FROM COLLECTION TO MUSEUM MANAGEMET SYSTEMS.
A CRITICAL REVIEW OF DEMANDS AND FEATURES

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Abstract

Many national and international documentation and digitisation projects, procurement procedures and tenders describe an optimized information flow within museums and cultural institutions in order to keep the ever growing explosion of data manageable in a human and sensible way, allow simple data still to be compiled and retrieved as meaningful information. At the same time the very same projects and tenders show an infinite desire for additional functionality, flexibility and personalisation.

Relief is promised by requesting all kinds of standards. Standards for data entry, object description, procedures, data export, data import, metadata, harvesting, vocabularies and access, as well as for the technical format of data. While the museum professional should not be bothered too much with these guidelines and rules, the developers of collection and museum management systems have a hard time to keep up with all these rapid developments and growing demands – often getting into a kind of marketing race about the number of acronyms, which is supported by this or that one system.

The key question is: "How do the facts of increasing demands, the growing number of standards, the education of museum professionals and budget concerns within cultural institutions go together?"

INTRODUCTION

This paper shall raise questions and stir discussions about the potentially evolving gap between growing demands, developing standards and limited museum budgets in relation to the situation of professional software developers, who create collection and museum management software for the cultural sector.

Examples and numbers will be given from the experience of hundreds of documentation projects and implementations of collection management systems – from the professional and from the commercial point of view. The whole discussion about the supposedly alternative of in-house custom developments has been finished years ago and might fill another paper another time.

CHANGES DO ACTUALLY HAPPEN

It is highly interesting to follow the changes in museum management and collection management over the last two decades. While in the late 80s and early 90s computer technology and data storage was still expensive and the very first documentation systems focused exclusively on the main inventory and the scientific documentation of cultural objects, nowadays museum missions focus much more on visitor- and user-experiences, participation, networking and collaboration between cultural heritage institutions.

Internal procedures are supposed to get streamlined, workflow optimized, communication faster and better – today it is absolutely not uncommon, that museum managers expect a collection management software to serve as tool enhancing the productivity of their employees and to serve as a tool to reduce "cost per exhibition". Information aggregation and extensive re-use of data in different settings and products is meant to save time and money, while improving the quality of the museum's work at the same time.

Many of the new paradigms of museum management and museum services actually developed directly out of the ever expanding possibilities of computer hardware and software – something like "social tagging" would be unthinkable without internet. And the expectations grow at least with the same speed as the technology changes and expand into more and more work spaces.

A COLLECTION OF DEMANDS

As one of many collection management software developers over the last years we received many national and international tenders and procurement documents from collections and museums of all kinds and sizes. It is a simple fact which is extractable from those papers, that the demands towards a collection or museum management system grow constantly and fast. While this is no surprise and seems "natural", quite a surprise was to learn, that the number and quality of demands and requested features has not necessarily any relation to the size of the museum or the available budget for the project.

One reason for the rise in demands is the growing computer literacy and knowledge of those writing the specifications within such a process, who are not always the end-users of the same system. A certain part of the museum community also is much more informed about ongoing discussions within expert meetings and professional associations (like CIDOC).

One more reason might be the idea, that museums, libraries and archives as "knowledge and heritage institutions" are meant to increase collaboration, exchange more knowledge and share more information with one another. This partly political will is implemented in many countries through new agencies, supported by the European Commission through funds for MLA projects and leads to the situation, that standards and demands from the formerly separated three worlds, the museums, the libraries and the archives, shall be mapped, implemented and brought to action.

The following collection compiles what we have found in the specifications for the procurement of collection or museum management systems - often as mandatory features, and without limits in the possible mixture of features, standards and requests.

DOCUMENTATION STANDARDS

Documentation standards are one of the most valuable assets, which are developed within the professional community and implemented by system vendors into professional collection management systems. There is no doubt about the usefulness of this close link between the customer and the developer. Nevertheless sometimes it gets confusing: without any intellectual insight or concern about what this really means, multiple standards are combined on paper, which have never been combined in real life before, no matter if the result of such a link is sensible or contradictory.

The compilation, which standards the desired collection management system shall be compliant with, reads as follows and includes international and national standards for museums, libraries and archives - and these are selected examples only.

The system shall be compliant to these standards and guidelines:

SPECTRUM (Documentation standard, Collections Trust, formerly MDA, UK), www.mda.org.uk/spectrum.htm

CDWA (Categories for the Description of Works of Art, Getty Research Institute, USA), www.getty.edu

Object ID (Getty Research Institute, USA, now Council for the Prevention of Art Theft, USA), www.object-id.com

CCO (Cataloging Cultural Objects, Getty Research Institute, Visual Resource Association, USA), www.vraweb.org/ccoweb

Dublin Core (Dublin Core Metadata Initiative),

www.dublincore.org

CIDOC Information Categories, (ICOM International Committee for

Documentation), cidoc.icom.org

CIDOC Core Data Standards, (ICOM International Committee for Documentation),

cidoc.icom.org

MIDAS (Marburg Inventory, Documentation and Administration System,

Bildarchiv Foto Marburg, Germany), www.fotomarburg.de

MIDAS Heritage (UK Data Standards for Information about the Historic

Environment), www.english-heritage.org.uk

ICCD (Italian National Documentation Standard,

Central Institute for Cataloguing and Documentation), www.iccd.beniculturali.it

EAD (Encoded Archival Description, Society of American Archivists and the

Library of Congress, USA), www.loc.gov/ead, www.archivists.org/saagroups/ead

MARC (Machine Readable Cataloguing, Library Standard,

Library of Congress, USA), www.loc.gov/marc

Preservation of information

Besides content, knowledge and best-practise oriented standards like those mentioned

above, the system shall also follow these guidelines and models for the preservation

of data, media and digital information:

Preservation of Metadata (Digital Preservation Coalition),

www.dpconline.org

Preservation of Digital Objects (OCLC/RLG Working Group on Preservation metadata, Online Computer Library Center & Research Library Group, USA), www.oclc.org

OAIS Reference Model (Long-term Archiving of Data, Open Archival Information System, Consultative Committee for Space Data Systems, NASA, USA), public.ccsds.org

Information Exchange & Harvesting Standards

Furthermore the system needs to offer ways to interoperate with other software systems, platforms and portals. Not only simple data, but meaningful information shall be transferred to "outside" resources where it can be imported by any program, which follows the same standards and rules and vice versa. No matter, if content is to be delivered to a co-operation partner (e.g. exhibition exchange) or to a cultural portal site (e.g. www.europeana.eu), the system shall be able to produce and process the dataflow in compliancy with the following standards:

CIDOC CRM (Conceptual Reference Model, ISO Standard 21127:2006, CIDOC), cidoc.ics.forth.gr

CDWA Lite (XML Schema, Categories for the Description of Works of Art, Getty Research Institute, USA), www.getty.edu

OAI-PMH (Protocol for Metadata Harvesting, Open Archive Initiative), www.openarchives.org

SPECTRUM XML (XML Schema, Documentation Standard, Collections Trust, UK), www.mda.org.uk/schema

MuseumDat (XML Schema, German Museum Association), www.museumdat.org

Z39.50 (Protocol for search and retrieval from remote databases, ISO Standard 23950, Library of Congress, USA), www.loc.gov/z3950

TEI (Guidelines for Electronic Text Encoding and Interchange, Text Encoding Initiative), www.tei-c.org

OpenGIS (Reference model for geospatial information exchange, OGC Open Geospatial Consortium Inc., USA), www.opengeospatial.org

Integration

Actually these documentation standards and data exchange standards are just some of the requirements which are complied by museums as part of a typical specification during the process of acquiring a new collection or museum management system.

Each single implementation of such a system takes place in an already existing IT environment, which might be less or more complex. Highly depending on the "activity" of internal IT staff, the new system has to be placed into a complex environment of already existing applications. The more applications already are in use, the higher is the probability, that it is mandatory to interface with those products.

Except for simple standard interfaces with e.g. Microsoft Office applications, in many cases individual API's (Application Programming Interfaces) have to be developed according to the individual range of software applications in use. Exemplary requests for data exchange possibilities are interfaces with products such as:

Library Systems of all kinds, since they overlap with bibliographic data for scientific documentation in the collection management system.

DAM, Digital Asset Management Systems, including the joint handling of images and image metadata (EXIF - Exchangeable Image File Format, IPTC – International Press Telecommunications Council, XMP - Extensible Metadata Platform).

Business Process Software, like Microsoft BizTalk, an enterprise size process automation and workflow solution; Microsoft InfoPath for the automation of forms and reports on an institutional level; Microsoft SharePoint for content management and collaboration throughout the whole corporate network.

Any **CMS** Content Management System which runs the intra- or internet website of the museum or institution. Of course most collection management systems offer a ready made web client software which integrates seamlessly into the existing website.

SOA, Service Oriented Architecture shall be supported by the system. The idea of SOA is to split up processes and services into software modules, which can interoperate independently and be plugged-in into several other processes and programs independently.

Accounting Systems and any other administrative software shall potentially interface with the system (e.g. SAP, PeopleSoft) for sharing user data, addresses, values, transactions, orders and invoices.

Ticketing Systems shall be connected to the system for booking information and statistics.

CRM, Customer Relationship Management shall share data with the system (central address pool, events, booking, donors, friends of the museum etc).

Content included

Demands also expand into the content side of documentation of cultural assets. Depending on the nature of collections and the internal documentation policy, all kinds of vocabularies shall be accessible from within the collection management system. As most vocabularies are copyright protected, it is impossible for the system vendor to pre-load any number of potentially useful thesauri, classifications and vocabularies. Nevertheless the use of thesauri, classifications and vocabularies is most

important for successful retrieval in large collections and the long-term maintenance of high quality information.

Thesauri like AAT - The Art and Architecture Thesaurus, TGN - The Getty Thesaurus of Geographic Names, ULAN - The Union List of Artist Names (all by Getty Research Institute, USA) or SWD - Subject Headings Authority File, PND - Name Authority File, GKD - Corporate Body Authority File (all by German National Library), AKL - World Bibliographical Dictionary of Artists (by Saur Verlag, Germany) are copyright protected and a license has to be acquired from the responsible publisher.

www.getty.edu/research/conducting_research/vocabularies
www.d-nb.de/standardisierung
www.saur.de/akl

IPTC Thesaurus (Metadata standard for categorising media content, International Press Telecommunications Council), www.iptc.org.

ISO Standards for monolingual and multilingual thesauri shall be regarded by the system (ISO 2788, ISO 5964). Support of mono- and poly-hierarchical thesauri shall be given.

SKOS core (Simple Knowledge Organisation System, W3C World Wide Web Consortium), www.w3.org. SKOS core, a model for expressing the basic structure and content of concept schemes such as thesauri, classification schemes, and other types of controlled vocabulary, shall be regarded by the system.

"Mash it up"

The seamless integration of services by any provider shall be possible from within the collection management system. Those services can be read-only (additive linking of additional information) or in read-write mode by adding content into the central collection management system (and thus creating new content).

MuseumVok-WS (Structural standard for museum vocabularies, thesauri, German Museum Association), www.museumsvokabular.de. Integration through web-services and use of external vocabularies, which are maintained by the community or editor shall be supported by the system.

Social Tagging is gaining more and more momentum and is seen as a valuable addition to metadata creation by museum professionals only – enhancing online search, professional search and knowledge about your visitors. The prototype project is the open-source software based steve.museum – a real life implementation can be used at www.imamuseum.org/connect/tags, the website of the Indianapolis Museum of Art. Social tagging shall create new content and shall be forwarded into the collection records of the central management system.

Mash-ups with external content is not limited to vocabularies or tagging interaction. The system shall be able to link content from and to any site or source – e.g. portal sites like the already mentioned Europeana, the European Digital Library for Museums, Archives and Libraries, but also to popular sites like Wikipedia, Google Maps, Google Earth, Flickr etc.

No Hardware Interfaces

Actually there are no demands to interact directly with hardware, since any hardware comes with a piece of software (driver, API, application). So the real demands here are interfaces with software again. There are demands to interact with hardware tools like barcode scanners, any other kind of 2-D and 3-D scanning devices, RFID (Radio Frequency Identification) systems, audio guide systems, kiosk systems, PDA-Guides and alike. Lots of these systems are proprietary, nevertheless the collection system shall be able to offer "collaboration" on a certain level: for example it is demanded, that the system gets feeds from RFID tags to automatically update current location information and the location history of collection objects.

Technology

The technology side of demands is as colourful as technology itself – to highlight just the most common demands, the system shall be compliant to industry standards on the level of operating systems (Windows, Unix), on the level of backend database systems (SQL), it shall be based on open source development tools (if not be open source itself) and its user interface shall be internet browser based and therefore platform independent. Those demands might have a reasonable "counterpart" in person of a well educated IT staff within the museum, but this is not necessarily the case. On the technology side it happens, that museums ask for a setup, which in day to day life and maintenance cannot be supported by the responsible staff (e.g. open source).

…and more

Besides the above mentioned demands the system has to offer the highest security level (revision security): the system and the vendor shall guarantee, that no record and entry ever can be deleted without traces, in case the respective "real" collection object disappears. Of course the system shall offer full multilingualism of the user interface, all manuals, online help files and potentially all the content. Besides Unicode, it is demanded, that certain additional scripts are supported (like hieroglyphs). Furthermore the system has to be accessible, disabled friendly and W3C compliant.

But of course…

Despite the amount of demands, necessary functionality and supported features, the system shall be easy to handle, with little or no user training necessary, it shall be as self-explanatory as possible, most flexible and expandable, user-definable and able to be personalized, easy to maintain and to update.

"AND SOON WE WOULD LIKE TO HAVE…"

There is little imagination necessary to make up some soon coming ideas and demands, what else a collection management system shall offer in upcoming versions: Why shouldn't the already existing location information within the museum management system drive the content of galleries within the museums virtual equivalent in Second Life including images, text, audio and video files?

Since mobility and location awareness is implemented in the smallest devices nowadays, why not access your collection information via iPhone and at least do some basic editing? Upload some geo-referenced images from your mobile phone to the system and have them connected to an event or exhibition record.

Let the collection management system automatically feed the authoring system of a PDA based gallery guide, updated of course wirelessly.

Rightly collection management systems are meant to be the source of the most important data and knowledge within a cultural institution - therefore the ideas of re-purposing, re-using and re-contextualising are without limits (I won't be surprised, if somebody soon connects your Collection Management system with his Playstation or Wii Fit console).

WHAT HAPPENS, IF THEY DID ALL THIS?
OR: THE GAP BETWEEN WHAT YOU WANT & WHAT YOU CAN AFFORD

There is not a single product, which covers all the above listed features – and if there was, no one would be able to handle it. But there would be no need to handle it, since it would be way too expensive in the first place.

More serious: It is obvious, that museum software has developed from basic collection documentation to highly capable museum management software within the last 10 years. Collection management is still the core task for such systems, but numerous management tasks are implemented nowadays, and of course the above

mentioned features often are implemented into those systems. The ongoing development follows the never ending stream of demands. Therefore many of those systems are already loaded with a huge array of possibilities, serving potentially every person, who works at museums and with collections.

At this stage the dilemma develops - and this is the real challenge to solve for the future: the software gets more and more complex since its development follows the requirements from the professional museum and IT community. Not only does it get more and more difficult for software developers to maintain and regularly update the product, but there are also increased chances for bugs – simply because the code grows and through interfaces, additional dependencies to third party products arise.

In addition, each company has to deal with not only their standard products, but also numerous customizations and deviations from the original core product. Some of the more individual, original or rare demands will end up as custom code only – without finding their way into the release plan of the standard product. The more numerous those custom versions are, the more personnel has to be employed to support and maintain these clients. By the way: just to say "no, sorry, we cannot do this" is no alternative, since the contractor will loose that project and budget.

At the same time software developers face another situation: unlike what you would suspect at first sight, the number of software companies and products dealing with the broader scope of collection management grows permanently. This is a very interesting observation, since one would have guessed, that in such a unique niche market over approximately 20 years, only very few companies are able to survive.

The 16 products tested during the "Collection Management Software Review" in 2003 by CHIN (Canadian Heritage Information Network, www.chin.gc.ca) are just the tip of the iceberg. Besides products which are available internationally, there are products with a limited availability and range in certain regions (like countries, states, regions, cities). I would suspect, that there are between 50 and 100 commercial collection management products available worldwide, within a market of around 40 Million Euro. Simple math shows, that with an average turnover of 500 Thousand to

max. 1 Million Euro per year only small companies are able to survive. In fact the market leaders get a bigger share, and many local and regional products are highly risky "one man shows" with much less income. Depending on the region you also find authorities (universities, research institutes, ministries), which develop their own custom made collection systems and distribute them for free or at very low cost to the museums – another setback for commercial software developers since in these cases neither comparison nor competition takes place.

This market segment is highly specialised, requires very special knowledge, does not grow substantially and offers very limited budgets. And still: everybody knows about this pressing situation and – no blame here – takes advantage. Today a museum can buy a system, which never offered so much benefit for so little money. Competition is strong and keeps prices low. In some rare cases this leads to the situation where either companies go out of business, or "philantropic" venture capital (if something like this exists) went into the companies - with no obvious disadvantages until today.

But one day the gap between the growing demands of the museum and documentation community, the low prices of products and the permanent need for software companies to work for profit, might just be too big. Different scenarios are possible: the product might get more expensive. Or the quality of the product and service will drop. Or the company goes out of business. None of these possibilities are in favour of the museums.

Therefore it might be good advice for the client, as well as for the contractor, to watch the list of demands very carefully and concentrate on new features, where need is proved. Easily some extras here and some "nice to have things" there might lead to a dilemma with the above described effects.

THE FUTURE MUSEUM MANAGEMENT SYSTEM

The perfect future museum management system shall offer a lot of the possibilities described above, avoid contradictory standards, follow established standards, focus on the key tasks and serve (still) as the main information pool for the whole institution.

The software will be the most important repository for basic data and information and serve as source for numerous other systems which re-purpose and re-use the existing data in new contexts without redundancy. The system will be platform independent, available through different devices in different locations or location independent.

It will be much more a distribution and communication system, a well of data, assets and information, than a "Swiss army knife" which can do everything on its own - including to hurt the user.

ONE REMAINING QUESTION

The ever remaining question will be, if the qualification, skill sets and education of museum professionals is going to follow this development. Are curricula at universities updated in these fields? Is there enough possibility for advanced education of museum employees within their institution? Already today it requires highly professional skills in management, administration, information technology and the museum business in order to write a request for proposals and a functional and technical specification for the procurement of a collection management system. It's a rare skill to ask the right questions and to know your real demands by heart.