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Foresight Communication and New Modes of Mobility

Building consistent scenarios for achieving the elusive target Electric Mobility

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Abstract

In this paper I aim to combine the theoretical connections between systemic thinking and scenario method [1] as well as the communication and shaping of future mobility systems. This last aim is an inherent task of futures research. We will present the main results of a scenario process for electric mobility in Berlin 2025. Furthermore we set the scenarios in a broader context of new modes of mobility. The power of scenarios consists in the ability to challenge dominating paradigms. [2] But it is not an automatic process. The communication of scenarios as well as the strategic implementation in different policy fields is the true challenge of planning and futures research. The intelligence and reasonableness of this kind of future communication will decide on the successful diffusion of electric mobility and the emergence of new forms of mobility in general.

Keywords: futures research, scenario planning, system thinking, electric mobility, methodological design

1 Introduction

The discourse of electric mobility seems to be on the run. It is considered as an indicator for change in our automobile transport system. But electric mobility is only one form of future mobility. It is an additional and reinforcing step changing the existing mobility system that is based on individual car ownership and the dominance of combustion engines. Monitoring and steering this change scientifically the Department of Integrated Transportation Planning (IVP) at Berlin Technische Universität has developed an interdisciplinary research design that combines methods from transport planning and futures research as complementary approaches in the field of mobility research.

The discussion on electric mobility suffers from a lack of concrete future images and a methodological communication design to facilitate diffusion of electric mobility in various social systems. Only a systemic foresight approach

reveals different actor perspectives and dynamic correlations among various variables. Scenario analysis is an adequate methodological instrument to generate such consistent and sufficient future images. It is both an analytical communication tool and a strategic planning instrument [3]. Thereby scenario method aims at identifying important factors in the fields of economy, technology, environment, society and politics which influence the development of electric mobility.

To analyse and validate different development paths of electric mobility a set of scenarios for the development of the electric mobility in Berlin to the year 2025 has been designed. The research project "User behaviour analysis and spatial planning of the regional infrastructure", headed by Prof Christine Ahrend, Department of Integrated Transport Planning, included the sectors energy, information and communication technologies, user interests, traffic and transport.

This paper will set the scientific discourse of electric mobility into the context of futures research. For that reason we choose the systemic approach in futures research [4]. We argue for the necessity of systemic thinking in order to analyse, communicate and shape the future. In this regard appropriate methodological implications have to be developed.

Using the scenario method it has been shown that not only alternative modes of electric mobility could emerge in Berlin in the next decades. The systematic analysis generated new forms of mobility in a future mobility system. At least two consequences for planning and communication of on-going changes have to be considered. (1) Transport policy as well as planning has to be integrated with other political, economic and social environments in a systemic way. (2) Electric mobility and other new forms of mobility in a sense of sustainable mobility need public attention, motivation and access to individual experiences. We will exemplify this in a current project which tries to implement the 'Micromobility scenario' into the curricula of a driving school in Berlin.

2 The discourse of electric mobility

The media and political discourse on electric mobility seems to indicate the important role of electric mobility for a variety of goals in different fields. The main fields of interest are the transportation and energy sector. The ambitious goals are reducing CO_2 emissions in traffic systems and lowering the energy consumption in general. The discussions focus on possible contributions of electric mobility in the context of these goals. "In the public debate, e-mobility is presented as the ultimate solution to nearly all transport problems." [5]. Hopes were high and are not yet gone but a public disillusion is growing over the diffusion of electric mobility. The lack of sufficient numbers of e-cars, inadequate political support and the high costs for e-vehicles are the reasons for this disenchantment. Beside these problems the discourse was dominated by technical issues: battery technology, infrastructure and charging cycles were focal point of the discussion. By doing so all involved actors followed a traditional mental model of supply driven market. The low numbers of electric vehicles in the private fleet are evidence that this thinking is inadequate.

This line of thinking was also dominating the research agenda in Germany. The first wave of research projects was focused on technical issues, infrastructure and information technology. Only a few projects were designed to analyse patterns of user behaviour. Electric mobility was present in the media. A technological artefact was communicated without any considerations about the needs and perceptions of potential users. This situation was critical for the German Government and its 'National Development Plan for Electric Mobility'. This part of the government's energy concept increases the share of electric to a total of one million electric cars do actually make onto German roads by the year 2020. Consequently the 'National Development Plan' contains a great number of goals and recommendations for action. Among them is also a potential analysis of electric mobility as an integral part of new modes of mobility. What this means are multimodal mobility systems. Electric mobility is also aimed at promoting a new mobility culture and modern urban and spatial planning. [6]

The program's biggest problem is the lack of information for implementation. There is no clarification of what is meant by new mobility culture and how electric mobility can facilitate changes in mobility. It is not clear who should be the actors of change. The central question was not answered who should buy and drive these one million electric cars?

While the discourse of electric mobility was dominated by political, economic and technical issues little effort has been made to supply of electric mobility. A positive attitude among the public does not guarantee individual consumer acceptance. The "new" of electric mobility in a not-technical sense was not clear. It was found that people have not the need for electric mobility. Insofar other modes of communication and project designs are needed to bring people in touch with technology and its potentials.

These lessons learned were considered in the second wave of research projects at least to a certain degree. A lot of projects include users to test electric vehicles and its possible applications. But that is only a short term way to communicate electric mobility. What is needed is a sustainable mode of communication that extends electric mobility to a broader and more integrated approach of new mobility.

For strategic planning purposes a prospective perspective on electric mobility is essential. Futures research can support these strategic planning processes in helping to "prepare for the unpredictable". [7]

3 The need for systemic thinking in futures research

The past two decades have witnessed a turn in thinking about futures. Trend research dominated the field in the nineteen-nineties. Futurists were convinced they can draw lines from the present into the future with the means of trend analysis. But the conditions of analysing changes and future thinking in modern societies have been changed at the beginning of the new century. Since then most important premises of futures research are the understanding of the future as open and unpredictable. For those reasons scientific futures researchers argue about the future in a plural and alternative manner. *The* future doesn't exist and cannot be known. It is horizon of possibilities. Likewise there are epistemological and ontological limits concerning futures research. The epistemological problem is the cognitive inaccessibility of the object of study. The open development status of future events and changes sets the futures research its ontological limits. Other real-world considerations are responsible for the problematic status of futures research.

The conditions of future thinking are characterised by complexity, contingency, choice and construction. Linear thinking and principles of simple causality do not work in these contexts. Social forms, institutional arrangements and general patterns of behaviour are no longer stable over time. The given is always to interpret in in its possible difference. Zygmunt Baumann calls this 'Liquid Modernity' where long-term planning processes and a thinking over very long periods of time are no longer possible. [8]

The limitations of futures research are only a small excerpt from the discussion on the bases of this science. Since this is not the focus of this paper, futures research will be defined as: "Like history, futures studies are a polyvalent, neutral ‚social science' as it is a collection of methods, theories and findings that provides an analytical tool for people who hold different beliefs and goals." [9]

Based on this definition, we can review some assumptions of futures research. (1) Future thinking is thinking in terms of time. The findings of theories of time are consistent with a couple of propositions: "Time is continuous, linear, unidirectional and irreversible." [10] (2) We are living in a permanent present and interpret, evaluate and judge past and future from these actual point of views. The thinking about possible futures is influenced by our expectations. (3) There is no independent or objective knowledge. We have only "conjectural knowledge" about futures. [11] (4) Future images or narratives are constructed artefacts that should not be confused with predictions. They are based on structured communications from different actors and perspectives. (5) For that reason futures research is an interdisciplinary field of research. The scientists involved in this field come from diverse fields such as economics, social sciences or engineering. Again, the openness of the future was highlighted yet. To pick on this openness again I want to quote Wendell Bell. "The future from this point of view is an assemblage of different possibilities, contingencies, near certainties and uncertainties, constraints and opportunities, some more probable than others." [12]

According to Bell, these assumptions clarify the purposes of future studies. Futures research can be summarized as being concerned with possible, probable and preferable futures. „The purposes of future studies are to discover or invent, examine and evaluate, and propose possible, probable and

preferable futures.“ [13] It focuses on *how* things change and develop not on what will happen. Consequently, the attention is on dynamics and relations within systems of change. Futures research provides interpretations of the past and present in order to infer statements about possible future developments. In communicating future images or narratives future studies proposes action and shaping the future in this way.

At least three main scientific objectives can be distinguished. First, the descriptive goal wants to answer the question of what the futures hold. The question: why do the futures looks like the described way relates to the theoretical goal. The explanation of possible und probable developmental paths came to the fore. At least the normative goal is focused on the critical judgement which future is wanted and how preferred future can be reached. Summarising the above it can be said that futures research is a paradox enterprise. It aims to generate knowledge of things which exist under conditions of uncertainty, contingency and accelerative change.

Despite the epistemic limitations of futures research a theoretical approach is needed in order to generate meaningful knowledge about future developments. There is growing recognition that system thinking and a methodological perspectivism are adequate theoretical approaches to fulfil the prerequisites of futures research.

System thinking means a holistic und relational thinking. A system is defined by its elements and the relations between these elements. The systemic point of view is interested in the relations instead of the elements of a system. Systems internally are interconnected and dynamic. They operate through indirect loops, feedback loops, complex cause-and-effect relationships as well as nonlinear links. These characteristics make them difficult to study. In addition systems operate theoretically and empirically autonomous and independently of their environments, thus the developments of systems are the subject of internal processes which cannot be controlled from the outside. The processes are ongoing and therefore the causes for the system dynamics. Systems transform themselves continuously. The dynamics do not follow an internal logic or determined pathway.

System thinking emphasises the holistic perspective. “One of the key features of systems thinking is the claim that it is holistic, giving three messages: (i) the whole is more than the sum of its parts, (ii) the parts cannot be considered in isolation from the whole, and (iii) the behaviour of the system cannot be understood independent from its context.” [14] This is precisely the intersection with futures research. The holistic approach is a necessary requisite in order to handle complex and dynamic issues such as electric mobility. Modern futures research makes the attempt to integrate the different perspectives of actors involved. It is focused on the relations between structures and action. In case of electric mobility it is necesarry to consider infrastructure, battery technology and other technical issues. But it is just as essential to include the users’ perspectives. Their needs and mobility patterns structure the possible paths of diffusion. That is important in a field where something new is intended to enlarge an existing system. The actual discourse of electric mobility is characterised by lack of an appropriate strategy of user inclusion and relevant modes of communication.

System thinking is differentiated in various theoretically forms and schools of thought. The system theory by Niklas Luhmann is one of the most influential. This theory is based on the general assumptions of system thinking as mentioned above. Particularly important in the context of this discussion are two key elements of the theory: the existence of a theory of evolution and a theory of communication. Both theories support appropriative thinking about suitable modes of communication as well as evolutionary processes. But before, it is of importance to state a fundamental property of the theory which shows the potential for future studies. Luhmanns system theory is in its nature an interdisciplinary approach. [15] It follows the holistic approach in a universal sense. This property makes the theory most valuable for futures research. Concerning the evolutionary and communicative dimensions it enables integration of what happening and why thing are a certain way.

The common denominator of Luhmans system theory and futures research is societal change. Evolution describes a change in the structure of systems through selection and variation. Luhmann argues that there is no external authority that can steer these processes. Systems are autopoietic and self-referential. An autopoetic system produces

circulations of components by itself in order produce system components that are needed to maintain the system in mutual action. Thereby, the key elements of society as an autopoietic system are communications or communicative events. These communications maintain and change the system. But there the question arises how the selections and variations of systems can be influenced? How can politicians, scientist and potential users shape mobility system in order to strengthen electric mobility? How can we motivate people in choosing an electric vehicle instead of cars with internal-combustion engines?

The question can be answered with the help of Luhmanns communication theory. Communication has two levels. On the content level the focus lies on what should be communicated, on the relationship level the concentration is on how something is communicated. But both levels are intervened. Communication always occurs on these two levels simultaneously. Luhmann enlarged that basic model of communication. He differentiates between the information, the message and the understanding of the message. Consequently, a successful communication depends on a range of preconditions. Three selections in terms of a range of several options from which one has to choose must succeed. Information is a selection from a number of possibilities. It is possible to communicate different information. Significant for the purpose of motivating people to get in touch with electric mobility is the selection of relevant information for the public. It will be not sufficient to communicate only information about technical details and how an electric vehicle works. Information by itself is only one part of communication. Several different possibilities to inform others exist. There are a lot of messages to convey same information. The question of the message is exactly the main challenge communicating knowledge as a result of future studies. This is the subject of the fifth part of this paper. The last selection is how massages are understood. One can understand massages in different ways. In case of the discourse of electric mobility it is plausible to interpret electric mobility as a mean of changing mobility or as a contribution to reduce traffic-based greenhouse gas emissions. Communications happen only on the basis of a synthesis of all three selections.

In respect to the evolution of systems, Luhmann sums up: "The process of communication has its effect in producing and reproducing choice situations." [16] These choice situations require decisions. However, the question is on which assumptions decisions considering future issues are made? Are there any tools for the simulations of future developments that support decision making in the present?

There is another methodological similarity besides the interdisciplinary and holistic understanding of system theory and futures research. It derives from the scenario technique or scenario planning, the most important methodological tool of futures research. Scenarios "are of a crucial practical importance for public policy, management and strategic thinking in general". [17] The peculiarity resides in the fact that scenario thinking is systemic thinking. Scenarios are systems and scenario processes are ways of systemic thinking.

In dealing with the inherent uncertainty of future developments, scenarios try to simulate futures. Thereby, scenarios are not predictions of the future. Scenarios are constructed future images or narratives. They increase the ability of organizations and institutions to deal with their environments. Beside the primary objective of content generation the scenario process is a communicative goal in itself. „The scenario method is designed to produce the kind of mutual understanding that allows people to act toward common ends." [18]

The scenario literature distinguishes at least three main functions of scenarios: explorative, communication and strategic function. All existing and possible data of an issue has to be organized within the scenario process. That clarifies the common understanding of present situations. It focuses on probable and possible developments and this describes the explorative function. The communication function is closely linked to this. The scenario process gives a structured platform for discussions over controversial views. The extension of mental maps of involved persons is an important side effect of a scenario process. Networking and integration of different perspectives characterizes this function. Motivation, emotion, experience and different perspectives of the actors allow a common learning. The strategic function supports decision making processes. Within this context "Scenarios

are descriptive narratives of plausible alternative projections of a specific part of the future." [19]

Scenarios help actors "see what possible futures might look like (end states); how these futures might come about (plots and stories); and why they might occur (logics)." [20] Scenario planning processes are characterized by dynamic and emergent relations with a broad perspective. The process systematically includes uncertainty. That makes it a creative and open proceeding. In this way scenarios are systems. Each element of the scenario has an effect on the scenario as a whole.

The aim of this section was to demonstrate the methodological. It was illustrated by

4 Electric mobility scenarios

After demonstrating the methodological symbiosis of system thinking and futures research this section will present the usability of scenarios in planning and strategy processes. Scenarios on mobility and traffic development are an increasingly used tool in traffic planning and management. Scenario processes create possible, probable and preferable visions of the future. They make it possible to visually imagine possible futures. But they also provide a foundation for strategic decision-making. Both functions are means of communication in order to initiate and facilitate scientific and public discourses. Unexpected and previously unconsidered aspects and connections become evident during the scenario process and in the concluding discussion of the scenarios. As a result scenarios reduce complexity on the content level and in communication processes.

The potential of the scenario method can be illustrated on the example of electric mobility. A scenario process has been implemented in context of the research project "User behaviour analysis and spatial planning of the regional infrastructure" by the Department of Integrated Transport Planning of the Technische Universität Berlin. Three alternative scenarios were identified. (For the following remarks see [21].)

IT-CAR-ELECTROMOBILITY: In this scenario individual motor car travel is still favoured. Electric mobility is something for technical pioneers and the eco in-crowds. Insofar electric mobility remains in its niche. It is limited to the premium segment. Characteristic electric vehicles are E-roadsters, E-ragtops und E-hardtops with range-extender, also small e-cars as second car. Government aid and regulation with regard to electric mobility has not augmented. CO2-free vehicles do not benefit from special privileges. Battery powered vehicles play a marginal role in the transport system of Berlin.

Figure 1: It-Car-Electromobility (Source: IVP, TUB)

E-MICROMOBILITY: This describes a scenario in which essential changes compared to today's mobility have been taken place. A distinct preference for inter- and multimodal mobility determine this scenario. The role of an individually owned car declined. Individual mobility is still highly valued – but is mostly performed as multi- und intermodal mobility. Small and very small electric cars play a prominent role.

Figure 2: E-Micromobility (Source: IVP, TUB)

COMMERCIAL TRANSPORT AS PROMOTER: in this third scenario electric mobility is established by commercial transportation. Rapid diffusion of the market with battery electric vehicles is the result of a well-directed governmental support for demand and supply. Urban development politics is marked by consistent repression of heavy goods vehicles from

the city centre. Commercial transport is also a stimulus to electric driven private individual motor car traffic.

Figure 3: Commercial Transport as promoter (Source: IVP, TUB)

These alternative and consistent future images of electric mobility and its development are the results of a systemic process of futures research. For the purposes of this paper we will focus on the second scenario E-Micromobility. The scenario is more than an electric mobility scenario. It is a scenario of new forms of mobility in general. Based on this scenario do's and don'ts for the implementation of new forms of mobility and electric mobility will be extrapolated in the field of policy formation, strategic planning and communication. The E-Micromobility scenario works as the basis for other research project. One we will introduce at the end of the article.

The preference for multimodal mobility is the key element of this scenario. The old model of individual car ownership is replaced by collaborative and other changed patterns of mobility. Car sharing and integrated mobility services facilitate a continuing process of changing mobility patterns. People use different means of transportation for their daily mobility needs. Multimodality is organized and coordinated by smartphones and integrated mobility provider. Mobility cards are taken for granted for various leasing and sharing services. 'Mobility on demand' left the scientific niche and has become a matter of fact.

Electric mobility is completely implemented into the new mobility system. On the one hand a verity of different vehicle concept is on the streets. Small electric vehicles of vastly differing designs characterize the urban image. Pedelecs and e-bikes, diverse electric scooters and Segway variants complement e-cars and small utility vehicles with electric drives. On the other hand electric mobility is integrated into systemic mobility services. What started in 2012 with a couple of cars is completely integrated now. The number of electric cars in car sharing and fleets has greatly increased.

Private car ownership has not vanished but decreased significantly. But a certain majority prefers their (electric) bicycles or small e-cars and uses them until the next public transport stop – usually a commuter station –, leaving their vehicle at the recharging station and transferring to public transport.

The results presented here are based on the findings by various experts and scientist from different fields and disciplines. They are consistent with a numerous mobility studies, transport forecasts and expert judgments. But the narrations of good future images are only a part of the story. Communicating the future images is the most important step in the scenario processes. Communication here does not mean presenting scenarios in front of an audience in order to think about futures in images and stories. The communication of futures includes more than representation. The main challenge lies in practical aspects: how can we reasonable work with the scenarios within planning and strategy processes? How can we translate the inspirations and challenging insights into action? How can we generate follow-up communications?

5 Communicating futures

Future studies are processes of structured communication [22]. Methods like delphi surveys or scenario techniques are communicative structured tools. They provide mechanisms to explore expectations about future topics in a systematic way. The methods are communicative within itself by coordinating and adjusting different perspectives on an issue. In addition to the results of future studies the enabling of follow-up communications is the central goal of futures research. Above internal methodological structure future studies should initiate discourses and action. Insofar future projects and the following transferring of the results are both communicative processes. These are modes of future communication.

There are several traditional forms of communicating futures. The following list is neither complete nor a coherent typology. It is meant to illustrate typical modes of communication in the present. The most common and dominating mode is the operative processing by trends, scenarios and project results. Professional futurists, consultants and members of industrial research make use of these modes. It is a pragmatic way to generate follow-up communications in forms of strategies, product ideas or political recommendations. But it follows a simplyfied communication model. Communication here is a process whereby information is imparted by a sender to a receiver via a medium. But this model doesn't work in complex societies. It is not only inappropriate, but in addition it is an exclusive model. In most of the cases the researcher or consultant is in a privileged position of having knowledge about possible futures. At least they persuade this position to its clientele. This kind of knowledge lacks fundamental criteria of scientific research. The intersubjective transparency distinguishes scientific knowledge from other kinds of knowledge produced in commercial consulting firms or by so called 'future gurus'.

On the intersection of this mode and a more scientific oriented approach lies the analysis of present structures, communications and relations. The specific German term is 'Zeitdiagnostik' which literally means time diagnostic. Present societies shall undergo a diagnosis along specific criteria which distinguishes the old from the new society. Books like "The risk society: towards a New Modernity" by Ulrich Beck or "The Corrosion of Character: The Personal Consequences of Work in the New Capitalism" by Richard Sennett are examples of this kind of future thinking. The prescription of the present as new and a crisis epoch is the claim of those diagnoses. Approaches of this manner lack social theory compatibility and are not really oriented towards a future. In most of these studies it is not clear whether we are already living in the 'new' society or we are on the way to it. This kind of forecasting describes structural changes in societies. But structural changes are not described in an evolutionary way. They came as an epochal watershed into the fore [23].

A third communication mode is the creative and collaborative development and communication of future concepts, strategies or visions. This is done by special workshop designs or in other deliberative forms. This is the so called participatory approach in futures research. Large Scale Interventions and conference methods like Open Space, Future Search and Real Time Strategic Change Management belong to the narrow field of shaping the future rather than talking about futures.

Last but not least is the scientific informed communication with political intensions. Those are scientific conferences, public speeches or informal events.

All modes of future communication work fine in different contexts. But no mode guarantees actions to implement future studies results. From an evaluation perspective there are no criteria for judging the appropriateness of chosen communication measures. New forms and modes of communication are needed in order to facilitate diffusion of electric mobility. Issues with such a social, economic and ecological impact need innovative and direct ways of experiences. People should have the possibilities to interact with the different elements of electric mobility. They must test car concepts and new mobility solutions and also services. Only in this way they are able to evaluate the advantages and disadvantages of the new technology. In addition, new project designs in research and development are necessary. Especially when electric mobility is claimed as an important policy goal, inclusive and participatory measures are needed.

In the context of Luhmanns communication model the project design has to synthesize information, message and understanding of electric mobility in the appropriate way. Given the goal electric mobility as an integral part of mobility, it is necessary to communicate in a sustainable way. There is need for new modes of communication and communication channels in order to stabilize positive expectations concerning electric mobility. What kind of new designs could be used to reach that goal? What are new formats communicating sustainable expectations on electric mobility?

These questions are part of a future agenda. In the field of electric mobility the goal must be generating visibility and individual experiences. Beyond the technical, financial und infrastructural challenges it is impeccable to consider communicative aspects. For that reasons a project was developed that is pursuing a clear vision on

the basis of the results of this scenario process. The anchoring of electric mobility in the minds of the people is one of the main objectives for the implementation of electric mobility strategy of the German government. Electric mobility should be experienced, seen and felt. The involvement of driving schools is one option for positioning electric mobility as an integral element of multimodal mobility system. On the basis of the "E-Micromobility – Scenario" the Department of Integrated Transport Planning is developing a training module that focuses on the integration of electric vehicles into the training program of driving schools. A so called 'mobility school' is the vision behind the project. The current curriculum of driving schools is exclusively designed for driving a car after completing training. Other means of transport are not part of the training. Achievements of sustainable mobility and elements of new mobility services like car sharing are lacking. The project aims to develop additional modules in order to integrate multimodality and electric mobility into the curriculum. The perspective of the vision is to transform driving school training and the driving licence into a mobility training program. It could be possible und should be preferable that the future driving licence is called "mobility licence".

The project is based on the assumption that people are more open and adaptive for different mobility patterns at the beginning of their car socialisation. The early contact and experience with electric mobility may have a positive influence on their mobility preferences.

Within the training it is possible to specifically inform people about multimodality and electric mobility as means of sustainable mobility. They can learn to drive an electric car and can experience the broader idea of electric mobility as part of an integrated mobility system. This is the setting to convey the right information, a clear message and good understanding for the message of multimodality and electric mobility.

6 Conclusion and prospect

The paper has discussed the connections between system thinking and futures research. It highlighted the scenario method as an appropriate tool reducing complexity and uncertainty. Further it has been shown that analysing and thinking about possible futures is a necessary but not sufficient condition of future thinking. Futures research will rely on distinct modes of communication.

The research project is at first a practically attempt of an action based approach. Generally and in a theoretical perspective is more research on communicative theory in futures research needed. The question how can futures be communicated has not yet been answered conclusively. In addition to the existing modes of future communications we need more pragmatic and practical communication tools. That is an ambitious goal concerning the conditions of society at the beginning of the new century. The project 'mobility school' is the first step into a new project future.

Societies in the 21th century are polycentric societies. Polycentric societies have many centres and contexts and a lot of blind spots. Either different centres or contexts embed all others from the point of view of all others. There is no mean or authority that integrates the different points of views. The different systems are working independently. But the implementations of political or economic goals affect more than one system. The communicative challenge is exacerbated by the growing number of communication channels in modern societies.

In addition to the communicative grounding of future studies a systemic reformulation of futures research is necessary in order to connect it with social theory. Systemic and evolutionary futures research has the potential of analysing and understanding changes in an abstract but sufficient manner as showed in this paper. Such a theory allows seeing and explaining mutual dependencies within social systems.

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