Port of the Future

Innovating ICT Services in the 5G era

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http://jlab-ports.cnit.it

Webinar: «Decarbonising Small and Medium Ports»
Aveiro, July 7th, 2021

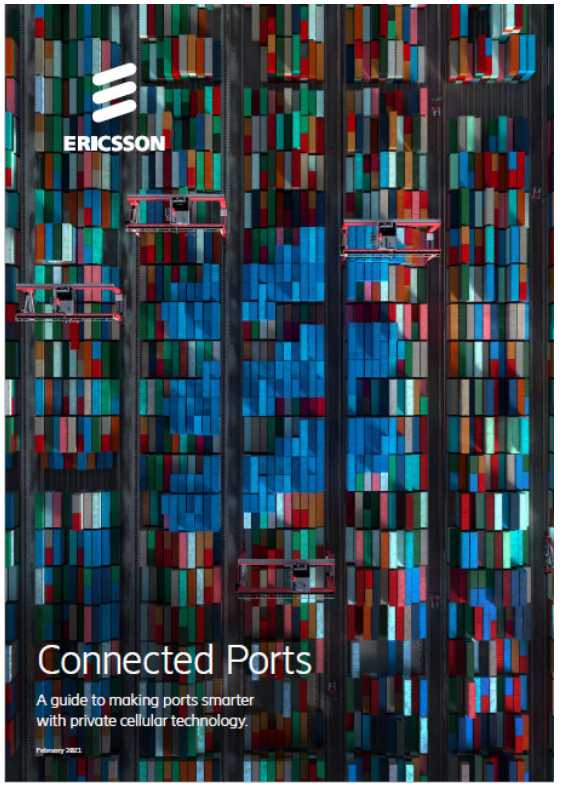
«Port of the Future»

- Sea ports in 2030:
  - high capacity and efficiency,
  - highly integrated with inland transport and logistic nodes,
  - capable of sustainable growth without further infrastructure investments.
  - following the European models:
    - for the circular economy;
    - to reduce the environmental footprint (more renewable, less pollutants);
    - to improve the navigability of port channels, operational efficiency, optimize the capacity of docks yards, and flows;
    - transform the port into a local and national innovation hub.

Image – Port of the Future Serious Game
(C) Deltares

Four challenges

- Running a tighter ship
  - best to utilize their assets with megavessels
- Unlocking the gridlock
  - cutting yard congestion
- People-friendly ports
  - automation elements that keep workers safe
- Getting greener by getting smarter
  - as a result of improved yard movements



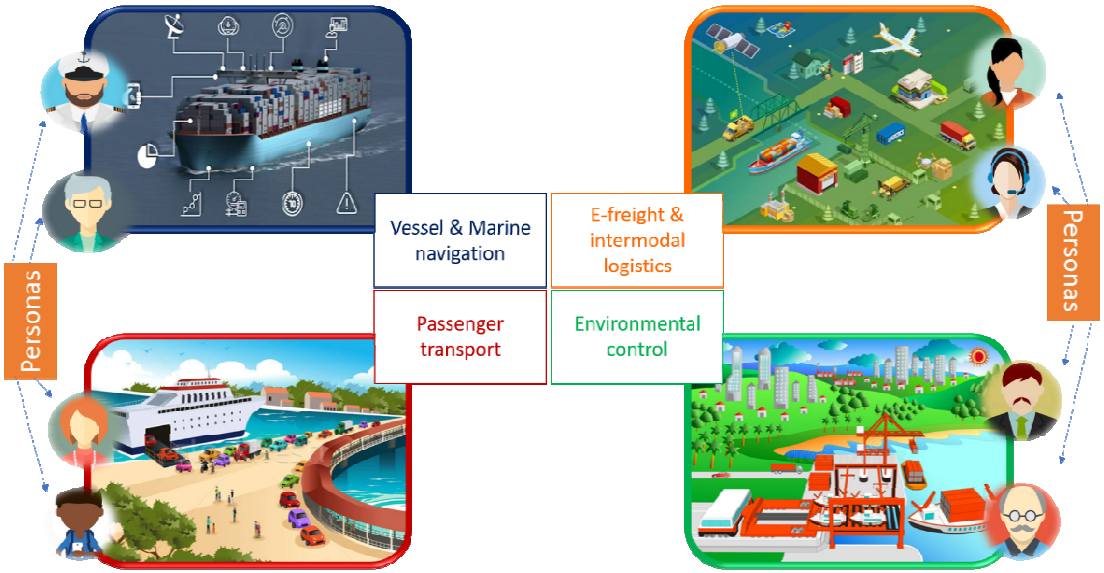
https://www.ericsson.com/en/internet-of-things/audience-page/connected-ports-report

Port of Livorno

- Mid-size historical port:
  - passengers and freight;
  - multipurpose(containers, break/dry/liquid bulk);
  - freight village, car stocking (25,000 cars capacity);
  - along TEN-T SCANMED corridor (core node);
  - door of Tuscany;
  - minor ports (Piombino, Elba) under the same organization.

Livorno: Port of the Future

- Objectives:
  - collect the requirements from the communities and design innovation services;
  - follow (and steer) EU **standardization** for data, networks and services;

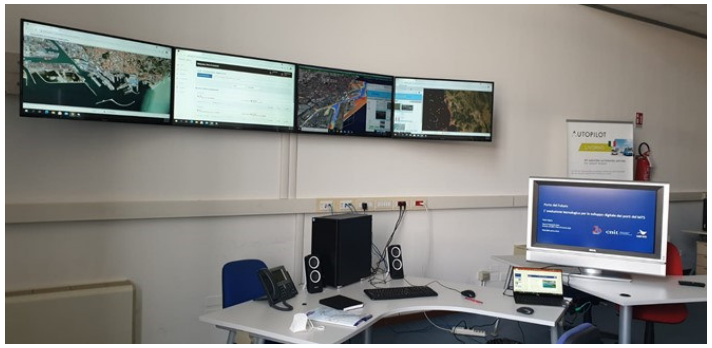


- allow the procurement from the digital market of innovation services;
- check the conformance against the requirements (included in tenders).

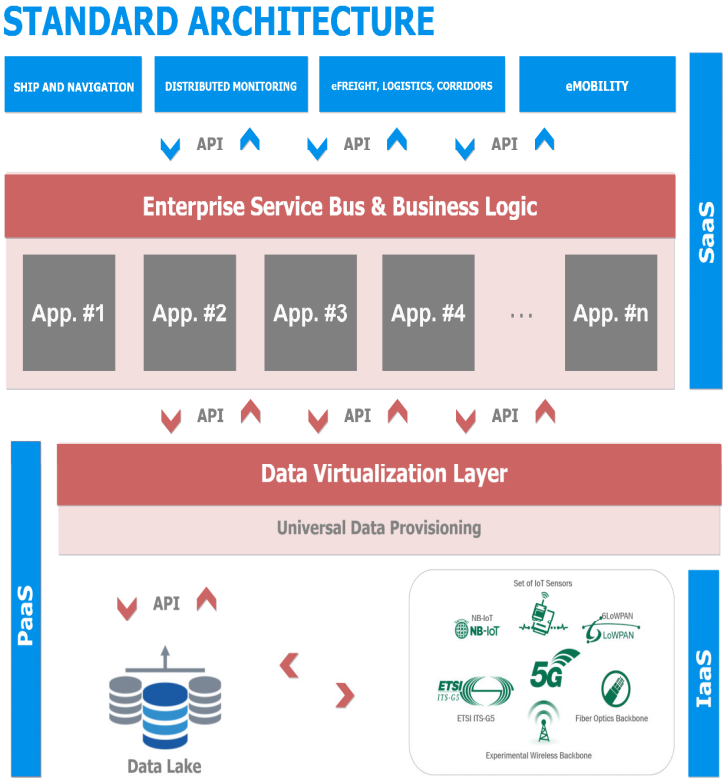
More videos in: https://jlab-ports.cnit.it/photogallery/

(New) Std architecture & continuous integration

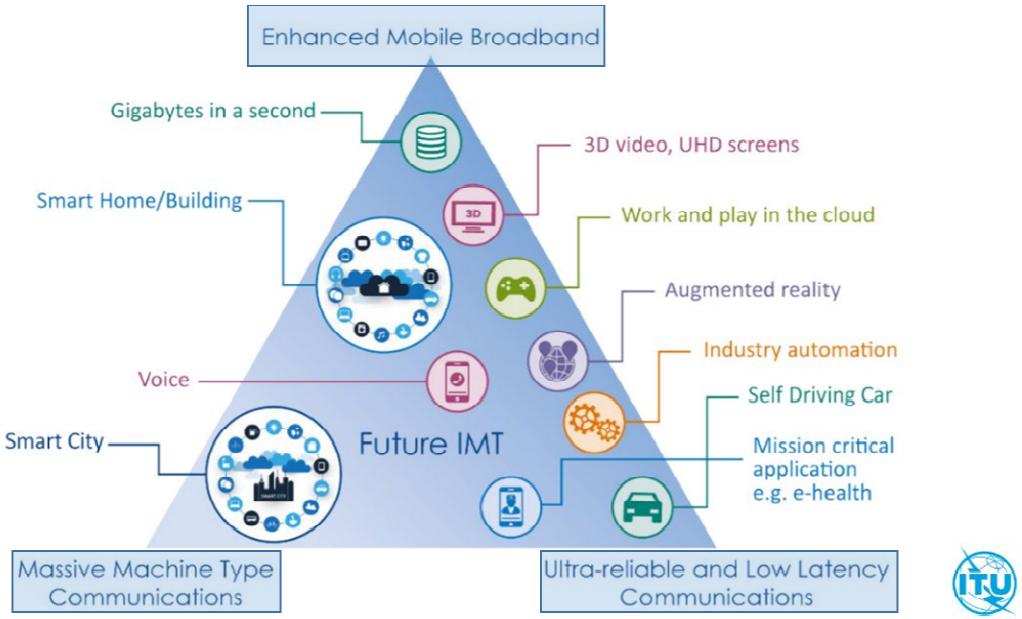
- Layer separation:
  - Infrastructure, Platform, and Software
- Data Lake (vessels, freight, carriers)
  - Document-based, RDBMS, GIS, and M2M
- Backward compatibility with legacy systems
- New cyber-security policies
- Application layer implemented by more provic
- Internal Integration Test & Validation



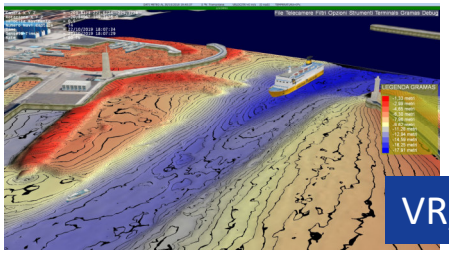
https://www.monicapmslivorno.eu/



5G in Ports



- eBB:
  - Touristic crowds
  - Assistance to people with disabilities
  - Emergency procedures



- UR-LLC (VR/AR - Digital Twin)
  - RT Port View
    - bathymetric data
  - RT Vessel View
  - RT Machinery status
  - RT Assisted docking

- mMTC (massive IoT):
  - Port (landside and sea) massive sensorization
  - Vessel (and cargo) sensorization

(New) Telecommunication Networks

Ericsson White Paper
GFTL ER 20:003151
June 2020

ERICSSON

5G spectrum for local industrial networks

5G Network in Port

ericsson.com Networks Digital Services Managed Services 5G IoT Portfolio Future Technologies

A final example can be found in the potential of the world's 835 c… …tly active ports [8]. One case study examining the private 5G network trial for the automation of China's Port of Qingdao indicated that a 70-percent labor cost savings could be achieved if 5G automation were to be fully implemented [9]. Our own research engagements in Italy' Port of Livorno …uggest much the same, with the potential for significant savings in port and quay opera… …duced berthing times for vessels and shortened cargo

(New) Data Management

- A Data Lake in Livorno:
  - Regain data ownership and consider the port as a Digital Hub
  - Invest in data availability, accuracy and trust
  - New data sources
  - Structuring the process involving the port in port information systems
  - Opening up market opportunities to generate new digital services
  - Enforce compliance with European standards

Bathymetric probe

Pollutants

Photonic radars

Acoustic sensors

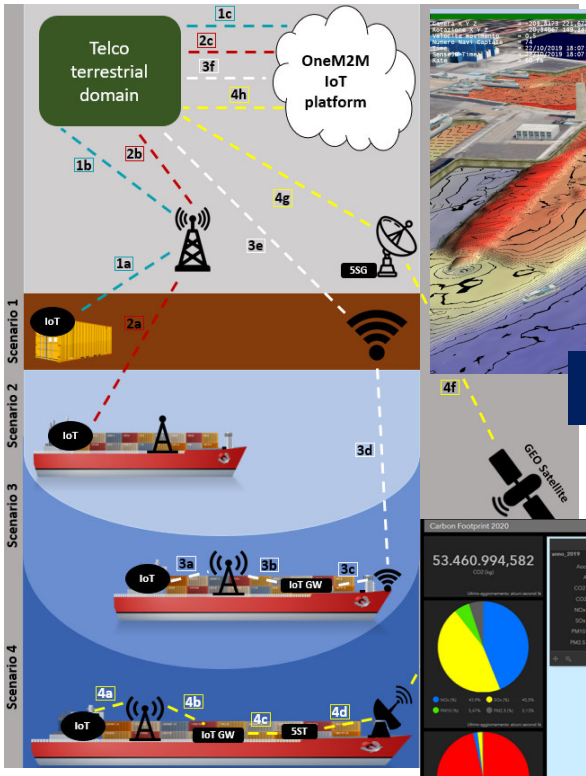
Video streams

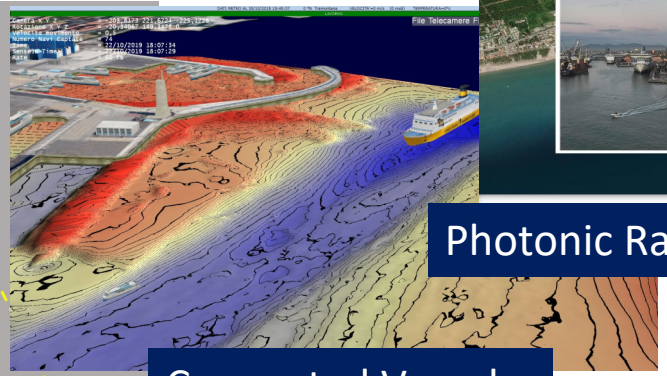
Meteo stations

Other data sources

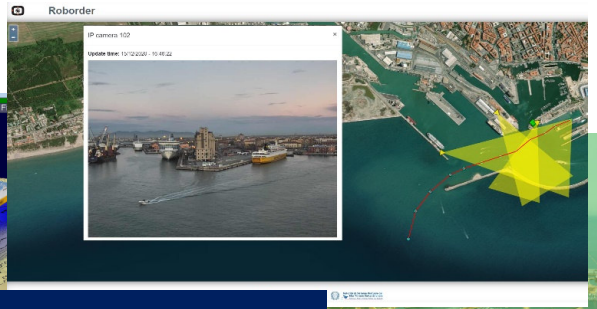
Autonomous/connected vehicles

Examples of ICT innovation services



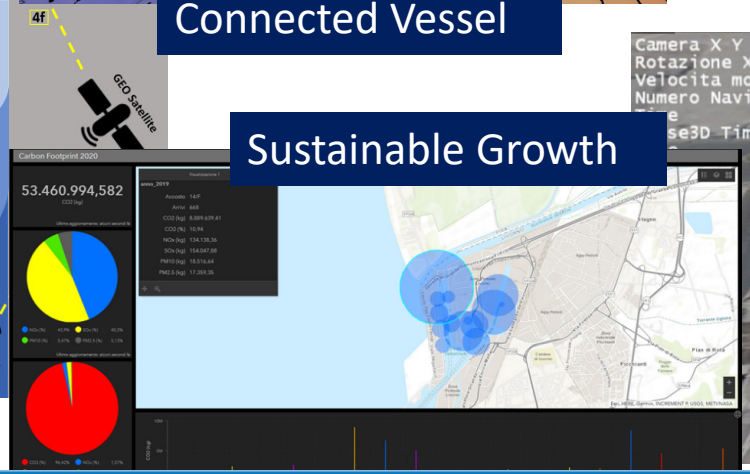


Connected Vessel



Photonic Radars

5G-enabled e-Freight



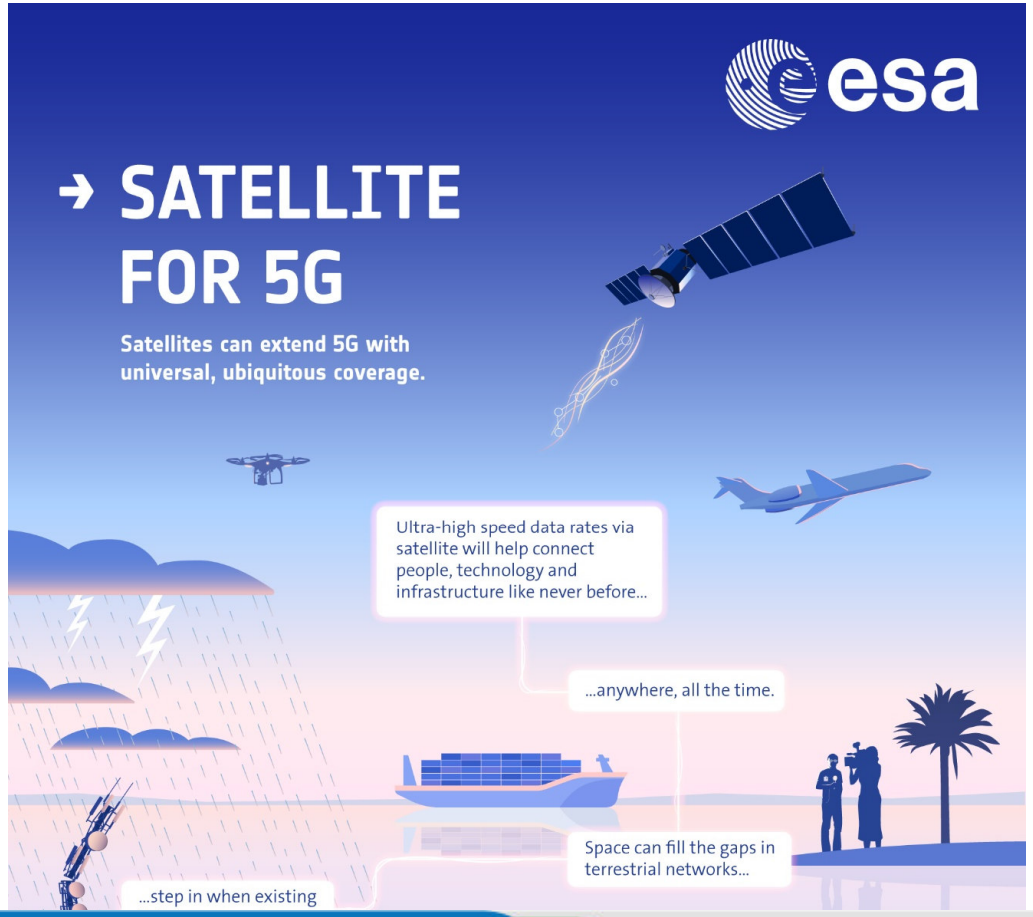
Sustainable Growth

CCAM

Not far in the future: Autonomous Ship in Livorno

Darsena Europa (2026)

- New (hard & digital) infrastructures in Livorno:
  - a MASS will enter Livorno exploiting seamless integration of 5G terrestrial and non-terrestrial links;
  - maritime services will be delivered bridging the gap from ship and shore digital infrastructure;
  - port services will be pre-booked and specially profiled for the vessel and freight type;
  - autonomous berth selection and docking will be performed.



Thank you!

- Port of Livorno:
  - has enabled a digital infrastructure capable of validating innovative services targeted to port communities;
  - has an unquestionable recognition in the international research and innovation domain;
  - is considered as a national “best practice” for 5G deployments in ports;
  - is developing solutions oriented to e-Navigation, e-Freight, Mobility and Sustainable Growth.

Courtesy of:

Corpo Piloti del Porto di Livorno