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Systemic In-formation Leadership

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Abstract

Systemic in-formation leadership is the missing ingredient in the current global debate on problems ranging from poverty, finance crisis to climate change. These issues span dimensions (e.g. ecological, cultural, economic, political and technological) and levels (e.g. planetary, international, national, organisational, personal, physiological, cellular, molecular, atomic and sub-atomic). They mutually co-produce each other and new problems emerge from their interaction.

Although an abundance of research and many solutions exist, these are partial, uncoordinated and mostly insufficient in the context of a systemic dynamic. They typically co-produce problems in other systems, are based on the problem logic and often cannot be implemented because of the resistance of some key stakeholders.

Conventional leadership is powerless in dealing with global systemic problems. Even if leaders have knowledge of systemic problem (dis)solving and ideal system (re)design, they are constrained by existing social structures (e.g. organisations, national governments, industry lobbies) which assume a life of their own and resist change from within and without.

To facilitate change in the context of complexity requires in-formation leadership. Its purpose is to in-form (put form into) existing systems so that they function sustainably and for the benefit of all stakeholders. This requires theoretical and practical knowledge of both, creating sustainable strategic designs (i.e. **what** needs to change) and managing the change (i.e. **how** to enrol stakeholders in co-producing a shared design and implementing it).

Since complex problems are inter-disciplinary, discipline specific knowledge needs to be extended and contextualised by a trans-disciplinary theory and methodology of system organisation. Biomatrix Systems Theory, which is a meta-systems theory, is such a body of knowledge. It can facilitate, integrate and contextualise an inter-disciplinary interaction for (dis)solving systemic problems. It provides generic theoretical frameworks and principles of system organisation. These do not provide answers to complex problems per se, but give rise to systemic questions that elicit systemic answers by the interacting disciplines that can co-produce the emergence of sustainable solutions.

Also, most complex problems are global in nature and (dis)solving them requires global participation. On-line methodologies (e.g. the BiomatrixJam) can be useful in facilitating this.

Key Words

in-formation leadership; systemic in-formation leadership; systems theory; biomatrix systems theory; applied systems thinking; complex problem (dis)solving; ideal system design; systemic change management; systemic change facilitation; systemic public policy design; stakeholder planning; stakeholder democracy.

Systemic in-formation leadership

What is systemic in-formation leadership?

Leadership is usually defined as "organizing a group of people to achieve a common goal" (e.g. (http://www.wikipedia.net). Wikipedia). And while there may be many other definitions, a brief scan through the leadership literature seemed to confirm a people centered approach and a focus of leadership.

However, it is the experience of the author as a futurist and management consultant in the public and private sector, that leaders at all levels are constrained by social structures, be they organisational structures or national and international governance structures. Even if leaders want to do things differently, they are eventually prevented by limiting structures to do so. They are rendered powerless by them.

In-formation leadership addresses this problem specifically. It is concerned with organising stakeholder representatives to redesign their interacting systems that co-produce the complex societal and organisation problems of their concern in such a way that they function sustainably and co-produce more desirable outcomes for their stakeholders.

Human beings have a great deal of freedom in choosing what form its cultural, economic, political and technological systems can take. Unfortunately, in the course of social evolution, many of those systems have become unsustainable. The outcomes they produce create complex systemic problems *such as such as the finance crisis, poverty, war, population explosion, unsustainable energy supply and climate change*. These and similar problems seem be unsolvable and even threaten the continued survival of humanity and other forms of life.

The purpose of in-formation leadership is not to describing the specific outcomes that a system should achieve. This is typically the realm of the visionary leader. Rather, the purpose of in-formation leadership is to ensure that the vision of stakeholders and the systems that co-produce them sustainable, namely that they meet the legitimate aspirations of their stakeholders and operate within the limits of nature.

From a change management perspective, the core challenge of the *systemic in-formation leader* is to facilitate change in such a way that stakeholders are aligned around their shared design and committed and able to implement it.

In order to facilitate the development of sustainable systems, the in-formation leader needs to understand how systems are organised and change. This requires knowledge of systems theory and its practical application.

In summary, systemic in-formation leadership ensures that the content and management of change are systemic.

Note on in-formation

The term information is derived from Latin and means *putting form into*. To emphasise this form changing and governing force of information and distinguish it from the more common use of the word, we spell it as in-formation. This spelling was introduced by David Bohm (1980) and is associated with his concept of an implicate order according to which the observable explicate order of the physical universe unfolds. (Laszlo, 2007)

To understand in-formation leadership we need to distinguish between the following related concepts:

- Data is a unit of quantitative or qualitative description of a phenomenon in physical or conceptual reality.
- Information is meaningful data about a phenomenon relevant to an observer or user.
- In-formation is generic information that determines the form and functioning of the phenomenon.

For example, the world-wide-web is a vast collection of data. A search produces information. The information associated with the search engine (i.e. algorithms) is in-formation. It represents the implicate order according to which data are generated and information provided.

Knowledge is associated with the data, information and in-formation of which we are aware (i.e. know about).

Experience is associated with the phenomenon that the data, information and in-formation describe.

Why do we need systemic in-formation leadership?

As humanity moved through various ages and stages of development, such as hunting-gathering, agrarian, industrial and more recently the advent of the information age, its cultural, economic and political institutions have undergone fundamental transformations. Their reach has changed from the extended family to the tribal, national and now global interaction. Technological development has diversified and accelerated. Worldviews have changed fundamentally with each stage of societal development.

The transition from the industrial to the information age started a mere few decades ago, hence our mindsets and institutions are still grounded in the industrial age, even if some changes have taken place. *For example, the nation state with its number based representative governance is still the dominant governance unit in international relations and we still have the same (or very similar) formal education systems, corporations, financial institutions and economic theories that evolved in the industrial age.*

We would argue that unlike the previous shifts, the shift to the information age is more fundamental, because it embodies a shift from predominantly organising physical reality (i.e. matter and energy based) to one that embraces the conceptual reality associated with information. The significance of this shift is that matter and energy (at least the harnessing thereof) are finite and scarce. If shared (*e.g. land and other things*), one party loses at the expense of the other, while the total amount

remains the same (i.e. it is zero sum). Sharing of scarce resources involves win / lose and gives rise to competition. By comparison information is governed by win / win. By sharing it, one does not lose it. It is also synergistic which means that by exchanging information new information can arise that was not inherent in the interacting parties.

The competitive mindset and scarcity thinking is appropriate in the context of dealing with a matter-energy reality. In the context of information it is inappropriate, as it prevents the creation of synergy which is a core competitive advantage in the information economy.

The synergistic reality of information also provides a challenge to some scientific theories. *For example, the economic law of diminishing returns evolved in the context of evaluating physical goods and services which indeed diminish in value with their increasing supply. By comparison, the wealth of Microsoft and Google could be explained by a law of increasing returns of information.* One could *also argue that the continuing financial crisis is a manifestation of the synergistic nature of information for at least two reasons. The first is that information has become the main means of production (as opposed to land in the agrarian age and physical capital in the industrial age). Being synergistic, it is not governed by the law of diminishing returns and takes on its own synergistic reality, as exemplified by the dot com bubble some years ago. Different approaches for managing are required. The second reason is that deregulation allowed the financial system to evolve from mostly dealing with information about real economic value and providing according services to the economy to generating information from this information (i.e. derivatives) and trading with it. Being synergistic and unlimited by regulation this has a run-away effect and becomes increasingly unrepresentative of the physical economy. By 2008 the traded derivatives amounted to 13 times the global GDP (i.e. the physical reality of the collectively produced goods and services). Since then it must have increased even more. Since the financial markets use the same currency as the real economy, they have a disturbing influence on it and can even destroy it.*

Besides the synergistic nature of information, the unsolved problems that emerged in the industrial age (e.g. poverty, population explosion, impacts of industrialization on nature) have become global challenges. They are beyond the reach of governing bodies which are still grounded in the nation based reality of the industrial age. The paradigm and institutions established in the industrial age are unable to deal with them. We need information savvy and globally orientated leaders.

The challenges associated with dissolving humanity's complex problems can be summarised and illustrated by the following comments:

- *We know what caused the finance crisis, but we don't know what to do about it*. (Statement by the G20, March 2009)
- *With current strategic thinking, global poverty is not only unsolvable, but could get worse.* (Comment by a World Bank Official, 2010)

  (***Note:*** There can be a decline in poverty in relative terms, yet an increase in absolute numbers, due to population growth.)

- *We know what needs to be done, but we don't know how it can be done*. (German Chancellor Merkel commenting on the Euro-crisis, 2012)

The first two statements illustrate a need for reviewing **what** needs to be done to solve our problems (i.e. our designs and strategies of systems), whereby the first statement illustrates that we don't know the solutions to some problems, while the second statement refers to the ineffectiveness of current solutions. The third statement indicates that we need to rethink of **how** we go about solving them (i.e. our change management and governance approaches).

Both are derived from the way we view the world (i.e. our paradigm). The current problems of humanity arise from the current paradigm. (Dis)solving them requires a new paradigm. We propose that systems thinking and more specifically, Biomatrix Systems Theory because of its meta-systems approach, can be this paradigm.

Worldview of in-formation leadership

We propose systems thinking as the appropriate paradigm for in-formation leadership for the 21st Century.

Systems thinking is a body of knowledge that provides concepts, frameworks and principles that guide the understanding of how systems are organised, function and change. It is also concerned with the emerging complexity and interrelatedness of the systems in nature (i.e. the naturosphere), psychological and societal systems (i.e. the psycho-sociosphere) and technological systems (i.e. techno-sphere).

While the systems of nature, society and technology are researched by a range of scientific disciplines in great detail and with excellent results, there is a lack of knowledge about the emergence from the interaction of these systems. This would be the realm of a trans-disciplinary exploration. *For example, there is no overarching trans-disciplinary theory of sustainability, although the concept of sustainability is associated with the interaction of social, technological and natural systems.*

Since complex societal problems (e.g. poverty and climate change) are emergent problems from the interaction of systems studied and shaped by different scientific disciplines, their (dis)solving require a trans-disciplinary approach to (dis)solving them.

Trans-disciplinary research is the realm of systems theory, being concerned with the interaction between systems and the emergence resulting from it.

Systems theory and related paradigms (e.g. cybernetics, operations research, complexity theory, chaos theory and field theory) have evolved during the last about 80 years and many different thinkers from different scientific disciplines have contributed to them. They are a conglomerate of different concepts, models and approaches (e.g. systems dynamics and ideal design approaches) that overlap with and even contradict each other and use different language for the same or similar concepts.

Biomatrix Systems Theory is an attempt to integrate and synergise the various concepts, models and approaches into an internally consistent meta-systems theory with a coherent language. The systems thinkers whose ideas were considered and integrated (not necessarily using the same language or in its entirety) are listed in the *References on systems thinking*. Their integration into a coherent theory was possible due to unique conceptual contributions by the multi-disciplinary research team that co-produced the theory in the context of a PhD programme at the University of Cape Town. The theory has been presented in scientific articles, as well as defended and applied in several PhD and Master Theses in different scientific disciplines. (Dostal et al. 2005, 2012; http://www.biomatrixtheory.com).

The approach and methodology of in-formation leadership presented in this paper is based on *Biomatrix Systems Theory*.

Key challenges of in-formation leadership

In facilitating the dissolving of complex societal problems and the redesign of current systems to ensure their sustainability, the in-formation leader has to consider the following challenges:

Systems are dynamic

Systems impact on each other. The effect of making a change in one part of a system ripples through to other parts of the system and to the systems it interacts with. These effects are largely unpredictable, due to emergence. Likewise systemic problems spread from one system to another, across levels and dimensions, *as exemplified by the domino effect of the finance crisis or the impacts of climate change*.

Systems thinkers have described the nature of systemic problems as being systems of interacting problems and given them different names, such as mess (Ackoff, 1974), problematique (Checkland,1981; Ozbekhan, 1977), wicked problems (Churchman, 1976) and complex problems (Senge, 1990; Flood and Jackson, 1991), amongst others.

Through their mutual impact on each other systems co-produce each other, as well as unpredictable outcomes (i.e. emergence).

Emergence implies that characteristics emerge from the interaction of systems that are not present in those systems and therefore no single system can be held responsible for it. *For example, climate change emerges from the interaction of humanity's economic, cultural, political and technological systems. We cannot blame corporations if we keep investing in them, consuming their products, demanding lower prices, higher wages, tolerate non-transparent governance systems, support a growth philosophy and follow the logic of the legal system that seeks a guilty party, to mention a few of the "conspiring" systems.*

Systemic problems can even emerge from systems that in themselves seem to be functioning well, or from solutions in other areas. *For example, the more successful the education system is in reducing school drop-outs, the greater will be the problem of youth unemployment.*

In-formation leadership is required to guide and facilitate the dissolving of emergent problems by redesigning the interacting systems that co-produce them.

The logic of the problem is not the logic of the solution

Knowing the causes of a complex problem but not its solution is typical for systemic problems. Albert Einstein observed: *We cannot solve our problems with the same level of thinking that created them.* Yet this is typically what we do.

We tend to react to problems with the logic of current thinking. *The probably worst example of current logic problem solving was rescuing the finance system by throwing trillions at it without addressing its underlying problems or even making a serious and sustained effort at redesigning the problem producing system.*

Such strategies exacerbate the problem and keep recreating it. *For example, banks which did not trade in derivatives before 2008 have added them since to their services, thereby increasing the problem in future.*

We keep "doing more of the same" even if we know that it will not deliver the desired results, merely because we do not know what else to do. *For example, the above mentioned comment that with current strategic thinking poverty is unsolvable implies that more of the same problem solving approaches will not yield better outcomes. Yet, we keep advocating them, such as promoting the trickling down effect of economic growth, or more of the same type of education which results in youth unemployment and educated unemployed*.

Moreover, as the environment changes, strategies that worked in the past will not produce the same outcomes and even create new problems, *as exemplified by the concerns with an outdated education system, including management education which is an outflow of the functional separation of the industrial age.*

In-formation leadership is required to guide and facilitate the redesign of unsustainable traditional systems.

Distinction between problem solving and dissolving

The distinction between problem solving and dissolving is related to that of a problem and solutions logic.

- **Problem solving** restores a system to its original functioning as determined by its design *(e.g. repairing a malfunctioning car)* or evolved functioning *(e.g. inserting a heart pace maker)*. The method of problem solving starts with problem analysis to find the cause of the problem (typically involving root cause analysis), identify the solution and implement it.

  The problem solving approach works well with systems that malfunction and need to be restored to their previous functioning. Even well designed social systems that experience a temporary problem *(e.g. because a member is making mistakes)* can benefit from problem solving.

The logic of the design of the system dictates the solving of the problem. The logic of the problem therefore IS the logic of the solution.

- **Problem dissolving** changes the functioning of the interacting systems so that they co-produce new outcomes that do not reproduce the problem. *For example, by creating peace, conflict dissolves, or by creating health the disease dissolves.* The method involves creating an ideal design of the interacting systems and designing and implementing the strategies that allow the systems to co-produce the outcomes intended by the design. The functioning based on the problem logic is replaced with a functioning derived from a new solutions producing logic.

  The problem dissolving approach is required in the context of complex systemic problems. It demands that systems function on the basis of a new logic. To arrive at such a logic requires creativity.

In praxis, systemic problems require a combination of the two approaches. *For example, finding a vaccine for HIV / AIDS would imply solving the problem of that epidemic. However the implementation of a worldwide vaccination drive requires problem dissolving in many related areas. Likewise, technological developments in electricity generation can provide solutions to many problems. Implementing them within the current system will, however require system redesign and according planning with relevant stakeholders.*

Multiple stakeholders

Systemic problems are always co-produced by different stakeholders and require their cooperation in (dis)solving them. This includes stakeholders from different dimensions (*e.g. cultural, economic, political, ecological and technological)* and levels *(e.g. societal, organisational, individual, as well as levels associated with natural systems like the planetary, physiological, cellular, atomic, etc.)*

Decision-makers associated with the different dimensions and levels of a problem need to cooperate in order to co-produce the dissolving of the problem.

Unfortunately the current atomistic paradigm (e.g. the separation of science into independent disciplines, the autonomy of self-governing social systems, and the emphasis on self-interest in economic thinking) leads to an ignoring and abdication of responsibility for impacts on the collective. While systems are interdependent in reality, their governance is disjointed. Their self-governance is not coordinated. Thus any cooperation between the stakeholders is largely voluntary, at least until we evolve different governance paradigms. This is the challenge faced by leaders at all levels. Even if they know how to solve societal problems, they do not know how to implement them, if a stakeholder is not willing to cooperate because their self-interest is affected (even if it is only reduced or temporarily affected).

Especially in a global problem (dis)solving context, our political (i.e. collective change management) processes become increasingly ineffective and leaders are powerless. *For example, the recent Rio+20 conference had its outcomes determined before it started - a sad illustration of our global impotence.* As globalization proceeds, even large nation states and regional alliances of states

become impotent against powerful transnational economic and political lobbies which pursue their self-interest at the expense of the other stakeholders.

This demands in-formation leadership and the use of a guiding theory to impose a transdisciplinary order on the management of change. However, even with a guiding theory leaders face a huge change management challenge. The redesign of problem producing systems is urgently needed. Before we know how such systems could function differently, we do not know what changes to initiate. Fortunately, stakeholder representatives can voluntarily participate in redesign exercises to create new possibilities for humanity. This can involve on-line applications, *as for example the BiomatrixJam which is a systemically structured on-line design application. (This methodology was explained and demonstrated at the AficaLeads Conference, 18-21 November 2012. An overview of it can be viewed on www.biomatrixweb.com)*

Approach of systemic in-formation leadership

Systemic in-formation leadership involves the contribution of generic organising frameworks and systemic organising principles, as well as a systemic methodology to guide the

- analysis of a complex societal issue *(e.g. poverty, climate change, war)* or an industry related issue *(e.g. education, finance, health, energy, transport*) and exploring its complexity
- redesign of the stakeholder systems associated with the issue on the basis of a new, solution logic
- management of the change in systemic ways through participative stakeholder planning around the issue of consideration.

Thus systemic in-formation leadership is facilitative. The leader introduces relevant systemic frameworks, concepts and principles to lead participating stakeholders to see their ideas in a systemic light.

Philosophy of science distinguishes between deduction and induction. From this perspective, systemic in-formation leadership is deductive, being deduced from systems theory. It imposes a systemic order on the generation of content around a specific issue. It does not prescribe or promote specific content. It provides a generic deductive order of contextualization of content and process, while encouraging inclusive and comprehensive inductive contributions from the stakeholders. The former relates to a prescription of systemic frameworks and principles. The latter includes all information derived from problem analysis and brainstormed solutions for a specific issue of inquiry.

Likewise, the unfolding of the change management process is an emergence from top down generic approaches and specific demands by participants. Working with willing or resistant stakeholders will call up different approaches and influence the way a specific change management process will unfold, however, without compromising the overarching systemic guiding principles.

Conventional facilitation approaches do not impose an implicit order. They typically allow a free-flowing emergence according to the suggestions of participating stakeholders.

We are aware of the potential criticism of being “prescriptive” (and of course “value laden” or “ideological”) because we advocate a systemic contextualizing order. Our answer is two-fold:

- If stakeholders who co-produce a problem are asked to decide how to find a solution, they are guided by the problem logic. They will merely perpetuate the problem (or even make it worse). Unfortunately, this is exactly what is happening within organizations and in the public domain across organizations and in governments. By comparison, systemic in-formation leadership allows stakeholders to find a new (systemic) logic.
- Systems theory is a scientific discipline and has been argued within and across various scientific disciplines (even if it is not “mainstream” yet, largely due to its trans-disciplinary nature and its core concept of emergence). It is thus, as much or as little an “ideology” (depending on the definition of ideology) as a scientific theory in any other scientific discipline. Having participated in a philosophy of science debate for many years, the author makes no apology for proposing that systems thinking is the paradigm of the information age.

In the context of science, systemic in-formation leadership depends on the acknowledgement of systems theory (under whatever name) as a formal trans-disciplinary approach, its continued scientific development, methodological application and use in trans-disciplinary academic debate.

A methodology of systemic in-formation leadership

Introduction

A systemic in-formation leader needs to be able to facilitate all steps in the methodology as well as manage the change systemically.

This section is an outline of the systemic methodology that we have found comprehensive enough for dealing with problem (dis)solving and system redesign in the public domain.

This problem (dis)solving methodology is in the tradition of ideal system redesign and incorporates the ideas of other systems thinkers of both the

- **system dynamics approach** (Dostal et al. 2005, 2012; Forrester, 1969; Flood and Jackson, 1991; Keys, 1990; Meadows et al. 1974; Gomez & Probst, 1987; Roberts et al. 1983; Senge, 1990, 1999) and
- **ideal design approach** (Ackoff, 1974, 1999; Ackoff & Rovin, 2003; Banathy 1994; Checkland, 1981; Churchman, 1971; Cross, 1984; Dostal et al. 2005, 2012; Flood and Jackson, 1991; Gharajedaghi, 1985, 1986, 2006; Nadler, 1981; Warfield, 1990).

It also includes new contributions based on Biomatrix Systems Theory (e.g. generic frameworks for problem analysis and design).

The steps involved in systemic problem dissolving are the following:

- **Problem analysis:** Unlike the problem solving logic that identifies root causes, the systemic problem logic is one that is an emergence from the interaction of multiple causes. The co-factors

need to be identified and the logic of their interaction explored (e.g. in a systems dynamics model).

- **Brainstorming solutions:** Since systemic problems have no pre-determined solutions, new ideas have to be generated. This requires systemic brainstorming techniques.
- **System(s) redesign:** The collection of diverse and even “way out” ideas that is produced by brainstorming needs to be reviewed and integrated into a coherent design. This is facilitated by a generic design framework and generic principles of systemic organization that need to be incorporated into the design.
- **Implementation planning:** While problem solving is associated with established functioning, problem dissolving requires the establishment of new behaviour, as well as different resource use. This needs to be carefully planned in a step by step manner.
- **Implementation:** In problem solving, the implementation is easier, because the system is familiar with the required behaviour. In a redesign situation new behaviour needs to be learned. This requires support, reinforcement and careful monitoring of outcomes, including more changes in behaviour if necessary.
- **Systemic change management:** Systemic change management refers to how the above steps are planned and facilitated. Thus change management is a parallel process to the sequential steps outlined above. Because systemic problems do not have pre-determined solutions, the change management approach needs to elicit the creativity of the participating stakeholders and needs to ensure their synergistic integration in an internally consistent and containing ideal design, as well as its implementation.

Each of the steps is discussed in more detail in the following sections.

Problem analysis

The *systemic in-formation leader* needs to facilitate an understanding of the complexity, multi-dimensionality and systemic dynamics of the problem.

Methods of problem analysis

The methods employed during problem analysis include the following:

Identifying problems and problem co-factors

Stakeholders identify problems they experience with regard to the societal issue under investigation, as well as the co-factors of the problems. The latter refer to the causes of each problem.

Exploring the dynamics of the system

The mutual interactions between the co-factors can be explored through a systems dynamics model. Depending on the nature of the problem being explored, this step could be a broad exploration in order to illustrating the systemic complexity of an issue. We find this useful in the context of social systems as well as for illustrating the interaction between social, natural and technological systems.

In the case of systems with fixed functioning (e.g. natural systems) the exploration of the dynamics of the system need to be more comprehensive, as this could reveal solutions of how the system can be restored to its “healthy” functioning.

We use the Biomatrix method of telentropy tracing for this. This method is more detailed than conventional systems dynamics models as it considers levels, dimensions and the distinction between conceptual and physical reality of systems. (Dostal et al. 2005 and 2012).

Forecasting current futures

A current future describes what could happen if the current behavior of the system persists. Depending on anticipated future environmental changes, alternative futures can be forecast. Often these are presented as alternative scenarios.

Current futures are rarely desirable because they imply deterioration of the system in interaction with a changing environment.

Theoretical and methodological considerations

As repeatedly argued in the systems literature (e.g. Ackhoff, 1974; Capra, 1982, 1996; Gharajedaghi, 1986), the paradigm of systems thinking is a meta-paradigm that serves a trans-disciplinary debate. Such a debate is required in the context of systemic problems that span different dimensions and levels in the systems hierarchy which are represented by different scientific disciplines. Thus, systems thinking recognises the multiple truths of a collective challenge as represented by different stakeholder perspectives and it is a core function of the *systemic in-formation leader* to ensure that all stakeholder perspectives explored and heard.

By exploring the truth of each stakeholder, the collective truth can be approximated, which may well contain contradictions and shift according to context. *For example, we need to understand the functioning of the current financial system or what brings about climate change from the perspective of stakeholders at all relevant levels and in all dimensions, both in overview as well as detail.*

Since the pursuit of truth is the realm of science, this places systemic in-formation leadership into the camp of science, albeit in a trans-disciplinary manner (as mentioned previously). By comparison, other societal pursuits (Gharajedaghi, 1986), such as health, peace, wealth, beauty or God, amongst others, involve ecological, political, economic, artistic or religious leadership. These are discipline specific and have a complementary role to play in understanding a systemic societal issue by representing different valid perspectives and different ways of knowing. At the same time, they are in themselves insufficient in dealing with a systemic societal issue *such as transforming the global financial system, dissolving poverty or preventing climate change (if tippling points have not been reached yet, in which case we would have to design strategies to minimise its effects).*

Change management considerations

Problem analysis serves more than one purpose, which may be more or less relevant in different situations. The systemic in-formation leader needs to facilitate accordingly. More specifically, problem analysis can facilitate the

- understanding of the complex nature and dynamics of the issue under investigation
- understanding of the magnitude of the change required and the areas that need changing
- change in the worldview of the participating stakeholders (i.e. to replace one-dimensional thinking and oversimplified and "naive" solutions thinking with the understanding that a fundamentally new approach is required)
- emotional satisfaction to stakeholders about being heard and considered (*e.g. those that are ignored by the stakeholders with more power*), or relieved of a burden of guilt and blame (*e.g. apparent "perpetrators" that are believed to cause the problem)*
- identification of the root cause (in the case of a system characterised by fixed functioning) and
- use of problems as input to brainstorming solutions.

It is also our experience that in problem dissolving situations, the discussion of the problem(s) keeps stakeholders stuck in the problem logic and reinforces it. It will not lead to a new, problem transcending logic and is therefore counter-productive. (An exception could be societal problems associated with trauma which need face to face interaction for emotional and not necessarily analytic reasons.) We therefore prefer the surfacing of problems and identification of problem co-factors by individuals in written form which are then clustered to be used as input for the brainstorming and plotting of the dynamics of the system.

Using on-line surveys (e.g. the BiomatrixJam) to identify problems and their problem co-factors is an especially useful method for allowing input from large numbers of stakeholder members. Having a guiding framework elicits submission of problems from all parts and perspectives of the system, ensuring an understanding of all facets of the issue in detail. Anyone can participate and all can view all outputs, making the analysis transparent. The zooming in and out between an overview of the whole issue and each of its parts in increasing detail automatically provides systemic education to the interested public. They not only get educated about the issue as a whole but also experience a mindshift change towards more systemic thinking. Thereby collective wisdom gets deepened.

Brainstorming solutions

The *systemic in-formation leader* needs to facilitate the exploration of future possibilities and stimulate creativity amongst participating stakeholders.

Brainstorming methods

There are many brainstorming methods available. We like to group them into success-based, problem-based and "a-rational" brainstorming methods.

Success-based brainstorming

Success-based brainstorming input can be derived from an exploration of the strengths of the current system, best practice, past success experiences, role models and benchmarking. The aim is to enhance and amplify successful strategies and operations and to reproduce it in other systems or parts of the same system. These are however not necessarily indicative of a new solutions logic.

Problem-based brainstorming

Problems are very useful for kick-starting creativity. The more problems a system has, the more opportunities there are for inducing change. Only perfect systems cannot be changed, besides being boring.

A useful method for inspiring a higher order systems logic is the frogs / prince method. It proceeds by transforming problems into their ideals and designing strategies to achieve the ideal.

We refer to this as the frogs / prince method, based on the metaphors of the “boiling frog” as an illustration for a deteriorating problem and the prince which is liberated from the frog by the kiss of the princess (i.e. the intuition) according to a fairy tale.

Existing solutions

Whatever the issue, there is typically an abundance of researched and intuited, tested and untested solutions for different parts of the problem that exist amongst stakeholders. These need to be collected, contextualised and explored in a brainstorming manner. Even if they have been rejected in the past for a variety of reasons, in the context of a larger whole they can become a valuable part or spark new ideas.

A-rational brainstorming

This refers to brainstorming methods like drawing, sculpting, mood boards, song-writing, dancing, story-telling, images and symbols, analogies and metaphors, amongst others. These methods tap into the creativity of the subconscious mind and its pattern recognition ability. They can yield amazing results, besides being fun.

Theoretical and methodological considerations

Social systems *(e.g. a marriage, education, finance or energy supply system)* have a choice in how they can function, as there is no “law of nature” that pre-determines it. If the system is problem riddled, it needs to be transformed according to a new, problem transcending logic.

While the analysis of a problem riddled system reveals the problem logic of the system, brainstorming needs to create a problem transcending solutions logic.

Clustering the brainstorming output allows stakeholders to view the brainstorming output associated with different parts of the system and according to different systemic categories. One can zoom in and out to view the ideas pertaining to different parts (i.e. levels) and categories. Iterating between categories and levels typically contributes to the emergence of a higher order solutions logic.

Change management considerations

Most facilitators are familiar with brainstorming techniques and know how to facilitate them. To make brainstorming systemic requires the

- inclusion of systemic brainstorming techniques *(e.g. the frogs / prince method)* and
- use of a systemic framework (e.g. as derived from Biomatrix Systems Theory) in order to ensure that brainstorming is comprehensive (i.e. covers all parts of a system, all categories of the systemic framework and all stakeholders); it also facilitates the clustering, categorising and integrating of the brainstorming output.

Since systemic problems have many sub-problems and problem co-factors, the brainstorming output can be considerable. It is therefore useful to produce design notebooks for the different (parts of the) systems that are being redesigned. These are used as inputs for creating the ideal (sub) design(s).

In an on-line application (e.g. BiomatrixJam) the notebooks are posted on-line. This enhances transparency, as well as inviting more brainstorming input (e.g. by stakeholders that were not included in previous rounds).

Ideal system (re)design

The *systemic in-formation leader* needs to facilitate the redesign of the interaction of the systems that co-produce the systemic problem(s) under consideration.

Design method

To make a systemic design requires knowledge of how systems are organised and function based on a comprehensive systems theory. The design team needs both issue specific expertise and systemic organisation related expertise. The latter provides the systemic frameworks and generic organising principles according to which the issue specific brainstormed ideas are selected, interpreted and synthesized into a coherent design.

Systems theory advocates the formulation of the design in idealized terms. Ideals are by definition not attainable or can only be attained momentarily before shifting again. The reasoning behind this is that ideals are timeless and remain relevant in any context and continue to inspire the system to approximate them. They can be reinterpreted according to changing needs and changing context and induce creativity and innovation in trying to attain them.

Theoretical and methodological consideration

Sub-designs

To dissolve a systemic societal problem *(e.g. poverty, or problems with education and energy supply)* requires an ideal design that in-forms stakeholders from different levels (i.e. societal, organisational and individual) and dimensions (i.e. economic, political. cultural, technological, ecological). It inspires stakeholders to design strategies that will co-produce the intended outcomes of the design. They

become sub-designs for the overarching design. Thus the overarching design automatically coordinates the strategies of autonomous stakeholders. Since these strategies are typically associated with different stakeholders, each stakeholder will need to make a design around the strategy.

For example, Germany's vision of moving towards electricity generation from renewable sources will affect all stakeholders along the electricity supply chain, from suppliers to electricity generators, the generators of electricity (both renewable and non-renewable), organisations associated with the storage and transmission of electricity and the various consumer groups. One of the strategies is to use non-renewable energy (e.g. coal) as back-up when renewable energy (from sun and wind) is not available. For the coal industry this implies a redesign of the business model from being a continuous electricity generator to becoming a complementary one that increases and decreases generation according to demand. Amongst others, this requires a change in the generating technology they use.

Thus to transform a societal issue *(e.g. electricity generation in a country or region)* according to an overall design *(e.g. renewable energy generation)* requires coordinated change within and between the co-producing stakeholder systems. This typically involves a strategic reorientation of these systems. More often than not a strategic reorientation by a stakeholder involves breaking new ground and needing new business models, *as exemplified by the changing role of coal-fired electricity generation.*

Iteration

Systems design is not a linear process. It requires iterations within each (sub) design as well as between the overarching design and the various sub-designs. This allows stakeholders to explore and reconsider their options in relation to the overarching design and the impacts they have on each other and the containing whole. *For example, the speed at which the coal industry can transform itself (given the legacy technologies that are still in place), could have an effect on the strategies of other stakeholders as well as the country and region as a whole. It will also affect the overall implementation plan for the country's transition to renewable energy use.*

Balancing self and collective interests

A systemic ideal design *(e.g. of an industry supply chain, or a regional development)* should deliver win / win outcomes for all stakeholders. This evolves through iteration between considerations inspired by self-interest and consideration of the shared interests of the containing whole.

The current systemic problems are largely an emergence from the "bottom up" causality of uncoordinated strategies and inadequate "top down" governance.

The "bottom up" causality arises from the self-interest of stakeholders, inspired by a paradigm that implies a belief in an invisible hand and that the sum-total of self-interest adds up to collective interest.

The "top-down" causality arises from the lack of shared ideas about the containing whole, as well as from non-systemic governance. (Systems theory distinguishes between different types of governance and advocates their balanced interaction). Systemic governance aims at coordinated self-governance

for the benefit of the whole and its interacting parts. It does not refer to top-down decision-making of an authoritarian regime (which does not work in a complex world, *as demonstrated by the demise of the centralised economies of former communistic regimes*).

An inspiring design provides each stakeholder with a long-term strategic direction for its self-governance. It also acts as an incentive for bridging over short-term disadvantages until longer-term benefits are reaped.

Sustainability

Most societal issues are an interface between social (i.e. psychological, cultural, economic and political) systems, technological systems and systems of nature (i.e. ecological, physiological, biological and physical).

To be sustainable, the design needs to accommodate the laws of nature and limits imposed by the carrying capacity of natural systems. *For example, in redesigning the energy supply chain, environmental considerations are a major factor in choosing between different technologies.* The sovereignty and integrity of nature must be respected.

Within the limits imposed by natural systems, the social systems are free to determine their own form and functioning. They can change and transform. *For example, the competitive economic ethos, behavior of financial markets, or the representative democracy model are created by humans, not by inevitable laws and can be redesigned.*

Change management considerations

Design team

The design of a system (using the brainstorming output, a systemic framework and systemic principles) is best done in a small design team. Large groups paralyze a design process and tend to yield the lowest common denominator output.

It is also important to note that the *systemic in-formation leader* and at least some of the team members should have patterned thinking skills (i.e. not every personality type is good at making a design). Team members should also have issue specific expertise, as well as knowledge of systems theory and how to apply it.

The most important consideration of a design is that it is formulated as a high level ideal. The loftier the ideal is, the more innovative the strategies will be. By comparison, mediocre aims give rise to mediocre systems. Thus visionary leaders need to be involved in shaping the content of the design.

The art of design also involves balancing the benefits of the whole and parts in the long-term and short-term and from multi-dimensional perspectives. This demands skills in managing paradox.

Depending on the size of the issue, there could also be sub-designs, involving sub-design teams. These need to be coordinated (e.g. a representative of each sub-team is also a member of the overarching design team).

Brainstorming input

The design team uses the brainstormed information (as clustered in the relevant design notebook) and reflects it against the generic systemic frameworks and organising principles.

However, not all brainstormed solutions will necessarily be incorporated into the design. Each idea needs to be evaluated within the larger whole of the design. *For example, the evaluation of a solution from an economic perspective could reveal that it is economical at the level of the organization, but not at the level of society, or vice versa. Or benefits in the short-term may become uneconomical in the long-term and vice versa. Or a solution would be viable if supported by changes in other systems (e.g. political or legal changes, or changes in values or consumption patterns).*

Design iterations

The design made by a design team is merely a draft design. Stakeholders need to review it and give their input. This involves a series of design iterations. (*See also the later section on change management).*

In facilitating design iterations, the design team must stay open to new input from stakeholders and willing to change the draft design accordingly. At the same time they need to ensure that the design remains coherent and systemic and they need to inspire stakeholders accordingly. (The redesign of Paris described in a following section on Systemic Change Management, serves as an inspiration for the design iterations).

The design is accepted as final, when sufficient alignment amongst stakeholders is reached and the design is approved by the relevant authority (*e.g. a government department or industry body).*

Implementation planning

The *systemic in-formation leader* ensures that the design gets operationalised through an implementation plan.

Method of implementation planning

Implementation planning follows a project management approach and its principles.

It determines the strategies and sub-strategies needed for implementing the design and who is responsible for each. It describes the intended outcomes for each (sub) strategy and plots the goalposts along the way under consideration of the sequencing and time-frames associated with each (sub) strategy.

An implementation plan also estimates the resources required for each (sub) strategy and considers their availability.

Theoretical and methodological considerations

Ideal design versus implementation plan

An ideal design is not an implementation plan. The ideal design represents the overarching vision, while the implementation planning grounds it in physical reality. Without an implementation plan the design is merely day-dream.

Failing to plan the implementation will not only result in a failure of the design, but could also make current problems worse. *The South African education and health care systems are sad examples of having been seriously damaged through failing to carefully plan the implementation of the Outcomes-Based Education and Primary Health Care designs.*

Cascading

The principle of cascading in space (from the containing whole to its parts) and time (from the time-less ideal to long and medium-term strategic plan and short-term operational plan) apply. It ensures that strategies are coherent.

Feasibility

During implementation planning the feasibility of the design in terms of available resources is assessed. Once the implementation has been thought through in planning, it can be implemented.

Iteration

If resources are insufficient for implementing the design, different strategies need to be considered. It is also possible that there is a need for changing the design. Thus there could be iteration between the design and implementation planning steps.

There could also be iterations between the broad implementation plan of the overarching design that in-forms all stakeholders and their sub-designs and according implementation plans. Thereby the overarching and more specific designs and implementation plans will mutually in-form each other.

Change management considerations

The broad collective implementation planning is done by a task team with according expertise. They represent the various stakeholder systems. The participation of the *systemic in-formation leader* and a representative of the ideal design team ensure continuity and coherence with the design.

Since a design is implemented by the sum total of actions by the co-producing stakeholders, implementation planning also occurs within each stakeholder system. This involves cascading the aims from the design and the collective implementation plan into system specific ones. Participation by a member from the collective implementation planning team ensures coherence and continuity.

In praxis, there are overlaps between the design and implementation phases which mutually in-form each other, involving increasingly detailed planning.

Implementation

Method of implementation

Implementation occurs according to the implementation plan. Each stakeholder is responsible for implementing its planned strategies.

Theoretical and methodological considerations

The desired outcomes of the overarching design cannot be attained unless each stakeholder implements its share of strategy.

Since most of the co-producing stakeholders are relatively independent decision-makers this requires commitment by each stakeholder. Their commitment can be reinforced by

- **Visionary leadership:** Leaders within each stakeholder organisation need to uphold the vision of the stakeholder design and its contribution to the overarching design of the containing whole
- **Regulation:** If the overarching design is systemic, it will incorporate appropriate regulation. Adherence needs to be monitored and sanctioned.
- **Public / private sector partnership:** The establishment of such a partnership is typical in the context of societal issues in the public domain. Its role is to monitor outcomes, provide strategic support, make strategic changes (if necessary) and motivate stakeholders, amongst others.

Change management considerations

The creation of ideal designs in the public domain (e.g. public policy designs), their implementation and the continued performance of these systems are the function of public government.

From a systemic perspective, the current nation and majority based representative model of democracy is insufficient to deal with the challenges of global systemic problems and problem-riddled legacy systems, *such as education, finance, transport, energy and governance systems*.

The current governance model is numbers-based, representative democracy within national boundaries. From the perspective of systems theory this is an entity system governance model. It would need to be complemented by an activity system (or function specific) governance model which involves the stakeholders of the function (i.e. a stakeholder democracy).

The challenge of such a governance model includes the following:

- activity systems form supply chains that cross national boundaries *(e.g. no nation can by itself manage the dissolving of the finance crisis or pollution and resource depletion of the planet)*.
- each stakeholder is equally important to the functioning of the whole, irrespective of size (be it number of persons or amount of any other resource). *For example, the stakeholders of a school are the pupils, parents, teachers, school principal, administrators and department of education, amongst others. Each stakeholder has a different function. The success of the education system depends on the fulfillment of each function.*

Systemic change management approach

Methodology

The generic change management approach of the systemic in-formation leader is using design and planning as tools for

- changing the mindsets of stakeholders to become more systemic
- aligning them around a shared design of the containing whole and
- committing them to the implementation of their share of strategies to co-produce the desired outcomes inspired by the ideal design.

Dwight D Eisenhower, commander of the Allied Forces in World War II and later president of the US, proclaimed a similar approach through his famous statement: *Plans are nothing. Planning is everything*.

The power of stakeholder co-design and planning as a methodology of change management was demonstrated most powerfully in the redesign of Paris which was facilitated by Ozbekhan (1977). It started with an initial ideal design of Paris made by a small design team, who interacted with widening circles of stakeholders to amend and flesh out the design.

Theoretical and methodological considerations

Unless stakeholders have bought into a shared vision and are committed to bring it about, the desired change will not happen.

Participation in design and planning generates this. The biggest learning from the redesign of Paris was its demonstration of the power of a collective creativity that is unleashed by a participatory process. In hindsight, it was the process of engaging stakeholders in a participatory process of interacting with the design, rather than the specific content of the original design, that contributed to its success. This change intervention has inspired the systems thinking community ever since and set a powerful benchmark.

As (parts of) systems participate in the formulation of a shared ideal design, they bring their unique information to bear on it, making it more holistic. Participation also implies interacting with the ideas of the design, becoming familiar with it and owning it (i.e. the design becomes part of the guiding ethos of each stakeholder).

By participating in implementation planning, the design acts as a force of inspiration for making according changes in the own system to help bring about the design. This type of planning entrenches practical application.

As circumstances change and new threats and opportunities arise, strategic changes in some or all stakeholder systems will be required. The overarching design, being ideal and therefore continuously relevant, will ensure that the changes made by different systems in response to their changing environment and inspired by the overarching ideal, will maintain coherence with those made by the other systems. *For example, the overarching vision of renewable energy generation will inspire the*

organizations along the electricity supply chain to choose from various technological options to comply with this vision.

Change management considerations

The Paris redesign used a variety of ways of stakeholder participation, ranging from workshops, written submissions, surveys to discussion in the public media.

Additionally to those approaches we also advocate on-line stakeholder participation through the *BiomatrixJam* and a more systemic approach to running a conference, the *Biomatrix Outcomes Based Conferencing*. (http://www.biomatrixweb.com). Both apply systemic frameworks and organising principles derived from *Biomatrix Systems Theory* to engage large numbers of participants in systemic problem analysis, brainstorming and ideal design around function specific issues in the public domain in such a way that integrated and synergistic outputs are created.

By comparison, the current conference model lacks coordination, let alone systemic integration. *For example, where is the categorised and in overview summarised output of the apparently 6000 papers presented at one of the largest HIV congresses held in Durban, South Africa, several years ago? How can such amount of information be meaningfully presented – in overview - to stakeholders and their members for collective understanding, or as coordinated input to collective decision-making?*

Also, most conference papers contain a mixture of both problems and solutions. By separating and then coordinating and integrating them within a larger context would demonstrate the dynamics of the current system and its underlying problem logic on the one hand and the emergence of a higher-order systemic solutions logic on the other. Instead we have a conglomerate of isolated solutions to isolated (i.e. separated from a larger context) aspects of larger systemic problems, argued in highly specialized conference papers or working groups (the latter often “behind the scenes”). Thereby the current problem producing logic is maintained in both, analysis and reactive and isolated solutions design.

To integrate and clearly present large volumes of information (to make it in-formation) would have been a daunting task in the industrial age (that is why representative decision-making in a majority based democracy model became so important). With the data processing capabilities and the development of the worldwide web of the information age, new ways of problem solving and decision-making present themselves, provided they are coupled to in-forming systemic frameworks.

By applying systemic frameworks and principles to both, problem analysis and solutions design, the *systemic in-formation leader* can facilitate a higher order sense making. The stream of puzzle pieces can be integrated into a clearly distinguishable picture (i.e. the kind of pictures that form the basis of visionary leadership).

Besides allowing direct participation of large number of stakeholder representatives in on-line applications (like the *BiomatrixJam)*, the systemic design allows zooming out to summarize overviews within the framework categories, as well as zooming in to increasing detail. Thereby each idea is contextualised by and becomes part of a larger whole.

While the jam organizes complexity, the face to face interaction during the design sessions of the conference synergize the jam data and facilitate the emergence of designs based on a new, problem transcending logic.

We like to believe that the BiomatrixJam and the Biomatrix Conferencing are useful contributions to the emergence of a function specific participatory stakeholder governance.

Conclusion

Systemic in-formation leadership complements visionary leadership. At the same time, it has its own vision.

Systemic in-formation leadership versus visionary leadership

There is a difference between *the systemic in-formation leader* and the visionary leader.

The visionary leader formulates and / or promotes a vision (or dream) about a specific issue on behalf of the collective. *For example, Chancellor Merkel promotes the vision of a transformation to renewable energy in Germany*. Such a grand vision demonstrates political will on the behalf of the collective. It also requires skills in promoting and communicating it to inspire followers (e.g. organisations associated with a whole industry, as well as the consuming and taxpaying public) to interpret and act on it.

This vision can however only be achieved if the stakeholders *(e.g. the stakeholders associated with the electricity generation supply chain)* change their functioning to bring this about. This requires systemic in-formation leadership. It uses systemic stakeholder planning as a methodology.

In summary, systemic stakeholder planning is a generic systemic methodology that involves stakeholders in

- fleshing out the vision into an overarching ideal design *(e.g. for the whole electricity supply chain)*
- cascading the design into sub-designs relevant to each stakeholder
- making the relevant implementation plans and
- monitoring and reinforcing implementation.

The same methodology can guide the design and implementation of any other vision. It is “neutral” in terms of any preferred content of a vision, design or specific solution. It is however not neutral in terms of the change management approach as a paradigm it has its own ethos, namely that of systems thinking. It ensures that designs and implementation plans, as well as the management of the change process are systemic – i.e. incorporate generic systems principles as outlined by systems theory. Amongst others, systems thinking promotes coordinated self-governance, the balancing of self interest with that of the containing whole and the participatory and transparent involvement of all key stakeholders in planning. As explained previously, the methodology in-forms the design with a generic systemic order. By comparison, the visionary leader provides content.

Ideally, the two types of leadership work together and provide mutual support and credibility. A design without a dream is dry, while a dream without a design is merely a daydream. *For example, the German energy transformation vision is still a dream without a coordinating design (or "Masterplan", as some commentators call for). Although this vision receives considerable attention through commentaries by the media and discussion forums (e.g. the technology dialogues), there seems to be no coordinating overarching planning process in place. Judging by the current coordination problems within the industry itself and between different governing bodies, this vision will be unattainable, unless a coordinating process is introduced. It is also interesting to note that technological solutions exist, but political, economic and organizational interests hinder their coordinated implementation.*

There are exceptions to when a dream does not need to go hand in hand with a design or plan. These are visions that represent not a redesign of systems in physical reality per se, but are concerned with a specific aspect of collective ethos (i.e. conceptual reality of a system). They are visions associated with a change values and attitudes, which in their own in-forming ways will change physical reality in many unpredictable ways that do not need or cannot be planned. *Typical examples are Martin Luther King's dream of racial harmony; or Nelson Mandela's visions of the rainbow nation, forgiveness and reconciliation; or the ecumenical movement of various religions.*

Such cultural visions are aimed to change the collective fabric of society through changes in worldview and attitude. They can be part of but in themselves would be insufficient to transform the energy supply industry or to transform the education or health-care system of a nation or the global finance system. *For example, to make the Energiewende happen, the Germany nation and its various organisations and institutions need to "have a dream" about sustainability and renewable resource use. At the same time, the energy industry needs to embark on a focussed and coordinating energy stakeholder planning process.*

The vision of systemic in-formation leadership

Systemic in-formation leadership is essentially facilitative. So why do we elevate systemic facilitation to a leadership role?

One reason is that its dream is to change the fabric of society through a change in worldview to systems thinking which has its own inherent ethos of the unity, connectivity and at the same time diversity of all life, which is ordered through the mutual contributions of all systems (i.e. a balanced exchange that benefits all systems).

Unfortunately, resistance to this worldview is deeply entrenched in all spheres of society. In the economy, there is a paradigm of maximising self-interest instead of balancing mutual benefits, one-dimensional growth instead of multi-dimensional development and short-term benefits at the expense of long-term sustainable ones. Scientific structures perpetuate the separation of disciplines and a philosophy of science grounded in analysis and predictability through ceteris paribus of a mechanistic paradigm, instead of embracing the concept of emergence and a transdisciplinary debate and its entrenchment in systemic curricula design for education. Societal governance involves numbers based representative decision-making which is so collective (i.e. of an anonymous majority) that it is

essentially non-transparent, instead of function-based decision-making that is participatory and has function related accountability and transparency. And the ultimate challenge is that these systems mutually reinforce each other. They “conspire” and re-enforce each other.

Breaking through this in its collective whole or even in its parts requires, indeed, systemic in-formation leadership of both, an explicit and implicit kind.

The **explicit** systemic information leadership includes inspiring stakeholders to review the current assumptions on which their scientific discipline, organisation or function are based, including that of the body of knowledge related to systems thinking. This largely involves personal leadership of the visionary kind.

The **implicit** systemic in-formation leadership is located in the structures of a system, as for example the design of a change intervention, education curriculum, action learning programme, function, industry, organisation or institution, so that the behaviour and outcomes of the systems concerned are automatically systemic. This type of leadership can be impersonal. The structure in-forms the activity, *analogous to the structure of the riverbed which channels the flow of the water.*

Ultimately, systems thinking is a worldview that shapes all systems and their behaviour. It represents a new set of values, inherent aims and guiding principles that in-form the ethos, aims, structure, behaviour and governance of all systems, including the way they use resources and interact with other systems.

List of references

Ackoff, RL 1974. *Redesigning the future.* New York: Wiley.

Ackoff, RL (1999). *Re-Creating the Corporation: A Design of Organizations for the 21st Century*. New York: Oxford University Press.

Ackoff, RL and Rovin, S (2003). *Redesigning Society*. Stanford: Stanford Business Books.

Banathy, BH 1994. *Designing social systems in a changing world: A graduate level text in systems design.* 25781 Morse Drive, Carmel, CA: Bela H. Banathy. (Field test version, June 1994.)

Bohm, D. 1980. *Wholeness and the implicate order*. London: Routledge & Kegan Paul.

Capra, F. 1982. *The turning point: Science, society, and the rising culture.* London: Wildwood House.

Capra, F. (1996). *The web of life. A new scientific understanding of living systems.* New York: Anchor Books.

Checkland, P. 1981. *Systems thinking, systems practice.* New York: John Wiley and Sons.

Churchman, WC 1976. *Wicked problems*. Management Science. Vol.14, (4).

Cross, N. 1984. *Development in design methodology.* New York: John Whiley.

Dostal, E. in collaboration with Cloete, A and Járos, G. (2005). *Biomatrix. A Systems Approach to Organisational and Societal Change*. Cape Town, South Africa: BiomatrixWeb.

Dostal, E. in collaboration with Cloete, A and Járos, G. (2012). *Biomatrix. A Theory in Graphics*. Cape Town, South Africa: BiomatrixWeb.

Flood, RL and Jackson, MC 1991. *Creative problem solving: Total systems intervention.* Chichester: John Wiley.

Forrester, JW 1969. *Principles of systems.* Cambridge Mass: Wright-Allen Press.

Gharajedaghi, J. 1985. *Towards a systems theory of organisation.* California: Intersystems.

Gharajedaghi, J. 1986. *Prologue to national development planning.* New York: Greenwood Press.

Gharajedaghi, J. 2006. *Systems Thinking. Managing Chaos and Complexity: A Platform for Designing Business Architecture*. Amsterdam: Elsevier

Gomez, P and Probst, JB 1987. *Vernetztes Denken im Management.* Die Orientierung. No 89. Bern: Schweizerische Volksbank.

http://www.wikipedia.net

http://www.biomatrixtheory.com

http://www.biomatrixweb.com

Laszlo, E. 2007. *Science and the Akashik Field: An integrated theory of everything.* Rochester, VT: Inner Traditions.

Meadows, DH. et al. 1974. *The limits to growth*. New York: Universe Books (2nd. Edition)

Meadows, DH. et al. 2004. *Limits to growth: the 30 year update*. White River Junction, Vermont: Chelsea Green Publishing Company.Beyond the limits. London: Earthscan Publications Ltd.

Nadler, G. 1981 *The planning and design approach.* New York: John Wiley and Sons.

Ozbekhan, H. 1977. *The future of Paris: A systems study in strategic urban planning.* Philadelphia: The Wharton School of the University of Pensylvania.

Roberts, N, Anderson, D, Deal, R, Garet, M and Shaffer, W. 1983. *An introduction to computer simulation: A systems dynamics approach.* Reading, Mass: Wesley.

Senge, PM 1990. *The fifth discipline. The art and practice of the learning organisation.* New York: Doubleday.

Senge, PM et al. 1999. *The dance of change*. London: Nicholas Brealey Publishing.

Warfield, J. 1990. *A science of general design.* Salinas, CA: Intersystems Publishers.

Yaneer Bar-Yam (2005). *Making Things Work: Solving Complex Problems in a Complex World*. Cambridge, MA: Knowledge Press.