Taula Rodona

Mario Canet, Transports Metropolitans de Barcelona, ZeUS
Òscar Puigdollers, Barcelona Serveis Municipals, BOC
Maria José Chesa, Barcelona Cicle de l'Aigua, ECHORD++
Joan Bassolas, Fundació Ciutat de Viladecans, IMAILE

TMB

Zeeus Project

TMB

- First public transport in Barcelona
- Surface Transport (TB) and underground (FMB)
- More than 1000 buses transporting 3000.000 people every day

Engineering objectives

- Optimize the maintenance reliability and feasibility of the fleet.
- Improve the passengers experience.
- Social responsibility aligned with the council requirements and European directives.
  - Air quality
  - Energy savings
  - Transport sustainability

TMB projects

- UITP active member
- Innovation
  - Hydrogen buses test (CUTE)
  - GNC buses
  - SCRT filters
  - Retrofit project
  - Zeeus

Zeeus project

- Eight cities in Europe working as demonstrators of different solutions of full electric buses for public transport.
- Bus OEM and facilities manufacturers involved in the project

Barcelona Zeeus demostrators

- 12M full Electric buses
  - Life cycle cost
  - Maintenance and reliability in summer time
  - Batteries life
- 18M opportunity charge buses
  - Viability of the system.
  - Feasibility in high performance operational conditions

Why Zeeus?

- 3 years demonstration test.
- Cost of TMB engineering cost.
- 50% of the price of the vehicle for the OEM.
- Possibility to buy the vehicle at the end of the demonstration.
- Share electric alternatives knowledge with other operators

B:SM Barcelona de Serveis Municipals

Ajuntament de Barcelona

Barcelona Open Challenge

November 2015

B:SM Barcelona de Serveis Municipals

Ajuntament de Barcelona

Barcelona Open Challenge

Document de definició

Economia, Empresa i Ocupació:
Barcelona Activa
Barcelona de Serveis Municipals

Introduction

International convening to invite companies, national and from abroad, to present **innovative solutions of 6 challenges** published by the city of Barcelona.

www.bcnopenchallenge.org

The offer for the companies is:

- **1 Million €** to **contract and implement** winning solutions
- **Services of growth**, entrepreneurial landing (required for international companies) and **references** for winning and finalist solutions

MAIN OBJECTIVE: To promote business growth and job creation by linking innovation with public purchase:

"CHALLENGES": ~~**Award/Pilots**~~ → **REAL CONTRACTS**

Barcelona Open Challenge

Document de definició

Objectives

BUSINESS

- Promoting **entrepreneurship**, **growth** and business innovation
- Access to **public purchase** (real command) by SMEs
- Attracting **investment** and **brand** positioning, …

GOVERNMENT

- Use **Public procurement** as a tool to promote innovation (CPI)
- Innovation in **processes**, **efficiency** and **transparency** in public spending
- **Collaboration** between municipal areas

CITIZENS

- **Improve** public services
- **Improve** the **quality of life** of citizens

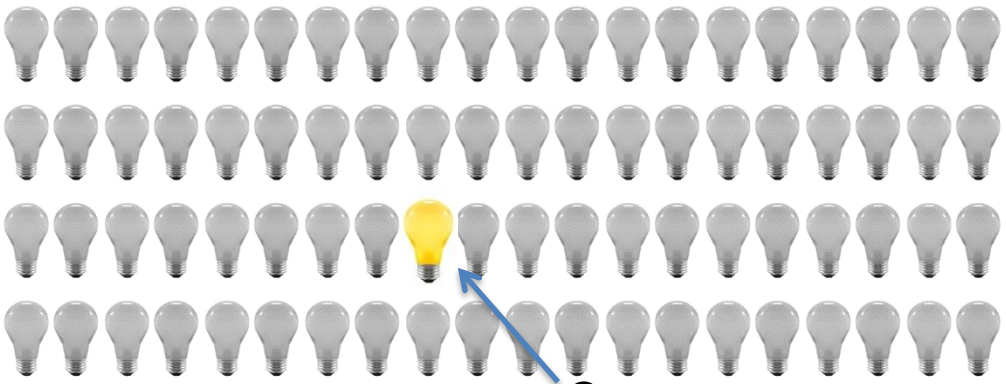
Barcelona Open Challenge

Document de definició

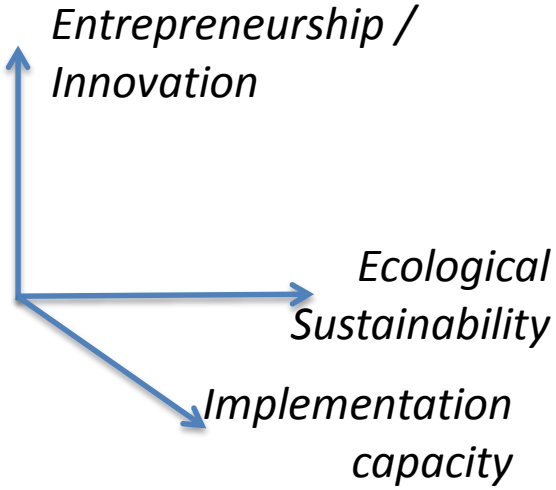
Administrative challenge

Juridical issues

LEGAL-JURIDICAL FRAMEWORK



Criteria for principles



Soluction BOC

ROUND 1 :
Ideas Contest
(ANONYMOUS)

TECHNICAL TRIBUNAL
From n ➔ to **15 ideas**

16/06/2014

COMPETITION JURY
From 15 ➔ to **màx 5** ideas

July 2014

ROUND 2 :
Negotiated PP Procedure

CONTRACTING COMMITTEE
➔ From 0 to 5 commands

Winter 2014

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Document de definició

ETS UNA EMPRESA INNOVADORA?

L'AJUNTAMENT DE BARCELONA ET CONTRACTA I ET FA CRÉIXER

BCN | OPEN CHALLENGE

6 REPTES DE CIUTAT QUE CERQUEN SOLUCIÓ

LA TENS?

Challenges

8 ←  Automatic detection and alerts about roads in disrepair

Develop new support systems to reduce social isolation  → 17

22 ←  Minimize robberies of bicycles in the city

Promoting local businesses through new technologies  → 50

14 ←  Monitoring the flow of pedestrians in the city

Implement new tools for the digitization of museum collections and archives  → 6

117 proposed ideas

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Document de definició

ETS UNA EMPRESA INNOVADORA?

L'AJUNTAMENT DE BARCELONA ET CONTRACTA I ET FA CRÉIXER

BCN | OPEN CHALLENGE

6 REPTES DE CIUTAT QUE CERQUEN SOLUCIÓ

LA TENS?

Results

From ideas to reality …

…solutions have met the requirements…

Automatic detection and alerts about roads in disrepair

Requirements vs. Solution (Example)

11 Million sqm. of pavement to be analyzed in 3 years, detecting at least 20x20x3cm breaches or 20x2 fissures-	At 0,4 Million sqm analyzed per day the system can scan Barcelona in 27 days with a technology not only able to detect but also able to typify the damages.

…with a genuine innovative public procurement methodology.

Definition of challenges → Definition of sollutions → Implementation of sollutions


B:SM
Barcelona
de Serveis
Municipals
Ajuntament
de Barcelona

European Clearing House for Open Robotics Development Plus Plus

Public end-user Driven Technological Innovation (PDTI)

ROBOTS FOR THE INSPECTION AND THE CLEARANCE OF THE SEWER NETWORK IN CITIES

Ajuntament de Barcelona

Barcelona Cicle de l'Aigua SA

Bristol Robotics Laboratory

BLUE OCEAN ROBOTICS - for humans

RUROBOTS Cognitive Science at Work

SEVENTH FRAMEWORK PROGRAMME

ROBOTS FOR THE INSPECTION AND THE CLEARANCE OF THE SEWER NETWORK IN CITIES

1. INTRODUCTION
2. DATA RESOURCE – SANITATION
3. THE CHALLENGE IN URBAN ROBOTICS
4. FUNCTIONS OF THE NEW TECHNOLOGY
5. EXPECTED IMPACT

1. INTRODUCTION

BARCELONA WATER CYCLE (BCASA)

MISSION

To manage, coordinate, monitor and optimize with quality, sustainability, participation and mainstreaming the provision of integrated water cycle services:

- Supply
- Sanitation
- Integrated management of the coast

leading all the commitments to improve the environment and fighting climate change, to achieve a sustainable and improved quality of life for citizens.

1. INTRODUCTION

STRATEGIC LINES

PROMOTE SOUND POLICIES FOR WATER CONSUMPTION

Ensuring rational use.

Ensuring the quality of supply.

Promoting the improvement and development of the entire water system.

Collaborate with other administrations in the development of hydraulic plans and projects.

PROMOTE POLICIES TO IMPROVE URBAN DRAINAGE

Improving and extending management of the development of the sewage system.

Controlling and supervising the maintenance of the sewer network.

Improving and extending the control and supervision of all conditions in the sewage system for work contracted out.

PROMOTE POLICIES TO IMPROVE THE INTEGRATED MANAGEMENT OF THE COAST

Promoting a new beach culture for citizens and tourists.

Coordinating operators.

Improving the services offered.

1. INTRODUCTION
WATER SANITATION
OBJECTIVES

- Planning and inspect the sewer and sewage network of the city.
- Control and monitor the conditions in the sewer network.
- Coordinate the work of scheduled cleaning of the sewer network.
- Manage, monitor and inspect projects and refurbishment and upgrading of the network.
- Supervise the construction works of private drains, concession of repair licenses and control of execution of works.
- Manage, monitor and inspect the projects and works of sanitation, drainage, sewers, pumping stations, treatment plants, siphons, etc.
- Collect data and prepare statistical studies of rainfall and its impact on network.
- Develop regulations on building materials and construction techniques of the network to ensure its uniformity.

2. DATA SOURCE – SANITATION

- 1.532 km sewage system network
- 42.425 Manholes
- 65.961 Drains
- 69.000 Connections

- 197 Control instruments
- 15 Water tanks

Other data:

- 565 km Optical fiber network

Ajuntament de Barcelona

Barcelona Cicle de l'Aigua SA

ECHORD++

2. DATA SOURCE – SANITATION

2. DATA SOURCE – SANITATION

MANAGEMENT OF THE SEWER NETWORK.(1/2)

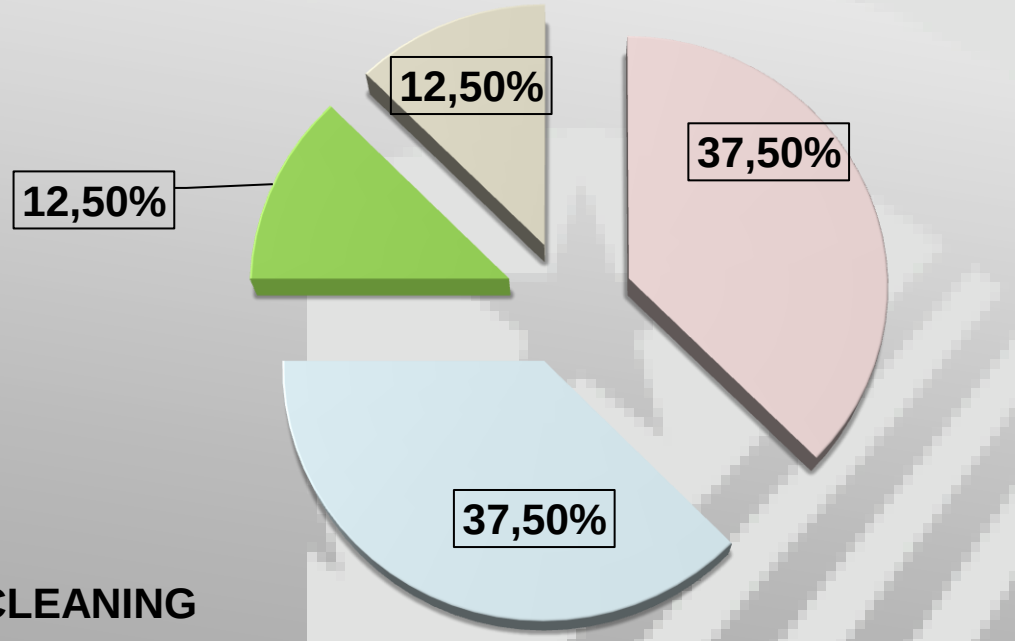
TASKS:

- **CLEANING OF THE EXISTING NETWORK.**
- **RECONSTRUCTION AND REHABILITATION OF THE EXISTING NETWORK.**
- **SEWER INSPECTION.**
- **ADVANCED MANAGEMENT OF SEWER NETWORK.**
  - Network planning.
  - Operation and maintenance of tanks, pumping stations, floodgates and sensors (limnimeters, etc.)
  - Technical operation in real time
  - Management of episodes during rain
  - Other: directions of works, editorial projects.

2. DATA SOURCE – SANITATION

MANAGEMENT OF THE SEWER NETWORK.(2/2)

SEWER INSPECTION COST : 1 M€ / YEAR



3. THE CHALLENGE IN URBAN ROBOTICS:

ROBOTS FOR THE INSPECTION AND THE CLEARANCE OF THE SEWER NETWORK IN CITIES

Sewer inspections require many humans to work in risky and unhealthy conditions.

Introducing a robotic solution in this process aims at reducing the labor risks, improving the precision of sewer inspections and optimizing sewer cleaning resources of the city.

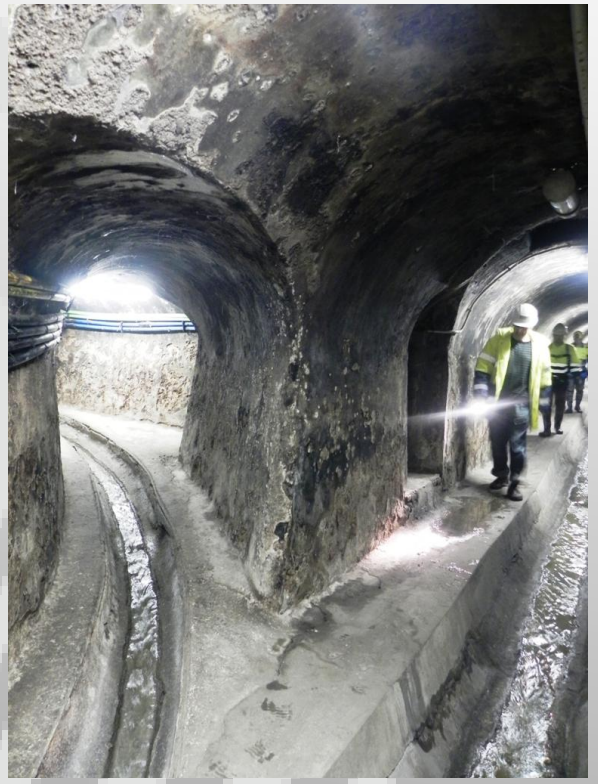
The robot should determine the quantity of sediments in the sewer by detecting abnormal levels of water or obstructions in pipes.

4. FUNCTIONS OF THE NEW TECHNOLOGY

1) SEDIMENT INSPECTION

   (ROBOT AUTONOMY: MINIMUM 4 HOURS BATTERY; OPTIMUM 3.000 METERS IN 8 HOURS, MINIMUM 1.500 METERS IN 8 HOURS)

2) IDENTIFY STRUCTURAL DEFECTS
3) SEWER MONITORING
4) WATER, AIR AND SEDIMENT SAMPLING
5) SEWER CARTOGRAPHY



4. FUNCTIONS OF THE NEW TECHNOLOGY

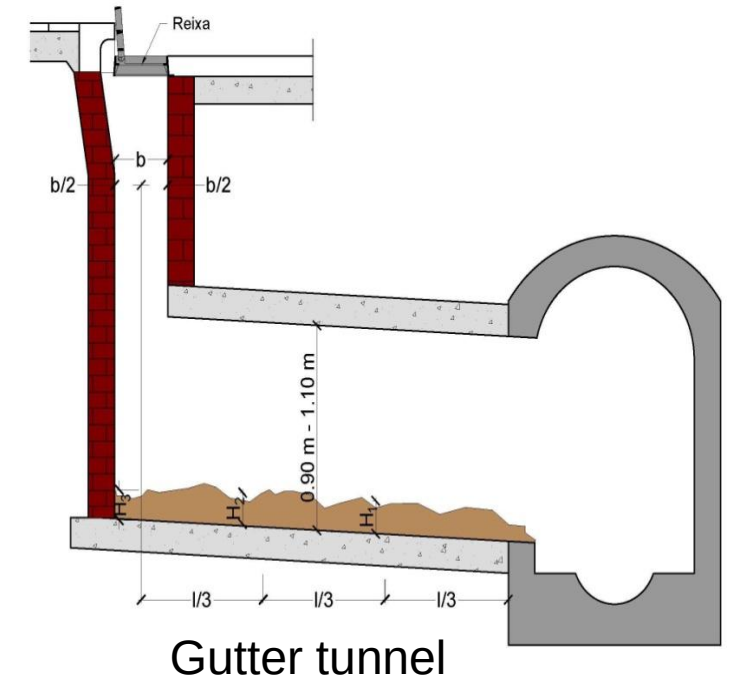
CONDITIONS

The cost of the complete brigade inspection should be less than **0,50 € / meter**. This inspection brigade of visitable works, and all its elements like inlets, manholes, siphons, slope changes, etc. with the staff necessary and sufficient. Including previous works required for the inspection, signals, elements of protection and security staff, ventilation, equipment, tools, materials, assistant needed, reporting, editing, filming, etc. all included.

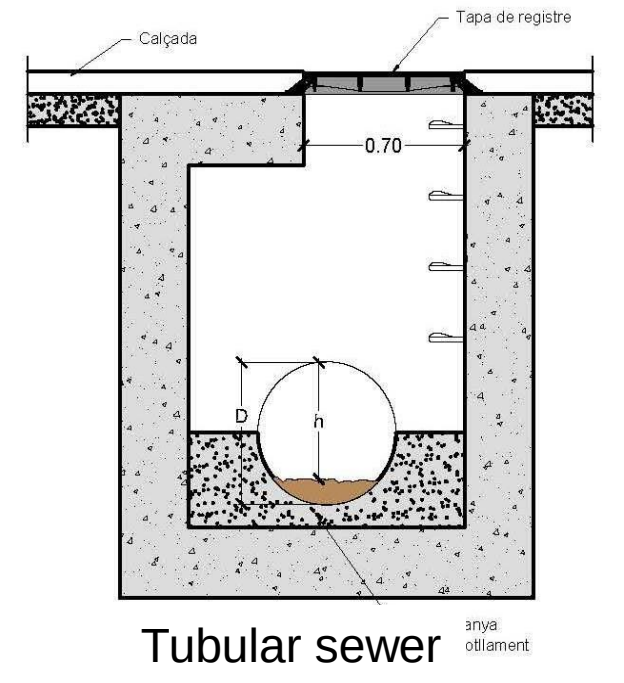
4. FUNCTIONS OF THE NEW TECHNOLOGY

4.1. SEDIMENT INSPECTION: depending on the minimum standards of operation of each item → decide whether it has to be cleaned or not.

(QUANTITY AND LOCATION)
(ROBOT AUTONOMY: MINIMUM 4 HOURS BATTERY; OPTIMUM 3.000 METERS IN 8 HOURS, MINIMUM 1.500 METERS IN 8 HOURS)



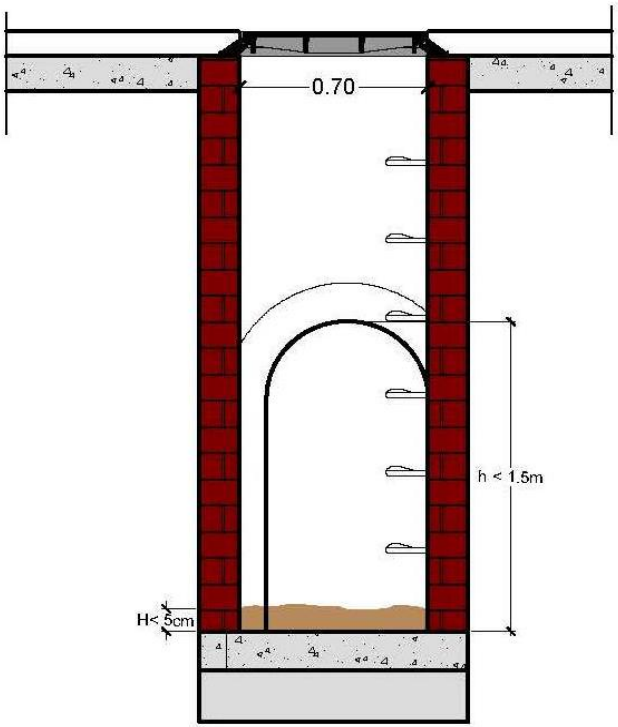
Gutter tunnel



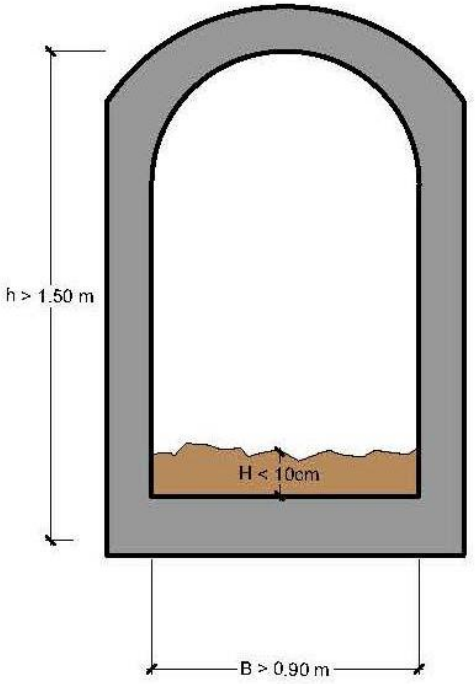
Tubular sewer

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.1. SEDIMENT INSPECTION: depending on the minimum standards of operation of each item → decide whether it has to be cleaned or not.



Non visitable sewer

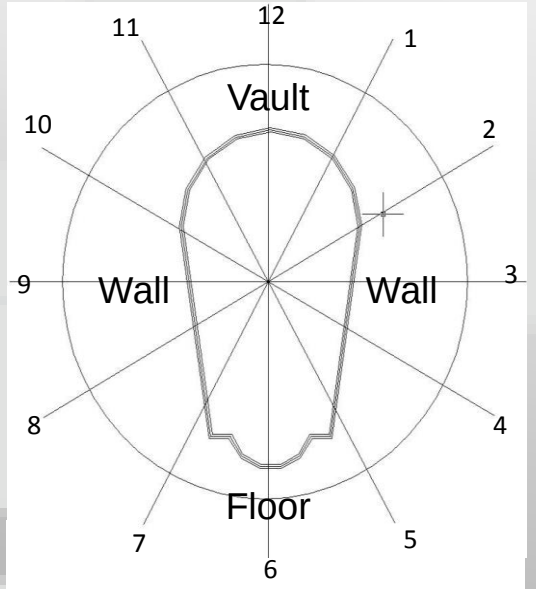


Visitable sewer

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.2. IDENTIFY CRITICAL STRUCTURAL DEFECTS: locate and identify critical damages inside the sewers.

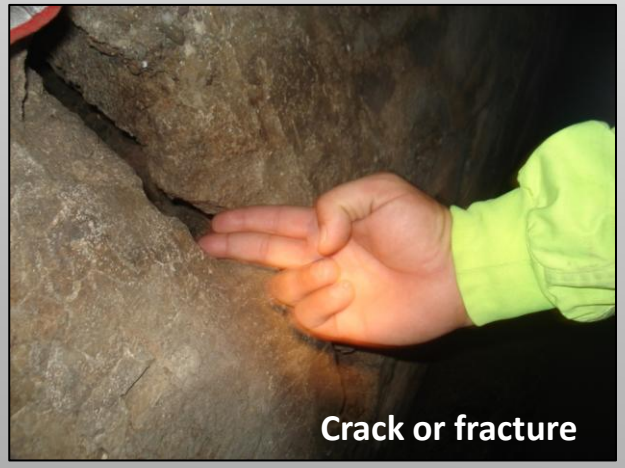
Name	UNE-EN13508-2 code
Crack	BABB
Fracture	BABC
Break	BACA
Break with loss	BACB
Collapse	BACC



Circular location following a clock-face pattern

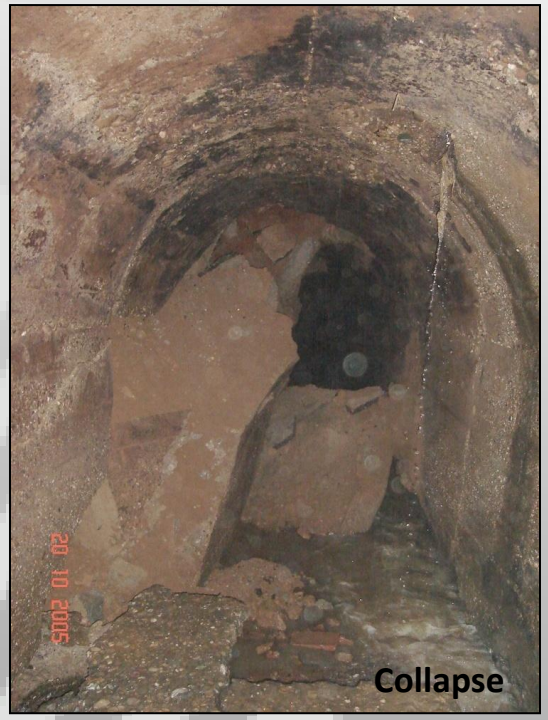
4. FUNCTIONS OF THE NEW TECHNOLOGY

4.2. IDENTIFY CRITICAL STRUCTURAL DEFECTS: locate and identify critical damages inside the sewers, whether it is located on floor (sewer's bottom), vault (sewer's roof) or walls.


Crack or fracture


Break


Break with loss

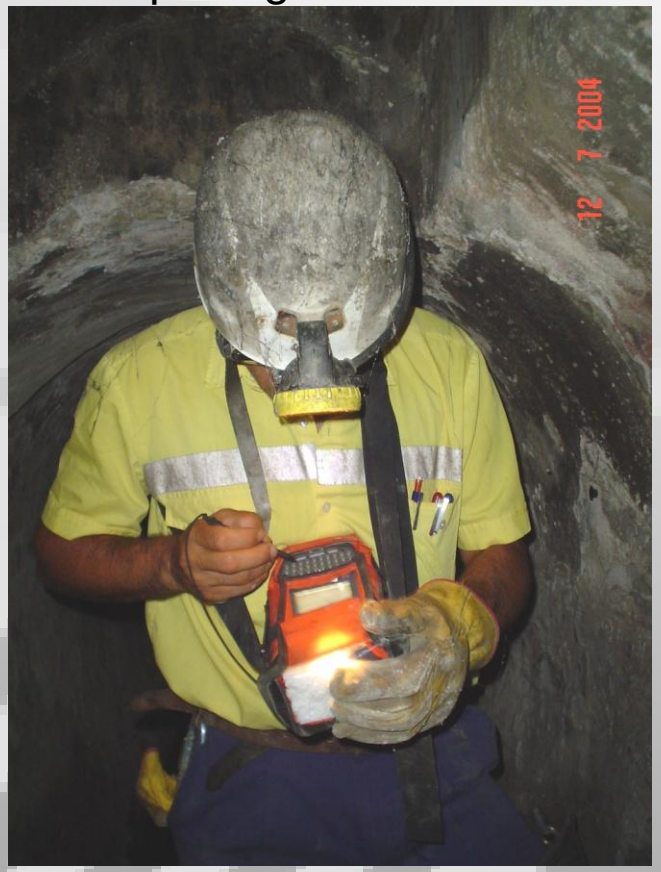


Collapse

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.3. SEWER MONITORING: to approximate the robot to the maximum level of sensitivity → to make decisions without exposing to risk situations

- To avoid access to sewers at risk situations
- To decide safety and health measures for staff
- To locate and follow spills or leaks, normally illegal, in order to protect sewer infrastructures from abrasion, rust and aggressive spills
- To determine tendencies in compounds (seasonal, daily, etc.)
- As a tool for environmental research in sewers



4. FUNCTIONS OF THE NEW TECHNOLOGY

4.3. SEWER MONITORING: to approximate the robot to the maximum level of sensitivity → to make decisions without exposing to risk situations

General functions
Video 360º
Noise record

Water sensors
Temperature (Tª)
pH
Conductivity
Turbidity
Organic matter

Air sensors
Temperature (Tª)
Relative Humidity (%RH)
Carbon Monoxide (CO)
Hydrogen sulphide (SH_2)
Methane (CH_4)
Oxygen (O_2)
Lower explosive limit (LEL)
Volatile organic carbons (VOCs)

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.4. WATER, AIR AND SEDIMENT SAMPLING: complementing monitoring, it is greatly important in order to obtain valid and traceable information → environmental policies

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.4. WATER, AIR AND SEDIMENT SAMPLING

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.5. SEWER CARTOGRAPHY: more effective sewerage management based on the reliable knowledge of the location and characteristics of the network, linked to the territory.

» Gives **precise knowledge** about the actual infrastructure.

» For developing **hydraulic models** allowing accurate strategic decision making and **efficient operation**, planning and development of new infrastructure.

» Provides greater flexibility in the **distribution of information** both inside the corporation and externally.

» **Help maintenance and rehabilitation** of sewers.

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.5. SEWER CARTOGRAPHY: localization of basic sewer elements


Manholes


Home drains inlets


Street drains inlets


Section reduction

4. FUNCTIONS OF THE NEW TECHNOLOGY

4.5. SEWER CARTOGRAPHY

Sudden slope change


Connection of lines at same level

5. IMPACT EXPECTED

SOCIAL AND CULTURAL IMPACT

- IMPROVE THE QUALITY OF LIFE OF CITIZENS SINCE IT WILL IMPROVE THE SEWER PERFORMANCE
- IMPROVE SEWER WORKERS HEALTH AND SAFETY MEASURES

ENVIRONMENT IMPACT

- REDUCE OF ODORS AND OVERFLOWS

ECONOMIC IMPACT

- REDUCE THE COST OF SEWER INSPECTIONS

INNOVATION IMPACT

- IMPROVE THE PUBLIC SERVICE GIVEN SINCE IT OPTIMIZES THE SEWER CLEANING RESOURCES

ABILITY TO EXECUTE

- REALISTIC EXPECTATIONS

BARCELONA WATER CYCLE
Medi Ambient i Serveis Urbans - Hàbitat Urbà
Ajuntament de Barcelona

Acer,16
08038 Barcelona
Telèfon: +34 932 896 800
www.bcasa.cat

Info.bcasa@bcn.cat

The ECHORD Plus Plus Consortium acknowledges support by the European Commission under FP7 contract 601116.

Projecte IMAILE

Workshop “Compra innovadora. Una estratègia de futur“

Co-funded
by the European Union

Acció – SCEWC
18.11.15

INTRODUCCIÓ

- El procés de Compra Precomercial de l'Ajuntament de Viladecans s'emmarca dins el projecte IMAILE (Innovative Methods for Award Procedures of ICT learning in Europe)
- Co-finançat pel 7è Programa Marc de la UE
- 1er **PCP (Compra pre-comercial) en educació** de la UE
- Pressupost PCP: 3.8 milions d'euros
- Durada: 42 mesos – Febrer 2014/ Juliol 2017

Co-funded by the European Union

CONSORCI TRANSNACIONAL

•10 socis en 7 països

Grup licitador	- Ciutat Halmstad (Suècia) – Autoritat contractant - Ciutat Konnevesi (Finlàndia) - Regió Sachen-Anhalt (Alemanya) - Ciutat Viladecans
Equip de suport tècnic, legal, comunicació, etc.	- L'Agència Regional de Desenvolupament i Innovació de la regió Észak-Alföld (Hongria) - Les Universitats Otto-Von-Guericke de Magdeburg (Alemanya) i Jyvaskyla (Finlàndia) - La consultoria en assumptes legals INNOVA+ (Portugal) - L'Associació E.N.T.E.R -European Network for Transfer and Exploitation of EU Project Results- (Àustria) - Ciutat Varberg (Suècia)

Co-funded by the European Union

Objectiu

L'objectiu general del projecte és utilitzar el procés de Compra Precomercial (PCP) per identificar tecnologies i serveis innovadors que donin resposta al repte de desenvolupar Entorns Personals d'Aprenentatge (PLEs) de nova generació per l'educació primària i secundària en les assignatures de Matemàtiques, Biologia, Química i Física (STEM).

Co-funded by the European Union

REPTE COMÚ

2012

Repte/ problema inicial

- Demanda creixent d'aprenentatge personalitzat

Repte/ problema pedagògic

- Risc creixent que els estudiants no assoleixin els objectius STEM
- Augment del % d'abandonament escolar
- Solucions tecnològiques actuals no donen resposta a les necessitats reals a les aules.

Repte/ problema social

- L'augment del % d'abandonament escolar suposa un cost major per la societat a llarg termini
- Increment de la demanda de professionals en STEM pel 2025

Co-funded by the European Union

INNOVATION GAP

1. Primer estudi pre-liminar sobre les possibilitats existent al mercat > Identificació ***INNOVATION GAP***

2. Presentació del projecte a la CE.

3. Estudi de les necessitats i del mercat en profunditat: confirmació ***INNOVATION GAP*** >> PCP.
    - 2 RFI a empreses
    - Enquestes, workshops docents (550) i alumnes (520) europeus.
    - Enquestes administracions públiques (1/3 Estats Membres)
    - Etc.

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PRINCIPALS REPTES IDENTIFICATS

- **Reptes**

Reptes Impacte esperat	
Reptes pedagògics Impacte directe	Repte 1 – implementació completa d'un enfocament d'aprenentatge personalitzat en STEM per tots els estudiants, incloent estudiants amb necessitats especials Repte 2 – Augment de la motivació en STEM I els resultats dels estudiants que fan servir sistemes d'aprenentatge basats en les noves tecnologies
Reptes tècnics Impacte directe	Repte 3 – Aplicable tecnològicament a tots els dispositius, interoperabilitat i escalabilitat de les solucions digitals innovadores.
Reptes socials Impacte indirecte	Repte 4 – Mercat de treball I demanda creixent de professionals en STEM al 2025 Repte 5 – Costos i riscs d'abandonament escolar en els Estats Membres de la UE

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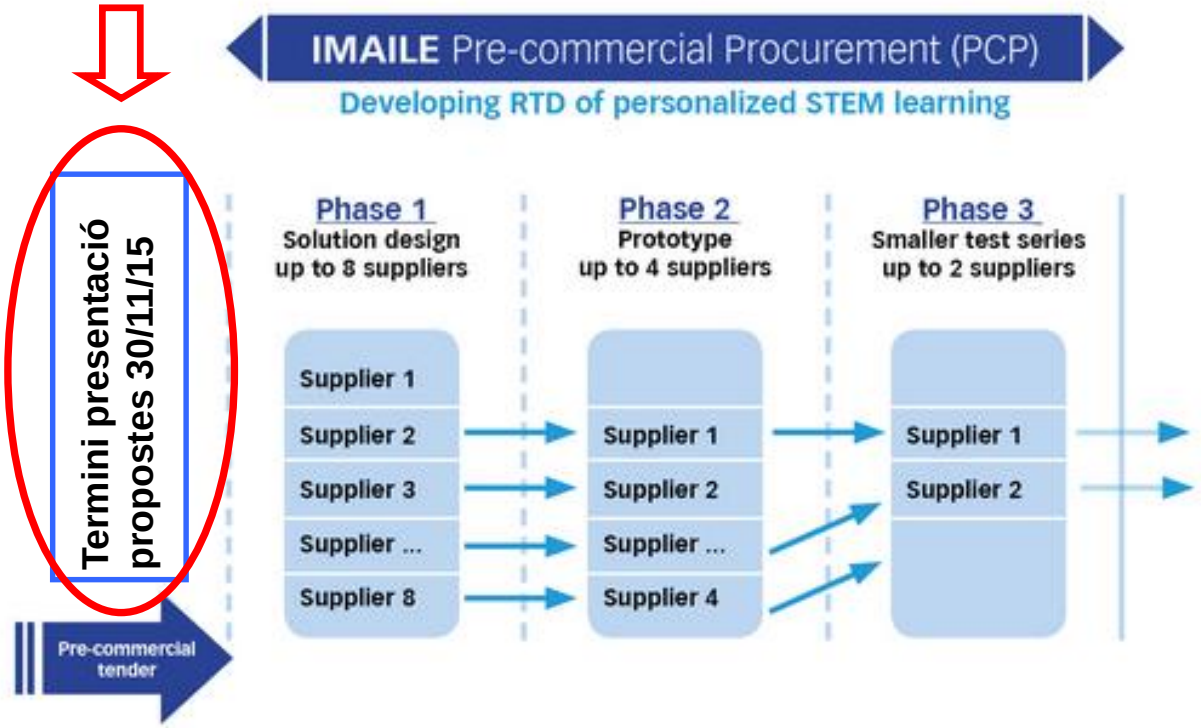
ESTAT ACTUAL



- **FASE 1** - Disseny de la solució: 3 mesos – Febrer 2016 (380.000€ / 8 proveïdors)
- **FASE 2** - Conceptualització del prototip: 6 mesos – Maig 2016 (1.520.000€ / 4 proveïdors)
- **FASE 3** - Test dels prototips - 7 mesos – Gener 2017 (1.900.000€ / 2 proveïdors)

Co-funded by the European Union

IMAILE Contacts

Més informació: www.imaile.eu

Contacte a Viladecans – Sonia Domínguez

International_relations@viladecans.cat

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