



# **Systemic structural constellations in academia facilitating transformation processes towards sustainability**

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## **Abstract**

Although efforts are being driven forward to foster sustainable development in academic systems, its implementation is still hesitantly. In order to generate holistic sustainability in organisations, institutions and companies, new approaches are becoming more and more relevant. Against the background of multifaceted and complex interrelationships in institutions, organisations and companies, systemic structural constellations represent a novel approach for resolving problems since they can reveal underlying dynamics and implicit knowledge patterns. Systemic structural constellations are accompanied by an innovative way of structuring and uncovering unconscious information, hidden patterns and phenomenology or inner realities. The main question is how systemic structural constellations can foster changes towards sustainability within academia based on the whole institution approach? Using exploratory case study design in multi academic settings, like research, consulting and transfer, and teaching and administration, the potentials were figured out. Main results are: the method offer a wide range of didactic applications for problem solving in the fields of learning, specific sustainability requirements and enables the adoption of holistic, transformative and interdisciplinary perspectives. However, sound education for practicing systemic structural constellations as a moderator or constellator as well as clear human ethics and an open mind are precondition for practicing in a positive manner. An integrated reflexion process is mandatory.

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**Key phrases**

*Education for sustainable development; exploratory case study design; systemic principles; systemic structural constellation; unconscious knowledge and whole-institution approach*

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## 1. INTRODUCTION

After the United Nations' Decade of Education for Sustainable Development several goals have still to be reached, e.g. a comprehensive and holistic concept serving for all universities (Grindsted & Holm 2012; Scott, Tilbury, Sharp & Deane 2012). The changing or transforming of academic systems is always assigned to a whole-institution approach and oriented on participation. However, a whole-institution approach for "transforming the curricula, pedagogy, research and operations at the core of higher education and engaging all stakeholders - governing bodies, students, faculty and community" (UNESCO 2014:126) is rarely recognisable, but highly appreciated. This is in line with understanding of Schneidewind, Singer-Brodowski, Augenstien and Stelzer (2016) highlighting the innovative concept of transformative science that goes beyond the current main understanding and role of science and academia. They argue for an active role of science for initiating and facilitating change processes. Yet, clear comprehensive strategies and a wide implementation within academia is very rare, but ideas for implementing a whole-institution approach are necessary (UNESCO 2014). In addition, as there is still a huge gap between knowledge, strategy, behaviour and action concerning sustainability in academia, pedagogical innovations, interactive learner-driven methods as well as new tools for fostering sustainability in whole-institution approaches are necessary. Current research focusses on sustainability learning (Figuerò & Raufflet 2015), but neglects various knowledge-action gaps.

The new method **systemic structural constellation** is interactive-based and participatory-oriented as well as enables the integration of unconscious and hidden knowledge in decision-making processes (Arnold 2017). As human decision-making is only based on conscious thinking by 2 percent (Wehling 2016), the method might mitigate the gap between the mass of information and knowledge concerning sustainability and the lack of action in light of sustainability by appearing and integrating unconscious knowledge. It further

supports effectuation work theoretically and practically and widens decision theory in the case of unpredictability or perfect uncertainty (Ortega, Teresa García & Valle Santos 2017; Sarasvathy 2008). Systemic structural constellations are able to represent and picture spatially patterns, relations, structures and relationships within a system with the help of representative perception, and thus, they can be used for manifold issues (Kopp 2013). Representative perception occurs by the persons placed in a constellation and is a kind of body symptoms or feelings expressed by the persons in the constellation that do not represent themselves, but who are very consistent with the feelings of a person of whom they are representative in the system (Arnold 2017). Systemic structural constellations permit both, a deep look into the informal structures and relationships of institutions and social structures as well as the testing of interventions or different solution options with regard to their effects (Sparrer & Varga Von Kibéd 2001). How can systemic structural constellations foster changes towards sustainability within academia based on the whole institution approach?

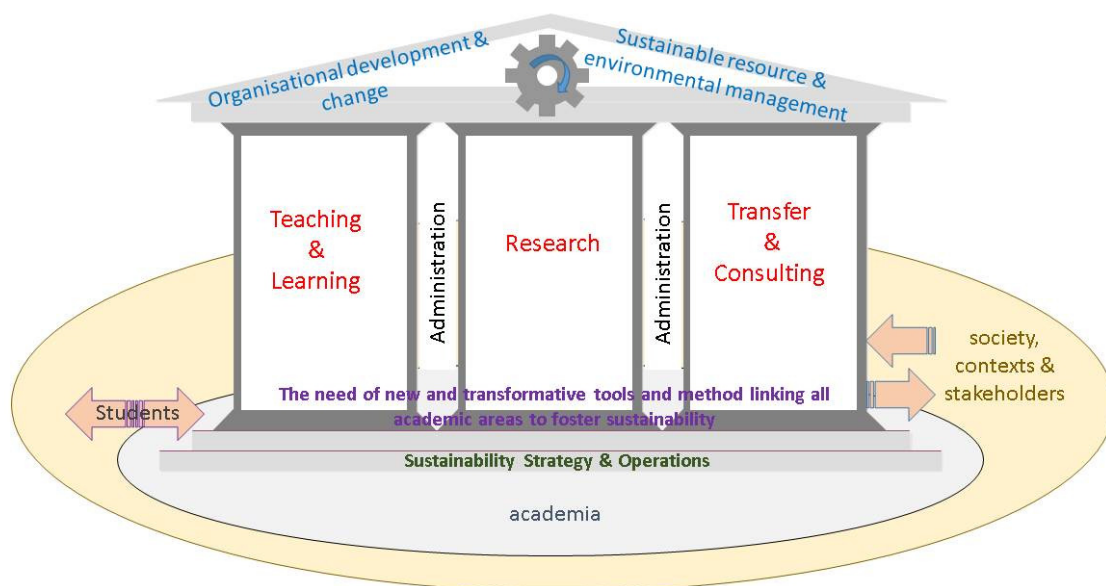
Following an explanatory design, the article discusses potentials of systemic structural constellations as a new method in light of the whole-institution approach and its ability to foster sustainability within academia. It provides an insight into the possibilities and limits of the method and identifies key configuration options for the application in teaching, research and administration.

## **2. THE NEED FOR A WHOLE-INSTITUTION APPROACH TO FOSTER SUSTAINABILITY IN ACADEMIA**

Sterling, Warwick and Wyness 2016 differentiate four broad categorisations of education for sustainable development based on research interests: (A) Curriculum change and learning processes, (B) systemic change and institutional learning, (C) sustainability competence, action and engagement, and (D) institutional impact on the community and effecting change towards sustainability (Arnold 2017). In the focus are designed processes and institutional change processes being more complex and emergent. According to Barth (2015:46) three different levels are important for establishing sustainability in higher education institutions: (1) research on sustainability, (2) teaching and learning on sustainability topics, and (3) institutional or organisational change processes “as self-reflective praxis, embracing management processes and operational parameters” of higher education institutions

themselves as well as part of a stakeholder in a sustainable society (Arnold 2017). Müller-Christ (2014) aggregates these aspects and argues for two management approaches that can support the implementation of sustainability more deeply within academia (Arnold 2017): (1) diverse contributions to a sustainable development (science, education and higher education, transfer and consulting), and (2) sustainability of the academic institution and system itself (social, environmental and economic impact, organisational change and monitoring). Stoltenberg and Burandt (2014) emphasise education for sustainable development is a deep change of perspectives stressing new thematic priorities or foci and methods or methodologies rather than an additional nor a new task for educational institutions. All in all, new methods and tools are necessary to address all these different issues and foster sustainability in academia (see Figure 1).

**Figure 1: Sustainability in academia in light of a whole-institution approach**



Source: Own compilation

Fostering sustainable understanding, pedagogical innovations and implementing sustainability issues into learning and education were the main aims during the United Nation Decade of Education for Sustainable Development, 2005 until 2014. One of several goals in the United Nation Decade was to anchor interdisciplinary and innovative

development processes at academia (UNESCO 2005). Barth (2015:19) highlights higher education in the context of education for sustainable development “since universities not only generate and transfer relevant knowledge, but in addition educate future decision makers to enable them to contribute to a (more) sustainable future”. In this context, the raising internationalisation, and global knowledge transfer and exchange have also to be stressed (Arnold 2017). There is a huge variety depending on the countries (UNESCO 2013, 2014) although diverse activities, like networking, teaching, science-based or project-based activities and planning or strategic approaches for implementing sustainability within higher education institutions were established during the decade. Mainly, the universities reacted with innovative actions in teaching, such as project seminars, courses, ring courses or the use of new methods or working groups compiling sustainability concepts or sustainability reporting (Cortese 2003; Ramos, Caeiro, Van Hoof, Lozano, Huisigh & Ceulemans 2015; Rowe & Hiser 2016; UNESCO 2014, 2013). This diversity reveals the lack of coherent standards, indicators and strategies for education for sustainable development within academia (Arnold 2017). As education for sustainable development neither found its way coherently nor holistically in higher education landscape so far, Müller-Christ 2013 stated academia seems to have a formulated willingness to integrate sustainability but this is clearly higher than the ability to act.

In particular, UNESCO (2014) emphasised a sustainable development and education for all are predicated on a special educational quality highlighting and communicating both knowledge and fundamental perspectives as well as attitudes for a sustainably behaviour in all contexts (Mochizuki & Yarime 2016; Ramos *et al.* 2015). Wals (2010) and Avelino (2011) perceive it as a new understanding of education giving room for discourse, debate and reflection. Since the understanding of education depends on different views, ideas of man or humanity as well as values, Stoltenberg and Burandt (2014) stress the Western understanding to deal with these topics in a self-determined way. Barth (2015) argued sustainability is always aligned with (1) complex and systemic problems, (2) interdisciplinary, (3) self-directed and lifelong learning, and (4) competence development. Sustainability challenges cannot be handled by monocausal thinking but by stressing uncertainty, unforeseen dynamics as well as multi-level effects (Arnold 2017). People should be trained in recognising, understanding as well as dealing with these complex and systemic problems and possible solutions (Arnold 2018). Interdisciplinary knowledge and negotiations are

needed (Jones, Selby & Sterling 2010). Education for sustainable development has to foster knowledge acquisition, lifelong learning, inter disciplinary, multidisciplinary and multi-stakeholder collaborations. It also takes different cultures and mind-sets into consideration (Arnold 2017). Self-directed learning strategies as well as strategies how to learn to learn are vital (STRAKA 2000). That is why academia has such a pivotal importance in the context of a sustainable development.

Changing academic systems is assigned to a whole-institution approach and oriented on participation (D'Andrea & Gosling 2005; MC Millin & Dyball 2009). A whole-institution approach addresses "transforming the curricula, pedagogy, research and operations at the core of higher education and engaging all stakeholders - governing bodies, students, faculty and community" (UNESCO 2014:126; see Figure 1). Providing active participation and involvement as well as creating opportunities for debating and discussing issues and recognising, reflecting and resolving concerns are some critical success factors for curriculum transformation (de la Harpe & Radloff 2003; de la Harpe & Thomas 2009). D'Andrea & Gosling (2005:6) stresses a whole institution approach "allows for different types and levels of devolution" and is not a one-size-fits-all model of changing academia, but bases on interconnectedness and strategies for creating learning institutions. Different stakeholder groups are involved, e.g. as chairmen, sustainability coordinators or sustainability change agents, student groups, researchers or administrative departments (Arnold 2017; Stables & Scott 2002) for incorporating sustainability into a wide learning environment.

The realisation of a whole-institution approach "will require deeper innovation in leadership and staff development" (UNESCO 2014:126) in academia and peer learning across institutions. Progress "can best be achieved when multiple actors engage in a whole-system redesign" (UNESCO 2014:171). UNESCO addresses the need for visions and leadership, networking, new methods and forms of research enabling high levels of participation as well as introducing and supporting interactive, integrative and reflecting forms of learning - including multi-stakeholder learning settings. As there is a need for a multi-stakeholder orientation as well as a holistic academia-wide strategy integrating the institutional sphere (management, change and administration) with the duties and responsibilities of academia involving main stakeholders by sustainable strategies and operations, there are several

concepts for analysing education for sustainable development. Mochizuki and Yarime (2016) underline the science-policy gap and the need for transforming global governance in light of sustainability. “The aim of transformative science is to achieve a deeper understanding of ongoing transformations and increased societal capacity for reflexivity with regard to these fundamental change processes. The concept of transformative science is grounded in an experimental paradigm, which has implications for (1) research, (2) education and learning, and (3) institutional structures and change in the science system” (Schneidewind *et al.* 2016:2). Transformative science is more than observation and analysis of societal transformations. The authors base their arguments on the diverse functions of a science system (Popa, Guillermin & Dedeurwaerdere 2015; Schneidewind & Singer-Brodowski 2014): increase of reflexivity, open up solutions and opportunities concerning innovations, support of participation and self-organization, and balance societal power structures. The authors also stress integrative perspectives and highlight the recognition of knowledge gaps, uncertainties and risks. As there are innovative methods missing integrating all these criteria, the potentials of systemic structural constellations how to cope with them will be discussed.

## 2.1 Systemic structural constellations

Systemic structural constellations are able to represent and picture spatially patterns, relations, structures and relationships within a system and, thus, they can be used for manifold issues (Arnold 2017; Kopp 2013). Specific foci of a system can be represented and simulated through spatial arrangements or physical layout of persons or symbols (Arnold 2017; Sparrer & Varga Von Kibéd 2014). According to Wade (2004:194) systemic structural constellations “provide powerful and creative ways to clarifying and resolving complex, possibly intractable issues associated with organisations”, systems or social actors. Using systemic structural constellation the pattern of relationships, structures, interaction, implicit knowledge and hidden or underlying dynamics and influences within a system can be made obviously by a way of representing (Arnold 2017). The mass of information and data, details and opinions or aspects can be focussed and pointed within a new dimension. Wade (2004:194) also highlighted “apart from bringing clarity, constellations give opportunities to experiment with possible options in a safe environment to aid decision-making”. Systemic structural constellations allow both a deep look into the informal structures and relationships of institutions or social structures and the testing of interventions or various solutions with

regard to their effects. Constellations can be used for revealing new perspectives on all issues addressed as business, politics, religion, cultures, war and crimes, philosophy. (Arnold 2017).

Constellation work has mixed roots (Daimler 2014): in family systems therapy, e.g. psychodrama and group interaction (Boszormenyi-Nagy & Spark 1973; Moreno 1993; Satir 1988), solution focused concepts (Berg 1994; De Shazer 1994), existential-phenomenology approaches (Brentano 1967; Husserl 2003), see Figure 2. Nowadays, structural constellations are widely applied in different contexts like psychology, medicine, pedagogy, business management; and its performance was proofed in clinical studies (Weinhold, Bornhäuser, Hunger & Schweitzer 2014). There is a wide variety of structural constellations in practice or manifold forms (Daimler 2014; Lier & Lier 2015; Sparrer & Varga Von Kibéd 2014). Yet, but the method is not arbitrary and has a certain frame (Arnold 2017), see Figure 2. The choice of form(s) strongly depends on the concern and the particular interest of the issue-holder as well as the constellators' familiarity with the format (Arnold 2017). There are personal, organisational levels and the more complex system ones that constellators should always have in mind. Moreover, some grammar, structure, order, arrangements and principles of interaction have to be considered (Arnold 2018), see Figure 2. There are general systems orientations: (1) securing existence, (2) growth and reproduction, (3) boosting immune system, and (4) individuation (Daimler 2014). König (2007) stresses the different underlying dynamics as well as mediating or moderating elements depending on the formats.

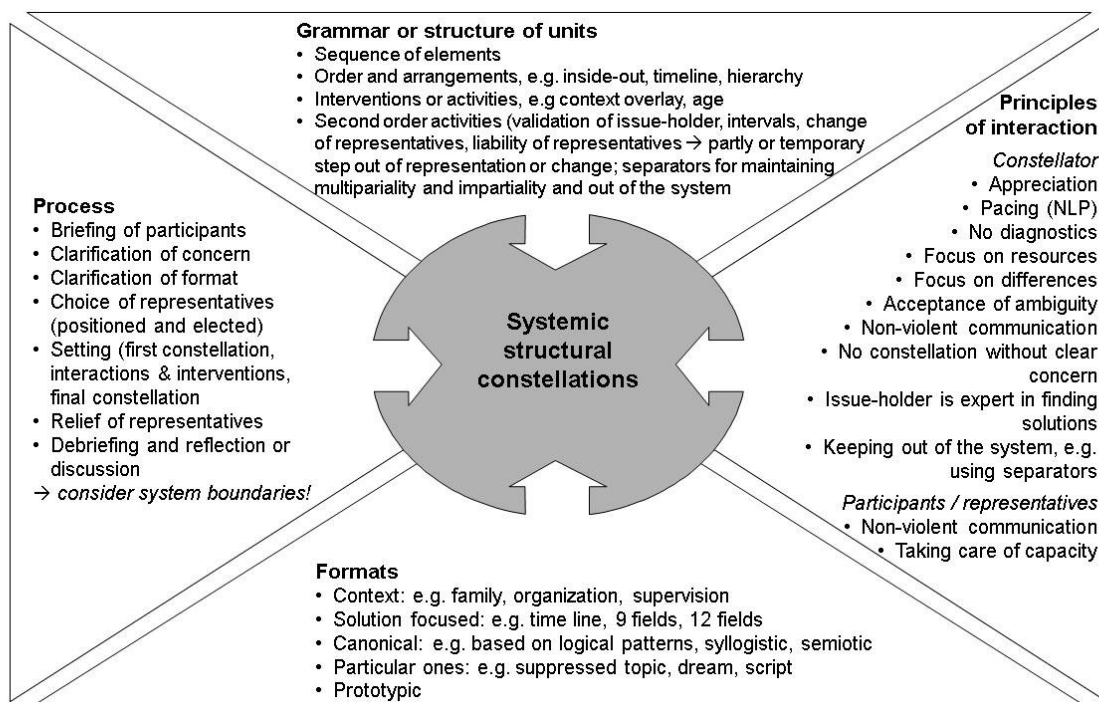
A basic assumption of the constellation work is based on representative perception not being random or arbitrary or even scripted, but determined by the position and the relations in the system itself (Arnold 2017). This fact was proofed by Schlötter (2005) in an empirical test design meeting the current scientific quality criteria. According to him the perception of the position in a room is a kind of non-verbal language of the position of people in the room to each other or a kind of sign language or sign system, comparable to a language that follows a generally understandable semantics. He stated the representative perception performs unfettered by language and culture. In his research project with 250 volunteers and more than 4000 individual tests, Schlötter (2005) demonstrated that systemic structural constellations provide information not being dependent on individual persons, but mainly



objective (Arnold 2018). The represented information is thus, rather independent from individual characteristics and more based on phenomenology or representable patterns.

Conducting structural constellations three main different groups take part in general: a facilitator or process manager or constellator, an issue-holder and a group of people willing to participate as representatives in a constellation (Arnold 2017). There are some steps in the whole work (Arnold 2017): First, the constellator and the issue-holder clarify the issue. This includes the aimed goal and key elements involved in the constellation process. Second, selecting the representatives and who is representing which core element of the specific system. All persons are able to reject, so that the issue-holder continues to ask other persons out of the group. Every person can leave the constellation and be replaced by another person. Third, the issue-holder places all representatives in the room (Arnold 2017). This spatially grouping is called structural constellation justified by the fact a spatial pattern is mapped showing arrangements, distances, and directions as well as underlying dynamics of the situation are more visible.

**Figure 2: Guiding characteristics of systemic structural constellations**



Source: Based on Daimler 2014; Sparrer & Varga Von Kibéd (2010, 2001); Sparrer & Varga Von Kibéd 2014

Representative perception is the key in constellation work. The placed representatives operate as resonators of implicit and hidden knowledge (Rosselet 2013) providing essential data on the system (Franke 2003). During the process, the constellator asks the representatives to express their feelings and impressions as well as to follow their moving impulses. Describing the body perception, emotions or emerging images, sayings or sentences without any interpretation and evaluation are essential for the process (Arnold 2017). Expressing what makes a difference on the places - even if it does not make sense to them - is pivotal for constellation work. Body signals should be recognised attentively by the constellator (e.g. looking down at the ground, in the air) as they might have potential information for the ongoing process (Arnold 2017). Practicing nonviolent communication is a must (Rickinson & Reid 2016; Rosenberg 2015). After having an initial constellation of the system, the ongoing processes and intervention differ from school to school and constellator to constellator (Arnold 2017). The representatives can move according to their own impulses, they can talk with each other during this search process, the constellator can guide the process by suggesting changes in position or recommending to say particular words and sentences. The constellation process is typically finished when a satisfying solution or final constellation is found or the process runs out. 20 minutes to 2 hours is an average timeframe for systemic structural constellation work. The representatives are released from their work and obtain thanks by the issue-holder or client. Final, there is a debriefing between client and constellator, and a joint reflexion with researchers and participating persons.

## 2.2 The potential of systemic structural constellations in academia

In general, it is crucial to distinguish different levels in institutional contexts having an influence on sustainability challenges in academia. As in academic contexts people are part of the main transaction and exchange processes, there is always a personal level. This level has to be focused in case the general systems orientations (Daimler 2014) *individuation* becomes crucial. The authors stress that the appreciation and facilitation of individual capabilities become essential in case a system wants to develop, learn and change. Creative processes should be enabled. Systems, which are not able to change and develop further, are often limited due to individual capabilities. In academia, there are different

individual capabilities of members in academia and thus, organisational capability to facilitate sustainable development and change (Arnold 2017). Due to additional restricting factors, e.g. limited or fixed-term contracts of scientific members limited personal training and maintain of human resources and knowledge, a whole-institution or transformative science approach is necessary to foster sustainability in academia. Participatory methods become necessary to counterbalance personal or organisational constraints of academia. A conceptual framework for academic sustainability or sustainable academia should always provide several degrees of freedom for individuation and should focus on different ways of facilitating sustainability in or by academia.

The *boosting immune system* is the other general system orientation (Daimler 2014) that is crucial for academia. Long-term oriented systems, as academia is, develop functions and patterns compared to a human immune system. Sparrer (2016) highlights the ability to communicate, bearing responsibility and commitment as key elements in social systems. Having a central role in society, as stated in the whole-institution and transformative science approach, academia has to reflect and develop the own communication ability of academic outcome and real transformation. Fostering sustainability and establishing its transitory role in society, academia needs new ways and forms of communication and dissemination of new knowledge to serve other systems and boost the whole societal immunity (Arnold 2017).

In transformative science evidence-based arguments, creative laboratories and scope for experiments play a crucial role. In this sense, transformative science fosters active dialogues “with societal stakeholders and accepts the challenge that comes with this by explicitly questioning and reflecting its own implicit assumptions” (Schneidewind *et al.* 2016:2). Therefore, the authors provide a comprehensive overview on different transdisciplinary approaches, transdisciplinary research methods, action research, intervention research or transition research. All conceptualisations have the following issues in common: “they recognize and integrate various types of knowledge, they take a critical stance towards conventional research paradigms and they strive for a new contract between science and society” (Schneidewind *et al.* 2016:10). According to Schneidewind, Augenstein, Stelzer & Wanner (2018) real-world labs are appropriate tools to meet current real-world challenges in complex environments. “In short, they can be described as places of learning, which can have various types of impact: they create socially robust and socially acceptable solutions

for actual problems, they serve as testing ground for new knowledge and solutions, and they can facilitate transferability of solutions to other contexts. The basic assumption is that experimenting and learning-by-doing is important not only to initiate change, but also to arrive at a better understanding of transformation processes per se” (Schneidewind *et al.* 2016:10). This description is linkable to the capability of systemic structural constellations for unconscious knowledge. Furthermore, the authors emphasise that mutual learning will only happen in case of a high degree of reflexivity and transparency within participatory processes. The subsequent reflexion process in constellation work is also of pivotal importance. Consequently, we apply structural constellations as an additional method for and in transformative science.

Systemic structural constellations serve as a new approach for integrating reflexive and systemic elements as well as actively shaping transformation processes so that education for sustainable development can be seen and experienced (Arnold 2017). The method is capable of working on and reflecting systemic relations emerged by explicit questions (Sparrer & Varga Von Kibéd 2001) in transdisciplinary and/or participatory settings. Systemic structural constellations can be utilized specifically in the context of education for sustainable development demonstrating effective approaches for overcoming resistance and addressing specific educational contents interdisciplinary, reflexively and experientially (Arnold 2017). The success of the method is assigned to action research (Schlötter 2005) and can be described by the systematic spatial locations and perception of decision-makers (Sparrer & Varga Von Kibéd 2014). Initiating change processes, the integration of systemic structural constellations in academia, in particular in research, teaching and administration, enforces a new understanding of systemic properties and relations. The capability of the method to simulate effective interventions and governance increase the possibility of the emergence of new hypotheses foster sustainability in and for academia.

### **3. RESEARCH DESIGN**

In this research, systemic structural constellations are explored as a method to foster whole-institution approaches and science transition. The potential of the method concerning the above described criteria is discussed: active participation and involvement; creating opportunities for debate and discussion; recognising, reflecting and resolving concerns; reflexivity; solutions and opportunities; recognition of knowledge gaps, uncertainties and

risks (de la Harpe & Radloff 2003; de la Harpe & Thomas 2009; Popa *et al.* 2015; Schneidewind & Singer-Brodowski 2014, 2015). New hypotheses for fostering sustainability within academia are developed. The study comprises a method-based and a content-based part. An exploratory case study design (Bryman 2015) was used. It is most appropriate when rather unknown circumstances, conditions or patterns are given and only limited or no research concerning the specific topic is given (Bryman 2015). In general, the setting of systemic structural constellation relates more to correlative studies than experiments, because there are no comparison groups and the focus is set on circular relations and changes (Bryman 2015). Data collection was based on observation; interviewing; testing as well as heuristics (see Table 1).

**Table 1: Research design of examples**

Academic area	Research & Consulting/ Transfer	Teaching	Institution – administration
Topic	Automotive & logistics	Digitisation	Sustainability
Goal	Harmonising digitised and complex production	Advantages and disadvantages in light of sustainability	Initiating and implementing more sustainability in academia
Participants	Managers of a German automotive, logistic and supply companies, researchers from JUB	Students and researchers from TUC	Students and persons from the mid-level academic position in a knowledge hub
Place, setting	Jacobs University, workshop	TU Chemnitz, seminar	University of Oldenburg, workshop
Year	Autumn 2016	Autumn 2017	Autumn 2015
Duration	Approx. three hours including reflexion	Approx. one hour including reflexion	Approx. two hours including reflexion
Research design	based on exploratory case studies in multi academic settings		
Data collection	Literature review; observation, interviewing, testing as well as heuristics during constellation process		

<b>Preparation</b>	Video, protocol, joint reflexion	protocol, joint reflexion	protocol, joint reflexion
<b>Data interpretation</b>	Interpretative-hermeneutic methods, reference analysis		

Source: Own compilation

Systemic structural constellations can be classified to qualitative research, e.g. in exploratory and hypothesis generating settings. They are part of field and action research (Bryman 2015). To date, in socio-science and economics qualitative research is mainly concentrated on conscious data (Christie & Miller 2016; Kyburz-Graber 2016). Yet, only two percent of human thinking is conscious thinking and expression (Wehling 2016). In contrast to conventional qualitative and other participatory research methods, systemic structural constellations primarily focus on unconscious knowledge and the visualisation of hidden information spatially represented. This is an absolutely new quality of knowledge that neither can be fully described by given tools nor fully clustered in given research designs. Representative perception is unique and a capability itself (Schlötter 2005). Although systemic structural constellations are assigned to qualitative methods, given methodological designs and tools are not sufficient for comprehensive research design. Further or new designs need to be developed in order to assign settings of systemic structural constellations in economics and the occurrence of unconscious or intuitive knowledge more precisely (Arnold 2018). Like case studies systemic structural constellations start with a specific research question or goal and focus on a concept or specific topic.

There is still the difficulty of double hermeneutics (Giddens 1984; Ginev 2007) as researchers interpret either interpretations or socially adapted evaluations of interviewees or involved persons in research settings (Arnold 2017). According to neuroscience our decisions are prepared by our unconsciousness (Soon, Brass, Heinze & Haynes 2008). Reducing one level of hermeneutics and finding stable or sustainable solutions, the unconsciousness should be taken more into account in research settings (Arnold 2017). Integrating unconscious knowledge and phenomenological patterns in scientific research generates more holistic knowledge and can support efficient and effective transformation processes towards more sustainability. The strong focus on conscious knowledge, behaviour and decision-making might be causing all the problems in implementing sustainability issues within a broad scope of action. It can also be one reason for the remaining gap between

existing explicit knowledge and actual behaviour. A stronger emphasis and embedment of unconscious knowledge and decision-taking in research designs will be necessary (Arnold 2017).

Constellation work is also closely connected with abduction and intuition. Sahm and von Weizsäcker (2016) stressed the important role of intuition in early and late stages of learning processes and its crucial impact on decision-making. Reichertz (1999) argued that abduction is a mental process, a spiritual act; a mental leap bringing together you never thought that it belongs together. He was contrary to the alleged understanding abduction produces new knowledge by logical deduction. According to Reichertz (1999) a linguistic hypothesis is only the result of an abduction and results from processes that are neither rational justifiable nor criticisable. In structural constellations abduction can also take place, so often new relations, combinations and perspectives become visible and turn out. Additionally, systemic structural constellations follow current quality criteria enabling knowledge integration and development (Arnold 2017).

- Objectivity: Schlötter (2005) argued for a high objectivity based on his results. Objectivity is also based on rules and detailed formats when practicing constellations (Sparrer & Varga Von Kibéd 2014).
- Reliability is very sophisticated and complex in the context of constellations according to Schlötter (2005). Social contexts often show a higher variance - constellations can be repeated with the same people, but at the same time there are also learning and cognitive processes, so the initial situation can never be reconstituted again. Schlötter (2005) used parallel tests and different test persons and was able to generate high reliability. In reliable settings systemic structural constellations generate authentic information on implicit or unconscious knowledge transforming it into explicit knowledge (Arnold 2017).
- Validity: Internal validity and reliability are closely connected (Lamnek 1988). In high complex situations, as constituting in constellations, the reliability-validity dilemma occurs and has to be tolerated. External validity is strongly linked to assessment of the issue-holder(s) concerning the efficacy in and of the systemic structural constellation: 'Were the statements and the solution(s) helpful to make socio-economic processes more resilient, sustainable and more effective?' (Arnold 2017).

Balancing all quality criteria is central. A high validity has always to be secured by the issue-holder confirming the representation of the system. Having no external issue-holder or working with prototypic constellations, there should be a mindfulness of interpretation, since it is unclear what is represented (Arnold 2017). In addition, Popper (2002) should always be kept in mind stressing scientist cannot encompass an objective, absolutely valid truth. Yet, in line with the arguments above this method needs new and other quality criteria in order to justify the new form of knowledge. Adapting criteria used in and for labs could be a solution for progressing new quality criteria as in labs an “additional and decisive factor is a high degree of reflexivity and transparency” (Schneidewind *et al.* 2016:10). Otherwise mutual learning will not happen and the variety of interpretation and constructive perspectives will lie idle instead of engaging new concepts and real transformation processes. There are also changing roles. Scientists become part of the process either serving as constellator or representative. Experiencing representative perception can change own worldviews and assumptions and enable new understanding or perspectives and finally result in “reflexive knowledge production that can initiate change in society” (Schneidewind *et al.* 2016:11). Usefulness (for stakeholders or society) could be an additional criterion - describing the meaningfulness, the helpfulness or value for providing further or new understanding, insights or solutions.

#### **4. ILLUSTRATING THE VIRTUE OF SYSTEMIC STRUCTURAL CONSTELLATIONS IN LIGHT OF WHOLE-INSTITUTION APPROACH**

In the following section, three different constellations in the context of academia are shown to analyse the potentials of the method to foster a whole-institution approach and sustainability within academia.

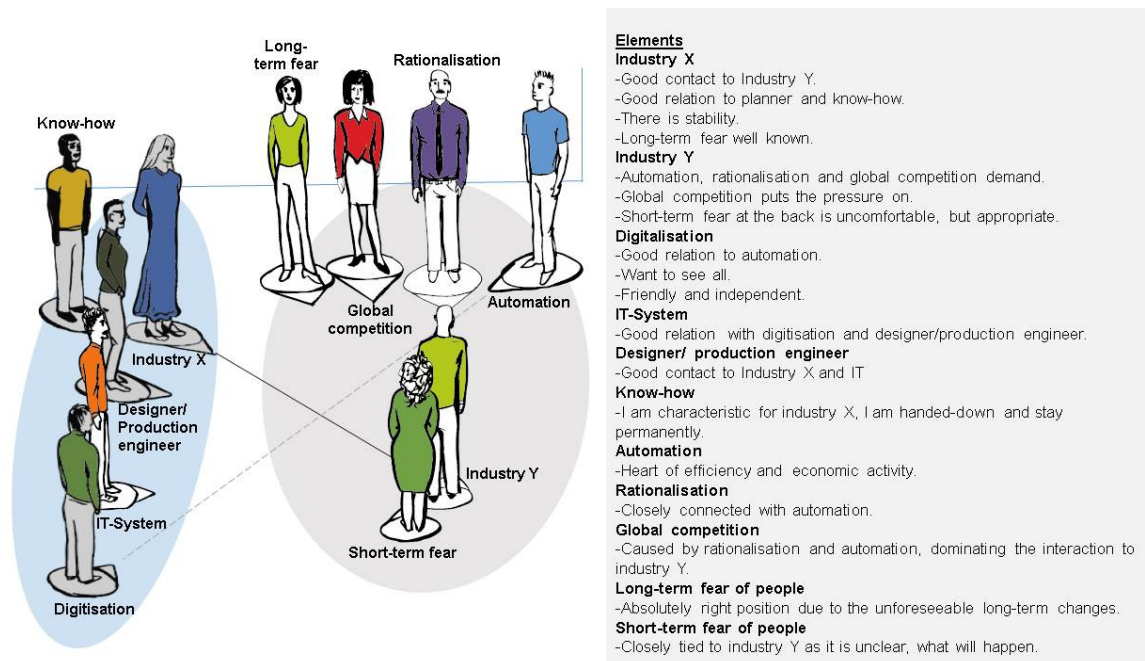
##### **4.1 Research & Consulting/ Transfer**

The selection of the participating persons based on the transdisciplinary research question; the practitioners wanted to find answers in light of human-machine interfaces and human



cognitive biases as they are often confronted with in their daily work. All persons were asked if they were willing to take part. The main goal was to find out relations between the industry 4.0 and several elements (Arnold 2018). The following elements are part of the systemic structural constellation: industry 4.0, industries X and Y, digitisation, automation, rationalisation, IT-system, designer, and globalisation, factor X, short-term and long-term fear. The inclusion of both types of fear was initiated by the practitioners and scientists as changes are often accompanied by fear. All elements were positioned by a practitioner. The process work is based on differences; the representatives articulate given differences on their positions. Starting with industry 4.0, the elements started talking with each other. It becomes obvious industry 4.0 is not part of the systems as it is a dummy construction. There was no relation between the elements and industry 4.0. All representatives, including the one of industry 4.0, decided to take the element out. Of crucial interest is the emerged cluster of two different industries within the process work (Arnold 2018). Although not defined in the beginning of the constellation process (only industry X and industry Y) two different types of industries that evolved. Industry Y is more determined by global competition and strongly dependent on automation processes and rationalisation efforts. Big automotive companies belong to this cluster as well as local logistics and manufacturing companies or local stores implementing new digitised features or tools. Industry X is more characterised by well-established small-and medium-sized companies operating in knowledge-intense and manual production supported by IT-based applications. It becomes obvious that IT-Systems and digitisation can have two-sided effects: support and increase of productivity as well as success and increase of automation and rationalisation that addresses the competitive challenge and subsistence changes of manpower and jobs. Figure 3 shows the result of emphasising essential elements in a competitive digitised world.

Figure 3: Example I of constellation in research and transfer



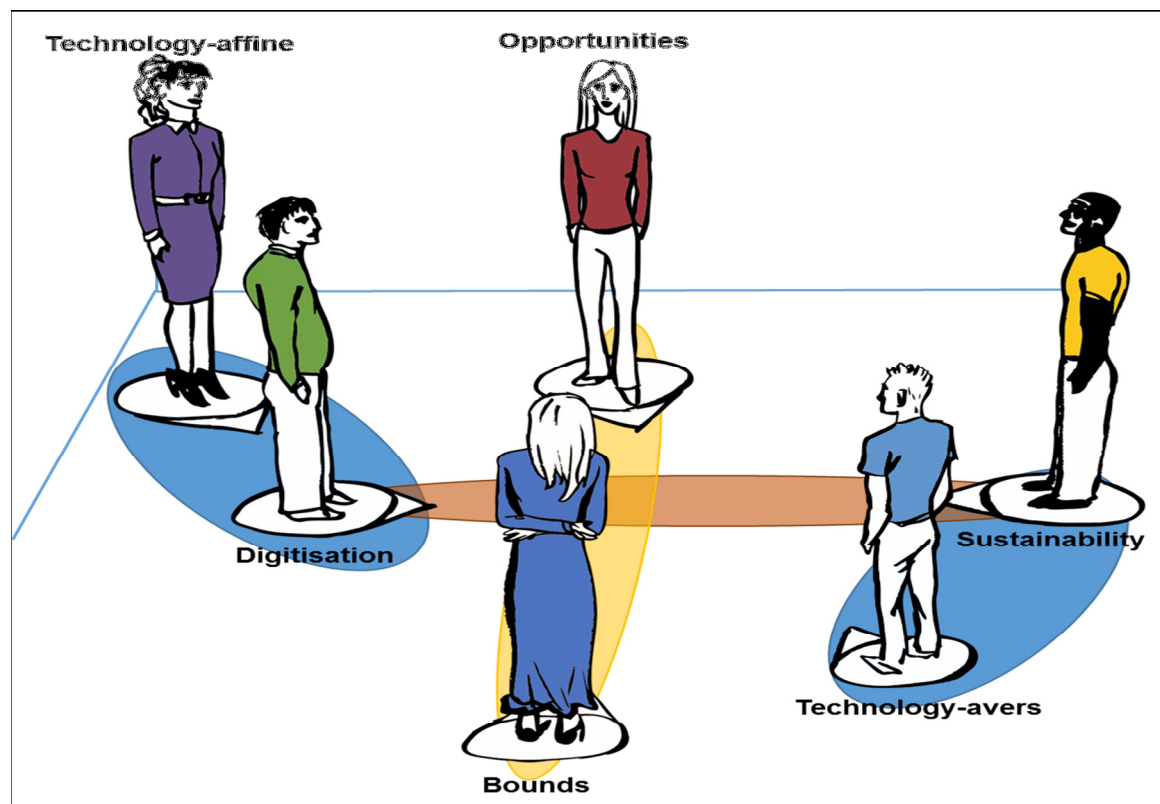
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Source: Own compilation

## 4.2 Teaching

Other examples can be found in teaching. The elements Digitisation & Sustainability as well as Opportunities & Bounds positioned in a quadrat representing different poles in two main tensions. The element Technology-affine had clear intentions to push digitisation directly and promptly. In the initial constellation Sustainability was mainly oriented on bounds and preferred technology-averse options. The element became more open-minded and balanced during the process valuing digital opportunities towards sustainability. It emerged a new understanding as a mediating element being able to analyse options case-based and comprehensively to consider all opportunities and bounds in terms of digitisation. Final, the conclusion in the constellation process was: a profound SWOT analysis for taking sustainable decisions will be necessary. The main goal of this structural constellation was to find out digitisation and sustainability relate to each other looking at opportunities and bounds, see Figure 4.

Figure 4: Example of constellation in teaching - digitisation & sustainability



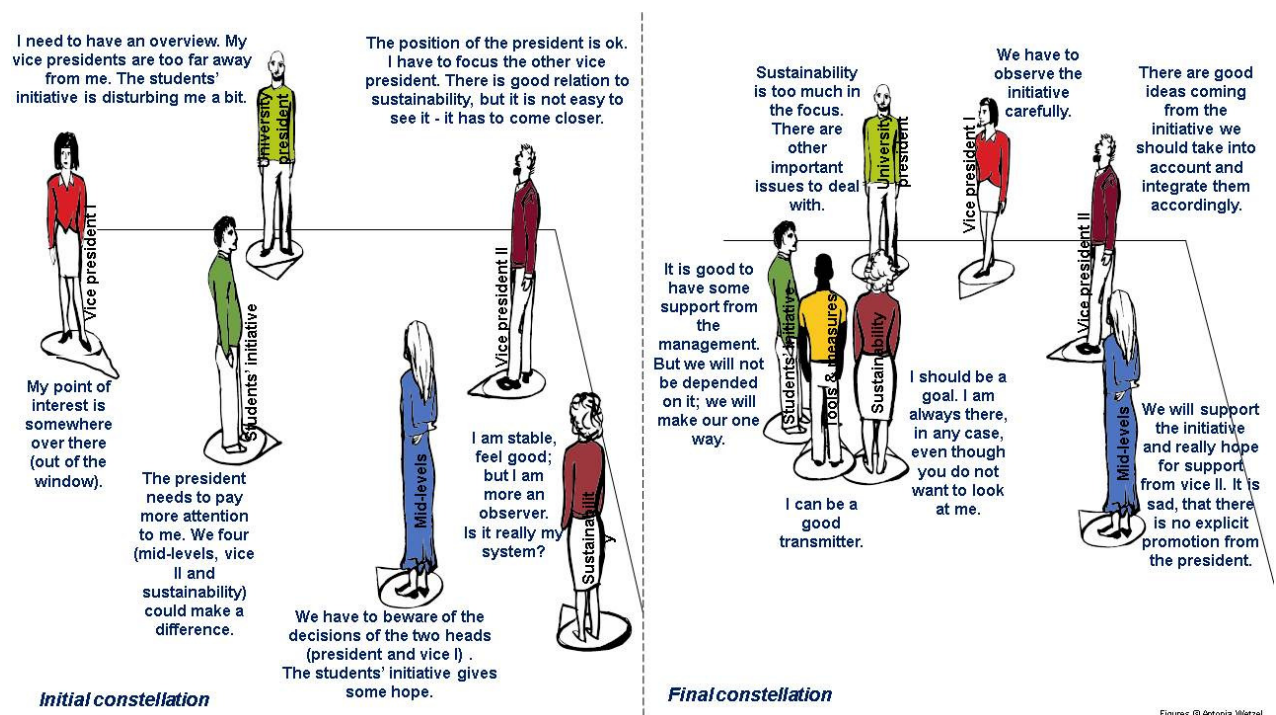
Source: Own compilation

### 4.3 Institution and administration

A third example is based in the institutional area (Figure 5). An academic group wanted to foster sustainability within academic. The people had some ideas of what to do, but they were not sure how to start with their initiative best. As the whole group of people had this issue they selected an issue-holder as the head of the constellation. After a short initial clarifying conversation six different elements and representatives were selected and placed in the room (Arnold 2017). The initial constellation revealed a challenging situation, because it was difficult to address the idea of more sustainability within academic life. The element Sustainability was situated outside of the system and did not feel incorporated. During the process work the element became more central. Several positions were tested to find a good position for Sustainability within this system. Suddenly, the Vice president II got the idea a transmitter was missing between the Initiative and Sustainability. Then, the representatives discussed about the role and characteristics of this transmitter. The Vice president II had a

clear idea of what is needed and argued for inventory or survey concerning the steady-state situation of academia. Tools and measures were needed for raising data and demonstrating responsibility. As a consequence the new element Tools and measures was added and asked to find a good place within the system. After placing the following talk about CSR between the elements Initiative, Tools, Sustainability, Mid-levels and Vice II initiated a transition process towards sustainability in the system. In this case, in the final constellation a bottom-up initiative emerged as the solution to activate some change towards more sustainability within the particular academic system. See Figure 5 for constellation in institutional contexts.

**Figure 5: Example of constellation in institutional contexts**



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Source: Own compilation

## 5. DISCUSSING POSSIBILITIES AND LIMITS OF APPLICATIONS FOR AND IN ACADEMIA

### 5.1 Method-based implications

There are several various applications as well as advantages and aspects to consider when applying constellations in teaching, research, and institutions following a whole-institution

approach. Currently, more multi-causal and inter- and transdisciplinary contexts require new and innovative methods that have consequently to be taught. The integration of systemic structural constellations in academia allows a teaching and learning of complex relationships, multi-level challenges and transdisciplinary; and makes the importance of sustainability for businesses tangible and visible. It provides essential knowledge for social contexts in general and sustainability in particular. Like in labs, the method can enable and encourage “students to reflect on their actions as consumers, citizens and learning human beings” (Schneidewind *et al.* 2016:12). A great challenge is that organisational members engaging with education for sustainable development often have limited or only particular influence on higher level policies (Thomas 2016). A bottom-up initiative could integrate staff or ask for their participation in a constellation session either being representative or observer and discussant, therefore, initiate change. Beside politics, a step-by-step commitment can be easily established and fostered.

Transdisciplinary research processes empower fast problem identification and problem structuring, allow direct problem solving in cooperation & between science and practice and permit the direct integration in research contexts (Jahn & Keil 2015; Hirsch Hadorn, Hoffmann-Riem, Biber-Klemm, Grossenbacher-Mansuy, Joye, Pohl, Wiesmann & Zemp 2008). Constellation work can do so, too. “Collaboration and partnerships between university researchers and community stakeholders should be scaled up as mechanisms to deepen learning, strengthen the knowledge base on local social, environmental and economic issues and contribute to solutions for local-level sustainability” (UNESCO 2014:126). In this sense, constellation work fosters a whole-institution approach. Transdisciplinary systemic thinking can be developed quickly into a system by the representation of an element (Arnold 2017). Insights, findings, implementation options or conclusions resulting from constellation work often differ from a pure study of documents, interviews or an empirical survey, and are not comparable in speed. Valuable is the own experience of representing a system’s element and the resulting effects and relationships. This can make a tremendous difference in perception, evaluation and future action. Key sustainability competencies - systems thinking, normative and strategic competence as well as anticipatory competence and interpersonal one (Wiek, Farioli, Fukushi, & Yarime 2012) - can be strengthened by the method and its reflexive processes. All in all, Table 2 shows the potentials of the method to foster a whole-institution approach and transformative science based on the criteria described above.

**Table 2: Potentials of the method based on the seven criteria described above**

Criteria	Examples of applications of the described three illustrative cases
• active participation and involvement	Integration of students, company representatives, managers, researchers as issue-holders as well as representatives and discussants
• creating opportunities for debate and discussion	Simulations in teaching, unexpected solutions in transfer & research, impulses in institution
• recognising, reflecting and resolving concerns	Whole constellation process, outcome of constellation
• reflexivity	Subsequent discussion and reflexion in all cases
• solutions and opportunities	constellation process, simulation and outcome of constellations in all cases
• recognition of knowledge gaps	Personal (issue holder, researchers or stakeholder, content-based, e.g. how to organise a network best; risk-related new information or tool-related missing information
• uncertainties and risks	Explicitly (as in case teaching) or implicitly in constellation process and following reflexion

Source: Own compilation

The subsequent discussion with company representatives and students is of importance for a sustainable learning in the transdisciplinary teaching and research process. The special representation of depth structures and hidden pattern and the joint experience allows a discussion of science and practice at eye level including a mutual stimulation of theory, practice and reality. Asking committed students for their feedback regarding the integration of systemic structural constellations in teaching, the following answers are quite representative for 50 to 75 percent of all students in a course (Arnold 2017): ‘It is great that we have the chance to try alternative methods.’, ‘The method is a great supplement to the traditional methods of economics.’, ‘I cannot understand why the method is not spread more widely.’ Company representatives often do not expect the great possibilities and the substance of insight gained by the method. They are also enriched by the final joint reflection and vivid discussion.

However, the positive response of the students and practice partners is mainly linked to the responsible use of the method and the meaningful as well as attentive application through

the constellator. A sound training in systemic structural constellations and a respectful interaction with people and their concerns is mandatory (Bodirsky 2015). Nevertheless, introducing new methods in academia and science there are always resistance and constraints to overcome (Arnold 2017). The constellator or facilitator has to accompany persons patiently in getting to know a new method and being part of this new method or to becoming part after having had a bad experience. Four aspects have a major influence on how soft a beginning and the willingness to take part are (Arnold 2017): (1) group or group dynamic, (2) culture or geographic region, (3) adventurousness or innovativeness, (4) age or maturity. If people do not believe that the method works, the use of signs and hidden elements is powerful. Once those people are part of a constellation, can feel what representation is and can observe or realise the absolute difference to role plays or theatre - they might change their opinion and lose constraints. Applying the method in whole-institution contexts the effective force, and thus, responsibility can go far beyond academia, e.g. in science-private-partnerships. Systemic structural constellations do not necessarily cause systemic and sustainability action (Arnold 2017), but can open minds and change reality by changing the inner place from which we act (Scharmer & Kaufer 2013). Further research is necessary concerning new and appropriate scientific criteria and designs for establishing methods based on unconscious knowledge in social science and economics. It is also of interest if different stakeholder groups provide different quality of unconscious knowledge in light of a specific topic.

## 5.2 Content-based implications

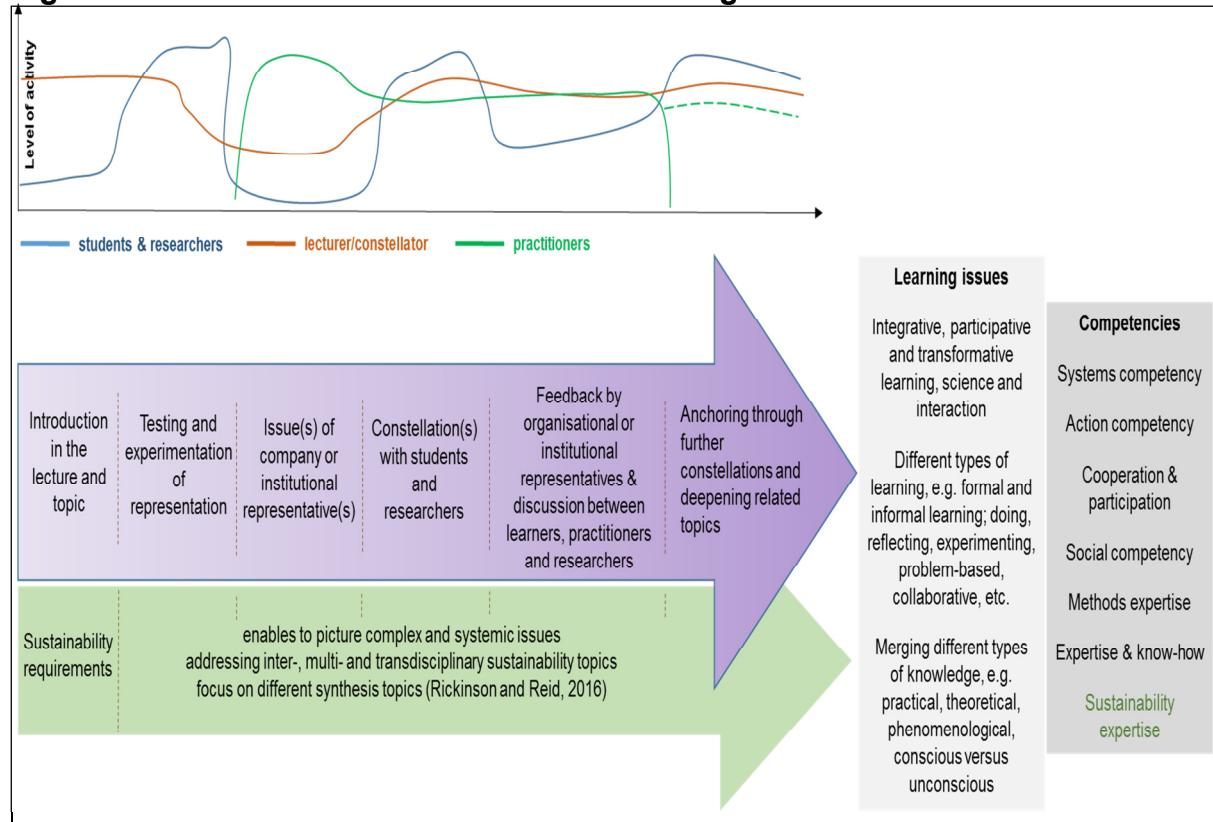
New tools and methods for transformative science are necessary. In case, a whole-institution approach is not supported by an institution or faced with scepticism, systemic structural constellations are also useful to generate bottom-up change. Integrating structural constellations addressing sustainability issues within teaching and learning contexts have impact on the curriculum by offering learning opportunities as well as on students and their competencies. In learning settings, systemic structural constellations can be an additional tool in sustainability pedagogic beside stimulus activities, future visioning, case studies, critical reading, and group discussions. (Evans 2016, see Figure 6). Focusing the sustainability impacts of the campus and its operations in learning and researching contexts

the students might also have influence of changes in institutional operations. This is closely connected to the systems orientation individuation. Academia should create tools and patterns to use the capabilities of the students for their own transition; otherwise it will stagnate. In light of whole institution approach systemic structural constellation work can support holistic, transformative and inter-/multidisciplinary settings, sets on values, reflexion, critical thinking and problem solving, integrates participatory reflexion, discourse and decision-making, and stresses locally relevant and applicability in daily life settings.

By analysing multi-level, complex sustainability challenges, learners will be empowered to recognise dysfunctional boundaries as well as cut value streams, so that they can manage sustainability issues in a more clear-sighted, comprehensive, cross-cultural and interdisciplinary way (Arnold 2018, 2017). By means of systemic structural constellations transdisciplinary collaboration as well as community involvement can be initiated and strengthened. According to Barth (2015) the integration of external stakeholders within learning contexts is crucial for education towards sustainability. Jointly working on sustainability challenges can strengthen leadership and motivation of external stakeholders involved as issue-holders. Final, constellation work can be integrated into the so called science shop. Referred to the members of the platform [livingknowledge.org](http://livingknowledge.org) science shops are small entities carrying out “scientific research in a wide range of disciplines - usually free of charge and - on behalf of citizens and local civil society”. Consequently, constellations are useful for inter-, multi- and transdisciplinary research and transfer that is society-driven (Arnold 2017). This is good practice of communication, learning and education for sustainable development in co-evolutionary interaction of multi-level systems (Adomβent 2013). New tools and ways of communication with stakeholders and society have to be developed. Figure 6 gives an overview how to integrate the method in teaching and research to strengthen a whole-institution approach.



**Figure 6: Possible embedment in teaching and transformative research**



Source: Own compilation

Using so called science-private partnerships - collaborations between researchers and practitioners in constellation settings - makes complex interrelationships, challenges on several levels, sustainability-related transdisciplinary teaching and research as well as the significance of sustainability for companies tangible and visible. In communicating and raising awareness of complex topics such as sustainability, learning progress can be achieved both at the knowledge level and at the level of action. Nevertheless, system constellations do not necessarily lead to systemic action; however, they can strengthen and sharpen thinking and acting in multi-level systems and multiple interrelationships. Collaboration between organisations and research institutions goes beyond conventional organisational constellations, since more formats for the systemic level can be introduced into science-private partnerships, and well-founded reflection on the basis of the state of the art and corresponding new approaches are only possible. In this way, new and fast ways of transferring and implementing innovative and sustainable ideas from research into practice and integrating new impulses from practice into sustainability research and teaching can be

smoothed out at the same time. Systemic structural constellations could be implemented in academia to foster transformation and change towards sustainability, as already practiced successfully at e.g. Ansbach University of Applied Sciences, University of Bremen and TU Chemnitz.

The following assumptions are developed based on the discussion above and the results of the illustrative constellations.

**Assumption 1:** The more intense the permanent integration of students into sustainability transition of academia is, the faster academia can develop, learn and change towards sustainability.

**Assumption 2:** The more comprehensive a training and the integration of the permanent members of academia is, the higher the likelihood of sustainability chance in academia.

**Assumption 3:** The more diverse an academic communication strategy is, the better the boosting immune system is. Consequently: the healthier the role of academia in society.

**Assumption 4:** The more underlying or hidden patterns or unconscious knowledge becomes obviously, e.g. by means of systemic structural constellations, the more effective will be respective incentive and control measures.

**Assumption 5:** The more systemic structural constellations are used in academic settings the higher the coherence of sustainability knowledge, wording and activities.

**Assumption 6:** The broader systemic structural constellations are used in academic settings the higher the likelihood of transformative science.

## 6. CONCLUSIONS

Constellation work is a powerful tool in explaining and transferring of multi causalities in systems. It can complement traditional methods for achieving learning progress in all academic areas, in terms of the levels of knowledge, cognition and action. Systemic structural constellations can foster an additional path towards a novel understanding of science by emphasising abduction and intuition beside deduction and induction for generating new ideas, innovation, new strategies and methods to foster sustainability comprehensively. It also stresses the necessity of developing new hypotheses and approaches by integrating both conscious and unconscious knowledge. Yet, systemic

structural constellations do not automatically or inherently cause actions, changes or transitions towards more sustainability - they can enable or encourage new mind-sets, perspectives and behaviours. As the efficacy of the method goes beyond academia a whole-institution approach and transformative science is addressed. Nevertheless, conducting systemic structural constellations a profound training, ethics, governing guiding principles and philanthropic values are necessary. As this research is novel and upcoming there is comprehensive research necessary in order to better define and understand the applications and limits of the method in diverse settings in social science and economics.

### **6.1 Method-based findings**

- Information, findings, implementation options, conclusions resulting from constellation work differ from a pure study of documents, interviews or an empirical survey and are not comparable in speed. New hypotheses can be formulated.
- It supports to overcome fixed mental models and resistance to change while working with the unconscious and not against it.
- In transformative science, new scientific criteria and designs were defined. New quality criteria and research designs are also necessary to cope with systemic structural constellations revealing unique knowledge forms and representative perceptions.

### **6.2 Content-based findings**

- The method is able to foster a whole-institution approach in academia and serves as a tool for rapid problem identification and problem structuring. Constellation work allows direct problem solving in cooperation with different stakeholder groups based on the integration of unconscious knowledge and in spatial arrangements.
- Sustainability is one among many topics. Successful integration within academia aligns with systemic principles and heuristics into consideration.
- Fostering sustainability and establishing its transitory role in academia and society need new patterns and perspectives, like integrating all academic members, having permanent and fixed-term contracts, in change processes as well as innovative ways and forms of communication and dissemination. Appreciating the role of academia in society the circulation of new knowledge serving other systems and strengthening the own and society's resilience has to be rethought.

Further research is necessary concerning the above raised assumptions and how a combination of transformative or conscious- and unconscious-based tools can foster sustainability in academia more effectively.

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