COMMIT

PROJECTPLAN

WORKPACKAGES

DELIVERABLES

BUDGET

TRUSTED HEALTHCARE SERVICES (P15)

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1. Background

The high bandwidth connectivity provided by the internet enables new services to support citizens in their daily lives. An important category of these services is healthcare services. The first examples of these services exist today, and soon new services will emerge offering increased sophistication and monitoring people more closely than ever. An exponential growth of these services is expected, due to two tendencies. First, demand for care and cure will increase over the next decades due to the ageing population. Secondly, the number of healthcare workers is expected to diminish relative to the total population. New healthcare services can overcome this problem by allowing people not to rely only on traditional care. They include the following types of services:

- Home healthcare services support people who are chronically ill (e.g. post-stroke, diabetes, Chronic Obstructive Pulmonary Disease (COPD)) or who are rehabilitating. These services monitor the health and well-being of people, enabling tailored assistance where and when needed.
- Health and wellness services support people to live a healthy and convenient life. This is a broad category of services that help people choose a lifestyle that matches with their health and that provide support to people with health problems.
- Health communities bring together people who share a common interest in a specific health condition. The community supports its members to improve their health.

Trust is a requirement for the widespread adoption of healthcare services by clients (patients), by formal and informal caregivers and by the parties that are financially responsible. Trust is a wide ranging concept. In this project, we focus on transparency, security and privacy as core elements of trust.

This project relates to the BSIK project Freeband. Freeband focused on personalization of information services, including specific health and wellness services. This project builds on Freeband by focusing on the privacy and security requirements of healthcare services, and by ensuring trustworthiness.

The contributors to the project are internationally recognized players in the field, both nationally and internationally. The companies and care institutes offer remote patient monitoring and home healthcare services. They actively participate in setting of (inter)national standards, including security and privacy standards. The universities are well known for their expertise in privacy and security. They use this expertise also in healthcare applications.

Current home healthcare services are rudimentary in nature. Often they rely on call centers and fail to use the possibilities that the internet offers (e.g., always on, high bandwidth, automation, integration of services). One of the important impediments for the use of the internet is the lack of trust. Existing techniques address part of the security requirements, for example tools for

identity management (Liberty Alliance) and for encryption of connections (SSL). Missing are techniques that help end-users to establish trust in a healthcare service provider in terms of privacy, reliability, integrity of the data chain and techniques that help physicians to assess the reliability of information and data contributed by patients. There is a need for an integrated and easy to understand approach to trust in terms of security, privacy, and transparency, where users can make an informed decision if they trust a service and can control the usage of information that relates to their personal lives. To achieve interoperability, it is important that security solutions are standardized to a large degree.

2. Problem description

Electronic healthcare services offer great benefits to patients and people in need. Patients that use these services gain peace of mind, independence and a better quality of life. Patients rely on these services for their safety and care. For physicians, electronic health and wellness services offers an opportunity for better and continuous care. For insurers and governments, these services bring a reduction of costs, and for commercial service providers, this is a new business opportunity.

Trusted Healthcare Services (THeCS) addresses a key issue for healthcare services, namely: trust. Healthcare providers need to trust the patient data they obtain remotely from the measurement devices deployed in patient's home. It is crucial for them to know that a vital sign of a registered user is measured (not of his friends/children), that the measurement was taken with a certified device, under standardized conditions (e.g., with the blood pressure cuff on the arm at the heart level) and that it is not obtained as a result of device malfunctioning. Patients need to trust the service in general, as well as that the service will properly protect personal data. Standard internet security techniques provide authentication and encryption of the communication with a service provider. However they do not provide the user with means to control measure or even know how a service provider will actually use personal information. It is very important to have the mechanisms in place that allow users to trust these services, as trust is a pre-requisite for the acceptance of the services by their users. A user must be able to make an informed decision to trust a service provider on the basis of facts, such as reputation, and security attributes. Appropriate tools will assist the user in making correct judgments.

Healthcare services deal with very personal and private information. Home healthcare services monitor patients and gather data that is interpreted by medical professionals. Health and wellness services support people in need in many ways on the basis of personal and health related information. People in health communities share health and wellbeing information which then becomes potentially available to the whole community and beyond.

Healthcare systems and the perception of healthcare are different from one country to another. There are important differences in for example cost, government involvement, insurance and reimbursement, organization of care (GPs, hospitals, home care, elderly homes, etc), and expectations of patients. Healthcare in the Netherlands (and in any other country) is unique, and this uniqueness has grown over many years. Dutch patients and physicians communicate in a way that is specific to the Netherlands, and patients take responsibility for their health in their own way. The electronic exchange of patient records in the Netherlands is taken on by NICTIZ. NICTIZ is based on international standards, but the set of selected standards and the way in which they are used is specific for the Netherlands. The Dutch government is creating DigID, which is a unique and national infrastructure for authentication of citizens in governmental services. The main questions that this project will address are the following:

- Can a physician trust data measured by a patient at home? Home healthcare patients measure physiological parameters at home, and a physician uses this data to make treatment and diagnosis decisions. It is very important that the measurements are accurate and that a physician can accept them as medical information.
- Can health and wellness services create a transparent view of how they use personal information?
- The personal information that health and wellness services use is highly privacy sensitive. Consumers can trust services that create transparency and that limit access to personal information strictly to what is needed to provide the service.
- Can the EHRs and other sources of patient's health data be used for clinical research and clinical decision support in a privacy preserving way without labor-intensive data anonymization?
- Patients and consumers want the possibility to control their personal health information on social networks. How can patients participate in social networks while ensuring their privacy and controlling the use of information in a simple intuitive way?

3. Objectives

Project's goal

This project addresses a key issue for electronic healthcare services, namely: trust. Healthcare providers need to be able to trust the patient data they obtain remotely from the measurement devices deployed in patient's home. Patients need to trust the service in general, as well as that the service will properly protect personal data. This project will create measurable and enforceable trust. This project creates new techniques to measure and control the reliability and use of (healthcare) information. These techniques allow users and service providers to trust each other and to benefit from these new services. In a healthcare setting, trust is of special relevance because of the sensitive and personal nature of health information and because of the possibly very adverse consequences of late or incorrect decisions related to one's health. Trust

establishment is crucial for physicians and service providers as they will use healthcare services to implement and extent (medical) treatments.

Planning of all dimensions

This project aims to address the following questions:

- Can a physician trust data measured by a patient at home? Home healthcare patients measure physiological parameters at home, and a physician uses this data to make treatment and diagnosis decisions. It is very important that the measurements are accurate and that a physician can accept them as medical information.
- Can health and wellness services create a transparent view of how they use personal information?
- The personal information that health and wellness services use is highly privacy sensitive. Consumers can trust services that create transparency and that limit access to personal information strictly to what is needed to provide the service.
- Can the EHRs and other sources of patient's health data be used for clinical research and clinical decision support in a privacy preserving way without labor-intensive data anonymization?
- Patients and consumers want the possibility to control their personal health information on social networks. How can patients participate in social networks while ensuring their privacy and controlling the use of information in a simple intuitive way? -

Results

The goal of P15 THeCS is to create and define:

- the ethical, legal, sociological and psychological requirements for trust in healthcare services. The spectrum of healthcare services is very wide, ranging from formal medical services to pure commercial services that support every day activities. Often these services share information. It is this integration of services from different domains and information sharing that is of particular interest.
- a technical protocol to reliably assess the quality of medical data (e.g., blood pressure) measured by patients at home, e.g., identification of the patient, compliance with measurement protocol, certification of the measurement device.
- a cryptographic technology that enables health service providers to process encrypted medical information so that only intended operations are possible and that information is not disclosed otherwise. A specific example is categorization of a community into groups of patients with similar (according to a definition relevant for healthcare) characteristics, without disclosing the characteristics of individual patients.
- a cryptographic technology for privacy preserving data mining of patient health data to support clinical research and knowledge creation for clinical decision support systems.
- to demonstrate and evaluate these technologies in the context of COPD electronic healthcare services that monitor the patient at home and help patients to adopt a healthier lifestyle.\to

Deliverable Impact and Valorization

Standardization and regulation are the main instruments for the adoption of trust technology in healthcare applications. The projects will make contributions to established standardization groups in the field (such as Continua, HL7, IHE, NEN), in which a number of the partners are participating today already. In some cases this may lead to income for project partners from software or patent licenses. A number of project partners will build on the results of the project when they are consulted by healthcare companies and organizations. The embedding of trust and privacy in healthcare services requires a strong commitment of the service providers in terms of way of working and procedures. The industrial project partners will incorporate the project results into their products so that their customers can benefit from the results.

Deliverable Dissemination

The THeCS project will develop a number of demonstrators to present and evaluate the project results. The demonstrators will also be used in a small scale trial. In addition the demonstrators are available for use at events and conferences. The project will organize a number of workshops to gather requirements and discuss options for further development with professionals and experts in the field. The project will write a number of popular papers or white papers to make the results accessible to a wide audience. The papers will be available for example for download for the web. Especially the academic partners in the project will publish scientific papers and present the project results at scientific conferences (e.g., well-know trust management and medical informatics conferences and workshops such as MIE, IFIP TM, STM, etc, as well as at national symposiums such as WISEC). The project will result in a number of PhD and master theses.

International Imbedding

The project will make contributions to the international standardization groups (Continua, IHE, HL7) that are globally recognized as the leaders in this field and whose specifications are expected to be adopted in very many deployments globally. Project partners currently participate in several closely related collaboration projects at the European projects, e.g., in the FP7 ICT projects TAS3, Universaal, TClouds. The project will present the results at international scientific conferences and in international journals.

Deliverable Synergy

- P5 Sensor Content for Wellbeing: P5 develops distributed data management for measured body signals (amongst others). The privacy requirements developed in P15-WP1 are of interest to P5.

- P6 Socially enriched Access to linked cultural media: P6-WP8 "Trust & access policies (TAP)" develops trust and access control policies for web meta data on the basis of ontologies. This relates to P15-WP3 "Trust management for home healthcare services". P6-WP8 will develop trust algorithms which will be used as input by P15 WP3 to create a comprehensive trust management solution for home healthcare addressing also the trust issues related to data coming from the Internet.
- P7 User Centric Reasoning for Well working: P7 develops lifestyle management for COPD (amongst others). There is opportunity to jointly analyse privacy and integrity requirements and to jointly development a demonstrator.
- P9 Very large wireless sensor networks for Well-being: P9-WP4 considers the privacy of data collected in the extremely large scale wireless sensor network. AI techniques and light-weight –crypto inspired – solutions will be developed. There is a clear link with P15. The projects exchange requirements, architectures and possibly solutions

4. Economic and social relevance

This project addresses the very important trust (transparency, privacy and security) questions for healthcare services. Electronic healthcare services will offer important economic and social benefits for our society, however these services cannot be exploited until the trust question has been addressed in a fundamentally correct way.

Healthcare services will play an important role in the future to improve the lives of chronically ill and the elderly. The website of the Continua Health Alliance (www.continuaalliance.com) describes the growth of the number of chronically ill as follows:

- More than 1 billion people in the world are overweight, and at least 300 million of those are clinically obese.
- Over 600 million people worldwide have chronic diseases, and the spending on chronic diseases is expected to increase. For example, in the US alone, spending is expected to increase from $500 billion a year to $685 billion by 2020.
- Globally, the number of persons 60 and older was 600 million in 2000. It is expected to double to 1.2 billion by 2025.
- The available workforce in health care is generally expected to diminish dramatically over the next decades.

In the Netherlands, the Zorginnovationplatform (www.zorginnovatieplatform.nl), an initiative supported by the Ministry of Health) has created the vision document "Inspiratie voor innovatie". This vision document states that in the Netherlands 4.5 million people are chronically ill. The number of chronically ill represents a huge challenge for the healthcare sector, and e-health services can help to provide care. The chronically ill are the fasted growing group in healthcare due to an aging population (dementia, stroke), better diagnosis and treatment options, and changing lifestyles (heart, COPD).

Today 1.2 million people work in the healthcare sector in the Netherlands. This is 14% of the working population, a very important economic activity. Extrapolation of the current trend indicates that until 2020 there is a need for 480.000 additional healthcare workers, of which however only 250.000 people will actually be available. The Zorginnovationplatform indicates that the e-health is crucial to guarantee continuity of care for the chronically ill in the Netherlands. E-health increases the productivity of healthcare workers. It enables patients to manage their own disease and involves the social environment in the care for the patient. E-health also is important in the strategy to prevent chronic diseases.

The growing shortage of health care workers is not the only problem: our population is gradually aging. In 2007 there were 2.4 million people over 65 years of age and this number will rise quickly after 2011 ["Vergrijzing neemt sterk toe" http://www.rivm.nl/vtv/object_document/o3097n21018.html]. At the same time, the modern elderly are less prepared to be "taken care of" but want to stay in their homes and in control. However, they face the inevitable fate of becoming less physically able and less connected over time, which brings the risk of falling ill and severe loneliness. To help the elderly to stay in control, stay connected and increase their wellbeing, the only viable option is to make more use of ICT that we can all trust.

Privacy is a major concern of many citizens and the government has an important role in protecting the privacy of the citizen. Therefore, the government has developed legislation to protect its citizens, who do make serious use of the legal facilities provided. For example, on December 17 2008, 2% of the Dutch population (330.000 people) had submitted an objection form to the Dutch Ministry of Health, stating that their medical records cannot be shared electronically (www.minvws.nl/kamerstukken/meva/2008/bezwaarprocedure-epd.asp).

This project brings together a unique consortium of Dutch companies, institutes and universities that together have the capabilities to create very innovative solutions for trust in healthcare services. Trust is a crucial element of these services and of high societal value:

- The project will create the technology for reliable home healthcare devices. These devices measure the health of the patient in a reliable and professionally endorsed way.
- The project will create the technology for health and wellness service providers (such as for example Philips) to restrict access to personal information to the minimum that is required for the delivery of the service. This is a differentiating factor that allows providers to create services on the basis of personal information that otherwise would not be available. An example is an activity monitoring service that takes activity data and medical condition into account. Normally the medical condition would not be available as this information is only available to medical professionals treating the patient.

- This project will make important contributions to national and international standards for patients to enforce how a healthcare service can use and share their personal information. This is important to ensure a lasting impact of the project as well as compliance of the standards to the particular requirements in the Netherlands. Standards ensure interoperability, which is crucial for the wide spread adoption of e-health services and the integration of service offerings of different providers. Further, standards will ensure that the technology will become available for all relevant parties. A standard also creates a market for Dutch manufacturers of healthcare devices and software. By developing a standard, this project creates a knowledge base that service providers can leverage to develop their services.

5. Consortium

The partners in this project form a well-balanced group that is composed of universities with expertise in (medical) trust, commercial providers of healthcare IT solutions, and an organization for rehabilitation that develops and uses home healthcare solutions. The following partners collaborate in this project:

- The group ISS of Philips Research (PR) (project leader) specializes in information security and personal safety. The group executes several projects in the area of medical security and collaborates with national and international partners. Further the group actively contributes to standardization in this domain. Philips is a provider of healthcare equipment, of home healthcare solutions, and of health and wellbeing services. Philips is one of the world's biggest electronics companies and Europe's largest
- Roessingh Research and Development (RRD) creates innovative ICT services in rehabilitation care, in close collaboration with health care professionals, patients and insurance companies. Several services, involving monitoring, tele-consultation and remotely supervised training have been and are being implemented successfully in daily care. Roessingh Research and Development is acknowledged as a centre of excellence in rehabilitation technology and pain rehabilitation by the Dutch Minister of Health.
- Roessingh Hospital is a rehabilitation centre specialized in the treatment of complaints related to posture or movement. Roessingh Hospital offers treatment to inpatients and outpatients. Roessingh also specializes in complaints of chronic pain or fatigue.
- Capgemini (CG) is a consultancy and IT solution provider with extensive activities in healthcare IT. Capgemini is actively participating in relevant standards groups such as HL7.
- TNO Information and Communication Technology is one of the largest knowledge centers in Europe on ICT, and has a highly experienced group working in the field of information security. TNO-ICT is a unique centre of innovation in the Netherlands that brings together the ICT and Telecom disciplines of TNO.
- Irdeto empowers companies to protect and monetize their digital assets and maximize return on content with innovative and reliable software technologies, content management and

- de Waag Society/Healthcare researches and develops creative technology for innovation in healthcare following the principle of users as designers. de Waag Society develops innovative cultural and educational applications for children and youngsters, and healthcare applications for the physically or mentally challenged individuals.
- The Tilburg Institute for Law, Technology, and Society (TILT) of Tilburg University (UvT) is a multidisciplinary research institute on the border between law and technology. It comprises legal scholars, ethicists, social scientists, public administration experts, etc. TILT has extensive expertise regarding privacy and identity management, including in the health care domain.
- The groups DIES and DB at Twente University (UT) specialize in data management and security for new applications. The groups currently participate in a number of projects in the area of medical security.
- The Security group of the Eindhoven University of Technology (TUE) focuses on security and trust management. The group has extensive expertise in the area of access control policies and policy enforcement.
- The Information and Communication Theory (ICT) group at Delft University of Technology (TUD) has a track record in secure signal processing which is needed to carry out matching processes on users' protected data.

The academics in the consortium are technical, social, legal and economic researchers from the 3TU, and UvT with a strong international reputation.

- TUD/ICT group of Lagendijk with an 18+/20 rating at the last Delft + Leiden Research Assessment.
- UT/DIES group of Hartel with an 18/20 rating at the last National Research Assessment.
- UvT/TILT group of Prins, member of "Wetenschappelijke Raad van de Regering" and the KNAW, and Koops, member of "de Jonge Academie".

Consortium partners are leading participants in relevant national, European and international projects, including: EU FP6 PRIME, INSPIRED, FIDIS, NESSIE, 3D-FACE, SPEED, EU FP7 Turbine, PrimeLife, standardisation activities like the Liberty Alliance and Health Level 7, ENISA, several IFIP working groups, BSIKs, Sentinels, DIFR, ICTRegie advisory board. PRIME was awarded the 6th annual HP-International Association of Privacy Professionals (IAPP) Privacy Innovation Award.

The THeCS project collaborates with other COMMIT projects that address adjacent fields of research. Collaboration is foreseen with COMMIT P7 User Centric Reasoning for Well working. Intelligent environments monitor users and share the observed behavior with service providers. This is privacy sensitive information. THeCS will coordinate the drawing up of requirements for privacy with P7. Further this project will collaborate with P5 Sensor Content for Wellbeing, which

develops distributed data management for measured body signals, as well as with P9 Very large wireless sensor networks for Well-being that considers the privacy of data collected in the extremely large scale wireless sensor network. This project will provide these two projects with legal, ethical and technical requirements related to security, privacy and trust applicable to health and fitness services. Finally, this project will make synergies on trust and access policies with P6 Socially enriched Access to linked cultural media. This project will use trust algorithms created by P6 to address the trust issues related to data coming from the Internet.

6. Workplan

The project comprises 6 work packages and will run for 4 years.

- Work package 1: Requirements, validation and socio-legal context
- Work package 2: Demonstration and standardization
- Work package 3: Trust management for home healthcare services
- Work package 4: Privacy preserving data mining in electronic health records
- Work package 5: Private Health Services in a Group with a Distrusted Server
- Work package 6: Matching and social relationship management for decentralised healthcare services

After 1 year, the project will have developed the requirements and the concepts for trust in healthcare. After year 2, the project will have specified the demonstration and developed the trust technology in concept. After year 3, the project will have demonstrated the trust technology. After year 4, the project will have evaluated the solution and created 4 PhD theses. The project will include two requirements-design-validation cycles. After the first iteration, achieved intermediate results and a mock up of the final functionality will be presented to the user groups for validation. The evaluation results will be used to refine the requirements, improve the quality and guide the development in the second iteration.

The execution of the project runs a number of risks, which we have mitigated in the following way:

- The universities participating in the project will ensure the enrollment of PhD students in the project by starting the application process at the earliest possible time after notification of acceptance.
- The project might struggle to achieve wide spread adoption of its results. We plan to achieve this through standardization. The project will contribute trust technologies to healthcare standards. Access to relevant standards groups is ensured through the partners who are participating in relevant standards groups such as NEN, Continua and HL7.

WORKPACKAGES

Project number P15	
WP title	Requirements, validation and socio-legal context
WP leader	Sabine Wildevuur, Waag Society

Objectives

In integrated healthcare systems, a large variety of providers and other stakeholders are involved. This work package identifies requirements for trusted healthcare, focusing on the 3 use cases: (1) professional home healthcare services, (2) consumer health and wellness services, and (3) health communities. On the basis of literature search and interviews with experts and users, the work package establishes the trust requirements. The work package will study the trustworthiness of services and the relationship between transparency, privacy and security. Further, the work package studies the legal requirements regarding division of responsibilities and applicable legal data protection regime (e.g. data protection law, health law, regulations regarding the identification of citizens, both general and healthcare specific, and databases law).A user driven approach will be taken; in which the users (different stakeholders) will be involved from the beginning. The methodology of involving users through a service design approach is applied through for example co-creation workshops with the different stakeholders. In this way the developed technology will meet the needs and demands of the users. A service blueprint will be developed describing the ecosystem of the product/service to be developed.

Project number P15	
WP title	Demonstration and standardization
WP leader	John Bernsen, Philips Research

Objectives

This work package develops a demonstrator of a home healthcare system for COPD management (integrating the security technologies developed in the other work packages) that shows in particular interaction of the user with the security functionality. COPD patients can often benefit much from a change in lifestyle under medical supervision. The demonstrator is used to evaluate the security functionality by systematic collection and analysis of feedback collected in user groups. The demonstrator will in particular show trust management and privacy preserving policies in selected scenarios for remote COPD management. This work package will create two demonstrators (one in each requirement-design-validation cycle). The first demonstrator (a mock up of the final functionality) will be evaluated in WP1 and will serve to refine the requirements, improve the quality and guide the development in the second requirements-design-validation cycle. Finally, the work package will contribute to standardization in the area of security for healthcare by nationally and internationally contributing to the relevant standardization groups (e.g., Continua, HL7, NEN). Standardization offers interoperability across the devices and services of different vendors. Thus it creates a market for remote healthcare products and prevents vendor lock-in. Standardization of security functions is particularly important because it supports users in establishing the trustworthiness of compliant services.

Project number P15	
WP title	Trust management for home healthcare services
WP leader	Prof Dr Milan Petkovic, Technische Universiteit Eindhoven

Objectives

This work package will develop the technology for physicians and other users of measured home healthcare information to easily determine the trustworthiness of the information.

In particular, the goals of this work package are to investigate the issue of data trustworthiness from the home healthcare provider and patient perspectives, as well as to design methods and tools to increase and visualize indicators for data reliability and patient compliance (ensure that the data is coming from the right patient, and certified device, as well as that the measurement process was performed properly).

The security protocols, the cryptographic primitives, as well as the developed trust management system will be analyzed and validated both theoretically and practically with real end users in a case study in cooperation with other WPs.

Project number P15	
WP title	Privacy preserving data mining in electronic health records
WP leader	Dr Svetla Petkova-Nikova, Universiteit Twent

Objectives

Electronic health records (EHRs) are very valuable for medical research and clinical trials. Researchers need EHRs to perform clinical trials on new medicines, for example. However, EHRs contain very sensitive data and should not reveal the identity of the patient. Therefore EHRs must be anonymized before they are released to the clinical investigators. The existing anonymization techniques are not sufficient for protecting the privacy of the patients' data. The problem with techniques like k-anonymity and l-diversity is that they have been shown to be insecure; the anonymized data can easily be de-anonymized. Moreover, there is some health data which cannot be anonymized at all, such as DNA and dental data. The goal of this work package is to propose new techniques which will enable us to build fundamentally novel solutions. In particular, we will propose techniques for search in encrypted data that would allow the investigators to access EHRs for medical research or clinical trials, while preserving the patients' privacy. Our ambition is to go even further building algorithms for privacy preserving data mining, which will allow extraction of knowledge. The general setting that we consider in this work package is depicted in Figure1. The system consists of *patients* who get treatment from a healthcare provider, the *healthcare provider* who treats the patients and collects medical data, the *server* which stores the EHRs and the *investigators* who use EHRs for clinical trials or medical research. One optional entity is a sponsor (e.g. pharmaceutical company) who finances the medical research or clinical trial. To assure the privacy of the patients' data, EHRs are encrypted and then stored on the server. The system must provide mechanisms which allow the investigators to search in the database with EHRs in order to extract patterns from data sets and deduce knowledge from those patterns.

Project number P15	
WP title	Private Health Services in a Group with a Distrusted Server
WP leader	Dr Thijs Veugen, TNO

Objectives

The business driver for Irdeto in this work package is: With digital set-top boxes, and even TV sets, becoming more powerful and more interactive (now often with two-way communication and being hooked up to the internet), it is possible to offer new services to end-users. Attractive services lie in the domain of eHealth, where one can setup groups dedicated to patients with similar symptoms. Irdeto is interested in securing these services, both at the user and at the data warehouse site. Irdeto would consider both hardware solutions (preferably even by retrofitting already deployed hardware), and software security solutions using Irdeto's Cloakware product line. A second business driver for Irdeto would be to enable these services in its middleware.

Project number P15	
WP title	Work package 6: Matching and social relationship management for decentralised healthcare services
WP leader	Qiang Tang , Universiteit Twente

Objectives

In a self-help group, members provide each other with various types of help, usually nonprofessional and nonmaterial, for a particular shared, usually burdensome, characteristic. The help may take the form of providing and evaluating relevant information, relating personal experiences, listening to and accepting others' experiences, providing sympathetic understanding and establishing social networks. Philips is a worldwide well-known provider for home monitoring and tele-healthcare system, which collects a large amount concept of self-help group so that patients can maximally benefit from their data.

DELIVERABLES

Important conference contributions
8

Important conference contributions
8

Products
-

Software
1. Platform for trusted COPD home healthcare (mock-up)
   WP2, M18: Demonstration and evaluation platform for trusted COPD home healthcare (mock-up)
   - WP 2 YP 2012

2. Trust management for COPD patients (second demonstrator)
   WP2, M36: Demonstration of trust management for COPD patients (second demonstrator)
   - WP 2 YP 2014

3. Privacy policy enforcement in COPD health services (second demonstrator)
   WP2, M36: Demonstration of privacy policy enforcement in COPD health services (second demonstrator)
   - WP 2 YP 2014

4. Software solution to measure protocol compliance
   WP3, M12: Technical solution to measure protocol compliance for treatment of COPD. The therapy uses devices that assist respiration
   - WP 3 YP 2012

5. Solution to measure information trustworthiness
   WP3, M24: Technical solution to measure information trustworthiness -in the management of COPD
   - WP 3 YP 2013

6. Solution for automatic, unobtrusive and reliable COPD patient identification
   WP3, M30: Technical solution for automatic, unobtrusive and reliable COPD patient identification
   - WP 3 YP 2013

7. Privacy preserving data mining techniques

WP4, M42: "Implementation of a demo of privacy preserving data mining techniques". The demo will show one of the designed searching in encrypted data schemes which will be used by investigators to query the encrypted data. The demo will demonstrate that patient's privacy is preserved even when investigators deduce knowledge from the encrypted data. The demo will be presented to a broad audience of health care stakeholders.

- WP 4 YP 2015

8. Demo of transparency tools

   WP5, M46. Implementation of a demo of transparency tools in trusted health care communities.

   At the end of the project there will be a demo showing transparency tools for privacy preserving cryptographic protocols, dedicated to health communities. The demo should meet the requirements from M12. The demo will be presented to a broad audience of health care stakeholders.

   - WP 5 YP 2015

9. Privacy preserving matching protocols

   WP6, M46: Implementation of a demo of privacy preserving matching protocols for a healthcare self-help group. The demo will be presented to a broad audience of health care stakeholders.

   - WP 6 YP 2015

User studies

1. User requirements

   WP1, M12: User requirements for trusted healthcare services

   - WP 1 YP 2012

2. Co-creation workshops

   WP1, M 18: Report of co-creation workshops with the different stakeholder's incl. insights and opportunities for the trusted healthcare services

   - WP 1 YP 2012

3. Usability test

   WP1, M36: Report of usability test, including recommendation

   - WP 1 YP 2014

4. Use cases

   WP2, M6: Use cases for trusted home healthcare in COPD management

   - WP 2 YP 2011

5. Small scale trial
   WP2, M36: Small scale trial of trusted COPD home healthcare
   - WP 2 YP 2014

6. Trust management
   Requirements WP3, M6: Trust management requirements in COPD home healthcare
   - WP 3 YP 2011

7. Evaluation
   WP3, M36: Evaluation of trust management in COPD home healthcare
   - WP 3 YP 2014

Other results

1. PhD Thesis
   WP1, M48: PhD Thesis: Mutual trust of patient and physician in revalidation services in the Netherlands
   - WP 1 YP 2015

2. Contributions to standardization
   WP2, M36: Contributions to standardization nationally (NEN) and internationally (Continua, HL7) for trusted healthcare services
   - WP 2 YP 2014

3. PhD thesis WP
   WP3, M48: PhD thesis: -Trust management for COPD patients in home healthcare.
   - WP 3 YP 2015

4. PhD thesis
   WP4, M48: PhD thesis: "Privacy preserving data mining protocols by means of searching in encrypted data"
   - WP 4 YP 2015

5. PhD thesis
   WP5, M48: PhD thesis: "Private Health Services in a Group with a Distrusted Server".
   This will be the PhD thesis of the TUD candidate in the project containing at least the following topics:
   - Group Recommendations;
   - Dynamic Clustering with a Distrusted Server.
   - WP 5 YP 2015

6. PhD thesis

   WP6, M48: PhD thesis: "Privacy preserving matching and social relationship management for decentralized healthcare services". This will be the PhD thesis of the UT candidate in the project.

   - WP 6 YP 2015