IoT Academy

# Digital Transformation: Enhancing IoT-driven Solutions for Smart Islands

Applied use cases in the implementing smart islands – use case 2

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## Jamal Sophieh

- More than 20 years of experience in the ICT sector and in management and business field
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- University Instructor and Lecturer in University of Tehran and University of Shahid Beheshti (Tehran) for 5 years.
- Senior Instructor of Digital Transformation and Digital Economy
- Expert and  Manager of Digital Economy Department (ICT ministry of Iran) for 5 years.
- Coordinator and Expert of ITU Study Groups (Telecommunication Infrastructure Company- TIC.ir) for 3 years
- Senior Analyst of Strategic and Comprehensive Planning (Telecommunication Infrastructure Company- TIC.ir) for 5 years
- Journalist and Analyst of ICT Specialized Magazines for 15 years

Source: NewsRoom, 2019

# Croatia’s Islands: Making the Most of Their Territorial Capital Through Smart

key areas of intervention or KAI

The thematic coverage of smart islands encompasses a wide range of development sectors

1. smart governance and smart resource management
2. smart economy
3. smart mobility
4. smart environment
5. smart living and safe islands

## Based on the conducted analysis, the key areas of intervention for “smart islands” are identified below:

**1. Smart governance and smart resource management**

a) e-public administration

b) ICT infrastructure

c) communication platforms for dialogue with citizens, and the civil and private sectors

d) smart planning of island development

e) encouraging social innovations

f) transparency of public data and information

g) integrated management systems for islands’ infrastructure and natural resources

## Based on the conducted analysis, the key areas of intervention for “smart islands” are identified below:

**2. Smart economy**

a) ecosystem for entrepreneurs

b) diversification of island economies

c) sustainable tourism development

d) territorial branding

e) development of creative and cultural industries and IT sector

f) expansion of opportunities for locally produced food

g) e-commerce

h) e-business and businesses networking

i) lifelong learning in line with the needs of the labour market and informatic literacy

j) development of skills related to smart specialization and entrepreneurship

## Based on the conducted analysis, the key areas of intervention for “smart islands” are identified below:

### 3. Smart mobility

a) infrastructure for clean island transport

b) alternative fuel infrastructure

c) walking, cycling and non-motorized transport infrastructure and services

d) digitalization of island transport systems

e) clean island transport vehicles

f) improving the mobility of the island population (not only tourists)

g) intermodal transport and better connectivity of islands and mainland

i) increasing the awareness of the local population and visitors about the need to preserve the environment and providing means for more rational use of resources

# Based on the conducted analysis, the key areas of intervention for “smart islands” are identified below:

**4. Smart environment**

Croatia’s islands: Making the most of their territorial capital through smart solutions 26

a) renewable energy sources and promoting self-sustainable islands

b) smart energy and water distribution systems and smart drainage

c) smart public infrastructure

d) smart buildings, homes and districts

e) smart waste management

f) control and monitoring of air, soil and water quality, noise reduction

g) smart and environmental management of industrial sites

h) smart measures for adapting to climate change

i) increasing the awareness of the local population and visitors about the need to preserve the environment and providing means for more rational use of resources

## Based on the conducted analysis, the key areas of intervention for “smart islands” are identified below:

**5. Smart living and safe islands**

a) high capacity broadband network

b) support to the development of e-citizens

c) digitalization in the field of health care (smart healthcare infrastructure)

d) and e-health services

e) smart educational infrastructure and development of educational platforms

f) social and inclusive infrastructure provision (including universal access for elderly and disabled)

g) protection, valorization and promotion of cultural heritage and cultural services

h) improvement in quality and security of public spaces

i) more effective development of a program to combat indigenous wildlife

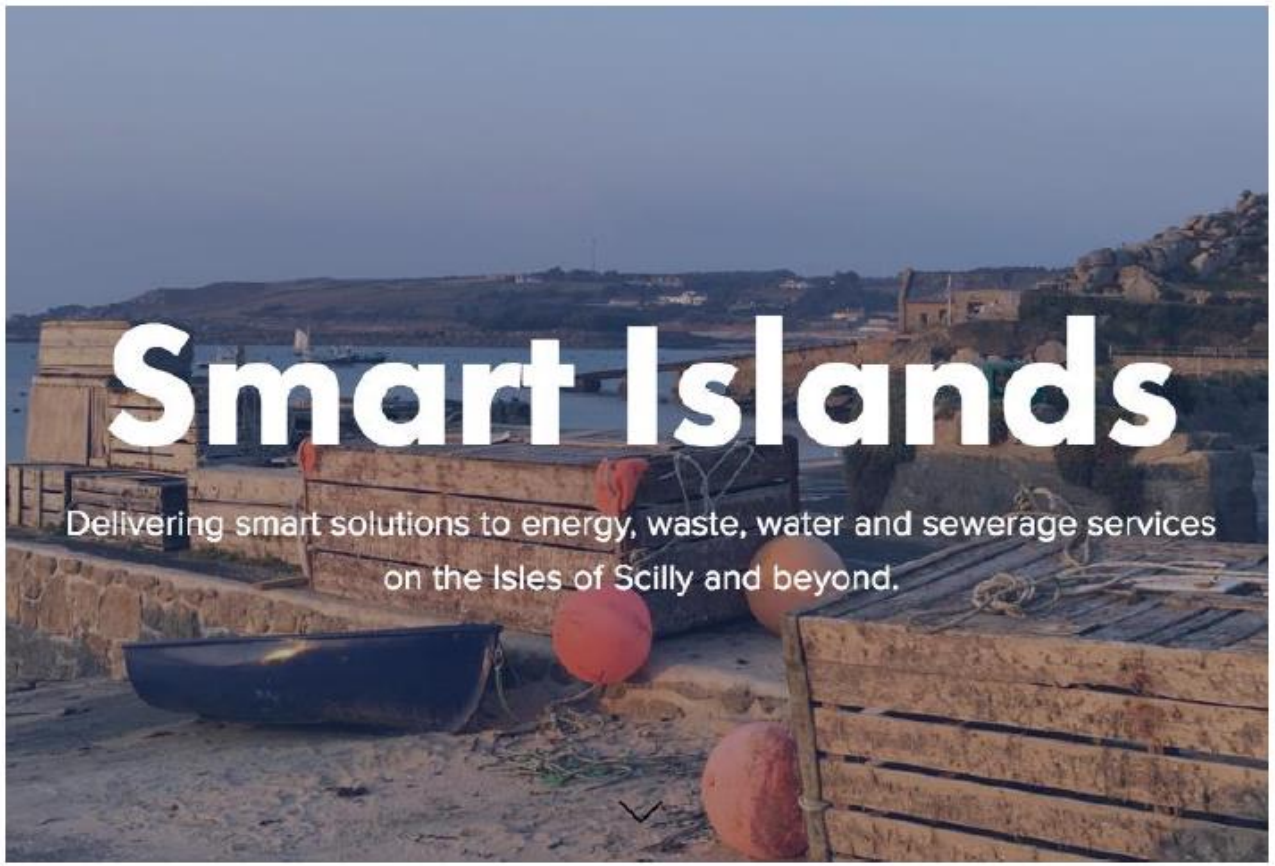
## Palma de Mallorca  in Spain

The municipality of **Palma de Mallorca is currently the second largest "Wi-Fi" city, after Miami (USA).** Wi-Fi Palma is a project run by the *Universitat de les Illes Balears* on big data and tourism. The project is being developed in cooperation with the Supercomputing Centre in Barcelona, the most powerful supercomputer in Spain. To increase its attractiveness as a tourism center, starting in 2014, Majorcan authorities began to provide free Wi-Fi access across the entire island starting in 2014 thus aiming to become an intelligent tourism destination.

# Europe

**On a global and European scale, there are good examples of smart island approaches worth learning from; some particularly relevant cases are presented below.** There are cases of islands implementing various smart solutions, which differ from smart city solutions in their scale and complexity, but which have the same aim of making a more efficient use of resources and achieving higher levels of environmental and social sustainability. **Samsoe island in Denmark**, for example, has a project known as *Fossil Free Island* where they are introducing a number of technologies such as biogas, smart energy systems, upgraded wind power feeding heat pumps, storage heat and electricity, energy savings, smart energy systems, and e-mobility (e-vehicles, ferry). Around 70-80 % of financing is obtained through public-private partnership and only 20% comes from funding or direct subsidy.

The **Island of Salina, often labelled as 'the greenest of the Aeolian islands'**, has started its clean energy transition. The island has taken initiatives to promote eco-tourism and initiatives to reduce pol-lution and environmental degradation and is planning to implement energy efficiency and energy saving measures particularly in public lighting systems and the heating and cooling of its public buildings. Further, the municipalities aim to produce energy locally, capitalizing on the island's abundant renew-able energy resources of electricity and heat, and to switch their public transport to electric minibuses powered by solar PV. Charging stations would be available for electric vehicles on the island as well. These initial plans and activities have been well received by residents, local tour operators and visitors.

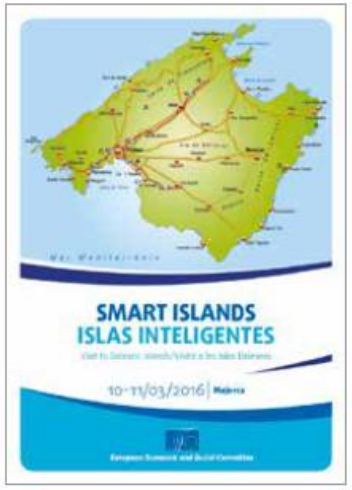

Smart Islands
Delivering smart solutions to energy, waste, water and sewerage services
on the Isles of Scilly and beyond.

## The Smart Islands programme, the Isles of Scilly, United Kingdom

The Smart Islands programme in Scilly intends to deal with Scilly's main infrastructure and utility issues through a sustainable and affordable approach, whilst providing a model for the community that can profit from a rapid transition from being carbon intensive to having a low carbon footprint. The main goals of the project are a 20% reduction in electricity bills by 2020 and 40% by 2025, to cover the isles' energy demand with the renewable generation up to 40% by 2025, having 40% of vehicles be low carbon or electric by 2025 as well as increased offerings for internships, cultural exchange and STEM skill delivery for young people.

Saaremaa
Samsø
Île d'Yeu
Mallorca
Favignana
Kythnos
European Economic and Social Committee

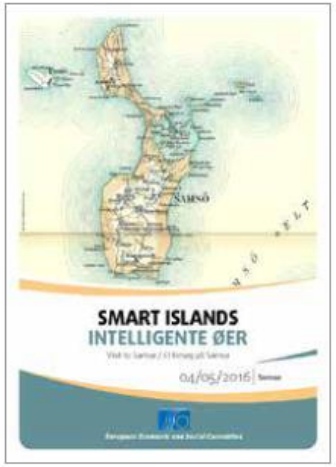
Located in the Atlantic, Île d'Yeu is an island and a municipality, just off the Vendée coast of western France. With a surface area of 23 km2, the island has 4 600 inhabitants. Around 10km long with an average width of 4km, its surface area is around 23km2. The island's two harbours, Port-Joinville in the north and Port de la Meule, located in this rocky inlet of the southern granite coast, have been famous for the fishing of tuna and lobster. However, the decline of fishing activities is pushing Ile d'Yeu's community toward the development of tourism, renewable energy and the digital economy.




The Balearic Islands are located in the middle of the Mediterranean Sea, and have a population of 1.120 million. Majorca is the largest island in the archipelago which has a total surface area of 4492km2. The island's capital, Palma, is also the capital of the autonomous community of the Balearic Islands. Since the 1970s, the archipelago's economy has diversified from a model based on subsistence farming to one based on tourism. However, the Balearic Islands are facing saturation of the traditional tourism model. The answer is to diversify tourism by exploiting digital and new technologies. The objective is to make the islands more competitive by boosting the economy using innovation, particularly in the digital economy.

Located in western Sicily, the Egadi Islands are an archipelago of 37.45km2 made up of three main islands (Favignana, Levanzo and Marettimo) and two islets (Formica and Maraone). The main municipality, Favignana, includes the three islands of Favignana, Marettimo and Levanzo. Favignana is the largest of the three main Egadi Islands, with a surface area of 19.8km2 and a population of 4230 (31st december 2015). The island is famous for its caves of calcarenite rock (locally known as "tufo") and the ancient fishing technique of "tonnara", which involved the trapping and "mattanza" (culling) of Bluefin tuna.

Essentially based on tourism and fishing, the economy is driven by the Egadi Marine Protected Area (MPA), established by the government and managed since 2001 by the Municipality of Favignana. It is the largest marine reserve in the Mediterranean and has shaped a local policy which aims to extend the tourist season, repopulate the island and boost the economy.




Samsø is a Danish island and municipality located 15km off the Jutland Peninsula. Covering an area of 114km2, the island was used during the Viking Age. Part of the island is Natura 2000 protected. The population of Samsø fluctuates from 3 700 (winter) to 25 000 (summer). The island is split between the north and the south. Residents use around 1 500 vehicles and have a network of cycle paths. Samsø's economy is based on small-scale fishing, farming (particularly potatoes and asparagus) and tourism. Ten years after the Kyoto Protocol entered into force (1997), Samsø won a national competition, reaching 99,6% renewable energy within ten years. Samsø is meeting its challenges (demography, transport and waste management) through an interactive approach which is already operating very well in the field of energy.

Kythnos is a 100km² island and municipality located in the Western Cyclades. Very windy, the island hosts the first wind farm ever installed in Europe. The north of the island is a Natura 2000 protected area.
Kythnos economy was driven in the 19th century by mining activities (e.g. iron). Today, its economy is based on small-scale fishing, the diversification of agriculture toward products with Geographical Indications (GIs), and the development of a sustainable tourism model.
The island's population is around 2 400, rising to 25 000 during the summer. Remarkably, the local population is increasing. Today, the population is "ready to promote Kythnos", adopting soft development (as opposed to the excessive tourism activities which prevail in Mykonos, for instance). Kythnos is also on the way to develop a Sustainable Energy Action Plan Master Plan Proposal entitled "Smart Island Kythnos".

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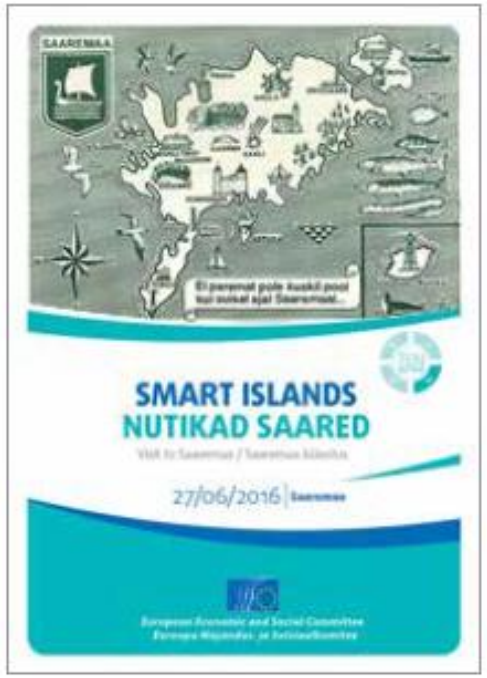



Located between the Gulf of Riga and the Baltic Sea, Saaremaa is the largest of the 2 222 Estonian islands. Measuring 2 673 km2, this big island has a population of 33 000, which is shrinking. The island's economy is diverse and generates growth and jobs, as illustrated by the industry. Apart from food, shipyards, small craft building, electrical equipment, plastic products (films for garbage and seals for car air conditioning systems), the municipality estimates that 94 SMEs employ around 1 000 people. In addition, companies from abroad are developing activities.

Relatively wealthy, Saaremaa is trying to increase tourism and to improve its accessibility.

# Information and Communication Technologies (ICT)

- Big data and tourism
- Emergency Quick Response Code
- Internet broadband community
- Virtual care and services for the elderly population
- Smart small harbour services

Free Wi-Fi access on the beach in Palma de Mallorca, Balearic Islands, Spain

Emergency Quick Response code project, Balearic Islands, Spain

# Innovation, including energy, transport and environment

- Offshore wind farm
- Solar energy
- Energy efficiency and sustainable mobility
- Straw-fuelled heating systems
- Introduction of renewable sources of energy in the power
- Mix
- Public filtered water fountains to prevent plastic waste
- Marine Protected Area (MPA)

Water supply and waste reduction project, Favignana, Italy

Solar PV system installed on the roof of the Casa Comunale, Favignana, Italy

Burning straw for heating, Samsø, Denmark

# Tourism development

- Redevelopment of the old processing factory
- Hiking and exploration trails
- Recreational fishing
- Ecotourism, preserving the heritage of renewable energy
- Preservation of the local architecture
- Cultural and heritage centre
- Geoparks

"Ex Stabilimento Florio delle tonnare di Favignana e Formica" former tuna fishery, Egadi Islands, Italy

First wind farm in Europe, Kythnos, Greece

Angla Windmill Mount, Saaremaa, Estonia

# Economic development other than energy or tourism

- Shipyards
- Small-craft competence center
- E-commerce
- Turning a declining market into a landing point
- Short supply chain
- Circular economy
- Labelling the island’s products

Tour of shipyards, Saaremaa, Estonia

Fish market, Île d'Yeu. © Commune de l'Île d'Yeu

Branding local products, Saaremaa, Estonia

## Scientific initiatives to protect the marine environment

- Coastal observing and forecasting system
- Protection and study of marine meadows
- Rescue centre for Sea Turtles and Monk Seal Observatory

Balearic Islands Coastal Observing and Forecasting System (SOCIB), Mallorca, Spain

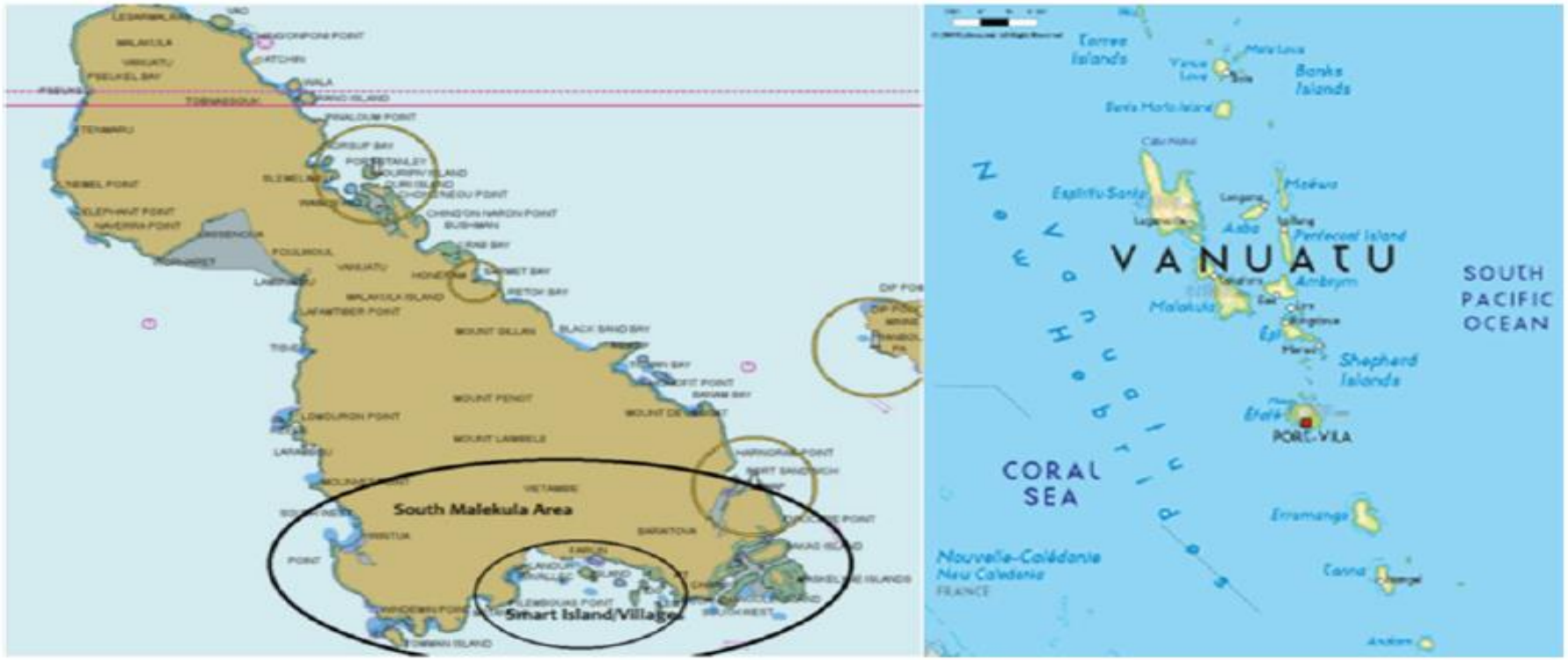
## Smart solutions in governance and social innovation

- Methods of cooperation
- SmileGov project
- The Pact of Islands
- Redeveloping the urban environment

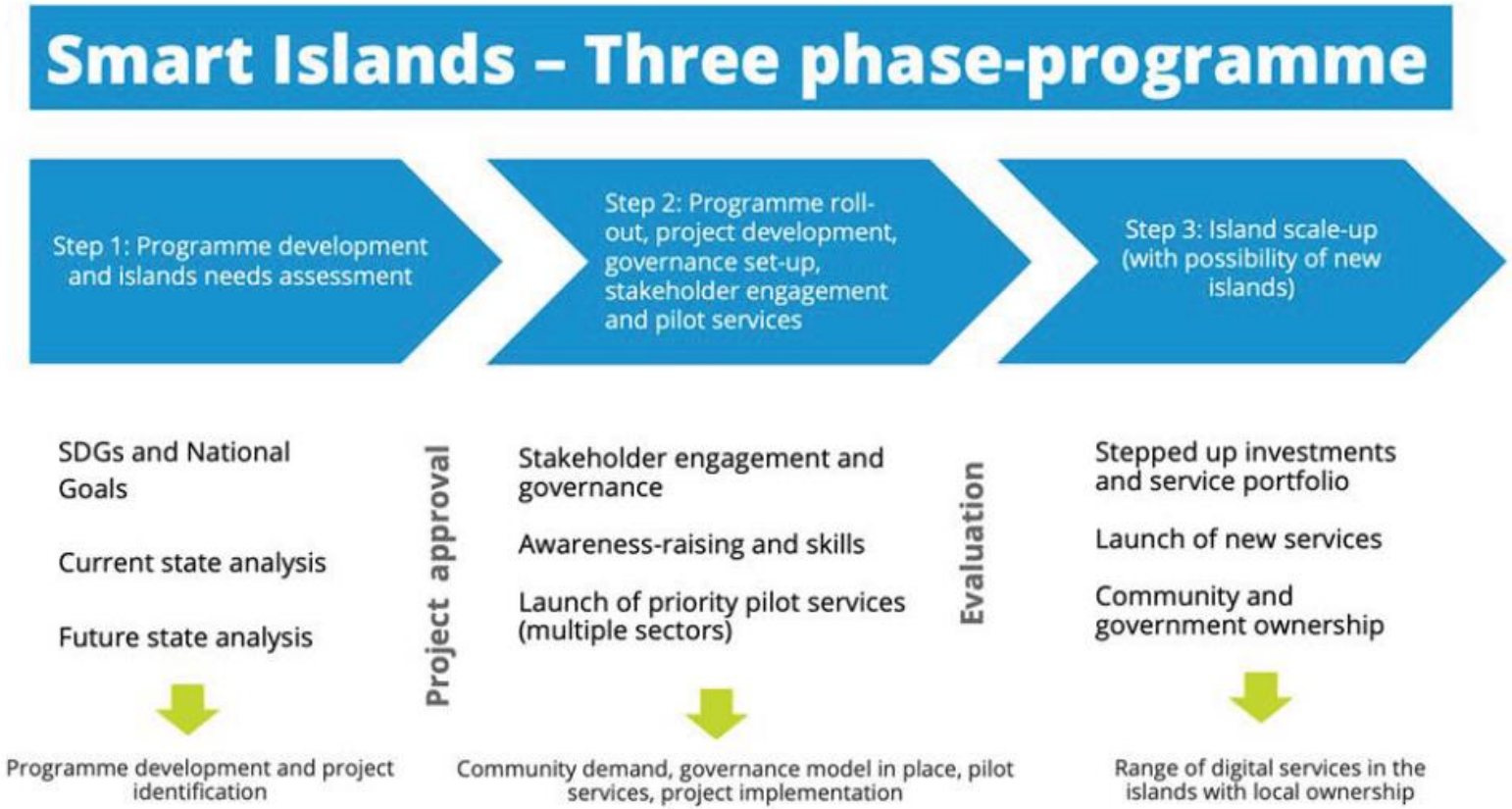
# South Malekula: A smart island of Vanuatu

## Preliminary study of needs and priorities

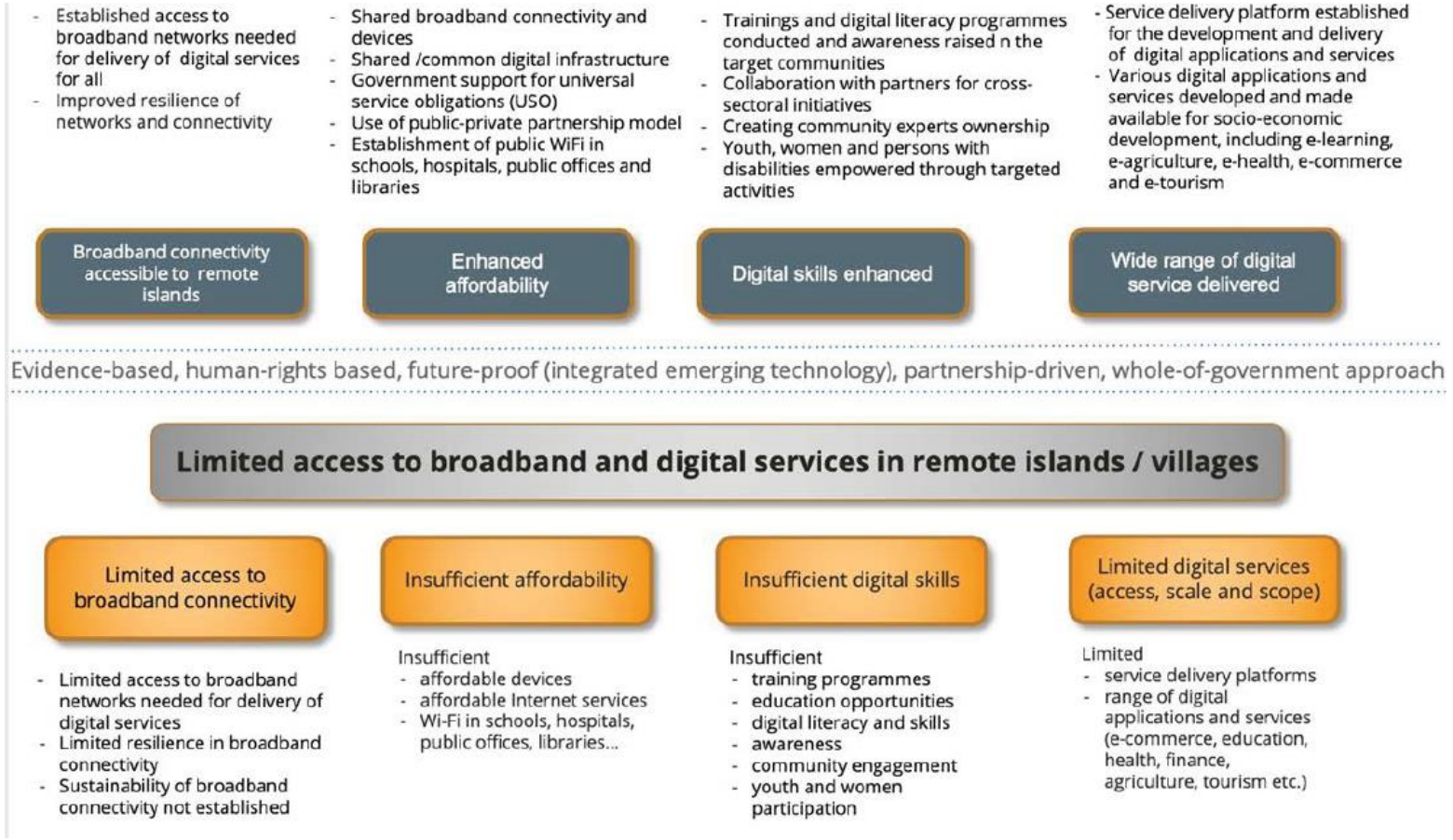
2021



# Phased approach to the Smart Islands Vanuatu Programme



# Problem and solutions tree for Smart South Malekula



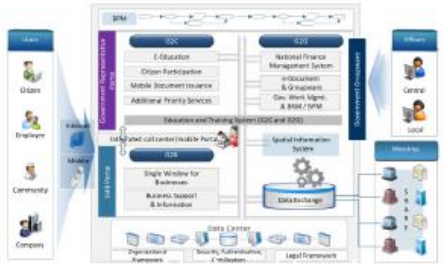
# WHOLE-OF-GOVERNMENT APPROACH TO DIGITAL DEVELOPMENT

**ICTs and SDG**

SDG

**National Vision and SDG Implementation Plan**

Legislations
Regulations



Customized planning

**Smart Sustainable City**

**Smart Village**

**Smart Islands**

Digital services and applications- https://www.itu.int/itu-d/sites/ict-applications/ and Smart Sustainable Cities - https://www.itu.int/en/ITU-T/ssc/Pages/default.aspx

## Digitalization and Smart islands in the Kvarner archipelago

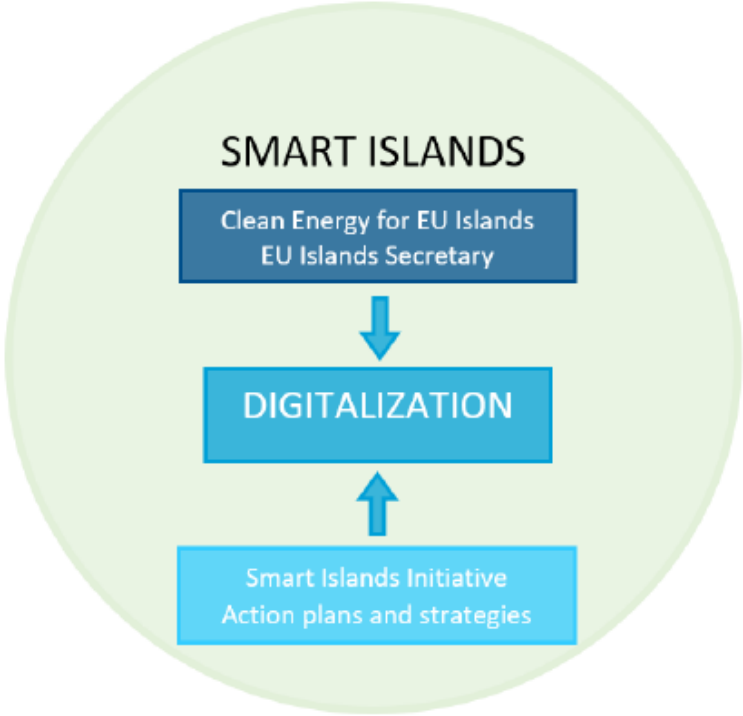
- Currently, in the European Union there are two major initiatives that address the issue of sustainable development of the islands. Top-down initiative coming from the Declaration on Clean energy for EU islands and bottom-up Smart Islands initiative.

- Both initiatives consider islands as living labs that can host innovative pilot projects and lead Europe's transition into a sustainable and low carbon environment. Following objectives of both initiatives, the Croatian government passes a law on islands that support the development of smart islands.

# Framework for Development of Smart Islands in Croatia

| Phase | Framework | | |
|---|---|---|---|
| | *Duration* | *Actions* | *Results* |
| P1 | 1991 – 2003 | Generating ideas, setting up frameworks | National Island Development Programme, Law on Islands |
| P2 | 2004 – 2016 | Advocacy, Mobilization, Screening, Mapping | IEE projects STORIES [16], Meshartility [17], BEAST [18], SEAPs, SECAPs |
| P3 | 2017 – 2030 | Experimentation with top – down and bottom – up frameworks, ICT expansion | Smart Islands Declaration [2], Clean energy for EU islands [1], Horizon 2020, Pilot islands, ICT/ Digitalization, National Legal framework for Islands |
| P4 | 2030 – 2040 | Society assisted acceptance and full commercialization (self-sustained) of Smart Island approach | Smart energy, Smart transport, Smart water management, Smart waste management, Smart Governance, Smart economy, Climate change adoption |
| P5 | 2040 – 2050 | New innovation and business model | Innovation, Business models, Resilience |

# Combining top-down with a bottom-up approach to develop Smart islands



# LoRaWan connectivity and devices deployed for Smart Islands project

The network on the Cook Islands will run several smart island use cases including energy metering, water management, air quality streetlight operation and emergency notifications, such as tsunami sirens.

Smart applications will align with the Cook Islands' climate change programme

- A LoRaWAN network is being deployed on the Cook Islands in the South Pacific for a range of smart applications.
- It is a joint collaboration by semiconductors and advanced algorithms supplier Semtech and ICT and internet of things (ioT) solutions provider ICTnexus.
- As part of the ICTnexus Smart Islands project, an IoT platform will feature Semtech's LoRa devices as well as a LoRaWAN network for the Island's infrastructure.

Using LoRaWAN the Cook Islands will be transformed into a smart island. Source: Pixabay

- The LoRaWAN will enable the islands to implement several smart island use cases including energy metering, water management, air quality and weather station monitoring, streetlight operation, asset tracking and emergency notifications, such as tsunami sirens.
- “Scalability was key in choosing the right technology to develop the Cook Islands into truly smart islands,” said Tai Kauraka Tangaroa, chief executive officer at ICTnexus. “As we start with Rarotonga for launch, building IoT infrastructure across 15 islands is no simple task, but the strong capabilities of Semtech’s LoRa devices and LoRaWAN standard provided an ease of deployment and scalability this comprehensive project requires to succeed.

Using LoRaWAN the Cook Islands will be transformed into a smart island. Source: Pixabay

# Caribbean Smart Islands – Digital Technology as a catalyst for Economic Growth and Sustainability

## The Smart Islands Forum

- Caribbean-Central American Action in partnership with Mastercard and the Inter-American Bank will host this first “Caribbean Smart Islands” Forum in Washington DC on June 26th, 2018 to discuss how public and private entities can partner in the digital payments ecosystem to generate economic growth in the Caribbean.
- This event will bring together global industry leaders, government, international organizations and NGOs and associations.

**Theme 1: Smart Islands: Enabling the Ecosystem for digital payments**

**Theme 2: Tourism as a catalyst for growth and resilience in the Caribbean**

**Theme 3: Harnessing Trade for Growth: Enabling Caribbean SMEs to enter global commerce**

## One case of investment:
## Hitachi confirms £10.8m Smart Islands investment

The project is co-financed by the European Regional Development Fund and will be conducted in collaboration with the Smart Islands Partnership and UK smart energy pioneers Moixa and PassivSystems. The initiative aims to “unlock and balance renewable energy generation, making 100 homes more energy efficient and supporting 200 businesses in the Isles of Scilly and in Cornwall, whilst reducing fuel poverty through the use of innovative technologies”. Hitachi also announced that it will develop and deploy an ‘innovative IoT (Internet of Things) platform’ on the islands through the Smart Islands Project, to demonstrate “how an individual community can build a replicable and scalable model to rapidly transition from being carbon intensive to a low carbon community”. They added: “Through the deployment of smart solutions across the islands’ infrastructure, the company will demonstrate the potential of the UK to take a lead role in this area “to inform the UK’s industrial strategy as well as to ensure a sustainable future for many regions of the UK and beyond".

# Smart Island' digital platform up and running in Mallorca

Formentor Lighthouse, Mallorca. archive photo. | **P. Pellicer**

- The Consell de Mallorca's **'Smart Island' digital platform** is already up and running, making it possible to consult a large amount of diata via a mobile phone, computer, or other public device such as information panels.
- The devices will be **installed at archaeological sites and lighthouses** to record visitor attendance.
- **Traffic 'Smart Island'** will monitor the roads, with 21 stations collecting data on vehicles,, making it possible to adjust mobility policies and message boards will warn drivers of traffic jams and other problems on the roads.
- **Meteorological stations** will monitor environmental conditions in certain areas of the island, which is very important for emergency management.

https://www.majorcadailybulletin.com/news/local/2021/07/31/87555/mallorca-technology-smart-island-digital-platform.html

- **Environmental and structural sensorial devices** have been installed at the Palau de la Diputación, the main headquarters of the Consell and at the Betlem de la Sang chapel, to control and prevent the deterioration of these facilities.
- Devices have also been placed on the **Misericòrdia building in Palma** to monitor energy efficiency and **at 180 bus stops** to advise passengers of waiting times, mobility alternatives and other issues.
- State-of-the-art hardware has been given to Firefighters and the Emergency Services.
- ‘Smart Island’ works via a data transmission network and the Government has poured **9 million euros** into the project.

https://www.majorcadailybulletin.com/news/local/2021/07/31/87555/mallorca-technology-smart-island-digital-platform.html

thank you
danke
謝謝
ngiyabonga
teşekkür ederim
gracias
merci
obrigado
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bedankt
go raibh maith agat
mochchakkeram
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terima kasih
grazie
arigatô
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takk
tapadh leat
спасибо
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Баярлалаа
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