Towards a Self-Regulated Learning in a Lifelong Learning Perspective

Nour El Mawas[1], Jean-Marie Gilliot[1], Serge Garlatti[1], Patricia Serrano Alvarado[2], Hala Skaf-Molli[2], Jérôme Eneau[3], Genevieve Lameul[3], Jacques-Francois Marchandise[3] and Hugues Pentecouteau[3]
[1]*IMT Atlantique, UMR CNRS 6285 LabSTICC, Brest, France*
[2]*Université de Nantes, LS2N, Nantes, France*
[3]*Université Rennes 2, CREAD, Rennes, France*

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Abstract: The professional development presents many difficulties related to speed of change and the explosion of knowledge that requires people to learn at many intervals throughout their lives. This study proposes a combined Self-Regulated Learning Process, functional and technical architectures in a Lifelong Learning perspective. The Self-Regulated Learning is carried out using Semantic Open Learner Models. We illustrate our process through some services examples. This work is dedicated to the Lifelong Learning active community and more specifically to researchers in Technology Enhanced Learning, pedagogical engineers, and learners who meets difficulties in integrating multidisciplinary expertise, technology and know-how throughout their life.

1 INTRODUCTION

Nowadays, a person will have many different jobs during his/her life. Lifelong Learning is becoming a central asset, beginning during initial training at university, pursuing during the whole career with many different jobs. Learning is also Life wide, as it occurs in multiple, formal and informal contexts: school, home, work, etc. Lifelong and Lifewide Learning are key elements for the prosperity, especially in a knowledge society.

Adult education research acknowledges that most of Lifelong Learning outcomes are acquired apart from formal learning (whether they come from school or university). Non formal, informal or incidental learning represent the vast majority of adult learning. In other words, self-learning methods (self-directed learning, self-documentation, meetings with fellows or relatives, etc.) constitute the main majority of learning resources (Tremblay 2003). Whether they are planned or not, related to a concrete goal or acquired on the fly due to exchange or pure coincidence, these resources link the knowledge to experience (from life, work, etc.). This is tacit, implicit, informal knowledge, which allows everyone to build autonomously his own experience and his own learning path.

Current learning traces and learning recognition are very scarce and formal. The capitalization passes via different tools, devices and methods: portfolios, training personal account, recognition of personal and professional experience, etc. A challenge today is to organize those resources in order to scaffold self-learning process and to explore new learning models that can help to capture implicit, informal knowledge in order to capitalize the different training experiences and work throughout the life.

The motivation behind this work is the speed of change and the explosion of knowledge that requires people to learn at many intervals throughout their lives. For this reason, schools and universities are no longer providing a package of knowledge and skills to serve a person for life. Learners need to ensure their professional development in a Lifelong Learning perspective.

The main objective of this paper is to define combined process and functional / technical architectures for personal Lifelong Learning. The process and architectures will allow learners i) to

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formalize their experience on tacit knowledge, ii) to capitalize their knowledge and competences, and iii) to foster their collaborative interactions and social knowledge building.

Section 2 proposes the theoretical background of the study. Section 3 presents several existing approaches for professional development and Lifelong Learning dimensions. Section 4 details our scientific positioning including our Self-Regulated Learning Process, Semantic Open Learner Models, and Technical infrastructure. Section 5 defines our evaluation perspectives in the research project named Sedela. Section 6 summarizes the conclusion of this paper and presents its perspectives.

2 THEORETICAL BACKGROUND

The basic idea behind the term "Lifelong Learning" is that learning can and should occur through each person's lifetime (Knapper and Cropley, 2002). The basic premise of Lifelong Learning (Sharples, 2000) is that it is not feasible to equip learners at school, college or university with all the knowledge and skills they need to prosper throughout their lifetimes. Therefore, people will need continually to enhance their knowledge and skills, in order to address immediate problems and to participate in a process of continuing vocational and professional development. The new educational imperative is to empower people to manage their own learning in a variety of contexts throughout their lifetimes (Bentley, 1998). The European Lifelong Learning Initiative defines Lifelong Learning as “a continuously supportive process which stimulates and empowers individuals to acquire all the knowledge, values, skills and understanding they will require throughout their lifetimes and to apply them with confidence, creativity and enjoyment, in all roles circumstances, and environments” (Watson, 2003).

Professional development (Day 1999) consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school and which contribute, through these, to the quality of education. It is the process by which, alone and with others, learners review, renew and extend their commitment as actors of their learning; and by which they acquire and develop critically the knowledge, skills and emotional intelligence essential to good professional thinking, planning and practice through each phase of their lives.

Professional development is a crucial aspect of Lifelong Learning. Indeed, the best way to support, develop, and cultivate an attitude of Lifelong Learning is through a professional development focusing on learners needs identified by them, their institutions, and their communities. In other words, professional development is a way to improve the quality of learning and develop a culture for Lifelong Learning.

3 RELATED WORKS

In this section, we consider existing approaches and infrastructures to manage professional development and what are important dimensions of Lifelong Learning that we must take into account in order to insure this professional development.

3.1 Existent Approaches for Professional Development

The state of the art shows us mainly existing approaches and infrastructures to manage professional development and related learning. We mention Learning Analytics (LA), Personal Knowledge Management (PKM), Personal Learning Environment (PLE), e-portfolio (e-P), Personal Knowledge Network (PKN), and finally the LinkedIn platform (LI).

Learning Analytics (Gasevic et al. 2015) is the Big Data approach for learning. Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs. Many Universities or educational services, such as MOOC platforms, are collecting data to conduct analysis. This is however bounded to an institution or a commercial platform. Data collection and analysis are conducted according to internal services with no connection to students’ needs. Moreover data cannot be long term stored and must be used for predefined analysis for ethical reasons.

PKM and PLE (Chatti 2007) relate to a collection of processes that a person uses to gather, classify, store, search, retrieve, and share knowledge in his or her daily activities and the way in which these processes support activities. The former is more dedicated to work, while the latter may embed additional services related to learning. In both cases, it is based on the idea that persons need to be responsible for their own growth and learning, and

push a bottom-up approach. However, those approaches capitalize on knowledge production rather on personal development.

PKN (Chatti et al., 2012) considers the Learning as a Network (LaaN) based on connectivism, complexity theory, and double-loop learning. LaaN starts from the learner and views learning as the continuous creation of PKN. For each learner, a PKN is unique adaptive repertoire of tacit and explicit knowledge nodes (people and information) and one's theories-in-use (norms for individual performance, strategies for achieving values, and assumptions that bind strategies and values together).

A portfolio is a meaningful documentation of a learning path, either for assessment or for formative purposes (Ravet 2007). E-Portfolios (e-P) are one of those tools that have been appeared in education since Internet usage becomes more widespread. Compared with paper based portfolios, they also have the added values in terms of keeping records, connecting ideas, relating information, and publication (Barrett 2006). However, in existing implementations, recording is manual. It relates to reflexive process, not to current learning support, and no data access granting for other purpose than collaborative reflexion is provided.

LinkedIn (LI) is a business oriented social networking service. It provides a powerful cloud-based CV service, and professional networking services, where every data is public. LinkedIn exploits user data collected to provide valuable information. It already proposes higher education curriculum ranking, according to job wishes, based on alumni analysis. It totally control algorithms used, analysis derived, and how information is provided, without direct feedback to users.

Our interest is to link the professional development to the Lifelong Learning. That is why we present in next sections the Lifelong Learning dimensions and the existing approaches regarding these dimensions.

3.2 Lifelong Learning Dimensions

Researchers discuss important dimensions in the Lifelong Learning (Narciss et al., 2007) (Sloep et al. 2011). These dimensions are: capitalization of learning experiences including work and long term learning, learning recognition, learning goals management, personal learning management, and social learning.

In a long term perspective, the capitalization of learning experiences should be provided. It has to be able to manipulate different data: learning traces, learning evidence, learning confidence, professional outcomes, and recommendations. Learners will need to organize them, and evaluate achievements. This self-managed database should be organized to support Self-Regulated Learning Process (SRLP), according to relevant Learner Models.

Out of this database, we pay a special attention to learning recognition: diplomas, certificates, recommendations as they constitute external support of SRLP. They acknowledge achievements and constitute certified evidence.

Learning goals management is a key for SRLP. It is a very personal decision that has its roots in a social environment providing examples, discussions and opportunities.

To reach these goals, learners need to plan, to conduct and to regulate their learning process. All of this is a personal learning management that can be instrumented, i.e., modeled.

Collaboration is essential to support learning; hence our last dimension is social learning. It includes the ability to share and to interact with others, and to contribute to emerging knowledge.

Following these dimensions, we will discuss in the next section the positioning of each existing approach for professional development regarding these dimensions.

3.3 Discussion

In this section, we examine existing approaches detailed in section 3.1 and we analyze if they take into account the Lifelong Learning dimensions (Table 1).

Table 1: Comparison between existing professional development approaches and LLL dimensions.

	dim1	dim2	dim3	dim4	dim5
LA	1 course	-	-	1 course	-
PKM	-	-	-	-	x
PLE	-	-	x	x	x
PKN	-	-	x	x	x
e-P	x	x	-		-
LI	-	x	-	-	x

For the sake of clarity, dim1 refers to the capitalization of learning experiences, dim2 to learning recognition, dim3 to learning goals management, dim4 to personal learning management, and dim5 to Collaboration. LA allows the capitalization of learning experience and the personal learning management for only one course. PKM ensures collaboration through sharing knowledge. PLE and PKN take into account the learning goals management, the personal learning management, and

collaboration. E-P provides the capitalization of learning experiences and learning recognition. LI guarantees the learning recognition and collaboration between professional (through peers' recommendation).

Across the table 1, we found that no existing approach for professional development meets our Lifelong Learning dimensions.

The needed approach should be a support to the capitalization of learning experiences. It must also insures the learning recognition and promote learning goals management, personal learning management, and collaboration. This led us to think deeply about a new approach that insures the professional development in a Lifelong Learning perspective.

4 OUR APPROACH

In a Lifelong Learning perspective, learner empowerment relates to the ability for a person to be able to define his/her own learning path and act on his/her environment, including peer learning. It is a prerequisite for autonomy, to deal with many different jobs and corresponding learning requirements during his/her whole career. Our approach aims at designing, developing, experimenting and evaluating an improved model of Self-Regulated Learning Process, supported by Semantic Open Learner Models and an experimental infrastructure, in a Lifelong Learning perspective. Firstly, the concept of Self-Regulated Learning Process is introduced. Secondly, the Open learner models and its benefits to support Lifelong Learning are presented. Thirdly, how the SOLM is built. Fourthly, the relationship between SOLM and learning Services is discussed. Finally, the technical infrastructure is detailed.

4.1 Self-Regulated Learning Process

Our main goal is to experiment learning methods developing Self-Regulated Learning Process in a lifelong learner autonomy perspective and to provide new opportunities for professional and self-development based on the concept of portfolio, recommendation, and quantitative / qualitative data collection that can be "aggregated" in an open learner model.

The Self-Regulated Learning Process refers to the learner himself. Since the early research on the autonomous learner in the 1980s, work has shown the close links between autonomy, reflexivity and metacognition (Tremblay, 2003), and more especially between self-directed learning, self-determination and self-regulation (Schunk and Zimmerman, 1998; Cosnefroy, 2001). These models show that motivation and personal project (individual components of learning) are essential but not sufficient elements: the psychosocial dimensions of learning (through collaboration, trust, evaluation) are decisive for building effective learning environments.

Indeed, if the learning process is personal, it can nevertheless be taught, with adapted learning methods. Although the former work of Schön (1983) on "reflective practitioner" has been widely used for vocational training, it has only gradually irrigated Lifelong Learning issues (in work/study programs, higher education, etc.). The same holds true taking into account the role of personal experience in professionalization process. More recently, the question of reflexivity emerged regarding the evolution of higher education within the impact of competences in the curricula reforms and the emergence of new devices and methods to take into account the learning experience (Rege-Colet and Berthiaume 2015).

Nowadays, the theoretical models of learners' empowerment are numerous and pursue different ends, sometimes competing (Eneau, 2012 2016): self-regulation of learning (for learning management), self-directed learning and self-development (for Lifelong Learning) and even awareness and critique (for transformative learning). These different models have been widely discussed, especially for the assumptions on which they are based and for the instrumentation they can generate.

On a methodological level, the complexity and subtlety of learning situations, where a set of different dimensions (cognitive, affective, biographical) are mobilized, require to articulate the joint analyses of researchers and learners together, and even the involvement of teachers and pedagogical advisers. This means participatory action research (PAR) or design-based research, within individual and collective inquiries to analyze the activity (through self-confrontation, explicitness, focus groups, etc.). This crossed methodology should then respond to different objectives of analysis, understanding and transformation of learning methods and help to develop some new and more integrative tools (Lameul and Loisy 2014).

The main consideration is that learner empowerment cannot be solely based on the control or reinforcement of technical skills or abilities. On the contrary, methods and tools must be thought in terms of capacitation (Falzon 2013; Oudet 2012), i.e., (i) the support they provided to each learner, individually,

for self-orientation, production of informed choices, of personal and professionals projects, etc.; (ii) the possibility they offer to anyone to become aware of his/her strengths and weaknesses, for improvement or enhancement, in a perspective of automatization; (iii) the purpose of these policies of capacitation in terms of equity, so as to guarantee to everyone equal opportunities, in terms of capabilities (Eneau & Simonian 2015).

To some extent, tools thought in term of capacitation have to fulfill the different Lifelong Learning dimensions proposed in the paragraph 3.2. This requires making the learning process more explicit by means of adequate learner models providing relevant self-information. The next section shows how Open Learner Models can support the learning process and the corresponding Lifelong Learning dimensions.

4.2 Semantic Open Learner Models

A learner model refers to the model constructed from observation of interaction between a learner and a Technology Enhanced Learning system. "The learner model is a model of the knowledge, difficulties and misconceptions of the individual. As a student learns the target material, the data in the learner model about their understanding is updated to reflect their current beliefs" (Bull, 2004).

An Open Learner Model (OLM) makes a machines' representation of the learner available as an important means to support learning (Bull & Kay 2010). It can be viewed or accessed by the learner, or by other stakeholders (e.g. teachers, peers, parents, etc.). In the Learner Model community, important studies have been developed about learner control, understandability, availability of various sources, visualizations and their impact on learning (Bull & Kay 2016).

Indeed, there are a variety of ways in which an open learner model might be useful to the learner and support the Lifelong Learning process: (i) Capitalization of learning experiences and Learning recognition: the open learner model can be built and updated from a large variety of data sources (user interactions, learning analytics, badges, evidences from exercises or QCM, diplomas, certificates, badges, endorsements like in LinkedIn, recommendations, etc.; (ii) Learning Goals management: Promoting metacognitive activities (reflection, planning, self-monitoring); (iii) Personal learning management: Allowing the learner to take greater control and responsibility over their learning, encouraging learner independence; facilitating navigation to materials, exercises, problems or tasks, etc., where links are available from the learner model; increasing learner trust in an adaptive educational environment by showing the system's inferences about their knowledge; (iv) Collaboration: Prompting or supporting collaborative interactions amongst groups of students, Facilitating interaction between learners and peers, teachers and parents; Etc.

In others words, an Open Learner Model is a necessary machine representation of the learner knowledge and skills and their progression to support Lifelong Learning. In a recent publication (Bull and Kay 2016), the SMILI framework for interfaces to learning data in open learner models has been reported. This paper has also studied the different works of the entire OLM community. The community is focused on the design of OLM environments to access and modify short term learner models. Various usages of such open learner models are proposed in the literature, but no generic infrastructure enabling personal data access, long term storage and data transfer (Gilliot et al. 2016). This exhibits that Lifelong Learning perspective is still an emerging question in the Learner Model community.

To support Self-Regulated Learning Process, a learner model has to be partially shared and exchanged with different stakeholders, compared to the resources metadata to support adaptation, compared to other learner models to support collaboration, etc. In other words it is necessary to ensure interoperability among resource metadata, learner models and other models supporting learning processes. An Open Learner Model based on Ontologies and the semantic web principles will enable us to provide interoperability at knowledge level among collaborative services, Open Learner Models and distributed data sources and trusted services.

Thus, we will design an innovative semantic OLMs (SOLM) to give more expressive power to facilitate self-regulation and systematic development of collaborative services tailored for self-directed learning.

Semantic Open Learner Models will be developed to support Self-Regulated Learning by making informal or incidental learning resources more explicit. This will be achieved by capturing, managing, sharing, etc., personal learning data from various heterogeneous sources with semantic enhancement. Semantic models will enable long term management and a certain level of trust for collaborative services. It enables us to explicit reasoning and learner model usages. In our context, personal learning data are data owned and controlled

by people themselves to deal with learning services addressing Lifelong Learning dimensions.

4.3 Building the SOLM

The SOLM building will be based on an iterative process. The process will be as follows: i) First of all, a state of the art in the domain of learner models (OLM, Lifelong Learner modeling ...), portfolios, competences (IMS, 2008), and standards like IEEE PAPI (Oubahssi and Grandbastien, 2006), IMS LIP (Kalz, 2007) will be established. According to that study, a first version of the SOLM and its corresponding ontologies will be designed and/or reused; ii) According to a use case, its experimentations and the corresponding data gathering, iterative SOLM improvements will be defined according to test-field feedbacks till having a "stable version"; iii) The different SOLM versions will be aggregated. The main idea is to get a consolidated version of SOLM that ensure reusability and interoperability among a set of uses cases.

4.4 SOLM and Learning Services

To exemplify how we address the Lifelong Learning dimensions linked to an open learner model, we define some micro scenarios that are needed to develop students "meta-competences" (Tremblay, 2003). These scenarios are learner oriented, as it is depicted thanks to "my" possessive determiner. The reflexive learning process will be developed by combining those micro-scenarios:

1. "My knowledge" depicts the need to aggregate different sources of data: whether learning traces, learning evidence, professional outcomes, recommendations, that will constitute personal resources for reflexive process. This learning service should combine manual entries and automatic recording to provide the Open Learner Model properties. A learner can scrutinize, control and manage his open learner model to provide a certain level of trust.
2. "My CV": the learner is able to select a view of "his knowledge" to publish some relevant information, a "CV", to cooperate with others (such as a peer in a project), to apply for a new job or a new training. This learning service enables the user to manage its open learner model to provide a CV, a specific portfolio
3. "My learn in progress" refers to the ability to organize learning, i.e., to have learning goals, construct a learning todo list with tasks done, access to current working documents.
4. "My collaborations" are the person or the services a learner wishes to collaborate with. Collaboration is a win-win process based on resource sharing, data integration and trust. The open learner model sharing owner will manage grant access and usage policies to control data usage and to develop trustful collaborations.
5. "My Future Course" is a combination of recommendations by the community and a wish list. Recommendations could be for example for a software engineer trainings of new technologies (MongoDB, ElasticSearch…) identified as relevant in his community. The wish list is a translation of continuing development. This services is based on the open learner features that must be shared, exchanged, compared, etc. By granting access of his open learner model and to the community learner models, a learner can manage its future course.
6. "Alumni feedback" is an example of external service that could provide fruitful collaboration. By granting access of his open learner model to an alumni community, a learner can get back relevant information, such as possible occupations and corresponding learning paths.

According to these micro-scenarios, table 2 presents the comparison between our proposed services and LLL dimensions. For the sake of clarity, S1 refers to "My knowledge", S2 to "My CV", S3 to "My learn-in-Progress", S4 to "My Collaborations", S5 to "My Future course", and S6 to "Alumni Feedback".

Table 2: Comparison between our proposed services and LLL dimensions.

	dim1	dim2	dim3	dim4	dim5
S1	various sources	-	Acknowledging different kind of evidence	Independent learner model	-
S2	Diffusion	-	Diffusion	-	-
S3	-	-	-	Current state of learning	-
S4	-		-	-	Direct relationships
S5	-	"Wish list" and recommendations	-	-	Human recommendation
S6	-	Possible learning paths	-	-	Personal contribution

In the next section, we define our technical infrastructure in order to provide the SRLP carried out using Semantic Open Learner Models and some services examples.

4.5 Technical Infrastructure

Our infrastructure is a Semantic PIMS (SPIMS) (Abiteboul 2015) in the cloud. In a previous publication (Gilliot et al., 2016), we have presented a proof-of-concept prototype based on a Personal cloud

infrastructure and standard interface implementation to collect data.

Figure 1 shows the prototype architecture (Gilliot et al., 2016). Components of the personal cloud are highlighted in green. Learning components (including services) are highlighted in violet. In our architecture, e-Portfolio (1) is seen as an example of Learner Model. It enables data access according to lifelong personal goals. Implementing such Learner Model in a Personal Cloud provides personal data storage (2), enabling full data access to the learner and full duration control as well. Data are collected in two different ways: external learning achievements may be collected thanks a data transfer mechanism (3) from external servers, whether institutional or commercial, or learning traces thanks a learning streaming flow (4). The proxy mechanism (5) provides a basic mechanism to grant access selectively.

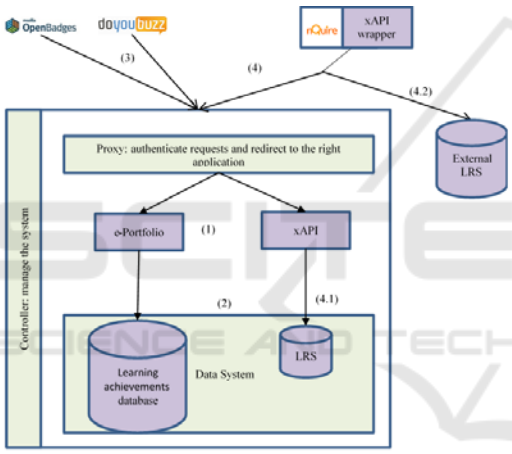

Figure 1: PIMS.

In this context, we developed two data transfer connectors. The first data transfer connector retrieve Open Badges, where the user may synchronize his personal learning achievement database with existing backpack. As validation of badges is maintained by external (institutional) servers, the user is only able to classify which ones are relevant for what purpose in his e-Portfolio. Other digital diplomas can be retrieved in a similar way. The second data transfer connector retrieve commercial e-Portfolios, the commercial e-Portfolio service provides a specific API enabling download of existing learner certifications. This service can be extended in the case of LinkedIn.

Once the data transfer connectors are implemented, we need to aggregate data from various learning sources, this must be achieved through specific API, based on linked data to enable higher semantic information level, or data streams. Those data are collected in data stores, providing access to various services see (Gilliot et al., 2016) like reflection, visualization, adaptive learning…. New standards have emerged, called xAPI that provides data streams based on statements (ex "I did this") to depict activities, and on Learning Record Stores (LRS) to provide data access. Those standards are widely adopted in the open learning environments (Santos et al., 2015). In our context, statements are duplicated in the learner personal cloud and the external LRS, enabling data collection for personal (4.1) and institutional (4.2) record storage at the same time. This gives the opportunity to fulfill institutional analytics needs, and give direct access to the user as well. Our architecture also enables the exchange between personal and institutional records.

We developed a specific Learning Record Store compatible with cozy framework and used the xAPI to enable data aggregation from various contexts. As it is embedded in cozy context, it ensures user control, as well as the ability to fine grained control access to third party services and to other LRS.

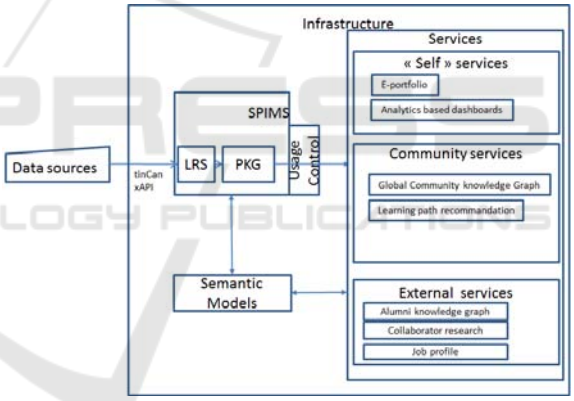

Figure 2: Our infrastructure.

This prototype is able to store statements from various applications proposing a xAPI wrapper. We used some basic examples, and developed a specific wrapper we tested on nQuire, which is a personal inquiry learning system proposed by the Open University (Mulholland et al., 2012). As a proof of concept, this wrapper sends activity statements to the personal LRS of the user and in parallel to an institutional LRS.

Figure 2 shows our infrastructure. There are two main roles of the SPIMS. The first role is to collect learning data via xAPI. These data are provided from different sources like self-declaration, peer recommendation, badges, certificates, diplomas, professional experience, informal learning, and

Learning Analytics. The second role is to control the use of the learning data (via proposed services) by the learner himself. These data must comply with the semantic models from the SOLM, the domain models, the activities (SRLP) and data sources model. Services use also these semantic models in order to respond to requested queries, to use data for inference purposes, and to insure Human-Machine interactions.

We have already explained that semantic aspect is very important in our approach to support Self-Regulated Learning.

Figure 3 shows the interaction between different PIMS. Each PIMS controls the access to its own learning data stored, retrieved and manipulated in Resource Description Framework (RDF). If PIMS 1 want to access to specific data of PIMS 2, a SPARQL request is sent from PIMS 1 to services that call PIMS 2 and depending on its authorization the requested data will be shared or not with PIMS 1. More generally, it will be necessary to process federated queries over the distributed RDF data sources to provide the different learning services (Montoya et al. 2015).

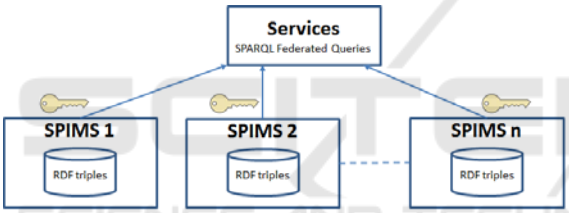

Figure 3: Collaboration and semantic aspect in our approach.

The proposed architecture has to address the following features: heterogeneity of data, interoperability and scalability. Heterogeneity of data and interoperability can be ensured by a semantic web approach (Ontologies and Linked Data). It is one of the main role of the semantic web. Nevertheless, the level of abstraction vs specialization of the different ontologies have to be chosen carefully to foster the reuse of SOLM and its usefulness – more level of abstraction leads to more reusability, but less usefulness. It is also necessary to deal with the use of very different data sources and to limit its impact on the redesign. In terms of scalability, a difficult problem will address: a federated query engine at scale up. Indeed, existing federated query engines cannot scale for a large number of data sources. We want to propose a federated query engine that can scale for a large number of SPIMS.

After having described our approach, we will proceed to our evaluation perspectives in the next section.

5 EVALUATION PERSPECTIVES

In the context of our approach evaluation, we have identified apprenticeship training as key experiment field, including professional environment and reflexive approach. Working with students will enable us to track progress in Self-Regulated Learning Process, to qualify learning methods and to test our tool's based on our infrastructure as an intertwined experiment. Those experimentations will be conducted on two different populations: (1) Apprenticeship students in education science, where professional development is a central asset in the curriculum; (2) Engineering students.

Innovative learning methods will be defined in coordination of professors in charge of professional development of the two populations. Qualitative interviews will be conducted with teachers and learners as well, in order to identify relevant advancements and potential additional needs in this new kind of personal environments. Experimental rounds will be based on a semester period, and we aim at being operational during two full academic years.

For the tool's test phase and the analysis of the practices, two methodologies will be developed.

The first methodology is a qualitative methodology in two stages:

a. The technique will be the semi-directed interview (Blanchet and Gotman 2015) in a comprehensive epistemological framework (Kaufmann 1996). The goal is here, from an individual collection of data to create a typology of the situation and current practices. For follow up interviews, we'll use the principles of the explicitness (Vermersch 2010);

b. On the other hand, we'll collect group interviews (Duchesne and Haegel 2008) with students in training to estimate the variation of the practices with regard to the purposes of the training.

The second methodology is about a questionnaire that will be sent out to collect a second level of objectification (Martin, 2005), to measure:

a. Various understanding of the tools and procedures,

b. The students' satisfaction compared with the training objectives.

In parallel, additional indicators could be designed thanks to data collection in experimental infrastructure. Such indicators will be developed as trusted collaborative services.

6 CONCLUSIONS

This study addresses the problem of the speed of change and the explosion of knowledge that requires people to learn at many intervals throughout their lives. The main questions of the study are how to address, what are the approaches allowing the professional development in a Lifelong Learning perspective, and how to promote Self-Regulated Learning. We investigate the problem from its theoretical background, and we consider existing approaches for the professional development in order to see if any existing approach can meet our requirements. Unfortunately no one can respond to our needs in terms of capitalization of learning experiences including work and long term learning, learning recognition, learning goals management, personal learning management, and social learning. To achieve this, Self-Regulated Learning Process is proposed with functional and technical solutions to our problem. This solution allows learners to insure their Self-Regulated Learning, to manage their data learning and collaborate with peers.

Our perspectives are that our Self-Regulated Learning Process will take advantage of explicit Open Learner Models to develop and support self-learning methods in personal and professional development. Trusted and long term capitalization will enable lifelong perspective. Collaborative services will provide the needed socialization for Lifelong Learning and organizational knowledge creation.

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