

# A Storyboard of the APOSDLE Vision

Stefanie Lindstaedt<sup>1</sup> and Harald Mayer<sup>2</sup>

<sup>1</sup> Know-Center, Inffeldgasse 21a,  
8010 Graz, Austria  
slind@know-center.at  
www.know-center.at

<sup>2</sup> Joanneum Research, Steyrergasse,  
8010 Graz, Austria  
harald.mayer@joanneum.at  
www.joanneum.at

**Abstract.** The goal of the APOSDLE (Advanced Process-Oriented Self-Directed Learning environment) project is to enhance knowledge worker productivity by supporting informal learning activities in the context of knowledge workers' everyday work processes and within their work environments. This contribution seeks to communicate the ideas behind this abstract vision to the reader by using a storyboard, scenarios and mock-ups. The project just started in March 2006 and is funded within the European Commission's 6th Framework Program under the IST work program. APOSDLE is an Integrated Project jointly coordinated by the Know-Center, Austria's Competence Centre for Knowledge Management, and Joanneum Research. APOSDLE brings together 12 partners from 7 European Countries.

## 1 Motivation

In current business practice and eLearning research projects, most spending is applied to enhancing *knowledge transfer* of formal training interventions. Haskell [4] informs us that in 1998 US\$ 70 billion were spent on formal training and Back [1] states that in 2000 US\$ 78 billion were spent on corporate training and continuing education. Studies on the other hand have revealed that in today's economy only a small amount of knowledge that is actually applied to job activities comes from formal training. On average people only transfer less than 30% of what is being learned in formal training to the professional workplace in a way that enhances performance. This is independent of the kind and quality of the courses taught but mainly depends on too little consideration of work environment needs during and after formal training efforts [8]. 80 – 90% of what employees know of their job, they know from *informal learning* [7]. Initiatives aiming at enhancing knowledge transfer of formal training try to answer the question: "How much does the learner know after engaging in the formal training?" Instead, as suggested by the above numbers, the question which should be asked is: "To which extent can the learner apply the newly acquired skills to her work tasks?"

In order to answer this second question one has to look at the theories of *learning transfer* [5] and design computational learning support based on them. A simple taxonomy of six levels has been proposed which reach from nonspecific transfer over application and context transfer to near, far and creative transfer. Transfer on all these levels involves the application of what has been learned to situations which are more or less similar to the one in which the knowledge was acquired. Within this contribution we focus on application situations stemming from the work tasks and processes.

*Work-integrated learning* happens to a tremendous degree during social interaction, while knowledge workers collaborate on digital artifacts or communicate aspects of these artifacts. The role a knowledge worker embodies in social interaction is subject to continuous change: At one point in time, a knowledge worker acts as a learner, at another point in time, the same knowledge worker acts as an expert (teacher) depending on her expertise with regard to the subject matter at hand [6]. Hence, when we learn there is always explicitly or implicitly some teaching involved. In the case of formal trainings we usually encounter one teacher or trainer who conveys the content to be learned. But in other situations – such as reviewing code – this teaching role is not so obvious to the expert herself. In the following we will refer to such episodes as *work-integrated teaching*.

## 2 APOSDLE Goals and Challenges

Triggered by the identified, unsatisfactory situation above the APOSDLE (Advanced Process-Oriented Self-Directed Learning Environment) project addresses underlying research challenges such as:

- Understanding and defining work-integrated learning and teaching
- Supporting learning transfer instead of knowledge transfer
- Integrating this support within real world application cases
- Measuring learning transfer within real world environments

Thus, the APOSDLE goal is to enhance knowledge worker<sup>1</sup> productivity by supporting informal learning and teaching activities in the *context* of knowledge workers' everyday work processes and *within* their work environments. APOSDLE leads the way towards the seamless integration of learning, teaching, and working at the future professional workplace.

The key distinction of the APOSDLE approach as compared to more traditional (e)Learning approaches is that APOSDLE will provide integrated support for the three roles a knowledge worker fills at the professional workplace: the role of learner, the role of expert, and the role of worker.

**Learner Support.** APOSDLE provides learners with support for self-directed exploration and application of knowledge. This is done within their work environment such that learning takes place within the learner's current work context. APOSDLE provides learners with guidance through the available knowledge by applying novel

---

<sup>1</sup> Knowledge workers (here often simply referred to as workers) are members of organizations whose essential operational and value creating tasks rely on knowledge as their critical work resource [3].

learning strategies. Content from knowledge sources are presented to learners even if the content provided has originally not been intended for learning. The main learning strategies that we use in APOSDLE will be based on the principles of *Cognitive Apprenticeship* [2]. This principle is widely recognized as a fruitful approach to learning in realistic situations and it combines aspect of problem-based learning and self-directed learning. Within cognitive apprenticeship scaffolding is a central technique for supporting learning. Cognitive scaffolds are tools that enable learners to perform processes they would not be able to perform proficiently without the support of the tool. Scaffolds help learners to go just beyond the level of proficiency they have on their own.

**Expert Support.** APOSDLE acknowledges that most effective learning transfer happens during communication, collaboration and social interaction. APOSDLE lowers the hurdles for knowledge workers to informally convey knowledge via their computational environment in that it captures the context of the creation, evolution and usage of artifacts. APOSDLE enriches artifacts with context information and therefore allows artifacts to be turned into true learning artifacts (contextualized collaboration). Based on existing approaches to capture knowledge, APOSDLE will develop new methods and tools which support the capturing of knowledge as it shows up in processes of collaboration. Especially, it will support communication and collaboration between people about an artifact (e.g. a document, a graph, or a piece of code). By doing so APOSDLE taps into collaborative learning episodes and makes the results available to other people in their own informal learning processes. This emphasizes the importance of group learning and communication support within the APOSDLE framework.

**Worker Support.** APOSDLE tightly incorporates learning and teaching episodes into the work processes in that it takes care of several aspects of workers' work contexts such as worker's competencies, work situation, and application domain. Workers are provided with context sensitive knowledge, thus raising their own awareness of learning situations, content, and people that may be useful for learning. APOSDLE enables workers to access content from several diverse knowledge sources without having to change the environment. Within APOSDLE we are concerned with the modeling and acquisition of context. Here, we define context as a set of relevant information and constraints that an individual (learner, tutor) needs in order to reach an individual or shared (learning) goal [9]. The relevance of information depends on the individual perspective and the goal that has to be achieved. We focus on the context of a task as the set of information and constraints which are relevant to a certain worker in a certain situation when trying to accomplish this task. In this narrow meaning, context is worker and situation-specific.

To work, learn and teach efficiently and effectively, a knowledge worker must be provided with optimal guidance to manage the large variety of knowledge artefacts available in the corporate infrastructure. Therefore the seamless integration of the underlying information spaces into an integrated semantic knowledge structure is of paramount importance. APOSDLE will therefore create such an infrastructure (referred to as APOSDLE platform) to support the integration of the three roles.

The outcome of APOSDLE will be a methodology, software framework and reference architecture for work-integrated learning enhancing the learning and teaching

processes for the individual and the organization. In order to ensure the general applicability of this outcome an application-driven approach is used to cover the needs of three fundamentally different organizations: a network of SMEs, a public organization, and a large corporation.

### 3 APOSDLE Usage Scenario

This usage scenario shows how the different roles of a knowledge worker – Learner, Expert and Worker – will be supported within *one integrated* APOSDLE Environment.

**Background.** Sandra is a technical expert at HighTech. She has recently been promoted to project manager. In this new role she has now also the responsibility of directly working with the customer to elicit the user requirements of the software application to be developed. In addition, she is responsible for ensuring that the requirements are updated, linked to the design documents, and finally used for testing. In the past she was involved with requirements management (RM) but never in the elicitation process (RE). Also, she feels a little uncomfortable since she is not sure that her team handles requirements according to the company standard.



**Worker Support.** A new project is about to start and so Sandra instantiates a new project folder in the common file system, sets up a common e-mail repository, etc. By analyzing these actions (which Sandra is executing within her work environment) an APOSDLE Work Tool automatically identifies that Sandra currently is in the project management phase “ProjectStart”. Another APOSDLE Work Tool unobtrusively offers all information relevant to the

ProjectStart phase. This helps Sandra to remember all the steps which need to be done. In addition, the APOSDLE Platform keeps a user profile of Sandra. In this profile Sandra’s expertise in RE has been recorded as low. One of the important first tasks associated with the ProjectStart phase is that the user requirements for the system to be developed need to be elicited. Due to Sandra’s profile the APOSDLE Work Tool makes Sandra aware that more detailed and more introductory information about RE is available. Since Sandra is happy about all the help she can get she selects the offered APOSDLE Self-Directed Learning (SDL) Tool.

**Learner Support.** By glancing at the window offered by the APOSDLE SDL Tool Sandra notices a number of very different available resources associated with RE, structured neatly into categories: *templates* to document user scenarios, a *frequently asked questions* list, *questionnaires* for structured interviews, *example* documents from other projects, a *tutorial* about scenario-based RE, a *link* to a community of practice (COP) platform within HighTech related to the topic, and even an announcement for a RE *class* to be held in a few weeks. The APOSDLE SDL Tool



explains which resources can be used for which purpose and how it all fits into the RE process. In addition, the tool provides Sandra with guidance about how best to approach to learn RE.

Right now Sandra is in a bit of a hurry since the first customer meeting will be held tomorrow. So the first thing she does is look at the COP platform. This platform is an APOSDLE Teaching Tool which knows about Sandra's work and competency context and helps her identify people with the right know-how to help her learn. She immediately asks some urgent questions and is pointed to a little pre-recorded tour through the available methods. Based on this information and the advice given Sandra decides that she will use the scenario-based RE approach. She switches back to her APOSDLE SDL Tool and selects this approach. She accesses the user scenario templates, skims through the tutorial, and looks at some examples from projects she was involved in. But since Sandra is not only interested short-term in RE but also wants to establish a better RE practice in her team she also signs up for the course offered.



**Expert Support.** Some weeks later Sandra reviews the use case descriptions of one of her newer team members. By now she has learned quite a bit about RE and especially is knowledgeable about the RE standards employed within HichTech. She immediately notices that her colleague started to document design options instead of focusing on the user requirements. Since this is a typical mistake most beginners make and which she has made herself, she already has compiled a number of reference materials,

examples, and guidelines within the review environment (an APOSDLE Collaboration Tool). She now marks the suboptimal parts in the use case, links the relevant material to it and writes a short explanation in the chat window about how the material applies here. She also points him to other such use case examples done before. In addition, by using another APOSDLE Collaboration Tool she records a short tour of the available use case modeling resources in the APOSDLE environment and makes this guided tour (including her voice annotations) available to all her team members by associating it to the project management phase ProjectStart. From now on inexperienced use case designers will be offered this tour automatically by the APOSDLE system.

### Acknowledgements

APOSDLE is partially funded under the FP6 of the European Commission within the IST work program 2004 (FP6-IST-2004-027023). The Know-Center is funded by the

Austrian Competence Center program K plus under the auspices of the Austrian Ministry of Transport, Innovation and Technology ([www.ffg.at/index.php?cid=95](http://www.ffg.at/index.php?cid=95)) and by the State of Styria.

## References

1. Back, A., Bendel, O., & Stoller-Schai, D. (2001). *E-Learning in Unternehmen. Grundlagen - Strategien - Methoden - Technologien*. Orell Flüssli Verlag.
2. Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18.
3. Drucker, P.F. (1993). *Post-Capitalist Society*. HarperBusiness.
4. Haskell, R.E. (1998). *Reengineering Corporate Training. Intellectual Capital and Transfer of Learning*, Quorum Books.
5. Haskell, R.E. (2001). *Transfer of Learning: Cognition and Instruction*. Elsevier Academic Press.
6. Lave, J., & Wenger, E. (1991). *Situated Learning – Legitimate Peripheral Participation*, Cambridge University Press.
7. Raybould, B. (2002). *Performance Support Engineering Part One: Key Concepts*. Ariel PSE Technology, 2000. Cited in Dickover, N.T.: *The Job is the Learning Environment: Performance-Centered Learning to Support Knowledge Worker Performance*, JIID, Vol.14, No. 3.
8. Robinson, D.G. (2003). *Skill and Performance: They are not equal*. Apartment Professional Magazine.
9. Wessner, M. (2005). *Kontextuelle Kooperation in virtuellen Lernumgebungen*. Lohmar: Eul-Verlag.