

PAPER TEMPLATE FOR IPRES 2010: QUALITY INSURANCE THROUGH BUSINESS PROCESS MANAGEMENT IN A FRENCH ARCHIVE

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ABSTRACT

This paper outlines the recent initiative run at CINES, a national IT datacentre for French academic researchers, to formalize the business processes of its department dedicated to the long-term preservation of digital objects, which is at present one of the very few operational long-term preservation platforms in France for the public sector and Higher Education and Research in particular.

One of the strategic goals of this organization is the evaluation and assessment of service quality. The processes formalization activity – coupled with an external audit and an ITIL approach – highlighted the department good practices, gaps and weaknesses.

The processes global map and most of the twenty detailed process maps have been put together to support the team in its documentation goal and are available online on the institutional web site, along with the CINES specific rules for archival processes formalization based on standards such as ISO 9001 or ISO 14721.

This experiment has revealed that such a process approach can to be an excellent mean to structure and plan for an efficient implementation of the preservation strategy as well as an opportunity to improve service quality, which is actually the final objective of the digital long-term repository of the centre since it's aiming at the future ISO 16363 certification.

1. BACKGROUND

CINES (Centre Informatique National de l'Enseignement Supérieur, a national datacentre for the higher education and research community) is a public French organization known worldwide for its HPC (high performance computing) activities.

CINES was also entrusted with a long-term preservation of electronic data assignment. Three types of digital documents are secured on the archiving

repository called PAC (Plateforme d'Archivage du CINES) for the years to come:

- ✓ Scientific data generated from observations, measurements or computation;
- ✓ Heritage data like PhD theses, educational data or pedagogics, publications or scientific digitized books;
- ✓ Administrative data from French universities: personal records...

A department dedicated to electronic archiving was created in 2003 and PAC was one of the first long-term preservation platforms deployed in production for the public sector in France. At present, more than ten FTEs work in the long-term preservation department, who have developed their own information system and participate in French and European projects.

In 2008, a quality initiative began with the objective of getting a full, transverse certification of the service covering archiving, technical, organization and service aspects. To date, CINES has been involved in the Data Seal of Approval (DSA) accreditation provided by the DANS (Data Archiving and Networked Services), a Dutch organization, and is still a member of the DSA Editorial Board. The long-term preservation department has also been audited by senior external consultants, in order to identify its strengths and weaknesses, and to prepare the certification within an accepted time frame. The strategy adopted by the Management to achieve its quality target relies on risk management (based on the DRAMBORA method) and a solid business processes formalization.

2. THE PROCESS APPROACH: WHAT IS IT ABOUT?

To increase readability and understanding, business processes formalization is based on graphical representations, using standard shapes and connectors to describe a sequence of events, alternatives or activities. Data sheets complement the graphics and describe all formalized objects, to comply with the international standards ISO 9001 and 9004.

For some processes, the methodology used for the formalization is a bottom-up one; for the others, it is a reengineering approach. Elaboration and validation of business processes systems have been done by iterations: experts are interviewed, process system managers represent processes, then, the whole archiving team and the management approve process maps before their publication on line.

The Business Process Analysis (BPA) approach and the work presented in this paper has been validated by French senior consultants specialized in long-term preservation issues and New Information and Communications Technologies (NICT).

3. EXISTING STANDARDS: WHY ARE THEY INSUFFICIENT?

The international standard ISO 9001 requires putting together specific documentation for each identified business process. All the characteristics of the process, a description of the workflow and identification of people who are responsible for its execution have to be summarized in a data sheet. But, CINES has gone beyond these requirements, as it didn't stick to a limited list of classified processes. Indeed, a set of process maps has been documented: a general map allows a global view, while a set of more detailed maps ("macro" and "detailed" maps) focuses on a particular formalized object. So, this type of formalization gives CINES a real basic reading of its network process.

The international ISO 14 721 standard is the main archival reference used by business analysts to formalize their archival processes. The OAIS model is very interesting because it proposes a functional view of the Archive. Six functional entities (Ingest, archival storage, access, data management, preservation planning and administration) include about thirty functions. However, it is not always easy to understand how powerful this standard is, and the complex interactions between the different functions described. The vision proposed by OAIS is vertical. On another hand, the business process approach is based on the split of the OAIS functions into objects called "activities" and their sequencing through relationships between them. The diagram shown on the opposite highlights one of these semantic links for the access process.

Furthermore, the OAIS standard focuses mainly on archiving activities. The business processes approach of

CINES integrates a few more aspects not yet described in the ISO 14 721 but which are vested in the Archive. For example, as with all French public organizations, CINES has to follow special procedures for procurement, and must report on its mandates to its supervisory and funding body. These two processes – and a few others, such as risk management, metrics and results appraisal, documentation management or prospective aspects – have been documented along with the functions described in OAIS.

Then, business process approach integrates few aspects from other standards. For example, security issues have been dealt through the ISO 27 001 requirements. The SEDA, a French exchange standard which formalizes relationships between the Archive, producers and users, has been used to improve and extend the OAIS model, particularly around the archive ingest and access issues.

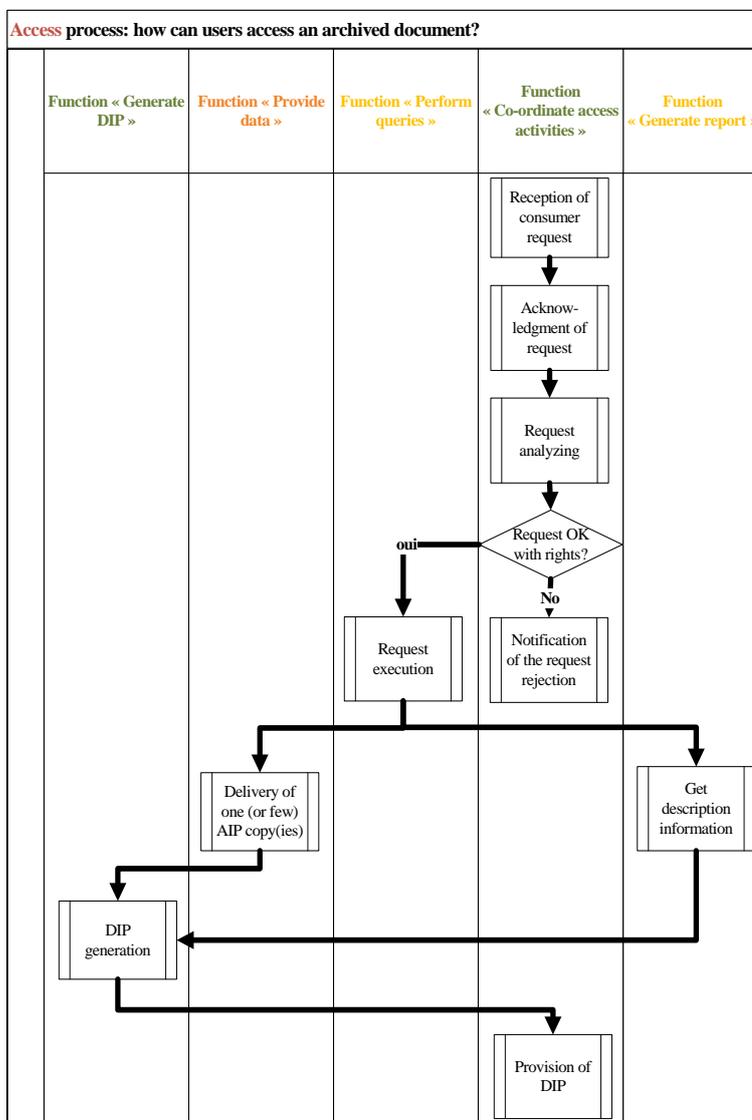


Diagram 1. Access business process: creation of relations between activities as in OAIS model.

4. ADVANTAGES OF THIS INITIATIVE: WHY DOING IT?

The business process approach is interesting because archiving issues are handled and entirely integrated into a greater scope. Thanks to the integration of ISO 9001 and other standards in the OAIS model, the business approach is complementary to classic initiatives.

So, this different focus allows a permanent auto-evaluation of the Archive with as many different points of view as different standards in the business process referential. The ability to realize its own evaluation is one of the prerequisites that an Archive has to meet to be certificated with, for example, the upcoming ISO 16363 standard for audit and certification done by CCSDS and ISO committees.

The business process documentation is the spine of the Archive as it answers inevitable questions around its activity: it designates the owners (“who”) of the processes, describes the triggers (“when”) or the rationale (“why”) for their usage, grades their importance or priority, and shows when there is a competitive advantage. As a consequence, during a certification initiative, such a document is considered by any auditor as essential.

The documents produced can help facilitate comparisons with other similar structures: as an example, the CINES risk management seems to be more focused on the mitigation activities rather than on the actions following the occurrence of the risk, which is a different approach from other French public institutions.

Economical benchmarking, various comparisons and better comprehension of your own internal running, as well as process repeatability are the building blocks of a more structured deployment strategy. Global policy comes in a variety of business process targets. This approach doesn’t fit with a hierarchical partitioning of function groups or teams, as engineers, archivists and other people involved have to work together to execute their shared processes as smoothly as possible. The business process approach gives elements to understand interactions between different parts of the organization and to facilitate interdepartmental cooperation.

Furthermore, business processes documentation proved to be an important vector of knowledge management and dissemination by improving internal communication, as it helps to bring newcomers up to speed on the Archive operation. Preserving digital objects is a key objective of repositories, which can only be achieved in the long term by preserving the high level of expertise that the team responsible of the Archive has acquired. When budgets shrink and turnover rate increases in institutions, this should be

kept in mind and managing business process documentation should be considered carefully.

This initiative also improved the overall performance of the archival information system, as processes have been assessed, questioned and rationalized; metrics and dashboards have also been improved and fine-tuned as part of the same BPI (Business Process Improvement) exercise.

Last, but not least, transparency on its own processes is a good way to create trust relationships with user communities, supervisory and funding bodies, partners, peers (i.e. other OAIS repositories involved in digital preservation), etc. For this reason, the CINES business process system has been made accessible on the Internet website. This allows discussions between peers around best practices, choices and strategies, or comparisons with other institutions which would have a similar initiative of business process documentation.

5. A SPECIFIC METAMODEL: HOW TO CREATE IT?

The business process system must be understandable by anyone: any person working in the Archive, any member of executive committee of CINES, any external auditor, any member of another Archive, any representative of the supervisory or funding bodies, etc. So, the representation of processes must follow a set of rules: such a collection is named a “metamodel”. Strictly, a metamodel is the representation of a special point of view on models. A model is an abstraction of phenomena in the real world; a metamodel is yet another abstraction, highlighting properties of the model itself. A model conforms to its metamodel in the way that a computer program conforms to the grammar of the programming language in which it is written.

Any formalization is the expression of a particular point of view of a system, so a metamodel has to be created to reflect it. As CINES did not have any BPA tool with a default metamodel, one had to be developed.

UML is a standardized general-purpose modelling language used in the whole world for information systems specification. But it restricts the scope of formalization as focuses on information system, whereas business processes incorporates strategic aspects and policy.

A methodology for the formalization of business processes exists: BPMN (Business Process Management Notation). It’s the only future standard existing but it is not mature enough or adopted yet. A criterion for choosing a good description language is, for CINES, its intuitive aspect. Any reader should be able to understand the signification of process maps without having to consult specific documentation. The BPMN is not used by a large community because of the lack of transparency and intuition. Furthermore, although it’s a

very strict notation, it can provide multiple frameworks to solve a specific problem. For CINES, this last aspect appeared to be a show stopper.

It is very difficult to find metamodels which develop clear sets of rules about representation and interactions between objects. Apart from BPMN, there are no standards on that formalization issue or real sharing of metamodels: even BPA software vendors don't provide their default metamodel.

The metamodel adopted for the formalization of archiving processes in the CINES is based on the identification of three object-types: processes, sub-processes and activities. A process is, according to the ISO 9001, an object with a semantic meaning that transforms an input into an output element. This process consists of a set of sub-processes. And the latter are sequences of activities. This choice of representation is simple and flexible enough to be juxtaposed with others for a comparison exercise.

The detailed rules description can be found online as the metamodel is documented on the CINES website.

6. THE CINES PROCESS SYSTEM: WHAT DOES IT LOOK LIKE?

CINES has identified twenty processes in its archival system. By the time of writing this text, seventy percent of them have been documented. For the iPRES2010 presentation, CINES will have spent a year and a half working on this formalization initiative, and we might have completed the whole business process system.

The diagram 2 shown alongside simplifies the detailed map of one of the fourteen processes which have yet been documented, the access process.

In accordance with the ISO 9001 requirements, CINES has defined the scope and breakdown of each process taking into account the following criteria:

- ✓ transversality, exceeding the boundaries of a function or activity;
- ✓ simplicity, manageable number of interactions with other processes and activities correlated in the process;
- ✓ completeness of the network process;
- ✓ consistency of interactions;
- ✓ clarity for stakeholders internal and external process.

Furthermore, CINES complied with the ISO 9001 requirements for process classification. The French national organization for standardization AFNOR, who also represents ISO at a national standpoint, published the documentation FD X50-176 in 2005.

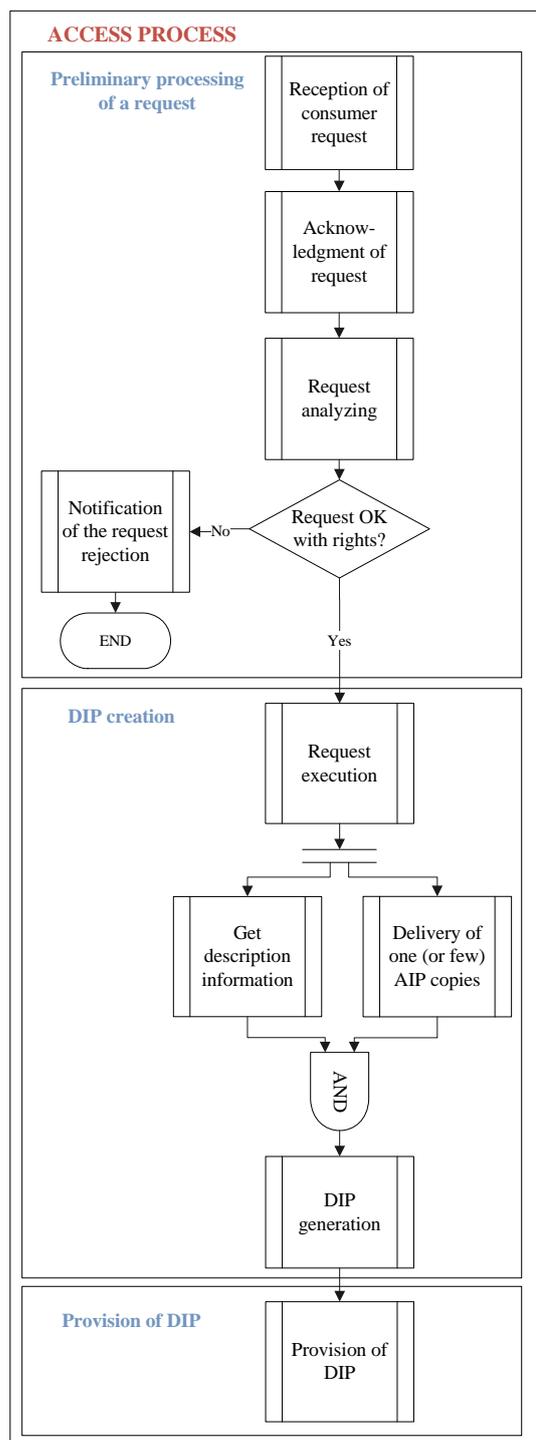


Diagram 2. Simplified access process map.

This reference provides a list of process management tools and, in accordance with the ISO 9001:2000, proposes a classification of processes in three groups:

- ✓ An implementation group of processes (shown in blue in the global map): based on the ISO 14 721 functionalities, these processes describe the core business;
- ✓ A second group with processes that support implementation processes (green processes in the global map below): they give the means to

achieve the long preservation activity and evaluate results. Unlike some business analysts, CINES has chosen not to distinguish these two sub-families;

- ✓ And a third process group that manages the whole system of processes (they are formalized in red on the global map).

Such a classification is recursively valid, as sub-processes and activities can be split the same way.

The diagram 3 shown on the next page describes the global processes map.

7. THE DAILY IMPLEMENTATION OF THE PROCESS SYSTEM: HOW DO WE USE IT? HOW IS IT UPDATED?

At present, CINES is still formalizing the business process system. Once a first version of the global processes map established and validated, each process is assigned to and managed by a member of the Archive. The person responsible for a process is member of the internal experts committee. As such, he has been interviewed for the initial formalization of the process and during its updating. This strategy promotes implication and strengthens personal expertise of each team member.

Interconnections between the documented objects imply a regular updating of all the processes already formalized. In this step of the process system specification, process pilots are essential: they ensure the consistency of their own part, while the process system manager is responsible for the total adherence.

This work is a means to encourage experts to consider their work methodology: this action takes the opposing course to routine. Furthermore, with the detection of areas of improvement, this initiative provides assistance for the implementation of global solutions.

8. CONCLUSION: WHAT ARE THE LIMITS OF THIS FORMALIZATION?

In process formalization, two types of projects are identified: mapping and modelling ones. Mapping projects are generally intended only to specify the Archive operation. Unlike modelling ones, these projects don't ensure uniqueness of objects. Adding a description allows a start in a quality initiative such as the ISO 9001 one. With the security on uniqueness of represented objects, modelling projects go further and add in-depth analysis and automation of workflows.

CINES has a specific position because it has neither its own BPA tool (for representation of processes) nor any workflow engine (to execute processes). Consequently, the work presented in this paper is not strictly a modelling project. Nevertheless, maps (done with a specific map tool) and a relational database ensure, with manual controls, uniqueness of objects and consistency of the process system. To avoid any confusion and distinguish a possible switch to real BPA, CINES talks about "maps" rather than "models".

Business process formalization is a step in the quality initiative of CINES. This work is still in progress, but publications are regularly available on the CINES website. As a result of a first external audit of the Archive, the specification of business processes, as well as other elements of the action plan which was put together to work out the gaps identified, has been deployed. As soon as the stabilized referential for audit and certification is chosen, the Archive will prepared itself to this next step of quality process.

Global Map		
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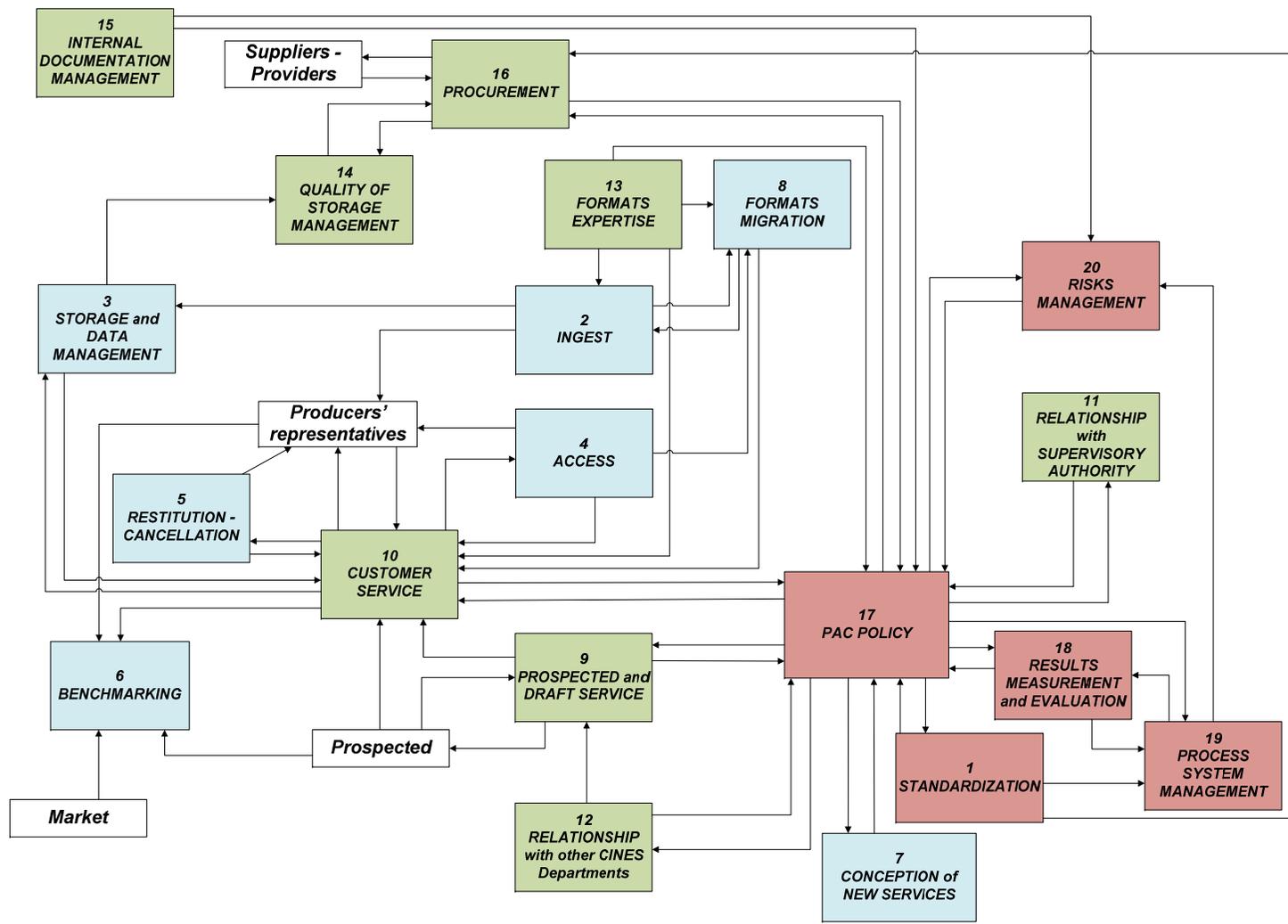


Diagram 3. Business process system of CINES.

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