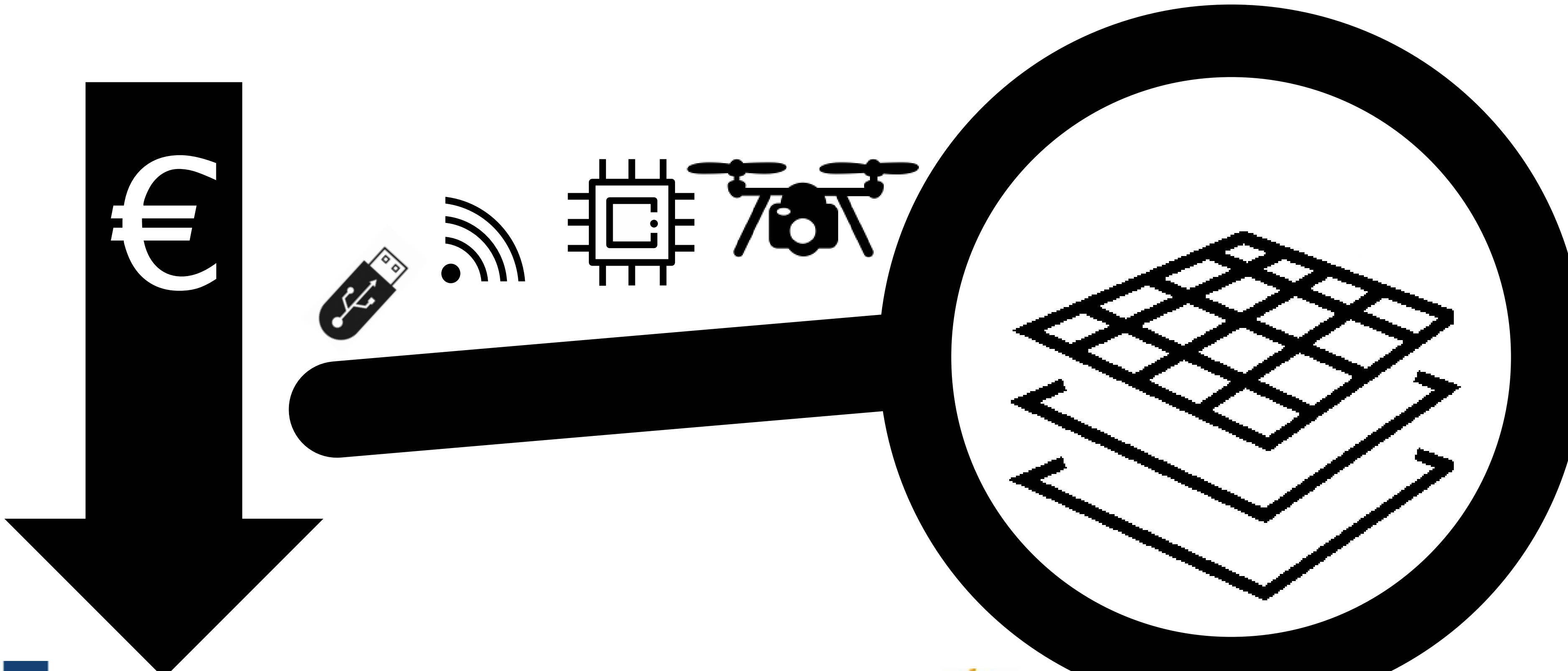
Raak-Publiek LCHT:

Low-Cost monitoring with High-Tech methodologies

HZ

SiA
Nationaal Regieorgaan
Praktijkgericht Onderzoek



Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

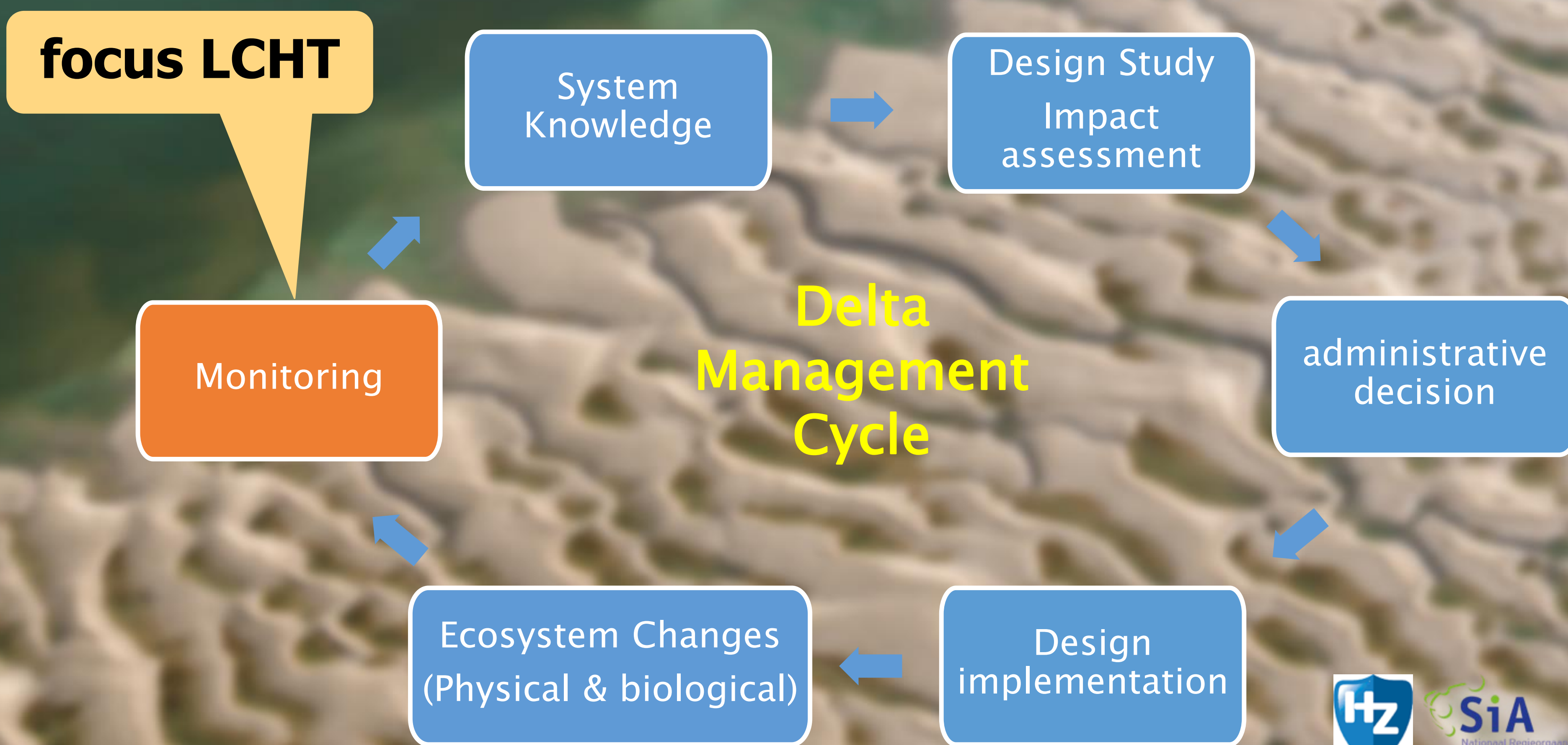
Provincie Zeeland

WAGENINGEN
UNIVERSITY & RESEARCH

NIOZ

Rationale

- NL: large inter- and subtidal Natura 2000 areas



Overarching objective

- **Test if Innovative Measuring Techniques can improve the delta management cycle?**

CONVENTIONAL Measuring Techniques	**INNOVATIVE** Measuring Techniques
Labour-intensive	Less Labour-intensive
Expensive	Cheaper
Few Measuring points	Multiple Measuring points
Intermittently (time/space)	Continuously (time/space)

Team

Joao .N.
Salvador de Paiva

Tjeerd Bouma
(HZ & NIOZ)

Tom Ysebaert

Tim Van Oijen

Wietse
van de
Lageweg

Lennart
van IJzerloo

Brenda Walles

Dana Nolte

Jeroen van Dalen

Research
assistant
WMR

Original plan:

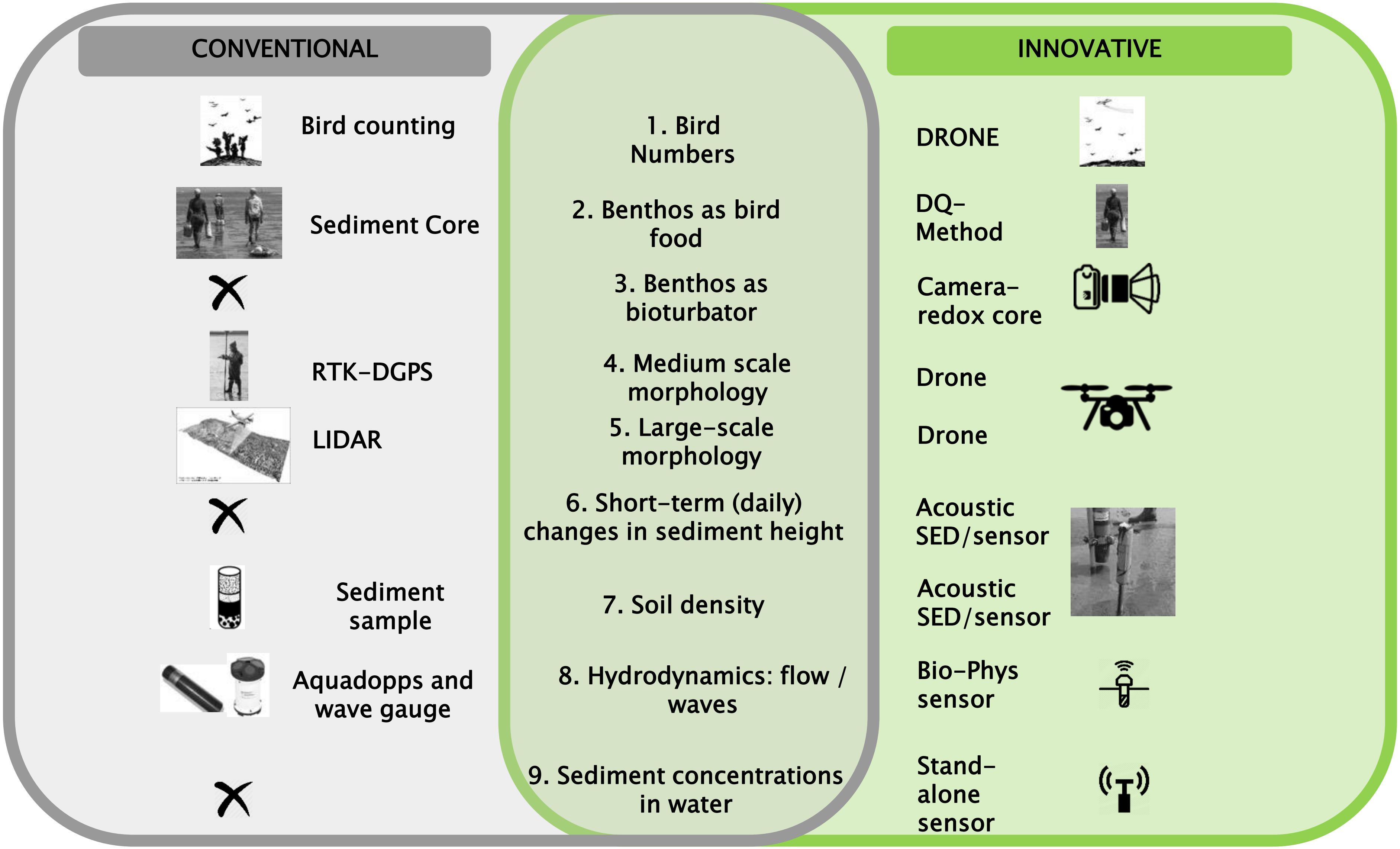
9 Parameters

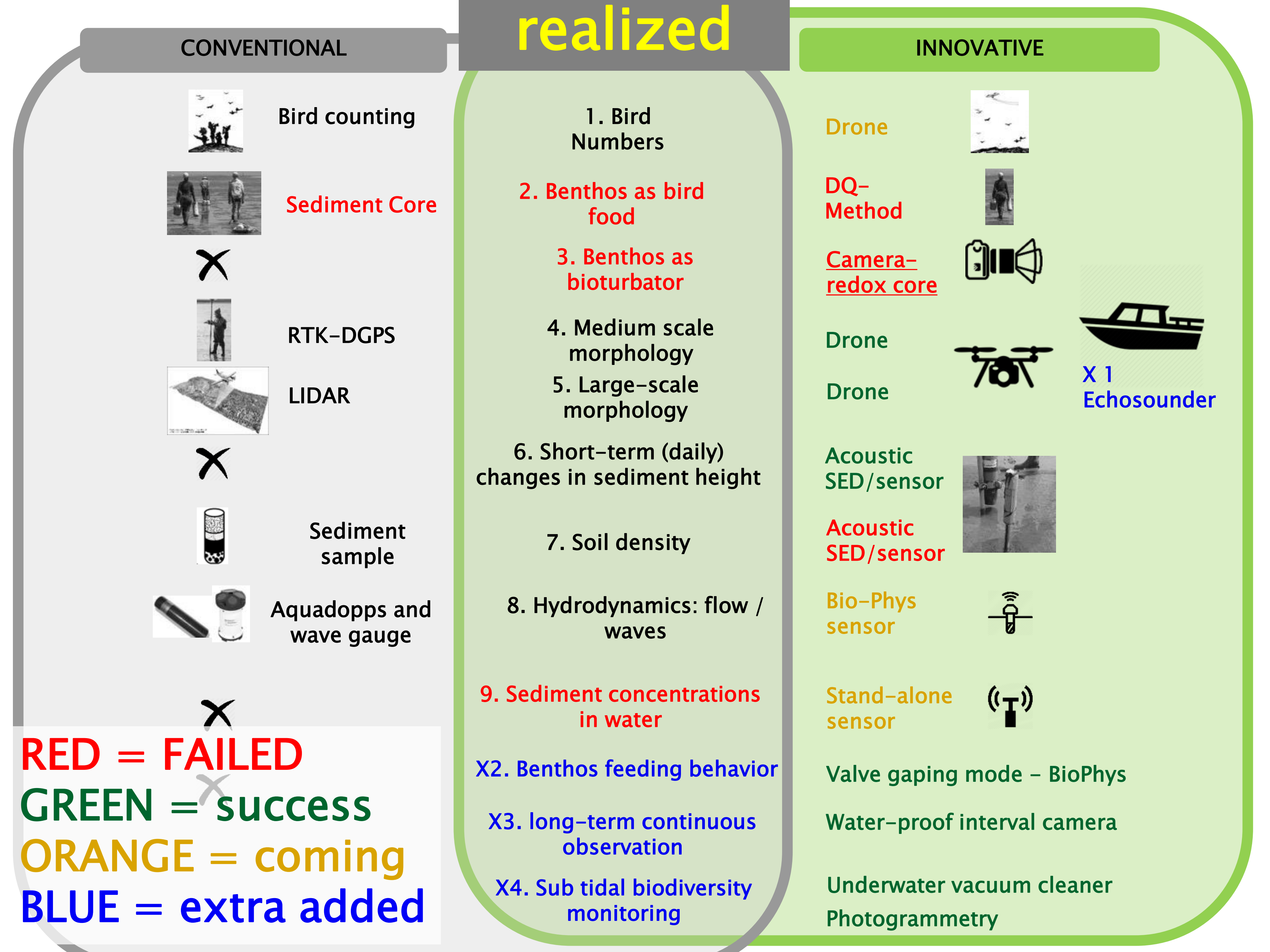
Conventional Techniques

vs

Innovative Techniques

Original plan:





realized
CONVENTIONAL
INNOVATIVE
Bird counting
Sediment Core
RTK-DGPS
LIDAR
Sediment sample
Aquadopps and wave gauge
1. Bird Numbers
2. Benthos as bird food
3. Benthos as bioturbator
4. Medium scale morphology
5. Large-scale morphology
6. Short-term (daily) changes in sediment height
7. Soil density
8. Hydrodynamics: flow / waves
9. Sediment concentrations in water
X2. Benthos feeding behavior
X3. long-term continuous observation
X4. Sub tidal biodiversity monitoring
Drone
DQ-Method
Camera-redox core
Drone
Drone
X 1 Echosounder
Acoustic SED/sensor
Acoustic SED/sensor
Bio-Phys sensor
Stand-alone sensor
Valve gaping mode - BioPhys
Water-proof interval camera
Underwater vacuum cleaner
Photogrammetry
RED = FAILED
GREEN = success
ORANGE = coming
BLUE = extra added

presenters

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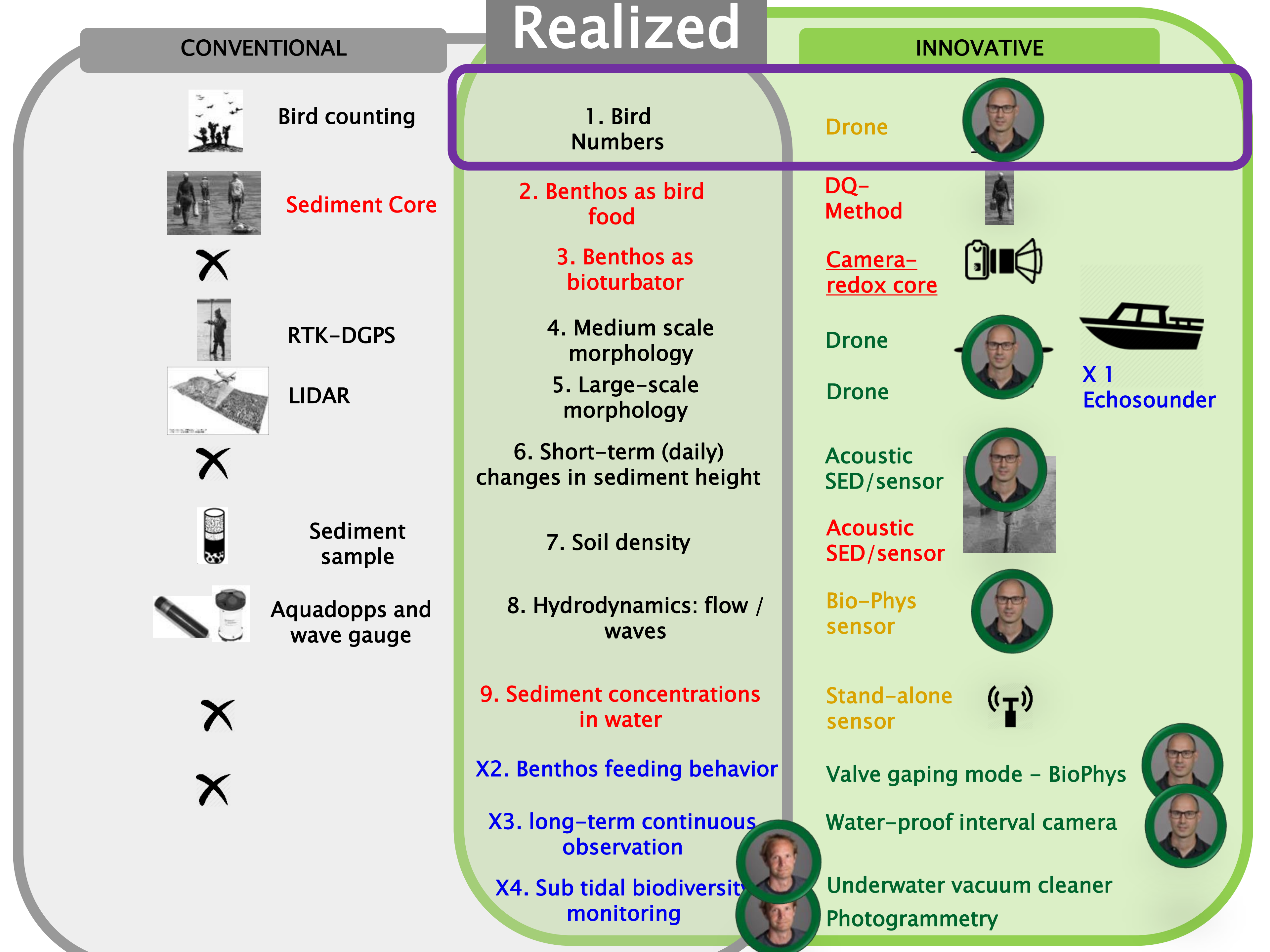
X	3. Benthos as bioturbator	Camera-redox core
RTK-DGPS	4. Medium scale morphology	Drone
LIDAR	5. Large-scale morphology	Drone
X	6. Short-term (daily) changes in sediment height	Acoustic SED/sensor
Sediment sample	7. Soil density	Acoustic SED/sensor
Aquadopps and wave gauge	8. Hydrodynamics: flow / waves	Bio-Phys sensor
X	9. Sediment concentrations in water	Stand-alone sensor
X	X2. Benthos feeding behavior	Valve gaping mode - BioPhys
	X3. long-term continuous observation	Water-proof interval camera
	X4. Sub tidal biodiversity monitoring	Underwater vacuum cleaner
		Photogrammetry

X 1 Echosounder

Topics per technique:

1) Why relevant
2) How does it work
3) Where do we (already / aim to) apply it

Joao



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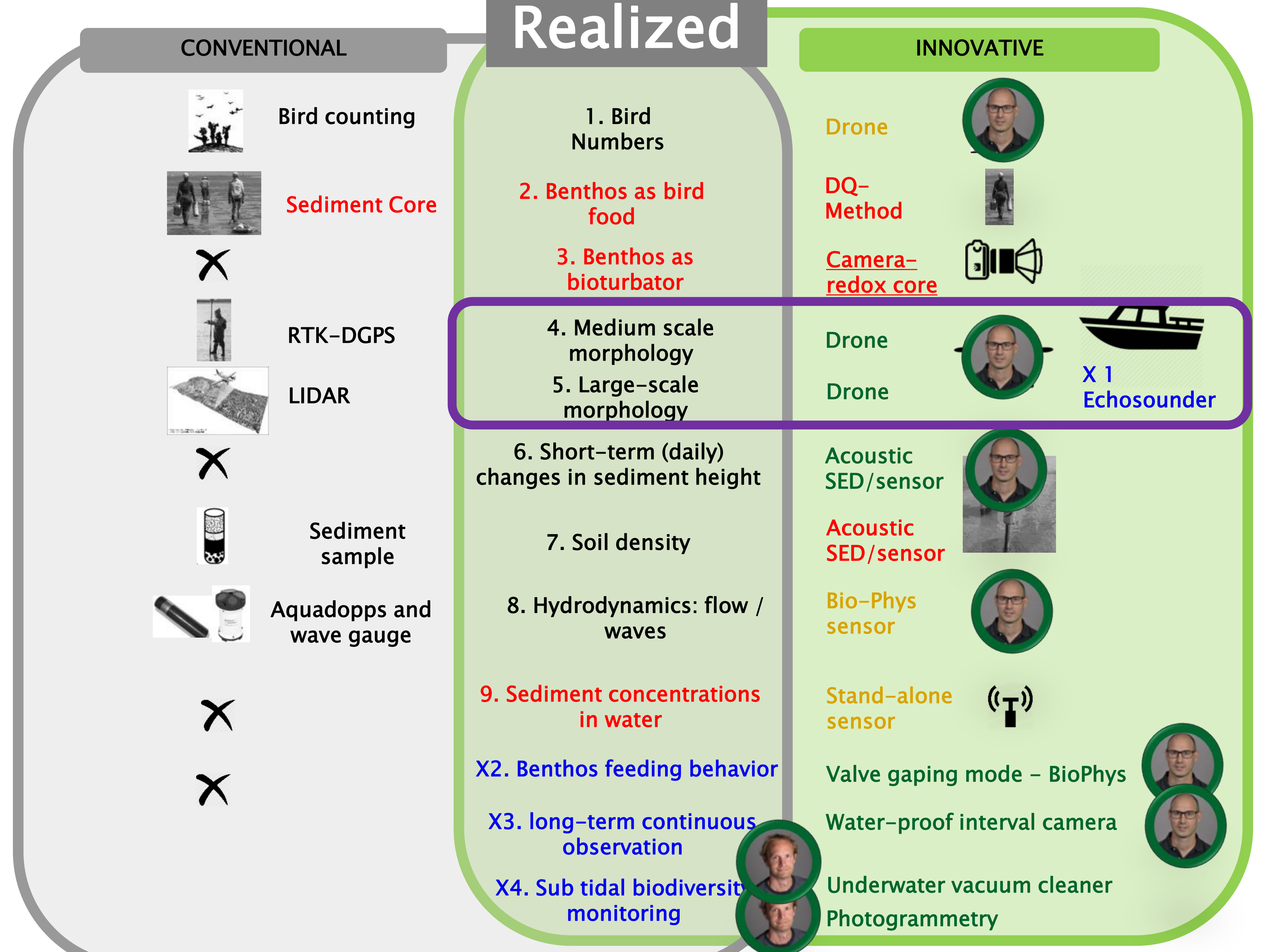

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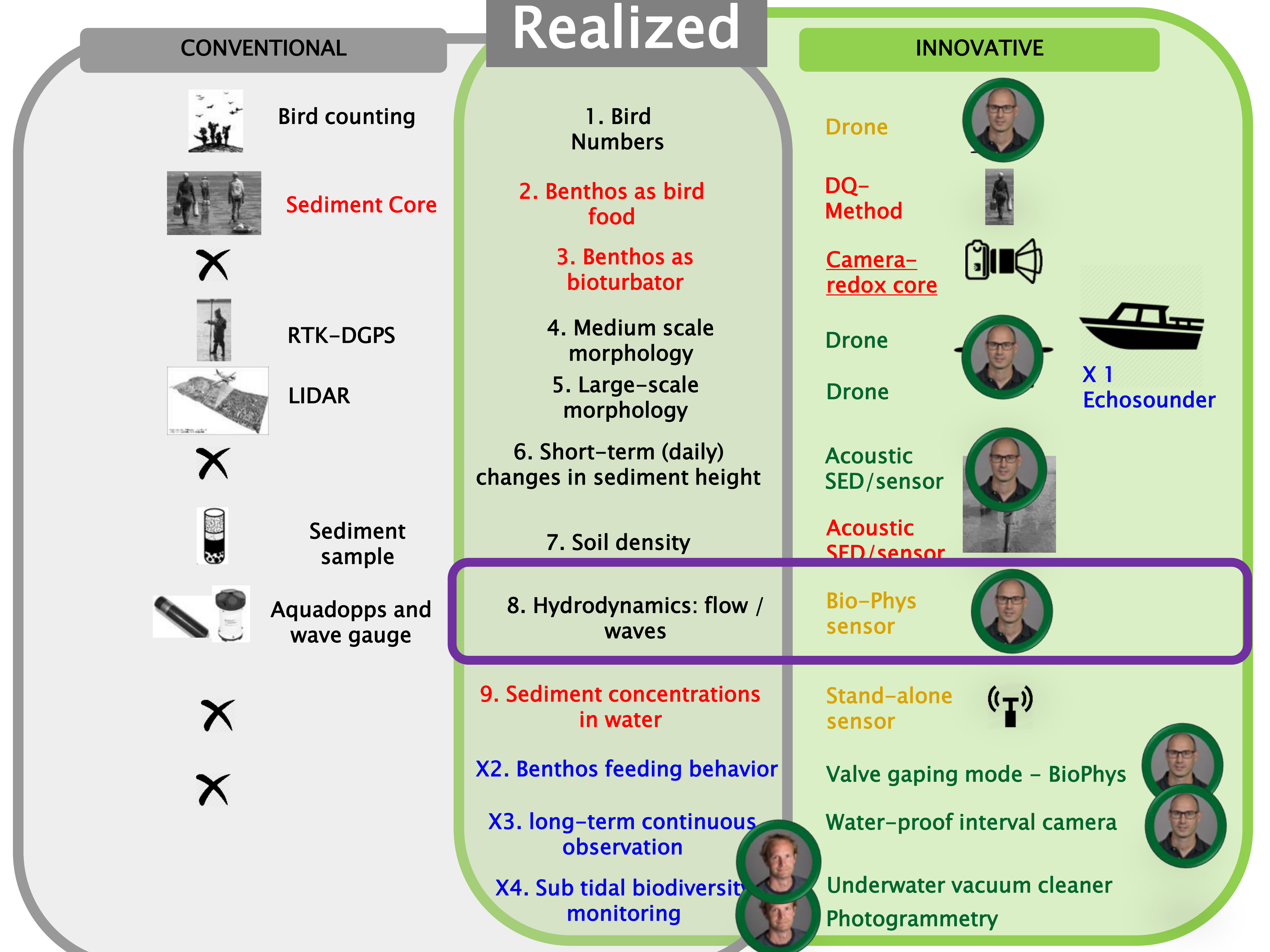

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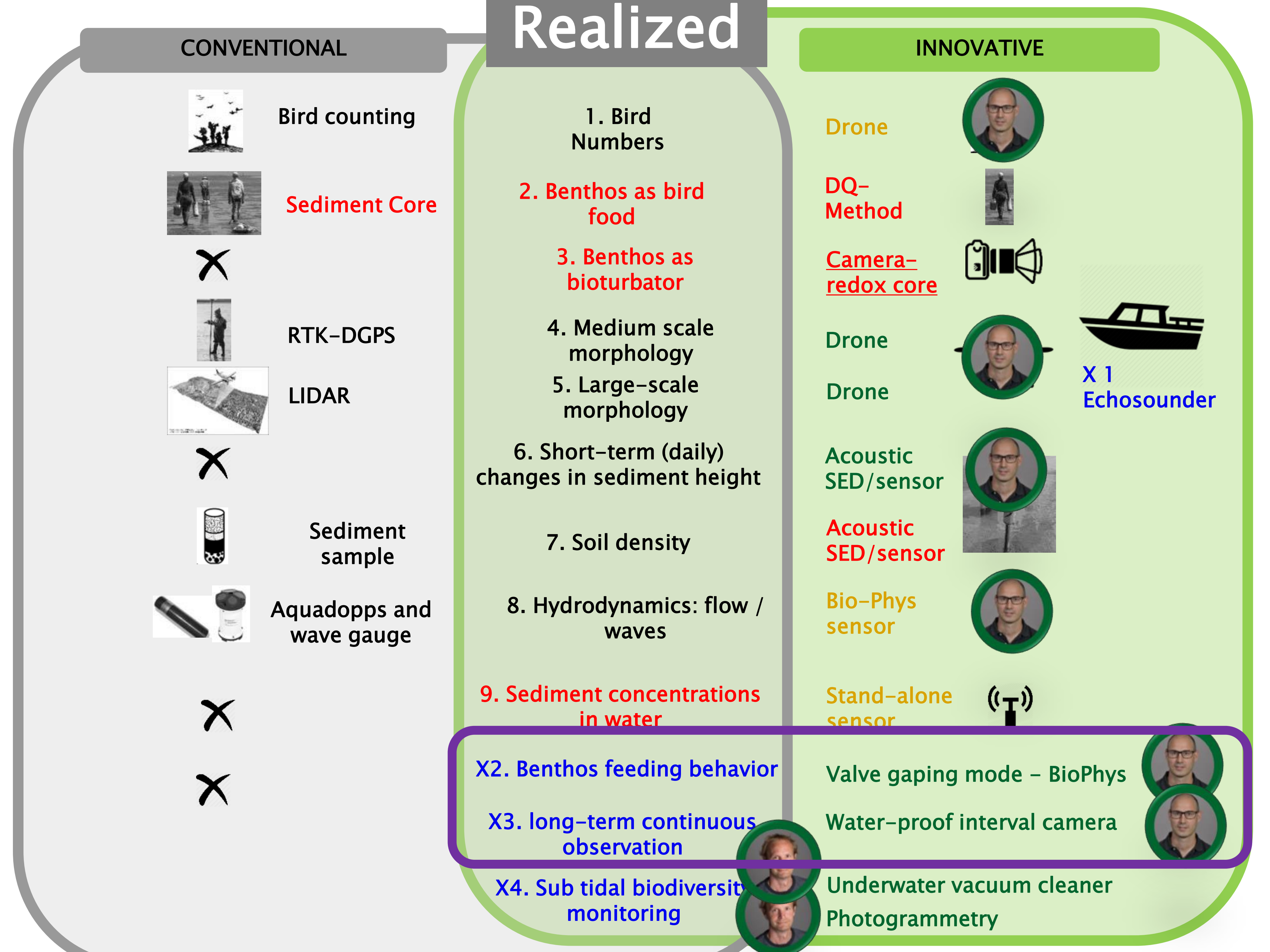
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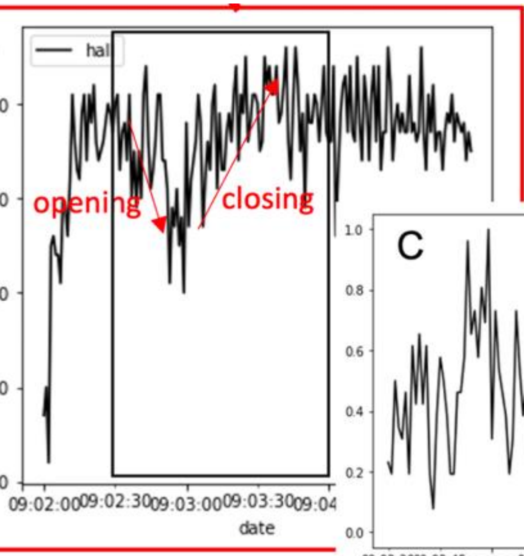
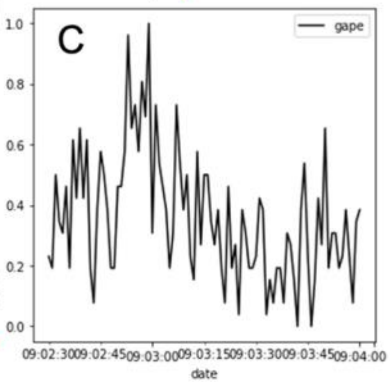
X2 – BioPhys → valve-gaping mode



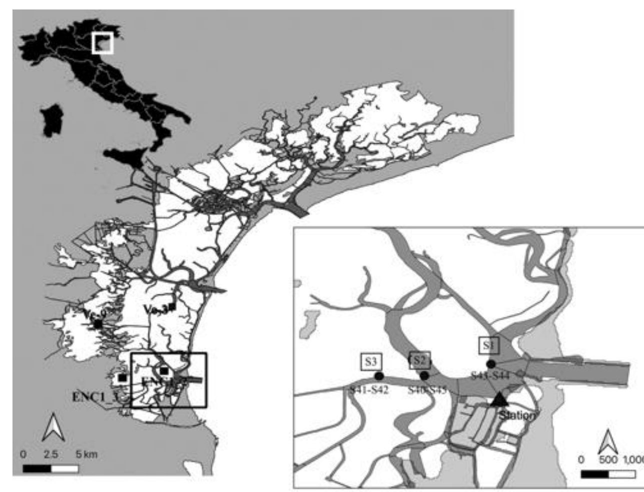


mussel with magnet

Measured = distance between
- Mussel-magnet
- Sensor-head

distance changes when mussel feeds

6-month test in Lagoon of Venice
(also 1-month test Waddensea)



Bertolini et al (2022) Science of the Total Environment 768 – 145085

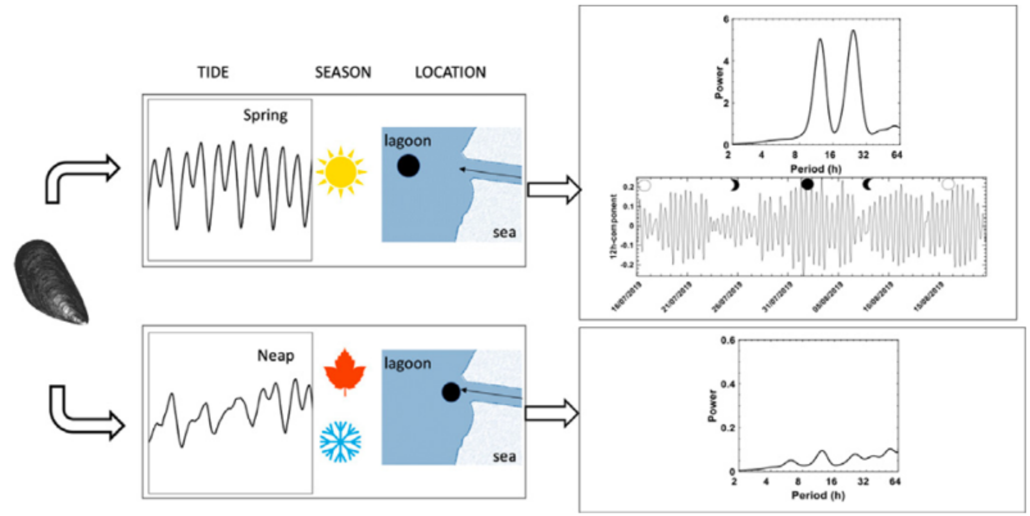
X2 – BioPhys → valve-gaping mode

How to cope in heterogeneous coastal environments: Spatio-temporally endogenous circadian rhythm of valve gaping by mussels

HIGHLIGHTS

- It is necessary to understand how organisms respond to environmental changes.
- Transitional coastal areas are great model systems.
- Mussels behaviour was monitored long-term and in continuous in three sites.
- It followed the tidal rhythm particularly in more internal site and in summer.
- Responses to small scale changes are important for management and for predictions.

GRAPHICAL ABSTRACT



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X2 – BioPhys → valve-gaping mode

- Mass production stage

- Useful for understanding carrying capacity
  - Waddensea
  - Eastern Scheldt
  - Western Scheldt
  - North Sea

X3 – Waterproof time-laps camera's

- Meerwaarde met Mosselen
  - camera on stick to stay dry

- GoPro
  - waterproof
  - *BUT* short operation time-lapse mode
- NIOZ time-laps camera's
  - resolution: 2592x1944
  - field of view: 170 degrees
  - 20 min interval + flash = 120 d
  - 20 min interval (no flash) = 200 d
  - Reached mass-production stage

Tim 

- Introduction
  - underwater lab
  - need for monitoring methods sub-tidal

- Standard techniques
  - In situ fluorescence

- LCHT innovations
  - What are they?
  - How will they be used in next projects?

Realized

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