Klaus North *and* Stefan Gueldenberg

EFFECTIVE KNOWLEDGE WORK

Answers to the Management Challenge of the 21st Century

EFFECTIVE KNOWLEDGE WORK: ANSWERS TO THE MANAGEMENT CHALLENGES OF THE 21ST CENTURY

KLAUS NORTH

Weisbaden Business School, Darmstadt, Germany

STEFAN GUELDENBERG

University of Liechtenstein, Vaduz, Liechtenstein

With several case studies

United Kingdom – North America – Japan
India – Malaysia – China

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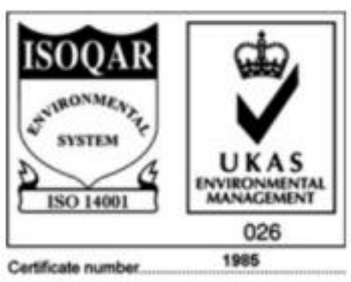

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Endorsements

Peter Drucker identified the need to increase knowledge-worker productivity as the most important management challenge of the 21st century. With a compelling blend of theory and practical advice, Klaus North and Stefan Gueldenberg have given us a much-needed road map to begin meeting that challenge.

Rick Wartzman, Executive Director of the Drucker Institute
at Claremont Graduate University and columnist
for Bloomberg Businessweek

Can knowledge workers be managed? This is one of the central questions in the book, and one that continues to interest scholars and managers alike. The authors convincingly argue it can, given the right context and systems. This is a wonderful book containing a valuable collection of ideas, tools, and approaches for those who would like to make the most out of knowledge-intensive work.

Georg von Krogh, PhD Professor of Strategic Management
and Innovation Department of Management, Technology,
and Economics ETH Zurich

To compete in today's globalized world, an organization's capacity to connect human minds and to harvest high performance of its talents is key. But how can we tap the full potential of human knowledge, creativity and innovation in our organizations? Based on an excellent combination of scientific reflection and practical insights, Klaus North and Stefan Gueldenberg develop a helpful framework that provides concrete suggestions to analyze and design effective knowledge work.

Prof. Gilbert Probst Managing Director, Leadership Office &
Academic Affairs World Economic Forum

Making knowledge work effective in a time of increasing information overload is the great management challenge of our time - we all know this. I welcome this book since it puts the emphasis on the "how" - this is what is needed today.

Dr. Doris Drucker, Board Member, The Drucker Institute

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Foreword by the President of the Drucker Society Europe

When Peter Drucker coined the term 'Knowledge Work' in the late 1950s, only a few appreciated the fundamental shift occurring in our economy and our society. True, it was hardly new news that knowledge had become a determining factor for modern economies. However, the consequences of this development on organisations and institutions were first sensed by Peter Drucker in terms of its dimension and its impact on organisations — with a new breed of 'Knowledge Workers' taking on an increasing share of value creation in modern economies.

From a bird's eye perspective, the evolution towards the knowledge society grew out of a development that started with the Industrial Revolution. On the basis of the philosophy of Enlightenment, scientific progress has spawned consecutive waves of technological innovation that would change the face of the planet forever. It created the foundations for a leap in world population that will culminate in some 9 billion by 2050 — invalidating the limitations for population growth set by Malthusian laws. These technological innovations were accompanied by powerful social innovations — Capitalism and Liberal Democracy on the one hand, and more recently Management — a *social technology* as Drucker called it. The mutual reinforcement of technological and social innovations brought about an unprecedented capacity to create wealth and led to the spread of democratic societies with open economic systems around the world.

With the proliferation of computing technology in the second half of the 20th century, it became clear that routine tasks could be largely taken over by machines — hence, most value creation would come from higher-order knowledge work requiring a combination of deep knowledge, experience, human ingenuity and motivation.

As the 20th-century society evolved into an increasingly dense fabric of interconnected organisations and institutions, professional management emerged first as an incidental occupation and then gradually evolved into a new discipline aimed at achieving performance in organisations. Although Peter Drucker himself was instrumental in defining management as a discipline that could be taught and learned in a systematic way, he recognised early that business and non-business institutions alike tended to impede knowledge work. With their bureaucratic pedigree and their approaches inspired by Taylor's legacy, they provided little to none of the environment that knowledge workers needed to be productive by all too

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often curtailing autonomy and initiative. Looking at these sobering realities, it was logical that Peter Drucker launched his big challenge to Management of the 21st century. 'The most important, and indeed the truly unique, contribution of management in the 20th century was the fiftyfold increase in the productivity of the manual worker in manufacturing', Drucker declared. 'The most important contribution management needs to make in the 21st century is similarly to increase the productivity of knowledge work and the knowledge worker'.

With all the frenzy generated by the latest developments in internet-based applications and mobile technologies, one would think that already today we have everything in place to make us highly productive in our knowledge work. Just look at the plethora of new applications and gadgets — collaborative tools, social networking, virtual worlds, blogs, wikis and a new set of mobile devices such as tablets, smartphones and so on. Yet, to assume that technology by itself would bring the desired step change in the effectiveness of knowledge work is way off the mark. Just remember when well-meaning experts explained to us that databases filled with information created inside and outside companies would set off a quantum leap in knowledge productivity in business. As everybody knows by now, this type of tools-centred knowledge management was a colossal failure. The root causes were manifold and range from a lack of understanding of the importance of tacit knowledge, which could not be codified in knowledge repositories, to stifling management systems and an underestimation of the cultural aspects of knowledge sharing.

Equally, what we currently observe with social networking tools cannot yet be considered as considerably enhancing knowledge work. Blogs, wikis and other online tools are not yet widely used in companies these days. However, in contrast to the flawed knowledge databases, they all bring a new quality, that is, a capacity for connecting human minds that did not exist before. Hence, we may be at the threshold of a new form of knowledge management and a new way of boosting knowledge worker productivity. However, this will only come to fruition if the systemic elements including the human factors for knowledge creation and dissemination processes are well understood and taken into account.

This is exactly the reason why the book *Effective Knowledge Work* is of such great importance today. Not only does it provide us with a framework for better understanding knowledge work and knowledge workers as such, but it is also highly geared towards application and practice with numerous case studies. When reading it, it will become clear that making knowledge work effective means much more than establishing a new function or process. Such an endeavour touches the very core of how organisations function and generate value. It will ultimately bring us closer to tap the full potential for human knowledge, creativity and innovation in today's organisations and institutions.

Yet, better productivity in knowledge work does not mean an increase in the quantity of knowledge produced — but rather denotes greater availability of the right knowledge in the right place when needed. It also signifies the creation of essential new knowledge for the company to achieve a competitive advantage and to drive innovation and change in a complex and unpredictable environment.

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In contrast to the flawed assumptions of the past, it is not primarily codified and static knowledge driving economic value but dynamic, fast-moving and evolving knowledge, which is constantly shaped by the interplay between practice and rigorous scientific reflection.

I commend the authors for having taken on this vital and highly underexposed subject — it is an important step in the right direction. Practice and management research will have to follow and explore more of this uncharted territory — albeit now with a much better map to hand.

I shall end with another quote from Peter Drucker that drives home the point that despite all the great technology, knowledge work is essentially about people: 'Knowledge is not impersonal, like money. Knowledge does not reside in a book, a database, a software program; they contain only information. Knowledge is always embodied in a person; carried by a person; taught and passed on by a person; created, augmented or improved by a person; applied by a person; used or misused by a person. The shift to the knowledge society therefore puts the person in the centre. In so doing, it raises quite unprecedented questions about the knowledge society's representative, the educated person'.

Dr. Richard Straub
President, Drucker Society, Europe

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Preface

'The most important contribution of management in the 20th century was to increase manual worker productivity fifty-fold. The most important contribution of management in the 21st century will be to increase knowledge worker productivity-hopefully by the same percentage. […] The methods, however, are totally different from those that increased the productivity of manual workers' (Peter F. Drucker).

The wealth of the western world is, to a large extent, attributed to its efficient management of manual work and the resultant increase in productivity since the beginning of the industrial revolution. Today, however, we need to acknowledge that our management practices and control mechanisms are less suitable on the one hand for facilitating effective knowledge work in organisations and, on the other hand, for attracting the best brains to perform in knowledge-intensive organisations.

Motivational factors for knowledge workers and manual workers differ considerably. Thus, for example, knowledge workers are increasingly reluctant to work in a company with a classical hierarchy structure. The best minds often leave the company to work independently. Does this mean that our companies are not attractive enough for knowledge workers? Or is it just a wrong style of management and outdated management methods that make more and more knowledge workers seek their future elsewhere? Are there any successful models of promoting career paths as a professional as against a career in management?

In the day-to-day work, the way in which information and communication technologies are being used (e.g. the flood of e-mails) seems to have an adverse effect on the productivity of knowledge work. Supply-oriented and centralised methods of knowledge management fail to address the concrete needs and expectations of knowledge workers.

This book presents tried and tested methods offering concrete suggestions to analyse and design effective knowledge work. Each topic is accompanied by a self-diagnosis allowing the reader to assess their own situation; 15 cases have been included as a source of inspiration as to 'next practices' for shaping the future of knowledge work.

Among others, the book addresses the following questions:

- What is knowledge work?
- What are strategies and methods for increasing productivity, quality, effectiveness and value of knowledge work as well as well-being and work satisfaction of knowledge workers?

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- Can knowledge workers be managed, and if yes, how?
- How to select the right information and communication technology (ICT) support and make best use of it?
- What are adequate methods for measuring performance of knowledge workers?

This book comprises two books: One is a guideline for creating and reflecting upon knowledge work and the other is a collection of case studies from different fields of knowledge work, given under each subsection. They demonstrate how productive knowledge work can be carried out.

This book also shows how modern knowledge work functions in today's world; it is a collective work. We thank all the contributors of the case studies for their creative inputs. Brief information about the authors is provided in the About the Authors.

We are also thankful to Mr. Rupert Petschina who has authored Chapter 4 on information and communication technology.

Our thanks go to Virendra Degvekar and his team for translating the original German version of the book to English.

We would like to express our special thanks to Joachim Stonig who took on the responsibility of editing the complete book as well as researching, updating literature and cases assisted by Jana Muecke.

We thank Emerald Group Publishing, particularly Diane Heath and Catriona Gelder, for supporting the project.

We hope this book makes enjoyable reading and look forward to your views and comments. Please write to us at k.north@gmx.de or stefan.gueldenberg@uni.li.

Klaus North and Stefan Gueldenberg
Wiesbaden and Vaduz, Autumn 2011

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Chapter 1

Knowledge Work(ers) — The Challenges

1.1. Three Reasons to Engage in Effective Knowledge Work

The press is full of reports about relocation of manufacturing units to low-cost locations. We are increasingly losing out on easy-to-learn jobs. However, this loss is not yet fully compensated by the increasing number of people employed in knowledge-intensive occupations. In the United States and Europe, more than 30% of the economically active population works in knowledge-intensive and creative professions such as engineering, science, teaching, consulting, banking, management, journalism, medical practice, law and art; in social professions; or in the information and communication sector, just to name a few (Hall, 2007; National Science Board, 2010). Figure 1.1 shows how the percentage of those employed changes as the society transforms from an industry-oriented to a knowledge-oriented one. In 2007, knowledge- and technology-intensive industries combined contributed just under $16 trillion to global economic output — about 30% of the world's GDP. In Great Britain, these changes have been even more marked than in most of the rest of the world. The British share of manufacturing in total economic output declined from 35% to below 15% between 1970 and 2005, and the share of knowledge services went up from 23% to 46% in the same time period (Brinkley et al., 2009).

Knowledge-intensive jobs

Florida (2002) postulates the rise of a new social stratum, the *creative class*, whose values comprise creativity, individuality, and being unique and performance oriented. The creative sector accounts for nearly half of the total wages and salaries of the US economy (Florida, 2007, p. 29).

Creative class

Even in the remaining two thirds of occupations, the percentage of information and knowledge processing is on the rise. 'Value creation through knowledge' is becoming the dominant source of our prosperity. We can maintain and multiply this prosperity only if it is based on effective and creative knowledge work.

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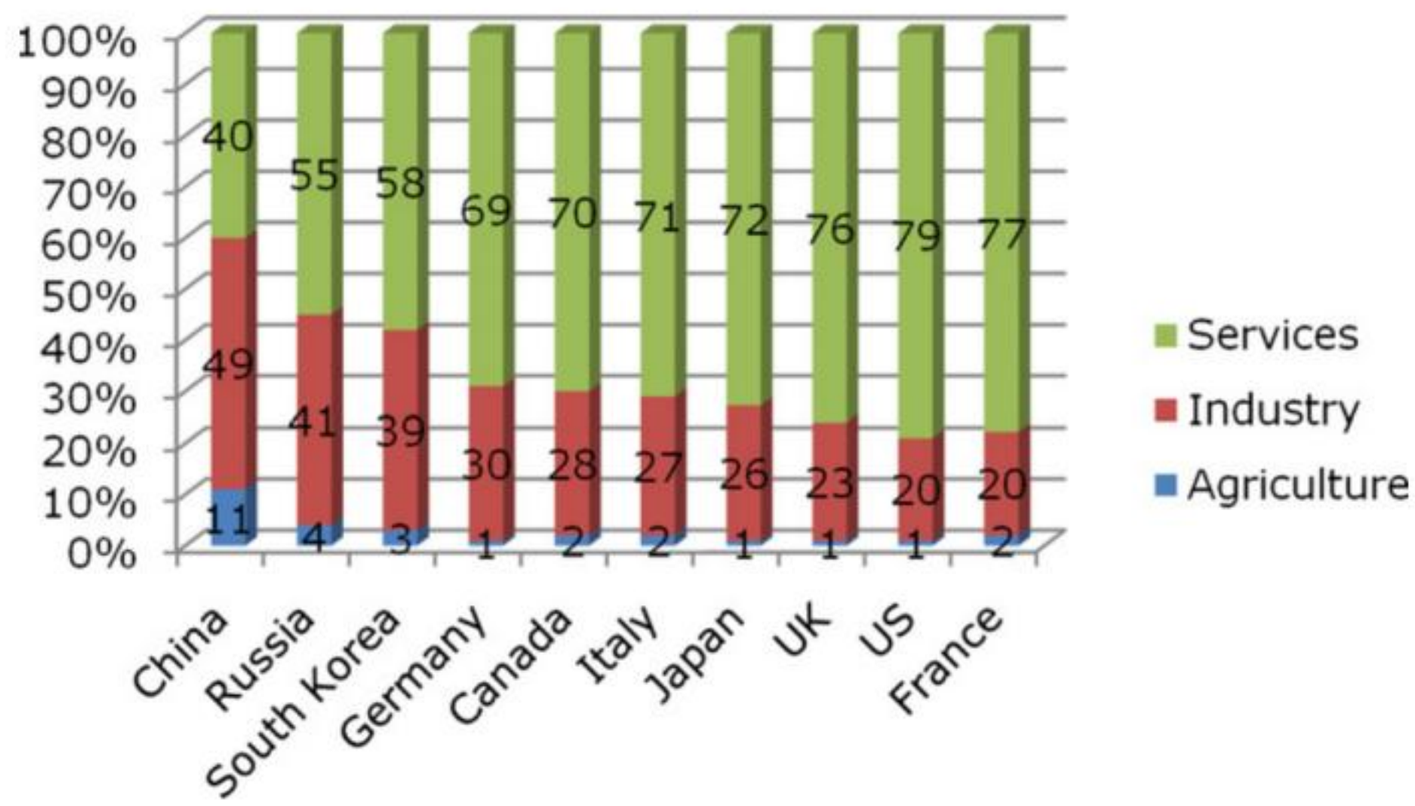

Figure 1.1: Sectoral analysis of GDP contribution for different counties, 2008. Data taken from the National Science Board 2010 report.

Global knowledge economy

However, many of the solutions from the industrial age do not serve this purpose. Knowledge workers, companies, organisations and even regions and countries are working towards positioning themselves in the global knowledge economy, and are looking for suitable methods to attract, develop, retain talents and make the most of them.

Let us look at three pertinent reasons to engage in effective knowledge work:

1. *Why knowledge workers should reflect on their knowledge work?*

Taylor's division of labour: Even for knowledge work

The much lamented shortage of qualified personnel does not translate into an automatic increase in the market value of knowledge workers. Not only industrial work but also knowledge work is governed by the rules of globalisation. It is likely that knowledge work will be off-shored when, for instance, the costs incurred on a programmer in Eastern Europe or India is just a fraction of the local costs.

Knowledge work, just like industrial work, is also divided according to Taylor's principles. Simple tasks which can be standardised are executed in places where economically priced skilled workers are available. The compilation, interpretation, and linking of these parts are then done by the better paid knowledge workers in the high-wage countries. We will look at this in more detail in Section 3.5. You can try calculating for yourself if your job is at risk.

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Estimate how your value added relates to the total costs of your workplace (salary and overheads as well as capital investment in your work place and social services).

$$\frac{\text{Value added}}{\text{Total cost of work place}}$$

What is your market value as knowledge worker?

Don't you have the data? Are you unaware of the value you are adding? Then it's about time you find out. If the ratio between value added and total costs of the workplace is in the order of 2, you can rest assured that your job is fairly secure. It could get unpleasant for you though if this ratio were to be less than or equal to 1. In such a case you would be financially less attractive a proposition for your employer.

A self-employed individual previously associated with a large corporation remarked regarding this value cost relation: '*It is only now that I realise how much I need to work to maintain the level of income I made in my earlier job. I think many of my former colleagues do not "earn" the salaries they receive*'.

Self-employment of knowledge workers!

Knowledge workers are increasingly turning to self-employment and become 'knowledge-preneurs' (Carson, 2001). Their knowledge has to be marketed well and their time has to be used productively.

Many knowledge workers complain about information overload and ever increasing intensity of work. Do you personally have strategies of management of information and knowledge? And honestly, do you make full use of your talents, abilities and potential to finish the task at hand? Or do you tell yourself: 'It is just not worth it. I'd rather not. I would end up being thwarted anyway.' If this is the case, you need to ask yourself whether your current job is the right one for you.

2. *Why organisations should bother about effective knowledge work?*

How can we attract and retain the talents we need? How can we lead our highly qualified employees, striving for individual responsibility and self-realisation, to achieve company goals? Do we encourage and mobilise the potential of our employees? And do we even know the potential of our employees?

Organizations are living social systems

Many organisations fail to find satisfactory answers to these questions. With knowledge work playing such a dominant role, the machine, as a metaphor for the organisation from the industrial age, becomes outdated. Ideas of organisations as living social systems are often defined in theory but rarely reflect the

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daily practices of companies. Currently, organisations put in too much effort in achieving competitive advantages of the first order. They focus on quality leadership, brand power, and product and service innovations (Wüthrich, Osmetz, & Kaduk, 2007). But some organisations have realised that it is worthwhile to look actively and systematically for competitive advantages of the second order. According to Wüthrich et al. (2007), these organisations empower their employees to experience necessary personal freedom, to be passionate about their work and to use their intelligence for the benefit of the organisation.

Second-order competitive advantages gain importance

If your organisation is still focusing on first-order strategies and practices, it is time to think about the challenges and potentials of second-order competitive advantages to harvest high performance of your talents (Figure 1.2).

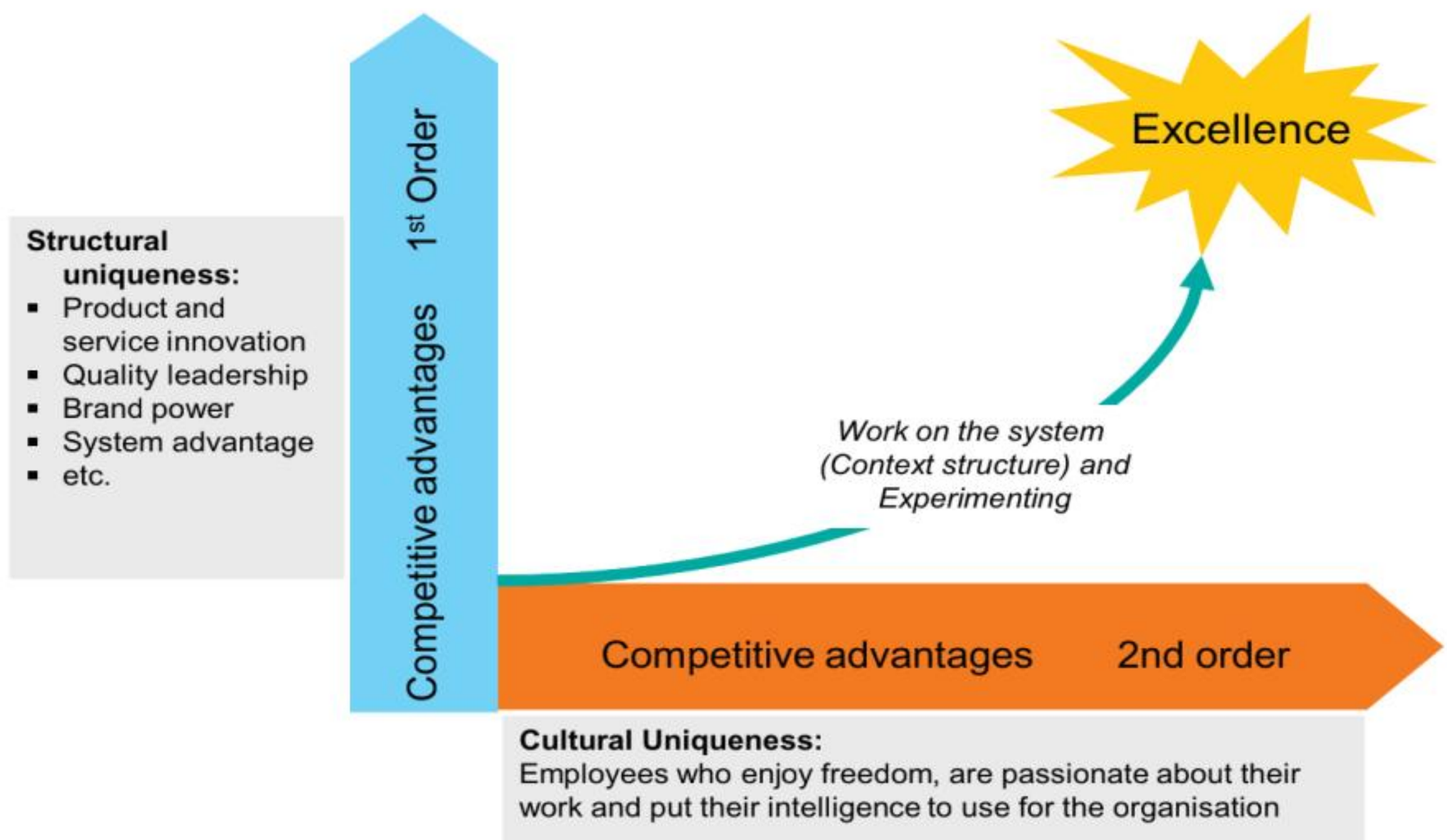

Figure 1.2: Competitive advantages of first and second order (Wüthrich et al., 2007).

3. *Why regions should have strategies to attract and develop talents?*

Knowledge creates growth

Regions with a high percentage of people employed in knowledge-intensive occupations have a higher per capita Gross National Product (GNP) than comparable regions. Knowledge work is becoming the growth engine of the region. The *creative class* (Florida, 2002) has high purchasing power, is mobile and is well-informed. Regions worldwide have recognised this and are courting the best talents. The lack of qualified personnel,

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Figure 1.3: What makes a region attractive for knowledge workers? Based on Florida (2002), Montreal Knowledge City Advisory Committee (2003), and Yigitcanlar, Tan and Baum, Scott and Horton, and Stephen (2007).

Table 1.1: Checklist: Why you should engage in effective knowledge work.

	Completely Agree	**Partly Agree**	**Disagree**
Knowledge Worker			
1. The work that I do is not easy to relocate . It cannot be done elsewhere with the same quality at lower costs			
2. For my work, the ratio of value added to total labour costs is >1			
3. I am actively developing my value proposition to enhance my employability			
4. I have effective personal strategies for managing information and knowledge			
Knowledge Organisation			
5. We are successful in aligning and leading knowledge workers to achieve our company goals			
6. We are satisfied with the way we utilise and develop the potential of our employees			
7. We systematically develop competitive advantages of second order			
8. We have suitable instruments for measuring the effectiveness of knowledge work			
Knowledge Region			
9. We have enough skilled professionals in our region			
10. The region is attractive for knowledge workers			
11. The region effectively links education, research and business			
12. The region actively supports the establishment of knowledge-intensive and creative organisations			

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predicted with the demographic development, can be reduced in regions which manage to attract knowledge workers. The motto is *brain gain* instead of *brain drain*. Figure 1.3 shows the factors which make a region attractive for knowledge workers. The availability of well-educated qualified personnel encourages the establishment of knowledge-based companies, which, in turn, adds value to the region thus leading to a virtuous circle. To use this potential in a planned manner, metropolitan regions across the world have started adopting strategies for developing into a knowledge region by promoting research and development and training of skilled personnel, and linking companies, research and educational institutions (North, 2008). Florida's three T's: Technology, Talent, Tolerance form the characteristics of a creative region.

Brain gain versus brain drain

With the help of the checklist in Table 1.1 you can check for yourself what motivates you to engage in effective knowledge work.

A Doctor in the Year 2016

He touches the lapel of his jacket and signals his availability by briefly pressing the button hidden there. Peter is on his way to the medical practice which he shares with a colleague. Six years ago they started their practice. It was the time when the health sector was facing great challenges. The effects of the health reform at the turn of the millennium had not yet been digested when doctors suddenly had to deal with completely *new requirements* regarding their *work organisation*. Peter remembered this time very well.

It was in August 2010 that they had inaugurated their medical practice. Most people were taking their holidays when the press reported about unusual health threats. The number of deaths caused by the heat wave was quite high. Also, the spread of several flu epidemics within the span of a few weeks was a phenomenon that had not been noticed in the previous years. In addition, there were unsettling reports of infections and diseases spreading due to contaminated food supplies.

Peter still remembered well how the discussions about faked organic products and genetically modified food affected his daily work. Patients felt very insecure. They were bombarded with contradictory information from TV, radio and magazines and turned to doctors for clarifications. The first few weeks of their medical practice's activities involved mostly such cases: hundreds of phone calls, visits and contacts with patients who primarily sought information rather than medical attention. This created problems not only for him but also for his colleagues. How was one to handle this flood of queries? How was one to do justice to the patients' problems when there remained no time for the treatment?

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The established doctors struggled with the increasing dissatisfaction of their patients. More and more often they heard that patients had visited *health portals* on the internet. They were very often surprised that patients came prepared with different diagnoses, exemplar cases and their own opinions about their symptoms. The reputation of medical doctors worsened.

Peter's personal digital assistant beeps shortly. It alerts him of new messages. He can retrieve these only using speech commands. He is accustomed to making use of the commuting time to the practice to get an overview of the tasks due for the day ahead. 'Appointments?' he asks and gets a brief list of the calendar entries of the day via a voice output. The first appointment is in the morning, with a patient with chronic muscular tension in the region of the shoulder blades. 'Patient file for the past two years?' he asks and the system reads out a summary of the patient's history over this period. At the end of the file the program asks him whether he would like to get current information about symptoms, treatment measures, medicines or entries relevant to this case from *HealthWiki*. He chooses HealthWiki.

He is still amazed by the revolution brought about by this system within such a short period. HealthWiki has established itself as an information and exchange portal for patients, doctors and all professionals in the health sector. And such a system had been more than necessary. Six years back the information flood from the internet had caused a great deal of problems. The media had then referred to the developments in the health sector as *mediCommunity*. There were information portals mushrooming all over the internet that enabled the public to compare their symptoms and diseases with the experience of other patients. There were full-fledged *self-diagnosis applications* based on newly developed internet technologies. The consequences were devastating. While patients developed their own diagnosis by interacting with people with similar complaints and wannabe doctors, the medical doctors had to defend their expertise against the *intelligence of the masses*, and the individual medical history of the patients became secondary. The trust in the quality of health care diminished.

While listening to some HealthWiki entries of a specialist regarding chronic muscular tension in the shoulder blade region, Peter instructs the digital assistant to compile a customised file about this ailment that he would then hand over to the patient. This file contains *latest information* from HealthWiki and links it to the history of the patient. Thus, the procedures and medication are focused on each individual. Peter will look through the file and make corrections later in the practice; he will also include the information he gathered from his brief research and the discussion with the patient. He will then store these modifications with the push of a button into the patient file and upload them in anonymous form to HealthWiki as well.

The thought of the conditions in the past makes Peter smile. The fact was that the doctors were poorly organised. They had to face the accusation of not keeping up with the rapid developments and often found themselves in situations where they were informed by patients about new treatment methods that they could not

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comment on due to their own lack of information. Only technological advances in knowledge networking could remedy this deplorable situation, Peter had been informed by a friend. The technologies for sharing content — his friend was talking about ontology — had already widely penetrated industries with a high degree of standardisation. From service technicians for printing machines to engineers in the automobile industry, all of them could rely on *advisory systems*. These systems could provide information about diagnosing problems and troubleshooting — taking into consideration the peculiarities of the concerned machine and its environment. Why should these not aid the 'service technicians for human beings', he wondered. The friend showed him one of the current developments, a *semantic wiki*. The speciality of this application was the possibility of updates which the user can execute himself. He reads a particular section and adds his own information to it. This way he links his knowledge with previously existent structures. The result is a network of knowledge elements which can be retrieved in several forms. Peter immediately saw the option of exchanging information with other doctors and particularly also with his patients via such portals.

The option of linking the content to the patient information systems was very interesting. This would help to connect individual information systems for his patients with up-to-date information. Peter smiled yet again thinking about the great ideas of that time and the difficulties they had initially in convincing colleagues that knowledge cooperation presented a chance to work with the patients and satisfy their thirst for information, and at the same time to regain the confidence of the patients in the expertise of doctors.

Meanwhile, having arrived at the medical practice, he is handed the health forecast for the region by his assistant. This plan informs doctors about the latest diseases in the region that are reported in statistically significant numbers, possible causes and individual tips for the doctors. These individual tips are related to the patient information of the respective practice. This enables the doctor to quickly inform patients who are at risk and take preventive measures. Even this forecast is an analysis from HealthWiki and is the result of the information of the previous day uploaded by the medical practices in the region.

He finds no direct implications for his patients today. Still he takes some time to read the forecast. Just two days ago he was able to inform two of his tinnitus patients about a medicine which proved very effective in treating the symptoms that the patients complained about. He would keep track of this tinnitus phenomenon and also upload his findings about it to HealthWiki. Perhaps a solution for tinnitus was close. The health insurance companies and the government had especially promoted the information exchange between medical practices and pharmaceutical companies conducting research. Earlier there had been no direct possibility of verifying the effectiveness of medicines. The earlier practice of agreements and contracts between the corporations and the doctors

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could no longer compete with the transparent analysis of HealthWiki. The pharmaceutical industry had to face up to the objectivity and transparency in the exchange of information.

'This is the spot!' Peter points to the area of the tensed shoulder in the hologram of the patient. 'There are several approaches to treatment', he continues and brings in several illustrated descriptions into the hologram and explains each procedure. The patient gives detailed information about other symptoms and answers a few questions which are instantly added to the patient information in Peter's digital assistance system through the speech port. Based on the program, the system can compare and evaluate several treatment methods.

Peter assesses the evaluations of the system and advises the patient about the result. He recommends osteopathic muscle energy techniques, which are recommended as most effective by many patients with similar symptoms as well as by their doctors. He consults his *assistance system* and refers the patient to two of his colleagues nearby who are specialists in this area and whom the system indicates as being available in the following week.

The patient transfers the calendar information to his electronic agenda and finds the next suitable appointments. Then he decides upon the osteopath who offers him an appointment for the coming Tuesday. With a push of a button Peter sends an e-mail to the patient as well as to the osteopath with a direct link to the assistance system of the clinic. This link provides the patient permanent access to the patient data and all analysed information from the files and doctor appointments. This customised file helps the patient in his or her internet research and it acts as a filter to hide all irrelevant information and uses the patient profile to focus search results.

Moreover, the patient can provide more information that can be of use to Peter. Apart from a new calendar entry, the osteopath also receives all the relevant data about the patient via the electronic assistance system. Peter knows that the results of the osteopathic consultation will be automatically synchronised between his and his colleague's assistance system so that he can generate another patient file before the next consultation that includes these results. Peter recalls again how vividly his friend had explained to him the uniqueness of this new assistance system based on *semantic technologies*. He has already grown so accustomed to all the information being provided in the right context with the right level of detail by his assistance system that he hardly remembers the old times. Back then, there used to be systems that retrieved heaps of documents from all over the internet upon querying a keyword. Peter remembered the hours he spent in just separating the supposedly relevant sources from the others. A world without personalised assistance systems — unimaginable.

A beep from the personal digital assistant indicates an urgent message. Peter retrieves the message and gets all the data about an emergency case involving one of his patients. He hurries up and gets into his car and follows the instructions of the GPS system, which received the address of the incoming emergency case from

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the assistance system. During the drive, the system reads out the most important patient information to him. The system notifies him that for such symptoms a drug is recommended that is not in his emergency kit. He confirms the request for this drug. He can be sure that the pharmacy service will deliver the required drug to the automatically transmitted address within minutes.

He discusses the next steps with the daughter of the emergency patient over a cup of coffee. It all went well. The patient, however, will take a long time to recover. Peter hands the patient file over to the family and informs them of its HealthWiki links. The system contains a lot of information relevant to family members of the patient, along with the experiences of family members of other patients. Often such small experience groups form full-fledged *expert communities* which present a valuable source of information for the doctors and their files.

Peter recognises the largely new role of his job. He mediates between the individual situation of his patient and the commonly available sources of information. His experience allows him to judge the results delivered by the assistance system. Then, this judgement is again fed into the assistance system to improve its quality. Hence, the patient receives a pertinent information package about his or her illness that is perfectly tailored to his or her situation. With this package of information, the patient can carry out his or her own search on the internet. He or she uses the doctor's file as a *filter*, which helps to find only relevant information. The information found by the patient can be incorporated in the diagnosis of the doctor.

This sort of cooperation in recent years has led to the formation of a very close doctor–patient relationship. The confidence is back, especially the trust that the doctor is working on the solution along with the patient and not in a different world. *Ontology* was the right word for Peter. Ontology is defined as a common basis for different concepts and tells us the relationships between them. Though this helps communication between people, it is also used for machine communication. It is a good thing for Peter that these developments took place.

Peter and his wife enter the impressive reception hall. They were invited to the annual meeting of a friend's company. Peter has already set his status to *unavailable* in the assistance system. All messages will be directed to his mailbox and any emergency cases are forwarded to his colleague who is on duty, allowing Peter to spend an undisturbed evening.[1]

Hans-Peter Schnurr

1. SemanticMediawiki (http://halowiki.ontoprise.de) and Smartweb (http://smartweb.dfki.de)

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1.2. What is Knowledge Work?

To lead and develop creative and effective knowledge work we have to understand what knowledge work is and how it differs from manual work.

Contribution of knowledge to added value

No activity can be carried out without knowledge. Every activity, however simple it might be, involves elements of knowledge work. The factor that differentiates activities, however, is the contribution of knowledge to value added. If the value added is primarily achieved by tangible effort such as assembling a product for instance, we are dealing with material work. If the effort involved is by and large non-material and based on cognitive skills such as consulting, product development, or web design, we are dealing with knowledge work.

Material work vs. knowledge work

Table 1.2 presents a contrast between characteristics of material work and knowledge work. The raw material and the output of knowledge work are essentially information whereas material work mostly requires tangible input in order to achieve a tangible result.

A product developer for instance receives information as input in the form of product specifications and various other pieces of product information which he or she then uses to work on the design of a product (the work object). The result is a modified design or a product evaluation. A doctor also performs knowledge work. He or she processes a wide range of information in order to arrive at a diagnosis. In this phase, his work object is not the patient as such, but the information about the patient. If required thereafter, the doctor then performs material work by administering an injection or performing a surgery on the patient. As we see here, elements of knowledge work and material work can very

Table 1.2: Distinguishing knowledge work from material work?

Criterion	Knowledge Work	Material Work
Input	Information/knowledge	Material input
Output	Information/knowledge	Tangible product or service
Work object	Intangible	Tangible
Activity	Processing of information, creating and using knowledge	Processing of material input
Skills	Cognitive skills mental dexterity	Manual skills manual dexterity
Tools	Information and communication tools	Tools for physical work

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often converge. The actual activity or source of value added in knowledge work lies in the processing of information with the help of knowledge.

Our definition of knowledge work

Knowledge work is an activity based on cognitive skills that has an intangible result and whose value added relies on information processing and creativity, and consequently on the creation and communication of knowledge.

Knowledge workers are people who primarily engage in knowledge work.

Along the same lines, Davenport (2005) describes a knowledge worker as someone whose principal activity consists of acquiring, generating, packaging or applying knowledge; in other words 'knowledge workers think for a living'.

According to Florida (2002), the Creative Class is characterized by the ability to create complex solutions, by their independent judgement based on a high level of education and the creation of new knowledge.

Cognition

If knowledge work is an activity based on cognitive skills with a non-material outcome, we need to study cognitive skills in order to improve our understanding of knowledge work. *Cognitive skills* are any mental skills that are used in processing and acquiring knowledge. Cognitive skills of a person include perception, reasoning, memory, learning, creativity, planning and problem-solving among others. They enable thoughts, opinions, attitudes, desires and intentions.

The cognitive process consists of various mental processes (Kagono[2]):

Mental processes

1. Information gathering: People and organisations are not passive receivers of information, but they actively engage in searching for valuable information based on their knowledge.
2. Sense-making: After acquiring relevant information, people make sense of the information by combining it with their existing knowledge.
3. Choice: Based on the sense-making, people derive alternative courses of action using their knowledge. They compare the

2. http://kms.jpn.org/track_a-1.pdf

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and not in the minds of individual. Explicit knowledge can be recorded, transferred and stored using information and communication technology (Figure 1.4).

This applies to detailed process descriptions, patents, organisational charts and quality documents, to name a few.

The value of knowledge is evident only if the knowledge (know what) is converted to know-how which manifests as actions.

Action

However, knowledge translates into concrete actions only when there is the motivation and the drive for it. The ability and the will to do something are decisive for the result and together lead to value added. Actions yield measurable results which indicate how a person, a group or an organisation generates knowledge from information and uses it for problem-solving in specific situations.

Competence

The ability or capacity to act appropriately in a situation is known as competence. Competence materialises at the time of implementing knowledge. Krogh and von Roos (1996, p. 45) have defined it as follows: '*... we view competence as an event, rather than an asset. This simply means that competencies do not exist in the way a car does; they exist only when the knowledge (and skill) meet the task*'.

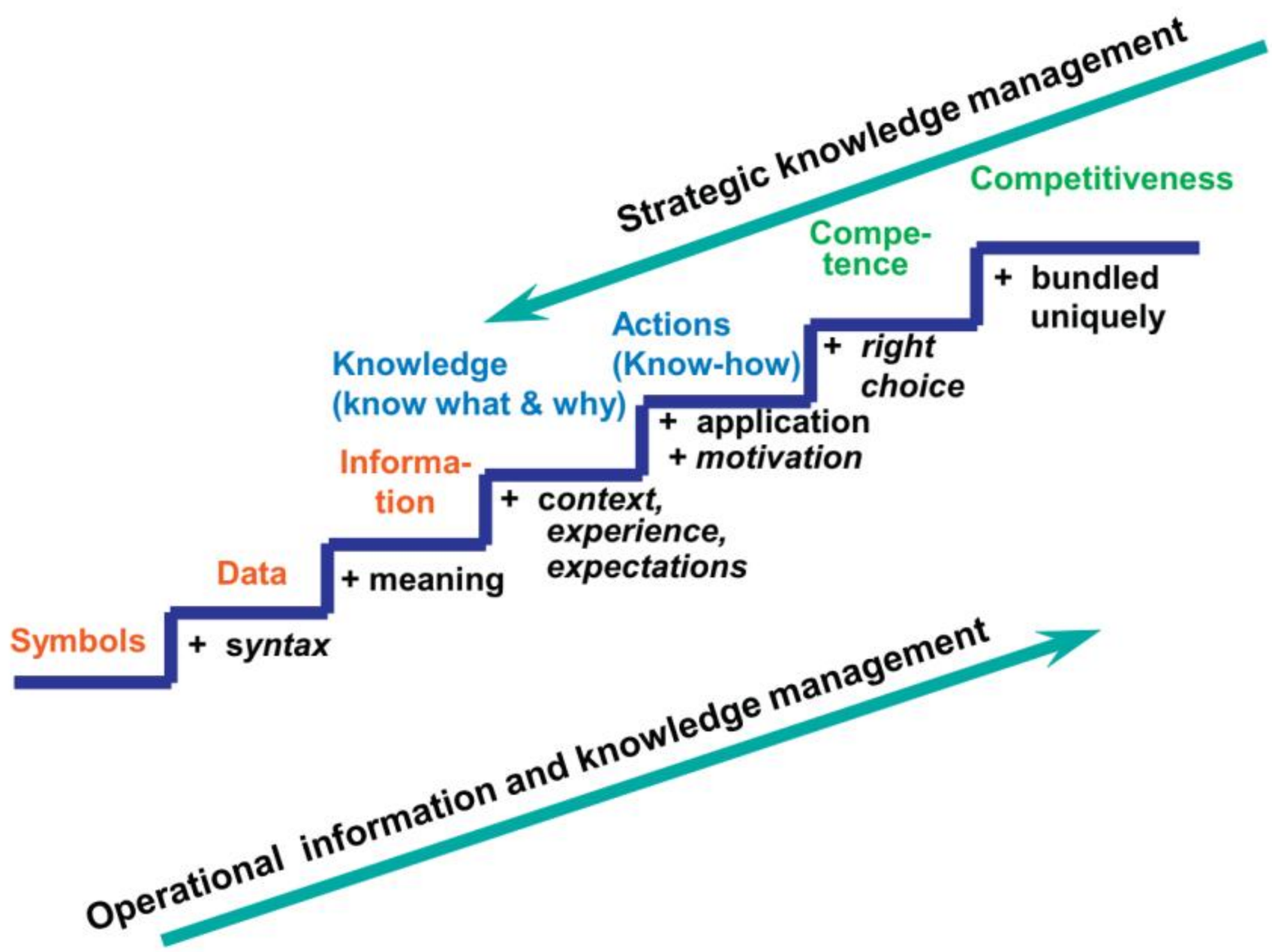

Figure 1.4: The knowledge ladder: Value creation of knowledge work.

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Table 1.3: Checklist: Assess your knowledge work (Part 1).

Task	Value for customer (3 = high, 2 = average, 1 = low)	Time (% of working time)
1. Planning, organisation and strategy development		
2. Analysis, structuring, research, and reflection		
3. Synthesis, creation, and combination		
4. Communication and documentation		
5. Learning		

Do you spend lots of time on activities which are not valued by the customer? Can you reduce these activities or reshape them so that the customer attributes more value to them?

Problem description is an art

1.2.3. The nature of work

To create effective knowledge work, we should not only work on the structure of the process but also on the problem definition and the expected result. Defining a problem and describing it is an art. A good problem description brings you close to a solution in most cases.

In doing so, the following antagonisms play an important role: Routine vs. novel, individual expertise vs. collective effort, and simple vs. complex tasks.

Routine vs. novel A call centre agent or a claims officer in an insurance firm performs his or her tasks in a routine knowledge process in a recurring pattern. This involves standard rules, algorithms, and standardised process flows. If employees are often entrusted with totally new tasks for which they have no experience to bank on, they should have room for creativity, freedom of choice of approach to problem-solving, and the opportunity to discuss with experts and the appropriate time for the same.

Individual vs. collective Is the activity specific to individual expertise or is the output a result of teamwork by experts?

Teamwork catches on

While teachers, doctors, and lawyers usually work as individual experts, working in projects often calls for cooperation of experts from different disciplines. Even in professions that are

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Table 1.5: Role model of knowledge work.

Role	Description	Examples	Challenges
Knowledge creators or *The creative*	Being creative and generating knowledge, e.g. in the form of concepts, designs, products, strategies etc.	Researcher, developer, architect, composer etc.	Finding freedom for creativity and integrating into the market process
Knowledge communicator	Target-group relevant research, structuring, preparation, communication of knowledge, motivation and persuasion	Journalist, trainer, teacher, manager, marketing expert, librarian and information service provider	*Packaging* the appropriate knowledge by being in direct/ indirect contact with the customer, collaborative use of materials, individualism versus co-operation
Knowledge-intensive service providers: *the classical experts*	Based on specific expertise, providing individual solutions in direct or indirect contact with people	Doctor, lawyer, consultant and manager	Development of customised solutions from an immense repertoire of possible measures, utilisation of collective expertise
Implementer of routine knowledge-based processes	Execution of standardised, rule-based processes individually or as part of the complete process	Call centre agent, claims officer and insurance agent	Systematic development of *Best practices*
Knowledge worker in material production	Problem solving and planning in production or in technical services	Service technician, maintenance staff and production worker	Learning systematic problem solving, freedom and motivation for improvements
Learner	Reflection, systematisation of experiences, acquiring new knowledge, upgrading one's competency	Every knowledge worker	Management of time and freedom, studying in knowledge communities

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1.3. Obstacles and Drivers of Effective Knowledge Work

1.3.1. Day-to-Day Madness

Focussed work for 11 minutes at a time

After an observation period of more than 700 hours, the shocking result was revealed: 57% of all the tasks are not completed but interrupted midway. Half of these tasks are interrupted due to external factors such as e-mails, telephone calls, or other colleagues; the other half for no obvious reason. On average, employees work for only 11 minutes uninterruptedly on one task. One who stops midway works on two different tasks before resuming the first task. Only three fourths of interrupted tasks are resumed on the same day. 'For these people, fragmentation of work is a part of life' — this is the conclusion which Gonzalez and Mark (2004) have drawn after studying the routine of 24 employees of a management consultancy.

Millions of work hours are wasted writing e-mails each year

On average, an employee spends one to two hours reading and writing e-mails every day. More than half of the employees are immensely stressed due to e-mails (Weick & Schur, 2008). A study of 27 programmers and project managers of Microsoft showed that they react to 40% of e-mails within two seconds. On an average, they need 15 minutes to resume their work after having reacted to an e-mail (Iqbal & Horvitz, 2007)

Approximately 28% of a working day or 2.1 hours daily is lost on average due to interruptions and distractions. The consulting company Basex surveyed 1000 office employees — from management executives to clerks — to find out the time they are held back from concentrated work daily due to non-productive distractions and the time they take to resume their work from where it was interrupted. Frequent interruptions, the pressure to be always reachable and to respond within a short time, '*multitasking*, and the pressure of deadlines are a part of a routine working day for many knowledge workers. However, these operational productivity killers account for only a fraction of the gap between potential performance and actual performance.

1.3.2. Utilisation and Development of Potentials

What performance are knowledge workers capable of achieving if they work under ideal conditions, and what fraction of these results do they deliver in a real organisation or as independent knowledge workers in a real work environment?

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survey of 23,000 employees conducted by Harris Interactive in the United States, and applied them to a football team:

- Only 37% of those surveyed stated that they were aware of exactly what their company was trying to achieve and why.
- Only 20% were enthusiastic about the goals of their team and their company.
- Only 20% of the employees thought that their tasks were clearly aligned with the goals of their team and the company.
- Not more than 50% of them were satisfied with their weekly performance.
- Only 15% felt that they had complete freedom to achieve key objectives.
- As low as 15% felt a sense of trust around them.
- Hardly 17% were of the opinion that their company encouraged open communication — one which had room for different opinions, and which lead to new and better ideas.
- Just 10% thought that people were held accountable for their performance in the company.
- Only 20% completely trusted the organisation they worked for.
- Those having co-operative and trust-based working relations with other departments accounted for a low 13%.

Six factors for attracting top-class knowledge workers and to engage them productively

Buckingham and Coffman (2001, p. 21) studied the factors which are essential to recruit top-class knowledge workers, retain them, and engage them in productive work. The following six factors have a highly positive correlation with productivity, profitability, employee retention and customer satisfaction:

1. *Knowing exactly what is expected of you at work*
2. *Availability of resources to execute the job correctly*
3. *Opportunity to do what one can do best*
4. *Regular recognition and appreciation for the work done*
5. *Recognition of an employee as a human being*
6. *Having a mentor at work who supports your development*

Well-being at workplace and team spirit

Though these factors are also relevant in industrial work, they are, however, critical for enabling effective knowledge work, which in its core is often an activity involving little structure, a lot of novelty, and dependency on individual expertise. Moreover, well-being and team spirit (Hube, 2005) at the workplace also affect the productivity of knowledge work. Another factor negatively affecting productivity is the situation wherein knowledge workers increasingly have to start freelancing, or are employed on short-term contracts, and perceive a high risk of losing their job (Dostal, Parmentier, Plicht, Rauch, & Schreyer, 2001). In such

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Table 1.8: Checklist: Information, communication and teamwork.

	Completely Agree	Partly Agree	Disagree
1. I need a lot of time for reading, deleting, and answering irrelevant e-mails			
2. I have effective strategies to overcome information overload			
3. I have learnt to find information effectively and efficiently			
4. I have adequate knowledge and skills in order to use information and communication systems			
5. The expectations I have set for being reachable and to respond quickly keep me from important tasks			
6. I constantly attempt multi-tasking			
7. I consciously choose communication media appropriate to the task at hand			
8. Co-operation in team or with other experts and professional groups is productive			
9. I spend a lot of time in ineffective discussions			
10. My network supports me in carrying out my tasks			

transparency about one's schedule, it also leads to fragmented days which make it difficult to concentrate.

Introduction of No Meetings time zones

Some organisations have resorted to introducing *No Meetings* time zones in which their employees can work without being disturbed.

Teamwork is often done in a network of colleagues and partners; this is particularly applicable for freelance knowledge workers: 'How well does my network function? What do I contribute and what do I get?'

Using the checklist given in Table 1.8, assess what are the effectiveness killers and potentials with regard to information, communication, and teamwork.

1.3.5. Improvement Potential No. 3: Self-Organisation, Competence and Time Management

How can knowledge workers apply their competence in a structured manner in value adding processes and at the same time maintain enough scope for creativity and initiative?

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within the circle of colleagues. It had helped the pastors *save a lot of time and better co-ordinate their activities*, which they could use for *improving the quality* of their work. The office had organised a preparation to baptism meeting as her first appointment of today's visiting hours. She had to take the car from the nearby car pool which was reserved beforehand for her along with the appointment scheduling. The secretary knew that she normally required a separate vehicle for this distance.

She took along with her a folder which had been put together with the help of colleagues and the public affairs committee of the church for the purpose of informing the families planning a baptism. The compilation of the folder, however, had been quite a complex and elaborate process. It was not only the individual peculiarities of the six pastors that were to be considered. Even the employees and about 30 honorary associates of the baptism preparatory courses, of the baptisms and of the follow-up team for the baptised and their families had carefully discussed the content. An *internet platform* served the purpose of spontaneous experience exchange and the preparation of regular team meetings. The effort was worth it. Children, mothers and fathers maintained considerable contact with the parish even if the family split up. The volunteers were more motivated and the annual survey in the parish about the quality of the offerings showed an increased *customer satisfaction*. Donations increased, affirming the basic assumption behind community fundraising: All those to whom the church offers something of value are willing in turn to support the church.

After the baptism meeting, Vicky had to make a birthday visit. Unfortunately, she could not get the telephone number or the e-mail address of the old lady. Would she be there? Vicky was a little annoyed that the drive to visit could eventually end up being futile. But a more or less comprehensive maintenance of such data with the possibility of regular updates was still a dream. And the highly individualised lifestyles of people allowed for even less time slots for such meetings. Vicky wondered whether these visits did not fit into the time anymore. In this case though, the lady was available. She was very happy about the visit. She had heard about the youth project for bringing elderly members of the parish closer to the immigrant community. Vicky did not know much about it but promised to get back to her about it quickly. Just after the visit she would be sending out an SMS to her group of colleagues, this time around with the phone number of the lady. Somebody in the group would then get in touch with her within 24 hours. That was the *mutually agreed standard* for such situations in the parish. During the *certification* of their member offer, this was one of the regularly audited points.

Returning the car back to the carpool went quickly as usual. There was just enough time for the daily paperwork, checking e-mails and post, doing the most urgent and putting off the rest for later. Vicky read the e-mail from the registrar with interest: He had sent the link to the database location where the required paragraph of the protocol about the relic case was stored. She immediately checked the centrally stored files on the internet. It was true: There had been a

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2.1. On the Art of Leading Yourself as a Knowledge Worker

> Control is not leadership; management is not leadership; leadership is leadership. If you seek to lead, invest at least 50% of your time leading yourself. Invest at least 20% leading those with authority over you and 15% leading your peers. If you don't understand that you work for your mislabeled 'subordinates,' then you know nothing of leadership. You know only tyranny. Dee Hock, Founder and CEO Emeritus, Visa International

Are you responsible for managing knowledge workers? Does the result of your work depend on other knowledge workers?

If you answered yes to either of these questions, then you have inevitably had to face the question of how knowledge workers can be managed best and whether it is 'only' a question of self-leadership.

2.1.1. Leadership Always Begins with Self-Leadership

Learning to lead

According to Hock (1999), only those who can lead themselves will be capable of leading others effectively. This is particularly true for knowledge workers, who do not like to be managed by orders and rules. Drucker (1999b) says that in general, leadership skills can be acquired. However, this also means that leading knowledge workers needs to be learnt intensively and systematically through practical experience. These skills are not inborn, although there may be people of varying talent out there. The first thing about leadership skills is the optimal execution of one's own tasks (Senge, 1990). This is the reason we revisit the knowledge worker and his role in the framework of the organisation at the beginning of this chapter.

Typical characteristics of knowledge workers

Peter Drucker describes the knowledge worker on the basis of four typical characteristics (Drucker, 1999b).

- Knowledge workers have to define their own job.
- Knowledge workers need to describe their job to others.
- Knowledge workers are paid for their unique knowledge which others do not possess.
- Knowledge workers need to define their own information requirements.

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Check for yourself:

- *Am I really open to the new knowledge resulting from a conversation with others or am I merely looking for a confirmation of the knowledge that I already have?*
- *Am I more concerned about presenting my point of view clearly or about finding a solution together?*
- *Do I often see conversations as a verbal exchange, where I either come out as a winner or a loser?*
- *When was the last time that I learnt something new from my conversation partner or vice versa?*
- *When was the last time that I got new insights during a discussion in a group; insights which I later could not attribute to one particular participant from that group?*

Assessment of learning and communication

After answering these questions, you may realise that you need to consciously choose the people with whom you communicate and co-operate in order to be more successful in your work. One should not assume that the current organisational structure can do this for you.

2.1.4. Knowledge Workers are Paid for the Uniqueness of Their Knowledge

The half-life period of knowledge is decreasing

The knowledge economy is characterised by the significance of recently acquired knowledge and abilities; work experience is set to lose its value. In the past 25 years, the demand for work experience has reduced for each level of education. Knowledge and experience gained over a number of years are not as valuable today as they once were. In the new knowledge-based economy, only the highly qualified workers are rewarded with an above-average remuneration. In the course of this development, studies have also shown that employees with higher IQ are paid more. The difference between the income of employees with an IQ of 120 and above, and of those with an IQ of 80 and below is increasing continuously (Thurow, 1999). Therefore, no nation can afford to let its people remain uneducated in the 21st century.

According to the logic of the industrial society, the best specialists were often promoted to management positions with the belief that this would contribute to increased productivity of the organisation. This worked well as long as superiors could maintain a relatively good overview of the activities in their respective domains and had the necessary knowledge to do so. Simultaneously though, this knowledge had to be enhanced with knowledge management

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even much more severe for tax consultants and auditors. The tax authorities only do a verification routine and the professionals carry out the actual tax assessments and calculation of charges. One of the tasks handed over to lawyers and notaries is the keeping of business registers. We do not want to delve into too many details just now, but this development contributed significantly to the situation where now an individual lawyer is in most cases highly specialised in only one particular field of work.

Using the user interface at his writing table, Friedrich Winter opens a draft of a share purchase agreement. His client is a pharmaceutical company. His draft had been checked the day before by experts on tax, intellectual property, real estate, competition law and labour law. He himself is a company law expert for the medicine and pharmaceutical industry. His colleagues have commented heavily and he has to consolidate all of it. It is not easy when one's drafts are so heavily commented and virtually torn apart by one's colleagues. But that is the usual practice. Hardly any lawyer can draft independently today. Some still dream of the good old times when this was fairly commonplace, but now it is over. This transparency of one's work outputs for colleagues or sometimes even for the competition is quite hard for him and he has yet to get used to it. In fact he is a top qualified, successful and recognised lawyer, but there is hardly any work project that he can handle all on his own. His work has to be complemented and corrected every day, and his success depends on the efficient support provided by his colleagues. Every working day involves learning. He, however, enjoys that as he is a naturally curious and open person. But learning always entails some amount of pain; particularly so when one has to accept criticism from others and become aware of one's limitations. Speaking about learning, Ms. Fuchs, we have to leave now. We have a team meeting at 11am. The main topic is the review of our performance in the Elite plc transaction.

The two rush into the office and then straight to the meeting room. Even though a fruitful meeting could have been organised virtually with good quality and video support, personally meeting people still plays an important role especially in performance reviews. He, as the leader of the transaction, kicks off the meeting, but very soon the younger associates, who are partly still in training, join in. They complain that they were not informed promtly about the extensions in client requirements. What was the reason for this clog? Everything was stored electronically in the file. Brenner, one of the colleagues, had discussed this with the client over a business dinner and his headset did not work in the car on his way home when he wanted to dictate the news into the file. Back home the time was already reserved for family and the next day began with two other more important things. It is a case of human negligence, in spite of all the possible technical support. Nobody is mad at Brenner for this, though he is visibly uneasy; especially as it was the young Ms. Manna who brought up this point. After all, Brenner has been a lawyer for 15 years and for the past 5 years an equity partner in the company, and Ms. Manna started out only six months ago. But all hierarchy levels are overlooked when it comes to performance improvements for

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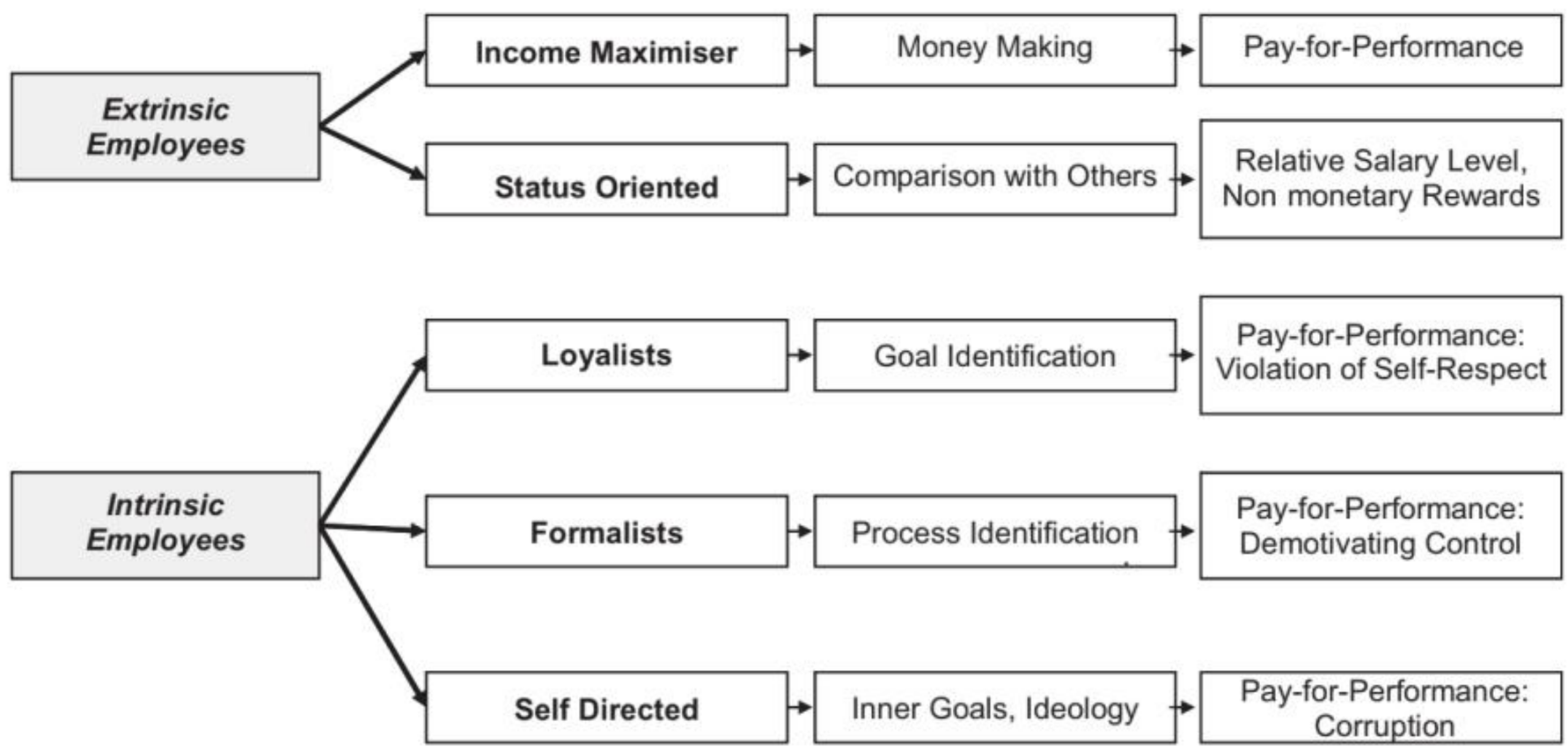

Figure 2.2: Typologies of workers according to Frey (2002).

Extrinsically motivated

The materialistic and the status-oriented employees can be motivated extrinsically:

Pay for Performance

Materialistic

This type can be motivated only through monetary incentives which aid in satisfying his/her consumerist needs for goods and services. Such a person does not really like his work but puts in all the effort only for earning money. The materialistic type represents the classic view of man of 'homo economicus' in economic theory. He increases or improves his output only if it earns him more money; also known as 'pay for performance'. In reality, this type is often found at managerial levels due to the prevailing incentive structure ('self–selection'). But it is not uncommon to find the materialistic type in activities way down the hierarchy, such as assembly-line workers or piece workers.

The Status-Oriented

Assets of position

This type also deals with extrinsically motivated employees, who tend to adapt to the expectations of their social environment. Satisfaction of the needs of such individuals is not linked to consumerist desires but to the direct comparison with other individuals. Their behaviour is defined by a comparable reference group such as neighbours, friends, fellow students or colleagues at work. Such a person can be described as competitive. He wants to be positively different for the others in every aspect.

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	This statement is applicable to me:	1	2	3	4	5
32	I always strive to stay abreast of the latest knowledge in my domain of work, since I hope to get a significant career boost by doing so	○	○	○	○	○
33	I identify myself with my profession	○	○	○	○	○
34	Sometimes my colleagues think I am pedantic	○	○	○	○	○
35	I like professional challenges with rich leeway regarding target achievement	○	○	○	○	○
36	I acquire new knowledge or skills only if I see considerable financial gain in doing so	○	○	○	○	○
37	Sometimes I secretly feel angry about the professional success of other colleagues	○	○	○	○	○
38	I think that I owe more to my profession than a formal contract could ever stipulate	○	○	○	○	○
39	I would make an outstanding civil servant	○	○	○	○	○
40	I like having a long leash when solving professional hassle	○	○	○	○	○

II. General part of the questionnaire

- I'm permanently employed in a business.

→ If you have agreed to the above question please continue answering the questions listed below under IIa. However, if you are not permanently employed, but run your own business please, continue with the customised questions for freelance knowledge workers listed below under IIb.

IIa. Customised questions for salaried knowledge workers

1 = Not applicable at all, 2 = applicable to a small extent, 3 = moderately applicable, 4 = predominantly applicable and 5 = completely applicable

	This statement is applicable to me:	1	2	3	4	5
41	The main reason why I work is to be able to afford good things in life	○	○	○	○	○
42	It is very important for me to flaunt my professional position in society	○	○	○	○	○

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$n = 12$ *Your score*	2	7	12	17	22	27	32	37	42	47	52	57	Sum
	Examples of typical professions (high-test score): Politician, military, government officials and high-level government officers												

Are you the **loyal type?**

$n = 12$ *Your score*	3	8	13	18	23	28	33	38	43	48	53	58	Sum
	Examples of typical professions (high-test score): Long-serving employee, secretary, staff, personal assistant, therapist and nursing professions												

Are you the **formalist?**

I = 12 *Your score*	4	9	14	19	24	29	34	39	44	49	54	59	Sum
	Examples of typical professions (high-test score): Lawyer, doctor, tax consultant, chartered accountant, government official and technician												

Are you **self-determined?**

$n = 12$ *Your score*	5	10	15	20	25	30	35	40	45	50	55	60	Sum
	Examples of typical professions (high-test score): Scientist, teacher, employee of a charitable organisation, artist, journalist and copywriter												

Intrinsic and extrinsic motivations are not independent of each other. If they were independent of each other, one would be able to combine both aspects separately and adapt them to the organisational goals as well as to the respective individual needs. A series of experiments in the field of behavioural psychology and behavioural economics have shown that this approach is not totally problem-free (Barkema, 1995; Frey, 1997).

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according to the Towers Watson Study, 2010. Good leadership fosters employee retention more than anything else. Mistrust and poor relationships with superiors however, increase fluctuation rates just as having no competitive salary or the lack of promotion and career prospects do. The reputation of the company is the deceive factor for motivation and commitment of employees. Here again good leadership practices seem to be very central.

Employee relations & performance

In another study Fulmer, Gerhart, and Scott (2003) showed that positive employee relations effectively serve as an intangible and enduring asset, and may, therefore, be a source of sustained competitive advantage at the firm level. They survey a number of measures of firm-level performance and conceptualise how each measure is likely to be affected by highly positive firm-level employee relations. They then empirically investigate whether positive employee relations is related to firm performance, focusing on publicly traded firms included in the '100 Best Companies to Work for in America'. The relative performance of these 'Best Companies' is examined via comparisons to both companies in the broad market and a group of matched firms. The 100 best places to work for generally had a higher ROA than the peer comparison firms studied over a 6-year period (1995–2000). The 100 best places to work for also had higher market-to-book ratios than their peer firms in the same period. Their 6-year cumulative stock returns outperformed the composite market index (376% vs. 193%). The analyses further suggests that companies on the 100 Best list enjoy not only stable and highly positive workforce attitudes, but also performance advantages over the broad market, and in some cases, over the matched group. Despite the additional costs associated with creating great places to work, the benefits appear to be more than compensated. Among these benefits is a workforce that when compared to peer firms is much more creative, better at solving problems, experiences lower levels of stress, is more closely aligned with organisational goals, and provides a talented pool of employees for higher level positions.

Google: The most attractive employer for knowledge workers

Facing problems acquiring qualified personnel or retaining them? Well in that case the example of Google, the American internet company and currently the world's most attractive employer[1], would interest you. Google receives an estimated 1300 job applications every day even without advertising for them. This

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Local line leaders

- Local line leaders are managers with comprehensive basic responsibilities at the bottom of the organisation; e.g. business unit heads who implement new product ideas and innovations.

In learning organisations, these management roles are essential and interdependent. Alone, none of them is in a position to create an environment which is attractive for knowledge workers, which can encourage learning, and which can contribute to the generation and transfer of new ideas and new knowledge. And all three are to be considered and recognised as management executives; even if officially they are not. Together, with their different roles, they form a collective leadership in a learning organisation.

Three roles for management executives

According to Senge, a management executive should enact three roles:

Leader as designer

- Leader as a designer, who creates the structure of the organisation and thus shapes the strategic and learning context, and also creates the conditions fundamental to achieve strategic success.

Leader as a teacher

- Leader as a teacher, who instead of giving all the answers, asks the right questions. In particular, he makes the employees and the organisation aware of the limitations of the existing models of thought, and works on enhancing these models.

Leader as a steward

- Leader as a steward, who is aware of his responsibility towards employees and the organisation as a whole, and therefore strives to serve both — the employees and the overall goal of the organisation, and tries to interlink the two.

Self-management

At this point, we cannot fail to mention the fact that all knowledge-oriented management requires self-management (see Chapter 2.1): Each change in the organisation therefore begins with the recognition and the change of one's own mental models. This is indeed a factor which makes the implementation of change in an organisation so difficult (Argyris & Schön, 1978; Senge, 2003). We have a fatal tendency to first try and make others change their behaviour, without realising that we need to begin by changing our own mindset and behaviour. Most of the change processes are doomed to fail right from the beginning because of the notion that one can bring about a change in the organisation without any changes in one's own thinking. Particularly harmful is the notion that this change can be implemented without any change in the personality of the management team. An example for this would be the belief that change can be brought about merely by investing in new technologies or by roping in external consultants who advise on how to drive one's own employees to change. Change programmes

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Having got over the shock (1) of having lost the employee, Mr. K, the realignment took the form of criticism of Mr. K, the refusal to additionally take on 'his' responsibilities and the refusal and (2) to check how one's own knowledge has been documented and made available to the organisation.

I soon recognised through the statements of some of my employees and through the initial actions, that the processes within the organisation needed to be changed. The mind — the rational insight (3) — said yes, but the heart, the gut feeling, refused to accept the realignment. The change process picked up pace only once the emotional acceptance (4) overwhelmed the rational insight. The emotional acceptance was responsible for mobilising the necessary resources. Enthusiasm, an inner fire and creative contributions for new work processes emerged and were further developed.

This process was not free of conflicts and occurrences of backfire. There was a constant need for personal discussions, changing of frameworks, motivation, even appeals and clear decisions to ensure the transition from rational insight to emotional acceptance.

Even the pace of the process from shock to inner acceptance turned out differently for different employees. Should one just wait for an eventual insight? Should the situation be dealt with through pressure or empathy? In hindsight I could not find one final and particularly not an all — inclusive answer. Employees are way too different from each other and deal with change in their respective ways.

In difficult management situations I always resort to my personal management principles.

The first management principle is: 'Listen attentively when your employees are speaking and give an understanding answer'. It is easier said than done; it demands strong communication skills and knowledge about active and passive listening. Are these techniques of knowledge management? Yes, especially in the

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and what we manage influences what we get
as result.
(The wisdom of Albert Einstein and Peter F. Drucker combined)

Measurement of effectiveness

Measurement of efficiency

The increasing number of publications in the area of measurement and evaluation in the recent past has not quite made clear what the two terms mean. Classically, measurement of effectiveness and measurement of efficiency are distinguished. Effectiveness measurement signifies the extent to which the performance requirements have been fulfilled, whereas efficiency measurement focuses on the economic use of company resources in order to achieve these performance requirements.

Thought and action

Strategic map

The measurement and evaluation system is thus the core system for the perceptions of any company. This system, directly influences the performance measurement and evaluation of the top management and of all employees, and indirectly influences the strategic decisions. Each organisation thinks and functions through its measurement system even if many decision-makers may be unaware of it. The measurement system can be considered as a strategic map which reflects the organisational reality in a certain manner. We all know that the basic difference between various kinds of maps is the purpose they serve; thus we have road maps, hiking maps, flight maps and climate maps. But all good maps have one thing in common:

Orientation

- They give an orientation: In a complex environment, maps help us to focus on the important things and to find our path which lies in the future.

Model

- They are rational and goal-oriented models of reality: Maps never depict the reality one to one. For one, it is impossible to do so, and secondly it would not serve the underlying goal to provide orientation, because the complexity of the maps would overburden the cognitive capacity of human beings and the organisation.

So what do the orientation maps in today's organisations look like? On which significant parameters do they help us focus? Do these parameters help us find a suitable strategy? And how is the strategic performance of an organisation defined?

Financial indicators

Classic approaches answer these questions with the help of various financial indicators. Starting with turnover, net income or EBIT, these indicators include traditional returns figures such as ROI or ROS up to the new estimates of shareholder value

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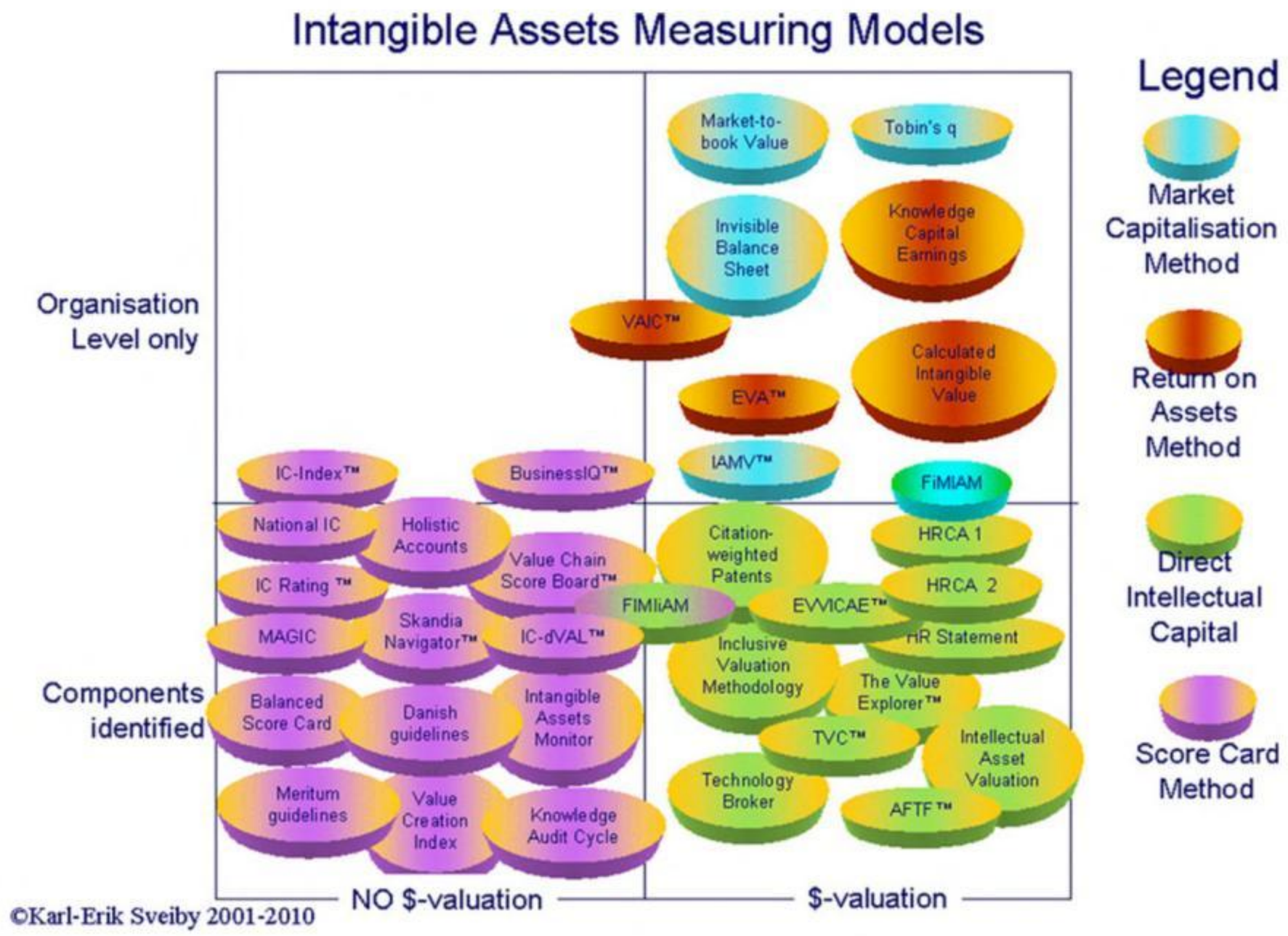

Figure 2.5: Methods for analysing the intellectual capital (Sveiby, 2010).

Direct intellectual capital methods

Direct Intellectual Capital methods for measuring intellectual capital estimate the monetary value of intangible assets by identifying the individual components. These individual components are then evaluated separately or in aggregated form.

Score card methods

With Score Card methods, the various components of the intangible assets or of the intellectual capital of a company are identified. Based on the company's strategy, indicators for individual value drivers are identified and measured. The results are represented in a scorecard. Contrary to the direct methods, in Score Card methods monetary analysis of intellectual capital is not carried out.

2.5.3. Efficiency: Productivity of Knowledge Work

Efficiency of knowledge work

Making the efficiency of knowledge work measurable means evaluating its process and productivity. If one has to measure the productivity of knowledge work, then first one needs to know what 'productivity' actually means and where it originates.

Productivity – definition

Productivity in general means the ratio between output and input of a production (Sumanth, 1994). However, the term

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2.5.4. *Methods of Measuring Productivity*

Three areas of interest: Management, economics, accounting

The methods of productivity measurement that are used in organisations today vary considerably. The difficulties involved in developing a uniform standard lie, on the one hand, in consolidating the interests from the three related disciplines of management, economics and accounting. The efforts put into finding an adequate method in these areas are rather isolated and not geared towards finding an integrated concept. On the other hand, the organisations themselves pose a problem by measuring their performance using random data instead of addressing the topic of performance measurement more seriously. Basically, the methods of productivity measurement can be classified into three general techniques (Singh, Motwani & Kumar, 2000, p. 255ff.):

1. Index measurement of productivity

Creation of individual indexes is the most commonly used method for measuring the rise in productivity. There are several popular ratios within this technique, but the *Total Factor Productivity (TFP)* by Craig and Harris (1973) is the most representative concept. The objective of this method is to measure the ratio of output and various potential inputs, the combination of which has to be adapted to the company. In order to take the objectives of individual measurements into account, the base period or the observation period (two or several periods) and the treatment of inflation have to be determined.

2. Linear programming

This technique determines a production frontier based on mathematical programming and, based on past data, analyses the contribution of each input to productivity. In linear programming, price data as well as a special functional form (non-parametric) can be done away with. The leading method in this flow of measurements is the *Data Envelopment Analysis (DEA)*. The advantages of this method are that it helps filter the less efficiently used inputs, offers the possibility of considering multiple inputs and output criteria at the same time, and provides statistical robustness through simulations and theoretical concepts. The disadvantage is the need for a comprehensive data series and the development of a test to prove the statistical significance.

3. Econometric models

Prerequisites for using this technique are existing technological knowledge of specifications and the knowledge about technology process. In this technique, the output function depends on multi-inputs and a technological index which can also be considered as

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an input. Despite the parametric form, it is possible to achieve a flexible functional form by using comprehensive sampling to determine these parameters. The need for price data and a considerable variance of the results are the main disadvantages of this technique.

We agree with Singh et al. (2000) that these techniques complement each other due to the different assumptions, the data used and the knowledge requirements. Ultimately, these three techniques answer three different questions:

- How did we fair as compared to the 3 years previous?

Index measurement of productivity

- Which inputs are used inefficiently in our productive process?

Linear programming

- For a given technological specification, to what extent can capital be substituted with work?

Econometric model

The conclusion is that there is no 'right' method for measuring productivity for all companies; the methods need to be tailored to the individual company, the industry, the objective and other aspects that need to be considered.

There is no method that can be called THE universal method

2.5.5. Dimensions of Measuring Productivity of Knowledge Workers

In over 60 years of research, numerous dimensions which scientists use to map the productivity of knowledge workers have evolved. Some dimensions used most often are listed here (Ramirez & Nembhard, 2004, p. 617ff.):

1. *Quantity*: Here, the output (quantitative production output) and the results (quantification of qualitative variables) are included in the analysis.
2. *Quality*: This dimension shows how high is the quality of work when measured with reference to a best practice standard.
3. *Costs* and/or *profitability*: Here, personnel costs are assessed and compared with an output; e.g. sales or profit.
4. *Time limits*: The point under assessment here is whether time standards are adhered to or how much extra time is required if not.

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5. *Autonomy*: Shows how much autonomy and independence the knowledge worker has in his/her work.
6. *Efficiency*: Indicates whether the actual work is done correctly; i.e. meets the prevailing standards with respect to costs, time and quality.
7. *Effectiveness*: The right kind of work done; a strategically useful prioritisation of work is done.
8. *Innovation/creativity*: Counts the number of new ideas that are developed in order to increase productivity.
9. *Project success*: This dimension evaluates the overall outcome of work in terms of decision-making, team synergy, communication quality, predictability, crisis management, documentation and transferability of knowledge.
10. *Responsibility and significance of work*: Emphasises the importance of being effective in critical situations.
11. *Customer satisfaction*: Focuses on the fact that the output generated has to generate value for the customer.
12. *Perception of productivity by knowledge workers themselves*: Attempts to offset possible misinterpretations of other factors.
13. *Downtime*: Helps get a long-term perspective of average productivity. High productivity at a particular point in time does not necessarily mean that this level of productivity can be maintained over the long-term.

However, the significance of particular dimensions in the literature is different in many cases from the actual implementation in the models.

Quantity, costs/profitability and time limits comprise over 50% of all actually used dimensions. If we look at the significance in literature, quantity is the first in the list followed by costs/profitability, quality, effectiveness, efficiency and time limits. The greatest discrepancies between literature and implementation are in quality, effectiveness, costs/profitability and efficiency. Reasons for these discrepancies on the one hand could be the difficulties involved in incorporating a certain measurement dimension in a model, or on the other hand the different views about research results and the type of implementation.

To summarise, one can say that on average, of the 13 measurement dimensions given in the literature, only two to three are taken into account for each model. None of the methods considers all dimensions; the maximum number of dimensions used in formal methods is five of which a select few are introduced in the next section, whereas the rest together cover only one single dimension.

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2.5.6. Six Selected Examples for an Enhanced Measurement of Knowledge Productivity

Function Point Analysis (FPA) FPA is a method developed to measure the productivity of software developers. FPA can be used for more than 250 programming languages and was originally developed to measure the software size and productivity at IBM. The productivity of a software project is specified with the number of function points in comparison to the programming duration. Function points are a measure for the complexity and the size of a software system. Each function that is seen by the user, e.g. inputs, outputs, interfaces, etc., is assigned a function point score dependent on the degree of difficulty and complexity. The number of function points a programmer can complete in a given time is one measure of productivity.

However, 'the procedures for counting FP are labor-intensive, require expertise and experience, and do not easily lend themselves to automatic data collection' (Sheetz, Henderson, & Wallace, 2009). Nevertheless, function point analysis is commonly used and is a better productivity measure for programmers than lines of code.

The accuracy of the method however heavily depends on the ability and experience of the analyst. Bok and Raman (2000) show problems which may result in implementing the FPA:

- The organisation knows that productivity is measured using the FPA.
- Capturing the correct indicators for calculating the function points.
- The rigidity of the measurement process.

FPA is not a method which delivers the absolute truth regarding the productivity measurement of knowledge workers and yet it is the best method to measure the performance of software programmers in a stable and controlled environment.

Operations-Based Productivity Measurement Ray and Sahu (1989) suggest three steps to measure the productivity of knowledge workers:

a. Classification of knowledge-based jobs: In the first step, individual jobs are divided into routine tasks and non-routine tasks.
b. Definition of the relationships between knowledge-based jobs: In this step, the correlations between individual job characteristics

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are drawn and indices are created, which are later used for further measurement.

c. Development of suitable models for measuring and evaluating productivity: The results of points 1 and 2 are combined to subsequently measure productivity.

The productivity is measured by a mathematical model that assumes a linear relationship between the variables identified in the three steps mentioned earlier. The operations-based productivity is thus the sum of job variability index, co-ordination index, interaction index and similar measures, weighted with individual or group coefficients.

Data Envelopment Analysis (DEA) The DEA method is used to measure the relative effectiveness of individual units, e.g. knowledge workers or a team of knowledge workers. This method was developed by Paradi, Smith, and Schaffnit-Chatterjee (2002) to measure the effectiveness of design teams. This method uses decision-making units (DMU) and analyses them as one individual unit.

A DMU can be for example be an engineering team that is evaluated based on inputs (e.g. number of employees, orders) and outputs (e.g. number of plans and processed requests) that have been identified. This data can be analysed with mathematical models (Paradi et al., 2002).

Swift Even Flow Method With the help of the Swift Even Flow approach, Schmenner (2004) has tried to explain the reasons for success and failure of service enterprises. This approach is based on the assumption that the processing time of material and information, and their uniformity in terms of quality, quantity and time sequence are decisive for the productivity of processes. Based on his service matrix of 1986 (Schmenner, 1986, p. 21) that provides an explanatory approach for increasing the productivity in service enterprises, Schmenner (2004) develops a service matrix which describes productivity depending on throughput time and degree of variation of the process (Figure 2.6).

Schmenner's original service matrix was based on the assumption that organisations achieve high productivity if customisation was reduced on the one hand and personnel expenditure minimised on the other.

The adapted service matrix according to the Swift Even Flow concept changes both these dimensions such that the variation in the underlying processes is the critical factor and not

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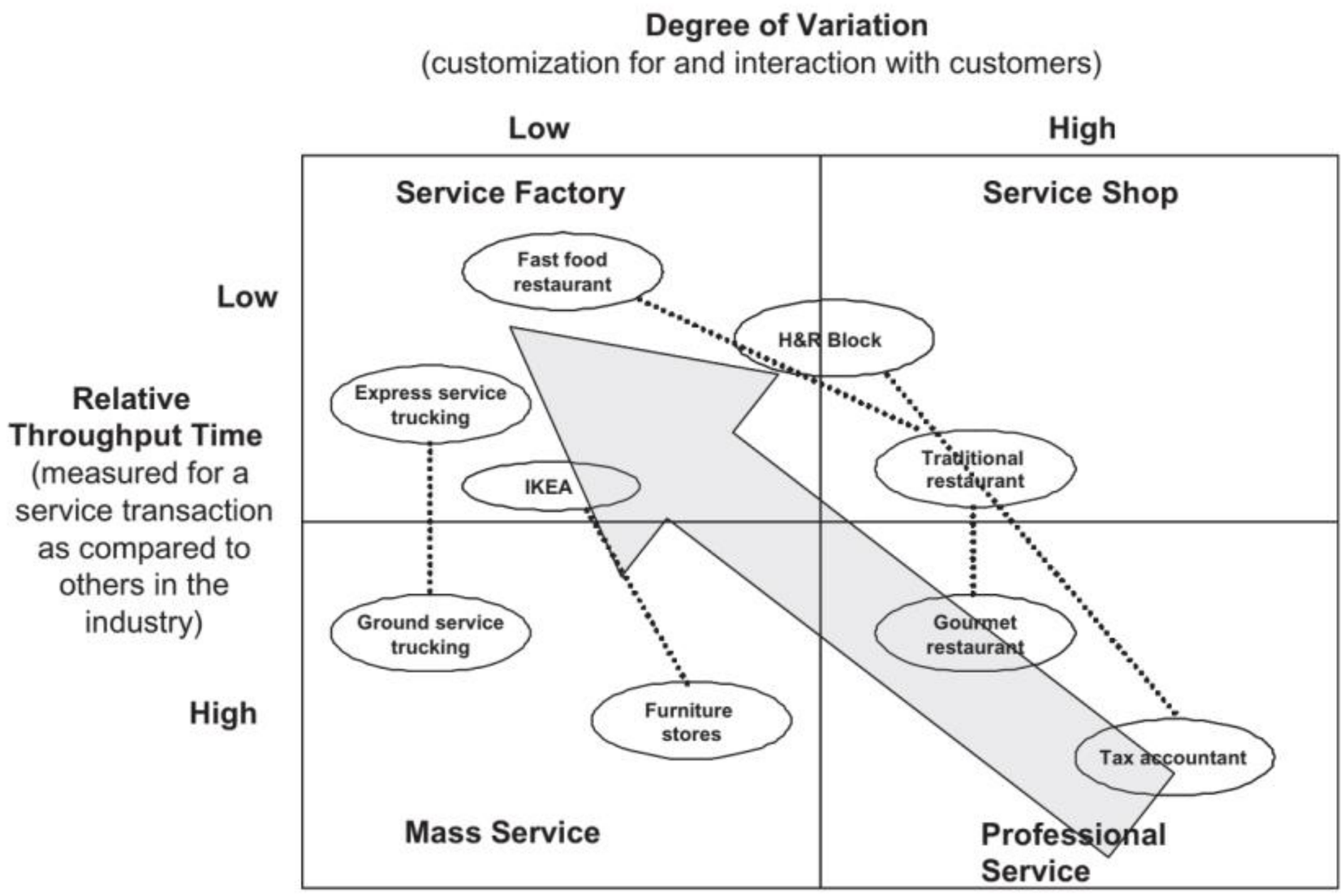

Figure 2.6: Revised service matrix according to the Swift Even Flow method (Schmenner, 2004).

the customisation. Similarly, the lead times of processing are the other determining factor and not the personnel requirements.

This development can be explained with the example of Ikea and McDonald's. Ikea offers a high level of customisation. However, in doing so it is ensured through a modular structure that the underlying processes are standardised to the maximum possible extent. McDonald's, the chain of fast food restaurant, is taken as an example to explain the second dimension. Here, the productivity is phenomenal, in spite of a high degree of customer contact and high man power. This has been achieved through standardisation of processes and minimisation of lead times.

By adapting his service matrix to the Swift Even Flow concept, Schmenner provides an interesting theoretical approach to explain the productivity of organisations. Though it is very clear from the examples as to why processing speed and process standardisation are relevant, the concept does not provide any information about the other factors which could be significant for increasing productivity. At the best, the view based on the two dimensions gives a basic classification of organisations in terms of their management of processes and with it a possible advantage with regard to productivity.

The KP^3 Method The KP^3 method was developed by two South Korean scholars, Jae Hyeon Ahn and Suk Gwon

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Chang (2004). This method suggests that knowledge can contribute to a significant competitive advantage over the competitor; however it cannot be easily measured.

The basic principle of the KP^3 method is not to measure knowledge or the value of knowledge directly, but to measure the contribution of knowledge to the performance of the organisation. This is done by linking knowledge to the organisational performance logically through the intermediate areas of product and process.

The three components of the KP^3 method are as follows:

Knowledge

According to Nonaka and Konno (1998) knowledge is typically divided into explicit knowledge and implicit ('tacit') knowledge.

Product or service process

According to Miller and Dess (1996) value is created mostly in a group of activities in the value chain, known as the core processes (this was adopted from Ahn & Chang, 2004).

Success

As already mentioned, the KP^3 method distinguishes between financial and organisational performance.

According to Ahn & Chang, these three components should be logically connected to each other. The authors tried to do this with the help of the four matrices. The following Figure 2.7 gives a better view of the same:

The following four matrices are distinguished:

1. *Knowledge — Product Matrix (A)*: This kind of product knowledge can be determined for each individual and can be summed up for all the employees.
2. *Product — Performance Matrix (B)*: Contribution to financial performance, which results from knowledge work.
3. *Knowledge — Process Matrix (U)*: The knowledge of the employees with regard to the core process. This can be calculated and summed up exactly as in matrix A.

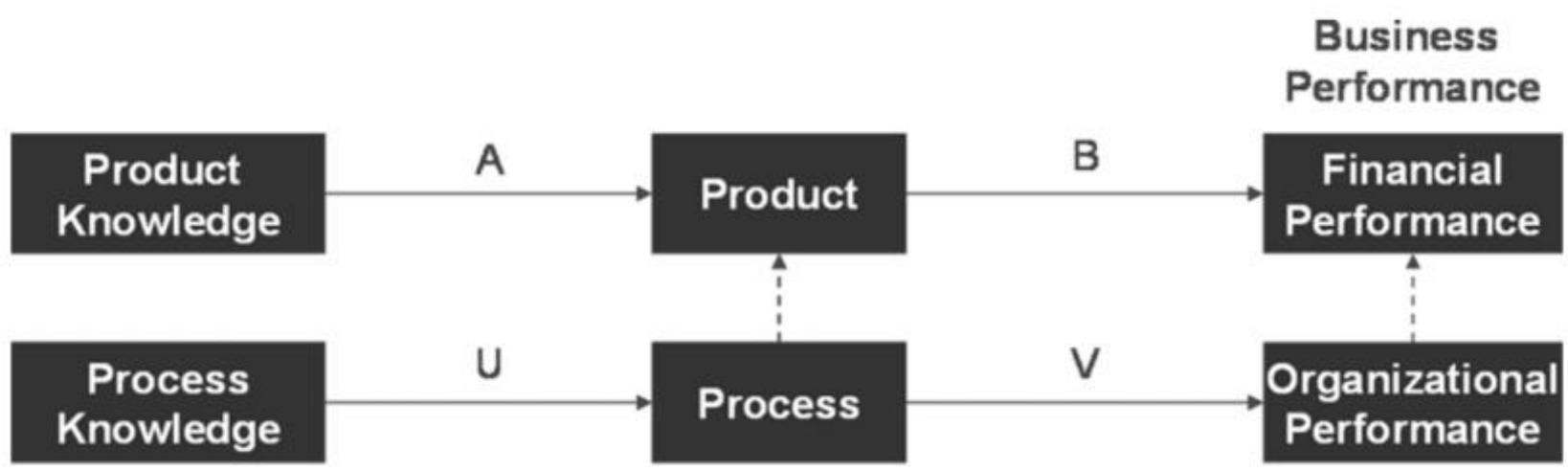

Figure 2.7: An overview of the KP^3 method (Ahn & Chang, 2004, p. 405).

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4. *Process — Performance Matrix (V)*: Indicates the contribution of the core processes to the organisational performance.

The following two matrices are further required for measuring the contribution of knowledge (product or process knowledge) to the performance of the organisation:

5. *Product Knowledge — Financial Performance Matrix (C)*: This correlation results by multiplying matrix A with B.
6. *Process Knowledge — Organisational Performance Matrix (W)*: Here, all knowledge activities with regard to the processes are added for all the employees.

The basis required for calculating the matrices is provided by the data envelopment analysis (DEA).

Capability Maturity Models Capability maturity models (CMMs) were originally developed for the U.S. defense department to assess the capabilities of software engineering organisations. The model is based 'on the assumption that higher process capability or organisational maturity are associated with better performance' (von Wangenheim et al., 2010, p. 92). Process capability can be developed by understanding the current processes, defining objectives as well as improvement policies and implementing these plans. According to the quality of the process design, an organisation can be classified as belonging to one of the five process maturity levels, ranging from initial to optimising. The classification depends on the degree of statistical control, quality assurance, process measurement and continuous improvement that is exercised (Humphrey, 1988). A CMM appraisal can serve as a benchmark and as a framework for process improvements.

The Software Engineering Institute at Carnegie Mellon University, which is responsible for the maturity appraisals, has extended the CMM to be applicable beyond the domain of software development. The capability maturity model integration (CMMI) can be used to optimise processes like product development, service management and product acquisitions (SEI, 2010). A CMM certification of a company's internal quality-oriented processes is often used by offshore IT service providers as a quality signal to attract clients (Gao, Gopal & Agarwal, 2010).

In a study in the software development industry, Shang and Lin (2009) concluded that using a systematic model such as the CMMI can enhance the understanding of how organisational knowledge is created, shared and managed. It can increase software quality and development efficiency. However, the CMMI

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