



Master in Innovation and Research in Sustainability

FUTURE STUDIES & STRATEGIC INNOVATION

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MEGATRENDS
TRENDS
WEAK SIGNALS
WILDCARDS
UNCERTAINTIES

MEGATRENDS



MEGATRENDS (European Commission)

- Megatrends are long-term global driving forces that are observable in the present and are likely to continue to have a significant influence for a few decades.
- They can be used to reflect on the future in a systemic way!
- The European Commission has decided to monitor 14 Global Megatrends relevant for the future of the world, with some focus on Europe. (EU FORESIGHT: What is the Megatrends Hub. How to use megatrends to make your work future-proof)

MEGATRENDS (SITRA)

- A Megatrend is a general direction of development, consisting of several phenomena, or a wide-ranging process of change.
- They are often considered to occur at the global level and development is often believed to continue in the same direction.
- Megatrends are not surprising: they are familiar things, changes that are already happening today and highly likely to continue happening tomorrow.
- They provide a useful view of broad future changes that can be narrowed down by focusing on more detailed trends, weak signals and the analysis of tensions.

MEGATRENDS (CIFS)

- Megatrends are the big drivers of change. They have massive consequences for all organisations in the medium term. Amongst the most important megatrends are automation, urbanisation, population growth, ageing, greater interconnectedness, globalisation, environmental change, and environmentalism.
- Knowing and understanding the trajectories of megatrends is crucial for any decision-maker seeking to make more futures-informed decisions in an increasingly complex world.

MEGATRENDS (Z_Punkt)

- Drivers of global change and strong impact that affect a system during a long period of time.
- Megatrends are driving paradigm shifts within areas of **basic need**. This leads to the emergence of **new growth areas** and **value creation opportunities** (Z_Punkt).
- But far-reaching **conflict lines** in society and politics are also recognizable against the background of the megatrends in question (Z_Punkt).



Economy
Dynamics



New Patterns
of Mobility



Business Ecosystems
& Networks



Future of
Health



New Consumption
Patterns



Biotechnology
Transformation



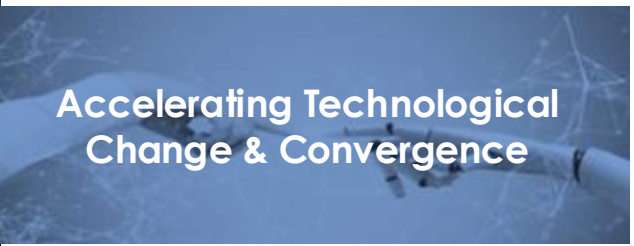
Digital & Virtual
Transformation



New
Individualities



Changing Nature of
Work and Skills



Accelerating Technological
Change & Convergence

MEGATRENDS



Geoeconomic Dynamics and
New Global Geopolitics



Globalisation



Cities and
Urbanisation



Climate Change &
Environmental Impacts



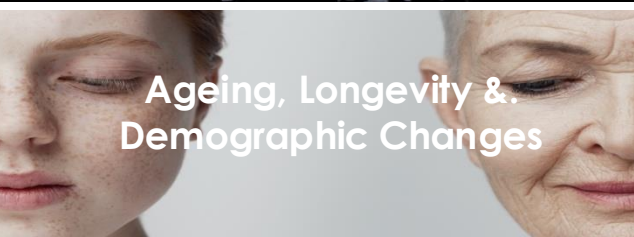
Transition to Clean Energy and
Energy Reversal



Social Welfare
& Inequalities



Changing Security
Paradigms



Ageing, Longevity &
Demographic Changes



Water Challenges

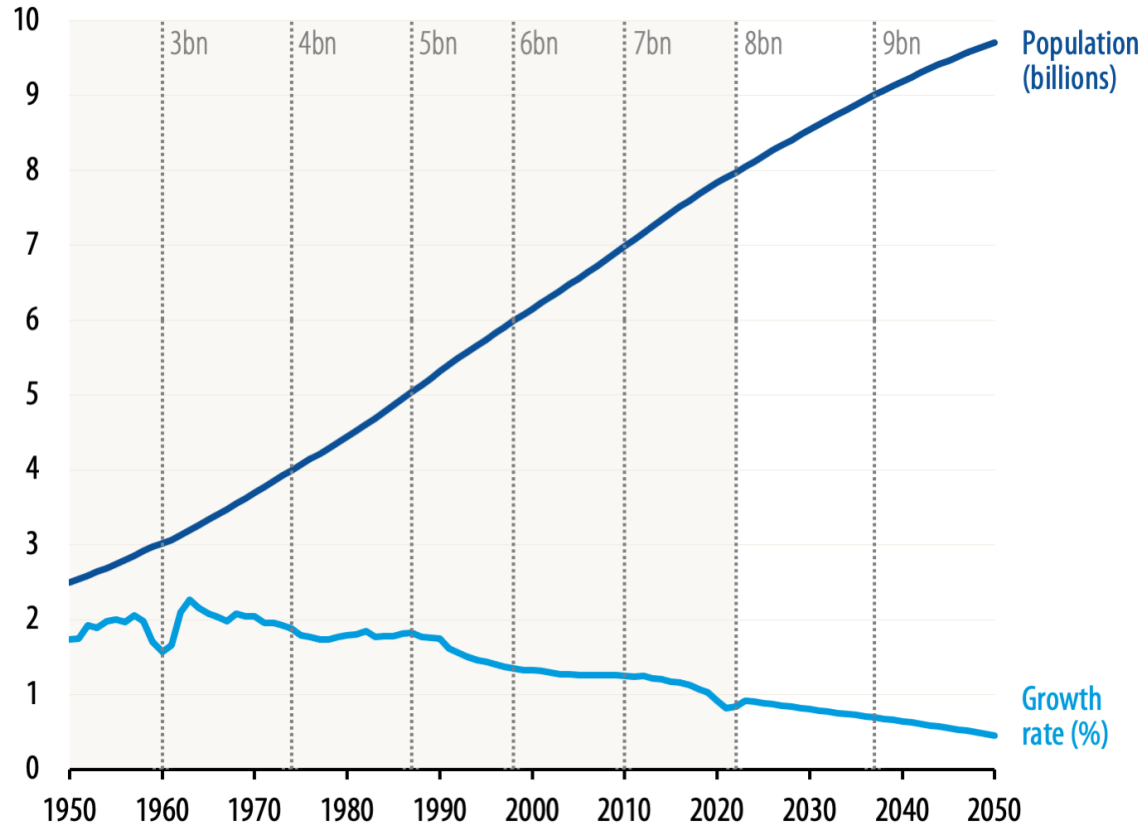


Ocean & Resources

SILVER TSUNAMI

Population boom fizzling

Even as global population passes 8 billion, the rate of growth continues to decline.

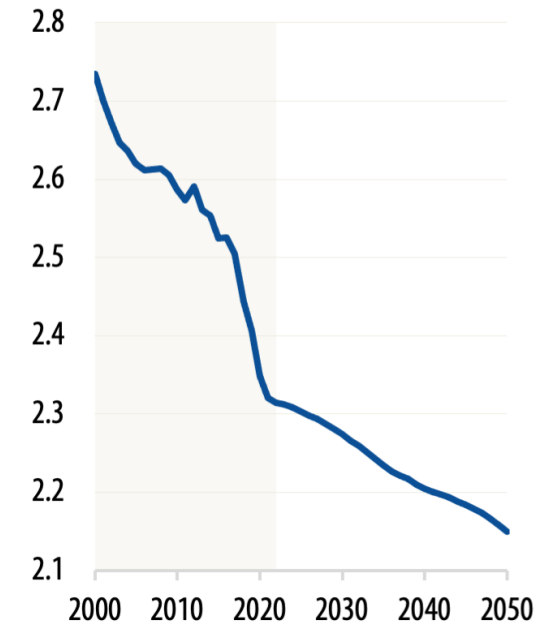


Sources: United Nations Department of Economic and Social Affairs, Population Division, World Population Prospects, 2022 Revision.

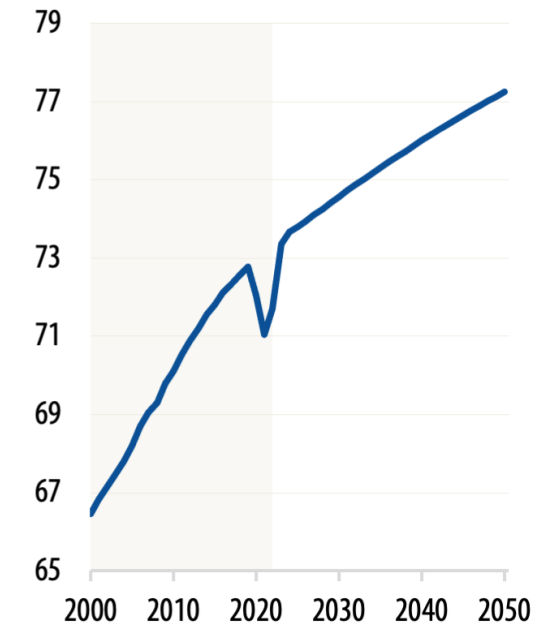
Aging population

People are living longer and having fewer children, leading to a greater proportion of elderly in the population.

Total fertility rate, worldwide
(births per woman)



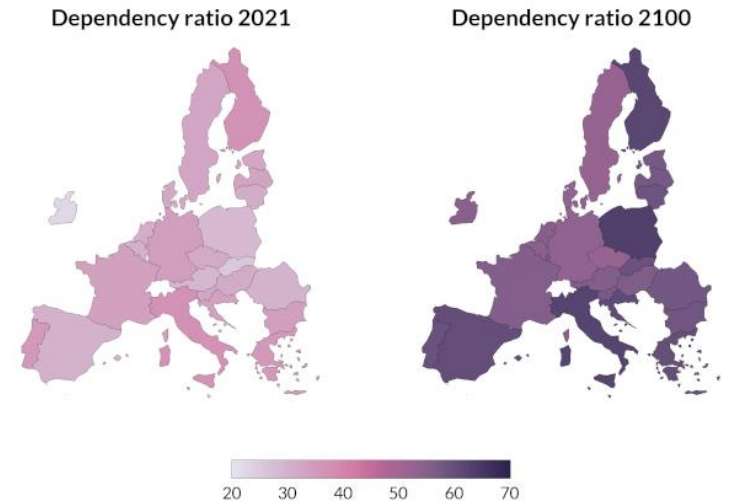
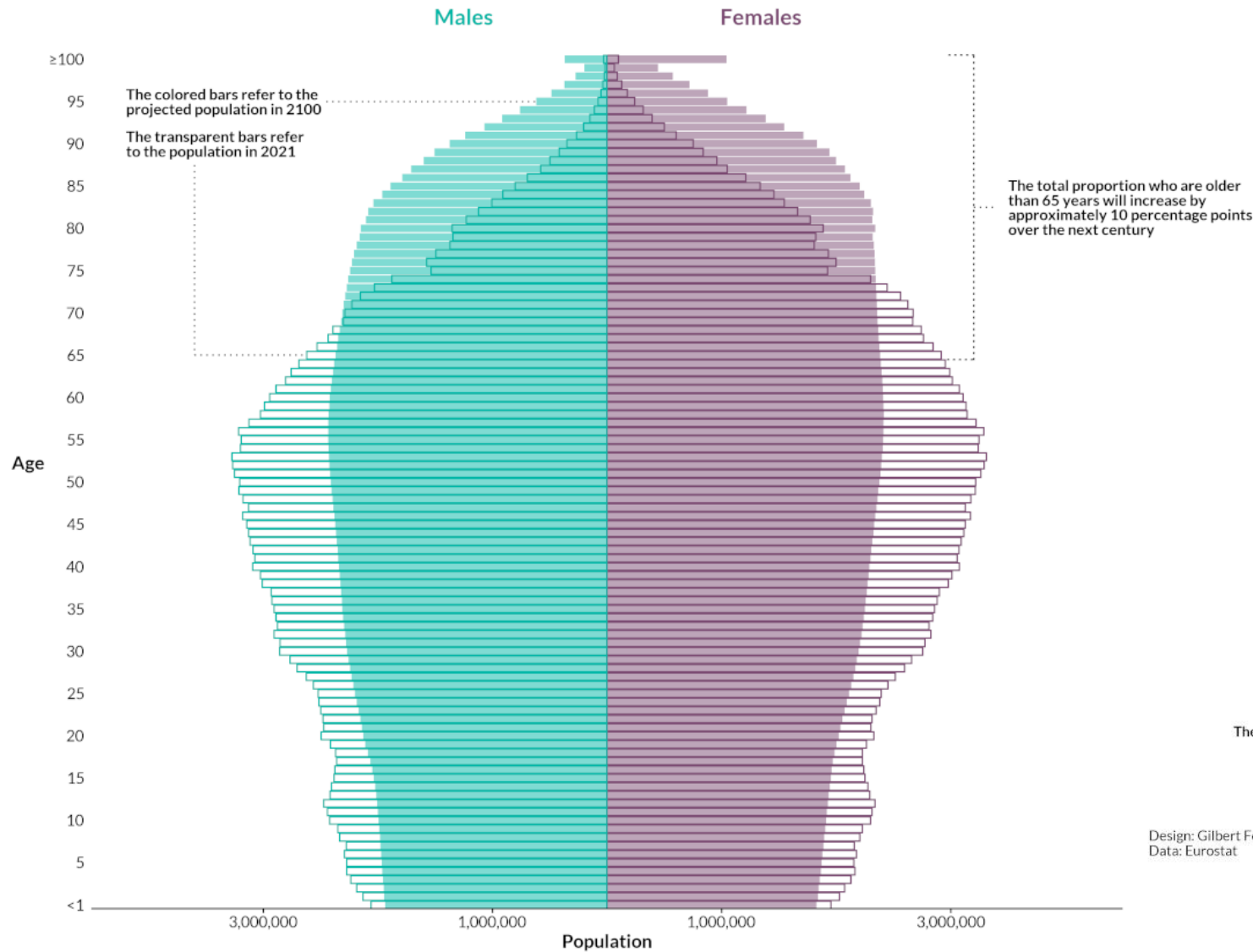
Life expectancy at birth, worldwide
(years of life expectancy)



Sources: United Nations Department of Economic and Social Affairs, Population Division, World Population Prospects, 2022 Revision.

The EU's Aging Population

2021 vs. 2100



The dependency ratio is calculated as the ratio between the number of persons aged 65 and over (age when they are generally economically inactive) and the number of persons aged between 15 and 64. The value is expressed per 100 persons of working age (15-64).

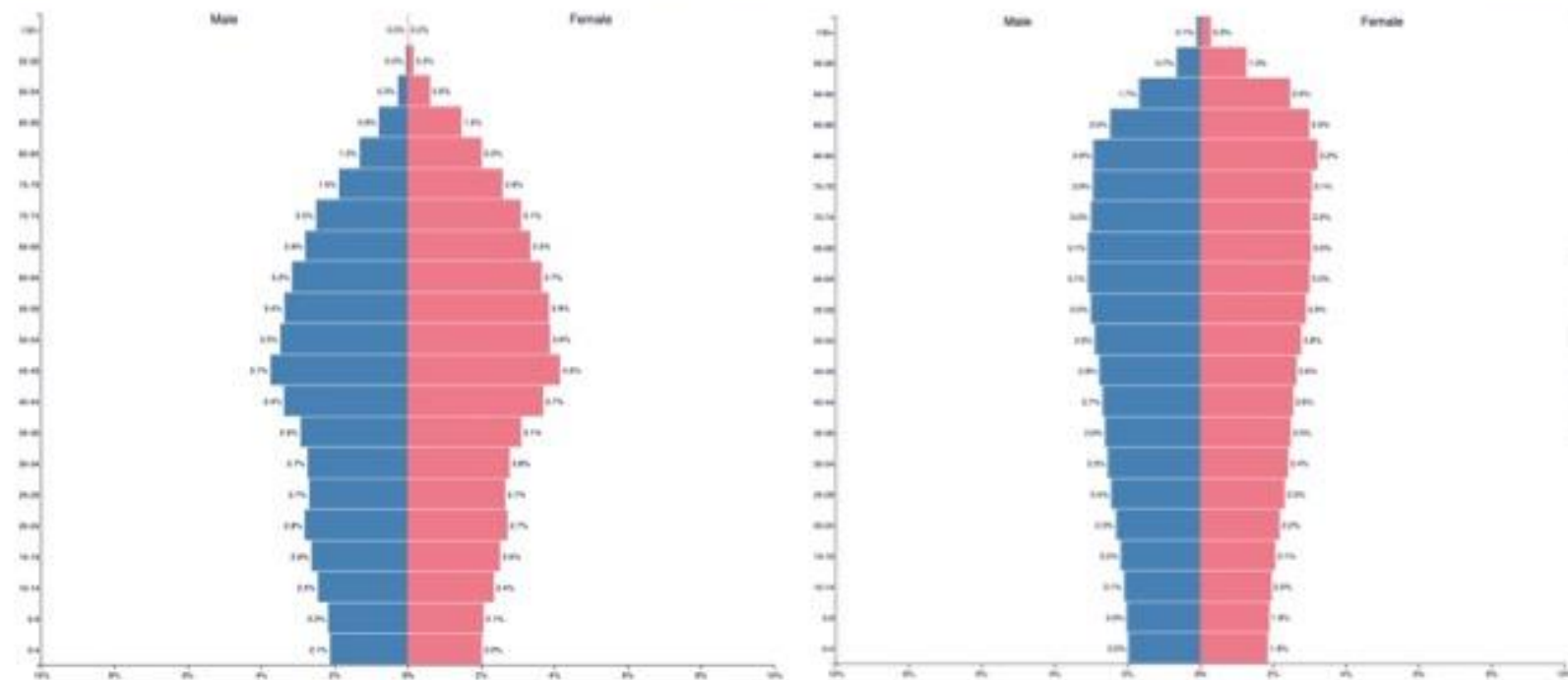
Design: Gilbert Fontana
Data: Eurostat

Portugal ▼
2022

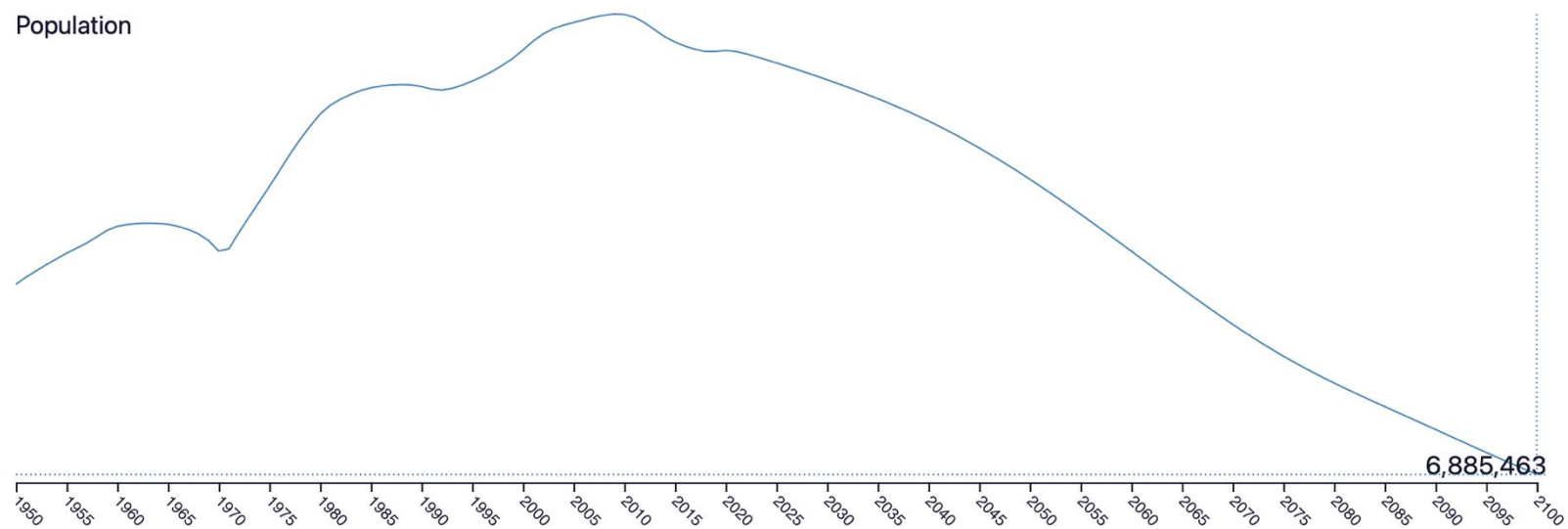
Population 10,270,865

Portugal ▼
2100

Population 6,885,463



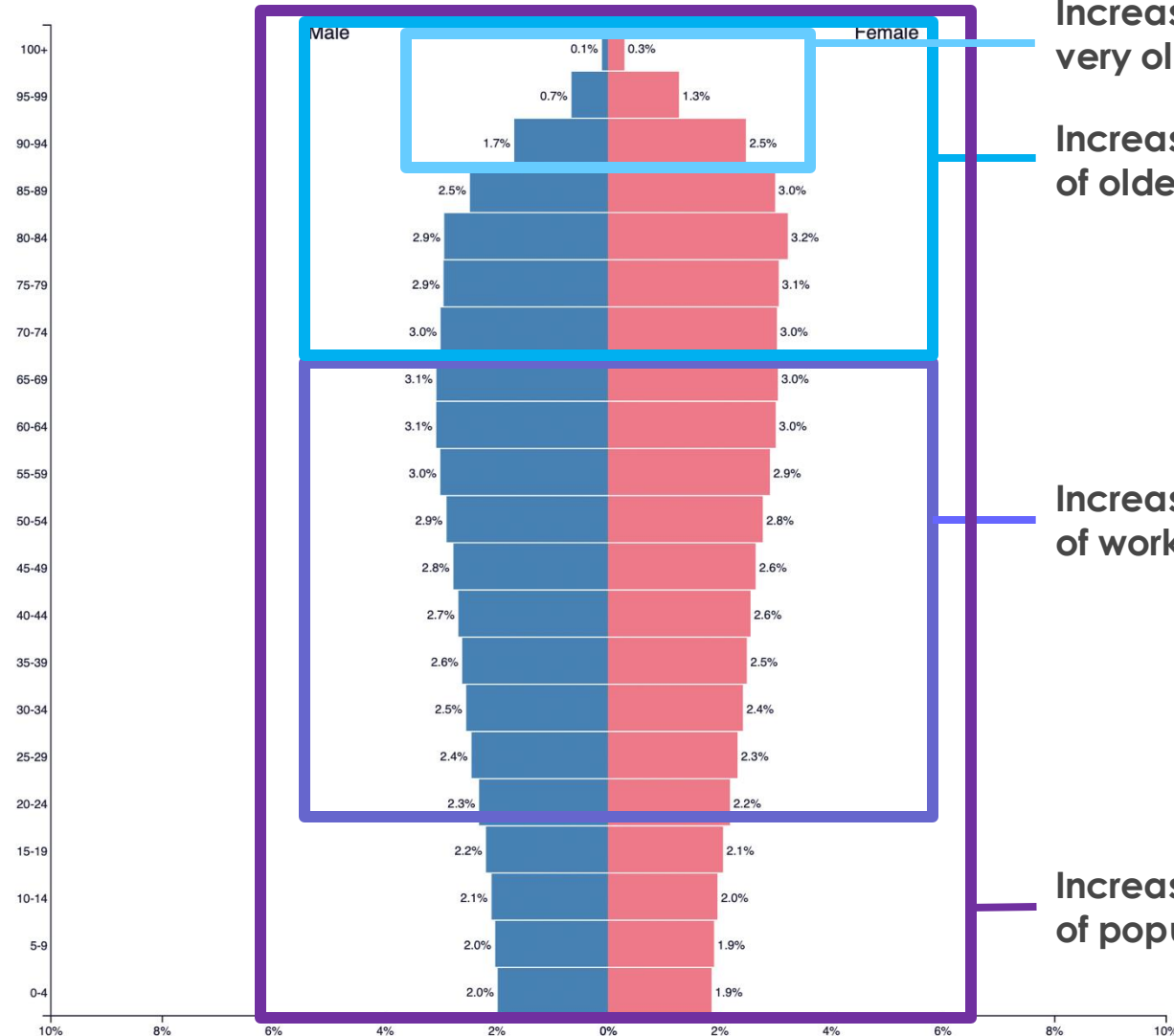
Population



Population Pyramid in 2100

Portugal ▼
2100

Population: 6,885,463



Increase average of
very old people (+90)

Increase average age
of older people

Increase average age
of working population

Increase average age
of population in general

TRENDS



Economy Dynamics

- Trade and Investment in a Volatile Economy
- Circular Economy
- Gig Economy and Freelancing
- Impact of AI on Economic Structures
- Global Economic Imbalances
- Open Finance/Banking
- Illicit Economy
- ...

Changing Mobility Paradigms

- Electromobility
- Mobility as a Service (MaaS)
- Road to Autonomy
- Smarter Infrastructure for Mobility
- The new Space Race
- Privacy and Data Protection
- Drone Warfare and Autonomous Weapons
- ...

Business Ecosystems & Networks

- Cross-Industry ecosystems
- Entrepreneurship Accelerated
- Digital Marketplaces and Platforms
- Collaborative Economy and Crowdsourcing
- Corporate Social Responsibility
- Agile Governance
- Empathetic Brands
- ...

Future of Health & Healthcare

- Telehealth and Remote Monitoring
- Precision/Personalized Medicine and Therapeutic
- Health Data Analytics
- Mental Health Awareness and Technology
- Digitize me and my health
- Changing mindsets about health
- Live Forever (Ageing/NCDs)
- ...

New Consumption Patterns

- Sustainable consumption
- Conscious Eating
- Flexible Content Consumption
- The Sharing Economy
- Personalization and Customization
- Radical Transparency
- Shifts in Travel
- ...

Biotechnology Transformation

- Biological Process Identification and Modelling
- CRISPR: Gene Editing at Scale
- Synthetic Biological Engineering
- Biosecurity and Dual-Use Concerns
- Human Optimization
- Green biotechnology
- Sustainable Materials
- ...

Digital & Virtual Transformation

- AI, ML & Data Era
- Ethical AI and Algorithmic Transparency
- International Cyber Law and Governance
- Digital Identity and Trust
- Augmented & Virtual Reality
- Quantum Computing
- Distributed Ledger Technology
- ...

New Individualities

- Differentiated Lifeworlds
- LGBTI Inclusion
- Youth Perspectives
- Multidimensional Me
- Next Gen Parenting
- Digital Identity and Privacy
- Social Media and Self-Expression
- Cross-cultural Interactions and Global Citizenship
- ...

Changing Nature of Work & Skills

- Digital Fluency and STEM Skills
- Automation and Job Redefinition
- Inclusive Labour Markets
- Lifelong Learning Pathways
- New organisations of work
- Purpose driven work
- Well-being in the workplace
- ...

Technology Acceleration & Convergence

- Artificial General Intelligence
- Ethical Implications of Emerging Technologies
- Cross-disciplinary Technology Integration
- Technology & inequality
- Nanotechnology & Advanced Materials
- Greater emphasis on understanding technology
- Robots are becoming scalable
- ...

MEGATRENDS & KEY TRENDS

Changing Geoeconomics & Geopolitics

- Expanding influence of East and South
- The battle for democracy intensifies
- Increasing influence of new governing systems
- Economic Sanctions and Trade Wars
- Energy Diplomacy
- Technology Competition
- Global Health Diplomacy
- ...

Globalization

- Connected World
- Increasing fragmentation of globalisation
- Digital Globalization and E-commerce
- Global Supply Chain Dynamics
- Cultural Exchange and Globalization
- Increasing significance of migrations
- ...

Cities & Urbanization

- Urban resilience as a new normal
- Escalating green action in cities
- Urban Governance through networks and groups
- Smart Cities and IoT Integration
- Urban Agriculture and Food Systems
- Sustainable Urban Mobility
- New Frontiers
- ...

Climate Change & Environmental Impacts

- Anthropogenic Environmental Damage
- Emerging Regenerative Paradigm
- Established practices are questioned
- Negative impacts increase
- Outside planetary boundaries
- Climate Migration
- Environmental Justice and Equity
- ...

Transition to Clean Energy & Energy Reversal

- Building Energy System Resilience
- CO2 Capture, Utilization, and Storage
- Electrification of Everything
- Energy Storage and Grid Modernization
- Re-mapping Energy Geopolitics & Governance
- Sustainable Urban Energy Systems
- Energy Poverty and Accessibility
- ...

Social Welfare & Inequalities

- Beyond the Welfare State to Basic Income
- Fiscal Policies to Support Social Protection
- Labour Market Participation
- Reasons for Welfare and Social Protection
- Weakening of human rights
- Welfare Models and Critiques
- Universal Health Coverage
- ...

Changing Security Paradigm

- International Security
- Peace and Resilience
- Cybersecurity
- Disarmament
- Future battlefields
- Nuclear Security
(Confidential)

Ageing, Longevity & Demographic Changes

- Global population is growing
- An ageing world
- Aging Reinvented
- Financial Security and Ageing
- Intergenerational Workforce Dynamics
- Age-friendly Urban Design
- Healthcare and Long Lives
- ...

Water Challenges

- Water: our most vital resource
- Better management of water
- Clean Water and Sanitation
- Agriculture and Water Impact
- Water Security and Conflict
- Urban Water Management
- Desalination Technologies
- ...

Oceans & Natural Resources

- Human Well-Being and the Ocean
- Impacts of climate change on the ocean
- Emerging Ocean Technologies
- Deep-Sea Mining and Exploration
- Access to food
- Aggravating resource scarcity
- New sources of resources
- ...

TRENDS

- A trend is a pattern of gradual change in a condition, output, or process, or an average or general tendency of a series of data points to move in a certain direction over time, represented by a line or curve on a graph. (OECD)
- Trends are large-scale, long-term shifts in social, economic, technological, environmental, or political conditions that influence a wide range of activities, processes, and perceptions. (European Environment Agency).
- A Trend Is a direction towards which an industry or market Is moving. A Trend can be understood as a significant development of one or more variables in the same direction and constant over a certain period of time. Compared to so-called "fashions" or "hypes", trends last at least five years and have a significant impact on the corporate environment. A trend exists outside of the company and independently from it. (Itonics)

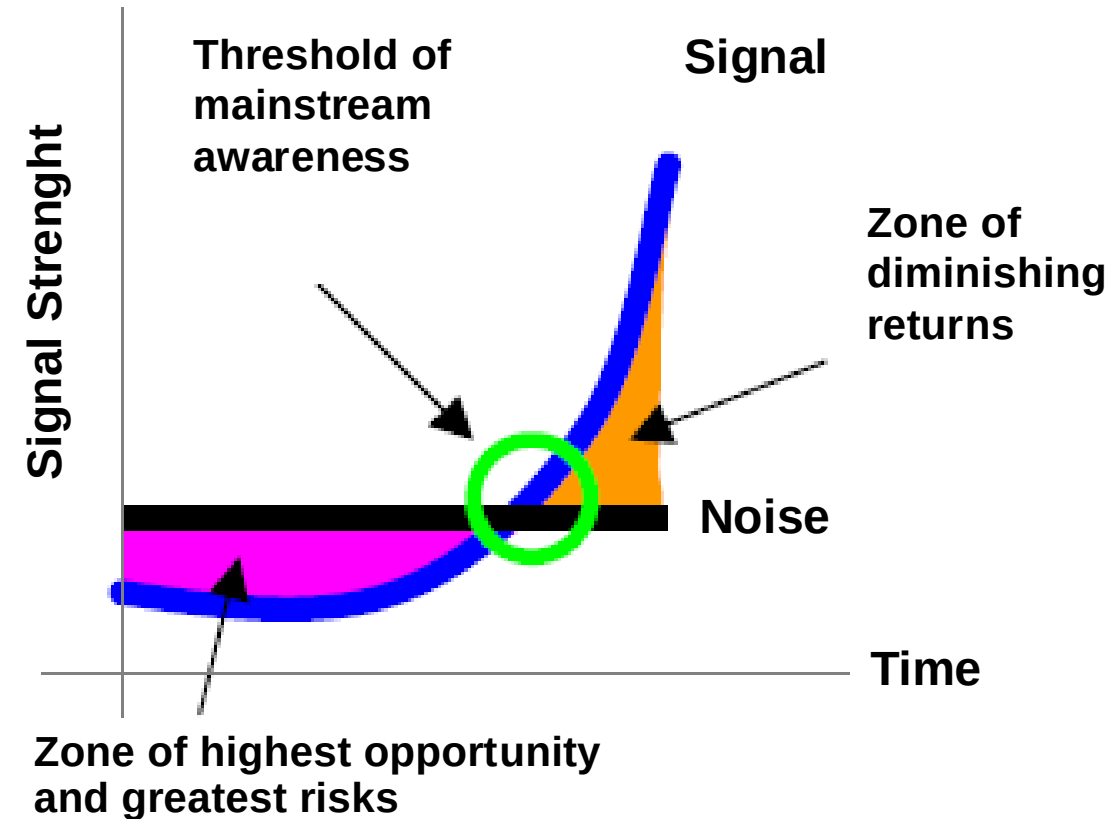
Weak Signals



WEAK SIGNALS

Weak signals are those ambiguous and controversial bits of information about the competitive environment that are typically hidden among the "noise" of the prevailing sense making paradigm and that gradually coalesce to form a pattern of intelligence that alerts sensitive leaders that it may be time to change their game.

Amplification of the Signal on a Channel with Noise



Source: Coffman, 1997.

WEAK SIGNALS EXERCISE

(This exercise will allow you to identify weak signals – the first indicators of a potential change)

1. In groups, consider what thing, phenomenon or event has recently surprised you, astonished you or seemed far-fetched or unbelievable. It could be, for example, a form of technology, a regulation, a political action, a business model, some civic action, the results of a study, a product or service, an idea, an invention, experiment or opinion.
2. Write down your observations and compare to see if there are any common themes.
3. Select one theme or one signal and discuss what would happen if what it describes were to become a part of daily life. What would potentially happen next and what would the consequences be?
4. Based on the discussion, formulate a “What if...?” question, which will stimulate a new way of thinking.

EXAMPLE

One group identified several signals, of which we thought the following were somehow related to one another:

- Saudi Arabia granted human rights to a robot
- Film stars are including details in their wills of how virtual versions of them can be used
- Robot strippers at the CES exhibition in Vegas
- Entertainment shows discuss artificial intelligence rights (e.g. *Westworld*, *The Good Place*, *Black Mirror*)

It became apparent in the discussion that all the signals were about **how the increasing prevalence of artificial intelligence and robots, in addition to the increased use of digital platforms, are changing our perceptions of what humans are**. It is increasingly common to think of humans as a mass of data and to give data masses or machines human-like traits.

The following questions were formulated based on the discussion:

- What if machines were commonly given human rights?
- What if the character and health of a person is defined based on the data available in the information networks?

Next: utilising weak signals

1. Weak signals can be used to construct a vision that supplements trend analysis.
2. Weak signals help one to recognise what types of surprises may occur along the way.
3. “What if?” questions can also be used to challenge existing visions and to highlight their different aspects.

WILDCARDS

Think the
Unthinkable



WILDCARDS

Think the Unthinkable

The
Economist

Britain after Brexit

Trump's one-sided peace plan

Private markets—a dangerous obsession

The problem with puberty blockers

FEBRUARY 15TH-21TH 2020

How bad will it get?



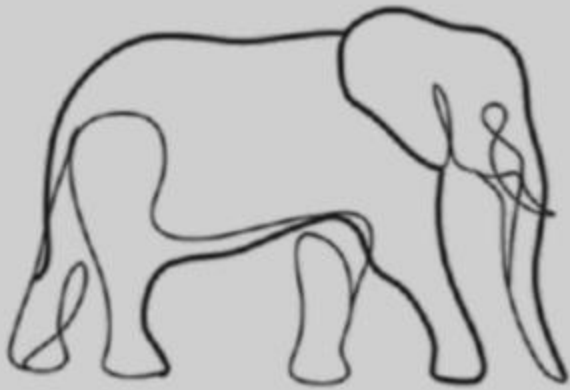
INSIGHT &
FORESIGHT

WILDCARDS

- "A wildcard is a future development or event with a relatively low probability of occurrence but, if it were to occur, would have a high impact" (Petersen).
- "Wildcards are events or developments that have a low likelihood of happening but, if they did happen, would have a huge impact on our world" (Mendonça et al).
- "Wild cards are low-probability, high-impact events that are difficult to predict in advance." (Wilson)

WILDCARDS

Discontinuities and sudden events with a low probability of occurrence, high impact and unexpected character.



BLACK ELEPHANT

Extremely likely and widely predicted events that are usually ignored by the society



BLACK SWAN

Events totally outside and way beyond our observations



BLACK JELLYFISH

Things we think we know and understand but which turn out to be more complex and uncertain than we expected

UNCERTAINTIES

UNCERTAINTY

Uncertainties are driving forces that point to alternative and contrasting evolutions.

CRUCIAL UNCERTAINTIES

Importance/Relevance (strong potential impact) to the FOCUS

Relative Independence

High level of Uncertainty

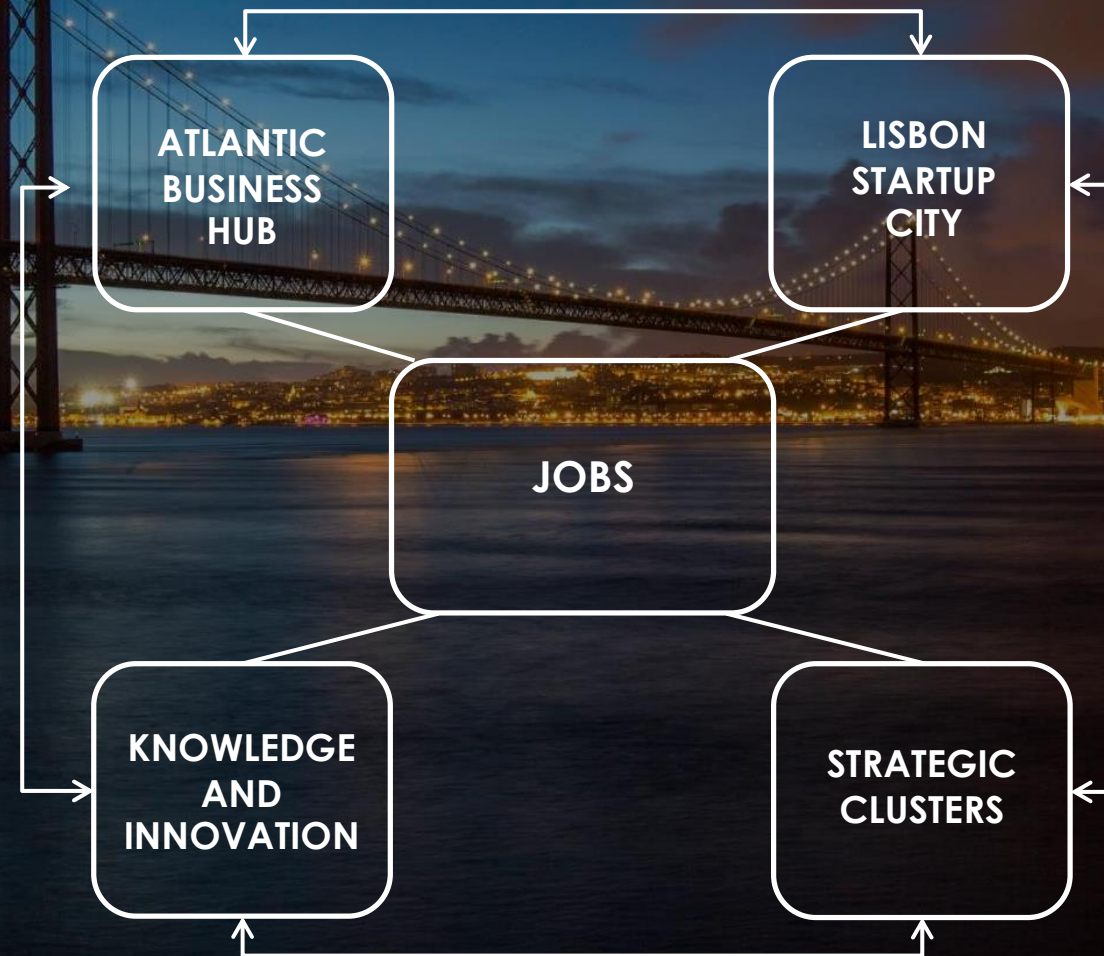
Critical forces with a high level of uncertainty and strong impact in the strategic focus. Crucial Uncertainties are the basis for the construction of Scenarios.



LISBON

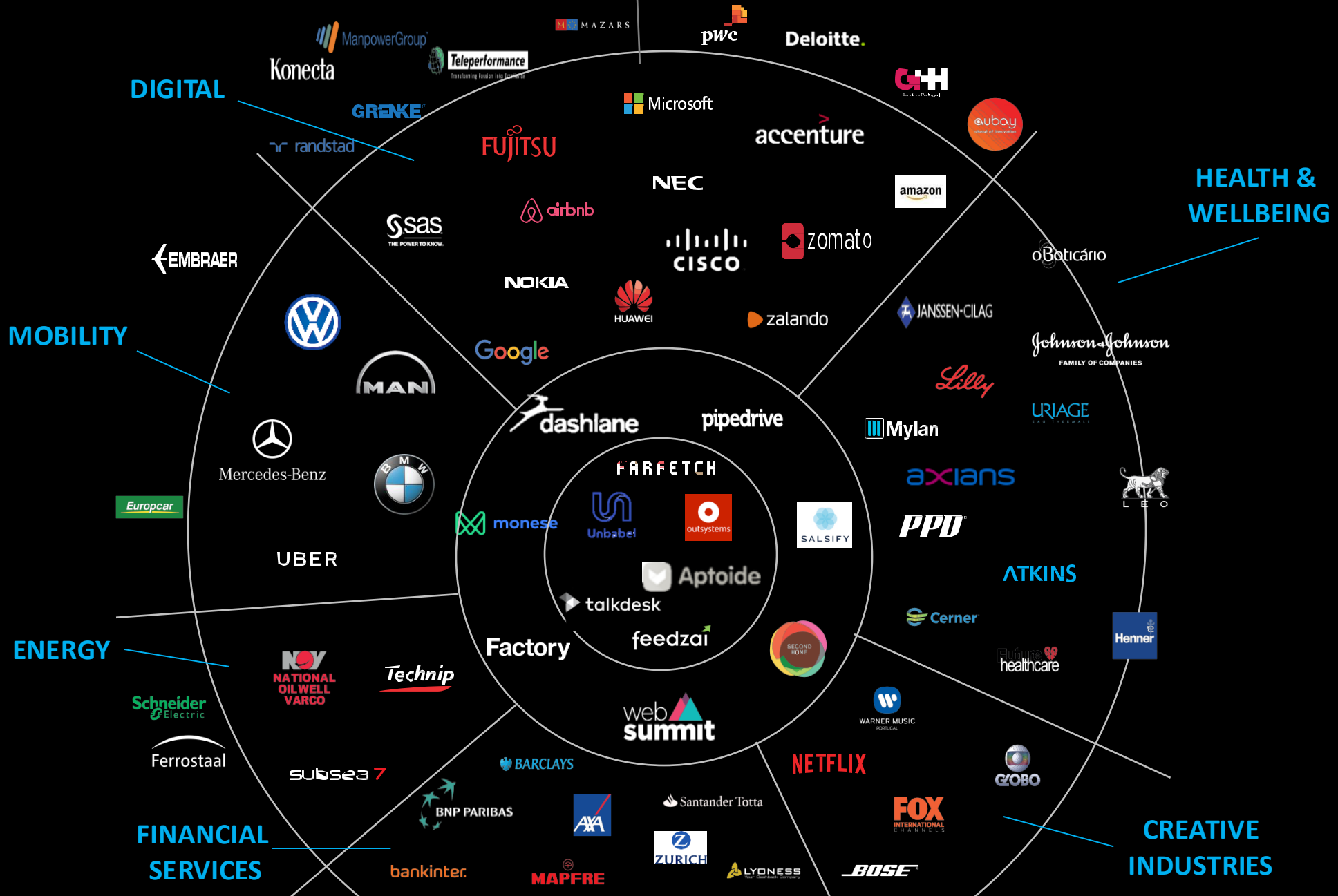
A Case Study

STRATEGY



Lisbon: an attractive city for global corporations, fast growing startups and innovative projects

2018



LISBON: A GROWING ENTREPRENEURIAL ECOSYSTEM

www.madeoflisboa.com



INCUBATORS

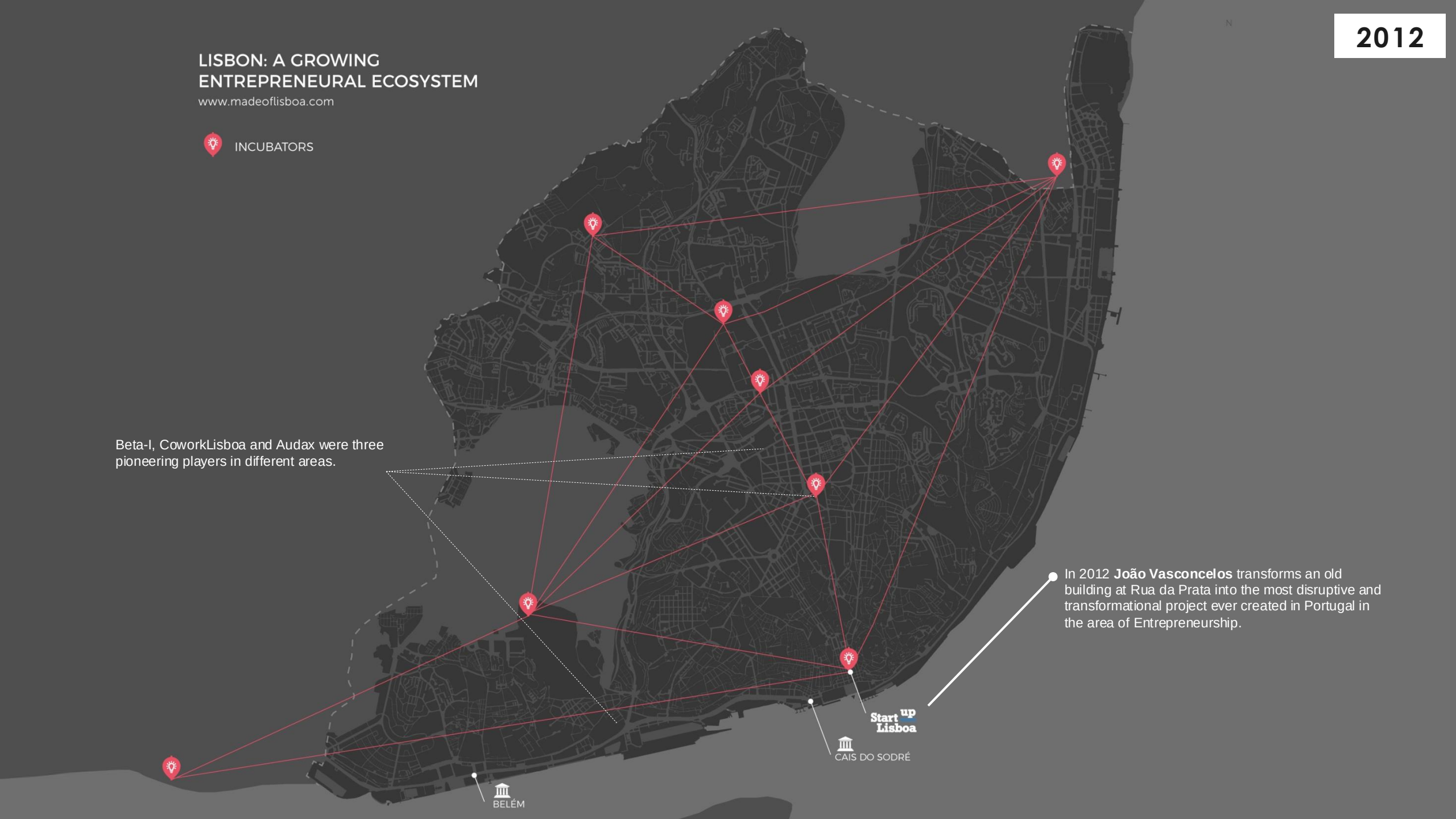
Beta-I, CoworkLisboa and Audax were three pioneering players in different areas.

In 2012 **João Vasconcelos** transforms an old building at Rua da Prata into the most disruptive and transformational project ever created in Portugal in the area of Entrepreneurship.

Start up
Lisboa

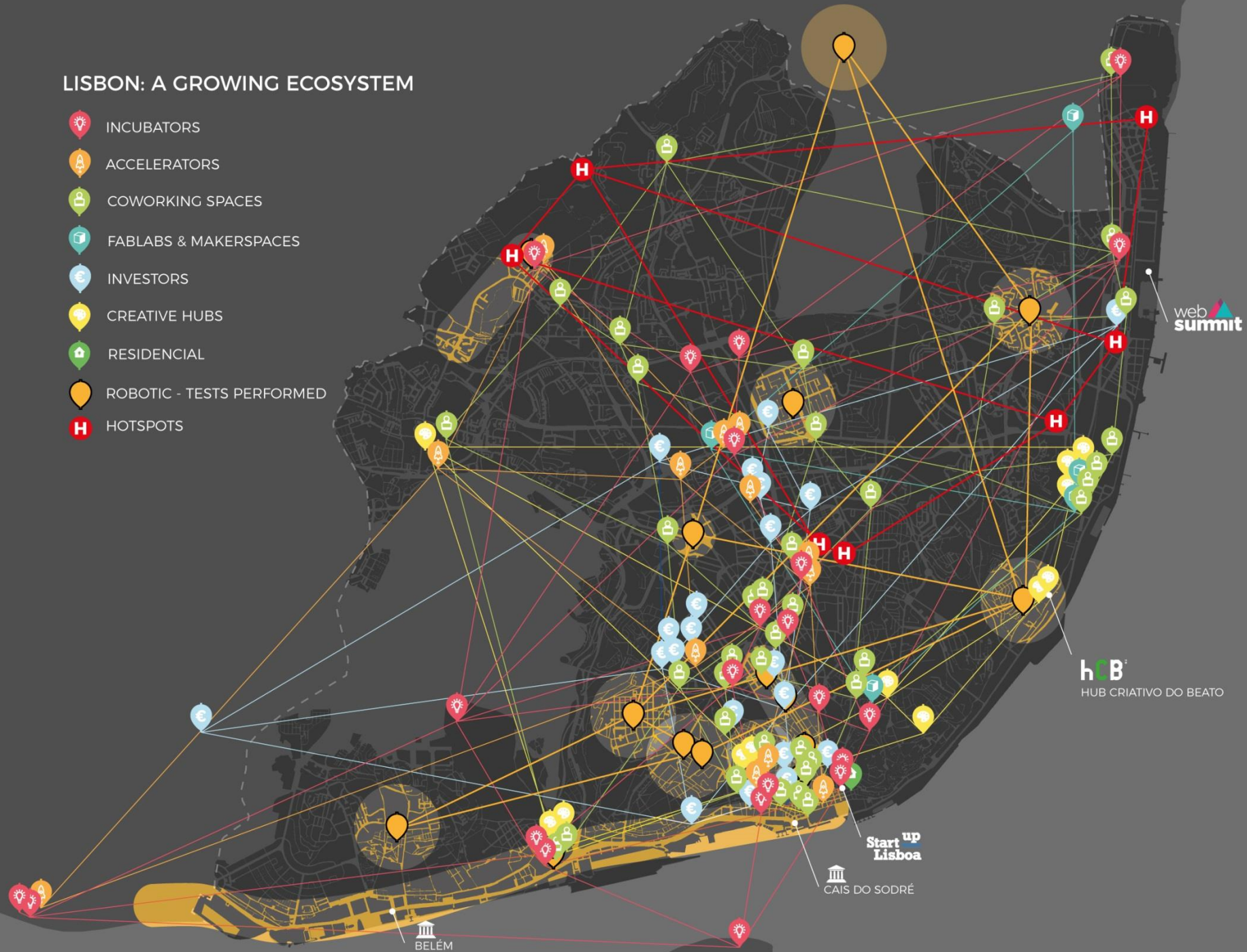
CAIS DO SODRÉ

BELÉM



LISBON: A GROWING ECOSYSTEM

- INCUBATORS
- ACCELERATORS
- COWORKING SPACES
- FABLABS & MAKERSPACES
- INVESTORS
- CREATIVE HUBS
- RESIDENCIAL
- ROBOTIC - TESTS PERFORMED
- HOTSPOTS



Scanning, Sensing and Acting ©

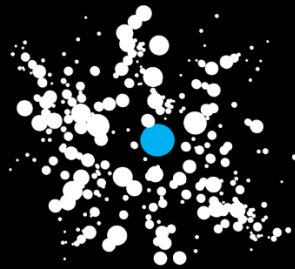
**A powerful strategic foresight framework for
organisations to think and act on the future**

SCANNING, SENSING AND ACTING

DESIGNING AND PREPARING THE PROJECT



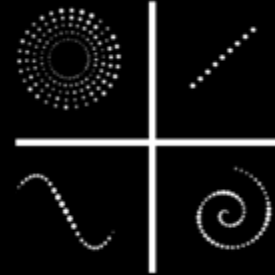
DEFINING THE
STRATEGIC FOCUS
& TIME HORIZON



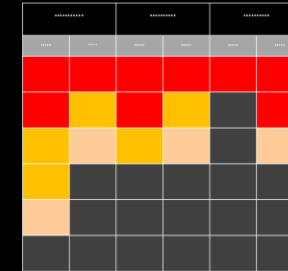
GLOBAL &
COMPETITIVE
SCANNING



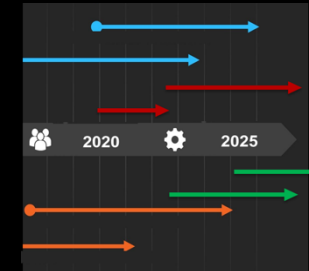
SCANNING
TO THE CORE



SCENARIOS FOR
THE FUTURE



EXPERIMENTING
PROJECTS &
STRATEGIES



STRATEGIC
ROADMAP

SCANNING, SENSING AND ACTING

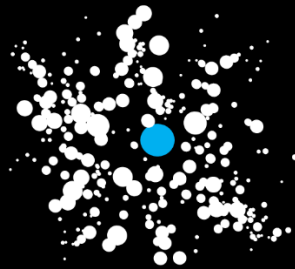
DESIGNING AND PREPARING THE PROJECT

Profiling the Company & Area, Decision Makers and Key Stakeholders | Defining the Rationales & Objectives | Selecting the Project Team and Experts | Setting-up the work environment



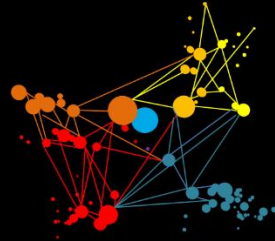
DEFINING THE STRATEGIC FOCUS & TIME HORIZON

- Select the Strategic Focus and the Time Horizon
- Collect and consolidate internal views on key driving forces, opportunities and challenges that lie ahead.



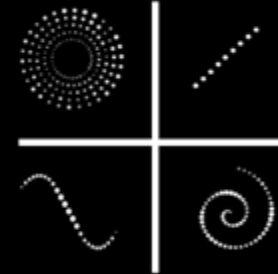
GLOBAL & COMPETITIVE SCANNING

- Identification and analysis of driving forces using databases, industry reports, patents, competitors, clients, market data & reports
- Initial interviews as critical inputs.



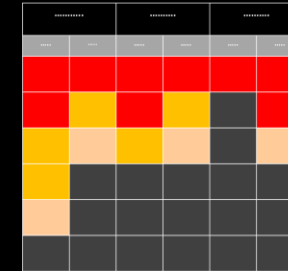
SCANNING TO THE CORE

- Select and categorize Trends, Wild Cards, Weak Signals, and Uncertainties.
- Co-create a Scanning Dashboard to map all the data and insights.
- Describe the building-blocks of the current strategy.



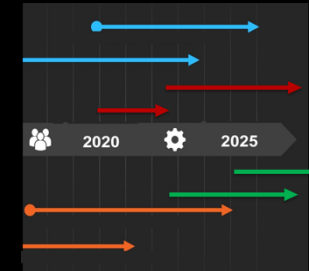
SCENARIOS FOR THE FUTURE

- Explore key driving forces and select Critical Uncertainties
- Build the Scenarios "Structures"
- Flesh-out and describe the Scenarios
- Identify and evaluate strategy alternatives.



EXPERIMENTING PROJECTS & STRATEGIES

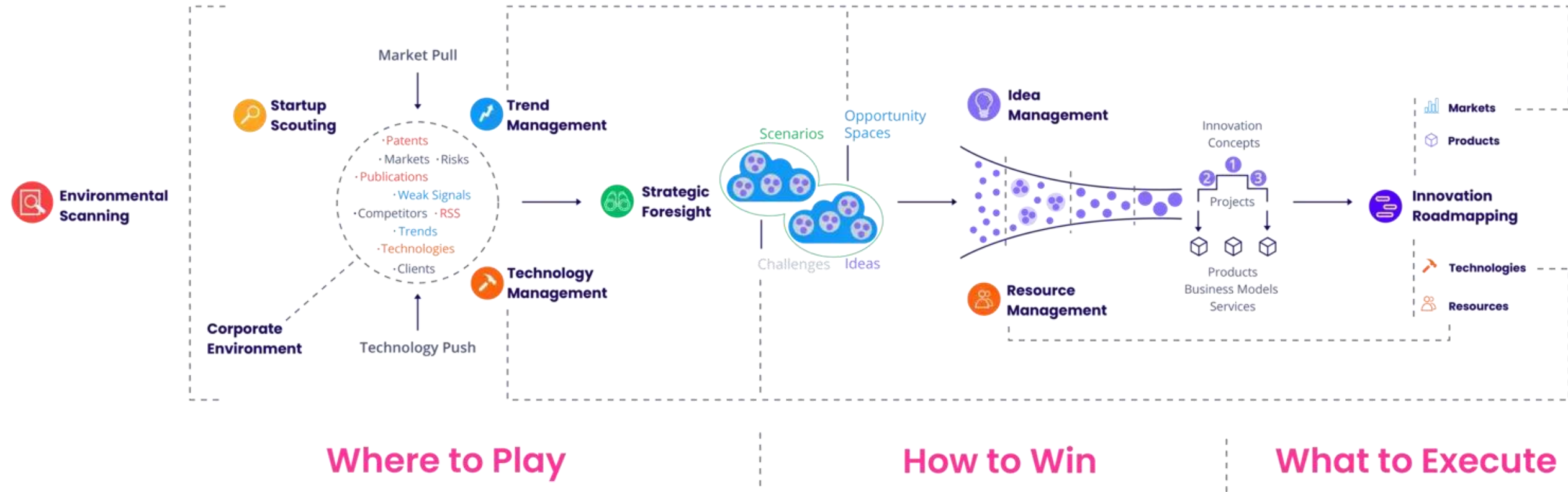
- Identify key stress factors and opportunities the company will face in the Future
- Explore and Probe Options and Strategic Responses.
- Prepare for future ecosystems and value network shifts



STRATEGIC ROADMAP

- Setup the implementation of the selected strategy
- Envision what key projects should look like in the future

ITONICS Innovation Operating System



FORESIGHT ACTION FRAMEWORK

FORESIGHT ACTION SERVICES (Training, Research, Mentoring, ...)

SCOPING

HORIZON
SCANNING

DEEP DIVES

SCENARIOS FOR
THE FUTURE

POLICY OPTIONS
STAKEHOLDERS
DIALOGUES

ROADMAPPING

REPORTING &
COMMUNICATION

CONTINUOUS SCANNING DATABASE

FORESIGHT TOOLBOX

CO-CREATIVE AND PARTICIPATORY APPROACH

FORESIGHT ACTION PRINCIPLES