



Technologies for a FAIRer Use of Ocean Best Practices

Pier Luigi Buttigieg, Pauline Simpson, Jay Pearlman, Peter Pissierssens, Scott Caltagirone, Mark Bushnell, Juliet Hermes, Emma Heslop, Johannes Karstensen, Frank Muller-Karger, Cristian Muñoz and Francoise Pearlman





The main goal:

Transition from a loosely-coordinated set of existing ocean observing activities to a sustainable, efficient, and fit-for-purpose Integrated Atlantic Ocean Observing System (IAOOS)



WP6 Cross-cutting issues and emerging networks

[...]

Coordinate engagement of international expertise and dissemination of best practice to improve efficiency and impact

[...]

to include international expertise in the design and development, operation and maintenance of IA00S and to disseminate this best practice

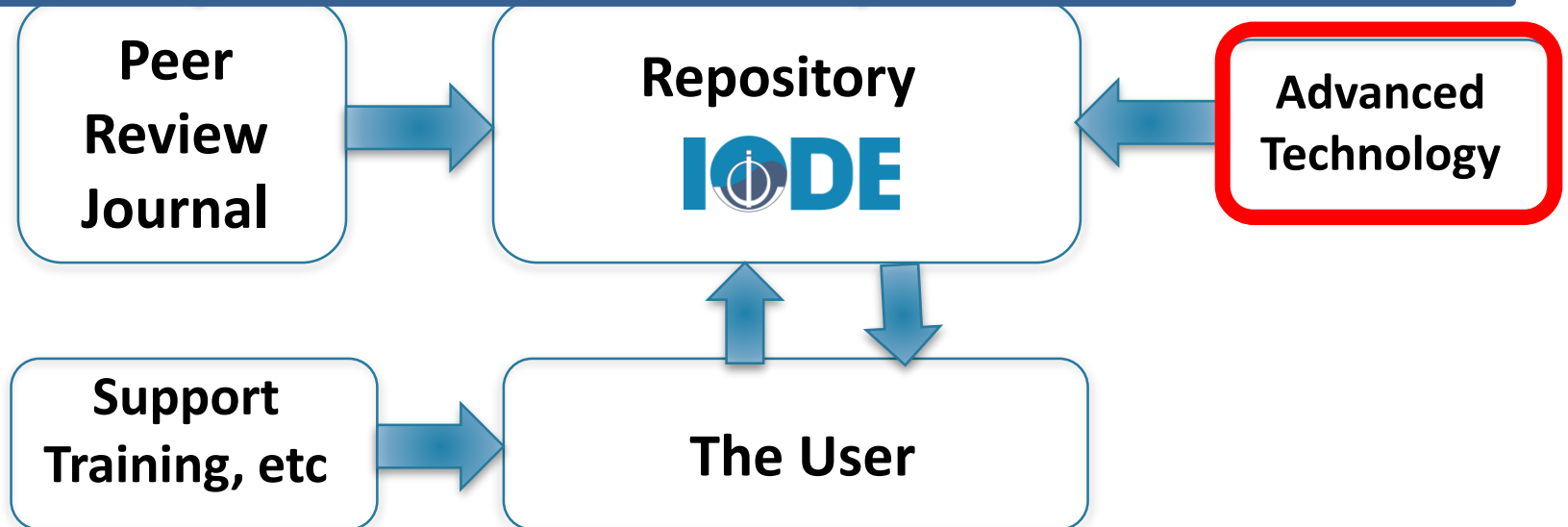
Global Best Practice System

Wednesday 7, November 2018

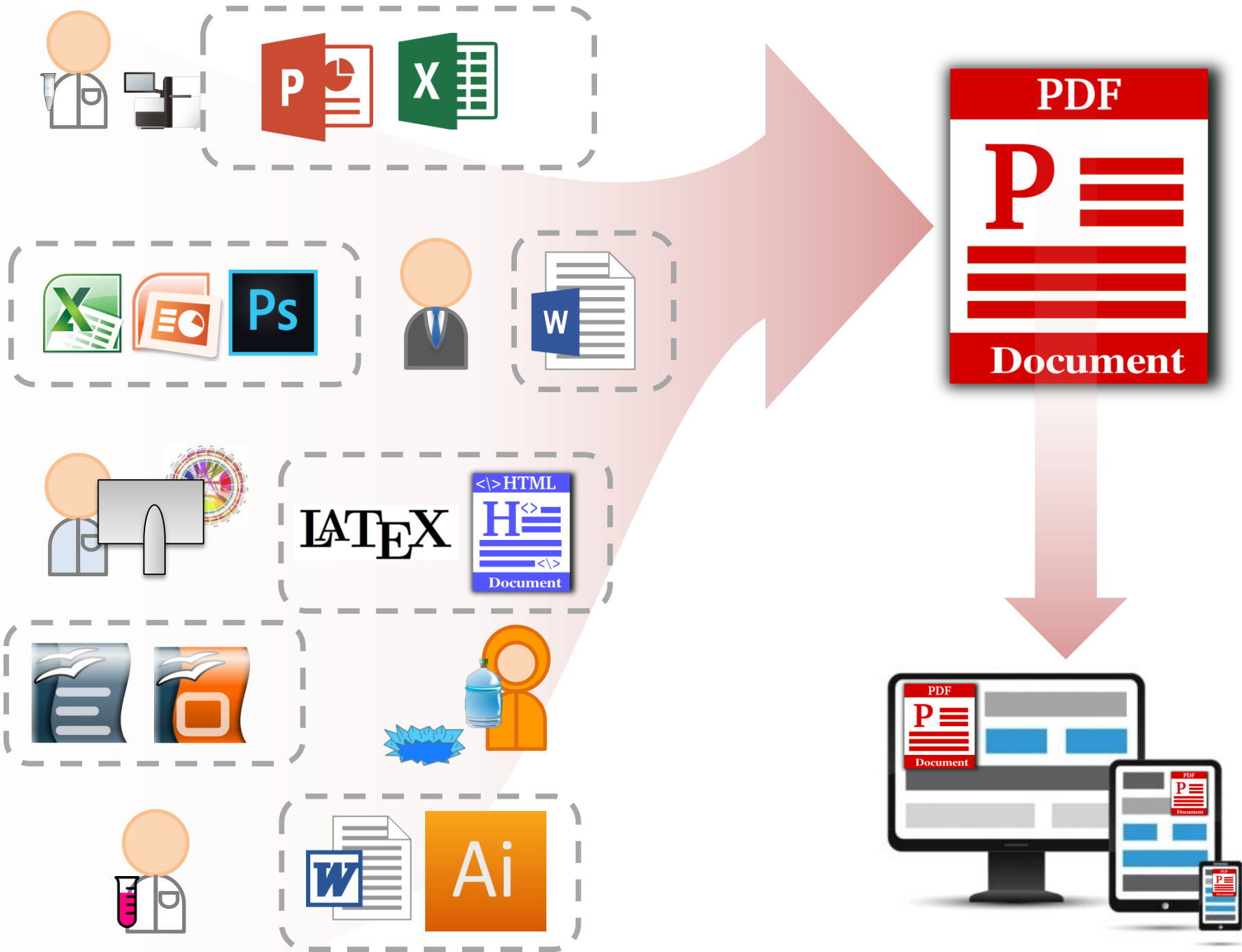
09:30 - 09:45

OceanBestPractices System: a global resource to facilitate harmonizing practices in ocean observation, data and information

Peter Pissierssens, Cristian Munoz, Johannes Karstensen, Jay Pearlman, Pauline Simpson, Mark Bushnell, Juliet Hermes, Emma Heslop, Frank Muller-Karger and Francoise Pearlman



The status quo...

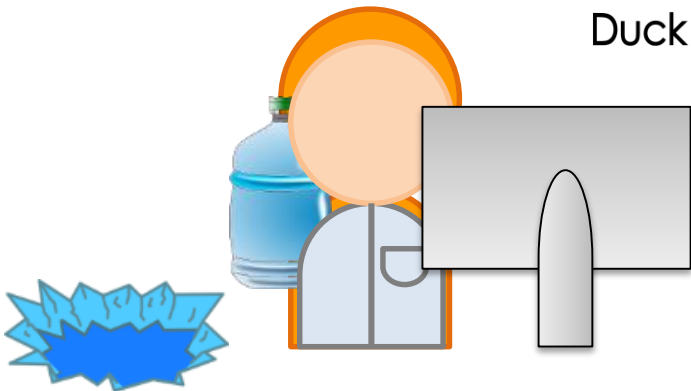
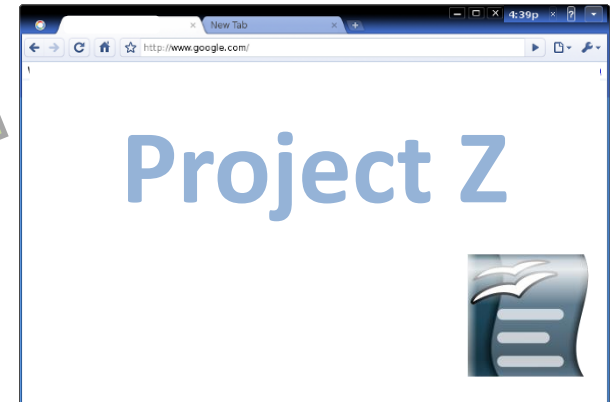


Most potential BPs are scattered, have varying degrees of accessibility, and varying digital lifetimes

404
Not found



DuckDuckGo



The Mission: solutions for a FAIRer future for Ocean Best Practices

FAIR: Findable, Accessible, Interoperable, Reusable

Wilkinson et al. (2016) *Scientific Data* 3, DOI:10.1038/sdata.2016.18

The basis...



Disclaimer: IODE/IOC does not warrant that the information, documents and materials contained in the OceanBestPractices repository website is complete and correct and shall not be liable whatsoever for any damages incurred as a result of its use.



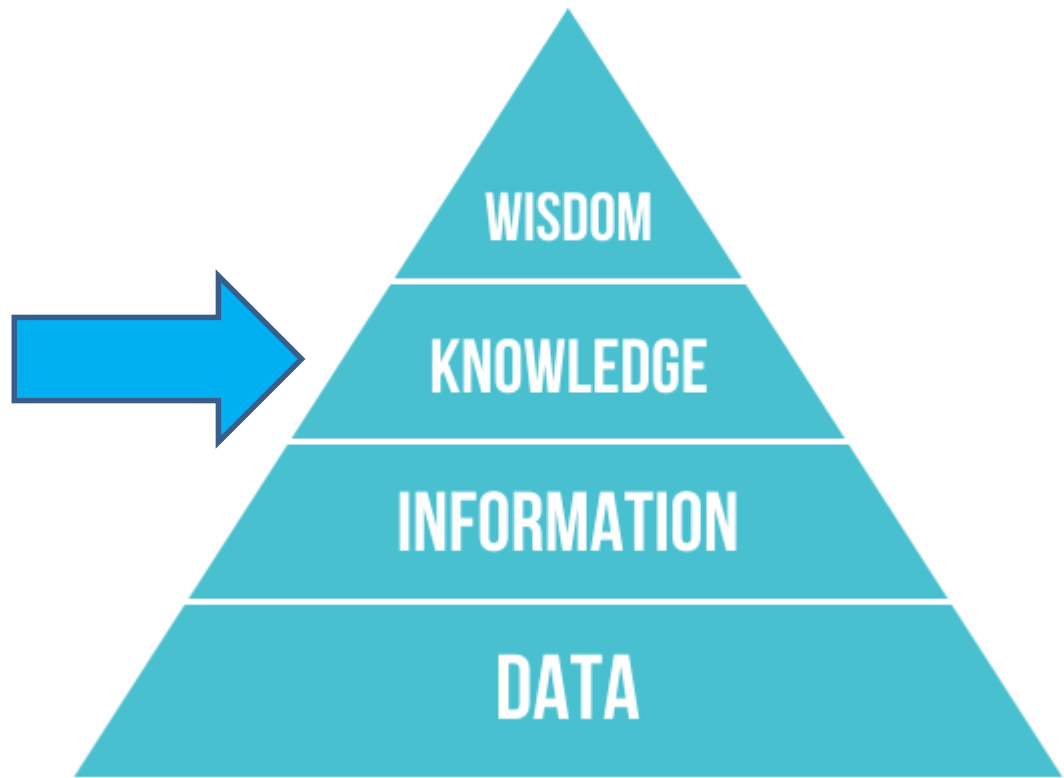
Findable
Accessible
Interoperable
Reusable

Adding semantics...

TO BE INTEROPERABLE:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles.
- I3. (meta)data include qualified references to other (meta)data.

Semantic tech



A rough illustration of the semantic gradient

Stronger semantics

Aiming for a high degree of expressivity, thus advanced querying and data mobilisation options

Ontologies

Taxonomies

Data models

Controlled vocabularies

Thesauri

Glossaries

Weaker semantics

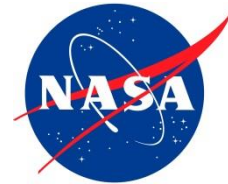
SDGI



UN
environment



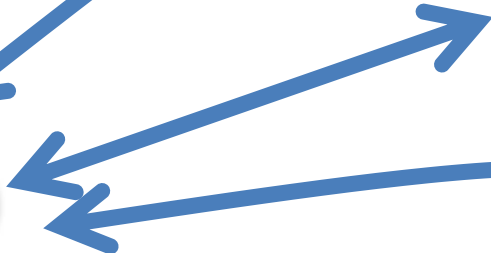
SWEET



AgrO



EnvO



Berkeley
UNIVERSITY OF CALIFORNIA



University of Colorado
Boulder



Data Detektiv

FoodOn

CCC
BC Centre for Disease Control



UC DAVIS
UNIVERSITY OF CALIFORNIA



ChEBI



King Abdullah University
of Science and Technology

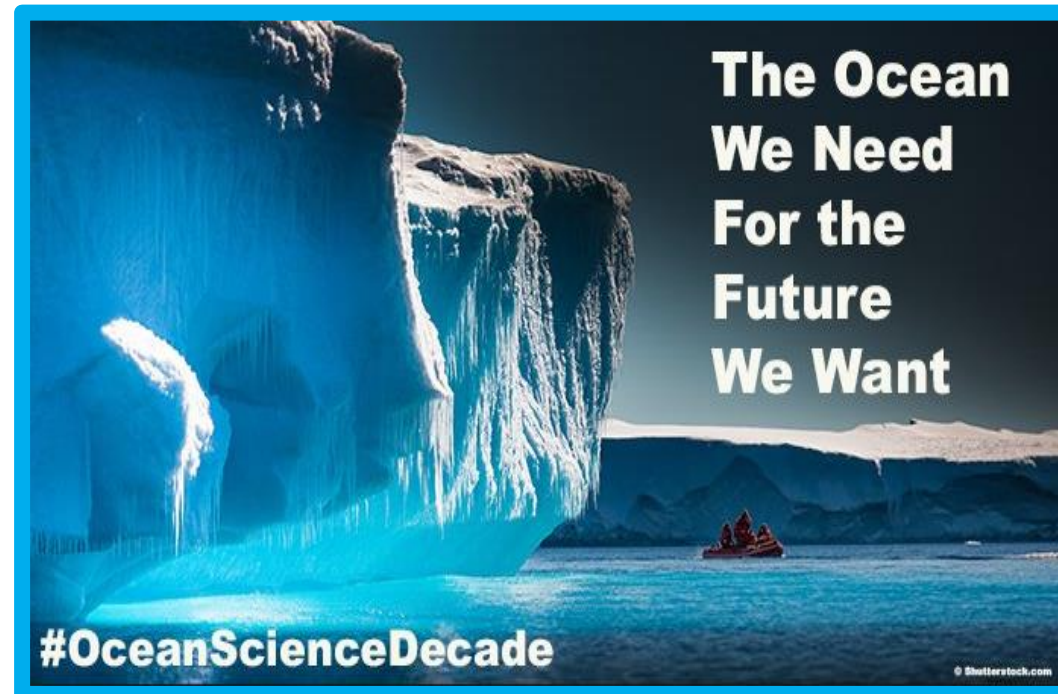
UN Decade of Ocean Science for Sustainable Development 2021-2030

“To gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in the achievement of the Sustainable Development Goal 14 on the ocean.”



*Sustainable Development Goals
Interface Ontology*

**Building data systems to support
interfaces to the Global Goals, targets,
and indicators**



Welcome to the CMECS Catalog of Units!

Use this database to browse the CMECS classification and to get definitions for individual CMECS Units. This database contains the units that were published in the **Coastal and Marine Ecological Classification Standard**.



[Search/Browse classification](#)

[About the classification](#)

[Download the CMECS Standard](#)

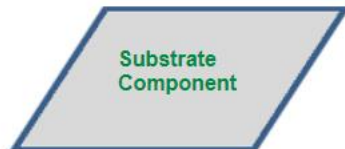
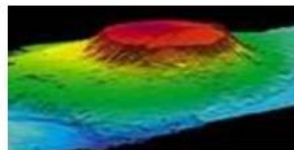
Download the Data:

[Excel](#)

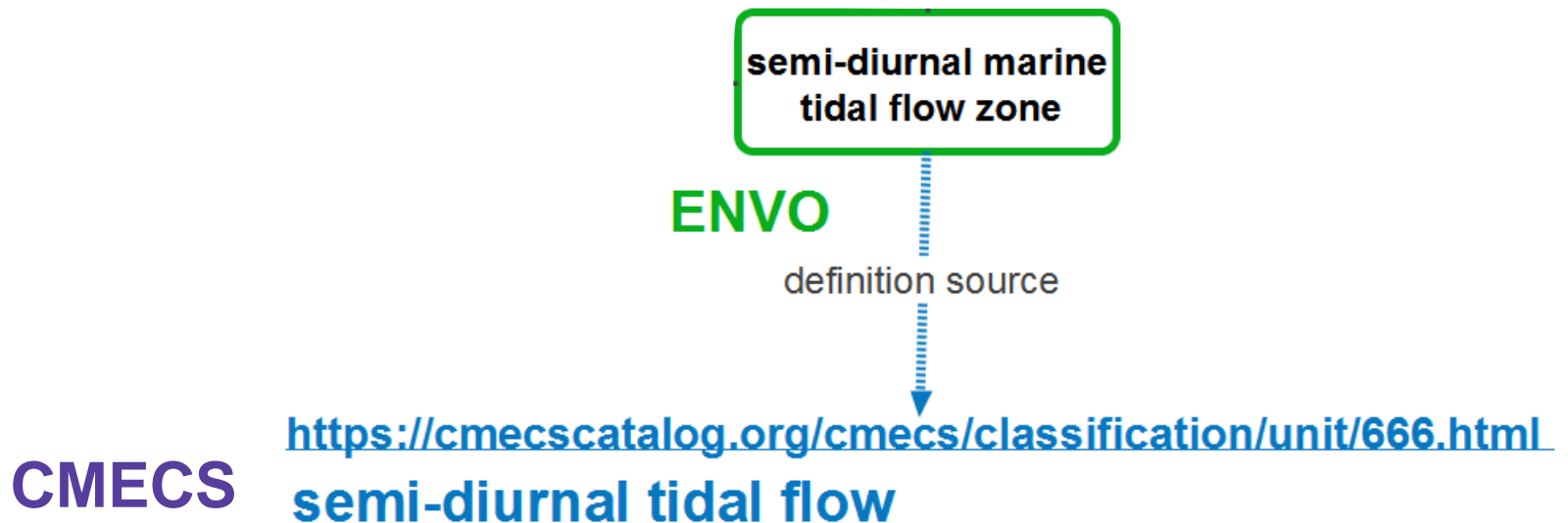
[Access 2007](#)

NEW: [Propose update to classification](#)

NEW: [Search for proposals](#)



Testing ontological expression of CMECS, clarifying ambiguities, and creating development cycle with the CMECS teams





OceanBestPractices

Repository of Ocean Community Practices in
Ocean Research, Observation and
Data/Information Management

BROWSE

All of OceanBestPractices

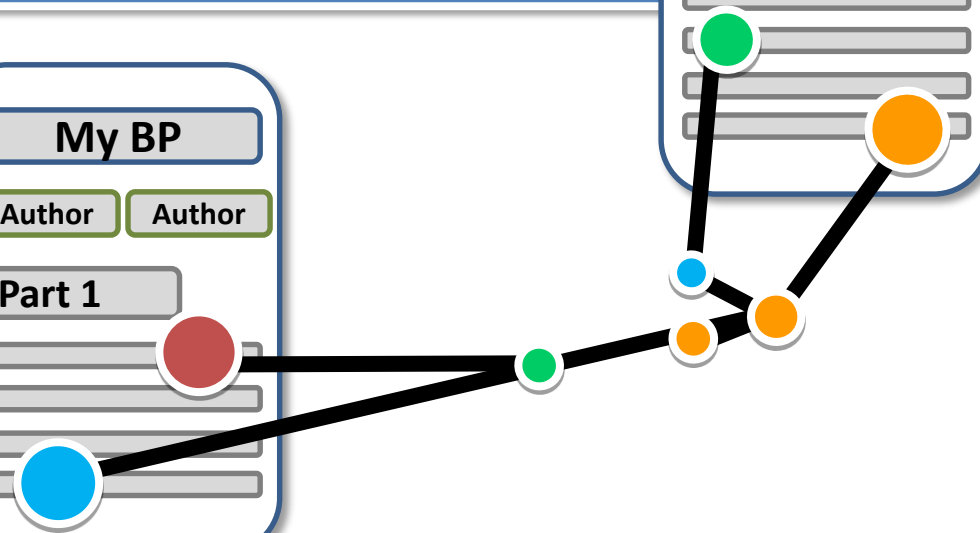
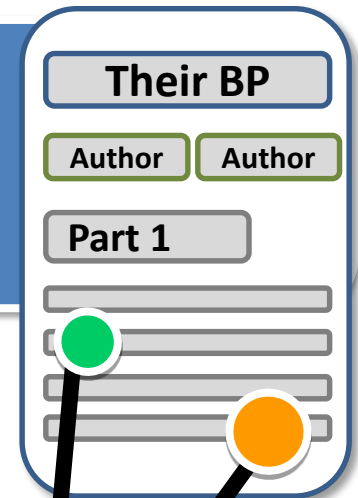
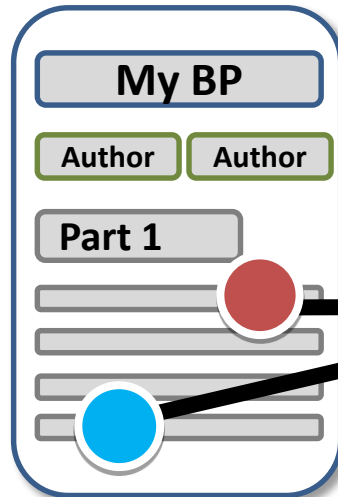
Communities & Collections

By Issue Date

Authors

Titles

Subjects



Sensors, Environments, Chemicals, SDGs...

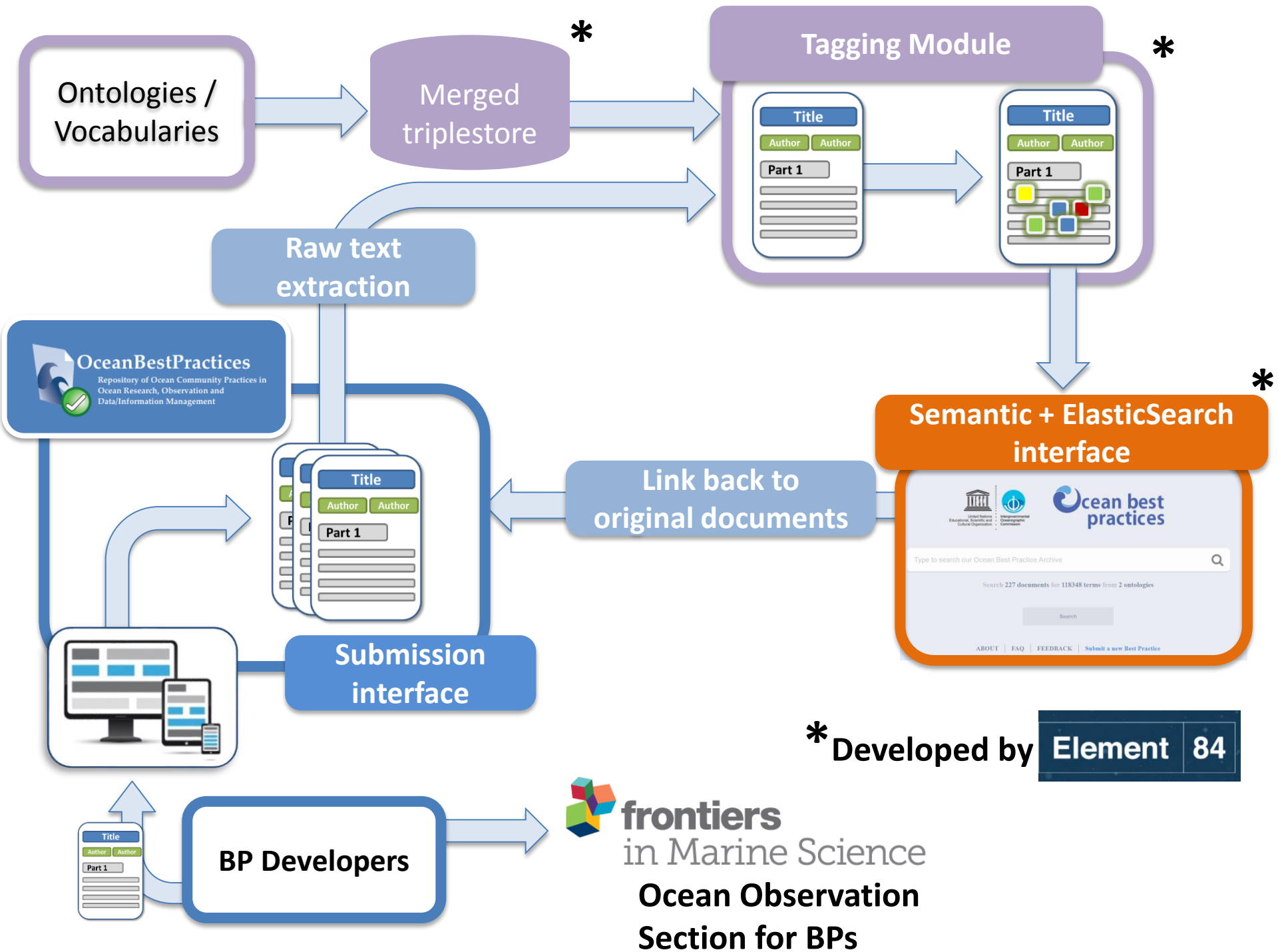


BODC sensor vocabs



OBO Foundry Ontologies

ENVO, CHEBI, SDGIO





All Fields ▾

Search OceanBestPractices

Advanced ▾



Search

[Search Tips?](#)

Search **326 documents** for **121029 terms** from **3 ontologies**

ENVO, CHEBI, SDGIO
(more on the way!)

Beta testing launching very soon



All Fields ▾

Search OceanBestPractices

SEAFLOOR ✕

FILTER BY TAGS

chlorophyll a (CHEBI)

sediment (ENVO)

field (ENVO)

R (CHEBI)

sand (ENVO)

sea (ENVO)

water (CHEBI)

mud (ENVO)

water (ENVO)

👉 ALL TAGS (67)

Home / Search OBP

2018

en

Marine Sampling Field Manual for Grabs and Box Corers.

Przeslawski, R., Berents, P., Clark, M., Edgar, G., Frid, C., H

Description Grabs and box corers both use receptacles to collect sediment and organisms on the seafloor... designed to sample unconsolidated sediment and organisms on the seafloor... about distance to the *seafloor*... which can be very important for (e.g., sedimentology, biogeochemistry), the chosen grab or box corer s

✕ Viewing Tags

📄 Explore Document

🗉 Generate Citation

Rapidly access document parts
linked to terms of interest

9. MARINE SAMPLING FIELD MANUAL FOR GRABS AND BOX CORERS

HIGHLIGHT MATCHED TERM: SEAFLOOR

9.1 Platform Description

Grabs and box corers both use receptacles to collect sediment after they are dropped to the seafloor. While the scooping motion of grabs disrupts unconsolidated sediment to various degrees, box corers return largely undisturbed samples of the sediment strata (Eleftheriou and McIntyre 2005). Grabs and box corers target surface sediment and associated porewater and fauna. They are typically deployed over sandy or muddy substrates, although some grabs can collect gravel or cobbles.

There is no single type of grab or box corer suitable for all environments, and selection of the most suitable type depends on the biological or physical target, substrate, depth, and vessel capabilities (Narayanaswamy et al. 2016). Acquired data can be quantitative (e.g. volumetric or mass specific) or semi-quantitative due to inconsistencies in sample volume and sediment disruption due to bow waves or other gear effects (Blomqvist 1991). For these reasons, this manual does not mandate specific gear types. There are numerous references to help facilitate decisions regarding grab and box corer equipment for a given marine survey (Riddle 1989, Eleftheriou and Moore 2005, Danovaro 2010, Narayanaswamy et al. 2016). Nevertheless, for monitoring purposes, it is preferable to maintain consistent gear through time and space, and we therefore recommend this where possible.

9.2 Scope

This Grab and Box Corer Field Manual includes gear designed to sample unconsolidated sediment and organisms on the seafloor. General steps are outlined in Figure 9.1 and described in detail in the sections below.

The samples collected by grabs and box corers can be used to derive a range of physical, chemical, and biological parameters (Eleftheriou and McIntyre 2005), and each of these parameters requires a



SEAFLOOR ✕

FILTER BY TAGS

chlorophyll a (CHEBI)

sediment (ENVO)

field (ENVO)

R (CHEBI)

sand (ENVO)

sea (ENVO)

water (CHEBI)

mud (ENVO)

water (ENVO)

ALL TAGS (67)

Home / Search OBP

2018

en

Explore knowledge neighbourhood to enhance discovery

al for Grabs and Box Corers.

Przeźniowski, K., Berents, P., Clark, M., Edgar, G., Frid, C., H

Description Grabs and box corers both use receptacles to collect sediment samples. Grabs are designed to sample unconsolidated sediment and organisms on the seafloor at a certain distance about distance to the *seafloor*... which can be very important for sedimentology, biogeochemistry), the chosen grab or box corer s

✕ Viewing Tags

Explore Document

Generate Citation

2013

en



All Fields ▾

Search OceanBestPractices

SEAFLOOR ✕

Home / Search OBP

2018 en

Marine Sampling Field

Przeslawski, R., Bere

Description Grabs and
designed to sample un
about distance to the s
sedimentology, biogeo

✕ Viewing Tags

Constrain /
Expand
searches
assisted by
knowledge
models

More Document

Generate Citation

2018 en

Global Inventory of AUV and Glider Technology available for R

Hunt, James

has functional parent

chlorophyllide a

is conjugate acid of

chlorophyll a(1-)

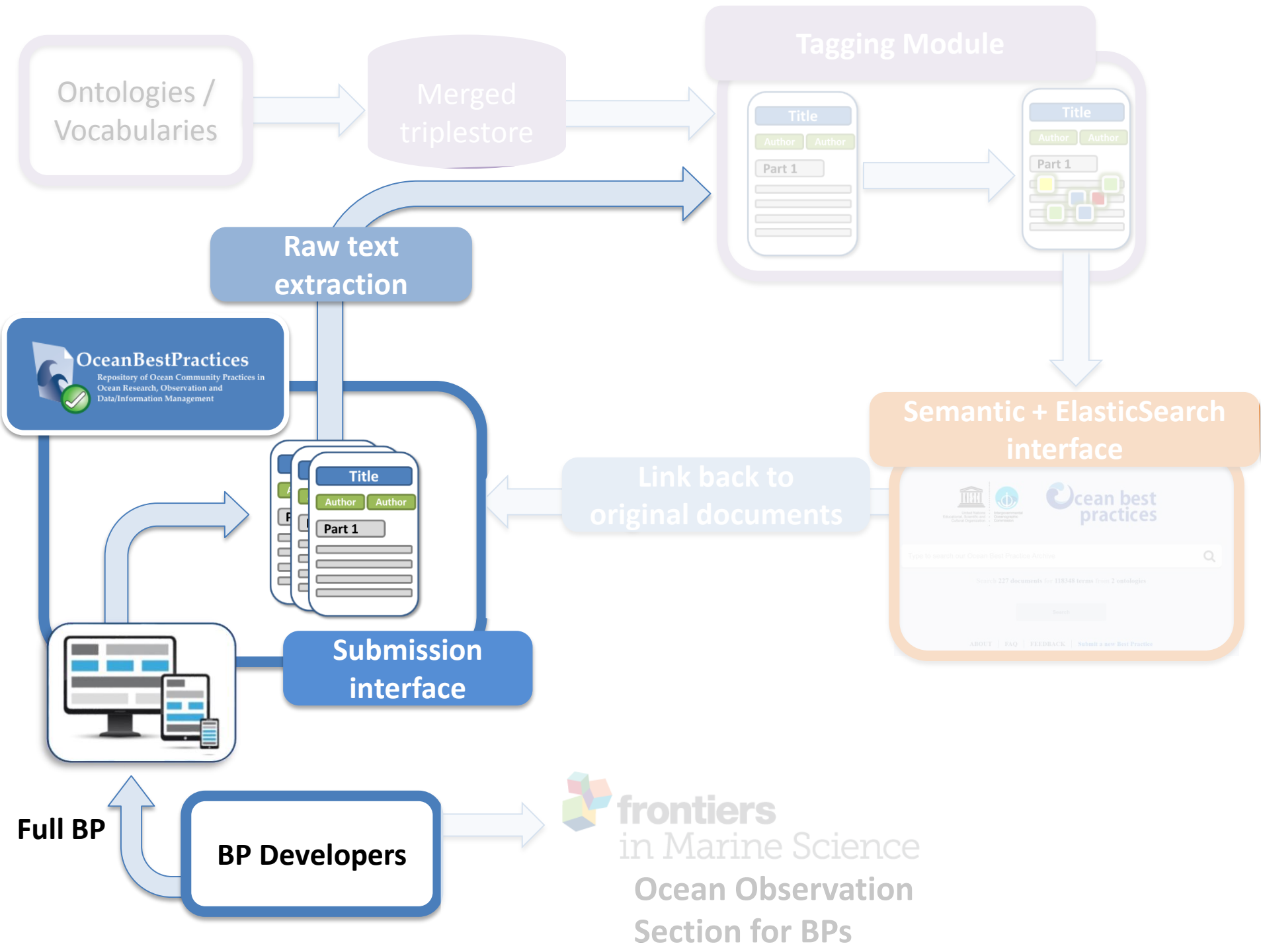
is a

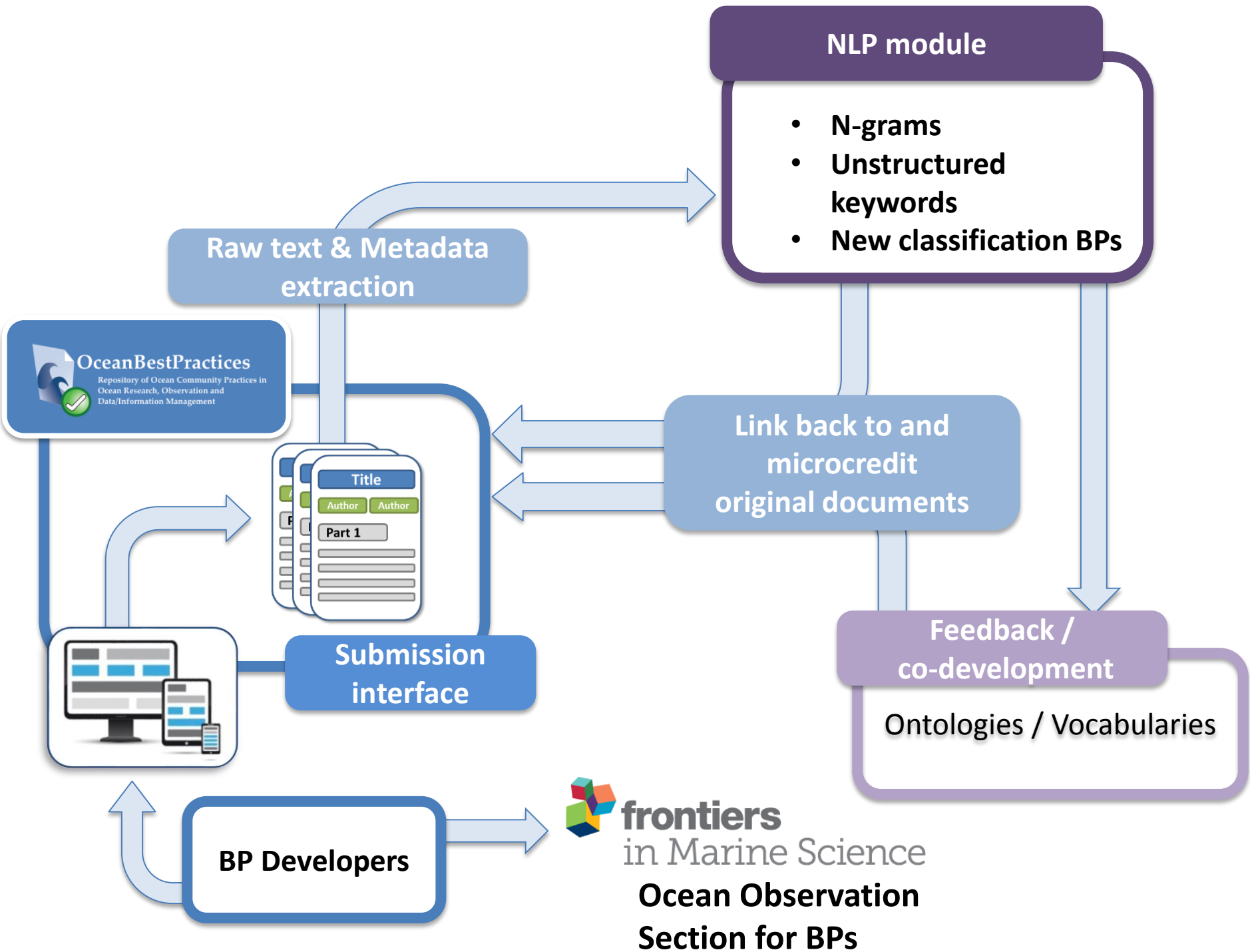
methyl ester

chlorophyll

has functional parent

Ensuring fitness-for-purpose...





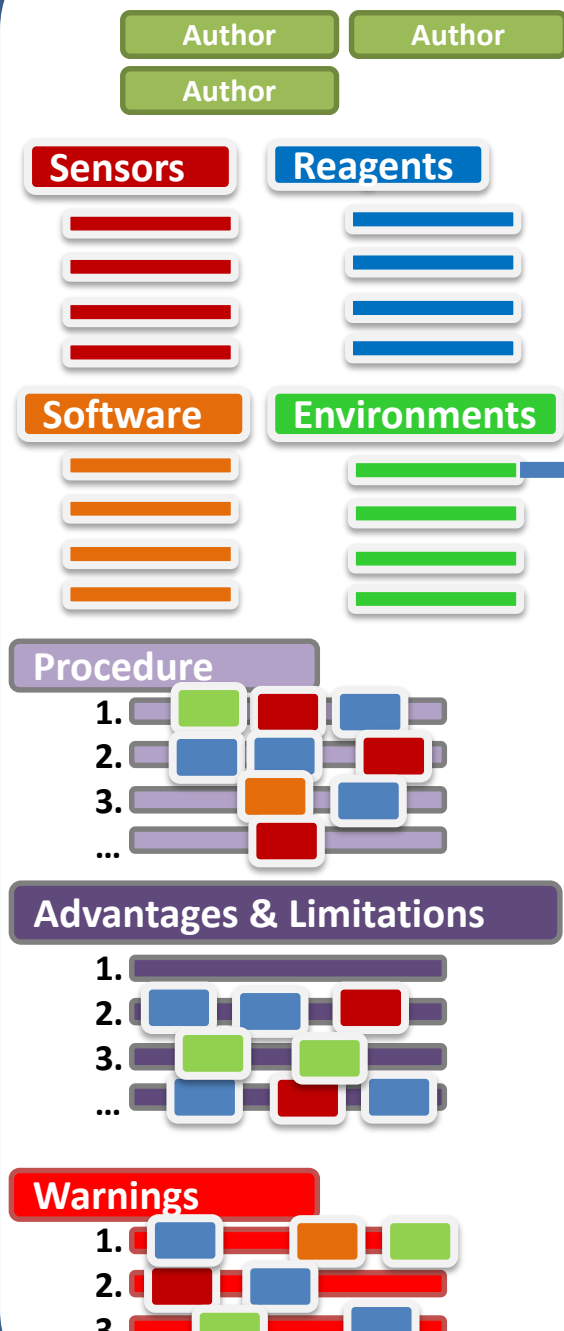
Concluding remarks

We're well on the way to a semantically enhanced, international BP repository for the Ocean Observation community

The near future...

- **Incorporate more semantic and terminology resources to improve coverage, focusing on interoperation and relevance to ocean observing**
- **Refine NLP and tagging routines for improved accuracy and knowledge harvesting**
- **Provide community guidelines on submitting parseable best practices**
- **Use semantic tags to link BPs to oceanographic data holdings and streams**
- **Improve user experience of the OBP system to simplify interaction with ontologies, while preserving their expressivity**

My Best Practic 2.0



Opening up BPs to informatics and linking them to data and information holdings

- Retrieve the common **sensors** across the protocols “McMussel mussel bed survey” and “OysterTech oyster reef survey”
- Retrieve all BPs that use the **software** “ArcGIS”
- Retrieve the **advantages and limitations** of the protocol titled “Sampling seawater for marine microbes”
- Retrieve the protocols and the list of **reagents** for documents authored by **E Hemmingway**



Acknowledgements



Antje Boetius
Felix Janssen



Intergovernmental
Oceanographic
Commission



Jacqueline McGlade
Ludgarde Coppens
Dany Ghafari

Best Practices Working Group

Mark Bushnell

IOOS

Juliet Hermes

SAEON/JCOMM

Emma Heslop

UNESCO

Peter Pissiersens

UNESCO

Cristian Muñoz

SOCIB

Francoise Pearlman

IEEE

Jay Pearlman

IEEE

Pauline Simpson

IODE

Frank Muller-Karger

MBON



Chris Mungall (UCB)
Ramona Walls (CyVerse)
Evangelos Pafilis (HCMR)
Mark Schildhauer (NCEAS)
Barry Smith (SUNY)
Suzanna Lewis (UCB)
and many, many contributors



Patricia Miloslavich

CMECS: Mark Finkbeiner (NOAA)
Derek Sowers (NOAA)

BODC: Alexandra Kokkinaki