CHAPTER 7

Science systems under pressure: The entrepreneurial *must* of traditional universities in the 21st century

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THE EVOLUTION OF UNIVERSITIES

After the fall of the Roman Empire in the 5th century of the Common Era, the public education system almost completely disappeared, with just a few church schools remaining. It was not until centuries later, when towns and international trade began to flourish again, that the value of education was recognized, and illiteracy addressed across a broad front. For this purpose, the first citizen schools were established. These schools, together with the church schools, subsequently evolved into universities. Students and teachers at these institutions formed a community, a collective, in other words, a *universitas*. In the Western world, the Pope and the Emperor protected these new institutions and granted them special privileges: each university had its own jurisdiction and autonomous governing body, making it almost a state within a state. The universities' main mission at the time was education, to which much importance was attached. After teaching had dominated at universities for almost half a millennium, the understanding of science changed in the 18th century, and experimental research became more important. This type of research led to a sharp increase in the number of professors and consequently to the creation of individual faculties. At the same time, increasingly more students were attending university. Since the

end of the Second World War and, in particular, in recent decades, universities have evolved from elite institutions where only a small percentage of the population was educated (approximately 5% of the corresponding age cohort) into a universal system that encompasses 40%-50% of young adults (Trow, 2007).

Eventually, the self-governance and autonomy of universities was brought to an end in the 19th century. The majority of publicly funded universities were integrated into the ministerial bureaucracies of their states, meaning the loss of the autonomous status that they had enjoyed for centuries. It was only in the last decade of the 20th century — and slightly later in Germany and Austria, at the beginning of the 21st century — that universities in continental Europe regained some of their autonomy. The aim was to transform the rigid, bureaucratic systems into efficient, effective and profitable service facilities. Under the title New Public Management (NPM) — or results-based management — new governance tools were introduced, legislation streamlined and modernized, and responsibilities redefined between the executive, legislative and administrative bodies. These reforms were aimed at giving universities more autonomy to stimulate the creation and dissemination of knowledge and innovation. In Switzerland, the term "autonomy dividend", associated with more efficient "knowledge production", was used. It was also assumed that the new-found freedom would give universities more leeway, particularly with respect to financial management, which they could then use to their advantage (Schenker-Wicki & Olivares, 2010). However, the extension of autonomy in the areas of organization and finance — mainly under the headings "performance agreement" and "global budget" — had a downside: the additional autonomy drastically increased the accountability of universities in a number of respects. The institutions concerned were obliged to introduce comprehensive reporting to measure and assess their activities (Haldemann, 1998). The form that accountability took varied greatly within Europe and depended on how much trust was given to the individual university by the responsible government agency.

However, the reforms did not affect the general consensus in continental Europe that education was a public good. Much of this understanding was based on the positive external effects on the economy that result from a competitive stock of human capital ("capacity building") (Weiss, 2000). As a result, education in continental Europe was (and still is) largely subsidized by the public purse. Therefore, tuition fees at universities in continental Europe are relatively low compared with those in the US or the UK. Some German-speaking countries have even abolished tuition fees altogether. Conservative governments in Austria and Germany introduced moderate tuition fees for publicly funded universities, but these fees were quickly scrapped as soon as a social democratic party came to power. Despite the intensive discussions

about substantial increases in tuition fees that have taken place repeatedly in German-speaking countries, the paradigm of education as a public good has held firm. At present, it is politically impossible (at least in German-speaking Europe) to propose that students make an increased contribution to cover the costs of universities.

THE NEW CHALLENGES FACING THE ECONOMY AND SOCIETY

However, it is not just the universities that have undergone a drastic change in recent decades — the society and the environment in which they operate have also evolved. The challenges facing research universities in the early 21st century are of concern to the governing bodies of many universities. They essentially relate to three developments: globalization, leading to an unprecedented acceleration in the pace of life; demographic change, associated with an aging society; and the increasing importance of the knowledge society.

Globalization: It is appropriate to begin with globalization. Globalization has drastically increased the speed of many daily and work-related processes, primarily due to the high concentration of different potential interactions. The megatrend of globalization goes hand in hand with a huge acceleration in knowledge generation. Never before has so much new knowledge been created, meaning that what was correct and relevant yesterday is outdated or irrelevant today. In the technical professions, the half-life of specialist knowledge is estimated to be approximately five years, indicating that acquired knowledge loses up to 50% of its relevance after this period, as it is replaced by new findings (Schüppel, 1996).

Demographic change: The second major development is demographic change caused by the decrease in birth rates and the increase in life expectancy, which will pose problems not only for Switzerland, but also for the whole of Europe. In Europe, the employment to pension ratio will shift from 4:1 at present to 2:1 by 2050, and the working population will shrink from today's figure of approximately 310 million to 250 million (Eggenberger, 2015). This forecast also applies to Switzerland, where the number of retirees will increase by more than 50% in all cantons over the next 10 years (Swiss Federal Statistical Office, 2016). In specific terms, this increase means that approximately one third of the population will depend on a pension and a functioning social security system. If these systems fail, old-age poverty will become a real possibility. In addition to the issue of retirement provision, the labour market will also be affected by major changes in demographic structures that will intensify the competition for talent. Furthermore, due to the aging of the society, the skills required in a knowledge society will not be

fully covered by existing skills, which will in turn make continuing education necessary to maintain the stock of human capital in the society. At the same time, the tax base will shrink for the state, as the income of retirees is generally not as high as that of the working population. This outcome will inevitably lead to a shortage of and more intense competition for government funds.

Knowledge society: The third development that should be mentioned here is the transition from a service society to a knowledge society. The creation of new knowledge is crucial to the success of an economy; in knowledge economies in particular (mainly Western countries), innovation accounts for 70%-80% of economic growth measured in terms of GDP (Information Society Commission, 2002). Thus, innovations are essential to the competitiveness of an economy, and universities play a key role in generating innovation (Stephan, 2012; Aghion, 2008). Governmental investment in research and development has therefore multiplied, and public spending on universities has skyrocketed, even in our own small economy of Switzerland: in the last 20 years, research and development (R&D) expenditure in higher education in Switzerland has more than doubled in real terms (OECD Statistics, 2018a). Increasing competition from Asia, and in particular from China and India, should not be ignored either. Over the past 20 years, China has increased its public and private research spending by a factor of 30. Due to this enormous growth rate, it is expected to overtake the US by the end of 2018 (it passed the EU back in 2015). These forecasts are based on the fact that China's average annual growth in research spending stood at 18% between 2000 and 2015, compared to 4% in the US. China is therefore preparing to become a leading scientific nation. China, with India in tow, may have joined the race late, but they are both going all out to catch up and overtake existing Western countries (OECD Statistics, 2018b; *Washington Post*, 2018). Thus, competition in research has intensified because of Asian countries, but new sources of research organizations, including platforms such as InnoCentive, are also playing an increasingly important role. NASA, for instance, posted a question on InnoCentive about solar flare prediction to which none of its engineers had been able to find an answer (Brynjolfsson & McAfee, 2016). After having been posted, the problem was quickly solved by a retired US engineer who had worked in a completely different field. The idea behind these kinds of platforms is quite simple: companies or organizations can make problems that they cannot solve by themselves internationally visible and thereby tap into an enormous additional source of human potential. An internet-enabled device, such as a cell phone, is all that is needed to use such platforms.

All the developments described above — globalization, demographic change and the knowledge society — intensify the competition worldwide

and call for additional investment in tertiary education, since the generation of new knowledge is becoming increasingly important for growth and welfare, and because generated knowledge quickly loses its relevance. These challenges are putting European and North American science systems under pressure and sharply raising the costs of tertiary education, particularly in disciplines in which expensive research infrastructures dominate.

EUROPEAN AND NORTH AMERICAN SCIENCE SYSTEMS UNDER PRESSURE: WHO PAYS?

The situation faced by publicly funded research universities in continental Europe, with Switzerland as an example

Modern research universities can conduct highly competitive research only if they are given sufficient funds. In particular, expenditure is affected by the sharp and continual rise in the costs of modern infrastructure, especially in the fields of life sciences, natural sciences, medicine and high-performance computing. However, digitalization has also made a mark on other areas (e.g. the humanities) and has led to major costs resulting from the collection, management and storage of data previously not available in digital form. Until recently, universities specializing in arts and humanities were spared the expense of costly research infrastructures, but this is no longer the case. As a result, the vast majority of universities — at least in continental Europe — are finding it increasingly difficult to finance the additional expenditure through state contributions. This difficulty also applies to Switzerland, a rich country with a very stable funding system that is essentially based on three pillars. However, due to international competition and pressure, this system is now being pushed to its limits.

In Switzerland, due to its limited constitutional powers, the Confederation has little influence on higher education policy. The only area in which it has constitutional powers is the ETH domain that includes the two Swiss Federal Universities of Technology. The main bodies responsible for the 10 research universities are the so-called university cantons, which to a large degree finance their universities by themselves. The Confederation has a subsidiary allocation function in that it provides financial support to universities in the form of basic or investment contributions, or it makes funds available for special programs. The basic contributions are traditional financial subsidies and can be used freely by universities. In addition, as part of a horizontal financial equalization scheme (the Intercantonal Agreement), the universities receive funds from the non-university cantons for the education of the students from these cantons. This arrangement presents difficulties, however, as on the one hand, the university cantons are no longer willing to increase

their contributions to the same extent as in recent decades, and on the other hand, the non-university cantons are no longer prepared to pay ever-greater contributions to the universities for their students. Thus, it should not be expected that funds will simply be increased to the extent desired by the research universities and their leadership.

The difficulties of sustainable research funding can be seen not only in Europe, but also in the US, where well-known research universities have amassed a mountain of debt to remain at the forefront of international competition. The University of California, Berkeley, a top-ranked, public research university, currently has debts amounting to $19.7 billion (University of California, 2018). The sky-rocketing costs and intense competition are a concern for all university presidents and can be described as a "race to the bottom".

A solution to the dilemma: "impact on society" or "third mission"

Recently, society's increasing investment in universities has led to a greater political focus on the topic of "impact on society". The debate, which started in the US and the UK, has also found its way into the politics of continental Europe. It calls for universities to implement their research results as quickly as possible to benefit society, create highly qualified work places, and, last but not least, generate additional income for the universities. This implementation requires universities to make a greater contribution to a region's prosperity — not only indirectly through increased educational returns, but also directly through research partnerships, patents, licenses and the formation of companies (spin-offs and start-ups) (Martin, 2012).

At the same time, the "third mission" is anathema to many university members who have been socialized in the publicly funded research universities of continental Europe and who fear for the independence of research and teaching at their own institutions. In addition, traditional research universities in continental Europe have never been accustomed to being held accountable for their impact on society. In Europe, the university governing bodies must make a large effort to implement the paradigm shift heralded by the "third mission" at their universities and to assuage people's fears.

Necessary investments to cope with the "third mission"

To cope with this political demand, university leadership is confronted with a number of new tasks. Essentially, these are awareness-raising among university members, training in additional skills, and providing appropriate resources. Without awareness-raising, young people are often unaware that they have the potential to start their own company to realize and

commercialize their ideas. In addition, skills must be imparted for successful companies to emerge. These skills should be taught in various courses and workshops and by mentors. Last but not least, universities must make resources available, including legal advice on setting up a company, support for patent and licence management and help with the search for potential licensees or investors.

For the leadership of a university, the "third mission" means, above all, additional resources and investments in the first phase. Whether the universities will actually be able to earn money from the spin-offs in later phases is not certain. Although some companies manage to make a major breakthrough and go public, this tends to be the exception. Most spin-offs become conventional small and medium-sized enterprises. Although the university does not earn money from them, the importance of these spin-offs for the university's region and for local politics should not be underestimated, particularly as they may lead to the creation of high-quality jobs and tax revenues for the local governments.

However, the innovation pipeline can achieve a high degree of innovation only if the individual sections are correctly populated. For example, if not enough funds are invested in basic research in a country, not enough ideas will be produced. In addition, if new ideas cannot be translated into marketable products due to a lack of capacity in applied research or experimental development, the pipeline at the upper end will become blocked and result in too few innovations. The art of politics lies in making the right investments in the right places. Education economics has taught us that in technologically advanced countries such as Switzerland, government funds invested in research should first and foremost benefit basic research (Gersbach, Schneider & Schneller, 2008).

New Forms of Public Private Partnership for the "third mission"

In the past, we used to have a classic sequential innovation pipeline in which ideas from basic research were further developed in applied research before being tested in experimental applications; today, we see a change from the strictly sequential processes to parallel and ever-faster interactive processes (Gassmann, 2006; West & Gallagher, 2006). Specifically, this change means that basic research, applied research, experimental development, and application are linked via several feedback loops, greatly accelerating the implementation of ideas. Thus, especially in medicine, translation research from the bench to bed becomes increasingly important and makes collaboration between different scientific disciplines and between basic scientists and clinicians indispensable for developing new therapeutic approaches. Currently, groundbreaking innovations in health care are not simply achieved in a

research lab, but happen at the interface of academia, health care and industry. Based on this, our university has developed a public private partnership with Novartis, one of the world's leading pharmaceutical companies, and the university hospital. We founded the Institute of Molecular and Clinical Ophthalmology Basel (IOB), where basic researchers and clinicians work hand in hand to advance the understanding of vision and its diseases and to develop new therapies for vision loss (innovation). The setup of the institute is highly collaborative and interdisciplinary, and it is intended to increase the innovation rate based on the several feedback loops installed. Novartis is interested in this kind of research because innovation in ophthalmology has been slow for many years and because globally, the prevalence of eye diseases is constantly rising. Even today, there is no effective therapy available for most of them. In aging societies, disorders such as macular degeneration or glaucoma constitute a leading cause of disability and loss of independent lifestyle. Worldwide, and especially in Asia, myopia — or short-sightedness — is steeply increasing, with up to 90% of teenagers being affected in some regions. The IOB was set up as a collaborative organization to address precisely this challenge. It was established as an independent foundation, granting academic freedom to its scientists.

THE ENTREPRENEURIAL *MUST* OF THE UNIVERSITIES

A new form of leadership: dealing with politics and parliaments

The modern research university will face some major challenges in the coming years: international competition for top minds, international competition in research and development, and exponentially increasing research costs. No university can overcome these challenges alone: it depends on the support of the public and the politicians at the regional and national levels. This calls for new forms of collaboration and organization. As mentioned above, 70%-80% of the growth in prosperity in knowledge-based economies is attributable to new knowledge. Science policy is therefore becoming economic policy, and vice versa, for the first time in history. Both areas overlap and are interdependent. To a certain degree it automatically follows that university funding is no longer the central concern of only the educated middle classes, but that it is largely responsible for the development of prosperity in a country. However, if science policy is also becoming economic policy, universities must make efforts to create new alliances in politics, business and society. University leadership in the 21st century needs to become more political and entrepreneurial for the benefit of its institution and is required to obtain the necessary parliamentary majorities to develop further and conduct cutting-edge research.

Dealing with more stakeholders

At the same time, the university boards have a duty to broaden their funding base. In German-speaking countries, this cannot be done through tuition fees but only through private financing. Private money is generally acquired in two ways: fundraising and sponsorship on the one hand, and knowledge transfer and innovation on the other. Although they have already gained some experience with fundraising and sponsorship in the past decades, the field of "innovation" is still uncharted territory for many traditional universities in continental Europe. In particular, new forms of public private partnerships should be established to support the third mission of the universities and to increase the financial base for cutting-edge research. In addition, new forms of sharing infrastructure could be established among universities and corporations. In contrast to the 19th and 20th centuries, when traditional universities in Europe were integrated into the ministerial bureaucracies and when the university leadership only had to deal with the ministry, university leadership in the 21st century is challenged by new stakeholders and by the significance that the universities have for the welfare of society.

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CHAPTER 8

Universities as drivers of societal development?

Michael O. Hengartner and Anna Däppen

Research and teaching have always been the two core missions of universities. But, central as they are, they only cover part of the spectrum of activities of modern universities. Indeed, urgent global challenges and the ongoing transformation of societies from agricultural to industrial to knowledge-based economies, have increased the public interest in profiting from academia also in other areas, including for example the transfer and exchange of knowledge (Ribeiro *et al.*, 2018). Universities are thus increasingly expected to actively promote interactions with industry and the society at large. These activities are often referred to as the "third mission" of universities (Etzkowiz & Leydesdorff, 2000).

The notion that universities can be agents of economic and societal development is, of course, not new; it had already emerged in Germany during the 19th century (Ribeiro *et al.*, 2018). History provides beautiful examples of the potential of universities to act as drivers of societal development, and many studies have confirmed the positive impact that can be generated by academic institutions (Blume, Brenner & Buenstorf, 2017).

THE THIRD MISSION

How broadly should this third mission be defined? That universities can contribute to the economic development of the surrounding community is undeniable. A recent study conducted by the League of European Research Universities (LERU, 2017) showed for example that the University of Zurich generated in 2016, directly and indirectly, more than €5 billion of economic activity and that almost 50,000 jobs depended, directly or indirectly, on the

university. Furthermore, the University of Zurich holds over 300 active patent families and founds a spin-off company based on an UZH patent on average every other month, making UZH an important player within the regional innovation system. In recent years, observers worldwide have noted the significant influence of universities as knowledge providers on regional and national innovation and entrepreneurship (Blume, Brenner & Buenstorf, 2017). It is important to note that the fruitful transfer of knowledge and technology is not a one-way street, but rather a co-production process (van den Akker & Spaapen, 2017). Only then can innovations be successfully implemented outside academia. Hence, frameworks supporting an active exchange of ideas between science and society are of fundamental importance.

To reduce universities' impact within society to "simple economic metrics" (Benneworth, 2015) represents however a far too narrow view. While the promotion of economic development through cooperation with industry or the generation of spin-off companies is widely accepted and promoted, universities can also impact their communities in non-economic terms, including developments at the infrastructure and cultural levels. Thus, more and more, universities are expected to act as drivers of overall societal development by actively generating a variety of societal benefits (van den Akker & Spaapen, 2017). According to Paul Benneworth *et al.* (2019), there is actually a "myriad of ways in which universities contribute to changing the world by equipping civic society with new ideas, challenging injustice and reflecting on past failures, by creating platforms for silenced voices and supporting the development of better policies and better democracy".

As proposed by Chrys Gunasekara (2006), it might thus be helpful to differentiate between the different types of activities performed by universities. The previously mentioned knowledge capitalization of universities through activities such as licensing and spin-offs can be seen as a generative role that directly creates growth opportunities and which is mainly economic in nature. On the other hand, universities also play an indirect systemic capacity-building role, for instance by providing informed and unbiased analysis and information, thus contributing to the development of institutional and social capacities (Gunasekara, 2006). According to Gunasekara, this second role of universities can be characterized as developmental, going beyond the direct influence on economic growth.

It is not least based on the consideration that universities "can engage with and stimulate social innovation processes" (Benneworth & Cunha, 2015) that the University of Zurich (UZH) operates more than a dozen museums, botanical gardens and scientific collections, which are free and open to the public. They represent an important part of UZH's societal engagement, attracting more than 250,000 visitors per year.

UZH also offers a large collection of free lectures and panel discussions, including separate lecture series aimed at children, seniors and the general public. These activities generate an environment of openness where a broad variety of issues can be discussed and critically assessed. It is the right of free inquiry and freedom of speech, ultimately tied to the concept of academic freedom, which makes universities the predestined actors to foster openness and public engagement (Tierney & Lechuga, 2010). As part of its public lecture series, UZH regularly invites renowned personalities to present their views on a certain topic. Up until now, many important, but also controversial, thought leaders and politicians have spoken at UZH, among them Sir Winston Churchill, or more recently, the former president of the European Commission, Jean-Claude Juncker, Petro Poroshenko, (then) president of the Ukraine, or the Polish president Andreij Duda.

All these various activities of course require significant resources. However, we are convinced that they are a good investment, particularly since in Switzerland only about 20% of an age cohort go to university. By providing an open platform for discussion, UZH aims at contributing to the evolution of society as a whole by promoting a differentiated view on the world — something that is essential to the functioning of modern democratic and pluralistic societies.

Universities can also promote societal development through their core mission of teaching. By preparing their students to become informed and responsible members of society and by educating the thought leaders of tomorrow, universities are able to develop considerable transformative potential.

DEVELOPMENTS IN SOCIETY

Many important developments in society had their roots in student movements, one need only think of the far-reaching consequences of the protests in 1968. Universities can thus also facilitate societal development by encouraging and supporting student engagement. UZH has a long history of successfully promoting bottom-up student initiatives. In recent years, students at our institution have for example launched the Zurich sustainability week, an initiative to promote an ecologically friendly and sustainable lifestyle, or the Refugees@UZH Program, inviting refugees to attend lectures as guest auditors and eventually helping them prepare for a later application at UZH.

Last but not least, universities can of course influence society through the promotion of research on socially relevant themes. As free and independent institutions, universities have a unique capacity to analyse global challenges

in all their dimensions and to offer solutions that take into consideration all relevant aspects of a problem. What is more, as places where many different perspectives meet, universities can provide a balanced view on potential risks and opportunities of developments such as technological change or digitalization. This consideration led UZH to launch a university-wide Digital Society Initiative (DSI) in 2016. DSI fosters interdisciplinary research on digitalization and promotes the dialogue with different stake-holders from inside and outside academia. Through their research, members of the DSI aim in particular at raising awareness of the effects and potential risks of a rapidly changing societal reality.

Of course, not every societal change is positive, and not every status quo is bad. Academic research can on occasion generate positive impact simply by acting as a stabilizing and integrating force within society. For example, the University of Zurich maintains a professorship of Romansh language and culture. Romansh, a descendent of Latin, is spoken by about 60,000 people living in a handful of valleys in the Swiss Alps. Although less than 1% of the Swiss population speaks Romansh today, it is one of the four official languages in Switzerland. Thus, although the small number of students speaks against it from an economic point of view, this professorship provides an important academic anchor for a language and a culture that represent an integral part of Swiss history and identity, the preservation of which is important for the cultural and national cohesion of the country.

TO SUPPORT OR TO DRIVE?

From the above, it is clear that universities definitively can, through their various activities, impact societal change. The final question that needs to be addressed is whether universities should act in a supportive role, helping society achieve changes that it deems worthwhile, or whether universities should aim to be in the driver's seat, set the developmental agenda for society and then spearhead these changes. While the latter would be intellectually attractive, it would, in our opinion, be counterproductive. The mission of public universities is to support society, not to boss it around, no matter how well-intentioned the bossing around might be.

This is not to say that universities never change society. But, ironically, history suggests that in many of the cases where universities did drive societal changes, these were not planned, but rather inadvertent side-effects of internal developments that were meant to only affect the university itself. As an illustration of this point, let us analyse two examples from the history of the University of Zurich (UZH), in which internal, "academic" decisions on how the university operates led to significant changes in Swiss society.

Being a country with few natural resources and an early industrialization, Switzerland became a comparatively early knowledge society and the establishment of institutions of higher education was seen as being of great public interest. The development of Swiss universities is in general closely linked to the development of the societies they are part of. This is particularly true for the University of Zurich, which opened its doors in 1833 as one of the first universities in Europe to be founded by a democratic state and not by a monarch or the church. In other words, UZH was founded "through the will of the people" and in response to public needs. The close relationship between the University and the community in which it is embedded explains why, at several points in history, university affairs gave inputs for lasting societal transformation. This was the case, for example, in 1839 when the appointment of the very liberal German theologian David Strauss to the Faculty of Theology of UZH caused great waves outside academia. The more conservative parts of the population who saw the old religious order endangered raised vehement protests against the appointment. On 6 September 1839, several thousand people stormed the city of Zurich, where a battle erupted between the protesters and the army, leading to 15 deaths and many injured. The liberal government, in disarray, was ousted and replaced by a conservative "provisional" government which held power for six years. The event was later referred to as the "Züriputsch", making the Swiss German word "putsch" an official German term to designate an uprising or coup d'état.

The graduation of female Russian student Nadezhda P. Suslova from the University of Zurich in 1867 is another example of how universities' actions can eventually initiate societal change. During most of the 19th century, women's rights to education were very limited throughout Europe. As a rule, only men were admitted to universities. There were a few exceptions, however. Following the lead from the University of Paris, the University of Zurich became the second university to allow women to study from the 1860s onwards. As there was no written law explicitly prohibiting the admission of female students, the president of UZH of the time took a pragmatic approach and allowed women to take up their studies at the University of Zurich. Over the following years, UZH attracted many young women, a large number coming from Russia, where previous reforms to girls' education had given women access to higher education, but without allowing them to pursue an academic degree.

Nadezhda Suslova was the first woman in history to formally enrol at UZH. In 1867, she graduated with a doctorate in medicine — the first woman ever to receive a doctoral degree in a German-speaking country. Suslova's pioneering achievement opened Swiss universities' doors to women. In 1872, merely five years after her graduation, women made up more than 30% of the registered student population at UZH, illustrating the lasting influence

of Nadezhda Suslova's matriculation and graduation. Suslova's success initiated an irreversible — but originally unintended — development towards equal opportunities at Swiss universities and, through the professional, social and political activities of the female university graduates, also within Swiss society.

So how are we to answer the question addressed in the title of this contribution — are universities drivers of societal development? The answer is likely both a yes and a no. Universities' actions can indeed have profound influence on societal development. Some of them change society, others stabilize it or can even take it backwards. However, the two examples above also highlight the limited control that universities have on their actions' impact within society. To fully anticipate and control the consequences of university affairs and of scientific innovation is hardly possible. In most cases, only history will reveal the ultimate effects — be they positive or negative — of scholarly actions and decisions.

CONCLUSION

In summary, while the fundamental importance of academia's commitment to society cannot be denied, prioritizing societal impact at any cost and in every domain is likely not the most effective approach. In the face of limited financial resources and time, university leaders should set clear priorities, focusing on those areas where they can actively influence the outcome of their activities. Not surprisingly, these will often be areas corresponding most closely with the genuine strengths of academia, namely research and teaching. Therefore, we propose that universities should not strive to actively "drive" societal development. Rather, they should focus on their core business in the areas of research and teaching, thus providing the necessary basis for transformative scientific discoveries, education for qualified graduates and the means for successful science-society relationships. In short, it is by fostering excellence in research and teaching that universities can most effectively serve the interests of society and generate positive impact.

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