indra
Smart cities

smart cities

Indra Smart Communities and Territories:

The path to an inclusive, balanced and sustainable growth

1. Indra
2. Smart City Transformation
    2.1. Consulting and PMO
    2.2. Urban Platform
    2.3. Vertical Solutions
3. Ecosystem
4. Use Cases
5. R&D Projects

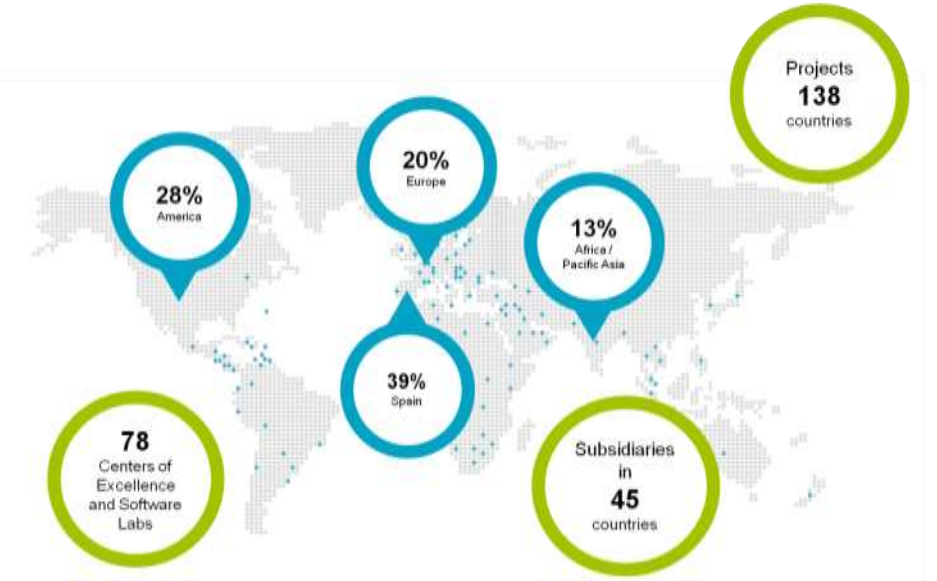
Indra

Indra is the number one Global Company in **Consulting and Technology** in Spain and Latin America.
It offers **technology solutions** and services for the Transport and Traffic, Energy and Industry, Public Administration and Healthcare, Financial Services, Security and Defense and Telecom and Media.

It is a **proprietary technology** company.

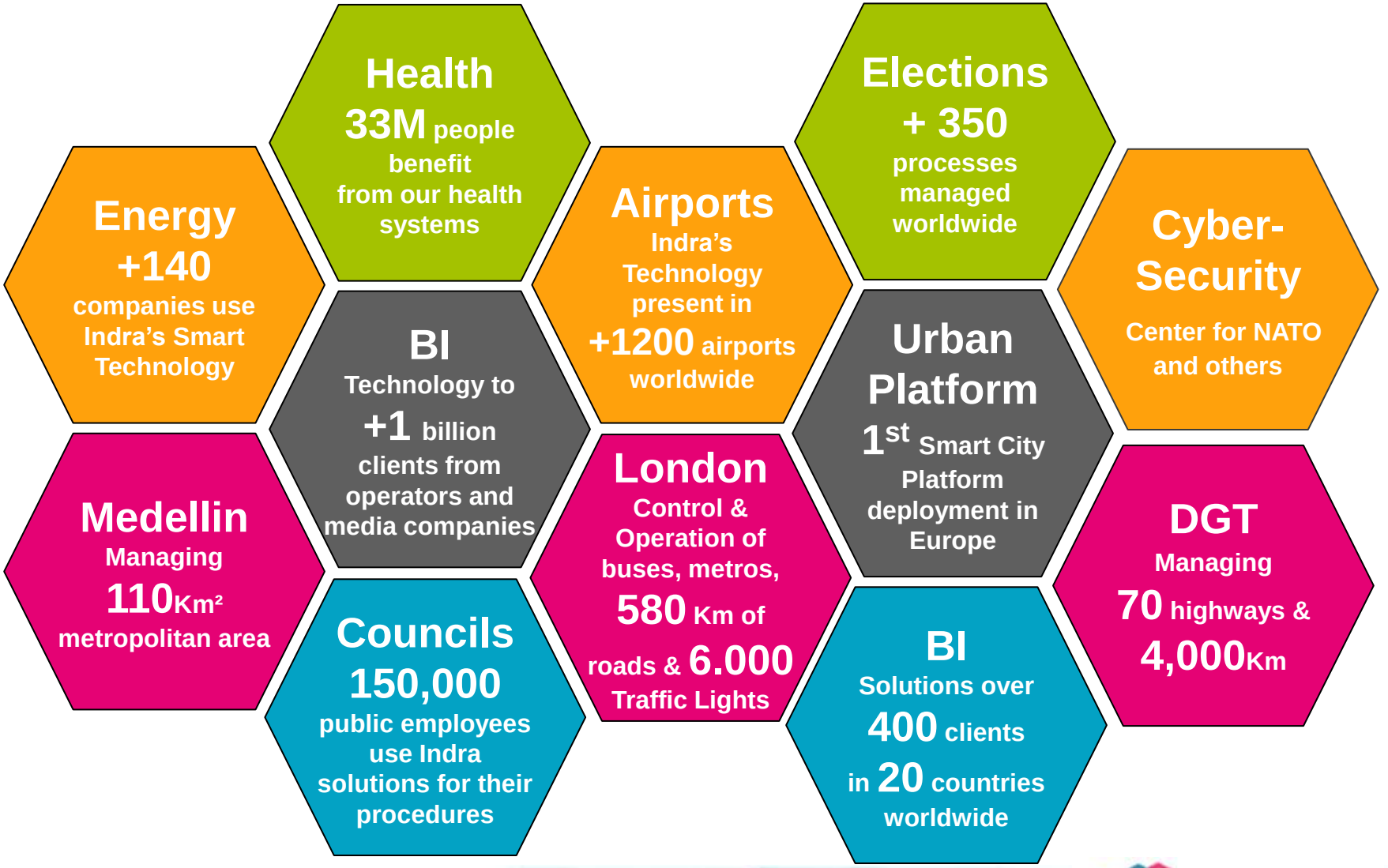
Its **business model** is differential because it is **based on innovation**

€3.000 M	138	43,000
in sales	**countries**	**employees**



Indra

+120 Smart Solutions Deployed Worldwide



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INDRA SMART CITIES: Consulting and PMO

… and The Path for Success

smart cities

Based on 3 Main Axis

PHASE 1 | Consulting and PMO

PHASE 2 | Urban Platform

Sofia 2

PHASE 3 | Vertical Solutions

Consulting

To adapt the technological projects to the specific city needs and objectives

indra Smart cities

smart cities

Experience on every single area involved in the smart transformation...

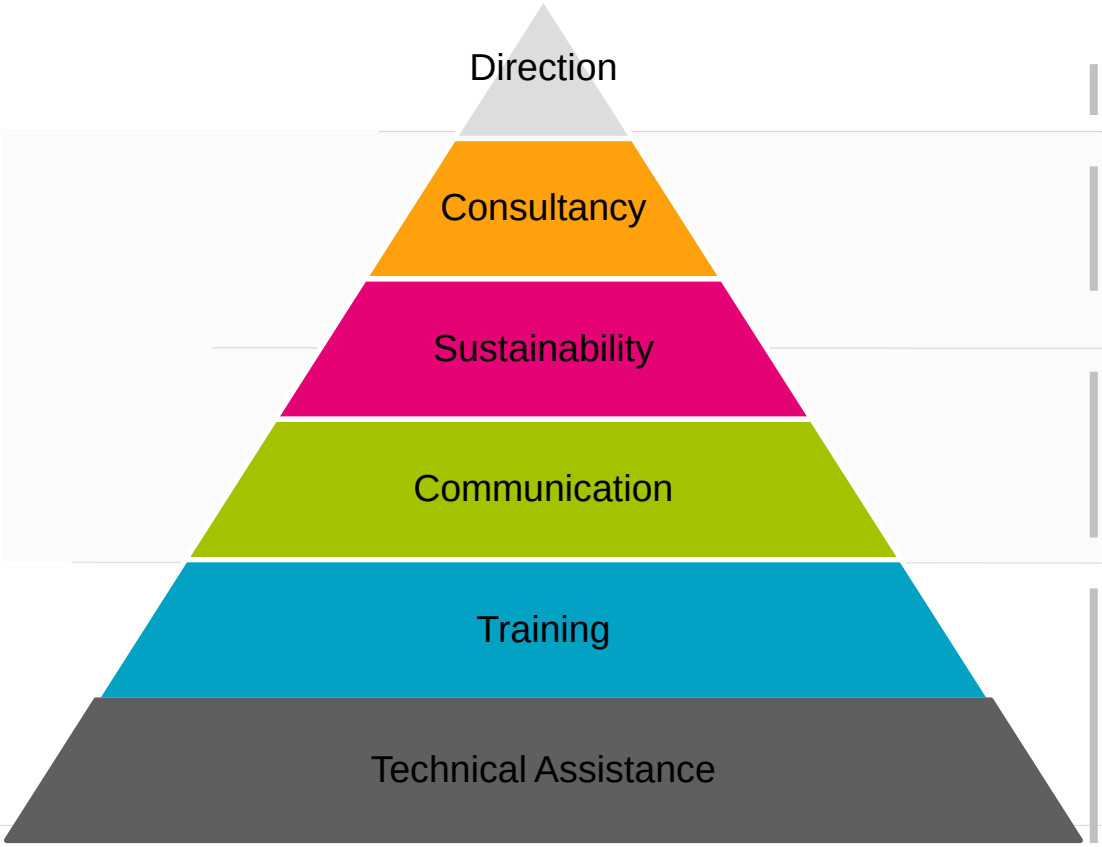
Legal & Fiscal	Evaluates the regulation, data protection, creation of new legal entities to execute the projects, and any other legal advisory..
Technological Advisory	Participates as a technological support partner, involved from the beginning of the project until the development of the technology.
Sustainability	Identification of sustainable models adapted to the cities to support real sustainable projects
Financing	Definition and access to public and private financing channels
Emerging Technologies	Knowledge and capacities on the development of emerging technologies

& experience in all the areas related to urban management

Energy & Utilities | **Public Sector** | **Traffic & Transport** | **Sustainability** | **Security** | **Telecom & Media** | **Health** | **Urban Platform**

Project Management Office (PMO)

The **PMO** is an important element of the **consultancy**, along the execution of the project. The PMO is in chargue of the **coordination** of the project and its mission relies on **to harmonize** the initiatives related with Smart Cities.It is also called **Smart Office.**



Objectives:

- Global Coordination of the Smart City
- Support the cities to evolve towards a Smart City Strategy with a holistic vision
- Catalogue and offer technological solutions. Involving the society with the Smart Cities, and achieving national and international recognition
- Guarantee the sustainability of the Smart City project and initiatives with the participations of the national and international authorities, promoting a business activity around the project.

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Our Urban Platform

Sofia2 is a **middleware** that facilitates the interoperability of multiple systems and **IoT** devices (Internet of Things), using **Big Data** techniques

Integrated Platform (no coupling)	**Integrated Security**	**UI + API centralized management**	**Customizable and extensible**
Multidevice	**Interoperability**	**Big Data approach**	**Semantic vision**
Horizontal scalability	**Market Technologies and Standards**	**On Premise & On Cloud**	**Open Source / Commercial**

SOFIA (SMART OBJECTS FOR INTELLIGENT APPLICATIONS)

ORIGIN

SOFIA (SMART OBJECTS FOR INTELLIGENT APPLICATIONS)

European investigation Project to create a semantic interoperability platform

- SOFIA was developed during 3 years and **18 partners** participated from 4 EU countries

PRESENT

R+D PROJECTS CONTINUE TO CONSOLIDATE SOFIA

- eVacuate, Arrowhead, IoE, CPSLabs, etc.

COMMERCIAL CLIENTS

- Smart Cities, Smart Energy, Smart Health, Smart Security.

FUTURE

NEW TECNOLOGIES AND R+D EUROPEAN PROGRAMS

- H2020, ECSEL / ARTEMIS...

•AREAS OF INNOVATION

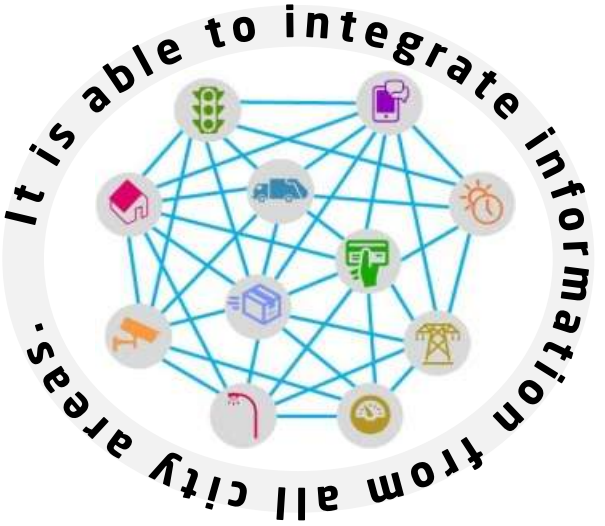
- CPS, City OS , IoT, Robotics, Social Interaction...

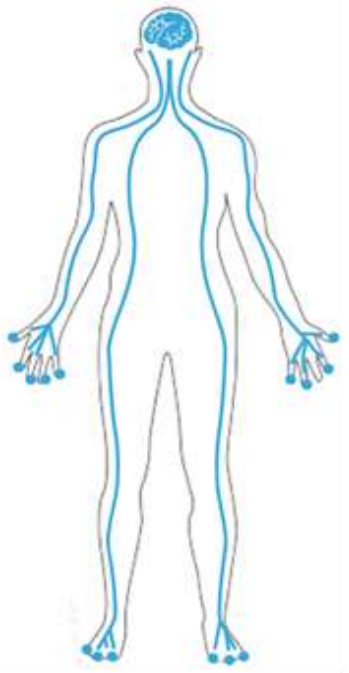
Our Urban Platform

The Urban Platform Sofia2

Sofia2 is:

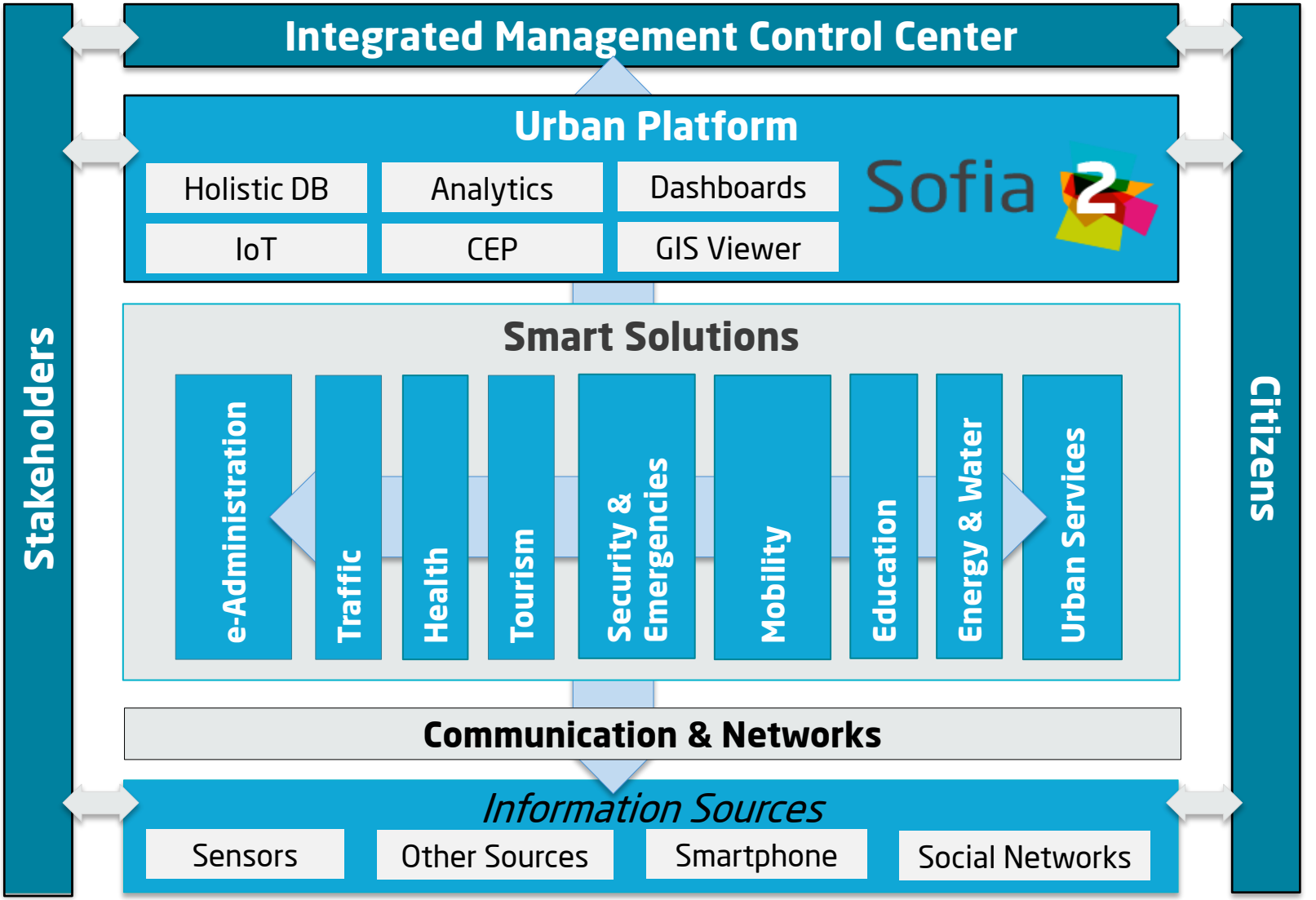
- To Hardware the **MotherBoard**
- To Software the **Operating System**
- To Humans the **Brain**





1. Acquire information in real time through the senses (sensors and systems devices)
2. Take real time decisions based on information received and previous learning processes
3. Storage all the information received in a short term memory
4. Consolidates the important information received along the day in the long term memory
5. Relates de different memories to be able to learn and act smarter next time

Indra's Smart Technological Approach



Indra's Smart Technological Approach

Sofia 2

Urban Platform

Holistic DB	Analytics	Dashboards
IoT	CEP	GIS Viewer

Sofia 2

Holistic Database

Sofia2 centralizes all information exchanged across the Platform, making use of specialized repositories best adapted to enable the most effective data storage and analysis:

Real Time Database (RTDB), providing a very high throughput of information both for storing and querying operational real time information.

Historical Database (HDB), providing BigData infrastructure to enable analytics over massive amounts of information stored.

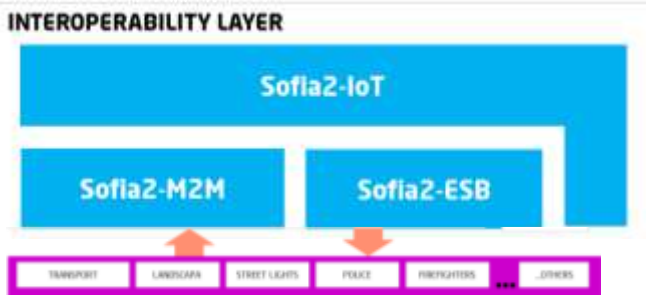
Analytical Database (ADB), enabling descriptive, predictive and prescriptive analytics to be made over contained information.

Configuration Database (CDB), storing internal configuration of the Sofia2 Platform.

Internet of Things (IoT)

Sofia2 acts as a centralizing and aggregating platform for all kind of information, covering **traditional IT systems** and **Social Networks** but also specialized in extracting and commanding data from IoT sensors and actuators across the network.. Sofia2's capabilities include:

- **Interoperability**: offering various connectivity mechanisms (REST, MQTT, Web Services, WebSockets, JMS...)
- **Multidevice**: enabling interconnection of all kinds of devices (Java, .NET, C, Arduino, iOS, Android, Python...)
- **Configuration Management**: Sofia2 can configure the SW installed on the device, enabling remote SW management.



Indra's Smart Technological Approach

Sofia 2

Urban Platform

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Sofia 2

Analytics / BI

Analytical services based on:

- Knowledge database with microdata precision level
- Clusterized and georeferenced variables
- Complex behavioral models
- Big Data capabilities with the most frequently used Office tools.

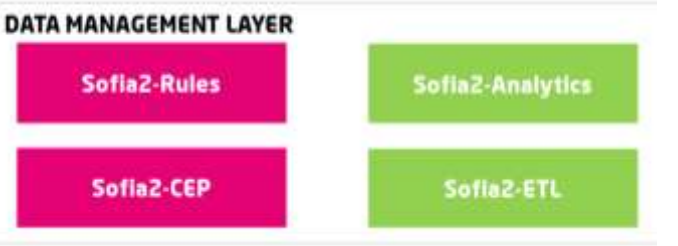
The platform features advanced BI tools.

Analysis and distribution via visual reports that are simple for end users to understand and use (Analysis Services, Reporting Services, SharePoint...)

Report and dashboard mode or in interactive mode, allowing Query & Reporting

CEP / Rules

- Sofia2 embeds real time rules engines which can trigger actions in reaction to the information that has just been registered in the Platform
  - **Scripting Engine**: Sofia2 enables the configuration of scripts, executed in reaction to the reception of specific types of information. These scripts can be hotdeployed into the Platform, enabling their configuration requiring zero downtime.
  - **Complex Event Processing (CEP) Engine**: Allowing the execution of queries over a continuous time frame. This enables time-dependent queries such as aggregations, patterns or absences over specified time periods.



Indra's Smart Technological Approach

Sofia 2

Urban Platform

Holistic DB	Analytics	Dashboards
IoT	CEP	GIS Viewer

Sofia 2

Dashboards / Portal

Information stored in Sofia2 is presented to end users across attractive and understandable user interfaces:

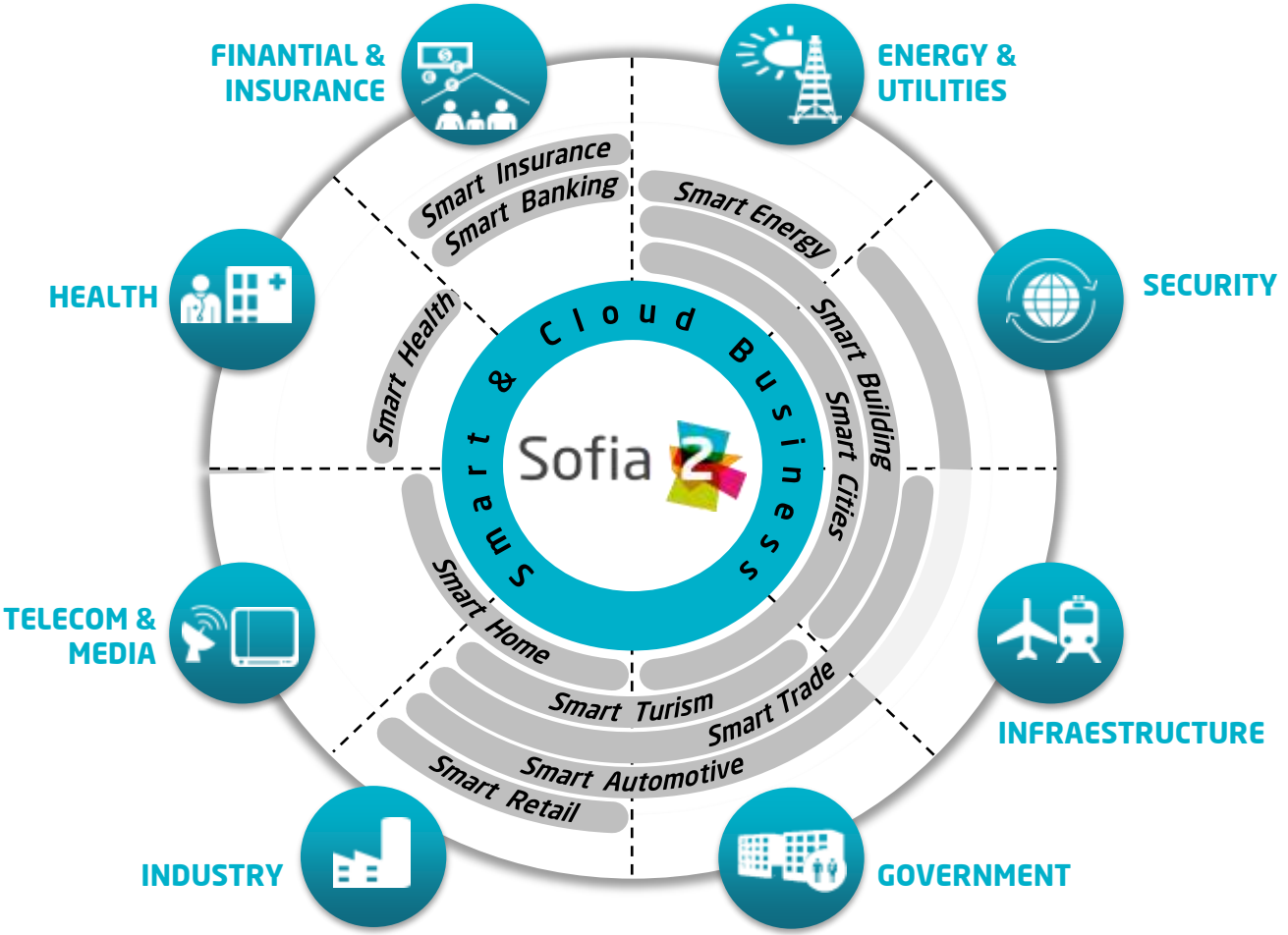
- **Dashboards** are provided for business users, enabling quick and accurate decision making,.
- **Reports**, exporting information to portable data formats.
- **Portals** are provided to end users to help them extract all value from the information stored in the Platform.

GIS Viewer

Sofia2 can also represent information across geolocalized interfaces in order to have a holistic view of the information across extended areas. Sofia2 is compatible with major viewers, such as:

- **eVidens:** an advanced and interactive integral 3D viewing system that allows management of geolocated information displayed within a three dimensional multimedia display environment.
- **Google Maps**, **OpenStreetMaps**: displaying information in standard 2D viewers

The impact of the platform across sectors



SMART EVERYWHERE

The IoT solutions are positioned transversely across different sectors and business

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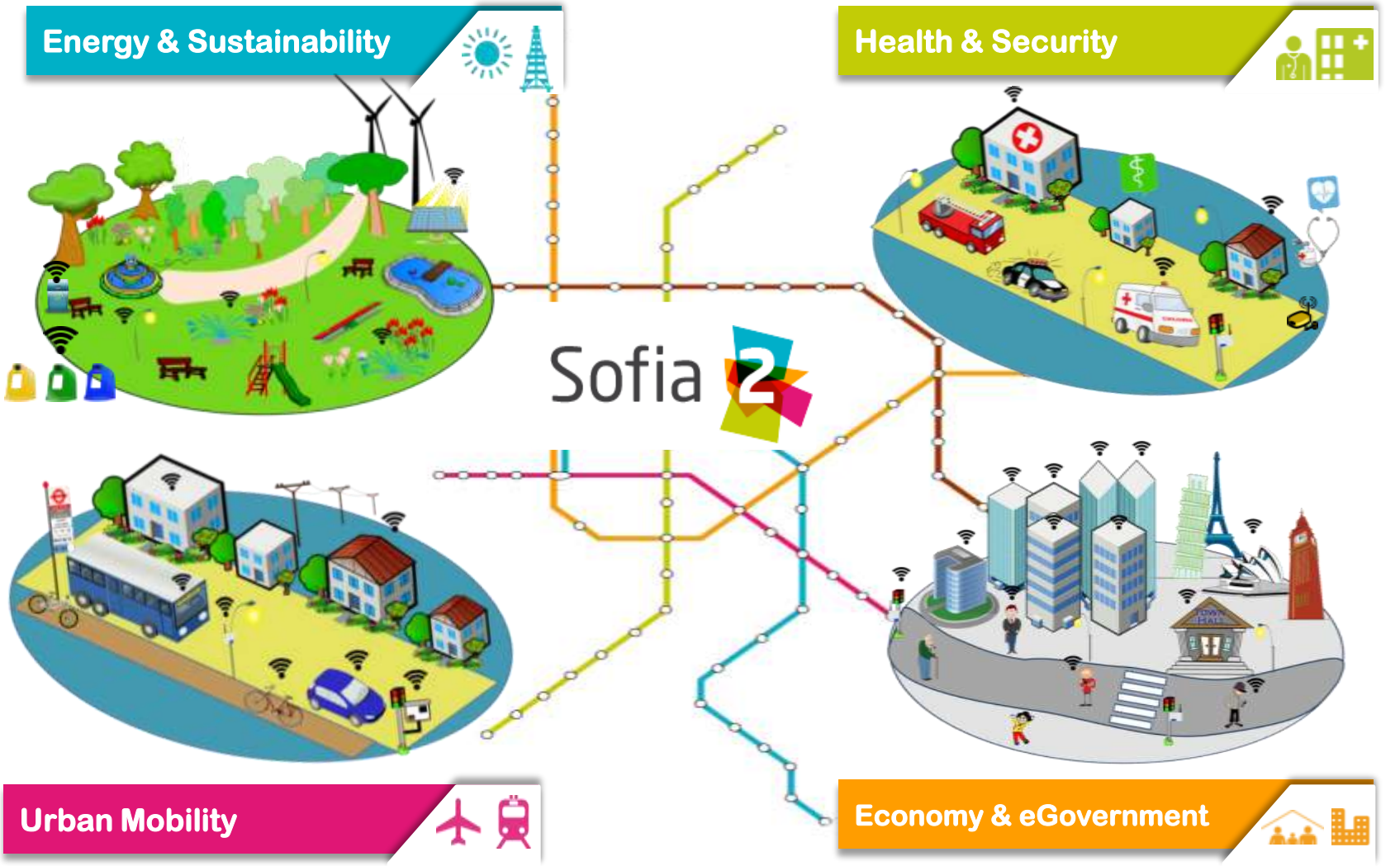
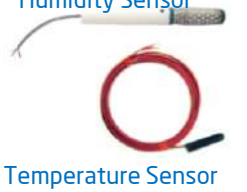
Smart Solutions



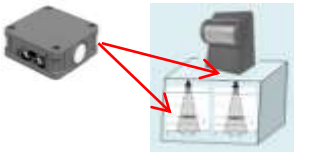
Smart Solutions

Energy & Sustainability

1 Smart Irrigation



2 Waste Collection



3 Smart Lightening

4 Monitoring & efficiency (Water and Electricity)

5 Losses and Fraud Control

Results & Approach

- Increase Efficiency on public Services by a reduction of costs.
- Increase Control by a better monitoring System.
- Reduces Environmental impact by the losses control and the efficiency management.
- Increases environmental footprint awareness.

INDRA SMART CITIES: Smart Transformation of the Public Services

Smart Solutions

Health & Security

1 Digital Home Assistance

2 Wearable & Hearable

3 Global Security Management

Results & Approach

Security: Improve citizens attention and the emergency resources coordination.
Decreases response lapse and increases the service quality.

Health: Increases patients life quality and reduces hospital expenses and waiting lists.

Smart Solutions

Urban Mobility

1 Traffic Management and Planning


2 Intermodality

3 Bus Priority Line Services


4 Parking & Smart Access

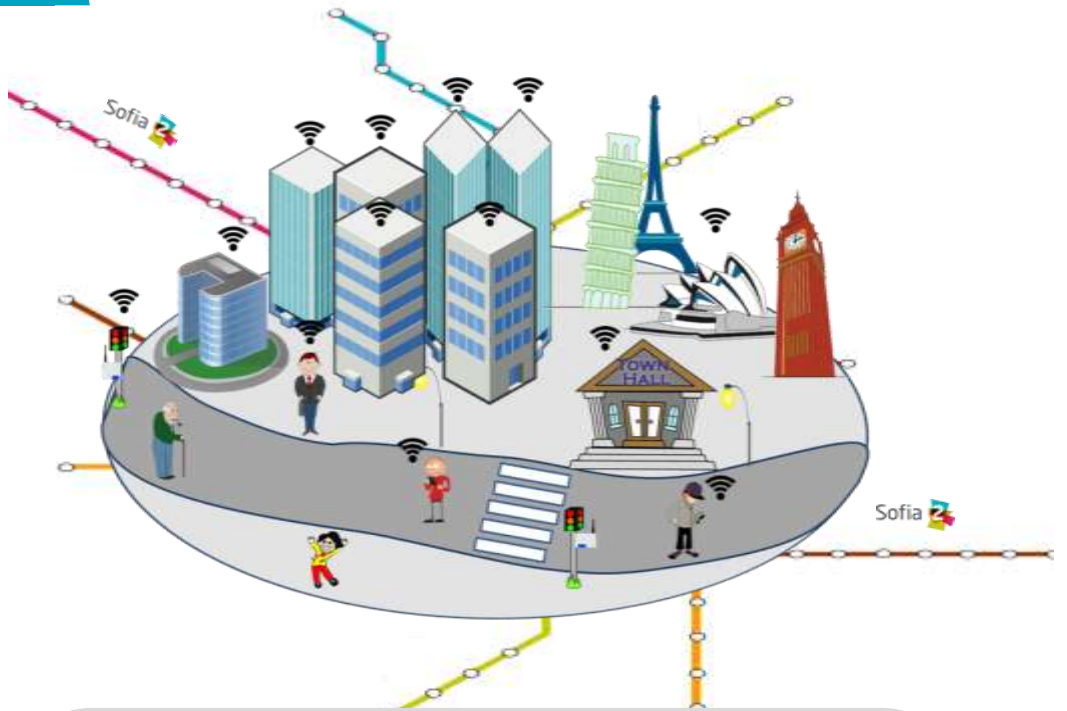
5 Electric Vehicle

Results & Approach

Design and Manage a better provision of traffic infrastructures through real time data analyze. Prioritizing the Public Transport and the intermodality.
Providing a new system where public services come first, traffic congestions are reduced and where the CO2 emissions are decreased

Smart Solutions

Economy & eGovernment



Results & Approach

eGovernment: Improve relationship between citizens and the Administration but also reduces cost and time provision.
Tourism: Enhance new tourism innovative solution to generate city branding and attraction.
Participation: Increasing transparency of the Administration and improves their communication and their participation into the decision making process.
Visual Data also helps to communicate the benefits of the public policies on an easier way to understand data.

1 Smart Tourism

2 Citizens Participation Tool

3 Smart Cards

4 Smart Campus

5 eGovernment

6 Visual Open Data

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INDRA SMART CITIES: Ecosystem

Sofia2 Ecosystem

The Sofia2 Ecosystem is one of our main achievements, in order to generate an active ecosystem and to encourage the development of new business models promoting entrepreneurship.

ECOSYSTEM

SOFTWARE PROVIDERS

Microsoft

SOLUTIONS & ENTREPRENEURS

eVidens

TI

urbiotica

e3t city

HW & DEVICES PROVIDERS

libelium

intel

UNIVERSITIES, COUNCILS...

- JOINT COMMERCIALIZATION
- EXPERIMENTATION ENVIRONMENT
- ACTIVE TRAINING
- COMMUNITY
- ROADMAP AND OPEN EVOLUTION
- INNOVATION
- CERTIFICATIONS
- ENTREPRENEURSHIP
- INTEGRATORS

An Inclusive and differential model

Sofia 2

Indra's approach is focused on the inclusion of all the agents involved on the project. Our experience prove us that this is the best approach to transform cities. Thanks to this inclusive and collaborative approach the benefits of the project are more wide along the territory.

Promoting and environment where Universities, Research Centers and Researchers are welcome to participate and provide new services an solutions.

Where the citizen is the main element on the transformation, encouraging their participation and active collaboration because he is the main and more important final user of the solutions.

Promoting entrepreneurship mainly on the IT sector, by providing powerful tools as the platform and encouraging them (entrepreneurs, SMEs, etc.) to design and provide new services and solutions by exploiting the data.

Public Administration, or any other public entity will be benefit of a common and interoperable infrastructure for all their services improving the knowledge of the services and improving their provision.

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Our complete Approach visualized on a single Use Case

Smart City A Coruña

- INTERNET OF THINGS
- BIG DATA
- API MANAGER
- SAAS
- DEVICES

THE PROJECT AND OUR APPROACH

- ✓ Consultancy and PMO
- ✓ Urban Platform Sofia2 for the management of the city services with a holistic vision
- ✓ Collection and storage of real time information from sensors, mobile devices, etc.
- ✓ Vertical Services from all different city areas (Mobility, Security, Environment, Water, Energy, Participation, Tourism, etc.).
- ✓ OpenData services: public data and applications based in the Platform's services.
- ✓ Cloud Deployment.
- ✓ Inclusive project approach (3 Large Companies, 12 SMEs, 2 Research Centers, 2 Start-Ups, 1 University) all the partners from the territory.

TECNOLOGY I KEYWORDS

• Sofia2	• API Manager
• IoT	• Rules and CEP
• Big Data	• Open Data
• Cloud	• Real Time

Our complete Approach visualized on a single Use Case

HOLISTIC CROSS DOMAIN CITY MANAGEMENT ENABLED BY UNDERLYING TECHNOLOGY, ALREADY PRODUCTIVE

Awards received as evidence of success

smart city

smart city

Ayuntamiento de A Coruña
Concello da Coruña
Ciudad de la Ciencia y la Innovación 2012

ARTEMIS Co-Summit Awards Winner 2009-2010 as the Best Artemis-FP7 R&D Project.

CO-SUMMIT 2009 CO-SUMMIT 2010

2013 & 2014 Finalist as best innovative proposal in the Smart City World Congress

smart city expo WORLD CONGRESS

Honorary Mention as the Best 2014 EU Innovative Public Buy by Coruña City Council

Selected as a Reference in the Washington Global City Teams Challenge 2015

GLOBAL CITY TEAMS CHALLENGE

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Research & Innovation projects

Smart Cities: Responding to new global challenges

The twenty-first century is witnessing a process of urbanization in the world that makes cities have to face new challenges, such as the increasing concentration of population, increasing consumption levels, a greater need for mobility or increasing demand on citizen security and participation in decisions.
These new challenges transverse to affect different areas of the city, so the solution should be approached with an integrated and innovative from all perspectives and key areas of the same vision.

Main references associated in R+D

sofia

P R C I E

CIUDAD 2020

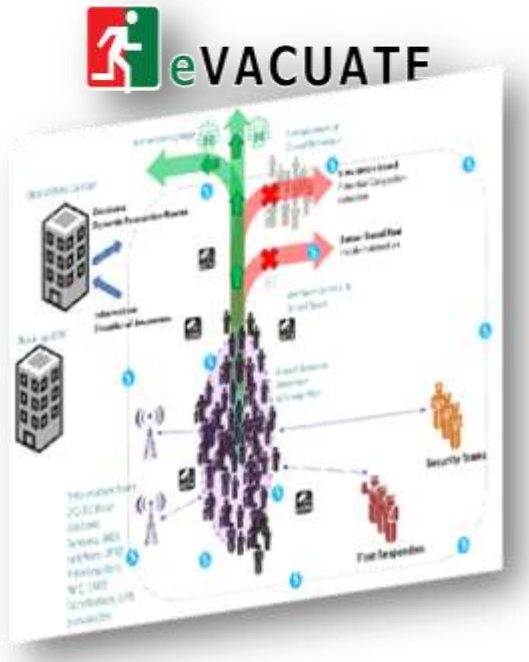
eVACUATE

smart city

GLOBAL MOBILITY

eVacuate

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 313161



A holistic, scenario-independent, situation-awareness and guidance system for sustaining the Active Evacuation Route for large crowds

Description of the project

eVACUATE aims to produce an integrated system:
- Provide a detailed system assessment and updated in real-time to situations requiring mass evacuation.
- It dynamically adapts to new circumstances
- Ensure Optimal Evacuation Strategy
- Facilitate the integration of the results of these analyzes in real tools and emergency management command and control
- Allow use and exports in centralized and distribut etc.)

Used Technologies

- **Persistent communications**
- **Systems Modeling and Simulation**
- **Printed RFID Tags**
- **Actuated Sensors Vision**
- **Decision-making tools**
- **Warning Systems at the population**
- **Realtime Architectures**

General Information

- **Partners: 20**
- **Coordinator:** Exodus S.A.
- **Founded by:** European Commission
- **Program:** FP7 Security
- **Start Date: 22/04/13**
- **End Date: 30/04/17**

Industrial Partners

Ciudad 2020

General Information

- **Partners: 9**
- **Coordinating Enterprise:** Indra
- **Found:** CDTI
- **Program:** Innpronta 2011
- **Start Date: 01/01/11**
- **End Date: 31/12/14**
- **URL:** http://www.innprontaciudad2020.es

Consortium

Towards a more sustainable city model

Description of the project

Innpronta CITY 2020 is a project that aims to achieve a breakthrough in the areas of energy efficiency, Future Internet, Internet of things, human behavior, environmental sustainability and mobility and transport, in order to design the city of the future, sustainable, smart and efficient.

Therefore, 2020 City conceives, designs and implements a new paradigm of sustainable and efficient city supported on three key areas:

- **Energy**
- **Transport**
- **Environmental Control**

2020 CITY achieve the 20-20-20 targets: **20% reduction of emissions, producing a 20% renewable energy and 20% improvement in energy efficiency.**

Used Technologies

- **Internet of the future & Internet of the things**
- **Cloud computing**
- **Fix and Mobile Participative Sensors**
- **Vehicular Communications**
- **Short and Large Range Communications**
- **Sensing, models and power management**
- **Energy awareness**
- **Data mining**
- **Reality mining**
- **Open Data**

ArrowHead

Embedded Systems for a Sustainable Europe

Description of the project

Its objective is the development and demonstration of a pilot urban platform that can intelligently integrate various urban services, taking into account: Sensing, Communications Network, Bus integration, monitoring and control and automation and generation rules for decision making and a number of services developed under a common platform to help improve urban energy efficiency through intelligent lighting and "smart buildings"

Used Technologies:

-Analysis of ubiquitous large-scale data collected across heterogeneous sources
-Smart grids
-Sensing (cameras, sensors volumetric, ...)
-Comprehensive management of sensing

-Network communications
-Short technologies and
-long range (Zigbee / RFID / wifi)
integrator bus
-Center operational management
-Business Intelligence
-Developing rules and algorithms management for automated ...
-Interaction with the citizen through mobile devices ...

General Information

- **Partners: 77**
- **Coordinator:** Lulea University of Technology (Sweden)
- **Founded by:** MINETUR
- **Program:** ARTEMIS
- **Start Date: 01/03/13**
- **End Date: 31/12/16**

Spanish Consortium

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