

A satellite view of Earth from space, showing the curvature of the planet and the Atlantic Ocean. The text "CEIIA - INNOVATION AND ENGINEERING" is overlaid in white.

CEIIA - INNOVATION AND ENGINEERING

SETTING UP FOR THE ATLANTIC

March 2015

CEIIA - Innovation and Engineering is a non for profit organization whose “associative capital” is in the hands of **Portuguese** enterprises, universities and a governmental agency.



CEIIA – Oporto, Portugal

- CEIIA - Innovation and Engineering was created in **2006**.
- Nine years later, CEIIA is now focused on designing **AEROSPACE** structures, developing **INTELLIGENT SYSTEMS** to manage mobility and city services and on **OFFSHORE ENGINEERING**.
- CEIIA employs **200 engineers** and operates in Portugal, Brazil, Spain, France, United Kingdom and Italy.

1. NAVAL ARCHITECTURE & MARINE ENGINEERING

- New concepts of Platform Supply Vessels
- FPSO: New designs for harsh environments
- FPSO: Top side technologies
- Other marine applications



FPSO – Cidade de Angra dos Reis

Currently CEIIA is setting up partnerships with engineering companies, research center and universities in Brazil and Europe.

2. AERIAL AND SUBMARINE ROBOTIC VEHICLES (1/2)

- Collaborative autonomous sea vehicles for marine operations (IRM, installation, ...)
- Deep sea observatories for environmental monitoring (landers, gliders, AUV, ...)
- Vigilance of human activities in the ocean (e.g. integration of sea and aerospace ; UAV)



ROV Luso, EMEPC ; ARGUS



INFANTE / IST/ISR Portugal

SISTEMA DE VEÍCULO AÉREO NÃO TRIPULADO (UAS30)

Missões

O Sistema de Veículo Autônomo Não Tripulado (UAS30) foi concebido e desenvolvido para cumprir com os requisitos das seguintes Missões:

- Controlo de poluição marítima;
- Monitorização de condições ambientais marítimas e terrestres;
- Monitorização do estado geral das linhas de média e alta tensão;
- Inspeção de Pipelines ou chaminés em altitude;
- Inspeção topográfica;
- Vigilância da linha de costa e arribas;
- Monitorização de barragens;
- Monitorização de campos agrícolas;
- Vigilância das pescas;
- Busca de naufragos;
- Vigilância de Esquemas de Separação de Tráfego;
- Vigilância de espécies animais selvagens;
- Voos fotogramétricos;
- Prevenção de fogos florestais;
- Retransmissão de dados ou comunicações.

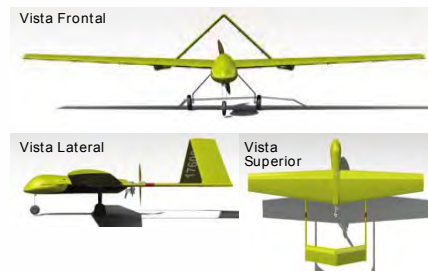


Sistema

Plataforma configurável, consoante missão e mediante a troca das asas ou remoção do trem de aterragem.

Sistemas de Missão – Equipamentos configuráveis de acordo com a Missão

- Câmaras no domínio do visível, UV e IR;
- Gimbal, estrutura de suporte de câmaras e estabilização de imagem;
- LIDAR, sistema de deteção e medição de distância;
- AIS, equipamento para identificação automática;
- Radiómetro, instrumento que mede a intensidade da radiação eletromagnética numa certa banda de frequência;
- Comunicações na banda UHF;
- Armazenamento de informação e outros.

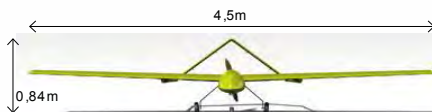


Estação de terra e Sistema de Lançamento por Catapulta e Recolha por Rede (opcional)



Características

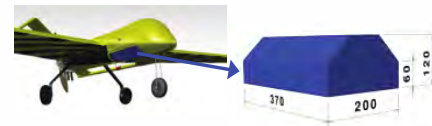
Dimensões da plataforma



Características Principais:

- Peso Máximo à decolagem = 25 kg;
- Peso em vazio (sem combustível e equipamentos de missão) = 16 kg;
- Peso para equipamentos de missão = 5 Kg
- Envergadura da asa = 4,5m;
- Comprimento = 2,5m;
- Potência do motor = 5 HP;
- Endurance = 5h (versão com baterias);
- Velocidade cruzeiro = 72 km/h;
- Velocidade de Operação = 50 km/h;
- Velocidade de perda = 37,8 km/h;
- Velocidade de subida = 43,5 km/h a 15-20 graus;
- Raio de giração = 30 m a 30 graus;
- Distância mínima para decolagem = 30 m.

Espaço para equipamentos de Missão (mm)



Características Secundárias:

- Possibilidade de configuração dos equipamentos, consoante as necessidades da Missão;
- Levantamento e aterragem em pista ou possibilidade de lançamento por catapulta e recolha por rede;
- Possibilidade de efetuar pequenas modificações estruturais (asa e trem de aterragem) para adequação a missões;
- Sistema transportável em espaço inferior a 10 m3;
- Possibilidade de inclusão de tanque de combustível adicional.

Quem somos

No âmbito do desenvolvimento de Sistemas de Veículos Aéreos não Tripulados foi estabelecida uma parceria entre a Unidade Aeronáutica do CEiiA e o Centro de Investigação da Academia da Força Aérea, utilizando as competências especializadas de cada entidade, nomeadamente ao nível do desenvolvimento, fabrico de plataformas, sistemas de missão e operação das aeronaves.



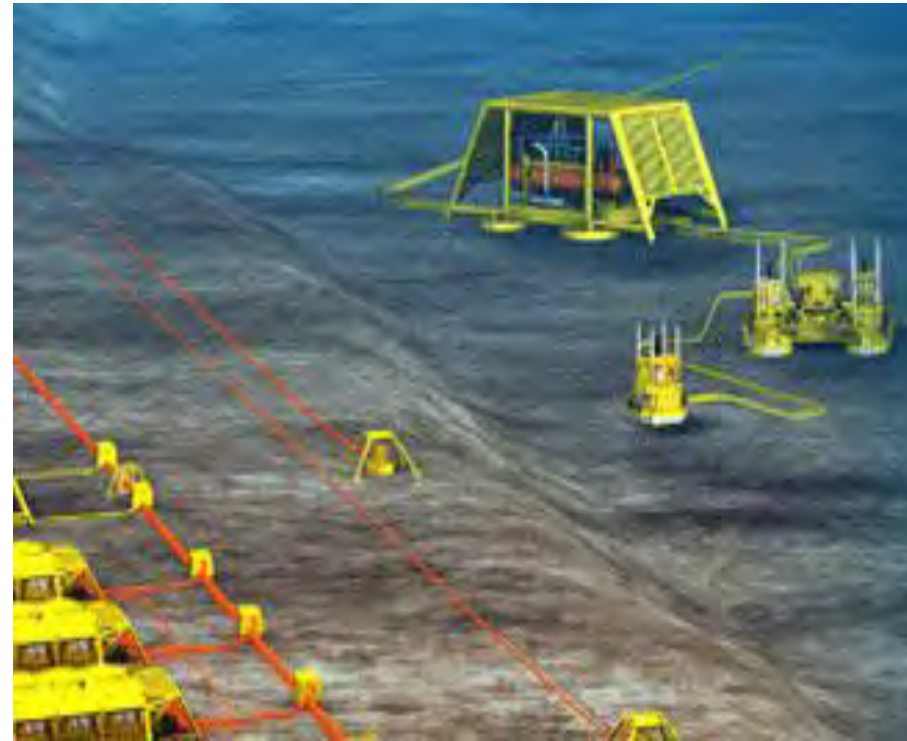
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CEiiA

3. OFFSHORE ENGINEERING (STRUCTURES AND ELECTRO- MECHANICAL SYSTEMS)

- Subsea systems (MPS, WAS, ...)
- New technical solutions (e.g. composites) and configurations for SURF systems



Source: FMC Technologies

Engineering Capabilities

Design optimization

Component Structural (and piping) analysis

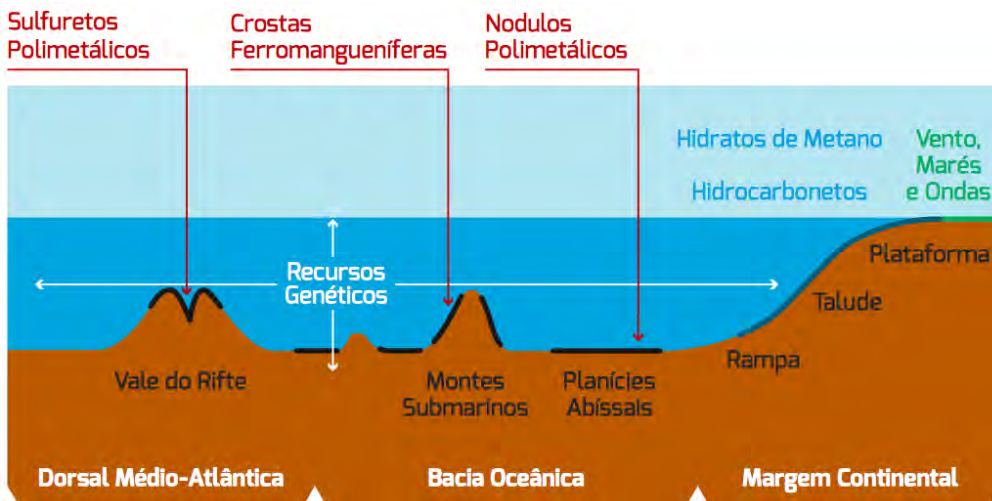
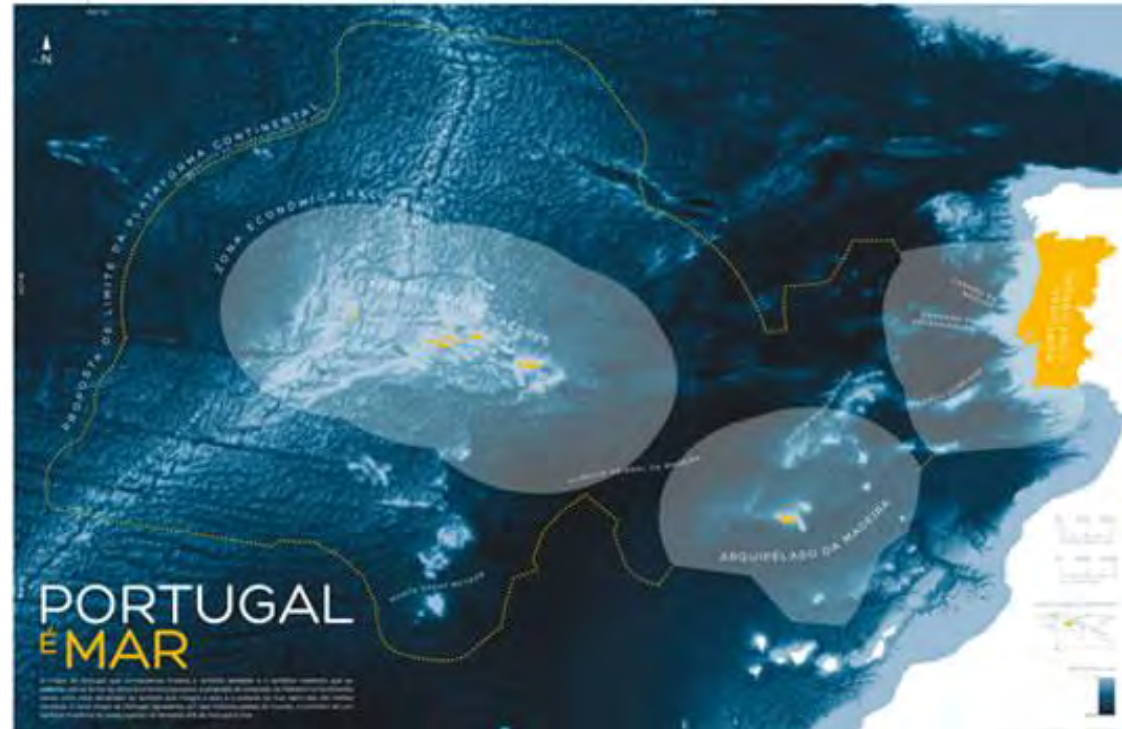
Structural tests of very large components

Global analysis (Simulations)

Stability and Structural Integrity

Fatigue Performance – Assessment, Inspection and Testing

- Portugal in the the process of extending its continental shelf (+2 150 000 square km).
- Once this is concluded, 95% of the overall territory under Portuguese jurisdiction will be ... “UNDERWATER”.

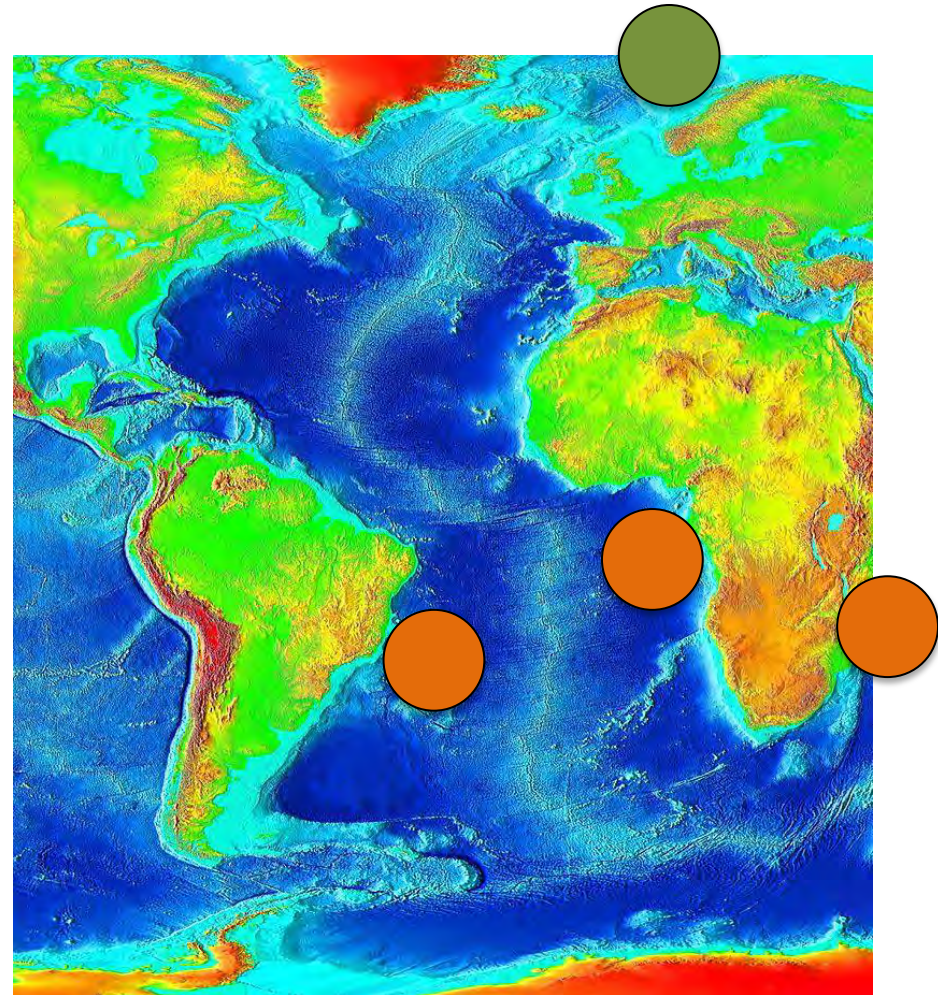


- Biologists, geologists and others claim for technology “to go deep sea” in order to get their jobs done;
- Engineers are being challenged

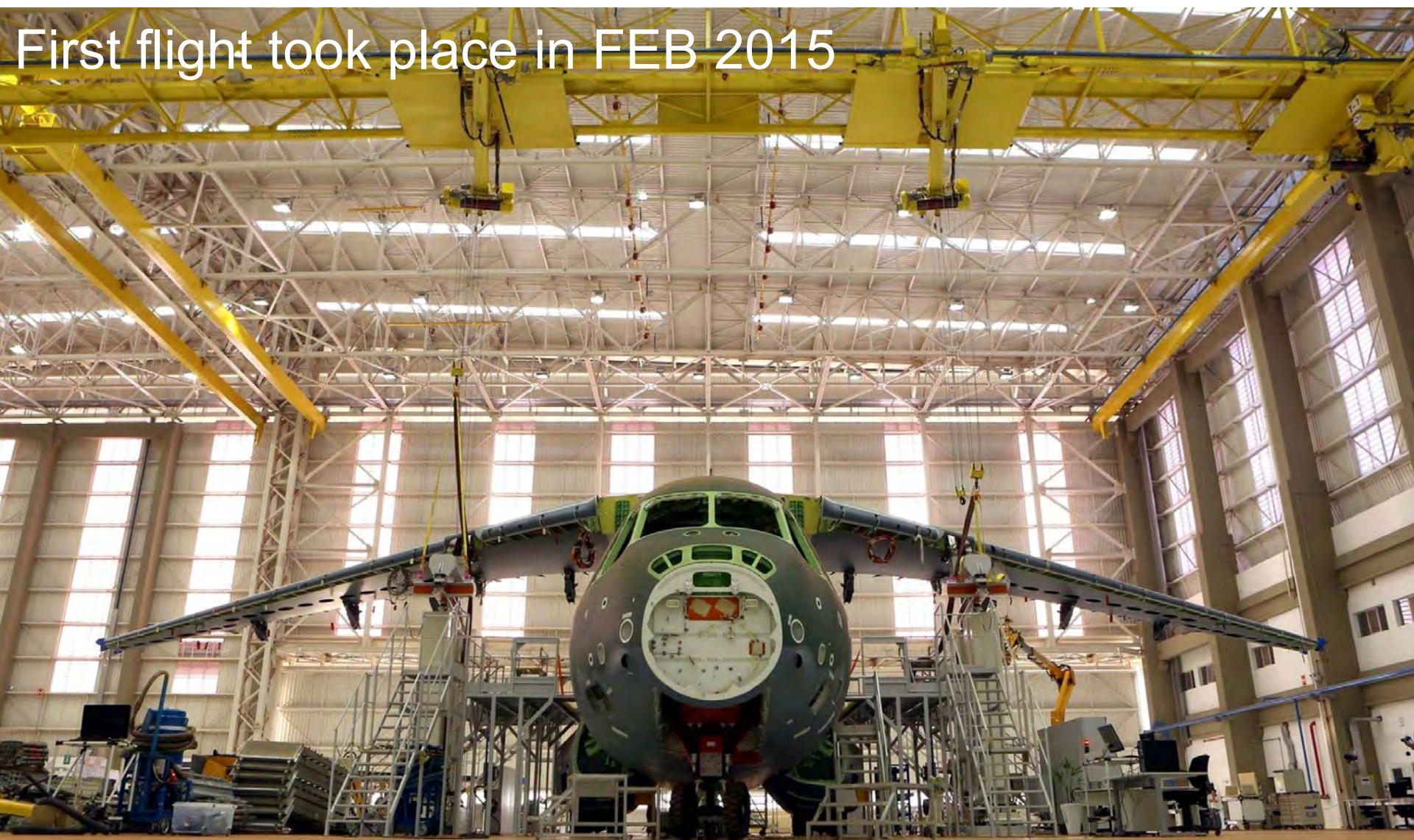
In spite of the recent oil price fluctuation

The dynamics of the E&P offshore in Portuguese speaking countries (●):

- Brazil plans to double its production by 2020;
- Mozambique is already a “hot spot”;
- Angola will keep its pace;
- The E&P in the North Sea is an interesting market.

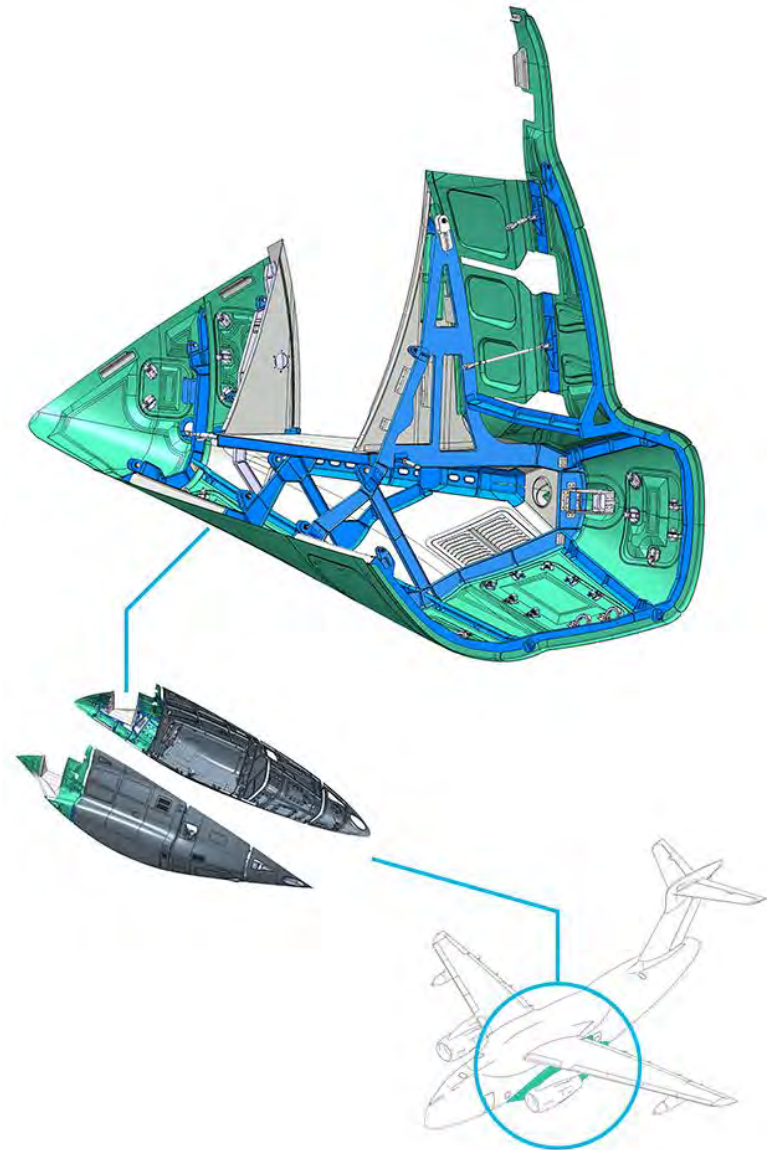
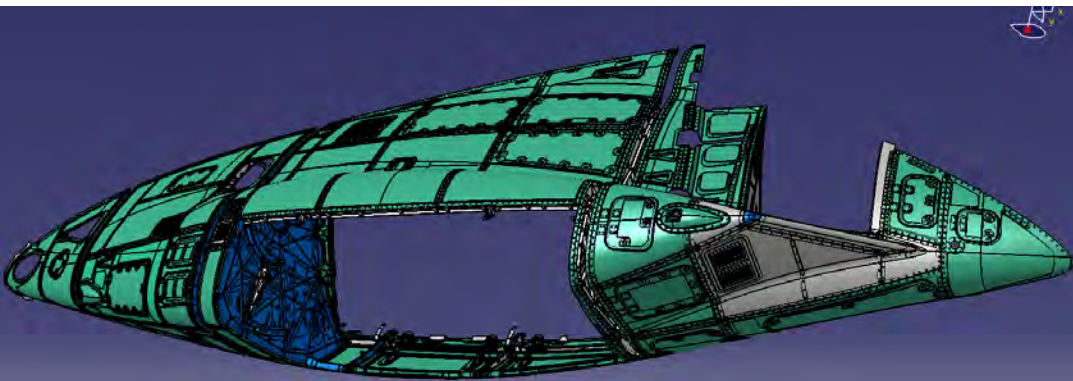
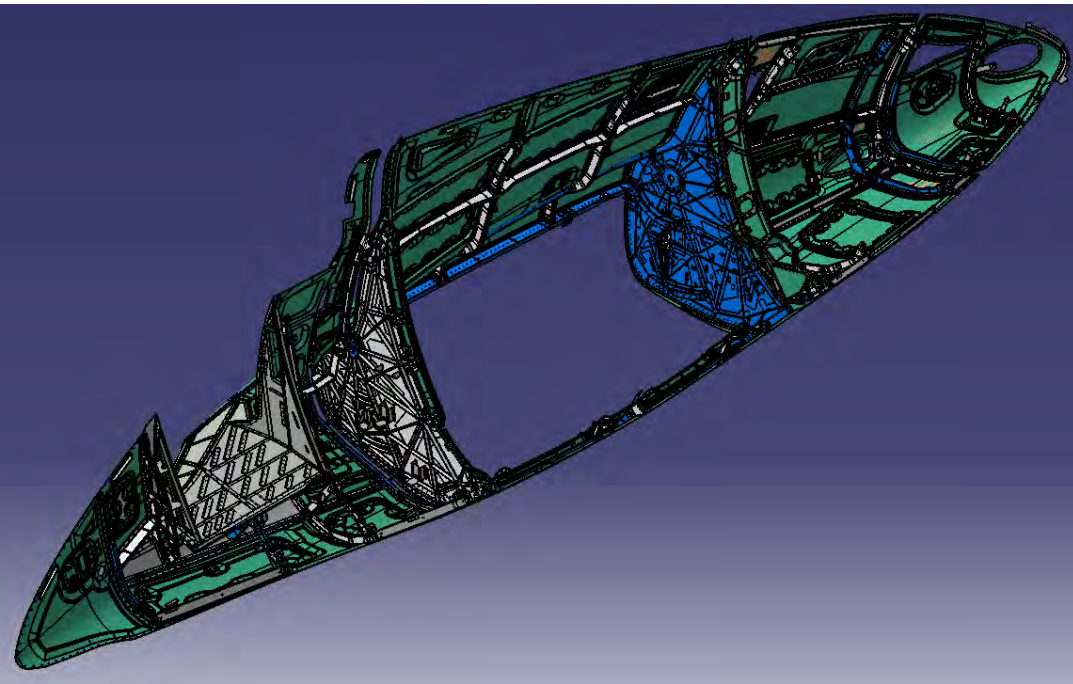


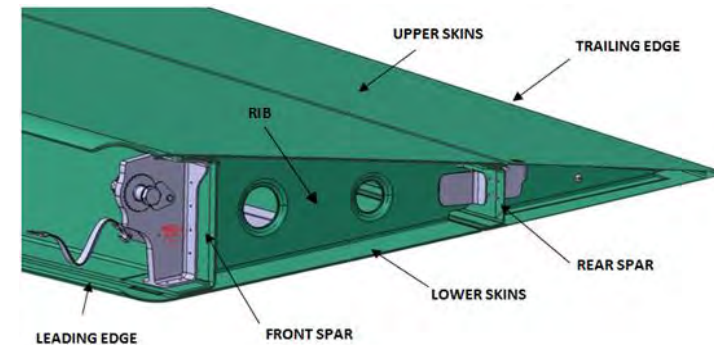
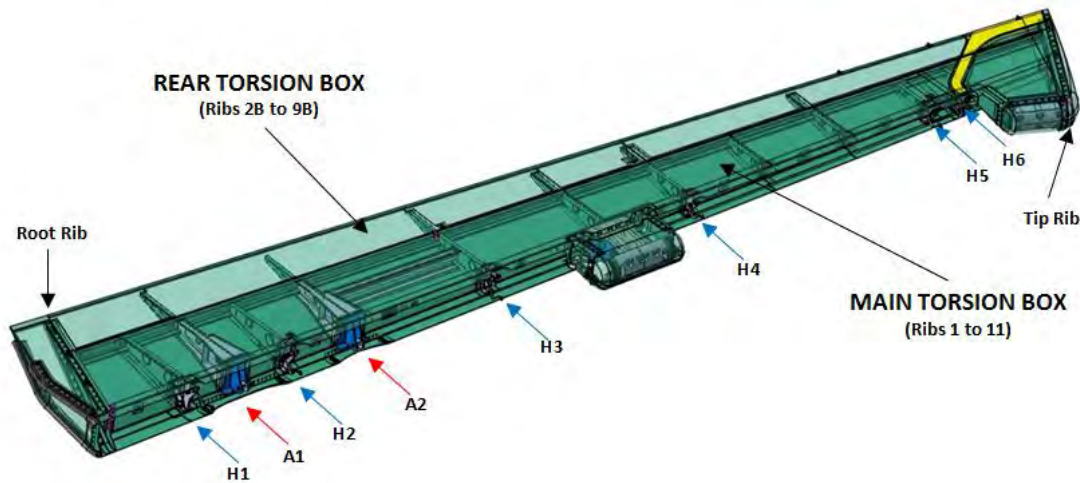
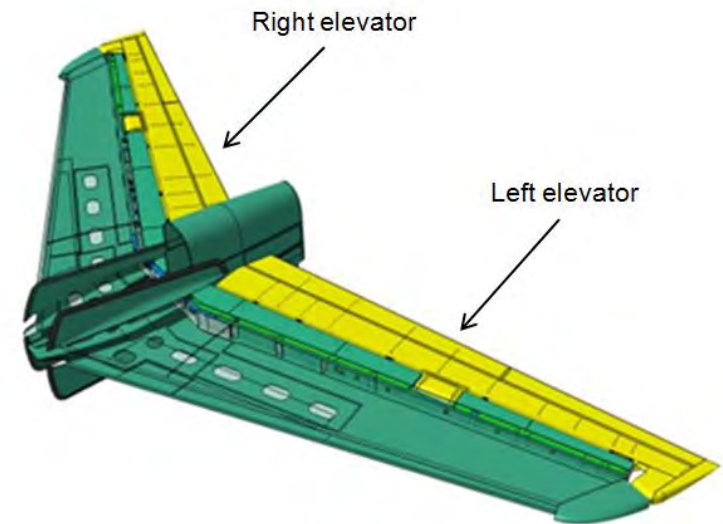
First flight took place in FEB 2015



**EMBRAER KC-390 ELEVATOR AND SPONSON
(COMPOSITE AND METALLIC)**

**EMBRAER KC-390 CENTRAL FUSELAGE
(METALLIC)**





1. INTEGRATED PRODUCT DEVELOPMENT (initially applied to automotive) (concept, engineering, prototyping, small series)



Buddy Electric Vehicle



Smart Electric Vehicle BE®



Electric Bicycles



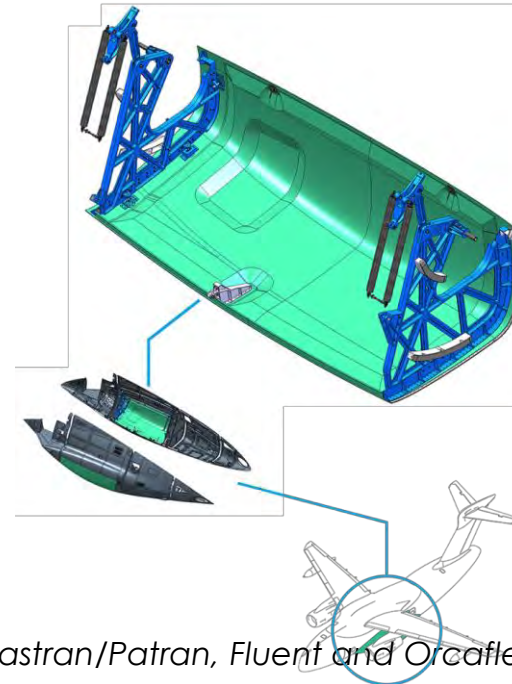
Chargers

2. DESIGN & STRUCTURAL ANALYSIS

Design

Structural Analysis

Fluid-Structure Interaction



Main tools/software: CATIA (V4, V5 e V6), HyperWorks, Nastran/Patran, Fluent and Orcadflex

3. SYSTEMS INTEGRATION

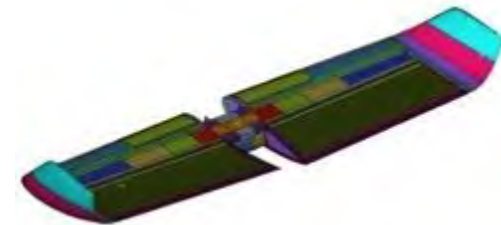
- Design and integration / installation of systems
- Design and integration of hydraulic systems in structural components
- RAMS Analysis (Reliability, Availability, Maintainability, Safety)



*Daher-Socata
fuselage electrical
systems integration*

4. MANUFACTURING SUPPORT ENGINEERING (SMALL-SERIES)

- Manufacturing processes development
- Manufacturing engineering
- Reverse engineering (rebuilding and surfaces optimization)
- Tooling design and analysis
- Test rigs development and validation



*Composite Tail Plane
Layup definition, structural
optimization and qualifying
reports*

Main tools/software:

- Equipment: 3D Virtual reality center, Comet, T-Scan with Laser tracker
- Software: RapidForm, Tebis, Inspect Plus, CATIA (V4, V5 e V6), Hyperworks, Nastran/Patran



MANUFACTURING
MIG/TIG Welding Assembly



MOVING ROBOT
Milling - *Soft materials*



MILLING CENTER
Milling - *Hard materials*



**MANUFACTURING
SUPPORT TOOLS**
Tooling development



MANUFACTURING SUPPORT
Rigs, jigs and tooling
development



COMPOSITES
Manual lay-up and infusion



COMPOSITES
Prepreg laminates
Autoclave curing



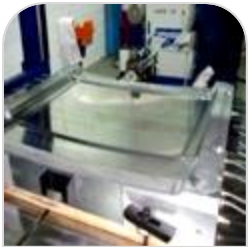
EPOXY TOOLS
Epoxy milling



RAPID PROTYTYPING
SLS , Object 3D



RAPID MANUFACTURING
Silicon molding, rapid
milling and rapid tooling



DCPD/RIM
Low pressure injection



FINISHING
Painting room
Preparation room



METROLOGY



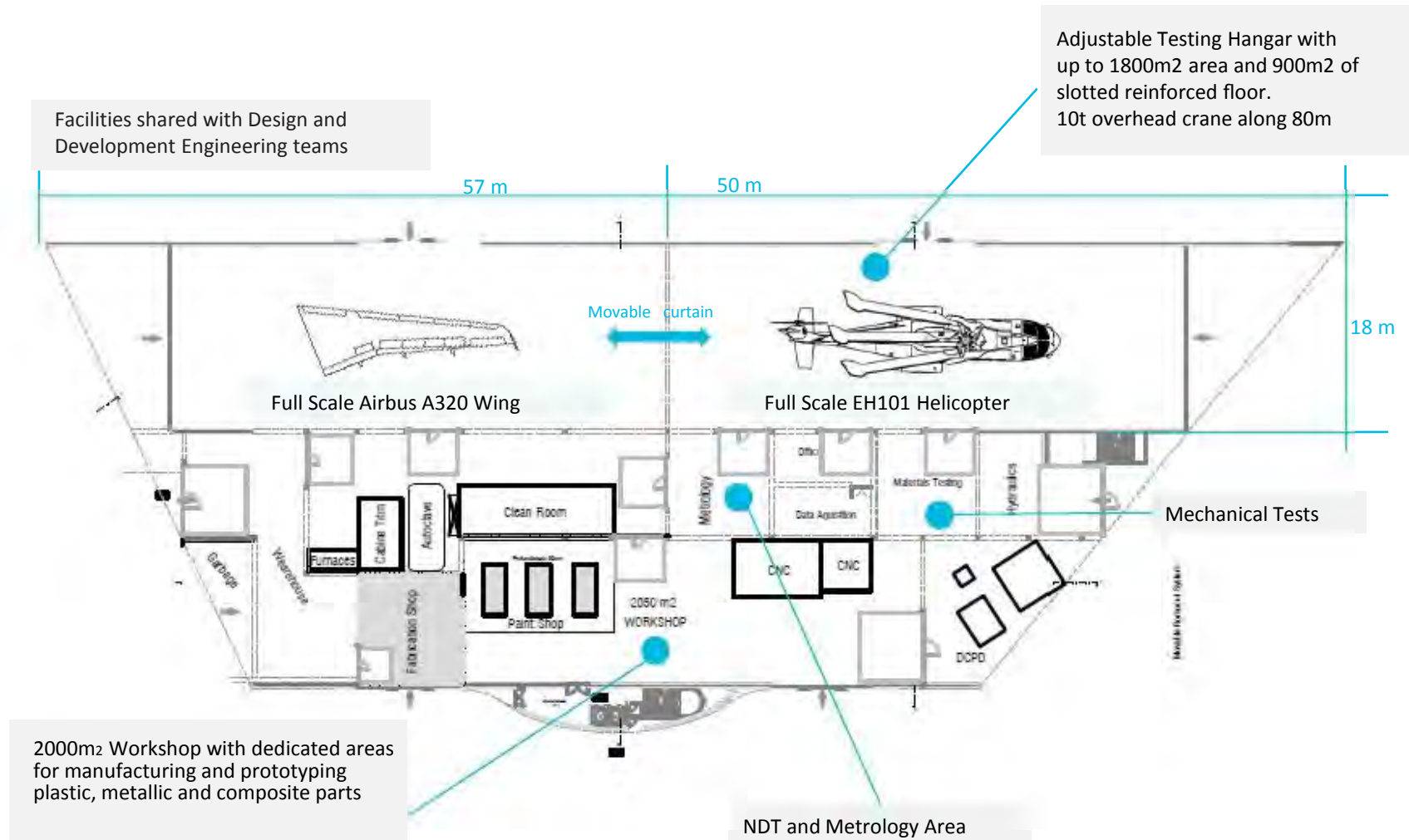
MATERIALS TESTING
NDT, materials
characterization, structural
testing



REVERSE ENGINEERING

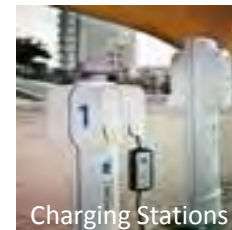
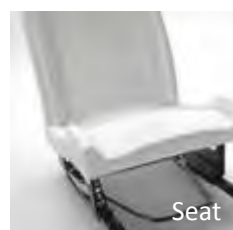
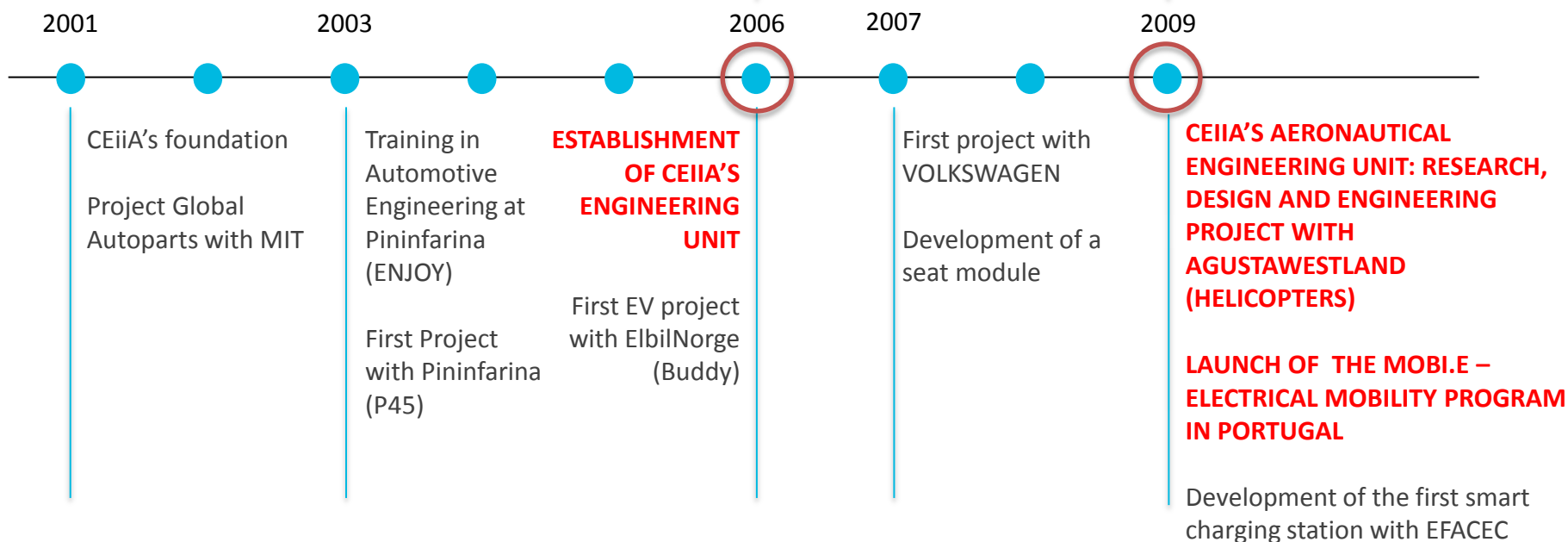
Testing Unit

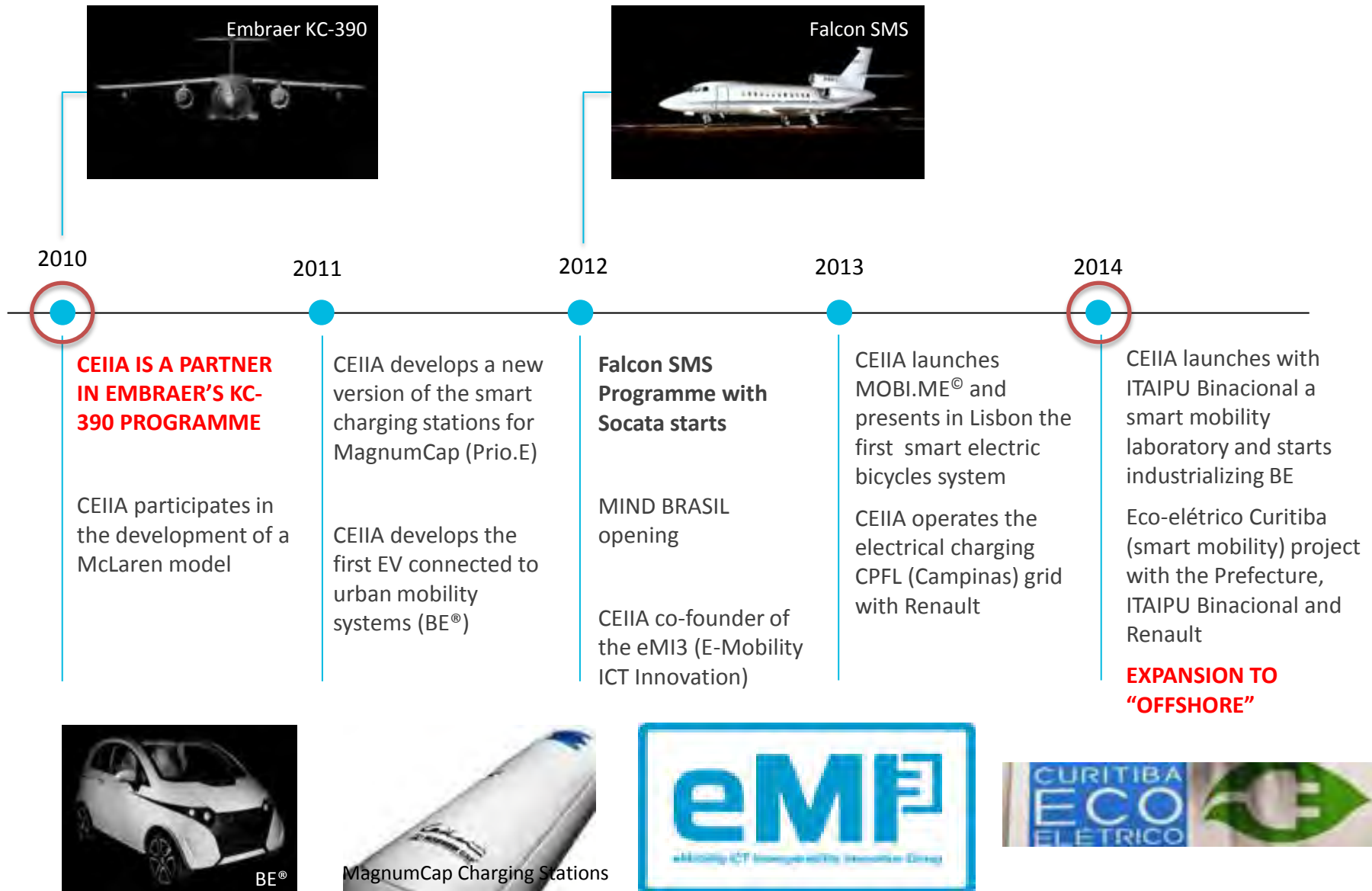
Testing, Prototyping and Certification Infrastructure



1. ATLANTIC AS AN OPPORTUNITY
2. ADD VALUE
3. SKILLED PEOPLE
4. RAPID TRANSFORMATIONS
5. COOPERATION

CEiiA's Transformation (1/2)





1. Due to increase of population, buildings, cars and services, the city became a complex environment (air pollution, traffic, waste and disorganization).
2. Finding solutions to reduce costs and constrains and improve quality of life, is a major challenge for modern societies.
3. The integration of intelligence and connectivity into the transportation systems allows the creation of new usage patterns for vehicles in addition to new mobility services in the city.

CEiIA has developed an **integrated intelligent mobility solution** delivering value across multiple levels. The solution is designed not only to **manage mobility services but also serve cities by integrate and facilitate its daily routines and processes.**

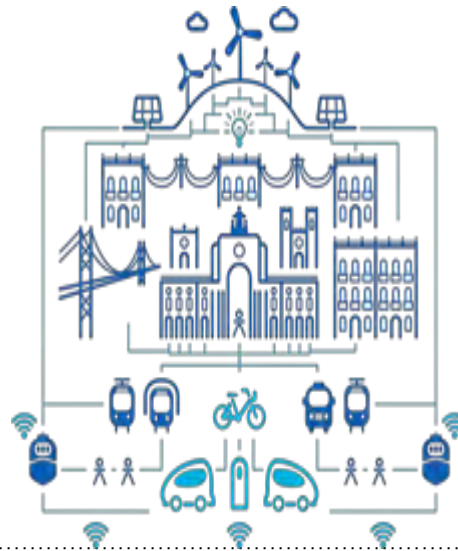
MONITORING

**S3C – SMART
CONNECTED CITIES
CENTRE**



MANAGEMENT PLATFORM

MOBI.ME



DEVICES & SENSORS

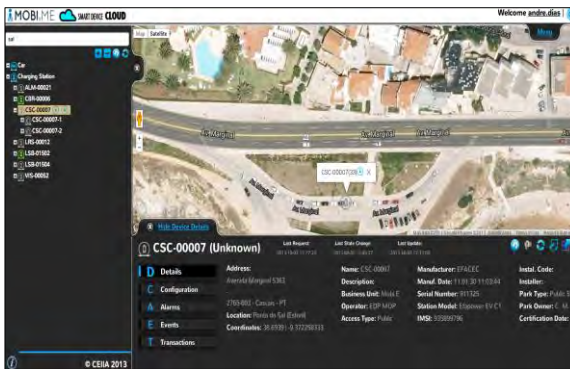
**MDC - MOBILITY DEVICE
CONNECTORS**

Empowering Smart Cities

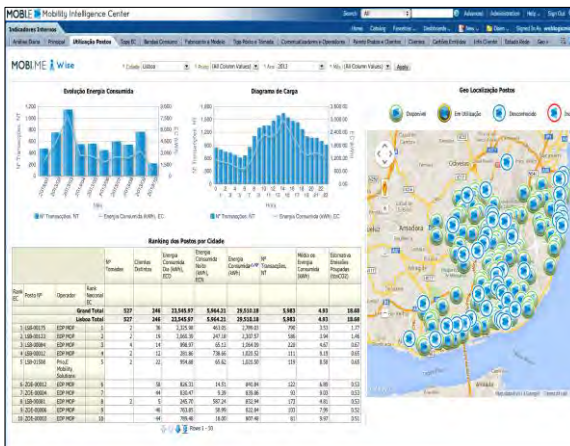


1. **Data collection, information processing and knowledge production**, for the identification of behavioral patterns, in order to improve the quality of cities, communities and operators management.
2. **Supporting city operators activity for different services**, assuming the control and management of different types of operations and business solutions, with an integrated perspective
3. **Providing decision makers and users with real-time information** and detailed reports about the impacts from their behaviors in the evolution and metabolism of their own cities, according to the following dimensions: mobility & transports, environment & energy

Through MOBI.ME, CEIIA is able to manage and integrate multiple mobility services



- EV Charging network management
- Vehicle-sharing services and their interaction with transport management systems
- Public transportation
- Energy management
- Parking management
- V2G and G2V services
- Fleet Management



MOBI.ME TOOLS

- Smart Device Cloud (SDC) – real-time device and communication management
- Smart Services Cloud (SSC) – CRM, billing and payment modules for complex and flexible business management and integration
- WISE – Business Intelligence and reporting tool for smart mobility services