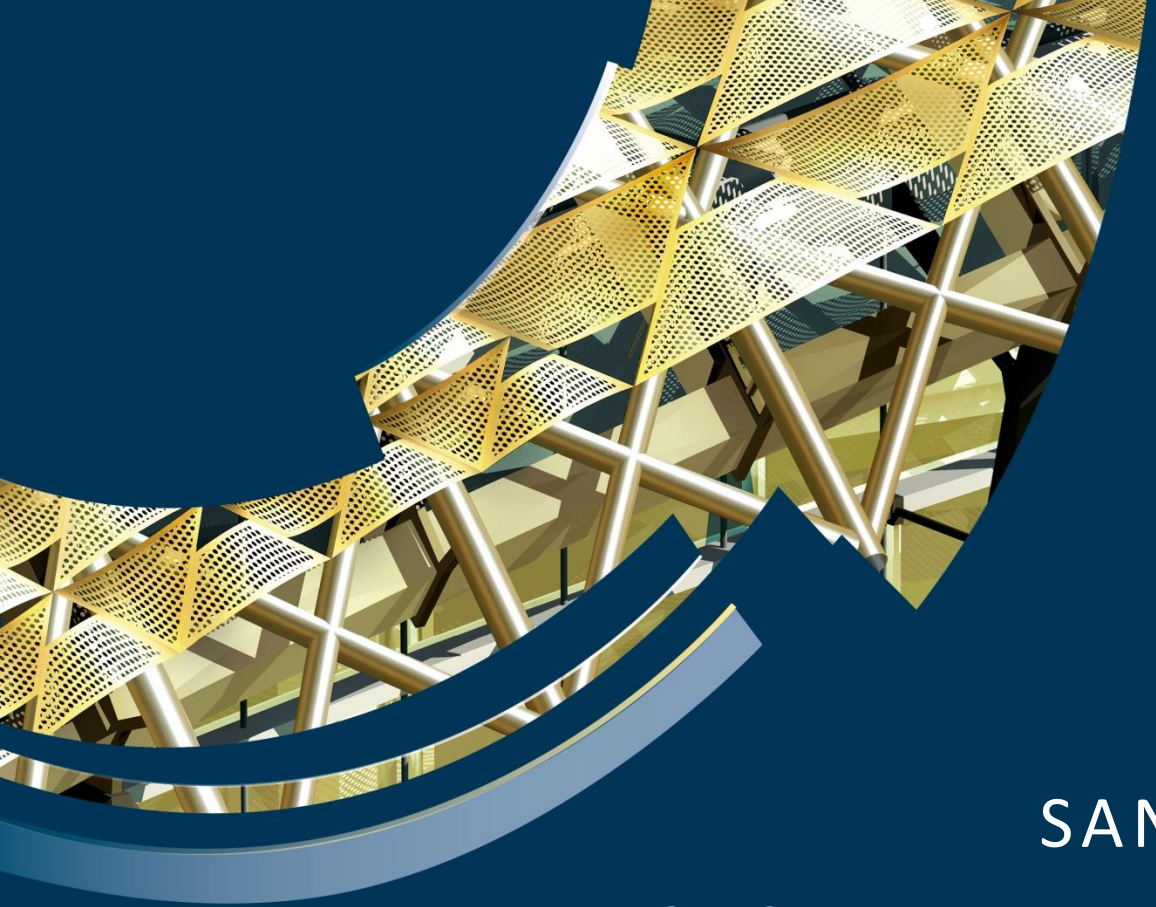


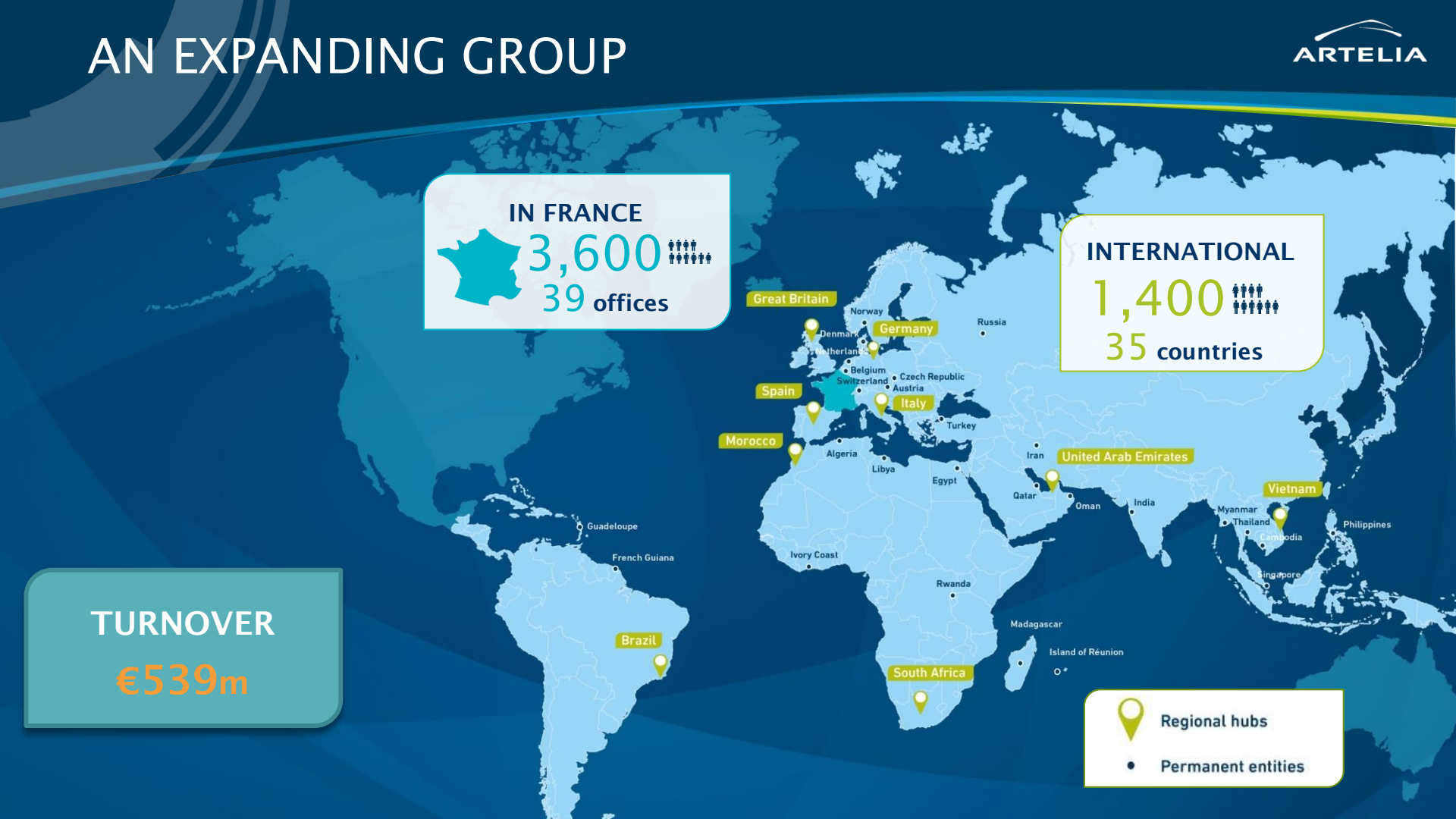
ARTELIA

Passion & Solutions

SANTIAGO DESEADO

SUSTAINABLE CITY SIMULATOR

AN EXPANDING GROUP



ARTELIA & ARTELIA INDIA

COTEBA GROUPE ARTELIA — 2011 — SOGREAH GROUPE ARTELIA

ARTELIA

BUILDING & INDUSTRY | WATER & ENVIRONMENT | URBAN & TRANSPORTATION | INTERNATIONAL

BUILDING CONSTRUCTION | MULTI-SITE PROJECTS | INDUSTRY | WATER | MARITIME | ENVIRONMENT | ENERGY | TRANSPORTATION | URBAN DEVELOPMENT | ARTELIA INDIA (MUMBAI OFFICE)

OUR BUSINESS LINES

Comprehensive assistance

from design through to works implementation

- Engineering
- Project management
- Consultancy

Comprehensive services to guarantee success for the projects

- Turnkey projects – Public-Private Partnerships – EPC

Comprehensive clientele

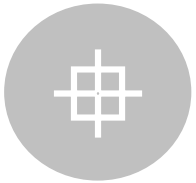
dealing equally with private and public clients

- Public clients & private clients

Urban Projects and Transportation : our expertise

Project Management

Contract & financial advisory



Masterplan

Feasibility studies

System & rolling stock

Infrastructure design

Tunnels & bridges

Traffic management

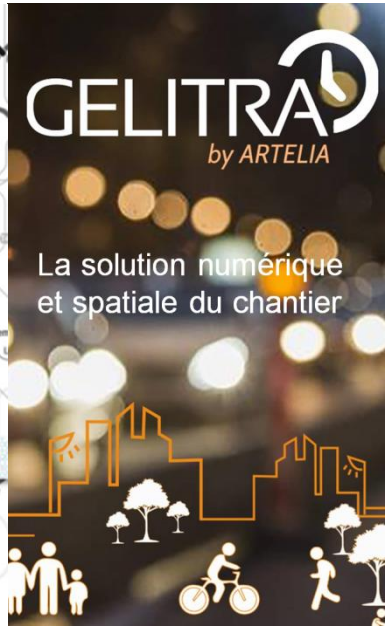
Smart and sustainable city

Governance & ICT

Intermodality & smart ticketing

Outdoor places & urban integration

CONTINUOUS INNOVATION



- Creator of **GELITRA**, solution for urban siteworks fleet management for the Greater Paris project
- Design and Construction supervision of the **LILLE CHASSIS DYNAMOMETER**, a world premiere
- **« SANTIAGO DESEADO » SUSTAINABLE CITY SIMULATOR**, demonstrator of french sustainable city management know-how

STGO des3aDo

TRÉSOR
DIRECTION GÉNÉRALE

vivapolis

SANTIAGO
Ilustre Municipalidad

Simulateur Santiago Des3aDo

ARTELIA

VEOLIA

as. ARCHITECTURE-STUDIO

ARTE CHARPENTIER ARCHITECTES

a

SIRADEL

Members of the consortium and respective roles

Artelia, lead firm in a consortium of engineering & architecture firms

Engineering-studies
Eco-design of urban development and services
Coordination of urban engineering,
Modelling of performance levels

ARTELIA
Leading independent French engineering group. 3500 employees - 40 branch offices outside France.
=> Design of cities on any scale and regarding all components, around the world: engineering for urban development and services

Architecture & Urban planning
Strategy and territorial analysis / Urban and architectural project

ARCHITECTURE STUDIO
12 associate architects – 220 employees. Many major international references
⇒ ***Design and promotion of French-style cities***

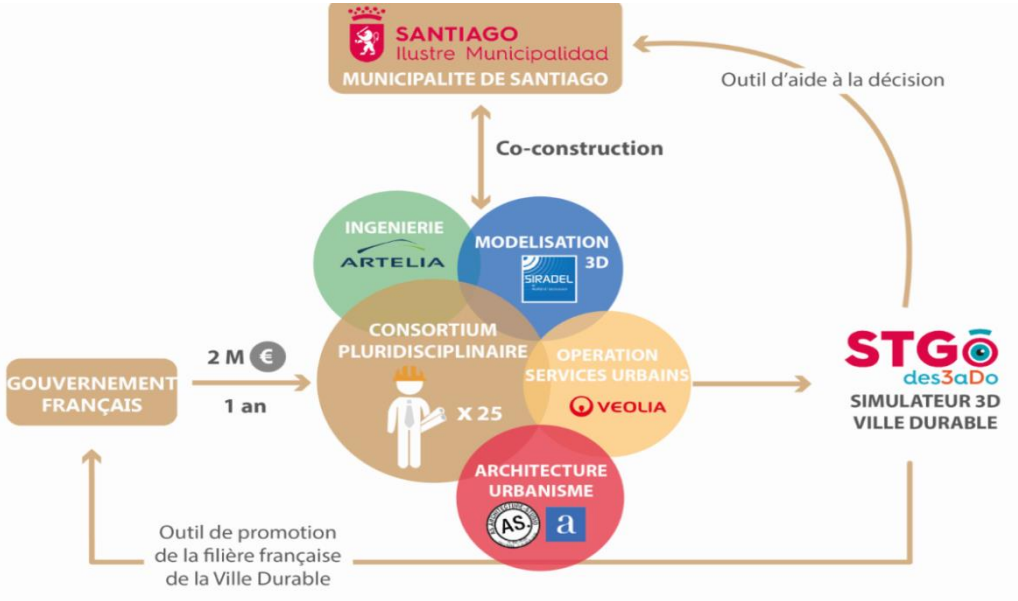
ARTE CHARPENTIER
20 associate architects – interior designers – town planners – landscape architects - 100 employees
⇒***Research and creativity at the service of man and his environment, extensive experience in urban planning projects***

Digital mock-up & 3D Interface
Acquisition of data, processing and visualisation.
Planning of radio networks

SIRADEL
Independent SME - Rennes - Toronto - Shanghai – 55 employees. Turnover: €5m - 250 key accounts - 60 countries – 100 partners.
⇒ ***Creation of 3D data and design of software***

Major industrial group
Innovative technical solutions

2Ei
Design office benefitting from the operational experience of Veolia Group operating teams
=> Consultancy services in waste management, energy

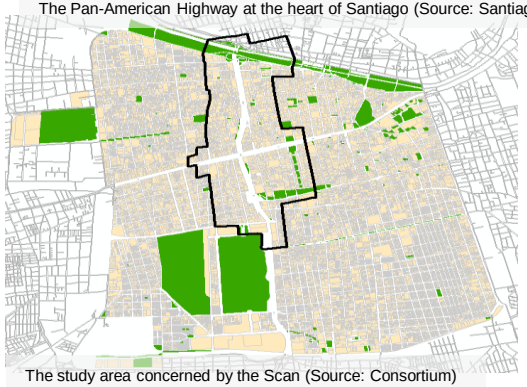


Context: challenge of revitalising Santiago's city centre bisected by the Pan-American Highway

The Pan-American highway running through the Americas (Source: Almanaque grafico mexicano)

An immersion in the **historic centre of Santiago's Metropolitan Region**: an urban project to improve quality of life and make the city centre more dynamic

The Pan-American Highway at the heart of Santiago (Source: Santiago Municipal Council)

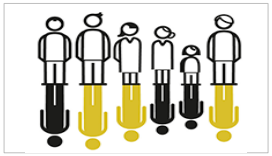


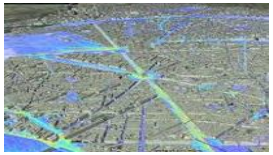
The study area concerned by the Scan (Source: Consortium)

Scope of study: Project area measuring 350 ha (black outline on the map opposite), bisected from north to south by the Pan-American Highway (drawn in white), located at the heart of Santiago municipality (310,000 inhabitants, 23 km^2 – coloured area on the opposite map), the historic heart of the Metropolitan Area (7 million inhabitants)

Design of a sustainable urban development framework:11 key components for sustainable cities

Artelia has set up an analysis framework based on existing SD frameworks: the 11 key components for sustainable cities

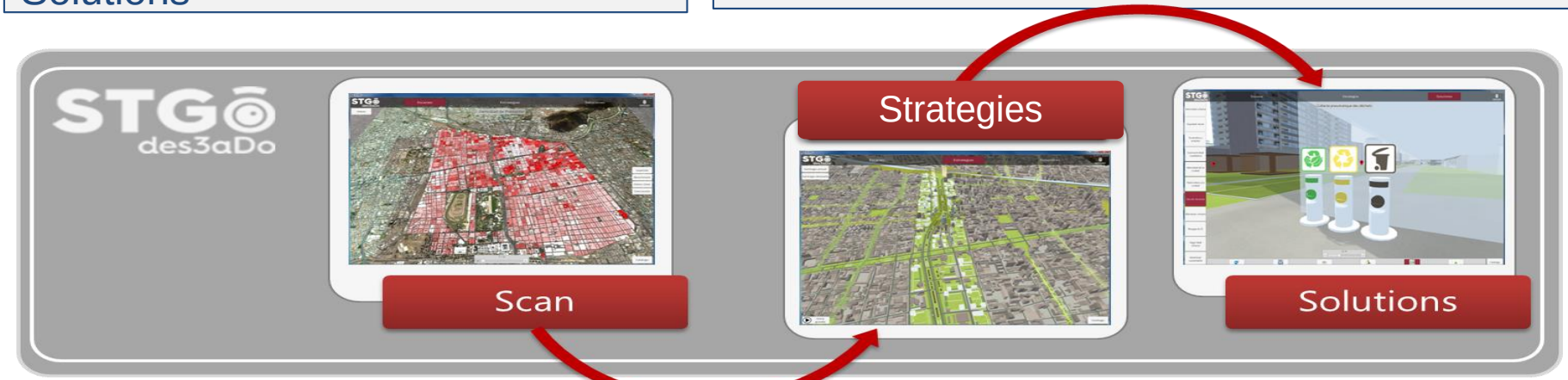
URBAN DENSITY	SOCIAL EQUITY	ECONOMY & JOBS	URBAN CONNECTIVITY	CULTURAL IDENTITY	NATURE IN THE CITY
Optimise urban density	Promote social equity	Develop the economy and jobs	Connect city-dwellers and new technologies	Promote cultural identity	Bring nature into the city
					

USE OF RESOURCES	QUALITY OF LIFE	NATURAL HAZARDS & CLIMATE CHANGE	URBAN SAFETY	SUSTAINABLE MOBILITY
Promote sustainable use of resources	Minimise urban environmental pollution	Address natural hazards and climate change	Develop a sense of security among city-dwellers	Organise active and sustainable mobility
				

Our entire approach is based on a **a study framework** consisting of the **Key components of Sustainable Cities**. These key components have been designed as strategic keys for understanding current urban challenges. They are cross-disciplinary and universal, and can be used to analyse any city.

An approach developed using 3 main phases: Scan, Strategies, Solutions

Artelia supervised the development of the software based on a process developed specifically to design sustainable cities.



THE SCAN

An **understanding of challenges and the ambitions of a city is** acquired by conducting an analysis of the territory based on this framework for a **Sustainable City.**

For each one, a set of geo-referenced 3D indicators was defined. The **"scan" of the city** also enables Santiago's current situation to be compared with that of other major cities around the world.

THE STRATEGIES

The scan is a way of identifying the key issues facing the area and of defining the outlines of a zone for the **urban development project.**
In Santiago, the urban project addresses a strategy aimed at **revitalising the city centre by covering up an urban highway.**
The simulator is used to visualise the project and its alternatives and to assess the impacts on the key sustainable city components.

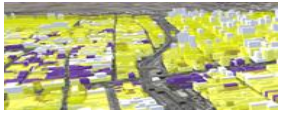
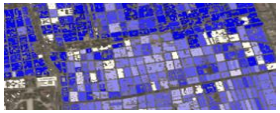
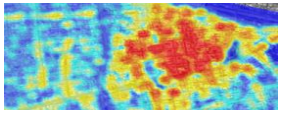
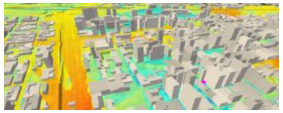
THE SOLUTIONS

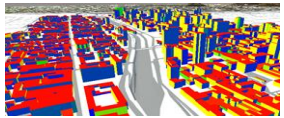
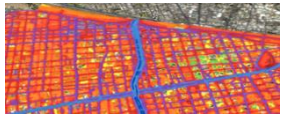
To translate these strategies into concrete actions, solutions for making choices regarding urban, technological, consultation, engineering, infrastructure resources and services are proposed and materialised in the digital mock-up of the urban project.

The simulator then becomes a **real showcase for French know-how.**

The scan: allowing everyone to understand the challenges currently facing cities

Results of the scan: 68 geo-referenced indicators in 3D, broken down into 20 sections that characterise the 11 key components for Santiago to become a Sustainable City

URBAN DENSITY	SOCIAL EQUITY	ECONOMY & JOBS	URBAN CONNECTIVITY	CULTURAL IDENTITY	NATURE IN THE CITY
Urban density can be increased if quality of life is maintained	High inequality at the metropolitan level, but also municipal level	Uneven distribution of jobs	Antennas unevenly distributed although many households own mobile phones	Protecting and promoting architectural and cultural heritage, and facilitating access to cultural & leisure facilities	Scarce and unevenly distributed green areas
					

USE OF RESOURCES	QUALITY OF LIFE	RISKS & CLIMATE CHANGE	URBAN SAFETY	SUSTAINABLE MOBILITY
Scarce water resources, heavy reliance on fossil fuels and nearly non-existent recycling	Quality of life harmed by strong increase in environmental pollution	Increased risks due to climate change	Strong sense of insecurity inside the safest conurbation in Latin America	Car-centred mobility and a vital need to organise and revitalise alternative modes of transport
				

The strategies: design of an urban project based on the understanding of challenges combined with the city's political ambitions

The design of a sustainable city based on the relevant challenges provides a vision for the future of the city based on strategic directions. It sets the objectives that will serve as foundations for any future urban proposals and works:

- Redevelop a network of green corridors
- Generate multimodal hubs
- Exploit new land

Design an urban project that accommodates all the ambitions by covering the central highway, which splits the city at its core.

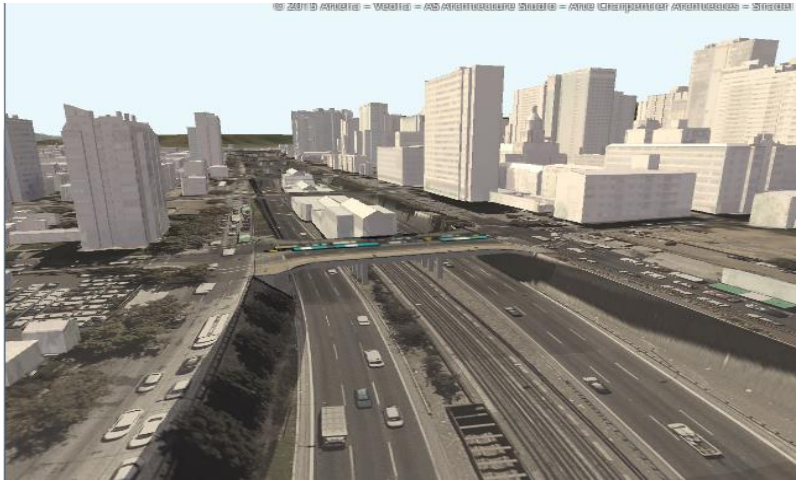
Redeveloping a network of green corridors (Source: Simulator)

	AMBITIONS		
	REVITALISE THE CITY CENTRE	REDUCE DISCREPANCIES & INEQUALITIES	MANAGE THE USE OF NATURAL RESOURCES
MAIN OBJECTIVES	Densify urban areas	Develop equitable access to services	Set up low-consumption urban services
	Develop economic activities that promote the cultural heritage	Develop and connect cultural and green areas in the city	Promote recovery of urban waste
	Create new centres around transport hubs	Promote local connectivity and mobility	Exploit the city's renewable energy potential

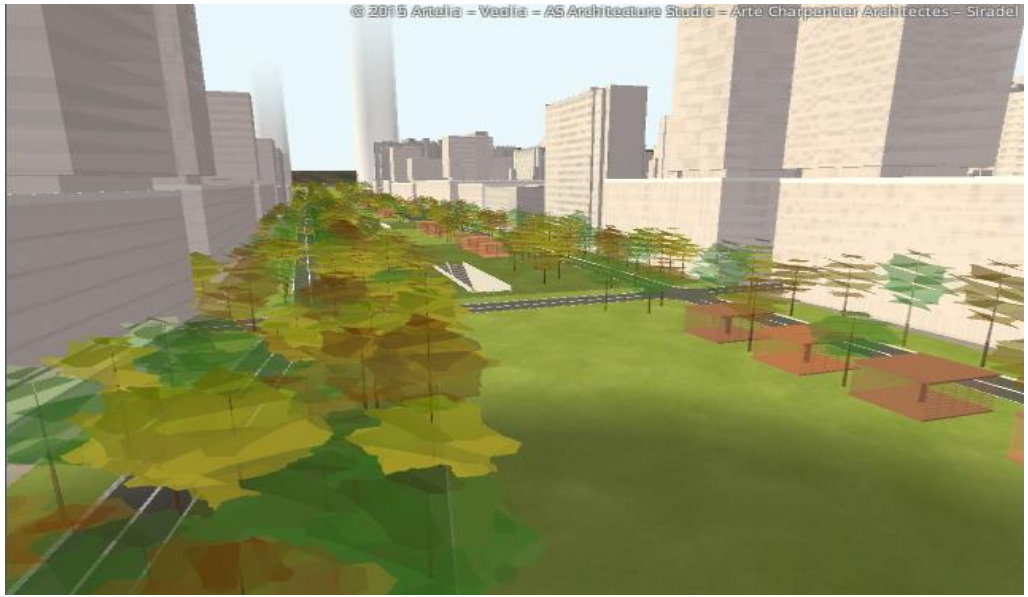
The Strategies: allow everyone to visualise and understand the changes

A “before/after” picture of the urban development project to facilitate consultation and decision-making

Current view of the Santa Ana metro station on the same axis as the Pan-American Highway (Source: Simulator)



Picture of the Santa Ana metro station in the “desired” Santiago, Santiago deseado (Source: Simulator)



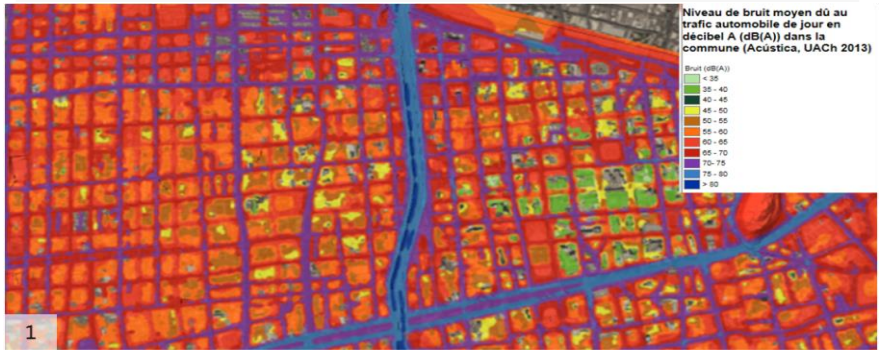
The Strategies: assessment of project impacts on the main indicators compared to the current situation

How does the project impact the indicators for the 11 key sustainable city components, the current performance levels of which have already been assessed?

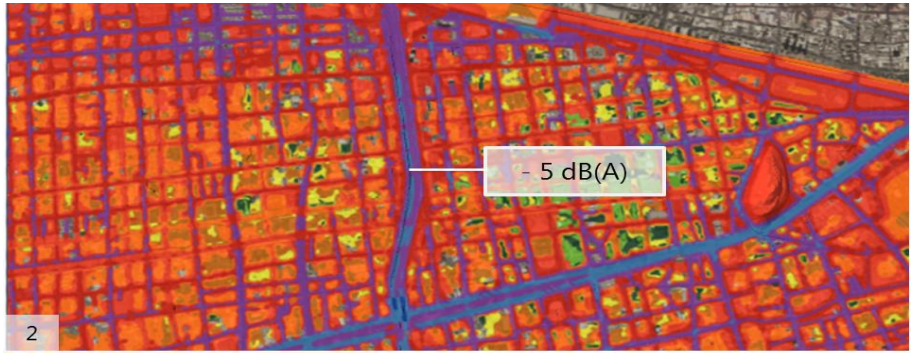
We suggest using an assessment system that shows the benefits of the development options designed with regard to the 11 key sustainable city components.

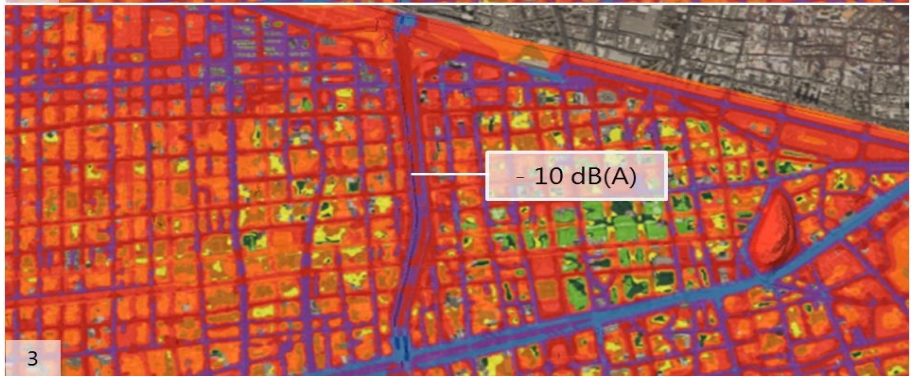
The pictures opposite are an example of traffic-related noise levels around the north-to-south highway, which are extremely high (blue line on the first image), and would be reduced by projects to cover the highway and other developments proposed (next pictures)

Indicateur Qualité de vie : 'Niveau de bruit du au trafic routier ' :
(1) Niveau actuel - Scan, (2) Evaluation Après - Option 1 et (3) Evaluation Après - Option 2



The assessment of urban strategies using engineering methods: "before/after" representations of urban and environmental issues





The Solutions: make a connection with the concrete, innovative solutions for the city

Materialisation of the strategies for the city

Technology, infrastructure and services

Implementation of the solutions in the context of the urban project

Technical and contextualised analysis of proposals

Key figures:

70 solutions for sustainable cities represented graphically in the 3D digital mock-up of Santiago and
broken down into
40 sets of coherent solutions that meet the challenges regarding the
11 key components for sustainable cities in direct connection with
200 products and services proposed by
130 French companies

A range of innovative solutions to implement in Santiago: pneumatic collection of waste, introduction of tramways in the transport network, etc.

Examples:

- **Rationalisation of water use**: solutions to collect stormwater and recycle water (on the scale of a district and building)
- **Management of urban solid waste / recycling**: in the communities, by bringing together services from municipalities and private private companies
- **Solutions to save energy**: photovoltaic power for lighting and other sources of electricity
- **Solar thermal energy**: solar panels to heat domestic hot water

…

The Solutions: promoting French solutions for overseas contracts throughout the urban project life cycle

(1) And **(2)**: the tramway solution is incorporated into the district study for which a 3D mock-up was developed

All the solutions are integrated into the mock-up but remain generic. They represent a concept, a method or a skill for the city.

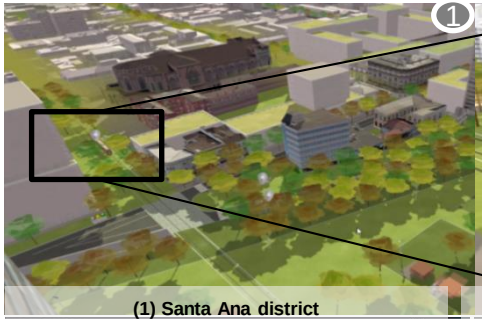
(3) A **technical data sheet** describes the generic solution (design > operational aspects)

- An introduction to the solution, its principles and operation
- The benefits associated with implementing this solution with regard to the 11 key components of a Sustainable City
- A qualitative or quantitative assessment of the impact on the key components of a Sustainable City and the possibility of visualising the impacts on a 3D map
- A expert's appraisal of the solution
- Application examples supported by benchmark figures
- A link towards proposals from French companies

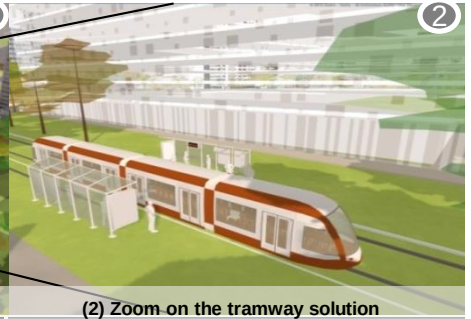
(4) A **commercial fact sheet** from a company describes a precise solution

- Presentation of the company
- Presentation of the solution proposed
- References

The solutions analysed, integrated and explained by Artelia: the example of the tramway to promote sustainable mobility



(1) Santa Ana district



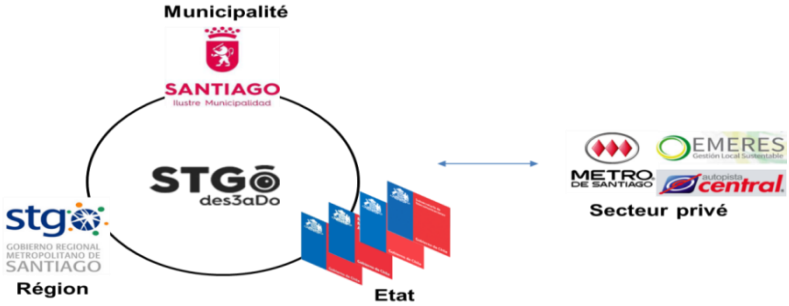
(2) Zoom on the tramway solution

(3) Fiche technique pour la solution tramway

(4) Fiche solution Entreprise ARTELIA /tramway

Strong interest from public authorities and buy into the project from city council teams

Assisting a public project owner to convey the political messages behind its vision of the city of tomorrow: interested members of Santiago Municipal Council.



The simulator is also an opportunity to bring together a large number of public decision-makers around a shared message and vision to guarantee a successful outcome for the sustainable urban development project. It is also an opportunity for discussions with influential players in the private sector.

A SUSTAINABLE CITY SIMULATOR FOR INDIAN CITIES ?

French smart city club

Smart City
MISSION TRANSFORM-NATION