



# **Road2CPS – Workshop on “Digitizing European Business and Society: Paving the Way towards Smart Destinations and Sustainable Tourism”**

*Shaping Smart Tourism in the Era of the Circular Economy:  
Opportunities, Business Models and Visionary Scenarios enabled by  
CPS and IoT*



Report Road2CPS Workshop,

11<sup>th</sup> October 2016 Palma de Mallorca, Spain

[www.road2cps.eu](http://www.road2cps.eu)

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Project Acronym:	Road2CPS
Project Full Name:	"Strategic action for future CPS through roadmaps, impact multiplication and constituency building
Grant Agreement No.:	644164
Programme	<b>ICT-1 2014: Smart Cyber-Physical-Systems</b>
Instrument:	Coordination & Support action
Start date of project:	01.02.2015
Duration:	24 months
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**The Road2CPS project is co-funded by the European Community's Horizon 2020 Programme under grant agreement n° 644164.**



## Executive Summary

The Road2CPS Workshop on Smart Destinations was held October 11<sup>th</sup> 2016 in Palma de Mallorca, Spain. The workshop originated from the Road2CPS consortium willingness to review a new emerging domain, Smart Tourism, which appeared both very dynamic and CPS-relevant, albeit not as visible as more established domains such as smart factory, smart mobility or smart cities. The workshop preparatory actions confirmed this initial intuition: the development of this sector is nowadays characterized by an increasing adoption of new technologies among which CPS is a key enabler, and by a deliberate impulse of a whole ecosystem (private and public actors). The latter is in strong resonance with the current EC initiatives to foster digitizing industry via networks of regional Digital Innovation Hubs (DIH) and Competence Centres (CC). Thus, collecting the views of some important actors involved in digitizing tourism was a very interesting and topical opportunity for Road2CPS.

The workshop provided an overview of how such a digitization is taking place in a particularly active region, the Balearic Islands, which has invested its long experience of tourism challenge management into a pioneering approach called “Smart Islands”. Its aim is to sustain a digital growth of this sector while enhancing the residents well-being. This features cross-cutting issues such as questioning the role of innovative technologies, planning the development of sustainable infrastructures, reflecting on resilience strategies for cities which see large seasonal population flows, aiming to pave the way towards circular economy. A key point which was acknowledged throughout the day was the importance of new technologies to provide valuable data by which more informed decision-making process can be set up and assessed, in contrast to the past decades. More generally the phenomenon of digitization and the deployment of Cyber-Physical Systems (CPS) technologies and the Internet of Things (IoT) is expected to increase substantially over the next decades, holding great potential for novel applications, innovative products and services as well as new business models. CPS and IoT technologies increase the ability to predict behaviour and can thus be used to reengineer business processes, e.g. designing them more sustainable, using available resources more efficiently and effectively – in line with the concept of circular economy.

Against this background, this all-day workshop brought together about 40 experts from academia, industry, municipalities and policy-making to learn about and discuss new concepts, frameworks, challenges and opportunities for smart destinations and sustainable tourism facilitated by digitization efforts. It was further set to align specific challenges faced by cities and regions whose economic and labour market profiles are marked by tourism and the corresponding opportunities offered by CPS and IoT technologies.

CPS experts as well as end-users and businesses ranging from start-ups to large enterprises were invited to participate and contribute to discussions on visionary scenarios, disruptive innovations and their impact on the business ecosystem.

The objectives of the workshop were to stimulate:

- Visionary scenarios on the role and priorities for CPS and IoT technologies to support the evolution towards more sustainable tourism in smart destinations.
- Foster exchange on CPS innovation perspectives and generating future business strategies.
- Aligning priorities and reflection on European initiatives and circular economy aspects to ensure the coherence of results.
- Assessing the impact on the business models of long established sectors such as the tourism economy.



More than twelve presentations<sup>1</sup> were provided, which covered:

- An overview of the current status of Road2CPS roadmapping activities and recommendation preparations
- An account of ongoing EC initiatives pertaining to DIH and CC to set the context
- In-depth accounts of the public stakeholders impulse regarding the Smart Island initiative at all administration levels (national, regional, cities)
- The prominent roles played by clusters (Turistec, Balears.T) and private companies from the service and industrial sectors
- Ongoing research and innovation projects in the tourism sector or in related domains such as Smart Cities, which share common preoccupations

After these presentations, group discussions enabled to formulate some recommendations. From a technological viewpoint, the major drawback of the fast deployment of device-centric infrastructures is the insufficient preparation ahead of time of shared data models suitable for a better interoperability between systems. The advent of a fragmented landscape is a risk. This does not mean one should count for a convergence in the systems being deployed, rather strive for common capabilities to extract information from data, across systems. When the goal is to be able to build better informed process management for a city or a territory the problem is on the semantics of data and the extraction of information from various sources (multimodal transport, waste management, tourists needs and behaviours, resident feedback, energy grids, etc.). This seems to be a pressing challenge ahead, where a European impulse transcending local disparities could have a major impact.

An important element was also acknowledged: the mind-set factor in this digitization process. Sure enough the companies and entrepreneurs need to adopt lean management procedures to promote horizontal thinking and collaborations. But citizens as well need to be involved. At a time where portions of the population in Europe resent from being left out of the digitization benefits, the risk of a digital divide is present. Promoting resident involvement in field experiments, gathering social studies specialists and giving populations feedback means is vital in such endeavours. It also is an opportunity to close the loop with the e-democracy and e-administration initiatives taken concurrently. Efforts should be dedicated to build trust in these systems. It is relevant that privacy and security issues were not so much taken into account in the presentations made throughout the day: the haste in which digitization is taking place in a techno-push approach needs to be tamed with informed management procedures regarding trustworthiness, privacy issues and feedback procedures. From an economic standpoint too, it is important to be able to provide future customers with the role they deserve in the design and deployment process of such initiatives: a fair evaluation of the deployed systems is at stake here.

Foreseen funding lines are in this respect: 1) how to enable the sustainability and evolution of both infrastructures deployed and the emerging ecosystem throughout their lifetime, 2) how to give citizens an edge in the digitization process to seize opportunities for an improved well-being, a cleaner environment and jobs/professional skills enhancements. These appear as rather long-term preoccupations, which is a nice reminder from society to turn all the energy and impulse that one perceived throughout the day into praised societal changes.

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<sup>1</sup> All presentations are available on the Road2CPS website under 'resources': [www.road2cps.eu](http://www.road2cps.eu)



## Introduction and Scope of Meeting

Dolores Ordonez, from AnySolution, who was hosting the meeting in the premises of ParcBit, Palma de Mallorca, welcomed the participants and gave a brief overview on the central position that tourism occupies nowadays as cross-sectorial technological application field and key business enabler for a whole ecosystem.

Meike Reimann, Road2CPS coordinator, introduced the aims and mission of the Road2CPS project and gave a brief overview of the agenda and the main objectives of the workshop:

- Visionary scenarios on the role and priorities for CPS and IoT technologies to support the evolution towards more sustainable tourism in smart destinations.
- Foster exchange on CPS innovation perspectives and generating future business strategies.
- Aligning priorities and reflection on European initiatives and circular economy aspects to ensure the coherence of results.
- Assessing the impact on the business models of long established sectors such as the tourism economy.
- Constituency building in one of the flagship communities that will define the future of CPS

More than twelve presentations were provided, which covered:

- An overview of the current status of Road2CPS roadmapping activities and recommendation preparations
- An account of ongoing EC initiatives pertaining to DIH and CC to set the context: This presentation was made by David Servat, CEA LIST, from the Road2CPS project.
- In-depth accounts of the public stakeholders impulse regarding the Smart Island initiative at all administration levels (national, regional, cities)
- The prominent roles played by clusters (Turistec, Balears.T) and private companies from the service and industrial sectors
- Ongoing research and innovation projects in the tourism sector or in related domains such as Smart Cities, which share common preoccupations

The formal agenda of the workshop is included below as reference (Figure 1)



<b>Road2CPS – Workshop on Smart Destinations and Sustainable Tourism</b>	
<b>09:45</b>	<b>Registration</b>
<b>10:00</b>	<b>Welcome and Introduction</b> <i>Introduction for the day (Dolores Ordonez, AnySolution)</i> <i>Road2CPS mission (Meike Reimann, Coordinator Road2CPS, Steinbeis-Europa-Zentrum)</i>
<b>10:10</b>	<b>Overview on related EC initiatives</b> <i>Digitizing the European Economy: impact on business and society (David Servat, CEA LIST)</i>
<b>10:30</b>	<b>Smart Destination as part of the Spanish National Integrated Tourism Plan</b> <i>Antonio López de Ávila, President SEGITTUR (National Ministry of Industry, Energy and Tourism)</i>
<b>10:45</b>	<b>Presentations</b> Presentation of the Use Case ‘Smart Island Mallorca’; Presentations on the concept, frameworks, components and tools for smart destinations (by industry, SME/start-ups, academia and municipalities) including: <ul style="list-style-type: none"> <li>• <i>Luis del Olmo, president of Balears.t / Jaume Monserrat: president of Turistec</i></li> <li>• <i>Cosme Bonet, executive minister of Economy and Finances Mallorca Island Government (Consell de Mallorca), "Brief introduction to the objectives of the SmartIsland project in Mallorca "</i></li> <li>• <i>Antonio Tirado, Municipality of Calvià, "Calvià City Council: Smart Destination plan"</i></li> <li>• <i>Elena Petrova, ASIDEES (NGO, Vienna, Austria)</i></li> <li>• <i>Prof. Bartomeu Alorda, University of the Balearic Islands; director of the SmartDestinations working group "Research on Smart Tourist Destination: Learned Experiences through ITCs Analysis"</i></li> <li>• <i>Juan Ramon Santana, University of Cantabria, ClouT and FESTIVAL projects</i></li> <li>• <i>Rafael Guinea, General director Tirme, Circular economy and waste management</i></li> <li>• <i>José María Bauzá de Mirabó, Waste management, Director MAC Insular</i></li> <li>• <i>Antonio Skarmeta, University of Murcia, MiMurcia project</i></li> <li>• <i>Joao Sarraipa, Institute for the Development of New Technologies, Portugal, Concepts for Agriculture and Tourism Cyber-Physical Ecosystems</i></li> <li>• <i>Marton Borbely, Xetics</i></li> <li>• <i>Michele Fuschillo and Pasquale Leone, Engineering, technology applied to Tourism</i></li> </ul> <i>End-user expectations, challenges and vision for future smart destinations and tourism. Connecting ideas to business</i>
<b>13:00</b>	<b>Lunch</b>
<b>14:00</b>	<b>Panel and Interactive Session</b> <i>With all speakers and in small working groups.</i> <i>The focus will be on defining key factors (technologies, business, policies) which have contributed to the success of the above initiatives and how such experiments can be replicated and/or transferred from one domain to another</i>
<b>15:50</b>	<b>Conclusions and next steps</b>
<b>16:00</b>	<b>Close of the Workshop</b>

Figure 1 Road2CPS – Smart Destinations Workshop AGENDA



## Overview on related EC initiatives

A short presentation of the current EC initiatives to sustain the digitisation of industry was done before the set of presentations on the Smart Destination initiative and related projects. It was an opportunity to refresh minds and spread the message that a cornerstone of the EC approach to digitisation lies in the combination of experience, skills and experiments involving the full diversity of stakeholders. This was precisely what the workshop was trying to achieve for a new domain.

The presentation was based on the materials used by EC representatives in multiple occasions, in particular, a recap on the main actions lines was given:

- Leadership in digital technologies value chains: enlarging the application of standards and reference architectures from vertical markets to mainstream, using PPPs as leverage means of this action and promoting replicable experimentation and method guidelines
- Access to technology: conquer the digital divide among industry companies in Europe (SMEs, mid-caps, non tech, etc.), favouring bottom-up spurring of digital innovations
- Skilling our workforce for digital change: in particular rethinking the workplace and provide new life long training
- Adapting the legislation to eliminate barriers to digitisation

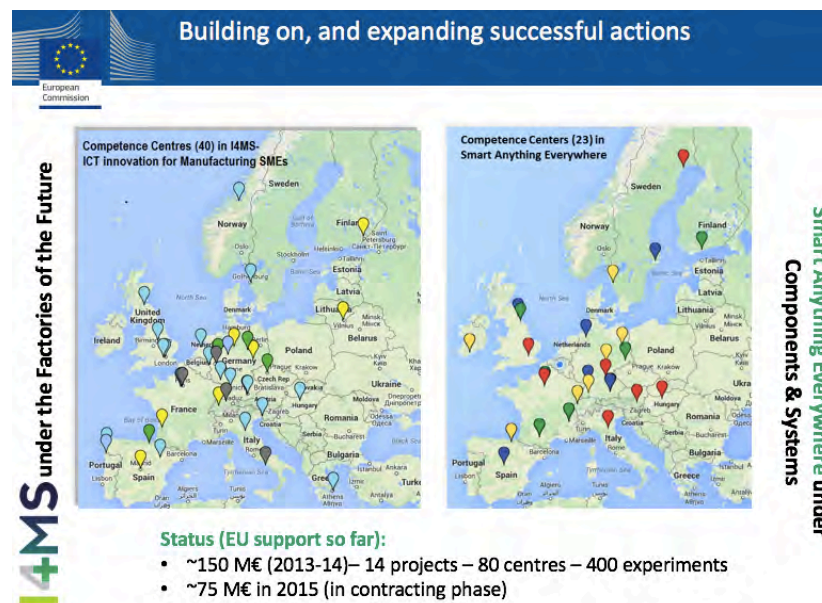


Figure 2 Digital Innovation Hubs deployment

The initiative is built around a pan-European network of competence centres (typically research organisations, universities) (see Figure 2):

- These centres provide expertise and skills in the advanced technology
- They support the technology transfer and act as innovation multipliers through active dissemination of best practices
- Typical project structure is Integrated Projects and in H2020, large Innovation Actions in order to have a critical mass of experiments.

- The focus is on industrial SMEs / mid-caps with experiments that include the whole value chain in a flexible partnership (only for the time of the experiment usually 12-18 months max) and a funding that can vary between 50K and 250K EUR.
- What is shared within the consortium is not the IPR which stays within the partners of the experiments, but the lesson learnt.
- The implementation of these schemes is flexible and light (especially in H2020) and allow for Open Calls for new experiments and the funding is distributed in cascade to third parties by the coordinator.





## Presentations

The following sections contain a summary of the presentations done during the workshop along with accounts of the discussions that followed. The reader can find some biographical notes on the speakers in the annex of this report.

### **Antonio López de Ávila, President SEGITTUR (National Ministry of Industry, Energy and Tourism)**

The presentation gave an in-depth account on the Smart Destination Initiative which plays a major role in the Spanish National Integrated Tourism Plan. Some figures help realize the importance of this sector for Spain. Last year 110m people visited Spain, including both tourists (who visit overnight) and excursionists (who visit but don't stay overnight). This year the same figure is projected to reach 160m. Spain is 3<sup>rd</sup> in the world for tourist income: tourism represents 11% of Spain's GDP, 13% of its employment, and it is one of Spain's biggest industries. Spain is 1<sup>st</sup> in the world for effectiveness in tourism sector.

One of the sector major evolutions these days lies in the increasing use of digital services: tourists plan ahead their trips relying on a variety of recommendation sources (friends, social network communities, travel agency services, ticket buying aggregators), they take advantage of personalized recommendations during their stays, and after their return home, they indulge in detailed accounts of their trips and appreciations broadcasted through social networks. These emergent behaviours have tremendous impacts on the sector stakeholders, which may benefit/suffer from rapid trends or dislikes. Alongside social networks, indirect information during the touristic seasons can be now gathered through sensors and IoT devices (e.g. free WIFI or WIMAX installations and information beacons) or dedicated city and touristic portals. The collected data may show usage peaks, expose insufficient coverage, or exhibits touristic visiting site flow patterns.

The Smart Destination initiative acknowledged this evolution and offered to set-up a framework to take benefit from it. Indeed, provided that this massive amount data becomes not overwhelming, it turns out to be an invaluable source of information to take more thoughtful decisions in terms of infrastructures and equipment deployment than was possible in the last decades. The amount of information collected is so much on the rise that tourism may well be faced with the big data challenge.

At all government levels, this evolution is seen as an opportunity to reinforce touristic attractiveness by deploying newer and more efficient infrastructures while enhancing the well-being of residents. In deed when the Smart Destination initiative delivers better internet coverage by deploying antennas or information beacons, this fights against the seclusion of certain areas, which in turn helps residents preserve a positive appreciation of the touristic nature of their homes. Another key point is to enable the sustainability of local initiatives for the development of touristic activities proposed by the residents themselves. The Badajoz experiment which has been running for a few years is one such example. Acknowledging the trend of tourists for "getting closer to nature" (e.g. spend a day with a shepherd, in the hills, and cuddle a goat/sheep), the government has funded improved connectivity facilities, outreach to locals, training, etc. to create a tourist-attractive venue, and empower citizens to create their own tourist offerings (e.g. day with shepherd), with a bit of technical help funded by the Badajoz municipality. The residents, turned entrepreneurs, can advertise their offer through a collaborative web-based tourist site and set up deals among the offerings as well (e.g. shepherd's day and discount from local wool shop). The government has now stepped back, and locals are running the whole initiative on their own.

The core of the Smart Destination Initiative is to provide an access to structured information, e.g.:



- Information on the touristic affluence of sites and visiting patterns, gathered through sensors at points of interest in a city to see the number of visitors at a specific point, and their movements
- Information about credit card spending: this information is provided in properly anonymized forms by credit card organizations partners of the initiative. This exhibits patterns of funds spent by tourist, broken down by nationality, gender, what they spent and when, age bracket etc.
- Information mined from Facebook, Twitter, Yelp and Instagram, which allows to understand what tourists think before, during and after their trip

This is made possible by the development of a rich collaborative ecosystem involving public-private partnership, with companies such as Mastercard, parking providers, museums, accommodation providers, restaurants, events, ICT tech and app developers. The information is made available through online dashboards.

An important impulse is set on multimodality, with the launch of an integrated transport ticketing system, starting with leaving home, incorporating flights and all the transportation steps between returning home again. This allows providing help and supporting tourists, and also provides useful information about tourist plans etc.

The discussion with the audience revolved around the following questions:

- The cost for municipalities who take part in this approach highly depends on the goals for the municipality. It can be very expensive to acquire some information from third parties, but it can also be cheap for the municipality to install their own sensors and collect data.
- The construction of the data models is provided by different partners in Spain with discussion involving municipalities. The ideas are currently exported to other countries, particularly Argentina and Mexico. Yet there are still major challenges to develop all-encompassing, shared data model.
- One of the goals if this initiative is to deliver improvements to quality of life for residents at the same time as improving services to tourists. One such cross-beneficial example, here in the Balearic Islands, is the decrease in communication seclusion of some areas where people had no communications even quite recently. Efforts to improve connectivity around the island to boost the tourist industry and support this kind of data collection allows to deliver connections to these isolated communities for the first time, so that some isolated elderly residents were able to talk on the phone to their relatives on other islands for the first time.
- Regarding the multimodality, the system is planned to accommodate all sorts of extensions (transport within the city, or intercity, even integrating less digitalized means such as the faithful donkeys for back-country rides)

### **Luis del Olmo, president of Balears.t**

The presentation introduced Balears.t (“Balears es turisme”) a cluster supporting technology and innovation in tourism. The current tourism model in the Balearics: profit margins have dropped and costs have increased over the years, which means that more and more visitors are needed each year to keep up the income. The number of visitors has not fallen, but despite the regular high numbers of visitors this has not translated into value for the community.

The Balearics appear insufficiently differentiated from other destinations. Thus initiatives were to be launched to help differentiate the Balearics as a destination with value-added tourism products. Interactive tourism is necessary, allowing to establish a relationship with each visitor, aimed a specific market segments.

This is made possible through the use of new channels to communicate with the consumer. Tourists now travel for fewer days on each trip but they travel more frequently. They are highly connected and they actively look for and share data online. They are interested in and enjoy natural landscapes and



local artisan crafts and products. Studying these features provides insights for valued tourism products which will differentiate the Balearics from other destinations. For instance, the Balearics excel at process: the logistics of transferring tourists onto the islands and into their accommodation and the reverse. Yet progress can be made to really know *who* the tourists are and what their interests are. This is also an opportunity for all residents to realize that they can have their say in the process, combining the efforts from public, academic and industrial.

Key to this approach is the availability of a digital platform. Many services can be launched, but a common platform is needed to operate these from in a co-ordinated way, ideally connecting everybody inside and outside the sector. This is seen as one way to deal with the cross-cutting challenges that are faced by highly touristic areas, namely the stress that seasonal bursts of population have on infrastructures and day-to-day resident lives.

### Jaume Monserrat: president of Turistec

The presentation of the Turistec cluster completed the picture established by the previous presentation on Balears.t with a view on establishing European cooperation around these subjects. Indeed, since 2013 Turistec manages the EUREKATOURISM+ Umbrella. This has the objective of increasing the competitiveness of tourism industry via the generation of industrially relevant research, technological development and innovation (RTDI) projects oriented to the sustainable development and improvement of tourism, leisure and cultural sectors, through technological innovation. Oriented to public and private entities, the EUREKATOURISM+ is also a European network for technological innovation agents in travel and tourism sector. Its added value, for the national governments involved, is to promote Europe as a Sustainable, Responsible and Accessible destination. A portfolio of more than 15 projects was funded under this scheme putting forward technological platforms. One such project is CyberContour which provides a touristic software framework and API development for B2B: hotels, travel agencies, car rentals, restaurants, leisure, etc. To raise awareness of such open platforms, Turistec has set-up its ICT solutions map, which depicts many of the numerous services that are in close connections with tourism (cf. Figure 3)

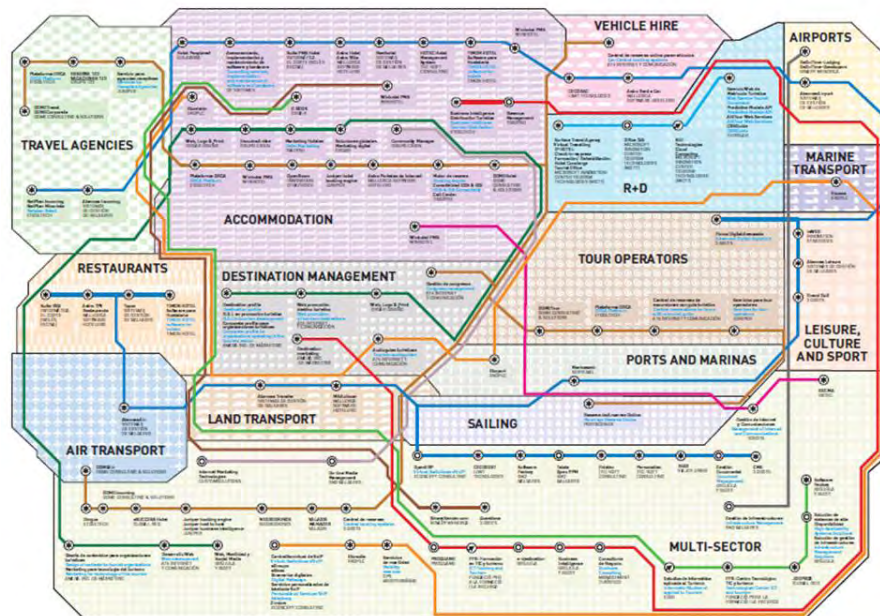


Figure 3 Turistec ICT solution map

One key discussed issue among the audience was to assess how difficult it was to convince stakeholders to joining the effort in this strategy. It turns out that public sector is easier to convince and attract. The private sector tends to be more cautious when considering a new platform which is open and involves sharing data. However, convincing and attracting private sector is very important for this type of platform, in order to increase confidence.

### Cosme Bonet, executive minister of Economy and Finances Mallorca Island Government (Consell de Mallorca)

The Smart Island Mallorca project was presented by the executive minister of Economy and Finances of the Mallorca Island Government. This project provides definite momentum at the scale of the Balearics together with the Smart Destination initiative at national level. Smart Island Mallorca signals a change in strategy within the island’s council, with the following goals:

- Delivering a digital platform – to collect information from tourists and share, allowing all to interact, and taking advantage of big data techniques to achieve “smart” ness
- Shortening the off-season, through offering new products and improving local quality of life.
- Learning from and being inspired by similar “Smart...” initiatives in Barcelona, Madrid, Malaga and Santander, especially regarding the management of such global issues as reduce emissions and improve sustainability on the island
- Achieve strategic mind-set change, involving all departments at the council and reaching out to residents

Smart Island Mallorca is funded by an 8.8M EUR grant from the central government department of industry and tourism. Of this grant, the biggest allocations are:

- 26% is allocated to improve mobility, including upgrading bus stops with smart information
- 25% is allocated to a smart platform
- 16% is allocated to tourism projects

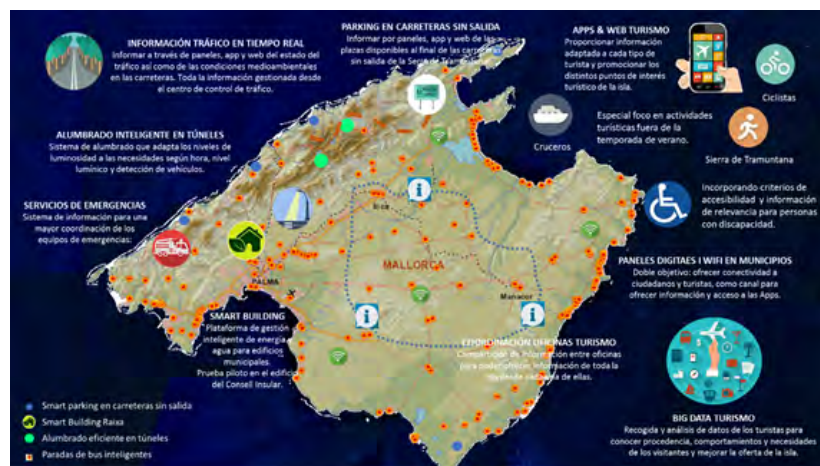


Figure 4 Smart Island Mallorca map of services

Figure 4 depicts the map of services and ongoing infrastructure projects. The work to improve mobility will help to influence traffic flow, for residents and for visitors. It will deliver information on parking in specific tourist areas, especially those with limited access. Weather and bus information will be made available through information panels installed at bus stops. The work to improve resilience includes working with the fire service to improve island’s overall resilience.

The work on the tourism platform will involve creating a database of tourist information – a model database for Mallorca. Based on this, information channels for tourists will be renewed, e.g. large

screens in tourist offices, information panel in areas lacking tourism office, free wifi access to download Apps (QR code for fast access) that in turn allows them to navigate the database offline.

Smart building energy efficiency projects include some pilot projects to reduce energy usage. One such project examines energy use on two specific road tunnels on Mallorca which are heavily used by tourists (e.g., to reduce energy used by lighting).

### **Antonio Tirado, Municipality of Calvià**

Calvià is currently working to turn itself into a smart destination. The presentation thus provided an overview of how such a project can be conducted within the framework set-up as seen in previous presentations at the different administrative levels. Calvià is one of the island's major tourism centres and the aim is to improve visitor experience.

The project includes:

- Changing the beaches into wifi spots (although it's assumed that European roaming technologies will reduce demand for wifi in the future)
- Providing a platform where everyone can contribute their data, so that general management aspects can be dealt with, such as occupation of parking, beach weather and water conditions in real time, etc.

At the time of presentation several platforms are being tried out, knowing that middleware is a key aspect of such data integration experience.

This presentation can be confronted with that of the MiMurcia project, given by Antonio Skarmeta (in subsequent sections), which has a similar approach for another city.

### **Elena Petrova, ASIDEES (NGO, Vienna, Austria)**

The Association for Sustainable Innovative Development in Economics, Environment and Society (ASIDEES), Vienna, Austria applies digital transformation solutions to foster novel information services for sustainable management of change, quality of life, monitoring of achievements in real time. The project by ASIDEES in agreement with the Cyber-Physical Systems Engineering Labs enables five EU municipalities with new CPS instrument 'Smart City Monitor' 1 for smart management of urban areas. This technology was introduced during the workshop. It allows to make models of complex cyber-physical objects such as city, island, regions and its subsystems. As example the waste water management issues were presented allowing to monitor object's statuses, provide its holistic vision to urban administration and specialists and other stakeholders.

Smart City Monitor provides sample urban model accordingly to ISO 37120 "Sustainable development of communities — Indicators for city services and quality of life" as a standard template. During the presentation it was underlined that touristic island like Mallorca can use the European Tourism Indicator Framework as sample CPS model. This framework has 27 core indicators, 40 optional indicators and they can be easily introduced in the Smart City Monitor and connected to relevant data sources and run in real time promptly. Indicators can then be used to look for dependencies and linkages between different aspects of the island life and have an integrated vision of the urban processes.

As a part of the available data in-kind contributors data sources can be used e.g. AirBnB provides the list of accommodations in Mallorca, or other open data sources fetched (e.g. [psml.org](http://psml.org)).

Such projects puts emphasis on the importance of measuring impacts of strategies and raising citizens' awareness to global issues such as water waste. For Mallorca, as a touristic island, this issue is of high importance due to seasonal flows, and could be kept under control of the authorities and citizens, provided with the important real time information regarding ongoing processes and impacts related to consumption and usage behaviours. It takes advantage of the connected world, where one can connect sensors to collect and build up data, using IoT technologies. ASIDEES concentrates on new projects



which allow small and medium municipalities to collect data and digitally transform it into information services which allows to grasp major results and use it in decision making.

### **Bartomeu Alorda, University of the Balearic Islands; director of the SmartDestinations working group**

The presentation put in perspective the influence that the digitisation of our world in general has on tourism, which has been characterized until recently by conventional infrastructures and strong link to traditional craftsmanship. As people habits have changed and rely now more and more on digital devices and virtual facilities in their daily life, they expect the same kind of facilities while travelling as tourists. The time has come for tourism to provide more of a digital immersion experience.

Destinations need to be more competitive, through exploring digital sensibility. The ability to discover the world around using the digital device provide a new way to understand the reality and it must be considered in a smart destination deployment in order to create best sensations to the visitors.

Based on research into this topic in the Balearic Islands, it was developed a Digital Immersion Index, which assesses a number of aspects of connectivity and digitisation. The index allows to express connectivity capacity at a destination, versus the accommodation density. It also features a methodology to highlight digital deployment at the destination. This can help defining the requirements for smart initiatives. The Free wifi infrastructures generate technical information used for management purposes: connection events, http commands or discovery services can provide information on the devices present in the coverage area. Singular location areas can be used to cluster the users' devices, and increase the knowledge about how they move around (or not), how long they stay in one spot and where they go. This kind of information can be useful for public and private sectors in order to take decisions about mobility, marketing or safety issues.

Internet of Everything technology can be used to monitor tourist activities. In turn this helps improving tourist experiences, through digital sensing and empowering destination management, and at the same time enhance smart city strategies.

### **Juan Ramon Santana, University of Cantabria**

The university group of Juan Ramon Santana is taking part in the Smart Santander project right from the beginning (University of Cantabria is technical manager). In the area of smart cities, the group is involved in two major projects which were presented.

The ClouT project<sup>2</sup> is a joint Japan and Europe initiative to provide a « city as a service layer » on top of the city infrastructure already in place; trials are conducted in different cities, some of which are focused on the means to motivate people by providing personalised information, using sensors to detect and gather data about tourist behaviour. One of the field trials is in Mitaka, which explores crowd-sourcing of touristic site photograph gathering, offering different prizes in exchange of pictures taken by visitors or citizens (18k photos were gathered). Another experiment is the following: a kiosk with a camera and interactive screen is installed and advertised as offering discount coupons to happy visitors. The kiosk captures photographs of the tourist using the kiosk and can issue discounts to local stores, based on the intensity of the tourist's smile. This allows to create a campaign centred around the theme of "destination" makes you smile, whilst encouraging engagement between tourists and locally-owned businesses.

The FESTIVAL project<sup>3</sup> studied experimentation as a service model. It provides APIs for homogenous access to testbeds. The service is developed for 3+1 domains: energy; smart buildings; city; shopping. In this project, IoT technology is used to foster new local commerce opportunities. Based on this, an

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<sup>2</sup> <http://clout-project.eu/>

<sup>3</sup> <http://www.festival-project.eu/>



experiment was conducted in Osaka where a shopping centre is filled with sensors. By tracking mobile packets and data as users walk around the centre, one can track where users are and how they move. Based on this, one can send users personalised offers, pushed to their mobile phones through Bluetooth. Other experiments deal with changing the ambiance, lighting or smell of the area according to the visitor's profile. FESTIVAL offers IoT testbeds and resources in Japan and Europe.

The application foreseen in the touristic sector is to build on the fly specific visiting routes for tourists depending on their interest and enable crowd-sourcing monitoring and enhancement of installations. Of course one question raised was that of the accessibility of such data and price thereof.

### Rafael Guinea, General director Tirme

The presentation of TIRME and of MAC Insular (which followed) provided an opportunity to link the current initiatives in the tourism sector with the global cross-cutting issue of waste management and circular economy. TIRME is an Environmental Technology Park founded in 1992 with adjudication of the concession of the public service for the management of urban waste in Mallorca, and has since evolved in accordance with the needs of the Majorcan society, established by the three waste plans which have been fixed by the guidelines for the model of urban and assumable waste management in the island. The waste management model implemented in Mallorca today targets to reach the strategic goal of **zero waste**, on the basis that all urban and assimilated waste delivered to the system, are valued material or energy. « For an island like Mallorca that lives off tourism to have a waste management model based on the zero waste is not a whim, it is almost an obligation<sup>4</sup> ».

The presentation underlined the need for both sustainability and development. Development can't continue without sustainability, and sustainability can't be achieved without development. How can new technologies help towards a more sustainable island?

- There is a strong appeal for a more circular economy, with a focus on reuse, maintenance or refurbishment – never landfill. For an island, which is a closed territory, waste management is very important.
- The deployment of electric vehicles should be encouraged: on an island, distances are fairly small and range anxiety associated with electric vehicles should be non-existent.
- On Mallorca everyone arrives by ship or by plane (because it is an island). This is much better for sustainability than arriving by car – these methods of transportation are more efficient.
- Efforts should be spent on green procurement policies. The public sector is the biggest buyer of services on the island. If the public sector has a policy to only buy sustainable, “green” services, then the market will change very quickly.

It was acknowledged by the audience that these axes of work are transferrable to many situations of touristic islands in Europe. Suggestion was done that the EC could define indicators that would enable to assess that the right direction is taken in such management policies.

### José María Bauzá de Mirabó, Director MAC Insular

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<sup>4</sup> [http://www.tirme.com/uk/company\\_presentation\\_01f1s.html](http://www.tirme.com/uk/company_presentation_01f1s.html)



The presentation of MAC Insular by its Director started with a short documentary movie that enabled to grasp the management process of waste recycling at the scale of the whole island. The MACInsular company provides different services, including managing the recycling of materials produced in a demolition site (as illustrated by Figure 5).

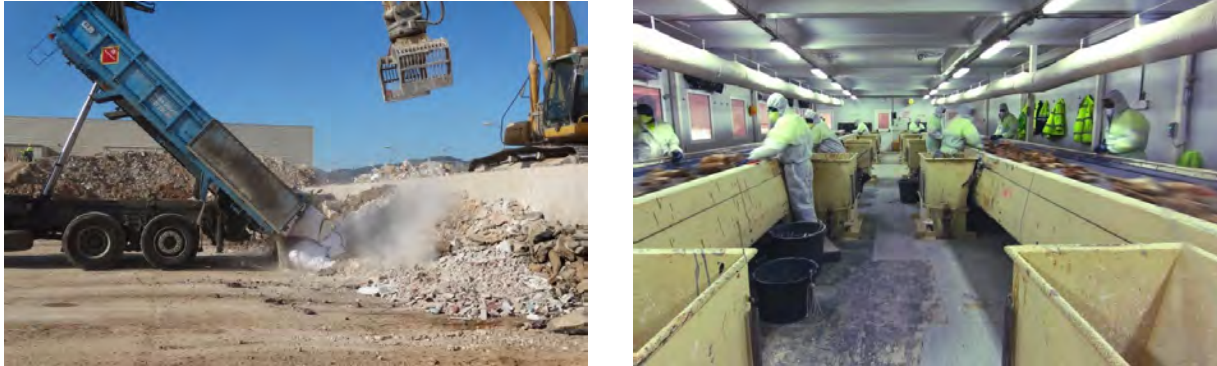


Figure 5 Waste management at MAC Insular

Waste is considered as new resource potential, minimizing as much as possible reliance on dumping. This includes handling waste such as tyres, furniture and large waste items, building and construction waste and rubble. On Mallorca, MAC Insular operates processing plants that collect this waste and separate it. Old furniture is being refurbished as well as other items which can be fixed, to be later sold to disadvantaged communities; the company operates workshops with carpenters and other skilled workers for this. Rubble and building waste are cleaned and turned it into different grades of gravel, suitable for pavements and roads, filling in quarries, landscaping etc. Items that require specialist handling (e.g., gases from refrigerators, electrical components) are extracted and sent for specialist handling, and the remaining units, now stripped of hazardous parts, can be treated or re-processed here in Mallorca.

This commitment started before the Smart Island Initiative (see also previous presentation) and produces astonishing results: from 3,400,000 tonnes of waste recycled, 460,000 appliances recycled, 50,000 tonnes metals, enough energy would sustain Palma for 6 months.

### Antonio Skarmeta, University of Murcia

Antonio Skarmeta provided an overview of the project MiMurcia, whose aim is to collect information from sensors to build up an intelligent system. The project is to be launched at the start of next year. Murcia being the 7<sup>th</sup> largest city in Spain, the project covers not only the city centre but a large number of suburbs and villages in the region.

The aims are:

- Improve communications, to provide citizens with new channels, enabling them to subscribe to particular context-relevant information.
- Increase sustainability: the focus is on smart urban transport – bikes, car sharing etc. – to encourage intermodality, helping the city to improve its public transport experience, as well as giving a strong impulse on smart waste management and smart management of water.
- Build on open data (supporting innovation by providing city data to SMEs to build new services for the city/tourism etc.)



A huge amount of information is produced by different devices and sensors around the city. A platform is planned to act as a facility to analyse data provided by citizens in order to try to identify patterns of behaviour in the city, especially w.r. to mobility.

Data sources include:

- iBeacons: placed around the city centre. They allow some interaction with visitors – can push advertising, promotions, etc. Current sites are located near to restaurants, museums, sites etc.
- Location-based information: cellular information, etc. This enables to track tourist flows and try to detect possible types of patterns. They provide valuable information for planning to improve quality of life and/or reduce traffic etc.

One goal for the MiMurcia project is to attract people back into city centre, stop the move away from the city centre into suburbs. How to encourage people back to shop etc. in city, and leave cars behind? This is important to provide added value to the city's economic activities. As Murcia is not an area with a mass market tourist industry, this is targeted at local visitors as well as tourists.

### João Sarraipa, Institute for the Development of New Technologies, Portugal

João Sarraipa provided an overview of his recent ICIST 2016 paper: "Concepts for Agriculture and Tourism Cyber-Physical Ecosystems", which suggests to consider CPS as new autonomous decision-making support and studies how such a sector as agriculture may benefit from transposable findings of more established domains.

In deed CPS technologies appear as catalysts to support transition. In a sensing enterprise, it's necessary to integrate three main enterprise dominions: sensing; knowledge; physical world. A CPS inhabits the intersection between these - supporting automation, analysis and interoperability.

For agriculture, CPS can help with control of diseases, collaborative share of resources/assets and predicting market price, etc. In Tourism, CPSs can help with collaborative share of resources/assets, supporting common goals across different providers in the sector (e.g., snow making or slope inspection); predicting weather and integrating this into other systems, predicting market value of rooms, etc.

CPSs generally have modular architectures with sensors or actuators as "assets" or nodes. They form the basis of sensing and reporting machines which can later be refined in new autonomous decision-making capabilities. This would allow to move from sensor and actuator based systems to systems with greater intelligent capabilities. The premises of this evolution can be seen in such a project as AQUASmart<sup>5</sup> (founded by the EC under the H2020 programme) where Uninova is partner, which helps Aquaculture companies to transform raw data into knowledge via accurate business-driven analytical models in a seamless and efficient process. Then, use this knowledge to dramatically improve performance.

### Marton Borbely, Xetics

The presentation established a parallel between smart manufacturing and smart tourism, showing that similar problems and challenges are faced by both sectors.

In Germany many manufacturers work without advanced management software systems, or with old/bespoke systems. Automation has resulted in more and better-developed software. IT and software has grown more and more important – it can help with optimising production, generating better results, improving visibility and control and generating a better overview.

As more and more information becomes available from machines and controls, new communication protocols are being used. This has led to a growing interest for "smart" equipment research, like reconfigurability, self-diagnosis and self-healing. In manufacturing, MES and ERP systems have been available from 1990s onwards. These days, data can be stored in the cloud, which means that it can be

<sup>5</sup> <http://www.aquasmartdata.eu/>



accessed on other devices, and can offer better speed. Modularity is important for manufacturing systems so that extra modules can be added to the system easily, it can be quickly reconfigured, etc.

Manufacturing dashboard – the state of equipment is real time. The dashboard provides the following types of information:

- Dynamic data from equipment is available online in the cloud. This includes: information about current capabilities; shift planning; dynamic calculation of KPIs; current job information; tracking and tracing...
- The planning board and scheduler provide functions like production optimisation using specific algorithms; automatic scheduling; automatic reconfiguration etc.
- The control functions include: starting/stopping production; changing parameters; changing some tools on the machine; ramping up; scanning barcodes to identify equipment; user information; production orders; move-in or move-out from stations; warnings and alarms...

Smart city parallels – as in manufacturing, smart cities also have a strong emphasis on: big data; tracking movements and flows (e.g., of people, vehicles, waste, water etc); identifying things/people; dynamic scheduling & planning; integrating different types of data; connecting facilities (in our case, factories); data storage; interpreting & displaying data etc. Thus in deed the evolution of equipment and its capabilities enables and at the same time *conditions* the type of management process which emerge in particular domain at a given time.

### **Pasquale Leone and Michele Fuschillo, Engineering**

Engineering is a leader company in software and IT services in Italy, involved in many projects around smart cities and smart manufacturing. The presentation given in this workshop, which concluded the presentation session, was focused on advances in software and services to build immersive visitor experiences. This is a definite trend in the enhancement of visiting sites, museums, exhibitions, etc. as already pointed out by several previous speakers throughout the day.

Cultural heritage in Europe is an important engine for tourism. The “CuTe” software demonstrated in the presentation is dedicated to streamline the development of immersive environments featuring web authoring, data management such as POI definition, various app services that support indoor localization, adaptation of language, etc. CPS localisation enables for instance context-aware content. Apps can be configured by geographic coverage and thematic areas etc.

In the future it is planned to allow users to augment stories with real time data e.g. live queue length alongside museum information.

This shows the convergence from both the media and tourism domain on the one hand and CPS domain on the other hand. Technological advances pave the way towards the realization of renewed approaches to tourism and cultural heritage immersion, much more in keep with the likes and habits of younger generations.



## Interactive Session

After the previous presentations, an interactive session was organized to confront the participants' points of view on the success factors and barriers that they deemed most relevant in their respective field experience. 3 working groups were formed of a little less than ten people each to focus on:

- Technological issues: what were the core technologies whose development impacted the most the success of projects (positively or negatively) and which ones were deemed the most strategic ones to sustain in the near future
- Business and innovation issues: what were the most important aspects of the business ecosystem, actors, willingness, awareness, and the most important foreseeable key success factors for the digitizing migration taking place
- Policy and regulation issues: what type of funding and incentives were the most successful and which type of actions could be recommended in the years to come for such a demanding sector as tourism (at the heart of a pressing demand for growth and yet faced with potential societal acceptance issues)

### Technology issues

The group started the discussion by an assessment of the technological issues proposed by the Road2CPS consortium as candidate priorities for the future years, namely: platform & interoperability, modelling & simulation, safety, security and privacy, autonomy & ubiquitous systems, HMI & machine/human awareness. These topics are further elaborated in the Road2CPS roadmap.

First of all, the list was confirmed by the participants as being relevant in light of their own experience and no definite gap was identified. In general, these topics are really linked to the question of hardware support and embedded system evolution, not just systems and software. Then the exchanges herewith summarized were on the opportunities and potential locks for each axis:

- **Platforms and interoperability:** there's a feeling that this is the main challenge – the main work is to provide interoperability between existing systems. Sometimes the existing equipment does not allow access to control devices – so one might have an interesting idea, but can't just e.g., access traffic lights, so additional equipment is needed. So there's fragmentation in systems; it's not feasible to access all the proprietary systems and models e.g. Google Maps.
- **Modelling and Simulation:** one question was to assess whether model-based engineering and simulation was used in the participant projects? It seems that this is not particularly the case as right now the target is on pragmatic solutions, building from the bottom up. The need for a more abstract view to cover the systems should arise when one thinks of putting together decision models (including scheduling, optimisation models etc.). Then higher level abstractions (and models) are needed.
- **Safety, security and privacy:** to the surprise of the Road2CPS consortium this subject was barely touched upon throughout the day. Privacy appears more a barrier to set up experiments, not so much a real issue. Some questions were raised: how about the possibility to correlate different sources of data – each does not identify a person, but could be integrated to identify a person? The answer was that there exist secure solutions, but not being used right now. Related to this – there is a need to cope with context-sensitive data, and take into account the environment e.g., a noisy environment affecting sensors. There is a need to take into account the validity of the information. In the projects presented it seemed everyone assumed participants provide good information, but could a malicious person use the system? This does not seem to be tackled right now. Yet we know that social networks rely on peer to peer validation and reputation – not tracked right now.



- **Big data and Real Time analysis:** there are existing data flow structures, but one lacks shared data models and semantics, so it's hard to make use of the flow of information. E.g., making out the temperature from a sensor – each sensor/system provides in slightly different way. This is considered as an important barrier to build global systems.

Thus as a short conclusion, the main findings, beyond the acknowledgement by all participants that technology changes induce changes in the processes deployed in a particular sector, were that existing deployed systems are to face severe problems of interoperability because of the lack of introduction of shared, agreed-upon data models. These models appear to come too late right now in the process – when one has already deployed a pragmatic device-centric solution. This is a drawback of the current initiatives launched for smart cities and tourism. As repeated several times throughout the day, the goals of such initiatives is to reconcile residents with the fact that their homes are touristic destinations, and turn this into a source of renewed well-being and empowerment. Such an endeavour involves planning, maintenance of infrastructure and taking into account cross-cutting issues such as waste recycling and circular economy, all of which call for models of higher-level abstraction to access, interpret, analyse, simulate and test scenarios. No doubt that this will form a major challenge of the years to come. As a side note, the absence of security and safety issues in the presentations made during the day was also deemed a sign of the haste in which such technologies are deployed, for the benefit of the economic growth, yet at the price of new challenges to be dealt with in the years to come.

### Business and innovation issues

The work in this group revolved around the key enablers for a successful business approach to innovation in the sector. First of all, it was acknowledged that one key aspect of the digitization taking place is that it requires first and foremost a **change of mind-set**. As mentioned in the technological working group as well, technologies impact processes and processes are what form the core of what companies are: regrouping people of various skills and convince them to work together with shared goals and methods.

In second position, came the fact that most of the services developed in the smart city or smart tourism sectors target **end-users**, be they tourists or residents. Thus projects have to take this particular nature into account and should put thought right from the start on the role that users will have in the development of systems. It was advocated that relying on user associations (e.g. by way of their representatives) could be a way to enlarge the audience of beta testers and turn them into early adopters. This leads to the fact not so present in the minds of project developers that one should look at users as future customers, which they really are, if the project succeeds. This change of vision is not shared widely enough, despite that a good part of Pillar 2 in the H2020 programme is targeting commercial applications right after the end of projects. In the end, what it takes for success is securing a critical mass of users/customers.

The management from the onset of **sustainable ecosystem** of stakeholders is dependent on a careful formulation of the problems that need to be solved and the role the different stakeholders play. This is seen as being insufficiently the case for the moment. To be more reactive and agile in such complicated projects spanning across various sectors and involving heterogeneous stakeholders, lean management is seen as an asset, especially when one has to break silos (public/private, between different companies or inside one single entity). The advent of competitors doing business without owning assets (using a pay-per-use model on top of assets belonging to others, such as AirBnB or Uber) may at any moment have disruptive effects on the whole value chain.

A complementary view on interoperability and openness was provide by this group. It was largely question throughout the day of the need for data openness. Though acknowledged as a key for granting access this does not imply that solutions need necessarily be open. Openness as such does not



guarantee sustainability or success; a certain degree of openness is needed to enable interaction with others yet openness is not equal to open source

### Regulation and policy issues

The group discussed issues regarding regulation and policy. These have an important impact in the initiation, realization and sustainability in the smart cities and smart tourism sectors and beyond, for the advent of a circular economy. This was underlined by the amount of public administration resources involved in the projects that were presented during the morning session.

One key aspect behind such an implication from policy makers is the motivation to turn such initiatives not only as sole economic impulses but rather as opportunities to change mind-sets and engage durable changes on social, economic and environmental aspects. Yet to engage citizens does require to assess which benefits they will get from digitization: training, mentoring, easier means of production, etc. These are rather pragmatic questions which need to be taken into account. This confirmed the findings from the group on business and innovation which emphasised the role of users in projects. For this, regulations may have to evolved and this is seen as a good point that projects feature a nice combination of industry, academia, and policy makers.

One element of the discussion was to assess the role of the recent innovative funding mechanisms that the EC launched in the past year (depicted briefly during the EC slot in the morning). That is the advent of a network of Digital Innovation Hubs and Competence Centres offering known and trustable desks for SMEs and entrepreneurs in their search of technological advice or experimentation access, know-how and association opportunities. This was acknowledged as being an important asset in the European landscape under construction for the years to come as there is a strong need for combined expertise on marketing aspects, political strategy and public-private alliance to support SME for instance.

Overall there was a concern expressed in the long-term sustainability of the technologies deployed in such initiatives in the tourism and smart cities sector. These technological deployments already form the assets for the years to come on which one will have to build decision support means for as important issues as circular economy or suitable empowerment of citizens. These have far reaching consequences and the question lies in the funding required to sustain in the long run such equipment and their evolutions. Another aspect is the training of citizens themselves on such technologies, taking into account the digital divide that may be further increased if one were not to pay enough attention to some people's resistance against the advent of a technological, de-humanized system. The challenge is yet to see how such systems may provide opportunities for novel activities and opportunities of job evolution. Related to this, is the question of establishing trust in such systems. The questions of privacy and security were not so much tackled during the discussion (see also the same situation in the technological group) which is perhaps a sign of infancy compared to other domains, which because of unacceptable consequences of accidents have had to adopt more conservative approach in this respect.

As a result, some foreseen recommended areas for funding in the years to come lie in filling the digital divide among citizens and between companies (those having gone a step forward and the others), so that a good ecosystem may promote exchange, collaboration and co-creation. Key skills are to be promoted in Europe for the challenges to be faced: there is a need for data analysts and data management infrastructure specialists with expertise on system engineering (capable for instance of assessing an infrastructure in terms of security and maintainability). Another key point is to be able to filter data as early as possible so as to reduce the data deluge that system may have to deal with. This means producing meaningful data right from the onset. This is not the case of the first deployments as much work on what should be observed and monitored is done while systems are being deployed. To help tackle this issue, cross-fertilization from different domains and mind-sets is strongly advised.



## Concluding Remarks

The workshop was appreciated by all participants and speakers. It was seen as an interesting opportunity to bridge the gap between communities, involved in various sectors (smart manufacturing, smart cities, tourism, circular economy) and belonging to a diverse ecosystem (public stakeholders, clusters, academia, SMEs). The tourism sector appears as exemplary of the digitization taking place: large deployment of device-centric infrastructures, gathering massive amounts of data, guided with the ambition to turn this data mining into informed decision-support models, while caring for a balance between legitimate economic growth goals and the well-being of citizens and our environmental preservation.

The recent EC initiative of promoting the advent of networks of Digital Innovation Hubs and Competence Centres will find here an ideal field of investigation. The Smart Destination initiative and its local declinations like Smart Island Mallorca, indeed represent already examples of such innovation hubs. The experience gathered from ongoing experiments in the Balearics should provide valuable information on what technology can bring to the sector and what lies ahead to achieve a sustainable ecosystem.

The group discussions enabled to formulate some recommendations. From a technological viewpoint, the major drawback of the fast deployment of device-centric infrastructures is the insufficient preparation ahead of time of shared data models suitable for a better interoperability between systems. The advent of a fragmented landscape is a risk. This does not mean one should count for a convergence in the systems being deployed, rather strive for common capabilities to extract information from data, across systems. When the goal is to be able to build better informed process management for a city or a territory the problem is on the semantics of data and the extraction of information from various sources (multimodal transport, waste management, tourists needs and behaviours, resident feedback, energy grids, etc.). This seems to be a pressing challenge ahead, where a European impulse transcending local disparities could have a major impact.

An important element was also acknowledged: the mind-set factor in this digitization process. Sure enough the companies and entrepreneurs need to adopt lean management procedures to promote horizontal thinking and collaborations. But citizens as well need to be involved. At a time where portions of the population in Europe resent from being left out of the digitization benefits, the risk of a digital divide is present. Promoting resident involvement in field experiments, gathering social studies specialists and giving populations feedback means is vital in such endeavours. It also is an opportunity to close the loop with the e-democracy and e-administration initiatives taken concurrently. Efforts should be dedicated to build trust in these systems. It is relevant that privacy and security issues were not so much taken into account in the presentations made throughout the day : the haste in which digitization is taking place in a techno-push approach needs to be tamed with informed management procedures regarding trustworthiness, privacy issues and feedback procedures. From an economic standpoint too, it is important to be able to provide future customers with the role they deserve in the design and deployment process of such initiatives: a fair evaluation of the deployed systems is at stake here.

Foreseen funding lines are in this respect: 1) how to enable the sustainability and evolution of both infrastructures deployed and the emerging ecosystem throughout their lifetime, 2) how to give citizens an edge in the digitization process to seize opportunities for an improved well-being, a cleaner environment and jobs/professional skills enhancements. These appear as rather long-term preoccupations, which is a nice reminder from society to turn all the energy and impulse that one perceived throughout the day into praised societal changes.



## Speakers

### Antonio López de Ávila, President SEGITTUR (National Ministry of Industry, Energy and Tourism)



Antonio López de Ávila was appointed as President of **SEGITTUR** in February 2012. Mr. López de Ávila worked at IE Business School ([www.ie.edu](http://www.ie.edu)), one of the top business schools worldwide, for over a decade. Before joining the government sector, he served as the school's Director of the Tourism Unit and also of the Tourism Research Centre, and he was the school's representative at UNWTO. From 2001 to 2004, he was an advisor to the Secretary of State for Tourism and Commerce, Government of Spain. He was also an entrepreneur as founding partner of the Spanish Institute for Business Management and many other companies. He also was Trustee of Paradores de Turismo ([www.parador.es](http://www.parador.es)). He is member of the Advisory

Board of **Tourspain** and member of the Advisory Board of **the Spanish Small and Medium-sized Enterprises Council**. He earned an Executive Master in Business Administration from IE Business School and a Bachelor Degree in Law from ULPGC (Spain)

### Luis del Olmo, president of Balears.t



Expert in Marketing in the lodging and tourism industry, he has been involved for over 30 years in the creation and development of national and international hotel and resort projects. Before joining Meliá Hotels International, he was involved in the areas of Sales and Marketing of Holiday Inn, now part of the Hotel Group IHG, in Europe, Middle-East and Africa and also part of the opening team of the most important Theme Park outside the USA, Disneyland Paris. He has contributed over all these years to the growth of Meliá Hotels International, both nationally and internationally, becoming the 13th largest hotel company worldwide, with over 350 hotels in 35 countries and in 4 continents (now ranked 19th with 90.000+ rooms). In

2007 Meliá Hotels International embarked in the outsourcing of the totality of its distribution technology and created the Joint Venture: Idiso. He is one of the founders of Idiso and has been recently appointed as its Chairman. President of Balears.t, the Cluster of Technology and Innovation in Tourism of the Balearic Islands. He also sits on the board of the Economic Council and the Tourism Foundation of the Balearic Islands.

### Jaume Monserrat: president of Turistec



“B. S. in Computing (University of the Balearic Islands) and MBA (EAE Business School), Jaume Monserrat currently combines his activity as **CEO of Dingus and Etooltech (Hitt Tourism Group)** with the Chairmanship of the International Cluster dedicated to Information and Communication Technologies applied to Tourism (**Turistec**). He is also the Chairman of the Tourism Umbrella within the pan-European network Eureka, EUREKATOURISM+, whose responsibility is held in Turistec. Furthermore, Monserrat is currently in charge of the Presidency of the first cross-sectorial innovation association in the Balearic Islands, named **IBClusters**”.

## Cosme Bonet, executive minister of Economy and Finances Mallorca Island Government (Consell de Mallorca)



Education: BA in Political Science and Administration by the Autonomous University of Barcelona. Currently studying a degree in Law at the Open University of Catalonia. 1997-2000: General secretary at the Balearic Islands' Socialist Youths Organisation and Organisation Secretary for the Socialist Group in Ses Salines – Colònia de Sant Jordi. 2000-2002: Secretary for Innovation, Communication and Education at the Mallorca Socialist Federation (MSF). 2002-2008: Organisation and Coordination Secretary at the MSF. 2008-2012: General Vice secretary of the MSF. **From 2012: secretary for Regional Policies at the PSIB PSOE** 1999-2003 and 2004-2011: Elected Island Minister at the Mallorca Island Ministry. From 2007 to 2011: Executive Island Minister in the President's Department at this same institution. 2011-2015: Member of the Balearic Islands' Parliament. **From July 2015: Executive Island Minister for the Treasury and Economic Department at the Mallorca Island Government**

## Antonio Tirado, Municipality of Calvià



From 2010 Chief responsible of New technologies, organisation and quality in the Municipality of Calvià. 2003-2010 Adviser in Calvià 2000 and Consorci Mirall Calvià. 2003-2010 General Director of New Technologies, Maintenance, Public Works and Environment in the Municipality of Calvià. He has worked in different technological companies as Globalia systems, ONICE, DURAN...

## Elena Petrova, ASIDEES (NGO, Vienna, Austria)



Managing Director, Association for Sustainable Innovative Development in Economics, Environment and Society (ASIDEES). Elena Petrova has MSc Diploma in Economics and Audit from Syktyvkar State University in 1999, Russian Federation diploma, recognized by The University of Economics in Bratislava (UEBA). Her research interests are focused in the field of Smart Cities and Urban Analytics where she studies and develops new instruments and methods and styles of city management and control and resource use optimization. Proactive participation in the Smart City Monitor (SCM) project as researcher and developer. Elena has more than 15 years of the entrepreneurial experience and good analytical skills enabling her to see the bigger picture of society and its change due to technological, climate and social impacts.



### Bartomeu Alorda, University of the Balearic Islands; director of the SmartDestinations working group



**Telecommunication Engineer** & Contract lecturer with a doctoral degree at Physics Department in Universitat de les Illes Balears (UIB). **PhD in Physics** at UIB. He is member of Electronic System group and collaborator of Architectural constructions and building engineering. Its initial research starts with the study of several **verification techniques and effects minimization** of aggressive CMOS technology minimization trends. The post-doctoral activity continues the research activity considering **non-destructive transitory effects, like ionizing radiation and functional fails due to noise** and considering the effects of parameter variability due nanotechnology fabrication processes. Since 2007 he has performed multidisciplinary research tasks focused on **knowledge and technology-oriented transfer** based on the application of microcontroller based sensor networks technology and the development of remote monitoring linked to concepts such as **SmartCity** and the development of **Digital Tourism** in the **SmartDestinations**. Participates in several master's and postgraduate related to automated building management systems and services, and the impact on the development of a SmartDestination. Is coordinator of the working group **SmartCity / SmartDestination** at UIB.

### Juan Ramon Santana, University of Cantabria



Juan Ramón Santana is a Telecommunication Engineer graduated in 2010 in the University of Cantabria. He is currently working as research fellow in the Network Planning and Mobile Communications Laboratory, a telecommunication research group from the same university. Prior to his current occupation, he was also part of the University of Strathclyde (Glasgow), working on IoT solutions for the cattle industry. He has been involved in several projects, such as SmartSantander, EAR-IT or FESTIVAL, European collaborative projects related to the Smart City paradigm and the Internet of Things. Among his research interests are WSN (Wireless Sensor Networks), M2M communications and smartphones apps

### Rafael Guinea, General director Tirme



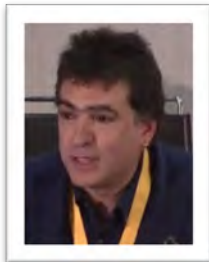
Managing Director of **TIRME, S.A.** "We aim to change the residues into resources, moving towards a more sustainable circular economy." Industrial Engineer from the ETSIIM of the UPM. 1997-200 Project Manager in ENDESA. Executive MBA from the Business School. President of Spanish Association of Waste to Energy

### José María Bauzá de Mirabó, Director MAC Insular



José María Bauzá de Mirabó Darder is Economics graduate at UIB. He has a degree PDD at Navarra University. In his professional career, he has worked as financial auditor in Arthur Andersen and as strategic consultant and process reengineering in Deloitte. In 2003 he joined **MAC Insular** as Financial Director and currently he is the Managing Director. Furthermore, he is an Executive Board and also the Environmental, Tourism and Economy Coordinator of the **Cercle de Mallorca**.

### Antonio Skarmeta, University of Murcia



Dr Antonio Skarmeta received the M.S. degree in Computer Science from the University of Granada and B.S. (Hons.) and the Ph.D. degrees in Computer Science from the University of Murcia Spain. Since 2009 he is Full Professor at the department of Communication and Information Engineering of **University of Murcia**. Antonio F. Skarmeta has worked on different research projects in the national and international area in the networking, security and IoT area. His main interested is in the integration of security services, identity, IoT and Smart Cities. Now he is collaborating with the **Murcia Municipality** as technical coordinator of the Smart City Project MiMurcia.

### Joao Sarraipa, Institute for the Development of New Technologies, Portugal



Senior researcher at **UNINOVA** center, he graduated in electrical and computer engineering, he also has an MSc in computer science, and holds a PhD in the area of industrial information systems of the electrical and computer engineering, all by the Faculty of Science and Technology of the New University of Lisbon (FCT/UNL). He is deeply involved in the areas of knowledge management, ontologies, semantic interoperability, and eTraining since his participation in projects like IDEAS (IST-2001-37368), INTEROP (IST-508011), COSPACES (IST-034245), IMAGINE (IST - 285132) and others. He has contributed to the publication of more than 80 research papers in recognized international journals and conferences

### Marton Borbely, Xetics



MSc. Software Developer Mathematician in University of Szeged, Faculty of Science, Computer Science. Since 2015 he works in **Xetics GmbH** as JAVA Developer and project manager. He has a large experience in European projects such as Copernico, SeLSUS, ReBORN, Iramp. He has worked in different companies as Software Engineer and JAVA engineer

### Pasquale Leone, Engineering



Researcher and software (Android in particular) Developer– Engineering S.p.A. BA in Computer Science, University of Naples Federico II, Naples, Italy. Released on Android 2 Beta and then on Google Play store 2 application called DeepTripLecce e DeepTripCatania aimed at helping tourists to get around museums and discover the cultural heritage of two cities

### Michele Fuschillo, Engineering



Bachelor's degree Information Technology. Naples Studies University "Parthenope", Bachelor of Science in Information Technology. Engineering S.p.a. Researcher - Chief iOS programmer – Mobile Developer – IoT prototyping principal argument: geolocalization; login/post social; fruition tourism

## Participants

Surname	Name	Organisation
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De-Lama	Nuria	ATOS Spain SA
De-Mirabó	José Bauzá	MAC INSULAR
Del-Olmo	Luis	IDISO/ Balears.t
Delgado	Silvia	Entrepreneur
Fuschillo	Michele	Engineering
Ginard	Paula	Consell Insular de Mallorca
Götz	Benjamin	FHG IPA
Guinea	Rafael	TIRME
Ingram	Claire	University of Newcastle upon Tyne
Leone	Pasquale	Engineering
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