



**ACT CCS 2 project no 299622**

**Digital Monitoring of CO<sub>2</sub> storage projects**

**DigiMon**

Athens, November 6th, 2019

Arvid Nøttvedt, NORCE

**Digital Monitoring of CO<sub>2</sub> storage projects  
DigiMon**

| No * | Participant organisation name  | Abbr.        | Country         |
|------|--|--------------|-----------------|
| 1    | NORCE Norwegian Research Centre AS   | NORCE        | Norway          |
| 2    | OCTIO Environmental Monitoring AS  | OCTIO<br>env | Norway          |
| 3    | NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY                               | NTNU         | Norway          |
| 4    | UNIVERSITY OF BRISTOL  | UoB          | United Kingdom  |
| 5    | CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING                               | CRES         | Greece          |
| 6    | HELMHOLTZ –CENTRE FOR ENVIRONMENTAL RESEARCH                                 | UFZ          | Germany         |
| 7    | SEDONA DEVELOPMENT SRL   | S-D          | Romania         |
| 8    | Nederlandse Organisatie voor toegepast -<br>natuurwetenschappelijk Onderzoek | TNO          | The Netherlands |
| 9    | Geotomographie GmbH  |              | Germany         |
| 10   | LAWRENCE LIVERMORE NATIONAL LABORATORY                                       | LLNL         | USA             |
| 11   | SILIXA LTD   |              | United Kingdom  |
| 12   | EQUINOR ASA  |              | Norway          |
| 13   | REPSOL –NORGE AS   |              | Norway          |

# Objectives



Overall objective: *“to accelerate the implementation of CCS by developing and demonstrating an affordable, flexible, societally embedded and smart Digital Monitoring early-warning system”*

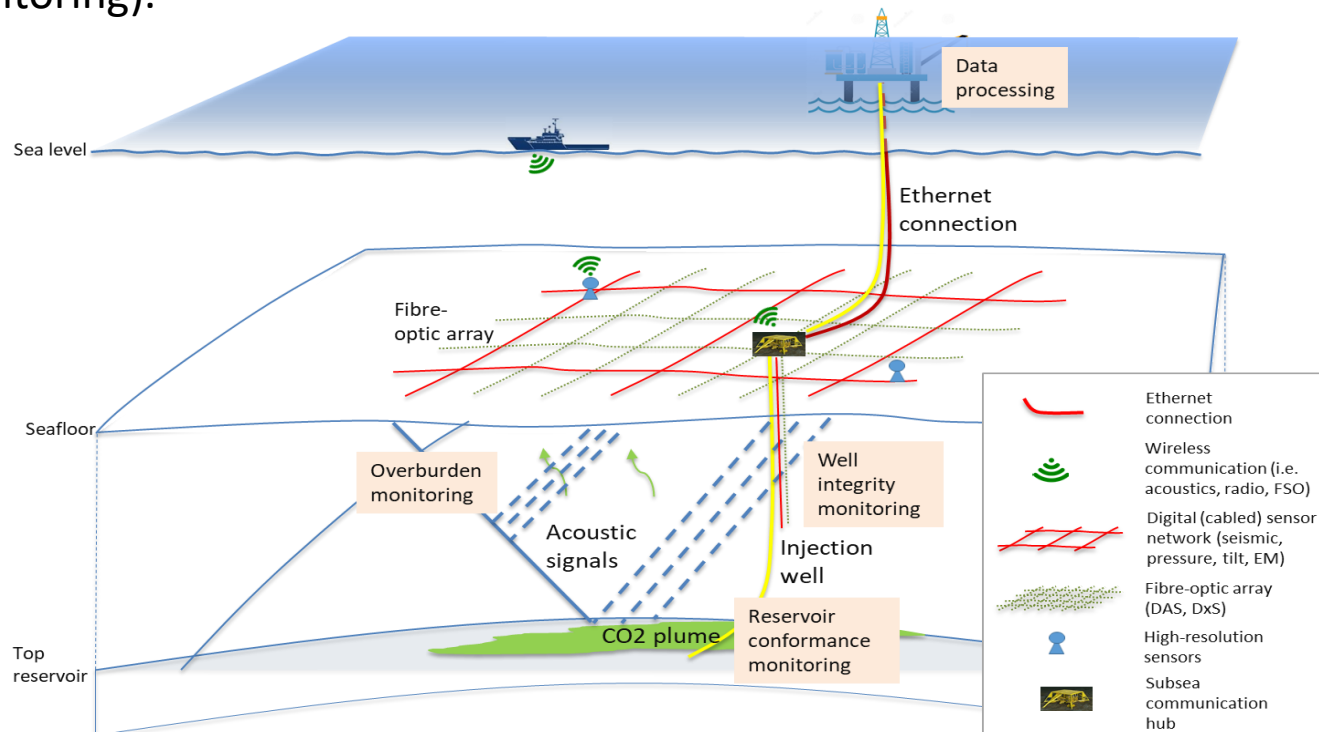
## Sub-objectives

- Provide a system for monitoring CO<sub>2</sub> plume, and identify and provide early-warning of actual or potential breaches in the subsurface barriers.
- Provide a *flexible* and *interchangeable* system with respect to the environment (offshore or onshore) and new system components provided by market-driven technology development.
- Provide a societally relevant monitoring system that addresses the views and worries of stakeholder groups and citizens.
- Provide knowledge communication and dissemination with the public and policy makers.

# The concept



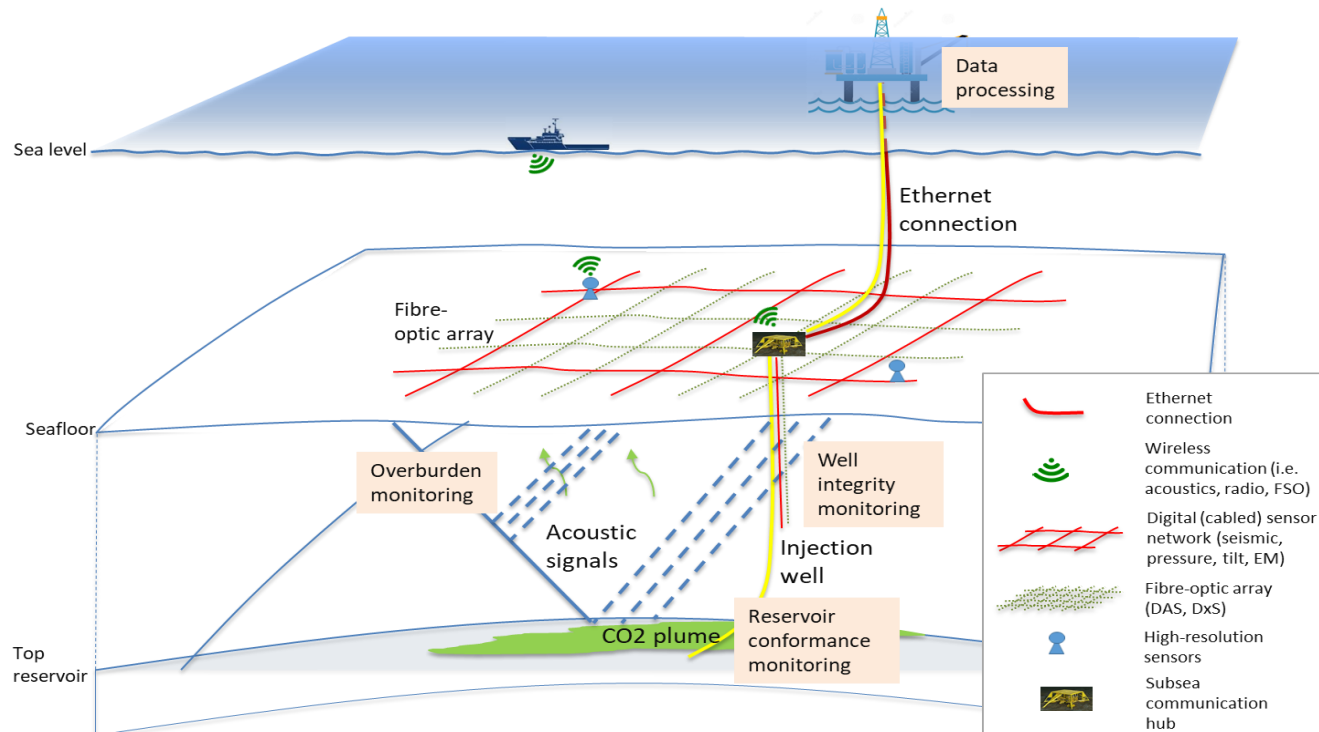
- Monitoring the plume movement in the reservoir mainly using remote passive geophysical measurements of changes in saturation and pressure (Conformance monitoring).
- Monitoring well integrity, mainly with downhole sensing (Containment and Contingency monitoring).
- Monitoring the overburden, including monitoring of above-zone CO<sub>2</sub> migration and early detection of CO<sub>2</sub> leakage anomalies (Containment and Contingency monitoring).



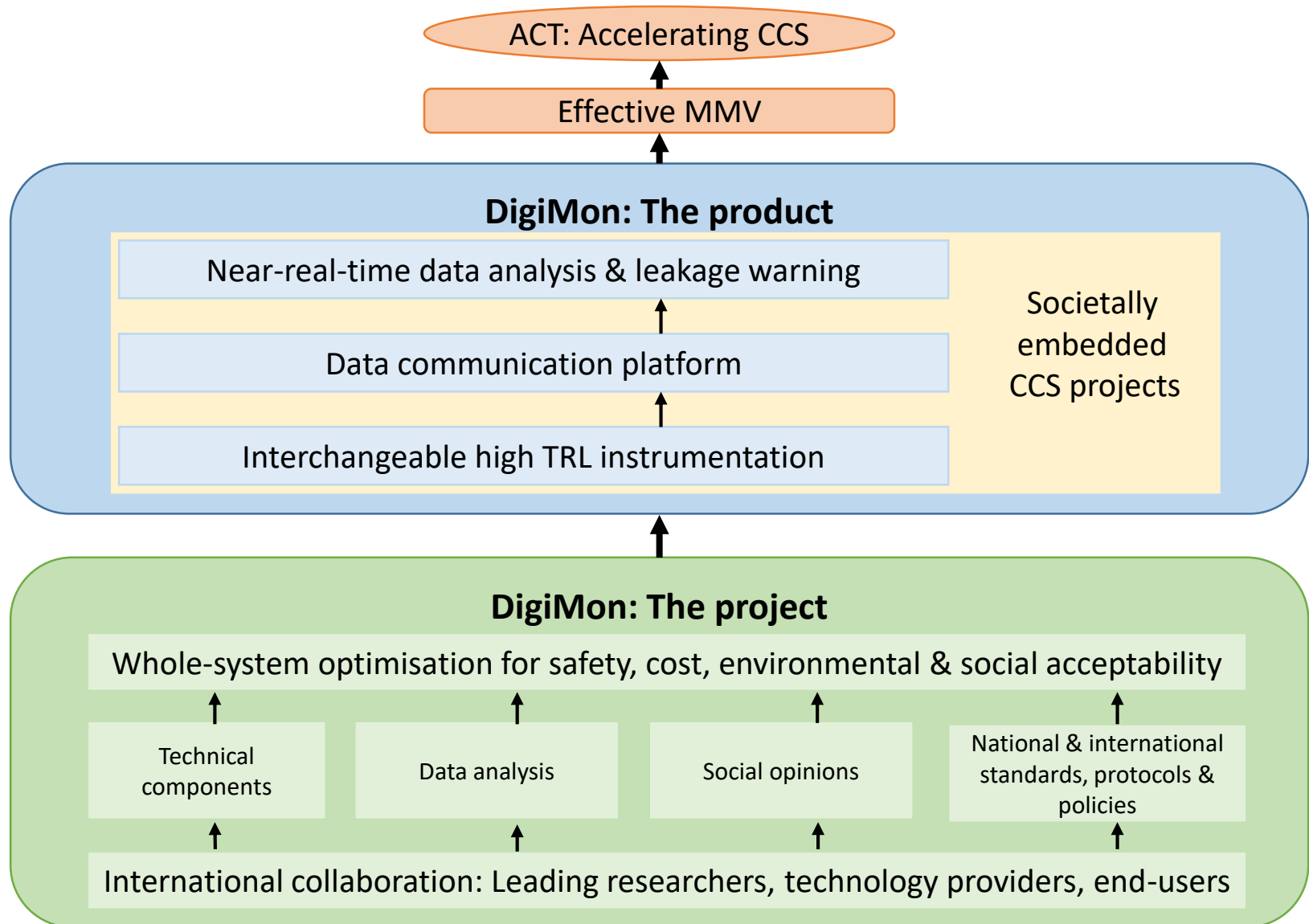
# Approach



- The DigiMon approach integrates a broad range of technologies for MMV at CO<sub>2</sub> storage sites (i.e. distributed fibre-optic sensing technology (DxS), seismic point sensors and gravimetry), combined with ethernet-based digital communication and near real-time, web-based smart data processing software. In addition, it uniquely considers the possibilities of monitoring technologies for CCS from the point of view of societal acceptability and benefit.

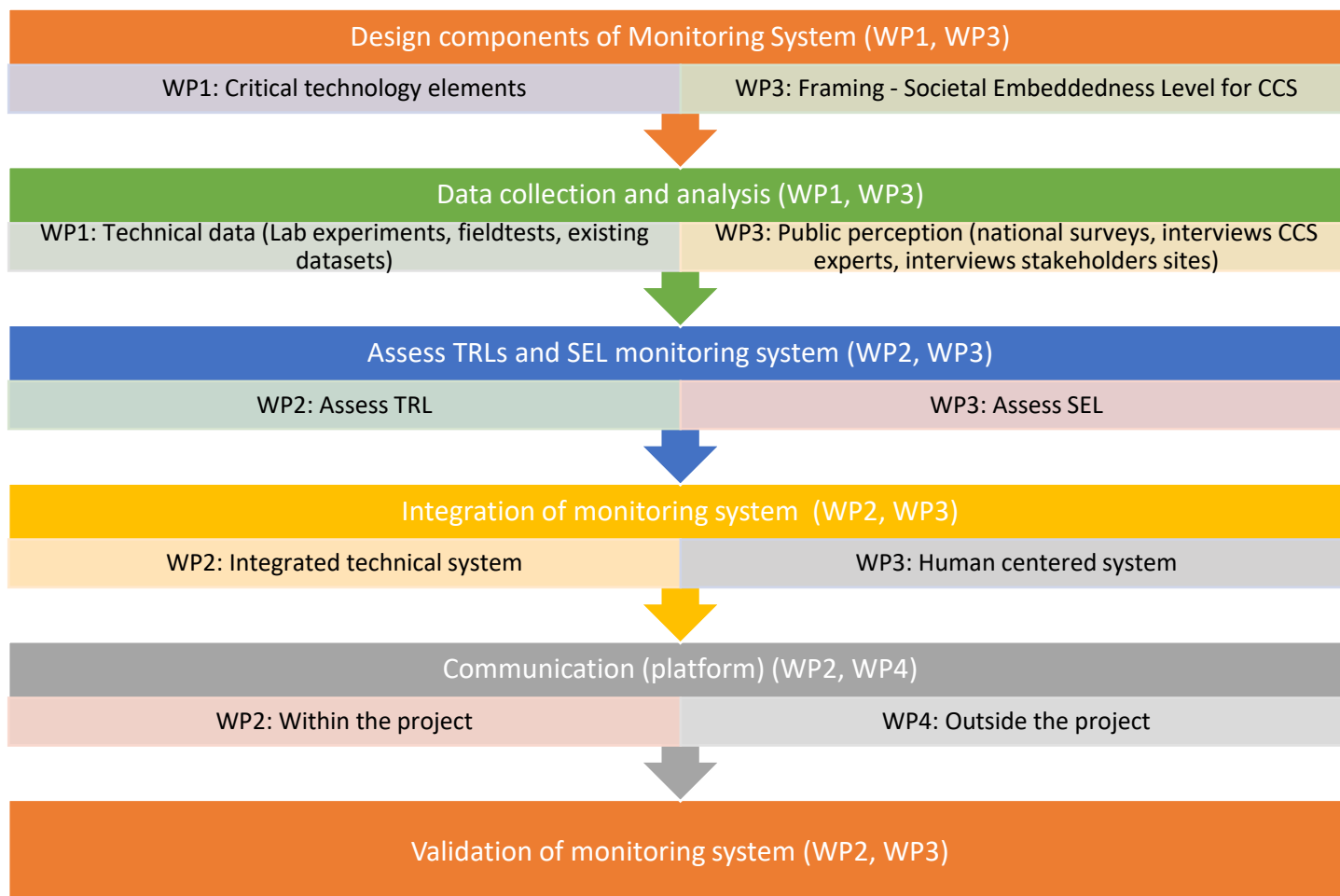


# The project and the product





# Methodology



Interdisciplinary process management



## Expected value

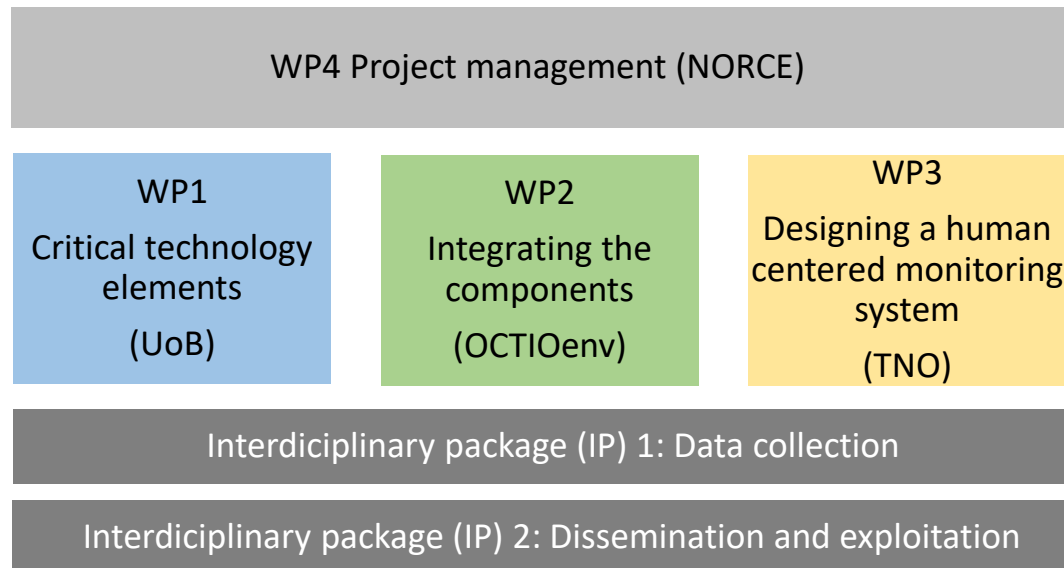
The DigiMon system is easily deployed and cost-effective, enabling a considerable improvement in monitoring capabilities related to CO<sub>2</sub> storage projects. The DigiMon project will have a direct impact on the economics of CCS, reducing capital and operation expenditure (CAPEX and OPEX) for placement and operations of CO<sub>2</sub> storage monitoring. This will lead to expected savings for CO<sub>2</sub> storage operators and improved competitive advantages for suppliers providing monitoring solutions to the market.



# Key success criteria



- Deliver on scope, time and cost (3 yrs)
  - Agree between partners on understanding of objectives and expectations
  - Agree between partners on joint responsibility for project results and completion of DigiMon system
  - Implement methodology supporting project execution and interdisciplinarity
  - Do things right and quickly implement corrective measures
  - Communicate and calibrate with all relevant stakeholders

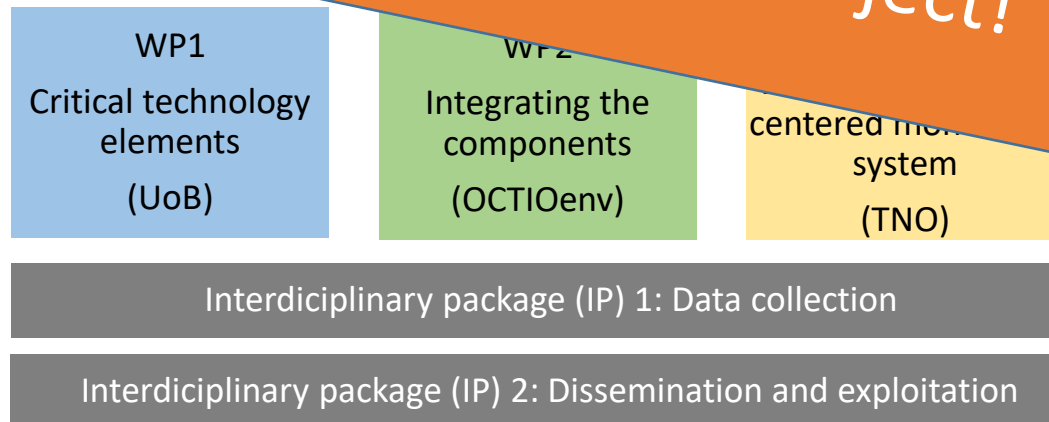


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*This is an industrial project!*



**Thank you!**