Designing Collaborative Ecosystems and community organization: Introducing the multidisciplinary portal on "Biodiversity and Linguistic Diversity: A Collaborative Knowledge Discovery Environment"

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The UNESCO Declaration on Cultural Diversity (United Nations, 2002) states the importance of Cultural Diversity as one of the "common heritage of humanity" and makes its defence "an ethical imperative indissociable from respect for the dignity of the individual." In declaring the hope, "that one day the declaration will acquire the same force as the Universal Declaration of Human rights", Koïchiro Matsuura, Director General, manifests the importance of the Declaration for global peace and one of the founding texts of the new ethics of the twenty-first century UNESCO (Wandl-Vogt et al, 2016).

There is a fundamental linkage between biological, linguistic and cultural diversity. "Over the past decade, the field of biocultural diversity has arisen as an area of transdisciplinary research concerned with investigating the links between the world´s linguistic, cultural, and biological diversity as manifestations of the diversity of life" (Maffi, 2005).

The interest goes back to the observation that all dimensions are under threat by some of the same forces. It was realized, that this may lead to dramatic consequences for humanity and the earth. "While it is widely acknowledged, that the degradation of the natural environment, in particular habitats, entails a loss of cultural and linguistic diversity, new studies suggest that language loss, in its turn, has a negative impact on biodiversity conversation. There is a fundamental linkage between language and traditional knowledge related to biodiversity. Local and indigenous communities have elaborated complex classification systems for the natural world, reflecting a deep understanding of their local environment. This environmental knowledge is embedded in indigenous names, oral traditions and taxonomies, and can be lost when a community shifts to another language" (UNESCO, n.d.). Several studies, mainly carried out on indigenous languages, demonstrate mutual benefits. UNESCO (see above) considers the safeguarding of traditional knowledge and indigenous as well as local languages used to transmit such knowledge as a yet "underused but promising tool for the conversation and sustainable management of biodiversity".

This paper introduces into a multidisciplinary, collaborative knowledge discovery environment (AAS and ACDH, 2016), established at the Austrian Academy of Sciences (AAS), Austrian Centre for Digital Humanities (ACDH) in close collaboration with Natural History Museum Vienna (NHM), launched on September, 1st, 2016.

The project aims to establish a collaborative open science workflow and enable knowledge discovery as well as experimental scholarship related to biodiversity, linguistic diversity and it´s cultural dimensions. It aims to serve as a social and technical infrastructure enabling research for a multidisciplinary community of practice. The portal contributes to the sustainable documentation and visibility of cultural diversity and traditional knowledge and to open it for the public.

In this paper we introduce into first results of our endeavor, yet focus on the design process and community building efforts concerning the "Biodiversity and

Linguistic diversity portal" (diversity4bio).

diversity4bio started as a case-study-collaboration between Natural History Museum Vienna (NHM), Heimo Rainer, and Austrian Academy of Sciences (AAS), Eveline Wandl-Vogt, in 2012, in the framework of the European funded project "OpenUp! Opening up European Natural History Heritage for Europeana".

Based on the background of the partners (Taxonomy, Non-standard-language Lexicography) and the OpenUp!-projects main focus (common names for Europeana metadata) the first step to get towards results was to work on linguistic diversity.

The partners designed the project as a community organization. Community organization in this paper is understood as organizing within communities defined by shared experience, shared curiosity and interests as well as shared (virtual) work space. Community organization is a process by which a community identifies needs and takes action, and in doing so develops co-operative attitudes and practices (Ross, 1955)

The main characteristics of Community organization are discussed on the given example (Wallin, 2016):

1. **The boundaries are fluid, informal:** Everybody who contributes to diversity4bio belongs to the network. There is no need of a certain scientific status or collaboration contract. Members support each other to find the right place to fit in. Still, it is visibility, citation and reliability is relevant for the network, which means a high degree on transparence for data interaction and publication.

2. **Significant incorporation of voluntary labor:** Community organization does not end in legal contracts or financial remuneration. diversity4bio recently is a loose network, where "members" are connected by common spirit and visions for further developments rather than legal contracts.

3. **Significant open sharing of knowledge:** diversity4bio is aiming to bring together experts to exchange and explore. The authors implement open science workflows based on the actors needs and the visons of the open science definition. It is introducing open science commons especially in research areas where these are still atypical, e.g. in traditional lexicography units. The digital transformation is described as a time taking process of building trust, where first sample data sets – e.g. names

for living organisms – are implemented into new collaborative, open approaches, enriched and methodologically innovatively exploited.

4. **Collaborative communities display:** Behind the virtual portal scenery, there is a shared ethic of independent contribution and there is a formalized set of norms of interdependent process management as well as an interactive social character and identity. Community building was a process of several years, which is reflected in the presentation, e.g. face to face meetings of the protagonists, just after first results of collaboration (biological data + linguistic data > Europeana-metadata workflow) workshop to connect others and opening up of the group towards a portal and first publication of results.

The very interactive and flexible community organization model is certainly a challenge, especially as diversity4bio is mixing up several disciplines without a very certain or concrete research focus.

Based on this fact we do have established network facilitators for botanics/taxonomy, Heimo Rainer, and cultural data/lexicography, Eveline Wandl-Vogt.

Technically seen, diversity4bio is a first example for an open science workflow design. The architecture makes use of existing (freely available) technologies and connects with existing infrastructures.

The architecture consists of three layers:

1. The Human Interface Layer
2. The Persistent Layer
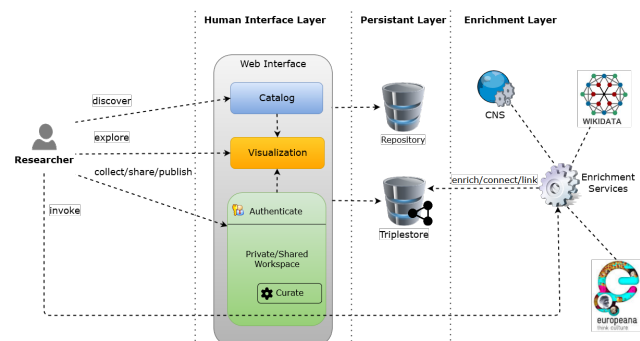3. The Enrichment Layer

Figure 1: Pilot-architecture of the open workflow for the diversity4bio © Davor Ostojic

Data Visualization is part of the Human Interface Layer and developed within the project exploreAT! (exploring austria´s culture through the language

glass). Furthermore, within the COST action IS1305 ENeL (European Network of electronic Lexicography) the interlinking and the use of the framework was stimulated. This may be seen as example on how ongoing initiatives contribute to the collaborative approach and vice versa.
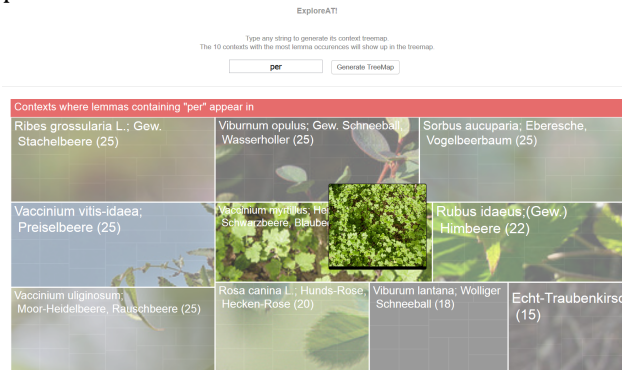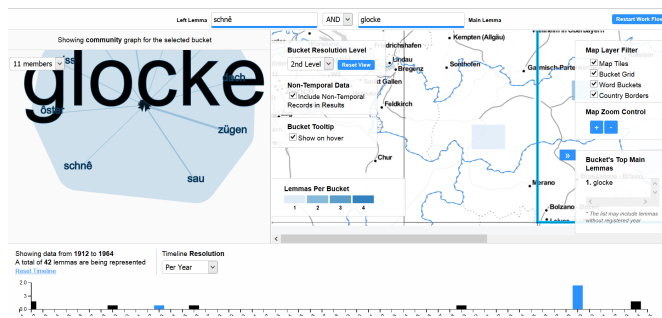

Figure 2,3 : Visualisation pilots developed in the project exploreAT!: Generalised and ready to be scaled up for global resources © Roberto Theron et al.

The portal offers a reconcile service. It queries the so called Common Names Service (CNS) at NHM for common names of living organisms in different languages for a given scientific name (Latin, Greek). The portal offers the opportunity of a CSV-import with the own data collection. Data import is time consuming. CNS itself is a distributed service.

Finally, the portal offers – as a first step – for a CSV-import of scientific names script-based RDF-modeling. Further enrichment services are in development, but at the time being not implemented into the portal, e.g. script-based semi-automatically interconnection with the Europeana – workflow mentioned above. Furthermore, out of the box repositories for researchers and citizens with less technical knowledge are necessary to keep in track with our vision to document traditional knowledge and related local language in development.

Finally, design probes for the collaborative process have been developed. The interlinked scientifically interpreted data may be reused to build a Pan-European (COST ENeL vision) or even global dictionary of plant names and envision based on this new movements for collaboration as well as research.
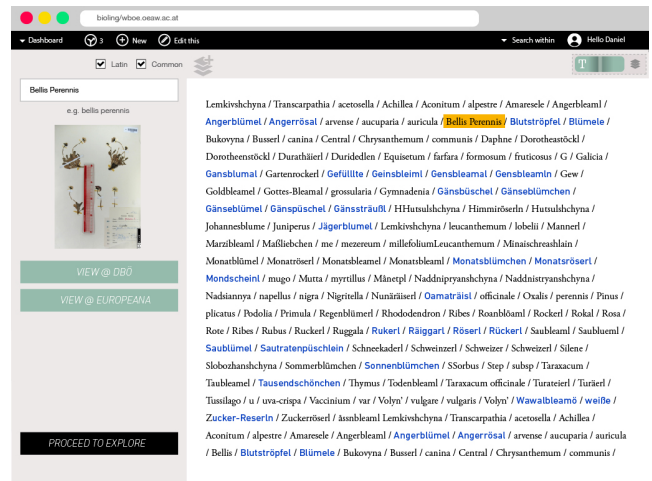

Figure 4: Design Probes for the further development of the diversity4bio portal towards a broader audience with cultural interest © Alisa Goikhman.

In conclusion, the authors give an outlook on next steps, pathways to contribute and join in and share the personal experiences along the way.

Acknowledgements

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