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Metoda za definiranje profilov za zdravstveno oskrbo

A method for defining profiles for healthcare

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A method for defining profiles for healthcare

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CONTENTS

ANNEXES

1. INTRODUCTION

This is the second edition of EWOS Technical Guide ETG 021. The first edition was produced by EWOS/EG MED as the first step in fulfilling a number of Mandates issued by the Commission of the European Communities. The Mandates concerned the production of profiles in the healthcare field. This Technical Guide defines a method for identifying such profiles. This second edition is a revision of the first, incorporating changes to the method which were identified by EWOS/PT N024 on medical image interchange, the first time the method had been used fully in one application area.

There are a number of audiences for this document. The principal one is practitioners in the field of IT in healthcare (e.g. the IT manager at a hospital). Others include suppliers of IT products and, to a lesser extent, OSI experts assisting in healthcare procurement etc.

1.1 BACKGROUND

In 1989, SOGITS issued Mandate BC-IT-SI-05. This Mandate was split into two parts, one being the responsibility of CEN and the other of EWOS. Both organisations set up Project Teams and both teams reported in early 1991. The report of EWOS PT 007[1] provides useful background to this Technical Guide. EWOS/TA 13 agreed that a new Expert Group (EG MED) should be set up in order to undertake work within the field of healthcare that falls within the remit of EWOS. The Work Programmes proposed by both PTs have been incorporated into a single document which has been approved by the CEN BT[2]. All aspects of this Work Programme that are concerned with Open Systems are the responsibility of EWOS/EG MED. Specifically, five items of the Work Programme have been so identified at the present time:

3.1	OSI Application Profiles for Health Care
3.2	OSI Transport Profiles for Health Care
3.3	OSI Management Profiles for Health Care
3.4	Multimedia Medical Data Interchange
4.1	Functional Profiles for Medical Image Interchange
4.7	Medical Image Interchange: Conformance Testing of Standards Implementations

The CEC has issued mandates in respect of work items 3.1 and 4.1. The first five work items are concerned with profiles, the last with conformance testing (and hence will be handled separately at a later date).

This document provides a description of the method for mapping user requirements into open systems (principally OSI) profiles.

1.2 OBJECTIVES

The principal objective of this document is to define a method whereby "real world" user requirements for communication between healthcare systems can be mapped on to open systems profiles.

There is a myriad of requirements for information interchange and processing in healthcare and these requirements may be satisfied by many different combinations of profiles. Current OSI profiles are well defined and categorised[3,4]; user requirements are neither well defined nor categorised, although work is being undertaken within CEN which will assist in this respect.

Most OSI profiles have been defined to support a specific interworking requirement and have not been used to satisfy the needs of any particular domain. When the user requirements are mapped onto existing profiles, there are three possibilities:

the user requirements are met fully by current profiles;

while the user requirements are broadly met, the particular requirements impose constraints on existing profiles; therefore, new profiles and/or combinations of existing profiles are required, albeit similar to current profiles but with additional constraints;

the requirements are not met by existing profiles and new profiles need to be developed.

Therefore, this document is intended to specify a method for:

identifying which of the above situations applies to a given user requirement;

indicating whether a particular profile can be used for a given user requirement; and

indicating where additional profiling work needs to be undertaken.

It is impractical to map every user requirement on to the appropriate profiles, as the set of user requirements is potentially extremely large. Instead, the document defines a method of specifying user requirements in a systematic manner so that classes of functionally similar user requirements can be mapped onto the same profiles.

In addition, at present there are no healthcare specific OSI base standards (as exist in other application areas such as manufacturing and inter-library loans). When such standards are developed (through bodies such as CEN), then profiles may also be required.

This document does not undertake the required profiling work. However, it does define a general method which will allow the profiling work to be undertaken (and thus fulfils the initial part of the first four work items specified above).

Further work will be required in future, particularly to relate user requirements to OSE profiles when these are developed.

1.3 DEFINITIONS

In this document, it is hoped that the meaning of the terms used are intuitively obvious. However, it is necessary to use terms precisely and so some formal definitions are given here. A list of acronyms is given in the Glossary.

Attribute: A property of a real-world object which can be characterised by a set of values. A set of attributes is selected in order to enable the characteristics of a particular domain to be enumerated. The particular domain of interest in this report is that of information interchange. Other domains (for future study) include Security, Information Structure, etc.

Attribute Value: A set of possible values which is assigned to a given attribute (e.g. attribute "Volume" may take the value "Small"). Attributes and their values are selected to be meaningful to non-IT specialists, and intuitive to apply.

Set of Attribute Values (SAV): For a defined set of attributes corresponding to a particular domain of interest (e.g. medical imaging), a Set of Attribute Values consists of an (ordered) list of values for each attribute.

"Goodness of Fit Factor" (GOFF): This defines how well a particular profile (or set of PFCs) matches a particular Set of Attribute Values.

Profile Functional Characteristics (PFCs): These characterise, in user-orientated terms, the functionality supported by a profile (or base standard). In many cases, PFCs will correspond to optional profile features which may need to be made mandatory in order to satisfy a particular user requirement (e.g. body part in MHS, document type in FTAM).

User Scenario (US): A description of a real-world information processing requirement, which may be characterised by a unique Set of Attribute Values. The relationship of US to SAV is many to one.

User Scenario Characteristic (USC): An aspect of a User Scenario that can be defined for a given scenario in such a way as to facilitate mapping on to an Attribute Value

1.4 STRUCTURE OF THIS DOCUMENT

Chapter 2 is a summary of the method; it is intended that this Chapter should be included in all documents which use the method, in order to give a consistent, brief outline. Chapter 3 defines the approach and the method adopted to map the user requirements to profiles. Chapter 4 demonstrates how the user requirements are categorised and the Attributes determined. The next Chapter assigns values to the attributes relevant to healthcare information interchange and defines how attribute domains relate to typical user scenarios. Chapter 6 briefly examines the open systems profiles and their categorisation. Chapter 7 defines the "Goodness of Fit Factors" and discusses their values. Chapter 8 specifies the matrix thus derived and this is followed by Conclusions and Recommendations. Finally, there is a Glossary and a list of References.

2. SUMMARY OF METHOD

This Chapter is intended to summarise the method defined later in this ETG. It provides sufficient detail for a user to understand the method and is intended to be included, with little change, in documents where this method is adopted.

There are two main phases of the method, development of the Matrix and use of it. It is expected that the method will be used for specific domains of healthcare (e.g. imaging) and the full healthcare matrix is the union of the separate sub-matrices.

1. Review the specific domain and identify the attributes and attribute values that pertain to this domain.

2. Create a series of User Scenarios describing "real-world" requirements of the domain.

3. Derive technical characteristics of these scenarios to enable each to be described exactly in terms of their communication requirements.

4. Select Transport Profiles, Application Profiles and Format Profiles relevant to the domain. Only these profiles which are candidates to support the requirements of the domain should be considered, "Candidate Profiles".

5. Establish taxonomies of Candidate Profiles and User Scenarios to allow them to be mapped on to each other in a rigorous manner.

6. Derive the Profile Functional Characteristics (PFCs) for each communications profile.

7. Define the quality criteria to be used for the evaluation of the usefulness and appropriateness of each profile, known as Goodness Of Fit Factors (GOFFs).

8. Produce a matrix of User Scenarios and Candidate Profiles, where each intersection in the matrix is a GOFF, i.e. an indicator of the suitability that Candidate Profile in the circumstances described in the User Scenario.

9. Whenever the GOFF indicates that no Candidate Profile would satisfy the user need, make recommendations for the modification or creation of an appropriate profile.

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3. APPROACH AND METHOD ADOPTED

3.1 INTRODUCTION

Information systems are rapidly becoming an accepted part of the healthcare world. As further systems are installed the need to pass information between them becomes greater, and the main obstacle preventing this is the lack of suitable and accepted communications standards.

Obviously many OSI standards can be used for such communication, but little work has been done on the suitability of OSI profiles for particular healthcare applications. Specifically, few attempts have been made to categorise rigorously which profiles should be used to satisfy which user requirements.

This document attempts such a categorisation by building a matrix of user requirements against OSI profiles, or to be more exact, a matrix of user scenarios against profiles. An entry would then be made at the cell representing the intersection of the scenario with a particular profile to indicate the suitability of the profile in that situation. It should then be a simple matter for the user to identify a particular scenario on the y-axis of the matrix and look along the line of cells for suitable profiles. Given that more than one profile would be suitable, the user could decide which to use based on his own implementation constraints. For example, he might be constrained by cost or an existing network.

Thus, at its simplest, the matrix would be of the form:

User Reqs	P1	P2	P3	P4	
Send lab rept from hospital to remote GP	Y		Y		
Send radiology image from imaging machine in one hospital to imaging machine in remote hospital				Y	

Profiles

However, healthcare informatics is a very wide subject which covers a large number of complex medical areas. It therefore gives rise to an almost infinite range of user scenarios. Although it is theoretically possible to identify these, there are certain disadvantages:

- Specialist medical knowledge would be required
- The resulting matrix would be huge and unmanageable
- It would be difficult to insert new scenarios or profiles into the matrix

Thus, while the above proposal would fulfil the requirement of identifying the mapping between user scenarios and profiles, it could not be used in practice. Therefore a method needs to be found to classify the scenarios in such a way that the matrix becomes manageable and which will allow interested parties to determine which profile(s) could - or should - be used for a particular user scenario. This imposes certain limitations on the exact structure and terminology used in the matrix. In particular, the following need to be borne in mind:

- This document is intended to be used by domain experts (probably healthcare IT specialists) rather than OSI experts.
- Although intended primarily for use in Europe it should be accessible to and able to accommodate contributions from experts in other countries.
- The purpose of this document is not necessarily to define unequivocally the profile that should be used for a particular scenario, but to point the user towards a number of profiles that could be used (or, put another way, will permit the user to discard profiles that are not suited to that particular scenario). It will then be up to the user to decide which profile to use, depending on the particular combination of functionality, cost, performance etc. that is required.

This approach has certain important effects:

- The terminology used, although applied in a rigorous manner, is biased towards that used in the user community rather than by OSI experts.
- The choice between certain profiles is determined by factors outside the scope of this document. For example, a user may require to send a file between two remote machines and the matrix may indicate that both FTAM and MHS are suitable. To an OSI expert, there are obvious differences in the use of these profiles. However, it is difficult to specify these differences as part of the user scenario, and therefore the scenarios that require MHS and FTAM cannot be segregated. The matrix would indicate both profiles to be suitable and the user should consult an OSI expert in order to come to a final decision.

- There are a number of non-OSI standards either being developed or in use in the healthcare domain (e.g. DICOM[5]). It is likely that if their functionality is not matched by an existing OSI profile, a new non-OSI profile may be required (this is permitted in TR 10000). For this reason, such profiles are included in the matrix.

3.2 REFINEMENT OF METHOD

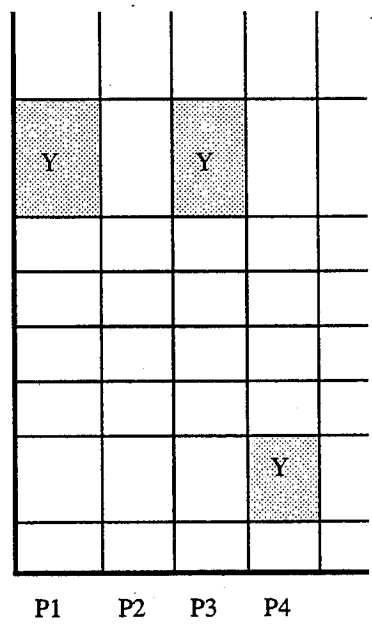
The above method maps user scenarios into profiles but, for the reasons outlined above, it is necessary to classify the scenarios in order to manage the matrix. Thus the first refinement of the method is to define a set of Attributes which can be used to classify each scenario. In fact, a further refinement which simplifies the method is to define the "user scenario characteristics" which is a more formal way of specifying the user scenario to facilitate mapping onto the "Set of Attribute Values" (SAVs). This method implicitly leads to a taxonomy of user scenarios.

Provided that the Attributes and their possible values are well chosen, it should be possible to define any user scenario in terms of these Attributes. One axis of the above matrix can then be replaced by SAVs. This method implies that scenarios with the same Attribute Values may use the same profiles and this property should be used in determining the Attributes.

This method suffers from a major disadvantage and so needs to be refined further. The disadvantage is that this axis theoretically contains every possible combination of Attribute Values and, even with a relatively small set of Attributes, the usual "combinatorial explosion" occurs, giving an unmanageable number of combinations, many of which will not be found in practice. Thus the second refinement is to restrict the axis only to those combinations that occur in practice. This can easily be achieved by defining various scenarios and determining the set of Attribute Values appertaining to those values.

Thus the matrix described above is now replaced by one of the form:

Scenario	User Scenario Characteristics	Attribute Values
Lab rept to remote GP	Frequency= .... Latency=... ....=....	ABCDEF
Scenario xxx		ABCCFG
Radiology image to remote hosp		CDEEDZ



Profiles

In practice, this will produce a matrix that is extremely difficult to read (in fact, it is more complex than the one it supersedes). Indeed, the above is an over-simplification in that a number of scenarios (user scenario characteristics) will map into the same Set of Attribute Values. To simplify the process, the matrix will be expanded into two matrices. The first is a list of user scenarios, followed by their User Scenario Characteristics and their corresponding Attribute Values. The second is the matrix of Attribute Values against profiles. The first of these will look as follows:

	Scenario Descriptions	User Scenario Characteristics	Attribute Values
1.	Clinical Laboratory Services		
1.1	Send report to remote GP	Frequency=.... .....=.....	ABCDEF
1.2	.....	.....	.....
1.3	.....	.....	.....
1.4	Doctor sends test request to hospital on same site		ABDVEF
1.5	.....		ABHJCC
1.6	.....		ABHJCC
2.	.....		
3.	Radiology		
3.1	CT machine to CT machine on same site		BJAABC
3.2	CT machine to CT machine on remote site		BJAABB
3.3	.....		