



NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

How 5G will accelerate shipping digitalization



<https://scan.di.uoa.gr/>

Prof. Nancy Alonistioti
Dept. Informatics and Telecommunications
National Kapodistrian University of Athens

Email: nancy@di.uoa.gr

The 5G landscape

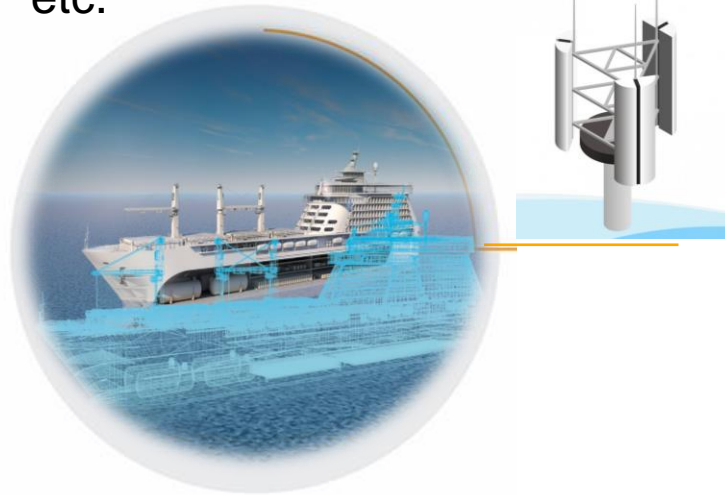
- Ubiquitous smart networks 5G - cornerstone of the development of smart ports.
- IoT and 5G network to support different requirements to realize the collaborative intelligence of smart maritime ecosystem.
- 5G and AI can support intelligent demanding applications, e.g., security monitoring systems covering the whole maritime operation
 - 5G, IoT, AI to effectively respond to emergency events and realize intelligent governance and management

The 5G and Digital twins landscape

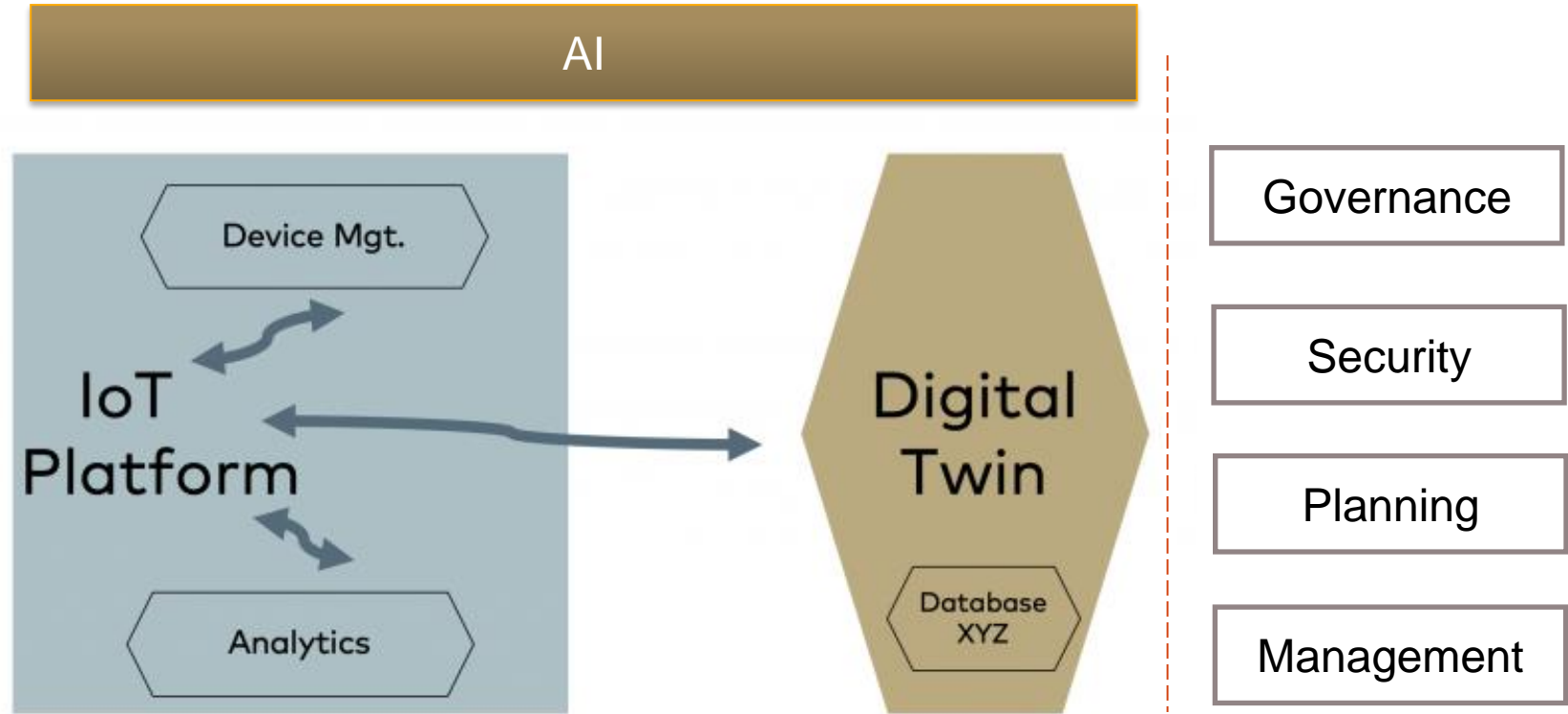
- 5G combining its cloud-native approach with its containerization features enables scalable applications and environments within its network.
- Digital twin technology is the process of using data streams to create a digital representation of a real-world asset to improve collaboration, information access, and informed decision-making.
- Digital twin is associated with capabilities for historical and real time data (- 5G enabler), modeling, analysis
 - 5G has great impact on smart maritime support due to its ultra-high bandwidth, ultra-low latency and capacity.

5G+, AI, IOT and Digital twin framework to unlock smart maritime capabilities

Sensors,
connected things
etc.



5G+



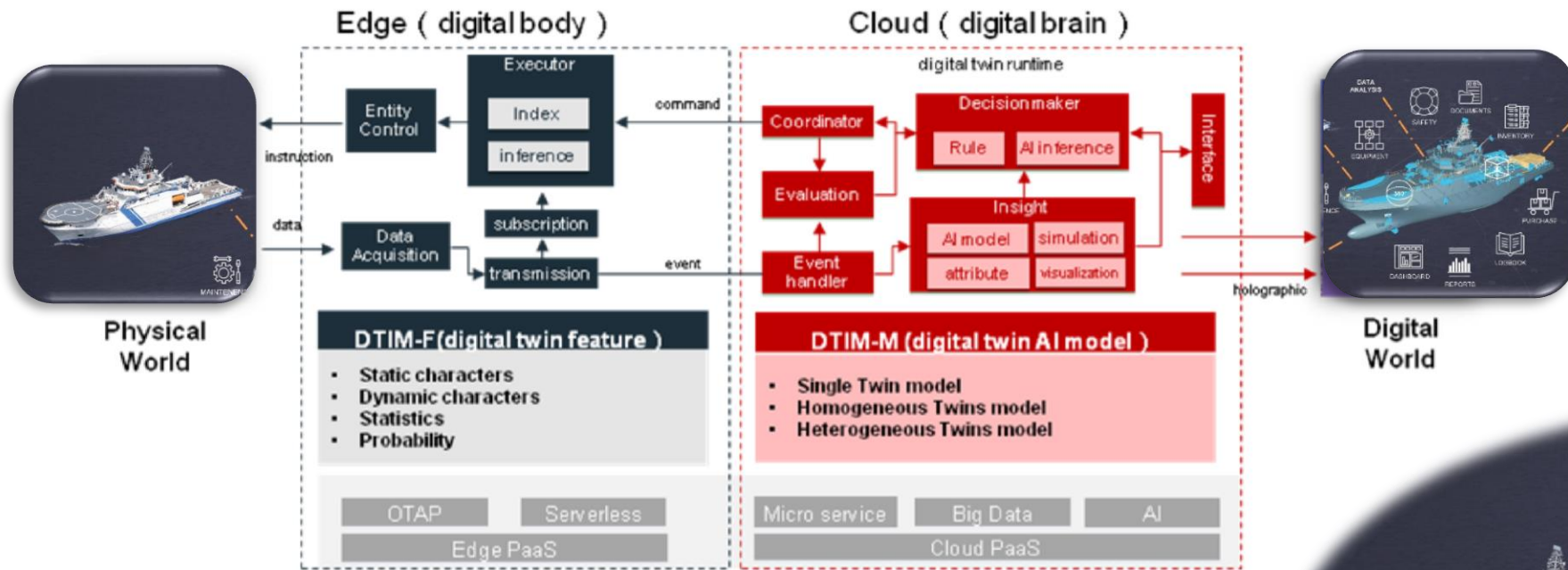
5G as main enabler for digital twin framework for cross-domain data

- Deployment of private 5G network in sea and port areas.
- 5G connected buoys will be able to convey data about sea conditions, measure, observe and record a wide range of chemical and physical parameters
 - 5G will greatly increase the data that can be collected, supporting DT for safe shipping through and around the Inlet.
- Operators have been working to deploy ultra reliable connectivity to ships on the Northern Sea, where speedy exchange of data in large volumes could reduce ship collisions and IoT sensors will help built DT for search and rescue missions.

5G as main enabler for digital twin framework for cross-domain data

- Environmental DT based on measurement sensors installed on ships to provide real-time data on the air quality and emissions in the port area.
 - Prototype environmental sensors and control units, which generate a data stream of raw measurement data, are connected to the data centre through the 5G mobile network with a dedicated network slice.
- A Digital Risk Twin for Ship or Port processes helps to understand how the systems and processes will work and fail, the probability for the failures and how one failure would affect the system as a whole.
 - Simulate processes, assess every possible failure, generate complete and real time analyses for Reliability, Availability, Maintainability and Safety taking into consideration factors in real world scenarios including Environmental Impact, Mission profiles and Operation modes.

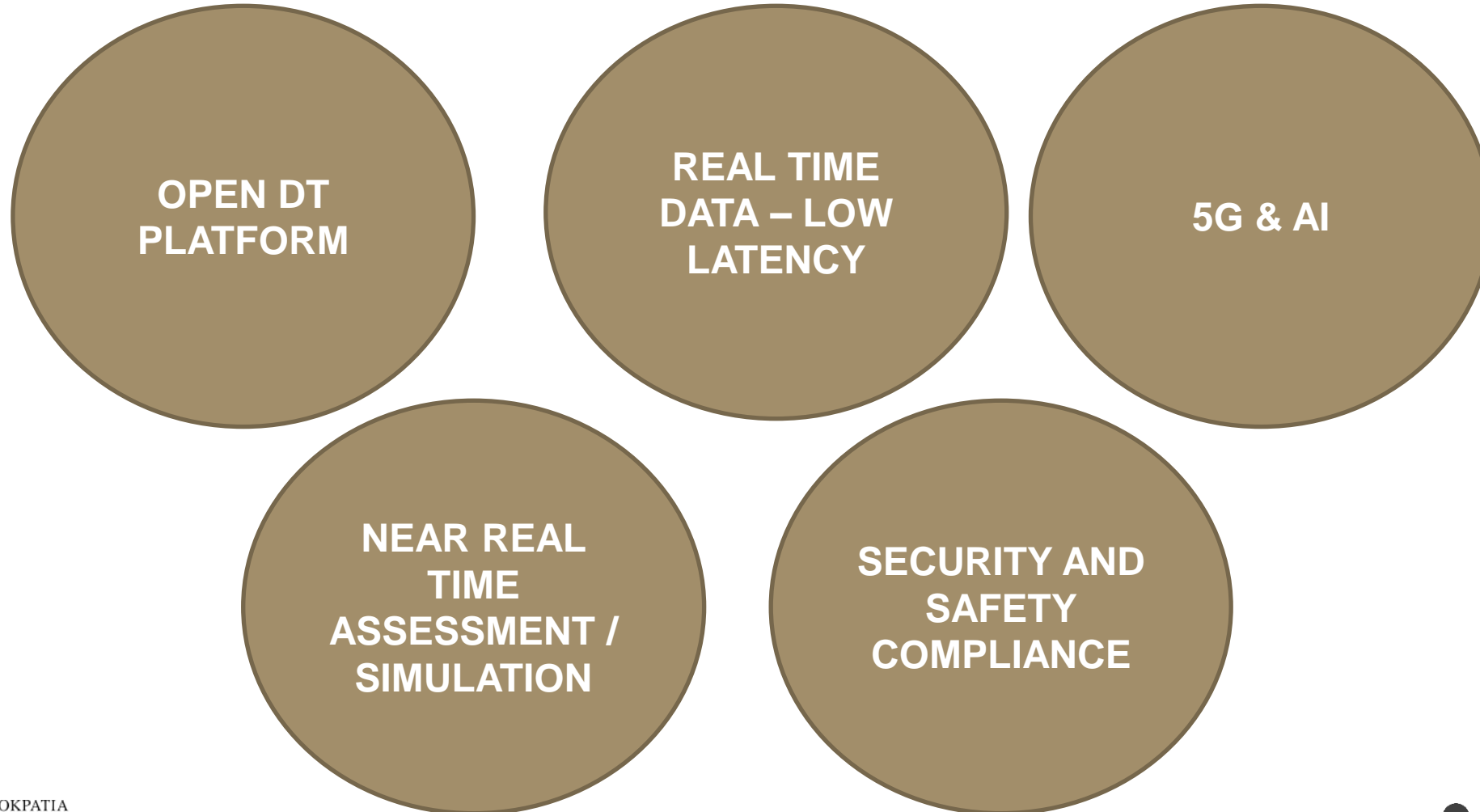
5G enabled Digital twin framework



TM Forum Catalyst White Paper



Conclusions: 5G and Digital twin framework challenges



THANK YOU!

- **QUESTIONS?**



Prof. Nancy Alonistioti
Dept. Informatics and Telecommunications
National Kapodistrian University of Athens

Email: nancy@di.uoa.gr