A new Semantics based environment to support collaboration in tackling the emergent marine ecosystem diversity treat of the marine microplastics.

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Few points to highlight:

- We focus on collaboration (human to human)
- Cross-disciplinarity

Outline

- Understand scientific research → collaboration
- Scientific communities → contexts (Paradigms)
- Communication
- Syntax vs semantics vs pragmatics
- Artefacts that help collaborations (Boundary objects)
- Representation vs Formalisation
- Building collaborative knowledge
- Putting all this in a software (COLLA- Ontodia)

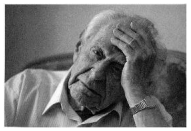
To understand how collaboration takes place we need to consider scientific reasoning

Traditional reasoning modes

Induction= from experience to Theory

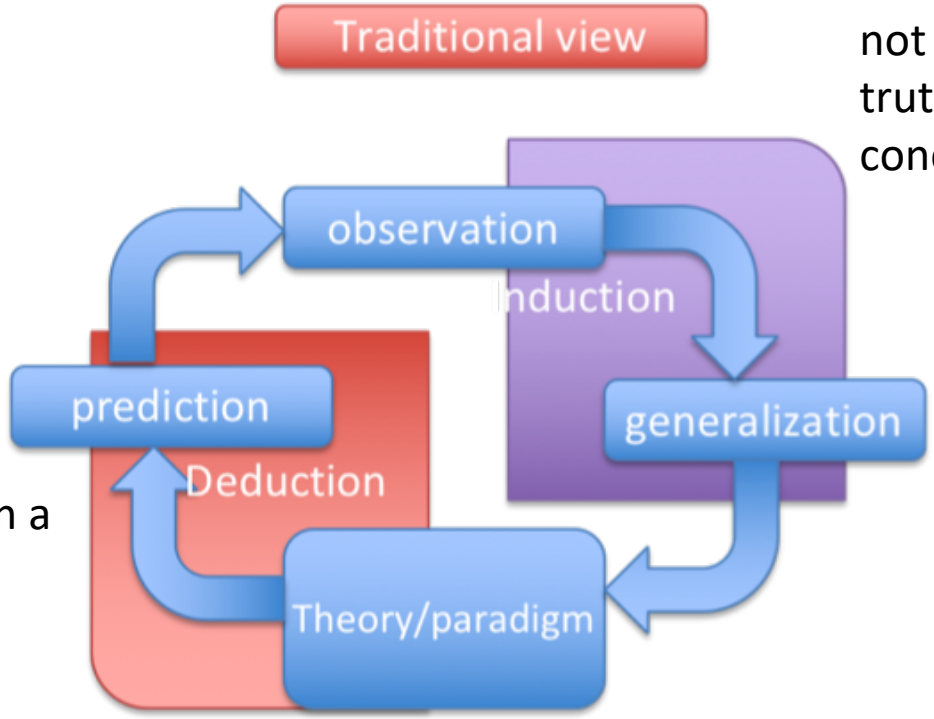
is it justified? From Humes to Popper many say no…

If saw 10 black ravens, I cannot say "all ravens are black"



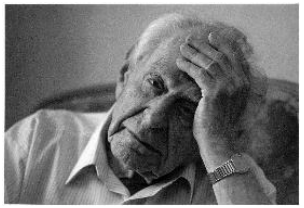
Deduction=within a closed system, changes the configuration of knowledge, cannot discover anything new

Induction: the truth of the premises does not guarantee the truth of its conclusions.



Deduction within a closed system, changes the configuration of knowledge, cannot discover anything new

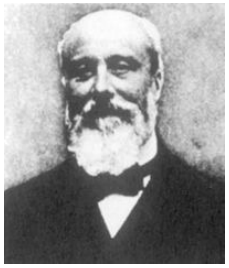
Verification …Can we verify if a theory is correct?



Popper

extends the inner inconsistency of induction to verification

We cannot say if a theory is right but we may say if it's wrong (falsificationism)?



Duhem+Quine thesis

Theories are made of many propositions and assumptions. If You test a Theory you cannot say which proposition or assumption was wrong

Lakatos

The pressure of critics (…or of failed tests) shifts progressively the corpus of auxiliary hypotheses (therefore called "*protective belt*") to save the central kernel of the theory

Logic → Socio-logic

Thomas Kuhn

A paradigm is what members of a scientific community share (Tradition, beliefs, myths,framework within which solutions are provided, context)

Kuhn argues that rival paradigms are incommensurable—that is, it is not possible to understand one paradigm through the conceptual framework and terminology of another rival paradigm

Scientists live in isolated communities (…as animal species) that evolve separately (…like squirrels on different sides of a canyon)

Latour and Woolgar

Science is a social construct.

Communication

- **Pragmatic level**: cares that **meaning + context** is sync. Generally this is achieved through the use of signs

Define an entity upon a list of attributes (intension after Frege)
All the entities matching the intension = extension
when what we are serching matches the intension → reached meaning

- **Semantic level**: cares that **meaning** is received but does not care about context, paradigms or else (here complications starts)

- **Syntactic level**: cares only that **message** is received as transmitted

Current situation in semantics (a first step into FORMALIZATION)

Controlled Vocab: lists of predefined and authorized terms.

divergences drive to endless discussions that often are truncated by authoritative personalities → Meltdown

highly public / high level of awareness and participation

Ontologies: specification of a conceptualization

← capture knowledge through expert elicitation

often difficult because knowledge is embedded

"we know more that we can tell" (Polany 1966)

What happens when different visions clash at this level:

A) Mapping between ontologies of different domains

Means we have no general principle

Can be very difficult if multiple visions

B) Develop a new higher level ontology

Modify granularity to achieve consensus (very generical)

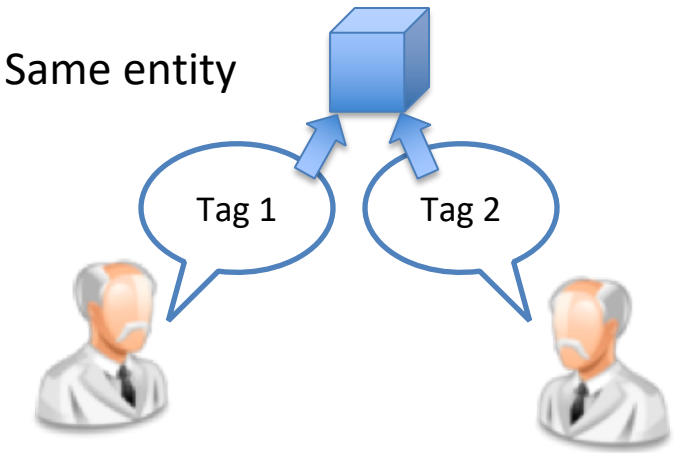
Pragmatics/Semiotics

the problem of context is a major issue that has concerned many philosophers (Frege, Wittengstein..)

It is possible to refer to the same entity/concept through signs, since sign user will invest them with the pertinent meaning

Signs become links to objects that then can be used within different cognitive models

Folksonomy/collaborative tagging



method of collaboratively creating and managing tags to annotate and categorize contents

Limitations:

- ambiguity,
- synonymy,
- discrepances in granularity

Boundary object

…towards representation

Star & Griesemer (1989) diverging communities can collaborate even without a shared cognitive model using a boundary object

Boundary object = objects/entities/concepts weakly structured in common use but strongly structured in individual use

Boundary objects should be flexible artifacts that as a traveller map *"does not control the traveller's movements through the world" Suchman(1987)*

Many types of B.O.:

- Images
- diagrams
- Concept maps
- Event bushes
- workflows

Made of objects that act as labels that users can refer to

Representation

A form of loose formalisation

- The epistemic is a form of Judgement
- Judgement represent or portray something
- Representations can be theories and models, linguistic and mathematical entities, computer simulations, concrete objects and so on and so forth.
- Language here is only one of the possible ways of representing the epistemic

(Chakravartty,1995) "descriptions of entities and processes by scientific representations are generally false"

(Callender, & Cohen, 2006) Representation fits research as we modelled it since it is prone to omissions and commissions.

- **Omission** is the act of neglecting some possible causes among those that can explain a phenomenon
- **Commission** is the act of deliberately change the network of possible causes and explanations of a phenomenon.

THE RECIPE How to develop an IT solution

To Handle Pragmatics in a collaborative work we need:

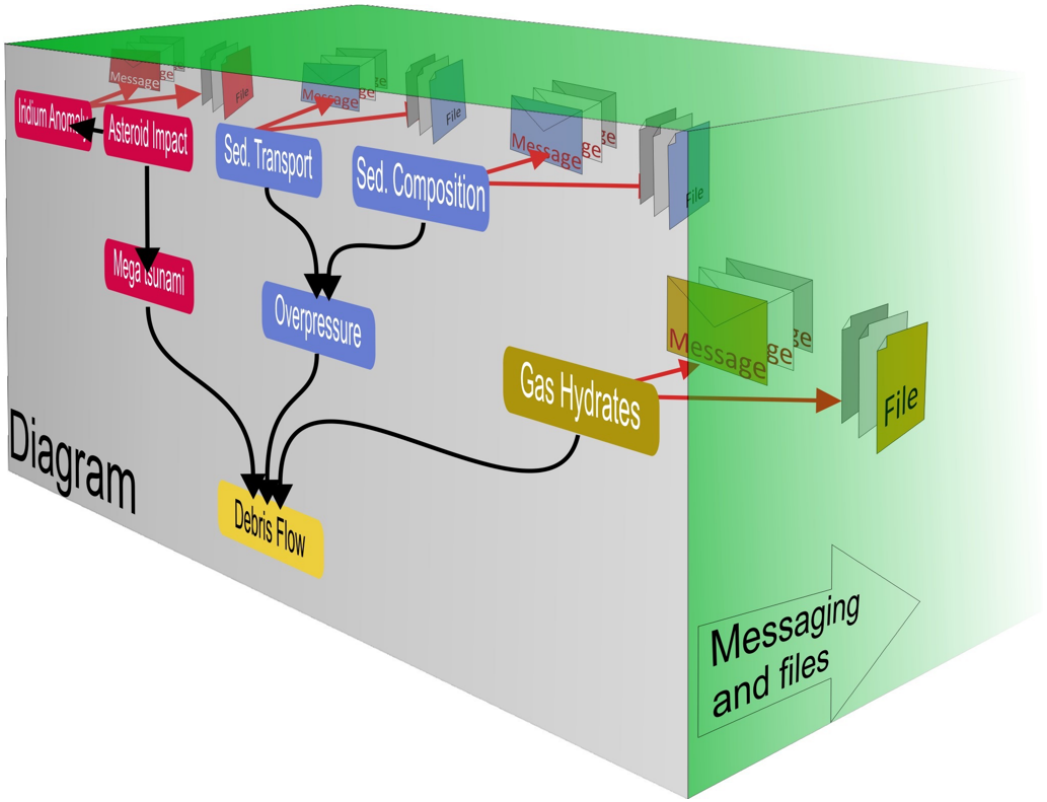
COLLA

- The web
- Means to communicate through web (instant messages, forums, communities of practices)
- Boundary objects (representational artefacts <— map to navigate the domain

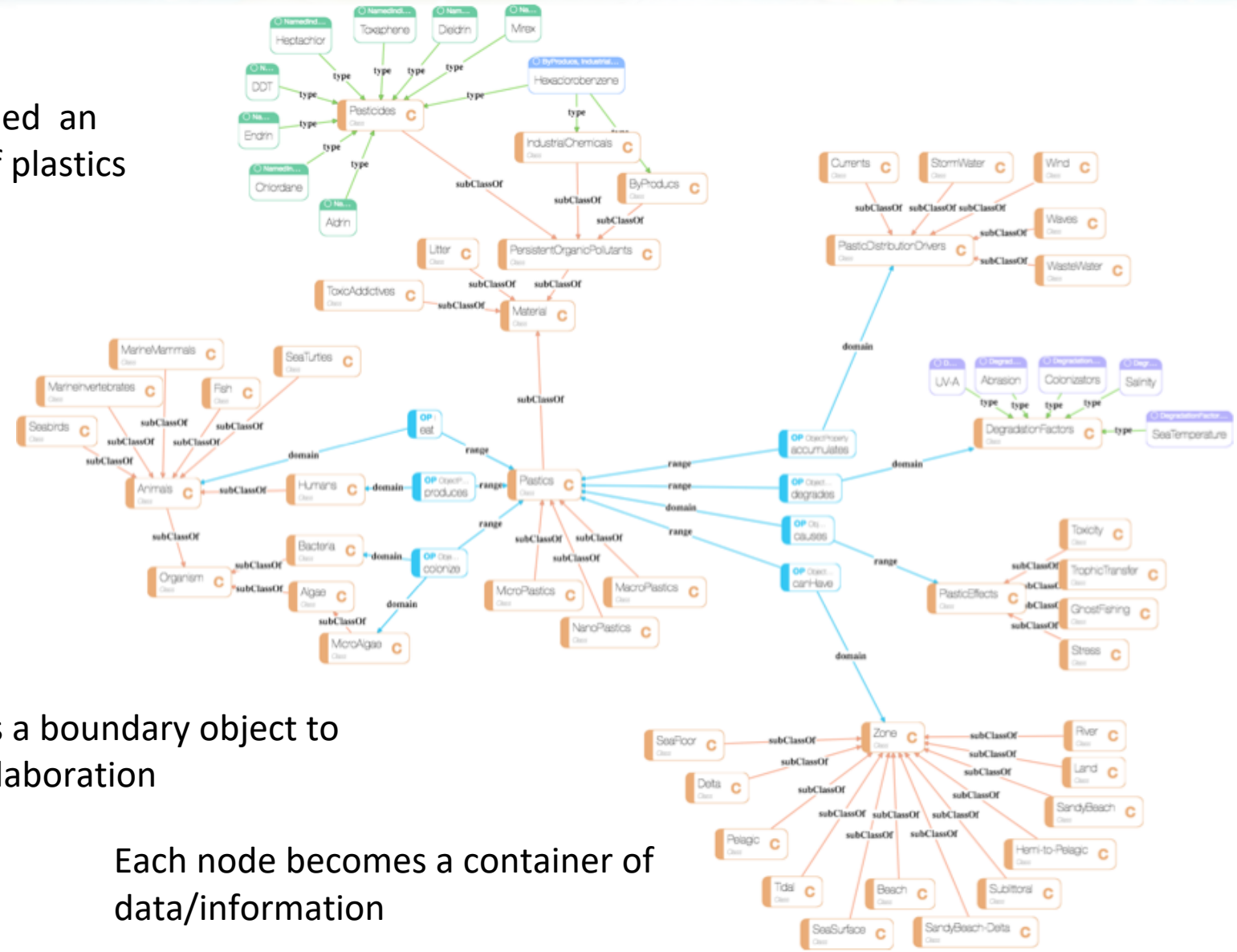
Ontodia

- Data storage and retrieval (linked to the Boundary object)
- Data visualisation (representation)
- Link between Data and Boundary object

COLLA:
representation of a domain helps structuring data/infrormation storage



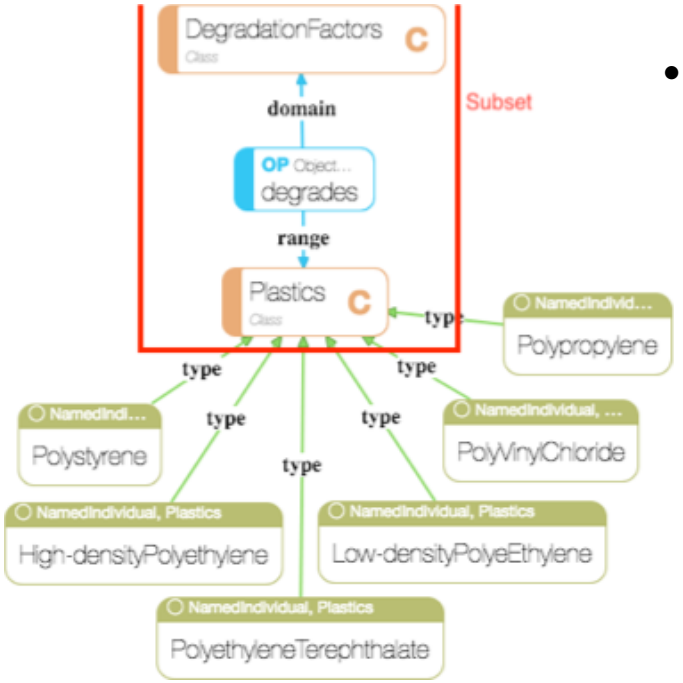
We developed an ontology of plastics at sea



We use it as a boundary object to support Collaboration

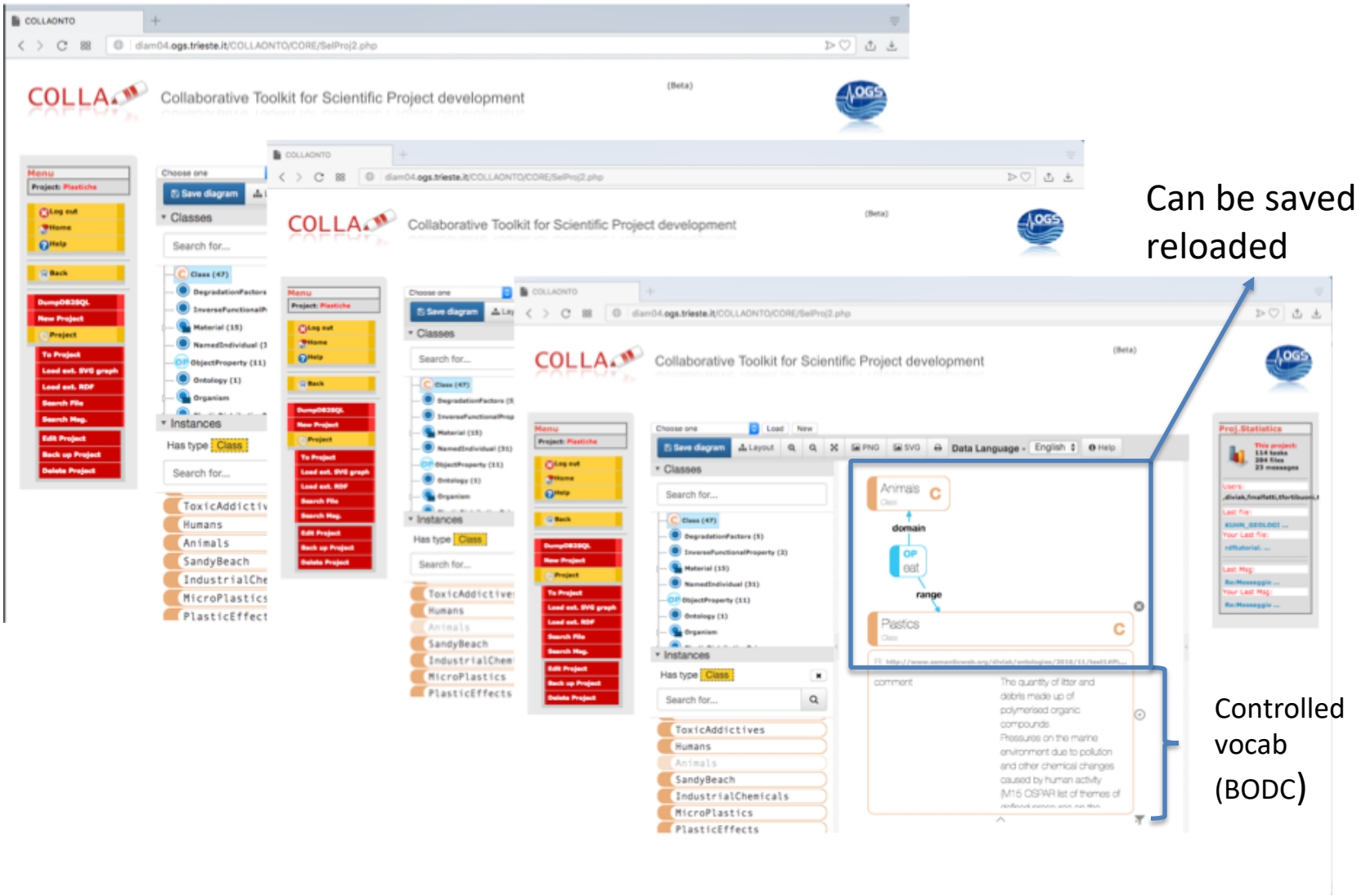
Each node becomes a container of data/information

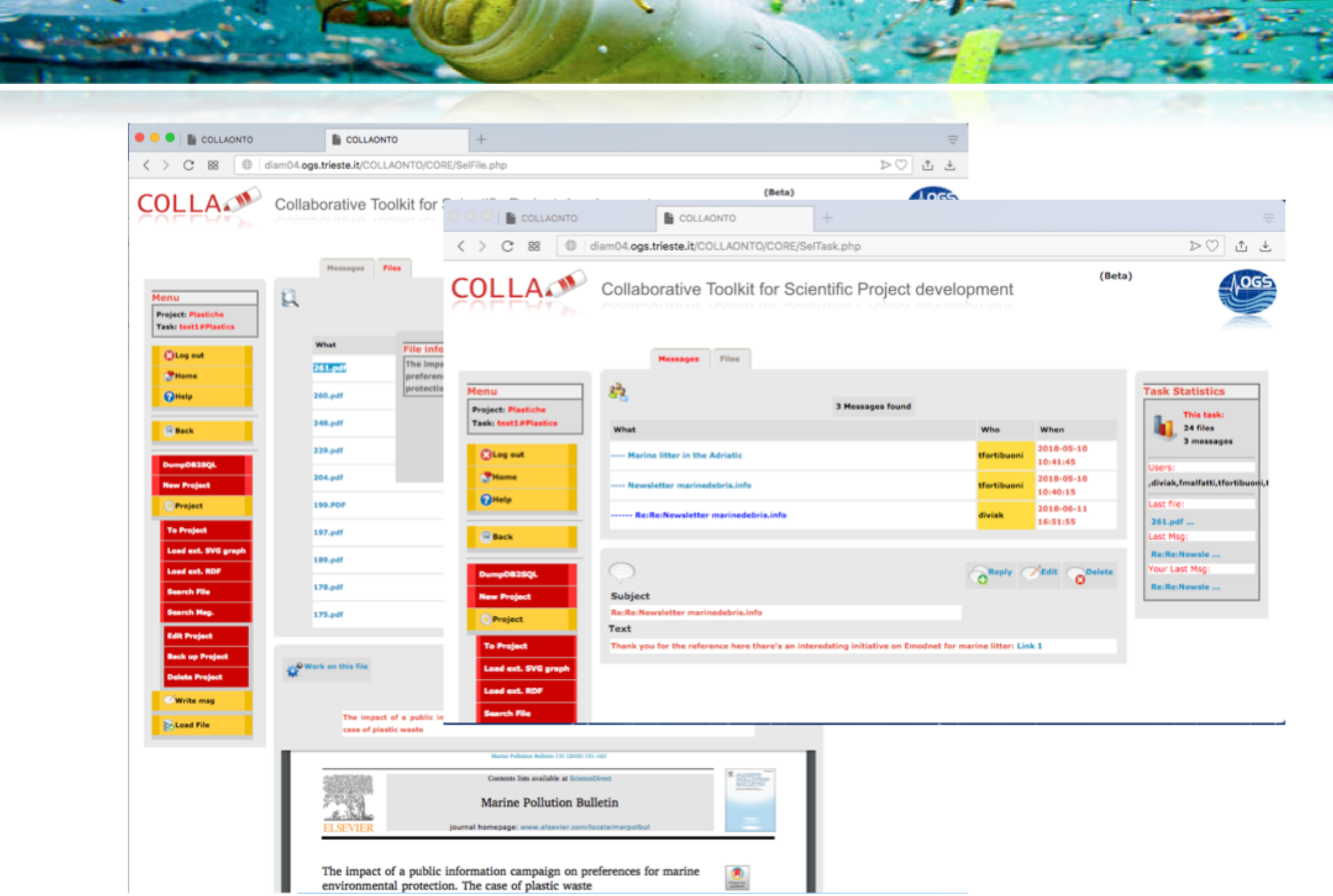
SUBSETTING: representation by omission



- **Omission** is the act of neglecting some possible causes among those that can explain a phenomenon

Subsetting, depending on back ground of the single partner while preserving each node Content


COLLAONTO
Collaborative Toolkit for Scientific Project development
Classes
Instances
Has type Class
Search for...
ToxicAddictives
Humans
Animals
SandyBeach
IndustrialChemicals
MicroPlastics
PlasticEffects
Data Language - English
Animals
domain
range
Plastics
comment
Can be saved and reloaded
Controlled vocab (BODC)


COLLAONTO
diam04.ogs.trieste.it/COLLAONTO/CORE/SelFile.php
COLLA
Collaborative Toolkit for
(Beta)
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Collaborative Toolkit for Scientific Project development
Menu
Project: Plastiche
Task: test1 #Plastics
Log out
Home
Help
Back
DumpDB2SQL
New Project
Project
To Project
Load ext. SVG graph
Load ext. RDF
Search File
Search Msg.
Edit Project
Back up Project
Delete Project
Write msg
Load File
Messages
Files
What
File info
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248.pdf
229.pdf
204.pdf
199.PDF
197.pdf
189.pdf
178.pdf
175.pdf
Work on this file
3 Messages found
What
Who
When
---- Marine litter in the Adriatic
tfortibuoni
2018-05-10 10:41:45
---- Newsletter marinedebris.info
tfortibuoni
2018-05-10 10:40:15
------ Re:Re:Newsletter marinedebris.info
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2018-06-11 16:51:55
Reply
Edit
Delete
Subject
Re:Re:Newsletter marinedebris.info
Text
Thank you for the reference here there's an interedsting initiative on Emodnet for marine litter: Link 1
Task Statistics
This task:
24 files
3 messages
Users:
,diviak,fmalfatti,tfortibuoni,t
Last file:
261.pdf ...
Last Msg:
Re:Re:Newsle ...
Your Last Msg:
Re:Re:Newsle ...
The impact of a public in
case of plastic waste
Marine Pollution Bulletin
Contents lists available at ScienceDirect
journal homepage: www.elsevier.com/locate/marpolbul
ELSEVIER
The impact of a public information campaign on preferences for marine environmental protection. The case of plastic waste

Conclusions:

We showed that it is possible to support collaborative research by means of

- boundary objects
- Ontologies that represent a domain
- Where each node is a container of data/information

- We tested the developed system in the domain of plastics at sea with good results

Future work (more space to ontology)

- Possibility to get data from neighbor nodes (upon relations)
- Recommending (similar to e-commerce)
- text extration

THANK YOU

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