

The Future History of e-Services

Long-term Preservation of Complex and Integrated e-Services

Göran SAMUELSSON¹, Lena-Maria ÖBERG²

¹ *Mid Sweden University, Gånsviksvägen 2-4, S-887 88 Härnösand, Sweden*

Tel: +46(0)70569045, Email: goran.samuelsson@miun.se

² *Mid Sweden University, Östersund, Sweden*

Abstract: Public electronic e-services will form an essential part of our current history. This paper focused on two questions. The first is concerned with the preservation of digitally born information. The second focus is the preservation of the e-service itself. Our results emphasized the need for preserving the association of objects like property unit designations that identify and integrate the information flow. We also found that it is crucial to use standardized metadata. It is important that the e-services keep and present the information in the same way as it was created. All unique transaction logs generated through the e-service must be returned to the authorities' own workflows and e-archives. It is essential that guidance on archival preservation of integrated e-services will be available as soon as possible, particularly as e-services will be outsourced to private providers. A further conclusion is that the whole document flow must be integrated and adjusted with the e-service in mind.

1. Introduction

In order to be able to reconstruct the traces of our past it is crucial to document the present. Public electronic services will form an essential part our current history, i.e. the archives of the future. If we do not succeed in capturing the complex trace of today, we risk tomorrow's description of this revolutionary period in human technology development becoming like a summer meadow containing only a withered and dried flowers from a herbarium. No matter whether the services deal with driving licences, health care or building permits, it is obvious that we have to document our governmental decision processes even in these new integrated e-services – but **who** will take the responsibility in this public cross-authority documentation, and the next question is **how**?

2. Business Case Description

In most European countries major effort is focused on creating public e-services for businesses and citizens. In this research we studied a newly created integrated e-service. The goal was to provide a service which crossed agency borders to make it easier for a citizen to seek information, for example about a property unit purchase or to follow the different processes that are needed to build a house.

3. Issues to be addressed

This project focuses on two main questions. The first is concerned with the preservation of digitally born information in complex and integrated e-services. The second focus is the preservation of the e-service itself; or maybe more correctly on the different processes which together create the e-service.

4. Objectives

Today many public documents are found in different kinds of computer based information systems. The problem is that such information systems are rarely designed to ensure the requirements for traceability of processes and the general requirements for recordkeeping over time and across authorities. This becomes even more complex where the e-services have a lot of different actors involved, with differing information flows and different regulations covering each type of agency, as in this study.

We divided the questions into two main areas. The first focus was on the information and metadata the e-service needs in order to function rationally and provide a digital archival repository in a satisfactory way:

- What kind of information and metadata is needed to describe and manage the e-service and its processes?
- What metadata is necessary to ensure possible future re-use and research? Metadata should also conform to the new archival description principles that will be introduced in many European countries in coming years.
- What are the most suitable file formats for documents and images for capture, archival storage, retrieval and delivery to future users.

The second area of focus is on questions dealing with responsibility:

- Who is responsible for taking care of information that is unique for the e-service? And who is responsible if the e-service is outsourced to a private company?
- Who documents and archives the information about the e-service itself?

5. Methodology Used

The Swedish *Bygga Villa Project* (Home Building Guide project) and the e-service www.mittbygge.se were chosen as an appropriate environment for exploring these issues. Different research methods were applied to the various research questions. First we undertook an extensive literature review and built a database of journal articles relevant to our special interests. Then the study was carried out in two phases – the first dealing with the current business process of building permits and the information created. Here we used a qualitative approach both for data gathering and analysis: an “archive excavation”, whereby we mapped the process history through the artefacts /documents/ in the archive. In the second part we treated the creation and construction of the e-service like a case study, where we followed the information flow through specified research questions concerning processes, metadata, documents and archive.

6. Business process of building permits

The study has been conducted in two Swedish municipalities categorized [1] as larger cities. The reason for choosing the municipalities for the purposes of this study was that they have traditions of traceability and openness. The focus of this study is building permits, because this process is an essential part of the “Home Building Guide”. The research was done in three steps:

1. Process modelling by interpretation of public documents from different time periods. Two different time periods were chosen: 1960-1965 and 1999-2000. The different time periods include processes from years with manual handling of building permits compared to processes from years with implemented supporting computer-based information systems (such as document management systems or work flow systems).
2. A seminar in which the process models were discussed with archival staff and local government officials with experience of building permits.

3. An analysis of which components make it possible or impossible to follow the process.

6.1 Description of municipalities

The two municipalities have chosen different types of solutions for their archive but they have some things in common. In both cases, the link that connects documents is the property unit designation. The following is an example of a process model used in the seminars.

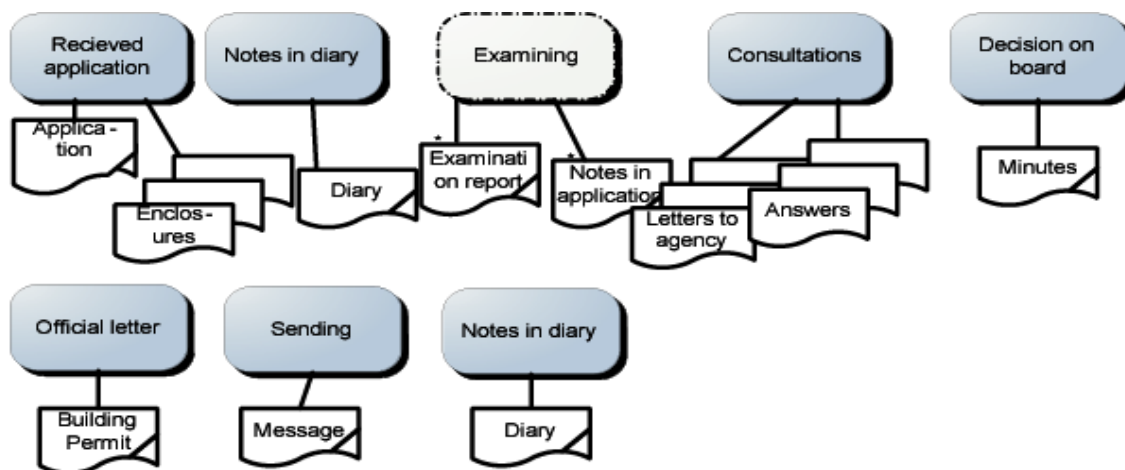


Figure 1: Example of a process model. Municipality A, 1960-1965.

In Municipality A all microfilms, documents and digital documents are indexed by the property unit designation, and it is also the only search criteria. Municipality B has indexed all drawings and maps by the property unit designation whereas documents like the application form and certificates are ordered by diary number.

In 1999-2000 both municipalities implemented electronic workflow and document management systems. Municipality A also implemented a digital archive so all documents from a building permit process are saved as TIFF-files. When a process is closed they make deliveries to the archive. The deliveries include all documents that should be preserved. There is no delivery of the workflow and document management systems or parts of it. The documents are in this sense separated from the system that they have been managed in. Municipality B also works with deliveries to the archive when a process is closed up. Drawings and site plans and such documents are sent to microfilming and indexed by the property unit designation. The rest of the documents are preserved on paper ordered by diary number.

6.2 Presentation of the Components

In this section the empirical data from the study is presented. The tables describe differences and similarities between both time periods in both municipalities. The process model in Figure 1 is an example of a model that was used in one of the seminars as a basis for eliciting further information.

The tables below are divided into two main parts: identified components and missing components. Most of components that have been found in the archives are documents. They often have embedded metadata (author, dates etc), which makes it impossible to describe all metadata. The tables below therefore include the identified components on what could be called the document level and sometimes diary level. The first table represents Municipality A and the second table represents Municipality B. Components marked with an asterisk did not appear in every instance of the process.

Table 1 Empirical results from Municipality A	
<i>Components Identified</i>	
<i>1960-1965</i>	<i>1999-2000</i>
Application	Application
Enclosures	Enclosures
Diary	Cover Page
Consultations	Consultations
	Certifications
	Minutes from consultations
Minutes	Links to minutes regarding decisions*
	Inspection reports*
	Examination report*
Building Permit with motivations and conditions	Building Permit with motivations and conditions
	Checklists for qualification certificate
Message to the applicant	Message to the applicant
Components missing	
<i>1960-1965</i>	<i>1999-2000</i>
Examination Reports	Examination Reports*
	Decisions pertaining to the type of process

Table 2 Empirical results from Municipality B	
<i>Components Identified</i>	
<i>1960-1965</i>	<i>1999-2000</i>
Application	Application
Enclosures	Enclosures
Diary	Printout from diary*
Examination report	Examination report
Certifications	Certifications
Building Permit with motivations and conditions noted on application form	Minutes from decision (includes the building Permit with motivations and conditions)
Flying inspection documentation	Flying inspection documentation*
	Minutes from consultation*
Delivered documents according to conditions in the permit	
Official letter by civil servant	
Consultations	
	Checklists for qualification certificate*
	Civil servant comments
Inspection Reports*	Inspection report*
Message to applicant	Message to the applicant
Components missing	
<i>1960-1965</i>	<i>1999-2000</i>
Inspection Reports*	Printout from diary*
	Certifications*
	Minutes from consultation*
	Checklists for qualification certificate*
	Decision pertaining to the type of process
	Flying inspection documentation*

The main differences between the municipalities are components concerning inspections and examinations. Municipality B has chosen to preserve different types of documents that describe those kinds of activities. From the mid 1960s there are examples of handwritten notes made by a civil servant after flying inspections.

During 1999-2000 the municipality has preserved all examination reports, which are forms that are filled in by hand. In Municipality A there are no examples of inspection reports from the first period. This was pointed out during the seminar and the participants were surprised by this fact. They could think of two possible explanations. The municipality accomplished a migration from paper to microfilm during the 70's. The municipality then had to decide which documents should be preserved and the decision was influenced by the cost of the migration. The other possible reason was that the inspection

report has never been part of the material that was delivered to the archive. The civil servants kept this kind of documentation on their files and they were never incorporated with the rest of the documentation.

Even during the later period of time there are few examples of inspection reports in Municipality A, but in seminar discussions, it was revealed that only inspection reports that note divergences from the norm are preserved.

The processes during the two time periods differ a lot, mainly because the law that regulates building and site plans in Sweden changed in 1987 (Plan och Bygglagen 1987). Most importantly, much of the responsibility moved from the authority to the applicant as the person responsible for quality. A lot of components were found to be missing because they were never sent in to the authority. The levels of formalization also differ between the time periods: it is higher during the later period.

This could be explained by several things. First of all both municipalities implemented electronic workflow and document management systems in the late 1990s and computerization in itself leads to formalization of processes and documents. Secondly, both municipalities started a process-oriented transformation, which partly aims to make the handling of building permits uniform. There is also a general trend of streamlining of public administration, which has led to the introduction of forms and templates.

This study has identified three components of great importance to understanding and preserving this business process over time and ensuring that future research is possible in this archived material. They are:

6.2.1 Context

The main component that connects different documents and their context is the property unit designation. The other important component necessary for the preservation of context is the diary. The Municipalities used the diary as the means of maintaining context in the 1960s. There, in the diary, it is possible to follow the different audit trails of the process. During the second time period (1999-2000), Municipality A replaced the functionality of the diary with a cover page. The cover page is part of the workflow and document management system. The cover page has been printed out and delivered to the archive together with all the other documents in paper format. Municipality B has the same kind of cover page in their system but they do not deliver it to the archive, which means that important contextual information is lost.

6.2.2 Date

The discussion of context concerns how to identify which item belongs to a particular instance of a process. This sets the external border for the instance. The component date has been shown to be very important for verifying the order of activities. There are very few examples of documents that have not been labelled with a date of creation or date when received, which of course is good.

6.2.3 Documents

Both the municipalities included in this study have chosen to preserve building permit information as documents, regardless of whether the system is paper-based or digital. The alternative nowadays is to use electronic forms and split up the information in several tables in a database, thus requiring preservation of the databases and systems within which they are held. The outcome of this document-oriented way of working is that the document gives information about context and activities in the process. This document-oriented way of working has in this sense a positive effect but there is also a risk in separating the documents from the system that they have been part of. There may be information about the

process that is not within a document and the organization must in those cases take care of those components in some way.

The argument here is not that the document-oriented way of working is the only alternative. But, for example, if an e-service includes applications in XML-format the organization has to take care of that situation. It is important to preserve not only the content but also the metadata that are part of the application. The municipalities' document-oriented way of working does not capture separated metadata. They both have separated metadata in their workflow and document management systems but they are not delivered to the archive. In the future, this will influence the possibilities for both interpretation and searchability, especially if citizens are to have direct access to the documents.

As noted earlier, the introduction of template-based documents helped to standardize processes across both municipalities, thus making it easier to follow the document trail. However, care must be taken in designing the template to ensure important components are not missed. A positive effect of the standardization is that this will make it easier when organizations need to exchange information, which will increasingly be necessary with integrated e-services.

7. The e-services - Home-Building guide

The building permit process is relatively complex. Figure 2 shows the different parts and actors in the e-service - Home-Building Guide (www.mittbygge.se). In the middle part of the process we have the e-service itself which has the function of an entrance hall where the citizens (on the left) and the business (on the right) start to communicate with each other.



Figure 2. The three parts of the Home-building Guide e-service

In Figure 2 the right-hand box has been labelled Kommun, Verksamhetsprocess (Bygglov), i.e. the Municipality's business process (Building permit), but it is possible to divide this business process further, into three more parts. First, the receiving process (Mottagningsprocessen) where the municipalities gather the application information from e-mail, e-forms, analogue mail, and from the Home-building Guide e-service. The application is registered in a digital business system equivalent of the diary. Then comes the building permit process (Bygglovsprocessen) where the application is formally screened. Under this process comments from other authorities and neighbors etc. will be taken into consideration. Finally the approval and minutes will be sent to the citizen. Then the citizen may lodge a building notification (Bygganmälan), which will start the third phase – the building process (Byggprocessen), finalized when the building is completed.

Now it is time to focus on the part of the building permit service where the Home Building Guide is situated. In Figure 2 above, the box in the middle functions as an intermediate link between the citizen and the municipalities' business systems. The e-service starts when the citizen logs in to the function and ME (My Engagement). In ME the citizen adds their personal information, national registration number, address etc. From ME the citizen will be linked further to the e-form services (eFormulär), when activated, e-form receives the personal information collected from ME and automatically fills in the form. Additional information, such as the property unit designation, must be obtained online by the applicant from the National Land Survey and the Real Property Register (Lantmäteriets

webservice). Finally the applicant signs the form (eID) and the system converts the form to a pdf-file or any another format that suits the municipalities' business systems.

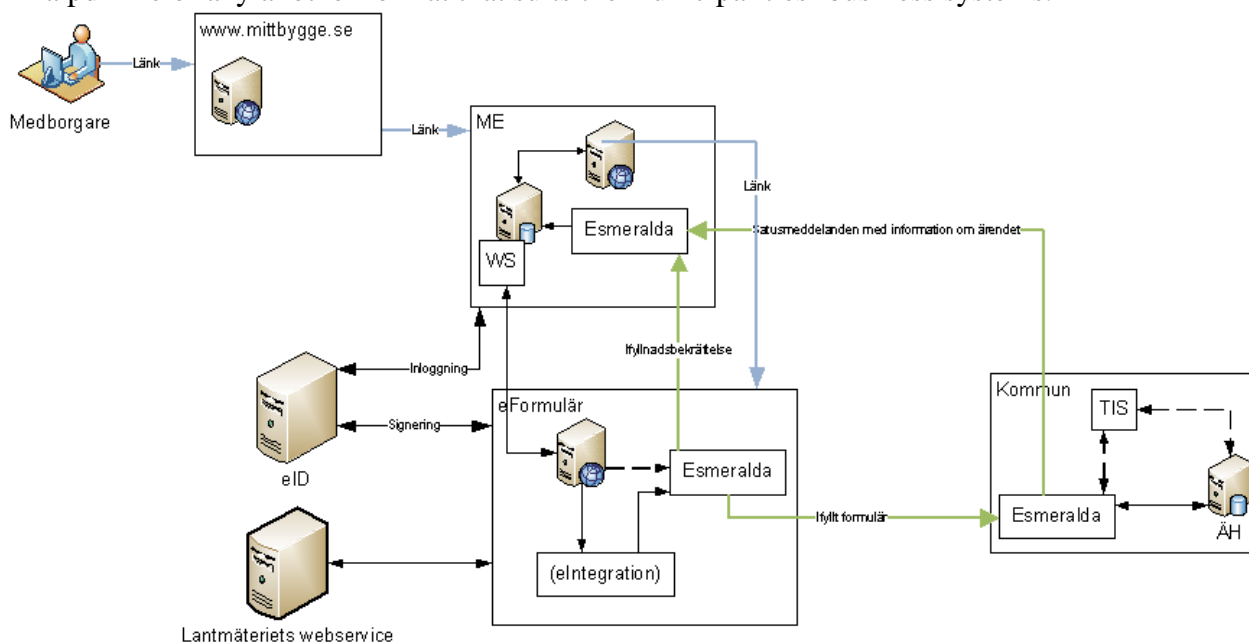


Figure 3. The components in the e-service www.mittbygge.se (Home-building Guide)

The e-service sends the application to Esmeralda (IDABC link), which automatically sends two messages;

- one to the municipalities;
- one through ME to confirm the application has been received.

While the matter is proceeding through the business system, each new transaction is directly updated in ME and also announced to the citizen by e-mail or SMS.

8. Findings

Our results emphasized the need for preserving the association of objects like property unit designations and social security numbers that identify and integrate the information flow. The study found three categories of components which connect information with the process and make it possible to follow the process over time - context, documents and date. The analogue process that was preserved in the archive showed the municipalities' internal processes. Very few components of dialogue with the applicant from the analogue process of a building permit were found in the archive. Yet it was revealed during the seminars that this dialogue takes a lot of time, including help with drawings and filling in the application. In e-services these communications will happen differently, perhaps by e-mail or digital forms. This raises the need for discussion about appraisal of what should be preserved or not.

The project also found that when preparing information and records for long-term preservation it's important to use standardized metadata, such as those specified in the ISAD(G) [2] and the XML-application EAD [3] standards. This facilitates information exchange and retrieval.

The e-service generated documents in pdf format in the online application for the building permit. These are stored in connection with the function "My Engagement" and will later be removed or eliminated. We found it is important to ensure that the citizen could always recognize the information. If they were to receive a document in pdf-format as a confirmation of the application but were later offered print-outs from a database or

transactions log in XML as evidence it will be viewed with suspicion. The e-service must always keep and present the information in the same way.

All unique transaction logs generated through the e-service must be returned to the authorities' own workflows and be kept in the authorities' e-archives

It is essential that the National Archives or another authority should promulgate guidance (directives) on archival preservation of integrated e-services as soon as possible, particularly as it is inevitable that some services will be outsourced to private providers.

A further conclusion is that that the whole document flow must be integrated and adjusted with the e-service in mind. In this case study a well-organised e-service was built, but capture of the authorities' own workflows was not included in the e-service system design.

References

- [1] SKL, www.skl.se, 2006.
- [2] Library of Congress (2008) <ead> Encoded Archival Description. Version 2002 official site. Accessed 16 July, 2008 from <http://www.loc.gov/ead/>
- [3] International Council on Archives. General International Standard for Archival Description 2nd edition. Accessed 16 July, 2008 from http://www.ica.org/sites/default/files/isad_g_2e.pdf