The Response-Ability of Networks: Healthy and Sick Agricultural Knowledge Networks in the Netherlands

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Abstract

What makes a network of individuals or institutions capable of finding appropriate answers to the challenges that it faces? This question exceeds the quest for innovativeness. Responsiveness does not only require a conducive environment for finding new technologies or opening up new markets. It also calls on every actor for taking responsibility of his share in society and his care for the ecological environment.

In this paper I will argue that the responsive capacity of a network depends on the way it is structurally coupled with its environment. I explore the view in which networks are seen as living organisms that can be healthy or sick. Many of the mechanisms behind biological life can be observed in human networks as well. The theory of 'Living Networks' has consequences for people who want to intervene in networks that are not functioning well, at least in their opinion. According to this 'ecological rationality' the goal of intervention is not to gain control or to win, but to restore relationship. Ultimately the ability of a network to respond appropriately depends on the responsibility individuals take for doing their share.

A few basic principles of the 'Living Networks' approach will be explained. Then it will be illustrated in three different ways. The first illustration pictures the recent history of Dutch agriculture[1]. In the sixties and seventies the Dutch agricultural sector has developed into a huge human network. It is generally believed that the intensive knowledge system has contributed substantially to its impressive innovative capacity. However, in the eighties it appeared that the sector had lost its connection with society, resulting in overproduction and unacceptable levels of pollution. Since that time the sector has difficulties in finding an new 'contract' with society. The question to be answered is whether the metaphor of living networks helps to understand what happened and whether it provides hints in what direction new perspectives possibly could be found.

The second illustration compares the ecological view of living networks with three different mainstream rationalities that have dominated the debate on agricultural development, at least in the Netherlands. The instrumental, strategic and communicative rationality each lead to quite different outcomes on questions like: "What is knowledge?" or "How to induce change?". The ecological rationality might be complementary to contemporary communicative approaches that often are disregarded as 'soft' by decision makers.

The third illustration shows the 'Circle of Coherence'. This model clarifies a bit more of the theory of 'Living Networks' in order to show its practical use in finding appropriate answers in sick but essential networks. The process of life is self-organising. The process gets blocked when structural couplings are

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1 The paper is based on the PhD thesis of the author, who studied the role of knowledge, leadership and government in Dutch agriculture in the period 1945 – 2001 (Wielinga 2001).

being distorted. This occurs in human networks when people develop reasons for not taking responsibility, either for their input or for attuning to others. This leads to loss of response-ability of the network they are depending upon: then the network can no longer respond adequately to changes. Leadership means restoring relationship. This is an intriguing conclusion in a period of time when perceived threats rather push people into self defence and efforts to gain control.

Living Networks

Structural coupling

There is a general pattern in all processes of life. A living organism consists of elements that reproduce the organism while the organism allows for reproducing the elements. Within the organism tasks division and specialisation develops, thus creating synergy. The process is being maintained by interaction patterns that include numerous feedback mechanisms that couple the elements structurally together (Maturana and Varela 1987). An organism like a bacteria cell can be seen as a network with an identity. Higher organisms like plants or animals consist of many cells that developed specialisation and task division at a higher level. They make part of communities and ecosystems that could be considered as networks of an higher ordering again. Lovelock (1979) postulated that the entire biosphere of the world actually is a huge living network, maintaining itself by an extremely complex but also vulnerable system of feedback mechanisms.

During the evolution life developed into an ever increasing complexity. It is important to notice that every phase of development created on its turn the conditions for the step that followed, up to its actual stage with a climate people can live in. Another interesting feature is the autonomous tendency to grow towards more task division, diversity, complexity and beauty, although the process might include shocks and periods of regression (Capra 1997).

The human society can be seen as a complex of networks within networks, in which the same principles of life are valid. Within the identity of a human network task division and specialisation develops. In the history of mankind we see a growing complexity and diversity up to the interwoven world community of today where global communication is just a matter of pushing a few computer buttons. During the many millions of years of evolution the living community grew slowly, learning by trial and error and adapting genetically. Since humans developed communication by abstract language, they were also able of adapting culturally, which went much faster. Today, people have gained a substantial impact on their ecological environment[2]. Now it is also their responsibility to improve the feedback mechanisms as required at this level of complexity. Basically this is what the quest of sustainability is all about. It is a breathtaking question whether mankind will do so in time. So far, the complexity of the human society grows faster than the dominant ways of thinking that should enable people to bring their behaviour in line with the carrying capacity of their ecological environment, thus restoring the structural coupling.

Healthy or sick networks

After this broad picture as context, let us look at a level of human networks where we might able to do something ourselves. Everyone is part of many networks at the same time. Organisations might be seen as a special type of network that possesses a formal structure and hierarchy. Some networks generate

[2] Jane Lubchenco (1998) in her 1997 presidential address to the American Association for the Advancement of Science.

energy: people like to be part of it. They are willing to give their input and to attune to others. This is a self propelling process, because when people do more effort, the reward is higher and the willingness to give input an to attune increases again. Consequently the identity of the network gets stronger. We could call such a network 'healthy'. The opposite occurs as well. Some networks take more energy then they generate. This can be noticed for example when procedures are ruling the agenda, and tasks feel as obligations. People become less willing to do effort and to keep account with others, making the reward of cooperation lower. Such a network could be called 'sick'.

Usually a life cycle can be observed in networks. It starts with people who share the ambition to tackle a problem or who inspire each other with a new idea. They form an informal network that attracts others. Over time they turn to action, requiring a structure with task division, specialisation and communication procedures. As long as the members remain interconnected and keep on learning the network develops in a healthy manner. The maintenance of structure always costs energy, but the synergy that is created keeps the balance positive. Sooner or later however the structure cannot keep abreast with the growing complexity, the reward decreases, and the energy balance turns negative.

The difference between healthy or sick is connection. When essential feedback mechanisms become distorted, the network looses its capacity to respond adequately to new circumstances. In animals and plants the structure looses its flexibility over time, ultimately causing death. By dying they make place for new life. Human networks can dissolve into chaos, or turn into inert structures when the powers that control order happen to be strong. Revival is only possible when someone takes up leadership and does what is needed to restore connections again, bringing new life into the network.

Vital space

This relatively simple metaphor has an interesting consequence. The process of life is autonomous and cannot be controlled. This means that inducing change is not a matter of gaining control, but creating a conducive biotope for the forms of life one hopes for. A crucial element of the biotope for any kind of healthy network is trust. People only engage into task division as they can trust that others will do their share, and they are only prepared to engage into a learning process with others as long as they can trust that their relative uncertainty will not be abused. This trust creates a space where people are curious and like to experiment. I call this the 'Vital Space' since it is essential to healthy networks.

One can hope that vital space will grow, but the harder one tries to achieve it, the less likely it is that he will succeed. By the way, this is true for most good things in life such as spontaneity, joy, creativity, trust, natural authority, and last but not least: love. Elster speaks of by-products because they cannot be manufactured directly (Elster 1983). On the other hand one can do a lot of things to spoil it. "Trust comes by foot but goes by horse", as an old proverb says. This is where we should look for opportunities to intervene. If we can discover what blockages are hampering the living process, and if we can do something to remove them, this is the way to improve the biotope for a healthy network, and to restore its responsive capacity.

At this point, the principle statement in this paper has been made. The metaphor of living networks offers a perspective on strategies for change that is not yet common: instead of the well known project approaches, applying strategies and instruments for reaching clearly defined targets that can be accounted for, it advocates the creation of space by removing blockages, requiring tailor made interventions in order to link people together. But: is there any empirical ground that supports such a theory? How precisely does it differ from mainstream ways of thinking? How do you assess the nature

of a blockage, and what kind of leadership will be required in different cases? The following paragraphs will briefly address these three questions.

Dutch Agriculture as a Living Network

The biotope of a 'Golden Age'

In the period 1960 – 1985 the Dutch agricultural sector conquered a strong position in the world market as third largest exporter of agricultural products. This is remarkable for such a small and densely populated industrialized country. The average productivity per farmer became the highest in the world. How can we understand this success? And also the problems that occurred later on?

The basis was laid right after the Second World War, when food security was top priority. Mansholt, as minister of agriculture, emphasised the creation of strong farmers organisations that were given far reaching responsibilities in agricultural policies. Furthermore, the agricultural knowledge system including extension, research and education (under the management of the ministry of agriculture) was upgraded and given plenty of room to do what was necessary. All efforts were focussed on creating conducive conditions for average farm households with perspectives (the 'stayers'). Technology was made appropriate for their circumstances, and market conditions were manipulated in order to ensure stable prices and reduced risks.

The policy was so successful that at the end of the fifties the national market became saturated. Then the focus shifted to the world market. This required a major effort cost effectiveness and by consequence farm scale had to be increased. Many small farmers had to leave, but at that time employment was no problem. Nevertheless, the policy remained basically the same: strong influence of farmers organisations on policies, generous support from the knowledge institutions of government, and the focus on relatively small family farms with perspectives. Meanwhile Mansholt moved to Brussels to repeat his success story at the level of Europe as the first commissioner for agriculture.

The agricultural sector became a network with a strong identity: task division and specialisation developed autonomously whereas the connections were maintained by the knowledge system. Notably the extension service kept communication lines between farmers and research short. Likewise extension personnel facilitated the policy making process as well respected partner in farmers associations at all levels. The steering network consisted of farmers leaders, politicians, high ranking officers and scientists who all shared the same background and ambition, and who regularly changed position amongst each other.

Loss of responsive capacity

The first signals of trouble appeared at the end of the sixties, when environmental protection became an issue for critical groups in society. However, farmers control over the market (cooperatives dominated the retailing system), politics and science had become so strong that these signals could easily be ignored. It took until 1984[3] before political pressure overruled the resistance and the first restrictive

[3] In this year the first restrictive measures were being taken: quota for milk by the European Economic Community, and a stop on investments for animal production on sandy soils.

measures were taken by government to reduce overproduction and pollution. By then, the bill to clean up the mess had become very high already.

Although the agricultural network could be considered as internally healthy, it had built a structure that had made itself too much independent from the outside world. So, at the level of society the system had become ill, resulting in high costs for the environment, for the taxpayer paying for overproduction, and for the Third World that could not cope with the unfair competition at the world market.

Desperately looking for new answers

Today, 20 years later, many farmers struggle with low or negative incomes and poor market perspectives, although they heavily invested in the latest technologies for efficient and environmentally friendly production methods. They lost their once so strong political influence. The market is no longer dominated by farmers' cooperatives but by supermarket chains instead that show no loyalty to farmers. As if this is not yet bad enough, farmers are plagued by one disaster after another: swine fever, phytophtera in potatoes, foot and mouth disease, and recently (2003) bird pest for which more than 20 million chickens (one fifth of the total population) had to be destroyed.

Most people realize that the agricultural sector cannot continue on the current track. The costs of labour, agricultural land, and the expenses for a clean environment are too high for bulk production such as grains, milk, eggs and meat. The capital- and knowledge intensive agricultural system should turn to specialities, niche markets and high quality genetic material, whereas another part of the farming community should re-integrate with its environment in order to maintain the landscape and to satisfy the needs of regional consumers. Although this already was the outcome of a national debate in 1994 -1995, serious reforms did not yet break through. It appears to be really hard to change patterns.

Yet, roles have changed dramatically within the system. The sector no longer sees government as the partner that stimulates growth, but as the bureaucrat that is limiting its possibilities by a forest of partly unrealistic rules. The knowledge institutions have become independent and they are struggling to survive at a competitive market for knowledge products. The strong identity of the sector made way for a much more fluid complex of smaller networks that compete each other. Nevertheless healthy networks of innovative entrepreneurs still exist, but they have the feeling they are rowing upstream.

Perspectives for healthy networks in agriculture

The glue is gone and needs replacement. In the past there was an army of free running intermediates (extension workers, researchers, teachers), provided by the knowledge institutions, who maintained the connections between all relevant stakeholders in the agricultural network. They facilitated the social learning process, both for the technical and the political aspect. The old system had to change, because of the changed position of government, the grown complexity of the system, and the fact that new stakeholders entered the field to claim their share of the rural area. Now new intermediates are needed to do what is necessary for stimulating new networks to develop and to keep them healthy.

At this point in time, the biotope is not yet favourable. Too many actors, including the knowledge workers, are forced into a survival mode, leaving no room to do what is necessary at the network level. There are government funds for stimulating innovation and participatory development. However, the culture of accountability determines to a large extend the possibilities for action, and most often leaves

little room for tailor made solutions. Furthermore, the bureaucracy poses a threshold that is difficult to overcome for many initiative takers.

The perspective of living networks suggests that the seeds of new life are everywhere: one can always find people with good ideas and the willingness to get into action. For getting new networks to flourish, a new generation of intermediates is needed with sufficient room to do what is necessary to remove blockages. Probably it is also necessary to reconsider the ways of thinking that are dominant in circuits of decision makers. The step from gaining control towards creating room is not an easy one.

Dominating arguments

Rationalities

People tell stories about the way the world is functioning. Some of these stories, paradigms or rationalities as they can be called, become so dominant that many people act accordingly, thus making these stories true. To a certain extend, that is, because reality is always more complex than any story could describe. When the disparity between rationality and reality becomes wider, people are no longer capable of solving their problems along the lines of thinking they are used to, because this was how these problems were created. Then a new rationality can break through and become dominant. Although any description of dominant rationalities runs short, the following mainstreams can be recognised in the post war period, at least in the scenery of Dutch agriculture. In this paragraph I will indicate where the ecological rationality is different from the others.

The instrumental rationality

In the instrumental rationality the world is a technical challenge. The more people know, the better they are able to set the right goals and make the appropriate instruments. This rationality dominated from the fifties until the nineties. There was great optimism that science would solve all problems and bring prosperity for all. Knowledge is equal to the objective truth, or the best way. Change is achieved by developing appropriate knowledge and disseminating it to the beneficiaries.

When during the eighties serious problems surfaced, people kept on believing strongly in technical solutions. For example, research was expected to develop such solutions for the massive surplus in animal manure. Thus, painful measures like reducing the number of animals in the national livestock would not be necessary. At least such measures could be postponed as long as the search continued.

Beyond a certain complexity systems become inherently unpredictable[4]. Then science looses its capacity to generate firm answers that could guide decision makers. This is aggravated by conflicts of interests. At a certain stage, opposing parties each call on their own scientists to support them in their battle. With conflicting interests it is hard to agree on the truth. After twenty years of debate in the Netherlands opposing parties still do not agree on reasonable norms for minerals and nitrate that should be allowed while fertilising the soil with organic manure.

[4] This is the basic statement of the chaos theory: Gleick 1987.

The instrumental rationality is effective as long as actors have a shared interest, and as long as there is confidence in expert knowledge. Whenever is not the case, people need another rationality to find effective answers to changes in the environment.

The strategic rationality

In the strategic rationality the world is a jungle where the fittest will survive, an arena where one can win or loose, or at best a market place where people seek mutual gain, based on well understood self-interest. Knowledge is a product, that can be produced, traded and purchased. Its value is not necessarily determined by its scientific validation, but by the value for the client. Change is achieved by influencing the market conditions. The free market stimulates all actors to concentrate on their specific qualities, and punishes inefficiency.

When it appeared impossible to take necessary but painful measures to clean up the trouble that was caused by instrumental thinking, the strategic rationality became dominant in the early nineties. Government put itself at a distance from other stakeholders, extension was privatised, and also research had to deliver products in search for funds. Government transformed itself to a client of knowledge products, paying for specific extension activities or research projects. Researchers became producers who had to deliver what the market demanded. Barriers should be removed in order to let the free market forces do its work. Government had to determine the borderlines of the arena, and repair the "market imperfections". In fact, the dominance of the expert was being replaced by the dominance of the financer.

When market forces are pushing actors too far into a survival mode, collective interests become the victim. Individual interests and short term goals tend to come first. When government tries to repair this, i.e. by investing in programs of public interest, its effectiveness is hampered by the fact that it is no longer able to attune to actual needs. The short information lines have been broken up, and the strong emphasis on equal treatment of all and accountability of public spending brings along bureaucracy and the inability to support tailor made solutions.

The strategic rationality is effective when actors can compete in an open market with effective procedures to prevent monopolists or drop-outs. However, when power struggle escalates, it is hard to see how this can be stopped. The capacity to solve problems of collective interests and long range risks is limited as long as strategic thinking is dominant.

The communicative rationality

In the communicative rationality the world is a village of interdependent people. As long as they are not aware of this, they are digging their own grave. Sustainable solutions will only emerge from social learning processes in which the stakeholders take each other as well as their ecological environment seriously. Knowledge in this view is not the objective truth or a product to buy. Instead it is an individual construct: a complex of language and theories that individuals use to understand what they see and to decide on what to do. When people in a network share the same constructs, we could speak of collective knowledge. Change can be stimulated by facilitating social learning processes.

Already in the seventies and eighties development workers in Third World countries found out that, in spite of their 'advanced' western knowledge and technology, they stood with empty hands trying to help

people under conditions that differed too much from the situation for which that technology had been developed. They had to learn how to learn together with their beneficiaries. In the nineties rural development in the Netherlands had become a multi stakeholder process that could only lead to satisfactory results when stakeholders would be prepared to learn together. Where communication between stakeholders like farmers, consumers, policy makers, researchers, nature protectionists and others fail, people get locked up in self-referential circles where they nurture their prejudgements about the others and become incapable of understanding viewpoints that differ from their own[5].

Although communicative approaches as a possible escape from the current problems recently are gaining attention, it is still hard to see how this would translate into structural measures such as a better financial regime for research, extension and education programmes, or a revision of tasks of public services. This is a serious problem, because strategic thinkers are not easily convinced that communicative approaches will be more effective than restrictive rules set by government in combination with the hard lessons that are imposed by the free market.

The communicative rationality is effective as long as actors are willing to engage in a social learning process in order to work towards agreement on collective action. However, such processes are easily obstructed by actors who hold hidden agendas or refuse to cooperate.

The ecological rationality

In the ecological rationality the world is a huge living organism, consisting of countless living networks (Lovelock 1979, Capra 1997). Also human networks behave as living organisms that can be healthy or sick. The term "ecological rationality" is borrowed from Röling and Jiggins (2000), who called for a new way of thinking that would enable mankind to respond to the enormous ecological challenges that are being caused by human activity in recent time.

The ecological rationality entails a different view on the role of knowledge again. All living organisms, however simple, are capable of perceiving signals and giving responses. Varela (1999) defines this principle as cognition: the mechanism through which living creatures are being structurally coupled to their environment. Humans have developed the capacity to communicate in abstractions. This has enlarged their range of perceptions enormously, because they can form very complex images of reality and they can exchange these images amongst each other. Therefore they can learn much faster than any other living creature. Still, the basic function of knowledge in this view is to ensure structural coupling with the environment, or as Maturana and Varela (1987) put it: "Knowledge is effective action in the domain of existence". This includes explicit and implicit theories, but also skills, behavioural patterns and intuition, in short: everything an actor uses to respond on signals. This applies to individuals as well as networks at a higher level.

This view on knowledge could be seen as a wider version of the one in the communicative rationality. The notion of vital space deviates more substantially from other rationalities, especially when it comes to the purpose of intervention. An instrumental goal is legitimised by its uncontested scientific value. It indicates the best way to gain control over the circumstances. A strategic goal is legitimised by the interest of the one who sets out for action. It is the way he thinks he can win. A communicative goal is legitimised by the participants. It is their understanding of serving their collective interest. In all three cases goals define a desired situation that should be achieved by gaining control.

[5] See e.g. Van Woerkum (1997, 2000)

The purpose of intervention in the ecological rationality is to restore connection, in order to allow vital space to grow. When the process is blocked because there is too little focus and coherence, targets and rules might helpful. However, the process can also be blocked by too much structure. Then intervention is needed to break down unproductive procedures and to allow for new experiments. For a healthy network is not necessary that actors agree with each other. A certain doses of conflict is useful for growth, as long as actors stay in contact. Sometimes it is even necessary to fight, if important collective issues are at stake. In contrast with strategic approaches the purpose of fight is not to win, but to force others into positions where they have to take each other and their environment seriously again.

This comparison leaves many options open for intervention from an ecological perspective. The last paragraph sheds some light on the practical use.

The Circle of Coherence

Interaction patterns

If intervention is to remove blockages in the collective learning process, we need to identify such blockages and we need to know what intervention might help to remove it. The Circle of Coherence *(figure 1)* is a model that clarifies how knowledge develops in a network. It distinguishes between interaction patterns that can become dominant and turn into regressive forms of escalation.

The model displays two dimensions:
The knowledge dimension refers to knowledge in the broad sense: images of reality, capabilities, behavioural patterns: in short all that is being used from perception to action. Knowledge development can take place between two poles:

- *Similarities*: There must be sufficient recognition in order to interpret new signals.
- *Differences*. There must be a certain degree of confusion in order to be interested to learn.

Between the poles people can be curious and develop new knowledge. Upon too much confusion people limit their perception, whereas upon too many similarities healthy people respond by looking for new differences that can always be found.
The position dimension refers to the relations between actors in a network. There must be a certain degree of trust to allow others to get involved in individual learning processes. Again collective learning can take place between two poles:

- *Individual*. There must be room for authentic individual input.
- *Collectivity*. There must be sufficient attuning to the needs of the collectivity of the network.

Too little room for individual expression and safety drives aggressive. Too little attuning leads to loss of collective protection and added value. This causes fear. Aggression stimulates to enlarge individual space, whereas fear stimulates to more attuning. The borderlines of trust are constantly shifting and need to be probed all the time. This is the natural drive behind games, and it is satisfactory to do so.

These two dimensions are similar to the well known phenomenon that every communication contains messages at two levels: the level of contents and the level of relations. The added insight is that healthy systems are self-regulatory. Children are curious and like to play. The mechanisms to return to the middle are built-in. This central part of the circle is called the *"vital space"*.

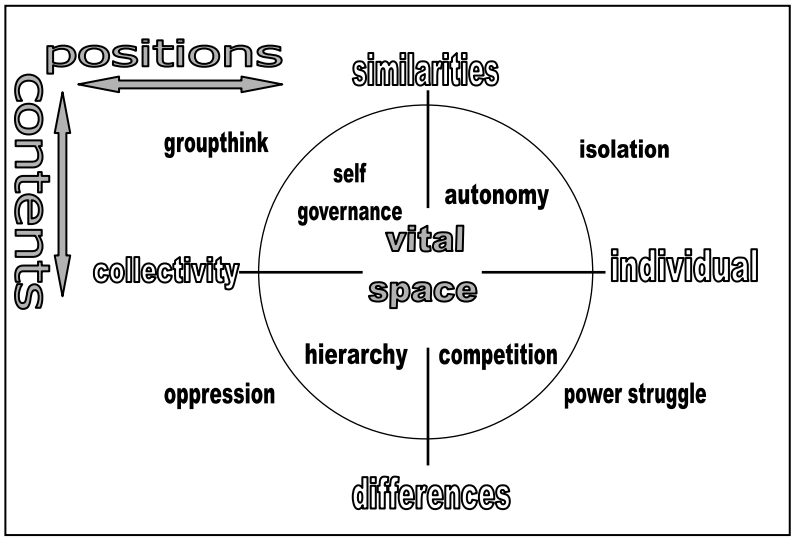

Figure 1: the Circle of Coherence

In the Circle of Coherence different interaction patterns can be distinguished.

- *Autonomy*. Actors interact on the basis of exchange. The balance of give and take should be positive.
- *Competition.* Actors feel challenged to give their input, striving for a better position.
- *Hierarchy*. Actors accept differences in influence and a certain discipline for the sake of the network.
- *Self Governance*. Actors take their responsibility on the basis of dialogue from equal positions.

These four interaction patterns contribute to healthy networks where social learning takes place, because they all stimulate actors to give more input and to attune better. Thus, they take responsibility for the network. The patterns will alternate over time, because in case one pattern becomes too dominant there will be actors taking up leadership to balance the situation again.
Each of the these patterns have also a regressive variety in which actors find different reasons for not taking responsibility. Their attitude provokes behaviour amongst other actors that will reconfirm their reasoning. Consequently such patterns escalate towards regression.

- *Isolation*. Actors flee from interaction and create their own security. They feed their illusion of being be free by minimizing the influence of others.
- *Power Struggle*. Actors fight to gain influence to the detriment of others. They feed their illusion of not being free until others have been beaten.
- *Oppression.* Actors are passive in resignation. They feed their illusion of not being free until others have made it possible for them to act. This goes for the oppressed saying that every move will be punished by their oppressor. It also applies to the oppressor who fears that his subordinates will abuse every freedom he would allow them. Both parties are prisoners of their mutual behaviour.
- *Groupthink.* Actors are passive in adjustment. They feed their illusion of being free as long as others secure their freedom. They cannot take the risk of being authentic because critics could put the collective values at stake and marginalize their position in the network.

The term "illusion" is a judgement from the point of view of the actor that intervenes. He assumes that actors are interdependent and should restore interaction. Whether his assumption is correct remains to be seen: actors might have good reasons to act as they do. The point is that in the view of the intervening actor something needs to be done to restore the responsive capacity of the network. This responsiveness is being blocked by an escalating pattern in which actors refrain from taking responsibility, either for

attuning (isolation and power struggle) or for authentic input (oppression and groupthink). Lack of attuning leads to chaos, and lack of authentic input leads to inert structures. The networks capability to respond depends on the responsibility its constituting actors take. We might as well call the Circle of Coherence "the Circle of Response-Ability".

Contrary to healthy interaction patterns the regressive ones do not correct themselves because actors feed the illusions of one another. That is why such patterns tend to escalate. It takes leadership to break out of the vicious circle. At least one actor should change its attitude in order to alter the pattern, either independently or with help from an intervening party from outside.

Effective leadership must be tailor made. An intervention that helps in one case might be counter-productive in another. For example, in the case of isolation it might help to bring in inspiring views and opportunities. This can change the perception of actors who feel that the network takes more energy than it generates. In the case of power struggle such an intervention would be counterproductive, because there are already too many conflicting views on what should happen. In the case of oppression it would not help either, because actors will always find reasons why any effort will be frustrated by the other party. If groupthink occurs, people deny having a problem and will not be interested in views on how to solve them. A complete overview of leadership roles related to each interaction pattern goes beyond the scope of this paper. The issue here is that leadership essentially is appealed to restore the connections between actors in order to make the network responsive again. Every blockage requires its own specific approach to break through the illusions that keep actors from taking their responsibility, assuming that they have a common faith.

Communicative interventions are effective as far as actors are open for communication. If they deny the problem or blame others for causing it, they will be less accessible for communicative messages. This is of course a gradual scale, ranging from curious actors to those who will abuse every information to feed their own illusions. If the latter is the case, communication does not help anymore. Then only position game is left to influence them. This however is a risky approach because the use of power easily feeds escalating patterns as well. The intervening party that is exerting power should be well aware of what he is doing. The difference between further escalation and restoring responsiveness is respect. The ultimate goal of leadership should not be to win, but to restore relationships. The effect should be that actors take positions in which they treat others, as well as their natural environment, with respect.

Conclusion

One step in a row

The ecological rationality as explored in this paper is again a story about the way the world is functioning: a simplified image of the complex reality. It will not be the last one. It is an effort to become more effective in meeting the huge challenges we are facing. It provides tools to be elaborated further. Tools for those who are willing to give up their ambition to control and who dare to enter into a dance with life. On every step life will respond, requiring a new authentic step from our side. This dance can only partly be learned, and dancing schemes offer only limited repertoires. People who go blind on models create accidents, because they are unable to perceive the signals that do not fit into the model. Probably we have to learn to respond more by intuition. However, that intuition can be sharpened by models that help to recognise and to distinguish. This is the intention of the Circle of Coherence.

References

Ban, A.W. van den, (1970): *Interpersonal Communication and the diffusion of Innovations:* In: Sociologica Ruralis, Vol X(3). pp199-219

Ban, A.W. van den, Hawkins, H.S.(1996). *Agricultural Extension.* (2nd edition). Oxford: Blackwell Science.

Bertalanffly, L. Von (1968): *General Systems Theory: A Critical Review*:. in: Buckley, W. (ed.) (1968): Modern Systems Research for the Behavioural Scientist. Chapter 2, pp 11-31. Chicago: Aldine Publishing Co.

Capra, F. (1996): *The Web of Life: a New Synthesis on the Matter of Mind.* London: HarperCollins.

Checkland, P. (1981): *Systems Thinking, Systems Practice.* Chistester: John Wily.

Checkland, P., Scholes, J. (1990): *Soft Systems Methodology in Action.* Chistester: John Wily.

Derrida, J. (1978): *Writing and Difference.* Chicago, University of Chicago Press.

Elster, J. (1983): *Sour Grapes: studies on the subversion of rationality.* Cambridge: Cambridge Press.

Engel, P.G.H. (1995): *Facilitating Innovation: An Action-Oriented Approach and Participatory Methodology to Improve Innovative Social Practice in Agriculture.* Wageningen: Dissertatie Landbouwuniversiteit.

Engel, P.G.H., Salomon, M.L. (1997): *The Social Organisation of Innovation: a focus on stakeholder interaction.* Amsterdam: KIT.

Gleick, J. (1987): *Chaos: making a new science.* New York: Viking

Lovelock, J. (1979): *Gaia*. New York: Oxford University Press

Lubchenco, J. (1998): *Entering the Centrury of the Environment: A New Contract for Science.* Science 279: pp 491-496.

Habermas, J. (1981a): *Theorie des kommunikatieven Handelns, Band 1. Handlungsrationalität und gesellschaftliche Rationalisierung.* Frankfurt am Main, Surkamp Verlag.

Habermas, J. (1981b): *Theorie des kommunikatieven Handelns, Band 2. Zur Kritik der functionalistischen Vernunft.* Frankfurt am Main, Surkamp Verlag.

Hoffmann, V (2001). *50 Jahre Hohenheimer Landwirtschaftliche Beratungslehre.* Margraf Verlag, Weikersheim.

Maturana, H., Varela, F. (1987): *The Tree of Knowledge. The Biological Roots of Human Understanding.* Boston: Shambhala.

Röling, N.G., (1995): *Naar een interactieve beleidswetenschap [towards an interactive agricultural science]*. Inaugurele rede,. Wageningen: Agricultural University

Röling, N.G., Jiggins, J. (2000): *Agents in Collaborative Management: The Logic of Collective Action.* in: Buck, L.E., Geisler, C.G. et al (eds): Biological Diversity: Balancing Interests through Adaptive Collaborative Management. Boca Raton: CRC Press.

Varela, F. (1999): *Ethical Know-how: Action, Wisdom, and Cognition.* Three lectures. Stanford California: Stanford University Press.

Wielinga, H.E. (1999). *Rural Extension in Vital Networks: Changing Roles of Extension on Dutch Agriculture.* In: Kania. J, Drygas, M. *The Role of Extension in a Global World: Proceedings of the 14the European Seminar on Extension Education*. Volume 1. The Agricultural University of Cracow, Dept. of Agricultural Extension. Poland.

Wielinga, H.E. (2000): *Rural Extension in Vital Networks: The Changing Role of Extension in Dutch Agriculture.* Journal of International Agricultural and Extension Education (7)1, p23-36.

Wielinga, H.E. (2001a): *Netwerken als levend weefsel. Een studie naar kennis, leiderschap en de rol van de overheid in de Nederlandse landbouw sinds 1945. [Networks as Living Tissue. A study on knowledge, leadership and the role of government in Dutch agriculture since 1945].* PhD thesis Wageningen University. Uitgeverij Uilenreef, 's Hertogenbosch.

Wielinga, H.E. (2001b). *Energy for Change.* Paper for the 15th European Seminar on Extension Education. Wageningen, The Netherlands.

Wielinga, H.E. (2002a): *Beratung im ökologischen Paradigma.* In: Müller, K. et al. (2002): *Wissenschaft und Praxis der Landschaftsnutzung.* Margaf Verlag, Weikersheim.

Wielinga, H.E. (2002b): *La vulgarisation comme tableau vivant: Expériences Néerlandaises.* Presentation for the Swiss ExpoAgricole meeting of agricultural extension services, in Murten, Switzerland.

Woerkum, C. van, (1997, 2000): *Communicatie en interactieve beleidsvorming. [Communication and interactive policy development]*. Bohn Safleu Van Lochum, Houten.

About the author

Eelke Wielinga specialised in the role of knowledge in human networks. He presently works as independent consultant and as associated researcher for the Institute of Agricultural Economics (The Hague, The Netherlands). As such he is involved in research projects, he conducts workshops and he gives lectures in The Netherlands as well as abroad.

After graduation at Wageningen University in 1981 (McS in Human Nutrition with Extension Science as major subject), he worked as development expert in Bénin and the Philippines, and as extension expert for the Dutch Ministry of Agriculture. In 1995 he joined the newly formed Department of Science and Knowledge Dissemination of this Ministry. As part of his duties he conduced a research on the changing role of government in the agricultural knowledge system. This study led to the PhD thesis he defended in 2001. His promotors were prof dr ir N.G. Röling (Knowledge Systems, Wageningen University) and prof dr H.R. van Gunsteren (Political Philosophy, Leiden State University). In 1999 he resigned from government and started his own consultancy firm: LINK Consult.