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Mobile Base Stations and Testbed-Simulation Cohabitation

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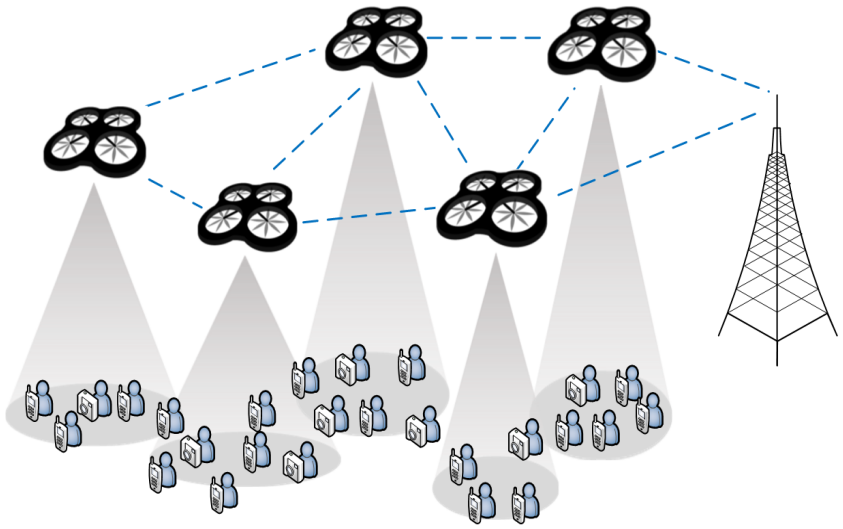
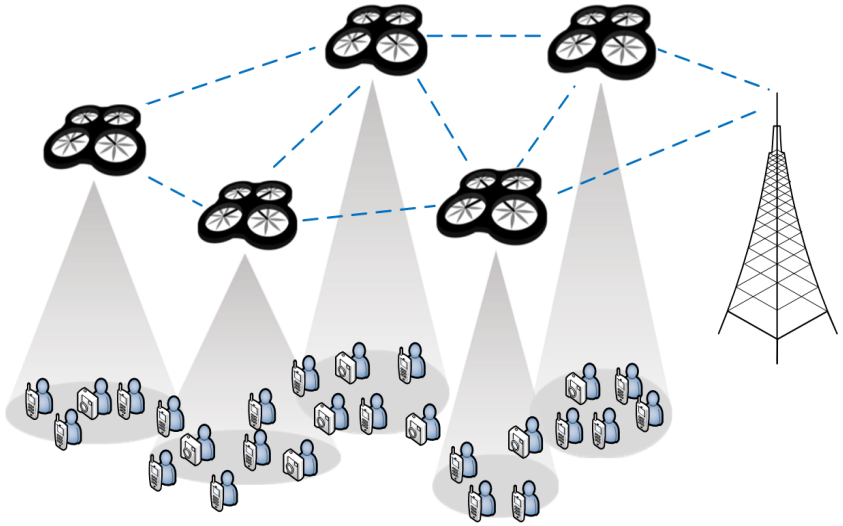
Two Messages

1. Radio Base Stations will be mobile



2. Network testbeds will cohabit with network simulators

1. Future radio Base Stations will be mobile



Motivation for Mobile Base Stations

Future offered traffic may be highly variable

- Video applications + Mobile users
- Small cells

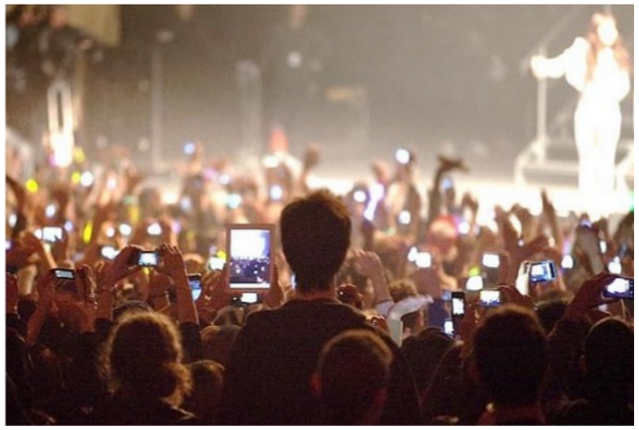
Massive deployment of fixed Base Stations may be

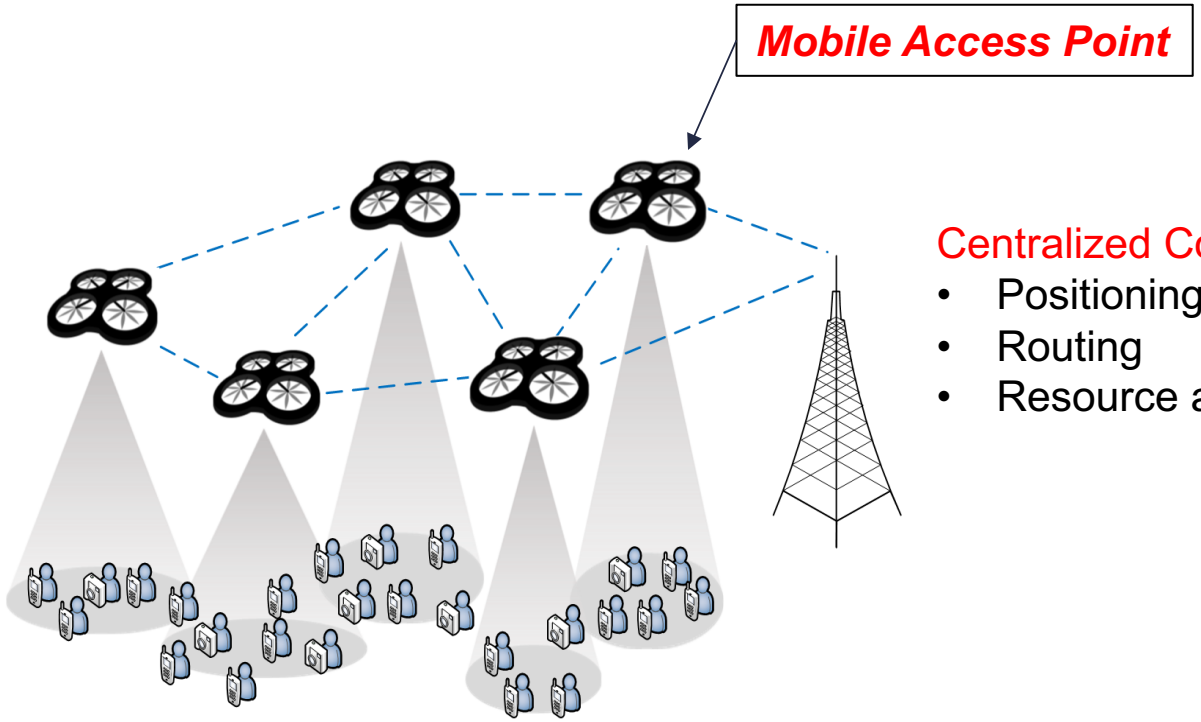
- Costly
- Inefficient

Possible solution: Mobile Base Stations

- Repositionable
- Enabled by small robots + small Base Stations

WISE Project (2016-2019)





Centralized Control for
- Positioning
- Routing
- Resource allocation

How to Sense traffic?
Where to place Mobile Access Points?
How to define the cells?
How to combine with MIMO?
How to build the wireless backhaul?

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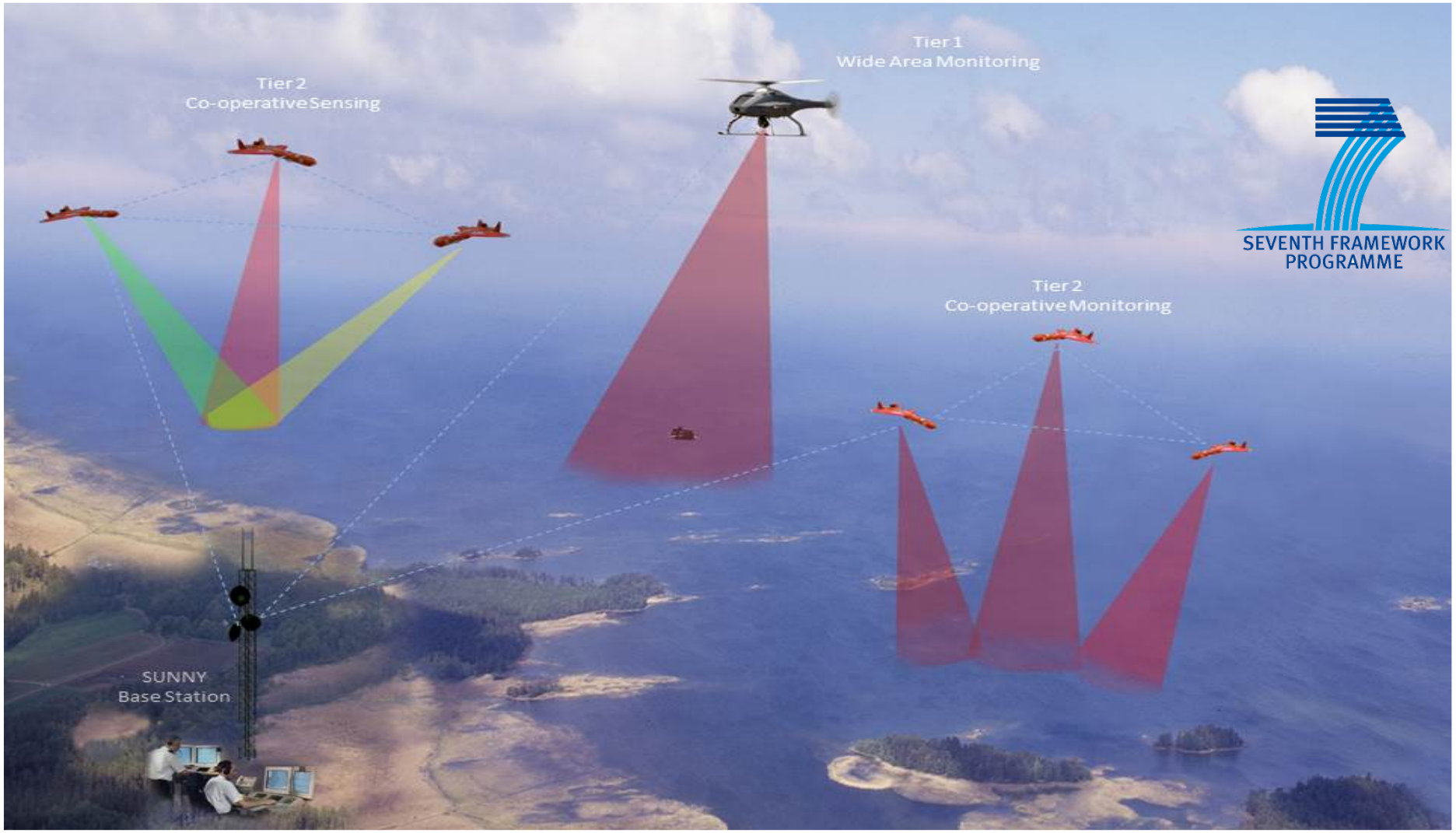
2. Network testbeds will cohabit with network simulators

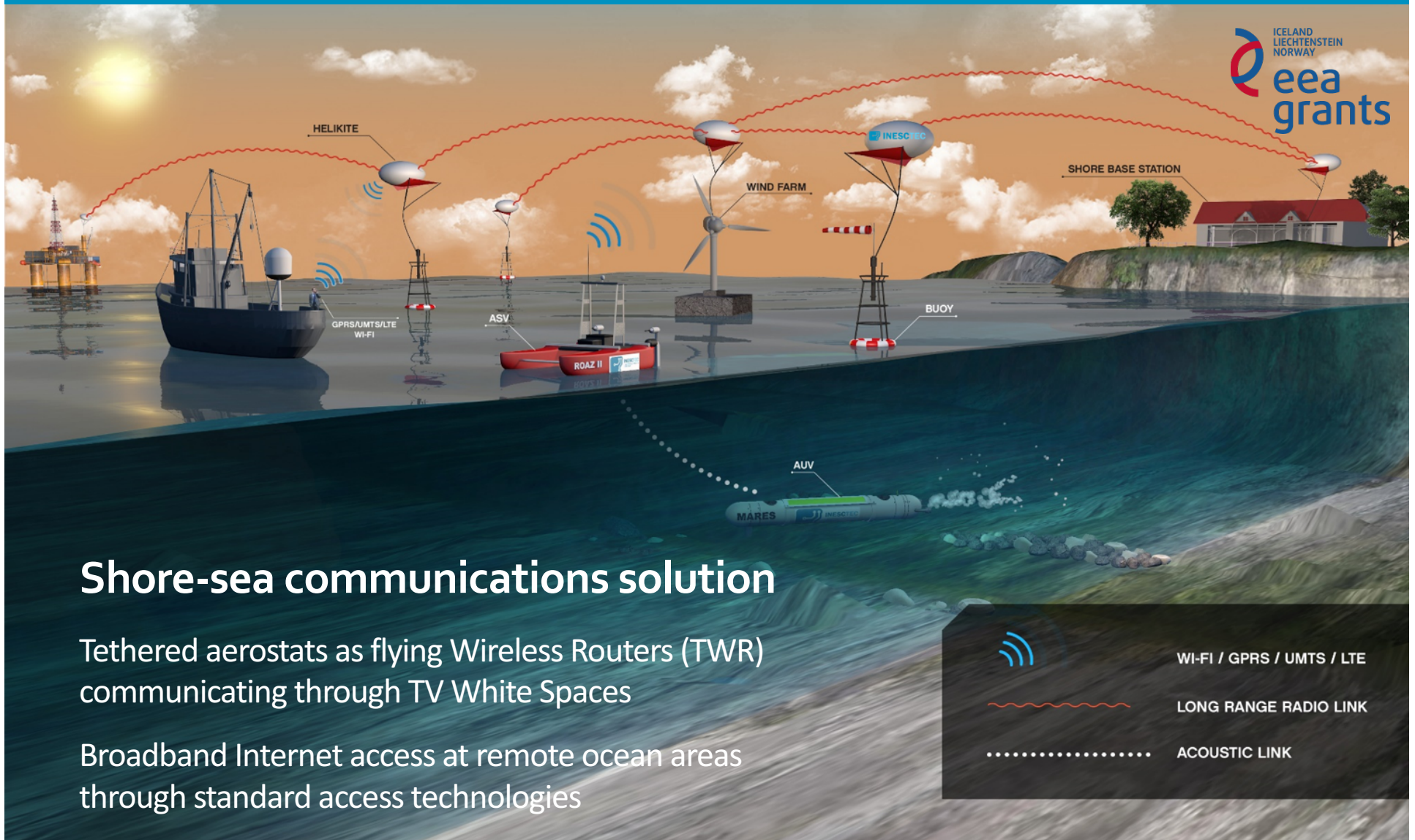
SUNNY* Project (2014-2017)



* Smart UNattended airborne sensor Network for detection of vessels used for cross border crime and irregular entrY

BLUECOM+ Project (2015-2016)

Connecting Humans and Systems at Remote Ocean Areas using Cost-effective Broadband Communications



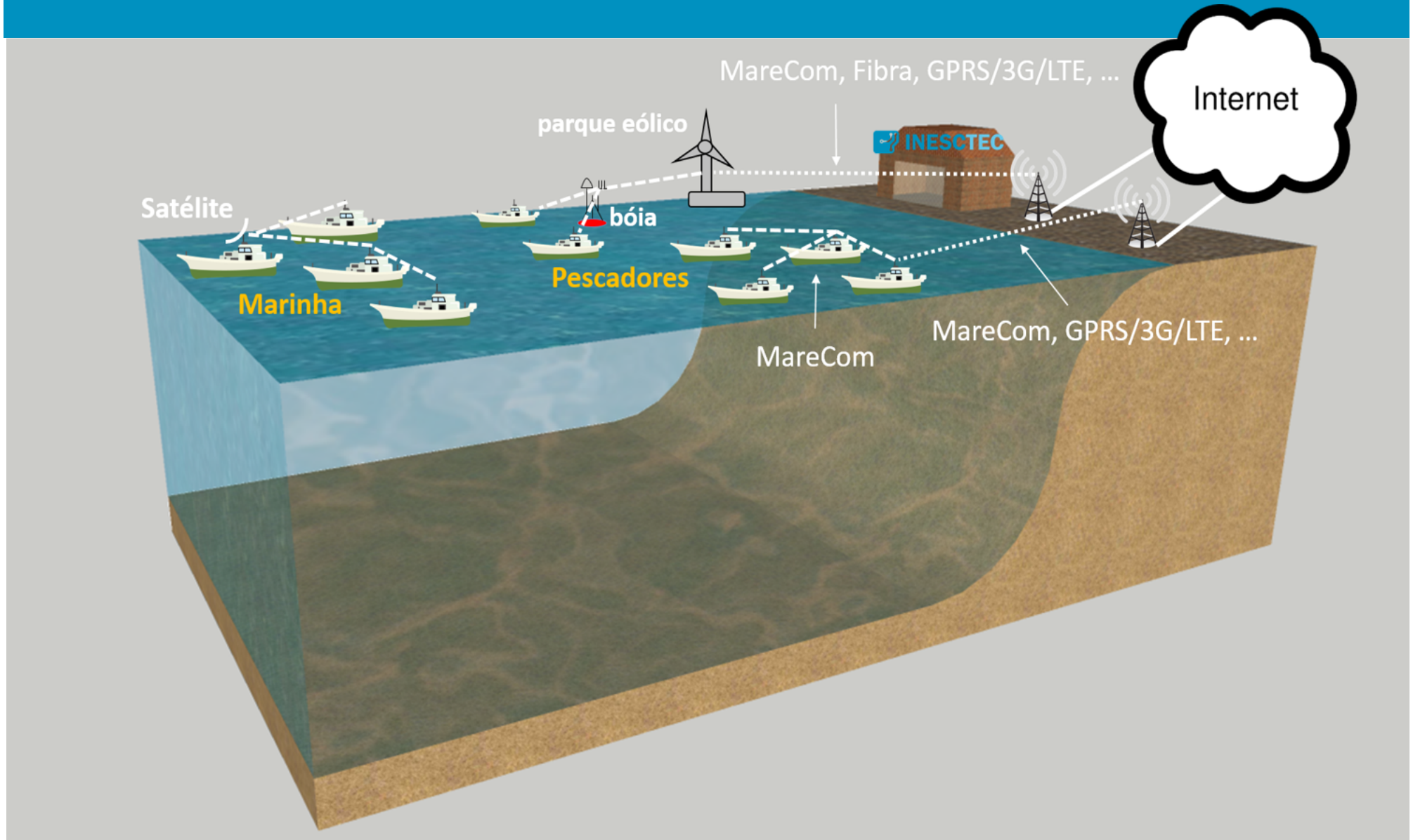
Shore-sea communications solution

Tethered aerostats as flying Wireless Routers (TWR) communicating through TV White Spaces

Broadband Internet access at remote ocean areas through standard access technologies

MareCom Project (2016-2018)

Maritime Community Networks and Services



ENDURE Project (2015-2017)

Enabling Long-Term Deployments of Underwater Robotic Platforms in Remote Oceanic Locations

Motivation for Testbed-Simulation Cohabitation

Our problems

- Rent boats and crews ➔ expensive
- Depend on complex robots (to study communications)
- Non-repeatable experiments

Complementary, Wireless Networks

- Becoming software-oriented (SDR, SDN, NFV)
- Shorter development cycles

Flexible Validation Process

Use computational models (as much as possible)

In lab … no seasickness

Reuse computational models in testbeds

Use real-world experiments to improve computational models

What is ns-3?

Packet-level network simulator

200+ contributors | ~8k users

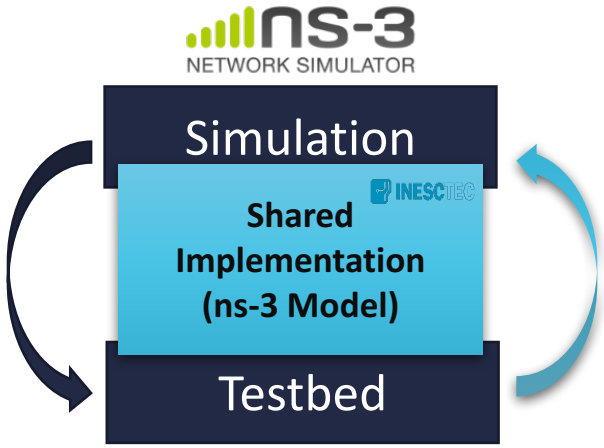
Reliable development process ➔ Trustable computational models

Open source project supported by the ns-3 Consortium

Fast Prototyping

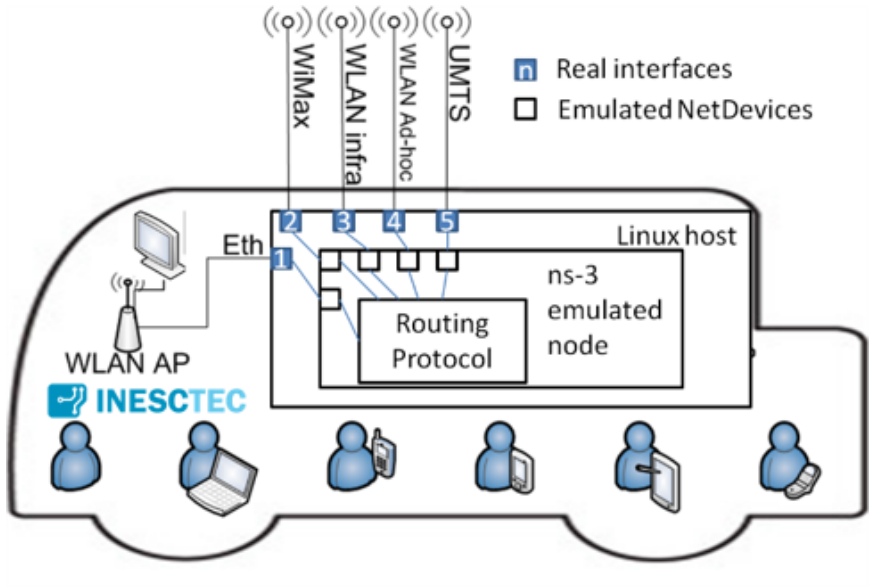
Simulation

Testbeds



(using ns-3 emulation capabilities)

SITME Project (2009-2012)



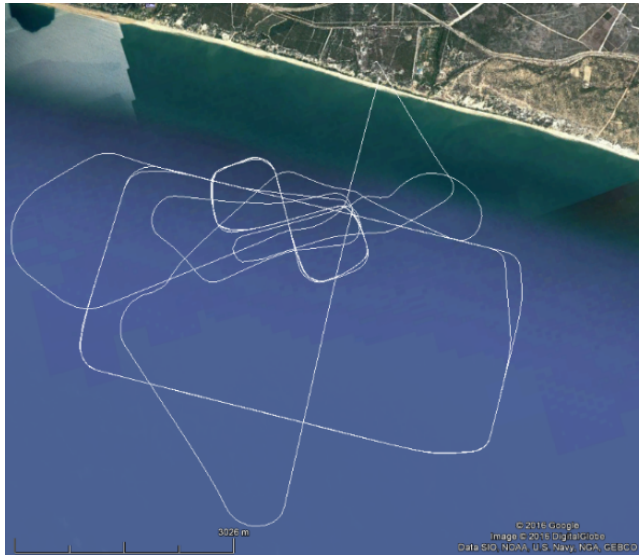
- 11 buses operating in Porto for 18 months
- Support of real wireless network interfaces

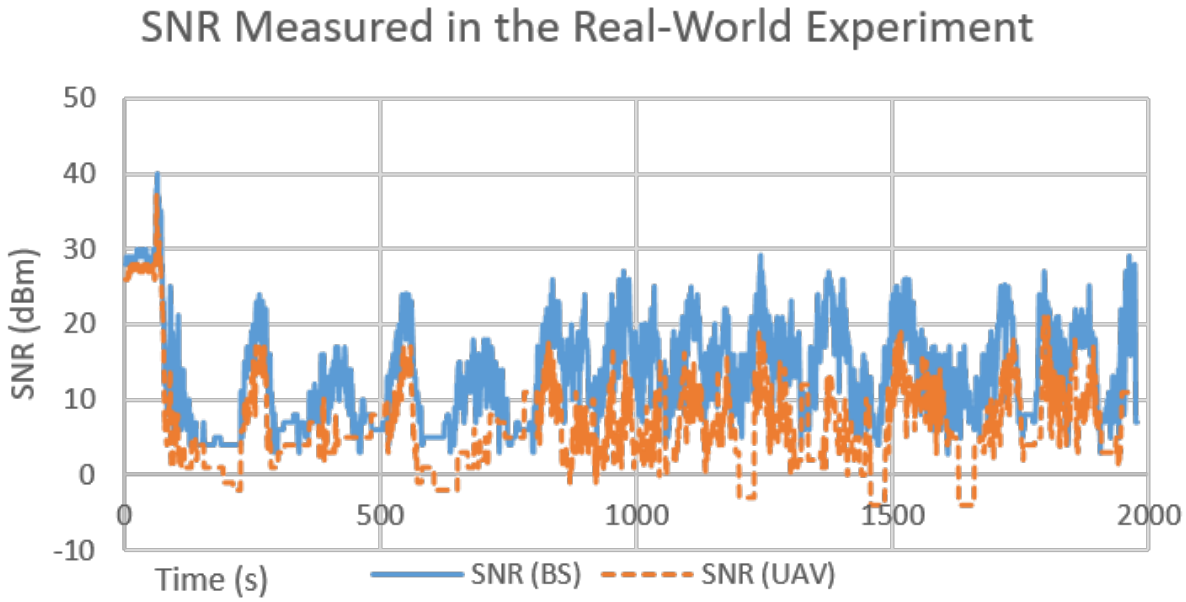
Perpetuating Real-World Experiments with ns-3

Simulation

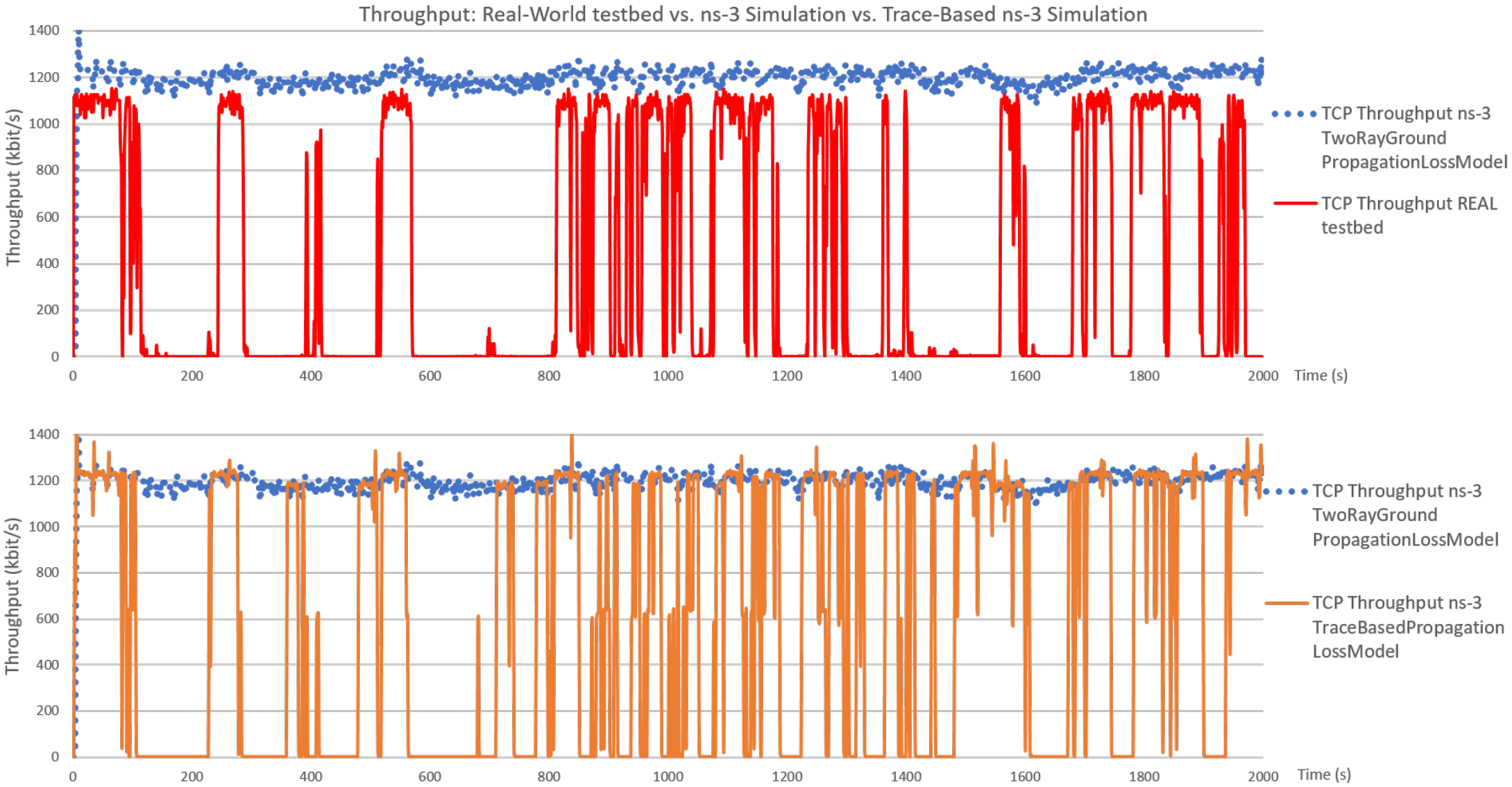
Testbeds

SUNNY Project





Perpetuating Real-World Experiments with ns-3



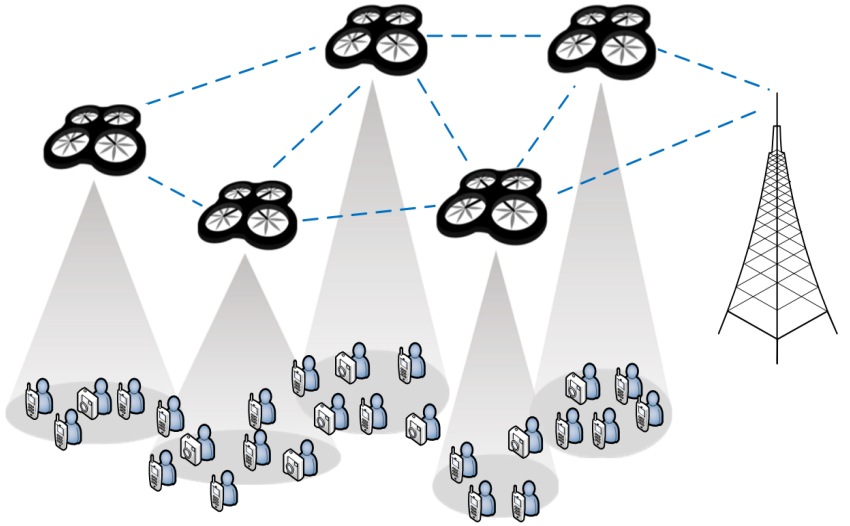
Testbed-Simulation cohabitation

Europe + USA should

- Provide incentives for development of trustable computational models
- Fund initiatives which enable testbed-simulation cohabitation

Conclusions

1. **Mobile Base Stations**



2. **Testbed-Simulation cohabitation**

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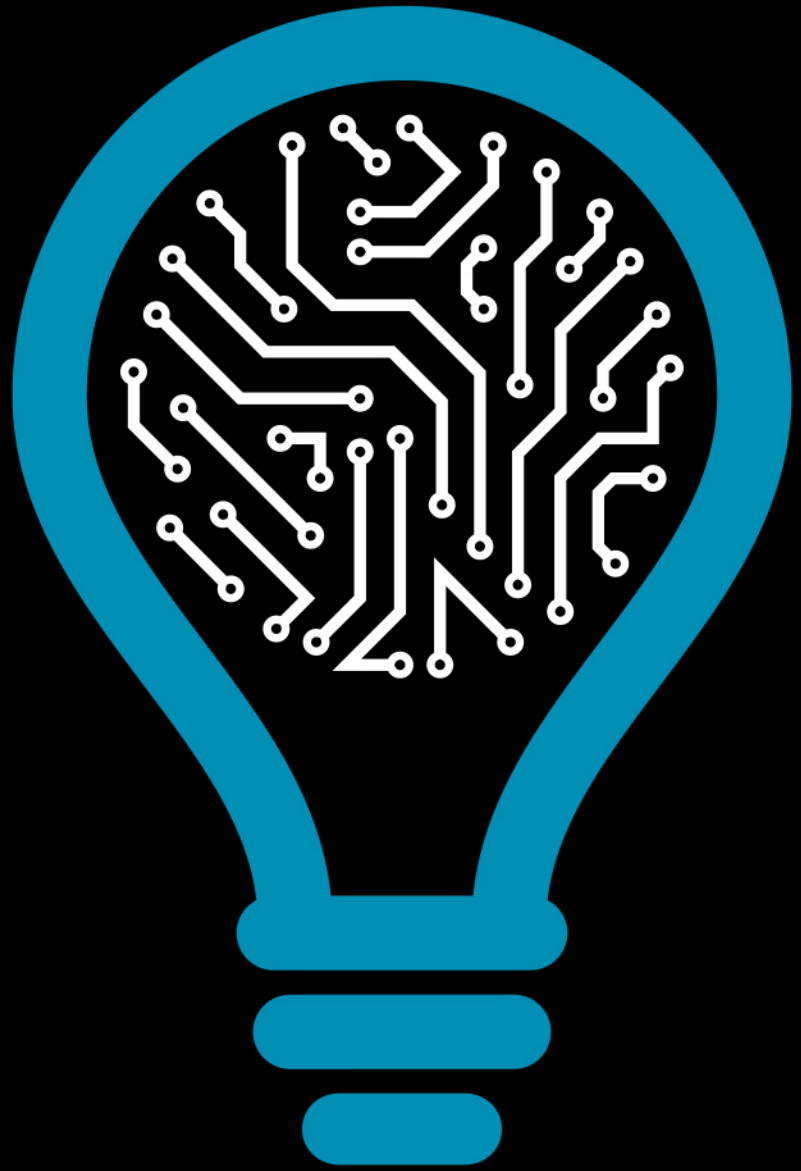
The End

from knowledge production to science-based innovation



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