ARIADNE Innovation Agenda and Action Plan

Introduction to the preliminary version

In the Innovation Agenda and Action Plan, ARIADNE promotes coordination amongst on-going efforts in building e-infrastructures, data and knowledge resources for archaeological research in Europe and beyond. It hopes this will foster synergies and yield the results needed by the research community.

The Agenda aims to identify the innovation needs of the archaeological research and data management community in Europe over the next 5-10 years, and suggest actions on how to meet these needs. The preliminary report is about the immediate needs, recommended actions and measures to be taken in the identified priority areas.

One major topic of the Innovation Agenda and Action Plan is "open data". Many archaeologists are not ready yet to make data openly available to others outside their research project or organisation. Therefore ARIADNE is aiming to contribute to the emergence of a culture of open sharing of archaeological data, trusted data archives, and creating data resources that are interoperable and re-useable.

The Agenda does not promote a "technology-push" view of innovation and take-up of new digital practices in archaeological research. ICT systems/tools and services are playing an important role in enabling novel archaeological research methods and practices, for example the use of GIS and 3D methods in the analysis of archaeological sites. But progress also depends on potential users' readiness to adopt and benefit from advances in technology.

Sources and methods

ARIADNE has carried out user needs surveys, interviews and background studies to understand what kind of services archaeological researchers expect from the ARIADNE e-infrastructure. The Innovation Agenda and Action Plan build on the results of these studies and further research to provide evidence for suggested actions in the innovation agenda.

Focus areas

The preliminary innovation agenda identifies 5 focus areas for the next 5-10 years:

o *Research e-infrastructures and digital resources:* data infrastructure for archaeological research, including coordination with infrastructures of related domains; mobilization of high-quality data from relevant sources;

o *Culture of open sharing and re-use of data:* open data policies/mandates, removal of barriers, and promotion of data sharing, re-use and citation;

o *Data archives and curation of archaeological research data:* reliable and cost-effective community archives for long-term data curation and access;

o *Capacity building for open data sharing:* institutional policies, guidance, training and other support for open data practices;

o *Providing services and enabling novel applications:* provision of data services (e.g. dataset registration, cross-archive search and other services), and support for further novel applications for archaeological research.

Context

Research e-infrastructures, digital archives and data services have become important pillars of the scientific enterprise, which in recent decades has become more collaborative, distributed and data-intensive. There is an increasing need to enable resource sharing over e-infrastructures by pooling data resources, tools and services, supporting online team-based and cross-disciplinary collaboration. There is the expectation that open access to re-useable and interoperable data will have an impact on the innovativeness of research.

However, the fact is that today many data resources are not accessible or discoverable due to attitudes and practices that are not favourable for open data sharing. There are two general challenges facing initiatives for research data sharing. The first is building capacity and the second coordination across different initiatives. In addition there are discipline-specific requirements that need to be fulfilled. Tackling these will enable e-infrastructures to play a significant role in enhancing research practices and bringing about transformative innovation in the humanities and archaeology.

Capacity building in open sharing of research data

The open data movement proceeds fast in some fields of the natural sciences, but the situation in the humanities is more difficult and requires capacity building, leadership and support. Dedicated training and support of users is lagging behind the implementation of the technical infrastructure. Changes in curriculums are necessary for the transition to open data practices. The responsibility for open data readiness lies with university departments, research institutes, and academic and professional associations.

There is a clear need for skilled data managers at all levels, research projects, institutional and community repositories, and research e-infrastructure and services. The challenge of building and retaining a workforce of research data curators should not be underestimated.

Coordination across the different levels of e-infrastructure

There are different levels of data management including:

- o *Local – university departments/institutes and research libraries:* support for individual researchers and projects.

- o *National – community-level data archives:* offer long-term storage, curation and access, and act as centres of expertise in data management, typically for certain domains.

- o *European/international – major e-infrastructures:* enable transnational online access to data archives, services and tools, promote standards setting, leverage national efforts, and support international collaborative projects.

The presence of very different stakeholders and resources (e.g. research institutes and laboratories, cultural heritage agencies, museums and archives), and generally tight funds, necessitate cost-effective solutions that allow benefits at the community-level. Lack of co-ordination means that available digital resources are difficult to access and integrate, more expensive to run, and cost-efficient operation and sustainability of the e-infrastructure and services is unlikely.

The primary challenges to building a rich, coherent and sustainable ecosystem of e-infrastructure and services do not lie in technology, but in coordination among all actors, building capacity and trust, managing the legal aspects and, of course, costs. ARIADNE, as a European Union funded "Integrating Activity" project, can play a major role in this regard for archaeology.

Actors and activities

The Innovation Agenda distinguishes three fields of activities:

- o Data mobilization and sharing through accessible digital archives/repositories,

- o Integrated data access through data infrastructure and services, and

- o Re-use of data in further research, in particular collaborative research supported by e-research tools and environments.

The figure below gives an overview of the actors and activities involved in mobilizing data and data sharing, enabling access to research data through digital archives, e-infrastructure and virtual research environments, and collaborating in its re-use.

	Data mobilization and sharing	ARIADNE e-infrastructure and services	Collaborative data (re-)use
Data sharing, access and (re-)use	Open data policies & mandates Capacity building of institutions and researchers (training and other support) Data management & access plans Institutional repositories and community-level data archives (national, domain-based) Sharing of open, re-useable data (incl. standard metadata and common vocabularies)	Networking and interoperability of data archives / repositories Data registration, catalogue of data sets and collections Data portal services (cross-archive data discovery, access and other services) Data mobilization support (e.g. guides to good practice) Collaboration with other other e-infrastructure and service providers	(Re-)use of shared data in new research projects (data from different institutions and countries) Virtual research communities / environments (VREs): collaborative e-research across organizations, countries, and disciplines Enhanced integrative research, comparative analysis and broad synthesis
Actors involved	Research funders Researchers and data managers of research projects Curators of domain archives and institutional repositories Research support services (e.g. university libraries) Academic/scientific publishers	Data archives / repositories connected to community e-infrastructure Providers and managers of data infrastructure and services, ARIADNE and others Providers/curators of special resources and services (e.g. vocabularies like gazetteers, thesauri, ontologies)	Research projects / collaborations Developers of open source e-research tools VRE builders and managers Distributed computing (Grid/Cloud) infrastructures and services

Overview of innovation actors and activities

Time horizons

The ARIADNE Innovation Agenda and Action Plan has two time horizons:

Horizon	*Innovation focus*
5 years (2020)	Open data sharing, data interoperability, and data access e-infrastructure & services
10 years (2025)	Novel ICT-enabled archaeological research ("e-archaeology")

In general, the priorities in the 5-year horizon are the same for archaeology, the humanities and most other disciplines. They concern growing an open culture of research. This is an immediate priority that will continue to require attention beyond the 5-year horizon. Other innovation topics clearly fall more in the 10-year horizon, in which a stronger demand for ICT-enabled archaeological research ("e-archaeology") can be expected.

5-year innovation horizon and ARIADNE

The objectives and recommended actions in the 5-year horizon of the Innovation Agenda and Action Plan centre on immediate challenges of open data, digital archives and e-infrastructures for data discovery and access. ARIADNE can contribute to these goals, for example, through promoting open access archaeological data, offering guides to good practices and supporting capacity development. The ARIADNE e-infrastructure and data portal will provide integrating functionality and services on top of existing data archives. The portal will offer a core set of services for the archaeological research and data management communities.

10-year innovation horizon

The *final* Innovation Agenda and Action Plan aims to create a roadmap towards potentially transformative innovations and substantial changes in archaeological research practices with a focus on digital resources and ICT-enabled research. However, a breakthrough in the next five years towards wide sharing and re-use of open data would already be a transformative innovation.

Report download

ARIADNE Preliminary Innovation Agenda and Action Plan. November 2015, http://www.ariadne-infrastructure.eu/Resources/D2.3-Preliminary-Innovation-Agenda-and-Action-Plan