

# Improvement of Electronic Correspondence of Inter-enterprise with Service Component of ECES

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## ABSTRACT:

by development of using software of Enterprise Content Management (ECM), necessity of improving electronic correspondence of inter-enterprise is felt more than before in order to enterprise cooperation. Despite existence of some bases for enterprise content management such as ECE protocol still there are some problems such as user intervention, delay, consumption of paper, parallelism, impossibility of tracking correspondence and security problems and possibility of enterprise cooperation is not provided well. Using architecture of service component which has advantages of service-oriented approach such as simplicity, reusability, interoperability and flexibility produces an optimal solution for interoperability between systems and heterogeneous substrates by increasing the agility of integration of web services meanwhile it does not have overload due to services and minimizes costs of development and maintenance. Component service of ECES which is implemented by using architecture of service component supports ECE standards and makes doing electronic correspondence possible between enterprises of Iran. This service component, by addressing the ECE problems described above, can provide organizational collaboration for inter-organizational electronic correspondence, independent of interfacing servers, with higher security and speed, and less error and with capability of tracking correspondence.

**KEYWORDS:** Electronic Correspondence Exchange (ECE), Enterprise Content Management (ECM), Service Oriented Architecture (SOA), Electronic Correspondence Exchange Service (ECES).

## 1. INTRODUCTION

Nowadays many enterprises face some problems in information management which is unstable and without capability of tracking due to plurality in server file, mail server, documentations' database, websites and collaboration tools [1].

Share use of enterprise documentations and publishing them by web lead to better decision-making and reusability. If enterprise documentations are not controllable, it leads to weak decision-making in the enterprise and will entail an ineffective and stressful enterprise [2].

The actions that have been taken to enable collaboration between content management software, such as web-based Cartable, MS Sharepoint, and government messaging systems, and even the ECE protocol for various reasons, such as affinity for mail servers, being primacy and low security, much user interference, the monopolism and intrusion of users outside the organization, failed to provide this possibility for an inter-organizational interactive electronic exchange of correspondence, properly.

Launching the government message system by the Ministry of the Interior is one of the first steps in Iran. This system is just a mailbox and can only send the file to the e-mail address of the organization. Dependence on the user for receiving and sending e-mail, manual entry of the characteristics of the letter, with registration in organizational correspondence software, the impossibility of relevance of this system with the office automation software and the limitation of the possibility of using only the organizations in the province and not outside the province is among the imperfections of this system. With the emergence of multiple Cartable and the resulting problems, such as low security, high cost and parallel work, the ECE Protocol provided this opportunity with the help of the e-mail service that administrative correspondence files can be sent to the target organization with the related keywords in the form of an XML file and there by extracting the keywords along with the correspondence file, they were registered with the administrative correspondence software. Some software brands such as Farzin have also developed web-based protocols that have only designed to

themselves. This leads to monopolism in this area, because for example, all organizations in the country cannot buy Farzin software. Solutions from Microsoft Company (SharePoint), and the Huddle and Xerox software are other examples that provide a solution to collaborate on a document, and include most of its contents within the organization and not beyond it [3]. SharePoint, due to the high penetration rate on the market due to its functional development and its dependence on the Office suite, Microsoft Exchange, and SQL Server, and the production of the most documentation and its co-axial context, are more successful examples than similar ones in companies such as Oracle, Xerox and IBM. Correspondence management solution in this context often requires the extraction of information from customer relationship management applications, ERP and its integration into a centralized electronic file. The output can be an advanced PDF file for sending via email [4].

This is a method for managing correspondence in organizations or companies to collaborate on collaborative use of organizational documentation which provides collaboration, reduces costs and rely less on paper and enhances user interaction. This method emphasizes the output of the correspondence rather than the input from the other organization and the need for access to the organization's software database to extract data from them, which is a weak point of the software [5].

ECE protocol is being used widely in Iran and provides possibility of Electronic Correspondence Exchange. But this protocol has many defects that have created weak enterprise cooperation between Enterprise Content Management systems [6].

Service Oriented method provides possibility of enterprise cooperation and inter-enterprise Electronic Correspondence Exchange well.

Architecture of component service as a service oriented method provides a new method to realize applied systems with better interoperability and flexibility while it minimizes costs of development and maintenance.

In this paper, ECE protocol has been implemented by using service component architecture and adding service component of ECES.

The ECE protocol is affiliated with the e-mail service, which also raises the number of mailboxes. Problems such as high simplicity, low security, user interference, low speed and high percentage error are its disadvantages. On the other hand, all office automation software does not fully support this protocol. The ECES service component by addressing these problems can provide organizational collaboration for inter-organizational electronic exchange which is independent of interfacing servers with higher security and speed, and less error and capability to track correspondence.

In this paper, first ECE protocol is introduced in part 2 and in part 3 inter-enterprise correspondence exchange is evaluated based on extensible ECM [7] with service component architecture (SCA) which is a service oriented architecture and its components are expressed. In part 4 service component of Electronic Correspondence Exchange (proposal component service) is introduced and finally the conclusion is expressed in part 5.

## 2. PROTOCOL OF ELECTRONIC CORRESPONDENCE EXCHANGE

Protocol of Electronic Correspondence Exchange was created by administrative automation work group of informatics companies' association which consists of representatives of the known companies in the administrative automation market in June 2005. Features and attachment files in a form of an XML file is put in order to send to destination to send the letter according to ECE protocol.

The file is sent to the destination through electronic post and there features and attachment files are extracted from XML file and recorded. Receiver after receiving that and recording in the local system should prepare the receipt which is a file from type of XML and send it to the sender. Therefore, two files are exchanged in this protocol named send and receipt file [8], [9]. Details of sending and recipient files have been specified respectively in tables 1 and 2. This protocol does not meet our needs completely despite great help in this field and still parallelism and even using paper and doing primary operation with file that are prevalent in this field. ECE protocol depends on Electronic Post Service which entails plurality of mailboxes. Problems such as high simplicity, low security, user intervention, low speed and high error percent are some of its defects. On the other hand, all administrative automation software does not completely support this protocol too

## 3. EXTENSIBLE ECM WITH SERVICE COMPONENT ARCHITECTURE (SCA)

Good enterprise architecture can help government in order to make resources of information technology favorable with Citizen Service Strategy plan [10]. Service oriented architecture is a suitable architecture to develop enterprise modern applied programs that simplicity, reusability, interoperability and flexibility are some of advantages of this approach [11]. According to advantages of service oriented architecture which the most important of that is interoperability, this architecture is suggested in order to inter-enterprise electronic correspondence exchange.

A framework can be used for integrated management of process and content which can be implemented as a service oriented framework for enterprise content management. According to facilities of this framework,

the possibility of electronic correspondence exchange is provided based on the service [13], [12].

Therefore, enterprises can have maximum productivity of available resources and focus on improvement of activities of their business environment.

There are two main challenges in understanding SOA from content management system [15] and [14]:

1- The identification of main and basic service which supports enterprise management is very critical. Fine-grained services can cause to overload during their combination together. Fine-grained services cause to deficiency of flexibility during the combination and customization.

2- Needs of content management system is various for different types of documents. Framework of combined systems is very heavy and a lot of programming is needed for combination and customization of services.

Integrated framework based on content and process has low flexibility about different types of documentation and needs of systems are high for different types of content and cause to overload for system. Customization of services is very heavy due to combination of services and needs a lot of programming.

An extensible SOA has been designed and implemented to solve above problems which is according to service component architecture. ECM architecture based on service component architecture suggests two main parts of customizable workflow and measurable document storage [16]. A thing which has importance is that to be ensured of relationships and dependencies of time of implementing main components among other discovered components to availability of service [2]. Preparation of an interface for implementation service of SOA causes to improvement of cooperation and flexibility and reduction of costs.

These components of service are designed based on SCA and include content storage service, document workflow service, search service, informer service, security service, executive logs service and integration service. A runtime dependency model and bootstrap mechanism based on graph traversal algorithm are introduced to ensure the availability of applied services. General architecture, designing each service, foundation approach and dependency model of runtime of components have been mentioned in continue.

Since high level applied services are supported by basic components in architecture, communication between these components and dependencies of runtime of them has importance to ensure availability of the service. Dependency model shows communication of all components of the system. By testing service with standard interface for evaluating viability of each dependent component, operational availability of applied services will be possible after this stage. This service oriented implementation approach provides a new method to realize applied systems with better interoperability and flexibility while it minimizes costs of development and maintenance.

This system "Fig. 1," has been formed from at least some services of service module for interaction with the user, a module of system management and user, a workflow configuration module, content manager module and document search module. Some components of SCA service base are produced in infrastructure of the system to support interaction module operation services of interaction with user and they are coordinated by SCA runtime service.

**Table 1.** Forming components of sending letter file- version 1.01, ECE [8].

Main components	Combination of main components
General information	Specifications of protocol- specifications of sender system
Information letter	Specifications of sender- specifications of receiver- specifications of other receiver(s)- letter number- letter date- related letters, type of communication, related number letter- date and hour of related letter- sender of related letter- subject of letter- prioritize- classification of letter- keywords of letter
Text(s) of letter	In one of image formats type of jpeg, tiff, gif and png and in existing case with textual files in format of Ms Word, Pdf and plain text
Attachments	Text of attachment file

**Table 2.** Forming components of receipt file of received file- version 1.01, ECE [8].

Main components	Combination of main components
General information	Specifications of protocol- Specifications of sender system
Information letter	Letter number- letter date- specifications of letter receiver
Receipt information	Sent code - letter registration number- letter registration date- explanation

#### 4. SERVICE COMPONENT OF ELECTRONIC CORRESPONDENCE EXCHANGE (PROPOSAL COMPONENT SERVICE)

In architecture of service component content management, basic service components include a service component of content repository to support and save documentations, a service component of workflow for documentation lifecycle management, tracking work stages and documentation routing execution for different users. Search service component is for search and documentation recovery, security service component is for supporting authentication, authorization and access control to documentations electronic signature is for approval and confirmation. Informing service component is for informing and reminding users from their tasks that have waited in workflow and log service component is for registration of execution and conducted transactions by user and finally aggregation and integration service component is for interaction with applied programs of external business [2].

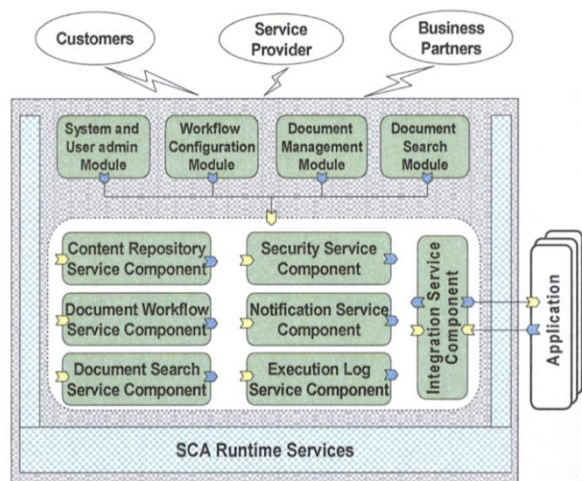


Fig. 1. Content management system (ECM) based on service component architecture [6].

Basic service component are used for high level combined services to support different modules and ECM management operation. Implementation of that can be local or long distance service that can be evaluated by applied programs of customer through service interface.

Basic service components include a service component of content storage to support saving documentations, a service component of workflow for documentation lifecycle management, tracking work stages and documentation routing execution for different users is for next tasks, search service component for search and documentation recovery, security service component for supporting authentication, authorization, access control to documentations electronic signature is for approval and confirmation.

Notification service component is for notifying and reminding users from their tasks that have waited in workflow and log service component is for registration of execution and conducted transactions by user and finally aggregation and integration service component is for interaction with applied programs of external business. Repository service component uses web service with a XML document model messaging [17]. Advantages of this model are providing profession documentary to validation and self-description with XML schema [18].

This service oriented implementation approach provides a new method to realize applied systems with better interoperability and flexibility while it minimizes costs of development and maintenance. It produces an optimal solution for flexibility and interoperability between systems and heterogeneous substrates by increasing reuse and agility of integration of Web services. Content management system has been equipped with a set of integrated web services to simplify interaction with external business programs.

Two sets of web services of document entrance and exit are implemented to activate information share with external management tool. Web service of document entrance is for creation of document to send documents directly to the system to start document workflow. Web service of document exit lets external management tool to extract information and documents in the system and share them. Implementation of this system shows that designing basis SCA supports extensible information of demand-driven management services and also it can be scalable for large enterprises that have advantages of simplicity, flexibility and effectiveness of cost.

According to the mentioned cases and advantages of using service component architecture (SCA) which is based on SOA and XML, it is necessary to use a single protocol in order to unify data and document and sending and receiving that among types of ECM systems [19], [6]. So SCA architecture is redesigned based on ECE standards which cover required standards to exchange data and documents among ECM systems in Iran. According to suitable architecture of SCA which needs all needs of an ECM, a component is required to send and receive data and attachment documents based on standards of administrative correspondence exchange among content management systems or administrative automation in Iran.

Name of this component is ECES. This name has been derived from name of ECE protocol due to use its standards and also providing it as a service component.

This component is responsible to send and receive correspondences in the format of a XML file based on ECE standards. In fact, ECES receives the received correspondence file from source and extracts data (fields) and attachment documents from XML file and delivers them to the related component. Also on the

contrary case, it puts data and attachment documents in a XML file based on ECE standard and delivers it to the related component in order to send to the destination.

Correspondence data which is exchanged by XML file includes letter number, date, subject, sender enterprise, receiver enterprise, related letters and attachments. Types of sent attachments include types of image file and pdf and word file. Graph of meta-model in order to save in enterprise content storage has been mentioned in figure 2. ECES service component has been formed from two main methods of reading and writing XML file.

Reading method is in order to receive XML file and extract its data. The extracted data is put in a data table. Writing method is in order to produce XML file and writing sent data in that. Therefore, send and receive operations of XML file of Correspondence are conducted by these methods.

In Figure 3 the place of service component of ECES is specified and the class diagram of ECES components has been shown in Figure 4.

The Microsoft .NET Framework has been used according to wide use of windows servers in governmental enterprises in Iran. In this implementation .NET version 4 is used. WCF and ECES have been used respectively for designing and programming and the exchange letter file is with XML format.

WCF is a framework to make service oriented applied programs and by that, data can be sent from one endpoint of the service to another as the asynchronous messages. An endpoint of the service can be a part of the continuous service which is hosted by IIS or it can be a service which is hosted in an applied program [11].

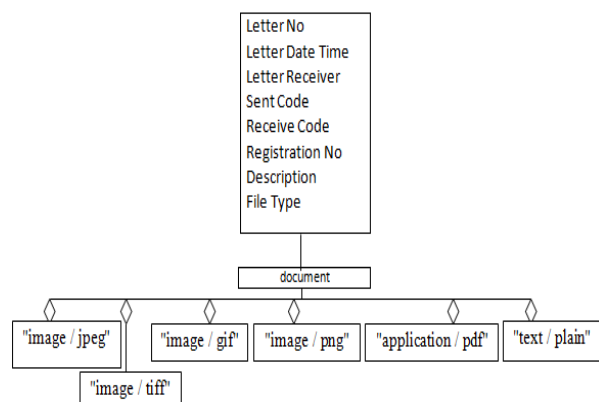


Fig. 2. Meta-model in order to save in content repository.

The sending and receipt operation of XML file is required in order to ECES programming. In fact, writing and reading are programmed from XML file. Therefore, the functions of creating EML file, writing to XML file and reading from XML file are required. Function of writing to XML file has been mentioned in figure 5.

In fact, in this component, the service component is received in order to send file of the specified data to send through ECES from input of service component and in the format of a data table. Data includes letter number, date, subject, sender enterprise, receiver enterprise, related letters and attachments. This data is written in XML file and sent to output of the component.

During receiving letter of XML file from input, the component is received and the mentioned data is extracted from that and put in a data table and sent to output of the component. Therefore, the component includes two main methods of sending and receiving that one of them receives XML file and brings data table to output and another receives data table and brings XML file to output.

Attachment files can be with formats of pdf, tif, jpg, docx or any other factor in the method of receiving, XML read the file from the sent XML and put them with other specifications in a table and bring to output. Function of reading from XML file has been mentioned in figure 6. In method of sending XML, it reads attachment files from data table and puts in XML file to be sent. Attachment file is saved in data table with binary data format and saved in XML file as base64String; so all these data types are exchanged in the two mentioned methods.

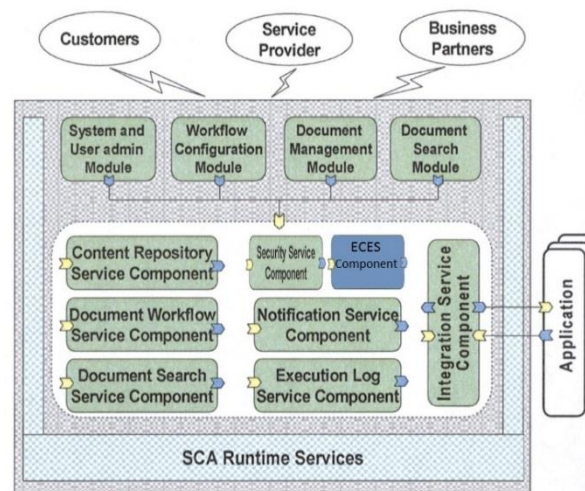


Fig. 3. Place of ECES service component.

Attachment files can be with formats of pdf, tif, jpg, docx or any other factor in the method of receiving, XML reads the file from the sent XML and puts them with other specifications in a table and brings to output. Function of reading from XML file has been mentioned in figure 6. In method of sending XML, it reads attachment files from data table and puts in XML file to be sent. Attachment file is saved in data table with binary data format and saved in XML file as base64String; so all these data types are exchanged in the two mentioned methods.

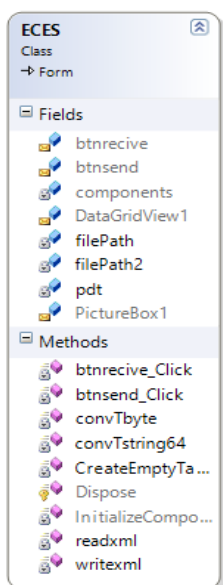


Fig. 4. The ECES class.

```
Private Sub writexml(ByVal dtable As DataTable)
    Dim dss As New DataSet

    Try
        dss.Tables.Add(convTstring64(dtable))
        dss.WriteXml(filePath2)
        MsgBox("Data has been saved.")
    Catch ex As Exception
        MsgBox("Data cannot be saved.")
    End Try
End Sub
```

Fig. 5. Function of writing to XML file.

```
Private Function readxml() As DataTable
    Dim xmlFile As XmlReader
    Dim ds As New DataSet
    'fill dataset with selected xml table
    xmlFile = XmlReader.Create(filePath, New XmlReaderSettings())
    ds.ReadXml(xmlFile)
    xmlFile.Close()

    'init datagridview
    Me.DataGridView1.DataSource = ds.Tables(0)

    Return convTbyte(ds.Tables(0))
End Function
```

Fig. 6. Function of reading from XML file.

## 5. EVALUATION OF THE PROPOSED MODEL

In order to evaluate the proposed model, the methodology of organizational content management software in Yazd Housing and Urban Development Organization was investigated. The organization uses FillerPlus Electronic correspondence software and Papyrus Electronic Archive Software. It is imperative to

share data and files by these two software programs electronically. Also, FillerPlus software with Farzin and Step software were used and the government message are in the Ministry of Housing and Urban Development, and the National Land and Housing Organization and Yazd Governorate, respectively, using the ECE Protocol. Therefore, the use of ECES creates tremendous development in the electronic exchange of this organization in the context of SCA architecture and increases speed, accuracy, and reduces the error and cost of inter-organizational correspondence exchange. The WCF the Microsoft .NET Framework has been used for ECES programming. There are two main methods in this program. The XML download method retrieves the file from the transmitted XML and puts it along with other specifications in a data table and outputs it. In the XML send method, the attachments are retrieved from the data table and are put it in the XML file for sending.

## 6. CONCLUSION

ECES component service which is published in SCA basis supports ECE standards and makes electronic correspondence possible between enterprises of Iran. This component has all advantages of service oriented approach and service component in itself and produces an optimal solution for interoperability between systems and heterogeneous substrates by increasing the agility of integration of Web services that does not have problems of overload of services. Therefore, by using this service oriented approach, the enterprise cooperation can be made possible in order to inter-enterprise electronic correspondences exchange independent of interface servers and with higher speed and security and less error and with capability of tracking correspondences and also this solves problems of ECE protocol.

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