An Agile, Cloud-based Framework for Aggregating Small and Large Cultural Institutions Across Europe and Beyond

POSITION PAPER

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ABSTRACT: It is widely accepted that the cross-cutting nature of research in social science and humanities needs joint input and solutions from different research specialisms, requiring a fundamental change in the traditional discipline-based approach. Thinking, designing, and operating in 'silos' cannot produce adequate solutions to meet the constantly evolving societal and cultural requirements across Europe. State-of-the-art cloud computing and data management technologies allow for the digitalization, storage, and integration of large, geographically distributed sets of cultural data. Approaches for service creation and management foster access and innovative scientific as well as economic utilization of these data. We propose the creation of an agile, cloud-based framework that has been specifically designed to aggregate stakeholders in order to amplify the evolution of the use and reuse of the collections of both large and small cultural institutions.

INTRODUCTION

It is widely accepted that the cross-cutting nature of research in social science and humanities needs joint input and solutions from different research specialisms, requiring a fundamental change in the traditional discipline-based approach. Thinking, designing, and operating in 'silos' cannot produce adequate solutions to meet the constantly evolving societal and cultural requirements across Europe. An increasingly dynamic socio-economic and technical landscape requires an agile, digital, framework that has been specifically designed to aggregate stakeholders in order to amplify the evolution of the use and reuse of the collections of both large and small cultural institutions. Further, that collections can be shared and proactively used to promote the articulation of both a common European and local identity through innovation in the telling of narratives. Examination of user-requirements in relation to the place, time, and device used in the consumption of collections is of increasing complexity, requiring a more sophisticated coupling of understanding of user-habits and preferences, with corresponding responsive producer responses. All this indicates the need to draw together a range of researchers with curators and platform developers.

In this position paper, we present an analysis of challenges to be taken into account when developing and operating a platform as the proposed one (Section 2). Elements of a framework solutions are discussed in Section 3 (organisational) and Section 4 (technical). Finally, a roadmap towards a deployment in Europe and beyond, is presented in Section 5.

CHALLENGES

A framework for the scientific and economic exploitation of digitalized cultural contents has to meet the following challenges:

- Models for scientific usage that outline how the platform can be used to conduct experimental and comparative research involving live users.

- Business models will be developed to understand how to make the platform and the associated eco-system sustainable. It is important to make those models useable to a large variety of users and contributors, including large museums as well as small (micro) ones, large, medium and small industry in Europe and beyond, as well as end users. In particular, ways to compensate end users for contributing data (and hence, to the European

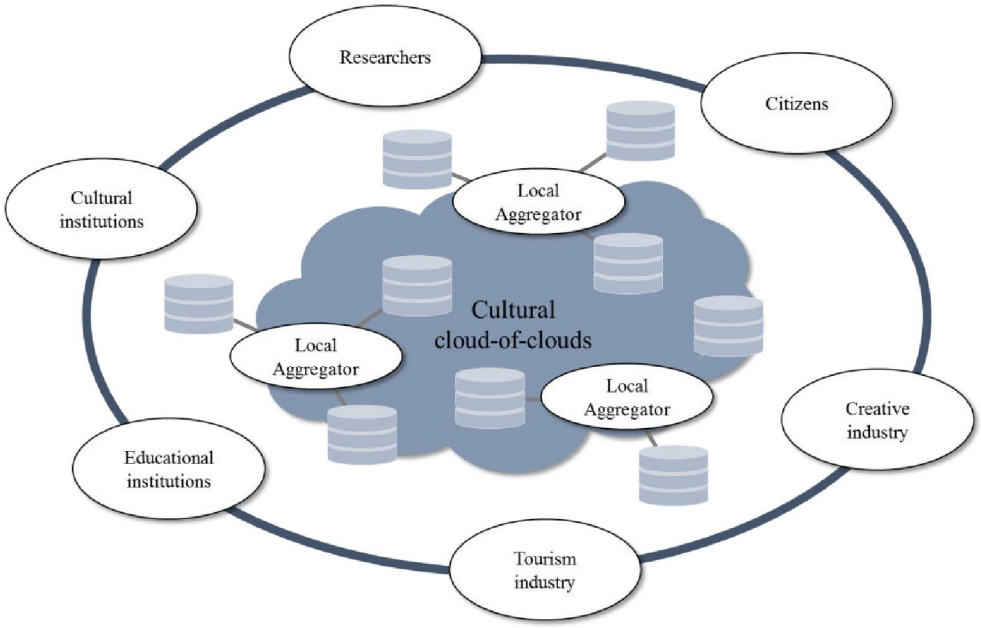


Figure 1. Local aggregator network.

Cultural Heritage) need to be available.

- Management of digital rights need to be considered when disseminating contents through the proposed platform.

- A strategic analysis of the ways data and meta-data of the platform is accessed by various stakeholders is important to define technical mechanisms for authentication and authorization.

- Finally, when working with PII related to end-users of the platform data protection issues occur. Therefore, in order to make user data available for exploitation, compliance with national and international regulations needs to be ensured.

- Technical challenges include: Definition of data and meta-data formats and interfaces for data exchanges, querying and resource sharing based on a number of well-accepted standards, provisioning of effective APIs for service access and composition by 3rd parties, unified business functions for account management, usage monitoring, billing and payment, license management, etc.

ORGANISATIONAL FRAMEWORK: LOCAL AGGREGATOR NETWORK

The platform has to provide a network that interconnects relevant stakeholders from various geographical regions, comprising of nodes that accumulate management of and access to local cultural contents. Those local aggregators will be specific organisations that aggregate and provide access to digital archives such as the cultural offices of municipalities, Associations, and local museums and universities, etc.

The diagram shown in Figure 1 illustrates the conceptual view on this eco-system:

- A number of actors form the eco-system for exploitation and access to digitalized cultural assets for various purposes, of interest to researchers, citizens, tourists, cultural institutions, creative industries and so on.

- These stakeholders use a common set of added-value services to access, enhance, or contribute to the available pool of digitalized cultural assets. They also software services for, e. g., building of narratives on cultural contents, support for touristic activities, or annotating photos with

stories providing personal perspectives.

- The aggregator for the eco-system is a cloud-based platform: An integrated federated cloud that allows for the mutual access to contents, services, and tools, provided by the local partners.

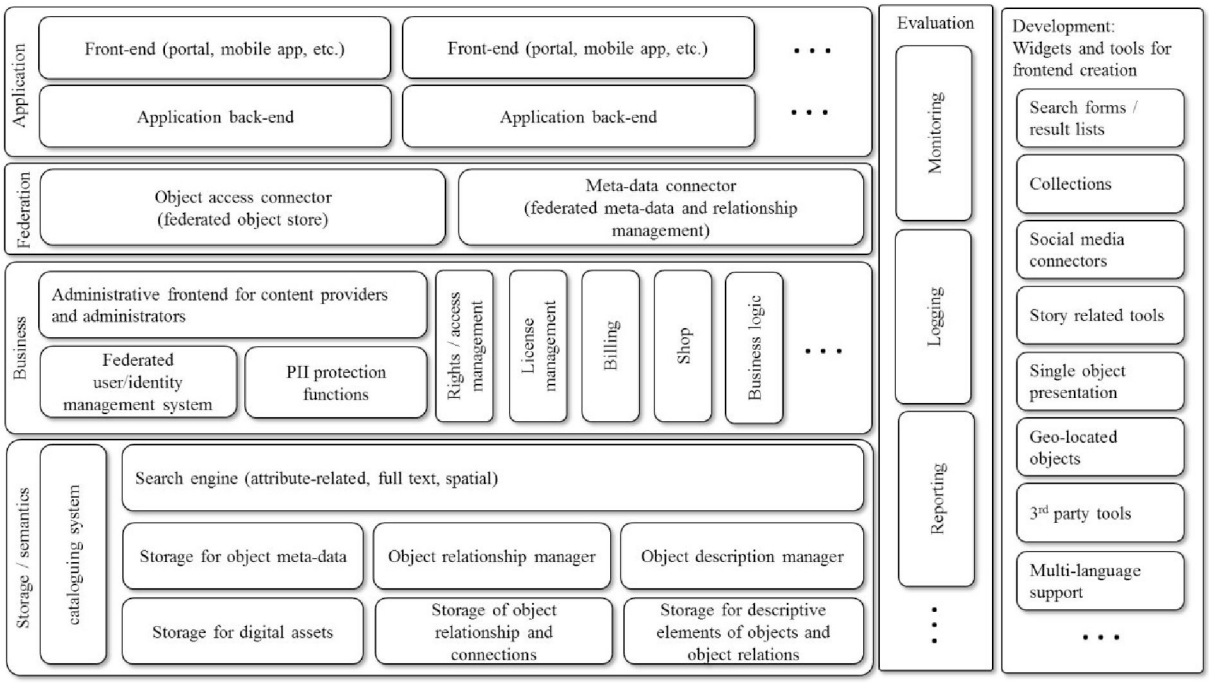
TECHNICAL FRAMEWORK: AN ENGINE TO SHARE CULTURAL KNOWLEDGE

The process of creating digital access to culture has so far focused on the digitalization of objects on-site and the creation of public online catalogues. Results in these areas are quite impressing, but to create an online experience and involve the general public, it takes more: Digital objects need to be available online to be embedded them in a context – narrative and local, to make it relevant for more audiences. We must enable the content providers to do so in an easy and cost-efficient way.

Local aggregators need the following tools and software as part of the platform (see Figure 2):

- **Application:** Interfaces to connect the platform with application servers and front-ends.
- **Federation:** Connectors to distribute information and access on objects and on meta-data on objects and interlinkage between objects.
- **Business**: Functions for user and identity management, access control and licence management, billing, shop functions, etc. In addition, functions related to the protection of PII and enhancement of privacy are placed on this level.
- **Storage/Semantics**: A cataloguing system and a backend online storage system to manage cultural objects, relationships between objects, descriptive elements, search functionalities, etc., based on meta-data standards to represent these information in a unified way
- **Evaluation**: Functions for monitoring, logging and reporting to make usage related data of the platform available for scientific and economic utilization.
- **Development**: Widgets, templates and tools for frontend creation, 3rd party service development and composition.
- **Security**. In community based portals as the proposed platform intends to develop security aspects are crucial for

Figure 2. Tentative system architecture.



ensuring privacy and data reliance. However, security requirements are limited to typical albeit important standard security issues such as protecting privacy on the community platform, secure communication between client and server (certified messaging), secure cloud with protection against attacks, secure data sets for avoiding unwanted changes (hash-codes), public/private indication of material (photos to be shared, not to be shared), and secure transactions for payments in on-line shops, for merchandising, and licensing.

ROADMAP

A roadmap for the deployment of a platform as proposed in this paper as to address multiple levels: The society that is supposed to use the platform, scientific and business actors that utilizing its contents and functions, cultural institutions as major provider of contents, and finally, the technical realization of the platform:

Building regional cultural communities. Digital technologies have created novel ways for the conservation of cultural contents. An increasingly growing part of the cultural heritage of Europe is already available in digitized form. Projects and organisations such as Europeana work on technical solutions to make digital assets electronically accessible und useable for scientific, educational, and economic purposes. A large part of these contents is related to geographic locations: European regions and cities. Digital access to cultural assets offers the opportunities for a variety of actors to engage into a discourse on cultural identities, and to form city-level cultural communities based on a shared interest of understanding, interpreting, and exploiting culture. These City Cultural Communities foster the co-working and co-creation of citizens, researchers, students, pupils and enterprises on specific cultural heritage that, when interlinked, will create the above mentioned eco-system.

Fostering the emergence of new research questions. When looking for European identities, research work is as much analytic as it has to be creative: The interpretation of European cultural heritage has to be performed in an interactive, participatory way involving all relevant actors, and has to concentrate both on understanding and on the creation of knowledge. Hence, community building has to aim on an environment in which such research initiatives can be realized.

Changing the nature of cultural institutions. Traditionally, the services of cultural institutions such as museums, theatres, or libraries are based on a producer/consumer relationship with their customers. They select and interpret contents on behalf of their customers, chose the mode of presentation, and assume that customers are content with merely using services as they are, without much ambition or competence on their own. Therefore, by allowing regional cultural communities to participate actively in the way culture is presented and consumed, has the potential to change the nature of cultural institutions towards an interactive and innovative way to work with customers.

Creating market opportunities for tourism and creative industries. Commercial exploitability of digitalized cultural assets is not only a pre-requisite for a sustainable platform, but also a driver for innovation. Effective business models are required to realize a long-term initiative to make a large portion of the European cultural heritage accessible and useable for various actors including European creative and tourism industries. In creating new value chains comprising the provisioning of contents, its presentation, the development and provisioning of added value services, integration of associated businesses such as restaurant or public transport, this has the potential to create market opportunities and – in the end – jobs, and encourage investments in particular in culture-rich regions of Europe.

Connecting the dots: Enabling cultural city networks. Europe is a mosaic of regions with different cultural, societal, and economic characteristics, which are connected by a large variety of relations: history, trade, politics, migration, etc. These relationships have to be made visible by federating the access to digitalized cultural assets across Europe, starting with a limited set of archives located in the selected European cities acting as initial local aggregators. Moreover, effective technical interfaces, standards, and guidelines

have to be made available to make contributions to the platform by other institutions acting as local aggregators feasible.

Transformation: Towards an European cultural agent. The ultimate goal of the proposal is to enable a transformative impact to the European society by diffusing the classical relationship between actors engaged in preserving, curating, interpreting, and presenting European cultural heritage, and those who merely consume it. Our goal is instead to create a "cultural agent", that is an active stakeholder who actively participates in the interpretation and creation of culture.

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