HowTo - Easy use of global unique identifier
(or "Global unique identifier in Action")

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Motivation

Identifier system are ubiquitous but commonly they are not global(ly known) nor are they unique (national vs. international). Usage of global identifiers in marine research greatly enhances search and retrieval of samples, data and related information and enbales scientists all over the world to reliably share and reuse research data.

For many scientific disciplines numerous identifier systems exists on a national and international level allowing non-ambiguous refernce to people, institutions and geosamples (Figure 1). Our goal is to reliably integrate these unique references in our virtual research environment, the Kiel Data Management Infrastructure (KDMI), supporting scientists in national and international projects and collaborative research centers.

Identifiers

Figure 1

Easy Use

First Step

We use our scientific workflow system to define the research workflow step by step. In every workstep metadata information is used to prebind to the proper identifier system (eg. ports from geographic places and not people) which can then propose adequate suggestions upon user input leading to the correct assignment of the port in question. Sometimes a mapping between identifier resources such as the german "Gemeinsame Normdatei" (GND) for people, institutions or geographic places and another like ISNI or OrcID for people only may be necessary for legacy reasons.

For example our *handwriting* recognition system in conjunction with "digital enabled" paper uses names and maps to relate those to the respective systems in order to retrieve a global unique identifier which is then used to reliably relate and store information (Figure 2).

Second Step

The second major step is then assignment of unique global identifers to geosamples based on the International Geo Sample Number (ISGN) already during an expedition or latest before archival in a physical storage. We do encode access to related information via identifiers in machine and human readable QR codes attached as labels to sample containers and samples themselves (Figure 3)
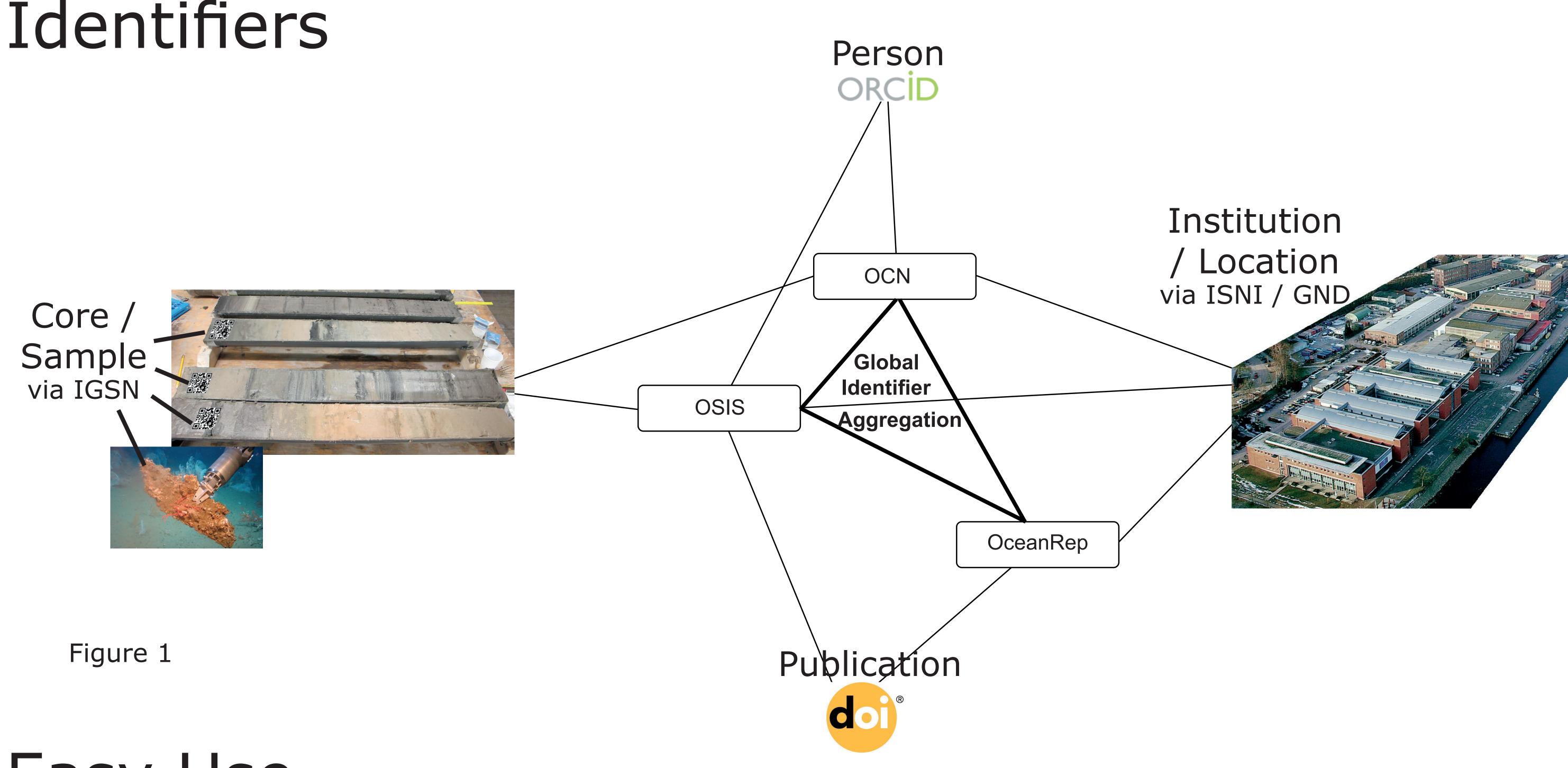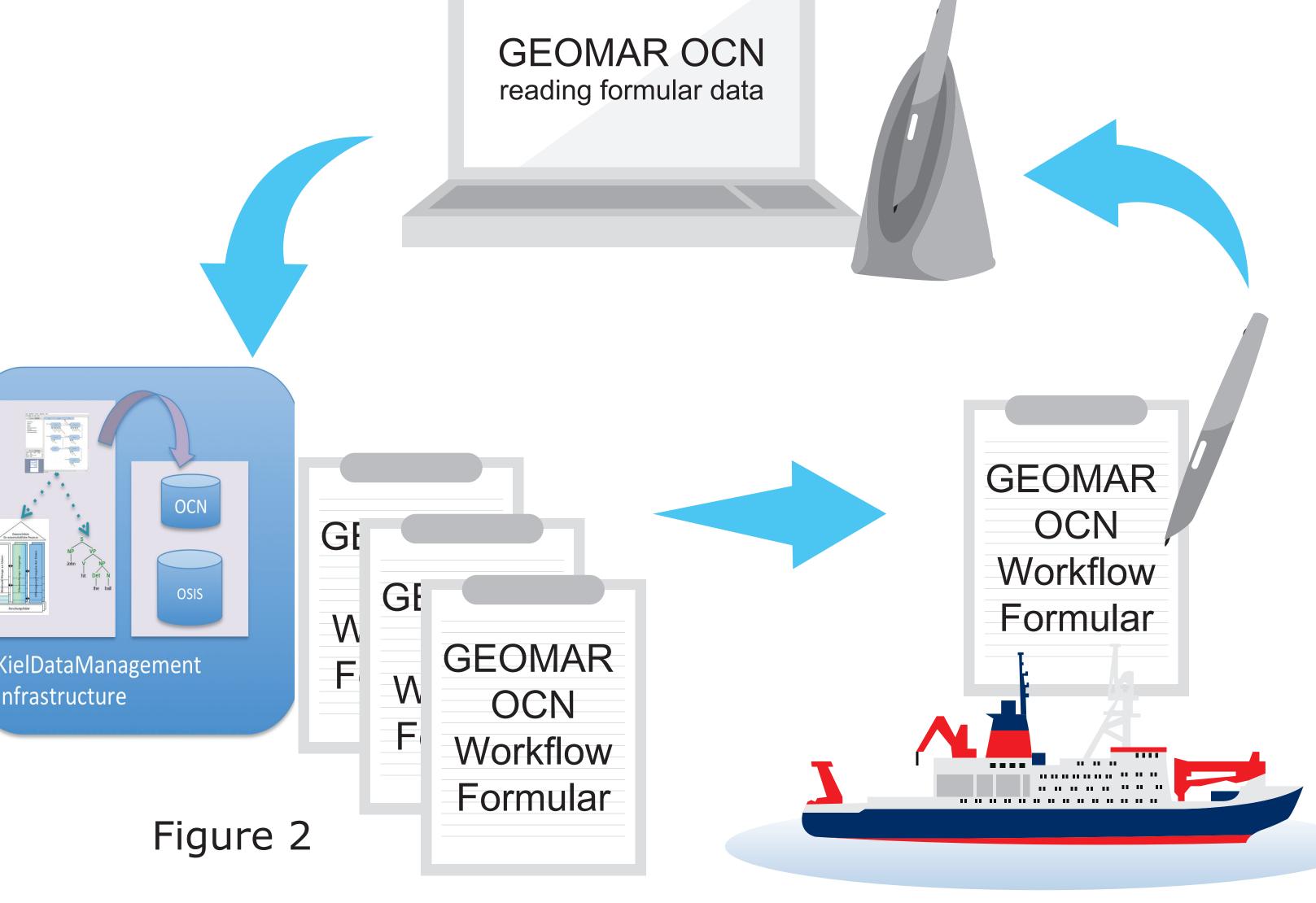
Third Step

Via digital representation of each physical object (ie. sample) or its container it is possible to easily relate it within our Ocean Science Information System (OSIS) to publications thru DOI eg. in World Data Centers (WDC Mare - PANGAEA) or scientific journals.

The non-ambiguous relation of information within our virtual research environment (KDMI) to external trusted information providers via unique global identifiers then requires no further steps or efforts to finally relate to emerging publications.

Figure 3

After all three steps are done, a scientist user can start searching a publication and will be offered the links to existing data and samples. Or one can start looking for a cruise and is guided to all data and publications linked to samples taken on that cruise. Or it can be search on geographic locations and find related publications, data and samples.

Figure 2

Conclusion

Ultimately researchers can easily follow the entire provenance of published research results to the very origin and even further to other related studies and their results due to the ubiquitous integration of unique global identifier backed by their respective information systems. The search is not over and can be extended in time and space to discover more data and research findings including their provenance and versioning history.

Finally, this approach already integrates the provenance of data and scientific conclusions and thus conforms to good scientific practice.

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