
HOMO DISCENS – A NEW SCALE OF LIFELONG LEARNING

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Abstract: The possibilities to acquire knowledge have changed enormously until today. This change has not only considerably influenced human beings in their process of knowledge acquisition itself, but also in reference to basic technical conditions, and has hence finally created a new learning culture. A novel paradigm becomes manifest in this new learning culture: *Homo Discens* –the learning human being. We do not understand this term regarding to the person and related steps of development or other approaches focusing on the person as it already exists in literature [4, 15]. Of higher interest and the essential aspect of this extract is the conceptional figure of the *Homo Discens* in IT. Standardized schemata have been developed in the past to define attributes and values relating to a person and to manage them in IT systems, i.e. identity management systems. The focus of our research is to derive a new paradigm and an advanced definition of *Homo Discens* for lifelong learning. Therefore, we have to review current identity management systems and add substantial power to existing schemata. In order to find a holistic solution, we have to consider the following aspects and problems: Up to now, no continuous model has been available which enables a consistent integration of learning persons with their roles, learning histories and related ePortfolios. Universities and enterprises still use different standards. This makes it particularly important to carry out a qualitative examination. We have specified a number of aspects, including the following: consideration of different groups, mobility-, convenience-, privacy- aspects and –one of the most important points– association of identifiers. This results in a performance spectrum starting in preschool and reaching as far as retirement. Only then a continuous ePortfolio can be created. And new possibilities will ensue for personnel promotion and personal employee development.

Keywords: Homo Discens, Identity Management Systems, Schemata, Lifelong Learning, ePortfolio

Introduction

In the course of their life, human beings are consistently confronted with learning. This already starts at a preschool age when important aspects for their future are conveyed to children at nursery school or kindergarden. As early as that, a constant switching takes place between learning and teaching. At a preschool age in particular, children do not only absorb knowledge, but they also communicate it to other children. This intensive interaction between children and their ability to make use of an immense learning potential is the beginning of a future "teaching learning career". Based on preschool education, the knowledge acquired at an early age is extended and enhanced in the course of education. Throughout their days at school, most people get a more precise idea of their plans for the future. Primary education and the different levels of secondary education provide students with a practical and theoretical knowledge base and enable them to gain important learning experiences. After finishing school, part of the students decides for the practical application in an enterprise of the things they have learned, others go to university. Both ways represent the beginning of a somewhat longer career which is concluded by retirement. Learning as well as teaching are still topics in working life, in research at university or mentoring by an employee of a company, for instance. Thus, human beings create a repertoire of knowledge and certificates of their knowledge over the years.

In this context in particular that learning is no concluded process (any more), this repertoire often exhibits considerable dimensions. This is promoted by an increasing trend towards universities for senior citizens. The substantial repertoire is commonly called portfolio or, when it exists digitally, ePortfolio, especially in conjunction with eLearning [3, 11, 18]. A continuous ePortfolio is of very high importance. It keeps record of a person's development and grants access to their skills, experience and knowledge. The seamless documentation of this information, which is partly contained in a normal CV, is an important characteristic of ePortfolios and thus an important aspect regarding the job market. The human being and learning, however, have changed essentially over the years. This issue will be illustrated in further detail and set in relation to the ePortfolio we have just introduced.

Human beings and learning in the course of time

While good education at universities or practical trainings were a guarantee for a lifetime position in often only one company until far into the 20th century, the situation is completely different today. Good education, excellent training and constant learning merely offer the prospect of lifelong employment. A guarantee for a lifelong position, however, is not given any longer. Every member of the society is requested to participate in constant learning in some form or other. A foresight shows that the current rules will not be valid forever. It will be more likely that high-quality education will be a prerequisite for participating in the global labour market. Lifelong learning and constant further education will be standard. It is in this context that we talk about the *Homo Discens*. This paradigm characterizes the human being in a new learning culture which eventually results from the technical possibilities and basic conditions for knowledge acquirement. The term *Homo Discens* already exists in literature, e.g. in [4]. Here, however, the image of humanity described under [15] is always used. We would like to amplify this idea and embed it in a technical environment. The demand of constant training and continuous learning calls for manageable and accessible learning histories, which means that it must be possible to keep record of the knowledge acquired in a lifetime

Status Quo

So far the learning process and its transition have been illustrated. Subsequently we introduced and described the *Homo Discens* paradigm. What is still missing is the reference to IT technology between these two aspects. If you use an IT system and want to use it in a personalized way, a user management system must be available in the system. In common learning systems (LMS) in particular, this user management is linked with the person's learning history. Currently, no integrated model is available for mapping the *Homo Discens*. If a user leaves the systems he has used so far and uses a new system due to a change of company or university, the information he has collected so far does not get lost, but is not integrated and visible. The main reason is that currently no sort of pack & go standard for ePortfolios is available in a unique standard for the exchange between different institutions. Although some researches are carried out and some standards are already established, such as the diploma supplement and the Curriculum Vitae by europass [9], or the IMS ePortfolio Standard [12]. But these initiatives and standards are only applicable for subareas. Another problem lies in the application of multiple systems with partly identical, partly different and partly superimposing processes. At universities for example, marks are saved in an exam management system, the learning history is in part traceable over a (central) LMS and registrations for lectures are carried out in a third system. The registration process alone affects three systems which provide different processes for it. This study, however, will not mainly focus on this problem. It is just an example to clarify the difficulties and problems that arise of an integrated view of a continuous ePortfolio.

Identity Management and eLearning

As mentioned in the previous chapter, user information is stored in a (central) user management system. This in particular is the key to the holistic perspective of the *Homo Discens* and directly leads to Identity Management (IM). The drawbacks of an individual user management for every system in an institution obvious. Since every system independently manages all identities, users must keep multiple credentials, e.g. user name and password. This is not acceptable with regard to security and does not enable unique authorisation structures. Other disadvantages include a difficult central service, inconsistencies between systems and guest accounts which must be created individually for every system. These points have led to the introduction of so-called Identity Management Systems in many institutions. These systems provide connected systems with personal data and therefore contribute to optimized management processes. Personal data are centrally managed and therefore possess a considerably higher data quality than a variety of individual sources. The advantages do not only include improved processes, but also comprise a clear increase in efficiency of diverse technical operations.

A central IM forms the basis for an authentication and authorization infrastructure (AAI). This infrastructure can be used internally in an institution or across institutions (federated). Figure 1 gives a more detailed overview. Within an AAI, users may access services of other institutions without additional effort. Regarding to eLearning in particular, this step is of great importance. New

requirements regarding mobility will be of increasing importance, in particular with regard to the Bologna process for which "our aim is 50% more learning mobility in Germany" [...] [17]. When students change universities more often, they want to fall back on previous learning units and claim achieved results at the new university. In this case it is inevitable and very important to plan the IM as a central core. Other aspects that may be subsumed by mobility are the desire or the demand for further education and the flexibility often required in relation to knowledge contents. Also in relation to joint degrees and multiple research associations, the organisation of a national or international AAI is indispensable. In this context, we also speak of a federated Identity Management (FIM). Once again, clear conditions must be created for lifelong learning and, especially in connection with an FIM, wisely planned in consideration of the special requirements of eLearning. For this, the DFN-AAI has recently been founded in Germany. As an independent service of Deutsches Forschungsnetzwerk (DFN – Germany's National Research and Education Network), it represents a German-wide federation on the basis of Shibboleth and is available for all universities and other educational institutions [5].

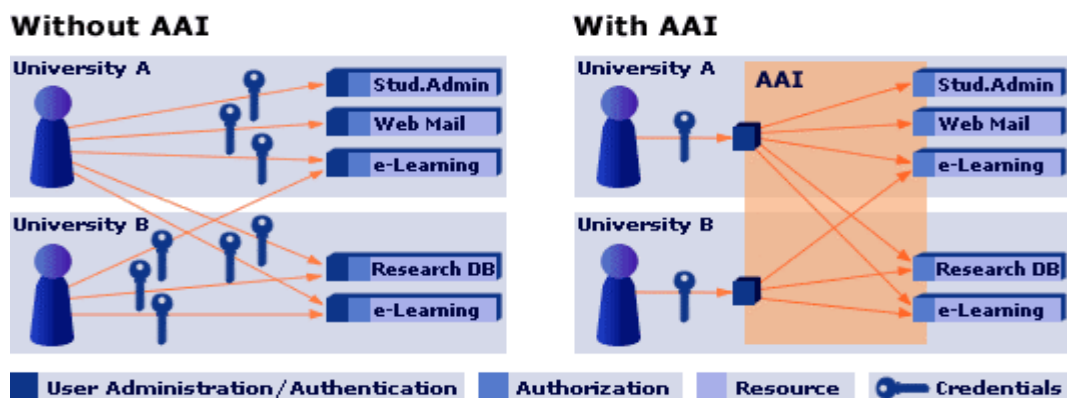


Figure 1. Difference between an AAI-Infrastructure and a normal infrastructure [19]

The DFN is currently consolidating the required attributes with different education institutions. TU München, among others, has submitted various suggestions which are now to be integrated into the AAI scheme. Previous considerations regarding ePortfolios, however, have not yet been taken into account. The present scheme primarily concentrates on the library environment that mainly works with aliases and not personal eLearning environment [10]. It is therefore necessary –for instance for issuing certificates– to receive the students' registration number, date of birth, course and term.

There are essential points with regard to IMs and eLearning which distinguish themselves from other subject areas such as administration and organisation. One aspect that is also related to mobility is the desire for a convenient usage. This alone is no specification of eLearning, but with regard to frequent changes to other universities in particular, students would like to transfer their ePortfolios or take them with them. In this context, clear guidelines and rules must be defined which are now much easier to find, considering the BA/MA unification through the Bologna process, than in the heterogeneous learning conditions almost 10 years ago [2].

Not only the transferal of the previous learning/teaching spectrum but also comfort in the sense of Single Sign-On (SSO) becomes an issue. It is thus not necessary, for instance, to transfer a student's personal data to another university when both universities are in a federation (see Figure 1). This, in turn, reduces the number of administration processes, contributes enormously to data protection and essentially increases comfort. A user may capitalize on the service of a different institution using the credentials of his home institution without having to apply for new access data or rights. This keeps the Bologna idea in good stead.

An IM forms the central core for various requirements. In connection with the desire for a continuous ePortfolio in particular, an IM contributes considerably to this, which will become more obvious in Figure 4 in this paper.

Roles

In our introduction, we already pointed out the different groups and frequent changes between learning and teaching. This is a vital aspect of the *Homo Discens* and also has great influence on Identity Management systems. In an IM every person possesses certain attributes. These attributes may comprehend name, first name, address, etc. They may, however, be an affiliation to an institution or the allocation of a role. Roles, in turn, may be selected by destination systems, e.g. the LMS, and used for rights allocation. Roles in general reduce the administration effort by enabling the allocation of rights on a role and not an identity level. The great advantage is that changes of rights are thus linked to a role, and a minor number of roles in most cases covers a broad spectrum of requirements for the rights allocation within a system. Roles are actually an abstraction of a process, an activity or an affiliation in the real world. Frequently, roles are connected to certain rights. An employee, for example, may view student data. Students on the other hand, may only view their own data. Roles may change and thus entail new rights.

This picks up on the *Homo Discens* concept. In his entire life, a human being is always in transition between different roles. Let's consider the university context. At the beginning of studies, you have the role of a student. This role enables the student to attend lectures at the LMS, write exams and complete tutorials. When you finish university and decide for an employment at university, you become an employee and receive a new role. That means that, in the course of your life, you build up a long and versatile learning history with different roles. This history may be temporarily accessed in the corresponding system, but gets lost in the long term. The information belonging to a role is usually not considered when changing a role, and thus gets lost. The essential aspect is that roles may be captured via an IM, and thus a connection with an existing ePortfolio may be established. This is one of the central issues of the *Homo Discens* paradigm and will be explained in more details below.

Identifiers

Another central topic in the field of Identity Management and eLearning is the clear definition of identifiers. Computers do not use attributes such as name, first name, date of birth etc. to identify users, but machine-readable IDs. Ideally, an ID has to be assigned to a user only once. By assigning a user to an ID, a "real world" identity is converted into a machine-usable ID. This process enables IT systems to handle users and create corresponding profiles or histories. IDs contain different functions and are classified according to certain specifications such as persistence, readability, capacity, uniqueness (see [13]). If you associate the ID topic with the request for a continuous ePortfolio for the *Homo Discens*, it becomes obvious that a global unique ID is required. Only this unique ID makes a corresponding portfolio in all systems possible. The technical aspects of this topic are illustrated in the "*Homo Discens*" chapter.

Assigning a unique ID to a learner must also be critically viewed, as in doing so human beings become "transparent". Every activity in a system leaves a clearly trackable data trace. The informational self-determination is only given in a limited dimension. In this regard it is not only very important to consider data protection but also to monitor data security. Although the creation of a complete ePortfolio seems to be of high importance in the long-term, the ePortfolio's compatibility with data protection must always be observed. A user must always be able to control the portfolio access, to determine to which systems the portfolio is propagated and, naturally, what may be saved in the portfolio.

Homo Discens

The *Homo Discens* paradigm has been mentioned several times, but it has not been comprehensively introduced and explained what we understand by it. We have seen different constructs around the word "Homo" in history [16]. Every construct describes a human nature or stage of development. This may be understood as a completed period or a long-term human characteristic. The term *Homo Discens* may be comprehended as the essential ability of learning. If we consider this ability in the context of higher education demands and the frequently quoted knowledge society, it becomes obvious that the human being completely meets the requirements of the *Homo Discens* paradigm. This characteristic is of course an essential part of the definition of the *Homo Discens*. In addition, we understand the term in connection with the ePortfolio. *Homo Discens* is the learning human being whose teaching/learning history is in a continuous form digitally traceable and who has the technical

possibilities to build up a seamless ePortfolio. We comprehend an ePortfolio as a collection of documents, files and other digitally available information which are placed in a digital repository by a human being for different purposes (comprehensive CV with certificates, documentation of his own learning progress, etc.). The folder in Figure 2 represents such an ePortfolio.

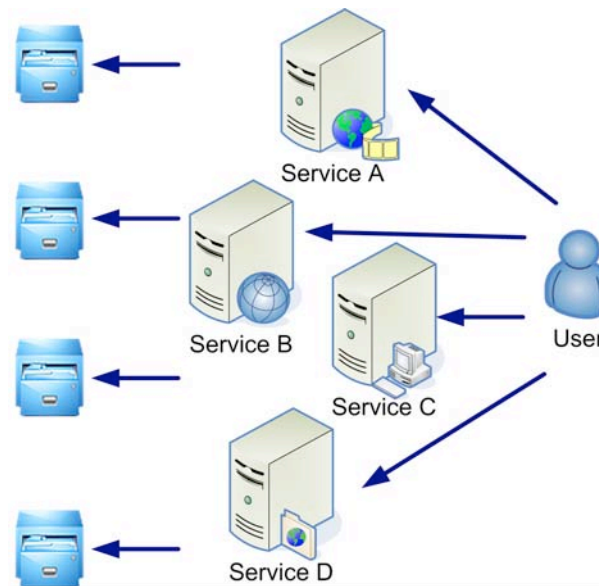


Figure 2. Distributed ePortfolio

With an ever wider distribution of computers, mobile technologies and also the internet, ePortfolios become an important issue which becomes more important through eLearning, which is learning by electronic means. Meanwhile, almost every fifth person possesses internet access [6] and thus access to digital learning contents. Knowledge in its conventional form cannot only be retrieved via libraries but globally via the Internet. These conditions enable the user to recall information independent from time and location.

The previous procedure for the creation of an ePortfolio is displayed in a simplified form in Figure 2. A person is active in different systems and uses various services. The knowledge fragments generated in this context, however, are linked with the corresponding system and can only be retrieved over this system. Of course, parts of it, e.g. documents, may be saved by the user and tracked by him on his private computer. The disadvantage is that only part of it may be accessed without the source system.

A learning history, for example, may not be transferred identically from the corresponding source system to one's own computer, because the individual lectures may rarely be exported in the context of the registration. There are different standards which enable the import and export of learning contents (AICC, SCORM, IMS,...). This, however, is only possible in one direction. SCORM courses, for example, may often only be imported in a learning platform but not exported. Moreover, only few lecturers completely publish their courses. Figure 3 shows the described way to manage information on a private computer, e.g. in a personal folder tree. This procedure is not ideal and does not enable a comprehensive composition and flexible availability.

Currently, various institutions engage in the ePortfolio issue. Suggestions have already been compiled and are available online [1, 8, 9, 12, 14]. We see diverse overlapping points here, but our approach differs, because we illuminate the continuity issue relating to IM or FIM. The previous definitions for the standardization of ePortfolios or the appropriate exchange are important and necessary. These processes enable the transferal of an appropriately standardized ePortfolio from one institution to another. This step could also be taken in the way suggested by us via an IM/FIM without the explicit export and import of the ePortfolios by using a web-based service for the storage of ePortfolios.

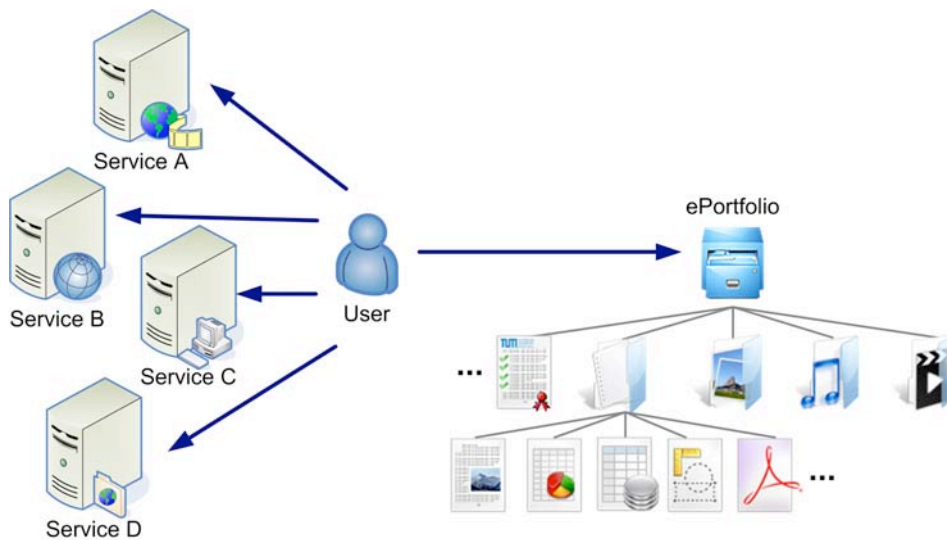


Figure 3. Personal ePortfolio

Figure 4 contains a schematic description of this point. Within an institution a user is recorded in a central IM. The user information is thus available for all services connected with or provided by the IM. The user information available via the IM does not only include a unique identifier but also affiliation or diverse role information. In addition to personal information, other attributes may be embedded. If a user is active in a service, his knowledge fragments may be made permanently available in a separate service according to the push or pull idea ("DB" stands for Data Base in the graphic). This would avoid the loss of information during a role change, because the external storage represents a guarantee for lasting availability. In order to give users full control over their ePortfolios, adequate views and access rights in form of versatile ACLs are necessary for such a system. Only then a continuously accessible ePortfolio unfolds its full potential. This means that the user may grant full access, access to certain parts or define a certain view for the ePortfolio. The red arrow in the graphic shows as an example for a system that knowledge modules, documents or other parts of an ePortfolio may be created via the corresponding DB.

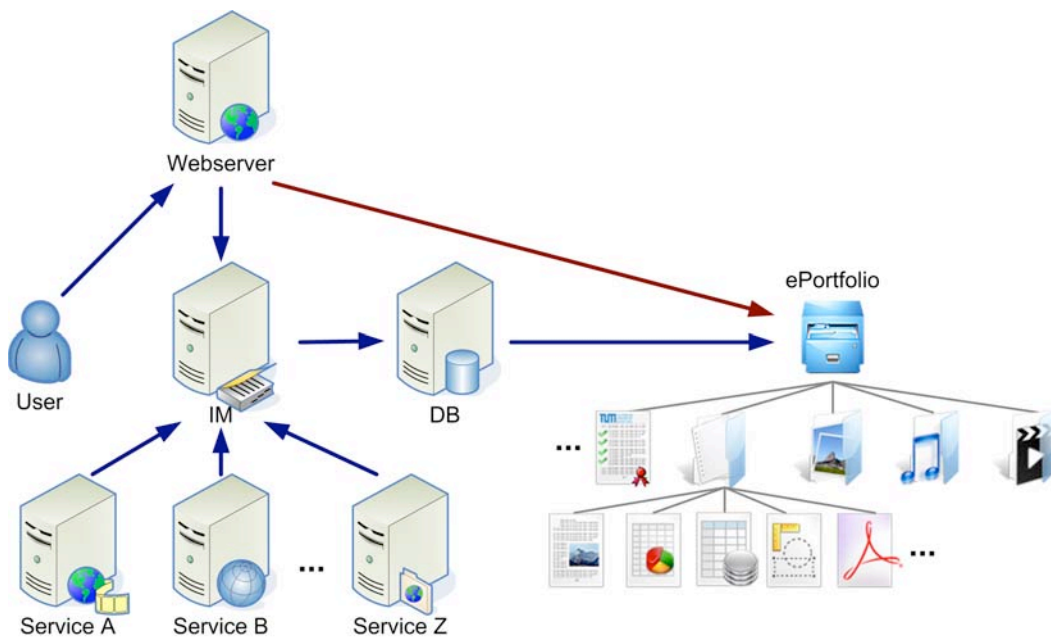


Figure 4. Schematic Representation of a continuous ePortfolio

In this context, we currently analyse in different researches the possibilities in connection with existing and established products at universities ([7, 20]). We focus on the following approaches:

- Concept of the DB service on the basis of UID;
- Amplification of the known schemata by other right structures in relation to the central Service DB;
- Transparent service by means of an Enterprise Service Bus;
- Integration in an AAI.

Conclusion

Lifelong learning cannot be ignored in today's working life. Consequently, the availability and quality gain a crucial meaning for the job market. In this regard, a multitude of institutions are meanwhile active in the research and development of technologies around ePortfolios. In the global job and education market ePortfolios will become an essential tool in competition. With all these important efforts, it is crucial to keep in mind certain criteria such as data protection and data security. Such a comprehensive information potential must be protected against external access and illegitimate usage, which is an essential challenge too. Data protection is a top priority, and privacy and the necessary protection of personal data are essential for such a service.

Another central aspect in this context is the crucial demand for the service's lifelong availability. It must be guaranteed that the service used or a person's continuous learning and teaching spectrum may always be accessed or that the service provides appropriate possibilities for export and external usage. This in particular is the reason for a standardized approach.

The model shown here always focuses on education institutions and universities. At the beginning, however, we were talking about the period from childhood to retirement. This vision is to be implemented step by step by the prototype implementation within a period of life. A crucial aspect is the corresponding infrastructure. At universities in particular, the formation of a continuous and powerful IT infrastructure is consistently given. This, however, does not apply for preschools and, unfortunately, quite frequently not for schools either. This still requires further considerations.

The mobility of learning has extremely increased over the last years. In addition, new possibilities for personal development have emerged through the Internet and the linking of knowledge. The access to the international knowledge market is thus obviously linked to the model presented here.

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