International Journal of Sustainability in Higher Education

Many roads lead to sustainability: a process-oriented analysis of change in higher education
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Article information:
To cite this document:
Permanent link to this document:
http://dx.doi.org/10.1108/14676371311312879

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Many roads lead to sustainability: a process-oriented analysis of change in higher education

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Abstract

Purpose – The purpose of this paper is to comparatively analyse activities to integrate sustainability in teaching, research and operational practice in different higher education institutions, which differ both in the degree of how far implementation goes and in regards to the most active stakeholders. Against that background, the paper explores, in a process-oriented focus, which drivers and barriers are experienced as most important and how they relate to each other.

Design/methodology/approach – A comparative multi-case study has been conducted, with two main steps to structure the research process: first, desktop research was used to select appropriate cases in a theoretical sampling. Second, data from interviews with relevant stakeholders in each case were analysed according to the constant comparison method.

Findings – Across all cases, three distinctive patterns of implementation processes emerged, each of them with a unique set of influencing factors. For each pattern, drivers and barriers, as well as their relevance, are experienced differently and specific key constructs can be found to explain the implementation process.

Research limitations/implications – The research focused on German institutions of higher educations and all cases are drawn from that population, which might limit the generalizability.

Practical implications – It is hoped to provide valuable insights for future implementation processes and for various ways to support a sustainable transition in higher education.

Originality/value – This is one of the first papers to consider the process of implementation and the interaction between drivers and barriers. The value of the paper lies in its potential to help in understanding what role different drivers and barriers play in different patterns of implementation.

Keywords Germany, Higher education, Universities, Sustainability, Higher education for sustainability, Organizational change, Comparative case study

Paper type Research paper

The role of universities in building a sustainable future

Nearly 20 years since the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and more than half way through the UN Decade of Education for Sustainable Development (2005-2014), the drive for sustainability is more than ever a global challenge and education plays a crucial role in facilitating the social learning that is needed (Pigozzi, 2010; Redclift, 2005). The important role of science and universities as active stakeholders in a process supporting a paradigm shift towards...
sustainability has been stressed both on the policy level and in academic discourse (Adomßent and Michelsen, 2006; Thomas, 2010).

Since then a number of activities have been undertaken on different levels both nationally and internationally, a process witnessed by a growing number of researchers on higher education for sustainable development and by an on-going discourse that features prominently in that journal (Kitamura and Hoshii, 2010; Ferrer-Balas et al., 2008). Activities to implement sustainability as a principle in higher education institutions take place at least on three different levels:

1. research on sustainability issues;
2. learning and teaching activities to educate future decision-makers; and
3. organisational change as self-reflective praxis, encompassing management processes and operational parameters.

Research on all three levels explores the drivers and barriers of implementation processes and is often presented as case studies, usually as rather descriptive “story-telling” (Corcoran et al., 2004). Beside that methodological concern there are at least two shortcomings in such an orientation. First, implementing sustainability in institutions of higher education is largely seen as a process that can be planned and managed in a top-down manner with a basic bottom-up commitment and that needs leadership support as *conditio sine qua non*. Such a view of one model of success does not do justice to the manifold activities which are initiated by a large number of different stakeholders in various ways. Second, such approaches usually treat drivers and barriers as static constructs that influence the implementation process. Consequently, it is not clarified how they influence each other, how they are linked and how they may change during the implementation process.

In this paper these shortcomings are addressed in a comparative case study, exploring processes of integrating sustainability issues in different higher education institutions which differ both in the degree of implementation (from “cosmetic reform” to “wholly integrative” (Sterling and Thomas, 2006)) and in regards to the most active stakeholders, that are the key driver of the process. Against that background the paper analyses which drivers and barriers are experienced as most important and how they are related to each other in a process of implementation, i.e. while integrating sustainability in the organisation on one or more of the aforementioned levels.

**Organisational change and the challenge of sustainability**

There is a growing interest in scholarship on organisational learning with findings shedding light on how to facilitate organisational change (van de Ven and Poole, 1995; Thomas and Allen, 2006). Learning is increasingly seen as key to organisations’ adaptation to new challenges and securing their future (Argyris, 2009; Senge, 2006). Based on that insight influencing factors have been identified and process models and recommendations to support such change have been developed (Kotter, 1996; Weick and Quinn, 1999).

Those findings originally explored in the context of economic organisations have been adopted and further developed for higher education institutions (Lucas, 2000; Kezar, 2001). Here the focus lies on questions of how universities as complex and unique entities are learning and what barriers and drivers occur during externally enforced change processes. Among the reported requisites for achieving significant change in the institutions are an
As sustainability is seen as a challenge that forces a paradigm shift (Zoller and Scholz, 2004), a growing number of case studies have analysed the experiences of higher education institutions and first comparative studies (Ferrer-Balas et al., 2008) and overviews of the field (Tilbury, 2004; Kitamura and Hoshii, 2010) have been conducted. How such change may be facilitated is analysed on different levels focusing on teaching and learning (Barth and Timm, 2011; Buszard and Kolb, 2011; Sherman, 2008), research organisation (Uwasu et al., 2009; Yarime et al., 2010) or campus operation (Weber et al., 2009). Only a few cases so far have tackled the challenge to implement a holistic institutional change on all levels (Blake and Sterling, 2011). The focus in researching these cases is generally on drivers and barriers of change on all three levels (Holmberg and Samuelsson, 2006) with more in-depth analysis on the influence and uniqueness of different stakeholders: that is, the role of students (Wolfe, 2001; Kagawa, 2007), academic staff (Barth and Rieckmann, 2012; Holdsworth et al., 2008) and administration (Moore, 2005) as well as external drivers (Walshok et al., 2011).

These findings resulted in a number of recommendations on how to facilitate the implementation of sustainability in higher education processes (de La Harpe and Thomas, 2009; Elder, 2008). These recommendations however are usually top-down-oriented and focus on leadership that is about to facilitate such processes and consists rather of a set of “golden rules” addressing the identified obstacles than taking into account a process orientation that takes an evolutionary approach with manifold interactions between the single factors (Weber et al., 2009).

Such patterns of evolving implementation processes that often differ widely in the way they are able to bring and sustain change are the focus of the following study with an emphasis on the process of bringing about change in an organisation.

**Analysing processes of change – a multi-case perspective**

This study takes a process-oriented focus, looking for the dynamics of and between drivers and barriers when change appears. The research takes the form of a multiple case study and is guided by the question of how implementation processes take place and what typical patterns of support and resistance can be experienced.

Case studies are the appropriate research strategy when the focus is on a “bounded system” and the in-depth consideration of the context of that system (Stake, 2005). Case study research seems especially suitable when “how” or “why” questions are posed and the focus is on a contemporary phenomenon within some real-life context (Yin, 2003). As Stake (2005, p. 444) points out, however, “[c]ase study is not a methodological choice but a choice of what is to be studied”.

Although case study research features prominently in research on higher education for sustainability, criticism has been made that existing case studies are far too often limited to rather descriptive “story-telling” (Corcoran et al., 2004). That seems of particular interest when the question of generalisation is raised, as there is a broader acknowledgement of the need for more theory-building and generalisation:

The call for accessibility of contextual experience also brings us to the notion of inter-case-study research, as opposed to single case-study research, or the idea of a meta-analysis of multiple case studies in order to look for trends, patterns and heuristics that are shared and emerge in different contexts (Corcoran et al., 2004, p. 18).
Here both multiple case studies and cross-case comparison are seen as potential enablers of more robust data (West and Oldfather, 1995). Stake refers to such an instrumental study extended to several cases as a “collective case study” in which:

[... ] a number of cases may be studied jointly in order to investigate a phenomenon, population, or general condition (Stake, 2005, p. 445).

A collective multi-case study has therefore been conducted to investigate the phenomenon of implementing sustainability in higher education against different contextual settings. Two main steps structured the research process: theoretical sampling by means of desktop research was used to select appropriate cases, which have been explored in detail by analysing data from interviews with relevant stakeholders in each case.

**Desktop research**

A first overview over the field was gathered by carrying out desktop research to identify potential case studies and to collect written case study material (reports, publications, background information). The search strategy included data from the online publication *Study and Research on Sustainability* [1] as well as an additional web search, bibliography data bases, and enquiries using existing networks of the scientific community. Cases have been limited to German institutions of higher education \((n = 418)\). Out of that universe, a sample of 17 institutions has been identified that consists of cases for whom background information and written material about sustainability-related activities exists and which have been active in more than one of the fields of interest.

Six initial cases were selected to start with, following theoretical sampling to include variety for contrasts of relevant categories and their properties (Glaser and Strauss, 2006). Two additional cases were included during the process of data gathering until theoretical saturation. Table I gives an overview of some of the main properties of the cases.

The selected cases encompass small, medium and large universities (columns 3 and 4) which are active in different areas of activities, in which they show various levels of activity (columns 5-8).

**Cross-case comparison**

For all eight cases semi-structured interviews have been conducted with different stakeholders to maximise the different views and to gain a deeper understanding of the implementation processes. In total, 24 interviews of 30-50 min each have been audio-recorded, transcribed, anonymised and coded. The problem-centred interviews have been structured along the history of the implementation process, main activities and perceived drivers and barriers as well as most important stakeholders and activities. All questions focused on stimulating rich narratives, with follow-up questions for better understanding. For every case study, at least two interviews with interviewees from different stakeholder groups have been chosen. Selection of the stakeholder groups was informed by the most important areas of activity in that university. Additional information and existing reports and articles have been integrated in analysis. Data were coded according to the constant comparison method with an interpretation that focuses on differences and commonalities in-between cases (Silverman, 2005). Key constructs are extrapolated by conceptualising and classifying
<table>
<thead>
<tr>
<th>Case number</th>
<th>Higher education institution</th>
<th>Number of students (approx.)</th>
<th>Number of staff (approx.)</th>
<th>Grade of activity</th>
<th>Areas of activity</th>
<th>Interview partner</th>
<th>Admin staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>hei_01</td>
<td>University</td>
<td>&lt;10,000</td>
<td>800</td>
<td>1</td>
<td>++</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>hei_02</td>
<td>University</td>
<td>10,000-30,000</td>
<td>5,000</td>
<td>1</td>
<td>+</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>hei_03</td>
<td>University of Applied Science</td>
<td>&lt;10,000</td>
<td>400</td>
<td>2</td>
<td>++</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>hei_04</td>
<td>University</td>
<td>10,000-30,000</td>
<td>2,000</td>
<td>2</td>
<td>++</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>hei_05</td>
<td>University</td>
<td>10,000-30,000</td>
<td>2,000</td>
<td>2</td>
<td>+++</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>hei_06</td>
<td>University</td>
<td>&gt;30,000</td>
<td>5,000</td>
<td>2</td>
<td>+</td>
<td>–</td>
<td>2</td>
</tr>
<tr>
<td>hei_07</td>
<td>University of Applied Science</td>
<td>10,000-30,000</td>
<td>660</td>
<td>1</td>
<td>+</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>hei_08</td>
<td>Applied Science</td>
<td>&lt;10,000 (Size of organisation)</td>
<td>150</td>
<td>3</td>
<td>+++</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

(Number of interviewees)

1 = recently started activities
2 = established activities
3 = long tradition of activities

++ = no specific activities
+++ = significant activity
++++ = core focus in that area

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many roads lead to sustainability

the relation between the different categories and their properties both within and between cases (Strauss and Corbin, 1998). A summary of the in-case findings have been presented to and discussed with the interviewees to offer the opportunity for informant feedback and to ensure respondent validation (Yanow and Schwartz-Shea, 2006).

Results

Across all cases, three distinctive patterns of implementation processes emerged, each of them with a unique set of influencing factors:

1. student-led change from informal to formal learning;
2. sustainability as a concern in campus operation; and
3. sustainability as a unique selling-point.

Rather than the level of implementation at the organisation, the active stakeholders involved in the process and their strategies to facilitate change are the aspects that differ significantly and distinguish the approaches. For each approach, drivers and barriers as well as their relevance are experienced differently and specific key constructs can be found to explain the implementation process. These constructs and their relationships, evolved from constant comparison of the cases’ data, constitute a specific approach of implementation and appear as:

1. causal conditions that (partly) caused the beginning of the implementation process;
2. contextual factors that determine the specific process;
3. strategies chosen by the different stakeholders;
4. intervening conditions that supported or hindered the strategies; and
5. consequences that emerge from the specific approach.

For the sake of clarity all three patterns will first be described separately and their commonalities and differences compared later in the discussion section. For each pattern, a figure offers an overview of the key concepts found in the data, while the subsequent description of the patterns consider in each case those constructs (emphasized in italic) that constitutes the specific approach in more detail.

Students as agents of change: from informal to formal learning

Implementation processes initiated by students can be characterised as an on-going learning process from informal to formal learning. Such a learning process can be described according to a number of specific key constructs that are grounded in the data and form a unique implementation pattern (Figure 1).

Its starting-point in most cases is a critical evaluation of the organisational performance in terms of sustainable development. First approaches to bring change are usually environmentally oriented action such as energy-saving campaigns or activities focusing on mobility or food that can be found in all cases (reaching for quick results). The key element is a learning process that combines formal and informal learning which is intentionally initiated by the students:

With these activities we finally get a chance to use and further develop the competencies that are defined as learning objectives in our courses [stud_01_02].
Here two approaches complement each other, both aiming at institutionalisation: first, informal learning in various activities is actively considered as an important experience. Different methods are chosen to integrate such learning in existing project seminars in the curriculum to enable action-oriented learning as a “deductive tinkering” with different approaches and strategies. Students acknowledge the importance of such integration, as it offers manifold opportunities for self-directed learning while at the same time support and moderation by lecturers is available and the effort is accredited in the curriculum (win-win-situations). Second, additional lecture series, often interdisciplinary and open or the whole academic community, offer additional input and help to reach a broader audience:

We felt we needed some sort of introduction to sustainability everyone at [name of the institution] can follow. So we decided to invite experts from different disciplines to an open lecture, open even to the general public [stud_05_01].

Causal conditions that support students’ involvement can be found both individually and collectively. In all cases, individuals engaging in implementation processes are very self-aware of their role as future key agents of change and have a strong personal commitment towards sustainable development (personal commitment). As a group, students’ engagement is most likely caused by being dissatisfied with the current situation at the institution, which again becomes obvious across all cases of student-led activities (experienced divergence between claim and reality). That could occur either because of a general lack of social responsibility at the institution with as yet no visible activities or because of a gap between claim and reality especially when sustainability-related courses or programmes are offered but such an orientation is not reflected in the organisation’s operational practice:
We have a number of programmes that deal with different aspects of sustainability. There are really specialised Master programmes where you can learn everything about energy efficiency for example. But if you look around at the campus you will find nothing of that. No energy saving, no renewables nothing at all. That disappointed us so much we agreed something must be done about it [stud_05_02].

The size of the institution, existing participation opportunities and general change processes at the institution are the most important contextual factors influencing students’ engagement (organisation size, culture of participation). Generally, the smaller an institution is the more likely it is that student activities reach a critical point of influence as the organisation is experienced as less anonymous and inhibitions about becoming active are lower. That also holds true if opportunities for participation (e.g. within the university committees) are established and general change processes (e.g. transformation of study programmes) are under way.

Students who successfully started implementation processes emphasise the importance of simultaneous action to gain a minimum of recognition. In such cases environmentally oriented campaigns function as a kick-off and are accompanied by information processes and public events like discussions, round tables or public lectures. To achieve such progress students make use of internal and external networks, very successfully manage to build contacts and succeed in external fundraising. Three aspects proved to be crucial across the cases: the range of contacts and external recognition students are able to build, the internal support and range of coalitions they can use between different status groups and finally the windows of opportunity students are able to identify and use. Such opportunities might include a change in the university board as well as accreditation processes.

Two consequences seem to be particularly important: first, on the individual level students involved experience a reflexive process of learning that combines formal and informal learning and is a crucial aspect in the development of competencies contributing to a more sustainable future (reflexive deep-learning processes). That being the case, participating in implementation processes is a highly valuable experience for students. In terms of the whole organisation the range of coverage of such activities depends on the commitment of other stakeholders (coalitions among stakeholders):

We started with one seminar and everyone liked it and encouraged us to continue. But neither our teachers nor anyone from the university supported us. Only when [name] started to offer seminars and integrated our activities we started to sustain that approach [stud_01_01].

Although student-led engagement is most likely to initiate longer-lasting developments, or help to overcome certain barriers, without support from other actors its outreach is limited. Finally, results heavily depend on the broader commitment and acceptance of those activities initiated by the larger group of students not directly involved (limitations of outreach).

**Routines and innovation: sustainability as a concern in campus operation**

The second pattern of implementation processes is characterised by a strong focus on campus operation. Here implementation is experienced as a paradigm shift which becomes visible in changing routines and introduced innovation: daily operations and practices change and new routines are established to incorporate sustainable principles as “business-as-usual”, which at the same time allows people to be
innovative in new fields and to face new challenges pro-actively. Newly established routines open up organisational practice and offer manifold starting-points. Figure 2 offers an overview of the most important constructs, typical for that pattern.

The context of such implementation processes in most cases is a tradition of environmentally oriented practices at the organisation which evolved in a long-term process (pre-existing environmental-oriented activities). Albeit some of these activities are already successfully integrated in daily routines, the main challenge remains, i.e. to sustain the organisation’s commitment over time despite change in the organisation’s population:

We have been engaged in energy-saving activities, for example, for years already. Many activities just became normal so that nobody think about them anymore. But with new students every year it is always a challenge to remind them of the importance of these activities [sus_off_03_01].

Innovation occurs either out of the necessity for (mostly technical) investment or when technical saturation leads to a reorientation of key issues for campus operation.

Strategies to bring change consist of four key elements. First, whereas investments and technical solutions seek to reduce the ecological footprint of the organisation, communication-oriented campaigns complement these activities to raise awareness and articulate other aspects of sustainability and try to help identify “win-win” situations (combination of “hard” and “soft” instruments). The second element is the on-going process of institutionalisation to integrate new actions into the organisation’s routines and to provide structural innovation. Here a combination of easy-to-implement short-term actions and more ambitious long-term investments proved to be most promising (institutionalisation). Third, to attract (external) funding an “early-adopter” approach of innovation is chosen and new activities are often accomplished as pilots for a broader audience (early-adopter-approach):

![Diagram of Implementation process]

**Figure 2.** Key constructs of an operational practice focused implementation process.
We always look for opportunities to be among the first to participate in pilot projects. So we have the chance to get both financial support and external recognition. [...] No one asks for recycling today anymore. That has to be a daily routine while at the same time innovations in new field attracts interest from outside [sus_off_06_01].

Finally, the collaboration with different stakeholders proved to be crucial, especially the internal collaboration with students and academic staff, in which the campus is used as a “living lab”:

We struggled a lot to reach students as well as academic staff. [...] But as we convinced one lecturer to use the campus as an example of a change process and facilitated student projects in a seminar we both offered, a lot more recognition could be obtained [sus_off_06_01].

In terms of contextual factors that support implementation processes, structural aspects are crucial: for all organisations that have successfully implemented sustainability issues, supportive internal structures have been most important. Even if the process is mainly led by administration as an organisational responsibility, the ability to get both students and academic staff “on board” strongly influences the degree of implementation. A number of other factors influence the development of supportive internal structures. Among them are feedback systems to ensure two-way communication, the visibility of successful short-term activities that can be communicated and successful participation in external competitions and awards to gain external recognition (feedback systems).

As a result of these implementation processes both routinized activities towards sustainability and organisational innovations are experienced as “two sides of the same coin” (routinized activities, organisational innovation from within). The degree to which implementation can be achieved strongly depends on the level of new internal and external coalitions that can be built (limitations of outreach).

Brand recognition: sustainability as a unique selling-point

The third pattern of sustainability implementation is the commitment of the whole organisation, and in most cases it is top-down-driven with broad support internally and externally. It is experienced as a “branding” of the whole organisation with a distinctive approach that sets the organisation apart from others:

As a small institution we cannot compete with the “big players” in every field we are working on. That simply would not work. But we can make a significant difference in parts: in teaching in our fields of research excellence and in the way we walk the talk. And this is what we try to do: being different [admin_08_01].

This approach again consists of number of distinctive key constructs which are shown in Figure 3 and described more in detail below.

Such a far-reaching development depends on a number of factors that influence each other. The recognition of the need to adjust the organisation’s vision and mission, caused by internal or external change, often constitutes the starting-point of such a process (external pressure and urgency for change). It then is experienced by staff as the chance for more fundamental change activities they can and should contribute to (windows of opportunity). Such an experienced need for change however needs to be accompanied by the broad support of all relevant stakeholders, both internal and external (coalition among stakeholders). These factors are more likely to fall in place in small or medium-sized universities, as they often cause closer collaboration between different stakeholders (size of organisation). Additionally, such a process is more likely
to be positively acknowledged as the opportunity to create a unique selling-point and brand the university on the market:

The positive feedback from externals as well as the increasing number of students helped us a lot to convince those who were very sceptical at the beginning. [...] It proved to be not only “the right thing to do” but also to be successful and acknowledged outside our university [acad_staff_08_01].

This approach is mainly driven by a strong leadership approach, which incorporates top-down activities but at the same time takes on existing bottom-up approaches. Here a strong leadership commitment, facilitated by strong individual motivation and commitment of someone from senior management (intrinsic motivation) is pro-actively communicated both internally and externally and activities are introduced before they become mainstream in other institutions (early-adopter-approach). To ensure the commitment of all internal stakeholders without overwhelming them, episodes of change and consolidation within the organisation are made sequentially.

Three main contextual factors seem to be critical in such processes. First, the experienced urgency opens a window of opportunity for such implementation processes. Often this urgency is supported by forthcoming accreditation processes and/or a fluctuation of staff:

I think we simply chose the right timing. We had to go through the whole accreditation process anyway, so we saw that as an opportunity to integrate sustainability as a basic principle in the curriculum [acad_staff_08_01].

Second, the feedback of external stakeholders strongly supports or hinders such processes. Third, the support of staff as key agents of change is crucial and can be facilitated by buy-in for staff not previously involved before or other incentives to strengthen existing activities (collaborative approach, buy-in-systems).
If such an approach is taken, a far-reaching influence can be witnessed as it has strong top-down support. As a consequence, existing structures are further developed and an “innovation from within” may take place that create changes on a wide range of areas (organisational innovation from within). It also causes external visibility and growing internal demand for further action as the process gains momentum and first results and improvements are experienced (visibility of action).

Discussion
The patterns of implementation that have been described not only show different approaches to implement sustainability but also face different hurdles on their way to deep-rooted integration. Although strong leadership with consequent structural and financial support will obviously bring about the most extensive change, the other approaches prove that this is not the only possible way to make a difference in an organisation.

Comparing the patterns, it becomes evident that even if the different approaches focus on the same aspects, they significantly vary in their emphasis on them and in the subsequent consequences. Activities that target campus operation, for instance, are taken into account in all three approaches but facilitate very different objectives. Whereas student-led activities focus on such activities which are highly visible on the campus and make people reflect on daily practices (and thus trigger informal learning processes), activities initiated top-down in a leadership approach consider external visibility and credibility as key aspects in the choice of activities. Management-led activities focus on those activities that have the most (economic) impact and can be integrated in management structures. Measurability is a key aspect in this context.

At the same time the relevance of influencing factors differs among the three patterns. Those differences can be illustrated by three key aspects, which are mentioned as crucial for implementing sustainability at universities:

1. on-going communication;
2. systems of support; and
3. leadership (de La Harpe and Thomas, 2009).

Communication in student-led approaches serves three main functions: to raise a feeling of urgency, to overcome information asymmetry between administration and students as well as within the student group and finally to create internal and external networks. Although information asymmetry is also a crucial aspect in campus operation-oriented approaches, it is acceptance rather than awareness that is seen as crucial. In a top-down leadership approach communication is sought to create a pull factor for students to study at that specific university and to empower internal stakeholders through feedback-oriented two-way communication.

Supportive systems and leadership are obviously a key aspect of leadership-oriented approaches, as they can facilitate and empower existing approaches and offer guidance and control. They are also important in campus operation both to support the integration of certain activities in existing management structures and to justify the relevance of such activities. In student-led-approaches, both supportive systems and leadership are seen as less important for starting activities, but offer opportunities to sustain them in the long run.
When the three different patterns are compared a final aspect of interest touches upon the role which academic staff play in such processes. Although they are not involved at the start of the implementation process in any of the three patterns, they are always described as a crucial target group for sustaining the process. As “transmitters” of implementation processes, they have the potential to bridge any gap between students and management, as well as between learning and campus operation. Thus, the role of academic staff is most critical when existing approaches are to be sustained and/or further developed.

Conclusion
As the analysis of the different case studies shows, implementation processes exhibit different distinctive patterns with significant differences in the way in which certain key factors influence the development. This study aimed at describing how such patterns look like and analysing differences, commonalities and how the underlying drivers and barriers influence each other. Although the study focuses solely on German institutions and thus faces limitations when it comes to general conclusions that could be drawn, it clearly indicates the need to consider these differences in the development process. A deeper understanding of key actors involved and key processes evolving over time will help to better support the future transition of higher education institutions.

It became obvious that change in learning and teaching, research and campus operation can be initiated in very different ways with a variety of stakeholders and such approaches will result in different outputs. In any case, implementing sustainability into the institution is a learning process, but this learning appears in various ways and with different forms of support needed. The first pattern of student-led change can be described as a social learning process with deep reflection on the individual level. Glasser (2007) here refers to second-order learning which means reflection on routines, traditions and values, a process, Bardaglio (2007) describes as deep learning. The second and third pattern instead is organisational learning that involves a wider range of stakeholders. While the second pattern emphasizes the way an institution can adopt to certain challenges, the third approach is much more about pro-active learning for innovation.

In all cases it becomes obvious that orientation towards sustainability is a fragile process that need manifold support from a critical mass of actors. In this context academic staff play a crucial role in constituting the status necessary to sustain activities that may be started by different groups. Results from studies on staff involvement, incentives offered and incorporated professional development programmes confirm the potential such an approach has to offer (Barth and Rieckmann, 2012). To support implementation processes, whether from inside or triggered by incentives from outside, it seems to be most promising to empower active stakeholders and offer ways and structures to facilitate the broadening of what has already been accomplished.

Notes
1. A publicly funded guide providing a comprehensive overview of key fields of study and research in Germany to universities and research institutions active in the field of sustainability (www.leitfaden-nachhaltigkeit.de/index_en.html).
2. All quotations have been translated by the author. The abbreviation indicates the status group the respondent belongs to, the organisation and the individual interviewed at the organisation.
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About the author
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