Knowing What to Manage

The development and application of a knowledge management scan

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KNOWING WHAT TO MANAGE: THE DEVELOPMENT AND APPLICATION OF A KNOWLEDGE MANAGEMENT SCAN

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Abstract

In today's knowledge-intensive society, organisations need to be able to effectively manage the increasingly important production factor "knowledge" in order to thrive. In this article, an instrument is presented, developed by O&i management partners in co-operation with the University of Amsterdam, which enables organisations to diagnose their 'state of the art' regarding knowledge management, and to identify opportunities and threats for a further growth towards professional knowledge management. The theoretical foundations of the instrument are presented, as well as the goals which it helps realise. Finally, the results are discussed of a continuous methodological evaluation of a central part of the instrument, the questionnaire.

INTRODUCTION

In our present information economy, there seems to be a wide consensus that managing the 'production factor' knowledge (Weggeman, 2000) efficiently and effectively is crucial for organisational survival. In other words, effective knowledge management is an important factor for good organisational performance. The question that then presents itself is, of course: When is knowledge management effective? How can an organisation know whether or not it is managing its knowledge processes the way it should? What is the road to optimal knowledge management, and how can an organisation evaluate how far it has travelled along that road – in other words, what must be done to achieve effective knowledge management?

In this paper, we present our research experiences with an instrument that can provide answers to such questions: a knowledge management scan which has been developed in a mutual co-operation between the University of Amsterdam and the Dutch consultancy firm O&i Management Partners. First, we will present the objectives of the scan, and the tools and methods that constitute this instrument. Subsequently, we will identify the relevant variables related to these objectives, and their theoretical basis. We will also discuss a number of empirical examples that clarify what kind of information the scan provides, and which questions the instruments helps to answer. Each time the scan is applied, we also test the instrument itself – both on statistical and qualitative criteria. The results of these tests are also discussed, concentrating on scale homogeneity and dimensionality. Finally, we will draw some conclusions regarding the value of such instruments, and their relevance – in both practical and academic terms.

THE KNOWLEDGE MANAGEMENT SCAN: OBJECTIVES AND INSTRUMENTS

The Knowledge Management Scan presented here is an instrument which primary aims tot provide an organisation with concrete – and fitting – recommendations concerning its strategy, tactics and operations with regard to knowledge management. These recommendations are formulated in a 'plan of improvement', in which pitfalls and barriers for a further professionalisation of knowledge management are identified, and strategies for overcoming such pitfalls and barriers are presented. In order to realise this primary goal, the Knowledge Management Scan has two objectives:

1. providing insight into the present situation concerning knowledge management in the organisation, by means of a 'snapshot' of a number of crucial processes and preconditions;
2. providing strategies and tactics for the further development of knowledge management in the organisation, by positioning the organisation in a 'phase model' of knowledge management.

In order to realise these objectives two methods are used

1. *Interviews*. The scan begins with a number of interviews with managers in the organisation, in order to get a first, qualitative picture of the situation in the organisation. During these interviews, the present and desired situation are described on a number of criteria:
   - Opinions on knowledge management;
   - Objectives and tasks of the organisation;
   - Primary and support processes in which knowledge is important;
   - The organisation's knowledge management policy;
   - The degree of organisational attention for knowledge management;
   - Current division of tasks and responsibilities concerning knowledge management;
   - Instruments currently used, the current knowledge infrastructure;
   - The organisation's culture;
   - Information on recent internal and external developments.

2. *Survey*: The second part of the scan consists of a questionnaire, which is distributed among all of the organisation's employees. This questionnaire consists of four parts. Part one contains a limited number of questions concerning some individual characteristics of the respondent (function, department, et cetera).

   Part two of the questionnaire concerns the current state of affairs regarding knowledge management, as perceived by the employees. In order to be able to determine where potential problems exist, six knowledge processes are identified which, in our view, are the processes at which knowledge management should be aimed:
   1. determining the knowledge needed,
   2. knowledge development,
   3. knowledge access,
   4. knowledge sharing,
   5. knowledge application and
   6. knowledge evaluation.

   In the following section, the model will be presented on which this categorisation is based, and these processes will be described.

Part three of the questionnaire aims to identify the organisational preconditions that must be met in order to realise effective knowledge management. The following aspects are measured in this part
- Organisational structure (degree of autonomy and degree of (de)centralisation)
- Organisational culture (openness, communication climate, degree of mutual respect)
- Motivating factors (clarity of organisational goals and visions, commitment, stimulation, feedback, time pressure).

The theoretical and practical considerations, which have led to the selection of these preconditions, will be discussed in the following section as well. Both the second and third part of the questionnaire (measuring knowledge processes and preconditions) consists of a number of statements, measured by 5 point Likert scales, ranging from 'strongly disagree' to 'strongly agree'.

Finally, the fourth part of the questionnaire contains a list of instruments (specific for the organisation under study) which can be used in knowledge processes. Respondents are asked to indicate to which degree they use these instruments, and how satisfied they are about them. These items are also measured using 5 point Likert scales, ranging from 'never' to 'very often' for usage, and from 'very dissatisfied' to 'very satisfied' for appreciation.

In table, a number of items from the questionnaire are presented.

[INSERT TABLE 1 ABOUT HERE]

In the following sections, we will further discuss the theoretical and practical foundations of the Knowledge Management Scan. A number of relevant theories concerning knowledge, knowledge management and contextual influences on knowledge management will be discussed which for the basis underneath the Knowledge Management Scan's design. We will also discuss how the results the scan provides are related to the objectives identified in this section.

PROCESSES, PRECONDITIONS AND INSTRUMENTS: FOUNDATIONS FOR A DIAGNOSIS

Different visions on knowledge and knowledge management (e.g., Nonaka & Takeuchi (1995); Polanyi (1966, 1974); Van Gurchom, Florijn & Van der Meulen (1999); Choo (1998)) emphasise the dynamic character of knowledge. Knowledge management concerns many different processes, and is aimed at designing and managing these processes as effectively as possible. In Weggeman's (1997; 2000) *Knowledge Value Chain,* six knowledge processes are identified:
1. establishing which knowledge is needed in order to realise the organisation's strategy,
2. determining which knowledge is available in the organisation,
3. developing knowledge where needed,
4. sharing available and new knowledge,
5. using knowledge in the organisational processes,

6. evaluating knowledge, relating the available knowledge to the organisation's objectives and visions, providing new input for establishing the knowledge need.

Knowledge processes: the flywheel of knowledge management

The opinions and insight described above have been an inspiration for our vision on knowledge management. The processes described by Weggeman (knowledge need, inventarisation, development, sharing, use and evaluation) are important for effective knowledge management. Identifying these six separate processes in itself, however, is insufficient. These processes must also be in line with the organisation's mission, vision, strategy and goals. Moreover, the organisation and management of these processes is crucial, of course. Finally, where Weggeman seems to assume a certain serial sequence in these processes, our model assumes a somewhat more complicated mutual relationship between the processes. Therefore, our model is not a value chain, such as Weggeman's, but a 'fly-wheel' – as presented in figure 1.

 [INSERT FIGURE 1 ABOUT HERE]

The metaphor of the 'fly-wheel' relates to the fact that the different processes and aspects of knowledge management should receive simultaneous attention, while the frequency and intensity with which attention is paid to each of these processes and aspects, varies across time. The central point here is that the different 'rings' in the fly-wheel have their own 'orbital velocity': the operational processes in the inner ring take place with a high frequency, the more evaluative processes in the second ring (determining the knowledge need and evaluating the available knowledge). The outer ring (mission, vision, goals and strategy) concerns the long-term orientation of the organisation. Management and organisation are in the flywheel's axis because they constitute the 'core' of knowledge management. So, in our view, knowledge management is not a chain in which a set sequence of activities takes place, but a dynamic whole of parallel activities with differing frequencies. Dosage, timing and balance are key concepts here. The specific situation in and around the organisation, as well as the management's ambitions, determine which aspects deserve more attention at which point in the process.

In order to be able to assess to what degree each of these processes is fully executed and managed in the organisation, we first need to have more insight into the state of affairs concerning a number of preconditions for knowledge management.

Preconditions: structure, culture and motivating factors

For effective knowledge management, the design of the processes must match with the organisation's characteristics. This fit depends on a number of preconditions, which we describe as: organisational structure, organisational culture, motivating factors and instruments. These preconditions determine the possible design of knowledge management processes in the organisation.

Organisational structure

An organisation's structure influences knowledge processes in two ways: indirectly through its influence on culture (see the next paragraph), and in a direct way. A lot of the literature concerning knowledge management (for instance: Brown & Duguid (1991; 2001); Storck & Hill (2000)) emphasises the fact that actual knowledge creation takes place where the work is really done – in other words, knowledge is directly related to practice, as Nonaka & Takeuchi (1995) and Choo (1998) contend as well. Decentralisation of tasks, power and autonomy of task execution are important structural characteristics that can stimulate the knowledge processes in the flywheel. Therefore, the central structural variable measured in the Knowledge Management Scan is:

- the degree of *autonomy* an employee experiences in designing and executing their work.

Organisational culture
Much literature in the field of knowledge management describes how an organisation's culture influences knowledge processes (for instance: Nonaka & Takeuchi (1995); Weggeman (1997; 2000); Choo (1998)). Weggeman (1997), for instance, states that an organisation, as a precondition for successful knowledge management, should:

> *"stimulate a work climate that gives the knowledge workers the feeling of being useful, that motivates people to be open, honest and a good colleague, and that makes political behaviour and power games unnecessary. Thus, an organisational culture can develop in which the employees feel safe and at home"*(p.110).

Nonaka & Takeuchi (1995) also identify a number of preconditions for knowledge management, all related to culture, such as:

- clarity on organisational goals,
- a high degree of independence for employees (as explained in the previous paragraph),
- stimulating creative processes in the organisation,
- information redundancy (providing people with more than just information on primary processes)
- diversity, which must match the organisations' dynamics and complexity.

There is much literature in this area, but here is not the place to give an exhaustive overview of that literature. In the Knowledge Management Scan, the different assumptions which are found in this literature are integrated in the following four cultural preconditions for knowledge management:

- *Openness:* An open culture promotes the sharing of opinions and knowledge, mutual tolerance and room for non-routine initiatives.
- *Mutual respect:* Mutual appreciation, understanding and trust have a positive influence on knowledge development, sharing and the critical evaluation of the knowledge need and available knowledge.
- *Communication climate:* This precondition is strongly related to 'openness', but has explicit attention for the communication dimension. *"The communication climate must see to it that employees are open for new ideas and experiments"*, as Sprenger & Van Oort (1998) put it. Open communication, both formal and informal, is generally assumed to be positively related to successful knowledge management.

In short, openness, respect (for managers and co-workers) and an open communication climate (within and outside of the respondent's department) are preconditions for a culture in which mutual trust is created and employees are willing to share their ideas and to experiment (Sprenger & Van Oort, 1998), and in which they can be held accountable for their performance.

Motivating factors
A number of the preconditions mentioned by Nonaka & Takeuchi (1995) and Weggeman (1997) are part of the organisation's culture, but are – in our view – better viewed as explicit ways to *motivate* employees to optimally design and execute their knowledge processes. Both Weggeman and Nonaka & Takeuchi, for instance, emphasise the importance of clarity on organisational *intentions* (or *goals and vision*), and the active *stimulation* of creative processes and knowledge processes. Weggeman also, with for instance Alkahafaji & Tompkins (in: Weggeman, 2000) emphasizes the importance of employees' *commitment* to the organisation. Davis and Botkin (1994) claim that organisations should also actively stimulate their employees' learning processes through directed and meaningful *feedback*. On the basis of these insights, we have identified the following motivating factors that are measured in the Knowledge Management Scan:

-   *Clarity on goals and vision (collective ambition, intention)*: When there is a clear and shared understanding of what the organisation's mission and vision are, a collective ambition is realised which will positively influence the success of the knowledge processes.
-   *Commitment*: Commitment creates a feeling of unity, which will motivate employees to 'go the extra mile', to give their best in order to enhance the organisation's performance – in stead of focusing on individual or departmental performance..
-   *Feedback:* Frequent feedback, showing appreciation for success, and tolerating failures (and being able to learn from them) are all factors, which promote the development, sharing and application of knowledge. Learning by experience can only take place when feedback is immediate and unequivocal.
-   *Time pressure:* In practice, the time that people have available turns out to be an important barrier too knowledge processes – these processes are hardly ever the employees' first priority. If people have too much time pressure in their work, successful knowledge management is difficult to achieve.

Instruments: the knowledge infrastructure

Choo (1998), Nonaka & Takeuchi (1995), Weggeman (1997; 2000) and Van Gurchom, Florijn & Van der Meulen (1999) all emphasise how important a good knowledge infrastructure is for knowledge management. This infrastructure consists of more than just ICT instruments – knowledge management instruments vary from the company library to mentoring, and from knowledge bases tot intervision groups. The instruments available in the organisation, and the experiences employees have with the use of these instruments, can seriously influence the design and execution of the knowledge processes in the fly-wheel – and, consequently, the success of activities geared towards managing these processes.

In the Knowledge Management Scan, explicit attention is paid to the instruments making up the organisation's knowledge infrastructure. Together with the organisation, a list is made of available instruments, which is subsequently made part of the questionnaire.

Diagnosis

Based on the processes, preconditions and instruments described before, the Knowledge Management Scan provides a picture of the organisation – or, a diagnosis of the state of affairs concerning knowledge management. Parts two and three, as described before, present a picture of the knowledge processes and the preconditions. Different statements are taken together into scales which measure each of these processes and preconditions.

Ultimately, this leads to scores between 1 and 5 for each of the knowledge processes, with 1 being an extremely low score (and an indication that there are grave problems with the process in question) and 5 being a very high score. These scores are generally presented similarly to the example in figure 2.

[INSERT FIGURE 2 ABOUT HERE]

Figure 2 presents the diagnosis of one of the organisations in which the scan has been executed. There is no room here to exhaustively discuss this diagnosis, but both the table and the graphical representation of the results indicate that::
- intra-departmental knowledge sharing scores significantly higher than inter-departmental knowledge sharing in this organisation, and
- knowledge evaluation is an activity that is somewhat underexposed in this organisation.

The preconditions are presented in a similar way, with an example being presented in figure 3. Again, the minimum score is 1 and the maximum score is 5.

[INSERT FIGURE 3 ABOUT HERE]

This example (which, by the way, does not represent the same organisation as the one in figure 2) also provides a number of conclusions::
- their is a generally positive perception of the organisational culture – the assessments of communication climate and mutual respect are clearly positive,
- there is, however, an obvious lack of clarity on organisational goals and vision, and employees do not have a very strong feeling of being stimulated and receiving clear and valuable feedback.

Again, there is insufficient space here to elaborate on this example, but figure 3 clearly show how the results of the second part of the questionnaire can be translated into a diagnosis of the organisation.

Finally, regarding the instruments used for knowledge management (part four of the questionnaire), an overview is given of the average scores (again, between 1 and 5) on both usage and appreciation. Table 2 gives an example of how these results are presented (again, from a different organisation than the one in the previous examples).

[INSERT TABLE 2 ABOUT HERE]

Table 2 shows a general preference for relatively informal instruments, where the employees themselves have the initiative, over more formal and top-down oriented instruments.

The examples presented in this section, show how the Knowledge Management Scan leads to a diagnosis of the state of affairs concerning the knowledge processes, the organisational preconditions for these processes, and the instruments used to support these processes. With this, a picture is provided of how well the flywheel of knowledge management is filled in. This picture is based on a match between the quantitative data from the questionnaire, and the qualitative data from the interviews. Figure 4 presents an example of how this can be represented.

[INSERT FIGURE 4 ABOUT HERE]

In this section, we have shown how the scan realises its first objective. In the following section, attention will be paid to the second objective the scan aims to realise.

A PHASE MODEL OF KNOWLEDGE MANAGEMENT: A PERSPECTIVE ON FURTHER DEVELOPMENT

Where the fly-wheel of knowledge management and the preconditions provide insight into the organisation's current situation, the phase model of knowledge management presented in this section gives a clear indication of the steps the organisation should take to further develop its knowledge management. This model helps to answer the following question: what is professional knowledge management, and what is the next step the organisation should take on the road towards this professional knowledge management?

Our phase model of knowledge management is based on two other theoretical models:
- Dubin's (1962) model of learning processes, based on the dimensions 'competence' and 'consciousness', and
- Nolan's theory (Nolan & Koot, 1999) concerning organisational growth stages in the implementation and application of information technology.

Dubin's (1962) model of learning is often used in education and training, and is based on models of "experiential learning" (cf. Kim (1993), Kolb, Rubin & Ostland (1991) and Rapmund & Wijnen (1990)). In this process, four stages are identified through which a person or organisation travels during a learning process:
1. *Unconsciously incompetent:* the person or organisation lacks certain knowledge or a certain skill, but does not know it. A situation in which this incompetence is a problem has not been met yet, so there is no manifest problem.
2. *Consciously incompetent:* there is a confrontation with ones failings, and a realisation of incompetence. It becomes clear what knowledge or skills are necessary in order to overcome those failings.

3. *Consciously competent:* activity is undertaken to overcome the shortcomings identified before, the needed knowledge or skills are acquired. There is much concentration on this process, and the process has a high priority.
4. *Unconsciously competent:* the knowledge and / or skills are internalised, becomes a part of the personal or organisational routines and mental models. Thus, this no longer requires explicit attention.

However this model primarily focuses on the process of individual learning, it's also applicable on organisational learning. Wagenaar (1999) describes it as follows:
> "In the first phase (unconsciously incompetent) the organisation is not aware of the importance of knowledge and knowledge management. In the second phase (consciously incompetent) the importance of knowledge is recognised, but one is incapable of managing this asset. In the third phase the organisation becomes capable of managing knowledge. In the fourth phase the organisation has mastered managing knowledge as an integral part of the daily activities. The professional organisation has learned to manage knowledge and eventually gone through the four phases. (p. 19)"

With these dimensions the *professionallity* in which an organisation copes with knowledge management is rated. Professionallity in two dimensions: (1) the *(in)competence* of managing knowledge and (2) how *consciously* the organisation has to handle this process.

The phases and terminology in this model are extracted from Nolans' theory on information technology. This model describes a number of stages which an organisation will go trough when it implements information technology. Nolan illustrates these phases with two s-curves on the dimensions: leaning process and automation budget. The content of the model in this context isn't totally relevant, but it inspired to the 'Phase Model of Knowledge Management' (figure 5).

[INSERT FIGURE 5 ABOUT HERE]

The phases will be amplified below.

Initiation
Organisations in the initiation phase are becoming slowly conscious of the possibilities of knowledge management. The idea is formed that knowledge management can solve some organisational threats (for example a tight labour market, labour turnover, and inefficiency). Sporadically knowledge management initiatives are taken.
However in this phase these are mostly ideas. Knowledge management isn't a subject on the MT agenda. Only some enthusiasts start little initiatives, which mostly fade away after al short time. These half-hearted solutions lead to sub-optimisation and the professionallity in which knowledge is managed is low.

Expansion
In this phase various knowledge management initiatives are taken throughout the organisation. The focus on knowledge management grows, but its still seen in a problem - solution context: Knowledge flows out of the company, mistakes re-occur often et cetera. Managers and employees are getting more and more conscious that

knowledge is an asset and they are starting within their business-unit small knowledge management initiatives. In this phase the first experiments with technical solutions take place. However the link with a knowledge organisation isn't made often. Solutions are only ad hoc and fragmentally implemented. So knowledge isn't managed professionally. One doesn't know exactly what knowledge management is and what to do with it.

Control
In the phase of control, knowledge management gets (more) central attention by the management team. Commonly a member of staff gets the portfolio 'Knowledge Management' and a working group 'Knowledge Management' is started. The proliferation of initiatives is inventoried and a more central approach is looked for. One is consciousness of the fact that knowledge should be managed, but the way in which to optimise its use it isn't clear. Technical solutions like a knowledge databank or a company wide Intranet is implemented. The control of this knowledge infrastructure hasn't explicit attention.

Infrastructure
It this phase it becomes clear that the initiatives out of the control phase are not in line with daily activities. The acceptance of implemented systems (the knowledge bases) is low and fall short of expectations. These failures and high maintenance costs lead to incomplete databases and therefore useable / unused systems. There is a technological discontinuity. Management and control are badly organised and the emphases still lie on putting knowledge in writing.
Knowledge management is synonymous with the knowledge base. It is on the management agenda solely as a cost-issue. In this stadium the downward spiral has to be broken and the way to deal with this problem has to be contemplated.

Organisation
The choices made at the end of the infrastructure phase, have to take shape. This happens in the organisation phase. The board has actively chosen to incorporate knowledge management and realises that this takes time to put into effect.
Knowledge has central management attention and this attention focuses on technique and organisation.

Integration
In this last phase, the organisation embeds the responsibility for knowledge management (integral management) and has centrally controlled knowledge management instruments. In the same way as personnel and finances each manager is responsible for the asset knowledge. Knowledge is competently and integrally managed. The whole knowledge management process is executed so the organisation becomes a learning organisation. Knowledge does not need special attention, the professionallity in which knowledge is managed is high. The flywheel turns 'on its own'. Knowledge management became management.

The perspective: How to get to the next level?
Based on the qualitative information from the interviews combined with the quantitative data from the questionnaire the organisation is placed in the phase model of knowledge management. This indication is then translated into a number of

concrete proposals to get into the next phase. These actions are organisation specific and the pitfalls and barriers of the phase are anticipated.

It is for example possible that the interviews indicate that knowledge management is just in a variety of ways implemented and not a subject on the management agenda. Additional the questionnaire points out that the sharing of knowledge takes only place in an informal way and within the business-unit. Moreover hardly any knowledge flows between department and there are no clear knowledge management visions or goals. The organisation will be placed in the expansion phase and could be advised to work on:
-   central management attention;
-   active propagation of attention on knowledge an organisational goals;
-   to level barriers between business-units;
-   and stimulation and integration of initiatives towards an organisation wide knowledge infrastructure.

Scanning the scan: Reflection on the instrument.

The scan has been tested abundantly by now. More than ten organisations are tested with the Knowledge Management Scan, and every time the scan itself has been tested as well. This reflection includes:
-   the process, the order of activities et cetera;
-   the interview questions;
-   and the items of the questionnaire, which are used to construct the scales of knowledge management and organisation.

In this paragraph we will focus on the results of this last part of evaluation: The quality of the scales that are being used to measure the various aspects in the questionnaire. In each case study are these scales analysed and then tested on homogeneity and dimensionality. The results of three case studies are presented in table 3. These three cases are selected because of their similarity. Every time the scan is scanned, it is improved. Items in the questionnaire are altered, in- or excluded because of their effect on the homogeneity and consistency of the scales. The cases presented are however highly similar. Only between case study two and three (very) small changes were carried trough.

[INSERT TABLE 3 ABOUT HERE]

The analysis reported in table 3 leads to the following conclusions:
-   In each case study is the majority of the scales homogeneous (Cronbachs' alpha >.60). A number of scales are consistently homogeneous across the three cases: knowledge access, knowledge sharing (within and in between departments), openness, clarity about goals and visions, commitment, stimulation, feedback and time pressure. Autonomy (not homogenous in the three cases) and Communication climate (has just in one case a sufficient level of Cronbachs' alpha) are problematical.
-   In relation to the consistency we see some similarities as well. Factor analysis shows that a number of scales measure consistently one dimension. In other scales consistently the same dimensions reappear:

- knowledge needed, splits into the individual knowledge needed and the knowledge needed in relation to her of her colleges.
- knowledge development, splits into the amount of which one perceives to be learning and the concrete use of new knowledge executing their job.
- the sharing of knowledge (within and in between departments) is divided (in all case study's) in sharing initiated by the respondent, and sharing initiated by the respondents' colleges.
- knowledge evaluation contains the evaluation of general organisational knowledge and the evaluation of information sources.
- openness splits in two over the positive formulated items and the negative formulated items. Although these items are re-coded they still measure a separate dimension.
- commitment splits into a dimension that measures general commitment to the company (which the respondent communicates outside his of her work environment as well) and a dimension that focuses on the respondents' own motivation.
- There where the scales are not consequently multidimensional, the division in dimensions is often logical:
  - respect in the last case study is split into respect for colleges and respect for executives.
  - feedback is in the second case study divided into error tolerance on one side and evaluation and criticism between colleges on the other.

Although homogeneity and dimensionality aren't consistent over all case studies, the described patterns indicate the quality of the scales. Homogeneity wise the majority of scales reach a sufficient level of Cronbachs' Alpha. And there where the scales are multidimensional, they are consistent and (what 's more important) with respect to content logical. These consistencies and logic give the indication that the Knowledge Management Scan is methodological robust.
The fact that after each execution the scan itself is scanned (on scale quality and process) it leads to the expectation that this robustness will further increase.

CONCLUSION

With the increasing importance of effective knowledge management in organisations, it becomes increasingly important that organisations can measure their state of the art on this subject. The Knowledge Management Scan that is presented in this paper turns out to be an adequate instrument for diagnosing organisations: the results gave in general a clear image of the situation an organisation was in, and the possibilities and pit-falls on their path trough the phases. It was found that the scan repeatedly leaded to concrete actions, which stimulated the organisations' maturity.

Furthermore the data presented by the scan, are scientifically interesting. Even though this paper which focused on the practical application of the scan, and for lack of space to elaborate, the scan gives the opportunity to empirical testing of theoretical insights. Analyses indicate for example a consistent relationship between the organisational culture and knowledge processes, phases and instruments, and differences in perception between management and shop-floor workers in relation to communication and knowledge. The methodological reflection, which is an important part of the

execution of the scan, will lead to an instrument that is practical and scientific valid and moreover will give much more valuable insights on the subject: knowledge management.

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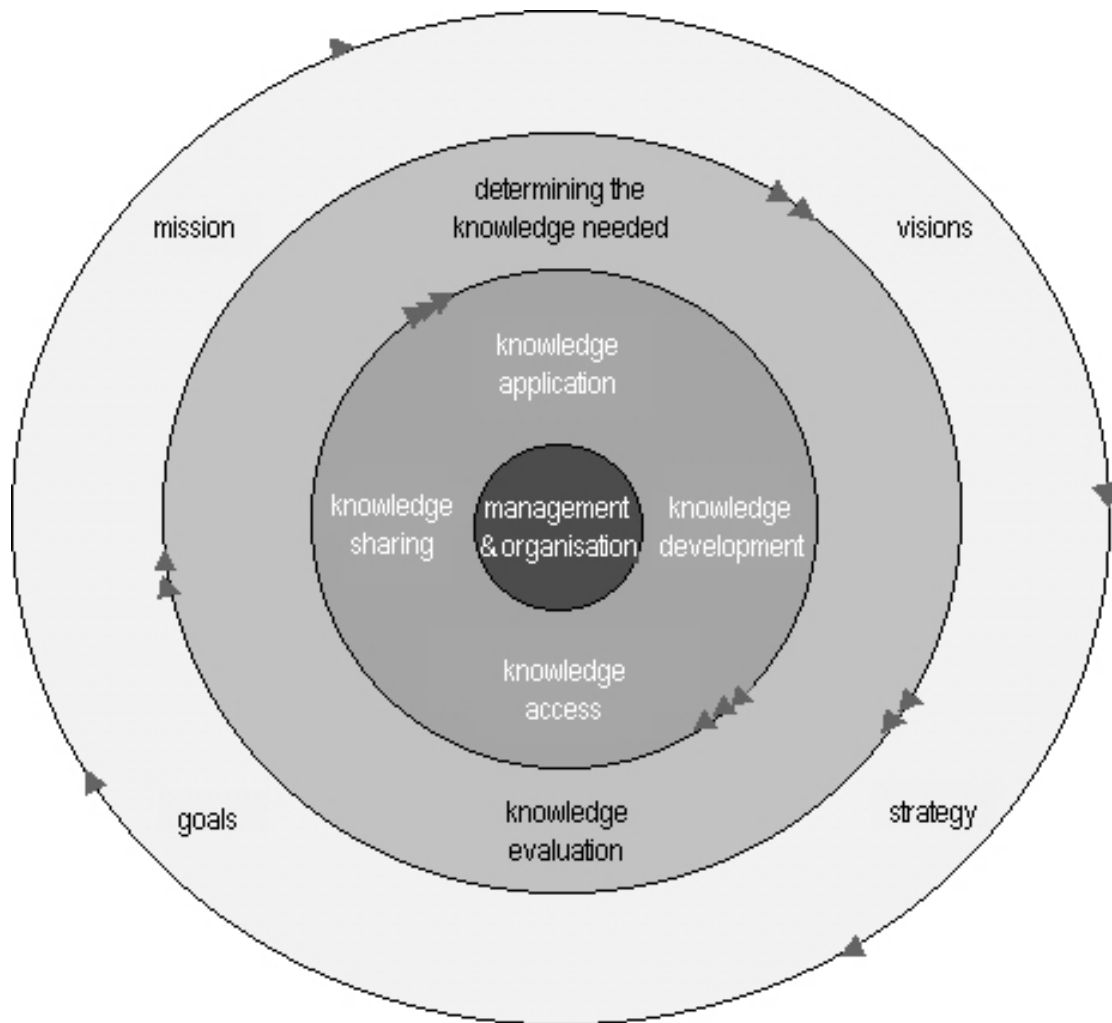
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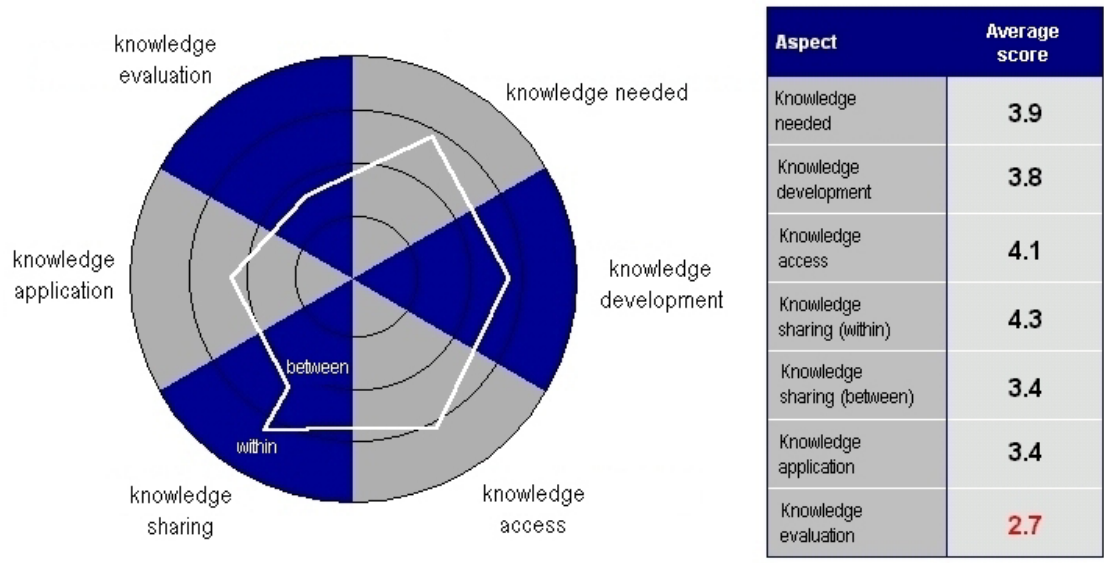
Figure 1. Knowledge Management: Fly-wheel

Aspect	Average score
Knowledge needed	3.9
Knowledge development	3.8
Knowledge access	4.1
Knowledge sharing (within)	4.3
Knowledge sharing (between)	3.4
Knowledge application	3.4
Knowledge evaluation	2.7

Figure 2. Results Knowledge Management Scales.

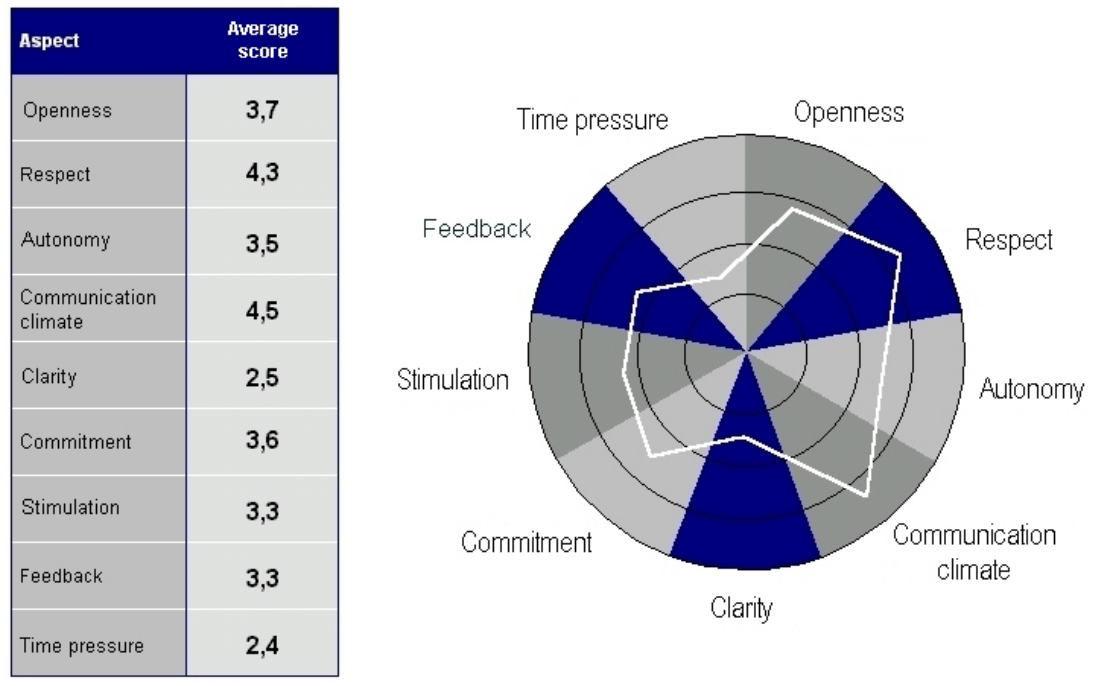| Aspect	Average score
Openness	3,7
Respect	4,3
Autonomy	3,5
Communication climate	4,5
Clarity	2,5
Commitment	3,6
Stimulation	3,3
Feedback	3,3
Time pressure	2,4

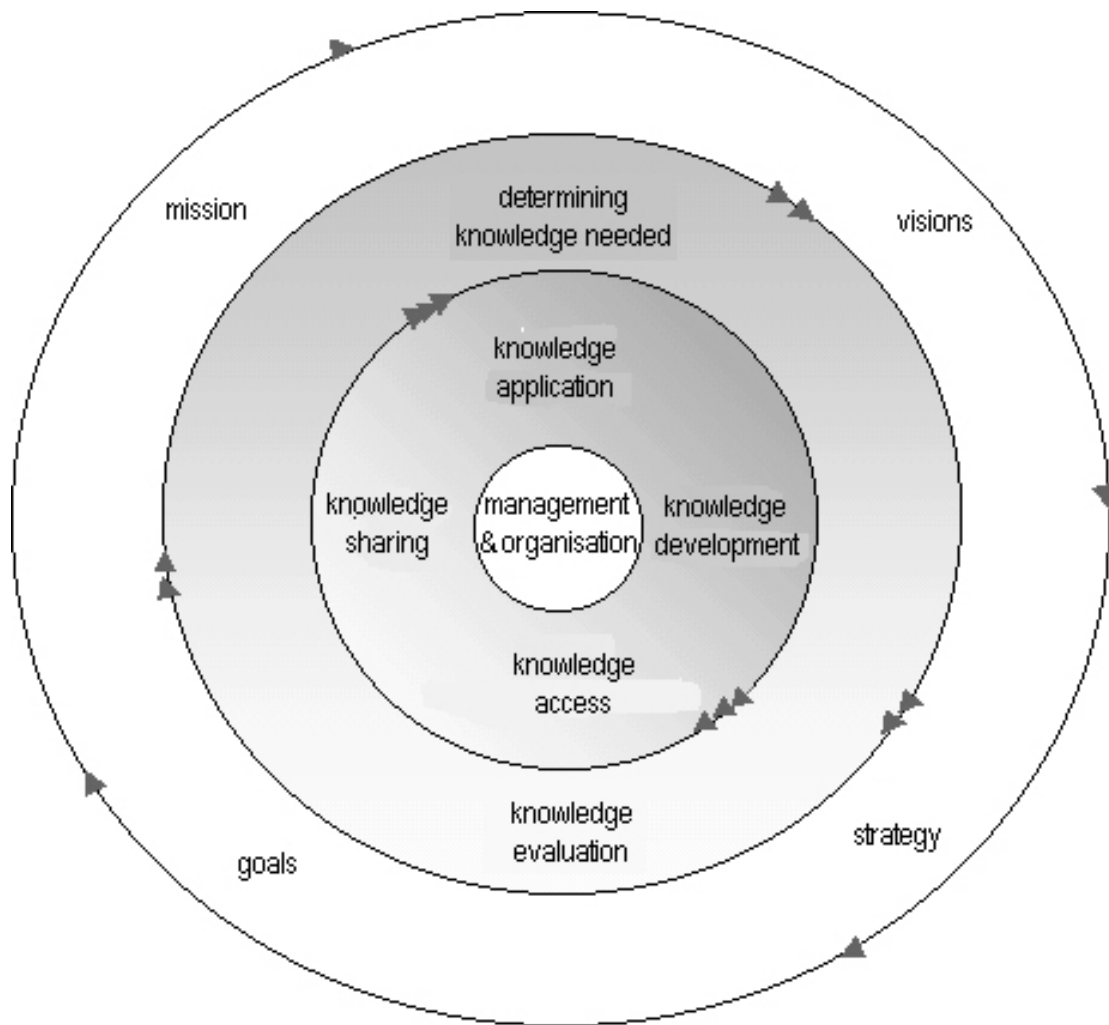*Figure 3. Results organisational scales.*
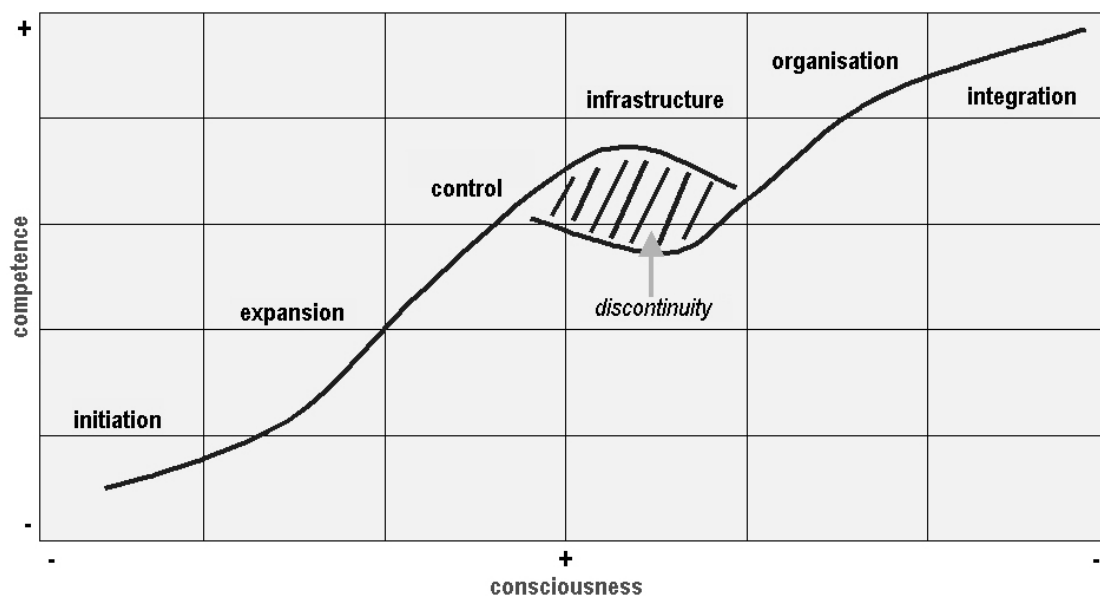
Figure 4. Results Fly-wheel.

Figure 5. Phases of knowledge management.

Table 1. Example: Scales in the questionnaire

Knowledge development:
• I'm still learning in my job
• I learn enough on my job
• I'm keeping my knowledge is up-to-date to fulfill my job
• I often use new knowledge in executing my job
• My colleges often use new knowledge executing their job
Knowledge sharing (between departments):
• When I've learned something new, I see to it that my collages are able to learn it as well
• I share my information with colleges outside my department
• I share my skills with colleges outside my department
• Colleges outside my department inform me about what they know, when I ask them
• Colleges outside my department inform me about what they can, when I ask them
Openness:
• We discuss openly errors and mistakes, in my department
• When I'm having a problem, there always a college to turn to
• We share within my department disappointments
• My department is - communication wise - closed to its surroundings
• The people within my department don't communicate openly

Table 2. Example: Instruments

Instrument	Average use	Average satisfaction
E-mail	4.5	4.3
Internet	3.9	4.2
Intranet	3.7	3.7
Documents	3.1	3.3
Consultation	3.0	3.6
Procedures	2.9	3.2
Bulletin	2.8	3.2
Satisfaction survey	2.7	3.1
Co-operation in multi disciplinarian teams	2.7	3.3
On the job training	2.3	3.2
Coaching	2.2	3.0
Library	2.1	3.4
Personal development plan	1.9	2.7
Mentoring	1.8	2.9

Table 3. Scales: homogeneity and dimensionality.

	CASE 1 (N=40)			CASE 2 (N= 109)			CASE 3 (N=60)		
	α	fact.	items	α	fact.	items	α	fact.	items
knowledge needed	.76	2	1, 2, 3, 4 5	.68	2	1, 2, 3 4,5	.64	2	1, 2, 3 4,5
knowledge development	.29	-		.68	2	6, 7, 8 9, 10	.73	2	6, 7, 8 9, 10
knowledge access	.75	1		.74	1		.60	1	
knowledge sharing (within)	.78	2	14, 15, 16, 17 18, 19	.82	2	14, 15, 16, 17 18, 19	.83	2	14, 15, 16, 17 18, 19
knowledge sharing. (between)	.67	2	20, 21, 22 23, 24	.75	2	20, 21, 22 23, 24	.80	2	20, 21, 22 23, 24
knowledge application	.55	-		.63	1		.71	1	
knowledge evaluation	.65	2	28, 29 30, 31	.78		28, 29 30, 31	.51	-	
openness	.75	2	32, 33, 34 35, 36	.72	2	32, 34, 35, 36 33	.76	1	
respect	.50	-		.88	1		.80	2	37, 39, 41 38, 40, 42
autonomy	.33	-		.43	-		.36	-	
communication climate	.19	-		.66	2	48, 49, 50 52	.54	-	
clarity (goals, vision)	.80	1		.81	1		.79	1	
commitment	.86	2	56, 59, 60, 61 57, 58	.82	2	56, 59, 60, 61 57, 58	.88	1	
stimulation	.92	1		.86	1		.87	1	
feedback	.67	1		.83	2	67, 68 69, 70, 71	.86	1	
time pressure	.72	1		.84	1		.80	1	

In each case study respectively: the Cronbachs' apha on the scale, the number of factors within the scale and which items in the questionnaire relate to the dimension, are presented. The numbers in the column 'items' therefore point to the specific questions in the questionnaire. Although these numbers give no information with respect to content, it is possible to deduct the consistency over the various case studies.