



# **Manual**

## **for**

# **Human Resources Instruments to Overcome the Shortage of Skilled Workers**

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## 1. Initial Situation

The long emerging problems of shortage of skilled workers in the technical and engineering sectors is on the increase. Despite ongoing unemployment and the financial crisis, companies are also reporting a serious deficit even at the skilled worker levels in the production sectors of metal and electronics. This deficit is manifested primarily on the basis of job vacancies or positions that are difficult to fill, production obstacles, changes in qualification structures and a decline in numbers of apprentices. These problems are also a serious issue in the light of demographic change that can be redressed in the long term only through sustained and continuous human resources and qualification planning.

The project 'Shortage of Skilled Workers' considers these deficits in order to develop strategies together with Small and Medium Size Enterprises (SMEs) to avoid the shortage of skilled workers. The Leonardo da Vinci Project<sup>1</sup> "Shortage of Skilled Workers" involves partners from six European countries. The project aim, emerging from the consultation, is to develop instruments for the analysis of personnel and economic requirements to be used in enterprises at the level of well-qualified skilled workers to identify skills shortages and skills gaps. The Project explores personnel development, career and qualification plans, in-house knowledge transfer, vocational and further training as well as internal and external recruitment strategies.

In literature, human resources development (HRD) is usually used as a collective term for measures relating to the future and "with improved *qualification of the employees* for business tasks as the subject matter" (Neuberger 1994, p. 157). However HRD is more than this: it also relates to the present and the sum total of all change processes, so it is able to shape and mould employee potential and willingness to act.

The handbook should provide companies with an opportunity to identify, analyse and apply the appropriate strategy from the existing wealth of different human resources strategies that are available. The measures shown here do not claim to be exhaustive but they do form a collection of suitable measures, which allow users to determine requirements and appraise company activities as well as facilitating a recommendation for action and an evaluation of the competences of skilled workers in companies. The recommendations for action derived from the estimation of company activities relate to short, medium and long-term measures that are able to contribute the reduction of the shortage of skilled workers.

Knowledge management systems may have greater significance for (SMEs) in order to maintain the knowledge in the enterprise when co-workers are leaving. In the manual suitable instruments are described to the knowledge transfer and for the documentation of actions.

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<sup>1</sup> The project is funded by the European commission and by own resources of the project participants.

## **2. Instruments of the personnel development against the background of the appearing shortage of skilled workers**

The following chapter presents various groups of instruments and structures that may make them suitable for use by SMEs to conduct demand-based planning and development of long-term personnel development measures. As stated at the outset, careful planning and structuring of measures to reduce the emerging shortage of skilled workers appears to have greater significance for SMEs.

The empirical results of the project show clearly that primarily SMEs have problems with the current and future assessment of the needs of their workers and with the protection of the knowledge management within the company. Here many enterprises recognize the necessity to secure their knowledge; however, clear strategies and processes for addressing these issues are missing. The arranged instruments will give assistance to the enterprises to carry out suitable skill needs analysis of their workers.

Therefore, the first part of this handbook presents instruments for determining and analysing present and future qualification requirements. These were gathered on the one hand from the literature and on the other hand were enhanced in the project, specifically for SMEs. The second part follows with the presentation of instruments that may be able to contribute to the identification, documentation and securing of experienced-based knowledge from skilled workers. The instrument of the Company-Wiki, developed in the project is presented more exactly at the end.

### **2.1 Instruments for identification and analysis of the current and the future qualification need**

Companies must select and develop skilled workers for the present and future tasks. Predictions are not always very reliable and, in addition, some requirements and tasks are subject to rapid changes. "In addition the development requires a constant change from the industry to the service society and further to a knowledge and an information society for the conservation of the job market ability of skilled workers and demands frequently a 'more' of talents and skills, knowledge and qualifications" (Bullinger, Tombeil 2000, p 26). Accordingly, how can future tasks be accurately predicted in order that skilled workers can be developed and trained at a sufficiently early stage? In order to respond to this question, various business instruments for the identification of qualification requirements are presented at this point.

<b>Instruments for the Identification and Analysis of Present and Future Qualification Requirements</b>					
	<b>Structure and Implementation</b>	<b>Application Area</b>	<b>Benefits</b>	<b>Requirements</b>	<b>Outlay</b>
<b>Analysis of Requirement and Job Profiles</b>	<ul style="list-style-type: none"> <li>- Analysis of the job profile description and the current requirement</li> <li>- Comparison of the description and practice required for the skills and abilities</li> <li>- Derivation of differences, gaps</li> </ul>	<ul style="list-style-type: none"> <li>- Positions / department change</li> <li>- Checking of long occupied posts for comparison with changes in the working requirements</li> </ul>	<ul style="list-style-type: none"> <li>- Differences and deviations become apparent</li> <li>- Easier adaptation of the profiles to reality</li> <li>- Derivation of training measures</li> </ul>	<ul style="list-style-type: none"> <li>- Intensive initial training in conducting the analysis</li> <li>- Precise formulation required</li> </ul>	<ul style="list-style-type: none"> <li>- More moderate for existing job profiles otherwise greater time outlay due to intensive training</li> <li>- Regular checking and trained staff required</li> </ul>
<b>Potential Assessment</b>	<ul style="list-style-type: none"> <li>- Precise appraisal and assessment using a criteria grid</li> <li>- Criteria set with a multi-level scale, allocation of assessment figures</li> </ul>	<ul style="list-style-type: none"> <li>- Recording of skill potentials</li> </ul>	<ul style="list-style-type: none"> <li>- Future-oriented, high quality human resources planning</li> </ul>	<ul style="list-style-type: none"> <li>- Execution of structured interviews</li> <li>- Combination of self and outside assessment</li> <li>- Nominal-actual comparison of working requirements with the skills</li> </ul>	<ul style="list-style-type: none"> <li>- High outlay</li> </ul>
<b>Staff Appraisal</b>	<ul style="list-style-type: none"> <li>- Regular (half-yearly / annual) meeting between two hierarchical levels to discuss work-related issues</li> </ul>	<ul style="list-style-type: none"> <li>- Company objectives and the objectives of the superior are broken down into tiered working objectives for the individual employee.</li> </ul>	<ul style="list-style-type: none"> <li>- Reflection on the past period and discussion of the future</li> <li>- Discussion of strengths and weaknesses of the employee, summarising performance</li> </ul>	<ul style="list-style-type: none"> <li>- Good culture of discussion and communication</li> <li>- Mutual trust and respect</li> <li>- Solution-oriented behaviour</li> <li>- Documentation of the meeting</li> </ul>	<ul style="list-style-type: none"> <li>- Intensive preparation (in terms of time and content)</li> </ul>

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<b>Quantitative Demand Analysis</b>	<ul style="list-style-type: none"> <li>- comparably with age structure analysis</li> <li>- Collection of the quantitative need of co-workers</li> <li>- calculation of a balance</li> </ul>	<ul style="list-style-type: none"> <li>- Determination of the actual condition of the age structure</li> </ul>	<ul style="list-style-type: none"> <li>- View into the future by projection of the actual situation</li> <li>- Derivative of a need for action</li> </ul>	<ul style="list-style-type: none"> <li>- Excel application</li> <li>- Estimation of the current and future specialist need</li> </ul>	<ul style="list-style-type: none"> <li>- Little technical expenditure</li> <li>- Moderate temporal expenditure</li> <li>- Automatic calculation</li> </ul>
<b>Specific Development Plan</b>	<ul style="list-style-type: none"> <li>- Production of a specific development plan to current and future specialist situation</li> </ul>	<ul style="list-style-type: none"> <li>- Designation of relevant tasks of work and development stages for an area</li> <li>- Designation of the necessary specialists for each area</li> </ul>	<ul style="list-style-type: none"> <li>- Widening of possible deficits of specialists</li> <li>- Derivative of a concrete development plan</li> </ul>	<ul style="list-style-type: none"> <li>- Obligatory registration platform</li> <li>- Exact estimation</li> </ul>	<ul style="list-style-type: none"> <li>- Easy manageability</li> </ul>
<b>Management Evaluation</b>	<ul style="list-style-type: none"> <li>- Evaluation of different problem fields and possible causes</li> </ul>	<ul style="list-style-type: none"> <li>- Evaluation of the relevance of criteria mentioned</li> </ul>	<ul style="list-style-type: none"> <li>- Automatic derivation of recommendations for action,</li> <li>- Short, medium and long-term measures considered</li> </ul>	<ul style="list-style-type: none"> <li>- Excel application</li> <li>- Exact estimation</li> </ul>	<ul style="list-style-type: none"> <li>- Time expenditure</li> <li>- Little technical expenditure</li> </ul>

Table 1: Summary of Instruments for the Identification and Analysis of Present and Future Qualification Requirements

### **2.1.1 Analysis of Requirement and Job Profiles**

As staff assessment is generally not undertaken in isolation, it usually demonstrates close linkage with other organisational and human resources policy instruments. Such instruments also include job descriptions, job profiles and requirement profiles, only in the light of which can staff and potential assessments be conducted.

#### **Structure and Implementation**

From the analysis of the job profile, its description is investigated in consideration of the competences and skills actually required and demanded. Accordingly, a comparison/juxtaposition takes place between the skills and competences described in the job profile and those required for the accomplishment of a task, generally including the professional competence, method, social, and personality/individual competence (Lindner-Lohmann/Lohmann/Schirmer 2008). Accordingly, the possible discrepancy between the existing and necessary requirements must be clarified in order that this may be overcome by means of targeted qualification measures.

#### **Application Areas**

An opportunity to analyse the requirement/job profile is presented when a new appointment is to be made for a position. It must then be checked to ensure that the job description matches the qualifications required from an applicant. However, the analysis is also suitable for positions that have been occupied for a long time. Here, a check may be conducted into the extent to which the qualifications of an employee match the current requirements of the position.

#### **Benefits**

Above all, a detailed job description creates transparency in human resources planning and orientation for the respective holder of a position by means of explanations of tasks, objectives, establishing competences, and defining areas of responsibility (Lindner-Lohmann/Lohmann/Schirmer 2008).

By analysing the job profile, differences/deviations from the activities currently practised can be easily identified. Thus, the profiles can be more easily adapted to the respective job description. At the same time, it can be analysed whether there is a need for further qualifications in order to practise the occupation competently.

#### **Requirements**

This instrument demands the intensive initial training of those who have to carry out the analysis. Above all, it involves checking the currentness of existing requirement or job profiles. An up-to-date profile description therefore facilitates the analysis and any necessary adaptation of the job profile.

### **2.1.2 Potential Assessment**

The potential assessment is a procedure for the structured checking of the presence of important properties for the fulfilment of certain tasks and requirements. From this investigation, estimates can be made about the potential currently available to carry out future requirements. As such, the analysis can help to identify potential for future tasks.

#### **Structure and Implementation**

The structure of a potential assessment does not conform to a standard design. As such, different variants are conceivable and practicable if not always logical. In general, it may be stated that a differentiated, more extensive criteria grid allows a more precise assessment and evaluation. The method used most frequently is the highly standardised, criteria-based grading procedure. Here, a set of criteria is prescribed and linked to a multi-level scale resembling the school grading system. The evaluations are conducted on the basis of the findings and observations relevant for the assessment. The corresponding evaluations, usually by the superior, are recorded in writing – for example with ticks – on a grid or documented by the allocation of an assessment figure (cf. Breisig 1998; Crisand/Kramer/Schöne 2003).

#### **Application Areas**

Potential assessments can be used in various areas of a company and carried out using different methods. Own (career) potential can be determined e.g. with a structured questionnaire, or a requirement profile can be generated for the purpose of human resources selection. As such, the potential assessment serves to record skill potentials, identifying factors such as knowledge, skills, abilities, motivation and certain personality traits.

#### **Benefits**

The benefit or “prime objective of the potential assessment is to be able to operate future-oriented and high quality human resources (development) planning” (Haenel 2005, p. 96).

The following must be noted as requirements for a potential assessment:

- Functionally differentiated knowledge of the term “potential”,
- Timely identification of people with potential and employees in need of qualifications in order to achieve the required potential,
- Consideration of the factors that determine or may have an impact on the expansion and development of potential (cf. Haenel 2007, pp. 137 ff.),
- Little/no discrepancy in assessment<sup>2</sup>.

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<sup>2</sup> The term “potential” cannot be clearly defined but is predominantly up to the respective observer or the individual person. This may result in a variety of impressions and evaluations, particularly if the

## Requirements

To carry out a potential assessment, it is initially recommended to answer the questions concerning which requirements are to be fulfilled and which potential needs to be available to do this (cf. Rosenstiel 2000). “It therefore involves determining, *breaking down* and *weighing up* the tasks” (Moser, Zempel 2000, p. 185). Following the requirement analysis, a profile is obtained of the tasks for which a certain potential must be in place. This profile is compared with the business requirements and the weaknesses of the employees can be determined and reduced whilst the strengths are developed accordingly. As far as possible, the suitability profile should correspond to the requirement profile. If this is not the case, suitable training measures should be applied which aid in the elimination of this discrepancy.

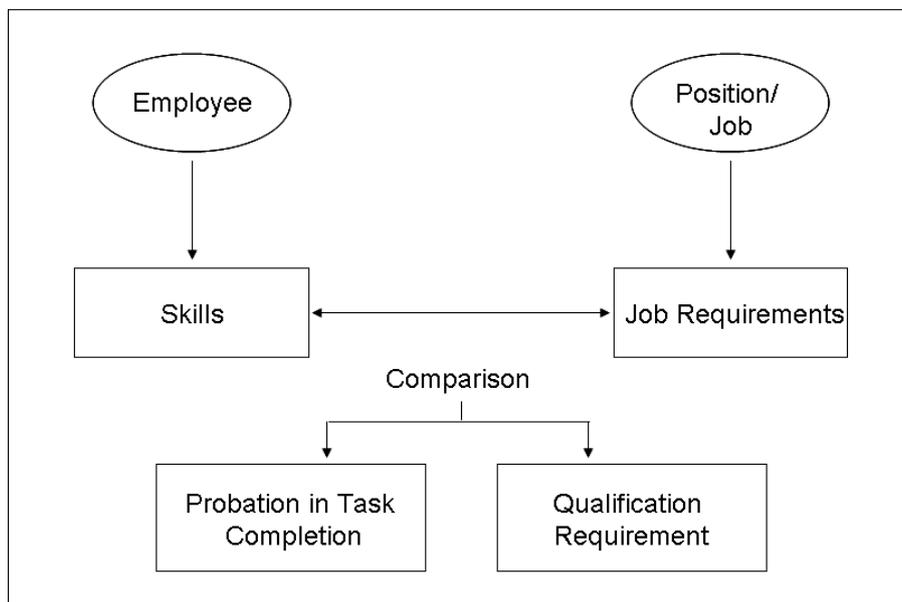


Figure 1: Requirements for Functional Suitability (with reference to Rosenstiel, L. v., 2000, p. 5)

This profile provides an indication of which tasks are important in which way, for which tasks a particularly succinct potential is required and, to which content the potential must extend.

The potential assessment can be implemented by means of structured interviews in combination with an external self-assessment, although a strategic workshop is also conceivable. The analysis can also be embedded in a staff appraisal. Furthermore, a potential assessment may be represented on the basis of a nominal-actual comparison.

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assessment is carried out by untrained/lay people but also in the classic sense due to the difference between self and external perception. (A/N).

### **2.1.3 Staff Appraisals**

#### **Structure and Implementation**

The “staff appraisal” may be seen as a form of communication between two (or more) people of different hierarchical levels within a company, in which specific, work-related content is discussed. Because of the lack of grading of performance and behaviour criteria, as outlined above, and because these are not taken into consideration, the staff appraisal is distinct from these.

#### **Application Areas**

The staff appraisal is often conducted in conjunction with a meeting to agree which objectives are to be developed, defined (agreed) and documented, and measures and resources to achieve the objectives are set. Staff appraisals can follow different aims, e.g. personnel review, qualification or potential identification<sup>3</sup> of co-workers. In staff appraisals in general, it may be stated that the company objectives together with the objectives of the superior are broken down to the extent that tiered working aims for the individual employee can be derived from these objectives.

#### **Benefits**

At the regular (half-yearly or annual) meeting, the participants discuss the past period and look towards the next period of work. The aptitude focuses of an employee are discussed, including strengths and weaknesses. Based on these, agreements are made concerning future tasks, criteria for assessing the results, and development measures.

#### **Requirements**

In order for a staff appraisal to be carried out successfully and for the appraisal to gain mutual respect, a good culture of discussion and communication is required. This also includes prior information about the purpose of such a meeting, specification of the advantages of the meeting, the issuing of an invitation to the meeting, and good preparation by both parties.

### **2.1.4 Early Identification of the Business Qualification Requirement<sup>4</sup>**

“If you wish to exploit new employment potentials and ensure the quality of education and training, you have to rethink and use new, alternative, differentiated instruments and methods for the early identification of qualification needs” (Bullinger, Tombeil 2000, p. 17). The Leonardo project, “Shortage of Skilled Workers” has adopted this

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<sup>3</sup> The different variants of staff appraisals can be found in relevant literature.

<sup>4</sup> The relevant instruments for the early identification of the qualification requirement are described in detail in a brochure. This handbook is available from ITB or from the project homepage, [www.sos-skilled-workers.eu](http://www.sos-skilled-workers.eu).

maxim and designed three instruments for the early identification and prediction of qualification and skilled worker requirements for SMEs in the production sector.

### **Application Areas**

A set of operational instruments for the establishment and early identification of skilled worker potential and demand should provide companies with an aid to the current and future planning and a medium- and long-term development of their staff. Therefore it is important to estimate future requirements (better than previously) and to be able to adjust to acting with greater focus and at an earlier stage.

All three instruments are aimed at the same target group: the skilled workers in SMEs in the production sector.

### **Structure and Implementation**

The instruments described here are based on an Excel application and were deliberately constructed for a simple adaption and use for the specific requirements of enterprises and the target group of skilled workers.

### **Benefits**

With the instruments, the companies should be able to independently analyse the extent to which they are already affected by the problem of the shortage of skilled workers at the present time and whether there is a present and future need for qualification on the level of the skilled workers. Beyond that the selective demand and the number of future specialists can be determined.

### **Representation of the Instruments for the early recognition of the qualification need on operational level**

Three different instruments were developed to forecast the qualification aim and future need for skilled workers:

- 1) Instrument to the quantitative demand analysis for skilled workers (How many skilled workers are needed in the future?):

The first instrument serves to determine the current and future demand for skilled workers in quantitative terms and its basic principles are similar to those of an age structure analysis. It surveys the quantitative demand for employees. From this, the actual situation of the age structure and a differentiated summary of human resources can be shown. Additionally, this tool allows a look at five to ten years in the future by extrapolation of the present situation. From this, a specific action requirement can be derived for human resources development, which meets the requirements of the age structure and of older people.

This instrument should, in a simple way, also motivate companies (SMEs) to carry out human resources planning. The request of this instrument is to provide a tool that

places the planning of the apprentice and skilled worker requirement on a more professional, and databased foundation. The instrument is aimed at SMEs with independent apprentice training and fewer than 100 employees. In this context, it is assumed that the business demand for skilled workers can be covered, at least partially, by internal training. First and foremost, this tool will be usable by those responsible for human resources (possibly in conjunction with training managers).

For the implementation no large expenditure is necessary. On the technical side, the availability of Microsoft EXCEL is essential. For the demand analysis an estimation of the current and future requirement of skilled workers (inclusive production managers) is necessary. To do this, two worksheets are provided in which the individual current status and the demand are to be entered. The results here are calculated from three areas:

- The (expected) year of retirement/leaving date (or end of the training programme) of the employees (apprentices) currently employed,
- The future demand for skilled workers and
- The average proportion of apprentices remaining in the business after the end of their training.

The total is calculated from both the age structure of the employees and from the future demand for skilled workers. Finally, a possible 'skills' deficit can be calculated.

- 2) Specific development plan of the current and future specialist situation with consideration of concrete tasks of work (example mechatronics):

The outcome of the second instrument is the production of a specific development plan for the individual skilled worker and future specialist planning for a certain area. The basis of this instrument is formed by concrete working process-referred tasks of work and possible stages of development for the advancement of the skilled worker. This development model was converted for the range mechatronics.

By means of the instrument, the superior can select relevant tasks of work and possible stages of development for an area. In the second step, he/she determines the number of skilled workers necessary, both for the current and for a future time. Thereby, an early identification is possible of how many co-workers in the respective stages of development (competence level) are needed in the future.

After the future relevant tasks of work are defined for the entire area, each skilled worker can estimate his/her own and future required stage of development. The superior likewise, makes an estimation of the current and future needs of development of the individual skilled workers. Finally, the estimates are compared with one another in order to represent differences. The results of the individual comparison can form the basis for a long-term personnel development.

The instrument is based on an obligatory registration platform, since the personal data should be confidential and not be accessible to all. The instrument is simple to complete and illustrates graphically, the evaluation of the current skilled worker as well as the number of specialists in the respective stages of development needed in the future.

- 3) Company determined problem fields for a shortage of skilled workers (evaluation of problem fields/causes, deduction of measures):

With the third instrument, small and medium sized businesses have an instrument to use in the identification of various problem areas<sup>5</sup> that may lead to a shortage of skilled workers and, from this, be able to evaluate possible resulting causes.

Initially, an analysis of the business requirement is generated by the company directors/management conducting an evaluation with respect to the relevance of six identified problem areas and their possible causes. These six problem areas are:

- Problems/difficulties in the recruitment of apprentices,
- Problems/difficulties in the recruitment of skilled workers,
- Attitude of companies to apprenticeship and training,
- Qualification deficit on the level of skilled workers (further training),
- Fluctuation/retirement of skilled workers and
- General personal competences of the employees required in the company.

The evaluation of the relevance for the criteria mentioned is to be completed. The individual problem areas and their causes are linked to recommendations for specific activities, which are generated automatically depending on an affirmative response to their relevance. These recommendations for action are divided into three areas, which are embedded and represented in a matrix: of short, medium and long-term measures.

The recommendations shown in a second view serve for guidance for the actual use, the detailed generation of substantiated measures to reduce the shortage of skilled workers.

### **2.1.5 Conclusions**

Effective human resources development depends on opportunity for employee participation. Current methods attempt to promote opportunities for employee participation, in order to reinforce the personal development and increase the motivation of the employee. The approaches shown for analysing qualification

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<sup>5</sup> These problem fields were identified in 27 case studies in enterprises and several experts' meetings in Europe.



requirements particularly aim to determine present and future qualification requirements through direct communication processes. The implementation and success of these methods are also heavily dependent on business structures. Here, consideration of day-to-day operation with team or project structures must not be forgotten.

<b>Instruments for the Transfer of Knowledge</b>					
	<b>Structure and Implementation</b>	<b>Application Area</b>	<b>Benefits</b>	<b>Requirements</b>	<b>Outlay</b>
<b>Mentoring</b>	<ul style="list-style-type: none"> <li>- Help and advice from mentor to mentee</li> <li>- Transfer of experience</li> </ul>	<ul style="list-style-type: none"> <li>- Young, inexperienced skilled workers, newly appointed employees</li> </ul>	<ul style="list-style-type: none"> <li>- Orientation and support for new employees</li> <li>- Informal exchange, communication of implicit rules</li> <li>- Construction and promotion of networks, career planning</li> </ul>	<ul style="list-style-type: none"> <li>- Mutual sympathy, sincerity and openness</li> </ul>	<ul style="list-style-type: none"> <li>- Time outlay for regular meetings</li> </ul>
<b>Job Rotation</b>	<ul style="list-style-type: none"> <li>- Systematic job changing</li> <li>- Job enrichment and enlargement</li> </ul>	<ul style="list-style-type: none"> <li>- Procedure for familiarisation with other areas of the company, continued training</li> </ul>	<ul style="list-style-type: none"> <li>- Increasing flexibility, mobility, motivation and productivity</li> <li>- Establishment of other, specialist competences, familiarisation with cross-departmental relationships</li> </ul>	<ul style="list-style-type: none"> <li>- Organisational outlay</li> <li>- Possibility of overloading employees</li> <li>- Productivity may suffer in the initial phase</li> </ul>	<ul style="list-style-type: none"> <li>- Training required</li> <li>- Establishment of a general framework (time, capacities etc)</li> <li>- Not practicable in all areas of the company</li> </ul>
<b>Knowledge Matrix / Knowledge Topography</b>	<ul style="list-style-type: none"> <li>- Can build on the staff (assessment) appraisal</li> <li>- Documentation of performance and abilities in a matrix</li> <li>- Identification, allocation and visualisation of knowledge carriers, content and the knowledge requirement based on internally determined criteria</li> </ul>	<ul style="list-style-type: none"> <li>- Detection / identification of knowledge</li> <li>- Usable and practicable for all employees</li> </ul>	<ul style="list-style-type: none"> <li>- Creation of transparency</li> <li>- Can be used in determining salary</li> <li>- Detailed assessment of the features to be evaluated</li> </ul>	<ul style="list-style-type: none"> <li>- Openness of the people being assessed</li> <li>- Willingness to cooperate</li> <li>- Clear formulation of criteria</li> </ul>	<ul style="list-style-type: none"> <li>- Careful planning and preparation</li> </ul>

<b>Instruments for the Transfer of Knowledge</b>					
	<b>Structure and Implementation</b>	<b>Application Area</b>	<b>Benefits</b>	<b>Requirements</b>	<b>Outlay</b>
<b>Communities of Practice</b>	<ul style="list-style-type: none"> <li>- Self-organised, practice-related community of informally connected people with similar interests or problem situations</li> </ul>	<ul style="list-style-type: none"> <li>- Configuration depending on nature:               <ol style="list-style-type: none"> <li>1. Purely internal to the company</li> <li>2. With few and mainly active members, CoPs with many and active members</li> <li>3. Purely informal</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>- Encouragement of skills through exchange</li> <li>- Quicker problem solving</li> <li>- Expansion of competences</li> <li>- Development of new solution approaches</li> </ul>	<ul style="list-style-type: none"> <li>- Obstacles or difficulties due to results differing from those expected</li> <li>- Success not necessarily directly visible and quantitatively measurable</li> <li>- Consideration of appropriate styles of communication</li> </ul>	<ul style="list-style-type: none"> <li>- Time</li> </ul>
<b>Company Wiki</b>	<ul style="list-style-type: none"> <li>- Alternative to an electronic information and communication platform</li> <li>- Representing, securing and transferring specialist, experience-based knowledge</li> <li>- Principle of a wikipedia (composition, uploading, revision and documentation)</li> </ul>	<ul style="list-style-type: none"> <li>- Rapid access and exchange of knowledge</li> <li>- Usable by all employees (as long as a computer with internet access is available)</li> </ul>	<ul style="list-style-type: none"> <li>- Description of the work process, documentation of problem solving strategies, securing existing knowledge</li> <li>- Optimisation of work processes</li> <li>- Facilitation of “learning bridges”</li> <li>- Transfer of knowledge for education and training</li> </ul>	<ul style="list-style-type: none"> <li>- PC with internet access</li> <li>- “MediaWiki” software</li> <li>- Explanation of responsibilities for content and currentness of content</li> </ul>	<ul style="list-style-type: none"> <li>- Employee training advisable, fairly high initial time outlay</li> </ul>

Table 2: Instruments for the Transfer of Knowledge

## **2.2 Instruments for the Transfer of Knowledge**

As well as the documentation and securing of knowledge, the transfer and communication of knowledge has also become of essential importance for professional decision-making and responsibility in companies of today. Knowledge management has often been mentioned as a significant key instrument in the empirical investigations of the project. This is because “knowledge management and human resources management have a central overlap: the employee, as the carrier of organisational knowledge” (Probst/Gibbert/Raub 2002, p. 1). However precise solutions for realisation often are missing in companies.

On this account, the significance of support facilities for learning and knowledge acquisition and expansion in the work process has increased. In the light of the demographic change mentioned at frequent intervals and the effects of this change, such measures involving younger and older workers alike have become more central (cf. Uhlemann 2000). In the next section, various processes and instruments should therefore provide an overview in order to give companies suggestions of how they may retain knowledge in the company and pass down the knowledge to younger employees/apprentices.

During the composition of the instruments, only those selected supported the collection of experience-based knowledge.

### **2.2.1 Mentoring**

#### **Structure and Implementation**

Mentoring is a human resources development instrument, in which a mentor gives a mentee help and advice. This may be of a personal or technical/professional nature. The aim is to advance the professional development of the mentee through the experience of the mentors (cf. Blickle, G./Schneider, P.B. 2007).

Knowledge identification takes place in the form of mutual exchange and questioning by the mentee. The documentation can be produced by the mentee in the form of personal notes. The exchange of knowledge takes place through the personal exchange.

#### **Application**

This instrument is principally targeted at young, inexperienced employees/skilled workers and at newly appointed employees / skilled workers.

Various types of mentoring are available, e.g. in a team, individual, external, internal, informal or institutional.

## **Benefits and Advantages**

The benefit of this instrument is its helpful orientation, support and the familiarisation it provides e.g. for a new employee. Also, the instrument facilitates advancement outside of the standard superior-subordinate relationship and the mutual 'give and take' means that the mentor too can benefit from the situation.

Among the advantages are the communication of informal and implicit rules, the construction and encouragement of networks, career planning and development. Furthermore, employee loyalty can be fostered e.g. by the more efficient configuration of own activities, contacts made, support plus practical tips and advice and the reinforcement of social and communicative competences.

## **Requirements**

Nonetheless, there are also certain barriers, which could have an inhibiting effect on the relationship between mentor and mentee. These may be the requirement for mutual sympathy, openness and sincerity, and a certain form of action and commitment from both sides. In addition to this, there is the time outlay for the meetings/exchange between the two people. Helpful factors for implementation are therefore mutual willingness and sincerity plus communication skills and a willingness to communicate.

### **2.2.2 Job Rotation**

#### **Structure and Implementation**

"Job rotation" means a systematic change of position in accordance with certain predetermined rhythms and procedures. The purpose of this is to enlarge or enrich the job and to develop and deepen specialist knowledge and experience<sup>6</sup>. The introduction of group or teamwork can be helpful here although it is not a prerequisite.

#### **Application Areas**

The process of job rotation is beneficial for both younger and older skilled workers, from the perspective of familiarisation with other company areas or continued training.

Here, job rotation is considered to be a form of training and life-long learning. However, this process cannot be applied in all company areas. Where it is used, certain criteria must be considered. Thus, e.g. certain framework conditions must be established and observed, such as the time required (including learning/familiarisation with the role), capacities must be available, and the benefit

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<sup>6</sup> Cf. <http://www.wirtschaftslexikon24.net/d/job-rotation/job-rotation.htm> and the federal association of job rotation: <http://www.jobrotation.de/ob/bundesverband/bv.php>

must be identifiable and communicated. In this way, the identification and transfer of knowledge can be guaranteed.

## **Benefits**

This process also holds both advantages and disadvantages. The following factors are evaluated as positive: increased flexibility, mobility, motivation and productivity; expansion of professional and social competences; greater openness and sincerity; familiarisation with cross-departmental relationships; increased identification with the company and the promotion of cross-departmental thinking and action.

## **Challenges**

Disadvantages include the increased organisational outlay as well as the high levels of time and work involved and the possible occurrence of integration problems. It is possible that productivity and efficiency will suffer during the initial phase, the employees may be overloaded, or there may be a lack of willingness due to anxiety over major changes.

### **2.2.3 Knowledge Matrix / Knowledge Topography**

The principle of the knowledge matrix<sup>7</sup> or knowledge topography may be based on a staff (assessment) appraisal, in which the performance, skills and developments are documented and assessed. With this instrument, certain criteria such as performance and skills are visualised in the various disciplines of the professional role, and relevant knowledge content, knowledge carriers and knowledge requirements are identified and assigned to these disciplines. This tool is used to map the knowledge landscape of a company and to create an outline of the strategic knowledge objectives, present and future knowledge requirements, and specific suggestions for covering these requirements. Core competences and expert knowledge can be elicited. The tool highlights development processes and decisions can therefore be made more easily as they no longer have to be made intuitively.

## **Structure and Implementation**

The structure of this process requires the designing of a grid into which individual disciplines, being requested, are integrated. Before initial use of the instrument, it is recommended to check the individual disciplines for coherence. The activities/skills and criteria e.g. social and professional competences to be assessed, are then established. As in the case of the potential assessment, the assessment model can be produced with a standardised grading procedure based on school grades. As

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<sup>7</sup> Cf. Gerick, T.: Return on Information – WissensControlling aus der Praxis: [http://www.competence-site.de/wissensmanagement.nsf/F84015F1EF00D17AC1257409003E93EF/\\$File/wissens\\_controlling\\_return\\_of\\_information-thomas\\_gerick\\_usu\\_ag.pdf](http://www.competence-site.de/wissensmanagement.nsf/F84015F1EF00D17AC1257409003E93EF/$File/wissens_controlling_return_of_information-thomas_gerick_usu_ag.pdf)

such, the figures in accordance with which the assessment is to take place are determined in advance. For the selection of the assessment criteria or disciplines to be graded, a combination of quantitative and qualitative criteria is advised. Such a model can be represented by means of a table, in which e.g. the organisation unit or department, the respective knowledge carriers' names and the individual features are listed. Here, the nature of the knowledge features can be represented in the form of bars (cf. Probst/Raub/Romhardt 2006, p. 68).

Organisation Unit / Department				
Knowledge Features / Knowledge Carriers	Feature a	Feature b	Feature c	Feature d
Person 1				
Person 2				
Person 3				
Person 4				

Figure 2: Knowledge Topography (Assessment of Knowledge Features by Knowledge Carrier), According to Probst et al 2006, p. 68

### Application Areas

The top priority is the detection/identification of the knowledge that is attributed to specific people. A transfer can be facilitated accordingly, although this does not take priority.

This instrument is equally suitable, practicable and logical for all employees, as it allows fundamental identification of the knowledge carriers. Because it must initially be seen as an elaborate process, the implementation must be carefully planned and prepared. Training/instruction may also prove to be helpful. In addition, regular employee questionnaires may support the process.

### Benefits

This process provides advantages in the sense that transparency and comprehensibility are assumed and the process can also be used to determine salaries. Moreover, it provides a detailed evaluation and foundation with respect to

the features to be evaluated. Not least, the exchange and completion of the evaluation and encourages communication.

### **Requirements/Challenges**

Nonetheless, there are a number challenges to be faced with this process, e.g. such as the temporal and organisational outlay. Furthermore, as with many other procedures, it also requires both a corresponding level of openness from the people being assessed and a willingness to co-operate. The purpose of this form of assessment must be clearly formulated and communicated in order to achieve the desired success.

#### **2.2.4 Communities of Practice (CoP)**

The “Community of Practice” (CoP) is a practice-related community of people who are informally associated with each other and have similar interests, face similar problem situations, or have similar tasks. These are not classic “working groups”. The term “community” can refer to both a physical and a virtual community.

The aim of a CoP is the nature of live exchange between participants, as in the case of employees or other interest groups. In relation to employees, this concerns not merely the knowledge from databases and experts but also the development of skills and creativity through which an extensive knowledge transfer takes place. Individual learning processes are interlocked with those of the community and its development. At the same time, changes take place in this community, which have an effect on the individual learning process.

#### **Structure and Implementation**

CoPs are largely self-organised with exchanges and mutual support. CoPs are identifiable from the following three dimensions (cf. Wenger 2004, pp. 73 ff.):

- Mutual engagement
- Joint enterprise
- Shared repertoire

Further skills are developed from this latter dimension, which are established over the course of time. Three types of communities are distinguished:

1. Socially based (original form),
2. Professionally based (target setting with the people exchanging information and forging contacts, directed towards employed people and from which learning networks, networks of experts and so-called “knowledge communities” are formed) and
3. Commercially based (realisation of profits and monetary benefits).

## Application Areas

The form of the CoP is focused on its members, who in turn focus on the direction of the community. Thus a distinction can be drawn e.g. between,

- CoPs that are purely internal within a company and CoPs with the involvement of external members / knowledge carriers,
- CoPs with few and mainly active members and CoPs with many and active or passive members or subgroups,
- Purely informal CoPs and CoPs that are officially integrated into the company etc.

## Benefits

The Community of Practice that is integrated into the company offers advantages in several respects. Firstly, the exchange advances the skills of the members, e.g. quicker problem solving and the expansion of competences. It also has a supporting effect where there are new solution approaches, innovations or “best practices”. Furthermore, the CoP can also provide opportunity for the development of new business areas.

## Requirements

Obstacles or difficulties may be that certain expected or desired results do not occur or do not occur in a specific way, that there is no success or only limited success and that this is measurable in a quantitative way. Another obstacle, in addition to the lack of time, is frequently also a low level of appreciation of CoPs.

### 2.2.5 Company Wiki

#### Structure and Implementation

The Company-Wiki<sup>8</sup> is a variant of the electronic information and communication platform with the options of expansion and of saving and passing on specific specialist and experience-based knowledge. The concept is based on the principle of a wikipedia, which is largely considered to be familiar. The Company-Wiki includes articles and documents from the employees themselves, e.g. about certain work processes. These can be called up, updated and revised/edited (cf. Bachner 2007).

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<sup>8</sup> This instrument, as represented at this point, has been developed and described in greater detail in the context of the conception of a knowledge transfer instrument for the Leonardo project, “Shortage of Skilled Workers”.

## Application Areas

The application of a company wiki works well in the light of the rapid access to knowledge and the exchange of knowledge. Here, the system can be used and operated by every employee, as long as a computer with internet access is available.

A company wiki works well in the light of

- Identification of the problem / work related knowledge of the skilled workers and the creation of transparency over the available knowledge,
- Simple operation in the creation/provision of documents,
- Participation in the knowledge of others,
- Optimisation of work processes,
- Avoidance of errors and identification of problem areas / sources of errors.

## Benefits

Thus, a contribution can be made to describing procedures for individual activities, describing error and problem solving suggestions, and passing on specific (experience-based) knowledge, e.g. specific customer information. In addition, the people listed as experts in a specific field can function as contacts.

The information provided is placed on an open, non-hierarchical user platform in the form of a knowledge database. The benefits of this instrument are in:

- The documentation e.g. of problem solving strategies and customer information,
- Securing and preserving the knowledge within the company,
- The optimisation of work and business processes and the avoidance of errors,
- The facilitation of “learning bridges” by the use of the knowledge provided by the other people and
- The transfer of knowledge for education and training,
- The sustainability of the explicated knowledge and
- The free software.

## Requirements

Certain requirements must be met for the introduction of a company wiki, e.g. the provision of PCs with Internet access for employees and the linking of the free, open-source software “MediaWiki”, which can be downloaded from <http://www.mediawiki.org/wiki/MediaWiki>. Instruction in the use and creation of own wiki pages are also provided on this homepage. Furthermore, at the start, every employee should receive training in technical processes and be made familiar with

the instrument. This also includes a pilot stage, in which practice and testing can be carried out.

## **2.2.6 Conclusions**

Experience-based knowledge often forms the basis for service provision within the company. The special knowledge of production relationships or experience in specific contact with customers and the resolution of tricky problems for the efficient fulfilment of work tasks are important factors for the success of a company. However, the preservation and ongoing development of this knowledge is frequently a large problem for SMEs. The instruments presented here may help with the transfer of knowledge, as they are very easy to configure and the company can implement them for itself.

### **3. Consequence for Implementation and Summary**

The manual shows selected instruments for personnel development, which contribute to the avoidance or reduction of the shortage of skilled workers at “shop floor” level in the producing sector of Europe. Therein, practised beginnings of personnel development that are particularly suitable for SMEs are described as well advanced approaches of the project “Shortage of Skilled Workers”.

Particularly for small enterprises, human resources development is a significant challenge, as they usually do not have adequate resources. Long-term career planning is nearly impossible for workers in these enterprises due to often short term planning. At this point the project tried to set and develop plain and manageable instruments in order to predict, amongst others, the future requirements of skilled workers. In this context it is very important to use these instruments for a constant demand analysis and as far as possible to include all workers in the use and advancement of the instruments. Thus a continuous development of quality can be achieved, that can lead to the increase in motivation of the individuals concerned and, in the classical sense of the organisational development, an increase in productivity.

The implementation of personnel development in SMEs so often fails because of the time related to carrying out the needs analysis and implementation of developmental strategies. With this manual, enterprises have the opportunity to select from different instruments with its specific characteristics to meet the need of the company. Hence a relatively quick comparison and, simple selection of suitable instruments for the skills needs of the company, can be obtained.

The available results lead to the conclusion that an early integration and application of the presented instruments in the personnel and organisational development in enterprises is recommended.

This includes the area of vocational training, where apprentices are instructed to use the instruments. This example allows apprentices a gradual and simple advancement to several instruments. So amongst others managing and working with the contents of a Company-Wiki can be compiled and used for vocational training.

During the implementation it is necessary to pay attention, generally, to a gradual and a stepwise convergency, together with the purposeful involvement of the co-workers. This integration with the persons employed, obtains additional acceptance, identification and motivation.

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