SEVENTH FRAMEWORK PROGRAMME

Challenge 1

Information and Communication Technologies

Trusted Architecture for Securely Shared Services

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1 Executive Summary

The Objective of WP9 "Employability and Healthcare Demonstrators" is to prove the generic applicability of the TAS3 trust infrastructure for exchanging and managing personal information in different domains, in particular in the areas of employability and healthcare.

Employability is a domain in which electronic data exchange has been uncommon in the past, but this is changing rapidly. Today, the amount of personal information dealt with, and therefore the associated data protection issues, is increasing. Where a CV used to contain only some vague and often unsubstantiated references to long past school education, today it is filled with detailed information about personal competences and experiences acquired both on and outside the job. The growing use of learner-owned ePortfolios, rather than static CVs, is enabling individuals to make substantiated claims backed up by examples of evidence drawn from a number of different sources. These portfolio applications are increasingly used in formal education and their role in lifelong learning is more and more recognised.

Electronic information exchange in healthcare has a longer history; additionally healthcare is a reference domain for privacy and security issues. Confidentiality has been a hot topic since day one (i.e. not only within health ICT), as it is beyond any doubt that medical information is very prone to abuse (not in the least by employers, which in turn has implications for the employability domain).

The e-health advancements and the security and privacy concerns, make healthcare a perfect test ground for TAS3 ("If you can make it there, you can make it anywhere…"). Deployment of TAS3 within the healthcare domain will be a tough benchmarking exercise. TAS3 should not only meet all requirements of the domain with the most difficult privacy requirements, it should also outperform existing solutions.

Employability is a more virgin area, where a new satisfying solution for securely managing the exchange of personal information has a high chance of wide adoption, which makes it a perfect domain for testing TAS3 scalability.

This deliverable is the first step towards defining pilots for the demonstration of the TAS3 trust infrastructure. From the real life stories of Caren, Dirk, Pieter and Anwar, concise use cases which are representative for the healthcare and employability domain have been extracted. These serve as a base to define minimum security and privacy requirements for an information exchange and management platform in those domains. Throughout this document four major demands are identified, which TAS3 will need to provide for its users in order to be successful:

- "Trust in information"
- "Trust in the system"
- "Trust in the other parties" (users and service providers)
- Full end-user control over information

In the final section of this deliverable a first step towards demonstrating TAS3 (WP9 goal) has been made by mapping the selected use cases on to the real world and legacy systems (participating organisations and persons, available software, available data …).

In the second iteration of this deliverable the focus will shift more towards implementation and deployment and the elaboration of more complex scenarios. A further deliverable (D9.2) will deal with evaluation.

2 Introduction

The Objective of WP9 "Employability and Healthcare Demonstrators" is to prove the generic applicability of the TAS3 trust infrastructure for exchanging and managing personal information in different domains, in particular in the areas of employability and healthcare.

Employability is a domain in which electronic data exchange has been uncommon in the past, but this is changing rapidly. Today, the amount of personal information dealt with, and therefore the associated data protection issues, is increasing. Where a CV used to contain only some vague and often unsubstantiated references to long past school education, today it is filled with detailed information about personal competences and experiences acquired both on and outside the job.

Electronic information exchange in healthcare has a longer history; additionally healthcare is a reference domain for privacy and security issues. Confidentiality has been a hot topic since day one (i.e. not only within health ICT), as it is beyond any doubt that medical information is very prone to abuse (not in the least by employers, which in turn has implications for the employability domain).

Today nearly all governments in the (western) world are trying to launch e-health projects aimed at improving electronic information exchange. Although the individual initiatives have different scopes (ranging from a central government controlled database, to a federation of private initiatives) and are in different stages of development (from drawing board to fully operational systems), they share the same vision.

The e-health advancements and the security and privacy concerns, make healthcare a perfect test ground for TAS3 ("If you can make it there, you can make it anywhere…"). Deployment of TAS3 within the healthcare domain will be a tough benchmarking exercise. TAS3 should not only meet all requirements of the domain with the most difficult privacy requirements, it should also outperform existing solutions.

Employability is a more virgin area, where a new satisfying solution for securely managing the exchange of personal information has a high chance of wide adoption (perfect for testing TAS3 scalability). The rising use of learner-owned ePortfolios, rather than static CVs, is enabling individuals to make substantiated claims backed up by examples of evidence drawn from a number of different sources. As ePortfolios are increasingly used in formal education and their role in lifelong learning is recognised, so is their potential as a tool to support individuals in transition between and within episodes of education and employment, empowering greater control over and understanding of tailoring and matching processes. There are now a myriad of ePortfolio system providers, including a number of open source offerings, but the increasingly accepted trend is that individuals require access to distributed data, using the ePortfolio as a tool to view, manage and, to some extent, control it.

Healthcare on the other hand already has its implementations and is in some countries (like the Netherlands) largely monopolized by the government; hence it might be difficult to market a new platform there. Nonetheless the recently revived trend of Personal Health Record (PHR) (with in its wake wellness, fitness, etc.) opens up a fully patient-centred side of healthcare outside of the public sector (cf. TAS3 objective, end user in the driving seat).

The structure of this deliverable reflects the approach taken within WP9: starting with real life experiences (storyboards), more concise use cases which are representative for the respective domains are derived. From those stories, domain requirements regarding security and privacy were extracted. These requirements serve as input towards the TAS3 platform architecture, with one clear message: if you cannot provide this functionality on TAS3, the platform is not a viable solution in this domain (minimum requirements). Based on the use

cases, the first pilots were defined. This deliverable is a first in a series of three iterations. In this initial iteration, the domain is introduced and the storyboards on which the work is based are elaborated. The pilot specifications themselves are concise and in this first iteration are restricted to a mapping of very basic use cases on to the real world (i.e. available software, responsible partners, etc.) as input to the technical WPs. In the second iteration, the focus will shift more towards pilot implementation and the elaboration of more complex scenarios. A further deliverable (D9.2) will deal with evaluation.

3 Use Cases in the Healthcare Domain

3.1 Healthcare Information Exchange

3.1.1 Background

In the healthcare domain it is common that multiple care providers have to collaborate on curing a specific patient. General Practitioners (GPs), specialists, pharmacists, … all take their part in the care process centred around an individual. However, a patient's interaction with a particular Health Care Provider (HCP) is usually an isolated process. Information exchange between professionals is thus inherent to healthcare, but typically happens at the beginning and ending of an "episode" with a certain HCP (note that the term "episode" is used loosely here).

This exchange predates the electronic era and has traditionally been done through the exchange of letters between physicians. Roughly speaking: a "referral letter" initiates a care episode with a new HCP and a "result report" (going back to the referrer) marks the end of that process. In this exchange, the patient, being at the centre, often acts as a postman.

In general, there are two ways in which information can be exchanged:

- Through direct messaging (i.e. addressed communication)
- Through sharing of information

The process described shows that healthcare is used to direct messaging. It is therefore not surprising that the first steps in electronic information exchange was though e-mail-like systems (e.g. the MediBridge and Mediring systems in Belgium, Carelink in Sweden, Kith in Norway, Medcom in Denmark, Diraya Andalucia in Spain). On a historical level, it is worth noting that the "paper-letter-origin" can still be seen in some healthcare message formats.

Today, the aim is rather building eHealth platforms, creating collaborative environments and shifting towards resource sharing instead of messaging in order to assure that detailed (not only summary) health information is always up-to-date and available where needed (cf. the "Quality of Care" and "Continuity of Care" paradigms).

3.1.2 Example of Interactions

Figure 1 illustrates a possible series of events that could unfold around a patient after a health complaint. The figure illustrates the information exchange as it typically happens today.

1. A patient has a complaint and visits his General Practitioner (GP).
2. After his examination, the GP decides upon performing a blood test.
    - For that he draws blood from the patient and sends it to the lab accompanied with a "lab request" in which he states which tests he would like to see performed.
    - After those tests have been performed, the GP will receive a report from the lab (typically a few days later).

3. The patient visits his GP again to get the test results where he gets informed by the GP that his condition requires a visit to a specialist. In the meantime the GP prescribes some drugs in order to suppress the patient's symptoms.
4. The GP "forwards" his patient to the specialist through a "referral letter" describing the condition of the patient.
    - After the necessary consultations, the specialist writes a report on his findings and sends this back to the GP.
5. Unfortunately for our patient, the specialist report advises surgery, so the GP forwards him to a hospital surgeon.
6. In turn, the surgeon can order a number of additional examinations, all through the described form of "order communication".
7. During the patient's episode of care at the hospital, the GP is typically notified of a number of events such as admission and discharge.
8. Again the care episode is concluded with a report.
   This means that in a classical scheme, the file maintained by the hospital is not available to the GP. He gets an extract though the discharge summary.

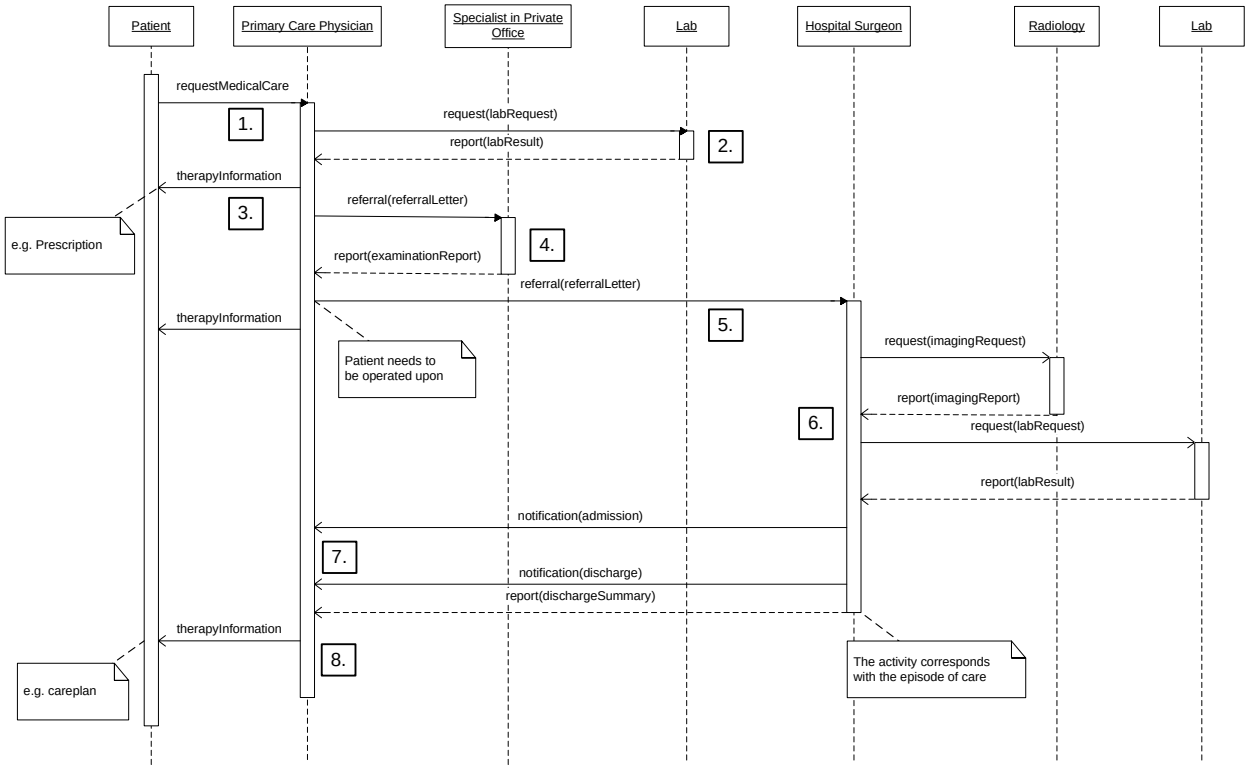

Figure 1: Example of interactions

3.1.3 Scoping: Present and Future

Overall, information sharing in the healthcare domain (assuming that all information is electronically available) means that all databases containing medical information should be readily accessible (of course with the necessary security and privacy guards in place). This

requires primary care, secondary care, ternary care, home care, pharmacists, etc. to open up their records and put them online. Note that in this whole discussion, the HCPs which do not yet keep electronic medical records are not taken into account[1]. Although this is the vision towards which eHealth is evolving, we are still far from reaching that objective.

In reality, hospitals are only beginning to open up their patient information to primary care. And often this is restricted to so-called "result servers" which only contain a small subset of the information available in the Hospital Information System (HIS). Many GPs use locally installed medical record software and do not keep information available on "servers". ASP medical record software typically is not used for information sharing (outside of a group practice or a temporary replacement scheme)[2].

When comparing the present situation with the ultimate eHealth goal, the origin and importance of the listed eHealth trends which are of relevance to TAS3 becomes clear:

- Hospital portals
    - For GPs these are not new.
    - For patients: there are a few pioneering hospitals[3] that have recently opened up their HIS to the patients themselves, enhancing patient empowerment.
- "Patient Summaries" of all kinds
    - Solving the "GPs don't run servers" problem, many initiatives exist to set up patient summaries. Patient Summaries are an extract from the medical record which allow a physician to understand the medical status of the patient in a few minutes and ensure the continuity of care. Typically they are maintained by a designated GP.
- Personal Health Records
    - PHRs are the most important trend towards patient empowerment and end-user control over personal data in healthcare, and therefore important for TAS3. PHRs are discussed in a later paragraph.

3.1.4 Repository – Registry Architecture

When fitting the pieces mentioned above together to form the complete puzzle, the eHealth architecture aimed for looks like: a (virtual) federation of information which is distributed in nature (in general, this vision is considered more realistic than the creation of a single nationwide centralised medical record database[4]).

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[1] In Europe, about 87 % of Health Care Professionals use computers, 69% have internet connection in their practice. About 80% use electronic storage of administrative patient data, 90 % use electronic storage of data for medical purposes, 66% use EHRs for consultation and 60% use basic decision support systems for diagnosis and 32 % use DSS for prescribing.

[2] Only subsets of EHRs are used to be stored centrally for emergency purposes or in general continuity of care delivery. Fear exists that centrally stored patient records could be accessed (on purpose or accidentally) by non authorized users and that control and peer reviews could be used to evaluate HCPs performance.

[3] In May 2008, the Estonian Tallinn hospital was the first one in that country to allow patients to view their medical records online through a patient portal.

[4] Although this model is also implemented (KanTa, Finland).

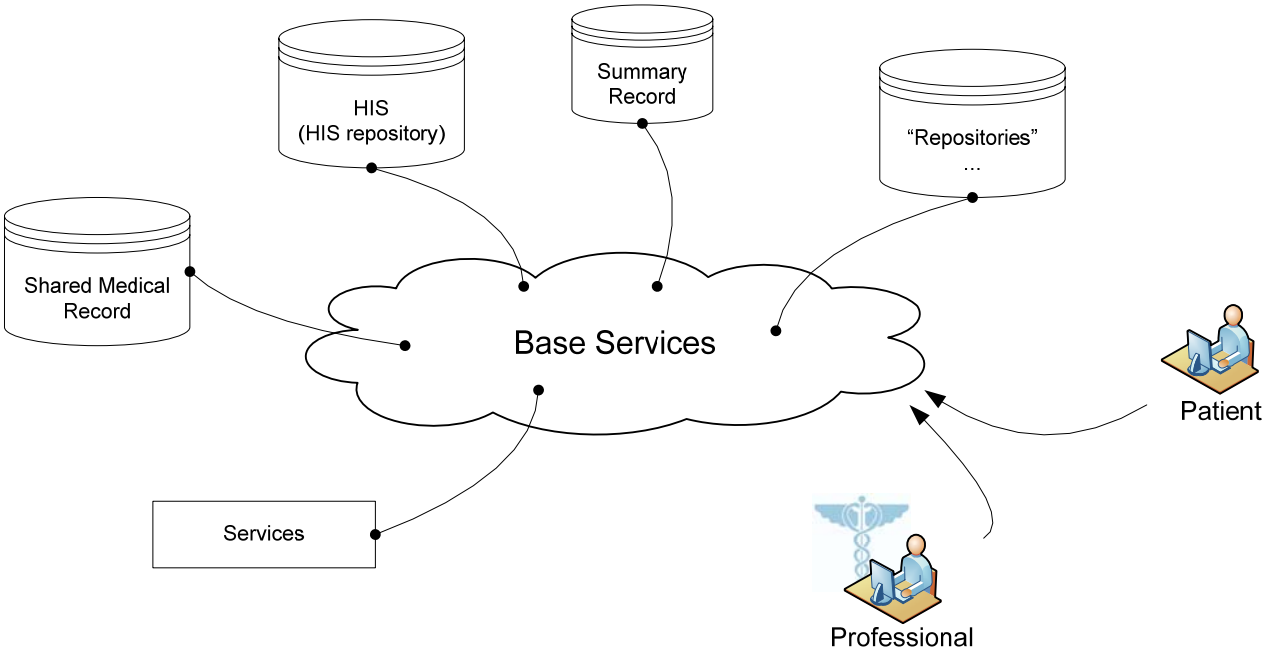

Figure 2: Repository - Registry Architecture

In this architecture one ends up with a number of repositories (hospital databases, summary records or even GP shared medical records, home care records, PHRs, …) which have to be interconnected, creating a patient-centric virtual medical record. The "fabric" needed to interconnect these different information sources will need to provide a number of base services in order to become a real "eHealth platform" (services such as registries or directory services in order to locate information, security technology, …).

The WP9 eHealth pilot is all about evaluating the TAS3 solution as a worthy platform candidate, especially with regard to trust and security services. It is a fact that this is exactly what the diverse National Health Information Network (NHIN) initiatives pursue (such as the Belgian eHealth platform[5] and the Dutch National Switchpoint[6]). Therefore, in order to get the TAS3 concepts accepted and implemented in the health domain, the TAS3 solution will need to prove its added value with regard to the planned NHINs (although these are currently largely underdeveloped).

3.1.5 The Personal Health Record (PHR)

Finally it is worth making some remarks about Personal Health Records (PHR) which have been put back in the spotlight by the initiatives of Google (Google Health[7]) and Microsoft (HealthVault[8]).

[5] http://www.behealth.be/

[6] http://www.nictiz.nl/?mid=30&pg=18

[7] http://www.google.com/intl/nl-BE/health/about/

[8] http://www.healthvault.com/

There is no universal and recognized definition of a "PHR", but there is a worldwide consensus on the (networked electronic) PHR as an electronic application through which individuals can access, manage and share their health information in a secure and confidential environment. It allows people to access and coordinate their health information and make appropriate parts of it available to those who need it.

Within the scope of TAS3, the PHR definition is restricted to online managed information, but as illustrated further in the storyboard it is not uncommon for people (typically chronic patients) to keep a paper-based PHR. Roughly, there are three kinds of personal medical information managed in a PHR:

- History/summary of medical decisions: discharge and referral letters
  This part resembles a copy of the "shared medical record" on the patient. It can be kept for archiving purposes (when the legally imposed data retention period for HCPs is short), as a summary record (where there are no national initiatives), personal reference/reminder, …
- Recording of observations and measurements
- Self-care plan

Applications surrounding the PHR include personalised health education (based on the PHR data), health information search engines, health appointment scheduling, maintenance of medico-administrative information of third-party payers and health insurance schemes, wellness applications linked to the recording of biometrics, etc.

As the PHR is initiated and maintained by an individual, it can be considered the ultimate expression of "patient empowerment". It supports the concept of the "smart patient". The idea is that the more Healthcare consumers are involved with their health and are given the opportunity to become educated about it, the more control they will take over it and the healthier they will (try) to be (cf. preventive medicine). In the end, society benefits not only because healthier people are happier and more productive, but also because they need to rely less on social security and health insurance.

To illustrate the view of health consumers on the PHR, this is what VOKS[9] members expressed when asked what the PHR might be useful for:

- The PHR ensures that information is always available and provides better control over the care process (in order to play a more active role):
  - The PHR allows the consumer to provide HCPs with valuable data (which was not available through other means) that can help improve the quality of care.
  - It guarantees access to the health information abroad, in out-of-hours and emergency situations.
  - The consumer can autonomously ask for a second opinion or start a care relation with a new care-giver.
  - It serves as a personal archive to backup information beyond legally determined retention times (i.e. personal archive).
  - Note that although the planned national systems aim to provide this availability of information and inter-professional communication, they seem not to offer the same level of control for the health consumer. Furthermore, these systems

[9] Organisation of parents and children with Oesophageal Atresia

are not yet (fully) deployed and their trustworthiness is currently challenged by both professionals and end users.

- A tool for (health) information management in general:
  - Used to track appointments, vaccinations, and numerous other wellness healthcare services data.
  - Helps to track references to physician instructions, prescriptions, allergies, medications, insurance claims, etc. Can be stored.
  - Used to record progress toward specific health-related goals (with the possibility of immediate feedback to the HCP).
- An entry point for health-education related services:
  - Based on PHR data a service can direct a patient to personalised information to facilitate in-depth discussions with healthcare providers. This knowledge leads to better self-management and a more active role in the decision-making process.
- An entry point for community building.

VOKS members also mentioned that although they clearly see the benefits of a PHR, most of them do not yet use it. The major problem is the lack of knowledge about how to begin managing a personal health record. They do not know which product best fits their needs (or even, what is available), how to get started (how to obtain health records from all their healthcare providers, what is relevant, etc.), how professionals will react (will they use the information), etc.

3.2 Storyboard: Caren's Stories

3.2.1 Introduction

The storyboard upon which the use cases for the TAS3 health pilot are built, are actual experiences of one of the members (Caren) of VOKS, the patient organisation which parties participating in the TAS3 project. The patient described in her reports is her now 18-year-old son Nick who suffers from Oesophageal Atresia[10]. Her account clearly illustrates the lack of "Continuity of Care" in the real world, in spite of the wide range of available communication means.

3.2.2 Story I: Information Exchange Between Professionals, Use of PHR

Caren's Story	Remarks
My son Nick was operated on directly after he was born with Oesophageal Atresia. He completed a three-week visit to a high level care	*In this story abstraction must be taken from the localisation of MCU and HCU. The communication issue*

[10] Oesophageal Atresia (OA) is the term used to describe a congenital obstruction in the oesophagus in newborn babies. It is a congenital anomaly in which the oesophagus ends in a blind upper pouch. The oesophagus is commonly known as the gullet, or foodpipe, and in babies born with Oesophageal Atresia this means that the gullet is not connected all the way to the stomach, and as result food and saliva cannot pass into the stomach.

unit (HCU) in an Academic Hospital after which he was transferred to a medium-level care unit (MCU). His situation at that point in time was stable.	*further described could be interpreted as an illustration of an intra-muros issue. However, the arguments made, stand in the situation when a patient is moved between hospitals (moreover, there the situation is even worse).* *Furthermore, it is not uncommon for units of a hospital which are located on different campuses to act as separate entities.*
While Nick stayed at the HCU several physicians and other HCPs maintained several personal/paper files to record health events, care provided and the evolution of Nick's health condition during his stay there.	*The issue of "individual" or paper-file record keeping without entering the information within a HIS is outside of the (technical) scope of TAS3.*
We (*i.e. both parents*) kept our own reports on Nick during the stay at HCU. We wrote down things like: • Acute life-events of our son • Administrative information such as names of physicians and other health professionals • Medical information that was only given to us verbally	*The worried parents start keeping their own medical record of Nick.* *Caren keeps this Personal Health Record (PHR) in paper form.*
When Nick arrives at the new unit (MCU), summary information is verbally exchanged between the nurses from the HCU and MCU. The nurses know nothing about the things that had happened during the last three weeks, only the situation on Nick's transfer.	*Note that the mentioned loss of information can also occur in a well-functioning health information exchange infrastructure. In cases where transfer documents are used, they usually contain a summary, not every detailed fact.*
The nurses ask us for the relevant missing information.	*Here the parents were able to rely on their PHR as a useful source of additional information.* *However, issues of trust arise: what information will HCPs trust, and what not?*
Several hours later, there are new doctors dealing with Nick's treatment. He's still very sick, but his situation is stable.	
Each doctor starts a new (personal) file for record keeping (diagnosis, treatment proposal, …) during the stay at the MCU.	*Apart for the fact that in this particular case the physicians in the same unit don't use a collaborative platform (which is not within TAS3 scope), this illustrates the distributed nature of medical records. Records are kept where they are generated,*

	i.e. where the patient resides (which is logical). *There is no umbrella patient-centric federation (yet, cf. eHealth platforms).* *Note that this way of working individually is not exceptional.*
Several points of the treatment are not in accordance with the treatments at the High Care Unit, they seem to be necessary but we do not understand them.	
At a certain point in time Nick is getting sicker and sicker: after an examination and several blood tests the doctors find out that Nick is very allergic to a certain kind of antibiotic.	
They already knew this at the HCU but the file reporting this allergic reaction was still missing from the MCU.	*This is a perfect illustration of a life-threatening consequence of the lack or faulty of information exchange.* *"Modern" healthcare platform initiatives deal with such situations, e.g. through a patient summary.* *Note that an important issue during information exchange to which TAS3 could contribute is assurance that all information is present and up to date.*
We had informed the doctors about this missing medication information, but nobody listened.	*Issue of Trust: patient-self recorded information (PHR) is not always trusted by doctors*[11]*.* *TAS3 could help making sure that by default the original source of data can be verified, increasing the level of trust in a piece of information.*
After this event we rapidly informed the doctors and nurses about the files on Nick recorded and kept at the High Care Unit.	*The physicians did not directly accept the PHR information, but rather retrieved it from the original sources. (See further, the PHR acted more or less ad a "personal "registry, i.e. a reference directory)*

[11] This relates to liability.

It took 48 hours to collect the most important information about Nick's health situation.	*Availability issue (resulting in the need for manual "federation" of information).* *The goal of modern health network architectures is to make sure information is available at all times and that the author of the information is verifiable as trusted sources.* *A PHR can work in parallel or in addition to a HIN, or possibly as a pointer to distributed information, acting as a "personal" registry.*
Therefore I stayed in the hospital during this period because I was afraid that the professionals might take decisions which were dangerous for Nick. I had to rely on the indulgence of my employer to get a few days off from work.	*Because of the chain of events, the parents started to distrust the information exchange.* *In order to be trusted by patients, any "solution" to the health exchange will need to give some assurance about the completeness of the provided information.* *A PHR could be considered as a tool to reassure patients themselves that all information is available; however such use as a "vigilante" tool should be avoided.*
24 hours later Nick's situation was getting worse: they brought him back to the HCU. The same nightmare started all over again.	

3.2.3 Story II: GP Requiring Data Not Locally Available

Caren's Story	Remarks
Two years later (Nick is at home) I noticed that he has fever, lung and several other problems. His general practitioner prescribes Nick the antibiotic he's allergic to. Fortunately I could interfere in time and inform the GP about Nick's previous allergic reactions...	*Note that the specific case of allergic reaction could be avoided at three distinct points in the care process:* • *GP himself with access to Nick's distributed medical records* • *At the pharmacy where access to a medication record could be made* • *By the GP or the parents when cross-checking with the PHR (the latter happened in this case)*

3.2.4 Story III: Monitoring Nick [1]

Caren's Story	Remarks
Children like Nick with Oesophageal Atresia are prone to abnormal (slow) growth. Therefore surgeons at the hospital ask me to monitor biometrics such as weight, height, skull development and check if he has trouble with hearing or his vision.	*PHR is perfect for such tasks*
For this I keep a diary in which I write down these measurements. We receive a min-max table from the hospital indicating normal values for the recorded parameters.	
If I notice through this monitoring that Nick's development falls behind, we have to take Nick back to the hospital. This event has already happened twice in Nick's life.	

3.2.5 Story IV: Monitoring Nick [2]

Caren's Story	Remarks
Oesophageal Atresia patients can suffer from excess gastric juice in the stomach. This is not only accompanied by serious heartburn, but, worse, can cause oesophageal cancer.	
When Nick suffers from acid stomach for an unusually long period, he's taken to the hospital for a 24-hour observation.	
Nick doesn't have to stay in the hospital for the whole 24 hours. A device is attached to his body which measures PH values in the stomach. At the end of the 24-hour period, Nick has to return to the hospital so that the readings can be analysed.	

3.2.6 Story V: Study Participation

Caren's Story	Remarks
In 2007, I was asked if Nick could participate in a study of physical development of young Oesophageal Atresia patients.	
The physicians organising this retrospective study required access to the monitored data	*Not only can the PHR serve as data source for such studies, it could also*

be used for subject selection.

3.3 TAS3 Trust and Security Requirements

3.3.1 Derived from the storyboard

From the storyboard it is clear that if TAS3 wants to play a role in the exchange of personal information in a healthcare environment, it will need to provide (Story I):

- "Trust in information"
  - "Can I trust this information to be correct?"
    - Who is the source of the information? Has it been validated or acknowledged? (e.g. by enforcing use of digital signature)
    - What are his/her credentials? (E.g. by linking to existing databases or working out a system of attribute credentials, by adding a "trust rating", etc.)
  - Trust in medical information is related to patient safety and therefore also to liability (of the treating physician). Establishing trust in a fact that excludes a possible threat (e.g. establishing a blood type) is not straightforward in healthcare (facts that confirm a possible threat, such as allergies, are trusted by default).
- "Trust in the system": Can I get assurance that…
  - … all information that is needed is available? (e.g. by listing all sources checked)
  - …the information is up-to-date? (e.g. timestamping, reminder/acknowledge systems)
  - …the system was effectively used? (e.g. by providing an audit trail)

Further, as mentioned in story V: it is plausible that Nick thinks that the biometric value backlog isn't particularly personal sensitive information. He could indicate that any study can use this data, as long as (conditions):

- The study is conducted by a medical professional and approved by the appropriate ethical boards
- The data is used anonymously

In general, TAS3 should support management for obtaining informed consent where needed and allow patients to revoke that consent whenever they wish to do so. In connection to the consent issue, TAS3 should allow for data "finality" (purpose of use) to be guarded. Although it is not possible to technically enforce finality, at least some means for monitoring and detection abuse should be included.

3.3.2 Common Requirements

There are a number of basic security requirements which are not apparent from the storyboard, not only because some of them are not the end-user's concern, but also because

people simply expect them to be taken care of in healthcare information management. Confidentiality of medical information is one of those. Clearly it is of utmost importance, but it is not explicitly mentioned in the storyboard.

A non-exhaustive list of security and trust-related requirements is given taken from the healthcare domain and clarified on some points by referring to the design of the Dutch National Switchpoint (NSP)[12]. The most important aspects are:

Authentication

- Support for various authentication methods is required.
    - Different security levels should be attributed according to the means of authentication.
- Example: The Dutch National Switch Point (NSP) defines three "confidentiality-levels" (low / medium / high) for applications that connect to it, depending on the user authentication.
    - Low
        - (Application level) Session-based login with username and password
    - Medium
        - (Application level) Session-based strong authentication
        - (information exchange) Session login, combined with "basic" authentication for each interaction with the information exchange platform (e.g. checking if the smartcard is still present in the reader)
    - High
        - (Application level) Session-based strong authentication
        - (information exchange) Strong authentication for each interaction with the information exchange platform

Security and Privacy Policies

- Patients should have full control to modify these policies and thus be able to fully specify access rights to their information according to their personal preferences[13].
- Despite this patient-empowerment approach, care should be taken that people who are not able to or not willing to deal with customising the security and privacy policy still enjoy sufficient protection (e.g. through an "overall default" security and privacy policy set by governing bodies).
- Usability of the policy rights management tools is of utmost importance. Configuration fatigue must be avoided as it leads to insecurity.

[12] The Dutch National Switch Point (NSP) is the central hub for the nationwide exchange of patient data between care providers in the Netherlands. It governs the exchange of patient data that is stored locally at individual care providers at the national level. Through the NSP care providers can reliably, securely and quickly exchange information.

[13] Even if they might endanger themselves with it, as long as they understand the risk that is taken.

- As an example, this is in short the Dutch NSP approach (from the original design documents):
    - The overall policies are called "authorisation protocols"
        - There is a "common authorisation protocol" which defines which "class of data" (medical, administrative, logistic, financial …) can be exchanged between different types of healthcare related organisations.
        - There is a "medical authorisation protocol" which defines for the class of medical data which function can be called by which type of Healthcare Professional (HCP) for each individual NSP application.
    - Additionally the patient has the opportunity to further restrict access for individual HCPs or complete classes of HCPs for each "class of data".
      The access levels that can be set are: Always / Emergency / After explicit consent / Never.
    - Further notes
        - "Authorisation protocols" have a more role-based nature; "authorisation profiles" a more discretionary nature.
        - The restrictions (authorization profiles don't deal with individual elements, or only restrict access, etc…) are there solely for reducing implementation complexity. The end-goal is total patient control of data exchange.
- Delegation
    - Users should be able to delegate their rights (preferably a limited set) for a certain period of time.
    - Care should be taken that delegation cannot be abused as a means to access otherwise not available information.

Logging / Auditing

- All interactions on the system should be extensively logged.
    - For each interaction a "purpose" should be indicated
- An authorised auditor should as a minimum be able to reconstruct the security related state of the system. I.e. see what would have been the governing policies at a certain time in the past.
    - Actually this should be taken one step further (this refers partly to the application domain), meaning that an authorised auditor should also see exactly what information a certain user might have had access to (e.g. through meta-data logs).
- Logs should be anonymised where possible.
- Patients (and authorised auditors) should be able to check logs relevant to them at any point in time.

3.4 Identification of the Actors

Foreground actors:

Actors	Role / Description
Patient	*Subject of care*
Legal Guardian of the patient in case of infancy, incapacity, or disability.	*Can be substituted in the role of the patient for information management.*
Healthcare professionals at primary, secondary, ternary and home care level (para-medics, physicians, medical students, ...) and pharmacists.	*Provide care, etc.*
National Institutions (e.g. patient/physician registries)	*Act as accrediting bodies also in the electronic world.*

Actors only of importance for more complex, rare or future scenarios:

Actors	Role / Description
Researchers (both commercial and academic)	*Secondary use of data.*
Family (non-guardian) of the patient, trusted persons	*Can be substituted in the role of the patient. But can also be indirectly affected by information about a patient (e.g. hereditary diseases, genetic defects,).*
Patient & Professional organisations	*They have an important role to play as enabler of patient-empowerment. Possibly they can get involved in the information exchange process as service providers (e.g. providing a pathology specific PHR).*

Note that only the purely medical side of healthcare is addressed in this text: as the medico-administrative side, for example, is completely ignored, hence actors such as third party payers and all kinds of insurance are omitted.

3.5 Use Cases

3.5.1 Introduction

From the storyboard, one basic scenario is derived and further elaborated in this first iteration of D9.1. The "sharing of health information through a PHR"[14] bases itself on fundamental functionality that TAS3 should be able to deliver in order to qualify as a health exchange platform. The scenario exists of three parts:

1. A hospital uploads to a Personal Health Record (eHealth-portfolio) using the TAS3 communication platform.

[14] Note that this model is certainly not yet accepted by professionals. It does however reflect very well the undeniable evolution towards patient empowerment. Note that in the end a PHR could also serve as mailbox for encrypted professional information (HCP to HCP).

2. A physician requires information about a patient and will use a TAS³-enabled information location service to look up patient information including that stored in the PHR.
3. The patient must be able to determine the access and usage rights on his TAS³-exchanged data, in this specific use-case: the rights on the PHR data.

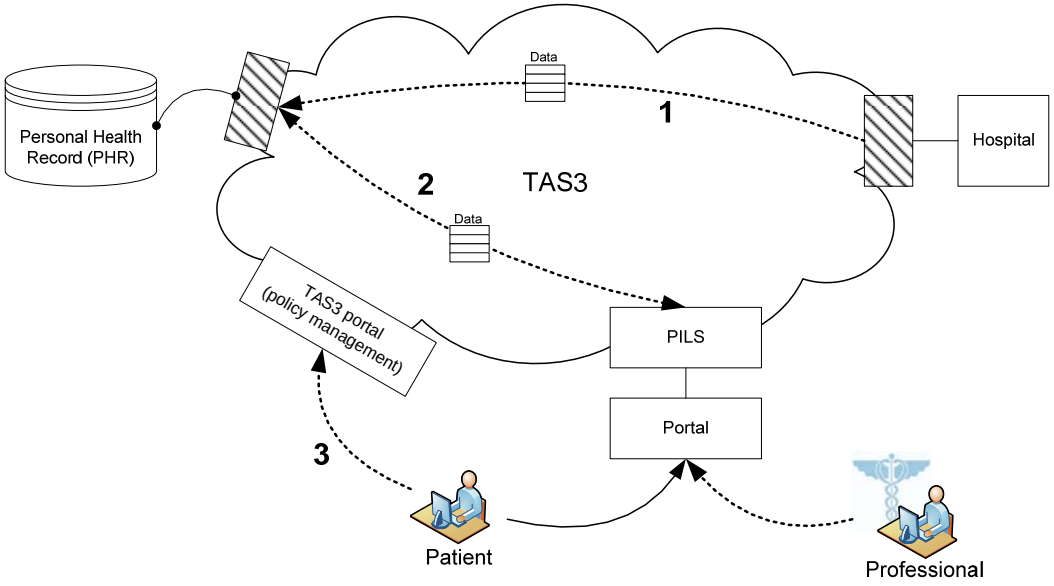

Figure 3: Use Case overview

The first iteration of D9.1 restricts itself to these three use cases. It is quite easy to derive additional scenarios from the storyboard; these will be developed in later version of D9.1 (as planned in the original DOW) as the technical architecture advances.

3.5.2 Use Case 1: a Hospital Uploads to an eHealth-portfolio (PHR)

Steps to be undertaken:

- The HCP in the hospital composes a report/dataset which he wants to export to the patient's PHR.
- In the application, the HCP will choose "export to patient PHR"; in a future scenario this may happen automatically when a report is composed (after an encounter or examination).

Requires:

- The Patient needs to have selected a PHR provider and he must have accepted the hospital and/or author as an information provider to his PHR.

- Patient identification is of utmost importance here (not only for confidentiality, but first and foremost for patient safety). A nationwide unique patient identifier scheme is not necessarily required (it does however simplify things considerably), as long as Identity Management is properly dealt with. E.g. a patient could provide a PHR-specific ID to the hospital so that they can link the internal hospital patient ID to that PHR ID (identity federation).

Security & Trust

- User and service authentication are essential.
- Patient identification is of high importance, not only for privacy (involuntary disclosure when data is uploaded to the wrong PHR), but primarily for safety.
- One (i.e. future user of the information) should be able to verify information authenticity (author, submitter,).
- Any action on the platform should be auditable.

3.5.3 Use Case 2: a Physician/GP Needs Information Stored in the PHR

At some point in time, for example during a doctor's visit, a patient might want to share data he has available in his PHR.

Steps:

- In order to access the correct PHR, the patient could direct the physician to his own PHR provider.
- However, a PHR is certainly not the only source of information. As explained earlier, health data is often distributed and patients (and physicians) do not necessarily know where relevant information could be located. Therefore, the physician will use an information location service to find out where medical data about his patient can be found.
- Using the patient information location service, the physician will get an overview of sources which have relevant health data available. In this use case, the PHR will pop up as an important source of information.
- The physician will query the PHR for information.

Security & Trust

- TAS3 should determine whether he has access to the resources.
    - This will require authentication of the physician, credential checking and evaluation of the request against the policies set forth by the user.
    - Note that information search itself is also subject to the data protection policies set forth by the user.
- If not, the patient should be able to grant him this access (see further) on the spot. Note that this use case can trigger use case 3.

This situation can occur in patient transfer situations (see story), second opinions, cross-border scenarios (e.g. consulting a physician on holiday), but also in emergency situations.

3.5.4 Use Case 3: the Patient Determines the Access Rights on the PHR Data

Patient empowerment is reflected in the capability of end-users to control the policies governing the information about them which is exchanged on TAS3. The ultimate objective is to come to full end-user control over data access as earlier mentioned. The way this achieved is defined by the TAS3 policy management mechanism will be elaborated in the WP5 deliverables

Points of attention:

- The usability of the policy management interface is key to the TAS3 success as it needs to provide full granular control without overwhelming the user (i.e. though wizards, design by example, etc.).
- Identity Management and role (credential) management and the need to interface with legacy systems. In healthcare many HCP credentials are accredited by governmental bodies, professional and scientific associations (e.g. physician speciality, HCP status (SS accredited or not), etc.).

3.5.5 Related Use Cases

The combination of the security and trust requirements in the health domain combined with the above scenario leads automatically to a number of related use cases, such as: a user wants to see who has accessed his data, a user wants to be notified when a certain type of people accesses his data, etc. These are not further elaborated in this first iteration of the deliverable.

4 Use Cases in the Dutch Employability Domain

4.1 Introduction

Kenteq and the University of Nottingham will demonstrate the architecture's applicability in the employability domain with employability services. The introduction and use of employability services supports a user-centric implementation of employability and flexicurity policies.

The aim of both the UK and Dutch Employability Use Cases is to show that online exchange of personal data in day-to-day processes between individual and service providers within the employability domain can be managed and protected in an application-independent TAS[3] architecture to deliver validated, securely shared personal information services including all identity management, privacy protection, trust and security needs. This is achieved by an integrated workflow approach to authentication, authorisation, trust and privacy.

4.2 Background

The European Employment Strategy (EES), inspired by the White Paper on Growth, Competitiveness and Employment, was launched in 1997. Since then, the EES has played a central role in co-ordinating the EU policies in order to create more and better jobs with employability and flexicurity as central pillars in this strategy.

Employability is defined as the ability of individuals to gain initial employment, to maintain employment and to obtain new employment if required (Hillage and Pollard, 1998[15]). For individuals, employability depends on personal competencies and the specific context within which they are employed including personal circumstances and labour market conditions. Individuals need access to trusted and secured information sources about personal competencies, job requirements and services to help them make informed and fast decisions about learning and working opportunities to avoid redundancy and unemployment.

Flexicurity is an active labour market policy and labour relations approach to unite the need for both labour market flexibility and social security. Flexicurity is defined by four components:

- Effective labour market policies and information systems that help people cope with rapid change, reduce spells of unemployment and ease transitions to new jobs;
- Comprehensive lifelong learning strategies to ensure the continual adaptability and employability of workers;
- Modern social security systems that provide adequate income support, encourage employment and facilitate labour market mobility;
- More flexible contractual arrangements and reliable career prospects.

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[15] Hillage, J. and Pollard, E., 1998, *Employability: Developing a framework for policy analysis*, Department for Education and Employment (DfEE) Research report. no RR85 (London, DfEE).

In the Netherlands the Commission Labour Participation proposes far-reaching measures that must be taken rapidly to allow the economy to function, to have sufficient staff in healthcare and education and keep public services affordable ("Shortage of workers requires new approach", Rotterdam, 16 June 2008[16]). One of the proposed measures is an ePortfolio for all citizens.

In consultation with employer organisations and trades unions, the Dutch Government has implemented an 'Employability Agenda' in the last 10 years. The aim of this agenda is to enhance employability of the (potential) labour force. This agenda is implemented in full and includes the design of a competency-based qualification structure as a link between secondary vocational education and training (VET) and the labour market.

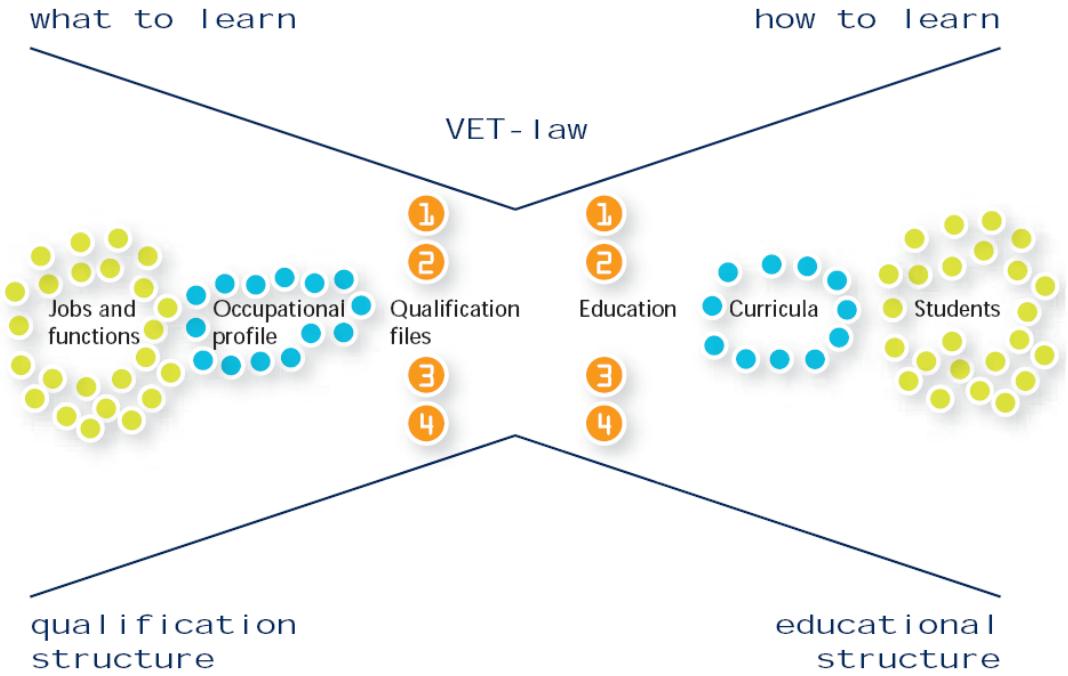


Figure 4: Qualification Landscape

The qualification structure is based on three elements:

1. Employers and employees determine together which jobs and qualification contents form part of the qualification structure. It has been legally established that employers, employees and education be involved in the description of the qualifications. They consult on these matters with the Centres of Expertise.
2. The qualifications are based on competencies. Competencies are the sum of knowledge, skills and attitudes that are needed for a job, in society or for further study. An employee needs both professional and generic competencies in order to practise a job satisfactorily.
3. The qualification requirements have been described in qualification files. All files that are found in the qualification structure have been described in a single format from

[16] http://www.naareentoekomstdiewerkt.nl/

which a choice can be made from a fixed set of 25 competencies, referred to as the Centres of Expertise Competencies Model. The competency model is compliant with the competency standard (IEEE RDC and SHL[17]). This ensures the same structure and layout for all qualification files. Insight has been gained into the similarities and differences between the various qualifications in the qualification structure for senior secondary vocational education. This gives trade and industry, educational institutes and students a clearer view of development opportunities.

All qualification files in this qualification structure describe core tasks in a standardised Competency Model managed by the Centres of Expertise, authorised and approved by the Dutch Ministry of Education and subsequently used by all educational institutes.

Core task 1: Repairs defects in combustion engines	Competencies																							
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
Work processes	Deciding and initiating action	Leading	Coaching	Caring and understanding	Cooperating and consulting	Adhering to principles and values	Relating and networking	Persuading and influencing	Presenting and communicating information	Writing and reporting	Applying expertise	Applying technology	Analysing	Investigating and exploring	Creating and innovating	Learning	Planning and organising	Meeting customer expectations	Delivering results	Following instructions and procedures	Adapting and responding to change	Coping with pressures and setbacks	Showing the need for achievement	Entrepreneurial and commercial thinking	Acting businesslike
1.1 Prepares the task					×						×	×		×						×					
1.2 Diagnoses problem with combustion engine										×	×	×	×						×		×				
1.3 Repairs the defect in the combustion engine	×									×	×	×						×	×		×				
1.4 Supports and instructs apprentices and colleagues				×	×						×														
1.5 Checks his work and completes the task										×		×							×						
1.6 Gives technical explanation to client					×					×	×														

Figure 5: Example of core tasks and competences

The competencies that a worker needs for each core task in a regular work process are determined and described in a so-called "process competency matrix" (see Figure 6).

The content of the qualification files is the negotiated result of a continuous process in which social partners, Centres of Expertise, the Educational Institutions, the Ministry of Education and the Governmental Institute for Inspection of Education are involved. Kenteq, as one of the 18 sectoral Centres of Expertise, is collaborating at a formal level to develop the qualification files used in employability information exchange.

Employability services, including competency-based matching, accreditation of prior learning and the description of personal competency profiles in an ePortfolio can successfully build on this formal process with reference to the qualification structure as described in the qualification files.

[17] http://www.shl.com/SHL/en-int/Products/CompetencyFramework/

Figure 6: Development process qualification files

4.3 Scoping: Present and Future

The management of employability information identifies business processes and information exchange and sharing. Employability information is defined as personal information stored in the systems of different organisations such as employers, schools, colleges or universities, employment service providers, employability service providers, training providers, recruitment providers, and other channels. In the employability market all this information needs to be available through the ePortfolio of the student, employee or Job Seeker.

To develop a high-level knowledge economy, individuals need to be able to make their own choices about their personal development. When all individuals are able to use their full creative potential and talents and manage their own careers efficiently, Europe will be able to compete with the fast-growing economies in the world for years to come. The image of an employee who manages his own career and works and learns at his own pace, independently of training schedules or organisational financing regulations is the most efficient scenario for lifelong working and learning. The shift towards individual responsibility for employability should be supported by creating the right conditions and opportunities for employees (and employers) to control their own employability information. To access employability information there is need for an ICT infrastructure to make the exchange of this data possible. In the Netherlands there is an example which shows the exchange of employability information between employer, school, employability service provider and an ePortfolio provider in a pilot. This is the 'Alescon' use case (Figure 7, not further elaborated).

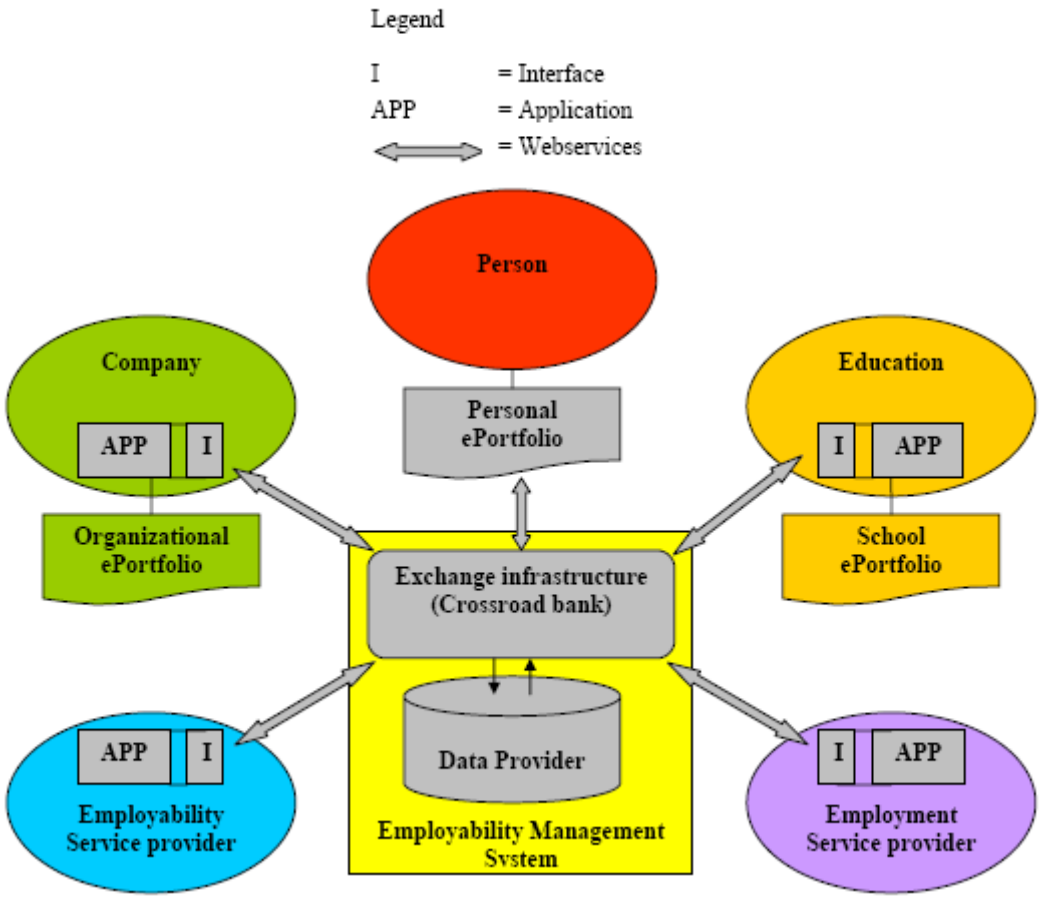


Figure 7: Information Exchange

An important issue in the architecture of an employability information system and the development of employability services is the central position of the individual citizen with control over his own personal data using an ePortfolio. For the exchange of information between the individual citizen and the main actors in the employability domain this is a major shift in data exchange patterns and policies from within institutions and organisations to between individuals and institutions and needs a new system architecture for trusted and secured employability (web-)services.

New developments in Dutch employment and employability policies include recommendations for enhancing participation through introducing the right to regular assessment of individual's competencies and the introduction of an ePortfolio for all. Access to employability services will be encouraged and made more straightforward by better logging, storage and use of personalised workplace and learning support.

The two Use Cases below describe practical situations with online exchange of personal data with a Trusted Employability Management System and will validate that this information exchange can be managed and protected in an application-independent architecture to deliver securely shared personal information services while including privacy, trust and security needs.

These Employability Use Cases are designed to show that online exchange of personal data for employability between individuals and service providers supports the integration of the Common Principles of Flexicurity into national processes and contributes to the practical implementation of these principles in the Dutch employability domain.

4.4 Scenario: Accreditation of Prior Learning (APL)

4.4.1 Introduction

Accreditation of prior learning (APL[18]) is the common name given to the process of recognising the competencies an individual has gained through formal and informal learning in various settings. This implies that professional competencies acquired through learning on the job, domestic responsibilities or voluntary work are in principle comparable to those acquired in formal learning situations. Moreover, the definition of competencies is broader than knowledge, skills and attitudes. They also implicitly refer to the ability to adjust to changing circumstances, flexibility or deployment potential. Therefore, competencies cover personal and social as well as professional areas.

Recognition in this instance means awarding certificates or diplomas on the basis of a generally recognised standard, such as the qualification structure for vocational education. Obviously, there are also other standards relating to the labour market which employers and employees regard as relevant. External legitimacy is the key requirement for recognition.

APL is not a goal in itself. It supports the desire to develop individuals and to strengthen human resource management within companies. It is an important means for realising permanent labour market suitability and employability. Competency development is a continuous learning process throughout life. In fact, lifelong learning is experienced by everyone, it only needs to be valued and guided. The knowledge society has a major interest in capitalising on this. APL aims at investing in the most effective and efficient means of working and learning.

The framework is among others inspired by the "Common European Principles for the Validation of Non-formal and Informal learning" (European Commission, 2004) and can be used to assess procedures, improve transparency and set a minimum standard for APL procedures.

In November 2006, a covenant (Kenniscentrum EVC, 2006) was signed by all parties involved in the Netherlands. These parties agreed on the following arrangements:

- The use of the code is voluntary, but the signing parties will dedicate themselves to promoting the use of APL. Making its use mandatory would detract from the motivation to work with the APL code.
- Everyone who starts an APL procedure agrees on the reasons for doing so. APL is not a standard process but an individualised series of arrangements customised to the goal and use of APL. Bespoke work is the standard.
- Every APL procedure ends with an APL report. This report states that the individual has documentation showing his or her competencies. APL is therefore independent of any educational provider.
- Accredited APL providers are listed in a directory.
- The competencies of people supervising these procedures and performing the assessments are documented. Only professionals can be supervisors or assessors.
- The quality of APL procedures is always being improved, both at the level of the providers of APL and at the level of the code itself.
- The quality code for APL aims to achieve more transparency and comparability and to make APL more accessible. It contains the following items:

[18] http://www.kenniscentrumevc.nl/evc_nl/56e810f09ac7e8195078f4e8cd07b6bb.php

- The goal of APL is to define, evaluate and accredit individual competencies.
- APL primarily addresses the needs of the individual. Entitlements and arrangements are clearly defined and guaranteed.
- Procedures and instruments are reliable and based on concrete standards.
- Assessors and supervisors are competent, impartial and independent.
- The quality of the APL procedure is guaranteed and is being improved on an ongoing basis.

4.4.2 Storyboard: APL at Heineken

No	Dirk's story	Remarks
1	Dirk is 37 years old and has a vocational education certificate at level 2. He has worked at the Heineken plant for 15 years.	*Heineken intends to develop its technical staff.*
2	In the company Dirk has worked his way up to project leader.	*He achieves a higher position without an official diploma.*
3	He reads about the right to develop himself in his career using employability services (Agreement between social partners).	*There is a regulation about an employability voucher in the labour agreement between trades unions and employers.*
4	He wants to gain a certificate at level 4.	*He wants validation of his competencies trough work experience*
5	Kenteq advises Dirk and he decides to do APL.	*He chooses Kenteq to execute an APL process.*
6	Dirk request an APL voucher from the Branch Office	*The Branch Office finances the cost of APL to the tune of* *€ 800.*
7	Together with the company he signs a contact with Kenteq to execute the APL procedure.	*The account manager draws up a contract containing:* *Objectives of the APL* *Personal information* *The Reference profile* *Privacy policy*
8	He completes his ePortfolio with his coach.	*Information exchange with:* *HR system* *ePortfolio system*
9	He collects the evidence for his competencies and skills.	*With this evidence he is able to show his competencies. The coach checks if the evidence is*

		correct and valid.
10	Dirk completes a competency test and a vocational test	*The assessor analyses the evidence and the results of the tests.*
11	The assessor visits him at his work and does detailed research on his job.	*The assessor has an interview with Dirk, checks his workplace and has a conversation with his boss.*
12	The assessor reviews all the information. The result of the APL indicates Dirk is almost level 4.	*The assessor reviews:* *The information from the Portfolio* *The results of the tests.* *The results of the interview,* *Check on the workplace and the conversation with his boss.*
13	Dirk receives the report and certificate from Kenteq.	*The quality controller of Kenteq Examens BV approves the results of the APL process.* *He also approves the report and certificate. The information is exchanged with Dirk's ePortfolio.*
14	He requests a diploma at level 4 from the college for Vocational Education.	*Dirk sends his APL information and requests a diploma.*
15	He starts an accelerated course at a college for Vocational Education.	*To get the official diploma he must do one course.* *If it is possible Dirk can exchange his APL results from his ePortfolio to the school system.*
16	Within one year he obtains his vocational diploma at level 4.e	*If it is possible the school can exchange the education information with Dirk's ePortfolio.*

An example of the story as a video can be seen here:

http://www.youtube.com/watch?v=-sbELE8xMrI

4.4.3 Requirements Derived From the Storyboards

The following trust and security considerations arise from this story:

- Dirk chooses Kenteq as his employability service provider. How does he know if he can trust Kenteq?
- Dirk creates an ePortfolio sends his data to Kenteq. How can he prove that he is the originator?
- The document or file contains embedded references to various certificates hosted by various institutions. Can Dirk maintain control over accuracy of his personal data? And can he select or deselect data?
- The document or file is transferred to the employer and the HR system of the employer confirms safe receipt of the file and sends a message. Can Dirk be sure that the recipient abides by privacy policies?

From the storyboard it is clear that if TAS³ wants to play a role in the exchange of personal information in an employability environment, it will need to provide the same as for healthcare:

- "Trust in information"
- "Trust in the system"
- "Trust in the other parties" (users and service providers)
- End-user control

4.4.4 Identification of the Actors

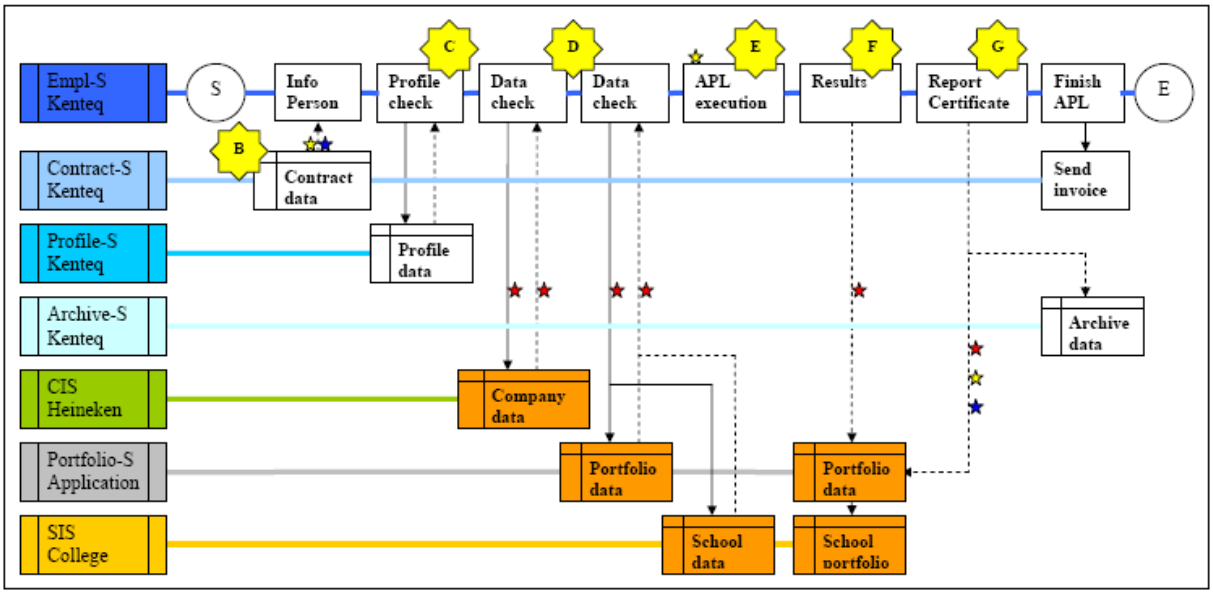
Actors	Role / Description
Employee	*The employee applies for an APL*
Employer HR manager Manager	*Heineken* *Supports staff development* *Informs the assessor about the work situation*
Branch Office Personal coach Co-ordinator	*Development fund* *Grants an APL voucher* *Controls the APL procedure*
Employability provider Account manager APL Coach Assessor	*Kenteq: Responsible for certified employability services* *Draws up the contract and the agreement about APL* *Helps to complete the Portfolio and checks the evidence.* *Executes the APL procedure.*
Awarding Body Quality Controller	*Kenteq Examens BV: Provides the certification* *Ensures that the process meets the quality standards of the APL code and approves the quality of the report*
ePortfolio provider	*Management system for a personal ePortfolio*
School / Training institute	*College for Vocational Education Leiden*

Co-ordinator	*Supplies a course and the diploma.*

4.4.5 Information Exchange

Traditionally data exchange for employment and for education has been paper-based and systems have been localised and closed. Individuals prove qualifications by physically showing paper copies of certificates to interested parties. Written and verbal references follow employees from one job to another. While CVs are increasingly prepared electronically and application processes offered online, the process is still as basic as attaching a word-processed document to an email message. CVs remain stories that individuals tell about themselves, rather than verified, evidence-based statements that can be easily matched against job profiles. Where processes are more developed, lack of standard data formats and issues with granularity remain obstacles to efficient data exchange. Fresh data entry is required for each new partner or process, resulting in duplication and confusion over authoritative sources.

To support mobility of the labour force, greater granularity of verified information about skills, competences and learning outcomes is needed, provided in an interoperable medium that allows cross-matching. Individuals need to maintain control of this data, ideally via an employability ePortfolio. This in turn would allow more focused access to Information, Advice and Guidance, resulting in workers having greater awareness about potential pathways and progression routes.



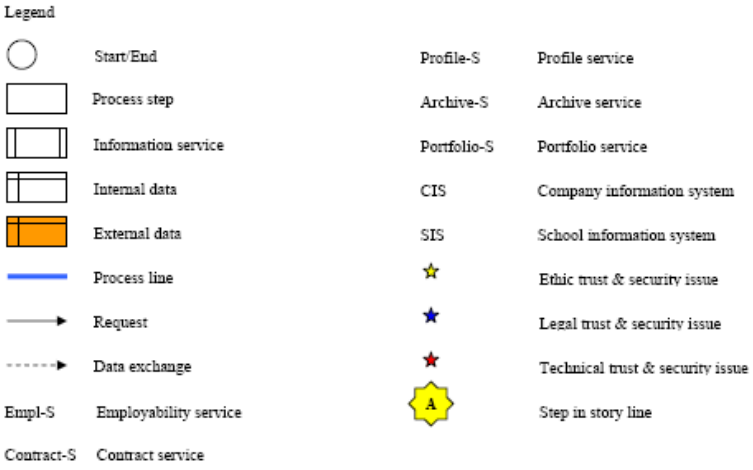


Figure 8: APL process

The competencies that an employee needs for each core task in a regular work process are determined and described in the reference profile. The reference profiles are based on the Qualification structure and Kenteq – as one of the 18 sectoral Centres of Expertise – is interacting with Social Partners and the Ministry of Education on a formal level developing the Qualification Files used in employability information exchange.

The brief overview of the storyline:

A. The employee wants to use the employability voucher from the collective labour agreement between employers and trades unions.
B. Together with his company he signs an APL contract
C. Creating a reference profile
D. Checking on previous data in other systems
E. Executing the APL process
F. Exchange of the results to the ePortfolio
G. Providing a report and a certificate
H. Development to a higher level qualification

4.4.6 APL Use Cases

From the storyboard we describe a few use cases that the TAS³ infrastructure should be able to support in order to achieve a trusted data exchange of employability information with a personal ePortfolio.

No	Name of the use case	Description
1	Contract	*The relevant information for the APL process is exchanged with the employability system.*
2	HR system	*The information in the employer's HR system is exchanged with the ePortfolio system of the employee, and also directly with the employability system.*

3	ePortfolio	*If there is a ePortfolio from the employee then the relevant information for the APL process is exchanged with the employability system*
4	Evidence	*All the evidence that is important for the APL process must be stored in the ePortfolio*
5	Results of APL	*The results of the APL procedure are exchanged with the ePortfolio of the employee*
6	Mandating	*The employee mandates Kenteq in the employability system to exchange the report of the APL to the employer*
7	School system	*Within the ePortfolio the employee can send relevant information to the school system. The school system can also exchange the results of education with the ePortfolio.*
8	Information request	*When there is a request for information, the employee can send relevant information from his ePortfolio or can grant access to the show case via a link.*

4.5 Scenario: Mass Layoff (ML) a.k.a. Job Seeker

4.5.1 Introduction

A mass layoff is defined as a process of terminating contracts of employment for more than 50 people within a 3-month time period within a single organisation.

The process starts with an announcement by the employer. The information has to be sent to public authorities and representatives of the workforce. Procedures are regulated in a European Directive and in national legal, jurisdiction and collective labour agreements. Typical reasons for terminating a large number of (long-term) contracts at once are changes in strategy and markets, followed by a decision to reorganise or close down.

A mass layoff is not just an economic action. It also breaks a psychological contract between employer and employee. Labour relations are described as partial gift exchange. It is not only employers who invest in employees by paying salaries, contributions for social security and training. Employees also invest a lot in a job to build up their careers. Career prospects within the company are drivers for motivation and performance. A mass layoff typically involves an abrupt ending of career prospects and income security. Damage control can be a lever for negotiating with public and private stakeholders about mobility and outplacement services.

Mass layoff, seen as forced mobility from job to job or a special type of outplacement can be more or less effective depending on the pace and quality of information exchange including the assurance of legal aspects and securing privacy and trust.

It is most important to provide valid and reliable career information and job descriptions on which personal competency profiles and mobility plans can be based for all employees involved. Translation of these job descriptions and core tasks are key in successful searching for new jobs and matching on competencies. These Employability Services are provided by the specialists of Centres of Expertise such as Kenteq.

Kenteq use the competency matching method to find the perfect match between the Personal Competency Profile (PCP) and the Vacancy Competency Profile (VCP).

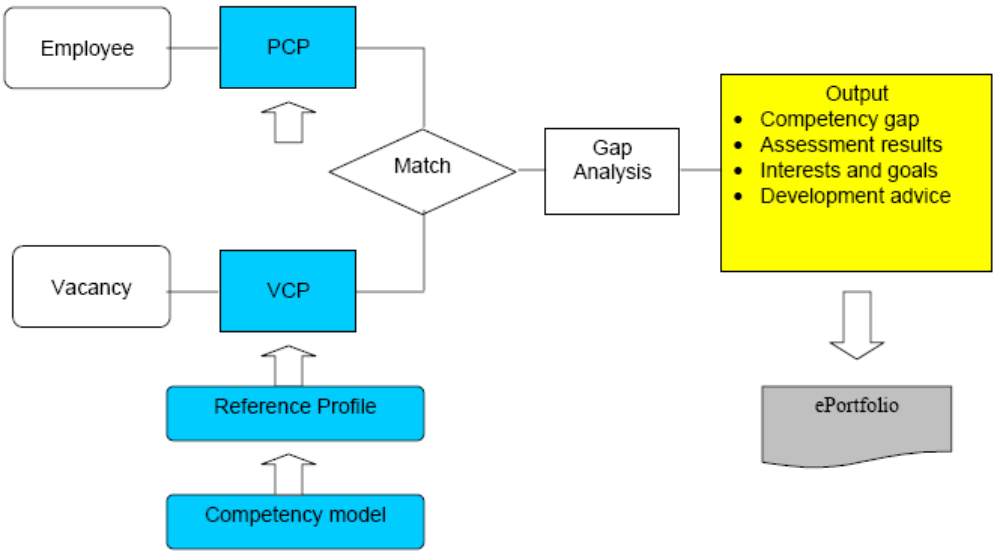


Figure 9: Matching on competencies

4.5.2 Story: The NedCar[19] case

No	Pieter's story	Remarks
1	Pieter is 48 years old and has a low level of formal education He has 25 years experience at NedCar in different positions.	
3	NedCar stops production of one type of car and Pieter faces redundancy in 6 months.	*There is an agreement between the Employments office, NedCar, Schools, Social security Office and Kenteq to work together.*
4	He contacts the Mobility Centre Automotive (MCA) for employment services, including an intake and authentication of personal data.	*The MCA does an electronic intake and supports Pieter through the transition from Work2Work.*
5	He is advised to do an assessment at Kenteq for a Personal Competency Profile PCP.	*With the PCP Pieter can search for a well matched job and will also find out about which competencies he must develop.*
6	He completes his ePortfolio with his coach.	*Information exchange* *HR system*

[19] large-scale automotive manufacturer in the Netherlands

		ePortfolio system
7	Pieter completes a competency test and a vocational test	*The assessor analyses the evidence and the results of the tests.*
8	He has an interview with the assessor from Kenteq	*The assessor has an interview with Pieter, checks his workplace and has a conversation with his boss.*
9	The results of the tests and the assessment are put in a Personal Competency Profile (PCP).	*The quality controller for the Kenteq Exams approves the results of the assessment process, the report and the certificate.*
10	All the information is exchanged with his ePortfolio.	*The results of the assessment and Pieter's PCP.*
11	He is given access to a Vacancy data provider.	*The co-ordinator of the employment service grants the vacancy provider.*
12	He searches for a suitable vacancy.	*Match between the PCP and the Vacancy Competencies Profile (VCP)*
13	Using his ePortfolio he applies for a job.	*Pieter can easily choose a suitable vacancy*
14	He finds a suitable job at a construction company.	*He signs a contract with the new employer.*
15	With his coach from the mobility centre he creates a Personal Development Plan (PDP) and stores that plan in his ePortfolio.	*Using the PDP he can choose a course.*
16	The Mobility Centre facilitates training.	*The MCA will finance the training costs.*
17	Within 2 months Pieter starts work in a new job in another company.	
18	As part of his new work he is trained as a welder.	*The results of his training can be stored in his ePortfolio*

4.5.3 Requirements Derived from the Storyboard

These are the same as those referred to in section 4.4.3 above.

4.5.4 Indication of Actors

Actors	Role / Description
Employee	*Must find a new job*
Company HR manager	*NedCar* *Supports staff development*
Mobility Centre Personal Coach Assessor	*Mobility Centre Automotive* *Coach who grants the search voucher* *Execute the assessment procedure*
Employment service Co-ordinator	*CWI* *Does the intake and grants access to the vacancy provider*
Employability provider Coach Assessor	*Kenteq: Responsible for certified employability services* *Helps to complete the Portfolio and checks the evidence* *Executes the assessment procedure*
Exam institute Quality Controller	*Kenteq Examens BV: Certification* *Ensures that the process meets the quality standards of the APL code and approves the quality of the report*
ePortfolio provider	*Management system of a personal ePortfolio*
Vacancy provider	*Collects vacancies in a database*
New employer HR manager	*Company with the vacancy* *Searches for new staff*
School Co-ordinator	*College for Vocational Education* *Supplies a course and the diploma.*

4.5.5 Information exchange

A crucial part in the information exchange of employees with Public Employment and Social Security Services is the information used for bidirectional matching of demand and supply side criteria. The quality and reliability of this information is critical for the job search process.

The information about competencies can be improved significantly by using a systematic analysis of work experience, job titles, core tasks and related competencies. The current situation is that most of this information is not yet related to competencies and other indicators, such as job titles, used within the organisation are quite often unique and not related to job titles and professions in the qualification structure. A job description used by the company is not always up to date and the core tasks, work processes and requested competencies can differ significantly from core tasks described in the qualification file. Work experience as a series of job titles is not therefore indisputably transcribed in personal competencies without professional support.

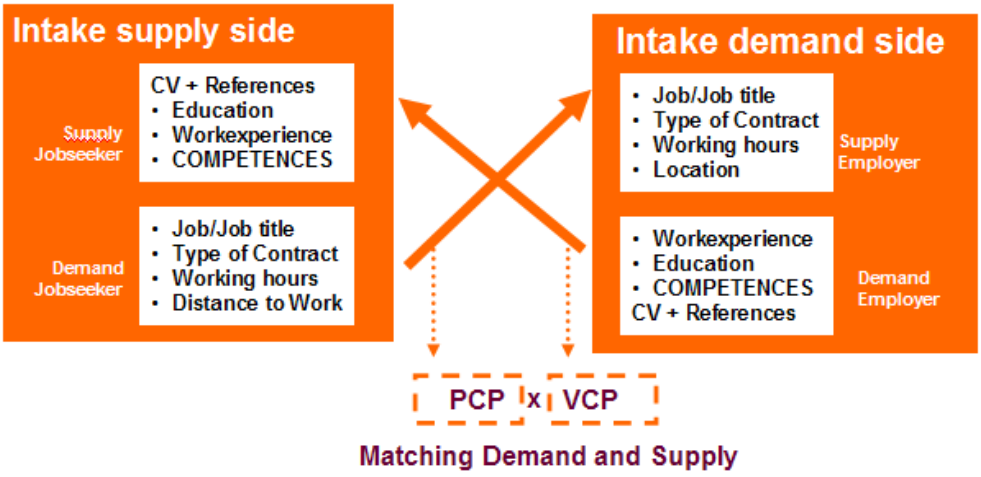


Figure 10: Bi-directional matching

The exchange of personal data between jobseekers and applications used by public employment services, temporary job agencies, outplacement agencies, employers, trades unions and training institutions is often insecure and inefficient. Therefore the matching results of supply and demand are not optimal. This process is bidirectional in nature.

A new development in the Netherlands is the inevitability of shared services between public administrations, enforced by a law stating that government is not allowed to ask information if that information has already been provided for other public services by that citizen. Subsequently trust and security guarantees are crucial and even more so in stressful situations characteristic of a mass layoff with a lot of obligatory rules to follow and information exchanges between the employee, authorities and intermediates.

A legal task and obligation for Kenteq and the Centres of Expertise is the assessment of the quality of a training place in a company and providing sufficient organisations and workplaces for students in secondary vocational education. This is a solid and well- respected source for qualified knowledge and expertise in job description and profiling. As part of an international project Kenteq has developed a generic model for the structured description of work-related competencies used for supporting international mobility and work placement. It shows that the core competencies used by the Centres of Expertise in transforming job-related information to Personal Competency Profiles (PCP) can be used in many vocational training and labour market related employability services.

Also, based on knowledge and systematic analysis of developments in organisations and technology within more than 28.000 companies operating in the field of technology, Kenteq can deploy this knowledge and experience in many different ways, including profiling vacancy competency (VCP), needed in employment and employability services.

New developments in employment and employability policies include recommendations for enhancing participation through introducing the right to regular assessment of competencies and the introduction of an ePortfolio for all. Access to employability services will be more straightforward and encourage better logging, storage and use of personalised workplace and learning support.

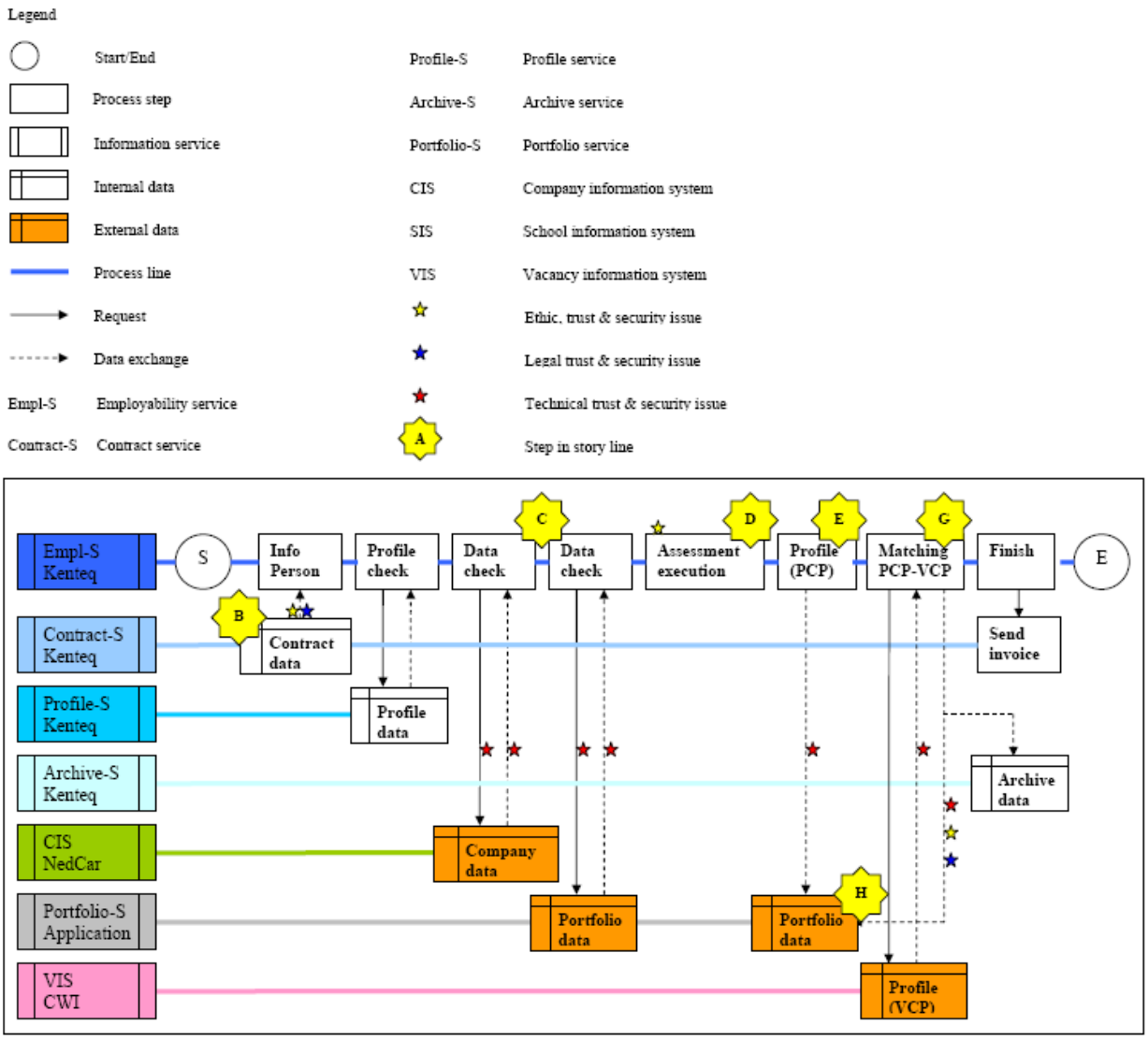


Figure 11: Assessment process Job Seeker

The brief overview of the storyline:

A. The employee searches for a new job because of a mass layoff
B. He does an intake in the mobility centre and a contract is signed for a assessment
C. Checking on previous data in other systems
D. He does an assessment which result a Personal Competency Profile (PCP)
E. The results and the PCP are exchanged with his ePortfolio
F. He gets access to a vacancy service provider
G. He searches for a matching vacancy
H. He applies for the job
    a. He signs a contract

4.5.6 ML Use Cases

From the storyboard we describe a few use cases that the TAS³ infrastructure should be able to support in order to achieve trusted data exchange of employability information with a personal ePortfolio.

No	Name of the use case	Description
1	Electronic intake	*All the relevant information from the electronic intake is exchanged with the ePortfolio of the Job seeker, and also with the employability system.*
2	HR system	*The information in the HR system of the employer is exchanged with the ePortfolio system of the employee, with the system of the mobility centre and the employability system.*
3	ePortfolio	*If the employee has an ePortfolio then the relevant information for the assessment process is exchanged with the employability system*
5	Results of the assessment	*The results of the assessment procedure and his PCP are exchanged with the ePortfolio of the employee*
6	Vacancy search	*The employee can search and match for an appropriate vacancy with the PCP in his ePortfolio.*
7	School /Training institute system	*From his ePortfolio the employee can send relevant information to the school system. And the school system can also exchange the results of education with his ePortfolio.*

5 Use Cases in the UK Employability Domain

5.1 Background

Employability is emerging as a strong area of concern for the UK Government. In a constantly-changing labour market, with the demise of traditional manufacturing industries and the rise of service-based industry, supporting skills development and employee mobility and education, thereby encouraging lifelong learning, is now both strong in the UK policy agenda and an area of growing concern for the education system.

Within this project, employability in the UK focuses on two main high-level processes: application to employment from Higher Education, as exemplified by management of internships and work placements for students, and upskilling the workforce through education and learning in employment within a regional partnership. There is a degree of complementarity between these situations: both aim to enhance the individual's employability, and both stand to benefit from enhanced tracking and matching processes made possible by technology. Moreover, both may form part of a continuum or a cycle: new employment leads to new opportunities for education, leading to acquisition of new skill sets which in turn make the individual eligible (and likely to apply for) for new employment.

Timely, accurate and secure presentation and exchange of skills data and personal information is key to success in both scenarios. Information exchange is an integral part of the application process. Individuals are responsible for release of data about themselves, their experience, their abilities and their aspirations. Recruiters and prospective employers are responsible for publication of data about the advertised role, and in turn want access to verified data in standardised formats to facilitate comparisons and matching of candidates to job profiles. Similarly, episodes of education for work-based learners result in learning outcomes which need to be matched to the needs of individuals and employers to ensure maximum benefit and value for money. Educators and awarding bodies are responsible for provision of verified data about individuals' experiences and achievements, to support both claims as part of an application process and further progression. Establishing ownership, authenticity and the secure transfer and persistence of all this data are key issues.

The need for access to accurate, verified data about potential employees for the purposes of recruitment, and about existing employees to build a better informed picture of the existing and potential skill set within an organisation, is influencing the development of UK policy at both national and regional levels. The final report of the Leitch Review of Skills[20] in December 2006 and the subsequent Government implementation plan[21] focused attention on the need for skills development, including higher level skills, within the workforce in order for the UK to maintain its position in the changing global market. Employers are responsible for maintaining records about their employees and are being offered brokerage services to examine and improve their overall skills profile and thereby improve productivity and profitability. Furthermore, research evidence shows that educating the workforce, especially in higher level skills, means that workers are more likely to experience job satisfaction and therefore staff retention improves, vital in an environment where it is estimated that 50% of

[20] *Prosperity for all in the global economy -- World Class Skills* http://www.dcsf.gov.uk/furthereducation/uploads/documents/2006-12%20LeitchReview1.pdf

[21] *World Class Skills: implementing the Leitch Review of Skills in England* http://www.dius.gov.uk/publications/worldclassskills.pdf

workers are dissatisfied with their existing employment. However there are a bewildering number of agencies at work in this area, causing confusion for both individuals and employers. A recent guide to the English skills system by the awarding body Edexcel[22] identified four planning and funding bodies, four regulatory/inspection agencies; five government departments, nine bodies representing or supporting providers; ten support agencies; twelve strategic bodies and sixteen separate support mechanisms.

The rise in activity of online job boards, the growth in online applications processes and e-recruitment (one major employer, the supermarket Sainsburys, is now only accepting applications on line[23]) brings to light further questions about control, security and trust. Meanwhile a series of recent public scandals in the UK concerning loss of (often sensitive) personal information have resulted in security issues becoming a national concern.

This process is placed in the context of a clear regional agenda. Nottingham has been designated one of 8 UK 'Core Cities' recognised by UK Government as being one of the main drivers of the UK economy outside London. However the East Midlands region as a whole is seen as an area of low skills and high employment. Traditionally there has been low demand for workforce skills and little incentive for individuals to invest in their own education. Smaller companies find it considerably more difficult to recruit staff with necessary skills and 'hard to fill' vacancies in the region are more likely to be skills shortage vacancies than they are nationally. There is an agreed need to move the region towards a higher-pay/higher-skills economy, supported by the activities of the Regional Development Agency.

Significant challenges for the region are seen as:

- raising employer demand for skills and quality of employment
- increasing demand for higher-level skills from employers and individuals
- matching skills supply to the needs of employers
- improving graduate retention
- mapping and maintaining progression routes
- knowledge-intensive sectors are focused in small number of companies
- the high proportion of SMEs, especially small SMEs and micro-businesses

By supporting the secure transfer of personal data between employers in the region and between employers and a regional hub, as well as with learning providers, the TAS³ infrastructure will support worker mobility and upskilling.

5.2 Information exchange / example of interactions

5.2.1 Information Exchange

Traditionally data exchange for employment and for education has been paper-based and systems have been localised and closed. Individuals prove qualifications by physically showing paper copies of certificates to interested parties. Written and verbal references follow employees from one job to another. While CVs are increasingly prepared electronically and application processes offered online, the process is often as basic as attaching a word-

[22] http://www.talent.ac.uk/news_details.asp?NewsID=1773

[23] http://www.onrec.com/newsstories/9866.asp

processed document to an email message. CVs remain stories that individuals tell about themselves, rather than verified, evidence-based statements that can be easily matched against job profiles. Where processes are more developed, lack of standard data formats and issues with granularity remain obstacles to efficient data exchange. Fresh data entry is required for each new partner or process resulting in duplication and confusion over authoritative sources.

As a result, a high degree of duplication arises: for example a health and safety certificate from one employer may not be accepted by another, which insists on imposing its own training, covering much of the same material, on the grounds that there is no evidence of the content of the previous qualification. To support mobility of the labour force, greater granularity of verified information about skills, competences and learning outcomes is needed, provided in an interoperable medium that allows cross-matching. Individuals need to be empowered to maintain their own control of this data. This in turn would allow more focused access to Information, Advice and Guidance, resulting in greater awareness about potential pathways and progression routes.

5.2.2 Management of Work-based and Placement Learning

This use case supports the UK Government current consultation[24] on high-level skills and the need to incentivise employers and opportunity providers to move beyond provision of career information, advice and guidance, such as the co-option of social software, to maintaining and developing relationships with students/learners through formal internships and work-based learning. If effective, these may result in potential employment opportunities and promoting improved regional graduate retention.

Systems are now available within the UK to support students undertaking placements in employment and work experience, making it easier, cheaper and more sustainable for universities and employers to develop and increase this provision. However, these systems could benefit from the broader infrastructure required to develop the engagement of higher education with employment across the domains of higher learning, knowledge exchange, research, and collaboration with schools, colleges and other training or employment advice providers. This includes linking to networks of small and medium sized enterprises to raise participation (SMEs often need more creative solutions to work placement and a higher degree of support for the process) as well as building on and sustaining new pathways and progression routes being developed by the regional Lifelong Learning Networks funded by HEFCE[25]. By maintaining links with the institution, students have the possibility of added value beyond that obtained by independently seeking positions via one of the many job board type sites which merely act as aggregation of advertisements for vacancies linked to employers' own online application systems.

5.2.3 The Problem

The current matching process of requirement to candidate is typically manual, non adaptive) and too time consuming, with few guidelines to work to for individuals, employers or the institution. Employer work-based learning and placement job descriptions or profiles often lack granularity (or any useful level of detail), which can lead to honestly mistaken

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[24] *Higher Education at Work, High Skills:HighValue* (2008) http://www.dius.gov.uk/consultations/documents/Higher_Education_at_Work.pdf

[25] The Higher Education Funding Council for England. For more on Lifelong Learning Networks, see http://www.lifelonglearningnetworks.org.uk/index.php

placements. In addition, all organisations have different business rules related to placements, their methods of working and increasing concerns about employer branding.

In addition, the individual candidate often appears to be a second-tier stakeholder in the process: opportunities, terms and processes are agreed between university and employer or between a Placement Service Co-ordinator (who is typically subject to little scrutiny or quality assurance) and placement provider (employer). There is no opportunity in this process for candidates to self promote the opportunities they seek and the terms under which they wish to be placed. This is expected to become more important as the younger generation increasingly define and promote their identity or their brand within environments of their own choice.

Capturing and recording of work placement experience tends to be *ad hoc* and non-standardised, and candidates are rarely provided with relevant processes and tools to support it. Dialogue with the employer is rarely facilitated following the experience, although institutions may seek to place further students in following years if the view is that the overall experience has been successful. There is also a lack of structured post-placement impact assessment or evaluation to measure the effect on future employability of the candidate and retention within the region.

5.2.4 Example of Interactions

As with most UK universities, there are a number of placement programmes operating within the University of Nottingham. However the majority of these are currently voluntary and students effectively manage their own placements. The most sophisticated scheme is that run for the University's International Office by Placementmaker, who seek to enhance employability for international students by placing them with local and national host organisations, many of which are SMEs.

Each Placement Service Co-ordinator's process is different, usually manual and unsecure, and the learner has to provide or complete information according to their requirements. If we take an example of the work placement discovery process, the current typical information exchange is:

- A learner wants a work placement to meet the conditions of his degree and/or to improve future employability. This may be a summer internship or a short-term part-time opportunity. When learners register on a programme:
    - Their registered status as university students is verified, normally using a university identity management process. (In the future this may be using a UK Unique Learner Number issued under the Managing Information Across Partners programme).
    - The student provides brief summary generic application information via an online form.
- The University has contracted work placement support to a third party (Placement Service Co-ordinator) with whom it has a contract but no formal sharing of information. The University has a duty to vouch that placement candidates are *bona fide* registered University students but there is no formal verification to support the placement discovery process apart from verification of student ID.
- The Placement Service Co-ordinator works with regional employers (who are largely SMEs) to identify suitable placement opportunities. Employers are briefed about the responsibilities and commitment involved, as well as the potential benefits. They commit to paying students a fixed training allowance and are given a clear understanding about their health and safety and insurance obligations.

- The Placement Service Co-ordinator is responsible for identifying placement providers and for negotiating work placements on learners' behalf. These are formalised in contracts between the Placement Service Co-ordinator and placement provider, and between the student and the Placement Service Co-ordinator.
- The placement provider may deal with a number of Placement Service Co-ordinators but there is no information shared between the parties, and in each placement instance it is usually the Placement Service Co-ordinator who collects and disseminates information on the placement provider (e.g. a profile) and the specifics of the placement (although this is usually very high level information with no semantic commonality).
- The placement co-ordinator manually matches the learner's profile from the online application form to available placement profiles and suggests suitable opportunities, releasing summary information to the learner.
- The learner agrees which placements he wishes to be put forward for and emails further information in an application (or CV) to the placement co-ordinator. There is no opportunity for the learner to publish and exchange or reference information from their ePortfolio to support the application. IAG may be offered at this stage to help the learner decide what content to put in a CV.
- The placement co-ordinator forwards CVs (via email) from the learner to companies, who shortlist for interview. They pass the shortlist to the placement co-ordinator, who informs individual students.
- Further information about the placement opportunities is released to shortlisted learners, who are offered face-to-face IAG, including hints for the interview, details of logistics and travel, and advice on which areas of their CV they should highlight at interview (all very time consuming; high change information is often 'lost in translation').
- The placement provider views the student CV (and other information if provided) but there is no easy mechanism to verify the information provided; on the basis of this they interview the candidates and make an offer or rejection, but all information is in manual records with little or no further feedback to the rejected learner.
- The Placement Service Co-ordinator draws up the contracts between themselves and the placement provider and student, explained during often un-documented face-to-face meetings, but there is usually no specific consideration given within the contract to data collection and sharing, which are carried out according to the policy of the institution.
- The placement provider commits pay a fixed training allowance to the Placement Service Co-ordinator, who then pays the student. Again there is usually no information sharing across the parties.
- Some monitoring takes place during the placement: the student sometimes has a workplace mentor and usually receives regular visits from the placement co-ordinator which are tracked in an online or manual 'customer' record of contact.
- At the end of the placement, the placement co-ordinator carries out post-placement assessment and evaluation with both student and placement provider, which helps to inform future placements.

Information exchange is practically non-existent during the work placement and post work-placement review processes. The result is that information is in different systems or just held manually, with duplication making auditing difficult, and the learner's personal record is no

further enriched by the placement unless he or she is proactive in collecting, reflecting, etc, or there is some kind of associated formal assessment of learning outcomes.

By introducing an ePortfolio into the process in place of or in addition to the current CV, the student is empowered to view and control data that changes hands, and create a skills record that can be further supported by other lifelong learning opportunities, shared and added to by various parties. The ePortfolio thereby becomes the data hub; it offers a view on previous experience and qualifications, on informal learning, and via a link to university systems could show verified MIS and module data. This brings it closer to being an Employability Portfolio which is defined as a 'a dynamically created view of authentic and diverse evidence, drawn from one or more repositories, that represents facets which a person or organisation has reflected, designed for presentation and (personal) data exchange to one or more audiences for a particular purpose and to facilitate related business processes'. The TAS³ security and trust infrastructure will offer a means to overcome the issues of authenticity, authentication, privacy and trust which arise.

5.2.5 Scoping: Present and Future

The use case identifies the business processes, information exchange and sharing required to facilitate regional placement operations effectively and efficiently within a network of employers, schools, colleges or universities, employment service providers, training providers, recruitment providers, and other channels.

Although there is much valuable research on work-based and placement learning, there is currently no system which joins vocational experience with education and learning. There is a need to provide a secure technical infrastructure that will enable education providers to co-operate to meet the needs of learners and employers for a region or sector. For example, a student's biographical data captured by a further education college could be shared with a university (with the student's permission) and in turn with an employer offering an internship or work-based learning. This would reduce both costs and duplication of data.

Another issue is recognising that a learner may only want to give Placement Service Co-ordinators access to personal information for the particular service the Placement Service Co-ordinator provides, and want to sign a further contract stating the terms under which this data may be shared once independent of whoever provides the placement.

Essentially this means the development of shared ICT services among trusted partners in order to choreograph a personalised programme of study and work across different providers, none of whom could, individually, meet the needs of the employee and the employer in full. Shared services of this kind would be of particular benefit to people undertaking higher education in employment, especially under the new UK Qualifications and Credit Framework[26], which encourages a modular approach to qualifications.

The progressive focus for the UK employability pilots is therefore[27] [28] [29]:

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[26] http://nds.coi.gov.uk/environment/fullDetail.asp?ReleaseID=384238&NewsAreaID=2&NavigatedFromDepartment=False

[27] University of Nottingham Quality Manual: Code of Practice for Placement Learning Programmes http://www.nottingham.ac.uk/quality-manual/placement-learning/code.htm

[28] University of Nottingham Quality Manual: Release of Personal Information on present and former students of the University http://www.nottingham.ac.uk/quality-manual/misc/release.htm

[29] Quality Assurance Agency Code of practice for the assurance of academic quality and standards in higher education: Section 9: Work-based and placement learning – (September 2007) http://www.qaa.ac.uk/academicinfrastructure/codeofpractice/section9/default.asp

- An initial pilot based on the work placement programme for international students at the University of Nottingham with local employers, largely SMEs, which will demonstrate how to facilitate trust in relationships and information. Later pilot activity will offer a full test implementation of authentication, authorisation, trust and privacy.
- An initial set of pilots, required to prove the viability of the development of a secure regional technical infrastructure that enables education, training and employability providers to co-operate to meet increasing demand for work-based and placement learning for a region or sector. It is envisaged that the focus will be graduate retention within the region and enabling employers to meet their requirement with higher skills, perhaps in the case of SMEs, by supporting 'portfolio' workers in a more coherent and collaborative manner.
- HE to employment: to focus on management of work-based learning, including secure and controlled transfer of ePortfolio information to support applications and provision of IAG, and on promoting relationships and communication between the University of Nottingham and local employers. This may also include linking to verification services such as the MIAP Learner Achievement Record and a greater focus on data portability, micro-transformations and interoperability of personal employability-related data.
- A regional employability focus: we are conducting discussions with pilot partners in the Food and Drink sector (identified by the East Midlands Regional Development Agency as a key growth), aiming to maximise the effects of IAG provision, promote individuals' skills development, support staff retention and improve corporate skills profiles (and therefore profitability). An employability ePortfolio offers an ideal tool to support this and will enable secure transfer of reliable (and verified) information between parties.

5.2.6 Architecture

We see the architecture supporting the work placement process via an ePortfolio as shown in the diagram below. This essentially represents an employability data exchange and is the same diagram as provided in the NL Employability pilot (see Figure 7). In the UK work placement context:

- The employability service provider would typically be a Placement Service Co-ordinator
- The company or host would typically be a placement provider
- The employment service provider could be an independent agency providing funding or other services
- The School e-Portfolio would be an institution-free personal ePortfolio provided by the University

The 'fabric' required to connect these different stakeholders and information sources is an Employability Portfolio system that is TAS³ enabled. An important issue in the architecture of an employability management system (as shown in the diagram above) and the development of employability services is the central position of the individual citizen with control over his or her own personal data using a data portable enabled ePortfolio. For the exchange of information between the individual citizen and the main actors in the employability domain this is a major shift in data exchange patterns and policies from within institutions and organisations to between individuals and institutions, and needs a new system architecture for trusted and secured employability services.

The Use Case hereafter describes practical situations involving on-line exchange of personal data with a Trusted Employability Management System which is able to validate that this information exchange can be managed and protected in an application-independent architecture; to deliver securely shared personal information services and meet privacy, trust and security needs.

The Employability Use Cases is designed to show that on-line exchange of personal data in day-to-day employability information exchange between individuals and service providers supports the principles and approaches of the UK Skills Agenda and contributes to the practical implementation of these principles in the UK employability domain[30].

5.3 Storyboard

5.3.1 Introduction

The following storyboard is a set of fictional experiences designed to illustrate practices which raise privacy and trust concerns and clearly illustrates the potential effect of lack of co-ordination, secure information sharing, respect for personal information and 'duty of care'.

This overall use case derived from this storyboard is intended to agree on the component use cases and interfaces required for phase 2 and 3 pilots to demonstrate and then prove the viability of the development of a secure regional technical infrastructure that enables education providers to co-operate in order to meet to meet the work-based and placement learning needs of learners, employers and other opportunity providers for a region or sector.

International Work Placement Story:

Anwar's Story	Remarks
Anwar is a second year student at a UK University and needs a summer work placement that will enhance his employability profile, pay him some money and address the fact he has a disability. Anwar has never formally applied for a work placement before, but has some previous work experience in the voluntary sector. He has no idea if there are any legal implications if he earns money in the UK as an international student. Anwar has been told by another student about a University scheme offering to find students summer placements.	*Highlights why employment advice services are required* *The University will hold data on Anwar's disability under the DDA31 but must ask for his consent to share disability information with Placement Service Co-ordinators* *Highlights why IAG services are important*
Anwar makes an appointment to talk to the University approved placement provider service who inform him they can help him with a placement but they have to first verify that he is a registered student and can be paid a tax-exempt training allowance under the Revenue and Customs Department rules while he gains work experience	*The issue of verification delay arises because the Placement Service Co-ordinator and the University have no ability to share information even through Anwar's personal information is held in the University student record system. Trust may rely on*

[30] Managing Placements with IT and Online - Good Practice for Placements Guides Volume 1 ASET, 2007

[31] Disability Discrimination Act (1995) http://www.opsi.gov.uk/acts/acts1995/ukpga_19950050_en_1

on a 'training scheme'. They ask to see his University student ID card, but also want to verify that he is registered on the University system. The Placement Service Co-ordinator tells Anwar they will contact him once they receive the verification. The placement provider does not inform Anwar that although they are operating from University premises, they are an external business employed by the University and what the implications to Anwar are to the placement discovery process.	*physical evidence to prove eligibility.* *There is a lack of transparency and clarity of actors, roles and responsibilities which could breed mistrust*
The Placement Service Co-ordinator contacts Anwar to confirm that he is eligible and they will contact him when they have some appropriate placements. Anwar asks the Placement Service Co-ordinator if they are aware of his disability and whether they feel this will limit his chances of a placement. The Placement Service Co-ordinator says they are not aware and ask Anwar for his consent to use this information under the DDA and to provide details. Anwar says he is happy to share this and other information he has on his previous experience, stored within his University provided ePortfolio, subject to this information not being shared elsewhere without his approval. The Placement Service Co-ordinator responds and says they have no agreement with the University to access personal information in his e-portfolio but he could publish and export the information to them or just provide paper-based information. Anwar is unwilling to provide paper-based information and not sure if he can export the relevant information in his portfolio. The Placement Service Co-ordinator suggests that they will ask Anwar for further information once they require it to support his placement application, but they will take into account the disability criteria	*Again this is usually a manual process and adds time to the whole process* *Anwar assumed the University would have shared this personal information with the Placement Service Co-ordinator but there is no agreement to do this and the University does not allow access to personal information from their student record system* *Although the student ePortfolio is provided by the University, information stored in it is under the control of the student, and there is no agreement that it can be shared with the Placement Service Co-ordinator* *Anwar is right to be concerned to just provide paper-based information as he has no control over where it will go or be stored* *There is no agreement between Anwar and the Placement Service Co-ordinator about when and how this information will be used, but once a learner has made a disclosure of a disability, there is a duty of care to act on it.*
The Placement Service Co-ordinator identifies a number of placement providers they believe have suitable placements for students like Anwar. There is no formal approval of placement providers but the Placement Service Co-ordinator briefs the placement provider about the responsibilities and commitments involved including that they commit to paying the Placement Service Co-ordinator the training allowance (so they can pay the student as a	*A this stage there is no contract between the Placement Service Co-ordinator and placement provider: this is only put in place once a placement has been offered and accepted by a student* *A more secure auditable system would require formal approval and*

trainee and not an employee, thus not incurring tax and National Insurance liabilities) and about their health, safety and insurance obligations	*registration of placement providers and their placement processes*
The placement provider is a typical SME and has few resources to define the placement role and requirements. The Placement Service Co-ordinator therefore creates a placement profile, with background information on the organisation, and this is stored in the Placement Service Co-ordinator's placement management system. There is no formal review or sign-off process of the placement profile and associated information by the placement provider	*There is no agreement in place concerning what information to be shared and no sharing between the respective parties' record systems.* *The placement provider has to trust the Placement Service Co-ordinator but what about if incorrect information is presented?*
The Placement Service Co-ordinator contacts Anwar to say they have a potential placement and asks him to complete an online application form which is stored on their system. At this point the application service provider only releases minimal placement provider information In completing this application form Anwar effectively agrees that the Placement Service Co-ordinator can act on his behalf to find and agree terms of a work placement but has to ask Anwar's consent to pass on any disability information disclosed to them. There is no explicit mention of terms or policies concerning sharing of personal information although it is assumed that there will be compliance with the Data Protection and Freedom of Information Acts.	*Personal information about Anwar is now locked into yet another system* *There is no facility for Anwar to set any terms or policies around his personal information*
The Placement Service Co-ordinator manually matches Anwar's application with the available placement profiles and suggests suitable opportunities, releasing summary information to him on the placement profile but no details on who the placement provider is, so that he cannot bypass the service and apply directly	*The placement provider has no means of knowing what summary information has been released to whom. What if it is not correct?* *No agreement about information sharing between the Placement Service Co-ordinator and placement provider. So typically, each placement provider will deal with a number of Placement Service Co-ordinators, each with different processes etc.*
Anwar agrees with the Placement Service Co-ordinator that he wishes to be put forward for 2 placements and emails an application CV and a link to a web-based presentational e-portfolio. The Placement Service Co-ordinator accepts the CV and portfolio but is unclear that they may be in breach of the Data Protection Act if they do no	*No agreement or information sharing between Placement Service Co-ordinator system and e-portfolio system* *Potential compliance risks*

check that only relevant personal information is used concerned with the placement matching process.	
The Placement Service Co-ordinator forwards Anwar's CV and ePortfolio to the placement provider by email, including a statement that Anwar has a disability (which Anwar has consented to) but no further information. The placement provider is interested and decides to interview Anwar. The placement provider extracts information from Anwar's CV and portfolio package and enters it into a spreadsheet to compare information on placement candidates and to aid the interview process. The placement provider is unsure about the validity of a training certificate provided by Anwar and emails the Placement Service Co-ordinator to see if they can provide further information, but they cannot	*No ability to track that Anwar has agreed to this information being passed on or provided consent under DDA* *No agreement on information sharing between Placement Service Co-ordinator and placement provider systems* *No audit trail that this information has been effectively 're-entered'* *No means of supporting verification services to improve the matching process which could lower the placement provider's trust in the Placement Service Co-ordinator*
The placement provider carries out an interview during which they reference some information in Anwar's portfolio that Anwar clearly has no right to present. The placement provider thanks Anwar and states they will advise the Placement Service Co-ordinator they would like to offer Anwar a placement.	*This is not an un-typical occurrence with presentational portfolios but could lower placement providers' trust in Anwar's capabilities and how he is supported by the University*
The Placement Service Co-ordinator draws up a placement contract between themselves and the placement provider. The placement provider draws up a separate contract with Anwar. There is no explicit mention of terms or policies concerning sharing of personal information. All parties sign the contracts	
Anwar is excited about starting his placement and is given a short induction programme. Anwar likes his supervisor who has taken an interest in his development, and so tells him a about his disability which his line manager was aware of (because Anwar has previously given consent) but had no information about	*Duty of care issues around safety etc must be included in induction but there is no tracking and assurance of this.* *Issues around disclosure here: this information should have been carefully shared with Anwar's supervisor and the placement provider is open to compliance risks under the DDA*
Four weeks into his placement Anwar's supervisor goes on holiday for 2 weeks and his replacement asks Anwar to work in another section of the organisation to do a different task. Anwar states	*This information should have been carefully shared between Anwar's supervisors; the placement provider is open to compliance risks around*

that he is only a trainee and that his disability makes it very difficult for him to do the task. The replacement supervisor shouts at Anwar and tell him to just get on with it.	*diversity (DDA) and auditing of proper systems and practices*
Anwar gets on with his new task but soon finds he tires very easily. On Friday morning Anwar has an accident which his colleague reports. Anwar is signed off sick by his doctor, who advises him that he needs to rest for 6 weeks, which is effectively the rest of his placement period.	*Anwar is clearly not empowered to make the right decision for himself, resulting in lack of trust of the placement process and provider*
Anwar is worried: he is not sure that he will continue to get his training allowance and thus be able to pay his rent	*Lack of transparency, putting extra stress on Anwar*
The Placement Service Co-ordinator contacts Anwar and informs him his placement contract will be terminated but that he may be entitled to some compensation.	*Lack of transparency as no way Anwar can see if an audit trail around information concerning his disability*
Anwar asks the Placement Service Co-ordinator why his disability was not taken into account when he was re-tasked. The Placement Service Co-ordinator replies that typically SMEs do not keep much information on their employees, never mind their placement students, so the information just got lost between supervisors. The Placement Service Co-ordinator says he is sorry about Anwar's accident and will call the placement provider to discuss it, but it is up to Anwar to decide if he wants to take any further action	*Typical acceptance of normative bad practice resulting in lack of trust between parties* *Anwar needs to be provided with a solution to managing consent around information concerning this disability within the DDA*
Anwar is not satisfied with this response and he contacts the Student Union for advice. On Anwar's behalf, the Union contacts the Office in the University responsible for the placement programme and requests that an investigation be carried out into the placement processes.	*Anwar has a case here under the UK DDA legislation. One can imagine how long this all takes to put in place and stress it would put on Anwar's health*
The Office escalates this to the relevant body in the University who carry out an internal investigation but are unable to complete a full audit as the information either is not recorded, is incomplete or is duplicated	*Lack of agreement on personal information and lack of ability to share information make auditing a time-consuming and unproductive activity*

5.4 Requirements Derived from the Storyboard

The considerations made by domain experts again refer to the same needs:

- Parties involved in employability processes need to be able to trust each other and their processes if the ecosystem is to work effectively, which is why some kind of process approval is required.
    - Those who fail to behave appropriately must have their trust rating changed immediately.

- The individual or end user needs to control some of his/her data through consent, and determine which data may be used by which process at which service provider.
    - The individual or end user wants to give a service provider access to his/her personal information for that service specifically and only wants to sign a contract or set policies independently of who provides the end service, provided the service provider is trusted (approved).
- If data needs to move, so must the explicit policies related to it, and the new service provider must obey them strictly.
- Can I trust that the information is correct? Who is the source of the information? Has it been validated or acknowledged? (E.g. by enforcing use of digital signatures).
- What are the credentials of the source? (E.g. by linking to an existing database or working out a system of attribute credentials, by adding a 'trust rating').

5.5 Identification of Actors

For this use case, the foreground actors are the learner, the University Placement Service Co-ordinator and the placement provider. Other potential actors are also listed.

Actor	Role / Description
Learner	*Learner requiring a work placement*
Placement Provider/host organisation	*An organisation offering a placement opportunity. May include corporations, charities, the public sector or others. May also be called a host organisation*
Placement Service Co-ordinator	*Unit responsible for the management of the placement process; may be a University internal or external provider. May also be called placement co-ordinators; there is often separation of roles for those who deal with commercial and legal aspects and those focused on the placement process and the end customers (student and placement provider)*
University Placement Tutors	*Members of university staff who take responsibility for overseeing students during the placement process; may also fulfil the placement coordinator role and/or provider career advice*
Administrators	*System users who are normally, but not necessarily exclusively, responsible for the tracking of placement information*
Quality Controller	*University Staff responsible for ensuring that any process meets local Quality Assurance guidelines*
Employer Coach or Mentor	*Usually provided by the placement provider to support the student during their placement*

5.6 Use cases

5.6.1 Placement Discovery Use Case

The initial pilot will focus on the critical information exchange challenges concerned with placement discovery. In this use case the actors are the student, the Placement Service Co-ordinator, who has separate roles regarding commercial and legal issues (programme officer) and supporting placement customers (placement co-ordinator). A generic overview of the process is:

- The Placement Service Co-ordinator (in this case an approved external University service provider) needs to find a reputable placement provider with a placement for student(s) X.
- The Placement Service Co-ordinator enters trust negotiations with possible placement providers until he finds one who has a placement that matches certain criteria
- The Placement Service Co-ordinator sends his request for a placement for student(s) X to the selected placement provider
- The placement provider prepares a placement profile for student(s) X
- Placement Service Co-ordinator accepts the placement profile
- Student(s) X has a placement profile to respond to and submits a response

At a high level this process can be described as shown in the diagram below:

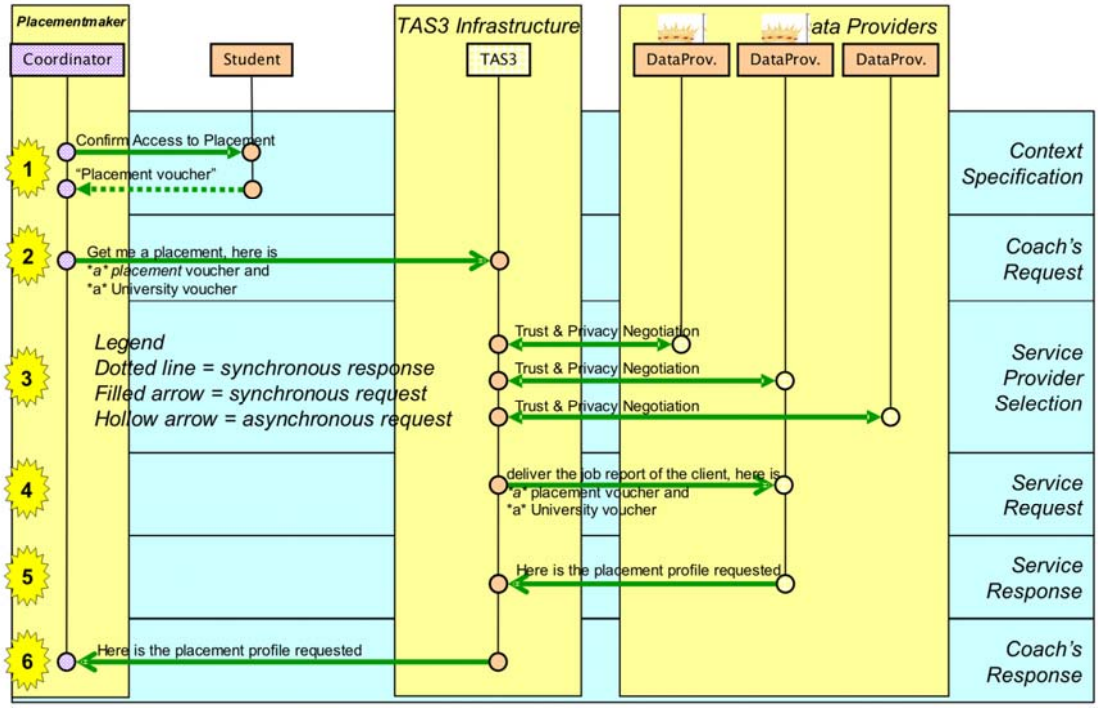
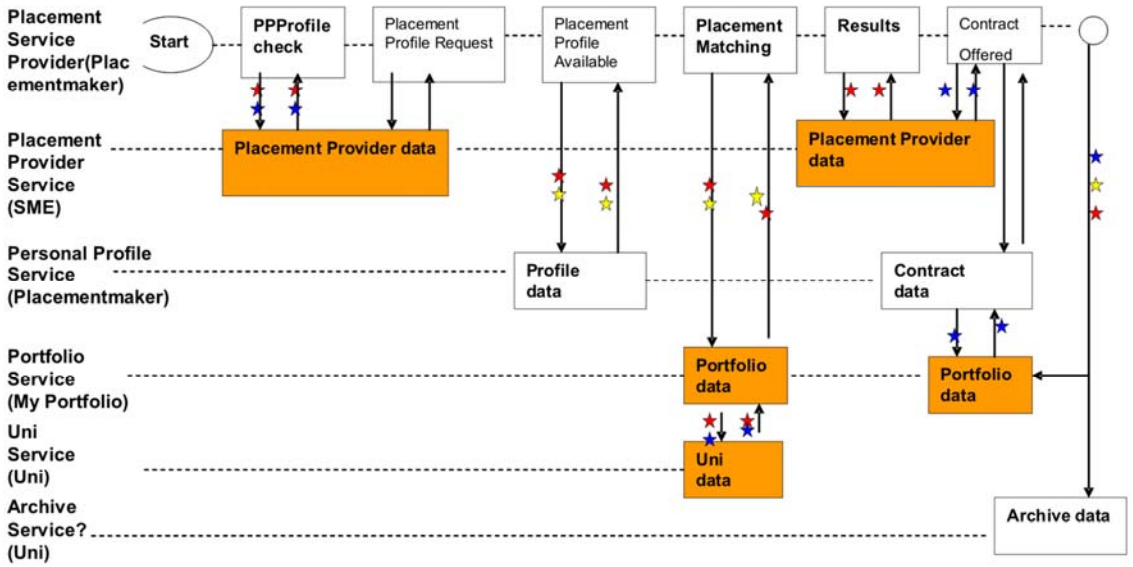


Figure 12: Placement Scenario Business Process

Steps in the use case:

- The University has contracted an independent placement service co-ordinator to provide placement support to international students in their second year or above. Placements are for short periods of summer work or for part-time positions. The University acts as an identity provider; this enables the placement service co-ordinator to authenticate the student/applicant against university systems.
- An international student at the University wants a work placement, has approached an approved third party placement service co-ordinator who supports such applications, and registered online.
- The placement service co-ordinator records approved available placements and placement profiles
- The international student is able to develop a skills profile for matching against a work placement and grants certain rights for the placement service co-ordinator to access this profile.
- The placement service co-ordinator matches the student profile to the work placement profiles on the system and informs the learner of possible matches.
- The placement service co-ordinator then sends the placement providers selected information about potential applicants, which includes limited access to further applicant information as required. The placement provider may request an interview with the applicant, which is recorded on the co-ordinator's system.
- The placement provider confirms a work placement offer to the placement service co-ordinator for specific student(s) and the placement service co-ordinator organises the relevant contracts.



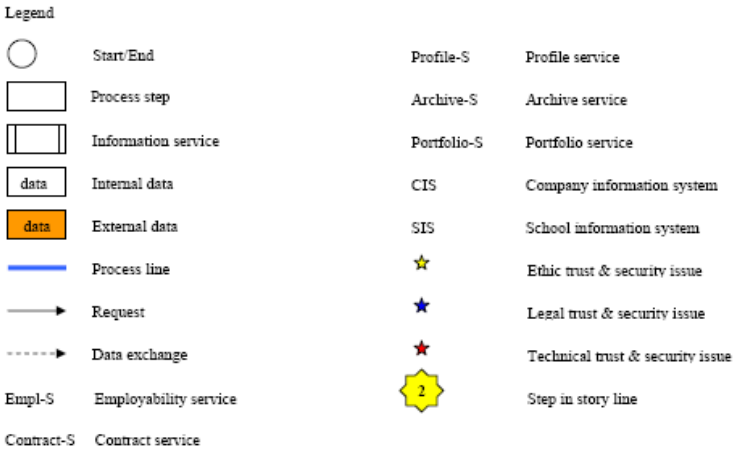


Figure 13: Stepped Process

In this use case, the following specific security & trust issues are raised by domain experts:

- How does the University trust the Placement Service Co-ordinator and that they are adhering to the contract (full audit trail?)? Does the University trust that the Placement Service Co-ordinator will only place placements with approved placement providers?
- Does the student trust that the Placement Service Co-ordinator is University approved?
- Can the student find out what the Placement Service Co-ordinator's role and responsibilities are and which rest with the University?
- Does the student trust the placement matching process to be fair and transparent?
- Does the placement provider trust the Placement Service Co-ordinator? How can they be sure the Placement Service Co-ordinator is University approved and determine what 'approved' means?
- Can the student trust the information provided by the Placement Service Co-ordinator on behalf of the placement provider?
- Can the student trust that only relevant personal employability information (referenced or stored within his/her ePortfolio or other systems) is required for the relevant steps of the placement process?
- How can the placement provider trust that if it does not want anyone to know it provides placements to University X this will be adhered to?
- The Placement Service Co-ordinator, placement providers etc. use their own systems and applications. How can they be sure that personal information is secure between one placement process and another?

6 Healthcare and Employability: Similarities and Differences

It is useful to compare and contrast these two domains chosen by the project for demonstration of the TAS³ architecture. A number of interesting similarities arise from this.

- Both employability and healthcare have a strong existing legacy of paper-based data exchange. Furthermore, the individual is often expected to act as 'postman' to transfer paper documentation between actors. In both domains, however, there is an increasing worldwide tendency to rely on electronic information exchange instead. The level of transition for each domain varies significantly from country to country.
- The context of both domains exhibits strong parallels:
    - both have a potentially high and wide impact on an individual's family and social life
    - In both the goal is to increase efficiency (by, for example, reducing costs and improving quality of service), and they aim to reach it through timely sharing of accurate, up-to-date information.
    - In both, 'improving quality of service' is approached through offering continuity, sustainability and durability. This implies a strong focus on availability (and thus exchange) of high quality information.
    - The perception of both healthcare and employment is changing from being a benefit to becoming an entitlement.
    - Is a long-term goal in both domains, in employability.
- Both domains have significant impact on individuals throughout their lifetimes: for instance compare the effects of
    - Pregnancy and childbirth with personal development planning
    - Injury or ill-health with unemployment (or the prospect of unemployment)
    - Improving health and wellbeing with upgrading skills and knowledge
    - Disability on healthcare needs with difficulties disability presents in finding and maintaining employment
    - Medical tests with admissions or aptitude tests (including interviews)
    - Accident and injury with mass lay-off.
- In both domains there is an issue of duty of care, with an increasing requirement to maintain an audit in order to demonstrate compliance. This is more stringent in healthcare because of the possible consequences of error and liability attached to that, but employability is catching up, with demands for a complete audit trail of competence of employees becoming a key element of personal development planning. The 'safe worker' concept is increasingly inherent within health and safety, associated regulations and codes of practice underpinned by legislation such as the new UK Corporate Manslaughter and Corporate Homicide Act (2007).
- The focus on the 'individual at the centre and in control with some form of consent' is generally more widespread in employability than in healthcare, where other actors (health care professionals) want (and sometimes need) to retain control. While there is increasing movement towards patient empowerment in healthcare, this still has a long way to go. In employability this focus is most apparent in transition between education and employment, where there has been a lot of project work focusing on

transfer of learner information to support improved transition and retention, including work to support learners moving into university education funded by the Joint Information Systems Committee (JISC) in the UK; however in some environments, for example the armed forces, there is still a clear culture of control being retained by other actors.

- In healthcare, actors exchange a significant amount of confidential information about individuals to which the individuals themselves have (in practice) little or no access; with a few exceptions this is not generally the case in employability.
- Employability is about effectively managing the dynamic relationship (reducing dependency) between employers and individuals, to their mutual benefit.
- In healthcare the reluctance to share information is seriously influenced by cultural aspects (fear of losing control, potential liability, effect of peer review), besides the fear of breaching confidentiality.
- Liability and litigation are seen as more of an issue in healthcare than in employability, although this may be changing.
- In both domains trust and credentials of the main actors are important; this encompasses certifying bodies and identity management. Healthcare is rigidly controlled by governments, which are often the certifying authority; however in employability accreditation gives the individual a market advantage, and although there is an evolution towards increased government control of certification, an individual may still need to be involved with a number of certification and awarding bodies.
- Employability is increasingly focusing on the importance of (authenticated) evidence (a definition which covers a broader range than certificates) derived from evidence distillation based on competence (improving the competence currency of the labour market).
- Many standard healthcare interactions do not require service discovery and complex trust negotiation. Most actors are known in advance and the trust model under which they operate (purpose of and limitations of data use) is strongly regulated. This is not always the case in employability.

7 Definition of the Pilots

7.1 Objective

The objective of the pilots in both the employability and healthcare domains is to prove that the TAS^3 architecture and components can serve in both domains and therefore claim to be generic in its base concepts and implementation in all EU-Member States.

The following paragraphs initiate the steps needed to move towards real TAS³ demonstrators (be it lab or field tests) starting from the use cases. In this first D9.1 iteration, a mapping is done of the actors and services that are involved in the selected use cases on to the "real world" (i.e. people, organisations and software tools).

7.2 Healthcare Pilot

7.2.1 Introduction

The initial healthcare pilot will show that the TAS³ platform is suited for healthcare information exchange. The data exchange will be performed with live data, but in a well controlled environment, meaning that only partners which are already engaged in bilateral agreements will communicate. The following will be demonstrated:

- "Upload" from the hospital to a Personal Health Record
- Consultation of patient data by a professional, conforming to the privacy policy that was previously set by the patient.

7.3 TAS³ Pilot Specifications

It should be noted that during the pilot definition phase TAS³ partner Medisoft decided to withdraw from the project because they no longer considered themselves able to perform their duties.

7.3.1 Actor Mapping

Scenario Actor	Pilot Organisation / Person	Remarks
Hospital	NVKC / UMC	Child surgeons working at the Amsterdam university hospital.
Patients	VOKS members	Ms. Caren Kunst will be the first test participant.
General Practitioners	Personal Physicians of the selected VOKS members	
PHR Service Provider	To Be Determined	Medisoft has officially asked to withdraw from the project. If no viable replacement is found, a mock-up PHR will

		be made.

7.3.2 TAS3 exposed services

Service	Pilot Service Provider	Software / System	Remarks
Data export from hospital	To Be Determined (TBD)	TBD	This probably will need to be custom made as no standard export is available.
Personal Health Record	TBD	TBD	
Information Locator	Custodix	PILS	

7.3.3 TAS3 Data Exchange

Content	From	To	Purpose of Transfer	Format / Standards used
Hospital Medical Reports[32]	UMC	PHR	Completing the PHR of the patient	Proprietary
Hospital Medical Reports (earlier uploaded)	PHR	Via PILS to consulting GP	Physicians consult.	Same as above

Content	From	To	Specific security requirements
Hospital Medical Reports	UMC	PHR	• The Full range of security requirements earlier mentioned is valid here. • Specific attention is needed for patient identification.
Hospital Medical Reports (earlier uploaded)	PHR	Via PILS to consulting GP	• The Full range of security requirements earlier mentioned is valid here. • Specific attention is needed for patient identification. • The search functionality must not violate access rights.

[32] The exact medical content is not yet determined. A number of reports are available, VOKS and NVKC need to agree on what can be provided for the pilots.

7.4 Dutch Employability Pilot 1: Accreditation of prior learning (APL)

7.4.1 Introduction

The NL employability pilots are defined as solutions for the individual career of an employee or for a group of employees in a potential redundancy situation. All pilots will use the Kenteq employability services, and will test trust and security of shared services based on the use cases. In the pilots the employee is central.

The objective of this pilot is to exchange the results of an employee's APL process with the ePortfolio system so that the employee has control over his APL results.

A brief overview of the process:

- The employee asks for APL.
- Kenteq executes the APL process.
- Kenteq exchanges the results of APL with a Portfolio System.
- The employee does a course at the college for Vocational Education.
- The employee is empowered to give access to the showcase to others.

7.4.2 TAS³ Pilot Specifications

The following are the specifications for the APL Pilot with an employer and a group of employees.

7.4.2.1 Actor Mapping

Scenario Actor	Pilot Organization / Person	Remarks
Employee	Company A	Daily business of Kenteq
	User	Applies for APL
Employer	Company A	
	HR manager	Supports the development of the employee
	Manager	Informs the assessor about the situation in which the employee works
Branch Office	Development fund	Pays APL costs
	Personal coach	Grants APL voucher
	Co-ordinator	Controls the APL procedure
Employability provider	Kenteq	
	Account manager	Draws up the contract and the APL agreement
	Organiser	Manages Competent system
	APL coach	Helps to complete the Portfolio and checks the

Scenario Actor	Pilot Organization / Person	Remarks
		evidence.
	Assessor	Executes the APL process
Exam Institute	Kenteq Examens BV	Provides certification
	Quality Controller	Ensures the process meets quality standards
ePortfolio provider	Synergetics NV	Provides an employability ePortfolio
School / Training Institute	ROC	College for Vocational Education
	Co-ordinator	Supplies a course and the diploma

7.4.2.2 TAS3 exposed services

Service	Pilot Service Provider	Software / System	Remarks
Employability portal	Kenteq	Competent	XML import and export (web services)
HR information Service	The Company	SAP Peoplesoft	
ePortfolio Service	Synergetics	Employability Management System	
ePortfolio Portal	Synergetics	ePortfolio application	Standard IMS and NTA2035 (web services)
Education information service	School, Regional Training Center	PeopleSoft nOiSe	

7.4.2.3 TAS3 Data Exchange

Content	From	To	Purpose of Transfer	Format / Standards used
Voucher	Branch O	Employee	Permit for APL	
Request for APL	Employee	AccountM	Agreement	Contract
User name Password	Organiser	Employee	Access to Competent system	Policy
Portfolio information	Employee	Competent	Personal information	IMS

Content	From	To	Purpose of Transfer	Format / Standards used
Portfolio information	HR system	Competent	Complete	XML and HR XML
Portfolio information	Portfolio application	Competent	Complete	XML IMS
Complete tests	Employee	Competent	Testing	
Evidence	Organiser	APL coach	To check the evidence	
Results tests	Organiser	Employee	Information	Competency model
Request for interview	Organiser	Employee Assessor	Appointment for interview	
Result APL	Assessor	Employee	To check	
Comment	Employee	Assessor	To react	
Results APL	Assessor	Quality C	To approve	
Report and certificate	Organiser	Employee	To provide	Proprietary Kenteq format
APL results	Organiser	Portfolio application	To provide	
APL results	Portfolio application	School system	To provide	
Access to showcase	Employee	Employer	Interest	IMS

Content	From	To	Specific security requirements
All	actor	actor	All specific TAS^3 requirements are recorded in D1.2 https://portal.tas3.eu/public/index.php/projects/1/files/2389

7.5 Dutch Employability Pilot 2: Mass layoff (Job Seeker)

7.5.1 Introduction

The objective of the pilot is the exchange of employability information from an employee who is searching for a new job.

A brief overview of the process:

- The Job Seeker does an intake at the mobility centre.
- The mobility centre exchanges the data with the Portfolio System.
- The Job Seeker requests a search voucher.
- Kenteq executes an assessment for a Personal Competency Profile (PCP).
- Kenteq exchanges the PCP with an ePortfolio System.
- Employee matches his PCP to the Vacancy Competency Profile (VCP)
- He applies for a job.

7.5.2 TAS3 Pilot Specifications

7.5.2.1 Actor Mapping

Scenario Actor	Pilot Organization / Person	Remarks
Job Seeker	Company A User	Daily business of Kenteq Applies for an APL
Employer	Company A	Mass lay-off
Mobility Centre	Personal coach Coordinator	Grants a search voucher and helps to complete the Portfolio Controls the procedure
Employability provider	Kenteq	
	Account manager Organiser Assessor	Draws up the contract and the APL agreement Manages Competent system Executes the assessment.
Exam Institute	Kenteq Examens BV Quality Controller	Provides certification Ensures the quality of the process
ePortfolio provider	Synergetics	Provides an employability portfolio
Vacancy provider	CWI	Provides an employability portfolio
New employer	Company B	Provides an employability portfolio

7.5.2.2 TAS3 exposed services

Service	Pilot Service Provider	Software / System	Remarks
Employability portal	Kenteq	Competent	XML import and

Service	Pilot Service Provider	Software / System	Remarks
			export (web services)
Intake Service	Mobility centre	Sonar system	
HR information Service	The company	SAP PeopleSoft	
ePortfolio Service	Synergetics NV	Employability Management System	
ePortfolio Portal	Synergetics NV	ePortfolio application	Standard IMS and NTA2035 (web services)
Vacancy service	Werk.nl	Vacancy information database	Format VCP

7.5.2.3 TAS3 Data Exchange

Content	From	To	Purpose of Transfer	Format / Standards used
Personal information	HR system	Mobility C	Intake	XML and HR XML
Personal information	Portfolio application	Mobility C	Intake	XML IMS
Personal information	Job Seeker	Mobility C	Intake	
Search voucher	Mobility C	Employee	Permit for search	
Request for assessment	Employee	AccountM	Agreement	Contract
User name Password	Organizer	Employee	Access to Competent	Policy
Portfolio information	Mobility C	Competent	Personal information	Web service
Complete tests	Employee	Competent	Testing	
Results tests	Organiser	Employee	Information	Competency model
Request for interview	Organiser	Employee Assessor	Appointment for interview	
Result + PCP	Assessor	Employee	To check	Format PCP
Comment	Employee	Assessor	To react	
Results + PCP	Assessor	Quality C	Te approve	
Report	Organiser	Employee	To provide	Format Kenteq

Content	From	To	Purpose of Transfer	Format / Standards used
PCP results	Organiser	Portfolio application	To provide	
PCP	Portfolio application	Vacancy system	Match PCP and VCP	Format VCP
Show case	Employee	Employer	Apply for the job	IMS

Content	From	To	Specific security requirements
All	actor	actor	All specific TAS[3] requirements are recorded in D1.2 https://portal.tas3.eu/public/index.php/projects/1/files/2389

7.6 UK Employability Pilot

7.6.1 Introduction

The initial pilot will test security and trust for shared services in a controlled situation, focusing on the placement discovery and matching process. We will work in partnership with the University of Nottingham International Office Student Placement Programme run by Placementmaker (an external University-approved placement service provider). By including a personal ePortfolio which learners can use as a personal data store, we will demonstrate how individual students can be empowered to control their personal data. This specification is therefore for an enhancement to the current process, including the incorporation of a placement management system (which we expect to be the OPUS system[33] or something with very similar functionality) which is more sophisticated than the basic Excel spreadsheet and Access database systems currently in use. This will allow tracking and monitoring of the entire process, from online registration to final feedback at the end of the placement.

A brief overview of the process to be piloted is:

1. Placementmaker records approved available placements and placement profiles on their management system.
2. The learner registers online for the programme with the Placementmaker system.
3. The Placementmaker system authenticates the learner against the University Student Records System (Saturn) using their student ID: only registered international students

[33] Development site for OPUS placement management system: http://foss.ulster.ac.uk/projects/opus

in their second year or above are currently eligible for the programme. If Saturn confirms that the student is registered with the university and falls into the eligible category, a further request is made from the Placementmaker system for access to the student's verified contact details (term-time and vacation addresses, DOB and telephone numbers) and confirmation of the course and modules they are enrolled on.

4. As part of the registration process, the learner is asked whether he or she has a personal ePortfolio. If there is none, the learner is given a personal ePortfolio account on PebblePAD and compiles evidence in it to complete a skills profile, which has been set up specifically for this programme. [We hope that it may be possible to link some skills evidence through the ePortfolio to course module learning outcomes and GradeBook results stored in the University's VLE system (WebCT), but this requires creation of Powerlinks in the University of Nottingham system which may have to be set up for the whole University.] The Synergetics competency matching system will be adapted as a tool to support the learner with this process, and the results will be fed into the ePortfolio.
5. The learner grants Placementmaker access to the ePortfolio profile created for placement purposes. Placementmaker uses the skills profile to match the student to opportunities on their placement management system.
6. The programme co-ordinator informs the student of possible matches. The student grants permission to use their ePortfolio, including CV information, as part of the application process for the placement (i.e. to be shared with the employer). This is recorded and tracked in the placement management system.
7. Placementmaker sends the employer details of two or three learners who match the available position, including links to their ePortfolio data. The employer uses this to compare the applicants and decide whether to select on this basis or ask for further information, which may include a face-to-face interview.
8. The progress of the process is tracked on the placement management system, which includes an audit of which information has been released to which parties and for what purpose.

7.6.2 TAS3 Pilot Specifications

7.6.2.1 Actor Mapping

Scenario Actor	Pilot Organisation / Person	Remarks
Learner	University of Nottingham international students	We hope to be able to include some EU students on the Leonardo programme
Placement Service Co-ordinator	Placementmaker	Independent consultancy contracted by the University of Nottingham International Office
Institution	University of Nottingham	
Host organisation	Local employer	To be selected from Placementmaker client register

7.6.2.2 TAS3 exposed services

Service	Pilot Service Provider	Software / System	Remarks
Student Record System	University of Nottingham	Saturn	In-house system; essentially large SQLserver DB
Placement Management System (PMS)	Placementmaker	OPUS/placement management system	Still to be finalised. Currently a series of Excel spreadsheets. Will encompass existing online application system.
ePortfolio	University of Nottingham	PebblePAD	Externally hosted service but pilot user accounts will be in protected server area to allow exploration of extensions to the system
Profiling service	Synergetics NV		Needs to communicate with the ePortfolio system
Audit service	University of Nottingham	To be agreed	Can be queried by any actor

7.6.2.3 TAS3 Data Exchange

Content	From	To	Purpose of Transfer	Format / Standards used
Student ID	PMS	SRS	Authentication and eligibility matching	Shibboleth XML, web service protocol
Student contact information	SRS	PMS	Verified and correct contact information for student	XML/LEAP 2.0; web service protocol
Student Course and module information	SRS	PMS	Develop initial learner profile	LEAP 2.0 (if available)
Placement profile	Employer system	PMS	Selection of suitable	HR-XML

			candidates	
Competence profile	Profiling system	PMS	Generate learner profile; matching against available placements	IMS, HR-XML
Competence profile	Profiling system	ePortfolio	To support reflection, evidence-gathering and action planning	IMS, HR-XML
Evidence of competence and experience	ePortfolio	Profiling system	To support analysis of competences	XML, IMS LIP/LEAP 2.0, HR-XML
Learner profile	PMS	Employer system	Support employer selection	IMS/HR-XML
List of matches	PMS	Learner	Alert learner to further action	email
Evidence/presentational ePortfolio	ePortfolio	Employer system	Support employer selection	Hyperlink to webfolio; HR-XML
Results & feedback	Employer system	PMS	Next stage in process	
Results & feedback	PMS	ePortfolio	Reflection and action planning	Text file

Content	From	To	Specific security requirements
Student ID	PMS	SRS	• PMS needs authentication to query SRS (trust between systems) • Communication and response must be secure
Student contact information	SRS	PMS	• University Data Protection protocol must be observed • Learner must consent to data transfer prior to transmission • Only data for the selected student must be visible
Student Course and module information	SRS	PMS	• University Data Protection protocol must be observed • Learner must consent to data transfer prior to transmission • Only data for the selected student must be visible
Placement profile	Employer	PMS	• Must only be visible to trusted parties

	system		• Trust must be established between systems
Competence profile	Profiling system	PMS	• Must only be visible to trusted parties • Trust needs to be established between systems • Must observe UK data protection rules • Learner must be able to withdraw information or permission to view information
Competence profile	Profiling system	ePortfolio	• Trust and authentication must be established between systems • Must only be sent to private area of ePortfolio • Must have learner consent before transfer • Learner must have control over data
Evidence of competence and experience	ePortfolio	Profiling system	• Must be secure data transfer • Must be anonymous, system does not know who the student is
Learner profile	PMS	Employer system	• Trust must be established between systems • Profile must only be visible to selected employer • Visibility should be time-limited and for specific purpose • Profile must be anonymised, no direct contact between learner and employer at this stage
List of matches	PMS	Learner	• Must only be visible to specific learner
Evidence/presentational ePortfolio	ePortfolio	Employer system	• Trust needs to be established between parties as well as systems • Link may be time-limited and only seen by specific actors
Results & feedback	Employer system	PMS	• Only visible by authorised actors • Link to specific learner(s) only
Results & feedback	PMS	ePortfolio	• Only learner should see content of file • Learner has control over data and may choose to delete it

8 Summary

This deliverable is the first step towards defining pilots for the demonstration of the TAS³ trust infrastructure. From the real life stories of Caren, Dirk, Pieter and Anwar, concise use cases which are representative for the healthcare and employability domain have been extracted. They serve as a basis to define minimum security and privacy requirements for an information exchange and management platform in those domains. Four major demands have been identified, which TAS³ will need to provide for its users in order to be successful:

- "Trust in information"
- "Trust in the system"
- "Trust in the other parties" (users and service providers)
- Full end-user control over information

In the final section of this deliverable a first step towards demonstrating TAS3 (WP9 goal) has been made by mapping the selected use cases on to the real world and legacy (participating organisations and persons, available software, available data …).

9 Glossary

ASP	Application Service Provider
CV	Curriculum Vitae
CWI	Centrum Werk en Inkomen
DDA	Disability Discrimination Act
GP	General Practitioner
HCP	HealthCare Professional
HIN	Health Information Network
HIS	Hospital Information System
IAG	Information, Advice and Guidance
LSP (NSP)	Landelijk Schakel-Punt (the Dutch National Switchpoint)
MCA	
MIAP	Managing Information Across Partners
MIS	Management Information System
NHIN	National Health Information Network
NSP	Dutch National Switchpoint
PCP	Personal Competency Profile
PCP	Primary Care Physician
PDP	Personal Development Plan
PHR	Personal Health Record
SME	Small Medium Enterprise
VCP	Vacancy Competency Profile
VOKS	Vereniging voor Ouderen en Kinderen met een Slokdarmafsluiting (Organisation for parents and children with Oesophageal Atresia)

Document Control

Amendment History

Version	Baseline	Date	Editor	Description/Comments
0.1		4 June 2008	B. Claerhout	Outline
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