

## KEEPING EXPERTS FOCUSED - THE BIGGEST MANAGEMENT CHALLENGE -

RAINER ERNE  
LEEDS METROPOLITAN UNIVERSITY

### ABSTRACT

*What are the crucial challenges in managing experts?*

*Some researchers state that the measurement of experts' productivity is to be regarded as the biggest challenge. Others claim that an expert's autonomy with respect to organisational goals and regulations poses specific challenges to her/his management. A third group of researchers perceive the contribution to and the usage of collectively shared knowledge as the biggest challenge. This question, however, has never been empirically explored from a cross-industrial point of view.*

*The paper here presented closes this research gap by examining, in five expert organisations from different business sectors, which topics line managers and experts regard as specific challenges in managing expert work.*

*The study demonstrates that from an expert's perspective, the biggest challenge consists in managing her/his own work, e.g. parallel streams, multiple-task switchings as well as heterogeneous stakeholder requirements. This is commonly regarded as a challenge which, so far, cannot be solved on the organisational, but only on an individual level.*

*The study also reveals that management inadvertently represents one of the sources of this challenge. The findings call for solutions with a view to minimising said challenges on an organisational level.*

**Key words:** *knowledge worker, expert, management, challenge*

Email: [rainer.erne@idp-lab.org](mailto:rainer.erne@idp-lab.org)

Tel: +49-(0)7141-4881223, Fax: +49-(0)7141-4881224

## 1 Introduction

*'The proper management of professional employees is among the most difficult problems facing the business enterprise' (Drucker 2006, p.337).*

One of the great achievements of Peter F. Drucker, who is called the 'man who invented management', is said to be his ability to anticipate key management challenges decades in advance (Byrne & Gerdes, 2005). He defined the management of knowledge workers as the biggest 'management challenge of the 21<sup>st</sup> century' (Drucker 1999a; Drucker 1999b; Drucker 2006).

Irrespective of the designation for that new type of knowledge-worker workforce, nearly all surveys of past decades point to a fundamental structural change in the labour markets of the OECD countries:

- There has been, from 1985 onwards, a 10 percentage-points increase in the so-called 'derivative services', e.g. consulting, coaching, teaching, researching, developing and management work (Weidig et al. 1999; Dostal & Reinberg 1999; Dostal 2001; Reinberg & Hummel 2002).
- The number of occupations in the categories 'manager', 'professional' and 'associate professional' or 'technical occupation' has increased by 10 percentage points over the last two decades (UK National Statistics 2000; Baldwin & Beckstead 2003; Beckstead & Gellatly 2004; UK National Statistics 2006; Davenport 2005; US Department of Labor 2006; Brinkley 2006).
- The demand for employees with an academic education increased by 190 percentage points between 1975 and 2004, whereas the demand for employees with a lower educational background is continually decreasing (Weidig et al. 1999; Kleinert et al. 2000; Dostal 2001; Reinberg & Hummel 2002; Reinberg & Hummel 2005; OECD 2006a; OECD 2006b).
- Levy & Murnane (2006) noted a disproportional increase in the demand for two skill requirements within the US labour force between 1979 and 1999: 'expert thinking' and 'complex communication'. In contrast to this development, they observed that the demand for manual and routine cognitive skills has been continually decreasing within the same time frame.

These employees who are engaged in derivative services such as consulting, coaching, teaching, researching and developing, i.e. in services requiring the non-routine application of specialised knowledge to individual cases, shall be termed 'experts' hereafter. They are to be regarded as a specific type of knowledge workers (Davenport 2005) and comprise the traditional professions, e.g. physician and lecturer, as well as new ones, e.g. management consultant and software developer (Mieg 2000; Mieg 2001).

There has been abundant discussion on the question of the challenges involved in experts' management as well as on the strategies employed in order to render experts productive.

This paper aims at pointing out three findings:

1. There are three basic streams of research focusing on three different key challenges involved in managing experts. All three streams of research are, however, lacking in empirical evidence.
2. In the empirical and cross-industrial research undertaken for the purpose of this study, it has been found out that managing their own tasks is seen as the crucial challenge by all experts in all investigated branches of industry. The perspective of their managers, on the other hand, is not commensurate with aforementioned experts' perspective. This lead to the finding that managers regularly and unconsciously enforce the multitasking and task-switching working mode of their

expert associates. Based on this perception, this study regards management as part of experts' productivity loss problem, not as its solution.

3. In order to solve the multitasking and task-switching problem in expert work, three different solutions on three different organisational levels could be implemented. These solutions were the result of the empirical research undertaken by the author and have been partially tested in management practice.

The paper starts with a brief literature review on the subject of the challenges commonly associated with managing experts, professionals and knowledge workers (chapter 2). The presented concepts are being reviewed and, as a consequence, an alternative research design is being proposed (chapter 3). Chapter 4 exhibits the major outcomes of the empirical research undertaken by this study from a cross-industrial point of view. Finally, possible solutions for handling above-mentioned challenges will be presented (chapter 5).

## **2 Literature review**

This study refers to existent literature investigating the specific characteristics of experts, professionals and knowledge workers - concepts which overlap with the concept of expert suggested here. Dependent on how the specific characteristics of professionals and knowledge workers are defined, researchers have focused on differing challenges involved in managing them. In summary, three different streams of research on the three challenges involved in managing professionals and knowledge workers can be identified:

1. the challenge of defining and measuring expert productivity
2. the challenge of motivating professionals for organisational goals, tasks and standards
3. the challenge of disseminating and using knowledge within an organisation

Said three challenges will be briefly presented, explained and reviewed in the chapters to come.

### **2.1 The challenge of defining and measuring expert productivity**

From the point of view of cognitive psychology, an expert's specific characteristic consists in his or her ability to solve domain-specific problems faster, more effectively and more accurately in comparison to 'novices' in their respective fields (Posner 1988; Ericsson & Smith 1991; Gruber & Ziegler 1996; Ericsson 2006; Chi 2006). While cognitive psychology examines the structure and the methods of experts' outstanding domain-specific capabilities in a laboratory context, the question arises again when expert work is embedded in an organisational context.

In a business context, therefore, one crucial challenge identified is how the 'productivity' of experts can be defined and measured. This question was first posed

by Peter F. Drucker regarding knowledge workers (Drucker 1999a; Drucker 1999b; Drucker 2006) and has, since, led to a stream of research on the definition and measuring of knowledge worker productivity.

Researchers, in this tradition, tried to define knowledge worker productivity in terms of a relation between the output and the input of work (Sink 1985; Thomas & Baron 1994). Unlike traditional productivity metrics, they also used qualitative parameters such as time invested in value-adding tasks in relation to total working time (Ray & Sahu 1989; Clark & Wheelwright 1993; Picard 1998) or earned values in relation to total working costs (Davis 1991; Merrifield 1994; Klassen, Russell & Chrisman 1998). Neither approach, however, answers the question of what exactly value-adding tasks in expert work are and how they can be determined.

This, in turn, provoked approaches such as the Function Point Analysis in software development, which tries to determine value-adding tasks with respect to realised functions (Garmus & Herron, 2000) or the Decision Making Units Approach which defines a relative productivity index according to output and input variables for each decision in the same organisational context (Charnes, Cooper & Rhodes 1978; Charnes et al. 1994; Paradi, Smith & Schaffnit-Chatterfee 2002).

Said metrics may be valid for and applicable to routine knowledge work, as Ray & Sahu (1989) and Ramirez & Nembhard (2004) showed. For non-routine expert work which generally deals with individual cases or projects there is still no commonly accepted approach for the definition and measurement of expert productivity (Ray & Sahu 1989; Davis 1991; Drucker 1999a; Ramirez & Nemhard 2004; North & Guldenberg 2008; Bosch-Sijtsema, Ruohomäki & Vartiainen 2009; North 2010).

The challenge of defining and measuring expert productivity, therefore, remains. This affects basic management principles since it is still commonly accepted that *'if you can't measure it, you can't manage it'* (Kaplan & Norton, 1996, p.21).

## **2.2 The challenge of motivating professionals for organisational goals, tasks and standards**

Other scholars view the specific characteristics of experts from a sociological perspective. They perceive an expert's competence in interpreting and solving a certain set of problems within a specific domain as her/his distinctive characteristic and label them, in this perspective, as 'professionals' (Abbott 1988; Hitzler 1994; Mieg 1994; Hitzler 1998; Mieg 2001; Pfadenhauer 2003; Evetts, Mieg & Felt 2006).

The attribution and embodiment of competence in a specific domain postulates a certain degree of autonomy for the expert at work, which is *'the very soul of professionalism'* (Freidson, 2001, p.217).

Adopting this perspective, the crucial challenge in managing highly autonomous professionals is how to motivate them for organisational goals, tasks and standards. This question has been raised by organisational sociology and organisational psychology with respect to conflicts between professionals and organisations (Gouldner 1957; Kornhauser 1962; Montagna 1968; Sorenson & Sorenson 1974;

Kerr, Von Glinow & Schriersheim 1977; Bailyn 1988; Raelin 1991; Grossmann, Pellert & Gotwald 1997; Schimanek 2005; Kogan & Teichler 2007) and is equally relevant from the business perspective regarding the management of knowledge workers (Alvesson 1995; Tampoe 1993; Drucker 1999a; Drucker 1999b; Scarborough 1999; Kubo & Saka 2002; Newell et al. 2002; Darr 2003; Alvesson 2004; Davenport 2005; Benson & Brown 2007; North & Gueldenberg 2008).

With regard to this point of view, one can distinguish three different modes of autonomy:

1. Autonomy regarding whether and to which extent an expert makes knowledge-intensive contributions to the business of an organisation, often also called organisational commitment (Meyer & Allen 1997; Dick 2004). In this respect, professionals and knowledge workers are often rather seen as investors than as employees in their respective organisation (Ulrich 1998; Drucker 1999a; Drucker 1999b; Kelloway & Barling 2000)
2. Autonomy in determining the goals and priorities of an expert's work, which has also been termed 'strategic autonomy' (Forsyth & Danisiewicz 1985; Bailyn 1988; Ulich 2005)
3. Autonomy in determining the methods, resources and organisation in the realisation of given goals and priorities, also called 'operative autonomy' (Bailyn 1988; Ulich 2005).

According to these three modes of autonomy, researchers have investigated and developed propositions on

1. how to attract and retain professionals and knowledge workers within an organisation (Tampoe 1983; Kubo & Saka 2002; Thompson & Heron 2005; Nelson & McCann 2010)
2. how to motivate professionals and knowledge workers for the goals and priorities of an organisation (Bailyn 1988; Raelin 1991; Tampoe 1993; Grossmann, Pellert & Gotwald 1997; Kubo & Saka 2002; Darr 2003; Davenport 2005; Benson & Brown 2007).
3. how to motivate professionals and knowledge workers for work standards ensuring quality and efficiency in expert work on an organisational level (Bailyn 1988; Raelin 1991; Tampoe 1993; Grossmann, Pellert & Gotwald 1997; Kubo & Saka 2002; Darr 2003; Davenport 2005; Benson & Brown 2007).

Generally speaking, the solutions proposed consisted in the designing and forming of organisational programmes, structures and behaviour according to the motivational disposition of professionals and knowledge workers. In other words: An organisation is well advised to satisfy professionals' motives of personal growth, operational autonomy, task achievement as well as material and immaterial rewards by institutionalising reward systems, career paths, challenging employment and adequate resources (Bailyn 1984; Tampoe 1993; Kubo & Saka 2002; Horwitz, Heng & Quazi 2003; Petroni & Colacino 2008).

Two questions, however, remain: Firstly, are said motivators really effective in every situation or are they apt to 'crowd out' existing intrinsic motivators, as some researchers suggest with respect to monetary rewards (Osterloh & Frey 2000;

Osterloh & Frey 2006; Weibel, Rost & Osterloh 2010). Secondly, what is to be done if an organisation is not in a position or willing to adopt organisational programmes, structures and behaviour in compliance with the motivational demands of experts, professionals and knowledge workers?

Therefore, the motivation of experts for organisational goals, tasks and standards remains to be one of the crucial challenges the organisation has to address.

### **2.3 The challenge of disseminating and using knowledge within an organisation**

A third stream of research views knowledge workers from a business-oriented perspective, i.e. primarily as knowledge-intensive resources for the creation of complex products and services for clients outside and inside of an organisation. In this perspective, knowledge workers only create value for an organisation if they are able and willing to apply, to create and/or to disseminate value-adding knowledge to and for the benefit of external and internal clients; knowledge which, in turn, becomes part of the organisational knowledge base (Pfißner & Stadelmann 1999; Drucker 1999a; Scarborough 1999; Newell et al. 2002; Davenport 2005; Hube 2005; North & Guldenberg 2008; North 2010; Probst, Raub & Romhardt 2010).

From this point of view, the crucial challenge of managing experts consists in the question of how value-adding knowledge can be disseminated within an organisation.

In this perspective, knowledge has to be viewed as a resource which differs from resources like manpower, equipment and material assets in three respects:

1. Knowledge is intangible and has to be made transparent.

Unlike tangible assets, knowledge can neither be perceived nor quantified. It can only be captured via verbal or documented representations. Consequently, knowledge, present in an organisation, is neither tangible nor can it be measured, but has to be made transparent and available displaying a required content in the right form (Hansen, Nohria & Tierney 1999; Sun & Scott 2005; Probst, Raub & Romhardt 2010).

2. Knowledge is contextual and contingent on individuals.

Knowledge is different from data and information. It is developed in the process of an integration of individually significant information into an existing cognitive context in which said information has to be interpreted and evaluated. Different individuals will interpret and use equal information differently. Making data and information available does, therefore, not necessarily mean that it is being viewed as relevant or value-adding by its intended receivers in any specific situation. This explains the concepts of 'absorptive capacities' (Cohen & Levinthal, 1990), 'not-invented-here syndroms' (Katz & Allen, 1982) and 'defensive routines' (Argyris & Schön 1974; Argyris 1991).

3. Knowledge is public and will not be easily shared.

Since property rights cannot be applied to knowledge, nobody can be excluded from its usage. It can be seen as a kind of public good (Stieglitz, 1999). This, in turn, advances the risk of social dilemmata, especially that of 'free-riding' when it is being shared within an organisation (Dawes 1980; Frost, Osterloh & Weibel 2011). The willingness to share knowledge in an organisation, therefore, is not to be postulated,

but has to be enforced. Crucial factors which enforce the dissemination of knowledge are cultural norms as well as personal relations (Sun & Scott 2005; Lin & Lee 2006; Ardichvili et al. 2006).

Owing to above-mentioned characteristics of knowledge, the sharing and usage of relevant knowledge within an organisation constitutes a challenge. Two types of strategies have, so far, been employed in order to handle said challenge (Nonaka 1994; Hansen, Nohria & Tierney 1999; Chai & Nebus 2011):

1. Codification strategies try to render implicit knowledge in an organisation explicit and available to many users by recommending IT solutions with the help of which information can be structured, retrieved and commonly used (Alavi & Leidner 2001; Richter & Derballa 2007). This strategy allows for a high re-use of information which is made accessible to a discretionary number of users while bypassing personal communication needs. The challenge, however, of contextualising knowledge as well as that of enforcing the willingness to share it, remains unsolved by this strategy.

2. Personalisation strategies try to facilitate the dissemination of implicit knowledge by enforcing direct communication between experts and non-experts. This strategy allows for a direct contextualization of knowledge according to individual demand (Nonaka 1994; Hansen, Nohria & Tierney 1999; Chai & Nebus 2011). At the core of personalisation strategies lies the institutionalisation of communities of knowledge (Wenger, 2008). By using this strategy, implicit context-based knowledge can be shared and the generation of new knowledge is fostered. Deviations in the quality and relevance of personally imparted knowledge, on the other hand, and the enforcement of the willingness to share relevant information are two remaining problems.

Despite considerable progress that strategies facilitating the dissemination of knowledge and experts' contribution to and usage of organisational knowledge have, so far, made, certain challenges still remain to be faced.

The literature review undertaken in the context of this study shows that the defining and measuring of expert productivity, that the motivation of experts for organisational goals, tasks and standards as well as that the dissemination and usage of knowledge within an organisation may be seen as the crucial challenges in managing experts. There are, however, some research gaps yet to be addressed, which question if these challenges are actually valid in the daily business of experts in different kinds of organisations.

### **3 Research gaps and research design**

The review of the existing approaches in defining the specific challenges involved in managing experts presented in chapter 2 uncovered three research gaps:

1. A conceptual gap

The concept of the expert as an associate, in the sense expounded in chapter 1 of this study namely of being engaged in the non-routine application of specialised knowledge to individual problems, overlaps with the concept of expert in cognitive psychology, with the concept of professions in occupational sociology and with the

concept of the knowledge worker in business theory; those concepts are, however, not entirely congruent with the approach we undertook to propose in this paper. It could, therefore, be declared that the challenges involved in managing experts have not yet been investigated.

## 2. A theoretical gap

The challenges involved in managing professionals and knowledge workers have been derived from presumed specific characteristics of said workforce. They need not occur in all industries, organisations and circumstances. Yet, it is not known under which conditions they occur, nor is it clear which challenges are genuine for expert work. This calls for an empirically based theory of challenges involved in managing experts.

## 3. A methodological gap

The challenges so far identified were taken from three streams of research methodologies: firstly, from quantitative or qualitative case studies in specific industries or occupational groups and they have been generalised to apply to all industries and occupational groups. Secondly, from cross-industrial studies investigating only one aspect such as the motivation of experts. Thirdly, from theoretical considerations on the characteristics of knowledge work and, respectively, of professional work, from which the challenges have been derived. Hence, those challenges have never before been examined in a cross-industrial empirical study as opposed to the studies so far conducted.

These findings invite cross-industrial empirical research aiming at a theory of the challenges involved in managing experts.

This paper presents answers to above-mentioned research gaps, based on a cross-industrial empirical multiple case study research (Myers 2009; Yin 2009) carried out in five different organisations commonly regarded as 'expert', 'professional' or 'knowledge-intensive' organisations (a software development company, a hardware development company, a consulting company, a hospital and a university) in previous treatises (Grossmann, Pellert & Gotwald 1997; Alvesson 2004; Davenport 2005; Brinkley 2006).

In these organisations, 42 semi-structured episodic face-to-face interviews with experts and their managers from three hierarchical levels, accompanied by document analysis and focus groups (Flick 2000; Bortz & Döring 2003; Lamnek 2005) were conducted by the author in order to develop a theory of the challenges and strategies involved in managing experts. The data gathered by means of interviews were subsequently coded and interpreted using the coding methodology proposed by Strauss & Corbin (1990) with the aid of Atlas.ti, Version 5.5.4 (Figure 1).



### Fig.1

Figure 1: Cross-industrial research design on the challenges of managing experts

Owing to confidentiality agreements with all participating organisations, the results here presented have been described in an aggregated and abstracted manner. Hence, the original data cannot be disclosed, only referenced.

In the following chapter, the line managers' perspectives and those of the experts on the question of which key challenges they perceive in managing experts are being presented in an overview.

## 4 Research results

### 4.1 Line managers' perspectives

The perspectives of the line managers on the question of which key challenges they perceive in managing expert performance comply to a certain extent with the challenges delineated in previous research and exposed in chapter 2.

One challenge has been commonly perceived as the key challenge by all line managers across the different industries and management levels: the challenge of motivating experts for organisational priorities, which correlates closely with the sociological point of view referred to in chapter 2.2.

The topics, however, for which experts are to be motivated differ across the five organisations studied:

In the software development business studied, in which software engineers specify and develop software functions for mainframe computers in large business environments, the main challenge perceived by the line managers was to motivate experts *'to leave their ... their 'innate' domain of expertise in order to move to another one with uncertain ends. (...) For managers such changes are easier to cope with, from my perspective, since they are working with tools and methods which are easier to transfer to a different domain. ... /Ehm/ For experts who have acquired expert status and expert knowledge in extremely complex domains it is much more difficult'* (InterviewTranscript\_Software\_R). The department managers referred to the same

challenge on a rather operational level, *'My job is to take up the strategies of [company name] and to try to implement them via the team manager in the respective software teams'* (InterviewTranscript\_Software\_B).

A very similar challenge was being named by the line managers of the consulting organisation. Here, the consultants are engaged in the support of business customers, solving strategic and operative IT-infrastructure issues. Since in this business, changes occur even faster than in software development, the crucial challenge is *'to realise in time where the train is heading to and /eh/ that we take the right measures to steer our associates in the right direction with respect to /eh/ behaviour, skills /eh/ as well as technologies'* (InterviewTranscript\_Consulting\_W). This is being perceived as challenging since it seems to be difficult *'to govern individualists in such a way that they perceive the goals of [company name] ... /eh/ as their own goals'* (InterviewTranscript\_Consulting\_Wz).

The challenge of motivating experts for organisational priorities has also been named by the chancellor and the deans of the university, but with a slightly different meaning. In the 'university business', the primary challenge does not consist in aligning experts with rapidly changing market demands, but to counterbalance the individual interests and priorities of the professors with the priorities of the faculties and the university, *'The main challenge in the role of a dean is /eh/ ... /eh/ to try to create a climate in which the given freedom, the given freedom, which I regard as being important, is used effectively not only in order to pursue one's own individual interests, but also to pursue the overall development of the institute or the faculty'* (InterviewTranscript\_University\_L). The chancellor, then, went on to corroborate his opinion that this is not easily achieved, *'The task of a chancellor is nothing else, but ... to institutionalise good conditions that these highly intrinsically and, of course, also extrinsically motivated individuals ... are able to deliver good work. He can control a little. I think, in fact, ... I see my main task in equipping this ship here, which is on its way and which is, at times, steering pretty clumsily in one direction, as well as possible. And this is, ... - to use the same metaphor - not to steer this ship in a completely reverse direction'* (InterviewTranscript\_University\_T).

Another example for the challenge of motivating experts for organisational priorities has been broached by the chief physicians of the hospital with respect to their associate physicians in the respective departments, *'All the documentation is annoying. Today, in the morning we have, we have to create this /eh/ these ICD codes in order to get our scores, the LFK scores, to get them, and so on. .. Up to now, administration has created the codes. .. It is evident that administration has no time left to do that and says: The physicians should do that. If we, then, reply, why should we do that? They answer: That are your scores and not ours. ... (...) Okay, ... now my physicians counter today in the morning: This is a mess, this is so much work to do. Then I tell them: Slowly, slowly, what does that mean now? ... Yes, that we have to do this now, ... we cannot do anything about it. .. (...) Therefore, we have to accept it. (...) Hence we turn the tables and ask ourselves: What can we do about it in a positive way? Administration has never optimised the scores. We need these scores for our negations. ... Yes, then we optimise them from now on. We figure a way out to get the most out of it by investing as little effort as possible. (...) ... If we*

*manage to do this in a smart way, we might reach some positive outcomes for us with minimum effort'* (InterviewTranscript\_Hospital\_DH).

In the hardware development organisation, finally, in which electrical engineers develop circuit boards and casings for the automotive industry, the challenge of motivating experts for organisational priorities has been broached by the department heads in, again, yet a different sense. Since this organisation underwent a major reorganisation one year prior to our exploration, the main challenge faced by the department heads was *'to keep the associates on track. Since the frustrations, ... since the problems always finally accumulate on my desk, /ehm/ to retain the associates for the organisation is the crucial task I am faced with. And, simultaneously, to bring the whole organisation into a more stable state'* (InterviewTranscript\_Hardware\_SCM).

As can be seen in all five organisations, the line managers commonly mention the motivation of experts for organisational priorities as being their crucial challenge in the management of experts. This is due to the fact that management is concerned with governing priorities while experts enjoy a great deal of operational and also strategic autonomy in their field of work.

Differences between the five organisations studied relate to differing priority contents, such as the adaptation to changing market demands or the decision for a medical treatment. A closer look into each single organisation reveals that the priority contents depend on the actual situation of the organisation's business.

Regardless of the priority contents, however, line managers use the same management techniques in order to cope with above-mentioned challenges:

1. They employ the management-by-objectives system in order to define and control organisational and developmental priorities on an annual basis,
2. They focus their attention on certain important topics which cannot be adequately controlled on an annual basis,
3. They issue incentives and / or directives where possible and adequate in order to have organisational and developmental priorities done,
4. They try to buy experts in for organisational and developmental priorities since the realisation of said organisational and developmental priorities strongly depends on the experts' commitment, especially in 'white box management' systems,
5. They design and control individual posts and positions and development plans in order to balance personal and organisational interests.

To sum up, the managerial task of governing priorities combined with an expert's autonomy (in her/his respective field of work) results in the challenge for the line managers to win the experts' favour for organisational priorities. This challenge is handled by techniques such as management-by-objectives, focusing the management's attention on selected topics, by issuing incentives and/or directives, by a buy-in of experts as well as by a modelling of positions according to the predilection of their holders and by the development of plans balancing personal and organisational interests. The priority contents as well as the need for governing priorities and the effectiveness of the strategies employed are dependent on the

actual business situation. These correlations are depicted in Fig. 2 derived from the structure of a 'grounded theory' which has been proposed by Strauss & Corbin (1990):

*Fig. 2*

*Figure 2: A theory of the challenges of managing experts from the perspective of line managers*

#### **4.2 Experts' perspectives**

Summarising the point of view of the experts of the five organisations studied was more easily and precisely achieved than the summarising of the point of view of the managers: The predominant challenge was seen as the management of their own expert work. This challenge has been commonly labelled as 'time management' or 'self management' (Allen 2002; Covey 2005; Drucker 2008) but has rarely been regarded as being the crucial challenge in expert work.

Managing their own expert work also had slightly different nuances in meaning for the experts of each organisation:

In software development it meant, '*... that from [land in Europe] there are always many requests relating to technique, relating to organisational issues. /Ehm/ ... Sure, if there are any customer issues, that is also every time an interruption of ... my daily work. This happens very often*' (InterviewTranscript\_Software\_Ba). Said interrupts come from the outside as well as from the inside of the organisation, '*In our business, reliability is not very high. (...) This means, if the company decides, as an example, here we cut and /eh/ and /eh/ just as an example, here we delay something, ... then I could have agreed on any delivery date. I would have had no chance whatsoever to keep this agreement*' (InterviewTranscript\_Software\_G).

In the consulting business, '*the main challenge consists in structuring and /eh/ in prioritising the different tasks which you perform in parallel in an effective way and /eh/ and that ... you arrive at a balancing of the different tasks done*' (InterviewTranscript\_Consulting\_L). Another aspect has been brought forward by a consultant who is responsible for the small-and-medium-business segment, '*In midmarket, that is, in the small and medium businesses in which, in most cases, only one business partner is engaged, it is often the case that I get, as an example, on Tuesday /eh/ ... a long e-mail with twenty attachments and that I have to deliver till,*

say, Thursday. Such are our, our ... our challenges, you see” (InterviewTranscript\_Consulting\_F).

The same challenge has been mentioned by the professors of different faculties and institutes, *‘The daily challenge is /eh/ the assignment of our own resources. There is, for sure, for all associates in our organisation /eh/ an explicit discontentment in regard of ... /eh/ research and /eh/ time. (...) Especially lack of time for research. That is that. /Eh/ It is an issue, so to speak, something, ... yes ... /eh/ ... with which I am also personally /eh/ struggling’* (InterviewTranscript\_University\_B). The same challenge has also been named by colleagues from other faculties, *‘From time to time I make some plans and from time to time it works, but not to the desired extent, yes. This, this, time management is certainly a challenge which you have to learn and, and, for which, unfortunately, it has here up to now ... I mean, at the time I grew up, here, in this system, this was not known, it did not exist. It was not clear that time management is something you have to learn and, also, where you have to gain experience’* (InterviewTranscript\_University\_N).

The physicians in the hospital, regardless of the medical department in which they worked, named that very challenge (in a different sense) as their major one, *‘The biggest challenge is that you /ehm/ ... cannot plan your daily work very well. (...) The patients come as they like to. Then ... I do, for example, not only an ultrasonic scan and the diagnostic part, but also surgeries. That means, it could be one surgery or two surgeries. It can go well so that you are finished after one hour. Or it could go wrong so that you need four hours. (...) And everything else will not be done or will be delayed and, ... yes, ... the lack of predictability’* (InterviewTranscript\_Hospital\_DM). Another aspect of managing one’s own work has been mentioned by a fellow physician from another department, *‘We have to complete a huge amount of administrative work for the department. (...) And this is annoying when you have to do it in the evening during overtime hours. We are not allowed to work overtime. Our boss feels the pressure from the administrative departments. (...) And nobody wants this’* (InterviewTranscript\_Hospital\_DR).

These are the same challenges also faced by the hardware engineers of the hardware development organisation. One engineer who develops circuit modules for customer projects stated, *‘The biggest challenges are the changing aims and objectives. Not the internal ones, but the ones which come from outside [of our team] and disrupt everything’* (InterviewTranscript\_Hardware\_W). A colleague of his brought the challenge of managing one’s own work forward in a slightly different meaning, *‘There is a huge amount of topics which buzz through this organisation and /eh/ ... that means to work on the right topic at the right time, ... /eh/ is, for sure, the main challenge. /Eh/ Right now, at the beginning of this week, I said to myself: I have to lean back here and think about what is really important. Since you get lost very easily, so to speak. (...) It is like in a rat race: jumping from one e-mail to the next one and from one topic to the next topic ... and you start to lose the big picture: What are the important things, what is actually our /eh/ our strategic goal, ... topics which you should take care of. This is, in my perspective, the ... the main challenge: to manage the balance between operative daily necessities and to go into a distance,*

*from time to time, in order to think about where we are heading to'*  
(InterviewTranscript\_Hardware\_P).

Irrespective of the industry and the management system in which the experts worked, managing their own work was seen as the crucial challenge from the point of view of software and hardware developers, consultants, professors as well as physicians. Managing their own tasks meant: There are numerous tasks and priorities to be handled, permanent task switching is to be managed, in some areas, little predictability of the work and also numerous stakeholders inside and outside of the organisation are to be satisfied. The multiple stakeholders and stakeholder requirements, changing over time, are, therefore, to be seen as the main cause for this challenge which was affirmed by all experts interrogated.

The aforementioned challenges are managed by the experts purely on an individual level: Some experts define their own priorities in order to cope with the amount of tasks and requirements. Others try to improve on structuring their working time, so that they have 'quiet slots' in the mornings or evenings in which they can accomplish their concentration-intensive work, and they plan for it on a daily, weekly or monthly basis. A third approach consists in trying to align one's stakeholders and their requirements with one's own tasks.

In summary, due to multiple and changing stakeholders and stakeholder requirements, experts are faced with the challenge of managing their own expert work and coping with phenomena such as numerous parallel tasks and information, continual task switching as well as with little predictability of work. They try to counteract these challenges on an individual level by defining their own priorities, establishing and using 'quiet slots' as well as by aligning stakeholder requirements with their own work scope. All three parameters, i.e. the causes, challenges and strategies, mainly depend on the degree of strategic and operational autonomy an expert has. The more autonomy she or he has, the less is he dependent on fulfilling stakeholders' requirements, the smaller is the challenge and the more effective the strategies to cope with it. This correlation becomes evident when comparing the professors' situation in university with the situation of the physicians in the hospital. While the first group enjoys the highest degree of autonomy in the organisation studied, the second group possesses the lowest. Consequently, the first group has the privilege simply of ignoring some of their stakeholders and their requirements while the latter is under the constraint to fulfil those requirements to a much higher degree. Hence, the challenge of managing one's own work is, by far, more pronounced for the physicians than for the professors and, reversely, the options of coping with said challenge are more demanding on the physicians than on the professors.

The correlations between stakeholder requirements, the challenge of managing one's own expert tasks and individual strategies to handle these are depicted in Fig. 3:

*Fig. 3**Figure 3: A theory of the challenges of managing experts from the perspective of experts*

When comparing the perspectives of the line managers to those of the experts, in the five organisations studied, one was prone to come to the conclusion that the challenges which line managers perceive have no relation to the challenges which are seen by the experts.

This conclusion, however, is wrong as a closer look and the results of the focus groups show.

#### **4.3 Managing experts is part of the problem, not its solution**

Taking the perspective of line managers in the context of expert work, their main task consists in governing priorities by defining and implementing the strategic orientation of an organisation in alignment with their sponsors' and customers' interests. With few exceptions, not detailed here, they understand their role in such a way as to entirely refrain from intervening with the professional work of the experts reporting to them. The policies pursued by them could be described with the help of the following interjections and statements: *'Don't interfere!'* (InterviewTranscript\_Software\_R), *'Don't tell them!'* (InterviewTranscript\_Consulting\_W), *'Let them be self-employed employees'* (InterviewTranscript\_University\_B), *'They are completely autonomous'* (InterviewTranscript\_Hospital\_DK), and respectively, *'I am completely dependent on them'* (InterviewTranscript\_Hospital\_Hardware\_S). Therefore, they have to define and monitor strategies, tasks and resources on a rather abstract level which does not directly interfere with the experts' daily work.

The experts, on the other hand, repeatedly stated that the line managers are to their own work nothing more than further stakeholders who can be added to the already existing list of stakeholders of internal and external customers, sales, administration and fellow experts in related domains. Moreover, the line managers as an additional stakeholder group add additional requirements to the experts' work. This statement can be corroborated by analysing the annual goals, the incentives and directives as well as the topics on which line managers place attention in the different organisations, such as

- the additional development and management of patents and integrated features in software development,
- the publication of papers and the acquisition of new customers in consulting,
- the organisation of conferences or the acquisition of third-party funds in scientific and academic work,

- the establishment of interdisciplinary centres in the hospital,
- the reorganisation of one's own work in hardware development.

Taking both perspectives into account, it became obvious how the specific challenges which line managers perceive are linked to the challenges which experts mention. They 'act' as additional stakeholders' requirements and are implemented by means of the management-by-objectives technique, management attention, incentives, directives, buy-in activities, the implementation of individual job designs and of development plans. These additional stakeholder requirements inadvertently compound the challenging situation of experts, who already struggle with their daily stakeholder requirements. This relation is depicted in Fig. 4.

*Fig. 4*

*Figure 4: Interrelations between management and expert actions*

This lead to the conclusion that managing experts, as presented in the five organisations investigated, is part of the management problem, not its solution. This management problem, moreover, has deteriorating effects on expert productivity as repeatedly stated by organisational psychologists (Rubinstein, Meyer & Evans 2001; Monsell 2003; Spira & Feintuch 2005). According to their findings, multitasking and task switching which are perceived as the crucial challenges by experts approximately account for a 20%- to 40% -loss in expert productivity. Taking this point of view, not the definition and measurement of expert productivity as proposed in chapter 2.1 is to be viewed as the major challenge, but not deteriorating it by managing them.

These findings call for a redefinition of management principles in a professional context in which the work of experts is concerned. Line managers are able to support the self-management of experts and their productivity by following one central principle: By keeping experts focused, or, as Malik (2006) and Drucker (1999a; 1999b) put it, by focusing them on few things. In other words, managing expert work



cannot be left to the knowledge workers alone, but has to be supported on an organisational level.

The study here presented designed and tested measures to keep experts focused on three levels. This was achieved with the help of the participants interviewed (Fig. 5):

*Fig. 5*

*Figure 5: Measures to keep experts focused on three different levels*

1. On an individual level, the establishment of 'quiet slots' included the performing of concentration-intensive tasks like the analysis of customer specifications, the writing of system specifications or the reviewing of test reports in flexible time bands, either early in the morning or late in the evening while using meeting rooms or the experts' home offices instead of open-plan offices. This was implemented as a work option for everyone in the organisation by providing additional 'quiet rooms' respectively making working times more flexible. Additionally, the experts found out that the 'agile planning' of their work day is much more effective than a detailed long-term planning which might never be realised owing to continual changes of schedules.

2. On a group or project level, 'consultation hours' have been established in order to allow engineers as well as their internal customers to perform concentration-intensive tasks within the usual office hours, sidestepping internal disturbances by the phone or by meetings. Between 10:00 a.m. and 12:00 a.m. the group had such 'quiet slots' and was, during that time, assisted by a first-level support who dealt with urgent inquiries.

Beyond that, short 15-minutes 'stand-up meetings' have been established instead of weekly one-hour meetings, since meetings had been determined to represent one of the most aggravating time killers in the organisation. This resulted in meeting time being used in an enhanced and more efficient manner.

3. On an organisational level, there have been attempts to restructure the job design in the direction of creating few comprehensive tasks instead of numerous small tasks with a view to keeping experts focused. Additionally, workshops called 'systematic waste disposals' have been organised in order to stipulate tasks no longer worth pursuing.

The effects of the 'quiet slot' and 'consultation hour' approaches when compared with the performing of the same tasks in usual office conditions are depicted in Fig 6 with respect to three engineering tasks:

- creating a system specification,
- analysing a test specification and
- answering a complex customer request.

*Fig. 6*

*Figure 6: Effects of 'quiet slots' and 'consultation hours' on expert tasks*

The aforementioned measures could serve as a guideline towards which line managers might orientate their role behaviour when working with experts in a professional context. They point in a direction which does not require a complete transformation of management, but requires a more precise management, which exactly balances the need for organisational change with the need for individual focusing.

## **5 Conclusions**

The paper here presented undertook to identify crucial challenges in managing experts. Experts have been defined, by this study, as associates whose main task consists in the non-routine application of general knowledge to specific cases. In literature, management challenges with respect to experts have never been investigated. Said management challenges have, however, been abundantly explored in the literature on professionals and knowledge workers. Said literature

proposes that the definition and measurement of productivity, the motivation for organisational goals and standards and the contribution to as well as the usage of organisational knowledge are to be regarded as the major challenges.

In the study here presented, which undertook to explore five different expert organisations from five different industries, the challenges so far determined by literature on the subject were not fully corroborated. Line managers in software and hardware development, consulting, a hospital environment and in a university commonly view the motivation of experts for organisational goals and standards as the crucial challenge in managing experts. Hardware and software engineers, consultants, physicians and professors, on the other hand, regard the management of their own expert work, i.e. dealing with parallel streams of tasks, numerous task switchings as well as heterogeneous stakeholder requirements, as their main challenge.

It has been found out that line managers in expert organisations inadvertently contribute to this situation, since governing organisational priorities implies nothing else as additional stakeholder requirements from the point of view of experts. The main task of line managers, therefore, consists in balancing their own task of governing priorities with the need of keeping experts focused and concentrated on their predominant tasks. This study undertook to design and test different measures such as establishing 'quiet rooms', 'consultation hours' and 'systematic waste disposal' to support the focusing of experts.

With respect to management theory it can be stated that the challenges so far identified in literature are also valid for the management of experts, as understood by this study. They do, however, not commonly apply to all kinds of organisations and industries and are not to be regarded as the crucial challenges. The crucial challenge in managing experts, according to the findings of this study, consists in the balancing of organisational priorities with the need to keep experts focused. Regarding this challenge more research is needed in order to design strategies and methods. Moreover, the devising of measures to determine the effects of the designed strategies and methods would be useful.

As for management practice, the roles, principles and tasks of line managers in expert organisations have to be revised. Instead of operating on a purely strategic level by continually confronting experts with new and numerous 'topics' which have to be implemented, the new task of line managers would consist in keeping experts focused. This means identifying those few topics which are crucial for the respective business and shielding experts against any additional impinging activities.

## Literature

Abbott, A. (1988) **The system of professions: an essay on the division of expert labor**. Chicago, University of Chicago Press.

Alavi, M. & Leidner, D.E. (2001) Knowledge Management and Knowledge Management systems: conceptual foundations and research issues. **MIS Quarterly**, 25 (1), pp.107-136.

Allen, D, (2002) **Getting things done: the art of stress-free productivity**. London, Penguin.

Alvesson, M. (1995) **Management of knowledge intensive companies**. Berlin, De Gruyter.

Alvesson, M. (2004) **Knowledge work and knowledge-intensive firms**. Oxford, University Press.

Ardichvili, A. et al. (2006). Cultural influences on knowledge sharing through online communities of practice. **Journal of Knowledge Management**, 10(1), pp.94-107.

Argyris, C. (1991) Teaching smart people how to learn. **Harvard Business Review**, 69 (3), pp.99-109.

Argyris, C. & Schön, D.A. (1974) **Theory in practice: increasing professional effectiveness**. Oxford, Jossey-Bass.

Baldwin, J.R. & Beckstead, D. (2003) **Knowledge workers in Canada's economy, 1971-2001**. Statistics Canada Analytical Paper. Ottawa, Statistics Canada.

Bailyn, L. (1988) Autonomy in the industrial R&D lab. In: Katz, R. ed. **Managing professionals in innovative organizations: a collection of readings**. New York, Ballinger, pp.223-236.

Beckstead, D. & Gellatly, G. (2004) **Are Knowledge Workers found only in high-technology industries?** Statistics Canada Analytical Paper. Ottawa, Statistics Canada.

Benson, J. & Brown M. (2007) Knowledge workers: what keeps them committed; what turns them away. **Work Employment Society**, 21 (1), pp.121-141.

Bortz, J. & Döring, N. (2003) **Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler**. 3. überarb. Aufl. Berlin, Springer.

Bosch-Sijtsema, P.M., Ruohomäki, V. & Vartiainen, M. (2009) Knowledge work productivity in distributed teams. **Journal of Knowledge Management**, 13 (6), pp.533-546.

Brinkley, I. (2006) **Defining the knowledge economy: knowledge economy programme report**. Research Paper. London, The Work Foundation.

Byrne, J.A. & Gerdes, L. (2005) The man who invented management: Why Peter Drucker's ideas still matter. **Businessweek** [Internet], November 28, 2005. Available from: <[http://www.businessweek.com/magazine/content/05\\_48/b3961001.htm](http://www.businessweek.com/magazine/content/05_48/b3961001.htm)> [Accessed 20 January 2009].

Chai, K.-H. & Nebus, J. (2011) Personalization or codification?: a marketing perspective to optimize knowledge reuse efficiency. **IEEE Transactions on Engineering Management**, 58 (2), pp.1-19

Charnes, A., Cooper, W., Lewin, A. & Seiford, L. (1994) **Data Envelopment Analysis: theory, methodology and application**. Boston, Kluwer Academic Publishers.

Chi, M.T.H (2006) Two approaches to the study of experts' characteristics. In: Ericsson, K.A. et al. eds. **The Cambridge handbook of expertise and expert performance**. Cambridge, University Press, pp.24-27.

Clark, K.B. & Wheelwright, S.C. (1993) **Managing new product and process development: text and cases**. New York, Free Press.

Cohen, W.M. & Levinthal, D.A. (1990) Absorptive capacity: a new perspective on learning and innovation. **Administrative Science Quarterly**, 35 (1), pp. 128-152.

Covey, S.R. (2005) **7 habits of highly effective people: powerful lessons in personal change**. Rev. ed. London, Simon & Schuster.

Darr, A. (2003) Control and autonomy among knowledge workers in sales: an employee perspective. **Employee Relations**, 25 (1), pp.31-41.

Davenport, T.H. (2005) **Thinking for a living: how to get better performance and results from knowledge workers**. Boston, Harvard Business School Press.

Davis, T. (1991) Information technology and white-collar productivity. **Academy of Management Executive**, 5 (1), pp.55-68.

Dawes, R.M. (1980) Social dilemmas. **Annual Review of Psychology**, 31, pp.169-193.

Dick, R. van (2004) **Commitment und Identifikation mit Organisationen**. Göttingen, Hogrefe.

Dostal, W. (2001) **Neue Herausforderungen an Qualifikation und Weiterbildung im Zeitalter der Globalisierung**. Gutachten im Auftrag der Enquete-Kommission ‚Globalisierung der Weltwirtschaft‘. Berlin, Deutscher Bundestag.

Dostal, W. & Reinberg, A. (1999) **Arbeitslandschaft 2010. Teil 2: Ungebrochener Trend in die Wissensgesellschaft**. IAB-Kurzbericht, Nr.10. Nürnberg, Institut für Arbeitsmarkt- und Berufsforschung.

Drucker, P.F. (1999a) **Management challenges for the 21st century**. New York, Harper.

Drucker, P.F. (1999b) Knowledge-worker productivity: the biggest challenge. **California Management Review**, 51 (2), pp. 79-94.

Drucker, P.F. (2006) **The practice of management**. New York, Harper.

Drucker, P.F. (2008) **Managing oneself**. New York, McGraw-Hill.

Ericsson, K.A. (2006) An introduction to Cambridge Handbook of Expertise and Expert Performance: its development, organization, and content. In: Ericsson, K.A., Charness, N., Feltovich, P.J. & Hoffman, R.R. eds. **The Cambridge handbook of expertise and expert performance**. Cambridge, University Press, pp.3-19.

Ericsson, K.A. & Smith, J. (1991) Prospects and limits of the empirical study of expertise: An introduction. In: Ericsson, K.A. & Smith, J. eds. **Towards a general theory of expertise: prospects and limits**. Cambridge, University Press, pp.1-38.

Evetts, J., Mieg, H. & Felt, U. (2006) Professionalization, scientific experience, and elitism: a sociological perspective. In: Ericsson, K.A., Charness, N., Feltovich, P.J. & Hoffmann, R.R. eds. **The Cambridge handbook of expertise and expert performance**. Cambridge, University Press, pp. 105-123.

Flick U. (2000) Episodic interviewing. In: Bauer, M. & Gaskell, G. eds. **Qualitative researching with text, image and sound: a handbook**. London, Sage, pp.75-92.

Forsyth, P. & Danisiewicz, T.J. (1985) Toward a theory of professionalization. **Work and Occupations**, 12 (2), pp.59-76.

Freidson, E. (2001) **Professionalism: the third logic**. Cambridge, Blackwell.

Frost, J., Osterloh, M. & Weibel, A. (2010) Governing knowledge work: transactional and transformational solutions. **Organizational Dynamics**, 39(2), pp.126-136.

Garmus, D. & Herron, D. (2001) **Function Point Analysis: measurement practices for successful software projects**. Upper Saddle River, Addison-Wesley.

Gouldner, A.G. (1957) Cosmopolitans and locals: toward an analysis of latent social roles. **Administrative Science Quarterly**, 2 (3), pp. 281-306.

Grossmann, R., Pellert, A. & Gotwald, V. (1997) Krankenhaus, Schule, Universität: Charakteristika und Optimierungspotentiale. In: Grossmann, R. Hrsg. **Besser Billiger Mehr: Zur Reform der Expertenorganisation Krankenhaus, Schule, Universität**. Wien, Springer, S.24-35.

Gruber, H. & Ziegler, A. (1996) Expertise als Domäne psychologischer Forschung. In: Gruber H. & Ziegler, A. Hrsg. **Expertiseforschung: Theoretische und methodische Grundlagen**. Opladen, Westdeutscher Verlag, S.7-16.

Hansen, M.T, Nohria, N. & Tierney, T. (1999) What's your strategy for managing knowledge? **Harvard Business Review**, 77 (2), pp.106-116.

Hitzler, R. (1994) Wissen und Wesen des Experten: Ein Annäherungsversuch – zur Einleitung. In: Hitzler, R., Honer, A. & Maeder, Ch. Hrsg. **Expertenwissen**. Opladen, Westdeutscher Verlag, S.13-30.

Hitzler, R. (1998) Reflexive Kompetenz: Zur Genese und Bedeutung von Expertenwissen jenseits des Professionalismus. In: Schulz, W.K. Hrsg. **Expertenwissen: Soziologische, psychologische und pädagogische Perspektiven**. Opladen: Leske + Budrich, S.33-47.

Horwitz, F.M., Heng, C.T. & Quazi, H.A. (2003) Finders, keepers?: attracting, motivating and retaining knowledge workers. **Human Resource Management Journal**, 13 (4), pp.23-44.

Hube, G. (2005) **Beitrag zur Beschreibung und Analyse von Wissensarbeit**. Dissertation, Institut für Arbeitswissenschaft und Technologiemanagement der Universität Stuttgart.

Kaplan, R. S. & Norton, D. P. (1996) **The Balanced Scorecard: translating strategy into action**. Boston, Harvard Business School Press.

Katz, R.L. & Allen, T.J. (1982) Investigating the 'Not Invented Here' (NIH) syndrome: A look at the performance, tenure, and communication patterns of 50 R&D project groups. **R&D Management**, 12 (1), pp.7-19.

Kelloway, E.K. & Barling, J. (2000) Knowledge work as organizational behaviour. **International Journal of Management Reviews**, 2 (3), pp.287-304.

Kerr, S., Von Glinow, M.A. & Schriesheim, J. (1977) Issues in the study of professionals in organizations: the case of scientists and engineers. **Organizational Behavior and Performance**, 18 (2), pp.329-345.

Klassen, K.J., Russell, R.M. & Chrisman, J.J. (1998) Efficiency and productivity measures for high contact services. **Service Industries Journal**, 18 (4), pp.1-19.

Kleinert, J. et al. (2000) **Globalisierung, Strukturwandel und Beschäftigung**. Tübingen, Mohr Siebeck.

Kornhauser, W. (1962) **Scientists in industry: conflict and accommodation**. Berkeley, University of California Press.

Kogan, M. & Teichler, U. (2007) Key challenges to the academic profession and its interface with management: some introductory thoughts. In: Kogan, M. & Teichler, U. eds. **Key challenges to the academic profession**. Kassel, Jenior, pp.9-15.

Kubo, I. & Saka, A. (2002) An inquiry into the motivations of knowledge workers in the Japanese financial industry. **Journal of Knowledge Management**, 6 (3), pp.262–271.

Lamnek, S. (2005) **Qualitative Sozialforschung: Lehrbuch**. 4. vollst. überarb. Aufl. Weinheim, Beltz.

Levy, F. & Murnane, R.J. (2006) **How computerized work and globalization shape human skill demands**. MIT IPC Working Paper 05-006 [Internet], Boston, Massachusetts Institute of Technology. Available from: <<http://web.mit.edu/ipc/publications/pdf/05-006.pdf>> [Accessed 09 January 2007].

Lin, H.S. & Lee, G. G. (2006) Effects of socio-technical factors on organizational intention to encourage knowledge sharing. **Management Decision**, 44 (1), pp.74-88.

Malik, F. (2006) **Führen, leisten, leben: Wirksames Management für eine neue Zeit**. Komplett überarb. Neuaufl. Frankfurt, Campus.

Merrifield, B. (1994) Measurements of productivity: key to survival. **International Journal of Technology Management**, 9 (5-7), pp.771-784.

Meyer, J.P. & Allen, N.J. (1997) **Commitment in the workplace: theory, research, and application**. Thousand Oaks, Sage.

Mieg, H.A. (1994) Die Expertenrolle. **Arbeitspapier Nr. 3** [Internet], Zürich, Institut für Umweltnatur- und Umweltsozialwissenschaften. Available from: <[http://e-collection.ethbib.ethz.ch/ecol-pool/incoll/incoll\\_405.pdf](http://e-collection.ethbib.ethz.ch/ecol-pool/incoll/incoll_405.pdf)> [Accessed 05.05.2006].

Mieg, H.A. (2001) **The social psychology of expertise: case studies in research, professional domains, and expert roles**. Mahwah, Lawrence Erlbaum.

Montagna, P.D. (1968) Professionalization and bureaucratization in large professional organizations. **American Journal of Sociology**, 74 (2), pp.138-145.

Monsell, S. (2003) Task Switching. **Trends in cognitive sciences**, 7 (3), pp.134-140.

Myers, M.D. (2009) **Qualitative research in business and management**. Thousand Oaks, Sage.



Nelson, K. & McCann, J.E. (2010) Designing for knowledge worker retention & organization performance. **Journal of Management and Marketing Research**, 3 (January), pp.1-18.

Newell, S. et al. (2002) **Managing knowledge work**. Houndmills, Palgrave Macmillan.

Nonaka, I. (1994) A dynamic theory of organizational knowledge creation. **Organization Science**, 5 (1), pp.14–37.

North, K. (2010) **Wissensorientierte Unternehmensführung: Wertschöpfung durch Wissen**. 5. Aufl. Wiesbaden, Gabler.

North, K. & Gueldenberg, S. (2008) **Produktive Wissensarbeit(er): Antworten auf die Management-Herausforderung des 21. Jahrhunderts**. Wiesbaden, Gabler.

OECD (2006a) **OECD employment outlook. 2006 edition: boosting jobs and incomes**. Paris, Organisation for Economic Co-operation and Development.

OECD (2006b) **Education at a glance. OECD indicators 2006. Indicator A8: labour force participation by level of educational attainment** [Internet]. Paris, Organisation for Economic Co-operation and Development. Accessible at: <[http://www.oecd.org/document/6/0,2340,en\\_2649\\_34515\\_37344774\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/6/0,2340,en_2649_34515_37344774_1_1_1_1,00.html)> [Accessed 07 January 2007].

Osterloh, M. & Frey, B.S. (2000) **Motivation, knowledge transfer, and organizational forms**. *Organization Science*, 11 (5), pp.538-550.

Osterloh, M & Frey, B.S. (2006) Corporate governance for knowledge production: theoretical foundations and practical implications. **Corporate Ownership and Control**, 3(4), pp.164-174.

Paradi, J.C., Smith, S. & Schaffnit-Chatterjee, C. (2002) Knowledge worker performance analysis using DEA: an application to engineering design teams at Bell Canada. **IEEE Transactions on Engineering Management**, 49 (2), p.161.

Petroni, A. & Colacino, P. (2008) Motivation strategies for Knowledge Workers: evidences and challenges. **Journal of Technology Management & Innovation**, 3 (3), pp. 21-32.

Pfadenhauer, M. (2003) **Professionalität: Eine wissenssoziologische Rekonstruktion institutionalisierter Kompetenzdarstellungskompetenz**. Opladen, Leske und Budrich.

Pfiffner, M. & Stadelmann, P. (1999) **Wissen wirksam machen: Wie Kopfarbeiter produktiv werden**. 2. unveränd. Aufl. Bern, Haupt.

Picard, R.G. (1998) Measuring and interpreting productivity of journalists. **Newspaper Research Journal**, 19 (4), pp.71-80.

Posner, M.I. (1988) Introduction: What is it to be an expert? In: Chi, M.T.H., Glaser, R. & Rees, M.J. eds. **The nature of expertise**. Hillsdale, Erlbaum, pp.XXIX-XXXVI.

Probst, G., Raub, S. & Romhardt, K. (2010) **Wissen managen: Wie Unternehmen ihre wertvollste Ressource optimal nutzen**. 6. überarb. u. erw. Aufl. Wiesbaden: Gabler.

Raelin, J. A. (1991) **The clash of cultures: managers managing professionals**. Boston, Harvard Business School Press.

Ramirez, Y.W. & Nembhard, D.A. (2004) Measuring knowledge worker productivity: a taxonomy. **Journal of Intellectual Capital**, 5 (4), pp. 602-628.

Ray, P.K. & Sahu, S. (1989) The measurement and evaluation of white-collar productivity. **International Journal of Operation & Production Management**, 9 (4), pp.28-48.

Reinberg, A. & Hummel, M. (2002) Zur langfristigen Entwicklung des qualifikations-spezifischen Arbeitskräfteangebots und –bedarfs in Deutschland: Empirische Befunde und aktuelle Projektionsergebnisse. **Mitteilungen aus der Arbeitsmarkt- und Berufsforschung**, 35 (4), S.580-600.

Reinberg, A. & Hummel, M. (2005) **Höhere Bildung schützt auch in der Krise vor Arbeitslosigkeit**. IAB-Kurzbericht Nr.9. Nürnberg, Institut für Arbeitsmarkt- und Berufsforschung.

Richter, A. & Derballa, V. (2007) **IT-gestütztes Wissensmanagement: Theorie, Anwendungen und Barrieren**. Berlin, Derballa Verlag.

Rubinstein, J.S., Meyer, D.E. & Evans, J.E. (2001) Executive Control of Cog-nitive Processes in Task Switching. **Journal of Experimental Psychology, Human Perception and Performance**, 27 (4), pp.763-797

Scarborough, H. (1999) Knowledge as work: conflicts in the management of knowledge workers. **Technology Analysis and Strategic Management**, 1 (1), pp.5-16.

Schimanek, U. (2005), Die akademische Profession und die Universitäten: ‚New Public Management‘ und eine drohende Deprofessionalisierung. In: Klatzki, T. & Tacke V. Hsg. **Organisation und Profession**. Wiesbaden, VS Verlag für Sozialwissenschaften, S.143-164.

Sink, S. (1985) **Productivity management: planning, measurement and evaluation, control and improvement**. New York, John Wiley.

Sorensen, J.E. & Sorensen, T.L. (1974) The conflict of professionals in bureaucratic organizations. **Administrative Science Quarterly**, 19 (1), pp. 98-106.

Spira, J.B. & Feintuch, J.B. (2005) **The cost of not paying attention: how interruption impact knowledge worker productivity**. New York: Basex

Stieglitz, J.E. (1999) Knowledge as a global public good. In: Kaul, I., Grunberg, I. & Stern, M.A. eds. **Global public goods: international cooperation in the twenty first century**. New York, Oxford University Press, pp.308-325.

Strauss, A. & Corbin, J. (1990) **Basics of qualitative research: Grounded Theory procedures and techniques**. Newbury Park: Sage.

Sun, P.Y.-T. & Scott, J.L. (2005) An investigation of barriers to knowledge transfer. **Journal of Knowledge Management**, 9 (2), pp.75-90.

Tampoe, M. (1993) Motivating knowledge workers: the challenge for the 1990's. **Long Range Planning**, 26 (3), pp.49-55.

Thomas, B.E. & Baron, J.P. (1994) **Evaluating knowledge worker productivity: literature review** [Internet]. Interim Report, No. FF-94/27, USACERL, pp. 1-27. Available from: [www.cecer.army.mil/kws/tho\\_lit.htm#abs](http://www.cecer.army.mil/kws/tho_lit.htm#abs) [Accessed 15. August 2009].

Thompson, M. & Heron, P. (2005) The difference a manager can make: organizational justice and knowledge worker commitment. **International Journal of Human Resource Management**, 16 (3), pp.383–404.

UK National Statistics (2000) **Standard occupational classification 2000 (SOC 2000): summary of structure** [Internet]. London, UK National Statistics. Available at <[www.statistics.gov.uk/methods\\_quality/ns\\_sec/downloads/SOC2000.doc](http://www.statistics.gov.uk/methods_quality/ns_sec/downloads/SOC2000.doc)> [Accessed 09 January 2007].

UK National Statistics (2006) **All in employment by socio-economic classification (NS-SEC) (Not seasonally adjusted)** [Internet]. London, UK National Statistics. Accessible at: <<http://www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7919>> [Accessed 20 August 2008].

Ulich, E. (2005) **Arbeitspsychologie**. 6. überarb. u. erw. Aufl. Stuttgart, Schäffer-Poeschel.

Ulrich, D. (1998) Intellectual capital = competence x commitment. **Sloan Management Review**, 39 (2), pp.15-26.

US Department of Labor (2006) **Occupational outlook handbook** [Internet]. Washington, Bureau of Labor. Accessible at: <<http://www.bls.gov/oco/home.htm>> [Accessed 09 January 2007].

Weibel, A., Rost, K. & Osterloh, M. (2010) Pay for performance in the Public Sector: benefits and (hidden) costs. **Journal of Public Administration Research and Theory**, 20 (2), pp. 387-412.

Weidig, I. et al. (1999) **Arbeitslandschaft 2010 nach Tätigkeiten und Tätigkeitsniveau**. Beiträge zur Arbeitsmarkt- und Berufsforschung, Nr. 227. Nürnberg, Institut für Arbeitsmarkt- und Berufsforschung.

Wenger, E. (2008) Communities of practice: learning as a social system. **The Systems Thinker**, 9 (5), pp.1-10.

Yin, R.K. (2009) **Case study research: design and methods**. 4th ed. Thousand Oaks, Sage.