Smart Open Services for European Patients

Open eHealth initiative for a European large scale pilot of

Patient Summary and electronic Prescription

D3.C.3 - PN Infrastructure Interoperability Report

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ABSTRACT
"D3.C.3 - PN Infrastructure Interoperability Report" is the outcome of Task 3.C.3 - Interoperability Testing / Common testing event. It focuses on the results of the face-to-face testing events, i.e. the Projectathons. In epSOS Phase 2, there have been two Projectathons in conjunction with the regular IHE-Europe Connectathons: Bern Projectathon in May 2012 and Istanbul Projectathon in April 2013. Within this document and its appendices, the details and outcomes of these Projectathons are provided.

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1 Introduction

epSOS is specified and implemented as a set of interacting National Contact Points (NCPs). epSOS technical specifications define common communication and data exchange interfaces only for NCP to NCP interactions. epSOS Participating Nations (PNs) are subject to validating the compliance of their NCP implementations to the epSOS specifications through a series of testing activities. These test phases are specified in detail in D3.C.1 - Proof of Concept Testing Strategy and its Appendix B - Proof of Concept Testing Strategy Details.

These test phases can be grouped under two main events: Projectathon (PAT) and Pre-Pilot Testing slot (PPT-slot). A Projectathon is an Integrating the Healthcare Enterprise (IHE) Connectathon like face-to-face event to perform conformance and interoperability testing. It also includes end-to-end functional testing involving health professionals (HPs). It is not mandatory for the PNs to participate with their actual national infrastructures in a PAT; a simulation of the national environment is accepted as well. PAT allows PNs to enter into Pre-Pilot Testing (PPT). PPT is conformance, interoperability and end-to-end functional testing with real national infrastructure and virtual data. PPT is a continuous process and the PNs need to operate their testing environments even after starting real operation. Within PPT, in order to be allowed to start real operational pilot, the PNs need to achieve at least one PPT-slot, which is an online testing event. According to the needs and statuses of the PNs, two-week long PPT-slots are organized a few times in a year for repeating all tests within the scope of PAT with real national infrastructure and virtual data. Both Projectathons and PPT-slots are managed by WP3.C Leader, and the testing infrastructure is provided by IHE-Europe through Gazelle® software.

Task 3.C.3, and hence this deliverable focuses on the results of the face-to-face testing events, i.e. the Projectathons. In epSOS Phase 2, we had two Projectathons in conjunction with the regular IHE-Europe Connectathons: Bern Projectathon in May 2012 and Istanbul Projectathon in April 2013. In the following sections and the appendices, the details and outcomes of these Projectathons are provided.

PPT-slot results are provided through interim reports, which are updated in several iterations with the feedback and repeated tests by the PNs, and finally through the Individual TPM Reports of the PNs. The most up-to-date information about a PN's PPT-slot result is always present in the TPM Report. As of July 2013, we had four PPT-slots and a fifth one is planned for September 2013.

2 Bern Projectathon

Bern Projectathon was the 3rd Projectathon of epSOS. It was held in conjunction with the regular IHE-Europe Connectathon in Bern on May 21-25, 2012.

2.1 Participants

In Bern, we had 6 on-site participants (Estonia, Finland, Portugal, Switzerland, SRDC and Tiani) and 2 experienced remote participants (Italy and Sweden) to support the on-site participants. Malta was also present for two days as an observer only.

The participants, their services and NCP solutions are presented in the table below.

Country	Organization	Services(**)	NCP solution
Estonia	EeHF	PS A & B	SRDC NCP
Finland	Kela	eP/eD-A	SRDC NCP
Portugal	SPMS	PS A & B	Tiani NCP
Switzerland	HUG	PS-A	Tiani NCP
Turkey(*)	SRDC	PS A & B	SRDC NCP
Austria(*)	Tiani	PS A & B, eP/eD A & B	Tiani NCP
Italy	LISPA	PS A & B, eP/eD A & B	Tiani NCP
Sweden	SALAR	eP/eD A & B	Tiani NCP + own portal

(*) SRDC and Tiani did not participate on behalf of their countries, but acted as Turkey and Austria during testing.

(**) PS: Patient Summary, eP: electronic Prescription, eD: electronic Dispensation

2.2 Organization

2.2.1 Monitors

A team of 5 monitors was set up and trained to assist testers and verify the tests cases. The monitors were selected following the requirements specified (expertise on epSOS specifications, neutrality, and experience on a previous IHE Connectathon):

- Anne Gaelle Bergé, epSOS services, XCA, XDR
- Giorgio Cangioli, epSOS services, CDA Expert
- Elena Vio, epSOS services, XCA, XDS
- Abderrazek Boufahja, XCA,XDS
- Eric Poiseau, XCA, CDA

These experts were chosen because of their skills corresponding to the requirements and after a call for candidates over epSOS project and IHE-Europe Members. The team was led by:

- Karima Bourquard, Director Interoperability, IHE-Europe

- Eric Poiseau, Technical Project Manager, IHE-Europe

2.2.2 Physical Infrastructure

The logistic organisation was under the responsibility of IHE (IHE-Europe with the help of IHE-Switzerland) for the following items: networking (broadband internet access, LAN set up and management during the entire event, hosting of simulators on local server), catering, security and social event. The Projectathon was a parallel event of the IHE Connectathon and located at the same place at BernExpo.

2.2.3 Testing Infrastructure

The tests were driven and reported using the IHE Gazelle Test Management Tool (**http://gazelle.ihe.net/EU-CAT/**).

Before and during the Projectathon, the set of test tools (simulators, validators) that were developed by IHE-Europe according to the epSOS specifications were used to assist testers and monitors in their testing duties, i.e. while trying to fulfil the obligations of the test cases that are assigned to them based on the services they implement. These test tools and test cases are not presented here in detail. They are available in D3.C.1 Appendix B - Proof of Concept Testing Strategy Details. The latest status of the test tools and test cases will also be reported in the upcoming deliverable D3.C.2 - epSOS Phase 2 Test Infrastructure with All Tools.

2.3 Results

In total, 80 individual Gazelle tests and 13 end-to-end functional tests were performed by the participants during a week. Out of these 80 Gazelle tests, all 80 were reviewed by monitors. End-to-end functional tests were analyzed by our semantic expert Giorgio Cangioli.

The numbers of completed tests and verified tests per participant are presented in the following table:

Participant	# of completed tests	# of verified tests
EE: EeHF	29	29
FI: Kela	10	10
PT: SPMS	22	22
CH: HUG	13	13
SRDC	43	43
Tiani	10	10
IT: LISPA	14	14
SE: SALAR	6	6

It should be noted that the sum of tests per participant is much higher than the total number of individual tests, i.e. 80, because peer-to-peer tests are counted twice in the former.

The detailed results of all the tests are presented in Appendix A to this document. After all the testing and verification activities, this report is automatically generated by Gazelle based on the available information.

All the participants passed the Bern Projectathon, and proceeded with their Pre-Pilot Testing activities.

An important aspect of the Bern Projectathon is that, it was the first epSOS testing activity where an NCP implementation other than the NCP-in-a-box, namely the SRDC NCP, participated and became successful. Half of the on-site participants (Estonia, Finland and SRDC) used SRDC NCP in Bern. This fostered the detection of new minor issues both in NCP implementations and Gazelle test artefacts that were not detected before; and led to improvement of both NCP implementations and the test artefacts. As a result, open source and free SRDC NCP formed the basis of the epSOS OpenNCP.

2.4 Detected Issues and Further Comments

Mostly minor issues were detected in both participant implementations and Gazelle test artefacts. These issues and further comments by IHE-Europe and WP3.C Leader are presented in this section.

Reported by IHE-Europe:

- We noticed some errors in the XDS metadata, the field XDSDocumentEntry.uniqueId shall be coded as an OID and some PN do not respect this constraint. See for instance TI-20540, TI-20002, TI-21531, TI-21328.
- Various problems on the translation of the displayName in CDA documents : see TI-20977, TI-21354, TI-20576
- From Italy, Base64 representation of the PDF document is sent in a single line, which can contains tens of thousands of characters. This gave problem to the SRDC implementation. Although this is common practice with Base64 to have line breaks after every 72 or 76 characters this is not a requirement. On SRDC side, the CDA display tools gets a Java exception, because this string is too long.
- We still found incorrectly formatted sourceId in audit message. In the case of epSOS this element MUST provide the ISO 3166-2 code of the country/region where the audit source is located. See section 4.5.3.6 of WP34_D342_V2.2 for more details. (TI-19279)
- There is a need to clarify how the fault conditions and error codes are handled: NCP-side or National Infrastructure-side? At the moment only some NCP-A systems manage fault condition for Patient Consent (error code 4701). Other fault cases are not clearly managed

by the portal-B. Some of the fault conditions depend on the policy defined in the country-A. In the Projectathon environment, no security policies were defined by the countries nor were they available before the beginning of the testing session and thus it was not possible to evaluate them.

- Errors in transcoding and/or translation of the codes were found depending on the local terminology server that was not in line with the MVC / MTC. The participants need to finalise their transcoding and be in synch with the server before testing.

- Overall, the epSOS solutions tested during the Projectathon in Bern were much more mature than the versions tested during the previous events. Both the applications and the tools used during the event have been improved based on the learned experience.

Reported by WP3.C Leader:

- Unlike the Pisa Projectathon in 2011, the network was very stable; both inside and outside.

- Monitors were also more knowledgeable compared to Pisa Projectathon is 2011. There was especially one dedicated colleague who studied D3.4.2 v2.2 before PAT, and implemented some validators.

- Some unrelated test cases appeared in all the participants due to assignment of test cases with epSOS profiles on the Gazelle side; for example eP workflow test appeared for PS implementers, and vice versa. IHE-Europe was immediately informed about this problem. They could not fix it during the PAT but they acted / will act accordingly. Unrelated tests were ignored by the testers.

- Some minor issues were detected in the Gazelle test artefacts, such as wrong namespace control for permission attribute in the HCP assertion validation schematron. Some of them were corrected during the Projectathon, and some others to be corrected after.

- OIDs are not used appropriately by many PNs for the unique document identifiers. A few examples:
  - 030308.RRCSLS.REF030308X1475.60591-5.CDA
  - urn:oid:2.16.17.710.813.1000.990.1.1.1.6b13180-a63e-11e1-b3dd-0800200c9a61
  - urn:oid:48905059995_PS

- Issues in displaying eP and creating eD for the Finnish documents. Due to following issues, Finland was not able to test completely with parties apart from Sweden:
  - JavaScript issue detected and confirmed by Tiani in their Portal.
  - Gnomon Portal gets an exception when only @root attribute is used for presenting the document id.

- The audit manager had some a problem in creating the audit messages with the correct audit message schemas. By default "Patient ID Mapping Audit" schema is used for the

Identification Service for both NCP-A and NCP-B. "Patient ID Mapping Audit" is valid only on the NCP-A side when a mapping between internal and external patient identity traits exists.

- There is a need for assigning read-only administrator privileges to the WP3.C Leader to track the progress of the epSOS testers easily and in real time through Gazelle.

- Although it helped a lot, especially for Finland that did not have an on-site eP/eD counterpart, remote supportive participation did not turn out to be as effective as expected. We should consider on-site supportive participation in the next events.

All these and further issues / comments were communicated to the related parties, where possible issues tickets were created through epSOS Central Service Desk, and tracked for resolution. They were then resolved by the responsible parties.

3 Istanbul Projectathon

Istanbul Projectathon was the 4th Projectathon of epSOS. It was held in conjunction with the regular IHE-Europe Connectathon in Istanbul on April 15-19, 2013.

3.1 Participants

In Istanbul, we had 5 on-site actual tester participants (Croatia, Hungary, Malta, Slovenia and Switzerland) and 2 experienced supportive participants (Finland and Portugal) to support the actual testers.

The participants, their services and NCP solutions are presented in the table below.

Country	Organization	Services(*)	NCP solution
Croatia	CIHI	eP/eD-B	OpenNCP
Hungary	GYEMSZI	PS-B, eP/eD-B	OpenNCP
Malta	MTNA	PS A & B	OpenNCP
Slovenia	NIPH RS	PS A & B	OpenNCP
Switzerland	HUG	PS-A	OpenNCP
Finland	Kela	eP/eD A & B	OpenNCP
Portugal	SPMS	PS A & B	OpenNCP

 (*) PS: Patient Summary, eP: electronic Prescription, eD: electronic Dispensation

3.2 Organization

3.2.1 Monitors

A team of 4 monitors was set up and trained to assist testers and verify the tests cases. The monitors were selected following the requirements specified (expertise on epSOS specifications, neutrality, and experience on a previous IHE Connectathon):

- Anne Gaelle Bergé, epSOS services, XCA, XDR
- Giorgio Cangioli, CDA Expert (monitored remotely)
- Abderrazek Boufahja, epSOS services, XCA, XDS, XDR, CDA
- Eric Poiseau, XCA, CDA

These experts were chosen because of their skills corresponding to the requirements and after a call for candidates over epSOS project and IHE-Europe Members. The team was led by:

- Karima Bourquard, Director Interoperability, IHE-Europe
- Eric Poiseau, Technical Project Manager, IHE-Europe

3.2.2 Physical Infrastructure

The logistic organisation was under the responsibility of IHE (IHE-Europe with the help of IHE-Turkey) for the following items: networking (broadband internet access, LAN set up and management during the entire event, hosting of simulators on local server), catering, security and social event. The Projectathon was a parallel event of the IHE Connectathon and located at the same place at Halic Congress Center.

3.2.3 Testing Infrastructure

The tests were driven and reported using the IHE Gazelle Test Management Tool (**http://gazelle.ihe.net/EU-CAT/**).

Before and during the Projectathon, the set of test tools (simulators, validators) that were developed by IHE-Europe according to the epSOS specifications were used to assist testers and monitors in their testing duties, i.e. while trying to fill the obligations of the test cases that are assigned to them based on the services they implement. These test tools and test cases are not presented here in detail. They are available in D3.C.1 Appendix B - Proof of Concept Testing Strategy Details. The latest status of the test tools and test cases will also be reported in the upcoming deliverable D3.C.2 - epSOS Phase 2 Test Infrastructure with All Tools.

3.3 Results

In total, 77 individual Gazelle tests and 11 end-to-end functional tests were performed by the participants during a week. Out of these 77 Gazelle tests, all 77 were reviewed by monitors. All end-to-end functional tests were analyzed by our semantic expert Giorgio Cangioli.

The numbers of completed tests and verified tests per participant are presented in the following table:

Participant	Verified	Partially verified	Critical	To be verified	Running	Paused	Failed
CR: CIHI NCP-B	7	2	0	0	0	0	1
HU: GYEMSZI NCP-B	13	5	0	0	1	0	1
CH: HUG NCP-A	12	1	0	0	1	0	0
FI: Kela NCP-A	1	4	0	0	0	0	1
FI: Kela NCP-B	1	2	0	0	0	0	0
MT: MTNA NCP-A	9	4	0	0	1	0	1
MT: MTNA NCP-B	11	2	0	0	0	2	0
SI: NIPH RS NCP-A	10	2	0	0	0	0	0
SI: NIPH RS NCP-B	9	1	0	0	0	0	1
PT: SPMS NCP-A	2	2	0	0	1	1	1

PT: SPMS NCP-B	7	2	0	0	1	0	0

It should be noted that the sum of tests per participant is much higher than the total number of individual tests, i.e. 77, because peer-to-peer tests are counted twice in the former.

The detailed results of all the tests are presented in Appendix B to this document. After all the testing and verification activities, this report is automatically generated by Gazelle based on the available information. The results of the detailed analysis of the end-to-end functional tests are presented in Appendix C - Istanbul Projectathon end-to-end Functional Test Report.

All the participants passed the Istanbul Projectathon, and proceeded with their Pre-Pilot Testing activities.

One of the most important properties of the Istanbul Projectathon is that, it was the first Projectathon that OpenNCP was used (it was tested in previous PPT-slots though), and furthermore all 7 participants had OpenNCP as their NCP solution. OpenNCP is the open source NCP solution based on the first open source NCP implementation of epSOS, namely SRDC NCP. OpenNCP is being collaboratively developed by several epSOS PNs since summer 2012. More information can be found at **https://openncp.atlassian.net/wiki/display/ncp/OpenNCP+Home** and **http://code.google.com/p/epsos-common-components/**.

The actual testers appreciated very much the physical presence of experts from the OpenNCP Team in Istanbul through experienced supportive participants Finland and Portugal; it has been great assistance for them. The actual testers and the OpenNCP team were quite pleased and satisfied with the operational performance of Gazelle test artefacts as well, which have been continuously improving through the provided feedback and IHE-Europe's planned updates. Some minor issues were detected both in OpenNCP and Gazelle test artefacts, a majority of which were immediately fixed during the Projectathon. The remaining ones have been fixed after the Projectathon. The OpenNCP Team is now focusing on integration of the OpenNCP Continuous Integration (CI) environment with the validator and simulator tools of Gazelle, for ensuring the quality of the developed software automatically in parallel with development.

3.4 Detected Issues and Further Comments

Only very minor issues were detected in both participant implementations and Gazelle test artefacts. In a few cases, issue tickets were created in epSOS Central Service Desk, and resolved by the responsible parties, such as the trailing space problem of the "History of procedures" code in eCRTS, resolved by CareCom. On top of the detailed test reports, IHE-Europe and WP3.C Leader do not have further comments.

There are some very helpful comments and feedback by the OpenNCP team:

- The presence of an OpenNCP Supportive team has been a great help for PN, namely by the accelerator factor it provided to other PN (consolidated know-how and experience in the PAT activities) and by the ability to trace SW issues and even solving at the time.

- The feedback gathered from the PN about the OpenNCP has been quite positive regarding: obtaining the SW artefacts, installing (manual), deploying and testing; all those steps have been accomplished (by all PN) and with surprisingly bigger success then with previous epSOS common components.

- A briefing (at the beginning of the PAT - on site) to all epSOS participant PNs would be really helpful to clarify the role of each Supportive Nation (like PT and FI), in order to unblock some support request and make communication fluent.

- There should be an optimized and well-known (by all) workflow for discovering / announcing issues in the OpenNCP, solving them, publishing artefacts and notifying the PNs (during PAT) - can be presented in briefing or preparing sessions.

- Gazelle validators are really improving since the beginning of epSOS and now they are "in command". Nonetheless, the OpenNCP team believes that the effort devoted to solving all the issues reported by Gazelle tests tools sometimes don't introduce high value to the software. This is valid in the case that the reported issues are very minor ones and do not affect interoperability directly. These mostly occur in transaction validations. The OpenNCP team believes that the focus should be more on document content quality.

- Apart from the value added by Gazelle validators, the OpenNCP believes that more effort (automated test, resources, stages) should be devoted to epSOS document scrutiny and quality assurance, in order to guarantee higher quality in the main information token that epSOS provide to end users.

- There should be a local instance (in PAT) of the OpenNCP Continuous Integration (CI) environment to speed up the publishing of new artefacts;

- The OpenNCP community should invest more time on developing the integration of OpenNCP with Gazelle test tools, to automate the process of capturing and validating the messages (during a PAT/PPT session) and in the CI environment - to test the software.

4 Appendices

The detailed results and reports of all the tests that were executed during Bern and Istanbul Projectathons are presented in the appendices as follows:

- Appendix A - Bern Projectathon Detailed Gazelle Test Report
- Appendix B - Istanbul Projectathon Detailed Gazelle Test Report
- Appendix C - Istanbul Projectathon end-to-end Functional Test Report