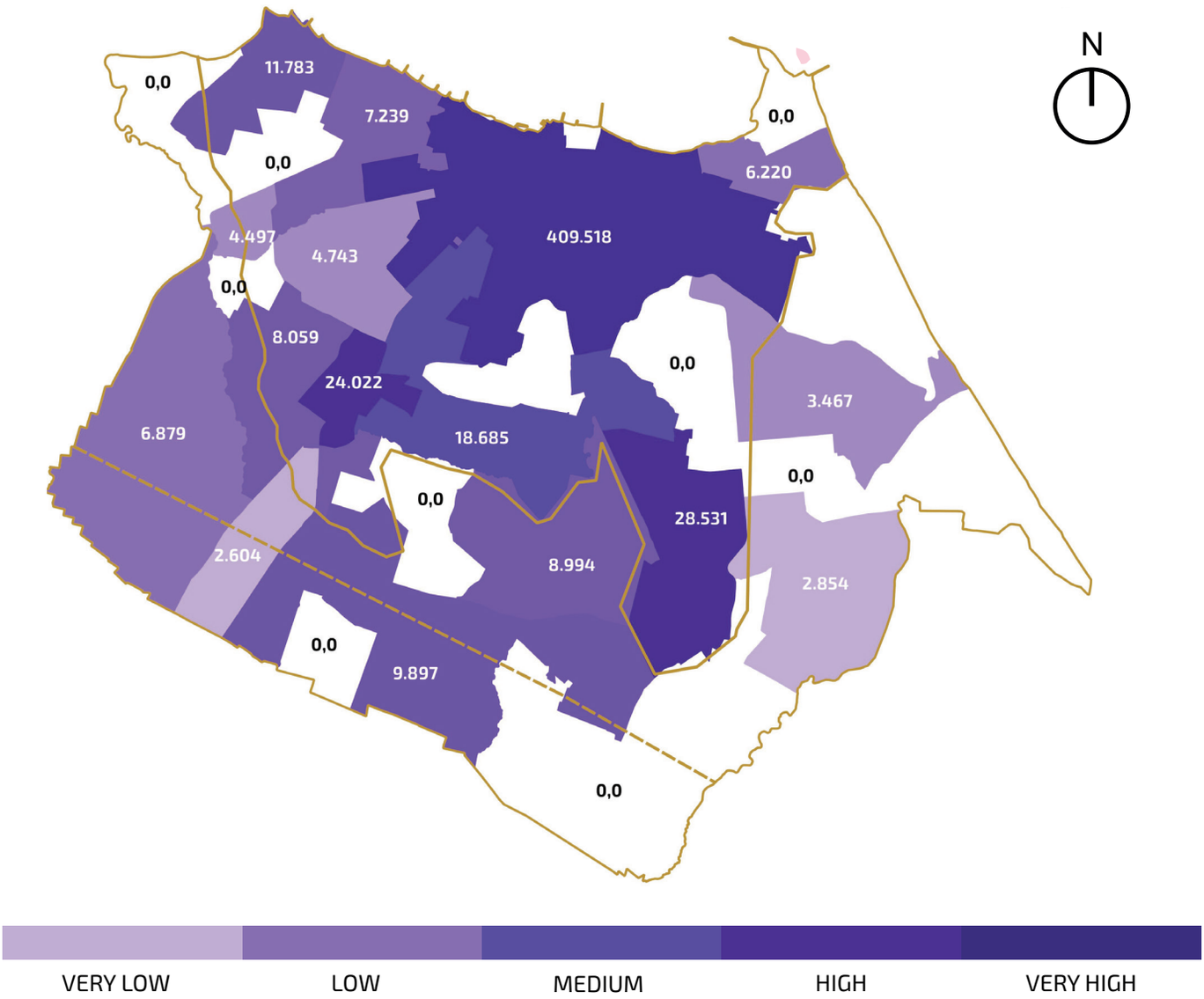
Within Fortaleza's urban panorama, understood as the current metropolitan context, people are radically segregated by income levels and have diminished access caused by low urban connectivity. In the current urban structure, those who do not own cars are at a great disadvantage with regards to access and have to limit their possibility of interchange, missing out on information and knowledge opportunities, consequently not being able to achieve a better quality of life. This happens, in part, because of increased land value in areas that have more plentiful opportunities, and these are precisely the places where centralized interactions could happen. Finding out how this map of interactions could be more generally distributed and keeping these areas accessible to the less privileged, while not compromising the city's connectivity, is one of the greatest challenges of the Fortaleza 2040 Urban and Mobility Master Plan.

We, the inhabitants of developing cities, took a long time to realize that when a city becomes a metropolis, it unavoidably needs the availability of urban planning that is guided toward public transportation, which means a physical relation between these two components in an integrated manner. Nowadays we know that this approach to urban planning - with specific land uses across "patches" as generic slabs, dispersive and expanded through low densities - ends up stretching out distances and makes it impossible for public transportation to operate and access all

places and communities. As the performance review of existing plans made it clear, Fortaleza has used the only available planning strategies, which do not encompass a way to conveniently control these negative outcomes of growth,for a long time now.

This inefficiency reveals itself especially when it comes to the demands of daily commutes between homes, educational centers, and areas of employment - all of which are, to this day, concentrated in the most privileged part of the city.

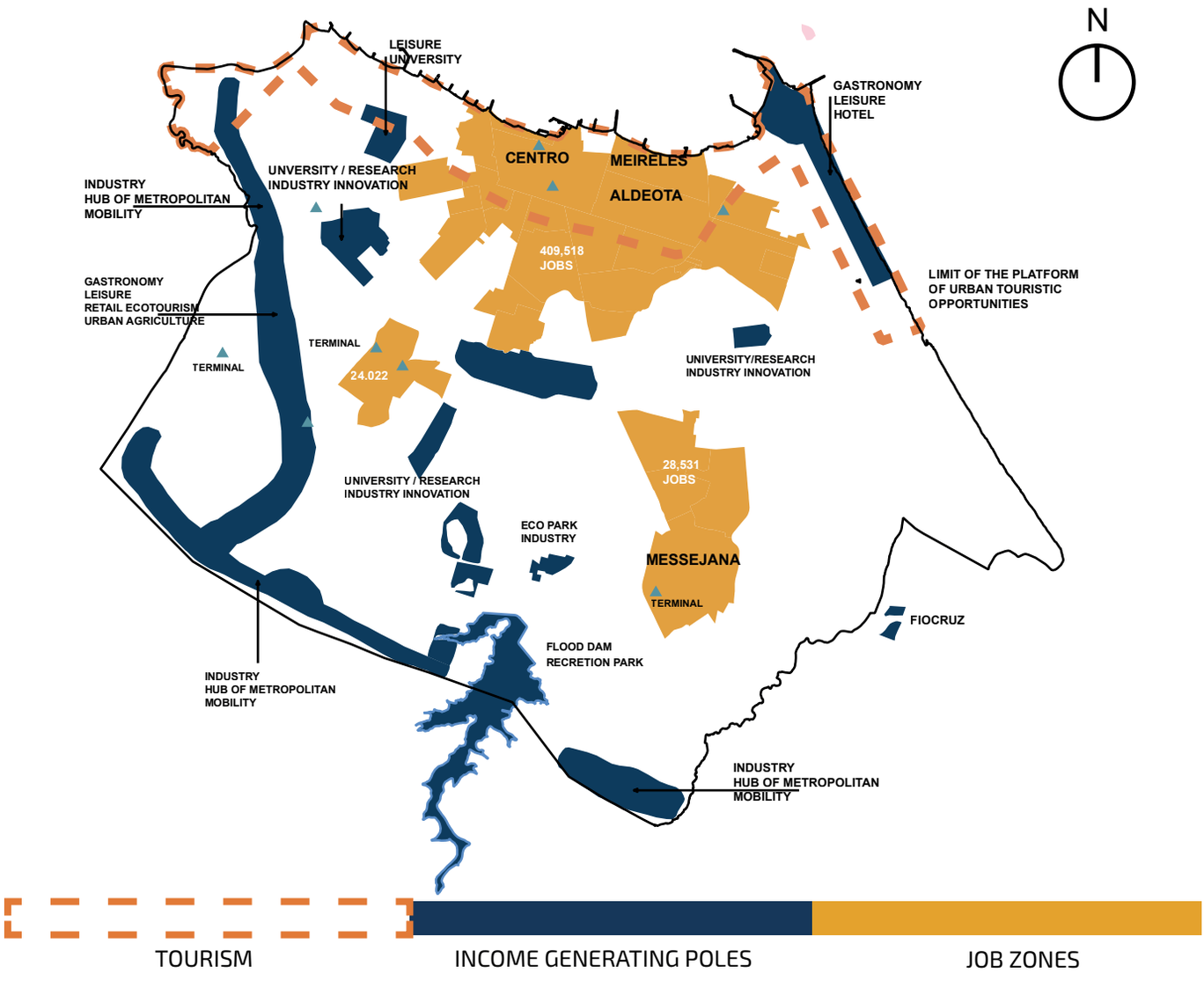
Figure 25 – Distribution of Jobs In Fortaleza



Source: Fortaleza 2040 Plan based on data from the Ministry of Labor, 2013.

As we face this reality, the need to anticipate planning becomes clearer. Only then can we reestablish the balance of access to opportunities that should be spread through the northwest, southwest, and southern sectors, thus diminishing the current commutes between these sectors and the east side of the city that has, to itself, the privileges of services and comforts of daily life within a local scale. It is evident that this process of decentralization requires a balanced distribution of land use so that opportunities and new economies can be spread out across the municipal territory, as well as new job centers, new institutional uses, services and neighborhoods that are connected

Figure 26 – Proposed distribution of jobs in Fortaleza



Source: Plano Fortaleza 2040.

to the city through viable and effective public transportation (see Figures 25 and 26).

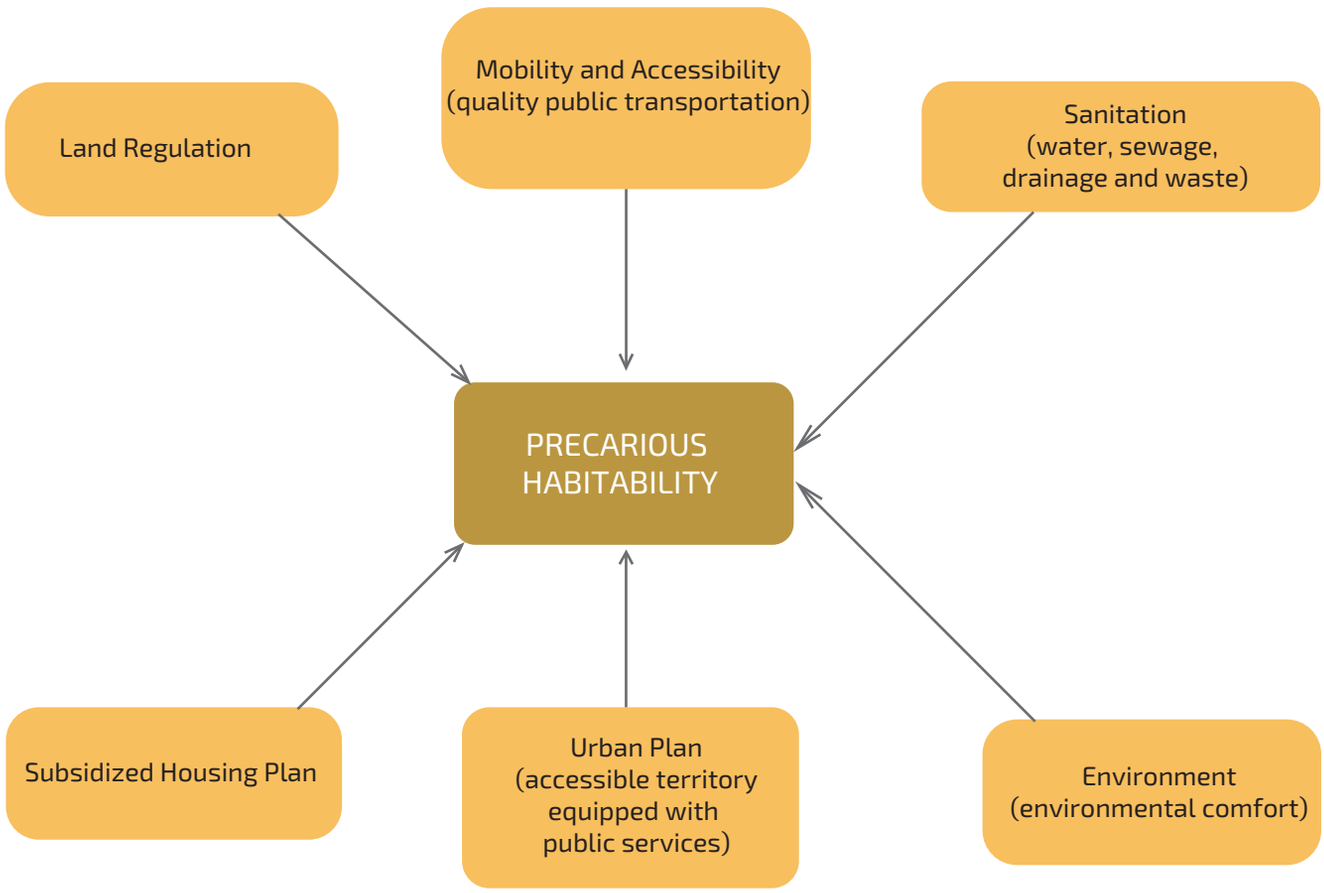
SOCIAL AND ECONOMIC CHALLENGES

The stages that preceded the creation of the Fortaleza 2040 Plan point to some of the great challenges faced in attaining the Plan's objectives.

The demographic dynamics of the city point to three main challenges:

- the **rapidly aging of the population** withits increased demand for health and social security which, are offset by a reduction in the population of children and youths, facilitating the offer of services, particularly education;
- the **increase in the population of working age** stresses the challenge of job generation that depends on a dynamic economy and on the formation of qualified labor;

Figure 27 – Challenge 1 – Precarious Habitability



Source: Fortaleza 2040 Plan.

- a combination between **territorial concentration** and the dispersion of the population across the urban space, leading to an inefficient offering of public services and, consequently, a lack of offering in areas of lower population density.
- Confronting the **huge social and territorial inequalities**, particularly the dramatic condition of precarious areas, is Fortaleza's main social challenge, guiding us to decisive actions when it comes to precarious habitation; the poverty of a large part of the population; the deterioration of public health; the high rates of violence and the situation of a considerable part of youths who are not studying or working.

CHALLENGE 1 – REDUCING PRECARIOUS HABITATION

In order to deal with the challenge of precarious habitation that is concentrated in precarious areas of the city where more than a million people live, we need to implement actions and projects on more than one front. As shown in the diagram, aside from the **Social Housing Plan (Plhis)**, which upgrades precarious settlements with decent quality of housing, the improvement of the City's habitation requires the deployment of **Land Regularisation** and **Mobility and accessibility** actions, so precarious areas can be integrated in the City, **Sanitation**, **Urban Planning**, with the introduction of public infrastructure and services, and protection of the **Environment**, for the creation of a comfortable environment.

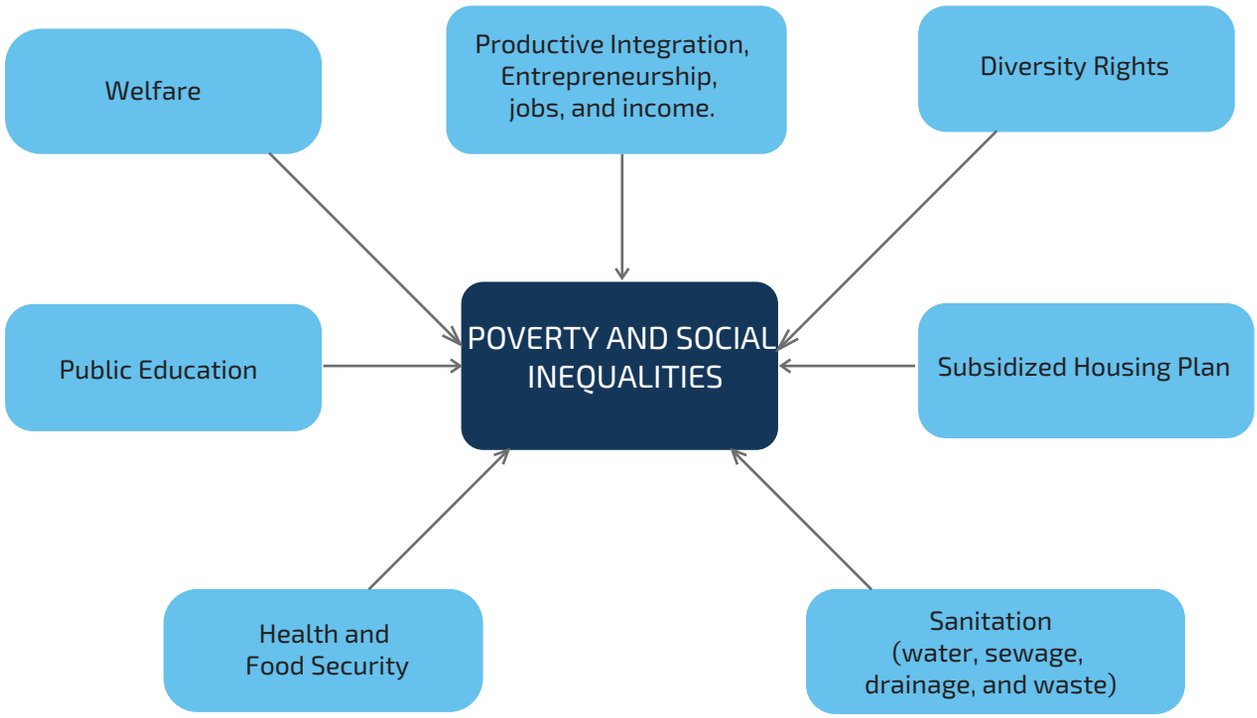
CHALLENGE 2 – REDUCING POVERTY AND SOCIAL INEQUALITY

The challenge generated by the poverty and social inequality in Fortaleza must be faced in a structured manner, through the combination of quality **Public Education**, putting an end to the gap in relation to private education, and through **Productive integration, entrepreneurship, jobs, and income**, which prepares the population for a job market that is ever more demanding in terms of qualifications, thus contributing to increasing the population's income. Poverty and unequal access to essential public services are challenges that must be faced while articulating the **Plhis** (focused in places where these services are less available), **Sanitation and Health**, and **Food security**. Additionally, considering the urgency of the situation of poverty and extreme poverty in the municipality, Welfare should contribute to addressing this challenge. And as inequality manifests itself through enduring prejudices and discrimination against diversity, it will be necessary to define strict guidelines for valuing and respecting differences in gender, race, sexual orientation, and age.

CHALLENGE 3 – IMPROVING PUBLIC HEALTH

The health of the population depends much more on the city's environmental conditions, sanitation, mobility, and the offer of public services and infrastructure than on medical-hospital care itself. Health also relies on the population's habits, be they eating habits or the practice of sports. Meanwhile, in order to face the challenge of health deterioration, there needs to be an integrated coordination between plans dealing with **Sanitation**, **Environmen**t - leading to environmental wellbeing and air quality - **Mobility and Accessibility**, with good public transportation coverage, **Urban Planning** – which will make life in the city more comfortable and less stressful – and the promotion of Sports and

Figure 28 – Challenge 2 – Poverty and Social Inequalities



(*) Rights of Seniors, Women, People with Disabilities, LGBT, and Racial Equality.

Source: Fortaleza 2040 Plan.

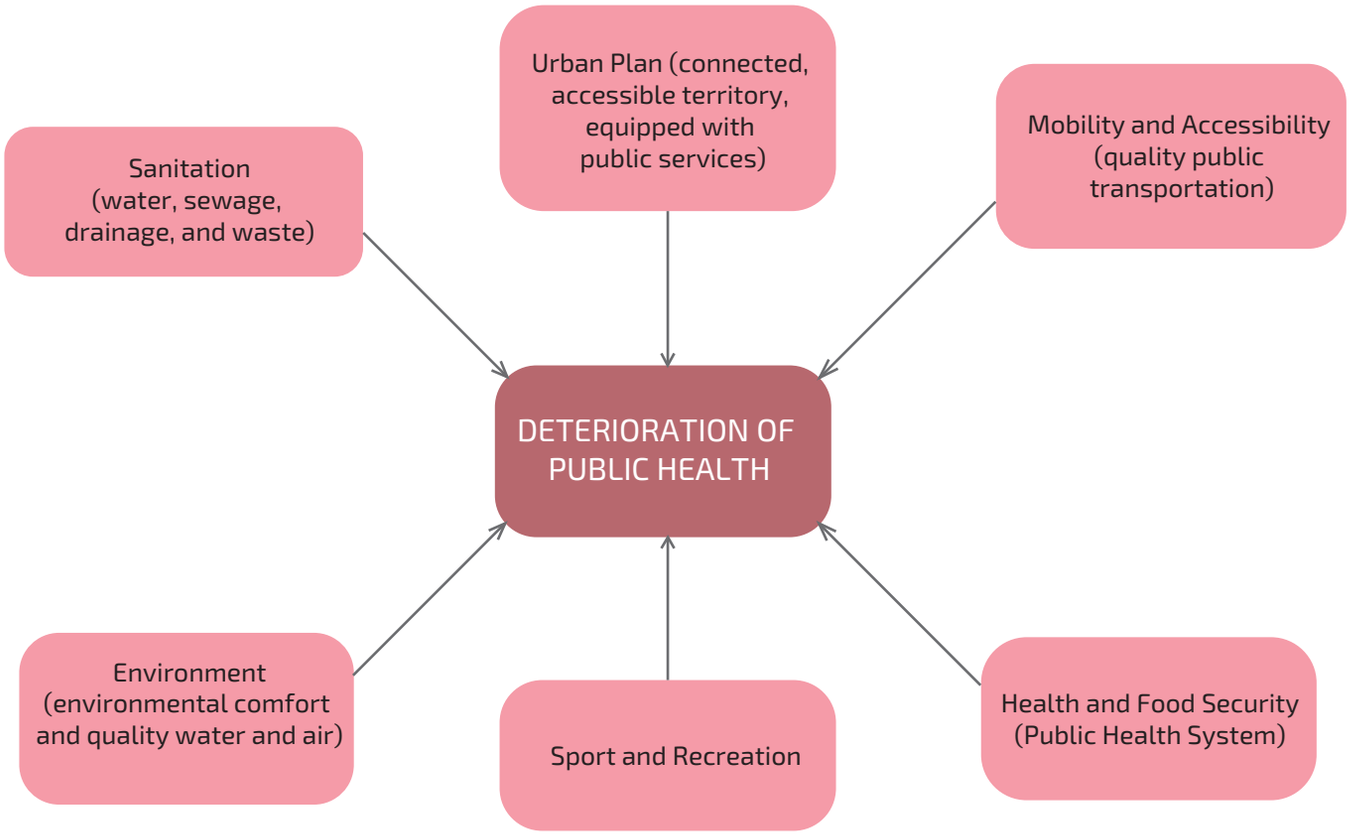
recreation.It is evident that all of these conditions, which create a healthier environment, should be complemented by a good public health system: **Public Health** and **Food security**.

CHALLENGE 4 – REDUCING THE HIGH RATES OF VIOLENCE

The high rates of violence, which affect young people in particular, are another great challenge concentrated in the precarious areas of the Capital of Ceará's territory. In close connection to this challenge, Fortaleza must face the serious problem posed by the percentage of young people who neither work nor study and who, living idly and in precarious areas, are vulnerable to drugs, criminality and are potential victims of organized crime.

The huge challenge presented by Fortaleza's violence, which victimizes young people in particular, can only be properly faced with policies and strategic actions in the social field. Even so, it also demands a **Citizen Security** plan to face organized crime and the city's criminal environment while the changes in society are still underway. The Citizen security plan must be coordinated with and accompanied by strong **Welfare** initiatives, as a way of preventing drug abuse and delinquency, as well as measures for rehabilitating

Figure 29 – Challenge 3 – Deterioration of Public Health



Source: Fortaleza 2040 Plan.

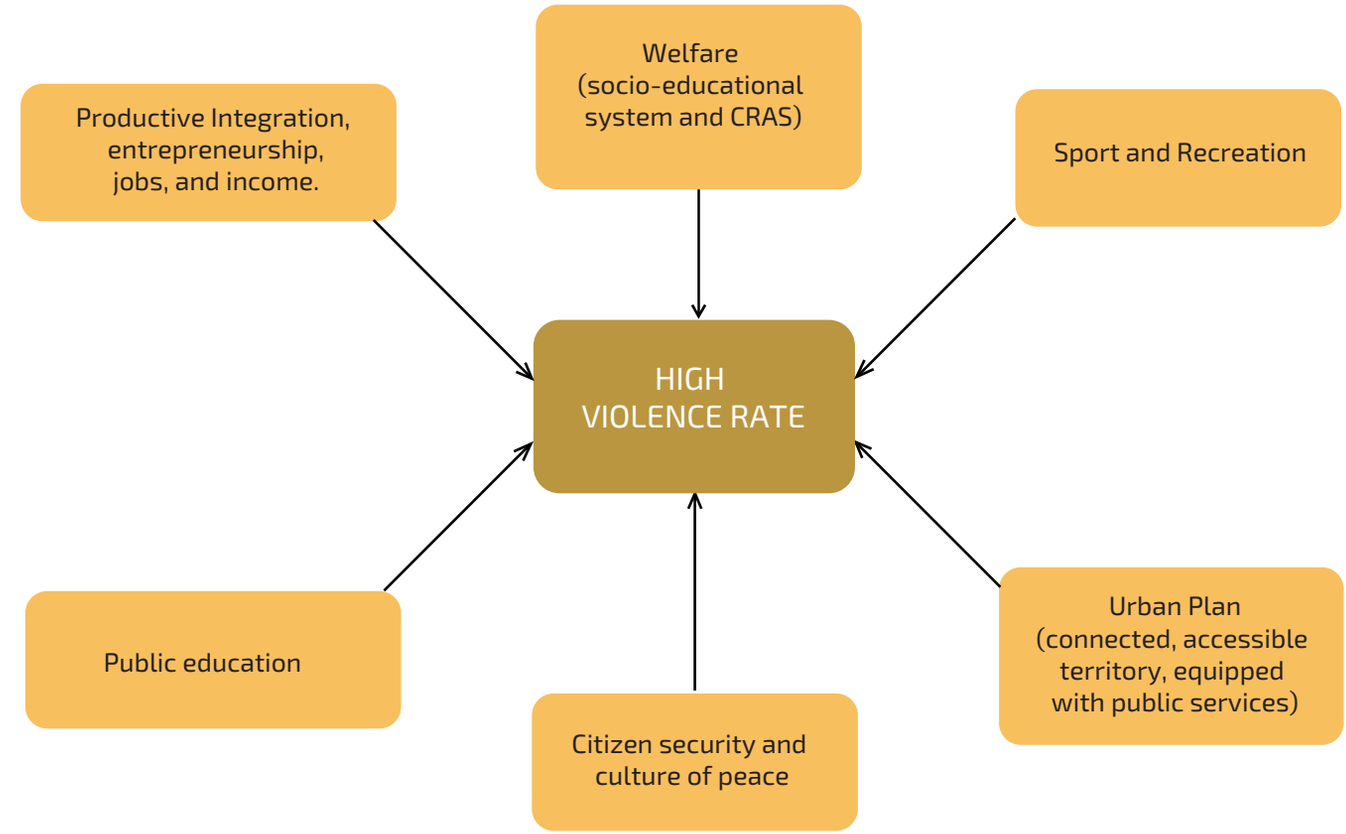
those who have served time. In the social field, **Public Education** will have absolute priority, for reducing the number of motorcycle accidents; **sports and recreation** activities will also be encouraged, as they supply people with alternatives that, in turn, open up opportunities for employment, consequently reducing the risks of social disruption. To reduce Fortaleza's rate of violence it will also be very important to implement the urban restructuring that has been detailed in the **Urban Plan** - with connectivity, denser areas, and the population's proximity to services and infrastructure, including lightning.

It will be important to move forward together with public security policies developed by the state government of Ceará, which has been, even if slowly, reducing the amount of lethal crime in the city.

CHALLENGE 5 – REDUCING THE AMOUNT OF YOUNG PEOPLE WHO NEITHER WORK NOR STUDY

The reduction of idleness among thousands of young people (who neither study nor work), particularly vulnerable youths (who live in homes with a per capita household income of up to ½ a

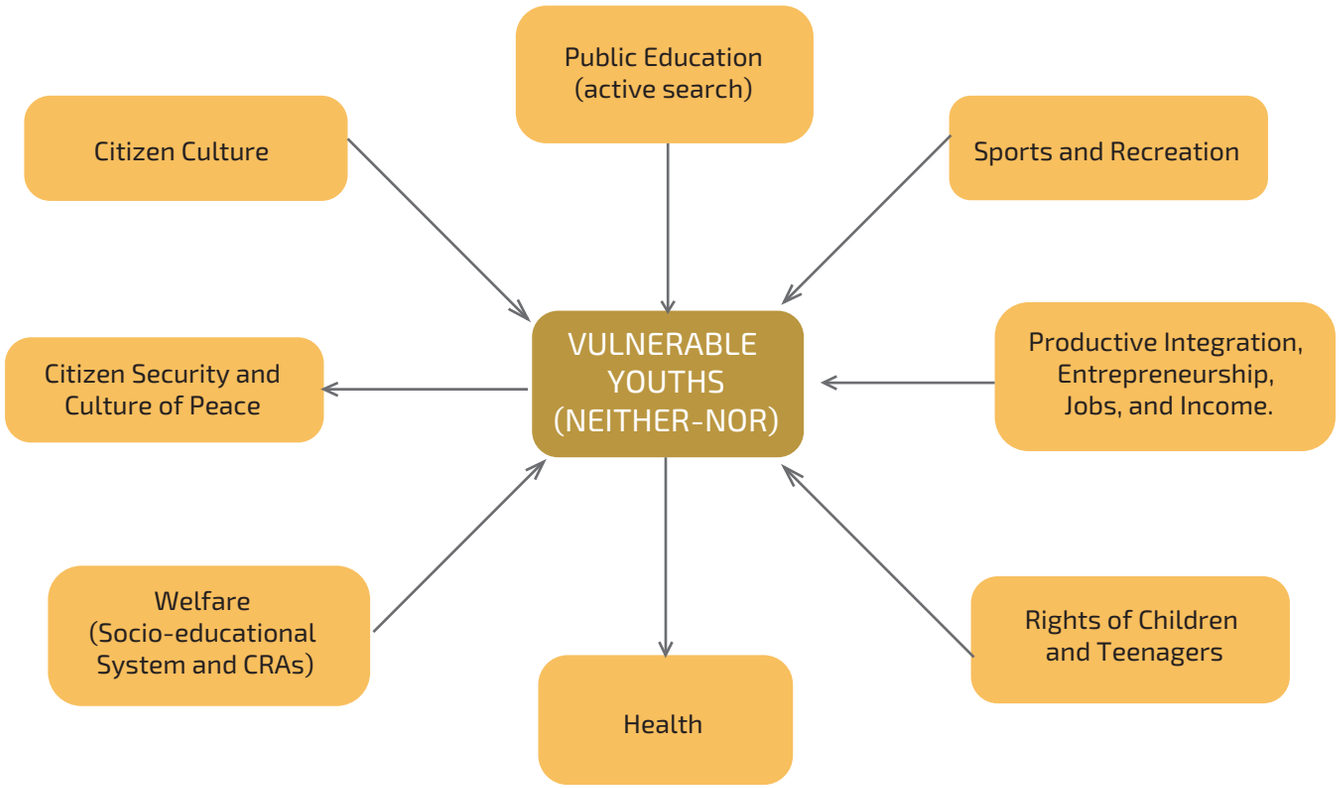
Figure 30 – Challenge 4 – High violence rate



Source: Fortaleza 2040 Plan.

minimum wage), requires a set of combined actions that can lead them to school and/or jobs, recovering their self-esteem, social integration, and distancing them from drugs and criminal environments. **Public Education** is the main action responsible for taking youths away from idleness, offering ample and attractive access to modern teaching methods and technological resources, including an active search for school-aged young people who are not attending classrooms. **Sports and Recreation** and **Citizen Culture** are two other fields that are capable of taking youths out of idleness and offering alternatives for socializing and self-esteem. Preparing young people for the job market, through **Productive integration**, offers them an occupational alternative coupled with income generation and social integration. In any case, considering the spread of drugs and the criminal environment among young people, confronting this challenge demands emergency measures of **Citizen security** and **Welfare**, including strengthening the CRAs and the socio-educational system for those fresh out of prison. Measures for assuring the rights of Children and Teenagers also contributes to the reduction of youths who neither work nor study and public health actions could care for youths that suffered premature childbirth.

Figure 31 – Challenge 5 – Youths who neither work nor study



Source: Fortaleza 2040 Plan.

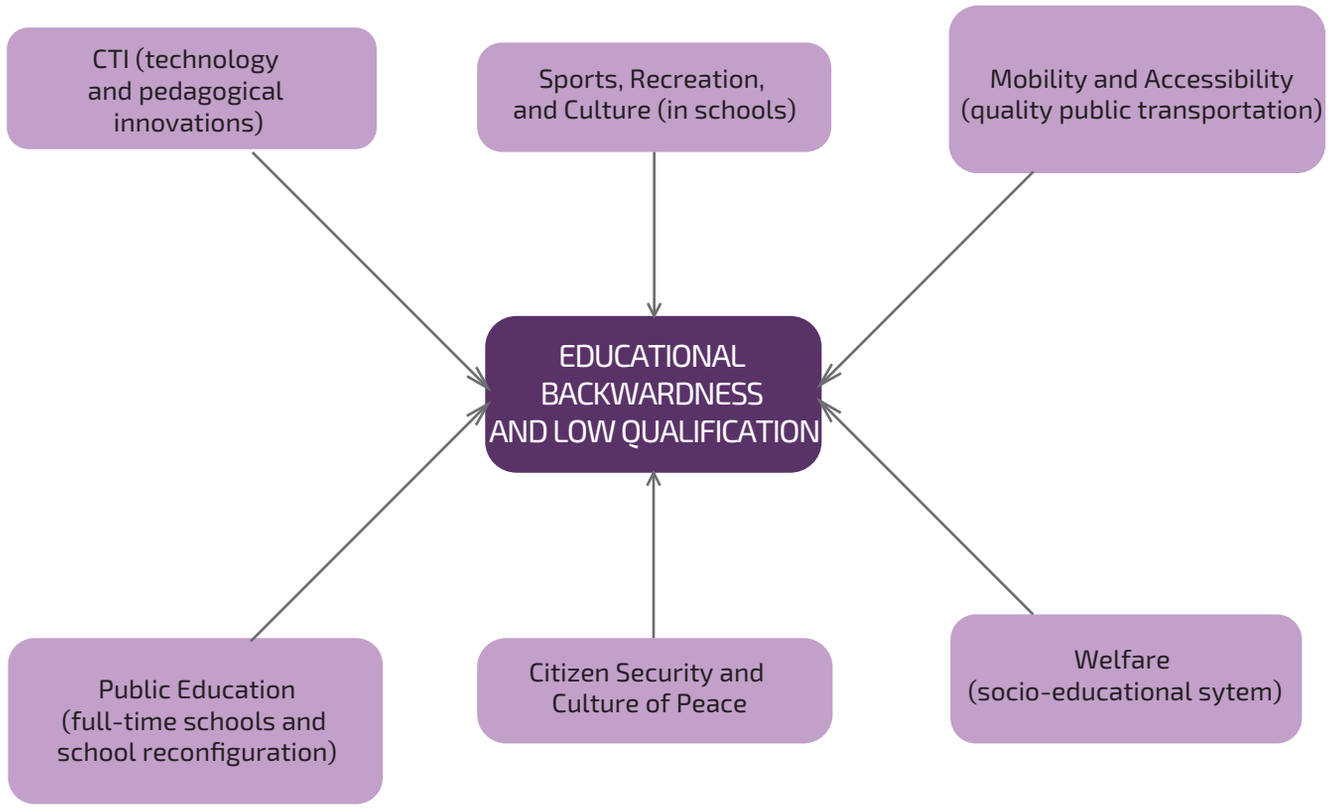
CHALLENGE 6 – FACING EDUCATIONAL BACKWARDNESS AND LOW PROFESSIONAL QUALIFICATION

Improving the quality of education and the ample access of children and youths to Fortaleza's public schools are another challenge faced by the city. Quality schools would reduce poverty and social inequality as well as contribute to the economy's competitiveness. In order to combat unequal access to opportunities in Fortaleza's society, public education in Fortaleza (both municipal and state schools) should advance rapidly so that they can match the quality of private education.

Expanding scientific and technological capacity, particularly strengthening the systems for innovation, and intensifying coordination with private activities are also great challenges for the future.

Developing a daring and consistent plan for **Public Education** is the cornerstone for facing the current low quality of educational and professional qualifications in Fortaleza, expanding full-time schools, reformulating and improving pedagogical processes, and valuing teachers. But the scope and the results of this type of education plan depend on conditions that will be brought about by other areas, especially **Science, technology,**

Figure 32 – Challenge 6 – Educational backwardness and low professional qualification



Souce: Fortaleza 2040 Plan.

and innovation. These would lead to innovation in pedagogical tools and **Sports and Recreation**, as well as **Citizen security,** ensuring the safety of teaching establishments, while **Welfare** focuses on youths and the school environment. Aside from all of this, **Mobility and accessibility** would enable proximity between the students, their families, and schools.

CHALLENGE 7 – LOW COMPETITIVENESS

Improving the economy's competitiveness is one of Fortaleza's main challenges on the economic front, reducing the gap in relation to other Brazilian capitals and, especially, the Northeastern ones. Economic competitiveness, as studies have shown, depends on several components that go beyond the economy, such as education, professional qualifications, technological development, infrastructure and the quality of the urban space, and the regulatory system. The municipality must deal with three other challenges: first, reducing the competitiveness gap across the territory in favor of regions with less capacity for attracting investment,to balance the regional distribution of economic activities; the second chal-

lenge consists of consolidating productive changes and adding value; and finally, Fortaleza must pursue the diversification of its productive structure, with emerging new activities with high knowledge and technology density.

The economy's competitiveness depends on education and professional qualification, technological innovation, the quality of the urban space - including mobility -, the quality of the environment, and public security. Aside from these areas, the competitive environment requires that a regulatory system is set in place, facilitating and stimulating businesses. In order to combat Fortaleza's low levels of competitiveness, actions must be coordinated in these fields: **Public education**, contributing to the quality of the population's education; **Science, technology and innovation**, favoring innovation in the products and processes of businesses; **Sanitation and Environment**, which generate environmental comfort; **Citizen Security**, **Mobility and Accessibility**, and **Urban Planning**, optimizing the use of spaces and improving communication, transportation, and, finally, the Regulatory system, which incorporates regulatory frameworks that encourage productive activities.

Combined actions in these fields will lead to an increase in Fortaleza's systemic competitiveness, improving its position in national and regional rankings, fostering development and density of the municipality's main productive chains.

Figure 33 – Challenge 7 – Low Competitiveness

Source: Fortaleza 2040 Plan.

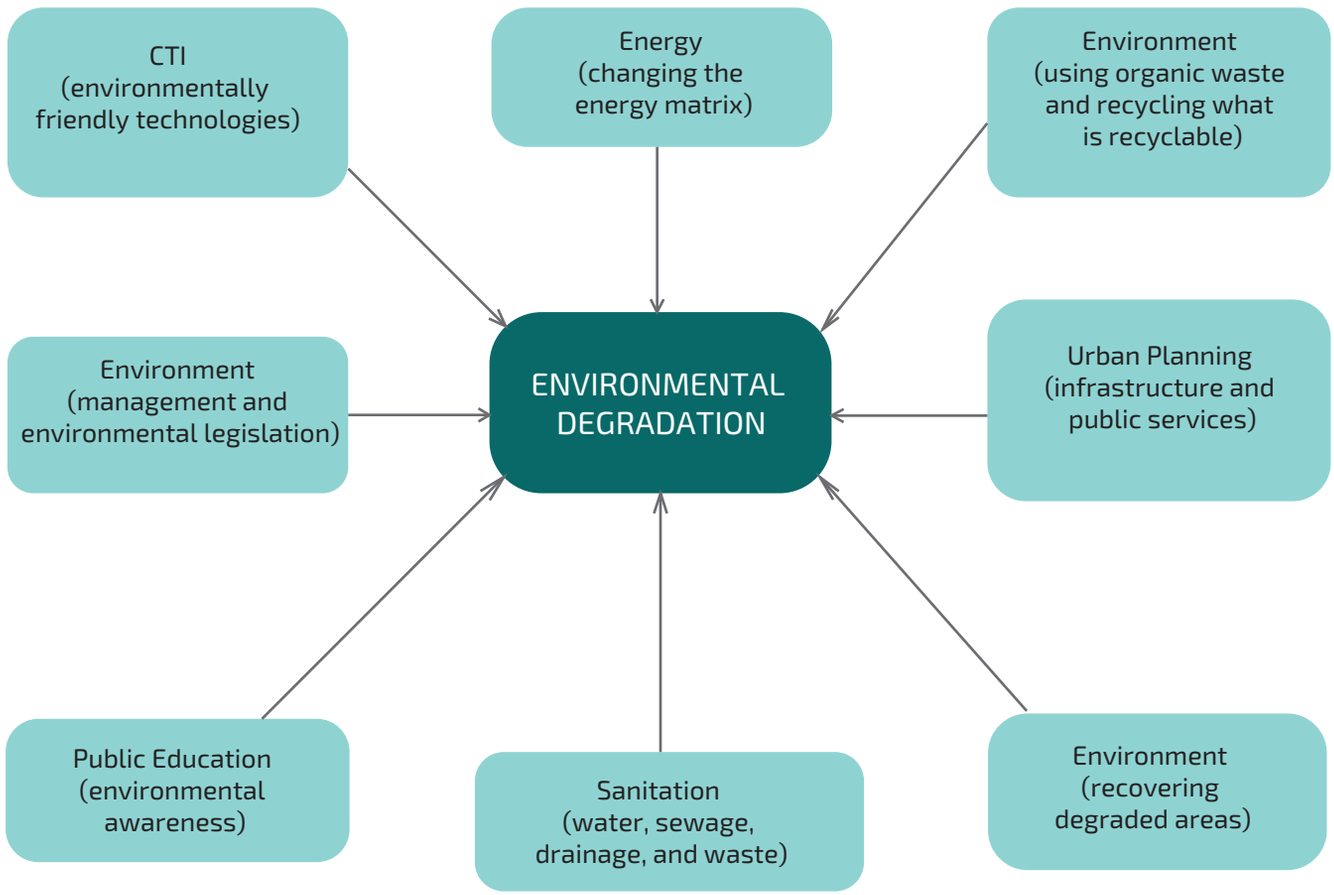
They would enable the sectoral plans - **Creative Economy**, **Marine Economy**, **ICT**, **Advanced Services and new economy**, **Tourism**, **Clothing Manufacturing**, **Civil Construction**, and **Urban agriculture** - that streamline the economy, generating jobs and income, and contributing to an increase in public revenue.

CHALLENGE 8 – STOPPING ENVIRONMENTAL DEGRADATION

Stopping the process of environmental degradation, deforestation, pollution of water resources, and recovering already degraded areas - these are the challenges Fortaleza faces in coming decades. The city must create conditions so that economic growth doesn't speed up these anthropic pressures, leading to further degradation of the environment.

Aside from implementing actions directly linked to the environment - recuperation of degraded areas, environmental management and monitoring (the management of urban water resources and the coastal area) and use oforganic waste and recycling what is recyclable - the response to

Figure 34 – Challenge 8 – Environmental Degradation



Source: Fortaleza 2040 Plan.

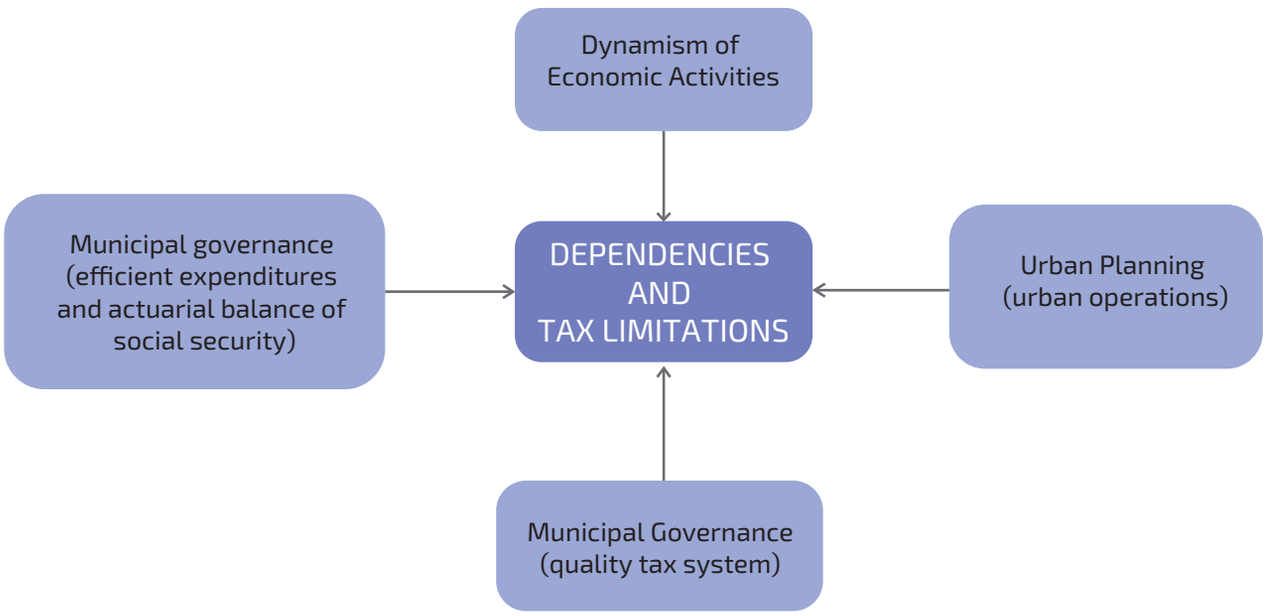
environmental degradation should include **Science, Technology and innovation** actions, developing technologies that might mitigate the anthropic pressure of productive activities, and allowing the sustainable use of natural resources; **Sanitation**, with water and sewage treatment and, particularly, selective collection of garbage, enabling its use and recycling, and **Energy**, which combines distributed microgeneration of solar energy with the repurposing of organic waste for energy generation. As well as all of these environmental education measures should also be taken.

CHALLENGE 9 – DEPENDENCE AND TAX LIMITATIONS

The main challenge of Fortaleza's public finances is the tendency of growth in the actuarial and financial deficits of Social Security, as shown in Table 2, that require a plan for equalizing and balancing in order to assure future benefits without jeopardizing public investment and expenditure.

Facing this fiscal challenge (dependence and limited resources) relies, first and foremost, on the economy's competitiveness and especially on the energy of resource generating economic activities, expanding the base for tax collection. However, this expansion of tax collection should be mediated by improvements in Municipal Governance, in terms of tax system quality and efficiency of public expenditure,

Figure 35 – Challenge 9 – Dependencies and Tax Limitations



(*) We should highlight consolidated activities - tourism, clothing manufacturing, civil construction - and potential activities - creative economy, sea economy, ICT, advanced service, new economy, and urban agriculture.

Source: Fortaleza 2040 Plan.

Table 2 – Financial results of Fortaleza's social security system

YEAR	SOCIAL SECURITY REVENUE	SOCIAL SECURITY EXPENSES	FINANCIAL RESULT
2006	175.084	139.219	33.866
2007	202.481	156.706	45.776
2008	276.671	183.294	93.377
2009	278.991	125.167	153.824
2010	298.846	221.020	77.825
2011	373.675	264.215	109.460
2012	492.826	315.695	177.131
2013	398.736	368.729	30.007
2014	471.087	474.414	-3.327
2015	544.467	581.619	-37.152

Source: Sefin/PMF, 2015

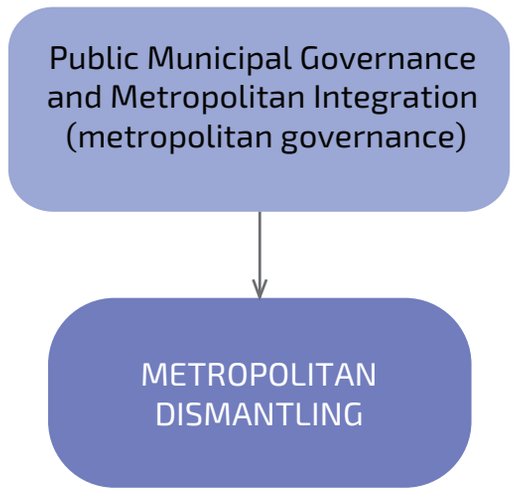
particularly concerning the recovery of balance within the social security system. On the other hand, the reduction of dependence and tax limitations can be compensated by several mechanisms that have been established in the Urban Plan.

CHALLENGE 10 – COORDINATING THE METROPOLITAN REGION

As the core of the metropolitan territory, Fortaleza must bear the challenge of coordinating the municipalities that form the metropolitan region so that policies, public services, and economic activities can be complementary and integrated. This metropolitan integration should optimize results for the whole population, avoiding the spread of problems from metropolitan units, while making the most of their potentialities so the region can development as whole.

As the capital, logistical and administrative center of the Metropolitan Region, Fortaleza carries the burden of responsibility when it comes to facing the metropolitan disarticulation that, nonetheless, also depends on the attitude of other municipalities and the state government's initiative. Fortaleza should make an effort to negotiate the construction of a metropolitan governance structure and take the lead with the establishment of Public Municipal Governance and Metropolitan Integration.

Figure 36 – Challenge 10 – Metropolitan Dismantling



Source: Fortaleza 2040 Plan.

OVERALL TARGETS

The vision for the future that expresses the Fortaleza that we want and can build by 2040 should be translated into targets using indicators to measure the evolution of the economic and social reality during the next decades. Reaching these goals, which we will present next along with different indicators, depends on the effective implementation of the plans proposed for several areas, which are capable of promoting changes that will take us from "Fortaleza Today" to the "Fortaleza That We Want". Although the targets and their indicators can be concrete and specific, dealing with economic, social and environmental dimensions, each one of them depends on the performance of the others. The result is a combined and systemic process of development. On the other hand, the changes and improvements of each indicator will move slowly during the first years, due to the inertia and pace at which these actions and their impact upon reality mature, gaining momentum and reach as they distance themselves from the present, especially after 2025.

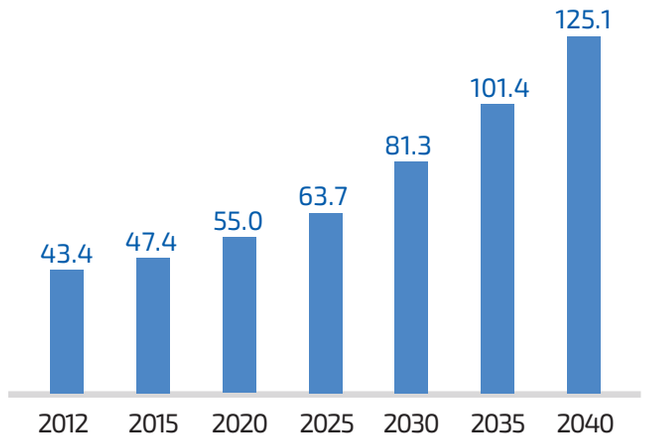
ECONOMIC TARGETS

The economic targets manifest themselves through specific indicators of Fortaleza's economy and largely stem from the increase of productive investments and from denser chains of production. However, the evolution of economic indicators is dependent on the improvement of competitiveness in the City that, in its turn, will not be attained without advancements in education, infrastructure, and innovation, as well as the improvement of urban space.

Target 1 - Raising GDP between 2012/2040 - from R$ 47.4 billion in 2015 to 125.1 billion

In the coming decades the economy of Fortaleza should grow about 4% a year, beginning at a very modest level and then expanding as strategic actions - raising economic competitiveness and fostering productive activities - are set into motion and the economy is freed from short-term restrictions. Consequently, in 2040, the GDP of Fortaleza will reach about R$ 125.1 reais (at 2015 prices), nearly three times that registered in 2015.

Graph 22 – Target 1 – Raising the GDP (R$)



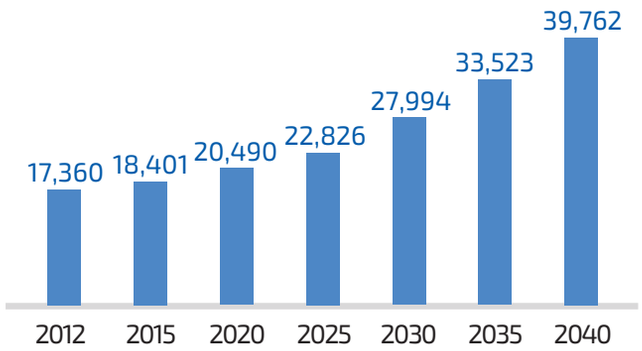
Source: Fortaleza 2040 Plan.

Target 2 - Elevating the Gross Internal Product per capita between 2012/2040 - from R$ 17.360,00 registered in 2012, to R$ 39.762,00 in 2040

The combination of economic growth at around 4% a year with the low population increase, around 0.8% a year, will lead to a continuous GDP per capita

increase in Fortaleza in the coming decades, from the R$ 17.360,00 registered in 2012, it will reach about R$ 39.762,00 in 2040.

Graph 23 – Target 2
Raising the GDP per capita (R$)

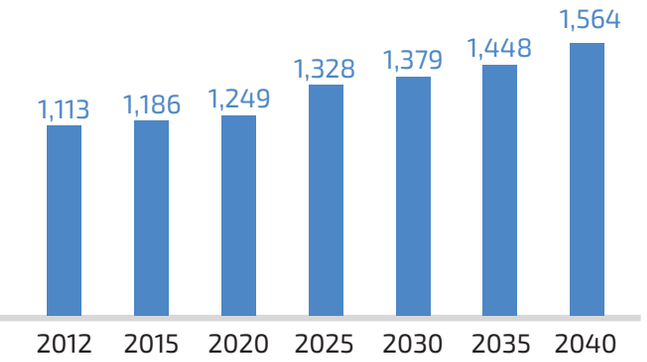


Source: Fortaleza 2040 Plan.

Target 3 - Increase in the occupied population from 1.186 thousand occupied people, in 2015, to 1.564 thousand by 2040.

Looking at an economic growth target of 4% a year, productivity could increase about 2.8% a year, slowly at first and then picking up speed as the policies lead to results and break through inertia, especially with labor and production innovation. The target for employment was defined as an increase from 1.186 thousand occupied people, in 2015, to 1.564 thousand in 2040. With the estimated growth of the Economically Active Population at about 1.1% a year, following the increase of the Working Age Population, the rate of unemployment in Fortaleza will be practically residual, at around 4% of the EAP (in 2014 it was 4.8%).

Graph 24 – Target 3
Increase of Occupied Population

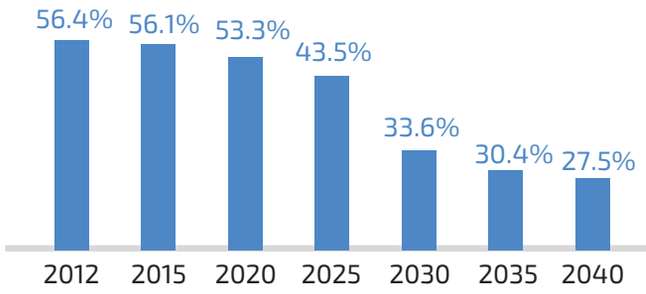


Source: Fortaleza 2040 Plan.

Target 4 - Reducing informality from 56.1% of the occupied population not working a formal job, in 2012, to around 27.5% in 2040)

Informal activities are part of the total number of occupied people in the city who, generally, are not formally hired or work in precarious conditions. So reducing the number of people working informally will be an important target for the future of Fortaleza (to have workers formally hired or be self-employed). Given the efforts toward professional qualification combined with measures for reforming work relations and labor taxes, as well as simplifying the operation of micro and small businesses, informal work should decline continuously in the coming decades - slowly during the first years, but gaining momentum as the impact of policies begins to show. The current target would lead to a reduction from the current 56.1% of the occupied populations (30.9% not formally employed) to around 27.5% by 2040.

Graph 25 – Target 4
Reduction of Work Informality

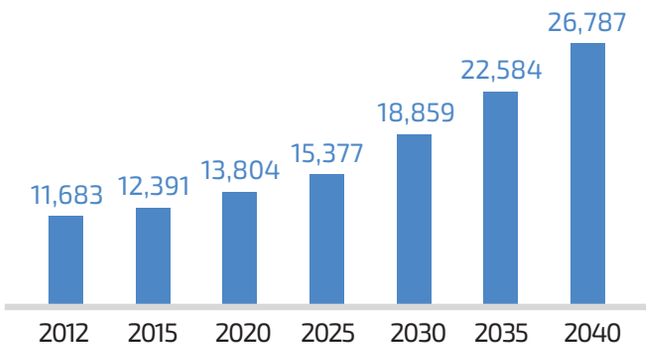


Source: Fortaleza 2040 Plan.

Target 5 - Raising annual household income per capita from R$ 12.391,00 per year (2015) to around R$ 26.787,00 in 2040

The growth of the Gross Domestic Product (GDP) will lead to an increase in GDP per capita, as seen in previous targets, which is expressed in a proportional increase of household income per capita in Fortaleza, a reflection of what families effectively have at their disposal. The target for household income per capita in Fortaleza foresees the increase from the current R$ 12.391,00 reais a year (2015) to around R$ 26.787,00, in 2040.

Graph 26 – Target 5 – Increase of annual household income per capita (R$)



Source: Fortaleza 2040 Plan.

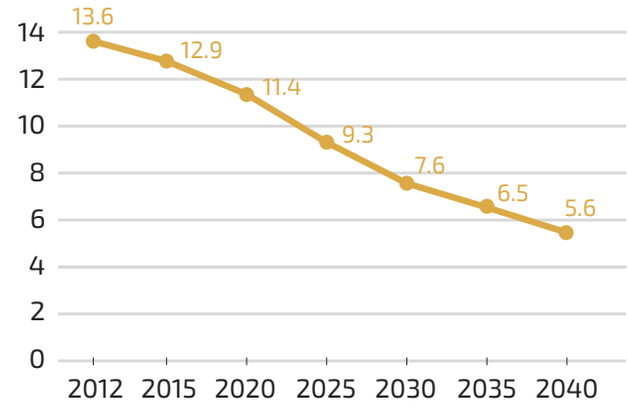
SOCIAL TARGETS

Increasing the population's quality of life, the main objective behind economic and social development, can be expressed through targets belonging to a set of indicators that deal with the reduction of poverty and social inequality, expansion of access to public services, improvement of urban conditions, decline of mortality (infant and traffic related), reduction of violence, and decline of idleness among youths. The reach of these targets depends on the actions and direct initiatives relating to social problems. They will be reached only if they are accompanied by growth of the economy and income, improvement of public education, raising public expenditure capacity, tax collection and effective management of public resources.

Target 6 - Reduction of poverty (percentage of the population with a household income per capita of up to 1/2 of a minimum wage) - 12.9% in 2015 to 5.6% in 2040.

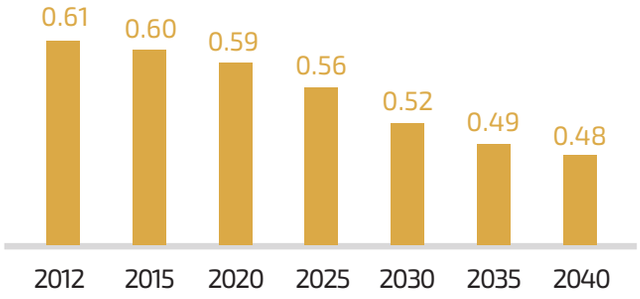
By 2040 Fortaleza's poverty rate (measured by the percentage of the population with a household income per capita below 1/2 of a minimum wage) should decline continuously and significantly, boosted by the performance of the economy (income and jobs) and by social policies that encourage an increase in income, particularly education and labor qualification. According to the target, poverty should drop from the current 12.9% of the population (an estimate from 2015, based on the Census's 13.6% in 2010) to 5.6% in 2040. This decline will begin slowly in the first years, but will gain momentum after 2020, when the policies begin to reap their benefits through changes in the conditions of the population with the lowest income.

Graph 27 – Target 6 – Reduction of Poverty



Source: Fortaleza 2040 Plan.

Graph 28 – Target 7 – Reduction of Social Inequality – Gini Index



Source: Fortaleza 2040 Plan.

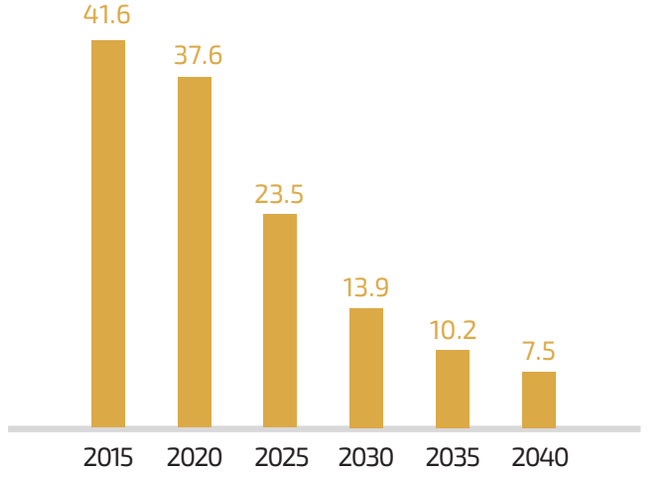
Target 7 - Reduction in Social Inequality - Gini Index - from 0.61, registered in 2010, to 0.48 by 2040.

Fortaleza is one of the Brazilian capitals with the greatest social inequality as measured by the Gini index (0.61, in 2010, on a scale from 0 to 1). The target for the next decades foresees a continued reduction, accompanied by a drop, in poverty as a result of employment growth and social policies, particularly education and professional qualification. The Gini Index will drop from the 0.61 registered in 2010 to 0.48 in 2040.

Target 8 - Reduction in the percentage of the population living in precarious settlements between 2015 and 2040 - Percentage of the total population of 1.077 thousand (2015) to around 235 thousand in 2040.

Large scale investment in precarious areas of Fortaleza will allow us to define a meaningful target when it comes to the population living in these types of settlements. This reduction would become more intense between 2020 and 2025, with a boost in investments and results. This would cause the number of people in Fortaleza living in precarious settlements to drop from 41.6% (2015 estimate) to about 7.5% by 2040. This target represents a significant decline in the number of people living in such areas, going from 1.077 thousand (2015) to around 235 thousand in 2040 - which is a high number for the city we aspire to.

Graph 29 – Target 8 – Reduction of population living in precarious settlements (%)

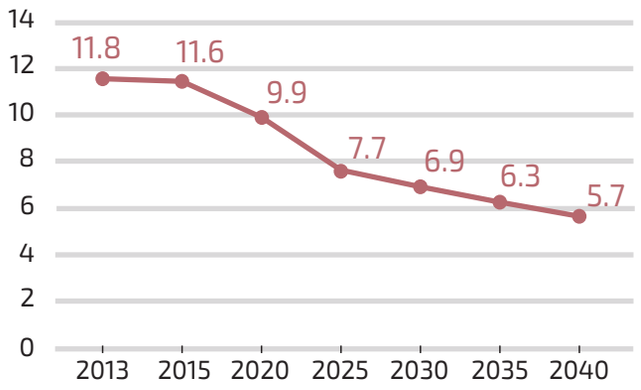


Source: Fortaleza 2040 Plan.

Target 9 - Reducing infant mortality from the current 11.8 deaths in every thousand live births (2013) to 5.7 deaths in every thousand live births by 2040.

The increase in income, along with the reduction of social inequalities, will foster an overall improvement of the population's public health indicators that are, in turn, boosted by the consolidation and strengthening of the health system. This combination of factors, reinforced by the improvements in habitability in precarious regions, enables us to define an infant mortality reduction target from the current 11.8 deaths in every thousand live births (2013) to 5.7 deaths in every thousand live births by 2040.

Graph 30 – Target 9 – Reduction of infant mortality (per a thousand live births)

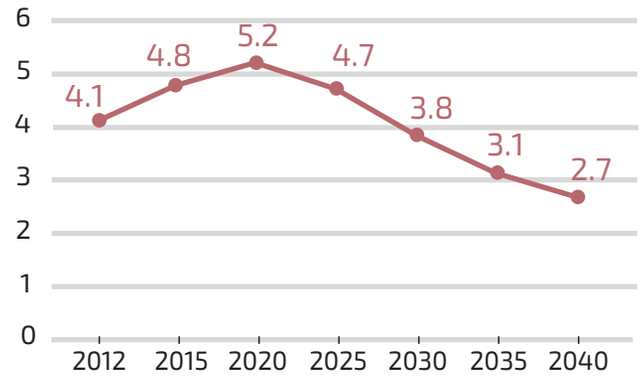


Source: Fortaleza 2040 Plan.

Target 10 - Reduction in motorcycle related deaths in traffic from 123 deaths in 2012 to 84.8 by 2040

The combination of improvements in the city's mobility through transit control and surveillance, and an increase in education, will lead to a reduction in the number of fatal motorcycle accidents. The established target seeks to reduce the current high level (2015) of 4.8 deaths in every thousand inhabitants to 2.7 deaths in every hundred thousand inhabitants by 2040. In absolute terms, this would present a reduction from 123 motorcycle related deaths, in 2012, to 84.8, in 2040, which still is a high number. Despite this, and considering the proliferation of motorcycles and the slow effect of urban planning, control and education measures, until 2020 the motorcycle death rate should still be growing for everyhundred thousand inhabitants. Its decline should start around 2020.

Graph 31 – Target 10 – Reduction of deaths in motorcycle accidents (per 100,000 inhabitants)



Source: Fortaleza 2040 Plan.

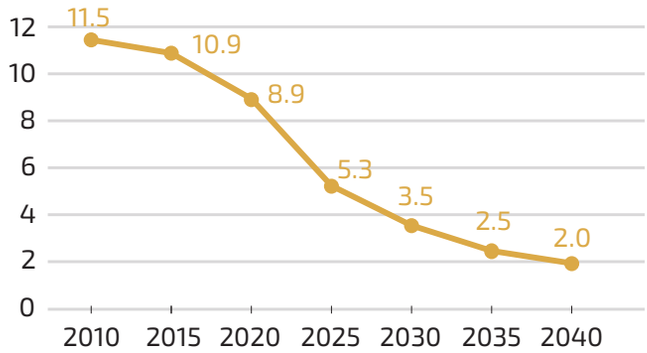
Target 11 - Reduction in vulnerable youths who neither work nor study from 19.9% (2010) to 2.0%, in 2040

Combined actions in education, labor qualifications, athletic and cultural activities, and employment intermediation should promote a drastic reduction in Fortaleza's young people who neither work nor study, particularly vulnerable youths (who live in homes with a household income per capital up to 1/2 a minimum wage).

Considering that the growing economy will produce a significant number of jobs, job market entries for young people will increase, reinforced by improvements in education and in the professional qualification of youths. As a target, a reduction from the present 10.9% of vulnerable youths who neither work nor study (2010) to 2.0% in 2040 has been set out.

As the percentage of vulnerable youths who neither work nor study drops, the poverty rate will also drop in coming decades, along with the vulnerability of youths and the absolute number of young people in this age group (from 15 to 24 years old). This way, in absolute terms, the young population (between 15 and 24 years old) who neither work nor study should fall from the present 50.809 (2015 estimate) to around 6 thousand (approximately 6.590) by 2040 (the population in this age range falls by about 0.9% a year, while poverty drops 2.2% a year).

Graph 32 – Target 11
Reduction of the percentage of vulnerable youths who neither work nor study (%)

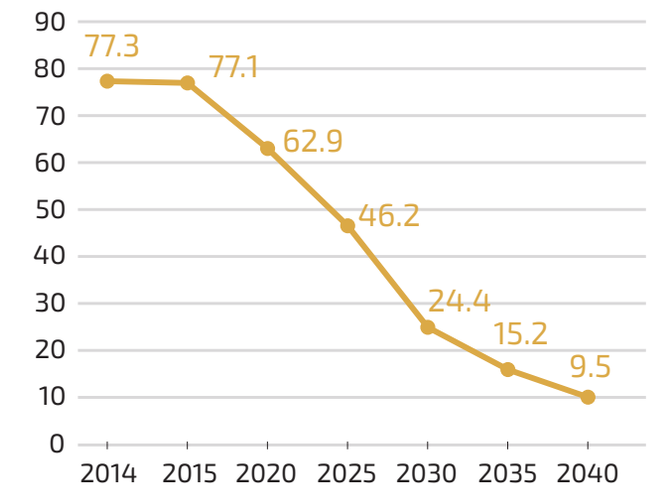


Source: Fortaleza 2040 Plan.

Target 12 - Reduction in the rate of violence (homicides in every a hundred thousand inhabitants) from the present 77.3 (2014) to 9.5 per hundred thousand inhabitants.

The Brazilian capital with the highest violence rate commits to this target for 2040: reducing the present homicide rate of 22.3 (2014) to 9.5 in every hundred thousand inhabitants, below the level that is defined as endemic violence (10 homicides for every hundred thousand inhabitants). An ambitious target that will only be attained if the targets for education, employment and income are also attained, along with a reduction in the number of young people who neither work nor study. The target would lead to a reduction of the absolute number of homicide victims - from the current 1.988 (2014) to 393 by 2040. It would be a process of continuous decline, slow during the first two five-year periods, but picking up speed as the policies and initiatives begin to reap results.

Graph 33 – Target 12 – Reduction of the Homicide Rate (per 100,000 inhabitants)

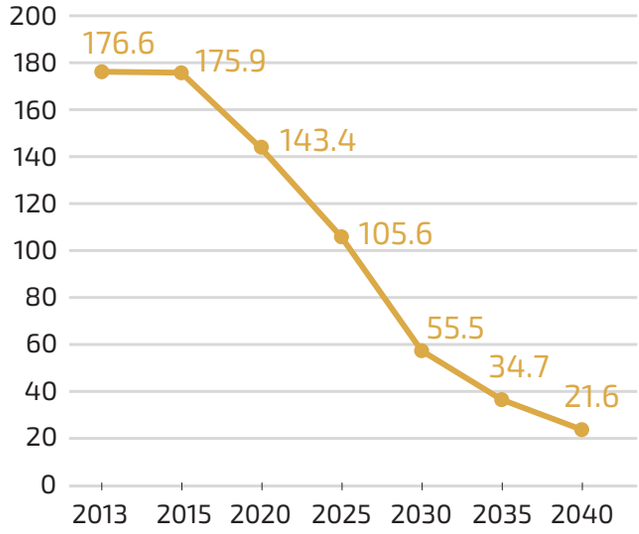


Source: Fortaleza 2040 Plan.

Target 13 - Reduction in the youth violence rate (homicides per hundred thousand youths between ages 15 and 29) - from 176.6 in 2013 to 28.7 in 2040.

Since young people are the most frequent homicide victims, Fortaleza 2040's most ambitious results should be pursued for this group: a continuous decline of the youth homicide rate that picks up speed after 2020, as measures become more mature, so by 2040 we can reach close to 28.7 homicides in every hundred thousand youths. This represents a reduction in the absolute number of victims from the estimated 1.224 in 2015 to 121 in 2040, considering that the young population will also reduce in absolute terms.

Graph 34 – Target 13 – Reduction of Youth Homicide Rate (per 100,000 youths)



Source: Fortaleza 2040 Plan.

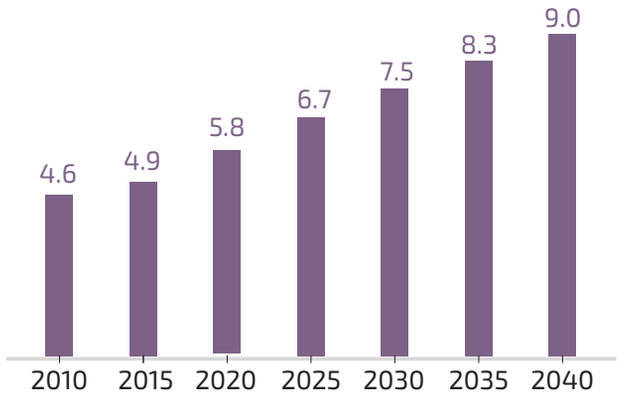
EDUCATION AND INNOVATION TARGETS

Improving the quality of education and the creating an innovative environment in the city, including the strengthening of research and technological development, are a central part of our vision for the future and is expressed the following targets. The attainment of these targets depends on the implementation of decisive actions and large scale accessibility to schools, at all levels, and research centers. The advancements in education and innovation, expressed in these targets, are essential for the attainment of economic (competitiveness of the economy) and social targets (especially the reduction in youths who neither work nor study and preparing workers for the job market). On the other hand, the significant volume of investments and expenditurein education and innovation - particularly on research, scientific and technological development institutions - will only be possible with the growth of the city's economy and, consequently, the increase in revenue and in City Hall's investment capacity.

Target 14 - Raising the quality of education in the first years of municipal elementary schools - raising the Ideb grade to 9.0 by 2040.

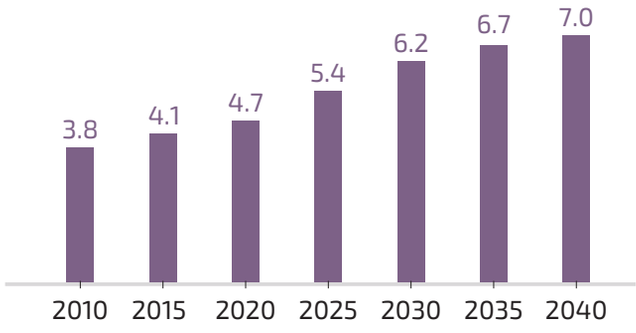
The quality of education, measured by the Basic Education Development Index (Ideb) should grow continuously in the coming decades, assuming a prominent role in Brazil in terms of knowledge and human education. In relation to municipal Elementary Schools, Fortaleza 2040 has established a grade of 9.0 as its 2040 target, with the improvement in educational achievement speeding up after 2020. With this

Graph 35 – Target 14
Increasing the Ideb score (early years)



Source: Fortaleza 2040 Plan.

Graph 36 – Target 15
Increasing the Ideb score (final years)



Source: Fortaleza 2040 Plan.

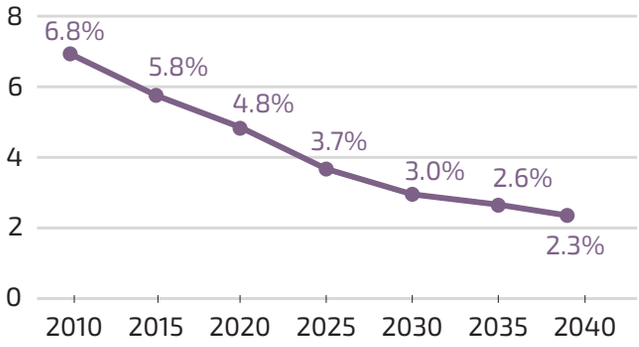
Target 15 - Improving the quality of education in the final years of municipal Elementary Schools - raising the Ideb score from 3.8, in 2013, to 7.0 in 2040.

For the final years of Elementary school, which are currently scored at a very low level, the target is to follow the development of the first years, as the first cycle's increased quality will be reflected in the later cycle. So an Ideb score of 7.0 in 2040 has been defined for the final years of municipal Elementary Schools, which means almost doubling the current 3.8.

Target 16 - Reduction in the illiteracy rate (population aged 15 or more) from around 112 thousand, in 2015, to around 62 thousand people in 2040.

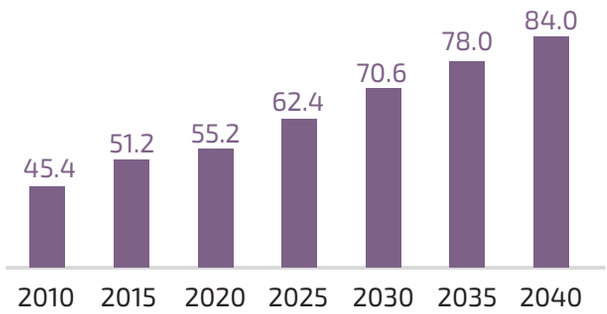
The illiteracy rate tends to decline out of pure inertia as the current Elementary School enrollment rate is high and continues to grow. But this improvement would be more rapid with direct actions against the residual illiteracy that affects the adult population. With the broadening of elementary school attendance over the years, illiteracy slowly declines and is restricted to the higher segments of the city's age structure. The literacy target establishes that we should reach 2040 with a maximum 2.3% of illiterate people among the population aged 15 or more. This movement should speed up after 2020, but it loses momentum and, with it, reduction inertia increases. In absolute numbers, the illiterate population will decrease from about 112 thousand, in 2015, to a little less than half in 2040 - around 62 thousand people.

Graph 37 – Target 16 – Reduction of illiteracy rate (population aged 15 or more)



Source: Fortaleza 2040 Plan.

Graph 38 – Target 17
Raising the High School attendance net rate



Source: Fortaleza 2040 Plan.

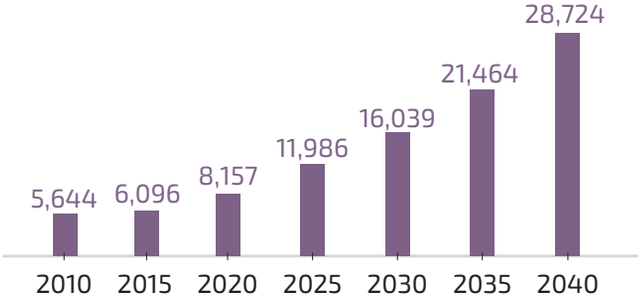
Target 17 - Raising the net High School attendance rate - from just 51.2% in 2015 to around 84% in 2040.

Although the High School attendance rate depends, first and foremost, on the State government, it is essential for the improvement of education, the competitiveness of the economy, and for the quality of life of the population that a significant part of youths attend classes. So we must greatly increase the current rate of only 51.2% (2015). This target seeks to raise the high school attendance rate to around 84%, considering that part of the school-aged population could be in the job market.

Target 18 - Increasing the number of active researchers in Ceará from 5.644 (estimated data based on the CNPq from 2014) to 28.724 by 2040.

The target that seeks to elevate the number of researches is based on data relating to the State of Ceará, since there is no specific data relating to Fortaleza. However, the majority of research institutions and their researchers are concentrated in the capital. As has been said about high school, the attainment of this research target depends mainly on the State, and even the Union, as federal agencies are the source of financing. But the municipality must articulate and support the attraction of researchers to Fortaleza. The target seeks a five-fold increase in the number of active researchers in Ceará - from 2015's 5.644 (estimated data based on the CNPq of 2014) to 28.724 by 2040, as shown in the graph, with annual growth of 6.5% (in the 2010/2014 period the number of researchers in Ceará grew, on average, 11% a year).

Graph 39 – Target 18 – Increasing the number of active researchers in Ceará

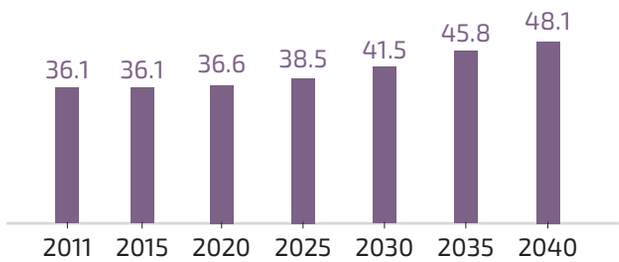


Source: Fortaleza 2040 Plan.

Target 19 - Elevating innovative attitudes in Ceará's companies by 50% (impacting on the capital)

Innovation is a central component of economic competitiveness and, as such, Fortaleza 2040 should pursue an increase in the introduction of new processes and products by local businesses. The target hopes to come close to 50% of companies in Ceará (impacting on the capital) introducing some kind of innovation, enabled by the increase in research activities in universities and research institutions, combined with pressure from a market that seeks better productivity and invests in new products or product improvements.

Graph 40 – Target 19 – Elevating innovative attitude among Ceará's companies



Source: Fortaleza 2040 Plan.

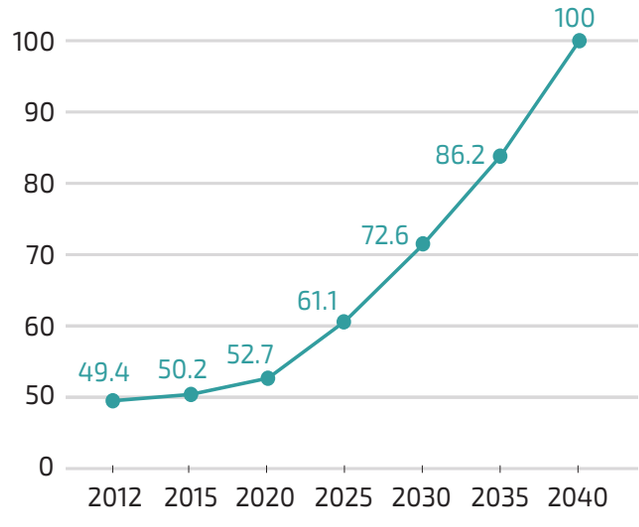
ENVIRONMENTAL TARGETS

Environmental targets depend on strong actions from public institutions, particularly City Hall, in terms of regulating the relationship between the economy and the environment, the implementation of measures for recovering degraded areas (water resources and forest coverage), as well as redefining the energy matrix in favor of renewable source (especially solar energy), and repurposing recyclable waste, reducing greenhouse gas emissions. The attainment of these targets entails changes in economic growth patterns, including technological innovation, boosting public institutions - their management tools as well as the quality of human resources - and the increase in available public resources (fiscal goals).

Target 20 - Sanitary Sewage Universalization

Until 2040, Fortaleza must universalize access to sanitary sewage, reaching 100% of homes in the city, this will require a large volume of investments that will continue throughout the 2017/2040 period. From the current coverage of 50.2%, estimated for 2015, it will increase slowly in the first years, picking up speed after 2025 as a result of the implementation of investments.

Graph 41 – Target 20 – Universalization of the access to sanitary sewage (% of homes)

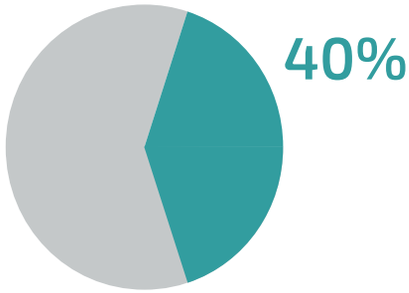


Source: Fortaleza 2040 Plan.

Target 21 - Supplying at least 40% of the city's water consumption through the reuse of water and the utilization of rainfall.

In relation to water Fortaleza 2040's target is to reduce the city's dependence on the Jaguaribe-Metropolitan system through the combination of water reuse and the utilization of rain water, considering the city has rainfall of 1.800 mm a year. The target for 2040 is supplying, at least, 40% of the city's water consumption through water reuse and the utilization of rain water.

Graph 42 – Target 21 – Water consumption through reuse and utilization rainfall

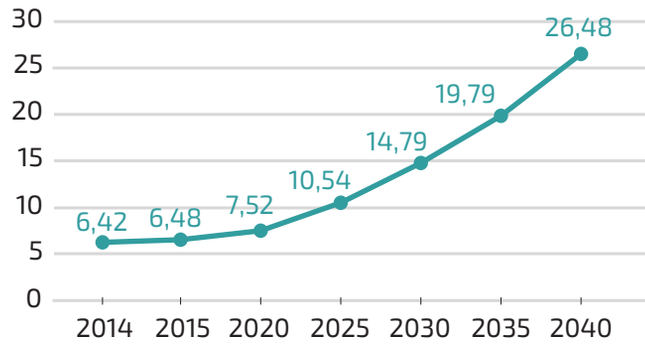


Source: Fortaleza 2040 Plan.

Target 22 - Expanding the city's green areas to 26.48 square meters of green area per inhabitant, building on the current 6.42 square meters

The quality of life of the population depends on environmental comfort, which greatly depends on the extent of the city's green areas. It should be noted that, according to the World Health Organization (WHO), the minimum acceptable is 12 square meters of green area per inhabitant. The target for 2040 is 26.48 square meters of green area per inhabitant, building on the current 6.42 square meters, a little more than half the required area for a healthy population. The implementation of recovery projects and the expansion of green areas will increase the overall green area slowly over the first ten years, gaining momentum after 2025.

Graph 43 – Target 22
Increase of green area (m2 per inhabitant)



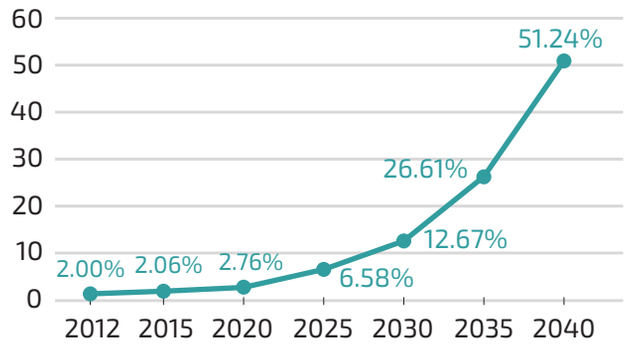
Source: Fortaleza 2040 Plan.

Target 23 - Increase the recycling of recyclable waste from the current 2% to at least 51% by 2040

In Fortaleza, only 2% of the recyclable waste is recycled, scarcely benefiting from economic wealth that is not only squandered, but also released into the environment, harming nature. The repurposing of recyclable waste has a great business potential that needs to be coordinated through the combination of incentives and prohibiting improper landfills. Fortaleza 2040 target looks to significantly increase the utilization of this wealth, expanding the current percentages (only 2%) to at least 51% by 2040.

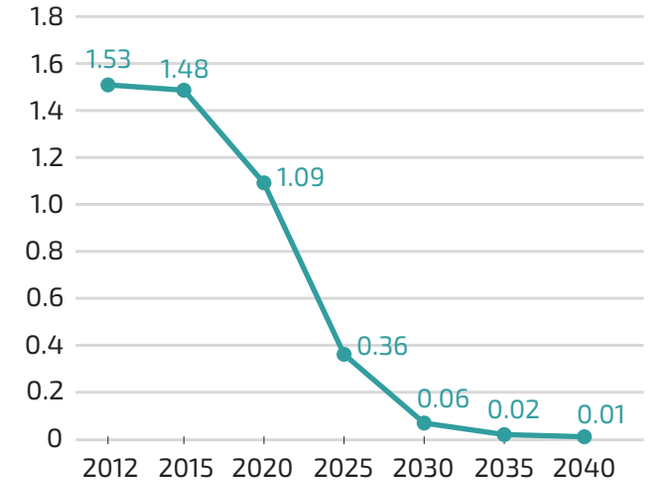
Considering inertia and short term difficulties, the target evolves slowly until 2025, when it speeds up because the measures have matured and due to business initiatives for the utilization of this resource.

Graph 44 – Target 23
Utilization of Recyclable Residues



Source: Fortaleza 2040 Plan.

Graph 45 – Target 24 – Reducing greenhouse gas emissions (tC02/inhabitant)



Source: Fortaleza 2040 Plan.

Target 24 - Reducing greenhouse gas emissions to 0 by 2040

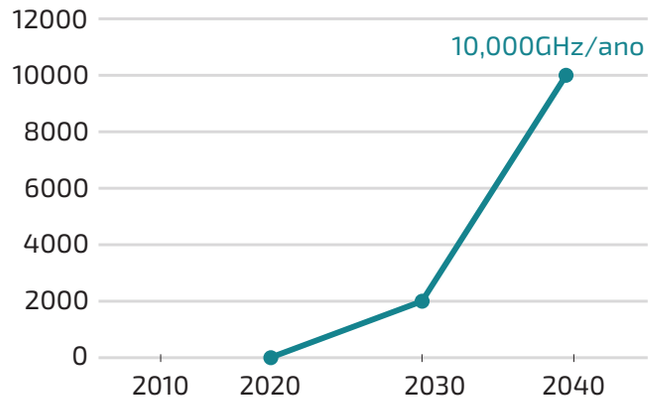
Changing the city's urban pattern and transforming its transportation system, recovering the city's green areas, and redefining the energy matrix will produce the combined effect of reducing greenhouse gas emissions in Fortaleza. In line with other targets in this field, Fortaleza 2040 aspires to reduce greenhouse gas emissions down to nearly 0 (measured as tons of C02 per inhabitant) by the end of this period. Similar to other targets, the reduction of emissions is quite slow in the first years, but gains momentum after 2020.

Target 25 - Expanding the distributed generation of solar power from photovoltaic systems (micro and minigeneration), reaching 10 thousand GWh/year by 2040.

Fortaleza should increase its energetic efficiency over the coming decades, reducing its energy consumption by around 20% between 2015 and 2040 due to a series of measures and incentives. This way, the city will be ten years ahead of the national target. More important than energy saving will be the generation of energy from renewable sources. The target is a significant increase of distributed electric solar energy based on photovoltaic systems (micro and minigeneration), reaching 10 thousand GWh/year by 2040, the equivalent to the population's estimated consumption this year; the use of 2% of the territory would suffice for this purpose. Another source of renewable energy to be explored in the future is electricity generation from the solid urban

waste of Fortaleza's metropolitan region; the target is to produce enough energy to supply between 12% and 20% of the electricity consumed in the metropolitan region in 2013.

Graph 46 – Target 25 – Expanding the distributed generation of electric solar energy based on photovoltaic systems (micro and minigeneration)



Source: Fortaleza 2040 Plan.

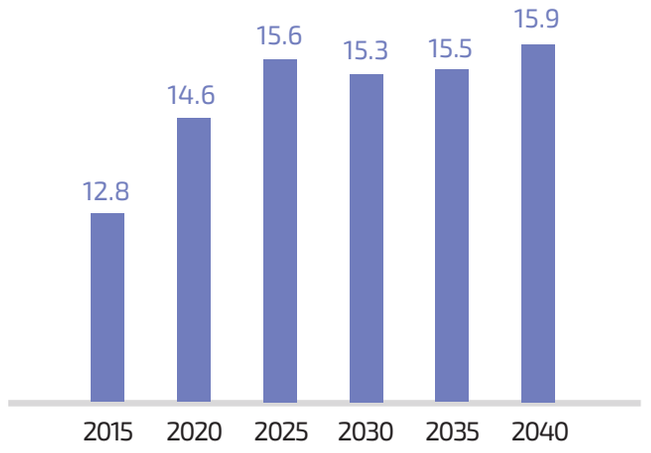
FISCAL TARGETS

The achievement of economic, social, and environmental targets depends on strengthening public management and improving governmental institutions, boosting efficiency and effectiveness on the implementation of projects and actions. But it's also important to expand the government's expenses and investment capacity with increased revenue and, especially, the rationalization of alternative ways of clearing funds for priority development areas. As a way to measure the improvement of public management in the future, two fiscal targets have been defined to indicate the tax collection capacity (in relation to the economy) and the availability of investment resources.

Target 26 - Expanding the relation between total revenue/GDP from the current 11.1% (2014) to almost 16% by 2040

The improvement of the tax system and the enhancement of collection efficiency will allow for the increase of revenue from the city's own sources and, considering the leverage of transfers, also increase total revenue, even surpassing the growth of GDP. The fiscal target for 2040 is to increase the relation between total revenue/GDP from the current 11.1% (2014) to almost 16% by 2040. This percentage has a tendency to increase in the first years, considering the low growth of GDP and the expansion of some updates in the value of revenues, with a new leap between 2020 and 2025, when the measures for restructuring the tax system have matured.

Graph 47 – Graph 47 - Target 26 - Raising Total Revenue as a percentage of the GDP (%)

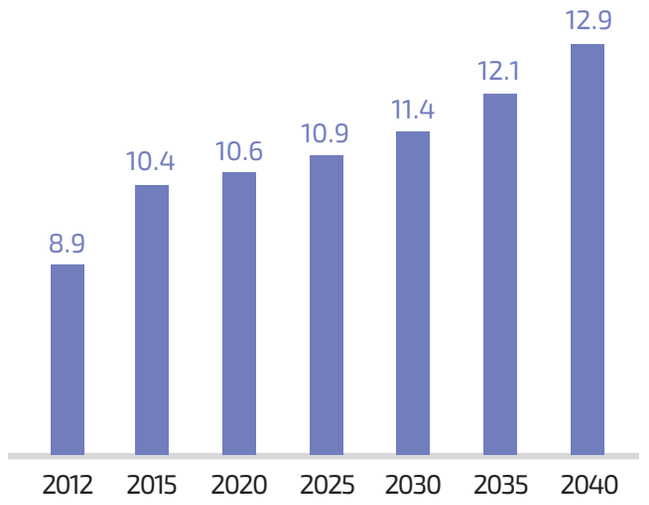


Source: Fortaleza 2040 Plan.

Target 27 - Expanding public investments in current net income from the present 8.94% to a little below 13% by 2040

As a target for 2040, investments should increase their share of current net income from the present 8.94% to a little below 13% by 2040, favoring the implementation of several projects that would enable economic, social, and environmental targets. The attainment of investment targets (as a percentage of current net income) is related to cost rationalization measures for limiting current expenses, including balancing social security pressures.

Graph 48 – Target 27 – Raising the Net Income that is available for investments (%)



Source: Fortaleza 2040 Plan.

CHAPTER 5

THE ADOPTED STRATEGY FOR URBAN PLANNING AND MOBILITY

HOW TO INSTALL PHYSICAL INFRASTRUCTURE IN ORDER TO MEET PREDICTED GROWTH

Fortaleza's socioeconomic and urban reality can be summarized by its remarkable income inequality, the growing housing deficit, the jobless zones; by the majority's inability to access employment zones, by the 32% of poor people in vulnerable housing, and by the ubiquity of precarious urban living focus points. Its current urban form reflects the process of physical growth and its relationship with the natural environment. Over 200 years of urban planning, the City occupied the natural environment through an intrusive process on two fronts: the more solid constructions, carried out by groups of the elite, and construction of a removable character, improvised by the poor. As the process of growth is dispersive, over these two centuries the City consumed a remarkable amount of virgin soil, extinguished rural areas, and virtually destroyed the patrimony of land for new constructions. The City will definitely need to define its future growth through the kind of spatial occupation that will be created by new works. Since it is no longer possible to offer empty lots for new constructions, it is very probable that Fortaleza will need to use means to contain urban sprawl, creating urbanization boundaries, compulsorily promoting intensified new land uses within the existing urban fabric and forcibly reaching the goals of a compact city in which public transportation will be made viable due to these changes.

The Urban and Mobility Master Plan recognizes the need for a pattern of urbanization, which will articulate the different types of land uses, their combination and intensities, in coordination with transportation, job centers, public services, and education centers. The characteristics of a solution to these typical metropolitan problems will define, across various urban zones, the way to use spaces and connect them as foreseen in the Public Transportation Oriented Urbanization Lanes standard. This is the way that 160 cities in the contemporary world are designing metropolitan solutions that enable people to interact, share, move, and gain access to urban opportunities in an equitable way.

A VISION OF THE MASTER PLAN IN SUPPORT OF FUTURE URBAN DEVELOPMENT AND THE LEGAL ZONING PLAN

In the urbanization standards that were used to understand and asses Fortaleza's urban form it can be observed that the city doesn't usually support, in a decisive manner, the creation of neighborhood units that are compact, semi-autonomous, and pedestrian-friendly - even if the low-income population has been seeking this type of model in their spontaneous physical interventions. Neighborhoods should have, in their very fabric, a collection of "mixed" uses, considerably reducing the need for commuting for their inhabitants.

In this context, the great green corridors - the Maranguapinho river and also maybe the river Cocó, as well as Fortaleza's network of lagoons - should be understood beyond their role of preserving natural resources, but as a potential point of convergence or as a regional connection lanes between neighborhoods and their adjacent areas. These areas could be developed for a series of uses and objectives without, however, disrupting the natural areas. While respecting all of the environmental requirements, the Master Plan checked to see if a typical corridor of that type could be established in order to form spatial lanes, examining the convenience of uses that range from active transportation areas (walking and bicycles), agricultural areas for urban gardens, boulevards, tramway lines, bike lanes, linear parks on a metropolitan scale, and accessible environmental areas on the river banks.

Fortaleza began its expansion from the Urban Center designed by Silva Paulet in 1812, oriented by historical corridors equivalent to old converging roads during the final decades of the 19th century.

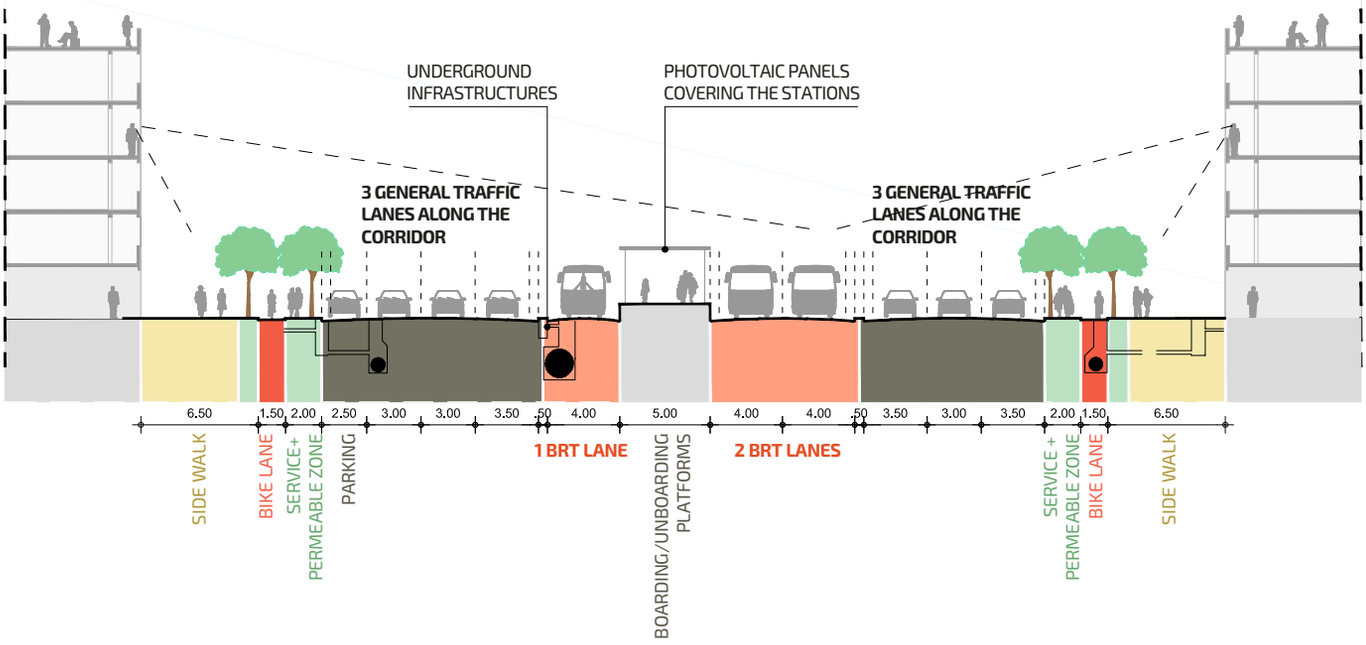
Due to gradual motorization, as occurred in most cities over the course of the 20th century, it ended up creating countless corridors for mixed or commercial activities as a solution to support connecting traffic between distant housing units and job and education centers. These same corridors work as central points between communities that the corridors themselves limit. Since they were not planned with consideration for management and accessibility, and not created as a public transport spine integrated with different land uses, Fortaleza's current corridors do not allow for efficient connectivity and produce traffic congestion. This congestion also occurs due to the fact that parking is usually individual, and the preferred parking spaces are in front of the driver's destination, that is, door to door. Unlike the trams of early urban motorization and its users, who were still pedestrians, the present-day automobile ended up creating a user whose only desire is a door to door journey that, as such, we have a hard time keeping part of the population circulating.

On account of its urban structure, the scale of its current physical development, and the growing demand that needs to be catered for in order to match expected growth, Fortaleza will unavoidably need a highly connective public transportation system that is radically connected to present and future land uses. Urban corridors, when oriented by transportation, are examples of urban planning patterns that are compatible with sustainability in metropolises, as they are adapted to structured communities that are based on local housing, jobs,education, commerce, and recreation and are also guided toward a mass transit system. This great breakthrough, which around 160 cities around

the contemporary world have taken advantage of, is the Mass Transit Oriented Development Lanes that present opportunities for shared financing of works that will adapt the urban form through urban consortium operation. At last public transportation has been recognized for its role as a driving force in valuing urban zones and altering real estate values. For this reason the transport project should not be elaborated separately from structures that are devoted to the future support of expected growth. The implementation of public transportation itself is an aspect of urbanization that it enables and maintains. As Mass Transit Oriented Development Lanes are implemented in Fortaleza, they will lead to changes in the value of properties adjacent to them. In this way the Mass Transit Oriented Development Lanes are an updated and metropolitan form of city planning through the rebuilding of adjacent areas, intensifying the land uses that enable transportation while, at the same time, creating an urban operation that makes the area viable (see Figure 37).

If a public-private consortium, along with long-term residents, can share the changes in real estate values, this leads to a way of making transport viable as well as expanding the supply of infrastructure for population growth. It is also an excellent solution when coupled with and supported by the banks of water resources creating a situation that is in line with environmental protection requirements. These requirements establish that the first lane must be devoted to metropolitan conservation and

Figure 37 – Example of Lane Division



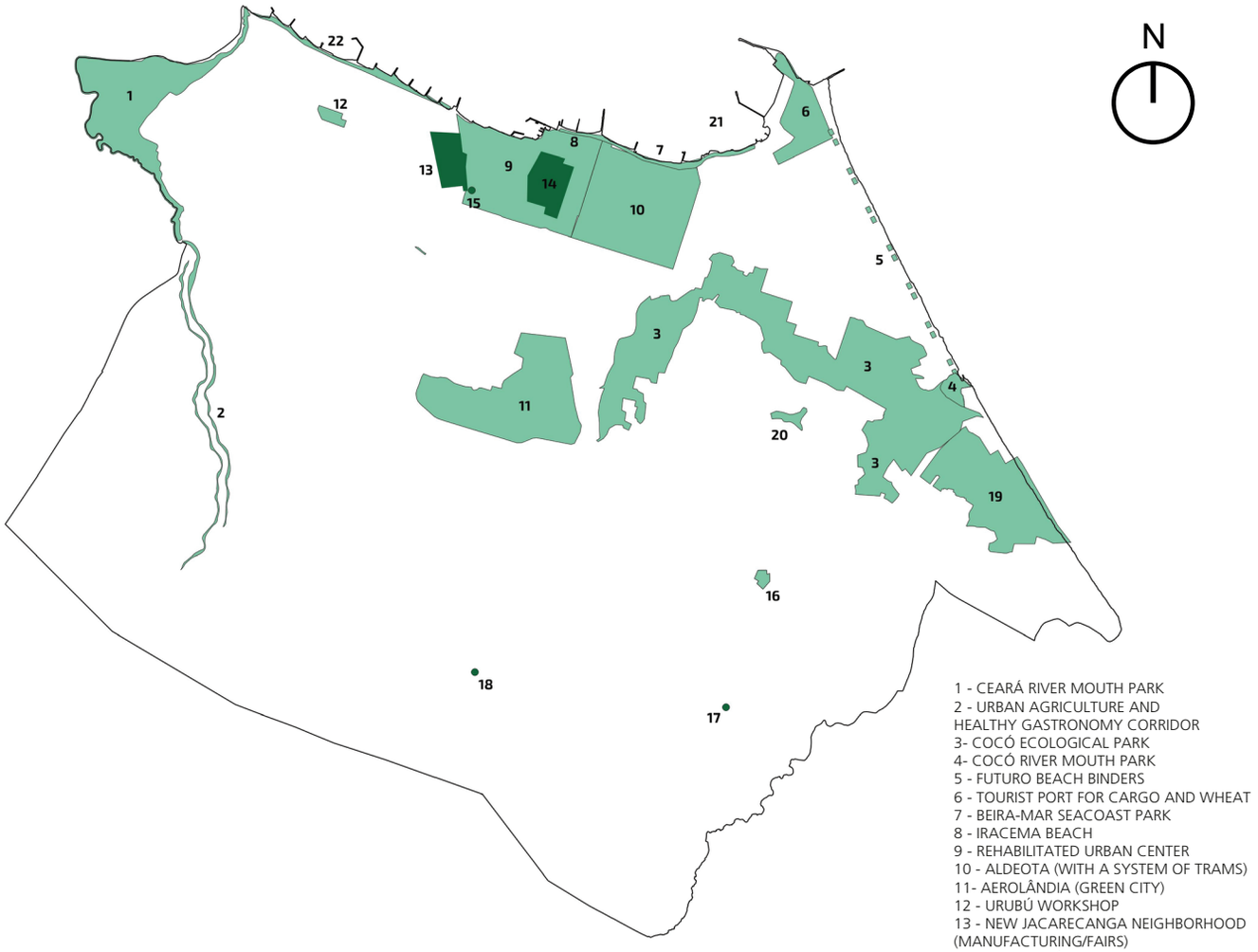
Source: Fortaleza 2040 Plan.

recreational parks, duly limited by a network of roads that support connectivity and public access, in which bike lanes and pedestrians have a prominent role. The pattern for this solution is in line with the demands of the Maranguapinho river region, to mention just one example.

Dealing with contemporary urban reality forces us to acknowledge the extraordinary technical perplexity - which lasted during the whole of the 20th century – with which these new cities were being formed, growing and supported by fabrics with a low connectivity, therefore experiencing a difficult coexistence with new methods of transportation. This pattern, typical of urban evolution, also had a negative impact on Fortaleza's urban form. There are countless factors that affected and affect quality of life in today's metropolises, as well as the environmental crises linked to the sustainability of human settlements. In this respect, in depth studies about our era's urban reality point to evident connections between nature, culture, diversified values, power relations, and technology. Each different combination of these factors corresponds to an urbanization pattern in a community, city, or region. Our era has used motorized vehicles to compensate for the difficulty in reaching destinations, which used to be near and are now far. Speed replaced proximity as a means of access, but without success, due to the physical limitations dictated by the city itself. In the case of developing world regions, the low quality of urban planning combined with migration, population explosions, growth through urban sprawl, and unbalanced distribution of land and opportunities, ended up blocking equitable access, which has created results that are typical of very poor, unequal megalopolises. These, in turn, are resolved through spatial confusion, with excessive commuting, absence of neighborhood units, forming of ghettos, difficulties regarding mobility, precarious housing in dangerous areas, and waste and destruction of natural resources.

Facing the scenario described above, the elaboration of the Fortaleza 2040 Urban and Mobility Master Plan was pointed to as a suitable strategy for characterize urban growth supported by sustainable criteria in Fortaleza. This led to pressing measures such as: protecting the natural environment; considering future land uses and integrating them with the current ones and the public transport system; structuring a spatial chain that will support these productive spaces; backing the definitive configuration of areas of opportunity and their accessibility; creating means of connecting and highlighting the components of the future tourist attraction "platform" (Figure 38); preserving the natural environment and making it accessible through a network of parks wherever they are needed; assisting and emphasizing built cultural heritage with new contexts and uses; fostering improvements in community living structures; favoring the network of connective spaces; promoting, whenever possible, the revival of declining structures; stimulating the use of shared parking and the efficient use of energy sources. The plan summarizes an urban project, whose quality comes from a new combination of the factors mentioned above. In turn, the urban project, with its sights on the future that appears before us, requires a systemic understanding of the contextual region and its cities, including aspects related to the economy, mobility, standards of neighborhood living and the use of resources without, however, underestimating the importance of nature and agriculture in a metropolitan context.

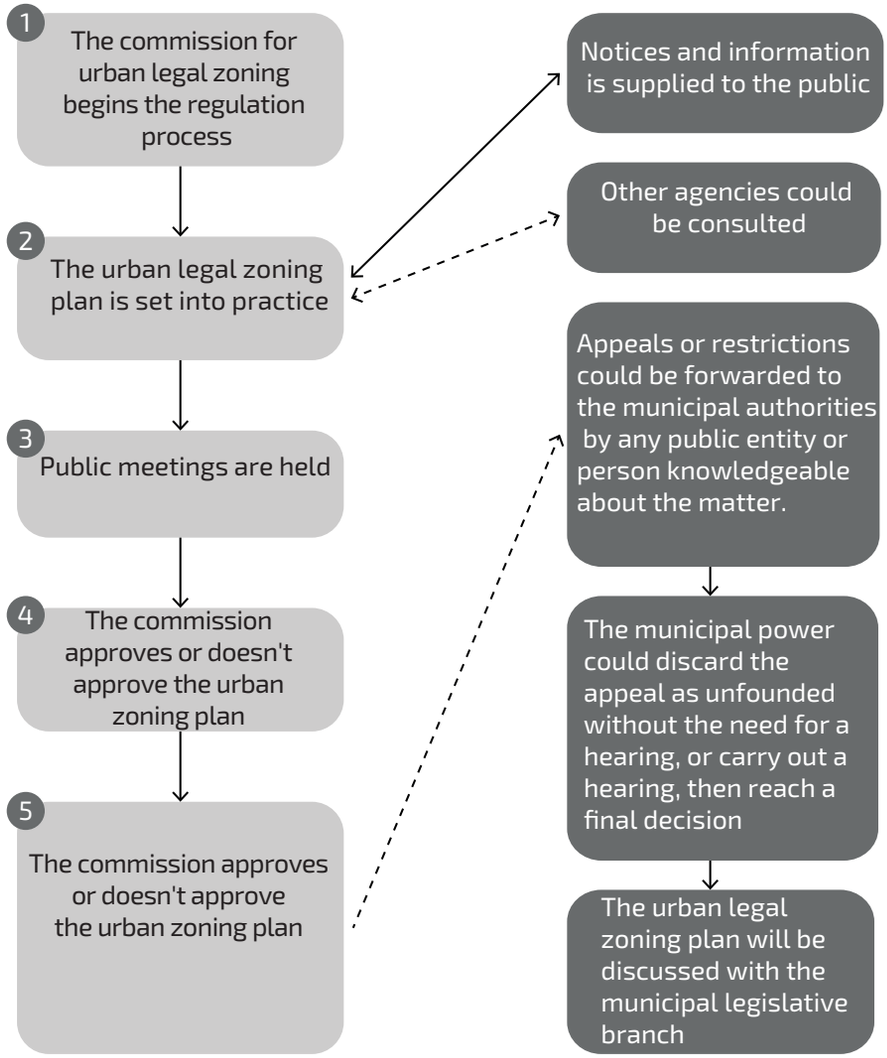
Figure 38 – Touristic Platform



Source: Fortaleza 2040 Plan.

In summary, the scope of the Fortaleza 2040 Urban Mobility Master Plan includes an interpretation of Fortaleza's urban form within its metropolitan context, summarizing the analysis of blockages and opportunities for a sustainable solution. The results found by the interpretation of Fortaleza's current urban form were integrated into the opinions expressed by the city's users, based on their first-hand experiences. So the urban problems of the current situation were identified and, next, possible means of solving these problems were presented to the portion of society involved. The activities shared with the community revealed Fortaleza's future, expressed in the Vision Statement and that should

Figure 39 – Zoning Process



Source: Fortaleza 2040 Plan.

have urban planning based on in-depth knowledge of its problems on a variety of scales.

In this way, and based on this knowledge, the Plan sought to organize a comprehensive and detailed vision of the future urban components of a Fortaleza that the majority of users and residents longed for. The Master Plan's components will be the inputs of the future Legal Zoning Plan, and this will be the viable and proper way to control the quality of growth without excessive determinism, offering flexibility and adaptability in the means of controlling urban development, making the policies and guidelines coincide as best as they can with the needs of various different patterns of users, with a view to secure a fairer, more accessible city for future generations.

In its precarious process of deciding locations for new economic anchors and important urban catalysts, the city of Fortaleza ended up sentencing, for a whole century, part of its urban fabric to a disqualification of land uses, the partial decline of its public space, and the abandonment of its man-made cultural heritage. Visible aspects of this mismatch could be identified when we analyzed the form of new neighborhoods, especially on the east side, comparing it to their original elements on the pericentral limits, or establishing links between the urban planning pattern on the northwest, southwest, and central urban regions. How could we forget the vitality of land uses, their mixture and densities, and the stimulus to maintaining infrastructure that has an important role in the neighborhood, in the Fortaleza of the second half of the 19th century? At the same time, the unruly, unplanned growth that began in the early decades of the 20th century and increased after the 1970's favored during over half a century the locating of urban expansion catalysts primarily in the eastern region, which is made up of the Aldeota neighborhood and its extensions, as is the case of Água Fria, a new area of urban expansion.

During this period the city also encouraged the formation of neighborhoods that lacked shared community living throughout the rest of the city. This expansionism is a blindness that is still present, always rewarding those who own plots of land that are large enough to house infrastructure, consequently altering the value of such plots, without balancing the results in terms of society's access and disregarding environmental requirements. It is a typically predatory sort of procedure and it generates decision making that only favors the land owner, who overestimates the value of the land, as if it has an advantageous location even when its location is remote, isolated, and generating expressive, and demonstrable, setbacks due to its inaccessibility.

During the rushed process of growth through urban sprawl and the unnecessary expansion of infrastructure driven by the interests of the few, the metropolis neglected areas with infrastructure where many lived and where healthy interchanges happened. This dispersive process is always creating new real estate development areas without exhausting the possibilities for adding new structures to the existing urban fabric - an action that always injects vitality into the public space, increasing the level of interchange and creating viable transport operations. In this way the structures and services built are always changing their location, moving toward the latest expansion hot spot and leaving behind an interrupted history, an installed infrastructure, a fleeting memory of the last short lived development and, at finally, a decline followed by unaccounted public losses. This pattern

is completed by the constant weakening of the urban landscape's significant elements and identity, generating highly unfair costs for a poor city.

In relation to its man-made cultural heritage, the city of Fortaleza, in its process of growth through dispersive expansion, could not find a means to control the undesirable effects that have been witnessed, despite heritage listings and other forms of record. There are difficulties in controlling the economic aspects and, as such, there have been no attempts to discover how to make the owners of historical structures see the advantages and reasons for protecting them. It's probable that the only way to protect the definitive form and remaining samples of our historical architecture is through a process of urban rehabilitation of the city's central zone. This initiative should follow criteria that can properly balance the synergies between old and new programs and buildings. For this purpose planning would require the establishment of new relations between historical structures and new urban components that, aside from respecting their visual spacial limits, foster changes through new land uses. In this way, old buildings would play a new and meaningful role within the new, rehabilitated urban fabric through the inclusion of new activities in that zone.

Fortaleza's urban center has become a mono-functional zone where signs of decline are visible and noticed by the population. This happened through the spontaneous formation of the metropolis' polycentric network based on motorized transportation. Despite the success of popular commerce, its extraordinary fiscal contribution, and its important role in maintaining the old center, the area demands the changes that complement land use in a suitable way. These changes need to be carried out in such a way that they transform the old center into a place that is used during the day and at night, promoting the rehabilitation of its utilization ratio, supporting the maintenance of the popular commerce, protecting the man-made cultural heritage, and attracting tourists. The center's north face, overlooking Fortaleza's coast, is also plagued by the lack of a project and outdated urban legislation that is due to new and century-old land uses that are totally unsuitable to the landscape's sensibility. It is necessary to balance the opportunities for intensified uses with protection and connectivity between the high and low parts of the old center, removing some activities that are incompatible with the landscape's value and integrating the existing landscapes through an apt connection between the Iracerame Brach, the historical center's commercial area itself, and the central zone's coast.

The city never showed concern for the preservation of noticeable landmarks that form its urban identity nor for protecting its heritage's elements, a necessary and competitive strategy in today's world, especially when you are aiming to attract tourism. The capital doesn't seem to be able decide on its unsustainable relation with the old Mucuripe harbor, especially when we consider the opportunities offered by the new Pecém Port Complex in relation to maritime freight. Curiously, the metropolis maintains, in its land use and zoning laws, that the coastal area between Mucuripe and Futuro Beach is an industrial zone - a privileged zone that could support urban development with tens of thousands of homes in an enviable location, along with hotel facilities near a touristic harbor. Due to apathetic urban planning, the city of Fortaleza also kept, through the past decades, its network of hotels by the sea from offering tourists

adjoining beaches that are fit for bathing, as bathing has been prohibited for residents for a long time.

At the same time, the metropolis that presents itself as a candidate for tourism still allows sewage to be discarded directly onto the beach, and has a shipyard installed at its historical central waterfront. During this time the city was much more concerned with templates than with assuring open and healthy accessibility so that each and every citizen could enjoy their right to swim in the city's beaches. It's as if we were always looking up and forgetting the many negative things happening at ground level. The case of Beira Mar avenue is very significant. Considered as a place of convergence, where locals meet visitors, it lacks urban planning and an improvement of the relations between private and public uses that have not been attained by countless renovations and that will only now be prioritized though a definitive project of urban rezoning, a priority measure that currently awaits resources.

We still need to consider the need for improving the urban planning of the stretch of coast that lies west of the Center, including its central part, limited by Barra do Ceará. The project that has been introduced still needs revisions regarding the characteristics of the paved walkways, the space devoted to cars, and the indispensable planning of community hubs that are centered around jobs, education, and recreation for the urbanized stretch located between the waterfront and Presidente Castelo Branco Avenue. The end of this corridor, in the west, deserves an assessment of the landscape's possibilities at Barra do Ceará with a project that seeks to highlights its scenery, as well as new connectivity, access, and elements that create security, especially support services and access to historical sites and to Ceará River Mouth Park and São Tiago hill, which should be properly urbanized and accessible to the public.

At the other extreme, at the east waterfront, the Sabiaguaba zone needs to be protected from urbanization, as this will fatally foster dispersion and environmental damage leading to all of the previously described effects that were inherited from already established areas. The existing urban fabric, contrary to the effects of unruly urbanization attempts, needs solutions that intensify usage through a natural process of vitalizing and protecting the patrimony that is in place. We still need to think about proper solutions in economic, social, and environmental terms for the families living around the city's remaining lagoons, favoring accessibility to the city, to tourists, and creating new means of improving comfort, access and opportunities for local residents.

REASONS FOR REHABILITATING FORTALEZA'S URBAN CENTER

The beginning of the process of analyzing the possibilities for rehabilitating the central urban zones unavoidably begins with the identification of

typical problems and situations of decline. The clear signs that show these problems beyond doubt are: mono-functional use, that is, one single use stands out in the urban zone, frequently popular commerce; the loss of competitiveness in relation to other new and peripheral urban regions; deserted built and public spaces without night time activity; unused and mostly abandoned man-made cultural heritage sites, making them vulnerable to the constant process of corrosion and destruction; low attractiveness of landmarks and public infrastructure, especially at

night; convergence of public use limited to the visible facilities of the transportation transference system, frequently unjustifiable and outdated if we look at the big picture and at the demands of a metropolis; the use rates of built structures that have been limited to daytime uses only; public areas that have been privatized through force by undue uses; a local mobility system that favors private vehicles or freight, overwhelming pedestrians; the absence of successful new constructions in its immediate surroundings and an absence of permanent community living in its squares and parks. Judging from these signs, we can safely say that an urban zone in these conditions is declining and lacking vitality. It is not hard to recognize that this is the case of Fortaleza's urban center. Despite the remarkable volume of its fiscal contribution and its popular commerce, which is worthy of support, these factors alone do not allow us to assume that the central space is vitalized as far as urban planning is concerned.

Fortaleza shows clear signs that the time has come to direct efforts towards making sure the center remains the focus of the capital's community life and the urban region's economic core, the main representative of the city's urban image, even if physical changes are unavoidably introduced. It's true that cities, as they transition from an urban to a metropolitan scale, infallibly lose their mono-centrality, when the old center begins to compete with new peripheral centralities. But it's also true that this transition does not necessarily imply that this neighborhood should lose its meaning, as urban centers are a referential landmark for a city's inhabitants. At the first glimpse of decline, central zones should be rescued by urban planning instruments in sync with tools for economic recuperation that manifest themselves, physically, within the existing fabric. This is one way to protect historical heritage and the whole ensemble of urban "assets". These actions normally require specific sectoral projects that are coordinated by a Master Plan that is gradually, yet systemically, introduced, as results are measured by their cost-effectiveness. And that is how one justifies the elaboration of this initial study, characterized by a Conceptual Viabilities Plan for the Urban Renovation of Fortaleza's Center. This designation seeks to give a real idea of the scope and true objective of the study: to prepare a feasibility study based on urban sustainability in order to evaluate the continuity of the work at the later stage of a Private-Public partnership devoted to this theme and properly accompanied by society's participation in the decision-making process.

It's also certain that the competitiveness between historical centers and other centralities should not be based on a search for similar offers, but on highlighting their unique and singular values. Their urban health is closely linked to a society's civic health and their vitality represent a concrete manifestation of a democracy. Real estate owners, entrepreneurs, community leaders, government agents, users, residents, and the technical community in general should all be involved in the Center's restructuring. We need to recover its role and importance for culture, recreation, celebrations, history, civic activities, and the big opportunities brought on by tourism.

It is evident that the role of central urban zones, throughout the world, has changed when compared to their initial functions. Their role as a place for shopping open to all socioeconomic classes has declined while facing the difficulties of

competing against other peripheral commercial centers. This has been further worsened as cars became more accessible and the availability of roads and connections to peripheral "shopping" networks increased. The low adaptability of central streets to cars, usually with narrow lanes, and other predominant forms of motorized transport have discouraged frequentation of the central zones, especially by the higher socioeconomic classes. This problem also creates the need for priority solutions concerning urban mobility. This efficiency pattern, in its turn, can only be set in place through solutions that match the typical limitations of the dimensions and roads of historical centers created at a time when animals and carriages moved amid pedestrians.

A good mobility project for the central zone will always be supported by ways of compensating the existence of such limitations, with the advantage of comfortable walking spaces. In other words, it will unavoidably consider a partial reduction of the motorized movement of people. The environment's physical attributes, which prioritize walking and downplay motor vehicles, requires a high connectivity with the local system of quality public transportation, as well as strategically placed areas for accessing urban transportation with a broader, metropolitan reach. It also needs to be anchored by peripheral parking hot spots that are within walking distance of the most sought after final destinations, subway stations, or local transportation means such as trams. This reconstruction is completed by the highlighting of landmarks and historical architecture supported by new uses and by compact neighborhoods, forming "clusters" with a hybrid, high density use. Whenever possible, they should be guided by housing and its complements - jobs and commerce. This mixture of uses is always a source of urban vitality, although we acknowledge that the core of central zones always tends to be occupied by activities link to government, finance, commerce, and civic celebrations. We should also understand that housing areas usually fit more efficiently in pericentral regions, but this is only possible when their introduction is preceded by indispensable elements that define areas of interactions, so community living can be established, that is: centers for jobs, commerce, education, mobility, recreation, all of which need to be easily accessible.

The idea of introducing housing in central zones, which has reached Brazilian cities with superficial interpretations, requires further deepening so that it can be successful. In this case it becomes risky, and even naive, to consider occupying unused structures with housing in central areas that are currently in decline with the noble intention of giving rise to a process of urban rehabilitation.

After countless disasters throughout the history of international urban planning, we have learned that housing programs are usually made viable by the desires of residents and profit viability for real estate entrepreneurs, and can only be fulfilled when the noticeable, materialized configuration of the zone's map has been properly configured. It is unlikely that housing will be the first thing implemented in a process of urban rehabilitation. Quite on the contrary, an interesting paradox, housing is a focus of rehabilitation but always the last thing to fall into place. This implies rigorous care with respect to planning the re-qualification of the system of public spaces with a view to rehabilitation and, further more, a systemic and coordinated form of implementation.

Overall, the relation between the four central points in the process of attaining a proper urban form which supports Fortaleza's central zone, should consider ambitious projects, although they need to be realistic in their synchronism and wide ranging view, with a gradual implementation, as the stage of decline and mixture of uses require this sort of treatment. It is not true that this situation can be solved by isolated and superficial measures; however, it is indispensable to understand that it is impossible to introduce all the physical renovation components at once. What we can ascertain as a basis is that, even in the strict manner of a constructive action, each intervention has a specific role within the future Master Plan, an instrument that the city has never used before, seeking to recover the central region. This is a process urban planners have nicknamed "urban acupuncture", which means, in the words of Christopher Alexander (1977) to acknowledge that the best constructive path for urban growth is through the gradual administration of small doses of adaptive changes.

As an overview supported by the urban interpretation of the central zone's current urban form, observing opportunities and barriers, we could say that the solution for the Center of Fortaleza, which will be presented to society, should be concerned with attracting inhabitants and visitors through the offer of diversified forms of housing for different levels of income and lifestyles. It should also consider improving the quality of public space, urban mobility range, fostering the highlight and protection of historic heritage and, as such, the plan should include:

- The clear identification of a powerful opportunity for the implementation of new structures backed by new land uses and their respective mixtures, varieties, and densities. These should initially be developed at the polygonal limits established by the Pajeú and Jacarecanga historical creeks, that would be recovered and transformed into urban parks on the east and west of the central region's core. Another area of opportunity is presented by the north face, now freed from the century-old blockage to which it was submitted, with the removal of the railroad and connectivity with the waterfront through vehicular and pedestrian solutions by means of urban bridges. These three limits would be assisted by a central corridor supported bya boulevard on the back of renewed blocks aimed at boosting the Municipal Administrative Center. At a later stage, re-constructive changes could be made to the fabric of the old center.
- Wide accessibility at the periphery of the central hub (limited by the Imperador, Duque de Caxias, and Dom Manuel boulevards and Presidente Castelo Branco avenue), with convenient reception for cars by means of parking lots embedded in "clusters" with a high density and hybrid use, within walking distance from a local transportation system - silent and non-polluting - (such as a tram), backed by the two existing subway systems, plus one that is under construction. Within this hub, comfortable mobility would be supported by the introduction of traffic calming measures with the expansion of spaces for pedestrians, the removal of transit traffic, and reducing speed limits;

- An opportunity for interaction between pedestrians throughout the chain of public spaces;
- Support for existing businesses;
- Attracting new businesses and the expansion of existing ones through geographical changes and opportunities (new hybrid use "clusters" combined with new mobility circuits);
- Dense growth backed by a mixture of uses, seeking to reestablish around the clock community life, favoring the creation of supply in order to balance the increase in the rental values caused by future changes in the zone's urban quality;
- Relocation, even if only partial, of public service offices, duly coordinated by the introduction of convenient housing for staff members, particularly in regards to the Municipal Administrative Center and the Municipal Council.
- Attracting new economic anchors in order to attain the gradual implantation of hybrid use "clusters", with housing and revitalization of public spaces during the daytime and nighttime. The new mobility system is the key, a pioneering element which will create this pattern of attractiveness;
- Duly coordinated financial incentives, including: reduction of fees; increase in specific funding; marketing strategies; incentives for special projects; incentives for investment in central properties; adoption of urban consortium operations; urban planning decisions regarding land use, initiatives for highlighting man-made historic heritage;
- Creation of architectural structures for new mixed uses of high density;
- Prohibiting the building of car-oriented "shopping centers" around the radius of competitive influence of the region known as expanded center, favoring the introduction of a commercial standard based on galleries and malls that are pedestrian-oriented;
- Inclusion of programs that favor diverse commerce and entertainment, transforming the center into a metropolitan hub filled with options, suiting the needs of different segments of the population;
- Learn from the shopping mall's model of centralized management and capacity to attract buyers;
- It is necessary to begin attracting housing through the demonstration effect materialized in some elements of the chain of conveniences and, next, implanting job opportunities, avoiding the same-old isolated, single use projects, because their scale will never have the same influence as a true prototype and will not generate safety, parking, and support for the ideal scale of neighborhood commerce.

Fortaleza shows clear signs that the time has come to direct effort towards making sure the center remains the focus of the capital's community life and the urban region's economic core, the main representative of the city's urban image, even if physical changes are unavoidably introduced. It's true that cities, in their transition from an urban to a metropolitan scale, infallibly lose their mono-centrality, when the old center begins to compete with new peripheral centralities. But it's also true that this transition does not necessarily imply that this neighborhood should lose its meaning, as urban centers are a referential landmark for a city's inhabitants. It's also certain that competitiveness between historical centers and other centralities should not be based on a search for similar offers, but on highlighting their unique and singular values. Their urban health is closely linked to a society's civic health and their vitality represents a concrete manifestation of a democracy. Fortaleza's urban center can promote its adaptation through the inclusion of land uses that are peripheral to its "core" and, in that way, support it with activities that are typical of community neighborhoods, thus receiving the influx - be it pedestrian or by means of local transportation - of new housing situations in

Figure 40 – Proposed Intervention on The Center of Fortaleza

Source: Fortaleza 2040 Plan.

its periphery. The materialization of these housing constructions at the pericentralities begins to make itself clear with some situations that have arisen from real estate market initiatives, albeit totally unrelated to any planning compatible with the proper purposes of a pressing change. The Center relies on an installed infrastructure that is only used during the daytime, as also happens with built infrastructure. Its chain of public spaces is inadequate for the density of human use during the daytime, and deserted during the night. This unbalance results in a drop in the final use rate, which translates into an economy of losses and decline of the urban zone's overall vitality.

Real estate owners, entrepreneurs, community leaders, government agents, users, residents, and the technical community in general should all be involved in the Center's restructuring. We need to recover its role and importance for culture, recreation, celebrations, history, and civic activities.

It's evident that the role of central urban zones, anywhere in the world, has changed when compared to their initial functions. Its role as a place for shopping that is open to all socioeconomic classes has declined while facing the difficulties of competing against other peripheral, car-oriented commercial centers, known as shopping centers. This has been further worsened as cars became more accessible and the availability of roads and connections to the network of commercial centers that are in a peripheral location in relation to the center. Although we must acknowledge the different historical contexts, it is worth examining the case of the majority of European cities. Anchored by their historic value, they were able to create the oldest antecedents of shopping centers - in this case, the famous galleries of the end of the 19th century, but, at the same time, didn't give in to the motorized model for commercial centers in situations where they might threaten the vitality of the main historic centers. Thus, the potent European commercial centers aimed at motorized access were frequently introduced alongside highways, at a reasonable distance from historic centers.

It also seems worth considering the dispersive growth process that affected the majority of the world's cities - Fortaleza among them. This pattern of growth, which happens through the adding of new urbanization zones in places not adjacent to the existing urban fabric, tends to force the appearance of new centralities, in a less than desirable way, as the typical urban design they serve is not based on the formation of neighborhoods supported by the local economy, accessible job sites, and complementary conditions of community living. And so the Urban Center is submitted to a process with a converging focus on popular commerce and becomes a place without attractiveness for housing and as such it has a role during the daytime and turns into a deserted location at night. This results in a remarkable loss with respects to the low use ratio for the installed infrastructuurban landmarks, public spaces, and man-made cultural heritage sites.

After countless attempts at the urban rehabilitation of the central zones, the main noticeable symptoms of the low quality of urban life in the central zone are as follows:

- Traffic congestion;
- Air pollution;
- Excessive dependence on motorized transportation;

- Loss of natural areas;
- High costs of maintaining roads, infrastructure, and public services;
- Unbalanced and non-equitable distribution of economic opportunities within the urbanized territory;
- Growing corrosive destruction of the sense of community in its adjoining peripheries;
- Predominance of one single, and excessive, form of use, and absence of diversified uses;
- Growing exclusion of housing in its immediate periphery;
- Empty public spaces during part of the night;
- Abandoned landmarks and elements of man-man culture;
- Absence of civic and commemorative activities;
- Low attractiveness for visitors;
- Absence of government offices;
- Excessive motorization and low quality of pedestrian opportunities;
- Excessive urban aggressiveness in public spaces.

A possible way to combat these effects, from an urban design standpoint, should not help but consider community aspects as the focus of the problem. Urban motorization, universalized after the 1930's, developed without assigning any value to issues relating to the physical structuring of life in community neighborhood units. This led to, at least in the majority of city's in the world, a growing and unruly process of destruction of shared values in the construction of cities. The type of urban planning that developed around the world, notably after the 1980's, prioritized the reconstruction of the opportunity for urban living in integrated communities that contained, at very least, diversified housing, commerce, work sites, schools and social infrastructure, parks, and civic facilities. It also believed that these contemporary communities should be formed with walkable distances between homes, places of work, and places that cater to the needs of daily life.

In turn, these areas should be at walking distance from public transport stations. Housing should always be offered in an accessible manner that suits seniors, youths, adults, and caters to diversified levels of income, as well as lifestyles, according to each group's preferences. This community fabric should contain, within itself, diversified businesses that provide employment as a way of promoting the stability of the community itself. Furthermore, communities require their central focus to offer legibility for civic, cultural and recreational opportunities, possibly in connection with parks and natural areas. It would be even more desirable if this chain of public and private spaces was designed and placed with such synergy that it attracts the presence of part of the population at all hours of the day and the night. The roads that back the community's spacial connectivity should supply all destinations with maximum efficiency, encouraging pedestrian use, bicycles, and limiting the speed of the traffic of motorized vehicles. The fabric that results from all this should conform to good urban drainage requirements, preserve natural systems, minimize wastage, make efficient use of water and consider recycling and energy efficiency of the architecture.

In order to re-qualify the structures and the chain of public spaces in the central zone it will be essential to consider the site's history, the morphology of the set of elements that define its urban fabric, the formation of its structuring into parts of urban plots, its different areas and different division patterns, the main feature of its road network, the land values and all their variations within the region. All of this should be taken into consideration in order to choose patterns for renewal that are in line with previously established elements that are decisive for viability. It will be necessary to hierarchize the set of technical instruments for knowing about its urban reality and understanding its evolution, with a willingness to update and streamline the knowledge of the fabric that integrates the spatial systems and harmonizes the movements of people and assets. This process will use the project's organized intelligence, so that data, images, and maps can be used with efficiency. All of these procedures and resulting products should keep the transmission of this information to an involved society in sight, whenever necessary, as future technical initiatives make decisions within a likely Public-Private-Partnership (PPP).

Difficulties in properly controlling the quality of the growth pattern of human settlements at present scales is a problem most metropolises share. Good management of urban growth and efficient control over an agreed urban form, suited for the intensification of interchange is what Fortaleza's center is begging for. This means the historic fabric that remains in the central zone should have its various morphologic aspects examined so that strategic zones can be selected for actions of renewal. Zones where the existing fabric's aspects are present should be closely observed and permanent activities should be highlighted and preserved. For that purpose, the community should be heard in relation to the disclosure of fields of opportunities for renewal and protection areas. Although the community's proposals and grievances are frequently expressed through complaints, and happen by means of fragmented claims – they are almost always brought on by the most legible cumbersome negative aspects of urban structuring, which affect the daily lives of its inhabitants -, they are, for the most part, authentic and realistic.

Contemporary metropolises deal with chronic problems of unequal opportunities, destruction of the natural environmental foundation, complex mobility, excessive motorization, changes in the value of time, decline of the cultural man-made heritage in historic centers, and housing deficit. All of these problems are present in Fortaleza's central zone and require a coordinated overview of actions for re-qualification.

POPULAR COMMUNITIES WITH A SUSTAINABLE VISION: HOUSING'S TRUE ROLE

The city of Fortaleza has, in present days, a quantitative housing deficit of 74.599 residential units, according to an estimate by the Social Housing Plan (Plhis). This reality itself could already justify the development of a housing plan for Fortaleza's urban territory, with a view to supply this demand. The Plhis is being developed in harmonization with the Fortaleza 2040 plan, updated demographic prognoses that have been dully crossed with the spatialization network of urban communities and neighborhoods, while still allowing for the potential distribution of focus points for local economies, along with their respective job centers. It is essential to understand the context of the Fortaleza Metropolitan Region, seeking a balanced solution for future population distribution supported by new opportunity matrices that might lead to a reinforcing of community living and reduction of urban commutes.

The need for a definitive urban plan for the Cipp's Area of Influence should be stressed, with the purpose of affirming it as a prototype of an attractive region that combines residential and work opportunities along with the development of touristic services on the coast, as well as protecting agriculture opportunities. In search of socially relevant solutions, the housing issue reveals innovative aspects. The most important of all these aspects is the fact that the field that can "turn the tables" is the contextual urban scale, that is - mobility, public space, neighborhood, social infrastructure, work within the community, the vitality of the community, that is, all of the proposals that have been coordinated in the Fortaleza 2040 Urban and Mobility Master Plan. The Master Plan adopted the strategy of favoring, by means of localizing the Lanes for Mass Transit Oriented Development, connectivity between vulnerable housing areas and other urban areas, as well as the connectivity between those areas and the other focus points for opportunities that will be made available by future urbanization. In each community there will always be a public transport system station.

Residential units will also have a highly important role in answering the demands for programmatic and architectural innovations that will only be attained through investigations, the creation of prototypes, and observation of the population's historic practices. Thus, it is necessary to support the creation of these new prototypes and consider homes as creators of healthy neighborhoods, and never as isolated objects. Furthermore, it will be essential to create a typological selection of residencies to supply the different types of users, levels of income, and lifestyles.

It is inconceivable to insist on the construction of housing complexes whose objective boils down to the construction of units, always looking to meet a quantitative target. In these cases the role of physical structures is always overlooked when it comes to supporting interaction, work, recreation, and healthy living. In these projects the fundamental role of urban location has always been neglected. Differently from such practices, technical initiatives in housing planning should extract their content from the manifestation of users during workshops and community forums and reference them to universal technical standards of sustainable urban design. From the coming together of these information,

new models will arise as well as innovations suited to the specific case of Fortaleza and its Metropolitan Region. It will be necessary to adopt, once and for all, a long-term vision that can shed light upon the advantages of creating solutions that match the future written by new generations and, at the same time, reduce the tendency toward marginality and the threat of losing contributions of young people coming from precarious housing zones.

While facing Fortaleza's reality it is possible to understand an urban structuring that has a high demand for a hierarchic and systemic planning that is shared by a family of components with converging or conflicting effects, among which the following stand out: community zones and their variations in population, densities, mixed-uses and urban morphologies; permanent historic centralities; diversified corridors for mixed-use development and transit traffic that work as linear, converging zones and, often, as separators between communities; strategic tracts with unsuitable uses that can be adapted to placing new components with a decisive social role; great functional structures with commercial, educational, religious, athletic, cultural, and health objectives; activity knots, urban centralities, and points for transport interchange; natural resources, in chains or isolated, such as rivers and lagoons, or urban voids; removal of blockages or barriers that prevent the easy converging of vulnerable populations to future centers for shared used of regional communities, where countless public services will be made available. Only after these components have been harmonized will it be possible to plan housing and its related activities, which will be coordinated with the movement of people and assets in order to define the physical structuring of a network of communities, keeping in sight Fortaleza's sustainable future.

Considering the time needed for implementing such a system of physical and spatial reforms, there will be need for a presentation of sectoral prototypes for urban design solutions for the various and complex types of scenarios in which these problematic social housing emergencies were installed. It will be indispensable to create other areas of housing density intensification converting the existing negative impacts into advantageous conditions for the formation of new geographies of opportunity with a distribution that is accessible to the network of communities. Within this vision we might include the role of housing as a basic component of new neighborhood units, with a diversity of solutions and varied implementations, preferably circumstantial to its insertion upon the existing urban fabric, or integral implementation upon available tracts of land when that is the case, but always adjacent to the existing urban fabric. Communities that are isolated from the urban fabric should only be supported under very specific circumstances and understood as "villages" for life with their own economy - including jobs, services, and local education, which is something that might take place in some municipalities of the Metropolitan Region, since, in Fortaleza's case, that becomes rather improbable because of the nonexistence of territorial situations that typically suit this sort of arrangement.

The future housing projects for Fortaleza could lead to the creation of models of urban form on a neighborhood scale that will enable the utilization of universal urban design patterns, duly calibrated by the observation of local cultural practices regarding the ways buildings of various scales

are shared, as well as their ability to form public domain environments that are in line with each group's cultural expectations. The structuring of new integrated environments could be backed by construction simplicity, however it should be well configured and legible to the population involved. This means that the physical definitions of the forms of these future neighborhoods should be anchored in proper articulations of the main elements of the space syntax of the urban design, which should favor sharing and vitality in these new urban communities belonging to a Fortaleza that is fairer and more accessible.

Housing planning entails a unique kind of responsibility when it comes to urban design decisions. This is because they are always within the zones of tension between the public and private character of personal living spaces, in which frontage planning works as a diaphragm that articulates both private and community environments. And so the housing project is something that goes far beyond a financial or architectural challenge, transforming into a field that also includes social, economic, environmental, and cultural meaning. This forces housing projects to have their conception built around arrangements that form neighborhoods and are designed while keeping in mind the broad, contextual vision of the metropolitan region around them. Another conflicting aspect of housing projects is that the demands it is supposed to meet are not shared by homogeneous groups in terms of interests, social classes, values, income, or living standards. There are groups that see housing as a way of expressing their class values, as symbols of prestige and, above all, accumulation. This group is not concerned with the lack of housing, but with their property's value dropping. The large majority, on the other hand, is made up of those who see housing as satisfying basic needs - the physical accommodation and safety their house might grant them. This majority group will not be able to fulfill their housing needs without the presence of some external intervention.

Limited budget, lack of involvement, political pressures, remote locations, unsuitable architecture, interference from land owners, and planning that lacks a contextual view of urban design: these are the main characteristics of the process of building properties that repeat themselves ad nauseam in metropolises across Brazil, and Fortaleza is no exception. They lead to big disasters within mass housing programs. Projects following this pattern are always placed in areas believed to be undesirable by the minority upper socioeconomic classes, in contexts that are far away from education, commerce and job centers and, often times, with improper urban design.

During the course of housing projects the Brazilian elite's role has always been guided by the idea that poorer inhabitants are able to endure marginalized situations in relation to the shared comforts of life in the city. However, users of this form of popular housing - and among them we can include those who improvised their homes in dangerous areas - have their own informal "indicators" used to evaluate the current desirability and the future perspectives of a residential area. This is demonstrated by their effort in remaining there, and by the way they promote improvements in their homes. These indicators include, in practice, many variables: income, ethnicity, physical appearance, costs, opportunities, security, quality of schools and distance in relation to job centers. Some of these variables are produced

and figure within the neighborhood itself, but other variables rely on external components. What is remarkable about Fortaleza's case is the way countless communities installed in mixed-use corridors, although living with intense transit traffic, have found their own spontaneous version of the urban form sought after by contemporary urban planning, in the sense it brings housing, work, neighborhood commerce, and services into one environment with maximum convenience and accessibility. At the same time these prototypes tend to have high densities, using duplexes and triplexes with commerce and services on the ground floor, helping to make the community itself viable, often times against outdated rules for land occupation and use.

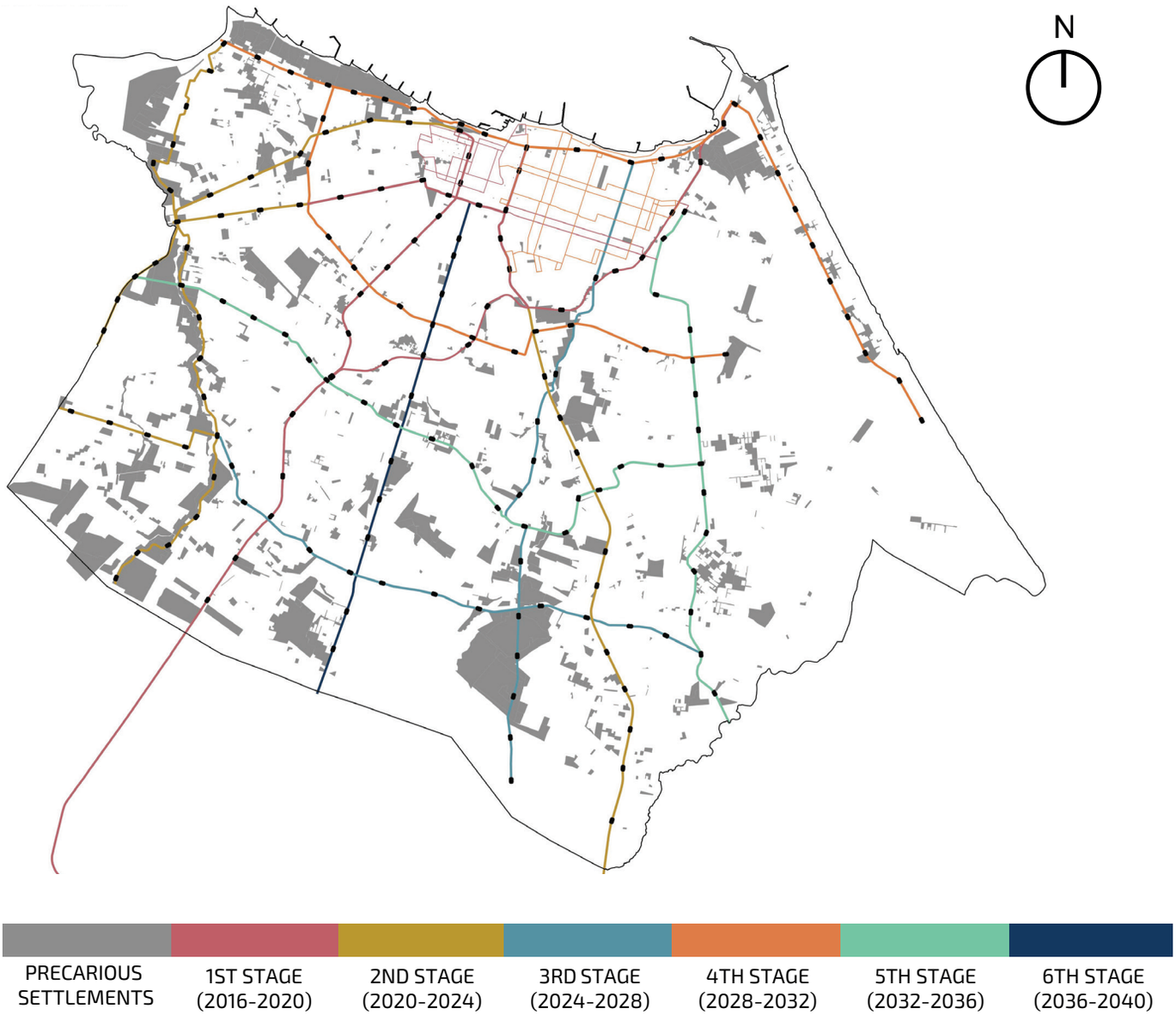
Carrying out the organization of resource uses in a community, the main purpose of urban design, will only be possible if we take into consideration the surrounding context beyond the neighborhood's borders. This is clear, as many of these resources are adjacent to or extend onto exterior areas, such as mobility systems, water resources, and various types of services and installations. Another aspect of great contextual importance, surpassing the neighborhood's borders, has to do with the preservation of environmentally sensitive areas, the promotion of economic development, and the availability of accessible work places. For the most part, these elements are distributed as conflicting opportunities and the localization of these components tends to lie beyond the neighborhood's context. Deep down, they influence their viability and prosperity. Other times they do exist, but are not connected to the life of those who dwell in an urban region formed by countless neighborhoods, such as is the case of the Cocó, Maranguapinho, Lagamar rivers and some lagoons. All of these contextual components, duly understood within the structuring of a neighborhood, can produce meaningful values, once value is understood in urban planning as benefit that can be directed by means of relations between the natural environment, the man-made environment, and the activity that is supported by their unique arrangement. Community design based on a contextual understanding ensures "assets", such as security, economic opportunity, quality public spaces, accessibility, healthiness, the values of interaction, etc.

Among the problems that make up Fortaleza's housing situation, we must mention spontaneously built homes, slums, settlements, Zeis, and residences in risky areas. Often these situations are solved through removals or transfers, since these homes are located in environmentally sensitive zones, which is unacceptable. The scale of the surrounding context during the process of planning the transfer of people living in hazardous situations poses a problem that stems from and is fueled by the very nature of urban areas and their role in containing social and cultural diversity: the danger is that a wide view of planning could cloud the planner's sensibility to the resident's personal feelings about the places where they are being offered a spacial arrangement that offers convenience in relation to where they live, work, and consume, even if this is insufficient. This is where the divergence between the macro and micro visions lie, and it could be expressed in the dichotomy between space and place. Space is the abstraction seen from the outside, while place is the specific location with which an established person keeps emotional ties or a deeply meaningful identification. It's the big difference between "house" and "home". In Fortaleza's case, projects for new neighborhoods

meant to house populations that have been moved to new locations, even when they are near to the original site, should contain design guidelines that not only organize the spaces, but also foster arrangements for important aspects of human lives.

It is indispensable that new designs are able to create a "place" value, where residents can establish, in this domain, new environmental identification and, at the same time, feel connected to the city.

Figure 41 – All Stages of the Transportation System



Source: Fortaleza 2040 Plan.

ACCESSIBLE NATURE AND URBAN DEVELOPMENT

According to Christopher Alexander (1977), contemporary cities, with their distended scale, need accessible and ubiquitous coexistence with green areas. He called this urban design pattern "accessible green". He draws attention to the fact that these green areas cannot be ubiquitous in a metropolis if its form and distribution are ring-shaped and on the outskirts of the urbanized area. This is because the city's constant growth will always push natural spaces into an outer, peripheral ring, away from the urban fabric's inner zones. From there, the urban designer suggested a distribution based on the interlocking "urban land fingers" along with another spatially designed system as a permanent set of "green fingers", allowing any urban zone to have easy access to permanent green areas. This form also ends up favoring good urban connectivity. Urban connectivity is the degree of connection between local roads, regional land use systems and chains of green areas, forming an accessibility network. This quality is highly desired when we are dealing with the qualification of urban spaces in metropolises, favoring permeability between structural blocks and systems of public spaces. Contemporary cities also require, when it's convenient, high connectivity between the components of the natural space network and the system of public spaces, duly harmonized with land uses and the consequent movement of people and assets.

The city of Fortaleza exerted a powerful attraction on countryside inhabitants with its process of urban development through housing. Fortaleza bound migration grew considerably after the 1950's and 1960's and is still happening, despite of the creation of new opportunities in some countryside areas. At the first stage, poorer migrants would settle in shacks in the beach zones, in the so called "areias", which were the first suburbs far away from the historic central zone. With the growing urban development these contingents began to install themselves in slums in the shoal lines or natural processing zones of great bodies of water, that is, in so called risk areas, notably on the urban ring that grew from Barra do Ceará to the limiting region of Messejana. A large part of the metropolitan population living in conditions well below the minimum acceptable levels of urban life resides on this stretch.

Aside from housing that was environmentally improper, housing complexes were also introduced during the 30 years of military government, located in remote locations, distant from services, jobs, shopping, and educational centers. This process gave rise to a model for expansion that was characterized by a very low average of housing density, which now forces its residents to undertake very long journeys between their homes and these activity centers. This also favored the rise of the so called "poverty pockets" with very low connectivity in relation to the metropolis's overall urban fabric, without access to knowledge and the development of employment resources.

This is already a chronic situation, and the difficulty municipal managements have had in definitively transferring these dangerous houses, located at the natural processing zones of two of the main rivers that run across the metropolis, is notable. A definitive solution for this problem would transform these two corridors into linear systems for natural landscapes

characterized as metropolitan parks, flanked by urban development of compact communities at environmentally convenient locations, anchored by efficient systems of public transportation, based on walking and locally supported by jobs, diversified housing, education, recreation, and supplied with services.

In principal these urban developments would have to be managed by criteria that includes everything from the regional scale up to sectoral details that are suited to the neighborhoods. Next, it would be necessary to understand that, nowadays, best practice for growth management chooses to clearly and rigorously delimit urban frontiers, so as to avoid continued growth through urban sprawl, preserving the "accessible green". This becomes more necessary than ever when we notice that, in Fortaleza's case, the dispersive situation stems from the unnecessary extension of infrastructure and the sustenance of very low land occupation densities. In this case, it becomes reasonable to develop the application of insertion policies for new urban developments in already urbanized areas, not allowing dispersive and remote peripheral urban expansion. Whenever that is unavoidable, for whatever reason, the expansions will have to happen in an adjoining zone in the form of compact, planned communities.

In order to attain the best community results through the management of growth, the time has come to promote social housing projects dispersed across the Metropolitan Region at employment focus points, avoiding the concentration of poverty. The popular practice of intensifying mixed land uses with housing, shopping, and jobs manifests itself as an "addition" that translates into a duplex or triplex pattern. These models coincide with what contemporary urban design considers the best practice concerning popular housing.

In order to attain sustainable criteria for future growth, connectivity between these community settings should happen through of a functional network of transport alternatives, each one having its role within the main coordination, and following the classic hierarchy of priorities - walking, bicycles, public transportation, and private cars.

A new type of urban growth management should include, with due importance, the preservation of the identity of historic communities, supporting their stability through the attraction of job centers, centers for education and public services, especially health and emergency. The same criterion should be used for the building of new housing neighborhoods. This initiative is in line with a sustainable urban design principle that encourages compact growth, insertions of new developments within the old fabric, and favoring mixed-use development with high density applications. This city form saves resources spent on energy, promotes local social capital, stimulates sharing and interchanges while it also greatly reduces crime and the establishing of poverty pockets, also encouraging material and intellectual interchanges. All of these initiatives facilitate the management of natural resources so it can be protected, preserved, and enjoyed for recreational purposes or local agriculture.

OBJECTIVES AND TARGETS OF THE URBAN AND MOBILITY MASTER PLAN

OBJECTIVES

- To accommodate a population of up to 3.600.000 inhabitants of the Fortaleza Metropolitan Region until 2040;
- To support, through anticipation, the management of the costs and benefits of urban growth, adopting the compact form criteria by means of a network of opportunity areas integrated by efficient transportation;
- To favor the financing of urban planning works and the construction of a reserve of structures required by the expected growth through integrated implementation between constructions and Lanes for Mass Transit Oriented Development;
- To structure existing and future urban development by protecting the natural foundation and making it accessible whenever it is convenient;
- To structure connective mobility in the city in a viable and accessible manner;
- To offer housing diversity depending on standards of income, age group, and life style;
- To gradually re-urbanize the secondary zones that are limited by the urban development corridors, making them accessible to all converging focus points and facilitating future urban drainage problems;
- To adjust private and public spaces considering the increase of senior population;
- To meet the new needs for a neighborhood based urban life and find solutions for precarious settlements, including their connectivity by means of public transportation;
- To favor opportunities for creating urban agriculture areas and local food production;
- To support the hierarchy of urban regions and sub-centers as unifying zones for the life of similar sets of neighborhoods;
- To implement neighborhoods anchored by urban development corridors;
- To promote contextual and local improvements in existing neighborhoods;
- To create a network of parks and recreational areas in a hierarchic scale;
- To protect man-made cultural heritage and support an accessible network of cultural spaces;
- To update the procedure for projects that can support the extension, maintenance, and implementation of infrastructure.
- To reduce isolation and support shared life between citizens;
- To reduce emissions and anticipate changes in climate;
- To structure green growth and the introduction of energy efficiency;
- To positively convert the impact of existing works or those under construction;
- To correct the misplaced public equipment that has economic and social importance;
- To create opportunities for new connectivity systems for the city's northwest zone.
- To create an urban logistics system;
- To create five implantation zones of urban areas with housing and work related to technological research based on knowledge;

- To decentralize and promote the adaptation of informal street commerce;
- To implement a program of urban operations that can support future growth in a coordinated manner by means of the proposals of the Specific Plans and the Lanes for Mass Transit Oriented Development;

TARGETS

- To introduce 13 Lanes for Mass Transit Oriented Development connecting 167 Urban Neighborhoods with the reconstruction of adjacent blocks and urbanization of Station Areas;
- To implement a system of trams connecting the Beira Mar Avenue, the Urban Center, and Aldeota;
- To implement the Pirambu/ BRT West / Vila do Mar system;
- To implement Specific Plans:
  - Futuro Beach/Mucuripe;
  - Aerolândia/Cidade Verde;
  - Urban sub-center of Messejana;
  - Urban Sub-center of Parangaba;
  - Metrofor South Line Corridor/ Porangabussu/ Benfica/;
  - Adaptive Reuse of the Oficina do Urubu;
  - Maranguapinho river valley/ Re-urbanization and Urban Agriculture;
  - Urban Rehabilitation of the Expanded Urban Center;
- To establish the Metropolitan Airport outside the urban zone;
- To transform the Mucuripe Port into a Touristic Terminal within a context with integrated landscaping, housing, commercial and touristic qualities;
- To implant urban mobility hubs on the Urban Center and Aldeota;
- To implant Urban Logistics hubs in the city's south border;
- To implant a system for the collection and processing of residues;
- Based on the Master Plan, supply elements for the elaboration of a Land Uses and Legal Zoning Plan;
- To implement the Touristic Attractions Platform;
- To implement Opportunity Zones.

CHAPTER 6

THE STRUCTURE OF THE FORTALEZA 2040 PLAN

In order to build a vision for the future and, therefore, reach the defined targets (that quantify said vision for the future and its evolution over time), it will be necessary to implement a strategy that is able to surpass bottlenecks and harvest opportunities presented by the external context. The strategy should comprehend reality's many dimensions in order to promote the necessary internal changes that will build the future.

The Fortaleza 2040 Plan organized this strategy by developing 32 plans aimed at reaching specific objectives within each field, and grouped them into seven broad strategic axes.

STRATEGIC AXES

Fortaleza 2040 is built on seven **strategic development axes**[12] that are integrated and complementary, converging toward the construction of the vision for the future and meeting the targets that unfold into **strategic goals**[13]. Fortaleza's development over the next decades, as defined in the vision for the future, requires the simultaneous and complementary interpretation of the seven axes that we will present next.

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[12] The **strategic axes** represent the **major priorities and choices** made by society that shape the path toward the future in blocks that articulate the strategic goals and organize the government's and society's initiatives, as to assure convergence and complementarity so the vision for Fortaleza's future can be built in the long run (2040).

[13] **Strategic goals** are the **mains results** that will be pursued by society (organized and grouped by affinity within the strategic axes) that anticipate the actions, initiatives and projects required and suitable for reaching them over the mid and long term.

Strategic Axis - Territorial, Social and Economic Equity

Includes strategic goals focused on the most critical and serious social and territorial problems.

Strategic Axis - A connected, accessible, and fair city

Expresses the urban space containing the Urban Master Plan and the Mobility Plan that articulates the thematic or sectoral strategic axes within the territory.

Strategic Axis - Community life, reception, and well-being

Strategic Axis - Development of culture and knowledge

Strategic Axis - Environment and Natural Resource Quality

Strategic Axis - Economic Streamlining and Productive Integration

Strategic Axis - Municipal Governance

Addresses the construction of a management system for Fortaleza 2040 that facilitates efficient and effective implementation of other strategic axes.

STRATEGIC AXIS - TERRITORIAL, SOCIAL AND ECONOMIC EQUITY

The Territorial, Social, and Economic Equity strategic axis contains the high priority objectives considering right to life, analyzing cases of death, their causes, territories and groups where they are concentrated, right to health, pointing out circumstances, contexts, territories, groups, and communities where this right would clearly be under threat. The axis unfolds into four strategic goals:

- Valued communities integrated to urban sociability;
- Income and employment opportunities distributed across the whole municipal territory;
- Culture of peace and citizen security;
- Productive integration.

This axis's strategic objectives become operational by means of the integrated and complementary implementation of the following plans of action and their respective abbreviations, used in the present organization:

- Social Housing Plan - HS;
- Land Regularisation - RF;
- Citizen Safety - SC;
- Productive integration, entrepreneurship, employment, and income - IP;

STRATEGIC AXIS - CONNECTED, ACCESSIBLE, AND FAIR CITY

The "Connected, Accessible, and Fair city" strategic axis involves the reorganization of Fortaleza's urban form, implementation of urban corridors, connecting poly-centralities, expansion of the citizen's access to assets, public services and employment and income opportunities, expansion of mixed-use and diversification of activities, strengthening neighborhood identities, appreciation and vitalization of the urban center and of public spaces, expansion of accessibility and connectivity in order to improve the population's quality of life, and a set of projects meant for specific city areas. This strategic axis unfolds into five strategic goals:

- Compact, accessible and connected city;
- Public services and spaces widely distributed across the whole municipal territory;
- Rehabilitated urban center;
- Equipped, secure, and integrated public spaces;
- Good public transportation.

This axis's strategic goals become operational by means of the integrated and complementary implementation of the following plans:

- Urban and Mobility Master Plan - PMUM;
- Urban Mobility and Accessibility Plan - PMOB.

STRATEGIC AXIS - COMMUNITY LIFE, ACCOMMODATION, AND WELL-BEING

The "Community life, Reception, and Well Being" axis points to a future in which receptive feelings and attitudes will be predominant in society throughout all social relations. Appreciation of their own identities, development of a feeling of fondness toward the city, contributing to a culture of peace and tolerance that improves the population's quality of life, including the eradication of the urban segregation that afflicts a considerable social segment that is kept from acceptable habitability and sociability standards, avoiding housing relocation actions, and the deconstruction of family and neighborhood relations. This axis unfolds into two strategic goals:

- A receptive, inclusive community, that appreciates and respects diversity;
- A wholesome community (health, sports, recreation, nutritional education).

This axis's strategic goals become operational by means of the integrated and complementary implementation of the following action plans:

- Health - SA;
- Sports and Recreation - EL;
- Welfare - AS;
- Rights of Children and Teens - CA;
- Youth - JV;
- Rights of Seniors - PI;
- People with Disabilities - PD;
- Women's Rights - ML ;
- LGBT RIghts - LG;
- Racial Equality - IR;
- Food Security - SN;

STRATEGIC AXIS - DEVELOPMENT OF CULTURE AND KNOWLEDGE

The "Development of Culture and Knowledge" axis is made up of four components that are complementary and intertwined with each other: expansion and improvement of education, increase of qualification among workers, scientific and technological development, and cultural development. This combined group favors human development, the increase and democratization of social opportunities and economic competitiveness, enabling innovations in the productive sector. This axis unfolds into three strategic goals:

- Quality education and professional training;
- Cultural appreciation and development;
- Scientific and technological development;

This axis's strategic goals become operational by means of the integrated and complementary implementation of the following action plans:

- Public Education - ED;
- Culture and Heritage - CP;
- Science, Technology and Innovation - CT.

STRATEGIC AXIS - ENVIRONMENT AND NATURAL RESOURCE QUALITY

The "Environment and Natural Resource Quality" axis addresses the recuperation and preservation of natural resources and the quality of the natural environment, especially water resources and generation of clean, renewable energy for the city, so quality of life and comfort can be offered in a sustainable manner.

This axis unfolds into and is articulated by four strategic goals:

- Natural resources, environmental resilience and comfort;
- Basic sanitation;
- Renewable energy and energy efficiency.
- Water security;

This axis's strategic goals become operational by means of the integrated and complementary implementation of the following action plans:

- Environment - MA;
- Energy - EN;
- Water Security - SH;

STRATEGIC AXIS - ECONOMIC STREAMLINING AND PRODUCTIVE INTEGRATION

The "Economic Streamlining and Productive Integration" axis organizes a set of strategic goals that seek to develop the economy, jobs, and income, combining the increase and strengthening of the ability to compete within a market of already consolidated activities, besides the rise of new economic segments with high revenue generation, and the expansion of productive integration, notably the solidarity economy. This axis unfolds into two, big strategic goals:

- Expanded and diversified productive and service structure;
- Consolidated and more competitive economic sectors, with high added value.

The strategic goals become operational by means of the integrated and complementary implementation of the following action plans:

- Urban Agriculture - AU;
- Clothing Manufacturing - CF;
- Civil Construction - CC;
- Creative Economy - EC;
- Marine Economy - EM;
- Advanced Services and New Industries - NI;
- Information and Communication Technology - TI;
- Tourism - TR;

STRATEGIC AXIS - MUNICIPAL GOVERNANCE

Municipal governance, understood here as the municipal governments, civil society, and the community's ability to plan and carry out policies, programs, and projects in a way that is efficient (with the least cost), effective (maximum implementation ofthe chosen policies and measures), and definite (results that reach into reality). This is a central component of the implementation of a development strategy. This axis, which unfolds into two strategic goals, is what assures the execution of other strategic axises and the resulting development of the city.

- Participative public management and control by society;
- Municipal Public Management.

This axis's strategic goals become operational by means of the integrated and complementary implementation of the following action plans:

- Plan for Municipal Public Management Development;
- Plan for Participation and Control by society in Municipal Public Management.


1
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CENTRO

CHAPTER 7

FINANCIAL VIABILITY

INTRODUCTION

Some issues were brought up recurrently by the participants and public managers throughout the long elaboration process leading to Fortaleza 2040: "Will there be funding for all of this? Could municipal finances afford all of these investments and costs that are estimated for the dozens of plans that are part of Fortaleza 2040?"

In order to answer these essential questions, and even prove the viability of the presented proposals, a team of five specialized professionals (from the fields of Economics and Finance) advised the 33 working groups during the formulation of budgets and made additional studies to attain an estimated evolution of municipal own-source revenues, expenses with municipal social security, forecast the evolution, or bottlenecking, of the municipal government's investment capacities, as well as possible revenue sources and operations that might enable the implementation of Fortaleza 2040.

Due to the lack of executive projects, expenses were estimated based on existing, or available, cost indicators, indicators that were suggested by federal programs (when that was the case), similar actions carried out in other places, or even estimates that were elaborated by the consultant or manager of each working group based on their experiences with similar actions up to that point.

The value of a few actions that didn't have the minimum required precision to have their costs estimated were left to be defined later. But, overall, these actions represent a small proportion of the total estimated amount.

The final foreseen amount of revenues and expenses has been organized as a long term multi-annual plan that is made up of six quadrenniums, from 2017 to 2040.

Therefore, based on data collected by the 33 groups, we sought to show the degree of dynamism for the future of Fortaleza from the point of view of the public budget based on the qualitative plans elaborated by the Groups, so that a demonstrative report could be formulated with the consolidated

projection of every regular revenue and expense, notably the capital's revenues and expenses, while observing the limitations established by the current legislation, particularly those contained in the Federal Constitution, Fiscal Responsibility Law (LRF), Budget Guideline Law (LDO), Annual Budget Law (LOA), and Multi-Annual Plan Law (PPA).

The consolidated budget spreadsheet only contains expenses that will be made through municipal funds, while each plan's budget contains all budget values, including resources from other sources - Union, State, international organizations or private initiatives, depending on the nature of the action.

The coordination of the team responsible for the Fortaleza 2040 Budget was undertaken by consultant Célio Fernando Bezerra Melo, and the team of consultants for the 33 groups was formed by the following technical advisors: Filipe Rabelo Távora Furtado, Juliana Rabelo Melo, Pedro Rafael Lopes Fernandes, and André Luís Freitas Ferreira.

THE FORTALEZA THAT WE WANT AND MUNICIPAL FINANCES

This chapter deals with the resilience the municipal investment capacity needs in order to structure the third stage, that is, the strategies the public authorities can implement to supply and direct resources, in a sustainable way, to the elaborated programs and action plans in order to attain an entrepreneurial, inclusive Fortaleza, with economic prosperity, enabling social well-being and the full human development of its citizens.

The chapter is divided into five sections:

- The State's role within the economic environment;
- The State and economic growth;
- Analyses of the municipality of Fortaleza's investment capacity;
- Proposals and suggestions for streamlining Fortaleza's investment capacity;
- Consolidated Budget Spreadsheets.

THE STATE'S ROLE WITHIN THE ECONOMIC ENVIRONMENT

The State's social and economic space has long been the topic of discussion in several branches of the social and human sciences. In economy, François Quesnay (of the Physiocratic school) already debated the State's role, and defended laissez-fairer, laissez-passer lê monde va de lui-même motto ("Let do and let pass, the world goes on by itself"), attributing to the State only the roles of upholding property rights and defending the nation, constituting the idea of the Secular State in economic terms. Adam Smith, in "The Wealth of Nations", published in 1776, acknowledged the existence of goods and services that generate a social profit greater than the private gain for supplying them and, therefore, the necessity for the government to act as a catalyst of society's will and express it through services supplied to the population - the State's allocation role. He considered that, besides this, the State has only two other roles: assuring national defense; and assuring an effective judiciary system.

Another view, orthodox Economic Theory, holds that the force of a free market can, by itself, reach an efficient result, following Pareto's principle, a result that commonly is called the first theorem of Welfare Economics, where all agents are in balance and it is impossible to better the situation of one of them without worsening the other's position. However, despite guaranteeing efficiency, the Economic Sciences cannot assure that any justice criterion

will be achieve by the market's unobstructed action since, as we are guided by the market's "invisible hand", efficiency could be characterized by a high degree of asymmetry concerning the way resources are distributed in society. Tireless, economic theory goes on to say, on the second Theorem of Welfare Economics[14], that any efficient allocation can be achieve by the market through the redistribution of wealth performed by means of non-distortionary taxes. Overall, the second theorem of Welfare Economics motivates and justifies the State's distributive role, a function that is defined by the implementation of measures that seek to mitigate economic and social imbalances between individuals and regions until they reach at least a socially acceptable level (BENÍCIO, RODOPOULOS, AND BARDELLA, 2015).

John Maynard Keynes, in "The General Theory of Employment Interest and Money" (1936), describes economic situations characterized by an expressive idle production capacity (derived from economic crisis) and the importance of the State as a conductor of economic stimuli through aggregated demand in the recovery of economic activity. Keynes motivated the attribution of the stabilizing role to the State.

In 1959, the State's main functions were defined by Richard Musgrave in The Theory of Public Finance, where he states that the government should perform a distributive, allocative, and stabilizing role. For Benício, Rodopoulos, and Bardella (2015), the distributive function refers to measures seeking to mitigate the income and living situation imbalances between individuals and regions until socially acceptable levels. The stabilizing function demands suitable government actions to prevent the effects of economic impacts on income and consumption. Generally, policies that have an effect on aggregated demand are used for that end. The allocative function, in its turn, translates into supplying goods and services that the private sector is not capable of offering at satisfactory levels exclusively through the market mechanism.

Once the State's economic role is well defined, the question that remains is how much do we need from the government in order to reach human and economic development goals? There are two possible answers: one, theoretical, based on the formulation of simplifying hypotheses for understanding the complex relations between the State and economic growth, and another one, empirical, which uses concrete data from countries and their respective governments.

THE STATE AND ECONOMIC GROWTH

The Solow-Swan model of economic growth (1956) established the Neoclassic School of Economic Growth, and stands out due to the simplicity and objectivity with which it explains the phenomenon of economicgrowth. The Model reduces the phenomenon of economic growth to four variables: product (Y), capital (K), labor (L) and "knowledge" or "effective labor (A). At any time, the economy detains amounts of capital, labor, and knowledge, and these are combined into production. Therefore, the function for production looks like this:

$$Yt = FKt,At\ Lt$$

In which t stands for time, this variable doesn't insert itself in the production function directly, but

[14] According to Varian (2006), the second Welfare theorem states that as long as preferences are convex, all efficient allocations, in the sense proposed by Pareto, could be achieved by means of competitive equilibrium.

only by means of K, L, and A. That is, the product changes within time only when production inputs also change. If the amount of a product increases after constant amounts of labor and capital, it is because a technological breakthrough happened and, consequently, increased the amount of knowledge.

In the economic structure defined by the famous Solow-Swan model, government can choose to intervene in the economy with hopes of making the country wealthier. However, its policies cannot alter growth in the long run. In the model described in Barro (1990), on the other hand, government - through a process of opting for an optimal size that is defined by the proportion of its GDP - may not only affect the level of economic wealth, but also be granted the chance of injecting greater speed into the process of economic growth. One may consider that, for the Economic Sciences, there is a place and a defined path for government as the promoter of the economic development process, and that the State's efficiency in meeting this sort of goal is directly conditioned by two issues concerning tax collection: how and how much to collect. Furthermore, there is the issue of budget execution, which deals with what kind of expenses should be prioritized.

EMPIRIC EVIDENCE ABOUT THE GOVERNMENT'S INVOLVEMENT IN ECONOMY[15]

Giuberti and Rocha (2015) review the literature on the relations between government and economic growth and present seminal articles where it is possible to notice that, despite some apparently conflicting results, the whole body of work leads us to a conclusion that confirms, up to a point, Barro's theoretical work (1990), much like Easterly and Rebelo (1993), who found evidence that public investment in transport and communication in developing countries lead to greater economic growth. However, there are other types of expenses and the authors themselves argue that their methodology does not produce conclusive results. Nijkamp and Poot (2004), based on a statistical analyses target for a sample of 123 case studies published between 1983 and 1998, presented evidence that, generally, the government's consumption, tax, and defense spending harm growth, while education and infrastructure expenses have a positive effect.

Barro and Sala-i-Martin (1995) conclude that education spending has a positive and meaningful effect on growth. Silva and Cândido Junior (2009) found that, generally, while investment has a positive effect on growth, government consumption has a negative one. Souza, Kannebleye, and Diniz (2010) concluded that government productive spending, particularly on infrastructure, have a positive effect on long-term growth, while income taxes affect it negatively.

Evidence found in a work by Angelopoulos, Philippoulos, and Tsiona (2008) show that, in fact, the relation between government size and economic growth is non-monotonic and does not posses a constant correlation, indicating that the size-efficiency mix is more important for growth than the government's size per se. In conclusion, the reported evidence shows that public expenditure with investment in infrastructure and education have a positive effect on economic growth. On the other hand, current expenses and rising taxes affect the country's development negatively.

[15] Based on Giubert and Rocha (2015)

ANALYSES OF THE MUNICIPALITY OF FORTALEZA'S INVESTMENT CAPACITY

The investment capacity of a municipality can be better understood by means of this equation:

C I = RCL - (DC + Redemption)

Where:

CI = Investment Capacity;

DC = Current Expenses

RCL = Net Income

In this regard, investment capacity could be understood as a "leftover" fiscal space after the state's machinery has been paid up along with debt redemptions. It is worth noticing that debt interest and burdens are already included in the current expenses. From this definition, and using data from the Department of Finance of Fortaleza (Sefin/Fortaleza), as well as those from the Department of the National Treasury, we can make a thrifty analysis of the municipal investment capacity. Table 3 allows us to observe the recent evolution of variables that define the municipality's investment capacity.

From graph 49 we can attain the real evolution - that is, after the period's inflation has been deducted - of the components that form the investment

Table 3 – Investment Capacity Components

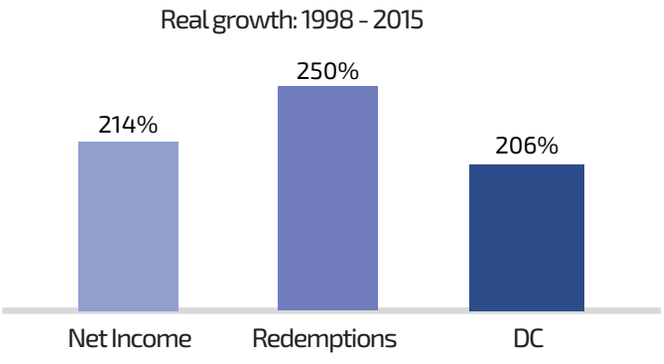
YEAR	NET INCOME	REDEMPTIONS	CURRENT EXPENSES
1998	R$ 1.666.858.675,77	R$ 14.179.999,39	1.543.664.696,76
1999	R$ 1.812.203.491,15	R$ 16.155.032,10	1.481.729.214,90
2000	R$ 2.107.131.699,42	R$ 16.971.247,07	1.943.258.311,11
2001	R$ 2.162.651.583,90	R$ 23.333.073,22	2.101.184.568,88
2002	R$ 2.465.000.909,76	R$ 26.310.812,06	2.035.882.344,90
2003	R$ 2.495.267.298,89	R$ 31.117.290,81	2.202.522.950,95
2004	R$ 2.659.994.767,71	R$ 30.847.904,05	2.378.716.898,21
2005	R$ 2.823.420.546,58	R$ 49.753.785,38	2.534.689.615,52
2006	R$ 3.194.949.300,84	R$ 46.308.689,23	2.998.783.611,52
2007	R$ 3.509.108.480,33	R$ 39.795.969,27	3.461.114.268,43
2008	R$ 4.087.121.610,12	R$ 49.454.293,13	3.677.648.190,74
2009*	R$ 3.868.317.450,85	R$ 7.603.408,59	3.898.524.311,94
2010	R$ 4.260.273.169,67	R$ 91.326.249,67	4.140.746.439,23
2011	R$ 4.653.349.089,75	R$ 50.656.598,84	4.583.829.010,65
2012	R$ 5.006.845.083,75	R$ 50.375.887,79	4.647.282.250,82
2013	R$ 4.546.516.254,34	R$ 59.157.884,07	4.555.823.088,72
2014	R$ 5.035.554.463,24	R$ 45.733.852,99	4.782.422.045,63
2015	R$ 5.229.991.502,10	R$ 49.647.175,94	4.725.644.057,42

Source: STN for the data between 1998 and 2002, Sefin/Fortaleza for the remaining years.
(*) After 2009 the current expenses and redemptions refer to settled sums.
Note: Values are at a 2015 price, according to IPCA.

capacity. Observe Net Income grew 215% in the period, while the redemption value shows a growth of 250%, and current expenses evolved by 206%.

The notable growth of redemptions is partially responsible for the municipality's low level of debt. According to the Fiscal Management Report from the 3rd four-month period of 2015, the consolidated net debt of the municipality of Fortaleza amounts to only 15% of Net Income. We should keep in mind that the limit for public debt in municipalities, as defined by the Fiscal Responsibility Law, is of 120%.

Graph 49 – Real Growth, Net Income, redemptions, and Regular Expenses (DC)



Source: Fortaleza 2040 Plan, adapted from Sefin, 2016.

Graph 49, as it shows only the real rate of growth, can give us a feeling of ease concerning fiscal stability. That is, once the Net Income rises above the current expenses, it is possible to feel some fiscal peace of mind. However, when we observe the Net Income's trajectory over time, along with current expenses, we quickly become aware that municipal fiscal stability has not yet been fully achieved. Current expenses overcame net income in 2009 and 2013. By definition and construction, the strong relative weight of current expenses upon the budget compromises, quite intensively, the municipality's investment capacity. Another point that is worthy of note is the fact that Net Income shows greater variability in relation to current expenses. This could be explained by the fact that the own-source revenue as well as the State's and the Union's mandatory transfers are sensitive to economic cycles (see Graph 50). Nevertheless, the evolution of the current expenses is nearly constant, always supporting growth.

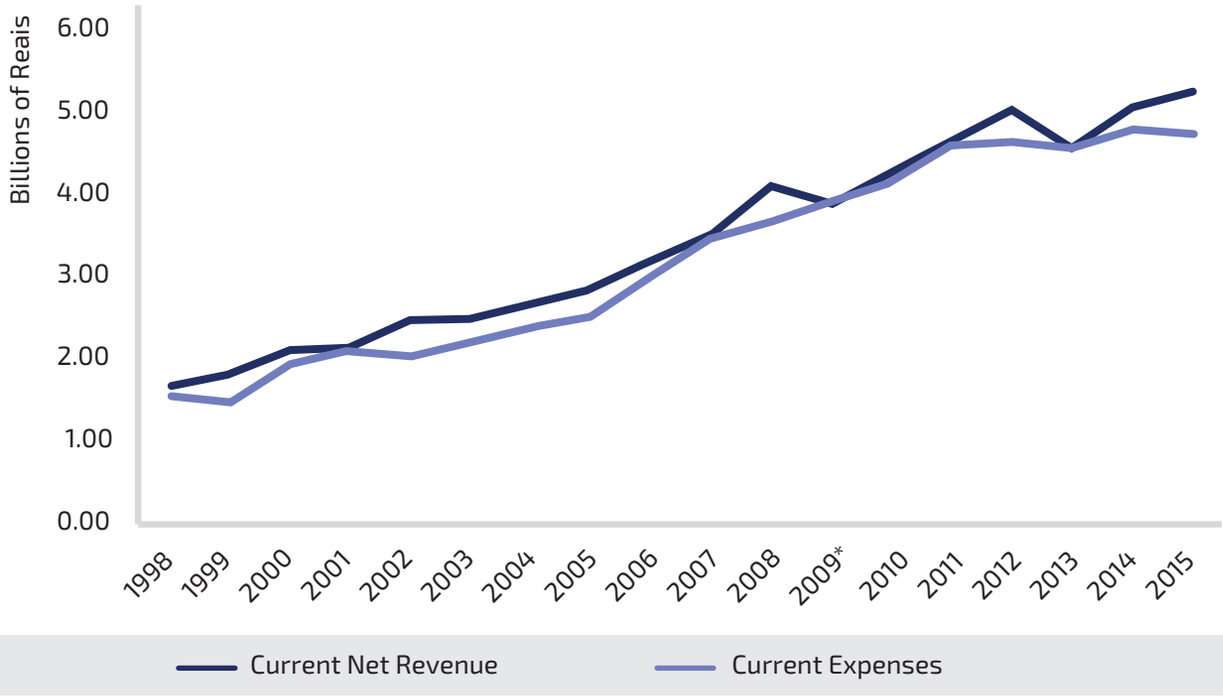
The influence of current expenses on the investment capacity can be better understood through table 4 and Graph 51. It is easy to notice that when current expenses grow, the investment capacity decreases.

A way to observe the evolution of current expenses and investments is through their trajectories over time. Looking at Graph 52 it is easy to see the tendency of investments that appears as an almost straight line. Meanwhile, the series of current expenses looks more like an exponential trajectory.

One of the main items that form current expenses are personnel expenses. On Table 5 we can see the evolution of the relative weight personnel expenses have on current expenses. In 2006, gross expenses on personnel were responsible for 46.3% of the current expenses. In 2015, it was already responsible for 61.5%. This information deserves a closer look, given the stiffness of Brazilian labor legislation, especially when it comes to the civil service, with a notorious difficulty in implementing possible necessary adjustments.

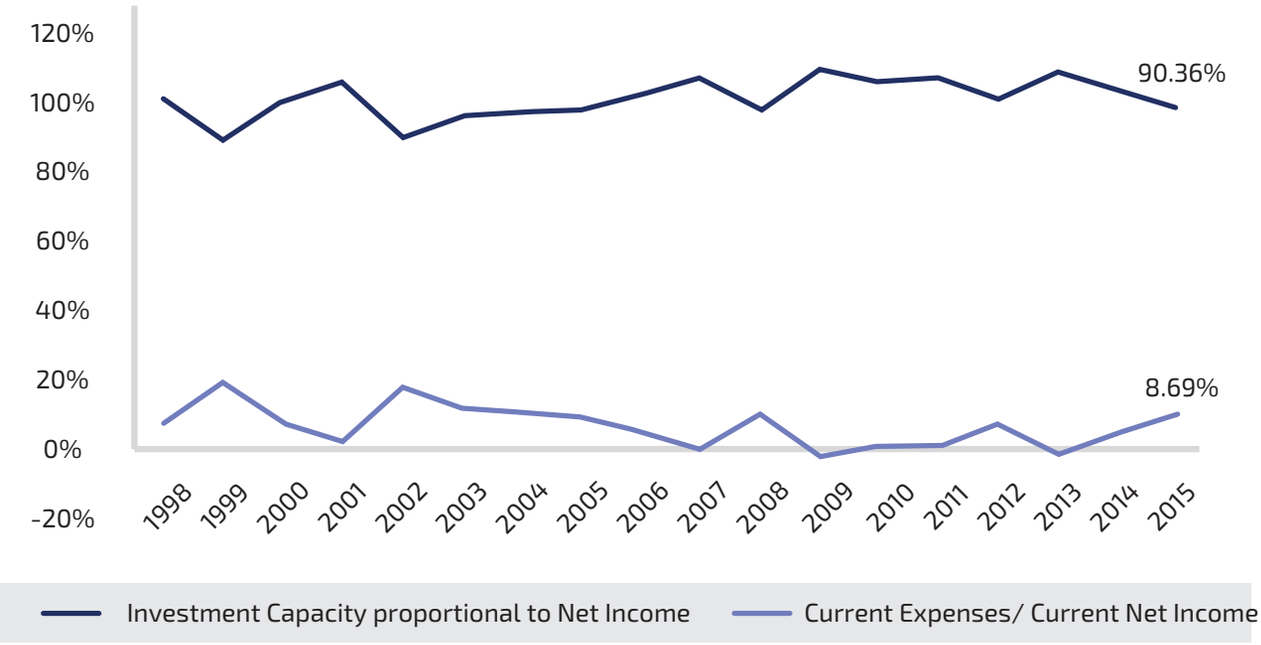
Thus, the relative growth of personnel expenses narrows the ability to manage the current expenses, which, in turn, hampers any plans that seek to increase the municipality's investment capacity.

Graph 50 – Trajectory over time – Net Income X DC



Source: Fortaleza 2040 Plan based on data from Sefin/Fortaleza and STN, 2016.

Graph 51 – Investment Capacity X Current Expenses



Source: Fortaleza 2040 Plan based on data from the Sefin/Fortaleza and STN, 2016.

Table 4 – Investment Capacity X Current Expenses

YEAR	INVESTMENT CAPACITY PROPORTION NET INCOME	CURRENT EXPENSES/ NET INCOME	INVESTMENTS / NET INCOME
1998	6,54%	92,61%	15,11%
1999	17,34%	81,76%	15,11%
2000	6,97%	92,22%	22,24%
2001	1,76%	97,16%	12,72%
2002	16,34%	82,59%	8,79%
2003	10,48%	88,27%	11,68%
2004	9,41%	89,43%	11,74%
2005	8,46%	89,77%	3,17%
2006	4,69%	93,86%	5,16%
2007	0,23%	98,63%	7,48%
2008	8,81%	89,98%	7,96%
2009	-2,27%	100,78%	8,99%
2010	0,66%	97,19%	9,58%
2011	0,41%	98,51%	9,24%
2012	6,18%	92,82%	8,70%
2013	-1,51%	100,20%	8,61%
2014	4,12%	94,97%	9,40%
2015	8,69%	90,36%	6,35%

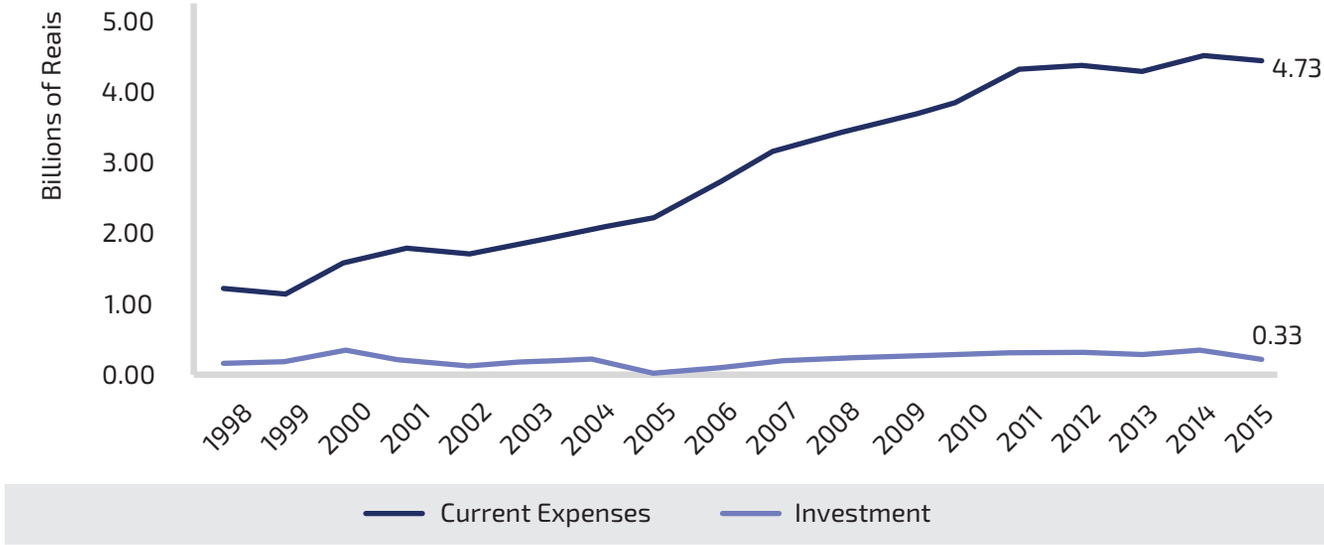
Source: Fortaleza 2040 Plan adapted from the STN and Sefin/Fortaleza, 2016.

Table 5 – Current Expenses X Personnel Expenses

YEAR	CURRENT EXPENSES	GROSS PERSONNEL EXPENSES	GROSS PERSONNEL EXPENSES CURRENT EXPENSES
2006	R$2,998,783,611.52	R$1,388,454,218.42	46.30%
2007	R$3,461,114,268.43	R$1,760,203,336.95	50.86%
2008	R$3,677,648,190.74	R$2,015,403,516.12	54.80%
2009	R$3,898,524,311.94	R$2,053,577,115.61	52.68%
2010	R$4,140,746,439.23	R$2,156,107,929.41	52.07%
2011	R$4,583,829,010.65	R$2,331,663,037.18	50.87%
2012	R$4,647,282,250.82	R$2,594,682,444.11	55.83%
2013	R$4,555,823,088.72	R$2,780,445,357.72	61.03%
2014	R$4,782,422,045.63	R$2,898,827,058.88	60.61%
2015	R$4,725,644,057.42	R$2,906,456,610.76	61.50%

Source: Fortaleza 2040 Plan adapted from Sefin/Fortaleza, 2016.
Note: Values at 2015 prices according to IPCA.

Graph 52 – Current Expenses X Investments



Source: Fortaleza 2040 Plan based on data from the Sefin/Fortaleza and STN, 2016.

One may get the false impression that the social security issue is not as big a problem as the active personnel expenses. However, when municipal social security actuarial projections are taken into account, as exposed on Table 6, we can have a glimpse of the difficulties social security might bring for the municipality's fiscal stability.

From 2022 on, City Hall will need to cover a growing social security debt. If no reforms are performed, the projection indicates that the social security's uneven accounts will increase, totaling a value greater than R$ 16.7 billion by 2040, which would dangerously jeopardize the municipality's fiscal stability and its investment capacity.

In this sense, it becomes vital to carry out social security reform that reverses the growing social security deficits. Repairing this source of fiscal instability is indispensable for the municipality's good fiscal progress and, consequently, the preservation and increase of the city's investment capacity. It is important to highlight that, aside from the negative relation between the investment capacity and the current expenses, which are made clear on Graph 51, there is a positive relation between investments and current expenses. That is, investments and capital expenditures generate, at some level, an increased current expenses.

A simple example is the building of a hospital. All expenses made with purchasing the plot, the construction, equipment, could be categorized as capital expenditure. But an equipped hospital, without doctors, drugs and health professionals, is useless. Therefore, the plans for long term investments must consider these repercussions on current expenses and, consequently, their impact on investment capacity itself. Some estimates were carried out with the intent of examining this fact in relation to Fortaleza and all of them indicated that investing generates an increase in current expenses.

On Table 7 we have an estimate of current expenses compared to the first investment variable discrepancy. That is, what is being examined is how

Table 6 – Actuarial Projections

YEAR	REVENUE	EXPENSES	RESULT	NET EQUITY
2014				R$ 799,244,741.17
2015	R$468,407,948.90	R$ 508,126,396.73	-R$39,718,447.83	R$ 807,480,977.81
2016	R$469,784,600.31	R$ 530,626,828.52	-R$60,842,228.21	R$ 795,087,608.27
2017	R$472,262,920.26	R$ 557,236,695.58	-R$84,973,775.32	R$ 757,819,089.45
2018	R$474,981,748.81	R$ 586,800,160.59	-R$111,818,411.78	R$ 691,469,823.03
2019	R$479,103,226.33	R$ 628,897,358.60	-R$149,794,132.27	R$ 583,163,880.15
2020	R$481,245,984.37	R$ 676,498,060.37	-R$195,252,076.00	R$ 422,901,636.96
2021	R$486,877,306.47	R$ 732,489,000.34	-R$245,611,693.87	R$ 202,664,041.31
2022	R$490,233,510.08	R$ 786,131,771.85	-R$295,898,261.77	-R$ 81,074,377.98
2023	R$495,954,997.12	R$ 836,542,744.39	-R$340,587,747.27	-R$ 426,526,587.93
2024	R$497,233,571.59	R$ 886,877,803.94	-R$389,644,232.35	-R$ 841,762,415.55
2025	R$501,678,323.64	R$ 927,011,484.08	-R$425,333,160.44	-R$ 1,317,601,320.92
2026	R$505,483,218.96	R$ 961,349,157.95	-R$455,865,938.99	-R$ 1,852,523,339.16
2027	R$508,639,671.78	R$ 1,003,207,800.81	-R$494,568,129.03	-R$ 2,458,242,868.55
2028	R$510,803,209.86	R$ 1,031,507,543.79	-R$520,704,333.93	-R$ 3,126,441,774.59
2029	R$514,093,779.43	R$ 1,059,140,179.06	-R$545,046,399.63	-R$ 3,859,074,680.70
2030	R$515,350,747.29	R$ 1,082,746,309.08	-R$567,395,561.79	-R$ 4,658,014,723.34
2031	R$518,314,971.72	R$ 1,105,553,407.00	-R$587,238,435.28	-R$ 5,524,734,042.02
2032	R$518,832,268.99	R$ 1,123,460,420.24	-R$604,628,151.25	-R$ 6,460,846,235.79
2033	R$520,876,877.51	R$ 1,140,353,949.58	-R$619,477,072.07	-R$ 7,467,974,082.01
2034	R$520,679,173.94	R$ 1,154,524,091.63	-R$633,844,917.69	-R$ 8,549,897,444.63
2035	R$522,187,057.33	R$ 1,164,454,207.12	-R$642,267,149.79	-R$ 9,705,158,441.09
2036	R$521,271,928.24	R$ 1,171,729,329.02	-R$650,457,400.78	-R$ 10,937,925,348.34
2037	R$522,267,389.53	R$ 1,181,037,715.05	-R$658,770,325.52	-R$ 12,252,971,194.76
2038	R$521,073,161.56	R$ 1,186,458,915.77	-R$665,385,754.21	-R$ 13,653,535,220.66
2039	R$520,654,760.12	R$ 1,189,022,864.89	-R$668,368,104.77	-R$ 15,141,115,438.68
2040	R$519,351,467.71	R$ 1,190,689,765.69	-R$671,338,297.98	-R$ 16,720,920,662.98

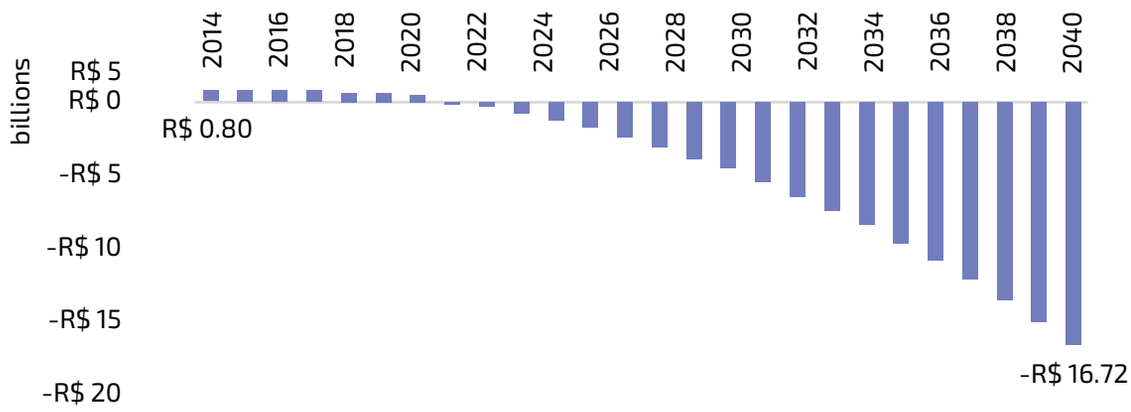
Source: Fortaleza 2040 Plan adapted from the IPM/Fortaleza, 2016.

Table 7 – OLS using 1999-2015 observations (T = 17)

DEPENDENT VARIABLE : CURRENT EXPENSES				
	Coefficient	Standard Error	ratio-t	p-value
const	1,60E+09	8,07E+08	1,9830	0,066*
INVESTMENTS_1	5,33931	2,40741	2,2179	0,0424**
Dep. variable Average	3,30E+09	Dep. Var. Current Ex.		1,16E+09
Residual Sum of Squares	1,61E+19	Regression S.E		1,04E+09
R-Squared	0,246947	Adjusted R-Squared		0,196744
F(1, 15)	4,918925	P-value (F)		0,042422
Log-Likelihood	-375,9694	Akaike criterion		755,9389
Schwarz Criterion	757,6053	Hannan-Quinn criterion		756,1045
ρ	0,770043	Durbin-Watson		0,339017

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

Graph 53 – Projection for the net equity of the social security's internal system



Source: Fortaleza 2040 Plan based on IPM, 2016.

Table 8 – OLS using 1998-2015 observations (T = 18)

DEPENDENT VARIABLE: CURRENT EXPENSES				
HAC standard errors, bandwidth (Bartlett kernel)				
	Coefficient	Standard Error	ratio-t	p-value
const	1,21E+09	7,72E+08	2	0,1373
INVESTMENTS_1	6,25514	2,52059	2	0,0246**
Dep. variable Average	3,21E+09	Dep. Var. Current Ex.		1,20E+09
Residual Sum of Squares	1,71E+19	Regression S.E		1,03E+09
R-Squared	0,298502	Adjusted R-Squared		0,254658
F(1, 16)	6,158439	P-value (F)		0,024565
Log-Likelihood	-398,0841	Akaike criterion		800,1683
Schwarz Criterion	801,9490	Hannan-Quinn criterion		800,4138
ρ	0,816676	Durbin-Watson		0,353839

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

investments carried out in the year t-1 affect the volume of current expenses of year t. Observe that the p-value of the investment_1 coefficient is smaller than 0.05; therefore, this statistical relation is valid for a 95% confidence interval. The coefficient's sign is positive, which shows a positive relationship between the investments in the t-1 period and the current expenses in t. Therefore, based on data from this estimate, we could say that there is statistical evidence that the investment level increase leads to an expansion of the municipality's volume of current expenses.

On Table 8, results show that investments affect the level of current expenses in the same period as they were carried out. This is probably linked to cases of public assets which are built and begin operating on the same year. Thus, thebeginning of their operation immediately impacts the current expenses. Having said that, we see that investments positively affect the current expenses simultaneously,

or in parallel to them. That is, the investments carried out in year t also affect the current expenses of year t. As well as possessing a lagged effect, that is, investments carried out in t-1 affect expenses in t.

In Table 9 we have an estimate of the log-log regression of current expenses versus investments. That is, a regression between the logarithm of current expenses and the investment logarithm. This type of regression gives us an additional piece of information about the relationship between these variables. The coefficient reached by this regression also represents the elasticity between variables, that is, the impact, in percentages, upon the current expenses from the stand point of a percentage variation in the level of investments.

The coefficient of the investments variable, with a value of 0.40, shows that for each 1% variation in the investment level, the expenses vary positively by 0.40%. In other words, for every 10% investment variation, current expenses vary by 4%. This kind of information has a key role for long term planning when it concerns a meaningful volume of investments, such as is the case of the third stage of Fortaleza 2040.

It is also important to point out the importance of municipal investments in raising the city's level of economic activity, and its consequent repercussions on municipal tax collection.

In Table 10 we have an estimate of Net Income versus the level of municipal investments performed in the 1998-2015 period. The results show a clear, meaningful and strong relationship between the level of investments performed and the municipality's Net Income. This relation has a positive direction, meaning that the more investments are made, the more taxes are collected. In other words, one of the ways to increase collection is through the increase in investments.

Municipal investments affect net income by means of tax revenue; through the increase of economic activity, the municipality can collect more, thus elevating its investment capacity as well as maintaining a positive endogenous growth cycle through investments in public capital. Table 11 shows the elasticity between investments and tax revenue is of 0.508%, meaning that, a 10% variation in the level of investments, the effect on tax revenue is of over 5%.

Table 9 – OLS using 1998-2015 observations (T = 18)

DEPENDENT VARIABLE: CURRENT EXPENSES				
	Coefficient	Standard Error	ratio-t	p-value
const	13,8844	4,37537	3,1733	0,0059
INVESTMENTS_1	0,406368	0,22415	1,8129	0,0887*
Dep. variable Average	21,81483	Dep. Var. Current Ex.		0,404808
Residual Sum of Squares	2,311065	Regression S.E		0,380055
R-Squared	0,170409	Adjusted R-Squared		0,118559
F(1, 16)	3,286606	P-value (F)		0,088651
Log-Likelihood	-7,066924	Akaike criterion		18,13385
Schwarz Criterion	19,91459	Hannan-Quinn criterion		18,37939
ρ	0,851016	Durbin-Watson		0,201657

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

Table 10 – OLS using 1998-2015 observations (T = 18)

DEPENDENT VARIABLE: CURRENT NET REVENUE				
	Coefficient	Standard Error	ratio-t	ρ-value
const	1,51E+09	8,16E+08	1,8474	0,0833*
1_INVESTMENTS	5,99049	2,43432	2,4609	0,0256**
Dep. Var. Average	3,42E+09	Dep. Var. Current Ex.		1,19E+09
Residual Sum of Squares	1,76E+19	Regression S.E		1,05E+09
R-Squared	0,274567	Adjusted R-Squared		0,229227
F(1, 16)	6,055785	P-value (F)		0,02561
Log-Likelihood	-398,3602	Akaike criterion		800,7203
Schwarz criterion	802,5011	Hannan-Quinn criterion		800,9659
ρ	0,813838	Durbin-Watson		0,375917

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

Table 11 – OLS using 1998-2015 observations (T = 18)

DEPENDENT VARIABLE: TAX REVENUE				
	Coefficient	Standard Error	ratio-t	p-value
const	10,5010	4,40897	2,3817	0,03*
INVESTMENTS_1	0,507625	0,22588	2,2474	0,0391**
Dep. variable Average	20,40748	Dep. Var. Current Ex.		0,426164
Residual Sum of Squares	2,34669	Regression S.E		0,382973
R-Squared	0,23993	Adjusted R-Squared		0,192426
F(1, 16)	5,050697	P-value (F)		0,039073
Log-Likelihood	-7,204599	Akaike criterion		18,4092
Schwarz Criterion	20,18994	Hannan-Quinn criterion		18,65474
ρ	0,816362	Durbin-Watson		0,418587

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

One way to spot increased economic activity caused by municipal investment is testing their relation to the level of formal jobs. For the 1998-2014 period, municipal investment has a positive impact on the number of formal jobs. This result supports the conclusion reached by Gupta et al (2002) that capital expenses should be preserved by tax adjustments, as they boost the levels of economic activity because they have a direct impact on tax collection. Another aspect of the impact municipal investments have on economic activity is shown by how they relate to the municipality's GDP. In Table 12 we can see that municipal investments have a positive and significant effect on Fortaleza's GDP. This is an important relationship, as it proves the importance of municipal investment for the development of a city. More municipal investments mean a greater level of economic activity and greater

Table 12 – OLS, using 1998 - 2015 observations (T = 15)

DEPENDENT VARIABLE: GDP

	Coefficient	Standard Error	ratio-t	p-value
const	2,48E+10	7,82E+09	3,1718	0,0074*
INVESTMENTS_1	51,4648	23,7477	2,1671	0,0494**
Dep. variable Average	4,09E+10	Dep. Var. Current Ex.		1,06E+10
Residual Sum of Squares	1,15E+21	Regression S.E		9,40E+09
R-Squared	0,265393	Adjusted R-Squared		0,208885
F(1, 13)	4,696537	P-value (F)		0,049384
Log-Likelihood	-364,6688	Akaike criterion		733,3376
Schwarz Criterion	734,7537	Hannan-Quinn criterion		733,3225
ρ	0,808922	Durbin-Watson		0,403922

Source: Sefin/Fortaleza. Estimates were computed by means of GRETL.

employment generation, therefore increasing the city's basis for tax collection, enabling the increase of revenue and fostering its role as a driver for municipal development.

In this sense, and based on estimates presented here, we can see that the greater the investment, the greater is the municipality's level of economic activity, the greater is employment generation and, consequently, the greater is the tax collection and, with it, the municipality's investment capacity. Since the investment level has a negative effect upon investment capacity through the elevation of current expenses, otherwise raising the investment capacity by means of increased tax collection capacity, we have a variable with a great conduction level. And this level is characterized by a point at which investment's positive effects on collection are exactly the same as their effect upon current expenses. At this point the Municipal Executive Authority can play a great role as a promoter of the city's economic growth.

PROPOSALS AND SUGGESTIONS FOR STREAMLINING FORTALEZA'S INVESTMENTS CAPACITY

In light of the analyses of Fortaleza's current investment expenditures and their relation to components of the current expenses, while also based on theories and empirical results presented in previous sections, this section aims to bring suggestions that can positively impact the municipality's ability to perform productive expenditures.

As we question the future of fiscal management by public administration entities, the carrying out of a vigorous adjustment of tax becomes a concrete tendency. By definition, there are two ways to implement an adjustment of public accounts. First, it is possible to do it through increasing tax rates, increasing tax collection bases, raising tax collection efficiency, etc.; or the adjustment can be made through public spending cutbacks.

There is economics literature, theoretical as well as empirical, that analyzes the effects of both kinds of adjustments on the economy. In a recent article, two political economy professors from Harvard, Alberto Alesina and Silva Ardagna used, as a sample, OECD countries that implemented tax adjustments and/or incentives in the 1970 - 2007 period and found the following evidence.

Firstly, tax incentives based on tax reduction are more effective in raising economic growth than incentives based on increased public expenditure. On the tax adjustment front, they pointed out that adjustments by means of expenditure cutbacks are more effective in reducing deficits and mitigating the debt/GDP ratio than adjustments supported by tax increases.

Gupta et al. (2002) apud Benício, Rodopoulos, and Bardella (2015), in a study with a sample of 39 low income countries, concluded, among other things, that tax adjustments based on current expense cutbacks tend to generate higher growth rates than adjustments based on tax increases. Furthermore, their text indicates that public capital expenditures should be maintained, as they have a positive impact on economic activity. All in all, the evidence listed above show that an efficient tax adjustment, be it in terms of generating the fiscal stability the State requires or in terms of economic growth rate repercussions, is based on current expense cutbacks that maintain capital expenditures while avoiding recurrent tax increases.

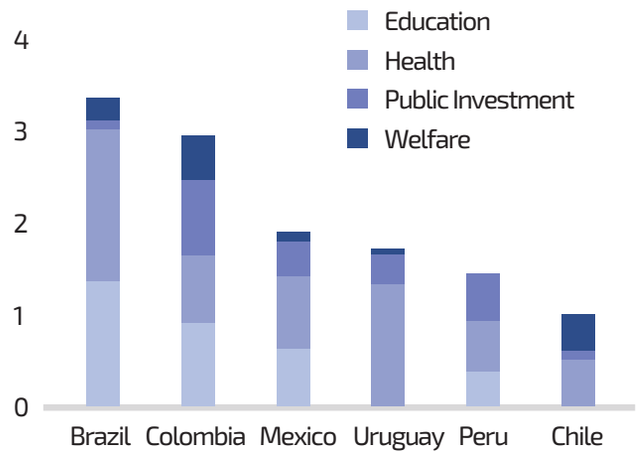
In that sense, a desirable fiscal reform would prioritize the preservation of, or even the increase, in capital expenditures (investments). As we've seen in the previous section, municipal investments raise the municipality's revenue through economic growth, that is, they increase the tax collection base. With a view to preserving municipal investments, it is necessary to equate the social security problem

with the municipal civil service and also decrease growing spending on active personnel, enabling the municipality's investment capacity to increase through the reduction of current expenditures. Concurrent with the need to reduce the municipality's expenditures, there is the need to maintain and improve the health, education, sanitation, housing and urban design services. The suggestion of reducing expenses seems dreadful in a city such as Fortaleza, so deeply scared by the inequality and precariousness that plague a large part of the population. However, reducing expenses does not imply a reduced supply of public assets or services.

The IMF released a 2015 report in which, among other things, it estimated the potential for generating savings by means of reducing inefficiency levels in the supply of public assets and services. According to data from the IMF, Brazil's savings potential reaches 3.25% of the GDP/year. If, hypothetically, the Fortaleza municipality shares an equal level of inefficiency, and considering the city's 2013 GDP, the savings potential generated by reducing inefficiency levels is around 1.7 billion/year. Even if Brazil's inefficiency level was three times higher than Fortaleza's, savings through inefficiency reduction would be superior to 500 million/year. Therefore, an incredibly important source for the Fortaleza 2040 budget is, without a doubt, the reduction of inefficiency in management and supply of public assets and services (see Graph 54).

According to Graph 55, Fortaleza's investment capacity in 2015 was around R$ 454.7 million, representing about 8.69% of the municipality's Net Income. As we've seen, after the reduction of the inefficiency levels in expenditures with health,

Graph 54 – Savings brought on by inefficiency reduction (% of GDP)



Source: Fortaleza 2014 adapted from IMF Staff calculations.

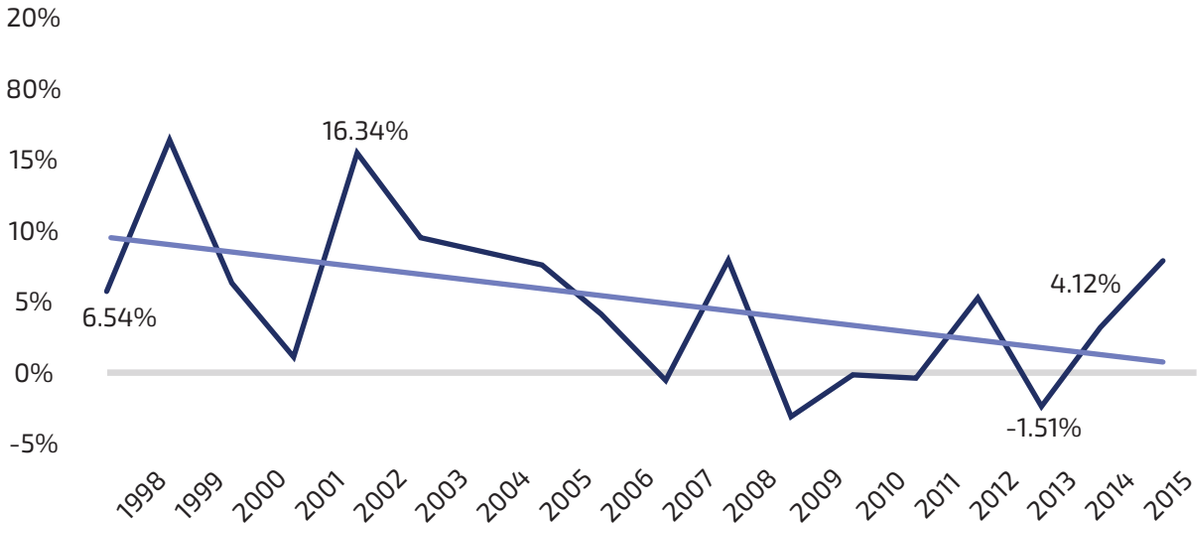
It is beneficial to raise the efficiency in the supplying of goods and services, as it leads to the simultaneous reduction of expenses and the conservation, and sometimes increase, of the quality of the public service.

education, social protection, and investments alone, the municipality of Fortaleza could raise its investment capacity by 1.7 billion/year. Considering the current level of investments, municipality's potential investment capacity, not considering debts, would be of 2.154 billion.

We need to stress that the Fortaleza 2040 Plan contains, among its main enterprises, projects that are excellent candidates for Public-Private Partnerships and concessions. Mobility works, such as the BRT and the subway lines could - if well thought out, with well defined regulatory frameworks - be undertaken through partnerships with private initiatives through concessions or formation of PPPs.

Furthermore, Bengali economist and Nobel prize winner Muhammad Yunus, has suggested the creation of a BNDES for poor people. This sort of undertaking - the creation of credit lines destined for needy families - could cover the costs of a reasonable

Graph 55 – Fortaleza's investment capacity (Net Income proportion)



Source Fortaleza 2040 Plan based on data from Sefin/Fortaleza, 2016.

part of the Social Housing Plan (Plhis) and all housing demands within the urban axis. On the other hand, there are several multilateral organisms such as Bird/ World Bank, the BID, CAF, and KFW, to name only the largest funders for sustainable development projects across the world, that can be called on to aid the funding of large urban design works within a environmental and educational sphere. Therefore, we suggest that, within Fortaleza's practical framework or through outsourcing, a management unit is hired for these projects, in order to boost the connection with these funding organizations. Preferably by competing for straight grants.

The city of Fortaleza's assets will be valued after the Plan's implementation. We could use the green factor in taxes in order to induce private investments in cisterns, use of photovoltaic panels, planting of trees, etc. The analysis of the municipality's investment capacity, combined with the proposals listed here listed, shows that the Fortaleza 2040's targets can be met through efficient management of public resources and harmonious integration with private initiatives, as well as partnerships with multilateral organisms that sponsor economic and social development.

THEORETICAL BASE FOR THE BUILDING OF SCENARIOS - PUBLIC FINANCE APPLICATIONS

The objective of this text is to give a theoretical basis for the consistent formulation of plausible hypotheses about the future of public finances in Fortaleza and its metropolitan region. We propose a mathematical, qualitative model for a better description of the relation between the economic environment and its constraints for a better allocation of public expenditure.

The construction of an economic environment model took into consideration classic and contemporary theories concerning economic growth. The investments in capital as a constraining factor for economic growth are based on the Solow e Swan (1956) model. The importance of investments in human capital - using ideas as the engine for growth - are taken from Romer's (1986) seminal work. In order to measure the incentives that constrain investments in physical and human capital, the model proposed here uses ROE, return on equity, and proposes the construction of the ROHC - Return On Human Capital.

The idea of commercial opening as an important factor to start the process of economic growth by means of gains in productivity can be traced to Smith's work (1776). Along general lines, Smith argued that the size of a market limits the division of labor. In that sense, commercial opening, as it expands the market size, deepens the process of work division and, with that, increases specialization, inducing productivity gains. One way to measure the level of commercial openness is the Open Markets Index (OMI) calculated by the International Chamber of Commerce (ICC).

On the other hand, institutional quality as a fundamental cause of economic growth is credited to work by the economic historian Douglas North, he formulated a model in 1990 in which institutions are the main cause for long-term economic development. Institutional economy was boosted and later perfected through the works of various economists, although especially theworks of Daron Acemoglu, which contributed significantly to the

strengthening of the theoretical backbone of economic science.

With the intention of granting measurability to the importance of the relation between institutional quality and economic development, this work proposes the use of the Human Opportunity Index (HOI), calculated by the world bank, and the Corruption Perception Index (CPI), calculated by international transparency.

Based on the theories presented above, we can understand the economic environment, synthetically, as a function of available incentives pertaining to investments in physical and human capital and to entrepreneurship. As these by-products of the respective rate of return that are brought on, in a higher or smaller degree, by the institutional quality that includes interest economics. In this sense, the economic environment can be understood as a function of these constraining elements and their inter-relations, or crossed effects. In order to better illustrate this, take the following equation:

AE = F (AC;DE;ROE;ROHC;CPI, HOI)

where AE = economic environment

AC stands for the level of commercial openness. The OMI works as a proxy for this variable. The relation between economic environment and commercial openness is positive, that is, the more the economy is integrated with international commerce, the better and more dynamic its economic environment will be.

DE stands for economic dynamics, here understood by the easiness with which business are carried out in ample terms - buying, selling, enterprising. As a proxy, we have the Doing Business Index. It's easy to perceive that the more dynamic an economy is, better and quicker is its development.

ROI: Return on Investment, can be understood as a rate of return over investments in capital.

With this variable, the idea is to attain a measure regarding the incentives for making investments. That is, the greater the return over capital, the greater are the incentives towards making new investments.

ROHC: A measure of return investment in human capital. Here we seek to understand a population's educational progress as the result of the return investments on human capital, as education possess, in its various levels, opportunity costs as well as direct ones.

CPI: Corruption Perception Index. The idea behind this variable is that the highest the perception of corruption in a country is, the worse is the quality of its political institutions. This has a negative impact on economic development, especially as it concerns question of equality and opportunity distribution.

HOI: Human Opportunity Index seeks to measure the degree of equity in opportunity given to the children of a nation. The higher this index is, the less inequality of opportunities among poor and rich children, promoting greater economic dynamics and facilitating the dissemination of productivity gains throughout society, which allows for a more homogeneous economic growth in a society.

In this sense, with the exception of the CPI, the economic environment is positively affected by the variables here listed. So, based on this small and simple theoretical kit, it is possible to verify the impacts of measures or events related to these variables and their respective effects upon the economy. For instance, a tax reform that enables the reduction of complexity in the process of paying taxes would be positive for the economic environment, as it would allow for greater economic dynamics due to the greater easiness with which businesses are made.

Also, it would increase the return over investments, once tax paying costs are reduced. And so we would hope that the present text works as a theoretical benchmark that is objective and parsimonious in our efforts to build future scenarios concerning the economy of Fortaleza and its region.

In order to clearly define the hypotheses, the fundamental aim of this present work, it is necessary to divide variables into Autonomous and Uncertain. This division should enable us to build a reliable scenario. Autonomous variables are those which have a consolidated course over time, that is, regardless of circumstantial changes, they will follow their natural course. The Uncertain variables depend on global, national and regional circumstances and trends; for them we define hypotheses that guide the construction of alternative scenarios. It is fundamental to address the issue of efficiency in municipal pubic expenditures in order to achieve a sustainable future for the city of Fortaleza, since the definition of a long term strategy for this important aspect of public management is capable of altering the perspectives of fundamental programs and plans.

Next, we'll carry out an analysis of the municipal expenditure's chief constraints, which should be met with changes, so that the municipality's accounts can remain balanced until 2040 and beyond, always observing the Federal Constitution's determinations and following budget laws (PPA, LOA, LDO e LRF). The 1988 Federal Brazilian Constitution demands the elaboration of three budget components:

- PPA - Multi-annual Plan;
- LDO - Budget Guidelines Law;
- LOA - Annual Budget Law.

This tripod is related to the logic of budget-programming, whose application seeks to achieve governmental goals, among which are: increasing people's well-being and improving quality of life. Federal, state, municipal, and the Federal District public administrations must adhere to this tripod.

The PPA refers to mid-term planning beginning in the second year of a current government's tenure until the end of first year of their successor's term, thus making up a period of four years. Under Article 165 of the Constitution:

> *"§ 1 The law which institutes the pluriannual plan shall establish, on a regional basis, the directives, objectives and targets of the federal public administration for capital expenditures and other expenses resulting thereof and for those regarding continuous programs".*

The PPA, after the elaboration and planning stage, will be transformed into government programs; such programs will be the same used for the elaboration of the Annual Budget Law. For this reason it is commonly said that: The PPA finishes the program, the LOA begins it. The integration between the PPA and the LOA is made through the Budget Guidelines Law. The budget guidelines represent the steps that must be taken so that planning and execution of public budgets are entailed. Article 165 of the Federal Constitution states that:

> *"§ 2o The law of budgetary directives shall comprise the targets and priorities of the federal public administration, including the capital expenditures for the subsequent fiscal year, shall guide the drawing up of the annual budget law, shall make provisions for alterations in tax legislation and shall establish the investment policy for the official development financing agencies."*

The LDO's focus is the planning of governmental actions, and it is created through four instruments by means of establishing targets for public administration:

- Regulates the capital expenditures of the following year;
- Regulates the elaboration of the LOA;
- Frames the alterations of tax legislation.
- Regulates the investment policies for official funding agencies.

The LOA must be elaborated in accord with the PPA and the LDO and in conformance with the LRD, Article 165:

> *§ 5o The annual budget law shall include:*
>
> *The fiscal budget regarding the Powers of the Union, their funds, bodies and entities of the direct and indirect administration, including foundations instituted and maintained by the Government;*
>
> *The investment budget of companies in which the Union directly or indirectly holds the majority of the voting capital;*
>
> *The social welfare budget, comprising all direct and indirect administration entities or bodies connected with social security, as well as funds and foundations instituted and maintained by the Government.*

As we observe the determination of the budget program's tripod, we can see that nothing is said about the control of the governmental budget's execution. Such an attribution was covered by the Fiscal Responsibility Law (LRF). Article 4 of the LDO is currently composed of a series of demands that are defined by the Fiscal Responsibility Law, such as:

- Balance between revenue and expenditures;
- Criteria and form relative to the spending authorization;
- Norms relative to the control of costs and the evaluation of results from programs financed with budget funding;
- Other conditions and requirements for the transfer of resources to public and private agencies.

As we can notice, the LRF instituted a series of requirements for the LDO in regard to the control and execution of public budgets. As such, the CF and LRF norms for the LDO complement and seek to guarantee that these instruments for planning governmental targets have the ability to follow the elaboration of budget execution.

The LRF also defines the Fiscal Targets Annex (AMF) where bimonthly targets should be included for income, expenditures, nominal and primary results and the amount of public debt, considering a history of the three prior years and a projection for the term that will begin in two years. If the AMF targets are not being met, the spending authorizations will be limited so as not to jeopardize the attainment of the established budget targets. The Task Risk Annex (ARF) is also stipulated by the LRF. This annex discusses the utilization of the Contingency Reserve, the resource surplus needed for covering contingent liabilities and unforeseen tax risks. As the most important part of the Public Budget, the defined expenditure, in a strict sense defined by resolution n° 1.1121/08 of the Federal Accounting Council as "reduction of economic benefits during the accounting period in the form of outflow of resources or divestment

of assets or increase of liabilities that result in a reduction of equity and in a broad sense, with each and every cash outflow from public coffers" should then be more carefully controlled over time.

Based on this definition, we can assume that public expenditures are fundamental to good functioning of the public machinery; in this way, we project that, in any scenario, the search for greater efficiency in the allocation of expenses should guide us in the future. On the other side we have the public revenue, a mechanism that is able to generate resources so the government can execute its programs and investments. The public revenue, defined in an ample sense as any inflow into the public coffers and, in a strict sense, as the definitive increment of value to the public coffers, without consideration or restitution, with the purpose of supplying public expenditures. Just as happens with expenditure, revenue must be well managed, as it is the main mechanism for carrying out governmental programs and investments.

This brief methodological discussion about the main components and requirements of public budgets should advance the construction of scenarios for Fortaleza's public finances, since only this understanding can allow us to establish variables that enable us to address these themes and suggest changes aimed at budget sustainability in Ceará's capital.

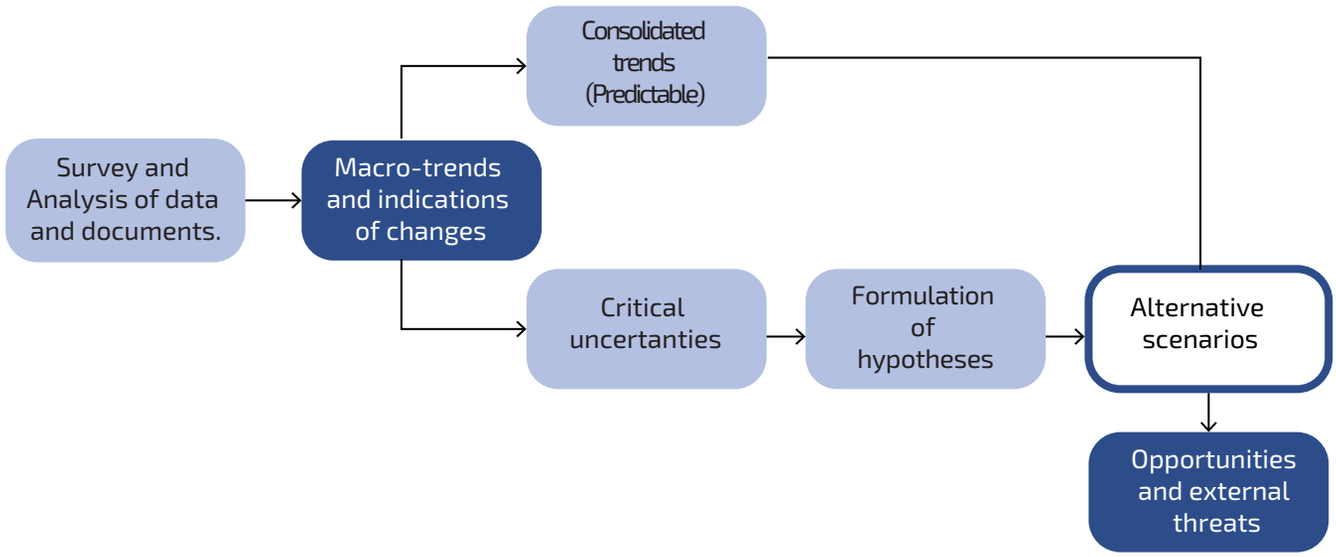
Figure 42 shows the flow chart used for building scenarios and performs exactly as we've described above - consolidated trends fall directly upon scenarios.

With a view to reaching an optimal scenario for the city of Fortaleza, which was elaborated from a combination of plausible variables, the desirable scenario that Fortaleza 2040 strives to reach depends, inescapably, on a set of variables that must converge in the following manner: Combination of favorable external conditions (Global, Brazil, and Ceará) with the introduction of public policies directed towards urban restructuring (new concepts) and competitiveness, with an innovative and proactive business class, leading to changes in the reality of Fortaleza within the next 25 years.

This combination of variables leads to the creation of a great scenario for the city of Fortaleza by 2040, which we now describe:

- In 2040 Fortaleza will be a competitive city - better education, intense innovations, public security, quality and sustainable¬infrastructure; with an organized urban space, compact and connected, with mobility and quality public transportation, recovered and preserved environment (a green city with broad and respected urban spaces);
- Fortaleza's economy will grow moderately in the period, with some moments of greater dynamism;
- Fortaleza will have a high quality of life, with an ample and equitable offer of quality public services, social equity (reduction of poverty and social inequality);
- Over the coming decades the city of Fortaleza consolidates its leading role in organization, metropolitan governance and regional integration (a network of cities).
- By defining where we want to go and taking as a premise Brazil's consolidated trend of having stricter control over public accounts, overflowing into states and municipalities, we will elaborate hypotheses in line with these considerations, in which fiscal adjustments and a more efficient control over public spending is unavoidable.

Figure 42 – Flow chart – Building Scenarios



Source: Fortaleza 2040 Plan.

Premise - Consolidated trend: Fiscal Adjustment Unavoidable

Hypothesis: adjustment, planned or by default

- Considering the adopted premise for building scenarios for the public finances of the Fortaleza municipality within the 2040 horizon, where we consider that fiscal adjustment and austerity are unavoidable in all levels of public administration, the city of Fortaleza will surely be included in this tendency.¬ Considering the first hypothesis, the event of an adjustment "by default", we notice that a fiscal adjustment with unforeseen cutbacks will be necessary, even while facing all the signs of Mismanagement. An adjustment by default would be the worst-case scenario, as it would entail an indiscriminate cost cutback, leading to the need to also cutback exclusive and essential services, prompting popular uproar. An adjustment by default is characterized by a public administration that lacks the ability to honor its budget and financial commitments, not possessing the means to pay its debts, nor its obligations regarding current expenses and capital expenditures.
- In this scenario there is a budget imbalance (Public Deficit), as the revenue coming from taxes, contributions, patrimony, current transferences and others transferences, is insufficient to honor commitments made to social security, personnel expenses, investments, in short: current and capital expenses. Currently the public accounts of federal, state, and municipal agencies show these characteristics, for the most part, therefore the country currently faces high economic instability. It is not acceptable to plan such a passive attitude for

the next 25 years; thus, we consider that there is will be a growing strengthening of laws that regulate public accounts, enabling better control of public administration and, consequently, a greater possibility of making long-term plans for public accounts.

- •The worst-case scenario would be a default, as it causes social tension and, as recent history has shown, one of its results is immobility by political actors, who are the ones charged with making reforms.

Hypothesis: Planned

This should be Fortaleza's goal for the 2040 horizon - the search for a city with balanced accounts should begin with carrying out the planned adjustments, from the present time until after this period. The pursuit of an efficient budget should go beyond budget laws and the Fiscal Responsibility Law, in the sense that the public administration should seek to generate results at the least cost to public coffers, meeting the demands of fiscal and budget responsibility and defining additional barriers for the increase of current expenses. Institutional reform that yields a suitable mechanism for incentives so the private sector will join the PPPs, concessions and privatizations, with legal and technical guarantees so these initiatives can be perfectly and freely executed. This would diminish the need for public investment. With the adoption of practices that reinforce the principle of efficiency, establishing efficiency evaluations and introducing a system of penalties and rewards.

The planned adjustment should consider all population structures within the foreseeable future, the working age population numbers, quality of education, aging of the population, etc. This perspective should consider the complex nature of political, social, economic, technological and environmental behaviors - noticing that better basic sanitation leads to cost reductions in health, better traffic education reduces accidents and, consequently, also reduces health costs. Less violence also diminishes health costs. Thus, health is no longer treated as building hospitals - the system's complexity should be approached with necessary attention. These illustrative examples seek to highlight the transversality of the public budget and the importance of a planned and efficient managements of expenditures.

To reinforce this idea, we can notice that education and expenditures on sport, for instance, have a direct effect on violence and drug use; thus, we once more highlight that the complexity of social interconnections should be treated through connections at different levels, not only in a linear form. In the intermediate scenario, the adjustment happens and is not followed by pro-competitiveness measures.

These are some of the chief impacts that could affect the budget of the Fortaleza municipality:

a) Effects of Social Security Reform

Social security reform is among the items that would have to be affected by a successful tax adjustment, and these are the possible repercussions:

- The IBGE index of aging shows that in 2000 there was a rate of 18.7 seniors (65 years old or more) to every 100 youths between ages 0 and 14. In 2040 the senior population will surpass that of children by 13%, and in 2060 this rate could be of 100 to 206.2. This changes the demographic profile and will add further pressure on public finances;

- In prospective terms, a recent IMF study (2012) states that, in the next 15 years, health expenses in Brazil will increase at about 1.9 percentage point of the GDP. This was the second most meaningful increase among the emerging countries researched.

Based on these IBGE projections, there are some options for controlling the social security budget in the Fortaleza municipality:

- Prolongation of the population's working age;
- Equalization of gender issues in social security;
- Mitigation of debt problems by equalization of the social security system.

b) Budget Laws

The strengthening of budget laws is a constraint that should enable better and more efficient managing of public accounts. In 2016, for instance, the Fiscal Responsibility Law was responsible for overturning the accounts presented by the President of the Republic. Budget irregularities were the reason for the non-acceptance of the accounts for the year of 2015, constituting a crime of fiscal responsibility. While we do not wish to discuss if this was indeed a crime or political maneuver, the fact remains - for the first time in history, public budget laws were effectively used. Thus, we imagine that they should be even stronger to control public management, the spending authorization limit, the limit of spending on personnel and benefits, the limit of public debt, among other things. The legal strengthening of these laws represents a huge step forward in public finances.

c) Social Costs and Personnel Costs

The second breakthrough established by the Fiscal Responsibility Law states that there should be a limit of 60% of Gross Current Expenses spent on personnel. These costs should take into account the following variables:

- The sum of municipal expenses with assets;
- Spending on inactive personnel and pensioners;
- Elective offices, posts, functions, or civil, military and government staff costs, as well as any other paying services.¬
- Maturities, fixed and variable benefits;
- Grants, pension proceeds;
- Reforms and allowances;
- Additional payments of any kind;
- Bonuses, over time, and personal advantages;
- Benefits; and
- Contributions collected by public bodies for social security entities.

We have already noticed a concern with limiting public administration expenditures with personnel. With the future in mind, we have devised a set of decisions that will lead the public administration to adopt work regimes more geared toward productivity and with greater flexibility that allows cutbacks - closer to the private regime of formal employment.

SUMMARY OF BUDGET COMPONENTS

Next we present a spreadsheet with current revenue projections consolidated by our technical staff, followed by a synthetic spreadsheet that presents the total budget values for all 33 action plans that are part of the Fortaleza 2040 Plan, organized by quadrennium, relative to municipal resources.

In the specific volumes of each axis there are 33 budget spreadsheets in specific analytical formats for each plan.

Table 13 – Spreadsheet with Regular Income

DESCRIPTION (Current Values)	2017 - 2020	2021 - 2024	2025 - 2028	2029 - 2032	2033 - 2036	2037 - 2040
ACCRUED CURRENT REVENUE	30.652.909.917	38.113.579.964	45.281.268.493	57.209.446.061	73.833.330.323	98.936.841.460
CURRENT REVENUE	29.810.813.586	36.928.745.877	43.658.872.799	54.820.860.582	70.396.921.377	93.552.610.610
Tax Revenue	7.598.363.602	9.143.853.631	10.708.277.394	12.900.053.242	15.860.465.383	20.140.592.059
ISS	3.446.529.628	4.275.799.925	5.257.287.524	6.630.770.130	8.512.014.407	11.256.074.722
IPTU	2.389.740.366	2.855.418.919	3.122.963.383	3.503.634.377	4.000.538.214	4.705.123.822
ITBI	507.223.929	523.407.328	572.449.075	642.227.274	733.311.320	862.464.093
IRRF	1.195.645.435	1.425.996.572	1.686.421.975	2.045.836.380	2.526.012.837	3.212.738.352
Other Tax Revenues	59.224.244	63.230.887	69.155.437	77.585.081	88.588.605	104.191.070
Tax Revenue f(Investiment)	824.530.691	1.021.404.004	1.207.551.094	1.516.278.042	1.947.092.858	2.587.550.938
Tax Revenue f(Efficiency)	17.565.640	26.464.732	40.067.461	70.050.941	149.076.682	673.660.363
Tax Revenue f(Currency Appreciation)	-	136.965.353	374.777.139	802.256.496	1.340.239.407	2.123.019.549
Contribution Revenue	3.795.333.254	4.370.403.431	4.971.377.685	5.800.799.374	6.888.946.908	8.427.173.423
Property Revenue	1.003.821.883	1.065.803.230	1.142.830.640	1.257.016.640	1.407.164.420	1.622.542.473
Service Revenue	35.784.771	41.217.603	46.885.437	54.707.775	64.970.176	79.477.306
Current Transfers	15.994.620.396	20.400.280.775	25.928.284.299	33.879.666.750	45.156.309.519	62.130.940.612
FPM	2.693.619.830	3.232.142.403	3.957.332.686	4.970.183.419	6.353.422.551	8.366.197.242
ICMS	3.676.263.767	4.412.482.422	5.218.320.620	6.330.461.964	7.816.279.122	9.941.224.109
IPVA	789.814.478	972.240.359	1.185.818.813	1.483.613.258	1.889.243.517	2.478.215.760
SUS Transfers	4.507.632.647	6.001.760.970	7.928.794.927	10.744.728.134	14.820.441.848	21.058.803.103
FUNDEB Transfers	3.251.538.755	4.349.328.526	5.745.802.628	7.786.440.148	10.740.009.611	15.260.796.543
Other Current Transfers	1.075.750.918	1.432.326.096	1.892.214.626	2.564.239.826	3.536.912.870	5.025.703.855
Other Current Revenues	773.598.833	819.299.678	861.217.345	928.616.802	1.019.064.971	1.151.884.738
CAPITAL REVENUE	1.915.178.931	2.582.903.538	2.993.441.804	3.469.279.539	4.020.805.053	4.660.059.384
Credit Operations	897.086.998	967.340.577	1.121.241.742	1.299.628.151	1.506.395.336	1.746.058.598
Sales of Assets	2.691.761	2.869.784	2.986.308	3.107.565	3.233.744	3.365.047
Loan Repayment	430.417	458.883	477.516	496.905	517.081	538.077
Capital Transfers	1.014.969.755	1.612.234.294	1.868.736.237	2.166.046.918	2.510.658.893	2.910.097.663
Other Capital Revenues	-	-	-	-	-	-
RPPS RESERVE	346.586.319	-	-	-	-	-
TOTAL	32.568.088.848	40.696.483.502	48.274.710.297	60.678.725.599	77.854.135.376	103.596.900.844
Current Net Revenue	26.833.486.913	32.244.685.888	37.374.724.747	43.320.938.365	50.213.177.850	58.201.953.258

Table 14 - Spreadsheet with Expenses and Revenue Surplus Projections (Consolidated Budget)

	PLAN	2017 - 2020	2021 - 2024	2025 - 2028	2029 - 2032
PUBLIC CONSUMPTION	Welfare	55.655.334,57	30.215.333,38	32.169.023,20	30.200.283,38
	Children and Teenagers	64.506.200,57	61.001.198,75	61.001.198,75	61.001.198,75
	Culture and Heritage	122.652.019,80	35.142.006,00	19.634.002,95	22.884.003,50
	Education	1.426.339.825,05	1.433.045.821,88	927.527.405,67	700.347.099,33
	Sports and Recreation	65.016.455,89	43.319.133,21	25.920.000,31	26.976.000,31
	Seniors	490.290.004,27	487.843.002,47	485.520.002,30	486.018.002,26
	Racial Equality	103.874.311,22	93.234.804,24	86.332.003,54	85.859.203,34
	Youth	224.052.480,26	355.217.074,60	504.593.074,93	544.007.075,11
	LGBT	33.376.042,64	5.658.040,62	5.658.040,62	5.658.040,62
	Women	34.492.446,45	27.894.646,45	27.894.646,45	27.874.646,45
	People with Disabilities	97.102.172,97	83.274.768,47	27.693.067,81	66.113.867,92
	Participation and Social Control	2.787.106,89	1.637.102,89	1.637.102,89	1.637.102,89
	Public Management Development ****	9.467.000,00	1.191.000,00	61.000,00	51.000,00
	Food and Nutrition Security*****	19.706.400,00	19.706.400,00	19.706.400,00	19.706.400,00
	Public Health	291.911.990,31	186.258.164,22	186.258.164,22	171.972.449,94
	Security	134.154.770,63	84.179.333,33	21.071.333,33	7.683.333,33
	PLANOS	**2017 - 2020**	**2021 - 2024**	**2025 - 2028**	**2029 - 2032**
PUBLIC INVESTMENT	Urban Agriculture	9.539.324,01	9.390.391,51	9.531.045,01	9.841.693,01
	Clothing Manufacturing	54.975.004,20	54.641.670,26	51.766.668,17	51.766.668,17
	Civil Construction	24.933.000,00	74.383.000,00	19.858.000,00	4.508.000,00
	Science, Technology & Innovation	107.366.666,67	76.400.000,00	62.975.000,00	52.100.000,00
	Creative Economy	126.433.000,00	125.863.000,00	125.773.000,00	125.773.000,00
	Sea Economy	23.692.400,00	6.396.400,00	125.000,00	125.000,00
	Energy*	652.328.905,27	154.377.005,27	154.572.205,27	154.377.005,27
	Environment	141.352.680,83	541.786.015,93	489.466.672,43	446.300.003,93
	Job Market	17.299.911,12	14.882.511,12	14.691.777,78	13.400.000,00
	New Industries	67.900.001,55	134.400.004,75	64.200.001,85	55.800.001,20
	Social Housing**	75.026.351,21	282.901.337,78	456.567.874,80	369.306.890,40
	Integrated Environmental Sanitation	36.524.203,35	213.524.219,69	21.000.000,19	21.000.000,19
	Water Security	178.780.272,72	17.035.272,72	13.035.272,72	11.035.272,72
	ITC	189.363.400,00	91.042.000,00	96.661.600,00	91.044.400,00
	Tourism	95.002.870,56	108.266.870,56	92.414.960,56	93.371.960,56
	Urban Planning***	3.419.367.737,55	4.151.140.065,05	4.832.399.565,05	5.463.341.179,22
	Land Regularisation	5.830.300,00	5.995.650,00	15.257.100,00	27.246.000,00
	CURRENT AND CAPITAL EXPENSES	8.401.100.590,57	9.011.243.245,14	8.952.972.210,80	9.248.326.781,78
	CURRENT REVENUE	30.652.909.916,72	38.113.579.964,40	45.281.268.492,80	57.209.446.060,64
	BALANCE	22.251.809.326,15 (Positive Balance)	29.102.336.719,26 (Positive Balance)	36.328.296.282,01 (Positive Balance)	47.961.119.278,86 (Positive Balance)
	ACCUMULATED BALANCE	22.251.809.326,15 (Positive Balance)	51.354.146.045,41 (Positive Balance)	87.682.442.327,42 (Positive Balance)	135.643.561.606,28 (Positive Balance)

2033 - 2036	2037 - 2040	TOTAL	%
32.169.023,20	28.231.543,56	208.640.541,28	1,327%
56.030.199,00	55.827.865,19	359.367.861,00	2,285%
17.484.002,50	16.814.002,25	234.610.037,00	1,492%
942.115.617,44	894.112.618,56	6.323.488.387,93	40,211%
21.274.500,31	22.171.999,51	204.678.089,56	1,302%
485.518.001,97	489.120.002,73	2.924.309.016,00	18,596%
85.859.203,34	85.859.203,34	541.018.729,00	3,440%
525.218.674,97	564.593.075,14	2.717.681.455,00	17,282%
5.658.040,62	5.658.040,62	61.666.245,72	0,392%
27.874.646,45	28.072.646,45	342.629.678,70	1,107%
66.113.867,92	66.113.867,92	406.411.613,00	2,584%
1.540.802,72	1.540.802,72	10.780.021,00	0,069%
48.000,00	48.000,00	10.866.000,00	0,069%
18.547.200,00	18.547.200,00	115.920.000,00	0,737%
167.686.735,65	167.686.735,65	1.171.774.240,00	7,451%
7.683.333,33	5.683.333,33	260.455.437,30	1,656%
	SUBTOTAL:	15.725.771.352,49	32,18%
2033 - 2036	**2037 - 2040**	**TOTAL**	**%**
7.022.834,01	7.436.591,51	52.761.879,04	0,159%
51.766.668,17	51.766.668,17	316.683.347,12	0,956%
3.758.000,00	3.758.000,00	131.198.000,00	0,396%
36.500.000,00	35.000.000,00	370.341.666,67	1,118%
125.773.000,00	125.773.000,00	755.388.000,00	2,280%
125.000,00	125.000,00	30.588.800,00	0,092%
154.501.605,27	154.352.005,27	1.424.508.731,63	4,299%
469.966.670,43	443.300.003,43	2.532.172.047,00	7,642%
11.196.000,00	11.142.000,00	82.612.200,02	0,249%
45.450.000,80	47.250.000,85	415.000.011,00	1,252%
203.402.243,72	126.213.765,17	1.513.418.463,08	4,567%
15.999.999,85	15.999.999,85	324.048.423,12	0,978%
11.035.272,72	11.035.272,72	241.956.636,32	0,730%
74.224.000,00	113.539.600,00	655.875.000,00	1,979%
70.967.960,56	66.891.960,56	526.916.583,34	1,590%
2.892.492.682,66	2.910.194.743,04	23.668.935.972,58	71,429%
26.214.600,00	13.314.900,00	93.858.550,00	0,283%
	SUBTOTAL:	33.136.264.310,92	67,82%
6.661.218.387,59	6.587.174.447,53	48.862.035.663,40	100%
73.833.330.322,76	98.936.841.459,53	344.027.376.216,86	
67.172.111.935,17 (Positive Balance)	92.349.667.012,00 (Positive Balance)	295.165.340.553,45 (Positive Balance)	
202.815.673.541,45 (Positive Balance)	295.165.340.553,45 (Positive Balance)		

Notes about the premises of Table 14:
(*) The Energy Plan values have a 10¨% contribution from Public Investment
(**) The municipal resources should cover, in the case of the Social Housing Plan - PLHIS, only the 15% contribution from Public Investment, with 85% cov ered by the State and Union.
(***) Only public investments - In the case of urban design works, we've considered contributions of 20% from the private sector, private investments in housing were not considered in this consolidation.
(****) Almost 90% of investments should be made with resources from the PNAFM (Union and International Organisms) Program, transferred to municipalities for the development of municipal public management.
(*****) Only one of these budget actions will be implemented with Municipal Treasury funds, all others will use resources from Union programs. Many actions have not yet been budgeted, as they need more detailing so that a thorough budget can be created.

Disclaimer:
The budgeted values include only new investments and additional expenses (payrolls, fixed costs, and other current expenses) stemming from incremental actions proposed by the many Fortaleza 2040 plans. In order to obtain the total budget, these values need to be complemented by expenses with personnel, current expenses, interests, repayments of previously entered loans, inversions, reserve funds, among other budget headings that relate to the administrative structure, public services and ongoing construction.

COST-BENEFITS ANALYSIS

Present day public administrations have some key problems that hamper manager's decision making process. With budgets increasingly restricted, and frequent demands coming from different segments of society, resources should be allocated in a way that yields greater profitability. From society's standpoint, as a municipal population, profitability should translate into a greater gain per invested currency unit.

Allocating budget resources for a specific public action necessarily indicates externalities, which may result in gains or losses for a sector of society that is indirectly involved in said action.

Within the Fortaleza 2040 Plan, a large set of actions was planned in such a way that, after investments for implementation and maintenance funding, they came to generate a set of direct benefits as well as positive and negative externalities. A comparative analysis of the positive and negative aspects derived from such plans was necessary to prove their viability.

Therefore, the selection and use of methods for monetary measurement and appraisal of public assets and actions became essential so that we could achieve a systemic understanding about the impacts brought on by these proposed public assets and actions.

Thus, six studies were undertaken for using Cost-Benefit Analysis (ACB) as a foundation for the decision-making process, they enabled us to:

- Compare the total volume of resources needed for implementing actions and their respective social benefits;
- Prove, monetarily, the social and economic convenience of these actions;

- Show society the social net return of the actions foreseen in the Plan, including the internalization of positive and negative externalities of each plan;
- Encourage the practice of identification and accounting of the economic costs and benefits in public policies, even if those are not immediately convertible into currency.

The ACB, understood in a macroeconomic sense, consists of the verification of the existence of a positive difference between the economic earnings and costs of the Fortaleza 2040 portfolio of projects from the standpoint of society as a whole.

The projects that were selected to undergo this analysis were:

- Recycling of solid urban waste;
- Improvement of urban mobility;
- Expansion of the city's vegetation coverage;
- Expansion of sanitary sewage;
- Reduction of criminality;
- Education improvement.

The Fortaleza 2040 participation groups, public managers and technical consultants diagnosed the problems of each of these themes, established a vision for the future and targets, made projections of each theme's evolution, and proposed a plan of action with a schedule and a budget. These plans are the starting point of the analysis developed.

On the annexed DVD there are details of the methodologies and calculation memory for each of the elaborated ACBs. The results and advantages obtained from investments are presented next.

ADVANTAGES OF RECYCLING SOLID URBAN WASTE

Table 15 summarizes the results for the Recycling ACB. We can see that the implementation, expansion and universalization of recycling activities, in place of Fortaleza's squandering and poor waste disposal, according to the premises detailed above, will yield at least R$ 3.1 billion (present value) in economic benefits between 2017 and 2040 with a total cost of R$ 1.0 billion in the same period. In other words, a Benefit/Cost ratio of 3.1, proving the project clearly is viable.

The chief economic benefits occur through the sale of recyclable and recycled materials (almost R$ 2.3 billion). It is also worth noticing the relevant benefit presented by the improvement of environmental quality, valued at R$ 470 million.

Among the costs, the largest share comes from processing costs related to recycling activities (R$ 488.9 million) and investments required during implementation (R$ 261.9 million). We should highlight the meaningful negative externalities related to high water consumption in a possible facility for converting waste into electric energy (R$ 108.3 million). This externality could be mitigated by the use of other technologies instead of the one selected for this study (gasification followed by combustion of the derived gas, generating energy through the Rankine cycle), which wouldn't require high water consumption.

ADVANTAGES OF IMPROVING URBAN MOBILITY

Table 15 summarizes the ACB results for the Fortaleza 2040 Mobility Plan. We can see that the expansion of mass transportation, instead of private transportation, according to the premises previously discussed, will bring at least R$ 6.9 billion (present value) in economic benefits between 2017 and 2040 after a cost total of 2.1 billion in the same period. In other words, a Benefit/Cost ratio of 3.2, proving the project is clearly viable. The chief economic benefits

Table 15 – ACB Results for Waste Recycling

DISCRIMINATION	PRESENT VALUES
BENEFITS TOTAL (R$/year)	**R$3,132,946,269.00**
Annual sales of Recyclable Material	R$947,616,958.00
Annual Sales of Recyclable Material + Energy	R$1,318,679,009.00
Prevented Use Of Water Resources	R$2,916,008.00
Prevented Use of Electric Energy	-
Costs Prevented with Environmental Control	-
Reduction of Morbidity and Mortality	R$48,535,881.00
Environmental Quality Gains	R$473,974,469.00
Job Generation Gains	R$285,513,192.00
Prevented Landfill Handling Costs	R$55,710,751.00
TOTAL OF COSTS (R$/year)	**R$1,019,746,325.00**
Implementation Investments for Recycling Enterprises	R$261,850,269.00
Investments and Costs for the Plan's Execution, Control, and Transmission	R$5,703,309.00
Increase in Costs for Selective Waste Collection	R$154,961,171.00
Water Consumption for Energy Generation from Solid Urban Waste	R$108,345,840.00
Recycling Operational Costs	R$488,885,737.00
TOTAL BENEFITS - COSTS (R$/year)	**R$2,113,199,943.00**
COST/BENEFITS RATIO	**R$3.07**

Source: Fortaleza 2040 Plan.

Table 16 – ACB Results for Mobility

DISCRIMINATION	PRESENT VALUES
BENEFITS TOTAL (R$/year)	**R$6,867,152,223.00**
Real Estate Value Increase (1)	R$3,444,640,728.00
Prevented Atmospheric Pollution Costs (2)	R$2,177,291.00
Prevented Accidents Cost (3)	R$1,012,608,682.00
Prevented Shortening Journey Time Costs (4)	R$1,039,684,260.00
Prevented Energy and Fuel Consumption Costs (5)	R$650,741,347.00
Prevented Operational Costs (6)	R$711,978,979.00
Carbon Credit	R$5,320,936.00
TOTAL OF COSTS (R$/year)	**R$2,120,304,000.00**
Fuel Consumption (tep) (8)	-
Energy Consumption (Mwh) (8)	-
System Maintenance (9)	R$475,361,626.00
Managing the Mass Transport Plan Costs (10)	-
Implementation Investments (11)	R$1,644,942,374.00
TOTAL BENEFITS - COSTS (R$/ano)	**R$4,746,848,223.00**
COST/BENEFITS RATIO	**R$3.24**

Source: Fortaleza 2040 Plan.

happen through increased real estate values across the area of influence (about R$ 3.4 billion), followed by economic earnings with the reduction of accidents and journey times (R$ 1 billion, each). Among the costs, the largest share comes from investments for the implementation of mass transport routes (R$ 1.6 billion in net present value). In the chart below, the cost for the new mass transport route's energy consumption are zero, because they have already been computed in the net balance of prevented costs that is included in Benefits.

ADVANTAGES OF THE EXPANSION OF THE CITY'S VEGETATION COVERAGE;

Table 17 summarizes the ACB results for the Fortaleza 2040 Vegetation Coverage. We see that the expansion of vegetation coverage, according to the premises previously discussed, will bring at least R$ 3.7 billion (present value) in economic benefits between 2017 and 2040, after a cost total of only R$ 256 million in that same period. In other words, a Benefit/Cost ratio of 14.6, proving the project clearly is viable.

ADVANTAGES OF THE EXPANSION OF SANITARY SEWAGE

Table 18 summarizes the result for the universalization of sanitary sewage in Fortaleza ACB We can see that universalization will bring around R$ 1.45 billion (present value) economic benefits between 2017 and 2040, after a cost total of R$ 899.7 million in the same period. In other words, a Benefit/Cost ratio of 1.6, proving the project clearly is viable.

Table 17 – ACB Results for Vegetation Cover

DISCRIMINATION	PRESENT VALUES
BENEFITS TOTAL (R$/year)	**R$3,748,911,195.00**
Increased Value of Vegetation Coverage (asset value. DAP)(1)	R$1,631,318,710.00
Real Estate Value Increase (2)	R$2,030,409,545.00
Prevented Energy Cost (cooling through vegetation coverage)(3)	R$79,712,767.00
Prevented Pollution Cost (4)	R$7,283,064.00
Carbon Credit(5)	R$187,109.00
TOTAL OF COSTS (R$/year)	**R$256,137,644.00**
Implementation Investment (6)	R$150,717,978.00
Increased Vegetation Coverage Costs and Maintenance(7)	R$57,863,546.00
Water Consumption (8)	R$47,556,120.00
Investments For Funding the Plan's Execution and Control (9)	-
TOTAL BENEFITS - COSTS (R$/year)	**R$3,492,773,551.00**
COST/BENEFITS RATIO	**R$14.64**

Source: Fortaleza 2040 Plan.

Table 18 – ACB Results for Sewer Systems

DISCRIMINATION	TOTAIS(2040)	PRESENT VALUES
% OF SUPPLIED POPULATION		
Total Population	3146711	2577268
Supplied Population	3145779	1293148
Non-Supplied Population	932	1284120
INCREASE IN SUPPLIED POPULATION (A)	**1,852,631**	**452**
TOTAL COSTS (R$1.00) (B)	**2,761,252,767**	**899,698,289**
Investments (increased in the period) (R$ 1.00)	1,909,210,368	684,931,312
Investment per Supplied Individual (R$ 1.00)	1.031	1.516
OAM(R$1,00)	852,042,399	214,766,977
OAM per supplied individual (R$1.00)	460	475
TOTAL BENEFITS (R$ 1.00)(C)	**6,262,147,803**	**1,452,138,784**
HEALTH		
Reduction Health Costs Per Capita (Supplied Individual)	2,87	2,00
Reduction of Health Costs	5,323,863.00	903,011.00
WORK PRODUCTIVITY		
Productivity gain per Supplied Formal Employment	5013,00	5132,00
Work Leave	74,618,030	12,936,414
Income	3,955,550,873	915,937,151
School Performance	753,769,298	174,540,873
URBAN ECONOMY		
Real Estate Value Increase	1,010,803,993	236,555,630
Real Estate Value Increase per Supplied Neighborhood	2789.00	2695.00
Tourism Income	462,081,746	111,265,705
Tourism Income per Supplied Formal Job	11,699	11,164
LIQUID BENEFIT (R$ 1.00) (D) = (C) – (B)	**3,500,895,036**	**552,440,495**
NET BENEFIT (R$ 1.00) PER SUPPLIED INDIVIDUAL (E) = (D) – (A)	1,890	1,222
BENEFIT/COST RATIO (F) = (C) / (B)	2,27	1,61
INTERNAL RATE OF RETURN (%)	**0.43**	

Source: Fortaleza 2040 Plan.

These results indicate that every R$ 1.00 invested in the universalization of sewage collection in Fortaleza will yield a benefit of R$ 1.61.

The NPV of R$ 552.4 million corresponds to the social net profit for society after we have deducted all the investments for the universalization of sanitary sewage required. This social net profit represents a return of R$ 1.222 per supplied individual.

ADVANTAGES OF REDUCTION OF CRIMINALITY

The global incremental cost of violence in Fortaleza has been estimated at about R$ 5.5 billion, which corresponds to the difference of current violence costs (present value) in the vision for the future scenario (R$ 23.3 billion) and the trend scenario (R$ 17.8 billion). The estimated value of R$ 5.5 billion represents society's gains with criminality reduction,

if the targets for the Fortaleza 2040 plan are met.

The number of lives saved is 20,303, around 846 lives/year, calculating the different between the vision for the future scenario and the trend scenario. The costs of violence in relation to GDP represented 5,6% in 2015, while in 2040 they would represent 0.4% in the vision for the future scenario and 2.4% in the trend scenario.

Table 19 – ACB Results for Crime Decline

VIOLENCE SOCIAL COSTS	PRESENT VALUES
Scenario (Vision for the Future)	
PUBLIC SECTOR	
Public Security	R$4,591,088,783.00
Prison System	R$474,940,219.00
Health System	R$1,899,760,876.00
TOTAL PUBLIC SECTOR COSTS	**R$6,965,789,878.00**
PRIVATE SECTOR	
Loss of Human Capital	R$4,274,461,970.00
Security	R$2,533,014,501.00
Insurances	R$2,374,701,095.00
Transfers due to Theft or Robbery	R$1,678,122,107.00
TOTAL PUBLIC SECTOR COSTS	**R$10,860,299,673.00**
TOTAL VIOLENCE COST	**R$17,826,089,551.00**
% OF TOTAL VIOLENCE COST IN RELATION TO GDP	3.2%
COST OF VIOLENCE PER CAPITA	R$738.93
Scenario (Scenario D)	
PUBLIC SECTOR	
Public Security	R$6,010,409,275.00
Prison System	R$621,766,477.00
Health System	R$2,487,065,907.00
TOTAL PUBLIC SECTOR COST	R$9,119,241,659.00
PRIVATE SECTOR	
Loss of Human Capital	R$5,595,898,291.00
Security	R$3,316,087,876.00
Insurances	R$3,108,832,384.00
Transfers due to Theft or Robbery	R$2,196,908,218.00
TOTAL PUBLIC SECTOR COST	**R$14,217,726,769.00**
TOTAL VIOLENCE COST	**R$23,336,968,428.00**
% OF TOTAL VIOLENCE COST IN RELATION TO GDP	4.5%
COST OF VIOLENCE PER CAPITA	R$967.36
HOMICIDES DIFFERENTIAL (C) = (A) – (B)	R$20,303.00
NET BENEFIT (R$1.00) (D) = (C) – (B)	R$5,510,878,877.00
NET BENEFIT IN RELATION TO GDP (%)	1%
NET BENEFIT (R$ 1,00) PER SUPPLIED INDIVIDUAL (E) = (D) / (A)	R$271.43

Source: Fortaleza 2040 Plan.

ADVANTAGES OF IMPROVEMENT IN EDUCATION

The estimated value of R$ 5.9 billion represents society's gains with an improvement of Education if the targets for the Fortaleza 2040 plan are met. We should consider that such benefits are downplayed, as we did not consider the spillover effect of more qualified workers and job market players, contributing to a further social capital increase in the economy of Fortaleza.

We can therefore consider that it is socially viable to make investments of over R$ 6 billion for improving Fortaleza's quality of education.

Table 20 – ACB Results for Education Improvement

DISCRIMINATION	PRESENT VALUES
BENEFITS TOTAL (R$/year)	R$5,954,433,478.00
Effects of Preschool Education (propensity to paying for this service)	R$3,880,295,736.00
Effects of Elementary School on the Job Market (Quality of Teaching)	R$58,351,266.00
Effects of Elementary School on the Job Market (Age/Grade Distortion)	R$1,478,179,400.00
Indirect effects of Elementary School	R$537,607,076.00
TOTAL OF COSTS (R$/year)	**R$0.00**
Action: 3,2,1, Reconceptualization of Municipal Teaching Institutions	-
Action: 3,2,1, Development of Early Childhood Education	-
Action: 3,2,3, Development of Elementary School I and II	-
Action: 3,2,4 Development of Regular and Professional High Schools	-
Action: 3,2,5 Development of Education for Youths and Adults (EJA)	-
Action 3,2,6 Democratic and Participative Management and Appreciation of Professionals	-
BENEFITS TOTAL – COSTS (R$/year)	**R$5,954,433,478.00**

Source: Fortaleza 2040 Plan.

CHAPTER 8

GOVERNANCE IN THE FORTALEZA 2040 PLAN

Ensuring that the Fortaleza 2040 Plan would be taken into consideration and adhered to for the next six municipal administrations was one of the chief concerns shared by thousands of people who participated in the formulation process. It's only natural, since dozens of plans are elaborated for Fortaleza, but very few are carried through. There is not a culture of planning, or even continuity between one administration and the next - generally they are more concerned with advancing their own political marketing than advancing the city itself. Next we present the proposed Municipal Governance System, in which two specific strategies are used which have been designed to ensure the implementation of the Fortaleza 2040 Plan.

The first one, aimed at the municipal executive environment, relates to the organizational structure and management process, composed by the Project Management Office and the Project Management Hubs (in a network), which are supported by the ensemble of Sectoral Councils and Commissions. In the second strategy, outside of the municipal executive environment, although supported by it, we make use of the City Observatory, an institution responsible for promoting control by society and participation in the Fortaleza 2040 Plan, as it is not a government plan - it is a social plan. Both of these complementary strategies are presented in further detail.

As we have detailed in the first chapters, the Fortaleza 2040 Plan is formed of dozens of plans organized into seven strategic axes. This set of plans is made up of hundreds of actions, programs, projects, and interventions which will be considered in future government plans for the next six municipal executive administrations, as they will also be taken into account by the Master Plan and the Land Use and Occupation Act as they are updated. Before they are implemented, all of these actions will need to be detailed into executive projects and budgets, the required funds must be raised, and they must be adjusted to the new contexts that might arise over the course of the coming 24 years. The plans must be monitored and, above all, their results must be evaluated, so the government, as

much as society can transform the city into The Fortaleza that We Want (vision for the future and its respective targets).

The implementation of the Fortaleza 2040 Plan requires not only the two specific strategies we've mentioned, but chiefly the development of a new and productive Municipal Governance System, in which it is fundamental for all players involved (stakeholders) to have clearly defined roles, that involve not only not normative definitions of duties and rights, but also regulations and procedures, transparency in actions, responsibility and accountability, ways to interact, follow up, control, keep and review public and private behavior so as to promote health, quality of urban life and the commom good.

The municipal governance system proposed by the Municipal Governance axis is totally devoted to and reinforces the governance of the Fortaleza 2040 Plan. The model presented here was debated and agreed on after several meetings and workshops that had the participation of representatives from several social segments, public servants, hired consultants, and inhabitants from different neighborhoods in regional meetings.

As such, we propose the City Governance System as a set of connected public instruments, based on its own set of principles, coordinated by specific entities whose job it is to ensure citizen participation and effective control by society in the decision making process regarding the city and proposed by the Plan.

Finally, the system should ensure participation and control by society:

a) during the monitoring and evaluation:

- of public policies;
- of the functioning and improvement in the quality of services;
- of the effectiveness and allocative efficiency of public resources;
- of the effectiveness and commitment of public servants;
- of the plan and the governance system.

b) in the (re)formulation of public policies;

c) in the construction of the citizen's co-responsibility in transforming the city.

The definition of public state and non-state behavior and the creation and strengthening of public spaces for participation and control are key in the fight against corruption and clientelism in the management of public affairs in line with the previsions made by the Fortaleza Master Plan.

The system of governance will aid the public authorities and society in reducing inequality, social integration, and the much needed construction of a sense of belonging, which encourages citizens to defend and care for the city's space.

GOVERNANCE PLAN CHARTER OF PRINCIPLES

With a view to bringing dignity to people (art. 1, III, FC/88), the eradication of marginalization and of social and regional inequalities, (3, III, FC/88), right to the city (art. 182, FC/88), the urban-regional processes of planning and management stemming from the Fortaleza 2040 Plan should be guided by the following governance principles:

- Respect of democratic and republican participation;
- Promotion of citizenship;
- Prioritization of vulnerable territories;
- Mechanisms that assure equity and participation;

- Transparency;
- Legality and ethics;
- Integration and an inter-sectoral approach
- Communication and dialogue;
- Assured social expression;
- Production and sharing of knowledge;
- Shared, efficient and effective administration;
- Clearly defined responsibilities and procedures;

Such principles, when applied to governance, represent the core of each action that will be set into practice according to the Fortaleza 2040 Plan, and is connected to federal, state, and municipal legislative provisions. Governance, as it is understood by this chosen set of principles, incorporates politics into urban development debates, going beyond a definition that is centered on governmental efficiency attained through adjustment programs, so it can be understood as centered on society, on the idea of political mediation, based on the advancement of citizenship, democracy, equality, with special attention to vulnerable territories.

DESCRIPTION OF THE MUNICIPAL GOVERNANCE SYSTEM

The Fortaleza 2040 Plan's governance system stems from a methodology that respects the classification of strategic axes defined by the Municipality, organized into sets of goals that stand for the chief long and mid-term results that society should pursue. The city's governance is linked to the "Municipal Governance" axis and as its structure is born from the following references:

- Territorial governance
- Institutional governance
- Control and participation
- Legal governance.

TERRITORIAL GOVERNANCE

Territorial governance is linked to acknowledging the city as a system composed of territories within a social construction that should be supported by cooperation and reciprocity. In order to ensure this it is fundamental to create instances that coordinate the government, civil society, and private sectors from various territories.

Iplanfor – the entity responsible for monitoring the Fortaleza 2040 Plan – should also establish procedures for the elaboration and updating of the descriptive territorial map, in which areas with urban, social, environmental, and economic vulnerabilities are highlighted. They should have enough descriptions and markers to support proactive decisions and actions from the municipality, as well as control practiced by citizens. In light of this, and as a way of ensuring governance that seeks to effectively observe the system's functions that have the duty of monitoring decision making and actions that are to be implemented, we recommend that:

a) A territorial delimitation of the defined areas of the municipality are undertaken, ensuring the broad participation of vulnerable territories, as well as keeping a descriptive and updated map of territories, objective markers for progress and setbacks, especially in areas with social, urban, environmental, and economic vulnerabilities.

b) The amount of time between information updates is established, so that the decision-making process can engage specialists from the areas dealt with by the Plan, as well as public servants and citizens,based on the body housed at the City Observatory, as well as Sectoral Councils coordinated by Iplanfor along with the agencies that manage the different public policies involved.

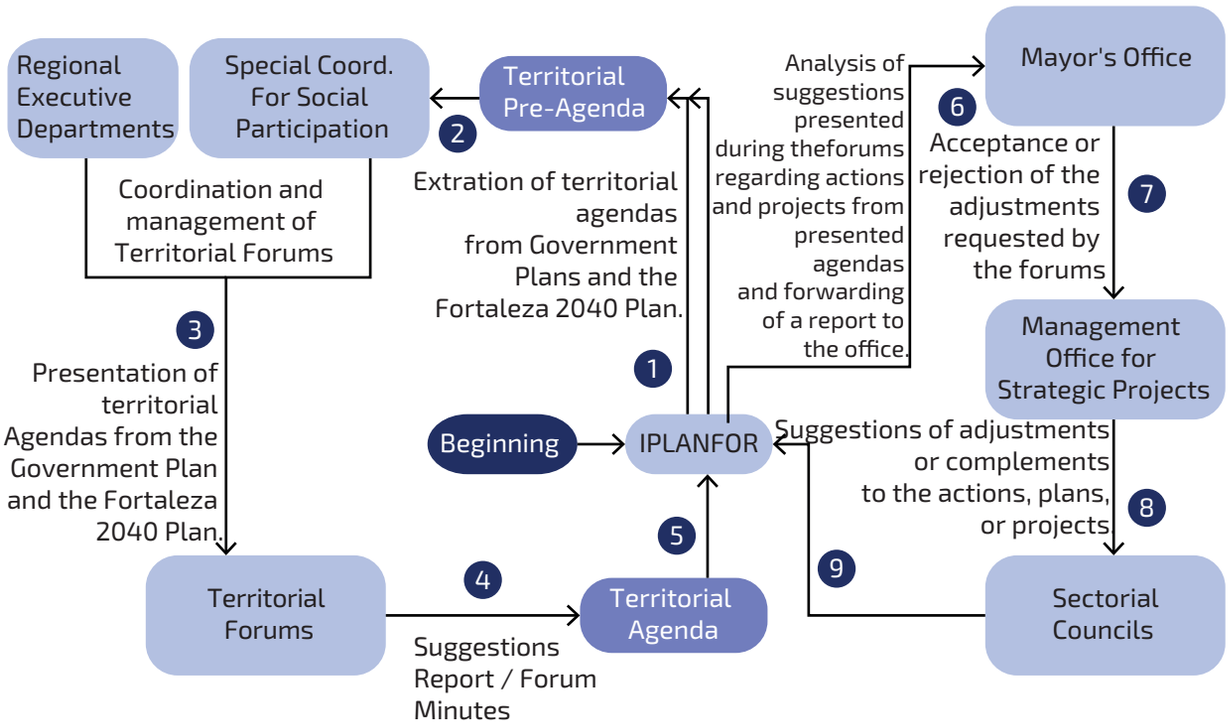
c) That a unique system for social participation that respects territoriality and its singularities is defined, creating and (or) perfecting the territorial participative bodies, so that we guarantee a conversation-based relationship between public authorities, the management of the Fortaleza 2040 Plan, society, and the City Observatory (Territorial Forums and the Inter-municipal Council).

d) As well as the existing instruments, spaces for expression, communication, dialog, and mediation, be established including newly available technologies, such as:

- Community Radios - they must be considered as spaces for expression and their programming should be based on the (re)definition of territories, as they could be managed by skilled people within the community as hired service providers, monitored by equally qualified public servants;
- Websites and Apps - essential tools for a city that hopes to be connected, using simple, approachable language that delivers information needed for monitoring the actions of municipal authorities. We suggest that we should follow in the footsteps of the communication system developed by Curitiba City Hall, based in Facebook and called Prefs;
- Territorial Forums and Committees - integration should also happen through territorial representation, by means of stimulating participation in forums and committees aiming to assure their space in the definition, elaboration, and execution of public policies. Within this perspective, a new division of the city into Regions should be debated, comprehending territories with an identity and an average of 250 thousand inhabitants that would lead to the establishment of Territorial Forums - bodies open to the community's participation in each territory, with the purpose of analyzing and debating the proposed territorial agendas (that would be created by Iplanfor from the several Fortaleza 2040 plans and the Government Plan), as well as taking the problems of their territories into their own hands and proposing solutions for them. This would make it possible to expand social control by the population of Fortaleza;
- Inter-territorial Forums - an instrument used for communication between territories that can aid the authorities in executing and maintaining their services, as well as identifying the need for new public policies;
- Mediation committees - these should be created so consensus can be reached on dissent concerning territorial issues, the provision of public services, the conservation of public infrastructure and environmental protection, and the relationship between the government and the population, among others.

The construction and reconstruction of the city should happen through participation - for this purpose we need to innovate in respect to the relations between State and society. We also demand respect for the old/new management mechanisms, which will enable the co-creation and co-management of public policies and implementation. The feedback received during the Territorial Forums should travel back to the higher levels of the municipal executive, as it can change the strategies adopted. In Figure 43 we see a suggestion for the organization of this procedure.

Figure 43 – Procedure for the participation in Territorial Forums



Source: Fortaleza 2040 Plan.

INSTITUTIONAL GOVERNANCE

The institutional structure has a prevalent role in the governance system, since a municipality needs to be qualified in order to guarantee the relationship that will be established between all actors involved, be they the Plan's managers, guardians, or society as a whole - identified by citizens and private initiative per se - and eventual partners, such as universities, research institutes, among others.

The concerns of citizens have intrinsic value and should be considered by themselves and as part of a notion of the common good, and not merely as instruments for catering to the interests of individuals or the market. The municipality's job is promoting the public interest and, as such, public management should observe constitutional principles, among them that of impersonality (isonomy), publicity (transparency), and efficiency (efficacy and effectiveness), as well as assure social participation, in line with the 1988 constitutional text (CASIMIRO, 2003). In other words, the Municipal Public Management of Fortaleza should be based on democratic, transparent, communicative, and participative management.

Governance and Iplanfor

In order to guarantee the Fortaleza 2040 Plan's effective governance, it is necessary to define Iplanflor, institutionally, as the Plan's manager, implying its strengthening with the establishment of a staff of career civil servants, duties, rights and responsibilities, institutionalizing Fortaleza 2040's governance system.

In order to manage the Plan's implementation, Iplanfor should institute an internal organ similar to an office for managing strategic projects. It would monitor the several sectoral councils that will hold the institutions responsible for carrying out the actions prescribed in several related plans, enabling it to support the relationship between the municipality, the citizens and the private sector, guide the project managing offices of each Sectoral Council, as well as support the Plan's new guardian body, that will be created and named the City Observatory.

It should also house meetings for a commission formed of City Hall career civil servants (Planning Network) that are linked to the thematic actions addressed in the Fortaleza 2040 Plan and the Government Plan, as well as employees of the institute itself, who act as a line of communication between the Plan and the municipality. Iplanfor should establish a management committee, to be elected from among the City Council representatives (whose composition will go through a reformulation) to closely monitor Fortaleza 2040's actions and results, as well as presenting results attained during City Council meetings.

The Municipality should use the structure that is already in place for the Public Communication System, implementing transparency through public and institutional communication that goes beyond mere advertising.

Governance and the City Observatory

The system should also rely on the creation of the City Observatory, in Fortaleza, to create more self-awareness of the city so that it can transform. The City Observatory should be the Fortaleza 2040 Plan's guardian, having a decisive role in the monitoring of public policies that relate to the Fortaleza 2040 Plan and other actions in the city that directly impact the targets established by the Fortaleza 2040 Plan.

The Municipality should acknowledge the Observatory as an important tool for controlling actions linked to the Plan. Its attributes, as well as autonomy and organizational structure should be defined in relation to the plan, including its capacity to review the Plan and the governance system at intervals to be objectively defined.

The Observatory's organizational structure, as well as definitions regarding its legal personality, should be formalized so it can be incorporated into the Fortaleza 2040 Plan as a body for dialogue. Its structuring should guarantee monitoring, control, social participation, and communication with Iplanfor, the Municipality and Fortaleza's society.

Governance and Public Municipal Management

It is necessary to submit the governance system to an institutionalization with respect to Municipal Management themes, grouping the advised actions and plans, as well as incorporating the social participation system while favoring the territorial issue, as has been suggested, in order to guarantee social control by the population through the decentralization of public decisions.

Fortaleza's City Hall needs to restructure and reinforce within its administrative environment the sector that hosts the governance system. We need

to create a culture of governance and deliberative municipal public administration committed to the Fortaleza 2040 Plan. Having that in mind, it becomes necessary to establish training and qualification courses for public agents, with a view to strengthening public administration through a process that may end up transforming institutions as they are and promoting the rescue and appreciation of the public servant's role in fulfilling their public duty, within the context of bureaucracy and deliberative public administration, as a way of facing the growing social demands.

The governance system should be geared towards assuring that the Fortaleza 2040 Plan actions are set into motion and are characterized by maximum participation and control by society. A system that involves communication, information, and qualification of social actors will enable successful monitoring of the Plan as it acknowledges the dynamics of the city that are part of both static and variable issues, of interests, dissent and consensus. This also involves the daily practices of public communication and information, strengthening the Municipality through the possibility of a dialog (PERDIGÃO, 2015) that should encourage society to be not only the recipient of public actions, but also responsible for the continuity of assets, infrastructure, and services that are at their disposal.

GOVERNANCE OF PARTICIPATION AND CONTROL BY SOCIETY

It is necessary to establish a social participation policy for the Fortaleza 2040 Plan in which these processes engage communities and their territories, encouraging an ever-growing number of leaders and citizens interested in its deliberations. The participation of all people in debates about general and specific topics should recognize conflicts, creating contributions and supporting solutions as well as answering social demands. It is therefore necessary:

- To formally create a SOCIAL PARTICIPATION SYSTEM based on already existing instruments, organizing them so they can be acknowledged by citizens and by the Municipal Public Administration as a whole, in a transparent and intelligible manner, establishing, if needs be, duties and deadlines for responses by the Public Administration.
- To recreate and encourage the preservation of alliances, networks, and social pacts, considering the territories, their interests and characteristics, including private initiatives, the municipality, the Plan's managers and guardians, alongside citizens. Networks - instruments for integrations and inter-sectoral affairs - could be established from already existing themes and public policies, such as Children and Teenagers, Health, Education, Environment, City. These would form connections through cross-sections, creating links between regions of the city, including Fortaleza's metropolitan region. These alliances could also happen around extraordinary topics that need urgent answers, such as programs for the eradication of the mosquito that transmits dengue-fever, forging relations between public agents and social and economic leaderships. Social pacts, closely linked to the idea of an alliance, should be built to ensure the permanence of actions that can prevent steps backwards on social vulnerabilities related to public security and the environment, for instance.

- To create and strengthen the system for monitoring and evaluating the Plan's goals and targets by means of commissions, forums and competent bodies, based on previously determined markers, especially those that assess progress and setbacks. Monitoring instruments should be linked to the City Observatory, with objective parameters for comparison, and criteria based on specific and widely accessible regulations.
- To ensure social participation, by territories, in the process of formulation, regulation,and implementation of policies for universalizing basic public services through forums, commissions or councils specially designed for this purpose.
- To create and structure a body linked to the Plan's guardian, charged with establishing a link between the municipal government, the Plan's administrative entity, and society. This body would be based at the City Observatory to ensure the effective functioning of the participation system.
- To guarantee the integration of the population - based on territorial definitions - into the municipality's administrative process, making them more transparent and accessible.
- To establish, in the Municipality, a program of short courses and (or) meetings with budget related topics, particularly concerning short, mid and long-term demands.
- To create participation and control by society throughout all of the following stages: formulation, regulation, implementation, monitoring, and evaluation of public policies and their targets and goals.
- To refine multipartite, equal and fair representation in collegiate bodies by means of a system that boosts minority participation, especially in regard to the control of the Plan's actions.
- To invest in the strengthening of governance culture by means of actions linked to training in vulnerable municipal territories, seeking active participation in the monitoring of the Plan.
- To boost participation by means of short and medium duration courses, debates, and periodic discussion forums, under the responsibility of the municipality and the entity charged with the Plan's managment and control.
- To establish a Communication and Information System with communication, expression, dialog, and mediation channels that validate the Plan's decisions and actions by means of already existing community radios, territorial forums, thematic committees with territorial representivity, in order to foster a governance culture within society.

LEGAL GOVERNANCE

Legal governance has to do, in short, with compliance with article 37 of the FC/1988, as well as the constitutional provisions that determine the behavior of federation bodies in regards to the elaboration of public policies, provision of services, and urban interventions that deal with the promotion and protection of rights, allowing and acknowledging citizen participation as interlocutors and controllers of all of these public behaviors. It is therefore necessary to regulate these tools of dialog with society and incorporate them into the Municipality's legal system as they are a procedural

stage in the process of public decision making.

The Fortaleza Master Plan - supplementary law 062, from February 2, 2009 - is the basic instrument behind the Municipality's urban policy and it is integrated in the municipal planning system. Its revision/update is fundamental so that the directives of the Fortaleza 2040 Plan can be executed.

In order to promote the Plan's effectiveness, it is necessary that the municipal legal system formally incorporates the suggested Governance System, based on the formal conception given by the Master Plan's previsions, thus assuring compliance with the goals that have been defined alongside the population, including the Participation and Social Control System, as well as the Public Communication and Information System.

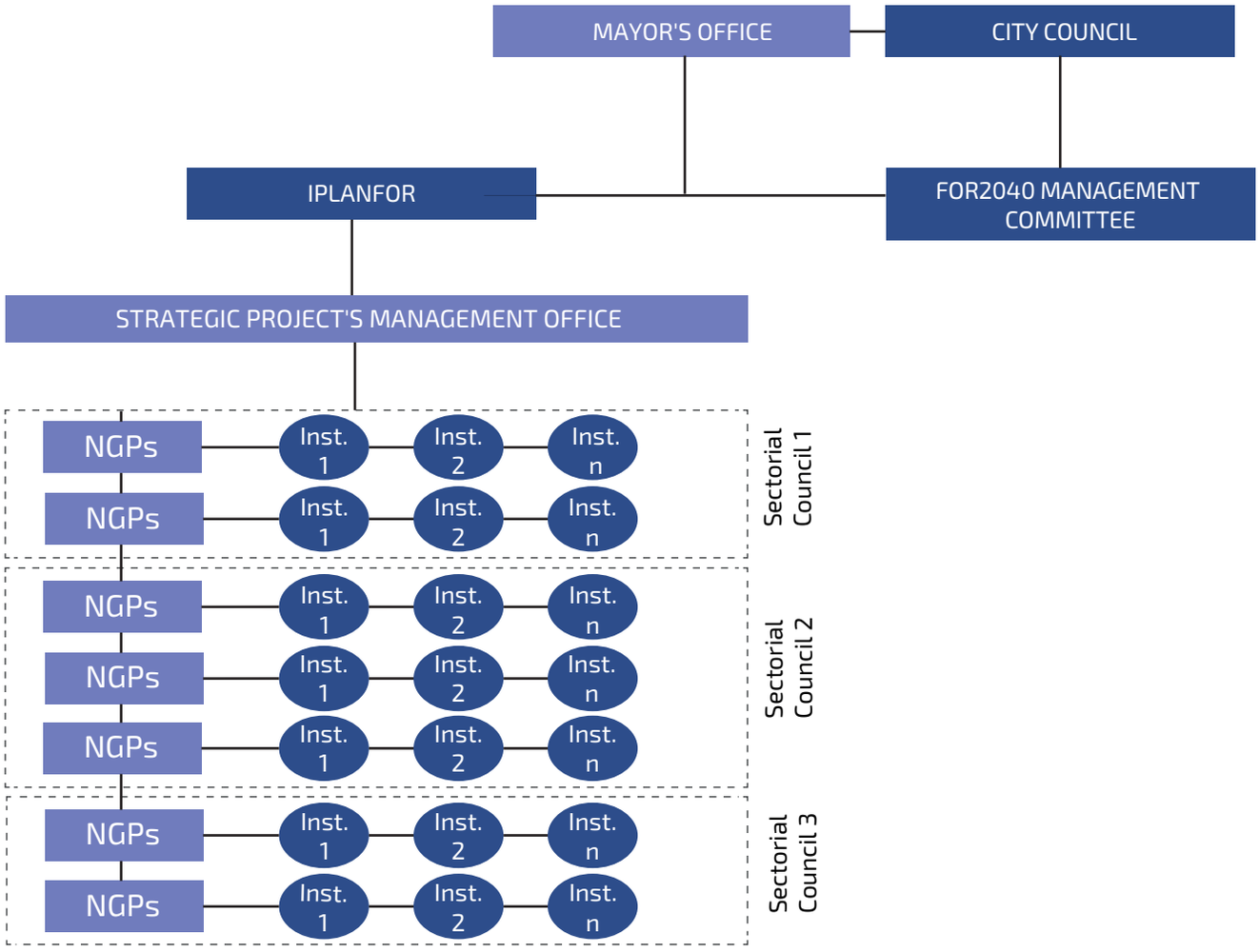
The following things need to take place:

- A comparison between the normative provisions related to municipal urban management, particularly Law n° 062/2009 of the Master Plan along with the Fortaleza 2040 Plan;
- The identification and regulation of the Plan's management, monitoring, and control bodies, at Iplanfor, with the objective definition of their roles, including their ability to participate in inter-sectoral budget planning;
- The formal definition of the function of the City Observatory as it relates to the Fortaleza 2040 Plan;
- The formalization and (or) regulation of the Participation and Social Control System with the definition of its mechanisms, unifying its instruments, thus assuring their effectiveness and transparency;
- The institutionalization of the Fortaleza 2040 Plan, of the Master Urban and Mobility Plan as a guiding document in the process of updating/reviewing the Master Plan. Also, the institutionalization of the Economic and Social Development Plan, the Urban Mobility Plan, the Subsidized Housing Plan and all other specific plans for each public policy, whose law drafts, amendments to the Organic Law and proposed decrees can be found in the annexed DVD;
- To perform a review, and posterior regulation, of the structuring and procedural system of territorial planning instruments as well as those for social participation. This should take into account the Governance System's charter of principles and the normative provisions about the guarantee of Right to the City.

ORGANIZATIONAL STRUCTURE OF THE FORTALEZA 2040'S GOVERNANCE SYSTEM

As we have mentioned, within the scope of the proposed Municipal Governance System there are two strategies strictly related to the governance of the Fortaleza 2040 Plan. The following diagram represents a summarized view of the organizational structure of the governance system proposed by the Fortaleza 2040 Plan, in which Iplanfor (an authority linked to the Mayor's office, with the mission of promoting strategic alignment and institution of a planning and management-by-results culture) is charged with articulating, enabling and monitoring the various strategic project management hubs of each Sectoral Council, as well as coordinating the participative process of updating and adjusting the Fortaleza 2040 Plan every four months. It's also responsible for aligning the governmental plans, Master Plan, and sectoral plans to the city's strategic development plan;

Figure 44 – Organizational Structure of the Fortaleza 2040 Plan's Governance System



Source: Fortaleza 2040 Plan.

NGPs - Project Management Hubs

Inst. - Agencies, entities, and institutions responsible for the actions that integrate the plans the Sectoral Council will manage.

ATTRIBUTIONS OF EACH INSTANCE IN THE ORGANIZATIONAL STRUCTURE OF THE FORTALEZA 2040'S GOVERNANCE SYSTEM

Chart 2 – Duties of each instance of the organizational structure of the governance system

INSTANCE	ATTRIBUTIONS	STAFF OR CONFIGURATION
Iplanfor	• To manage, follow up with the Sectoral Councils, monitor, and evaluate results by means of the Governance Observatory, coordinate the review processes for the Fortaleza 2040 Plan. • Coordinate the Project Offices and the hubs for project management, with the Iplanfor team offering support to several Sectoral Councils. • To be the City Council's and the Plan Management Committee's secretary. • To back the actions of the City Observatory. • To elaborate territorial agendas.	Multidisciplinary team (Environment, Economy, Urban Design, Mobility, Social Sciences, Communication, Public Managements, Geography, etc.)
City Council	• To monitor the implementation of the Fortaleza 2040 Plan.	Composition is defined by the Creation Law (to be reformulated)
Fortaleza 2040 Plan Managing Committee	• To monitor the Plan's execution.	Tripartite Representation: Public sector, productive sector, and Civil Society.
Sectoral Councils	• To integrate the institutions responsible for the execution of the actions of each plan or set of plans, as well as monitoring the execution and result markers	Representatives from institutions responsible for the actions of each plan. Territorial Representatives and Council Representatives
Thematic and Sectoral Commissions	• To support sectoral chambers in the coordination of specific actions	Technicians from institutions responsible for the actions of each plan.
Project Management Hubs	• To serve the Councils and involved agencies with the management of the strategic projects contained in the plans (more complex projects and plans)	Technicians specialized in Project Management) (Iplanfor)
City Observatory	• To monitor progress. • Produce informations. • Promote control by society.	Multidisciplinary technical team hired by means of a project coordinated with the Astef or FCPC, complemented by professors and scholarship holders (UFC)
Fortaleza 2040 Plan Council - City Observatory	• To articulate and exercise due control by society over the Fortaleza 2040 Plan.	Composed according to the Observatory's Statute.

Source: Fortaleza 2040 Plan.

RELATIONSHIP BETWEEN THE PLANS AND THE SECTORAL COUNCILS

Below we suggest the organization of Sectoral Councils and some Commissions (outcomes from the Sectoral Councils). The "RT" abbreviation used indicates the instances in which require the presence of representatives from Forums or Territorial Councils (to be instituted), as well as agencies or public/ private entities that should compose each Council, listed in Annex I of the present document (matrix with institutions responsible for the implementation of each plan's actions), and known specialists to be identified and invited.

a) SOCIAL HOUSING AND LAND REGULARISATION COUNCIL

Council Coordination: Habitafor (RT)

- SUBSIDIZED HOUSING PLAN
- LAND REGULATIONS PLAN

b) PRODUCTIVE INTEGRATION COUNCIL - Council Coordination: Setra (RT)

- PRODUCTIVE INTEGRATION AND ENTREPRENEURSHIP PLAN

c) CITIZEN SECURITY COUNCIL

Council Coordination: Sesec (RT)

- CITIZEN SECURITY AND PEACE CULTURE PLAN

d) URBAN DEVELOPMENT AND MOBILITY COUNCIL

Council Coordination: Iplanfor/Sub-coordination: Seuma and SCSP (RT)

- URBAN AND MOBILITY MASTER PLAN
- URBAN MOBILITY AND ACCESSIBILITY PLAN

e) HEALTH COUNCIL - Council Coordination: SMS

- HEALTH PLAN

f) SPORTS AND RECREATION COUNCIL - Council Coordination: Secel (RT)

- SPORTS AND RECREATION PLAN

g) WELFARE AND FOOD SECURITY

- COUNCIL - Council Coordination: Setra
- FOOD AND NUTRITIONAL SECURITY PLAN
- WELFARE PLAN

h) HUMAN, CHILDREN AND TEENAGER RIGHTS COUNCIL

Council Coordination: SCDH (RT)

- RACIAL EQUALITY PLAN

  Racial Equality Commission (Sub-coordination: Racial Equality Coordinator)
- LGBT RIGHTS PROMOTION PLAN

  LGBT Commission (Sub-coordination:

  LGBT Coordinator)
- WOMEN'S PLAN

  Women's Commission (Sub-coordination: Women's coordinator)
- SENIOR'S PLAN

  Senior's Commission (Sub-coordination: Senior's Coordinator)
- PEOPLE WITH DISABILITIES RIGHTS PROMOTION PLAN

  People with Disabilities Commission (Sub-coordination: Coordinator for People with Disabilities)
- YOUTH PLAN

  Youth Commission (Sub-coordinator: Youth Coordinator)
- CHILDREN AND TEENAGER'S PLAN

  Children and Teenager's Commission (Sub-coordination: Funci)

i) EDUCATION COUNCIL and CTI - Council

Coordination: SME

- EDUCATION PLAN

  Early Childhood Education Commission (Sub-Coordination: SME)

  Elementary School Commission (Sub-coordination: SME)

  High-school and Vocational Training (Sub-coordination: Seduc)

- SCIENCE, TECHNOLOGY, AND INNOVATION PLAN

  Higher Learning, Science, Technology

  and Innovation Commission

  (Sub-coordination: Citinova)

j) CULTURE AND HERITAGE COUNCIL

Council Coordination: Secultfor (RT)

- CULTURE AND HERITAGE PLAN

k) ENVIRONMENT, SANITATION, ENERGY, AND WATER COUNCIL - Council Coordination: Seuma (RT)

- ENVIRONMENT AND SANITATION PLAN
- WATER SECURITY PLAN
- RENEWABLE ENERGY AND ENERGY EFFICIENCY PLAN

l) ECONOMIC DEVELOPMENT COUNCIL

Council Coordination: SDE

- CLOTHING MANUFACTURING PLAN

  Clothing Manufacturing Commission (Sub-coordination: SDE)

- NEW INDUSTRIES AND ADVANCED SERVICES PLAN

  Comissão de Novas Indústrias e Serviços Avançados (Subcoordenação: SDE)

- CIVIL CONSTRUCTION PLAN

  Civil Construction Commission (Sub-coordination: SDE)

- CREATIVE ECONOMY PLAN

  Creative Economy Commission (Sub-coordination: SDE)

- SEA ECONOMY PLAN

  Marine Economy Commission (Sub-coordination: SDE)

- URBAN AGRICULTURE PLAN

  Urban Agriculture Commission (Sub-coordination: SDE)

m) INFORMATION AND COMMUNICATION TECHNOLOGY COUNCIL

Council Coordination: Citinova

- INFORMATION AND COMMUNICATION TECHNOLOGY PLAN

n) TOURISM COUNCIL

Council Coordination: Setfor

- TOURISM PLAN

o) PUBLIC GOVERNANCE AND SOCIAL n PARTICIPATION COUNCIL

Council Coordination: Sepog

- PUBLIC MUNICIPAL MANAGEMENT DEVELOPMENT PLAN

  Public Management Development Commission (Sub-coordination: Sepog)

  Fiscal Management Commission (Sub-coordination: Sefin)

  Municipal Management of Social Security Council (Sub-coordination: Sepog)

  Management of Information and Knowledge Commission (Sub-coordination: Sepog or Citinova)

Administrative Reform Commission (Sub-coordination: Sepog)

Commission of Institutionalization and Updating of legal landmarks (Sub-coordination: PGM)

- PARTICIPATION AND CONTROL BY SOCIETY OF THE PUBLIC MUNICIPAL MANAGEMENT PLAN

  Participation and Social Control Commission - Council Coordination: CEPS or Coord. SERs (RT)

p) METROPOLITAN INTEGRATION COUNCIL

Council Coordination: Iplanfor

Coordination with the FMR municipalities to address actions related to the Urban Master Plan, Mobility Plan, Environmental Sanitation Plan, Water Security Plan.

CITY OBSERVATORY

The creation of the City Observatory in Fortaleza meets the city's demands for self-knowledge about its own transformation while also contributing to ensure the long-term effectiveness of the Fortaleza 2040 Plan. Although the Observatory takes on functions well beyond the Plan's safeguarding, it was necessary to separate it from the current municipal administration's image and reinforce its equal footing within the organization's structure.

The present content on the City Observatory is the direct outcome of presentations held at Iplanfor with directors, staff, consultants, and strategic partners (UFC) and workshops about the Fortaleza 2040 Plan's governance.

What the City Observatory is

The City Observatory is a space for building knowledge that is relevant to action. It sees the city as a hub of complex relations that go beyond physical and administrative boundaries. Its landmark features are:

1) the production of autonomous knowledge; 2) the participation of civil society, public authorities, and the private sector; 3) adaptation of its methods to each interlocutor, situation and/or object to be studied; 4) innovation.

In the first years of its creation, it should work by means of a contract or a pact with the FCPC or Astef, as well as a partnership with the Federal University of Ceará, which will be subsidized with funds raised through international organizations, peer organizations, and the government. Once it has proven its value to society, it will be duly institutionalized (non-profit).

The Misson of the City Observatory

To contribute to Fortaleza's transformation into a fairer city, that is more integrated and accessible, by means of the participative construction of strategic knowledge for the city.

The Values of the City Observatory

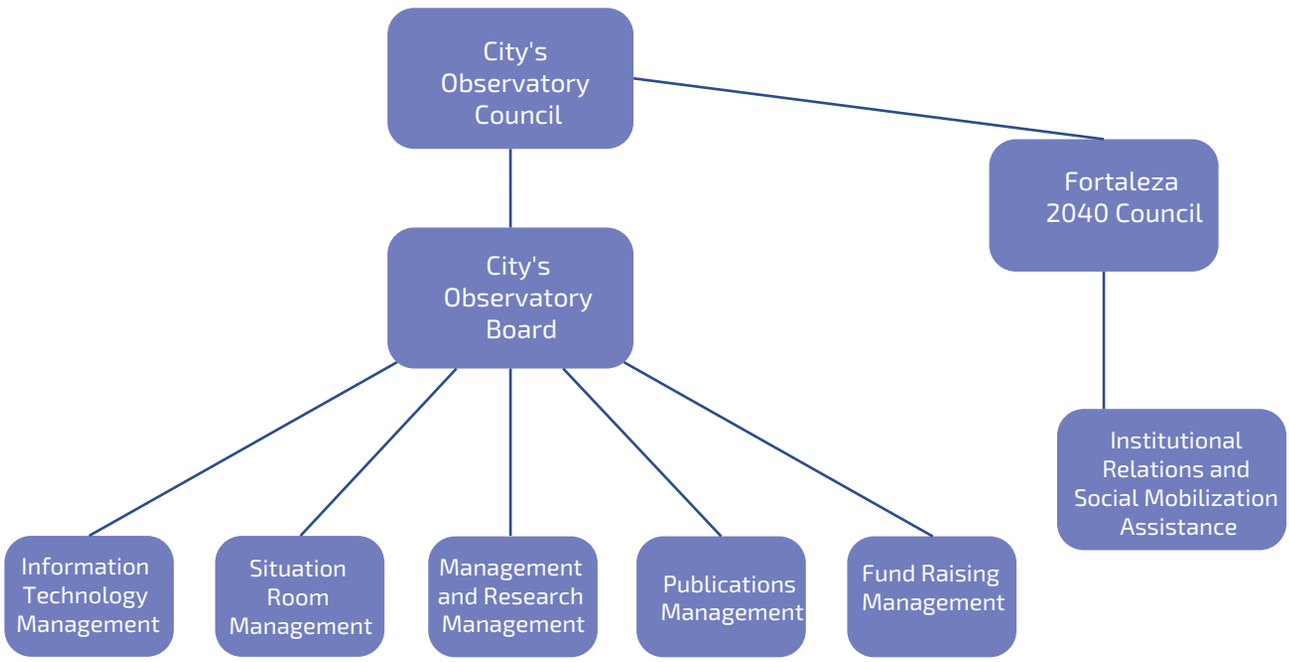
- Legality and Ethics: to act in accordance with the law and ethics.
- Publicity: To make public, in a clear and accessible manner, its research's results.
- Economicity: to consciously manage its resources.

- Equality: To produce knowledge in accordance with common interests.
- Scientific criteria: to produce knowledge with scientific validity.

Products of the City Observatory

- The Situation Rooms at the City Observatory: Physical and virtual spaces where interested parties can introduce data they have collected or crossover public information so they can better analyze issues and projects relating to the city's development.
- Diagnoses and Prognoses Studies: To undertake studies that portray the current situation of a determined aspect of the city. The diagnoses studies also assist the prognostic analyses of interventions upon the city: what are the likely impacts of a given intervention or public policy? What have we learned from similar experiences in other cities in Brazil or across the world? Which variables can produce greater impact upon the indicators that interest us?
- Periodic Monitoring of the city's strategic markers: Some markers are fundamental to understanding the city's reality and deserve to be constantly monitored: GDP, GDP per capita, HDI, Gini Coefficient, etc. However, in Fortaleza's case specifically, these indexes must be complemented with markers that better portray local reality, some of which are prescribed in the Fortaleza 2040 Plan. For instance: an Index for Zeis land regulation, an Index for motorcycle accidents, an

Figure 43 – Organization Chart for the City's Observatory (after its institutionalization)



Source: Fortaleza 2040 Plan.

Index for deforestation in springs that supply the city's water, etc.

- These strategic markers should be clear, pertinent, and measurable.
- Education of servers and citizens, qualifying social participation.

The City Observatory should fulfill the specific demand for educating public servants and citizens concerning data collection, organization, and cross-linking. Furthermore, this educational activity should run transversal to the actions of the City Observatory and taken into account when data is collected, when the Situation Room is used, and in all other encounters with external interlocutors.

The proposed organizational structure (Figure 43) for the City Observatory, as well as its statute, are available in the introduction to the axis relating to Municipal Governance, in which we have included a council that relies on broad participation from society in order to monitor Fortaleza 2040's implementation and its results.

Transition Plan for the Observatory's Implementation

- Incubation Stage:
  The City Observatory will be incubated for a maximum period of three years, observing the principles of equality, legality, scientific criteria, publicity, and economicity. After this period, the Observatory shall bear its operational costs by means of fund raising activities, in case it is properly backed by the municipal and/or state government and universities.

- Institutionalization Stage:
  After the three-year period under incubation, as a project, the City Observatory will be apt to become an Civil Society Organization Of Public Interest (Oscip). This legal transformation would imply that the Fund Raising Management would have a more active role, expanding the range of possibilities for funding the Observatory's projects and research. At the same time it bestows the institution with a more autonomous character, the Oscip's judicial structure assures it the possibility of establishing partnerships with the public authorities so it can give continuity to services of collective interest.

DIÁRIO OFICIAL

TALEZA, 02 DE DEZEMBRO DE 2016

É NAVARRO, ocupante do cargo de Assessor Parlamentar, l 02. PAÇO MUNICIPAL JOSÉ BARROS DE ALENCAR, 31 de outubro de 2016. **Vereador Salmito filho - PRESI-NTE DA CÂMARA MUNICIPAL DE FORTALEZA.**

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ATO Nº 03773/2016 - O PRESIDENTE DA CÂ-ARA MUNICIPAL DE FORTALEZA, no uso de suas atribui-es legais e de acordo com o art. 36 - II da Lei Orgânica do unicípio de Fortaleza. RESOLVE exonerar nesta data, por dicação do(a) vereador(a) ROBERT BURNS, o(a) Sr(a). RO-ILDO SISNANDO ARAÚJO, ocupante do cargo de Assessor Parlamentar, nível 04. PAÇO MUNICIPAL JOSÉ BARROS DE ALENCAR, em 31 de outubro de 2016. **Vereador Salmito filho - PRESIDENTE DA CÂMARA MUNICIPAL DE FORTALEZA.**

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ANO LXII

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DIÁRIO OFICIAL DO MUNICÍPI

ANO LXI **FORTALEZA, 30 DE DEZEMBRO DE 2015**

(REPUBLICADO POR INCORREÇÃO)

PODER EXECUTIVO

GABINETE DO PREFEITO

LEI Nº 10.429, DE 22 DE DEZEMBRO DE 2015.

Altera a composição do Conselho Municipal de Acompanhamento e Controle Social do Fundo de Manutenção e Desenvolvimento da Educação e da Valorização dos Profissionais da Educação – Conselho do FUNDEB.

FAÇO SABER QUE A CÂMARA MUNICIPAL DE FORTALEZA APROVOU E EU SANCIONO A SEGUINTE LEI: Art. 1º - O art. 2º da Lei n. 9.716, de 24 de setembro de 2010, passa a vigorar com a seguinte redação: "Art. 2º O Conselho do FUNDEB é constituído por 11 (onze) membros titulares, acompanhados de seus respectivos suplentes, conforme representação e indicação a seguir: I — 2 (dois) representantes do Poder Executivo Municipal, dos quais pelo menos 1 (um) da Secretaria Municipal da Educação ou órgão educacional equivalente; II — 1 (um) representante dos professores das escolas públicas municipais, indicado por seus pares em processo conjunto das entidades sindicais; III — 1 (um) representante dos diretores das escolas públicas municipais, indicado pelo seu colegiado; IV — 1 (um) representante dos servidores técnico-administrativos das escolas públicas municipais, indicado por seus pares em processo conjunto das entidades sindicais; V — 2 (dois) representantes dos pais de alunos das escolas públicas municipais, indicados por seus pares em Assembleia Geral convocada para esse fim; VI — 2 (dois) representantes dos estudantes da rede municipal de ensino, indicados por seus pares em Assembleia Geral convocada para esse fim, sendo 1 (um) indicado pela entidade de estudantes secundaristas; VII — 1 (um) representante do Conselho Municipal de Educação, indicado por seu colegiado; VIII — 1 (um) represen-

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DIÁRIO OFICIAL DO MUNICÍPIO

FORTALEZA, 02 DE DEZEMBRO DE 2016

JOSÉ NAVARRO, ocupante do cargo de Assessor Parlamentar, nível 02. PAÇO MUNICIPAL JOSÉ BARROS DE ALENCAR, em 31 de outubro de 2016. **Vereador Salmito filho - PRESIDENTE DA CÂMARA MUNICIPAL DE FORTALEZA.**

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TO MUNICIPAL DE FORTALEZA, 016. **Roberto Cláudio Rodrigues CIPAL DE FORTALEZA. Philipe RETÁRIO MUNICIPAL DO PLA- E GESTÃO.**

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GABPREF - O PREFEITO iso de suas atribuições le- o Decreto nº 13.196, de 3.08.2013, alterado pelo M 12.11.2014 e de acor- RESOLVE de acordo 27.12.1990, Estatuto publicada no DOM nizar a cessão para na Secretaria da ovidores rela- cação, cessio- e Admi- eza.

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DIÁRIO OFICIAL DO MUNICÍPIO

ANO LXI | **FORTALEZA, 30 DE DEZEMBRO DE 2015** | **Nº 15.678**

(REPUBLICADO POR INCORREÇÃO)

PODER EXECUTIVO

GABINETE DO PREFEITO

LEI Nº 10.429, DE 22 DE DEZEMBRO DE 2015.

Altera a composição do Conselho Municipal de Acompanhamento e Controle Social do Fundo de Manutenção e Desenvolvimento da Educação e da Valorização dos Profissionais da Educação – Conselho do FUNDEB.

FAÇO SABER QUE A CÂMARA MUNICIPAL DE FORTALEZA APROVOU E EU SANCIONO A SEGUINTE LEI: Art. 1º - O art. 2º da Lei n. 9.716, de 24 de setembro de 2010, passa a vigorar com a seguinte redação: "Art. 2º O Conselho do FUNDEB é constituído por 11 (onze) membros titulares, acompanhados de seus respectivos suplentes, conforme representação e indicação a seguir: I — 2 (dois) representantes do Poder Executivo Municipal, dos quais pelo menos 1 (um) da Secretaria Municipal da Educação ou órgão educacional equivalente; II — 1 (um) representante dos professores das escolas públicas municipais, indicado por seus pares em processo conjunto das entidades sindicais; III — 1 (um) representante dos diretores das escolas públicas municipais, indicado pelo seu colegiado; IV — 1 (um) representante dos servidores técnico-administrativos das escolas públicas municipais, indicado por seus pares em processo conjunto das entidades sindicais; V — 2 (dois) representantes dos pais de alunos das escolas públicas municipais, indicados por seus pares em Assembleia Geral convocada para esse fim; VI — 2 (dois) representantes dos estudantes da rede municipal de ensino, indicados por seus pares em Assembleia Geral convocada para esse fim, sendo 1 (um) indicado pela entidade de estudantes secundaristas; VII — 1 (um) representante do Conselho Municipal de Educação, indicado por seu colegiado; VIII — 1 (um) representante dos Conselhos Tutelares, indicado em processo de escolha conjunta de todos os Conselhos. § 1º - As indicações referidas nos incisos acima deverão ocorrer em até 20 (vinte) dias antes do término do mandato anterior. § 2º - Salvo o representante da Secretaria Municipal da Educação, os demais conselheiros de que trata este artigo deverão guardar vínculo formal com os segmentos que representam, devendo esta condição constituir-se como pré-requisito à sua indicação, posse e exercício do mandato. § 3º - São impedidos de integrar o Conselho do FUNDEB: I — cônjuge e parentes consanguíneos ou afins, até terceiro grau, do Prefeito e do Vice-Prefeito e dos Secretários Municipais; II — tesoureiro, contador ou funcionário de

da Educação Básica e de Valorização dos Profissionais da Educação – Conselho do FUNDEB, titulares e suplentes, serão nomeados por ato do Chefe do Poder Executivo Municipal, a partir da indicação de cada órgão ou entidade. § 5º - A representação dos estudantes será composta por alunos regularmente matriculados, maiores de 18 (dezoito) anos de idade ou menores de 18 (dezoito) anos de idade, desde que sejam emancipados na forma da lei." Art. 2º - Esta Lei entra em vigor na d[ata] sua publicação, revogadas as disposições em contrário. [PAÇO DA PREFEITURA MUNICIPAL DE FORTALEZA, em 22 [de dezem]bro de 2015. **Roberto Cláudio Rodrigues Bezerra - [PREFEITO] MUNICIPAL DE FORTALEZA.**

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LEI Nº 10.[430], DE DEZEMBRO DE 2015.

[Desa]feta da destinação de pra- [pú]blica o imóvel em que [fun]a Escola Estadual [Ma]Menezes de Serpa, [a]uso especial, e [dá] outras providências.

FAÇO SABER A CÂMARA [MUNICIPAL] DE FORTALEZA APROVOU E EU SANCIONO A [SEGUINTE] LEI: Art. 1º - Fica desafetada de sua destinação de [uso] comum do povo parte da praça cadastrada junto [à] do Planejamento, Orçamento e Gestão (SEPOG) sob [o] SER I, oriunda do Loteamento Cidade Nova Assunção, [apro]vado e registrado à margem da transcrição imobiliária [nº] 16.478, do Cartório de Registro de Imóveis da 3º zona da [Co]marca de Fortaleza, que passa ao uso especial, com fim de formalizar a cessão de uso do bem ao Estado do Ceará. Art. 2º - A parcela da praça desafetada do uso comum e afetada ao uso especial corresponde à seguinte descrição: terreno de formato irregular, situado na Rua Doutor Quixadá Felício com a Rua 25, bairro Vila Velha, oriundo do Loteamento Cidade Nova Assunção, totalizando área de 7.002,80m² (sete mil e dois metros quadrados e oitenta centímetros quadrado), com as seguintes dimensões e limitações: ao norte, por onde mede 82,00m (oitenta e dois metros) e se limita a Rua Doutor Quixadá Felício; ao leste, por onde mede 85,15m (oitenta e cinco metros e quinze centímetros) e se limita com a Rua 15; ao sul, por onde mede 82,00 (oitenta e dois metros) e se limita com o remanescente da praça; e, finalmente; ao oeste, por onde mede 85,65m (oitenta e cinco metros e sessenta e cinco centímetros) e se limita com a Rua 25. Art. 3º - Esta Lei entra em vigor na data de sua publicação, revogadas as disposições em contrário. PAÇO DA PREFEITURA MUNICIPAL DE FORTALEZA, em 22 de dezembro de 2015. **Roberto Cláudio Rodrigues Bezerra - PREFEITO MUNICIPAL DE FORTALEZA.**

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LEI Nº 10.431, DE 22 DE DEZEMBRO DE 2015.

Altera e acrescenta dispositivos

CHAPTER 9

PROPOSAL OF LEGAL INSTRUMENTS

Before we go into the theme of proposing legal instruments for the Fortaleza 2040 Plan, we understand that it is necessary to ponder on the plan's juridical structure and its insertion into the field of public policy.

The Fortaleza 2040 Plan must be understood within the Municipal Planning Policy context, firstly as an instrument of this policy, secondly as a type of strategic planning, and as such, one with an urban, economic, and social intent.

The planning policy serves the purpose of assuring the right to planning established by the 1988 Federal Constitution, and empowers citizens and the administration through the understanding of planning as a right, creating the capacity for social transformation through improved control by society and public policies.

This political importance is responsible, a priori, for the alignment of different municipal plans that emerge during the natural course of public management. Among others, the master plan, the multi-annual plan, the strategic plan; municipal policies/ participative municipal projects; human resource planning; and information and technology planning. All of these are complementary. But it also helps in distributing responsibilities between governmental organs that are responsible for planning, establishing formal spaces for agreement, deliberation, and participation (forums, conferences, inter-management commissions, Councils, etc.) and establishing the policy's own form of management.

It deals with planning policy through a dynamic and interactive process that structures - strategically, tactically, and operationally - the municipality's information, information technology, information and knowledge systems, people involved, and the infrastructure required for the management of the city.

This is where the need for legislation arises, emerging from the experience of elaborating the Fortaleza 2040 Plan, that is, to define legally and clearly its legal nature and the place it occupies within the legal frameworkof the

Fortaleza municipality, in other words, identify said plan as an instrument of the municipal planning policy to be instituted.

Opportunely the institution of this policy will regulate the Organic Law in how it complies with the principles and directives of municipal organization, related to art. 10, among them democratic practices, transparency, and popular control over government action, systematic planning and programming, as well as the municipal process of planning mentioned in art. 13, I.

Another important question is differentiating the Fortaleza 2040 Plan from the Master Plan, so as to avoid conflicts and prevent doubts concerning their roles in the city's planning. The Fortaleza 2040 Plan is a planning policy instrument that assures the right to planning. The Master Plan, on the other hand, is an urban development policy instrument that assures the right to the city.

Therefore, it is up to planning policy to define the responsibilities and procedures pertaining to the integration of these complementary plans, including other planning instruments.

Finally, the Fortaleza 2040 plan presents a collection of public policies that contribute to the creation of a city that is fairer, more sympathetic, more inclusive, and less violent. However, the diagnoses of public policies in the municipality of Fortaleza (Iplanfor, 2014) points to the need for institutionalization of a large part of these policies, a situation that mitigates the constitutional principle of legality.

We see an opportunity when looking at the content of the Fortaleza 2040 Plan, which strategically addresses these public policies and the need to legislate

on them or, in some cases, make them compatible with the content of said plan.

There are, therefore, changes that need to be made in relation to Organic Law, the Master Plan, and several other parts of municipal legislation, in order to adjust them to the vision for the future that the Fortaleza 2040 Plan strives to attain, but also in order to make them enforceable.

The Plan offers, in an electronic medium (annexed), the collection of proposals for legal instruments for institutionalizing the Fortaleza 2040 Plan, the Urban Mobility Plan, and the Urban and Mobility Master Plan (as a reference document for the city's urban development and for the participation process during the review of the Participative Fortaleza Master Plan - PDPFor), Social Housing Plan (Plhis), and other specific plans.

We suggest that seminars are carried out as soon as 2017 begins in order to introduce the existing related legal frameworks and principles and context of each policy, followed by the presentation of each plan and the proposed legal instrument for its institutionalization. At this time we can determine each policy that has still not been instituted, or even debate updates to be made to the policies already instituted. These seminars should have a good number of representatives from civil society, social movements, council members for each policy, and public managers. This way, we could institutionalize each of these policies along with their related plan, which would represent a huge step forward for Fortaleza's Legal Governance.

CHAPTER 10

FINAL CONSIDERATIONS

As we near the end of this general presentation about the Fortaleza 2040 Plan, we must make some final considerations, including some recommendations and directives, where there is room for improvement, studies that need to be completed or deepened, plans to be partially or totally concluded, as well as some additional clarifications.

IN RELATION TO THE URBAN TOOLS FOR PLANNING THAT SUPPORT GRADUAL QUALITY GROWTH - FROM THE PRESENT DAY UNTIL 2040

- In order to create growth that results in a planned urban form it is necessary to begin the process of reviewing the current Master Plan (PDPFor), using the Urban and Mobility Master Plan as a reference along with other Fortaleza 2040 plans as soon as possible;
- After, or in conjunction with, the process of reviewing the PDPFor, it is necessary to create an efficient instrument for regulating the urban development process while ensuring environmental control as well as considering the elements and potential arrangements that lead to a fair and accessible urban form established by the Fortaleza 2040 Urban and Mobility Master Plan;
- Said instrument, including rules for the development of urban form and land use and occupation - macro and micro zoning, special zones, strategies for environmental protection, rules for land subdivisions, urban re-qualification focus points, strategies for inducing growth and proper treatment of form, control over blueprints and densities, manners of occupation, strategies that foster connectivity and sociability, road network definitions, transportation of people and goods, distribution of services, rules for universal accessibility and organization of mass transit oriented development, among other matters - should be comprehensive and easily understood, devoid of

ambiguities, didactic, accessible to any citizen, and elaborated from experiences shared by the technical team, municipal authority representatives, representatives from various urban interests and the municipal legislative, in a democratic, open, and transparent process that leads to profound knowledge about the positive and negative impacts that each strategy or rule could have upon the city, the community, and the environment;

- It is necessary to further develop studies about possible sources of resources for investment in Specific Plans and the Sectoral Plans of Mass Transit Oriented Development, which are proposed in the Urban Master Plan, followed by the development of projects, executive budgets, and respective schedule of implantation. These future works, which promote urban re-qualification and add value to several city areas while also reducing territorial inequality, create new centralities, attractiveness, and opportunities for the surrounding community and the market. They fit perfectly with the model of urban consortium operation between the private and public sectors.
- The Terms of Reference - which will rule public tenders for the elaboration of several urban and architectural projects in each stage of Fortaleza 2040 - should be based on the Urban and Mobility Master Plan, as well as the Master Plan and the LUOS reviewed according to it. This way we can ensure the broad participation of professionals, businesses or consortia of firms, by means of Public Tenders at a local, national and international level, whichever the case may be;
- Legal forms should be restored and updated to recognize and promote the official authentication of the quality of urban or architectural projects, based on universal criteria that demands excellence of form allied to provable costs and benefits of a social, environmental and economic nature. The municipal executive power should foster access, knowledge, and broad debate among citizens about each project, holding regular hearings about their implementation. This is a democratic and legitimate manner to promote the continuity of the project's execution;
- As the efficiency of the implemented elements (urban or architectural) are demonstrated, experienced and approved by the audience, gradually new patterns for systemic components will be established. These should interact harmoniously with elements that were implemented by many others over the course of 200 years;
- The new structures generated by the urban form agreed upon in the Fortaleza 2040 Urban and Mobility Master Plan, understood as "urban insertions", should be inserted into opportunities presented by the old urban fabric, be it through insertions: (i) on the few lots or tracts without existing constructions that remain in the city; by replacing temporary or declining architecture; (ii) by replacing a layer of urban constructions without use or recognized cultural value; (iii) where re-constructive operations generate improvement or demonstrable advantages for the original owners;
- Urban insertions are meant to receive new construction layers in areas foreseen as more

suitable for distributing results across the environment, the economy, and the society involved. Therefore, they are viable as long as they do not cause social, economic, or cultural damage. Said urban insertion works can favor existing architecture in decline, through projects for adaptation complements and architectural vitality.

- The use coefficient and levels of comfort acknowledged by the population - who will use the future urban form as it gradually materializes - should be monitored and evaluated, while also considering the degrees of fairness, accessibility, and the economic stimulus generated by each project that has been elaborated and executed.

IN RELATION TO THE TERRITORIAL, SOCIAL AND ECONOMIC EQUITY AXIS

The plans inserted in the Territorial, Social, and Economic Equity Axis (Housing, Land Regulation, Safety, Productive Integration) were scattered across other Fortaleza 2040 axes until February, 2016. However, the technical staff, consultants and Fortaleza 2040 participants considered it appropriate to create a new axis right at the beginning of the entire Plan, given the invisibility of everyday tragedies that affect over 40% of Fortaleza's population, the great majority of which has a very low income and are squeezed into 12% of the city's territory in very precarious settlements without urbanization, residential infrastructure and very low supply of public services - dormitory towns without employment or income opportunities, neglected by the mass transport system. Places that concentrate the majority of murders, diseases, and misery. Non-city territories, that deny the right to the city, deny life itself to hundreds of youths and children who every year lay down their lives in these places, leading to an ever growing rate of urban violence, a violence that terrifies the entire population and the city's visitors.

It is our great hope that the eradication of this profound inequity of rights and of access to opportunities could be the focus of the new municipal administration, as nothing can thrive in a city with such inequality.

IN RELATION TO THE CITIZEN CULTURE DEVELOPMENT PLAN

Unfortunately the group charged with the elaboration of the Citizen Culture Development Plan could not complete said plan with good representivity. And so the project's technical coordination staff, given the topic's relevance, decided to expand the group and debates on the subject at the beginning of 2017, since it is this very culture, in the anthropological meaning of the term, that impacts the way we relate to a city, to public authority, to family and to the community. Fostering a supportive, proactive and ethical, citizen culture in the population, public managers, and Fortaleza's political and economic elite, is key to the large transformation that must happen so the city can become the Fortaleza that we want.

IN RELATION TO THE SOCIAL HOUSING PLAN

The first version of the Social Housing Plan (Plhis) was finished in December of 2012, although it was not institutionalized. Over the course of 2016, workshops were held in various city regions for the

identification, along with the community, or new precarious settlements that emerged in Fortaleza between 2012 and 2016, so that said plan could be updated and made compatible with the Urban and Mobility Master Plan, and also with the new Fortaleza 2040 Land Regulation Plan. Despite the identification of an approximate number of homes located in these new settlements they still haven't been submitted to technical visits to identify the types of intervention and actions required. Technical visits to said localities should happen in 2017, so that the Plhis Plan of Action can incorporate every action pertaining to each of these new localities.

The community and the technical staff who were part of the Plhis update, along with the group that elaborated the Regulation Plan, believe it is important that the large majority of precarious settlements are deemed Special Zones of Social Interest, as a way to assure the participation of people living in these territories in any project that might be carried out in said area, or even demand, from public authority, the implementation of integrated actions with a view to improve housing and urbanization, insert employment and income opportunities, offer public services, integration between those areas and the road network and public transportation, and creation of sports and recreational public spaces.

The values required for the land regularisation of the houses in precarious settlements were incorporated into the budget for the Fortaleza 2040 Land Regulation Plan.

IN RELATION TO MUNICIPAL GOVERNANCE

Within the context of governance, many studies and solutions will be needed so we can move forward. Among them, we highlight the following:

- Implementation of the proposed management model and internalization of plans in a municipal executive body;
- Institutionalization of Fortaleza 2040 and its many plans;
- Discussion and elaboration of proposals for a new administrative division, with smaller territories, and creation of a territorial forum;
- Studies and elaboration of a proposal that comprehends the many demands for organizational structure displayed in several projects;
- Integration of infrastructure in spaces adjacent to several territories toward the economy of contracted services related to support-activities (surveillance, transport, janitorial services);
- A knowledge generation center for improving municipal governance;
- A study of alternatives that avoid the growth of social security deficits;
- Adaptation of the legal frameworks mentioned in various plans, or the institutionalization of new legal frameworks.

FORTALEZA 2040'S FINANCIAL VIABILITY

Although the consolidated budget and the cost and benefits analyses point to the financial viability of Fortaleza 2040 and its respective plans, as the required resources represent less than 30% of the own-source revenue throughout the coming 24 years, many of these actions or projects rely on raising funds from the State Government, the Union, private initiative or external resources.

Raising funds is a lot easier when you have a quality project like Fortaleza 2040 but, on the other hand, there are a large number of executive projects to be developed along with more precise and thorough budgets, hundreds of contracts,

agreements, and partnerships to be signed with agencies and development banks, which led us to the creation of an office for managing projects linked to Iplanfor.

Several plans possess actions that still need to be detailed and budgeted, pending topics that need to be addressed by the policy's managing agency.

We still require deeper studies about which current expenses will be replaced by expenses incorporated into the proposed plans, and which will remain. The same goes for personnel and investment costs. In doing that, we could have greater precision concerning the exact amount of municipal funds that could be committed to the Fortaleza 2040 actions.

Urban operations should also be modeled in order to enable the execution of urban corridors as well as specific projects foreseen in the Urban and Mobility Master Plan.

IN RELATION TO THE PARTICIPATION PROCESS AND CONFLICTS OF INTEREST

The process of elaborating Fortaleza 2040 happened in an open and democratic manner, with unrestricted room for critics. As this autonomy became clear, the project, little by little, attracted people from different political preferences.

Gradually, thousands of people were accompanying and collaborating through the countless meetings, forums, and seminars that were held. In these events a question was always brought forth: How can you people assure us that this plan will be executed?

We received the concern everyone displayed about the plan being executed with great satisfaction, however on the other hand it was alarming how much of the Brazilian population was not interested in making use of their right to control and monitor the project.

The exercise of looking past one's own interests, or even the exercise of understanding how much public policies impact one another, brought great knowledge to all participants.

Another great challenge for the majority of participants was beginning to think and address the city's future from the immediate present. Brazilian culture is ruled by urgency and the short-term - amid the population, the academic field, and government in general.

But, gradually, a great majority of participants noticed that the transformations the city needs wouldn't happen in the short or mid-term, and that these transformations required the alignment of visions and efforts from several bodies within the government and society.

At the same time as public managers from different public managements instances gave their full support, working intensely on the project, others continued to busy themselves with actions and projects planned in the past and meant for the past. This is only natural when we are dealing with a cultural change which, in some cases, raised intense disagreement about the actions or projects presented, as was the case with those contained in Fortaleza 2040.

FOR A FORTALEZA OF OPPORTUNITIES - FAIRER, WELL CARED FOR, AND WELCOMING!

We are filled with hope because, during the last three years, thousands of people united and devoted themselves to making a dream real, investing hours of their lives into finding ways and solutions so they could, together, build a better Fortaleza for all.

It is important to remember that "*A dream you dream alone is only a dream. A dream you dream together is reality*". (Yoko Ono)

To deeply know every plan and identify how each one of us can contribute to the next steps towards building this new reality.

"There is nothing like a dream to create the future. Utopia today, flesh and blood tomorrow."(Victor Hugo)

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