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# A Digital Strategy for Arts

## Digital Arts' White Paper on AU's Digital Strategy 2016

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**D**igitization and digital media have generated a rapid proliferation of data that is unprecedented in the history of man. This digital surge is transforming knowledge discovery and understanding in every domain of human inquiry. Digital research, computing, data management, and data-intensive methods will therefore become integral parts of internationally-leading research in the humanities and arts. At Aarhus University's Faculty of Arts (Arts) the digital transformation is still new and has had limited impact on the majority of researchers and their research activities. Arts does, however, encompass several research groups that have invested in digital research for a number of years. In this white paper, representatives from these groups outline central elements (state of the art, challenges, and solutions) of the digital Arts with the objective of contributing to Aarhus University's Digital Strategy 2016. We envision an arts faculty where digital and computationally informed research is a natural and integrated part of conducting humanities research across every domain instead of an epistemic obstacle that belongs to particularly ambitious or avant-garde research groups. In essence, we want to consolidate and expand the role of humanities domain expertise in the era of digital data.

### Current and Future States of the Humanities

Within the last two decades the arts and humanities have become more and more entangled with the digital because our research objects are becoming digital. In 2000 75% of all stored data in the world were stored in analogue form (paper, film, photographic prints, vinyl, magnetic cassette tapes, etc.); in 2007 this had shrunk to 7%, and in 2012 a merely 2%. In some cases the digital material is based on digitization of non-digital artifacts, in other cases the digital material is born-digital which means that it exists in digital form only.

This fundamental change affects all phases of the research process within the arts and humanities, including the collection of data, the use of digital analytical tools and methods, and dissemination and interaction with stakeholders. Digitization of the cultural heritage, for instance, and new orientations towards archival studies, distant reading and large-scale quantitative approaches are transforming a number of disciplines, which challenge disciplinary barriers and make interdisciplinary competences and collaboration necessary.

To be able to benefit from the many new possibilities of having data in digital form, there is a need for support in all research phases in the form of technology, IT-developers, competency development, community building, and fostering of critical thinking about digital technologies and the humanities. There is an ubiquitous need for robust and targeted research data management structures that support all research phases, including the storing of data af-

ter a research project. It is paramount that Arts can support initiatives on all fronts (research, teaching and communication) that use digital data from past and present. Text mining of massive historical corpora or automated analysis of millions of social media images offer new methodological challenges and opportunities for producing new original insights. To include the humane, cultural and social aspects in applications of computer algorithms and digital data in all aspects of human society, Arts must support acquisition of interdisciplinary and technical skills, not just at a developer level, but as a strategic focus area that assists current and future Arts researchers in computational thinking and practice, data life-cycle, and quantitative modeling. Interdisciplinarity should be encouraged, not just as a way to acquire new skills, but as a recruitment strategy for future research environments.

## **Societal Impact and Shaping Future Societies**

Information technologies present two immediate challenges where arts and humanities play a pivotal role.

First of all, the increased ‘datafication’ of numerous aspects of life present many opportunities for understanding complex networked relations. The general assumption is that data and data analytics lead to efficiency and informed decision-making within business as well as the public sector. However, data in itself does not contain any information. The insights depend on what you do with the data: what data should be brought together? How should one interpret correlations, regressions, etc.? For instance, techniques to detect, analyze and visualize public contention over topical affairs online deeply depend on critical skills to select data that should be brought together (images, posts, newspapers, blogs, etc.). In other words, the deployment of algorithms to understand a communicative process demands not only the technical skills to structure data, but also a specialized insight into communication or political affairs. The knowledge and analytical skills of arts, humanities and social sciences is pertinent in the transition from data to valuable information.

Secondly, the deployment of information technologies often poses problems that are not technical, but human. E.g., the introduction of IT at the workplace (in the 1980ies) was often deeply alienating, and fundamentally changed the conditions of labor. Humanistic studies of IT have for decades been engaged in understanding the correlation between technical

infrastructures and human values and behavior, and also developing IT designs and design techniques that ensure an appropriate correspondence. This challenge persists, but is also expanded into larger areas of society: cultural consumption and production, social interaction, leisure activities, urban planning, surveillance, etc.. The introduction of IT into these areas typically involves heavy datafication, and calls for new insights into how the data capture and algorithms reflect modes of choice, values and conduct how they e.g., effectively single out minorities, particular behaviors, etc., while ignoring others. At a human scale, this may produce new kinds of alienations, where arts and humanities play a critical role in legal, ethical, or aesthetical considerations, as well as a practical role in developing better technology designs and methods.

To meet these societal challenges, research and education within the arts and humanities need to develop the necessary skills to handle data sets from multiple sources that are not harmonized, and in many cases not even publicly available. Hence, across the faculty there is a great need for freely available data and open standards combined with technical training to develop skills and critical understanding. Aarhus University has since the 1980ies invested heavily in developing a humanistic IT department with close ties to science and technology research, businesses and public institutions. This has created an environment with a high degree of impact both through graduates that participate in shaping companies and organizations’ mindsets, and through research collaboration with external partners. This impact deeply depends on practical engagement with and exploration of information technologies. Hence, there is a need for specialized laboratory facilities for research and education in IT. Finally, in projects that aim at detecting, analyzing and visualizing societal challenges (e.g., welfare, globalization, radicalism, urbanism, migration, etc.) through various modes of data analytics, interdisciplinary collaboration within the arts and between the arts and sciences may generate important insights, which leads to a need for incentivizing and supporting interdisciplinary cross-pollination at Arts.

## **Support Units, Laboratories and Research Commons**

Digital methods have become an integrated part of most Social Science and Humanities (SSH) research projects. They often require specialized skills and in-

sights into both the digital aspects and the involved SSH disciplines. The establishment and maintenance of these competences constitute a major challenge. The interdisciplinary competence requires time to establish and often strains the resources of individual research projects. Likewise, the specialists often find themselves academically isolated and in volatile positions relying on insecure funding prospects. This makes it difficult to retain these persons resulting in repeated losses of significant investments in competence building.

We propose that in research milieus where related skill requirements have reached a certain volume, the establishment of dedicated support units funded primarily by the pooled resources of research projects could be an efficient response to these challenges. The units would be closely integrated with specific disciplines and their competence profile would be defined over time by the portfolio of projects, but at the same time they would be self-administering with a degree of financial stability and constitute a collegiate group. Furthermore, the specialized competence could be developed into service capacity for external parties beyond the university.

Archaeology constitutes an existing example, where resources from research projects across Aarhus University and Moesgaard Museum have been pooled to establish the Archaeological IT Unit, which has now been in existence for more than 10 years and presently has five employees and three affiliated PhD projects. The unit also provides services for external parties within the Heritage sector with about 50 % of the income today originating from these external parties. The unit has recently started to house projects and activities, which are independent of the research projects, particularly in connection with national and EU digital research infrastructure building.

In order to produce state of the art research, we need to acknowledge and support the establishment of research commons and 'dry' laboratories as seen in the computational sciences. Given their interdisciplinary and collaborative nature, the success of digital research projects is critically dependent on continual interaction and shared problem solving among the involved researchers. Laboratory organization solves this problem by physically locating researchers in a space that is designed to accommodate their project-specific work patterns at the levels of functionality, productivity, security and sustainability. Research commons, spearheaded by university libraries, represent a similar communal solution where dedicated and technologically enhanced collaborative spaces

are created with the goal of integrating research, support and technology. In contrast to laboratories, research commons are typically not dedicated to one particular research agenda and might therefore be shared by several loosely connected projects. There are examples of both types of research organization among the digital research groups at Arts, but they are established at the sole initiative and expense of the researchers. We therefore propose that part of a digital strategy is to facilitate and incentivize the organization laboratories and research commons. These models for communal research organization are more than a precondition for successful digital research projects, they can be very cost-efficient alternatives to the prevalent one-researcher-one-office model.

## Digital Infrastructure

With their central role in MediaStream, the Danish netarchive.dk, and Kulturarvsclusteret, the State and University Library (SL) represents a central data and supercomputing infrastructure for Arts. Several digital research projects at Arts are currently collaborating with SL, but we expect this will increase exponentially over the next decade.

The library has several systems for accessing the digital collections that were developed for qualitative research in the radio, TV and newspaper collections (Mediastream) and the web archive (netarchive.dk). To open the collections for quantitative and data-intensive methods, SL has in collaboration with the Danish e-Infrastructure Cooperation (DeIC) established Kulturarvsclusteret, a national supercomputer facility for SSH. Along with the cluster, Kulturarvsclusteret offers a set of template-based tools that allow researchers with limited technical skill to use basic data analytics on unstructured data. For more advanced analytics, tools widely used in data science and computational/digital humanities are also available (Hadoop, Spark, Python, R) and SL can provide technical support. While the primary focus is on research projects that utilize the national collections as data source, the cluster is also available for projects with other data sources. Currently, the cluster is funded for a three year period after which it will have to be financed by income-generating activities, which is the standard for supercomputing facilities in the natural and technical sciences. That research projects have to factor in costs for access to supercomputers and technicians represent a significant challenge to Arts. External funding bodies are

not used to funding large infrastructural and technical components for the Arts and, at times, seem ill-equipped at handling this. Several digital projects have experienced budget reductions on computing and data management items. A related challenge is the necessity for external funding to gain access to supercomputing facilities. This will limit the access to computing infrastructure for the humanities where funding is scarce and technological alternatives are not available. We therefore suggest that alternative ways to finance access to supercomputing are considered in a digital strategy.

Finally, at a general level it is a strategic goal for AU to collaborate with international infrastructure initiatives such as Clarin-ERIC (text corpora and NLP tools), Darjah ERIC (teaching and storage), Text-grid and Ariadne (archaeology) and national infrastructures such as DIGHUMLAB (community and selected tools) and DeIC (supercomputing and data management). Furthermore, it is a goal to ensure access to and use of digitized collections (data infrastructure) independently of their origin and form, and Arts should work towards establishing collaborations across disciplines and institutions to support research into these collections.

## Summary

In this white paper we have proposed several components of a digital strategy for AU Arts with the goal of integrating digital and computationally informed research in every research area at Aarhus University's Faculty of Arts. We want to grow new and support existing world-leading digital research at Arts and strengthen the societal impact of humanities domain expertise. We have presented four general challenges (current/future states, societal impact, support units, digital infrastructure) that collectively point to the need for support (technology, developers, competency development, community building and critical thinking) in all research phases and the necessity of introducing a human dimension into data analytics and IT design. In contrast to the other faculties, competency development, technical support and communal research organization are of particular importance to the Arts, which reflect that Arts, with few exceptions, is at the beginning of a digital transformation.

For competency development and technical support we suggest that 1) acquisition of interdisciplinary and technical skills should be a strategic

focus area for Arts in order to facilitate innovative and sustainable digital research environments, and 2) creation of dedicated support units with a degree of self-administration and financial stability should be a priority. For communal research organization we suggest that support for interdisciplinary collaborative research is of utmost importance in a digital strategy specifically through 3) incentivizing and supporting interdisciplinary collaboration within the arts and between the arts and sciences, and 4) facilitating alternative communal organization of research groups in physical laboratories and research communes. Turning toward more general concerns for data and computing we suggest 5) support for the use of the small-to-big digital data spectrum in research, education and communication, 6) robust and targeted research data management for the entire data life cycle, 7) focus on the challenges related to heterogeneous and unstructured data, 8) (whenever possible) Arts prioritizes publicly available data and utilizes free and open standards, 9) development of alternative strategies for encouraging and funding supercomputing that are tailor-made for the Arts, and, finally, 10) a general commitment to national and international digital and data infrastructures.

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