Assessment of Competences Safeguards Sustainable Quality

Eva Vogt
evavogt@uni-wuppertal.de

Petra Winzer
winzer@uni-wuppertal.de

University of Wuppertal
Faculty of Civil Engineering, Mechanical Engineering, Safety Engineering
Research Group Product Safety and Quality Engineering

Abstract

Purpose
The quality of companies is particularly determined by the quality of processes and the abilities, skills and knowledge of the people involved. People with the necessary competences are an important factor of success for enterprises. For their survival on the market an effective organisation of enterprises and a continuous development of the necessary competences are an important condition. Due to this enterprises need an overview of the processes, the personal and process-oriented competences and the conditions to enhance learning. This helps managers to make strategic decisions.

Approach / Methodology
This paper presents a methodology that we called "competence-circle" to prepare systematically a completely process-oriented competence map. In four phases the user gets an overview of the processes and the competences. The regular application of the methodology offers the possibility to identify the improvement potential in processes, recommendations for competence development and the improvement potential to enhance learning.

Findings
The "competence-circle" was tested successfully in a small and medium enterprise, which operates in the industrial sector of management consulting. The result of the practical application was meaningful and important for the strategic development of the enterprise. But the methodology has to be tested in other conditions.

Originality
Important factors for the quality of enterprises are the process organisation and personnel with the relevant competences. Most of the existing methods only assess the personal competences, but it is also important to consider process competences. The new methodology "competence-circle" offers an easy way to assess the competences in connection with the processes. The method, tested in an enterprise of management consulting and also in enterprises of education, is successfully applicable in service enterprises.

Keywords: competence, competence development, human resources, quality

Paper type: Research Paper

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

713

Introduction

As globalisation increases, there are more enterprises in the same fields, products become more and more similar and technology develops very fast. Thus conditions on the market change continually. One consequence is the change from material products to knowledge-intensive services (Heinich, Winzer, Winzer 2006). The customers expect not only products but also services. This forces enterprises to concentrate more on the necessary competences. People with the necessary competences are an important factor of success for companies and in future this effect will continue to grow. From a knowledge-based point of view a change of paradigm related to human resources seems to be inevitable (Figure 1). Not only technology but also the knowledge and the attitude of the people are important factors of success. (Heinich, Wank, Winzer 2003)
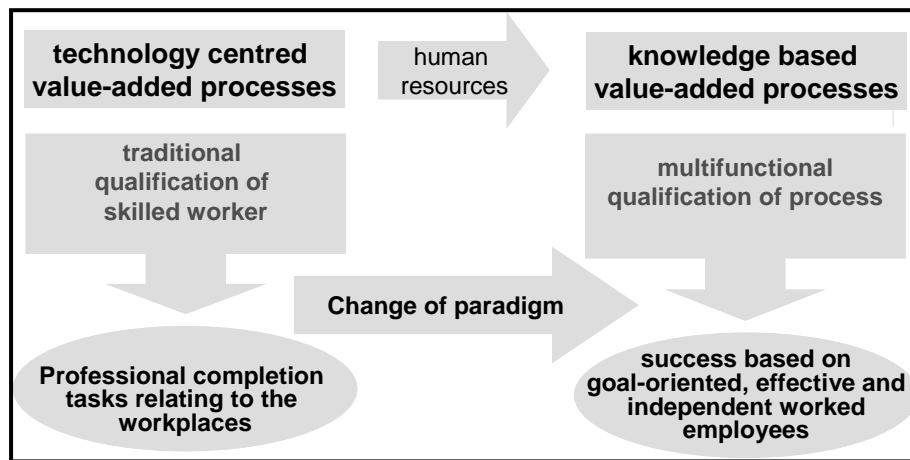

Figure 1: change of paradigm (Heinich, Wank, Winzer 2003)

This development results in new challenges that corporations as well as competitors have to face. To survive on the international market companies have to emphasise their uniqueness. Concentration on special features gives enterprises the chance to compete successfully. In this context the quality of companies is a significant criterion in comparison with other competitors. (Wank 2005b) The quality of enterprises is particularly determined by the quality of processes and the abilities, skills and knowledge of the people involved. Enterprises need a way to manage and optimise the processes and the competences of people. An approach to cover both fields and an example of its application will be presented in this paper.

Competences and their development

The word competence is ambiguous and complex. It is used in many different fields. Because of this there is no standard definition, nor is there a standard methodology. (Erpenbeck, von Rosenstiel 2003; Hartig, Maag-Merki, Klieme 2007) In most of the definitions the competences are subdivided into different categories. (Kaufhold 2006; Erpenbeck, von Rosenstiel 2003) In this paper competences are defined as all the abilities, skills and knowledge of a person. These are only revealed indirectly and can be assessed in performance and in results. Competences can be categorised into professional, methodological and personal competences. Professional competences are abilities, skills and knowledge connected with professional tasks. Methodological competences are abilities to independently develop solutions and learning skills. Personal competences refer to intrapersonal and interpersonal aspects. This means the person's self-image and his/her cooperation with other people. (Wank 2005a) Competences are not constant but variable. They depend

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

714

on situation, personal experience and motivation. This hints at the possibility to change and to develop competences. This process of development includes expanding, improving and refreshing competences. One single assessment of competences does not make sense and is not efficient. Only regular assessment offers the chance to get a realistic overall view and to track the development. (Kaufhold 2006) Training courses, self-organised learning and team-work are possibilities of developing competences. The acceptance and the support of the management are needed for the implementation of these possibilities. The management has to ensure the basic conditions to enhance learning.

The quality of companies depend on to processes and competences
According to DIN EN ISO 9000:2005 quality is defined as the "Degree to which a set of inherent characteristics fulfils requirements". This definition corresponds to the description "Degree of conformance between requirements and results" (Wank 2005b). Relating to the quality of enterprises a great many requirements of different stakeholders arise (Figure 2).
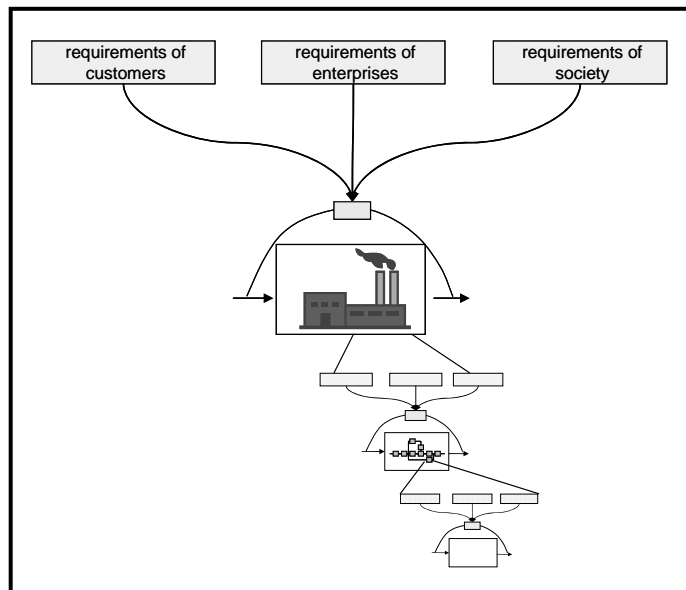

Figure 2: requirements on enterprises (based on Winzer 2002)

The requirements have to be met in each process and sub-process to improve the quality of enterprises. In terms of the process-oriented approach of DIN EN ISO 9000:2005 enterprises have to systematise their structure and optimise their operations. An effective design of processes has a fundamental effect on the quality of enterprises. Processes are defined as a "set of interrelated or interacting activities, which transforms inputs into outputs" (DIN EN ISO 9000:2005). According to the definition the outputs of a process depend on the interaction of inputs, person, working materials and operating resource (Figure 3) (Winzer 1997).

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
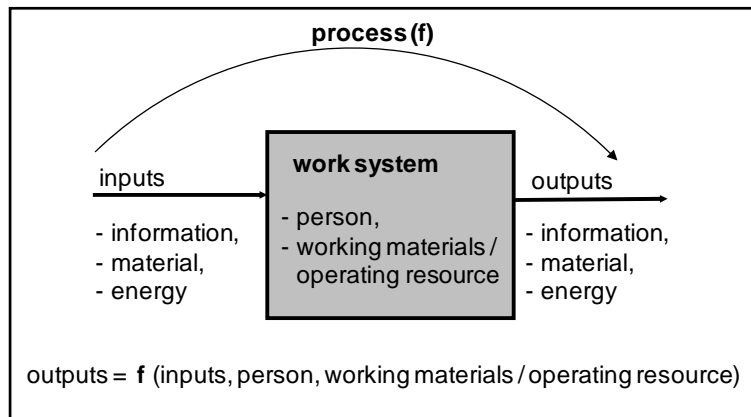Excellence; 20-22 August; 2008 in Helsingborg; Sweden

715

Figure 3: definition of processes (Winzer 1997)

From the knowledge-based point of view the most important factor is the person with his competences. Certain competences are necessary to get results which meet the requirements. For each process a specific profile of the necessary competences is needed, because the necessary competences depend on the task, the working material and the necessary technology among other things. The attribution of these profiles to the processes provides enterprises with a process-oriented competence map (Figure 4).
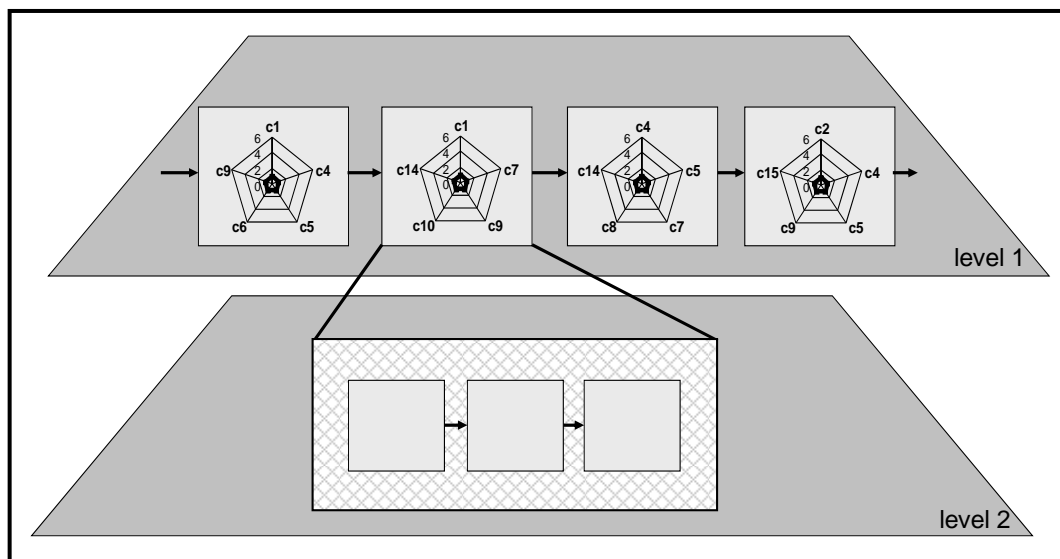

Figure 4: process-oriented competence map

The person needs the relevant competences to obtain results having the required quality. The necessary competences often change due to the dynamic of the requirements. The person has to adapt to these changes to perform his task in the right way. So independent learning becomes more and more relevant. (Bergmann, Pietrzyk 2000) But most of the persons do not know which competences are missing. They need an instrument to discover their shortcomings. By comparing the necessary competences with the existing competences of the people involved it is possible to identify shortcomings and potentials (Figure 5). If shortcomings are discovered, there will be different ways to react. By training courses, team work, changes in task it is possible to develop

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

716

the competences according to the relevant aims. But not every competence of a person is needed in the relevant processes. In this way these potentials can be detected and maybe used for the company. (Wank 2005b)
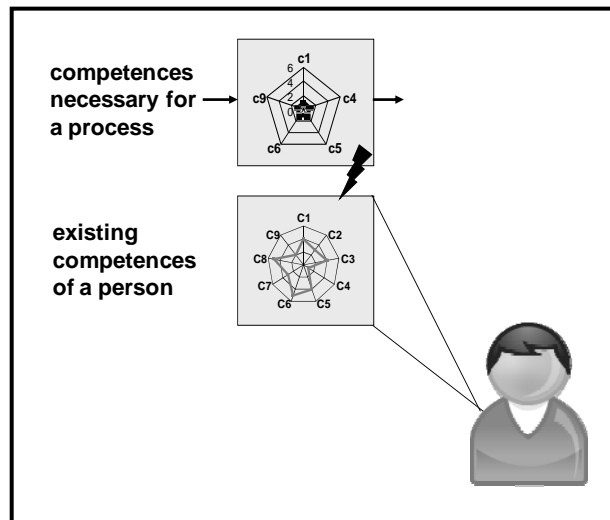

Illustration 5: Comparing the necessary

Figure 5: comparing competences (based on Wank 2005b)

Due to this companies need an overview of the processes and the personal and process competences. An efficient organisation of enterprises and a continuous development of the necessary competences are an important requirement to ensure survivability. This is an approach for managers to safeguard quality and to make strategic decisions. Companies need a method to assess the personal competences in connection with the necessary process competences. A lot of methods only assess personal competence, but this cannot solve the problems. Enterprises also need to assess process competences, which depend on the products and services.

Methodology
The methodology that we call "competence-circle" systematically prepares a completely process-oriented competence map (Figure 6). In four phases the user gets a process map, an overview of improvement potential in processes and recommendations for competence development. On the one hand this model assesses the competences needed for each process and the existing competences of each person. On the other hand the existing and the necessary conditions to enhance learning will be assessed. By comparing these profiles the enterprises can identify the potentials and shortcomings of competences, the improvement potential in processes and the improvement potential to enhance learning. Because of the variability of competences, regular application of the methodology and regular reprocessing of obtained data are important.

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
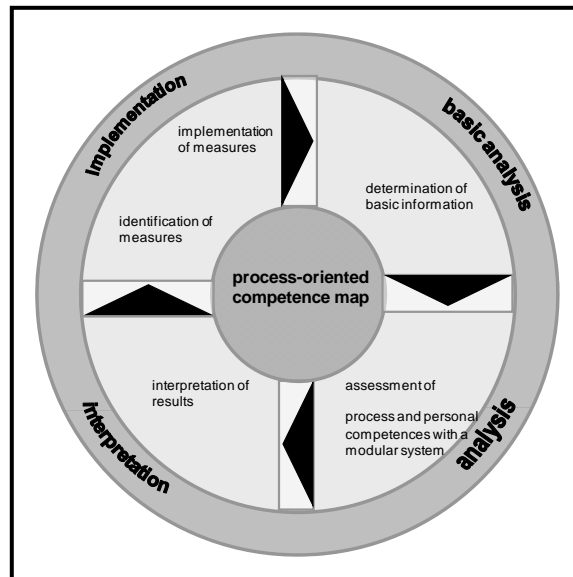Excellence; 20-22 August; 2008 in Helsingborg; Sweden

717

Figure 6: competence-circle

The four phases: basic analysis, analysis, interpretation and implementation have to be applied in the way described below to obtain a useful process-oriented competence map. The basis of the assessment is the analysis of information relating to the company, the persons, the processes and the general conditions to enhance learning. This basic analysis describes the situation in enterprises and is important for the preparation of the next components.

The analysis of the process and personal competences is based on a modular system consisting of a basic and an advanced module (Figure 7). The basic module includes the analysis of the processes and of the competences. Moreover the existing and the necessary requirements to enhance learning will be analysed. The first step which is "analysis of processes" can be left out, if companies have already documented their processes. Based on the information of the processes the people involved will reveal the necessary competences of each process. In the next step the people involved will assess their competences themselves. After this basic module it is possible to compare the necessary and the existing competences and to identify potential areas of development. This assessment results in a quick survey of the competences without investing too much time. However, the results are rather one-sided and subjective. The application of the advanced module yields a more objective and comprehensive result due to the external assessment of the competences of the individuals involved. If both modules have been applied it is necessary to combine the results.
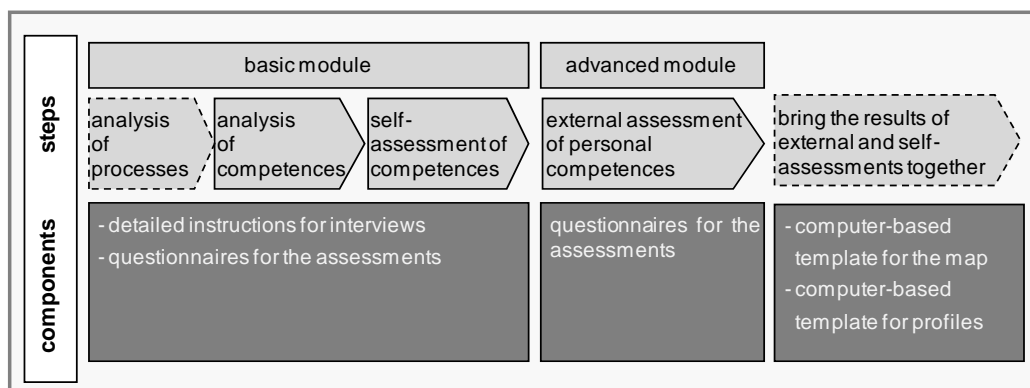

Figure 7: steps to analyse the processes and competences

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

718

The results will be interpreted in the next phase. For each person the existing competences will be compared with the competences needed for the processes in which they are involved (Figure 8). So for each person the areas in which further development is needed are identified. Moreover, hidden potentials will be discovered. Besides, the existing and the necessary conditions to enhance learning will be compared.
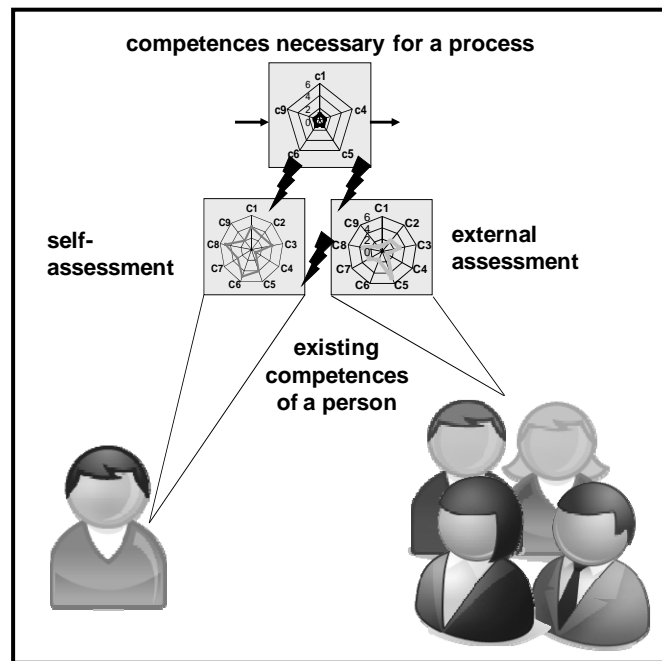

Figure 8: comparison of competences

Finally, in the last phase, appropriate measures will be identified and implemented. A catalogue of possible measures supports the choice. In individual talks with each person these measures will be discussed. If the persons agree to take action in this field they can decide what kind of measures they want to implement. By comparing the existing and the necessary conditions to support learning aspects for improvement can be found. Eventually, the management will be informed and can decide about what to do. There will be a checklist for the implementation and its control for each person and for the company.

The Tool

The methodology called "competence-circle" is supported by different components, like guidelines and questionnaires. For the analysis of the processes and the necessary competences the methodology uses individual interviews with open-ended questions, for which there will be instructions, and a catalogue of competences. To get relevant results of interviews it is necessary to create an atmosphere of mutual trust and transparency (Kaufhold 2006). Questionnaires are used for the self-assessment and the external assessment of the existing competences. The individuals have to assess themselves on a rating scale from 1 to 6. In the anonymous situation of filling in a questionnaire interviewees tend to answer more honestly (Kaufhold 2006).
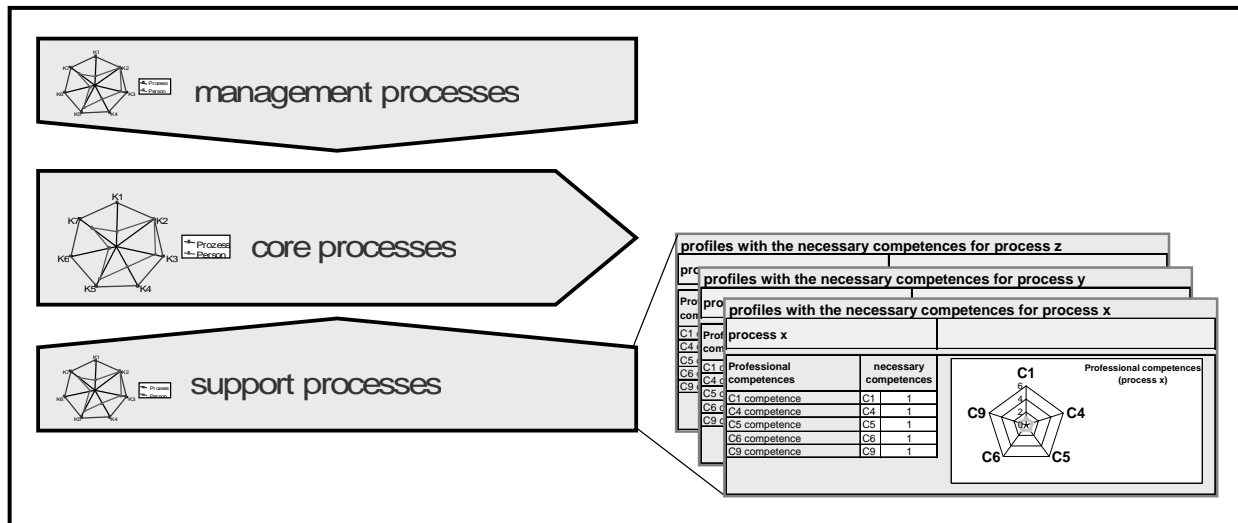
Figure 9: process-oriented competence map

The results of this assessment are
- a process-oriented competence map with profiles for every process revealing the necessary competences (Figure 9),
- a profile of the existing and necessary basic conditions to enhance learning and
- a folder with a survey of the existing and necessary competences for each person (Figure 10).
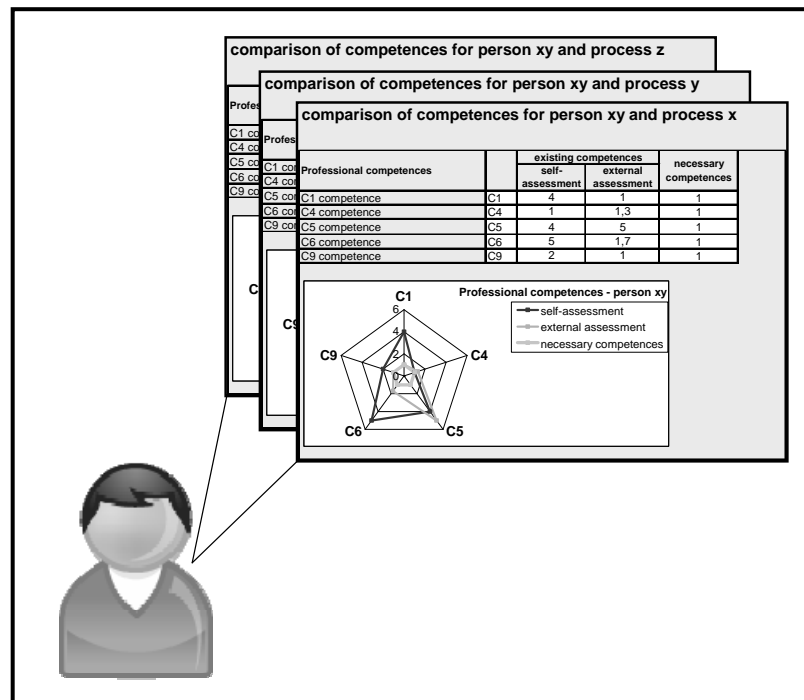
Figure 10: overview-folder for every person

Different tabulations in a clear arrangement indicate the
- potentials and shortcomings of each person,
- improvement potential to enhance learning,
- improvement potential in processes and

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

720

- appropriate measures to develop competences.

These results aim to optimise the processes and to support the development of competences. Based on the measures that are taken the quality of enterprises will be improved. The identification of the shortcomings and the potentials helps to strengthen the core competences of enterprises. In this way enterprises can emphasise their uniqueness and compete successfully.

Results of the example

The "competence-circle" was tested in a small and medium enterprise, which operates in the industrial sector of management consulting. At present the enterprise has no quality management system and no documentation of processes. So an overview of the processes fails to be aware of improvement options. In the past different measures to enhance learning and to develop competences have already been suggested. But these suggestions were not directed to the necessary competences. So the measures were not goal-oriented and not adapted to the employees specific needs. To act more strategically information about the processes and the competences in the enterprise were missing.

The methodology was applied in the following way:

- In this enterprise the complete methodology was implemented. Because of the missing documentation it was necessary to also analyse the processes, besides the necessary competences. Therefore each person was interviewed individually about these aspects. The result was a process map with the appropriate competences.
- The persons assessed themselves by means of questionnaires. So an individual profile of competence was drafted for each person, which was compared with the appropriate processes. In this way potentials and fields in which further development was needed were identified. In individual talks measures were defined. The result was a folder for each person with the necessary and the existing competences and the plan of appropriate measures.
- After the self-assessment the enterprise decided to also implement the advanced module including external assessment. Thus the persons assessed one another. The comparison of the assessments was very interesting because the data were very different in some respects. This external view pointed at different potentials and fields of development.

The result of the practical application was the necessary overview of the processes and competences. The enterprise now has the information needed to improve processes and can purposefully support the employees' learning and studying. The knowledge about the necessary competences makes possible to deploy the employees goal-oriented. Moreover the knowledge about the potentials and shortcomings helps managers to make strategic decisions and to continuously improve the quality of the enterprise.

Outlook

The practical application has shown that the use of the methodology yields meaningful and important results to develop enterprises strategically. The methodology was tested successfully in a small enterprise. The applicability of the method in larger enterprises has to be tested in future. This concerns in particular the external assessment. In general the methodology is still rather difficult and too complex to be implemented for self-application. As the competences and the processes are not static, it is necessary to repeat the assessment regularly. Only in this way enterprises can monitor the competence development and the success of the measures. The possibility to apply the methodology on their own is one of the important requirements. This will in future be fulfilled by means of a computer program.

List of references

Bergmann, B.; Pietrzyk, U. (2000): "Lernanforderungen von Arbeitsaufgaben und Kompetenzentwicklung". *Arbeit - Zeitschrift für Arbeitsforschung, Arbeitsgestaltung und Arbeitspolitik*; 1 (9), 40-53.

DIN EN ISO 9000:2005: *Qualitätsmanagementsysteme – Grundlagen und Begriffe (ISO 9000:2005)*, DIN Deutsches Institut für Normung e.V.; Berlin: Beuth Verlag GmbH

Erpenbeck, J.; von Rosenstiel, L. (2003): *Handbuch Kompetenzmessung – Erkennen, verstehen und bewerten von Kompetenzen in der betrieblichen, pädagogischen und psychologischen Praxis.* Stuttgart: Schäffer-Poeschel Verlag

Hartig, J.; Maag-Merki, K.; Klieme, E. (2007): "Kompetenzbegriff und Bedeutung von Kompetenzen im Bildungswesen". In: Hartig, J.; Klieme, E. (Hrsg.): *Möglichkeiten und Voraussetzungen technologiebasierter Kompetenzdiagnostik.* Eine Expertise im Auftrag des BMBF; Bildungsforschung Band 20; Bonn, Berlin

Heinich, P.; Wank, A.; Winzer, P. (2003): *Wissensgenerierung und -umsetzung im Handwerkernetzwerk.* Abschlussbereicht im Rahmen des Verbundforschungsprojektes: „Humanressourcen als Engpassfaktor für die Entwicklung von kleinen und mittelständischen Unternehmen" (KMU-HR); Aachen: Shaker Verlag

Heinich, P.; Winzer, A.; Winzer, P. (2006): "Strategische Allianzen durch generisches Management zukünftig gestalten". In: Winzer, P. (Hrsg.): *Generic-Management und Möglichkeiten der Stakeholderintegration.* Berichte zum Generic-Management; Band 1/2006; Aachen: Shaker Verlag

Kaufhold, M. (2006): *Kompetenz und Kompetenzerfassung - Analyse und Beurteilung von Verfahren der Kompetenzerfassung.* Wiesbaden: VS Verlag

Winzer, P. (1997): *Chancen zur umfassenden Unternehmensgestaltung.* Frankfurt am Main; Berlin [u.a.]: Peter Lang Verlag

Winzer, P. (2002): *Qualitäts- und Prozessgestaltungstechniken – Teil 2.* Aachen: Shaker Verlag

Wank, A. (2005a): *Begriffe und Konzepte zu Wissen und Kompetenzentwicklung in Unternehmen und Unternehmensnetzwerken.* Berichte zum Generic-Management; Band 3/2005; Aachen: Shaker Verlag

Wank, A. (2005b): *Entwicklung eines Instrumentensets zur Steuerung der Kompetenzentwicklung in Unternehmen und Unternehmensnetzwerken aus der Sicht wissensbasierter Wertschöpfungsketten*, Aachen: Shaker Verlag

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

722

Short biography of the authors

Name: **Dipl.-Ing. Eva Vogt**
Contact: **phone: +49 (0) 202 / 439-2057**
e-mail: evavogt@uni-wuppertal.de

Since 2006	Research assistant and doctoral student at the research group "Product Safety and Quality Engineering", University of Wuppertal
2005	Diploma in safety engineering at the University of Wuppertal

Name: **Prof. Dr.-Ing. Petra Winzer**
Contact: **phone: +49 (0) 202 / 439-2061**
e-mail: winzer@uni-wuppertal.de

Since 1999	University-Professorship for Product Safety and Quality Management, University of Wuppertal
1996	Professorship, TU Berlin, faculty Mechanical Engineering
1995	Auditor for environmental affairs of DGS
1994	Subject auditor for quality of DGQ
1985	External doctorate, TU Dresden, section Work Science
1977	Qualified engineer/ Diploma in Electrical Engineering and Work Organization, TU Dresden

11th QMOD Conference. Quality Management and Organizational Development
Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

723