
Transformation of Teaching and Research in a Globalized IT-Driven World

From State-Dominated Hierarchical Structures to Public-Private Open Network Approaches

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1 Chapter 1: Teaching and Research (The Traditional Paradigm as a Starting Point)

The focus of this contribution is on teaching and research, in particular their symbiosis in research-based learning at universities. By this it deals with the function of “teaching and research” in a specific “industry,” the university sector. The university sector is very broad and includes different types of universities—rather applied and college type of institutions of rather regional rank but also institutions focusing on fundamental research with a global reach. This sector includes roughly 16,500 institutions worldwide, of which just the top 500 appear in the rankings (see Rauhvargers 2011), and is fast growing in size as well as scope.

Teaching and research are activities that by their very nature allow people to advance into new areas and to tread what is at least for them terra incognita and by this constitute real experiences (for the definition and concept of *experiences*, see Schulze 2005). For this reason, teaching and learning, as well as research, are not just cognitive but also emotional and thus run deeper than other general or knowledge services. Mental images of how one experienced teaching and learning, how one achieved first research results as a young researcher and experienced discovery and understanding, are thus formative for life.

In nearly all cases, at least those with complex content, research and teaching require an interaction between various actors: students, teachers, or research partners, as well as infrastructure providers or consumers and users of research results. Teaching and research thus entail an extraordinary, interdependent system of service provision. In addition, research activities usually produce open output and operate in open systems. These features, the creativity required for research activities as well as the particularity and number of the participants involved, mean that

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research can only to a limited extent be actively managed as a discrete process to a limited extent. This is in stark contrast to many other service processes, which can be centrally managed and optimized as service chains.

Teaching and research can therefore be modeled and described with the help of a systems approach (for activity systems, or generally for systems approaches using the example of tourism, see Bieger (2010)). There is a debate within management research over whether a high interdependence tends to lead to inertia in adapting to new environmental conditions or whether this mutual dependence helps facilitate an incremental adjustment process. In investigating this question, it is important to find a suitable interplay between structures on the one hand and rules governing cooperation on the other hand (cf. the discussion in Albert et al. 2014).

The traditional system of teaching and research, as most people likely still remember it, can be viewed as rather hierarchically structured and molded by the state. A lecturer, most prominently the full professor in Latin often called *Amplissimus*, structures learning processes and mostly selects and processes the knowledge he or she then transmits. Research processes are similarly organized: a senior researcher structures a research project into research questions and coordinates the knowledge gained. Humboldt's model of academic chairs—still primarily dominant in German-speaking Europe—perfectly captures this world (cf., e.g., Backhaus 2015). The full professor holds a chair, and, as still commonly provided for in university bylaws, he or she heads a sub discipline at a university in teaching and research. The system moved toward a “fragmentation” into a myriad of subdisciplines (cf. Herrigel, p. 13, in Thomä 2012), driven not least by the full professors who could thereby stake their claim in the demarcated disciplines. In this hierarchy, the lecturers', associate, adjunct and assistant professors are hierarchically subordinate to the full professors, and under them are the assistants and doctoral students.

In these classical scientific networks, the professors exchanged their findings among each other. They were the real “hubs” of scientific work. Between these hubs, implicit hierarchies were again established within the research themes and cultural areas. In each country or language area, each discipline had its clearly dominant researcher, whose findings would serve as a guideline for the others and whom they would accordingly cite. Qualifying as a postdoc under these prominent researchers increased the chances of being appointed as a full professor, since these leading researchers were often members of advisory committees at other universities. The full professors were (and still are) granted lifetime employment with the idea of thereby securing their academic independence and enabling long-term-oriented research perspectives.

In this system, the owner and founder of the educational and research institutions was the state. This had a threefold aim, first to keep access to the educational institution open to broad segments of the population through governmental access rule and subsidies, second to keep teaching and research independent from private money and interests to guarantee academic freedom, and third to also effectively support the research disciplines and profit from the knowledge they generated. This

was a dominant model in particular from the advent of the nation-state until the end of the Cold War. Nation-states needed access to knowledge, for example, for the development of their national infrastructure such as railway networks or the further development of their institutional systems like school and legal system. This they secured through the establishment of full universities since Bologna in the eleventh century and specialized universities, such as the institutes of technology around the middle of the nineteenth century. In Switzerland, for example, the Swiss Federal Institute of Technology (ETH) played this role. Subsequently, at the end of that century, business schools and universities of economics and social sciences were founded, in Switzerland the University of St.Gallen (HSG).

Historically, public research funding of a wealth of large research areas—today many of them classified as purely private sector research areas—was vital and should not be underestimated. The emergence of the World Wide Web as well as Silicon Valley as the cradle of the IT industry can so be traced back to the large public (defense) research programs during the Cold War (see Lanz 2015). The dominance of the state leads to various additional by-products such as reverse selection in the admission process, by which public schools, for example, the high school/gymnasium through the administration of the university qualifying exam, had the power to decide who could enter the next level of education. The universities, led by the same state, had to accept successful graduates of these gymnasiums accordingly.

The emergence of typical research careers and life paths at universities can also be largely attributed to public regulation of the sector. The career path from undergraduate to master's and doctoral student, postdoc, and habilitation through to tenured professorship is a typical expression of this. Lifelong employment of even nonprofessorial teaching staff, for example, "academic councils," reflects the influence of the governmental civil service.

The hierarchical structure of the activity system "research and teaching" (see Fig. 1) clearly also contributed to important successes in a very specific contextual environment:

- In the period of the nation-state's dominance, the state was in the best position to finance critical research budgets. This was particularly the case with the growth of the public spending ratio in nearly all industrialized countries after WWI until the end of the Cold War in 1990.
- In a period of technologies which just allowed point-to-point communication using letters, telephones, or physical printed matter, communication between system heads, like full professors as hubs, was often the only way to diffuse ideas and findings over national and system boundaries.
- In a time of complex access to knowledge with limited space at universities and labor-intensive search processes in physical card catalogs in libraries, it made sense for the best informed people to select, process, and transmit knowledge.

The question is, to what extent has the environment changed and with it the conditions for teaching and research? And to what extent does the activity system of

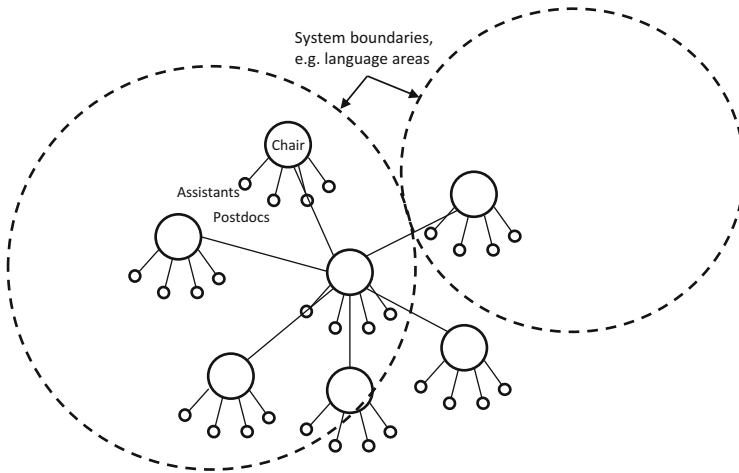


Fig. 1 Traditional activity system of teaching and research (own presentation)

teaching and research have to adapt, to this new environment? And is it capable to adopt?

2 Chapter 2: Changes in the Environment (Drivers of a Transformation)

The St.Gallen Management Model conceives the environment/the context of an organization as a resource space of options (cf. Rüegg-Stürm and Grand 2015). For each organization or function, resources must be optimally configured to become strategic success factors. A firm's environment includes the natural, social, technological, and economic environment. Changes in these areas require a reorientation to new strategic success factors and a reconfiguration of value-creation processes. For teaching and research, the following developments are especially important:

1. **Technological development:** In the first phase from the mid-1990s, the Internet enabled a global networking of researchers. Information could be exchanged at virtually no cost directly from point to point, between individual researchers worldwide. English established itself as the “lingua franca” in science; language areas became porous. In this process, the classical star-shaped network structure characteristic of the “professor” system was replaced by a grid network (see Fig. 2). No longer did professors as hubs of their research groups channel in some cases and even monopolize information streams. Opportunities to engage in collaborative research and prepare joint publications became a common good available to every level of an academic career. In a process of democratization of information sovereignty, all at once it was possible for a doctoral student to collaborate directly with a postdoc working on the same topic on another

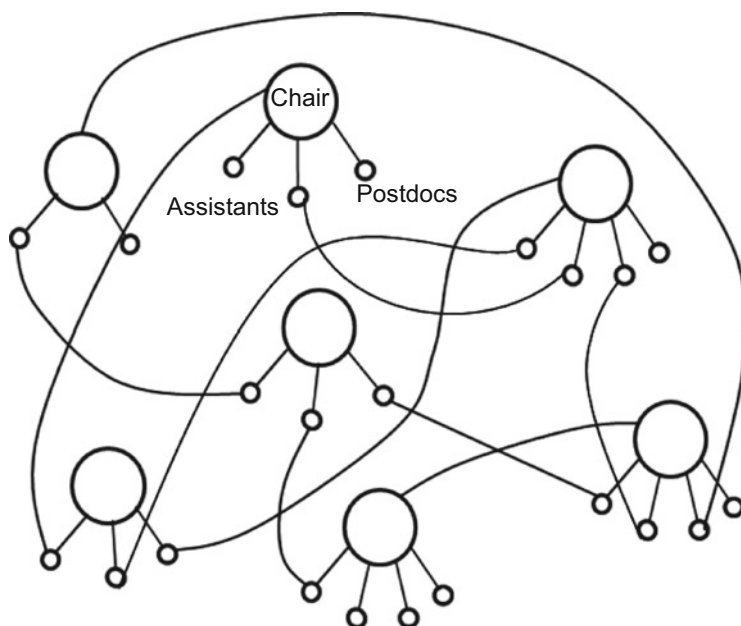


Fig. 2 Modern activity system of teaching and research in a global network (own presentation)

continent. Position as the key asset in academic research networks was replaced by knowledge on specific topics.

In the second phase from 2010, huge quantities of data became available in all economic and social realms affected by digitalization. For example, it was no longer necessary to collect consumer data using representative surveys. Through analyses of real demand data, such as purchases or information retrieval on the Internet, one had almost instant online access to individual and collective behavioral data. Empirical research moved from surveys and behavior lab experiments to big data analysis. Data are thus no longer the exclusive province of universities, which they collect on sample basis at great cost. They are distributed across company networks or purchasable on global search engines. Their analysis requires advanced algorithms and large computing/coding capacities. This is tending to increase the critical mass for research projects and is making new partnerships necessary, often between universities and companies.

The general access to knowledge is also changing learning behavior of the students. Students are increasingly learning from concrete tasks for which they download the necessary knowledge directly from the Internet. By this role of academic teachers is also changing. They not anymore select, channel, and prepare knowledge; they rather coach knowledge acquisition processes. They do not stand anymore between the students and the knowledge as quasi gatekeepers. Like coaches for the tasks, they are structuring the learning processes and moderating access to knowledge. Here too, network approaches are

becoming more important. Students work together on specific tasks, often with colleagues from other universities and knowledge partners for practice from all around the world. Collaborative learning (cf. Bruffee 1999) is becoming correspondingly more important. A campus' focus is no longer centered on research offices and separate lecture halls, but rather on inspiring multifunctional meeting rooms for students, instructors, and researchers, often in the form of labs like design labs (cf. design thinking Brenner and Uebernickel 2016) or special IT-supported learning environments such as trading rooms.

2. **Socioeconomic environment:** Because of globalization, competition is intensifying not only in the real economy but also between places and finally with the opening of markets for skilled labor for talents. High-cost locations in particular are under increasing pressure to boost their productivity and deliver value added. In the process of creative destruction (see Schumpeter and Seifert 1993) in the interplay between innovation and imitation, firms must continuously increase and enhance their competences. Only when firms using superior competences manage to provide individual goods and services of better quality and/or less expensively than other firms and other locations is their economic survival assured.

It is evident that because of the importance of intangible knowledge, the creative advancement of economic activities can be best pursued through personal exchange in clusters, supported by creative milieus (see Florida 2012). In this effort, companies seek collaboration with the most capable people and thus also locate their knowledge and research departments in places with strong knowledge clusters. Consequently in an effort to strengthen their competitive position places, countries and cities invest in the development of university activities, for example, by founding new institutions or acquiring subsidiaries of existing institutions.

This continuous improvement of their own capabilities as high-value and hard working labor is also important for specialists and managers (see Harford 2015). Thanks to the new information and communications technologies, knowledge workers can become more effective, for example, by making their ideas or concepts quickly accessible to a broader public and by achieving greater productivity and ultimately high incomes. In the network society, the expression "the winner takes it all" carries considerable weight (see Frank and Cook 1995). Those who quickly and consistently dominate an area of knowledge or competence set the standards and often exclusively command the highest returns (see Shapiro and Varian 2013) and productivity as well as salary differences increase.

In consequence, places, universities, and research institutions compete for the most talented people and, symbiotically, research partnerships with the most competitive companies or public institutions in their field. And talents want to maintain their capability levels by having access to high-rated knowledge streams and lifelong learning. Conversely, there are new markets in lifelong continuing education and qualification for alumni.

In this knowledge economy, there are also huge self-reinforcing effects. Good research partnerships make an institution attractive for outstanding researchers

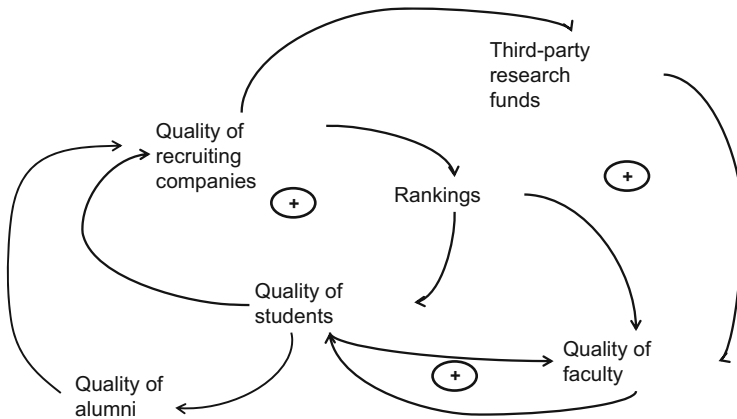


Fig. 3 Self-reinforcing effects at universities (Strategy paper, University of St.Gallen, 2014)

and teachers, which attracts especially talented students, who are then especially valuable as new recruits to the corporate research partners in the field. A university with good research partners as well as good researchers and students is naturally also attractive in continuing education, in that good, reliable collaboration in continuing education can generate new research collaborations (see Fig. 3), which at the end also strengthens the attractiveness of the place itself. Thus also differences between qualities of universities and attractiveness of places with their respective clusters are growing.

As a result of intensifying competition and economic globalization, the position of the state is also changing. With increasing financial constraints, the trend toward the state as guarantor of services is ever more pronounced (see Schedler 2000). Public services formerly provided by the public sector and the public administration increasingly are delivered also by private service companies. Functions such as the provision of health care, education, transportation, and even defense and security are no longer necessarily being fulfilled by the state itself. The state is using performance contracts and other instruments to ensure the corresponding functions are carried out. Services that in a state system were previously more or less “ordered” by the state and thus hierarchically organized are being at least partially opened to competitive bidding and are thus being somewhat exposed to market mechanism. Conversely, ever greater numbers of previously market-driven, purely private sector activities are now being increasingly regulated (cf. especially the financial sector). As a result there is an interesting convergence between the state/hierarchy coordination and market coordination of economic activities.

3. Developments in the university sector

The university sector which for centuries was the center of research and teaching activities was operating in a more or less stable structural environment. Against the backdrop of the developments in the technological and

socioeconomic environment discussed above, however, new institutional settings develop and research is provided more and more in countries, regions, and topical areas which previously did not have access to higher education. In many cases this happens through new and partly private providers. These include private universities or nonuniversity research centers, supported by foundations or other knowledge organizations. For example, consulting firms are supporting the study of business administration by creating research centers and private universities. These institutions all compete for research partnerships as well as outstanding individual researchers.

Universities rely on research-based teaching. Thereby teaching itself also is heavily influenced by digitalization. Students today have close to immediate access to worldwide knowledge. Using MOOC's (Mass open online courses) they can acquire knowledge from around the world. Traditional universities therefore have to create additional value through classroom teaching to legitimate the cost of physical presence of lecturers and students. As a consequence the role of lecturers is changing dramatically. Instead of lecturing knowledge, they have to develop competencies of students in quasi flipped classrooms (knowledge acquisition is performed outside the classroom by self-study) by using role-plays, games, and simulations in a role of more a coach and trainer. Hence quality of teaching depends on research quality and in addition the ability to invest in innovative teaching methodologies and infrastructures.

This all is reflected in an increasing differentiation, which is also apparent in other areas such as labor markets and locations. Qualitatively high-ranking universities reach out ever further in global markets for outstanding teachers, students, and research partnerships. On the other hand, there is a large group of relatively interchangeable educational institutions catering to the regional market and focusing on application-oriented research. Because of cost pressures, they are increasingly obliged to purchase educational content from the global marketplace in the form of MOOCs and in this way become dependent on large institutions. New competition as well as cooperation between universities is growing (see Huber 2016).

In summary, the following are the features of the process of transformation:

- Global network structures instead of regional hierarchical structures in research
- With big data increasing cooperation between university and practice
- Larger critical mass for research projects
- New forms of teaching and learning with large requirements for investment in new learning methods as well as physical and digital (e.g., IT in the form of “blended learning”) infrastructure
- Increasing numbers of private actors in competition with traditional state actors
- Intensified competition for the best lecturers and researchers
- As a result a growing differentiation between top and normal institutions and top and average places/locations in general

3 Chapter 3: New Models of Teaching and Research (Networks Between State and Market)

On account of the developments described above, the success of a university and indeed any teaching and research institution depends on its faculty and attractiveness to top students. The following elements are important in this regard:

- Assuring an attractive work environment and a cooperative culture for researchers and students. This involves monetary compensation; as described above, compensation for outstanding knowledge workers in the network economy is increasing disproportionately. But it also includes immaterial factors, such as the physical work environment, the social and cultural environment in which the university is embedded, as well as the university's control and management systems, which must be geared toward a long-term culture of trust in the context of an expert organization.
- The ability to develop situational and pragmatic forms of collaborations, especially in research, with other universities or partners in practice. Here basic principles must naturally be upheld such as preserving academic freedom through, e.g., the university's retention of the right to personnel decisions and avoiding strategic dependence on single partners by adequately diversifying partnerships.
- In order to preserve academic freedom and a long-term orientation, unconditional basic financing must be secured be it in a form of long-term paying commitments of the state or private partners or a significant endowment fund. Such basic financing is important for university teaching. Students' willingness to pay has been demonstrated for direct, instrumental, usable knowledge and competences. However, direct users, the students or course participants, typically do not display sufficient willingness to pay for a broader, socially oriented general education that empowers them to anticipate long-term developments. In research, solid basic financing is a guarantee for long-term employment contracts, i.e., tenure, which still are needed in the competition for top talents.

As mentioned above, the university landscape can be expected to differentiate. There is a growing discussion on generic types of universities, even business models of universities (see also Aebischer and Escher [2016](#)). Following generic types of universities can be expected:

- Universities with regional scope to cover basic regional educational needs: Such universities will continue to exist in the future. They will be dependent on a larger share of public financing, but conversely, for the state they will serve as an instrument for the pursuit of societal objectives like access to higher education for broad parts of the population. This is currently evident in the USA where a greater weight is being given to classical community colleges. These schools benefit from a certain regional monopoly because of the limited mobility of their students, who are often employed in outside jobs. But with public finances

increasingly under pressure, they have to improve their productivity and thus will also increasingly have to use elements of IT-supported teaching and learning. With shrinking resources research activities are bound to decline. They therefore increasingly rely on inputs from external research networks.

- Research and educational centers with a large proportion of visiting faculty: These institutions will benefit from either excellent locations or relationships with companies or donors. Their strategic competitive edge is owed to their flexible networking for faculty, students, and research partnerships. Their percentage of undergraduate training will be rather limited. Research can be significant depending on their funding and partner networks.
- Faculty-oriented institutions: The largest share of the traditional quality research universities belongs to this category. They have an interregional reach thanks to their faculty's performance and thus ensure for themselves a position in international research networks and student or recruiting networks. Thanks to their distinguished research and sought-after graduates, they are attractive for partnerships with the private sector and can thus raise significant third-party funds.

These three generic basic types span their own field over the three most important strategic resources, access to students, location, and faculty (see Fig. 4). In any case (competitive) position in networks is crucial. Classical central European universities of the Humboldtian tradition face the question of how to shape the transformation to a successful network organization in the interplay between faculty, location/campus, students, alumni, recruiting firms, and private and public research partners. This must take place against the backdrop of a stronger market orientation as public finances continue to shrink.

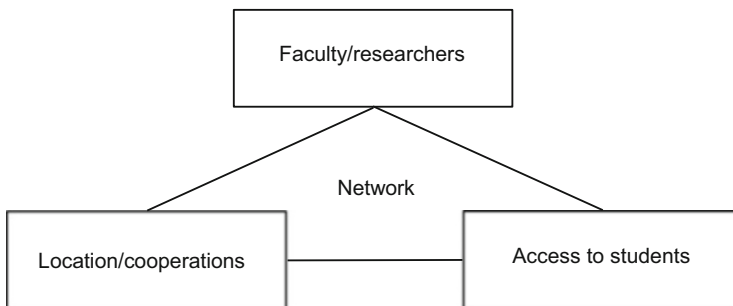


Fig. 4 Strategic success positions in teaching and research (own presentation)

4 Chapter 4: Outlook, A Regionally Rooted Faculty-Driven University with Global Reach (The Example of the HSG)

The University of St.Gallen was founded in 1898 as a classical commercial academy by the city's local textile firms, joined in a commercial board of directors, today the chamber of commerce and industry, as well as by the canton and the city of St.Gallen. Granted the right to award doctorates, it became a university in 1938. It has always remained true to its specialization as a university of economics and business while it has successively incorporated related disciplines such as law, social science, political science, cultural studies and humanities.

As a specialized university, it has always needed an interregional reach in order to achieve a critical mass. It introduced a foreigner quota of 25 % as early as the 1960s as a means of managing the high demand from abroad. Today, the University of St.Gallen, the HSG, ranks among the ten leading business schools in Europe (see Financial Times Business School Ranking 2015). In Switzerland it represents the third type of a university, the university of economics and social sciences, along with the classical full universities and the institutes of technology (the ETH in Switzerland) that emerged in the middle of the nineteenth century. Similar schools were the previously founded London School of Economics and Political Science (1895), the Stockholm School of Economics (1909), and the Vienna University of Economics and Business (1898).

Located near large economic centers and geared toward an interregional reach, the HSG follows the above-described, faculty-driven model. It has always structured itself as an expert organization and has always maintained a high degree of autonomy with distinctive self-administration by the professors. As with other expert organizations, the assembly of partners, the professors in the senate, remains an important decision-making body for policy issues.

With increasing internationalization and globalization, the University of St.Gallen has gone from being one of the leading business schools in the German-speaking world to one of the leading European business universities. As today in particular, the market for outstanding researchers and lecturers is global, and at least some of the university's activities must have global reach. Vision 2020 reads accordingly:

As one of the leading business universities in Europe, we are known worldwide as an academic hub for current problems in the economy and society as well as for the promotion of integrative-thinking, entrepreneurial, and responsibly acting people.

To advance from a regional institution to one with international and even global reach, the University of St.Gallen must pursue a balanced development on various levels (see Fig. 5). With the internationalization of its teaching, it creates the conditions necessary to attract outstanding students from Switzerland as well as the international student market. The internationalization of its teaching is also a requirement for the internationalization of the faculty and vice versa. Important past

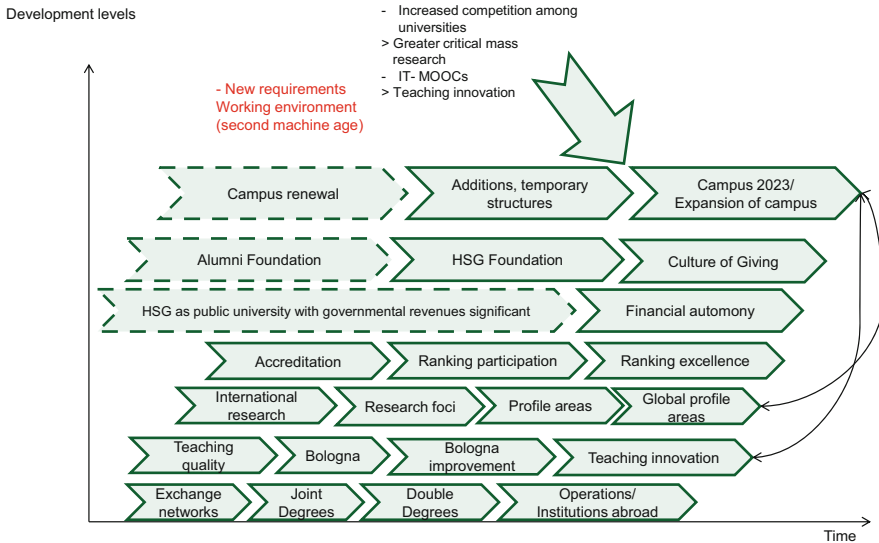


Fig. 5 Dependency of strategic development projects at the example of HSG (Strategy paper, University of St.Gallen, 2014)

development stages in this regard were the building of international exchange networks, Joint degrees, a bilingual campus, and representations abroad.

Excellence in research is an important requirement for developing a profile. Early on, the University of St.Gallen organized its research activities in institutes. Since the early 2000s, crosscutting institutional high-profile areas with European reach, so-called “lighthouses”, have been developed. The definition and support of such lighthouses were in the meantime handed over to the departments, while the university as a whole concentrated on developing global high-profile areas, so-called areas of thought leadership. This effort is being supported by the introduction of new chairs with international faculty.

An important requisite for modern forms of teaching, a good working environment for the faculty as well as an internal and external identifying icon is an attractive campus. In 1963 the HSG was the beneficiary of the first modern campus in Switzerland, a Cité Universitaire, as a closed research and learning space. Although since then it has been expanded more than once, today this campus is too small and no longer meets the needs of modern collaborative learning in all areas. Following this logic, currently one of most important strategic projects is the expansion of the campus from a capacity of just 5000 to upto 9000 students. This expansion is more than just an infrastructure project; it is an innovation project for teaching and research.

As a precondition for the formation of research focus areas and the development of global high-profile areas, as well as for funding a modern campus, the university’s financial standing must be strengthened. Traditionally, the HSG has

reached one of the largest proportions of third-party funding. As early as 1963, a third of the costs of building the campus were raised in a national fundraising campaign. An important forerunner of this tradition of self-financing was the creation of entrepreneurial entities in the form of financially autonomous research institutes at the end of the 1930s. The founding of the Executive School at the start of the twenty-first century established another important pillar. Most recently, the development of an HSG Foundation is an important step for fundraising. The university also moved away from being included in the governmental annual budget to being granted comprehensive financial autonomy based on a four-year performance mandate with the right of equity capital formation.

A strong alumni organization is of highest importance for the university's integration in sustainable research networks, as a basis for a loyal customer base in continuing education and as a basis for funding. The HSG has one of the oldest alumni organizations in the German-speaking regions with over 23,000 members currently. The establishment of professional offices in 1998 and the introduction of international alumni conferences were important steps in its development. In the future, the synergies between the university and the alumni organization should be strengthened.

Executive education is not only an important instrument for financing. It also helps embed the university in practice and research networks. Many collaborative projects with practitioners come about through relationships with participants in executive education. Important steps in the development of executive education at the HSG were the first seminars offered from HSG institutes as early as 1938, the founding of the continuing education in 1968, the construction of the Executive Campus HSG (Holzweid) at the end of 1995, and, as mentioned, the establishment in 2007 of the Executive School that offers important degree programs like the full-time MBA and executive MBA programs. In the future, the Executive School should be even more firmly targeting "C" level top management. Here an increasing convergence between consulting, research, and executive education in networks with partners from practice is becoming apparent. Often, research results are directly applied in divisional strategies of corporate clients, which then require implementation through executive education.

The ability to attract excellent researchers and teachers to a single university requires competitive offers and an inspiring working environment. The University of St.Gallen has a model for involving its professors in the success of its research units. In recent years, the possibilities for market-driven salaries have been expanded, in particular through activities in executive education. The Research infrastructure has also been strengthened by the construction of a central institute building, which will be followed in a few years by a second major center in the city. The research capacities have been expanded through the creation of new posts for mid-level faculty as well as a new fund for supporting conferences. Junior researchers have been detached from the chairs and are now directly assigned to the schools which reflect their independent position in internal and external research networks.

In the future, it will be increasingly challenging to combine practice-based research with the requirements of basic research. Both areas require increasing specialization. The key is developing internal work networks of both research-focused and practice-focused people who are firmly rooted in their respective networks (scientific community, practice).

In order to realize this, the university's management model must be continuously adapted. Here a balance must be struck between creating the capacity to develop strategic focus areas, which requires performance monitoring and central management, and avoiding the emergence of a transactional controlling culture, which would destroy internal cooperation.

The basis for this is being firmly rooted in the region. Further development requires achieving legitimacy in the region, for example, securing basic financing from the canton and the necessary acceptance of expansion projects. It also requires creating opportunities for research and learning nearby and contributing to an attractive residential and living environment for faculty and students. In the end also a university is relying on a well-functioning regional cluster. Thus, one of the basic strategic principles of the University of St.Gallen is to combine international reach with strong regional roots.

5 Conclusion

Knowledge organizations in research and teaching are undergoing a transformation. This is being driven by technological—mainly digitalization—and socioeconomic changes, primarily the new role of the state. In this process of transformation, the traditional strengths of the classical universities will erode. What is needed is an orientation toward a clear strategic factor for success. As the example of the University of St.Gallen shows, an aligned progress on different dimensions of development is needed.

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