



TELL ME Project NEWSLETTER

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Technology Enhanced Learning Living Lab for Manufacturing Environments

TELL ME IN BRIEF

Starting date: 1 Nov. 2012 / Duration: 36 months / Budget: 8.3 M€

The European Union 2020 Strategy is addressing the problem of developing more effective IT platforms and tools to support up-/re-skilling of employees in less technologically advanced EU-based SMEs. Achieving such a leap forward is a Challenge for Europe, whose solution may require inputs and insights from multiple domains, European Commission directorates and units, as well as more focused attention from Technology Enhanced Learning (TEL) researchers on how non researchers can use their findings.

The TELL-ME project (Technology Enhanced Learning Living Lab for Manufacturing Environments) aims to develop and trial in authentic contexts (SME-driven human-centric and service-oriented manufacturing workplaces) an innovative cross-enterprise methodology, and IT platforms providing support for continuous education and training of blue collar worker belonging to heterogeneous business ecosystems. Workers can be trained directly at their usual workplaces, enriched with traditional, mobile and augmented reality devices through which they are offered learning content and learning experiences that better meet their needs and preferences.

IN THIS ISSUE

- TELL ME in brief (p. [1-2](#))
- Progress of project activities (p. [2-4](#))
- eMeMO, the learning process in kinaesthetic learning (p. [4](#))
- Upcoming event : Horizon 2020, Smart Growth through TEL (p. [6](#))

TELL ME reinvents learning technology for human-centred and service-oriented manufacturing workplaces in small and medium enterprises.

PARTNERS IN THE PROJECT

Research & Development



Industrial SMEs Pilots



The project consortium includes 14 partners which are universities, research and technology institutes, private companies, located in Italy, UK, Portugal, Sweden, Belgium, Finland, Germany and Spain.

The experimentation in the project is carried out in Pilots in three Industrial SMEs:

Pilot in Mechanic Industry



To implement the flow of competencies between large multinational OEMs in an advanced domain like helicopter manufacturing and small local enterprises in charge of very practical and specific tasks like maintenance and repair.



Helicopter Maintenance: Support technicians making maintenance for the latest AW generation of helicopters

Pilot in Wood-furniture Industry



To deal with special treatments and procedures to be followed when finishing furniture to be brought onto ships, in particular luxury ships and cruise ships, again using new materials and adopting innovative production techniques and processes.

Furniture for Shipbuilding: Support workers (designers, manufacturers) in companies to develop products with an optimum level of quality, sustainability & safety



Pilot in Textile Industry



To address the problem faced by blue collar workers in the textile industry when they need to master more and more demanding constraints and requirements regarding quality inspection and make-up of the textile materials.



Textile Quality Inspection testing of textiles used in a very broad range of applications by non-high qualified personnel

PROGRESS OF PROJECT ACTIVITIES

Methodologies for Living Lab Learning, Life Long Learning, Social Learning & TELL ME Methodology

Europe desperately needs increased support for 'Learning By Experience' and for collecting and using evidence for associated experience effects. Technology-enhanced learning is an enabler in Europe's search for surer ways to increase the competitiveness and job-creating potential of its knowledge-based manufacturing industries.

Learning by experience relates to areas such as value-adding refinements to manufacturing processes (as in the end-of-shift team-review sessions that Toyota is famous for); refinements to the process of conducting those review sessions and the process of learning from them (i.e., 'getting better at getting better'); sharing experiences across

a supply chain or a Living Lab (vicarious learning by experience); and making learning by experience part of lifelong learning and peer-to-peer learning at the workplace and in informal networks.

TELL-ME's learning methodologies support learning by experience in the following way:

- On a Management level: To find cost-effective ways to use TEL and Learning By Experience methodologies to satisfy the known and likely future requirements of operational managers and training managers in manufacturing industry, regarding the knowledge, skill and safety aspects of how their blue-collar workers add value for their employers.

- On a Living Lab level: To use TEL to raise the competitiveness of a Living Lab and to refine and enhance the contributions that TEL makes to a Living Lab, especially by developing local versions of generalized Learning By Experience methods, so that all blue-collar workers in a Lab can play a part in enhancing their own organisation's knowledge and skills and can learn how to help to increase its 'competitive edge' (e.g., by adjusting to changes introduced by their management that involve incremental and/or radical innovation).

The TELL-ME learning methodology provides:

(1) A sourcing methodology for finding or devising next-generation training solutions for manufacturing, especially for blue-collar workers, and including TEL-based improvements upon or

reinventions of classic ways of training blue-collar factory workers;

(2) A benchmarking methodology to compare classic and next-generation training for manufacturing (on such measures as time to become competent, long-term recall of training, maximum productivity achievable with a specific level of quality, time to spot and remedy mistakes, costs, stress);

(3) A transforming methodology, to reduce or eliminate the effort needed to modify a training solution that was developed for other purposes (e.g., outside manufacturing or for a different type of manufacturing), to suit local circumstances or changes in training needs

More detail: download the deliverable D1.2 [here](#)

User Scenarios, System Requirements and Generalisation

The first task in the work package for "User Requirements and Business Validation" focused on analysing the work environments and the blue collar worker's tasks at the three pilot partners, as well as on gathering special necessities, e.g. from a motivational and regulative point of view.

Typical work situations were worked up as storyboards with both an "as is" version and a "to be" version. For the TEL platform to be developed, the consortium derived in a first step specific requirements from these analysis results. Then, they

generalised these special requirements in a second step.

Afterwards, these generalised requirements were grouped by actor and by application system cope. As methodological requirements, the consortium identified top level learning challenges and mapped them to the pilot partner's requirements and storyboards. The identified requirements guide the IT architecture and service development. Also the storyboards are inspiring the development of the project assessment methodology.

Business Economic Impact, STEEP sustainability, Open Innovation & Creativity Assessment Methods

Evaluation and impact assessment play an important though complex role in TELL ME, partly due to the scope and objectives of the project and the TELL ME system. In addition, however, both of the project's key components – technology-based enhancements to systems for learning on the one hand and manufacturing on the other – are themselves undergoing significant transformations.

Work to date has:

a) defined a general framework for evaluation and impact assessment in TELL ME, and

b) identified in the ECOGRAI method and the STEEP approach the key tools and methodologies that can be applied to the context of TELL ME in order to measure results and impacts.

TELL ME is in fact pioneering a concept in which learning experiences are directly shaped by both immediate and long-term conditions and requirements at the workplace and in the industry. The prospects for adaptation of the evaluation

methods to that situation appear to be confirmed by the preliminary analyses that have been carried out.

The next steps involve the definition of the operational strategy for the evaluation and impact assessment methods and tools, using the Living Lab approach and governance framework as the means to integrate and enhance the two methodologies in order to define a common, actionable set of indicators.

TELL ME Architecture

One important achievement reached during the first months is the definition of the interim version of the TELLME Architecture. This is a result of a shared work between the scientific and technical project partners: the former group provided excellent suggestions and guidelines and the latter designed the detailed technical architecture, harmonizing the scientific recommendations with the most advanced State of the Art technologies available on the shelf in the market.

Conceptually the architecture is based on three layers. In the top layer a smart and interactive Graphic User Interface (GUI) supporting the user during the job in the workplace monitoring him/her and suggesting learning paths. A set of engines complement the user interaction level providing the GUI with the ability to display different kinds of learning contents (video, audio, interactive pictures, lessons, etc.).

eMeMO, the learning process in kinaesthetic learning

We are all familiar with the performance differences between a skilled driver (who drives safely and smoothly without thinking) and a novice driver (who is hesitant, error-prone and struggles with each element of their driving). Our experience of learning such skills is that it takes many hours of practice. This is today's norm in training blue-collar workers in manufacturing: they become highly skilled at tasks that involve a mix of action and thinking, but it can take a lot of time to reach the level of competence that adds a lot of value for their employer, for example raises their competitiveness to global levels.

This work will require direct exploration of the tensions that can arise in defining conflicting goals due to different actors, different time frames, or different strategies. The introduction of the Living Lab approach as a method for resolving tensions in a 'win-win' governance framework appears well suited to reach this objective, in addition to defining the methods to promote and assess open innovation and creativity.

The lower layer of the architecture is composed of a set of interconnected repositories providing the information necessary for the composition of the customized and context-based learning material to be submitted to the user; examples of such contents are: static profile information, dynamic context information, atomic learning material, etc.

In between the presentation and the storage layers, is the middleware one that provides all the services in order to manage contents, create lessons paths, monitor and store user sessions, etc. This level is based on a set of off-the-shelf middleware such as a BPEL engine, an Enterprise Service Bus (ESB), a rule engine and an identity server.

The different pieces of the architecture will be implemented by month 12 and integrated with each other by project month 15, so creating the first prototype of the TELLME system to be used and evaluated by end-users in their pilots.

What does global competence look like, in terms of operating factory equipment? An example is a gymnast-like performance: it embodies smoothness, precision and speed, with a minimum of errors and wasted effort, and with low-strain movements. People with that level of skill seem almost instinctive in their reactions, not appearing to pause to think about what to do next. Many SMEs find it hard to recruit such skilled workers, and find it difficult to afford to train their own staff to full mastery.

We believe that most businesses would benefit from being able to widen the competence of their blue-collar workers so that they could handle a wider

range of tasks, at mastery levels of performance. This would be particularly valuable for SMEs who currently cannot afford to train to a high level. The challenge we set ourselves is to empower all companies, but especially SMEs, to train with less effort, at less cost and in a shorter time.

Our current approach is novel, and so we are refining it and testing it in multiple contexts and industries.

At the heart of our approach is a learning process with five steps:

Enquire > Mix > Experience > Match > Optimise
Our acronym for this is eMeMO, pronounced M M O.

The eMeMO steps are particularly appropriate for people who are "do-ers". This includes operators of factory equipment, whose work typically involves some mix of physical actions and mental judgements, with a mix of fast and slow steps, repeated with a cycle time that may range from seconds to hours. The blue-collar combination of physical actions and mental judgements calls for a mix of different types and locations of learning: some have called this "body-and-brain", others call it "kinaesthetic learning" or "tactile learning".

Whatever name is given to it, this kind of learning takes place by realisation through doing (holding, moving, carrying out each step in a process), while undertaking a relevant action in parallel (say, watching a demonstration), rather than by thinking before initiating action.

An example is a dancing class. An effective way for novices to learn the steps in a new dance routine is to first engage their mind (by paying close attention to watching a skilled person - the instructor - dance a part of the routine that is short enough to be recalled from short-term memory, then immediately to try that routine oneself or with a partner, so that they can "learn to feel the action in their body". For novices, this engagement of body, visual system and mind leads to faster and surer learning than learning in other ways, for example from lectures or videos of dancing.

The five steps enter into this as follows:

Step 1 (Enquire) provides tools for the worker or the SME to find out what it would help them to know (meaning new manufacturing processes and

associated skills), if they are to adapt to meet new challenges and then compete effectively; also, what relevant training resources they can get access to.

Step 2 (Mix) helps them to choose an appropriate sub-set of the training resources available to them, then to combine those resources in sequences that suit the specific training needs that face them. This may include use of some sub-activities or resources in parallel, as in "look at the demonstration – at the same time, imagine how you would do it" and then "try it – at the same time, reflect on which steps you need to practice". Some of these activities require the involvement of others such as helpers, supervisors, or a helpful community. Others require short-term access to scarce resources (such as simulators). For this, the initial resource capacity is determined and corresponding performance targets are set.

Step 3 (Experience) gives the learner the actual training experience.

Step 4 (Match) uses data on the engagement of learners with the training experiences, to make adjustments to each trainee's set of experiences, to increase their engagement in activities. Typically, this involves comparing the behaviour of the 'apprentice' with the behaviour the 'master' has specified when providing the learning resource.

If the required skill level is achieved, the learner advances to the next (learning) job.

If, however, the behaviour is not within the intended boundaries, the worker or their supervisor may decide to repeat the action cycle in order to improve performance.

In these cases, the cause of the poor performance may be found in lacking motivation or in lacking training. If it looks, however, like the required boundaries are not set right and behaviour is not improvable, it is necessary to select a different mix of materials and steps, or even to re-think the nature and size of the learning steps/tasks, so that learners can succeed in acquiring and improving their skills.

Step 5 (Optimise) allows for experimentation with new parameters for steps 2-4, seeking to increase the engagement and to drive up performance and reduce the time needed to reach a given level of skill.

UPCOMING EVENT



Horizon 2020, Smart Growth through TEL

Symposium at the 8th European Conference on Technology Enhanced Learning (TEL) Sept. 18th, 2013 – Cyprus

With this symposium, organised by the TELL ME project, experts from the TEL projects ARISTOTELE, MIRROR, LAYERS, idSPACE and TELL ME, and the Factory of the Future projects COPERNICO, VISTRA and MANUSKILLS will be gathered in a think tank to exchange how Europe 2020, the strategy for growth, can best benefit from technology enhanced learning and which are the opportunities for developing new TEL solutions for SMEs growth offered by Horizon2020.

TEL can facilitate ‘smart achievements’ like new products, services and insights, while at the same time, enabling ‘smart growth’, supporting learning of how to grow in sustainable ways, how to improve acquisition and sharing of the skills and insights needed, in contexts such as rapid design and virtual prototyping of new products, services and factories.

This “invitation-only” Symposium serves both as a concertation meeting between the projects (across EC units) and as a sandbox to explore new ideas for Horizon 2020.

More information at the Conference page:

<http://ectel2013.cs.ucy.ac.cy/index.php/program>

Programme of the Symposium:

<http://www.tellme-ip.eu/admin-1/event-files/programme-horizon-2020-smart-growth-through-tel>



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