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# Developing Electronic Records Management Software Applications and Managing Institutional Differences: A Comparative Study·

Özlem Bayram[a]*, Fahrettin Özdemirci[b], Taylan Güvercin[c]

*ᵃAnkara University, Faculty of Letters, Information and Records Management, Sihhiye-Ankara 06100, Turkey*
*ᵇ Ankara University, Faculty of Letters, Information and Records Management, Sihhiye-Ankara 06100, Turkey*
*ᶜTürksat A.Ş., Information Technologies Business Development, TeknoPlaza, Gülbaşı-Ankara, 06830, Turkey*

**Abstract**

For companies to manage their records efficiently, safe, systematically and economically, the transition to electronic records management systems is supported by legal regulations in Turkey. TÜRKSAT A.Ş. developed the "Electronic Records Management System (ERMS)", which is capable of records management, sharing and archiving safely on the web for institutions. Setting up, operating and managing e-Government services in Turkey are assigned to TÜRKSAT A.Ş. via the coordination of the Ministry of Transportation. Within the scope of TÜRKSAT A.Ş. informatics services, many institutions put the ERMS project into practice. Conducted at 3 different institutions, the project is compared according to various effective parameters, and it is discussed that how these parameters affect the projects, and how alternative solutions and institutional differences are being managed. Effective parameters variant to institutions are determined according to the discriminant analysis on project phase. Between the institutions that TÜRKSAT A.Ş. has been conducting projects, Ankara University e-BEYAS Project differs for being an educational institution and having an academic structure. This differentiation required e-BEYAS project to be handled in two phases. In the first phase, administrative records processes similar to public institutions were addressed, whereas in the second phase, it is decided to manage the academic records processes that are special to universities. With the institutionalization work made on the practice according to the determined differences, the practice is being adjusted to the institution. Three different projects are being conducted at 3 different institutions and various effective parameters encountered are being analyzed. These differences pose the need of different ERMS software for different versions and flexible software architecture for different institutional requirements.

\* Corresponding author. Tel.: +90-533-668-7097; fax: +90-312-600-0163.
*E-mail address:* ozlembayr@gmail.com

## 1. Introduction

For institutions to manage their records efficiently, safe, systematically, fast and economically, the transition to electronic records management systems is supported by legal and administrative regulations in Turkey. The records produced in electronic media have been made to be acknowledged legally by means of "Electronic Signature Law" [1]. With this regulation, it is accepted that the records saved in the institutions' own structure and the records saved in electronic media for the information and records management share with other institutions are in the same quality.

TÜRKSAT A.Ş. developed the "Electronic Records Management System (ERMS)", which is capable of records management, sharing and archiving safely on the web for institutions. Implementing the records system automation in the institutions with the application, which is put into practice or experimental stage in most institutions, TÜRKSAT A.Ş. aims at undertaking an important role in process of sharing records management between the institutions. It follows T.R. Ministry of Development's "e-Correspondence Project" [2] aiming at conducting the records share inter-institutions in electronic media in close. The task of setting up, operating and managing e-Government and informatics services in Turkey was assigned to TÜRKSAT A.Ş. via the coordination of the Ministry of Transportation in 2006 [3].Therefore, ERMS applications are carried out in many institutions by TÜRKSAT A.Ş. in Turkey. The institutions, in which the ERMS Project is carried out, can be divided into groups according to many parameters such as their working fields, administrative structures, the upper organizations and their tasks. For this reason, the institutions showing difference in structural characteristics are taken into consideration in determining institutions for comparison study.

## 2. The Comparison Of The Relevant Literature and Projects

A few studies attract attention between the projects carried out on Records Management in the recent years. Some of these studies are orientated to comparison of process and methods about records procedure between the large scale institutions in different countries [4], [5]. In one part of the studies, some subjects such as authentication, privacy and metadata, which are most discussed subjects among the basic constituents of records management, are majored [6], [7]. In these studies, the importance of implementing production and access of the records in electronic media in institutions as a part of daily administrative works and legal procedure arise. It is seen in the comparisons in different countries that the problems in the records management and archiving actually stem from the lack of institutional strategy. Nevertheless, there is no comparative study on basic factors effecting the institutionalization of the software in transition period to electronic records management.

In this part, the projects carried out in three different institutions are compared according to various effective parameters, and it is mentioned that how these parameters affect the projects and how the differences between institutions are managed with alternative solutions.

The three projects chosen for comparison are the projects of TÜRKSAT A.Ş., Undersecretariat of Treasury and Ankara University. The reasons why these institutions are chosen are as below mentioned.

• **Ankara University:** Among the institutions in which TÜRKSAT A.Ş. has been conducting ERMS project; Ankara University differs for being an educational institution and having an academic structure. Ankara University e-BEYAS project differs with this characteristic from the projects in the other institutions. This differentiation shows that e-BEYAS project should be taken into consideration as 2 (two) phases. Whereas administrative records processes are dealt in the first phase, it is decided to manage academic records, which are peculiar to universities, in the second phase.

• **Türksat A.Ş.:** Since Türksat A.Ş. is an incorporated society, it differentiates with its hierarchy and records processes from other institutions. Furthermore, because Türksat A.Ş. is an institution working as attached to Ministry of Transportation, it has some similarities with some processes of public institutions.

• **Undersecretariat of Treasury:** Since Undersecretariat of Treasury is a public institution, its records processes can be followed clearly, and besides many technical integrations can be made and diversified easily due to its developed technologic infrastructure.

### 2.1. Differences between effective parameters and projects

Effective parameters changing according to the institutions are determined by diversity analysis realized in the project stage. Adaptation of the application to the institution is provided by institutionalizing the application on the differences. Various effective parameters encountered in 3 (three) projects that are conducted and evaluated in the study are given below.

### 2.1.1. Organizational structure of the institution

The organizational structure of the institution that is settled in centers or countries has importance in test processes and training phases. Since the application works on web, the hardware infrastructure is not affected from the organizational structure. Organizational structures and their effects of 3 (three) institutions chosen as pilots are discussed in the below.

### 2.1.1.1. Ankara University

In the university structure, there are 8 (eight) Departments and 8 (eight) Directorships, 5 (five) Coordinators, 5 (five) Councils, 14 (fourteen) Faculties, 13 (thirteen) Institutions, 3 (three) Schools, 9 (nine) Vocational Training Schools, 1 (one) Conservatory, 2 (two) Training and Research Hospitals, 36 (thirty six) Research and Application Centers, which are attached to 3 (three) Rector Assistants, who are working as attached to Rector. The units locate in different campuses.

**The Effects on Application**

Incoming-Outgoing Records: Locating in different campuses effect the processes of incoming-outgoing records. In physical application, there are separate registry units in the faculties of Ankara University. There is Central Registry in the Rectorate of the university, and this department is responsible for incoming-outgoing records procedures of the attached units. When the electronic system is the case, the need of scanning these records occurs. It is planned that definitions will be created in order to execute the acceptance of the records belonging to each different campus after the process of the transition to electronic system. In this situation, scanners and printers will be provided for the units which receive the incoming records and post the outgoing records.

Paraph-Signature Routes: Since the university has academic units (faculties, institutions, etc.) differently from the other public institutions, differences also occur in records production processes. In the scope of the application, dynamic approval flows (paraph-signature routes) can be defined in order to execute different approval processes. Dynamic routes can be defined by the users besides forming automatic approval route by the system according to the hierarchy in which the user takes place. These functions give flexibility in the matter of differences between institutions. Thus, the variety in the final signature processes due to the university's academic structure increases the importance of creating dynamic route in the application in Ankara University.

### 2.1.1.2. Türksat A.Ş.

In the structure of Türksat A.Ş., there are 24 (twenty four) directorships, 23 (twenty three) Provincial Directorates which are attached to 5 (five) Assistant General Directors attached to General Directorate. General

Directors and Directorships locate in the 3 (three) campuses in Ankara and provincial directorates locate in the provinces.

**The Effects on Application**

Incoming-Outgoing Records: Türksat A.Ş. has 3 (three) units in Ankara, and units in 23 (twenty three) different campuses in provinces. In 2012 March, incoming records registries were defined in addition to the physical campuses which are available in electronic system. Moreover, the incoming-outgoing records registry of Legal Advisory is separated in the electronic system. Scanners and printers are provided for the units which receive the incoming records and post the outgoing records.

Paraph-Signature Routes: Since Türksat A.Ş. is an institution working as attached to Ministry of Transportation, its records processes execute similar to the public institutions. However, it has some differences since it is an incorporated society. For example, the papers, which are sent to the outside, are sent with double signatures differently from public institutions. However, these differences in the application can be overcome by means of dynamic approval routes created by the user.

### 2.1.1.3. Undersecretariat of Treasury

In the structure of Underscretariat of Treasury, there are 8 (eight) General Directorates and Departments which are attached to 3 (three) Assistant Undersecretariat attached to the Undersecretary, and there are also departments that are attached to Assistant General Directorates. There are also 3 (three) Undersecretariats that are directly attached to the Undersecretariat.

**The Effects on Application**

Incoming-Outgoing Records: The units of the Undersecretariat of Treasury apart from abroad organization and Mint locate in the central campus in Ankara. Due to this central location, a Central Registry executing the processes of incoming-outgoing records is defined in the electronic system of which test process still continues. Scanners and printers will be provided for the unit which receives the incoming records and post the outgoing records in electronic system.

Paraph-Signature Routes: Since Undersecretariat of Treasury works as attached to the Prime Ministry, its record processes proceed parallel to the public institutions' standard record processes. In this situation, function of forming approval routes automatically according to the hierarchy in which the users take place gains importance in this project. The approval flow, in which the unit managers of the user preparing the record take place, can be created and arranged according to the preference of the user by the system automatically.

As it is seen, among three institutions, although Ankara University is a public institution, due to its academic structure, its business processes and records flow show much more diversity than the other two institutions. Although Türksat A.Ş. has not as much diversity as Ankara University in business processes, it differs from other public institutions because of its incorporated society. Undersecretariat of Treasury is a typical public institution and its business processes and records flows are more appropriate to be standardized. This situation affects the definitions of the approval routes in the software. Therefore, there can be pre-defined hierarchical routes in the applications of each institution but dynamic routes, which can be created instantaneously, also need to be defined.

### 2.1.2. Records intensity of institutions

The yearly records intensity of the institution plays an important role in determining the hardware infrastructure on which the application will work, and the hardware needs such as scanners and printers which will be used in incoming-outgoing records procedure. Records intensities of 3 (three) institutions chosen as pilots are given in the below.

Table 1. Records intensity of institutions (yearly)

|  | Ankara University | Türksat AŞ. | Undersecretariat of Treasury |
|---|---|---|---|
| Incoming Records | 505.000 | 26.400 | 43.000 |
| Outgoing Records | 495.000 | 57.000 | 60.000 |
| TOTAL | 1.000.000 | 83.400 | 103.000 |

Examining records intensities, the conclusion is that Ankara University has an intense records flow in a year. Since records intensity effects the technologic infrastructure (server, storage, etc.) on which the electronic systems work greatly, the estimated server capacities should be determined. An average dimension of a record is supposed as approximately 4 MB. In this situation, the estimated dimensions of servers that the institutions should prepare as their infrastructures are as following (The capacity is calculated for 1 year).

Table 2. The records capacity of institutions (yearly)

|  | Ankara University | Türksat AŞ. | Undersecretariat of Treasury |
|---|---|---|---|
| Number of Records (Yearly) | 1.000.000 | 83.400 | 103.000 |
| Dimension of 1 Record (Average) | 4 MB | 4 MB | 4 MB |
| Total Capacity (Yearly) | ≈ 4.000 GB | ≈ 333 GB | ≈ 412 GB |

As it is seen, paraph-signature routes are affected due to the signature authorization stemming from academic structure especially in Ankara University, and for this reason there is more intense records traffic than other institutions. Designing the software in a scalable and expansive architecture simplifies to manage this situation.

### 2.1.3. Technologic integrations

Technologic hardware infrastructures and choices of the institutions affect the systems that the applications will integrate to a large extent. The technologic integrations conducted in the projects belonging to 3 (three) institutions chosen as pilots are given in the below.

### 2.1.3.1. Integration of human resources system

In the scope of application, integration can be provided with the existing external systems of the institutions. For example, if there is an available Human Resources System in the institution, organizational structure of the institution can be synchronized through this system by integrating it with ERMS application. However, if there is not an available Human Resources system in the institution, or if integration is not preferred, the organizational structure of the institution and the users can be defined through the ERMS application. Integrations of Human Resources System belonging to 3 (three) institutions chosen as pilots are given in the below.

Table 3. Integrations of human resources system

| Ankara University | Türksat A.Ş. | Undersecretariat of Treasury |
|---|---|---|
| In the scope of the software that will be applied in the university, no integration is provided with Human Resources System. The organizational structure of the university, users and title definitions were conducted through ERMS application. | In the scope of the software that will be applied in Türksat A.Ş., no integration is provided with Human Resources System. The organizational structure of the company, users and title definitions were conducted through ERMS application. | In the scope of the software that will be applied in Undersecretariat of Treasury, integration will be provided with Human Resources System used in the institution. Integration will be provided by means of views in database level with ERMS Human Resources System. In the result of this integration, the organizational structure of the institution and the users will be automatically withdrawn from the system and therefore synchronization will be provided. |

### 2.1.3.2. Single Sign-On (SSO) Integration

In the case when any Single Sign-On System is available in usage in the institutions, integration will be provided with ERMS application. In this situation, the users can access the application with their usernames and passwords, which are defined in the other systems. SSO Integration of 3 (three) institutions chosen as pilots is given in the below.

Table 4. Single sign-on (SSO) integration

| Ankara University | Türksat A.Ş. | Undersecretariat of Treasury |
|---|---|---|
| In the test process, integration is not made with any SSO system concerning the software that will be put into practice in the university. The usernames and passwords used for accessing the system are preserved in ERMS structure. Integration with SSO system will be started in the real practice following the test process. | The software, which is put into practice in Türksat A.Ş., works as integrated with the LDAP (Lightweight Directory Access Protocol) that is available in the company. In the result of this integration, the users can access the system with their usernames and passwords which they use to access their own e-mail accounts and their computers in the common domain. | The software, which will be put into practice in Undersecretariat of Treasury, will work as integrated with the LDAP (Lightweight Directory Access Protocol) that is available in the institution. In the result of this integration, the users can access the system with their usernames and passwords which they use to access their own e-mail accounts and their computers in the common domain. |

### 2.1.3.3. e-Signature Integration

Procedures of signature and paraph are enabled by using electronic signature certificates in the application. Electronic signing procedures are supported by the state with the law of electronic signature legally [8]. The institutions have to make their signature procedures with electronic signing method in the transition process to electronic application. However, this matter can verify according to the preference of the institution since there is not such an obligation for paraphs. ERMS application has enough flexibility to adapt to the electronic signing preferences of the institutions. e-Signature Integrations of 3 (three) institutions chosen as pilots are given in the below.

Table 5. e-Signature integration

| Ankara University | Türksat A.Ş. | Undersecretariat of Treasury |
|---|---|---|
| Electronic certificate and API (Application Programming Interface) are provided from TÜBITAK. Although paraphing will be executed with the application's own function, the number of the persons from whose e-signatures should be taken increases and it adds an extra cost because of the existence of many administrative and academic units which execute their procedures and correspondence with the ultimate signature as attached to an academic structure. Moreover, frequent changes due to the periodic renovation of the assignments in administrative staff, causes difficulties in e-signature application. For this reason, it is asked to use mobile signatures. | Electronic certificates are provided from TÜBİTAK, and Turktrust, API (Application Programming Interface) is provided from TÜBİTAK. | Electronic certificates are provided from TÜBİTAK, API (Application Programming Interface) is provided from a private company. As it is seen, API application in e-signature certification can be provided from different providers. However, customization is necessary in order to reflect this preference to the software. |

### 2.1.3.4. Integration of State Organization Database (ISOD)

Integration of State Organization Database is the system in which the institutions and foundation making formal correspondence are determined in a hierarchic way, and it is the system in which the information of communication and Correspondence codes that need to be used in the numbers part of formal papers of the institutions and foundations. The hierarchic structure on the system is determined with Correspondence (Correspondence or Institution) Codes that are created within certain rules. In the structure of the application, integration is provided with ISOD on the web base, and the codes of the institutions taking place on the database can be accessed. ISOD Integration in the application in 3 (three) institution chosen as pilots is given in the below.

Table 6. Integration of state organization database (ISOD)

| Ankara University | Türksat A.Ş. | Undersecretariat of Treasury |
|---|---|---|
| ISOD Integration is existent in the scope of the software which will be put into practice in the university. However, interfaces are developed at the request of the university in order to define the institutions that are not in ISOD. | ISOD Integration is existent in the scope of the software which will be put into practice in Türksat A.Ş. | ISOD Integration is existent in the scope of the software which will be put into practice in the Undersecretariat of Treasury. |

### 2.1.3.5. Mobile Signature Integration

Using mobile signature in Turkey is supported with notification published by Telecommunication Institution. Because of the above mentioned difficulties, it is planned to transit to mobile signature firstly in Ankara University, then in the other two institutions according to the technological developments. Considering it about Technological integration, using human resources system in Undersecretariat of Treasury facilitates the integration to ERMS. Electronic signature certificate is not preferred for paraph process in Ankara University differently from Türksat A.Ş. due to the changeable academic signature authorization. Therefore, ERM model for Ankara University will allows e-mail and SMS inquiry servers [9]. Although all 3 (three) institutions want the mobile signature application, such a transition will make great economic contributions to Ankara University.

*2.1.4. Metadata Schemas*

A study was started in March 2011 in order to define common metadata set, which will be used in the package structure created in Ministry of Development's "e-correspondence" project aiming at executing inter-institutions records share, and metadata elements on record types were requested from all public institutions. This study shows that metadata patterns diversify from institution to institution [10].

For this reason, institutional metadata are determined by means of discrepancy analysis carried on the transition period of putting into practice of ERMS software in the institutions in Turkey. The software can be personalized according to the determined metadata data by the system managers of the institution. Apart from the determined different metadata, there are standard metadata which need to be used in the application. Therefore, a pattern meeting Dublin Core standard [11] and TS 13298 standards [12], [13] in minimum level is dealt. In the records production and share processes, metadata data are assigned automatically and preserved for inquiry and access. In addition to this standard application, basic metadata data existing in the application in Ankara University, Undersecretariat of Treasury and Türksat A.Ş. are supported with preservation plans for archiving features.

## 3. Conclusion

Institutional differences make developing the software about ERMS applications in a flexible platform, in which those differences can be adapted, obligatory. Otherwise, the companies developing ERMS software will have to spend more time and more human power in institutionalization of each institution and the costs will increase. Increasing of costs will affect the preferences of institutions in using ERMS applications negatively. It is important that ERMS software has easily-applicable solutions in reflecting institutional differences to the software and they do not need to write new codes in the software, as well. For this reason, developing appropriate ERMS software for the process of e-institution creation should be one of the priorities of the companies developing ERMS software. ERMS applications should be taken into consideration as the basic software that forms the backbone of the system in e-State process.

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