



# PROLEARN

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***Deliverable D7.3 Integrated Model KWM & LA***

Integrated model of knowledge work management and learning arrangements

<i>Editor</i>	<i>Alexander Karapidis M.A.</i>
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## **The PROLEARN Consortium**

1. Universität Hannover, Learning Lab Lower Saxony (L3S), Germany
2. Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI), Germany
3. Open University (OU), UK
4. Katholieke Universiteit Leuven (K.U.Leuven) / ARIADNE Foundation, Belgium
5. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FHG), Germany
6. Wirtschaftsuniversität Wien (WUW), Austria
7. Universität für Bodenkultur, Zentrum für Soziale Innovation (CSI), Austria
8. École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
9. Eigenössische Technische Hochschule Zürich (ETHZ), Switzerland
10. Politecnico di Milano (POLIMI), Italy
11. Jožef Stefan Institute (JSI), Slovenia
12. Universidad Politécnica de Madrid (UPM), Spain
13. Kungl. Tekniska Högskolan (KTH), Sweden
14. National Centre for Scientific Research "Demokritos" (NCSR), Greece
15. Institut National des Télécommunications (INT), France
16. Hautes Etudes Commerciales (HEC), France
17. Technische Universiteit Eindhoven (TU/e), Netherlands
18. Rheinisch-Westfälische Technische Hochschule Aachen (RWTH), Germany
19. Helsinki University of Technology (HUT), Finland

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**Author/Editor:** Alexander Karapidis M.A.

**E-mail:** Alexander.Karapidis@iao.fraunhofer.de

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### Contributors

Name	Institution
Till Becker Dipl.Soz-Wiss.	University of Stuttgart, Germany
Sibylle Hermann	Fraunhofer IAO Stuttgart, Germany
Gerd Gidion	Fraunhofer IAO Stuttgart, Germany
Walter Ganz	Fraunhofer IAO Stuttgart, Germany
Martin Rieger	Fraunhofer IAO Stuttgart, Germany

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# 1 Introduction

The objective of PROLEARN is to support the implementation of Technology Enhanced Learning (TEL) within the professional education and continuing training in the companies to become more successful. The perspective of WP 7 requires the connection, combination and integration of findings in the field of educational, management and work related research. Especially the volatility and the intensive continuous change of conditions and requirements at work and the demands and possibilities for learning@the workplace have to be considered. The WP „Knowledge Work Management and Learning Arrangements“ has to generate the fundament for considerations illustrated above. The specific focus is directed to the knowledge based work, that is essential for the competitiveness of the companies but not enough known on behalf of its implications for management and formation / composition.

Knowledge Work Management (KWM) is understood as a cluster of balanced activities that intent to create optimal circumstances in a company for effective, efficient and human adequate conditions for knowledge based work and performance. In the ideal case the Knowledge Work Management will be a holistic approach of management, that starts with the conscious decision on a strategic level about the question, which kind of knowledge based work will be realised internal and which should be outsourced. It should end with concrete activities on the operational level that supports the individual realised work / efforts by organisational, technical and qualification-related procedures / services.

Learning Arrangements are intentional initiated constellations that enable options to make the process of learning transparent and configurative and to address the development of competence for action. Characteristic for Learning Arrangements is that the learning takes place in non-formal contexts directly connected with the work itself and that the process of learning is steered by the learner himself or herself (cf. Ballin & Brater 1996; Wilke-Schnauffer et al. 1998; Schiersmann & Remmler, 2002).

In Deliverable 7.1 an overview upon both topics has been given including the explanation of the state of the art and the current discussion, that is relevant from the perspective of the purposes for research and development in the PROLEARN Project. In the work package Knowledge Work Management six Key Issue Areas (KIA) have been described, that are directly connected to questions of learning. Figure 1 shows an overview upon those six KIA and visualises the embedding of the main questions of the WP7 into the complete PROLEARN project.

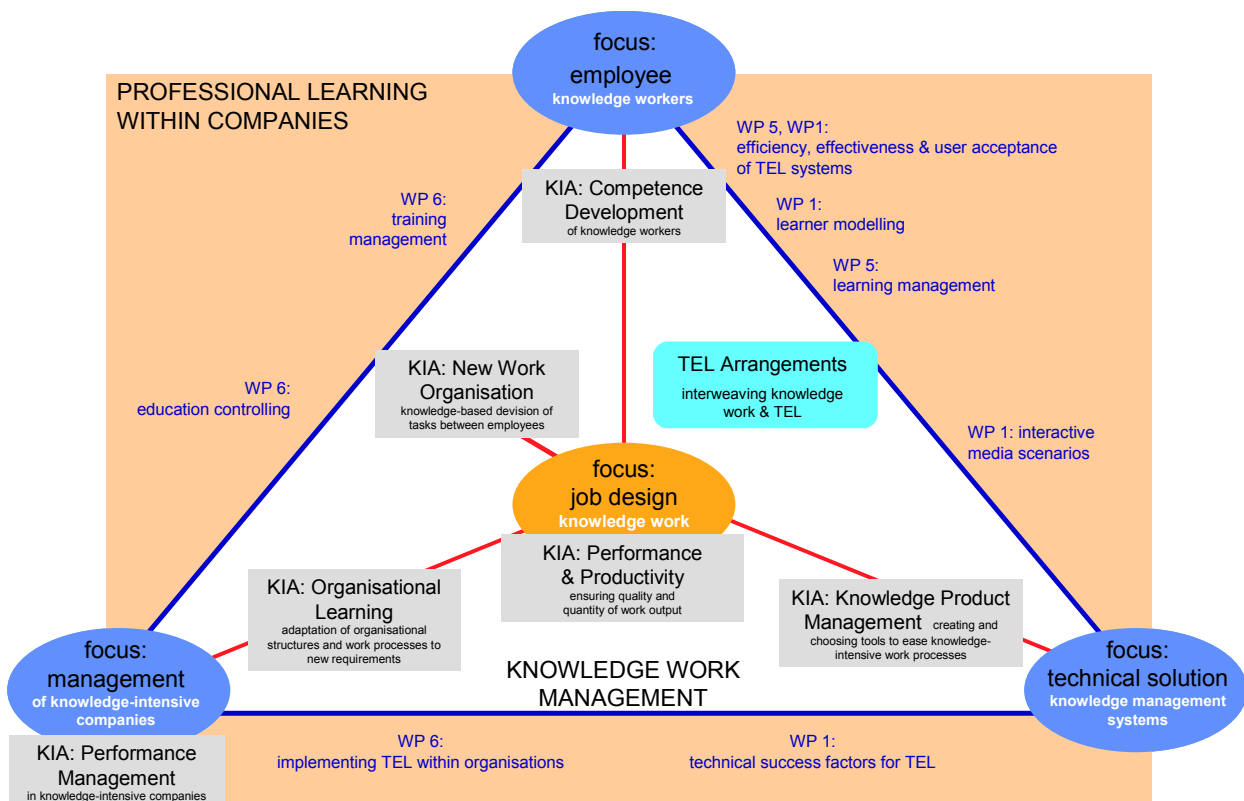


Figure 1: Embedding of KIAs in PROLEARN

## Objectives

Objective of this deliverables is to clarify several interrelations and interdependencies between the KIA and the formation / composition of the Technology Enhanced Learning Arrangements (TEL-Arrangements) in an integrated model. Out of this first hypotheses about barriers and success factors for TEL-solutions for knowledge workers can be found. The objective of this integrated model is to structure the discussion of knowledge work management issues within PROLEARN and to show how competitiveness of knowledge-intensive companies could be enhanced by TEL-solutions.

## 2 The integrated model

The six key issue areas (KIA) of knowledge work management addresses central questions in the thematic area of knowledge work management on different levels. These levels could be sorted in a logical sequence (see figure 2). The “KIA flow” starts on the strategic level, passes the operative and technical levels and reaches at the end the strategic evaluation level.

Companies reacts to changing business environments (new competitors, competitive products, new technological developments, changing laws, etc.) with new competitive strategies. Therefore they develop new products, but one strategy is also to change their company structure and processes (KIA Organisational Learning, New Work Organisation). The way they act influence on the condition how the employees can and must learn for their work (KIA competence development). On the technical level there is support for this training and working activities with concepts and tools (KIA learning management, knowledge product management). This concepts and tools didn't work for themselves, they have a concrete goal. They must increase the quality and productivity of the working tasks handled by the employee (KIA performance and productivity). To close the circle to the strategic level, the performance management system gives information if a chosen competitive strategy was implemented successful and if this strategy increases the competitiveness of the company. The six KIAs have not a clear cut to each other but for the activities in the research field of knowledge work management in PROLEARN it is separated in this way for a clearer working structure.

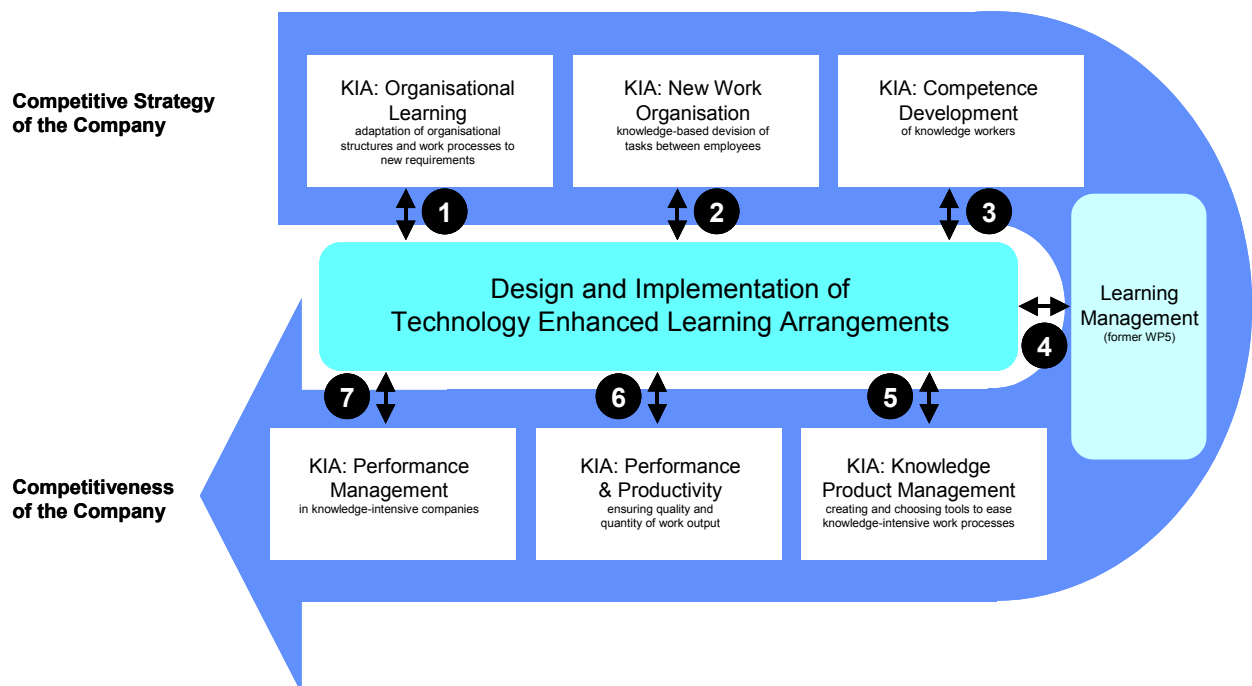


Figure 2: Integrated model knowledge work management and learning arrangements

Every thematic area (KIA) in the model is a substantial research area for its own. In some areas extensive knowledge is available. But in most cases there is a lack of information according to knowledge intensive companies, knowledge intensive work and knowledge workers in this thematic areas. As already revealed in deliverable D7.1 knowledge gaps can be found in the different Key Issue Areas. This gaps can't be closed in PROLEARN but they should be an issue with the aim to give recommendations to close them e.g. in future research projects.

From the results in every KIA the conclusion in the context of PROLEARN will be, how to design and implement technology enhanced learning arrangements in knowledge intensive work tasks.

In the following chapters first hypotheses for each KIA are lined out. The thematic area of learning management is excluded in this document because it will be included from WP 5 in JPA 2 as an additional KIA.

## **2.1 Supposed Relationships between KIAs and the Design and Implementation of TEL Arrangements**

### **2.1.1 Organizational Learning and TEL Arrangements**

For the productivity of knowledge work it is important, that the structures and processes in a company are not to rigid. So, that there is enough room for manoeuvre for the knowledge worker to organise his work self directed. On the other hand there must be a orientation for the knowledge worker in the organisation for his orientation (cf. Nurmi, 1998).

A important question in the KIA organisational learning is: Does knowledge intensive companies differ in the degree of their learning aptitude or mutability from other companies? And what are the consequences of the degree of their mutability for the design of knowledge work? One assumption is that a learning organisation can generate knowledge work quickly and also erase it quickly if the business environment changes. Companies must have a good command of this dynamic to reach sustainable effects of new competitive strategies for the implementation.

One specific attribute of the learning arrangements in this context is, that they are oriented on real working tasks, respective integrated into real working tasks. So, one condition for the design of learning arrangements is that the work processes are known, constant and documented, but in versatile companies with more and more knowledge intensive work tasks this condition is not the case.

According to this considerations the following questions can be deduced:

- Is it possible and wise to develop action oriented TEL arrangements for high versatile companies?
- How does TEL arrangements fro knowledge intensive work look like? Are the examples?
- Are companies able to recognise the ascent knowledge work in a early stage?
- How to reduce the time to implementation of TEL arrangements?
- What are the factors to keep TEL arrangements flexible and easy modifiable?
- How to reduce the costs of TEL arrangements to make them competitive in quick changing working tasks and working environments?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

### **2.1.2 New work organisation and TEL Arrangements**

The main theme in the KIA new work organisation is, what are the consequences of in- and outsourcing strategies, respective the internal short-term manpower planning for the degree of knowledge intensity of work. Since the creation of value is being achieved increasingly on the basis of knowledge, it is crucial for the survival of companies to position themselves correctly in relevant networks, and besides to be guided by a foresighted knowledge strategy as far as internal work division is concerned.

A lot of companies get aware of the fact that they are not able to implement innovations<sup>1</sup> or improve their processes. The reason is, that they don't have the needed knowledge resources and they are not able to collaborate with other companies in innovative tasks to get the required knowledge.

TEL arrangements could be a good resource to implement new forms of collaboration in distributed working environments. With good designed TEL arrangements it is possible to qualify employees for knowledge intensive working tasks in a quick and efficient way. A special challenge is that knowledge intensive companies are often working in networks There is no "full service provider", rather there is one specialist for each specific working task. The task of the companies now is to buy this "product bits" and coordinate the specialists. Knowledge work is done at the interfaces where the product is separated into small "product bits", the organisation of the specialists and eventually the integration into a complete product. The design of TEL arrangements therefore afford that must be defined work processes with the

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<sup>1</sup> innovation is seen here as any kind of innovations like patents, improvements to products and services, reorganisation of processes, etc.

“product bits” in the company. These processes and “product bits” are the reference for the learning process. In addition descriptions of the complete product or service are needed as well as a defined methodology to integrate them into the learning process. A additional aggravation is the knowledge intensive work is mostly done outside the office at customers and partners. This aspect must be taken into account for the design of TEL arrangements.

According to this considerations the following questions can be deduced:

- What is the way the integrate distributed work processes into TEL arrangements?
- Is it a advantage to integrate external persons in a TEL arrangement? How could this work?
- What is the best design for TEL arrangements for knowledge intensive working tasks in changing working/learning environments? What are the technical solutions for this kind of learning at work?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

### **2.1.3 Competence Development and TEL Arrangements**

Every time if there is a change in the work content and processes new requirements for the competencies of the employees arises and the process to get new knowledge during the work / at the work place changes.

The main focus of the KIA competence development will be therefore the interaction between the changes in the work process and the provision of the opportunity for the competence development of knowledge workers.

In future, the success of a company will depend increasingly on competent and efficient knowledge worker. The employees have to be enabled to “work across borders” and they have to be given the opportunity to build up and develop their competences systematically according to their job requirements. Especially knowledge workers working in projects fall between two stools (Scarborough, 1999): On the one hand they work multidisciplinary and therefore cannot simply rely solely on the knowledge and standards of their own field. On the other hand they work at the interface between different departments, organisations and hierarchies. So they do not really fit anymore in the organisation structure of the company where they are employed. For this reason they often excluded from both a career in their field as a skilled worker and in the management. And since they can profit little from the classical offers in further training – due to the diversity and complexity of their tasks – they rarely acquire formal qualifications that are generally acknowledged. It is necessary to have new concepts of human resources development, which enable knowledge workers to systematically build up and exchange qualifications. Some companies have identified this problem and are developing project careers as a third possibility beside professional and management careers. All other companies still adhere to the principle “hire smart people and leave them alone” (Davenport et al., 2002).

The aim of TEL arrangements here is the self directed learning to improve the employees skills. The question what are skills is easy to answer in the context of basic, manual working tasks. It is more difficult in the context of basic service tasks, because of the needed soft skills in the service sector. But for knowledge intensive or creative working tasks there are two problems to answer. Most of this working tasks are mental tasks, i.e. this are cognitive processes. Second, there are no tangible criteria's to measure, the control of knowledge intensive tasks. One reason is that the results are often collaborative results.

A easier task is the implementation of self directed learning. Knowledge workers are accustomed to search for the missing knowledge they need to fulfil their working task.

According to this considerations the following questions can be deduced:

- Does knowledge workers need support to get their needed knowledge or is this no problem for this person subgroup?
- What is the design of TEL arrangements to qualify “normal” employees as knowledge workers?
- How to measure the skills of knowledge workers?
- What is the impact of formal qualification and informal competencies for knowledge intensive working tasks on knowledge workers?
- Are their specific problems and solutions for the professional training of elderly employees?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

## 2.1.4 Knowledge Product Management and TEL Arrangements

The focus in the KIA knowledge product management is on the economical realisation of knowledge resources. Another focus is the economisation of knowledge intensive work tasks via knowledge products.

Knowledge exists in people's heads. But it can also manifest itself in processes, tools and other artefacts. It is one challenge in a knowledge-intensive company to use those so-called knowledge products purposefully, and another one to develop them for themselves or for the market. There is a great need for action, especially concerning the question of how to turn knowledge into products. Often it suggests itself to pass on knowledge to others, which in the course of work has been turned into checklists, procedural models, e-learning modules or software tools, instead of merely using it oneself. Many business segments have been created this way. However, many companies have problems estimating of what quality their knowledge is and which knowledge can be turned into products & services. Furthermore, there is a shortage of systematic procedures for developing and marketing knowledge products. Not only the development of knowledge products but also their implementation in the company is still a challenge. There are countless tools and consulting services in the market, which makes the very choice difficult, and later usage is often not optimal. Part of successful knowledge management, therefore, is the definite identification of knowledge transfer tasks as is the choice, implementation, and the organisational implementation of adequate solutions, where applicable.

TEL arrangements have a direct impact to increase the productivity. This TEL arrangements can have one more effect for the company if they are also a useful products for external companies /users and are sold. The design of TEL arrangements should be done in on task with the design of work tasks.

According to this considerations the following questions can be deduced:

- How to describe knowledge transfer tasks?
- How to specify the kind and quality of knowledge which is trained in a work process?
- How the evaluate the quality of knowledge?
- How may extrinsic thematic knowledge is needed for a knowledge worker to keep capable of acting?
- How to make very specific knowledge usable for non Experts?
- How to plan a engineering process for knowledge products?
- Are there good practices for the aim of companies to combine work process reorganisation with the development of marketable knowledge products?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

## 2.1.5 Performance & Productivity and TEL Arrangements

The KIA performance and productivity has the focus on the correlation between work design and the productivity, respective the quality of knowledge work.

Just as in industrial production, it is necessary for knowledge work to control the "magical triangle" consisting of time, cost and quality. As such this task is not an easy one. In the case of knowledge work there are two additional difficulties: On the one hand, it is not easy to standardise knowledge-intensive operation processes. On the other hand, it is no easy task to assess the quality of work results.

These tow additional challenges can easily be exemplified with the help of consulting projects. At the beginning of a consulting project there often is just one rough objective (e.g. increase of customer retention, acceleration of innovative processes, etc.). It is part of such projects - in agreement with the customer – to make the project's objectives more and more precise until a solution has been worked out. Therefore, it is not easy to plan and rationalise knowledge-intensive jobs in advance. Furthermore, neither the quality to be achieved nor the specific work steps are certain. This quality is negotiated with the customer in the ongoing process. For quality levels can be agreed upon only if the objectives are clear. But new solutions have to be developed since it cannot be left to the employees to decide which criteria they adopt for their own work. For example, one solution could be to generate performance-guiding principles, which present objectives for quality and performance to the knowledge worker on a rather abstract level, which serve as guidance.

In knowledge work task training is intrinsically tied to work. So, the efficiency and the effectiveness of training can't be measured independent from the efficiency and the effectiveness of work. Therefore there are special challenges for the design of TEL arrangements. For example the definition of quality criteria for knowledge work under the respect that this criteria could change during the runtime of the knowledge work. Standardisation of knowledge work processes. Definition of "soft skills" as basis for the performance measurement.

According to this considerations the following questions can be deduced:

- How to measurement the outcome of professional training in knowledge intensive companies?
- What are the new reasons for human resource management especially in knowledge based companies?
- How to bring human resource development and organisational development closer together and measure the productivity and attractiveness of this new integrated company development?
- How to measure competitiveness, innovations, flexibility and company value after implementing new professional training concepts in knowledge intensive working tasks?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

### **2.1.6 Performance Management and TEL Arrangements**

The productivity shouldn't be measured only at the work place. It must be also measured on a strategic level.

The KIA performance management describes the consequences of strategic decisions and controlling for knowledge work and training.

Knowledge-intensive companies need controlling systems to measure and evaluate knowledge-intensive work processes successfully. A problem that arises with performance management in knowledge-intensive companies is that quite different criteria for performance may exist within the same trade, depending on the company philosophy. This will be outlined in an example of two types of schools.

In a school for mentally handicapped children the objective is to convey as much information as the children can take in. An elite school has a completely different objective: to educate "the best." Therefore it would be a mistake to assume the same performance criteria for both types of school (Drucker, 2002). So, it is necessary and critical for success for knowledge-intensive companies to become aware of their own "mission." Based on such a fundament controlling systems can be developed, which take into consideration not only the "hard facts" (above all financial key data) and common "soft skills," but which really take into account the character and objectives of a specific organisation. Therefore it is important to integrate such criteria into a performance management system.

One task during the development of TEL arrangements is to give a statement about the evaluation and benchmarking models for professional training. The evaluation and benchmarking criteria must be customized for every company depending on the self image of a specific organization.

According to this considerations the following questions can be deduced:

- How to take the specific hands-on learning model for TEL arrangements into account in the tools for the planning and controlling of the processes inside a company?
- How to measurement the outcome of professional training in knowledge intensive companies?
- How to measure competitiveness, innovations, flexibility and company value after implementing new professional training concepts in knowledge intensive working tasks?
- How to implement procedures which take the results of a performance measurement in the redesign of TEL arrangements into account?

As the KIA structure the research field, these questions should be answered in the next steps of WP 7.

## **3 Conclusions and further activities**

Based on the findings of the gap-analysis a first integrated model has been developed that makes the connections between the two topics of WP7 - „Knowledge Work Management“ und Learning Arrangements – visible. This model will serve in the following chapters to stimulate and structure the debate between experts within WP7 and with experts from other WP and as well with external experts, scientists and entrepreneurs (executives from companies). The joint debates should contribute to the aspired detailing and explanation of the model and optionally as well the basic modification, if necessary. Such changes are not only expected but desired.



Figure 3: Output of WP 7

The next steps of work of the WP7 activities will concentrate on the generation of the following outputs (Figure 3):

- Screening upon the developments and activities in Europe in the six KIAs described above to produce an rough overview about the awareness of the named concepts, theses and questions in research and economy. The result will include a collection of topics of coming focal points and ideas for projects.
- Exemplary for the other KIAs in JPA II at first the interface / gateway between a KIA and the design of TEL Arrangements will be accounted more intensively. That means, a KIA will be chosen that has the closest proximity of content / subject to the other work packages to facilitate the cooperation and integration of findings. In joint effort with PROLEARN partners case examples and optional solutions will be described for user driven development of TEL solutions.
- In addition to that coming challenges for the Knowledge Work Management will be described and concentrated to strategic recommendations for action.

The results of these activities will be communicated via the PROLEARN VCC and will be reported / recapitulate in following deliverables (especially in the Recommendations Report, Deliverable 7.6).

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## 5 Annex

In the work shops of work package 7 statements and questions to the KIAs were collected. The statements and questions are pointed out below for every KIA.

### 5.1 *Organizational Learning and TEL Arrangements*

TEL arrangements can support the organisational learning if the following statements are taken into account:

#### **TEL process**

- Learning should be oriented at/ integrated in the work process. So, that the learning content is always as actual as the production process
- There must be defined work processes in the company. This processes are the reference processes for the learning process
- There must be a description of the specific company processes and a defined methodology to integrate them into the learning process

#### **Organisational learning**

- The three terms above must be taken into account to enable organisational learning in combination with TEL arrangements.
- Organisational development and HR development (especially competence development) must grow together into one development process.
- The TEL arrangement is one result of this integrated development process.
- The knowledge needed for a new work process must be identified and mapped onto the learning / competence development process.

#### **Questions in the KIA organizational learning under respect of TLE arrangements**

- How to develop semantics/ontology's that which take into account that there is a change of the work place to a learning place in knowledge intensive work tasks?
  - How to design an integrated process model which enables the knowledge adoption in companies by changes in the educational system, the professional training system and the processing of knowledge?
  - How to develop professional training concepts where Learning at work place is become the standard?

### 5.2 *New work organisation and TEL Arrangements*

TEL arrangements can support the new work organisation if the following statements are taken into account:

#### **TEL process**

- Learning should be oriented at/ integrated in the work process. So, that the learning content is always as actual as the production process
- There must be defined work processes with the “product bits” in the company. This processes and “product bits” are the reference for the learning process
- There must be a description of the complete product and a defined methodology to integrate them into the learning process.

#### **New work organisation**

- The three terms above must be taken into account to enable new work organisation by TEL arrangements.
- The different experts with there product bits must be aware of their “virtual” partners in the production line.
- The whole process must be visible for every partner delivering a “product bit”.
- The employees must have the competencies to organise the experts and “product bites” to the complete product.
- The employees must have the competencies to split a complete product into the “product bits”.

### **Questions in the KIA new work organisation under respect of TLE arrangements**

- How to develop a production process to separate the whole process into small tasks and “product bits” which take into account that there is a change of a integrated work place to distributed learning place in knowledge intensive work?
  - How to design an integrated process model which enables the knowledge adoption in companies by changes in the educational system, the professional training system and the processing of knowledge?
  - How to organise knowledge work that Learning at work place becomes a standard for professional training?
- How to manage communities of learners in distributed learning places?
  - How to use the informal knowledge of the experts with their “product bits” to increase the competitiveness of knowledge intensive companies?
  - Which concepts are useful for distributed working tasks for one product for the exchange of widely spread employees?
  - How to implement self directed learning in knowledge intensive companies with distributed working tasks. .

## **5.3 Competence Development and TEL Arrangements**

TEL arrangements can support the competence development if the following statements are taken into account:

### **TEL process**

- Learning should be oriented at/ integrated in the work process. So, that the learning content is always as actual as the production process
- There must be defined work processes in the company. This processes are the reference processes for the learning process
- There must be a description of the specific company processes and a defined methodology to integrate them into the learning process

### **Competence development**

- Competence development is a part of the human resource management in knowledge intensive companies.
- The three terms above must be taken into account to optimise the competence development with TEL arrangements.
- The competence development should recognise the aspects of life long learning.
- A new career concept should be the basis of the concepts developed for the competence development.
- The run effective competence development in knowledge intensive companies there must be a skill management for the employees.
- The employees must have the competencies from their own faculty and also from the faculties where they have a interface to. They must have multifaculty knowledge.
- Beside the professional knowledge in their discipline the employees must have knowledge about the company structure, hierarchies, departments, etc.
- There must be new concepts of HR management and training for a effective professional training in knowledge intensive companies.

### **Questions in the KIA competence development under respect of TLE arrangements**

- How to change the work place into a learning place for knowledge intensive work tasks?
  - How to change the educational system, the professional training system, the processing of knowledge and the knowledge adoption in companies according to the change towards a knowledge based society?
  - How to increase the awareness that human resource are the most valuable resources of a knowledge intensive company? Which strategies are successful?
  - Are there special concepts or the professional training in a aging society?
  - How to make learning at work place as a standard professional training concept I knowledge intensive companies?
- How to manage communities of learners?
  - How to use informal knowledge which gets a success critical task for competitiveness of knowledge intensive companies?

- How to develop concepts for the exchange of widely spread employees in distributed working tasks for one product?
- Which self directed learning concepts are required in the changing working society?

## **5.4 Learning Management and TEL Arrangements**

### **TEL process**

- Not applicable. The learning management executes the planned TEL arrangements.

### **learning management**

- When the process is specified the LMS provides:
  - A learning content management System
  - A learner management service
  - A course management service
  - A skill and competency management service
  - A knowledge management service

## **5.5 Knowledge Product Management and TEL Arrangements**

TEL arrangements can support the knowledge product management if the following statements are taken into account:

### **TEL process**

- Learning should be oriented at/ integrated in the work process. The learning should be combined with knowledge management tools to support the knowledge work task directly.
- There must be defined knowledge transfer tasks in the company. This tasks are the reference for the TEL process.

### **knowledge product management**

- The selection, design and implementation of knowledge management tools are the key elements to support knowledge work.
- The knowledge transfer tasks must be identified and described for knowledge intensive companies.
- For the knowledge transfer tasks the best tools must be identified.

### **Questions in the KIA knowledge product management under respect of TLE arrangements**

- How to describe the knowledge transfer tasks and knowledge products under the respect that there is a change of a integrated work place to distributed learning place in knowledge intensive work?
  - How to design an integrated process model for knowledge transfer tasks and knowledge products which enables the knowledge adoption in companies by changes in the educational system, the professional training system and the processing of knowledge?
  - How to organise knowledge work that Learning at work place becomes a standard for professional training?

## **5.6 Performance & Productivity and TEL Arrangements**

TEL arrangements can support the performance and productivity of knowledge intensive work if the following statements are taken into account:

### **TEL process to increase the performance an productivity**

- Learning should be oriented at/ integrated in the work process. So, that the learning content is always as actual as the production process
- There must be defined quality criteria for knowledge work processes in the company. This processes are the reference processes for the learning process

- There must be a description of the specific company processes and a defined methodology to integrate them into the learning process

#### **performance and productivity**

- Definition of quality criteria for knowledge work under the respect that this criteria could change during the runtime of the knowledge work.
- Standardisation of knowledge work processes
- Definition of “soft skills” as basis for the performance measurement.

#### **Questions in the KIA performance and productivity under respect of TLE arrangements**

- How to measurement the outcome of professional training in knowledge intensive companies?
  - What are the new reasons for human resource management especially in knowledge based companies?
  - How to bring human resource development and organisational development closer together and measure the productivity and attractiveness of this new integrated company development?
  - How to measure competitiveness, innovations, flexibility and company value after implementing new professional training concepts in knowledge intensive working tasks?

## **5.7 Performance Management and TEL Arrangements**

TEL arrangements can support the performance management in knowledge intensive companies if the following statements are taken into account:

#### **TEL process**

- Not applicable.

#### **performance management**

- Definition / Development of a evaluation and benchmarking model for the work tasks in knowledge intensive companies.
- The evaluation and benchmarking criteria must be individual for every company depending on the self image of the specific company.

#### **Questions in the KIA performance management under respect of TLE arrangements**

- How to measurement the outcome of professional training in knowledge intensive companies?
  - How to measure competitiveness, innovations, flexibility and company value after implementing new professional training concepts in knowledge intensive working tasks?