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# TECHNOLOGY INTELLIGENCE IN NETWORKS AND CLUSTERS

## A NOVEL APPROACH

In cooperation with:

IZET

IFP
Innovative foresight planning for business development

The Interreg IVB North Sea Region Programme
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„It is not the strongest of the species that survive, nor the most intelligent, it is the one that is most adaptable to change."

Charles Darwin

## A. An approach to technology intelligence in networks and clusters

Traditional concepts and methods of technology intelligence are in their practical implementation hard to unite for a company, but especially for an SME network. Technology Intelligence targeted by an SME network needs to have an organizational concept, which contains the potential and the opportunities to meet the practical challenges. KOLLER / UNTIEDT established a communication- and process-oriented approach, with the decentralized integrated technology intelligence (DIF). This makes it possible to use the decentralized structure of a network as an advantage. Although it was originally designed for a company in the medical industry, this concept can also be applied to companies and technology focused SME networks.

Networks often do not have established structures for the dissemination of information. In such systems it is usually up to each individual when and to whom information, deemed relevant to future developments, is passed on. This leaves the sober realization that these informal structures are far from sufficient to meet the information needs necessary for the strategic direction and development. In addition, some information sources are not only very specifically tailored to specific divisions and departments, but often can only be handled by a single person, who holds a hard to re-assign key position. Such informal processes therefore need to be provided with transparency, they need to be normalized and institutionalized.

The basic concept of decentralized integrated technology intelligence (DIF) is based on the use of locally available know-how within a company. Precisely this concept ensures that the DIF is well suited for the use in a network, because the participating companies already bring their know-how into the decentralized network. An essential feature is the formation of a hierarchy in the form of so-called radar groups, which are composed of the know-how carriers of the corresponding areas and who meet regularly. The purpose of a radar group is to discuss and evaluate changes from a previously designated field. As part of the network cooperation the radar groups can be formed by the project groups, which meet the composition and functions demanded for the radar groups. Furthermore, the operational early warning indicators from the respective areas are to be brought into the discussion, so that joint monitoring can be defined and implemented. As a basis for monitoring - depending on the field of observation – serve for example market research reports, patent analysis, competitor analysis, supplier reports, evaluations of exhibitions and convention visits, etc. If several local radar groups are being established, both scanning and monitoring can be carried out for a broad area of environment. The most significant rated changes are being remitted by the radar group in the DIF to the hierarchically superior radar group (if existing).

The identification and discussion of environmental changes in the radar group, and the dissemination of key results has the effect of qualified consideration and as a result a filtering, which provides that only a selected segment of the overall data is forwarded to the next level. By focusing on particularly relevant signals, one creates a significant reduction of complexity. Although this filtering implies a risk of an interest-selection of forwarded signals, this is mitigated by the fact that the selection

process is preceded by a debate between the participants and by the fact that the groups are under pressure to recognize relevant signals in time and remit them as significant. Moreover, this is followed by an evaluation of the signals at a higher level, which corrects an unauthorized selection. In addition, even central planning departments, such as those found in corporate structures cannot evaluate the signals objectively. The evaluation by the relevant experts in the radar group concept is based on comprehensive and current know-how.

At the head of the information process the DIF advises, to summarize the filtered information in an appropriate "strategy room", to prepare, and thus present the information to the upper levels of the network and the individual network participants. Here for are the typical instruments of the strategic foresight, such as "road-mapping". The following figure visualizes a possible form of DIF in a network.

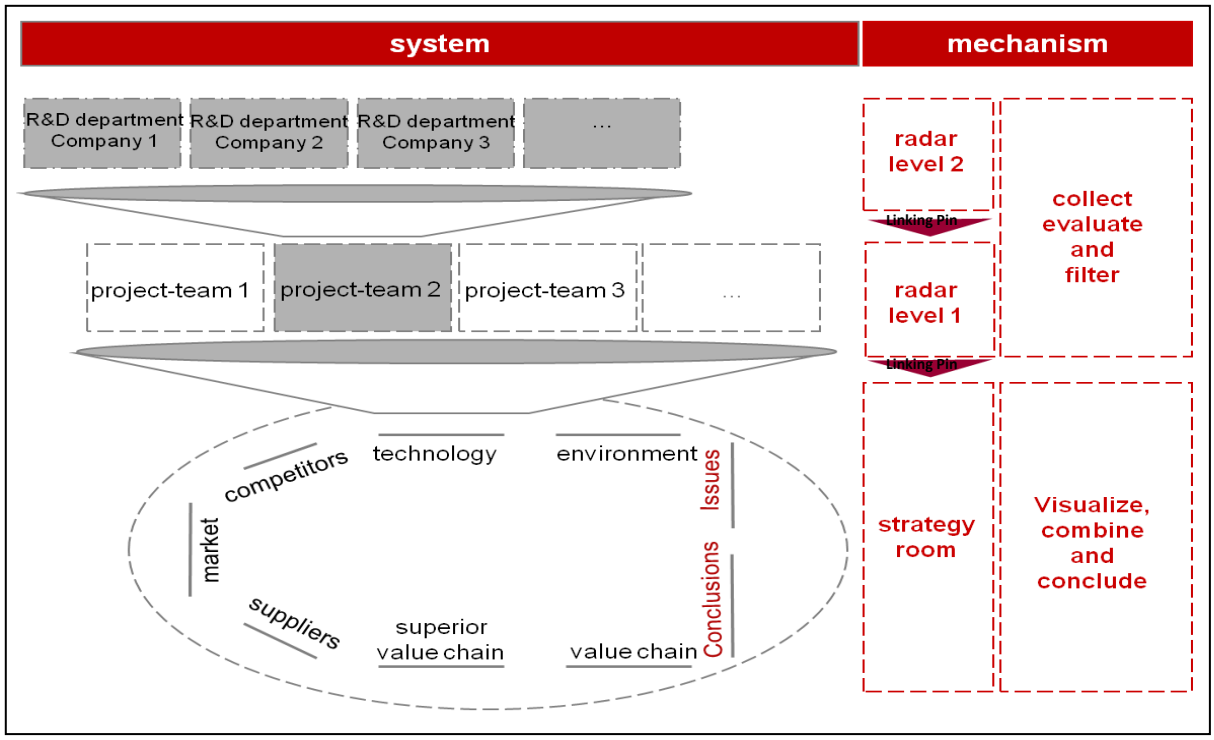


Figure 01: approach to structuring a network according to the DIF

Following: Koller, H./Hoelzner, H. M. (2009), p.73.

The required number of hierarchical levels depends on the size of the network and the heterogeneity of the observation areas. Furthermore, the radar groups or project groups may be expanded to include people who distinguish themselves by special contacts with the environment and act as "gatekeepers" or "boundary spanner". External participants such as lead users, lead supplier, including experts from research institutions should be involved as well, in order to significantly expand its competence and to avoid a possible blindness of the network. Here again, the network structure offers advantages, since the various parties in turn, rely on different participants and thus expand the spectrum significantly and independently. The advantages of such an approach are summarized by KOLLER / UNIEDT in the structuring of the observation areas, greater transparency,

the explication of important conclusions and open questions and the avoidance of the often complained about "lack of structure, guidance and visualisation (REGER).

An implementation of the approach will be facilitated by the following five recommendations:

1. **Recommendation: The establishment of observation areas and formation of radar groups**

   At the beginning it is necessary to establish observation areas and radar groups. Here the objectives of the network (target system) represent the source material, which should be adapted individually to the needs of the network management and especially to the needs of the network participants. It may be differentiated between internal observation areas, such as the product and service program, as well as other functional areas (R & D, purchasing, manufacturing, distribution, etc.), and external observation areas, which include in particular the economic, technological, legal and cultural environment of the network. In discussions of network management, a potentially existing Steering Committee and other stakeholders of the network it is essential to identify interest areas and corresponding radar groups and to structure them. In order to limit the amount of workload, those areas posing a grave threat to the network objectives should be prioritized.

   As a result the establishment of radar groups, entrusted with the responsibility for the information's generation as well as sharing, is essential. Each group is assigned to the responsibility of an observation area. In addition, the radar group may work in several levels in order to, as broadly as possible, generate the necessary information. This allows various discussions on the strategic relevance and the correct classification of information.

   It is advisable to determine a principal responsibility for each observation area that takes the lead, which leads and controls the radar group according to the objectives. Nevertheless, it is clear that strategic thinking alone may carry the theme of the meetings on the first level.

   The second level is the actual "working level" because here it is up to the participants themselves to generate information, which may have strategic implications, through their own channels. This results in the usually much too high complexity of information processing on the first-level. In the field of technology division into specific areas is also made. So on one side it is possible to analyze data from suppliers from which information can be given to technological innovation. On the other hand competing products can be observed in terms of technological development. Similarly, the problems and error messages of the completion of on-coming developments are used. An at least intellectually detached area, which may be by no means neglected, is that of the development departments, such as technology development, product development, process development and manufacturing technology. All the above-mentioned areas have the possibility of generating information by means of the members of each radar group, but even above all by the subordinate employee.

2. **Recommendation: Creation of rules and structures**

To be established Jour-fixe or existing meeting structures support the radar group concept, because a large part of the proposed meetings is already taking place with a nearly identical group of people. Furthermore, the described members of the various development areas meet to project reviews and other project meetings that take place depending on the progress of various projects. However, what benefits to the overall concept can this analogy of the groups of people bring?

Since the number of already listed meetings does not only exist in the field of technology, but for each of the other areas too, it is quickly apparent that it is easy to understand some of the network participants if they complain about the already too large number of meetings. Some of the leaders are taking part in various meetings and therefore attach no further value to additional meetings, especially when it is not even clear what the outcome will be. Accordingly, it is useful to include an additional agenda item in already existing meetings, which implies that the strategic development and the information obtained are being discussed elsewhere. Hopefully, in a way so that it leads to a conclusion, which serves the maintenance of the strategy room. Each of these radar groups must therefore have internal rules and an inner structure in order to effectively design the process. After establishment of the radar groups, the question arises how should a process look like, through which the information is embedded in the strategy room?

3. **Recommendation: Design of information processing procedures and development of information channels**

After the first steps of data and information gathering through the various channels, they are first reviewed and analyzed on the validity of their content. Subsequently, the evaluation of this information and therefore the review on the relevance for the strategy room follows. After this step is finished, the data is structured, by being hierarchically sorted by importance and then aggregated to the respective needs.

Finally, the processing follows, as the data is prepared to comply with the visualisation needs and requirements after the following update into the strategy space.

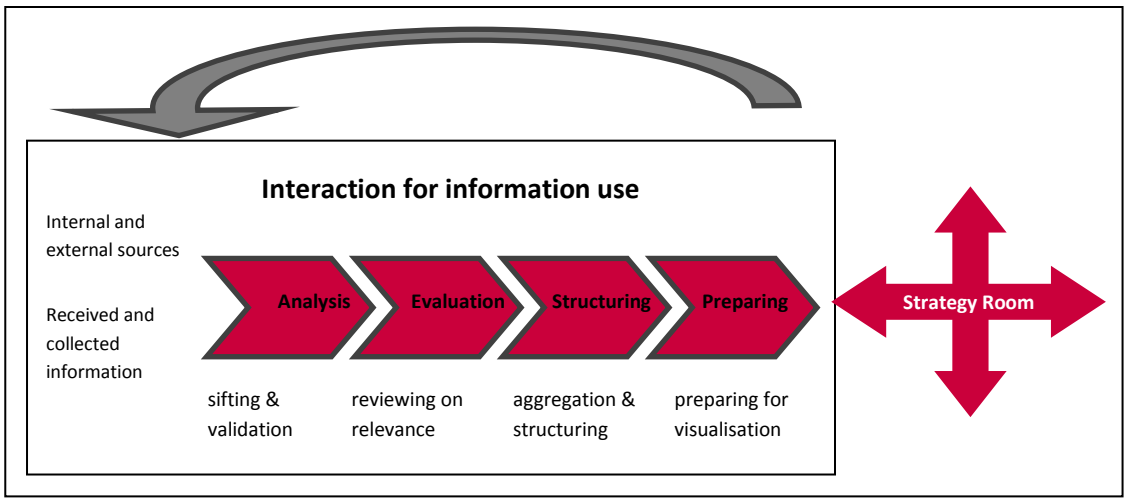


Figure 02: information processing
Source: Gross, D.-P. (2002), p. 85.

Important in the implementation of this process is the recurrence thought, on which everything is based. At any stage it is possible that the process could start over from the beginning - even if the information has already been introduced into the strategy room, it can go through the process several times if it becomes necessary. Interaction plays an equally important role, because all process steps can only be positively designed, through interaction and through positive communication among the various radar group members. Here by, however, it is important that the focus is always directed on the respective observation area, so that resulting discussions do not slip into to general territory.

The aim must therefore be to develop an information process that ensures that all the variable components, such as discussions and other communicative elements are being preserved. This ensures that no context is destroyed, which would be necessary for the first steps of the information processing process. Nevertheless, a clear structure must be recognizable that demonstrates a process flow, which should be oriented at the dissemination of information.

Experience has shown that the challenges of an early warning system in turbulent conditions can only be met if using qualified network partners and their employees, their interests and their personal networks as antennas to the outside world. They have the competence necessary to effectively scan large areas of the outside world and to conceive adequate monitoring. Taking account of these know-how providers, possibly supplemented with other outside experts, the significant changing of the framework can systematically be selected and thus included early in the process of strategy development and strategy adjustment. The challenge lies in the organization of the appropriate processes and in particular in the implementation of recommended institutionalized communication processes.

4. **Recommendation: Use of the strategy room**

How can the information aspired by the radar groups and introduced into the strategy room be transferred into useful knowledge? Put another way, how does knowledge development take place in the strategy room?

This question can be answered if considering that the development of knowledge is always context bound and affects the patterns of action and structures within the network and the companies involved. The simplified answer is - through the use of space. This is a key condition for the functioning of the overall approach.

In the following it is briefly described, how the use of the ideal type of strategy room could look like and why just the structure of a real room is well suited for the development of knowledge. As a matter of course, at the beginning there might still be reservations, whether it is right to meet exclusively in this room, but it will be necessary for the functioning of the room. A meeting need to be held in the strategy room and the team must embark on the idea to use the room as the key supplier. At the beginning of the process such a room understandably has not yet been filled so that all needs can be satisfied. However, at the beginning this can not be the objective. In fact, it is now due to the use of the room that an emerging process comes into motion, and this will cause the room to be filled gradually with the required information. If this first step is not made, the room can never meet its purpose. If the first step succeeds, however, then the room is a set of available tools making it possible to meet the expectations of the network managers and network participants. Provided a consistent use of all stakeholders, it is conceivable for the future, the implemented processes keep themselves alive and do not always have to be pushed by the instructions of the network manager. Once this has been established, the ideal case would be that the strategy room, including the associated processes independently adapt to the changing requirements and the use establishes itself in the working routine.

5. **Recommendation: Creating a virtual strategy room**

In order to make the knowledge or rather the related information and relevant data base equally available for all users - even if no direct contact with the radar group members exists - a computer based solution should be worked out. The operation of the virtual room can best be obtained using an identical surface structure (comparable to the strategy room). There are folders with the same headings of the observation areas, so that in principle there should be no difficulty in finding the appropriate counterpart to the real strategy room. Thus the user finds himself in a familiar structure, if seeking information or wanting to feed new information into the system. Below there may be several other layers in existence, however, they should not make the process more complicated, but rather increase the level of detail and the variety of information. It is thus possible in this computerized database to retrieve

all levels of aggregation of existing information. It would be desirable if the chosen system allows a keyword search and full text search.

A combination of real and virtual strategy room provides a combination of aggregated images or tables up to complex databases or reports.

With the approach presented here, regular processes of information gathering, processing and transmitting are being institutionalized. The connected components build the core of the decentralized integrated foresight system. This causes serious consequences both for all involved employees and for the management level and the overall process of strategic planning. The members of the radar groups are being entrusted with the observation of relevant environmental issues and participate in a discussion about environmental changes deemed essential by others, through this a clear awareness of these changes is obtained by each individual employee. This way, there is a systematic learning process for all participating employees at all levels, which ultimately increase the flexibility of the network significantly. All participants will recognize the positive impact of the strategy room as an invitation to the respective radar groups because their discussion results are clearly visualized.

In addition, regular referral of network management and network actors involved with the relevant changes in the framework of competitive strategies is also institutionalized. The strategy of the network is thus a matter for constant debate. Are on the level of the network managements, at least temporarily, important external partners involved in the discussion, such as potential members of an advisory board or steering committee, then the network management is repeatedly forced to present and justify its own strategy.

While the principles of the strategy room are being implemented, so is the base created to meet the information needs in some areas. Through the systematic implementation of the approach, it might be possible to gather relevant information from the environment and make the communication processes transparent for all stakeholders. The concept makes it possible to explicate already existing network knowledge and furthermore to preserve information and explicated knowledge content.

In any case, the outlined recommendations live from a strong involvement of the network participants at the operational level and through the promotion of such processes by the network management. Both play a changed role, thus dissolving the traditional vertical division of labour in parts: Quite deliberately, the network actors and all levels of their companies are now incorporated into the strategic planning of the network management. In return, the management receives the task of creating suitable conditions for such communication processes, at all levels. Overall, this so-formed collection of strategic planning in the operational level opens a wide range of topics, which offers a great potential for implementation in the practice.

## B. Success critical aspects of collective technology intelligence

In order, for a network with a focus on innovation, to enforce itself over the long term, it is, like a single company, forced to rely on the generation of strategic competitive advantages. The technology intelligence as an instrument of innovation networks defines, in its implementing, specific demands for the network and the participating companies. A set of requirements that specifically addresses the needs of technology intelligence in networks, has been developed by MIEKE. In this context, he explained, and appointed five points, which are regarded as essential:

1. **Strategic compatibility**

   A criterion is formed by the strategic compatibility. In this context, the degree of overlapping of the various fields of interests or the overlapping of corporate objectives is described. Here it is useful if the overlap is large enough, so that a sharing of the collected and evaluated information from the technology intelligence can be expected. A direct consequence of the strategic compatibility on the technology intelligence can be found in the definition of the search room. For this, a similar technological orientation of the enterprises is essential. In addition the recognized technological trends that are identified as promising must be recognized by all partners. The only way to create a base for the definition of an appropriate search space, which is a subject in the process of continuous review and adjustment, is like this.

2. **Cultural compatibility**

   For technology intelligence, which should result from a joint action, is the cultural compatibility another important success variable. The corporate cultures provide the operational framework, which determine the association with additional partners. A company, whose culture is characterized by recklessness, is of great disadvantage to the overall process. For innovation networks, companies that have an open-minded and open culture are the primarily chosen ones, so that the results of the technology intelligence are recognized and implemented.

   An essential prerequisite for the implementation of technology intelligence is the culture of communication within the network. On the one hand, it must be clear to all parties that the network management has to work for the participating network partners, on the other hand it must be recognized that all necessary information must be provided for this purpose. Network Management and agents are sitting in the same ship.

   This can be formulated even more clearly: In the framework of the early warning system, the existing network culture poses the cardinal success factor. Even sophisticated concepts must fail, if the necessary system of values, norms of behaviours and ways of thinking and acting do not harmonize with the technology intelligence.

The essential feature of network culture is their behaviour-effecting impact, which manifests itself in this context, for example, in the ignorance of the early warning system. In this case the network management and the heads of participating network partners pose as role models - for example through lack of interest - which then spreads into the lower hierarchy levels. On the other hand, the network is also characterized by a culture of adaptability. The first step in this direction is the principal of a lived commitment to the technology intelligence. Sustained interest and a demand for earl warning relevant information express this.

3. **Complementary resources**

Since there are independent companies in an innovation network, a similar resource endowment is of fundamental importance for a successful collaboration. As a side effect the network dominance of individual companies can be prevented. For the technology intelligence, companies can bring in resources in terms of new information from various sources; data processing capabilities, personnel expertise and capacity, and financing can also be brought in. This diversity allows the network to rely on a broad basis to thereby generate a continuous source of information, and process it effectively and efficiently.

4. **Trust between the parties**

The successful cooperation and the chance of a long-term network are crucially dependent on the confidence between the different network partners. Due to the fact that the companies come together for different motivations, and usually keep these secret, it is important for the partners to have a certain degree of predictability of the actions of other companies. Especially for the collective technology intelligence, which presents a difficult to measure competition-related knowledge transfer, a sufficient level of trust between network partners is essential. Once an imbalance of income and benefit exists, the concerned participant will lose the acceptance of the other network partners. This does not necessarily lead to a complete withdrawal of confidence, however, to a break in trust. Thus, it may come to obstacles in terms of hindered exchange of the required information. If this happens repeatedly, it could break the desired economies of scale and thus the base for the technology intelligence in the network would be destroyed. Furthermore, on the basis of trust, collective goals can be defined, which as a side effect, limit the opportunistic behaviour of the participants, which in turn leads to a strengthening of the base of trust. The possibility of a rating concerning the trustworthiness of the network partners may well prove to be helpful.

In addition to the trust in the network partners, the so-called system confidence is also of crucial importance. The monitoring of the functionality of the network is hereby the main concern. This presents a further requirement for the chosen organizational form, which must

be met by the network. Hereby it is to consider whether the network is hierarchical or non-hierarchical lead, whether or not an external management should be involved, or a management, which is composed of internal forces. Once the network operators get the impression that the implementation of technology intelligence fails, du to the organization of the network, the required resources will no longer be introduced. As a result the information delivered by the technology intelligence would be of substandard quality. Consequently, the system confidence also has a major impact on successful collaboration.

## 5. Handeling conflicts

Due to the composition of independent and economically self-reliant companies, joint projects often experience conflicts. Collective technology intelligence is not excluded from these events. Especially with issues concerning the search room, the assessment of possible technological trends or the readjustment of the technology intelligence, conflicts are to be expected. Such conflicts can be a major threat to successful work and for the continued survival of the network. Here it is important that previously formulate rules to minimize or eliminate the potential threats altogether.

The more often the network participants deal with the issue of technology intelligence the further they will develop the processes, and the earlier preventive measures can be taken in account within the network and the earlier the real value will be recognized by the participating parties. The repetitions of individual steps (or of the whole process) will each time be easier for all parties, and feedback processes from initial observations and actions will facilitate the learning process. Only a systematically and structured operated early warning system creates the necessary informational base to pick up on external developments early, initiate internal alignments and thereby keep the competitive advantages.

## C. Frequently asked questions (FAQ):

1. **Which frameworks make foresight planning necessary?**
2. **What are "weak signals"?**
3. **What is Monitoring? What is Scanning?**
4. **Where are the difficulties in implementing Foresight Planning?**
5. **Which opportunities provide collective foresight activities in networks?**
6. **How is a technology intelligence process structured?**
7. **What is a team organization with linking pins?**

### 1.) Which frameworks make foresight planning necessary?

Rapid technological changes, aggravating pressure to innovation, shorter cycles of innovation and dynamism and the globalization of markets are some of the many key phrases that again and again are used as justifications for constantly changing conditions and competition in the business environment. In this turbulent environment, networks and companies constantly seek new ways to prove their competitive abilities. A key to success lies in the ability of both safely and reliably identifying the current situation and the future technological developments. Strategic foresight and the specifically technology intelligence present, for networks and businesses alike, the ability to anticipate future developments and to incorporate the effects of imminent developments in their own strategic technology and innovation planning. Technology intelligence provides the necessary input information for strategic technology planning and innovation. The development and implementation of technology strategies is an essential component of strategic planning and is essential to ensure a successful business. The strategic plan will require extensive analysis on technological trends. The quality of derived information essentially determines the quality of the strategies. Between the need for intelligence gathering by the technology intelligence and the frequency of their implementation in practice is however, a substantial discrepancy. Nevertheless, are networks able to successfully position themselves in this discipline, each individual network operator will benefit from the results.

### 2.) What are "weak signals"?

At least since the early 1970s, has, in many areas, a departure from the assumption of continuous behaviour towards the adoption of abrupt and systematic development changes taken place. The foundation for the modern theories of the early warning systems was already laid in the mid-1970s by ANSOFF with the concept of the “weak signals”. So that he could help to overcome the one-sidedness of the classical logically based decision making treatment of imperfect information.

ANSOFF assumes that discontinuities always form a chain of causes and effects that can be detected early through a systematic search for weak signals. Accordingly ANSOFF's approach pursued the goal of optimizing the strategic planning of a company in such a way, that weak signals which indicate discontinuities are detected early in order to significantly improve the scope of action.

To achieve this, at least in part, it is necessary to detect the expected future threats and opportunities as early as possible and to anticipate emerging developments. At a very early stage these are often just information rudiments, will say fuzzy and less structured information, such as assumptions that, threats or opportunities are to be expected (e.g. information based on press reports, studies of future research organisations, information from internet forums, or information concerning the general economic development).

Most of the strategically relevant discontinuities are difficult up to too difficult to be predicted and at the time of their appearance can not be explained as a causally law. Is an anticipation of future developments and events successful, then the orientation of networks and their activities can be improved through strategic foresight by chronologically graded response strategies for potential future alternatives, which can be developed and held ready.

Weak signals often intensify over time and point ever more strongly to forthcoming environmental changes. Scanning and monitoring are main activities in this course of action.

### 3.) What is Scanning? What is Monitoring?

Scanning and monitoring represent the main activities of strategic technology intelligence. Whereas the aim here is to obtain as much awareness of weak signals as possible, in order to then analyze them in a further steps with regard to their causes and effects.

Scanning refers to the unbiased, target-independent and non-directed search for information. This is done in principle at anytime and anywhere, in prospect of finding weak signals. The scanning is a non-directed search through the entire network environment, and aims to detect trend like developments, it is primarily a kind of sampling of the internal and external environment for "weak signals". As sources of knowledge serve in particular newspapers, expert interviews and the Internet (considered keyword: knowledge management). The goal of scanning is to obtain evidence of discontinuities, which are nearly impossible to obtain by a directed search, since they are outside the relevant markets.

Based on the findings of the crude scanning monitoring attempts to win as much concrete information as possible from the detected phenomena or possible trends, meaning, it is an in-depth performed and lasting observation of a possible discontinuity. The aim of monitoring is to either refute or confirm the observed facts of the scanning, meaning, an idea is to be established whether

the facts could be a threat or an opportunity. This is achieved through a targeted search for further weak signals that can, by a reasonable effort, be filtered out during monitoring. Monitoring serves the firm establishment and then structuring of signals.

In a further step, the relevance of the analyzed signal is evaluated and ranked in terms of their priority. The produced results then form the basis for the development and implementation of appropriate response strategies.

## 4.) Where are the difficulties in implementing Foresight Planning?

Almost all markets are characterized by an increasing acceleration of alteration, resulting in shorter cycles of innovation and new organization and management concepts, which enduringly affects the effectiveness and efficiency of operational processes. Networks and enterprise, which withdraw themselves from these external developments, have no chance of existing permanently.

Larger companies try to increase this capacity through staff divisions, integrated functions within a department or as a temporary job in individual projects - small and medium enterprises (SME) face their limits in implementing this. Although small and medium-sized companies are increasingly active in industries that are also characterized by the fast pace and dynamism of its markets, however, resources, which are necessary for the implementation of technology intelligence like human capital, physical capital and, above all, knowledge, are often very restricted in their availability. This application gap is partly due to the high demands of technology intelligence in resources and methodological know-how, which mainly poses as a problem for small and medium enterprises.

Comparable scale limited resource shortages are common among SME in other business areas as well. To be able to take on the growing challenges in these business areas, it has become increasingly common, for SME in particular, to participate in regional networks. The network partners remain legally separate and independent entities, and operate in areas outside of the cooperation according to their own business policy. The motives for participation in networks are very multifaceted (e.g., focus on core competences, exploit synergies, increase in technological expertise, joint product- / process innovation, access to new technologies, minimizing risk in investments, joint market presence) and are not primarily to be seen in the technology intelligence. Nevertheless, within the framework of existing networks opportunities exist to resort to additional (complementary) knowledge and information sources as well as resource. It is this access to latter named sources that makes the networks significant for processes of technology intelligence in the companies involved - particularly SME. By collaborating within a network, for example through the implementation of joint labour sharing projects, it comes to a knowledge-sharing and joint use of resources.

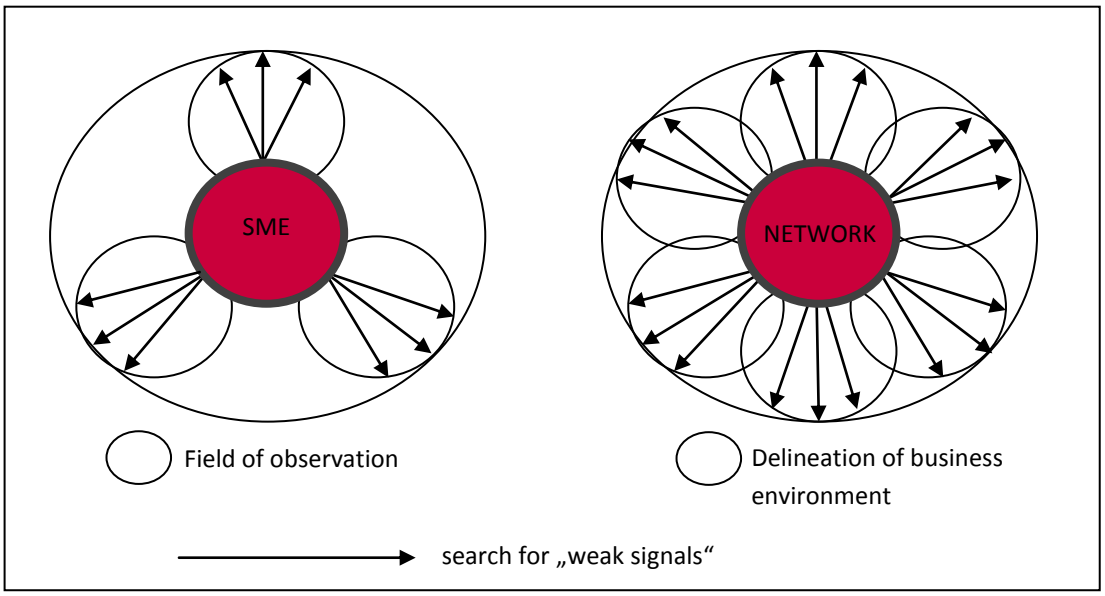


Figure 03: Extended field of observation in networks
Following: Ahn, H. and Meyer, C. (2000), p. 34.

Thus there is a certain pull to cooperate in technology intelligence, which arises from the increasing involvement of enterprises in networks. Together, stakeholders can develop future network strategies in order to assert themselves as a network on the market. This allows even small and medium businesses the ability to satisfactorily perform the task of "technology intelligence" in a network. This combination of suction and pressure will in the future lead to a spreading of technology intelligence networks.

## 5.) Which opportunities provide collective foresight activities in networks?

Access to shared knowledge and information sources as well as resources represent an important component for the development and implementation of proprietary technology intelligence processes of SME. The participation of SME in regional networks can thus counteract the lack of resources in the implementation of technology intelligence, and cover essential components within such a process.

For the joint exploitation of early warning information, there are many opportunities that are larger in a cooperative technology intelligence network already in existence than in newly established networks. They offer for example co-operation in the early establishment of technical standards and norms, or the shared research in an innovation network.

The possibilities and potentials of joint foresight activities depend primarily on organizational and operational design of the technology intelligence concept. A chosen technology intelligence network

concept should therefore be able to be put directly into practice, it should be adaptable to the needs of the participating network partners and it should have coordinating elements, which make it efficient. If successful in this, it leads from responding to designing and in the end brings better results and lasting success. True to the motto: "Think into the future and act in the present."

Difficult situation for the network and its actors can be made easier if all parties:

- regularly obtain important information about their market, their customers and new products,
- obtain detailed information on competitors and their products or services,
- put customer related solutions in the foreground,
- consider the introduction of new solutions and services as an important task,
- have a reliable overview of current and future revenues and expenditures,
- posses a sufficient willingness and ability to change
- not only think about their daily business, but also take time for perception, cognition, observation and pre-, post-and lateral thinking about the environment and their future,
- include the Staff in the decision-making processes and their goals.

Again, this list could be expanded. Often, however, it is to hear: "For something like that, I don't have time right now". "It doesn't work in my company, everything is different with us." and "This is far too theoretically for me." Or worse "I didn't need it before, why now?".

A list of the advantages of joint technology intelligence also shows the possibilities that they offer the network participants:

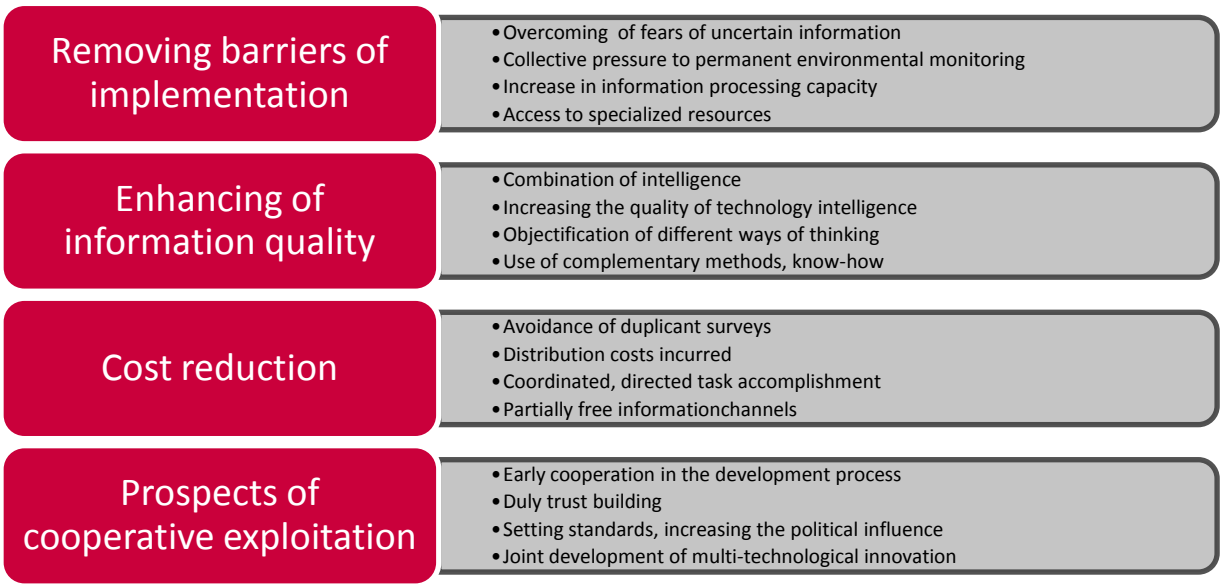


Figure 04: Benefits of joint technology intelligence
Following: Mieke, C. (2006), p. 50.

## 6.) How is a technology intelligence process structured?

Actively operating technology intelligence means to again and again ask the following questions:

- Do important things change for my enterprise, on which I have no direct influence?
- Do I have to respond to this change? Why?
- What happens if I do not react?
- What can I actually do?
- What will I do? Until when?

These questions are the base for the process of technology intelligence. The so-called technology intelligence process is the road map for getting from the identification of the issues, to the assessment, to taking concrete actions and from these results to developing strategies for the future.

There are a variety of visualisations, which represent the technology intelligence process and show the tasks therein. Although the graphs often differ in the visualisation of the individual process steps, however, they are in the substantive content generally very similar.

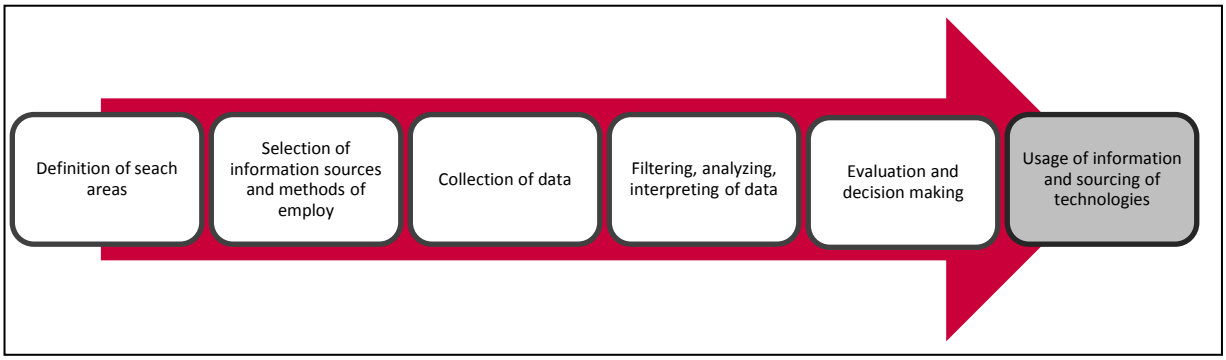


Figure 05: Phases of the technology intelligence process
Following: Reger, G. (2001), p. 538.

This visualisation can be further reduced which leaves the key tasks: assessment of information needs, information gathering, information evaluation, integration into the organization and communication in the network.

The goal of the assessment of information needs is to limit the search for information in order to avoid information overload and to minimize the effort required for information gathering. Well known technologies from within or from the outside of the network are being considered, as well as fields that are beyond the technological and non-technological competencies of the company.

Different sources can be used for the retrieval of information such as libraries, patent databases, Internet, R & D cost analysis, Delphi surveys, expert interviews in general, pattern analysis, etc. For

employment in the networks they need to assessed and selected mainly in terms of time and effort required for the research .

Generally applicable criteria can be derived from the use of analogy method or S-curve analysis while evaluating the information. In order to prioritize the topics in the context of information evaluation, approaches of moderation techniques can be combined with the methods.

The integration into the organization can go from the formulation of individual action steps, up to fundamental changes in structure and process organization.

### 7.) What is a team organization with linking pins?

A team is a group of people who together handle a particular task area and are overall autonomous. The team organization as an organizational form relinquishes hierarchical structures and clearly defined authority to issue directives. Instead, the decision-making powers are transferred to the individual teams. The team organization is based on the model of overlapping groups of RENSIS LIKERT:

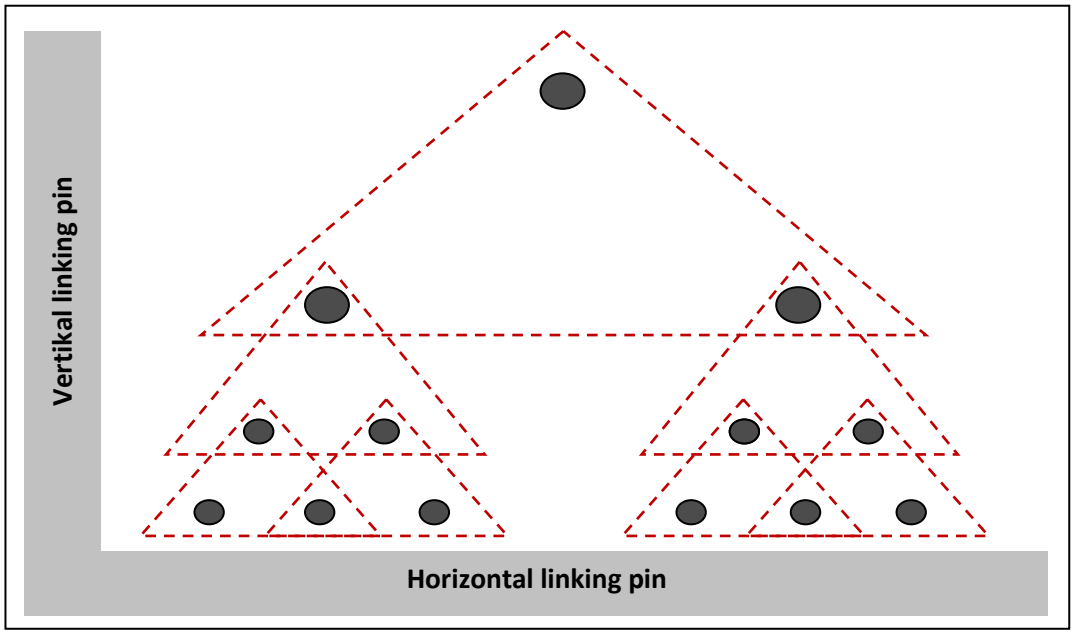


Figure 06: Linking Pins
Following: Olfert, K. Rahn, H. (2002), p. 213.

The entire organization of a company is interpreted as a system of groups. There are people who belong to several teams (linking pins). The Linking Pins improve communication and coordination within the company both horizontally (employee, who participates actively in various teams of the same level) and vertically (employee, who is also team leader and member of a parent group).

| **Advantages:** | **Disadvantages:** |
|---|---|
| ❖ motivation of employees (integrated into decision making process)<br>❖ creativity-enhacing work climate<br>❖ use of the expertise of all employees<br>❖ synergy benefits<br>❖ flexible organization form<br>❖ improved coordination | ❖ possibly lengthy decision-making or coordination processes<br>❖ dominance of individual members<br>❖ frustration of minorities, and its recommendations are not taken into account<br>❖ no clear lines of responsibility schemes<br>❖ efficiency decreases with increasing organizational size |

Figure 07: Linking Pins
Following: Olfert, K. Rahn, H. (2002), p. 214.

In the overall context of "technology intelligence in networks" a linking-pin team organization serves as structural organisation of the individual radar groups and ensure the communication and the related information flow within the network.

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