Threat or Opportunity?

From the Humboldt University to a Third Generation University Model

BY J.G. WISSEMA

Higher Education Policy is being discussed in almost every country in the world. This is caused by a number of fundamental changes that force universities to reconsider the Humboldt university model and subsequently public policy. This paper argues that current changes will result in a completely new model for universities, labeled the 'Third Generation University'. Policy measures should be based on such a model rather than being ad-hoc reactions to individual drivers of change[1].

The Humboldt or Second Generation University

What came to be known as the **modern scientific method** had its roots in the early Renaissance. Still, it came as a breakthrough when Wilhelm von Humboldt, the Prussian enlightenment philosopher, founder of modern linguistics, diplomat, and minister of education, founded the University of Berlin in 1810. While the University of Paris, founded in 1200, became the role model for the Medieval or 'First Generation University', the University of Berlin had enormous influence on the development of academia in the 19th and 20th centuries and the term Humboldt University came to denote the science-based university model[2].

Humboldt persuaded King Frederick William III to found the university on the basis of the liberal ideas of the philosopher Schleiermacher, who stated that: *"the function of the university was not to pass on recognised and directly usable knowledge such as the schools and colleges did, but rather to demonstrate how this knowledge is discovered, in order to stimulate the idea of science in the minds of the students, to encourage them to take account of the fundamental laws of science in all their thinking"*[3].

The Humboldt or Second Generation University (2GU) model that gradually emerged can perhaps be characterised as follows:

[1] This contribution is partly derived from: J.G. Wissema, Towards the Third Generation University – Managing the University in Transition, Edward Elgar Publishing, 2009 (translated into Polish, Turkish and Macedonian).

[2] Hammerstein, N., Epilogue – Universities and war in the twentieth century, in: Rüegg, W., (editor), A history of the university in Europe, Volume III, Cambridge University Press, Cambridge, 2004.

[3] Ruegg, W., Chapter 1 – Themes, in: W. Rüegg (editor), A history of the university in Europe, Volume III, Cambridge University Press, Cambridge, 2004.

1. The 2GU's **raison d' être** is to carry out fundamental research. Research is pursued in the interest of the advancement of science. Scientific results are public, allowing each and everyone to benefit equally. Efforts to apply the knowledge created are considered counterproductive to university objectives.
2. 2GUs have a second objective, inherited from the 1GU: education to create scientifically trained professionals. The education of future scientists is added to this.
3. 2GUs are very much based on the reductionist approach. 'Creative' disciplines are farmed out to special Academies (Music, Arts, Dance, etc). Science becomes subject to an ever-increasing number of subspecialisations.
4. Research and education are monodisciplinary. The monodisciplinary faculty organisation is dominant. Faculties hardly interact with each other; the 2GU is a conglomerate of faculties.
5. Education is open only to bright students who satisfy demanding admission criteria. Most students come from a well-to-do background, while there are provisions for highly talented students of lesser means. There are only standard programmes, albeit with considerable room for individual tutoring.
6. 2GUs are stand-alone institutions. They exchange information with the scientific world but, as institutions, they hardly cooperate with companies or other organisations.
7. 2GUs operate on a national or regional market. Students are recruited from the immediate neighbourhood; there is little competition for students.
8. 2GUs are institutions of national prestige. In order to allow greater numbers of students to enrol, Latin is sacrificed for the national tongue. The University of Berlin was the first non-Latin speaking university.
9. 2GUs are financed by the state with possibly relatively small donations from individuals or foundations. The state finances universities in good confidence; it asks little in return. This allows for 'academic freedom', the right of academics to choose their own fields of research and to educate as they deem best[4].

The characteristics describe an archetype, reality being always different. German universities, for instance, could have strong links to enterprises **(please translate as Wirtschaft)**[5].

Driving forces

The Humboldt model was extremely successful. It facilitated the scientific breakthroughs of the 19th and 20th century. This groundwork led to innovations that were the basis of unprecedented economic growth. Starting roughly in the 1960s however, the model was challenged by a number of changes:

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[4] The situation in the US was and is different, as private sponsoring, by organisations and individuals, has always played a major role in that country.

[5] In their history of the University of Tübingen, Walter and Inge Jens write about the time of 1860: „Aus der Hörigkeit gegenüber der Kirche befreit, gerät die Wissenschaft, mag sie sich auch noch so autonom und unpolitisch gebärden, in den Dienst der Industrie". W. und I. Jens: Eine deutsche Universität – 500 Jahre Tübinger Gelehrtenrepublik, Rowohlt Taschenbuch Verlag, 2004.

1. Liberal and socialistic policies resulted in a massive influx of students. Many new universities were created; existing ones had to expand rapidly. As a result, the quality of teaching came under pressure. Mass education with multiple-choice tests has little to do with Humboldt academic education.
2. A second effect of the explosion of students' numbers was the equally exploding budgets for academic education. With increased budgets came increased governmental control. As a result, higher education became bureaucratic and universities – to a great extent – ungovernable.
3. A different trend was globalisation, a phenomenon that did not stop at university gates. It led to competition on three fronts: for the best students, academics and research contracts.
4. Scientific knowledge reached a level at which further progress required interdisciplinary rather than mono-disciplinary research. For universities, with their – basically monodisciplinary – faculty organisations, this led to a competitive disadvantage **vis-a-vis** research institutions with more flexible organisational structures.
5. The increased cost of cutting-edge research brought top universities to the realisation that they had to look for alternative funding. The state, irrespective of the colour of the government in charge, was simply no longer able to put up the necessary means.
6. As far as the market for research is concerned, universities were faced with competition from non-academic research institutes. Since the adoption of the 'Fraunhofer model' in 1973, 60 percent of the budget of the Fraunhofer Gesellschaft is comprised of industry contracts. The Leibniz-Gemeinschaft cooperates with universities, industry, and other partners in different parts of the world. The Max Planck Institutes were awarded 32 Nobel Prizes. 70 percent of the budget of the Helmholtz-Gemeinschaft is raised from public funds. In contrast, in the US, most public research funds go to universities or industry, including the large grants of the Department of Defence.
7. New challenges also brought new opportunities: The high cost of cutting edge research, for example, led most technology-based corporations to close their facilities for fundamental research, relying instead on cooperation with universities, or, in Germany, the non-academic research institutes. The **open innovation** philosophy facilitates this cooperation[6].
8. Another opportunity is formed by the phenomenon of **technostarters**; students or academics who start their own science- or technology-based enterprise. Almost the entire IT industry has its roots in universities (IBM and the Asian IT companies being notable exceptions), followed by the life-sciences industries.
9. The role of universities and non-academic research institutes in the knowledge economy was acknowledged by many governments which now offer funds for education in entrepreneurship and support of technostarters – from the ministries of economic affairs rather than those of education and science.

[6] Chesbrough, H., Open Innovation, the new imperative for creating and profiting from technology, Harvard Business School Press, Cambridge MA, 2003. See also: Vaitheeswaran, V., Something new under the sun, Supplement to The Economist, 13 October 2007.

Although the 2GU had its charms and has brought us unprecedented wealth, it must not be remembered as a rosier picture ('free academic research') than it was; even Nobel laureates had to fight constantly for adequate budgets. In the 2GU epoch, the role of universities was limited to scientific research and education. It was considered wise not to bother them with the application of what they invented. This originated in 19th century's thinking in terms of specialisation: universities would generate the basic knowledge while companies and institutes for applied know-how would 'translate' this into practical solutions. That was the past. Now, a new model must be found that copes with the trends.

A new transition period

The trends mentioned in the previous section push the 2GU into change, bringing universities into a state of transition: the Second Transition Period (we call the centuries' long transition from the Medieval University to the Humboldt model the First Transition Period). They are experimenting with models for the commercialisation or utilization of know-how, new organisational structures, marketing activities in order to attract more and better students and staff, and new ways of. University Presidents or Rectors no longer sit behind their desks but rather travel around the world to procure contracts for fundamental research from large enterprises. Some universities call themselves 'entrepreneurial universities', giving different meanings to this statement. Know-how utilization is still seen as a sideline to the main functions of research and education. We would postulate, however, that the trends are converging and that a new model for universities is in the making, just as it was during the First Transition Period. Then the Humboldt University emerged as a powerful model,bringing unprecedented benefits to society andlasteing for two centuries. At this point, we can only speculate what the new model will look like. However, as many trends can be observed and as many examples of successful universities are available, we can brave several educated guesses regarding the emerging model. We will do so on the basis of the new role model: the University of Cambridge.

The Cambridge phenomenon

Thanks to the emergence of a substantial high-tech industry, Cambridgeshire, UK has been transformed from one of England's poorest areas into its second richest. This extraordinary change occurred as a result of a strong interactive process of a number of actors with the University of Cambridge that was itself subjected to a modernisation process aimed at keeping this university amongst the world's best. Together, these developments created what became known as the Cambridge phenomenon: the combination of deep science and new, science-based economic activity[7]. The Cambridge

[7] The Cambridge Phenomenon and The Cambridge Phenomenon Revisited, published by Segal Quince Wicksteed, Cambridge, 1985 and 2000. Some other data in this paragraph are drawn from these publications as well.

Phenomenon was not designed, it emerged; only at a later stage was it deliberately supported by the university, the colleges and the local administrations. There were three interacting developments: the establishment of a community of high-tech enterprises, the process of modernisation of the university, and the creation of technostarter facilities.

The development of a community of high-tech enterprises was enabled by the spontaneous creation of new technology-based firms that benefited from their proximity to the university. They were created either by academics and (former) students or by companies that moved in from other areas, including international enterprises. Their emergence or arrival provided a dynamic environment, similar to the early stages of the industrial revolution, during which employees left their companies in order to start their own[8].

The modernisation of the university followed the realisation that traditional ways of financing would be insufficient to stay at the cutting edge of science and technology. In 1991, it began collaborating with industry on a large scale. Concerns about academic freedom were replaced by the view that cooperation with industry was an essential part of the development strategy of the university- for scientific as well as financial reasons. The collaboration with industry was favoured by the fact that high-technology enterprises started sourcing out their fundamental research activities in order to reduce their in-house research efforts. Indeed, the 1990s saw a sharp decline in such in-house research activities. A typical outcome was so-called embedded research in which a team of researchers from an industrial firm co-locate with researchers from the university; this is often accompanied by a donation of the corporation to the university. The University of Cambridge has embedded research agreements with Microsoft, Glaxo, Rolls-Royce, Hoechst, Hitachi, Toshiba, SmithKline Beecham, Unilever, BP Amoco, Seiko and others. Interdisciplinary research became more important, for instance in a new chair in medical materials in which the Medical School, the Veterinary School, the Department of Engineering and the Institute of Biotechnology cooperate.

Finally, the development of technostarter facilities was initiated by some of the university's colleges, and later supported by government grants. At first, the University of Cambridge as an institution was not involved in these activities. Cambridge was and still is a typical research university, collecting selected academics and students from all over the world. It has the highest number of Nobel Laureates (85 as of 2010 in the world. But then colleges took initiatives, private capital moved in as business angels and venture capital funds, and private technoparks were established around the city. The result is a rich and varied range of incubators, shared accommodation facilities, financiers, and all kinds of professional support.

[8] This phenomenon is familiar from the development of the IT industry in Silicon Valley and the Boston area, but it was equally present in the development of the book printing industry, following the first successful book printing with movable type by Johannes Gutenberg in 1454 in Mainz. His financier, Johannes Fust, can probably be regarded the world's first business angel.

[9] We define Interdisciplinary R&D as Research and development activities comprising various and integrated scientific, technological and/or design disciplines. Transdisciplinary R&D is Research and development activities focused on a solution that involves scientists, engineers and designers from many disciplines, where the disciplines are no longer one-to-one related to individuals. This signals the return of the Renaissance man.

It took Cambridge 30 years to get to where it is today. The driving forces were the university's outspoken desire to remain a top establishment for the development of science and technology and many private (and college) initiatives to create high-tech enterprises linked to the university's rich sources of science and technology.

The Third Generation University

Through the example of the University of Cambridge and other leading universities, we can see that the 2GU characteristics listed above have been reversed or supplemented with other elements. On a very general basis, the 3GU can be characterised by the following features:

1. Fundamental research is still the basis and core activity of the university.
2. Research is largely transdisciplinary or interdisciplinary[9]. 3GUs embrace creativity as a driving force of similar importance as the rational scientific method. University Institutes, transdisciplinary units that focus on a particular field of interest, are essential structural elements of the university. Only they can supervise transdisciplinary PhD research. University Institutes have an entrepreneurial nature; they employ their own personnel and they report directly to the Board of Management. Faculties are responsible for basic education. As scientists move to University Institutes, faculties reduce in size and importance and may eventually disappear.
3. 3GUs are network universities, collaborating with industry, non-academic R&D, financiers, professional service providers and other universities. Together with these, they form a knowledge carousel[10].
4. 3GUs operate in an internationally competitive market. They actively compete for the best academics, students and research contracts from industry.
5. Most 3GUs cannot avoid being mass universities as politicians pursue 'equal opportunity' policies. But since they also want to play a leading role, they create special facilities for the best and brightest students and teachers. 3GUs therefore will be two-track universities; attracting and supportin top students, while supplying mass education in other programmes. The idea of the two-track university also applies to the domain of research where 'incremental research' exists next to cutting-edge scientific work.
6. In the 3GU, the role of creativity is restored and the Design Faculty plays a central role.
7. 3GUs are cosmopolitan; they operate in an international setting and they compete in an international market of students, academics and corporate research contracts. They employ the English language for all courses as the new lingua franca. 3GU's are multicultural organisations with a wide and diverse range of students; in this respect, they are close to medieval universities.

[10] The synergistic combination of traditional academic research and education, R&D institutes of enterprises, independent (often specialised) R&D centres, facilities for technostarters, financiers of many kinds and professional services of many kinds (accountants, management consultants, marketing consultants, IP specialists and so on) that collaborate in the creation and utilizationof know-how, preferably on the grounds of the university or near it. A know-how carousel is internationally regarded as a front-runner in knowledge creation in specific fields; a centre no researcher and no enterprise, active in the field, can ignore. In other words, it is a place where 'things are happening', where you have to be if you want to be in the front line of developments, whether you are an existing enterprise, a technostarter, an academic or a student.

8. Utilization of know-how becomes the third university objective as universities are seen as the cradle of new entrepreneurial activity in addition to the traditional tasks of research and education. As before, education is pursued to create scientists and scientifically educated professionals with the added goal of alsocreating entrepreneurs.
9. 3GUs will become less dependent on state regulation and could theoretically even be completely disconnected from the state if direct financing is replaced by indirect financing and if the state ceases to influence curricula and diplomas. This will not reinstate 'academic freedom' however, as research grants are given under politically established conditions[11].

[11] The situation in the US was and is different, as private sponsoring, by organisations and individuals, has always played a major role in that country.

These characteristics are summarised in Table 1.

TABLE 1: Characteristics of the 2GU and 3GU

Characteristics of:	
Second Generation University	**Third Generation University**
1. The basis is fundamental research	1. The basis is fundamental research
2. Mono-disciplinary research and dominance of faculties	2. Transdisciplinary research and rise of University Institutes
3. Stand-alone institutions with no formal links with other organisations	3. Open universities, collaborating with many partners
4. Operate on the local market. Other universities are seen as colleagues.	4. Operate on an international, competitive market
5. Mainly elite education for well to do students. Standard education	5. Multi-cultural organisations; mass and elite education
6. 'Creative' faculties have no place in the university	6. Creativity is restored. Central role for the Design Faculty
7. National university	7. Cosmopolitan university
8. Two objectives: research and education. No interest in the use of the knowledge created	8. Exploitation of knowledge is core business and becomes the third objective
9. Important role of state financing and state interference.	9. No **direct** state financing. No state interference

So what does a 3GU look like? At the core, there are the old university buildings. Around it, extended technoparks where incubators and shared accommodation for young firms mix with research establishments of non-academic institutes and corporations. The streets of the technoparks are named after the university's Nobel laureates and most successful entrepreneurs. This is not utopia. It can already be observed in many places in the world. It is these powerhouses that generate economic growth in the knowledge economy.

Policy implications

Ultimately, we come to the question about the consequences of the developments to higher education policy. Roughly speaking, public policy should encourage universities to develop into 3GUs. In our opinion, Starting points should be as follows:

1. Continued state support for fundamental research. Fundamental research can only be pursued at the top level if both state and industry contribute.
2. Accept and stimulate differences in quality of universities. Not every university can be a Göttingen or Cambridge and it is better to have a few of those, at the expense of the quality of other universities, than to have egalitarian sub-standards everywhere. We should not be afraid of competition: if it works for our daily bread, there is no reason it should not work for education, research and know-how utilization.
3. Universities should have three objectives, know-how utilization being of equal importance to research and education.
4. Money for new policy can be found by reducing general budgets to universities.

The following measures give an impression of the direction we have in mind:

1. Distribute funds for research, education and know-how utilization by tendering and letting the best proposals win.
2. Create funds for stimulating know-how utilization from the economic policy budget.
3. Supporte collaboration in fundamental research between universities and enterprises by doubling corporate investments in university research.
4. Allow streaming in education (upper and normal levels of education) and allow universities to award graduates of the upper level special diplomas. Education, at least in the upper stream, should be in English.
5. Raise fees for students, at the same time expanding the grants' system. Bright students can then pay the higher fee from the higher grant and the system is budget neutral.
6. Allow the creation of University Institutes as separate entities in universities, not connected to faculties. When distributing research funds, employ a mechanism that favours University Institutes over faculties.
7. Create funds for the establishment or strengthening of Design Institutes at technical universities.
8. Reduce control over universities. An auditor's report is sufficient; the market will do the rest.
9. Create fast immigration procedures for foreign students and lecturers.

To answer the question in the title of this contribution: the difference between a threat and an opportunity is time. For those who are quick to react, the developments offer opportunities. For those who lag behind, they will become a threat.

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