

The Production Learning System and its Adaptation to a European Environment in the Framework of EUCAM



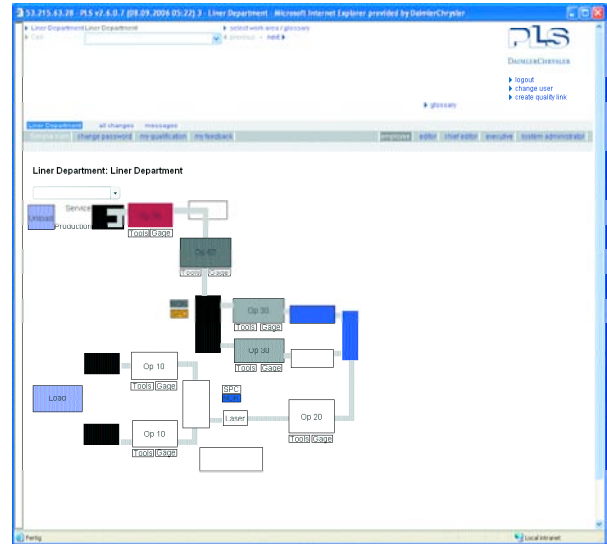
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The Production Learning System and its Adaptation to a European Environment in the Framework of EUCAM

By Gerald Thiel, DEKRA Akademie ¹

Orientation to more work-oriented learning has been demanded for years, and it is obvious that training providers have tried to meet this demand within the framework of their offerings (by collaboration with enterprises and by using new learning approaches such as task-based learning). However, it cannot be claimed that these offers refer to the work process as such which is a much bigger challenge than mere work orientation. It is not surprising that training approaches of this kind are rare, and cannot be achieved without big efforts not only from the training provider, but also from the enterprise: Up to now work process oriented learning has only been possible, without enormous difficulties, within the framework of large enterprises. Thus the smaller the enterprise, the more work process oriented learning needs the support of training providers whose teachers have to act as learning coaches. In addition, long-term collaboration of SMEs (Small and Medium-Sized Enterprises) and training providers requires organizational structures which cannot be created without many preliminary activities. This does not particularly

¹The author is a member of the EUCAM project team and has contributed to a *market study* which is one of the project deliverables. The article presented here is based on work documented in a series of papers produced during project work, of course not only written by him.



increase the willingness of SMEs to take part in such initiatives which aim at the continuous involvement of employees in learning activities.

So, for the time being, the only prominent service offering supporting work process oriented learning is a system which is based on public regulations: the Advanced IT-Training System in Germany (AITTS). This system is targeted at people who want to get certification of the work they are already (at least partially) performing within an enterprise via a process which delivers a documentation of their abilities, linked to a

The Production Learning System (PLS)

The Production Learning System (PLS), which was developed by DaimlerChrysler on the basis of the results of the project ALF³, is addressed to workers at the shop floor level in the automotive industry. It was tested at the Daimler Chrysler plant Mannheim (production of utility vehicles), where it is now established and integrated into the production system, as well as in other branches of Daimler Chrysler in Turkey and South Korea.

Instruments of the PLS

Technical environment: The PLS is run over the intranet, accessible to workers at their workplace via terminals which have been established there for this specific purpose. Thus everybody who works on the assembly line can get information about workplaces, and activities to be carried out there.

Virtual assembly: With the help of an editor, the whole production area can be reproduced as a virtual assembly. This enables workers to select single/specific workplaces in order to get information about activities related to them and competences needed to carry them out.

set of publicly recognised job profiles such as *Software Developer, Database Developer, IT Security Coordinator*, i.e. to professions which demand relatively high expertise.²

But work-based learning need not to be limited to this professional level. The results of the project ALF and the experience gained within the project EUCAM show that there are ways to establish this new learning approach even on the shop floor.



²Structure and features have been described at various occasions, and much material is available, but, of course, mainly in German. Many documents can be downloaded from <http://www.kib-net.de>

³Arbeiten und Lernen im Fachbereich (ALF) [Working and Learning in the Department], Common Project of DaimlerChrysler AG, IG Metall, and Fraunhofer-Gesellschaft (IDG), funded by the Bundesministerium für Bildung und Forschung (BMBF) [German Ministry of Education and Research], duration 01.07.2002 – 30.06.2005, <http://www.projekt-alf.de/>

Net pictures: “Net pictures” deliver a graphic description of work steps assigned to the workplaces. Every work step is depicted in the middle, in the eight “ears” of the work step information about tools, torque settings, numbers of components, quality requirements, and specific advice can be found. By means of various media (digital photos, videos, presentations) action processes can be visualized.

Competences assignment: Questions and answers which will enable the determination of competences which are assigned to four areas:

1. Field-oriented competence: This area is covered by information about components, tools, and quality. Key question: Which field-oriented knowledge is required for an activity related to a specific workplace?
2. Methodic competence: This concerns information about work processes. Key question: How to proceed in order to carry out the activity professionally?
3. Emotional competence: This encompasses the subject communication and collaboration. Key question: How to deal with colleagues in concrete situations?

4. Personal competence: This area delivers information about environmental protection, order, cleanliness and work security. Key question: What are the values which govern my actions?

News ticker: Current information can be circulated quickly within the whole production area via a news ticker integrated into the PLS: A pop-up window is opened at every terminal, delivering the message.

Feedback: Every worker is invited to give feedback about PLS content in the PLS. By announcing modifications to the editorial staff of the PLS and submitting proposals for amendment, workers can contribute to the maintenance and enhancement of the system.

Encyclopedia: The encyclopedia enables workers to search for background information about components, tools, machines, or specific terms. Textual information is enriched by diagrams, photos, presentations, and short video sequences.

Qualification matrix: Every worker can have a look at his *personal qualification* matrix which is available for every workplace in the PLS as the current status of his/her competence. In addition, planned qualification measures are recorded at this place.

Self assessment: Using the PLS, everybody can check his competence by a “self test”, thus defining his current “learning requirement”. Questions related to competences are available for every workplace; after having carried out the self test, workers can compare their answers with a model solution.

Didactic approach

This system is based on a holistic approach for the development of “professional action competence” which is supported by the activities of a *learning coach* whose tasks can be described as follows:

- Communicating with all relevant target groups (workers, foremen, team leaders, heads of department, etc.), the learning coach provides for the acceptance of the PLS and long term commitment of all involved parties.
- He advises workers on career development.
- He shows individualized ways to achieve qualification targets.
- He gives feedback on achievement of qualification objectives and possible optimization to all involved parties.
- He suggests individual and continuous amendments of the process of qualification.



For which purposes can the PLS be used?

To familiarize new workers with the production process

With the help of a learning coach and their foreman, new workers assemble a complete motor. This is supported by the PLS which is used to show the necessary work steps: A beamer projects net pictures on a screen, delivers information about components, tools, torque settings, and giving special hints, thus enabling workers, as far as possible, to assemble the motor independently. The *learning coach* explains work steps described by net pictures, and gives background information, without participating in the process of motor assembly which is carried out by the new workers themselves. Thus a process of active learning is initiated, not only providing workers with acquired knowledge, but also develops a “feeling” for the whole motor, its components, and the tools used to assemble it.

To support initial training

In principle, the approach is the same as in the case described above: Apprentices learn by participating in a training project which is oriented to future work (e.g. production and assembly of a “compressed air motor”: Apprentices make all components and assemble them). The PLS is used as an information resource; the function of the learning coach is covered by the trainer.

To adapt workers’ competences to a modified motor assembly

If the motor assembly has to be modified because of the use of new components, the PLS can support a smooth transition to new work processes:

- The prototype assembly team fills the PLS with information of the new component and informs the learning coach about the changes.
- The learning coach forwards this information to the workers at the motor assembly.
- A news ticker announces the changes at the PLS terminals.
- Current information can be retrieved by everybody, this supports an immediate change of the work process.

Which benefits are delivered by the PLS?

Self-regulated learning

The PLS is a holistic learning system, establishing self-regulated learning even in the area of production.

Qualification just-in-time

Descriptions of currently required competences are saved in the database for every workplace. Thus qualification just-in-time can be started without considerable preparation, supported by various media (as photos or video sequences).

Transparency of competence status

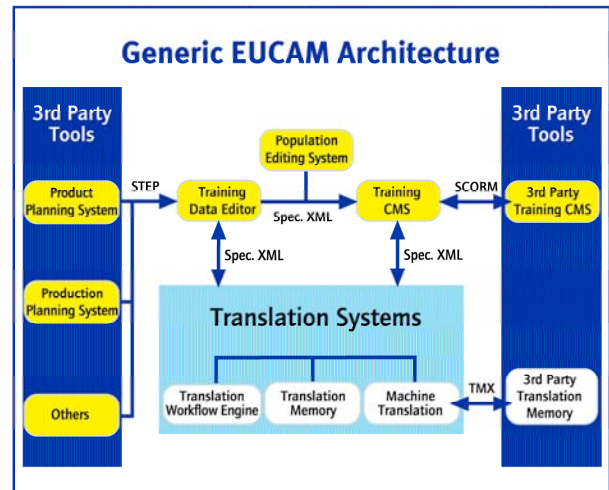
With the help of a *qualification matrix* which describes every worker’s current status of competence, visible for executives at any time, human resource development can be individualized, and made more effective. Within discussions leading to agreements of targets to be achieved by the employees, further qualification can be better planned.

Usability as an instrument of knowledge management

The didactic approach used for the PLS makes it possible to document and save experience of workers on a systematic basis. Thus ensuring that valuable know-how will not be lost.

EUCAM (Multilingual Communication in European Car Manufacturing)

The eContent project EUCAM⁴ can be considered as a necessary extension of the ALF project which was set up in a national context and, of course, built on the cultural and linguistic environment which is available there. Nowadays, car manufacturers operate on an international level, and therefore it is not surprising to discover in the process of establishing the PLS in the framework of one automotive enterprise (Daimler Chrysler) that successful implementation requires consideration of linguistic and cultural differences.



⁴Project Consortium: Daimler Chrysler AG (leader), European Metalworkers' Federation (EMF), Infoman Informationsmanagement GmbH, Language Technology Centre Ltd., DEKRA Akademie GmbH, EDAG Hungary Kft., UAB LKSoft Baltic, IG Metall, Duration 01.05.2005 – 31.10.2007, <http://www.eucam.org>

Continuous amendment

Using a feedback function integrated into the PLS, worker can contribute to the documentation of competences required to carry out the activities related to the process of assembly, and bring their additional ideas to bear in the PLS. As suggestions for amendments are rewarded, there is an incentive for workers to participate in developing the system.

Platform for document administration

The PLS delivers a technical platform for a centralized administration of documents of various origins (e.g. construction drawings, problem reports)

Communication between colleagues and foremen on different shifts or in different departments

Information flow between colleagues not working at the same time or place can be accelerated and amended via the PLS: Descriptions of work processes from various areas can be saved in a standardized format, current modifications are announced by a news ticker. So everybody is up-to-date irrespective of department and work shift.

EUCAM will build a technical communication and multilingual learning infrastructure via a state-of-the-art technology for car manufacturing which will eventually cover all European countries. The processes of motor production with its relevant technical details of manufacturing and quality management has been chosen as the reference model. A work process related multilingual communication solution will be established, which will initially cover six European languages.

Main targets are:

- Optimisation of the horizontal technical communication between manufacturers, suppliers and engineers – especially by integration of small suppliers into the learning environment of the automobile industry,
- Optimisation of the vertical technical communication between engineering, production planning, quality management and the shop floor

The following communication paths are supported by EUCAM:

- The cooperation of multilingual teams which are building up new production lines,
- The staff instruction by specialists when types or models are being changed
- The fault analysis by tele-engineering and remote maintenance.

A main chance of success by using EUCAM resources is the inclusion of local skills of the production workers – which realistically only can be achieved in their own language. User requirements and user obstructions (including cultural aspects) will need to be closely observed. Training concepts will be included out and tested. Furthermore the general conditions for the use of a speech infrastructure in different production systems is to be analysed. General solutions referring to usability and the learning environment will be created. Aimed at creating innovative work conditions, the employees' representations (*trade unions, works' councils*) will have to participate very closely.

As a result, working and learning on the shop floor, both qualitatively and quantitatively, will be distributed widely (work-process oriented learning as a paradigm used by plant operators). This will change the operational learning / communication culture in the European industry, open up new possibilities for an effective quality management and for continuous improvement processes and offer the opportunity to make a widespread impact on qualifications for workers in the industry, who have hitherto been underrepresented in vocational training strategies.

Partners DaimlerChrysler AG

Location: Germany

Homepage: <http://www.daimlerchrysler.com>

DaimlerChrysler is unique in the automotive industry: The product portfolio ranges from small cars to sports cars and luxury sedans; and from versatile vans to heavy duty trucks or comfortable coaches. The company offers financial and other automotive services through DaimlerChrysler Financial Services. With 382,724 employees, DaimlerChrysler achieved revenues of EUR 149.8 billion in 2005.

The company has production sites in 34 countries. In EUCAM, production sites in Germany, France, Spain, Turkey and the U.S. are participating. The Mannheim site is the largest production site in DaimlerChrysler's utility vehicle division and therefore will take the lead within EUCAM.

DaimlerChrysler is the coordinator of the EUCAM project and content provider / partner for manufacturing issues. The company will test project results and contribute to the implementation of process oriented learning and continuing education in Europe.



European Metalworker's Federation

Location: Belgium

Homepage: <http://www.emf-fem.org>

The European Metalworkers Federation is the umbrella organisation representing 65 metalworkers' unions from 30 countries with a combined total of 6.5 Million affiliates. The EMF acts on behalf of representative metalworkers' unions from all the Member States of the European Union as well as from European countries, which have not yet joined the EU, and also those from the candidate countries. The EMF is therefore the representative body defending the interests of workers in the European metal industry. The EMF advocates a social Europe characterised by democracy, freedom, social justice and solidarity. The EMF contributes to EUCAM as a vocational education expert. Furthermore the EMF will deliver and support the production of content by reflecting ergonomical as well as structural questions.

Infoman Infomationsmanagement GmbH

Location: Germany

Homepage: <http://www.infoman-systeme.de>

Infoman Group is a software and consulting group. It provides “customer care solutions” to its customers. The company was founded in 1992. The customer base comprises top 50 corporations as well as medium sized companies in Germany. Most of the income is generated by industrial project contracts. However, there is an increasing share generated through services and product licensing. As a software company Infoman engages in tool development. This includes prototyping and finalising products based on highly interactive systems by applying Web and CTI technologies. Infoman will contribute to the EUCAM project with a focus upon implementation and integration work and technical localisation. Assist in the process of designing of the tools in cooperation with the users. As technical coordinator infoman coordinates work in implementation and integration of the learning backbone system.

Language Technology Centre Ltd.

Location: United Kingdom

Homepage: <http://www.langtech.co.uk>

LTC was formed in 1992 in London and specialises as language technology product and multilingual service provider. LTC is one of the very few highly specialised organisations that operate both as software house and translation service provider. This means that LTC offers total solutions for a wide variety of multilingual requirements. The company pioneered implementations of the commercial use of translation memory technology as early as 1994, and trained corporate users and translators in this technology. LTC then designed the first business information management system for the language industry – well known today as LTC Organiser across the world.

LTC's new generation multilingual business information system – LTC Worx – will be released in October 2006. A new version of LTC's linguistic processing system LTC Communicator is currently being designed. LTC receives EU funds for research and development projects, market studies and trials. Due to a growing customer base in the USA, LTC established an office in Washington DC in 2005. Within the EUCAM project, LTC provides and adapts multilingual technology and translation / software localisation services.

Dekra Akademie GmbH

Location: Germany

Homepage: <http://www.dekra-akademie.de>

DEKRA is Europe's largest technical service organization and Number 3 worldwide. Headquartered in Stuttgart, we are active in about 30 countries in Europe, North and South America and Africa. We are organized into 4 Business Units comprising a total of 55 consolidated companies. The DEKRA Akademie GmbH – a wholly-owned subsidiary of DEKRA AG – has been one of Germany's largest private providers of continuing professional and vocational training for over 25 years, with more than 75 training centers nationwide. Our intensive interaction with industry, participants and the Federal Labor Agency ensures a deep insight into training and market needs and the optimization of our training offerings. We are the primary author of the Market Study but also contributes to skills requirements identification, infrastructure and field testing and implementation.

EDAG Hungary Kft.

Location: Hungary

Homepage: <http://www.edag.com>

EDAG Engineering + Design AG – as the world's largest independent development partner, develops customized concepts and solutions, optimized for production, to meet the mobility needs of the future. Besides development performance, EDAG offers the realization of turnkey projects for body-in-white manufacture and vehicle assembly from a single source.

EDAG Hungary as subsidiary company of the EDAG Engineering + Design AG, is providing services to customers from the automotive and aerospace industry – in the field of product and production systems development, simulation and coordination of manufacturing.

Special contributions of EDAG in EUCAM project:

- Input for academic and vocational education, as well as for learning behaviors of industrial workers in Hungary.
- EDAG as supplier for automotive industry develops the scope of information which can be provided by suppliers for application in production learning systems, main focus is on design and engineering data from the early product development process and on technical documentation. EDAG regards the process of information preparation and transfer and localizes it for the Hungarian industrial environment.

UAB LKSoft Baltic

Location: Lithuania

Homepage: <http://www.lksoft.lt>

LKSoft Baltic is the software development resource branch for the LKSoft organization (www.lksoft.com). The focus is on tools and applications around the international STEP standard (ISO 10303) on industrial product data. LKSoft chooses the Java programming language to implement STEP and is worldwide leading in this segment. To be able to offer top implementations LKSoft is for meanwhile 10 years actively participating in the STEP standardization within the ISO TC4/SC184 team and a member of the industry consortium PDES Inc./USA. Within the EUCAM project LKSoft is mapping Training Data requirements to STEP and develop a powerful editor for this. The goal is neutral exchange of Training Data between suppliers and OEMs.

Industriegewerkschaft Metall

Location: Germany

Homepage: <http://www.igmetall.de>

IG Metall is a democratic organisation of metalworkers in Germany. Membership is voluntary. The local organisations are the basic units of the overall structure. Workers are often faced with difficult situations, in which they need effective expert advice. A strong trade union protects them against arbitrary decisions taken by employers and from the vicissitudes of working life. IG Metall can help its members by offering various benefits. Collective bargaining is one of the trade unions most important tasks. It is a means of ensuring that workers receive an equitable share of the national product.

IG Metall contributes to EUCAM as a vocational education expert. Furthermore, IG Metall delivers and supports the production of content by reflecting ergonomical as well as structural questions.

Imprint/Contact

Volker Engert (EUCAM Coordinator)
DaimlerChrysler AG
HPC D10
Hanns-Martin-Schleyer-Str. 21-57
68299 Mannheim
Germany
volker.engert@daimlerchrysler.com
Tel.: +49(0)621/393-4620
Fax: +49(0)621/393-4085

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