Co-Designing Innovation Networks for Cross-Sectoral Collaboration on the Example of exploreAT!

Caitlin Gura  
Austrian Centre for Digital Humanities, Österreische Akademie der Wissenschaften  
Wohllebengasse 12-14/2, 1040 Vienna  
a Caitlin.gura@oeaw.ac.at

Amelie Dorn  
Austrian Centre for Digital Humanities, Österreische Akademie der Wissenschaften  
Wohllebengasse 12-14/2, 1040 Vienna  
amelie.dorn@oeaw.ac.at

Eveline Wandl-Vogt  
Austrian Centre for Digital Humanities, Österreische Akademie der Wissenschaften  
Wohllebengasse 12-14/2, 1040 Vienna  
eveline.wandl-vogt@oeaw.ac.at

Antonio Losada  
University of Salamanca, Department of Computer Sciences and Automation  
Pz Caídos s/n  
37004 Salamanca  
Spain  
alosada@usal.es

Alejandro Benito  
University of Salamanca, Department of Computer Sciences and Automation  
Pz Caídos s/n  
37004 Salamanca  
Spain  
abenito@usal.es

ABSTRACT

Daily interaction with digital media and devices has become a natural habit for the majority of people across different age ranges in Western cultures. The way we interact with and react to digital media, however, has been constantly evolving and there is a clear trend towards implementing device-oriented interactive engagement in a more meaningful way, where users readily add to shaping and creating digital experiences that not only generate added value for them personally, but also for the various other actors involved. This also concerns the interaction with both virtual as well as real-life objects in cultural settings. Across different sectors, creating a complementary synthesis of the digital and analog has been a primary topic, particularly in the course of the 21st century. In this paper we aim to discuss the establishment of cultural innovation networks between museums and other sectors, exemplify potential links between digital and physical objects in connection with a current Digital Humanities project (exploreAT!) and shed light on user engagement possibilities opening towards open innovation research infrastructures (OI-RI).

CCS CONCEPTS

• General and reference  
• General and reference~General conference proceedings  
• Applied computing~Arts and humanities  
• Applied computing~Anthropology  
• Applied computing~Ethnography

KEYWORDS

cross-sectoral collaboration; open innovation; open science; citizen science; museums; cultural identity; real-world objects; digital collections

ACM Reference format:

2017. Co-Designing Innovation Networks for Cross-Sectoral Collaboration on the Example of exploreAT. In Proceedings of 5th International Conference on Technological Ecosystems for Enhancing Multiculturality, Cádiz, Spain, October 2017 (TEEM 2017), 8 pages.  
DOI: https://doi.org/10.1145/3144826.3145378

1 INTRODUCTION

Daily interaction with digital media and devices has become a natural habit for the majority of people across different age ranges in Western cultures. The way we interact with and react to digital media, however, has been constantly evolving and there is a clear trend towards implementing device-oriented interactive engagement in a more meaningful way, where users readily add to shaping and creating digital experiences that not only generate added value for them.
personally, but also for the various other actors involved. This also concerns the interaction with both virtual as well as real-life objects in cultural settings. Across different sectors, creating a complementary synthesis of the digital and analog has been a primary topic, particularly in the course of the 21st century. Apart from libraries, another area that experiences much transformation in this respect, are museums.

Cultural knowledge contained deep within the repositories behind the imposing gates of museums no longer reflects the future ideal of how users want to engage with culture; nor is the interaction with real world objects only limited to particular physical places [5]. Rather, visualized links to related relevant resources are to be established enhancing the experience of museum users in novel ways (i.e. in the form of an installation that is both accessible within and beyond the museum’s walls) where they become an active part in shaping their experiences, knowledge, and contributions, but also how the cultural material itself is reinvigorated with new insights of examination.

Thus, in this paper we aim to discuss the establishment of cultural innovation networks between museums and other sectors, exemplify potential links between digital and physical objects in connection with a current Digital Humanities project (exploreAT!) and shed light on user engagement possibilities opening towards open innovation research infrastructures (OI-RI).

2 exploreAT! GENERAL INTRODUCTION AND METHODOLOGIES

The Digital Humanities (DH) project “exploreAT! - exploring Austria’s Culture through the Language Glass” [3, 35] provides the framework for participatory engagement among heterogeneous actors, such as GLAM institutions (Galleries, Libraries, Archives and Museums), through an innovation network, which is designed to foster experimentation within the research process. exploreAT! evolves around non-standard language resources, the Database of Bavarian Dialects in Austria (DBÖ) [40, 42] which contains a wealth of information on the spoken German in the area of the former Austro-Hungarian empire in the 20th century. Apart from language data, originally collect by questionnaire with the intention to produce a dictionary (WBÖ) [45] capturing the rich texture of the German language, the resource also contains an abundance of cultural information of various fields of life at the time (professions, festivities, food, animals, plants, etc.). In addition to the questionnaire data, various entries from folklore texts or vernacular dictionaries are also contained in the database, making this resource rich and abundant [41]. We are thus presented with abstract information in the form of spoken language captured in writing, but at the same time also with a plethora of potential references to real-world objects, where connections with other resources and sectors, such as museums, enable the establishment of novel innovation networks.

In this context one of the aims of the exploreAT! project is to contend with contemporary issues facing the museum realm as framed by the theoretical approach of the New Museology [23, 28]. The challenges that are specifically addressed involve the implementation of participatory engagement methods, where the actor is involved in co-curation and co-design of the research process made visible within and beyond the museum space, and the contention between digitization initiatives and original, analog collections.

To bring about this aim, methods of Open Innovation (OI) and Open Science (OS) in conjunction with design thinking methods toward experimental scholarship are applied in exploreAT! Originally stemming from the business realm, OI concentrates on generating creative and novel solutions through cohesive cooperation of cross-sectoral actors, which ultimately produce mutual added value for the actors involved [10]. Within the realm of academia, the term “cross-sectoral” does not necessarily refer to working with other researchers from other fields, but rather working with heterogeneous actors from various industries, politics, and civil society. The Federal Ministry of Science, Research, and Economy (BMWFWi) and the Ministry for Transport, Innovation and Technology (BMVIT) in Austria released their collaborative seminal work, the Open Innovation Strategy for Austria (2016) [6], which identifies how actors from academia, politics, the corporate realm, and civil society bring different insights and ways of working into a collaborative undertaking. This strategy emphasizes the necessity of open experimentation across sectoral borders in order to bring about sustainable and effective solutions. In addition to OI, OS is a current movement within academia, which calls for a turn of openness, transparency, and collaboration beyond the traditional research community. This movement focuses on making not only scientific research results available on an open access basis, but also opening up the research process as a whole as a way to make knowledge as readily available for the benefit of information society [15, 26, 39]. Essentially, the application of OI and OS call for an end to a rigid, hierarchical culture of exclusivity. The application of these methods in exploreAT! demonstrates how opening our research process to include external actors, particularly from civil society and museum sector, can lead to novel, concrete insights for the benefit of information society as whole, rather than just the research community. Therefore, we are encouraged to seize upon the unique and heterogeneous insights inherent within a diverse cultural society, and consequently, bring about an
opening up and democratization of the innovative research process.

3 exploreAT! and the cultural view

In the context of exploreAT!, connecting the collection of dialect words from the DBÖ via semantic enrichment and linked open data (LOD) [29, 30, 43] to digitized museological collections and other external resources makes visible previously hidden socio-cultural connections: "Museum websites and digital archives add new dimensions to accustomed practices of looking, as the representation of a coherent story, a central theme, or a particular history is knitted together with exploring unknown dimensions and tracing hidden connections within a collection," [34]. Interlinking collections provides the additional historical context to extract a more detailed understanding of how the world was perceived at a certain point in time. Additionally the connection to real-world objects facilitates multilingual, transcultural access. Objects not only illustrate language and its diverse meanings, but also represent polysemic cultural narratives for the individual as well as the community: "Objects are used to materialise, concretise, represent, or symbolise ideas and memories, and through these processes objects enable abstract ideas to be grasped, facilitate the verbalization of thought and mobilise reflection on experience and knowledge." [19]. The notion of cultural phenomena as polysemic challenges the tradition established of unquestionable, all-knowing authority by the 19th-century museum [1].

4 Co-Designing Collaboration

4.1 Interlinking lexical resources and cultural artifacts - Result

To initiate the interlinking phase with collections of cultural artifacts, the ontology for the conceptual structure of the DBÖ, which is currently in progress, needs to be established and evaluated. Once completed, the next step of exploreAT! is interlinking these lexical resources with cultural artifacts by means of the concepts. The ZBORZBIRK cross-border collaborative DH project between Slovenia and Italy serves as an example in how it connected both private and public cultural heritage collections gathered within a central repository [47] based on metadata aggregation that also accommodated multilingual access [21]. exploreAT! expands this concept beyond the repository by establishing an innovation network within the OI-RI [44] that allows actors, such as citizen scientists, GLAM professionals, and DH researchers, to exchange know-how, co-create, and co-design ways to make access to culture via digital tools and visualization methods meaningful for their needs and contributions to an international cultural community.

Essentially, we aim to demonstrate how cultural institutions can be perceived as more than centralized repositories, but rather as institutions that can adapt to the, "speed of global media flows, with contemporaneity rather than stasis," [46]. One potential use-case is the connection of the lexical resources to the digital photo database project Topothek [36], which focuses on digitizing community photos on a European-wide basis to make local, regional histories more visible. The science-driven approach behind this interlinking is to connect and highlight not only images, but also the language and biographical stories of the people from various communities. Out of the possible results brought about by these connections, the researchers gain a picture of the cultural identity of this region with the ability to investigate this diverse, transnational identity from various layers (i.e. photographical, biographical, and linguistic). This approach to interlinking exemplifies the notion of socio-cultural history as a mosaic consisting of a plurality of voices and (contradictory) meanings [37].

4.2 The Role of the Citizen within exploreAT!

Citizen Science forms an integral part of exploreAT!, where it constitutes one of the four work packages. In the former WBÖ project, citizens were mainly involved as data collectors and providers, which nowadays would often be considered an outdated concept of citizen science and rather fall under the more frequently employed term "crowdsourcing". Where in many of today’s science projects, citizens are still typically involved through data collection or validation, citizen engagement activities in exploreAT! aim at making the citizen an integral part of the project; the citizen is involved from the very beginning of the design and throughout the multiple stages of the research process, contributing to participatory experiments, common idea collection, and testing and evaluation of existing prototypes and research tools. These various aspects of citizen engagement also closely follow those outlined in the White paper on Citizen Science [32]. The citizens’ contributions in exploreAT! are meaningfully implemented to advance the attainment of the research goals, where they receive feedback and, most importantly, acknowledgment for their scientific work [14]. In this way, exploreAT! aims at acting as a demonstrator project for future (Digital) Humanities projects, creating sustainable workflows and processes moving away from closed to open innovation, by trying to foster eco-system and decentralized innovation networks [22]. Contact with citizens in the project is thus not only limited to individual meetings, but rather the continuous involvement and build up of communities is fostered, working towards sustainable outcomes for both researchers and citizens alike in the form of development cycles and continuous testing until an optimal results is achieved. Working with particular focus groups, i.e. dialect-speakers
and citizens with a multi-cultural background, aims to address complementary views of accessing and approaching our resource.

4.3 Citizen Scientist and Researcher: User Centered Approach – Method

At the outset of the exploreAT! project, initial reviews of existing projects and papers on CS in DH was carried out as a starting point to gather information on the status quo and have a better understanding for future co-design of collaboration strategies between researchers and citizen scientists. As a first step, a review of current Digital Humanities projects and the different ways of possible citizen engagement was composed [13]. A survey investigating the status quo of Citizen Science in Humanities projects was also carried out [31]. Both activities were directly set within the COST ENE network [12] where connections to other fields could potentially be exploited and where they were presented in a collaborative framework. Building upon the knowledge acquired from these investigations, various methods of cross-sectoral experimentation with Citizen Science and GLAM institutions are under consideration in this next step of exploreAT! focusing on interlinking the lexical resources and cultural artifacts. One possible form in which this experimentation can materialize is interactive installations located both within the physical museum space and online.

4.3.1 Interactive Installations

Although it is clear that digital technologies play an increasingly important role in the exposure and preservation of cultural heritage, museums traditionally have been the medium by excellence to present results of humanistic and non-humanistic advances to the general public [4, 46]. Given the intrinsic characteristics of a museum (physicality and specific cultural setting, among others), the design and manufacture of interactive installations has long been a topic of research in HCI (Human-Computer Interaction) and related disciplines.

Embedding technology in everyday environments by making use of Tangible User Interfaces (TUIs) and Tangible Interaction [20] is one of the HCI topics that applies more to the transmission of cultural heritage in many different scenarios, and it is specially relevant to the subject of museum installations and exhibits [9, 11]. Nowadays the application of different computational disciplines to these environments is a key aspect to achieve visitor experiences that are fully aligned with the aims of an exhibition. As it is the case for many Digital Humanities (DH) projects, among which we can include the one presented in this paper, many of their results are achieved by means of the application of technology of diverse natures. This means these results are intrinsically digital and therefore, it would be naive to think of presenting them without employing again the adequate technologies. One of the problems this circumstance presents, and that has been long discussed, is the lack of tangibility of such results. Technology is required in this case in order to bring digital research artifacts back into the physical world, in a process of de-digitization that creates fully functional, representative bodies of the cultural knowledge that is to be transmitted to the visitor.

In this section we present several use-cases of research performed by other authors which we found particularly useful in the context of the project exploreAT! project previously introduced in this paper. We also comment on the applicability of the solutions adopted to our research artifacts and the reasons why we looked upon this selection of works in order to plan the design of an interactive experience for citizens that serves our research goals. A good first example of de-digitization practises is given by other authors in their recent work. The aim of their project was “to investigate the experience of artefact-based memory sharing, focussing on the multi-perspectiveness of different memories as a result of different experiences on the same subject,” [25]. In order to achieve this goal, they interviewed several pairs of participants asking for shared memories they had together. Each participant contributed with one artifact (physical or digital) representative of this shared memory. The created artifacts were then exchanged and a second face-to-face interview was conducted, employing such artifacts as conversation starters that served to conduct a deeper study on how memories are created and retained. In turn, the findings of the study were published and exposed in an exhibition at MSR Cambridge in 2015.

We argue a variation of this approach could fit into the context of the exploreAT! project because of the tight existing relationship between language and memories. As much of our data input sources relies on dialectal dictionaries, we could support, for example, a rich intergenerational dialogue based on the creation of shared memories rooted in the particularities of the language in a certain region. The kind of questions conducted in the interviews could relate to the manner in which certain everyday objects were referred to by the elders, and how younger members of each generation built personal experiences on top of such items. Apart from providing answers to interesting research questions related to our project, such as how people viewed the world at a particular time, this approach would help to create personalized stories and cultural narratives that would persist longer in the hypothetical participants’ consciousness.

However, we believe the triggering of these shared memories would be much more difficult to achieve in our case and, as we commented in the beginning of this section, would have to rely on the outcome of our previous research, which is mainly digital information. In this case, we believe data
visualization is key to create tangible interfaces that could be presented in a museum installation. Relevant authors in the field of data and information visualization have materialized this approach in several experiences that we see susceptible of being replicated in our project \cite{18,38}. By bringing visualization of linguistic data into the physical space of the museum (using table-top displays and other ad-hoc devices alike), we could propose a visual discourse between all the visitors that interacted with the installation, overcoming the limitation that face-to-face interviews imposed in Neumann et al. 2017 and thus facilitating a more plural, massive dialogue sustained in data resulting from our previous findings.

5. **Cultural exploration and exploitation**

The example of the installation, as previously discussed, is meant to function as a tool for all actors to explore and share their knowledge, rather than as another outlet of the “authoritative” voice of the museum. Its implementation is an initiative to bring about a cultural paradigm shift in how actors like citizens, GLAMs, and researchers interact and conduct science with one another. The installation serves as an example of a possible tool that facilitates the user to explore culture from an entirely new perspective. It offers an experience for the user to call upon his or her previous knowledge and consequently enrich it through exploratory discovery: “Meaning is produced by museums visitors from their own point of view, using whatever skills and knowledge they may have, according to the contingent demands of the moment, and in response to the experience offered by the museum,” \cite{19}. The results ideally lead to a more meaningful interaction with digital tools within the museum environment that opens up new insights that can be shared with everyone: “By linking the images to other images, to other kinds of information, and to a wider array of users, the museum supports new opportunities to co-create narratives on their collections, by both museum experts and other users,” \cite{2}. Through the application of culturomics \cite{24}, the interlinking of immaterial and material cultural collections generates the experimental framework to examine and exploit citizens’ stories in order to investigate the cultural identity of not only individuals, but also that of their home region over time and space. Essentially this DH tool seizes upon the diverse perspectives of these heterogeneous actors and links their knowledge together in order to provide a more dynamic, complex understanding of their role and identity within this networked community. The introduction of the OI-RI offers the necessary architecture to facilitate this mutual exchange.

6. **Cultural change and Openness**

The agnostic workflow of this cross-sectoral collaborative co-design phase in exploreAT aims to demonstrate how opening up the research process to heterogeneous actors within an experimental framework generates mutual added value for those involved. The participation and contribution of citizens enables them to gain more insight into their cultural identity/ies, build their own pathways for navigating the data (i.e. based on a particular thematic interest) and consequently make it available for other citizens to explore and build upon. Their active involvement within the exploration of this interlinking of cultural collections ultimately leads to their empowerment by means of meaningful contributions for the benefit of a networked, knowledge society: “[...] ways in which the visitors can ‘walk right into the exhibit’ and thus play a part in producing its meaning, challenging the authority of the museum to produce and regulate their subjectivity,” \cite{46}. For GLAMs, the connections to other cultural sources provide new layers of investigation of their real-world objects. Users are encouraged to view their collections in new ways through novel visualization techniques, resulting in an increased visibility of their collections and participation in contribution projects, such as the Topothek \cite{36}. Moreover, through their participation in this phase, GLAMs gain understanding of the needs of the information society they serve and how their collections can be used to solve complex questions, such as that of creating an inclusive socio-cultural community. Essentially, this phase demonstrates that digitized and analog cultural collections can compliment one another harmoniously. Additionally, researchers benefit from cooperating with citizens and museums through the insights generated by these actors into what aspects of cultural artifacts, both material and immaterial are highly valued - as well as the inverse - during the exploration of the cultural data. By exploiting the diverse ways of thinking and discovering these actors embody, researchers discover new connections and pathways made possible through the actors contributions. Ultimately, the results would lead to democratic experimental scholarship, where each actor’s input is openly credited and considered as equally valuable. In turn, this phase would help bring about the cultural paradigm shift by means of the OI-RI in order to foster a community of inclusivity and mutual interaction \cite{32}.

Certain risks and challenges, however, arise within this open, experimental framework. To ensure that the pathways are not shared with malicious intentions, much oversight of citizen activity is required on behalf of the researchers and the museum. To ensure that citizens understand the task, how to use the installation, for example, and how their contributions and participation in the project will be used, must be clearly communicated and requires a sustainable, mutual dialog among the actors in this cooperation. Considering museums’ authority on providing expertly curated exhibitions and interpretations of objects, these institutions might prove reluctant in featuring citizen-curated content as well as set restrictions on the particular use and reuse of their digitized
collections [33, 46]. One of the other main challenges within this context is to ensure the development and sharing of best practices so that the interlinking of external sources can develop into a thriving, sustainable, growing, liquid innovation network consisting of a strong community of heterogeneous actors, which adapts to their changing needs. As the scope of this paper is the presentation of an agnostic workflow, we aim to conduct an evaluation of the processes previously outlined when we begin this next step in the exploreAT! project.

7. Conclusion and Outline

Concluding we can summarize that an open innovation approach to fostering links between different sectors opens a whole field of new synergies and knowledge networks among museums, citizens and scholarly disciplines. A first step towards engaging young citizens in the design process of prototypes for accessing our resource in the exploreAT! project, is on the way and implemented as interactive workshops in the framework of the Children’s University (KinderUni) in Austria. Community formation and continuous engagement is encouraged. In addition, our participatory approaches so that the interlinking of external sources can develop into a thriving, sustainable, growing, liquid innovation network consisting of a strong community of heterogeneous actors, which adapts to their changing needs. As the scope of this paper is the presentation of an agnostic workflow, we aim to conduct an evaluation of the processes previously outlined when we begin this next step in the exploreAT! project.

A.7 Conclusion and Outline

ACKNOWLEDGMENTS

exploreAT! is funded by the Nationalstiftung of the Austrian Academy of Sciences under the funding scheme: Digitales kulturelles Erbe, No. DH2014/22.

REFERENCES

[1] Anderson, B. [1983] 2016. Imagined Communities: Reflections on the Origin and Spread of Nationalism. Verso, London/New York.
[2] Beaulieu, A. & de Rijcke, S. 2016. Networked Knowledge and Epistemic Authority in the Development of Virtual Museums. In: Museums in a Digital Culture: How Art and Heritage Become Meaningful. Ed. van den Akker, C. & Legêne, S. Amsterdam University Press BV, Amsterdam, 75-91
[3] Benito, A., Losada, A. G., Therón, R., Dorn, A., Seltmann, M. & Wandl-Vogt, E. 2016. A spatio-temporal visual analysis tool for historical dictionaries. In García-Peñalo, F. J. (Ed.), TEEM ’16. Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality. ACM Digital Library, New York, 985-990. DOI=https://doi.org/10.1145/3012430.3012636
[4] Bennett, T. 1995. The Birth of the Museum. Routledge, London/New York
[5] Black, G. 2012. Transforming Museums in the Twenty-first Century. Routledge, London/New York
[6] BMWFW & BMVIT. 2016. Open Innovation Strategy for Austria. Goals, Measures & Methods. BMWFW & BMVIT, Vienna. Retrieved July 9, 2017 from http://openinnovation.gv.at/wp-content/uploads/2015/08/08_Barrierefrei_Englisch.pdf
[7] Brown, T. & Katz, B. 2009. Change by design: How Design Thinking transforms organizations and inspires innovation. HarperCollins, New York
[8] Cameron, F. 2015. The Liquid Museum: New Institutional Ontologies for a Complex, Uncertain World. In: Museum Theory. Ed. Witcomb, A. & Message, K. The International Handbooks of Museum Studies, Vol. 1. Wiley Blackwell, Malden, MA, 345-361
[9] Capurro, C., Nollet, D. & Pletinckx, D. 2015. Tangible interfaces for digital museum applications. Digital Heritage, 2015 1, 271-276
[10] Cheshborough, H. 2003. Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press, Boston, MA
[11] Cioffi, L. & Banon, L. 2002. Designing Interactive Museum Exhibits: Enhancing visitor curiosity through augmented artefacts. Eleventh European Conference on Cognitive Ergonomics. Retrieved July 9, 2017 from http://www.academia.edu/1040569/Designing Interactive Museum Exhibits Enhancing visitor curiosity through augmented artefacts.
[12] COST EN.d. WG4: Lexicography and Lexicology from a Pan-European Perspective. Retrieved July 9, 2017 from http://www.elexicography.eu/working-groups/working-group-4/wg4-meetings/
[13] Dorn, A. & Seltmann, M. 2016. Citizen Science in the context of recent Digital Humanities projects - an overview and outlook. Retrieved July 9, 2017 from http://www.elexicography.eu/wp-content/uploads/2016/08/Dorn_CitizenScience_COST_Barcelona.pdf
[14] European Citizen Science Association (ECSA). 2015. Ten Principles of Citizen Science. ECSA, London. Retrieved July 9, 2017 from https://ecsa.citizen-science.net/sites/default/files/ecsa_ten_principles_of_citizen_science.pdf
[15] FOSTER. Open Science Definition. Retrieved July 9, 2017 from https://www.fosteropenscience.eu/foster-taxonomy/open-science-definition
[16] Furmanov, M. 2017. Why the future of business is liquid. Technology Information Blog. (17 February). Retrieved July 9, 2017 from https://www.accenture.com/us-en/blogs/blogs-max-furmanov-liquid-delivery-model.
Co-Designing Innovation Networks for Cross-Sectoral Collaboration on the Example of exploreAT

[17] Hasso-Plattner-Institut. 2017. Was ist Design Thinking? Retrieved July 9, 2017 from https://hpi-academ.de/design-thinking/was-ist-design-thinking.html

[18] Hinrichs, U., Schmidt, H. and Carpendale, S. 2008. EMDialog: Bringing information visualization into the museum. IEEE transactions on visualization and computer graphics 14.6, 1181-1188

[19] Hooper-Greenhill, E. 2000. Museums and the Interpretation of Visual Culture. Routledge, London/New York

[20] Hornecker, E. and Buur, J. 2006. Getting a grip on tangible interaction: a framework on physical space and social interaction. In Proceedings of the SIGCHI conference on Human Factors in computing systems. ACM, New York, 437–446. DOI=https://doi.org/10.1145/1127722.1124838.

[21] Ledinek Lozej, Š., Peče, M., Ivančič Kutin, B. 2015. Linking local cultural heritage collections from the Slovenian–Italian border region with ICT. Информаційні технології в культурі: квазіінтернетна конференція (IKK 2015). Retrieved June 9, 2017 from http://elbims.inau.ac.rs/files/journals/ncl/27/ncln27p52-64.pdf.

[22] Leimüller, G. 2016. Open Innovation – Der Paradigmenwechsel, seine Chancen und Herausforderungen. Presentation. OI Stakeholder Workshop at the Wirtschaftskammer Österreich (WKÖ). winnovation consulting gmbh, Vienna. Retrieved July 9, 2017 from http://openinnovation.at/wp-content/uploads/2016/01/Präsentationsunterlagen-Leimüller-OI-Workshop.pdf

[23] Message, K. and Witcomb, A. 2015. Introduction. Museum Theory, an Expanded Field. In: Museum Theory. Ed. Witcomb, A. & Message, K. The International Handbooks of Museum Studies, Vol. 1. Wiley-Blackwell, Malden, MA xxiv-xlvi

[24] Michel, J.-B., Shen, Y. K., Aiden, A. P., Veres, A., Gray, M. K., Pickett, J. P., Holberg, D., Gancy, D., Norvig, P., Orwant, J., Pinker, S., Nowak, M. A., and Aiden, E. L. 2010. Quantitative Analysis of Culture Using Millions of Digitized Books. Science 331.6014, 116-82. DOI= https://doi.org/10.1126/science.1199644

[25] Neumann, S., Banks, R. and Dörk, M. 2017. Memory Dialogue: Exploring Artefact-Based Memory Sharing. In Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA ’17). ACM, New York, 884–895. DOI=https://doi.org/10.1145/3027063.3052756

[26] OECD. 2015. Making Open Science a Reality. OECD Science, Technology and Industry Policy Papers, No. 25, OECD Publishing, Paris. DOI= http://dx.doi.org/10.1787/9789264213531-en

[27] Österreichisches Staatsarchiv. 2017. Was ist die Topothek. Retrieved July 9, 2017 from http://www.elexicography.eu/wp-content/uploads/2016/08/Seltmann_presentation_survey.pdf.

[28] Serrano Sanz, F. 2014. White paper on Citizen Science for Europe. Societize consortium 2014. University of Zaragoza, Zentrum für Soziale Innovation, Tecnara, Universität Fedeli Campusina Grande, Universidade de Coimbra, Museu da Ciência da Universidade de Coimbra. Retrieved July 9, 2017 from http://www.societize.eu/sites/default/files/white-paper_0.pdf.

[29] Simon, N. 2010: The Participatory Museum. Museum 2.0, Santa Cruz, CA.

[30] Stevens, M. 2016. Touched from a Distance: the Practice of Affective Browsing. In: Museums in a Digital Culture: How Art and Heritage Become Meaningful. Ed. van den Akker, C. & Legêne, S. Amsterdam University Press B.V., Amsterdam, 13-29

[31] Theron, R. & Vandi-Vogt, E. 2014. The fun of exploration: How to access a non-standard language corpus visually. In Vis-LR: Visualization as Added Value in the Development, Use and Evaluation of Language Resources. Workshop at LREC2014, Ninth International Conference on Language Resources and Evaluation, 1239–1245. Retrieved July 9, 2017 from https://goo.gl/Unkw9.

[32] Topothek. Was ist die Topothek. Retrieved July 9, 2017 from http://www.topothek.de/woas-int/.

[33] Van den Akker, C. 2016. Curiosity and the Fate of Chronicles and Narratives. In: Museums in a Digital Culture: How Art and Heritage Become Meaningful. Ed. van den Akker, C. & Legêne, S. Amsterdam University Press B.V, Amsterdam, 57-73

[34] Viegas, F. and Wattenberg, M. 2007. Artistic data visualization: Beyond visual analytics. Online Communities and Social Computing. 182-191. DOI= https://doi.org/10.1007/978-3-540-73257-0_21.

[35] Walsh, K. et al. 2016. Open Innovation, Open Science, Open to the World – A Vision for Europe. European Union, Luxembourg. DOI=https://doi.org/10.2777/061652.

[36] Wandi-Vogt, E. 2008a. An Expanded Field of Dialektwörterbuch and Sprachatlas. The project „Datenbank der bairischen Mundarten in Österreich electronically mapped (dbo@ema)“. In Elspaß, S. & König, W. (Eds.), Sprachgeographie digital. Die neue generation der Sprachatlanten (= Germanistische Linguistik 190–191). Georg Olms Verlag, Hildesheim, 197-212

[37] Wandi-Vogt, E. 2008b. The participatory museum. A Textbook zum WÖRTERBUCH DER BAIRISCHEN MUNDARTEN IN ÖSTERREICH (WBO) als leistungsstarkes Werkzeug für die lexikographische Praxis. Literary and Linguistic Computing, 23(2), 201–217. DOI= https://doi.org/10.1093/lcl/lqm048

[38] Wandi-Vogt, E. (Ed.) 2010. Datenbank der bairischen Mundarten in Österreich electronically mapped (dbo@ema) [Database of Bavarian Dialects in Austria electronically mapped (dbo@ema)]. Interactive, georeferenced Resources for the Dictionary of Bavarian dialects in Austria (WBO, DBO). Retrieved July 9, 2017 from https://wbo.oeaw.ac.at/project/beschreibung/

[39] Wandi-Vogt, E. & Declerck, T. 2013. Mapping a Traditional Dialectal Dictionary with Linked Open Data. In: Kosm, I., Kallas, J., Gantár, P., Krek, S., Lamenges, M., Tuuliik, M. (Eds.). Electronic lexicography in the 21st century: thinking outside the paper. Proceedings of the eLex 2013 conference, 17-19 October 2013, Tallinn, Estonia. Trojina, Institute for Applied Slovene Studies/Esti Keele Instituut, Tallinn/Tallinn, 460–471. Retrieved July 9, 2017 from http://eklex.elex2013/proceedings/elex2013-proceedings.pdf

[40] Wandi-Vogt, E. 2017. Das Ende des brodhaus de enkens, eine open innovation infrastruktur (OI-IR) für die lexicographie. Invited lecture. Institut für Deutsche Sprache, Mannheim, DE. DOI= https://doi.org/10.13140/RG.2.2.36325.91368

[41] WHO = Wörterbuch der bairischen Mundarten in Österreich electronically mapped (dbo@ema) [Database of Bavarian Dialects in Austria electronically mapped (dbo@ema)] (WKÖ). winnovation consulting gmbh, Vienna. Retrieved July 9, 2017 from http://openinnovation.at/wp-content/uploads/2016/01/Präsentationsunterlagen-Leimüller-OI-Workshop.pdf.

[42] Wandi-Vogt, E. & Declerck, T. 2013. Mapping a Traditional Dialectal Dictionary with Linked Open Data. In Kosm, I., Kallas, J., Gantár, P., Krek, S., Lamenges, M., Tuuliik, M. (Eds.). Electronic lexicography in the 21st century: thinking outside the paper. Proceedings of the eLex 2013 conference, 17-19 October 2013, Tallinn, Estonia. Trojina, Institute for Applied Slovene Studies/Esti Keele Instituut, Tallinn/Tallinn, 460–471. Retrieved July 9, 2017 from http://eklex.elex2013/proceedings/elex2013-proceedings.pdf

[43] Wandi-Vogt, E. 2017. das ende des brodhaus de enkens, eine open innovation infrastruktur (OI-IR) für die lexicographie. Invited lecture. Institut für Deutsche Sprache, Mannheim, DE. DOI= https://doi.org/10.13140/RG.2.2.36325.91368

[44] WBO = Wörterbuch der bairischen Mundarten in Österreich. Bayerisch-österreichisches Wörterbuch: 1. Österreich. Österreichische Akademie der Wissenschaften (Ed.) Verlag der Österreichischen Akademie der Wissenschaften, Vienna.

[45] Wandi-Vogt, A. 2003. Der Paradigmenwechsel, seine Chancen und Herausforderungen. Presentation. OI Stakeholder Workshop at the Wirtschaftskammer Österreich (WKÖ). winnovation consulting gmbh, Vienna. Retrieved July 9, 2017 from http://www.elexicography.eu/wp-content/uploads/2016/08/Seltmann_presentation_survey.pdf.

[46] Wandi-Vogt, E. 2017. das ende des brodhaus de enkens, eine open innovation infrastruktur (OI-IR) für die lexicographie. Invited lecture. Institut für Deutsche Sprache, Mannheim, DE. DOI= https://doi.org/10.13140/RG.2.2.36325.91368

[47] ZBORZBIRK. 2017. Retrieved July 9, 2017 from http://zborzbirk.zrc-sazu.si/d-sj/domovasp