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From Max Weber's 'Science as a Vocation (1917)' to 'Horizon 2020'

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Abstract
In this lecture, I reconstruct the position of Max Weber in “Science as a Vocation” with regard to the motivation of scholars. I will contrast Weber’s position with the current debate on basic vs. applied science and offer a critical review of the European research policy. A particular focus will be on Horizon 2020 and the role of social sciences and the humanities therein.

Keywords
Max Weber, basic and applied science, European research policy, Horizon 2020.

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Introduction

In November 1917, Max Weber was invited by the "Freistudentische Bund" (Association of Free Students) to give a lecture. The Freistudentische Bund was a liberal left-wing student association which was originally formed in opposition to the sabre and colour carrying student fraternities. The topic of his lecture was "Wissenschaft als Beruf" or in translation either "science as a vocation" or "scholarship as a calling". The German term "Wissenschaft" comprises both the natural sciences, social sciences and the humanities. (In the following I will use the term "science" for "Wissenschaft".) The German concept of "Beruf" – not least against the background of Max Weber's own "Protestant Ethic and the Spirit of Capitalism" – denotes "vocation, occupation or calling" (Weber 1965; Rendtorff 1965). The lecture was one of a series of four devoted to the question of whether a worldly occupation could be commensurate with a life devoted to academic pursuits – a question which we can hardly make sense of today. Its complement is Weber's lecture on "Politics as a Vocation", a little more than a year later, of January 1919. In the second lecture he expanded in particular on the topics of an ethics of responsibility and an ethics of value commitment, already implicitly suggested in the first lecture.

Historically, late 1917 was a period when the defeat of Germany in World War I was imminent, but when it was neither clear under which conditions an armistice could be negotiated nor whether Germany would have a monarchist, republican parliamentary or revolutionary future. At that time, Weber still saw a potential role for Germany as an accepted European power, trusting that despite what he saw as its enormous mistakes in foreign policy and military leadership it could continue its role as one of the principal European nations. By the time of the second lecture, early 1919, Chauvinistic nationalism, the threat of revolution and the likely conditions of the Versailles treaty had foreclosed such options. At the age of 53 and after a decade of sick leave, Max Weber had to decide whether or not he wanted to return to academic life as a regular occupation. He was considering offers of chairs in Vienna or Munich, but he was also heavily involved in debates about the political future of Germany. For a while he was seen, and saw himself, as a potential political leader himself. He was asked to run for a parliamentary seat, but his official candidacy did not come about. Three years later, he was dead. On two occasions just months before the first lecture, Weber engaged in passionate debates in Lauenstein Castle in which he attacked the romanticism of the youth movement and what were in his eyes irresponsible views of political utopias, as well as the chauvinistic nationalism in some political and academic quarters (Radkau 2005, 737 – 752).[1]

In this paper, I will, first, recall and reconstruct the thrust of Weber`s lecture.[2] Second, I will ask whether his analysis, answers and institutional contexts are outdated and outmoded by looking at academic careers today – mostly but not exclusively in the German context. Third, I shall explore the goals and purposes embedded in the German science system, and fourth I shall do a similar exercise for European research policy and Horizon 2020. I will then come back to the question of how modern or how outdated Max Weber's views are.

Max Weber's "Wissenschaft als Beruf"

Max Weber's lecture is structured as follows. He first describes the material conditions of an academic career in his time and its institutional contexts. Then he asks about the necessary motivational prerequisites for doing science as a vocation: what is the subjective meaning of engaging in such a career? Then he shifts from the subjective goals and motives of the individual scientist to the objective rationales of – what we would call today – the subsystem of science. Just as the individual can give meaning to her or his own endeavours only by reference to contexts relevant to them – including the institutional ones – the subsystem of science derives its meaning from the larger societal setting in which it operates.

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[1] On the historical and personal contexts in which Weber gave this lecture and its systematic place in his writings, see also Schluchter (1980, 1971) and Lepsius (2012).

[2] For this summary and interpretation I have relied heavily on Schluchter (1980, 41-74).

What is the situation of a student who wants to pursue an academic career? In Germany at the time of Weber this meant doing a second doctorate, becoming a *Privatdozent* for a number of years, and not receiving a salary as an employee but living on the lecture fees of students. Often enough, this insecure position was only viable if it was supported by private wealth – in Weber´s case capital income from his wife's family's textile company. This insecurity had to be compensated for by a strong motivational commitment. Weber contrasts the German situation with that in the United States, with its salaried tenure track starting with assistant professor, and also with the emerging situation in natural science labs. To him, such labs resembled state capitalist enterprises in one crucial respect: the wage earner is separated from the means of production, just as the industrial worker no longer owns his tools as the traditional craftsman did. In other words, salaried academics become dependent on institute directors, who control lab space and access to research funds.

Weber's general conclusion is that the academic career is a hazard. It depends, not exclusively but to a very large extent, on pure chance – the chance of vacancies coming up, the interests, idiosyncrasies and contingencies of certification (for the 'habilitation') and recruiting faculties and administrations. Although he credits all involved with the best of intentions, he judges the distortions of merit selection to be pervasive: preference for one's own students, curricular needs and – interestingly enough – teaching abilities. Weber considers the latter to be problematic, since didactic and research competencies do not always match, and success in the lecture hall is not necessarily a criterion of excellence: it is not democracy that lies at the heart of science, but an aristocracy of intellect. His advice to young people who wanted to become university academics, and even more so if they happened to be Jewish, is a quotation from Dante's Divina Comedia: *lasciate ogni speranza* (Weber 1968, 588).

Weber´s second topic embraces the subjective motives for academic work, the inward calling for science. Motive and context are here complementary. The context is the extreme specialization of science, where any achievements of lasting impact are only possible within an extreme division of labour. Therefore, specialization is the prerequisite of success. Only if one can shut off all other concerns, only if one devotes oneself with full passion to the detail of the problem at hand – a conjecture in a manuscript, an interpretation of a theoretical text, experimental conditions, the collection of empirical data – can one experience the intoxication, the happiness, of scientific work. But devotion and passion alone do not suffice: creativity, imagination and hard work are also necessary. The bad news is that insight and creativity cannot be forced, creativity cannot replace hard work, and hard work is no substitute for creativity. Thus, there is a double hazard in science: the uncertainties of a career and the uncertainties of creative insight. Weber is not shy in despising "performance" in science – impression management. Personality in science can only belong to someone who devotes him or herself exclusively to this work, who is not ruled by ulterior motives beyond the object of study. It is not self-celebration of one´s achievements that is called for.

At this point, Weber comes to the crucial step in his argument. Passion, creativity and hard work and an exclusive devotion are not special to science. They are equally crucial, for instance, in art or even business. What is special to science, and what makes the attribution of subjective meaning to it so difficult, is that any scientific work is embedded in a form of advancement or progress which tends to make everything we achieve obsolete within a few decades. It is the very purpose of scientific work to be superseded and to be replaced by new findings and new theory. So why should one devote oneself to a task which can never be fully completed? Weber concedes there may be good practical reasons: the foremost of these is to solve technical problems with scientific means. However, he adds that this is not sufficient to impel one to do science as a vocation. If so, what then is the meaning of an inward calling for science?

To answer this question we must turn from the motives of the individual scientist to the role of science as a subsystem of society. Weber's answers are straightforward and well-known:

> 1. The development of science as a specific subsystem of society is part and parcel of the secular development of societal rationalization and differentiation. The emergent principle that everything in the world is subject to rational explanation and understanding leads to "Entzauberung der Welt", "disenchantment with the world".

2. Science has destroyed the monopoly of religion in providing meaning to the existence of the world and to human existence, but at the same time science cannot replace religion in providing such meaning. Weber quotes Tolstoj: "*Science is meaningless because it gives no answer to our question, the only question important for us: What shall we do and how shall we live?"* (Weber 1946).
3. Science and academia are under constant pressure and are prone to the seduction of providing value orientation and guidance, but Weber is annoyingly persistent in arguing that "ideology has no place in the classroom", that one cannot tell one´s student audience whether they should opt for socialism or representative democracy. What science can do, and can do very successfully, is to explicate – on the one hand – implications of value, value pluralism and value antagonism, and – on the other hand – to ascertain empirically the consequences, the means-ends relationships of a given value stance. We cannot, for instance, as social scientists opt for the value of more or less inequality, but we can spell out empirically – and I should add, convincingly – what societies with high inequality imply, for instance, for crime rates and even mortality (Jencks 2002).
4. *"All scientific work presupposes that the rules of logic and method are valid: these are the general foundations of our orientations to the world (...). But science further presupposes that what is yielded by scientific work is important in the sense that it is worth knowing. And this premise cannot in itself be scientifically derived (…) rather, it must be interpreted as an ultimate meaning which one can then reject or deny, as a part of one's own life position"* (Weber 1946).
5. Empirical science in this sense and under such historical circumstances needs a commitment which cannot be derived from religious or political convictions and goals. Moreover, it needs to be defended against their encroachment and claims: "The prophet and the demagogue do not belong on the academic platform" (Weber 1946).
6. After another excursion in which Weber again categorically maintains that charismatic leadership is not the job of the professor, he returns to the initial question: if science cannot decide on value and should not transmit value orientations, what, then, is its positive use for our practical and personal life, i.e. for science as an occupation?

First, again, practical knowledge – the mastery of life in its external conditions, and of social action. Second, methodology: in argument, experiment, observation and measurement. Third, clarity, consistency and integrity are the essentials of what constitutes the value orientation of science. This specific orientation towards the world is what science contributes to society and culture, and thus this is what it can offer as ultimate meaning to the individual scientist.

It seems obvious that Weber was trying to salvage some elements from the spheres of religion and politics for academic work, namely that commitment, total devotion, strength and clarity of conviction are not only functional prerequisites for religious and political life, but also for a proper life as a scientist (Weber 1920). The intellectual traditions of such a view reach back to Luther and Aristotle: to Luther and the Protestant Ethic regarding his equating of Beruf and Berufung, i.e. job and vocation, occupation and calling; to Aristotle because the latter defined the epistemic norm according to which moral goodness of a person is the prerequisite for attaining truth. Somewhat in deviation from his own strong statements, Weber seems to have hoped that the habitus of the scientist, with the passion and conduct of life as he conceived, could form a bridge across the fragmentation of science into a multitude of disciplines and compensate for the differentiation and specialization of science as a subsystem (Nietzsche 1980, 400-401, cit. in: Gegenworte 2012, 6). Let me remind you here that personality for Weber should be understood as the constancy of a person in his or her inner relationship with ultimate values and life meanings which are transformed into the goals of action and thus in purposive behaviour (Weber 1968, 132). Now, almost 100 years after Max Weber gave this lecture, we might ask whether and to what extent its messages are outmoded and outdated. Here, Weber himself gives a significant clue. At the famous end of his objectivity article from 1904, he states that the cultural importance which we attach to certain problems is always temporary. Rather

than the problems being "solved", their cultural significance fades over time and we move on to other problems.

> All research in the cultural sciences in an age of specialization, once it is oriented towards a given subject matter through particular settings of problems and has established its methodological principles, will consider the analysis of the data as an end in itself. It will discontinue assessing the value of the individual facts in terms of their relationships to ultimate value ideas. Indeed, it will lose its awareness of its ultimate rootedness in value-ideas in general. And it is well that that should be so. But there comes a moment when the atmosphere changes. The significance of the unreflectively utilized viewpoints becomes uncertain and the road is lost in the twilight. The light of the great cultural problems moves on. Then science too prepares to change its standpoint and its thinking apparatus and to view the streams of events from the heights of thought (Weber 1949, 112).

Max Weber gave his lecture on science as a vocation at a historical juncture in which the emergence of a subsystem of science and of the particular motives for action in this institutional sphere were controversial in two respects. On the one hand, they conflicted with the claims of religion to account for the world. On the other hand, the autonomy of science had to be defended against political and ideological partisanship. Max Weber rejected both infringements, and thus considered a subjective vocation for science possible, but also indispensable, if it is based on an inner commitment to scientific conduct as a conduct of life. Both kinds of struggles seem – at least in our type of Western societies – to have lost their significance. Religion wishes to be reconciled with science, not the other way around – see Pope Benedict on this and the pressure on Islam. For political partisanship the situation is less clear, but on the whole – with the partial exception of the U.S. – the passion seems to have gone out of this game too. In contrast, universal rights and, for instance, the United Nations millennium goals appear to usher in a period where a far-reaching value consensus might be possible.

I do not want to engage here in the philosophy of science debate over whether the dichotomy of facts and values can still be upheld (Putnam 2002) or whether the consensus theory of truth (Habermas 2003) can be defended – that would be a topic of its own. But we need only think of Amartya Sen's concept of "capabilities" (Sen 1999) to convince ourselves that the ethical foundations of science can probably be pushed at least one step further than Weber imagined. I certainly do not need to stress that the Nietzschean kind of passion and devotion is old Zeitgeist from another century: "keep cool" is the new message. And it shows how far we have come that Weber`s convictions are now taken up in advertisement slogans, as, for example, in the adverts of the Deutsche Bank: "Leistung aus Leidenschaft" – "Passion to perform".

So "outdated and outmoded" as a verdict seems more than plausible. But is that verdict actually also correct and adequate? I will try to answer in the following steps: I will review the institutional conditions of academic careers and their motivational implication. Then I will examine the purposes of science built into the institutions and policies of the German and European science landscapes.

The institutional conditions of science.

Obviously, the ideal type of unsalaried German *Privatdozent* supported by family wealth is history, and academic trajectories have more and more taken on the hallmark of careers as a sequence of salaried positions – much in line with Weber`s prognosis. However – with significant variations between national science systems and despite the apparent spread of tenure tracks – the uncertainties of academic careers, their hazards, have hardly vanished. And this is true in two respects. First, secure permanent positions tend to come late in life, if at all, and second, the share of "non-permanent" contracts and irregular employment seems to be ever increasing.

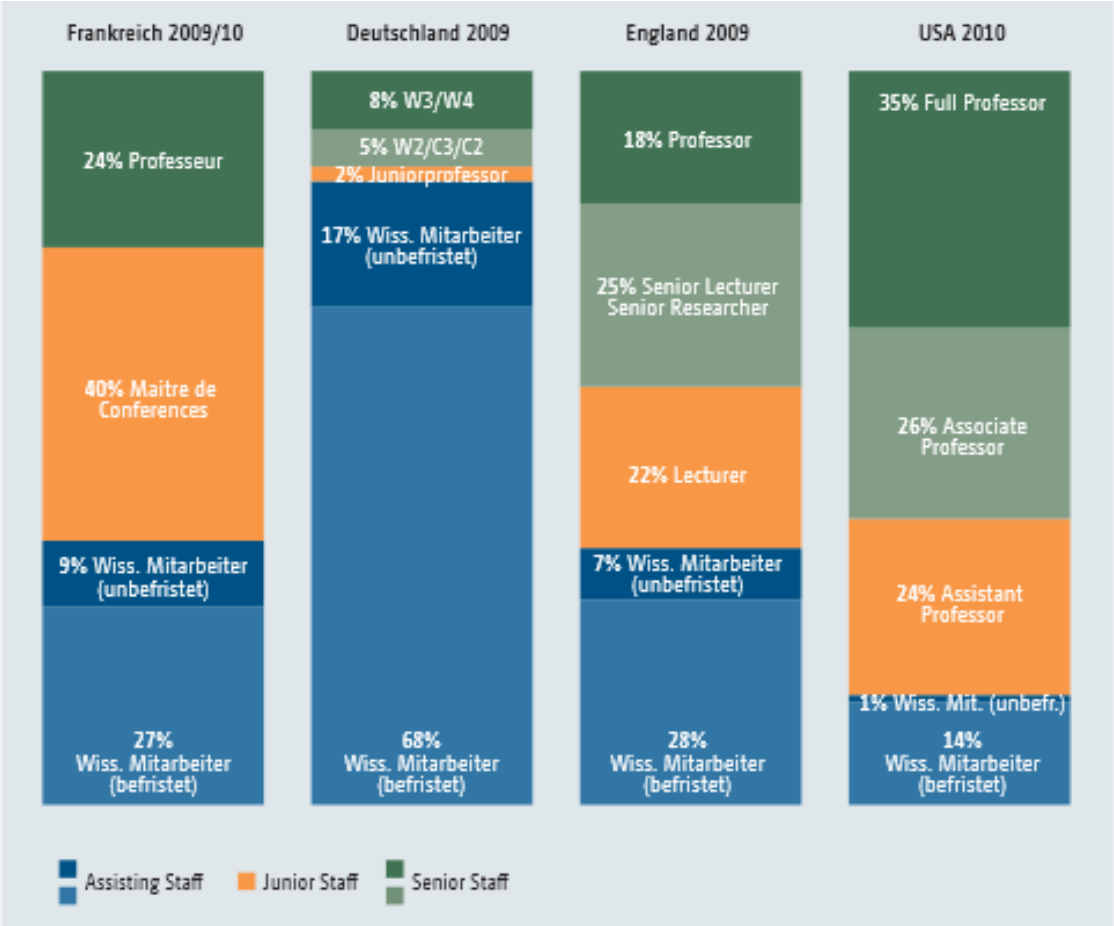

Figure 1: Structure of academic university staff in four countries
(Source: Bundesbericht Wissenschaftlicher Nachwuchs (2013); Kreckel (2008))

Let me take Germany as an example (excluding medicine): in 2002, there were about 113,000 university graduates in Germany. In 2006, i.e. four years later, in that very cohort 16% of graduates had received a doctorate – about 18,000 doctoral dissertations were defended. From this cohort, there is today a total of roughly 1200 scientists who qualify for a professorship (either because they hold a 'habilitation' or because they are junior professors) and they are in the age range around 40. Of these, only about 600-700 a year will have a realistic chance of obtaining the academic rank of professor. In other words, just about half of them. These opportunities will worsen rapidly if the increasing tide of graduates and doctoral students moves ahead (currently, there are about 200,000 doctoral students enrolled in Germany). Furthermore, let us take a comparative look at the structure of the full-time scientific staff at universities in four countries: France, Germany, England and the US. Obviously, such a comparison is not without problems due to the varying employment traditions in academia. Yet, some observations are striking. For example, at below 10 percent, the proportion of full professors in Germany is much smaller compared to the other three countries. Especially in the UK, and to a lesser extent in the US, the tenure system allows for more secure career paths. The same is true for France, where a 'habilitation' is a prerequisite for a full professorship, but where "Maitre de conferences" is a lifetime position that can be achieved after a doctorate.

We have to weigh these numbers with some caveats: part-time positions and post-doc stipends are not included and the German proportion of "Wissenschaftlicher Mitarbeiter" is inflated because doctoral students have employment contracts. Nevertheless, the overall picture still remains the same (Bundesbericht Wissenschaftlicher Nachwuchs 2013; Kreckel 2008). Under such conditions one can safely continue to postulate that an inner calling to science, i.e. a very strong intrinsic motivation, must

still exist as a crucial self-selection bias or self-socialization factor affecting entry into an academic career. Not much, then, seems to have changed between Weber's scandalizing of the university career situation of his time and the present situation: it is still very much a hazard. Nonetheless – even if the outcomes, i.e. transition probabilities, are uncertain – modern academic careers are at least partially careers in the sense of an ordered sequence of positions within and between organisations – in line with Max Weber's predictions. Do such careers then foster or prohibit a scientific creed as a personality constant, as a specific form of life design and life conduct? Do the material incentives of clearly defined positions in a hierarchical sequence with the expectation of permanent and secure pay foster or thwart academic value orientations?

The classical sociological concept of a career might give us some clues to answering this question. During his time in Britain, Karl Mannheim wrote in his book "Man and Society in an Age of Reconstruction" that

> Modern society attains perhaps its highest degree of functional rationalization in its administrative staff, in which the individuals who take part not only have their specific actions prescribed … but in addition have their life plan to a large extent imposed in the form of a 'career', in which the individual stages are specified in advance. Concern with a career requires a maximum of self-mastery since it involves not only actual processes of work but also the prescriptive regulation of the ideas and feelings one is permitted to have... (Mannheim 1940, 56).

From here, it is only a very short step to construct a tension between career orientation and science as a vocation. Karl Mannheim makes the important distinction between substantive rationality and functional rationality. Substantive rationality is based on individually-set goals, individual insights in a given situation and intelligently derived actions. In contrast, functional rationality aims at the coordination of a multitude of actors for externally-given goals. Careers foster this kind of functional rationality by substituting the goals of the organization for one´s own goals. In other words, secondary criteria like career advancement, increases in income or prestige compete with or substitute individually-held goals. In our context, this would then mean living off science rather than living for science. Mannheim's conceptual distinction parallels what psychologists call primary and secondary control, and what the early psychologist Gustav Ichheisser distinguished between as "Leistungstüchtigkeit" and "Erfolgstüchtigkeit" – "achievement orientation" and "success orientation" (Ichheisser, 1930). In success orientation the goal is to win a position and the implied status and income, whereas achievement orientation is towards the solution of tasks and substantive work in a given position.

This conceptual distinction reminds us of how David Riesman, the late Harvard sociologist, characterized what he called the inner-directed and the outer-directed personality (Riesman et.al. 1989). The inner-directed personality is guided by normative criteria of action: she or he has a life compass, an inner life goal which is persistently pursued despite any obstacles. The outer-directed personality behaves, in contrast, situationally rationally, constantly calculating advantages and disadvantages and changing his or her outlook like a chameleon. Outer-directed personalities with highly flexible selves match optimally with organisations which themselves are exposed to rapid change. If the goals do not yield benefits, they are readily shelved and changed. The suggestion here is that academic careers might more and more favour the latter personality type, that external criteria for success, such as the number of publications, citations, Hirsch-indices and impact factors, are foremost in the minds of young scientists today, as well as in those of search committees.

However, we might ask: does science really only flourish if it is conducted by persons with inner-directed personalities with substantive rationality and with no inclination to success orientation? Mannheim and Riesman did not just want to introduce analytical distinctions, but – very much in line with Weber – they wanted to depict secular trends. If they are correct, and if modern forms of organization favour secondary functional rationality and crowd out inner-directed characters, does that undermine the scientific conduct of life? Or should we not rather also entertain an opposite hypothesis: does the scientist with an inner calling and an inner-directed personality actually still fit forms of organizations of science which themselves are increasingly outer-directed – by commercial markets in

knowledge and technology transfer, by political markets of problem relevance, and by public markets of media attention?[3]

The purposes of science

Max Weber insisted that the vocabulary of motives for academic work should not primarily be treated as a subjective phenomenon, but should be seen in the context of the purposes of the science system as a whole. I would like to do this using two kinds of more concrete references. One is the German science landscape and the other is the European research policy arena. The purposes of the German science landscape are institutionally well-defined. Universities engage in investigator-driven basic research, the *Fachhochschulen* do applied instruction and research. The technical universities play a role in between: they do applied research partially financed by public money and partially by the private sector. Looked at more closely, the universities get about 35% of their research budgets from the DFG, our national science foundation, which equates with investigator-driven research (Deutsche Forschungsgemeinschaft 2012, 31). Therefore, one can conclude that a considerable part of the remaining two thirds go into more applied research.

Publicly organized and funded research outside the universities corresponds to about three quarters of the university segment. And here the purposes and motives are officially well-defined. The Max-Planck Society with its 80 institutes is devoted to basic research: once recruited, each director (but only he or she) is free in his or her research programme and well-supported. The Fraunhofer-Society organizes about 66 institutes of applied industrial research and has to gain about 70% of its budget of about 1.9 billion euros from contract research, and half of this 70% comes from industry; the rest is mostly Federal project money. The Helmholtz-Gemeinschaft, an outgrowth of the large nuclear facilities and space research, sees its task as running large facilities and tackling grand challenges. Its programmes are directly subject to Federal research policy: energy; health; earth and environment; aeronautics, space and transport; key technologies and the structure of matter. Finally, the Leibniz-Association in its 86 institutes engages in problem- or application-oriented basic research: education and cultural heritage; social integration, democratic participation, and economic development; health and biodiversity; optics and materials, the natural environment and sustainable development. In the Leibniz Association, we adhere to a twin set of performance criteria: scientific excellence at an international level; and relevance, i.e. social, economic and ecological usefulness. In contrast to the Helmholtz's, research programmes at Leibniz are not defined top down, but bottom up at the level of individual institutes and in a number of research alliances.[4] In the Leibniz Association, we adhere to a twin set of achievement criteria: scientific excellence at an international level and relevance, i.e. social, economic and ecological usefulness.[5] (Leibniz-Gemeinschaft, 2012). Given the pronounced division of labour and diverse missions, the self-ascribed motives of researchers should self-select or fall in line with official missions.

In contrast with these official missions, however, the issue is not theoretical vs. practical knowledge, basic knowledge vs. problem-oriented and applied research; the issue is research with objectives which are investigator driven vs. externally-imposed ones – with purse strings. And this then leads to the question of who should set research goals and programmes: the scientists themselves, the bureaucracy, parliaments or the citizens? (Carrier, 2008).

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[3] For a much more adequate and comprehensive historical reconstruction and analysis of the moral aspects of the role of the scientist, see Shapin (2008). I am indebted to Helga Nowontny for pointing me to Shapin's work.

[4] Both Leibniz and Helmholtz also run large infrastructures, among them research museums and libraries, some of which are well-known, like the Socio-Economic Panel and the German Social Survey.

[5] In our recent strategy paper "Safeguarding the Future through Research" we state the following: "The dwindling food resources, the consequences of climatic change, the preservation of biodiversity, the sustainable use of natural resources, social integration and economic growth, the consequences of population aging, the protection of our cultural heritage and of our democratic order – these are some of the challenges which we face. Our task is safeguarding the future through research."

Institutions and subjective motives

This picture of a well-defined division of labour in the German science system is, however, becoming somewhat blurred. This is occurring in several respects:

> 1. The old distinction between basic science and applied science (and infrastructure) is based on a theory of wealth creation and innovation, i.e. the linear value creation chain, where knowledge generated by basic science is then transformed into applications (prototypes) and manufacturing. Value in this framework is market value. The transistor, the scanning electron microscope or the MP3 player are good examples. This suggests that one should position research and research organisation along this value creation chain. But it is outdated for at least two reasons. One is that at any rate in the life sciences, but also in the material sciences, semiconductors and laser optics applications, licences and patents directly result from basic research – the money making blockbusters are mostly in biomedical research resulting in pharmaceuticals. The other reason is that nowadays it is rare that complete products are the outcome of the research/innovation chain but often only very small components like sensors, surfaces, or processes.
> 2. Both the DFG and the four research organizations have in recent years converged on the Leibniz model in propagating innovation and development and the practical uses of their research (for those who previously more exclusively legitimated themselves by investigator-driven basic science) and in extolling scientific excellence in international publications with high impact and citations (for those who in the past had a more applied focus).

In the tough competition for parliamentary support for research, claims in favour of the production of practical or, at any rate, useful knowledge come uppermost. It is certainly not science and knowledge as a cultural product which is celebrated as a means of human self-development and self-understanding in Wilhelm von Humboldt`s sense.

The only issue, then, seems to remain whether openly applied or manifestly basic research is better suited to ultimately becoming useful. I quote Peter Gruss, the current president of the Max Planck society, relying on a study by Hans Gersbach of ETH Zürich: "... it is basic research that serves as the essential driver for innovation for economic growth" (Gruss 2012). We all are familiar with the illustrative examples: the World Wide Web and CERN. There is certainly enough political pressure to portray the benefits of research in very practical terms – think only of the premature claims of the Human Genome project to provide the fundamentals for eradicating or treating diseases. I would contend that – certainly in Germany – there is a clear shift to devoting more core funding to problem- and application-oriented research, and to moving funds from core funding to soft money tied to specific research policies. However, countervailing tendencies should also not go unmentioned. The German Excellence Initiative has brought close to 400 million euros a year into university research, all for bottom-up investigator-driven research.[6] Thus, Germany is actually still distant from the recent British development of requiring pledges or demonstrations of useful impact for all its research grants, or indeed from the United States – where senators like Tom Coburn and congressmen like Lamar Smith directly legislate on the objectives of research, threatening to ban political and social science research if it does not contribute either to national security or economic growth (Prewitt 2013).

Nonetheless, in Germany, too, an increasing bulk of funds is tied to thematically predefined programmes. The motivation to join these programmes might partly derive from their quasi-normative topics and appeal, and some of these topics are attractive, such as biodiversity and renewable energy. Often, however, young scientists only have a limited choice and thus their own personal scientific goals tend to be replaced by those of the research programme. Thus, there is no lack of extra-scientific purposes with which the individual scientist can ascribe meaning to his or her work over and above doing science for its own sake. Is that so bad and does it necessarily distract from the quality of scientific work in Weber´s emphatic terms? Science as a subsystem is open to completely

[6] But it should not be ignored that only six of the generously-funded Excellence research clusters are in the social and the cultural sciences.

heterogeneous goals, which result from exchange relationships with the subsystems of the economy and politics and civil society.

Horizon 2020 and the European Research Area

Let me now come to Horizon 2020 as a particularly salient case. In order to avoid carrying owls to Athens or coals to Newcastle, let me summarize in the briefest possible way the truly astounding emergence of a European research union. In a first phase from the fifties to the early eighties, only very marginal research support activities were taken on by the European union and they were dominated by the foundation concerns of agriculture, coal, steel and energy. From 1984 onwards, European research efforts were mostly coordinated in the Framework Programmes. Until about the year 2000, they were dominated by industrial interests in innovation and development, of realizing the internal market. Finally, with the announcement of the "European Research Area" in the year 2000, the European Union is on the way to an autonomous research policy. Since 1984, the framework budgets have risen from less than 4 billion to more than 50 billion euros for the 7th Framework programme (Mitzner 2013; Stamm 2013; Winnacker 2012). Just recently, informal agreements on the 8th Framework Program, "Horizon 2020", with its budget of approximately 72 billion € (10 billion € p.a.) have been struck.[7]

In a sense, the overall direction of EU research policy has shifted from economic industrial interests to policy interests in relation to EU policy goals, and from there to research in the public interest. Put differently, the enlarged scope of the research programmes reflects the increased ambitions of the European Union. The draft "Proposal for a Regulation of the European Parliament and the Council establishing Horizon 2020" of May 2012 has 136 pages (Council of the European Union 2012). Let me cite the official rationale:

> Horizon 2020 shall contribute to building a society and an economy based on knowledge and innovation across the whole Union by leveraging additional research, development and innovation funding...
>
> This general objective shall be pursued through three mutually reinforcing priorities dedicated to:
>
> - Excellent science
> - Industrial leadership
> - Societal challenges"[8]

These areas are complemented by no less than 17 so-called "Cross-cutting issues and support measures" (Council of the European Union 2013, 12), among them:

- Bridging from discovery to market application;
- Social and economic sciences and humanities;
- Climate change and sustainable environment;
- Contributing to the digital agenda;
- Responsible research and innovation, including gender.

[7] A preliminary agreement was reached on 25 June 2013, see Council of the European Union (2013) and European Commission (2013).

[8] According to the preliminary agreement of 25 June 2013, the budget allocations are as follows: Excellent science: 24.3 billion; Industrial leadership: 17.0 billion; Societal challenges: 31.0 billion.

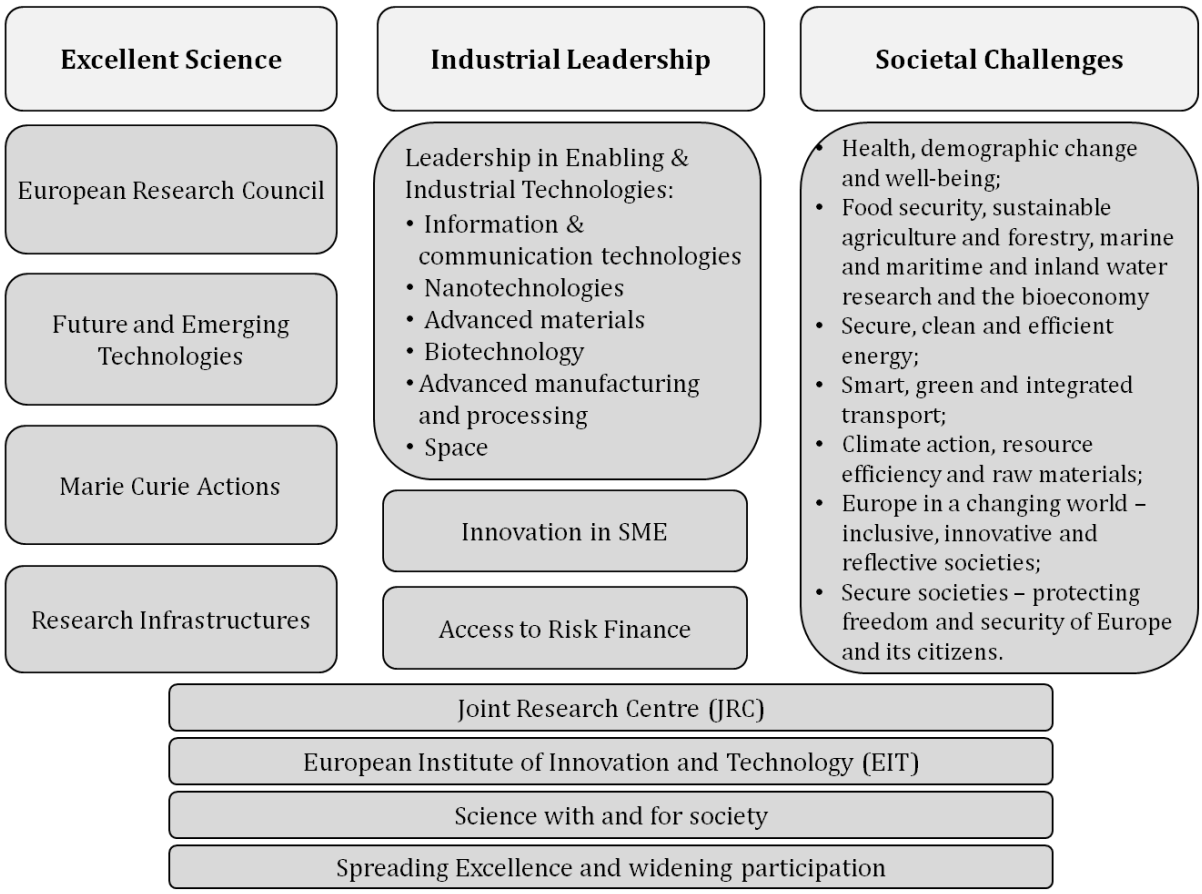

Figure 2: The structure of Horizon 2020 (own illustration based on Council of the European Union 2013, 34)

Under the priority "excellent science", the following programmes will be funded:

- The European Research Council (ERC);
- Future and Emerging Technologies;
- Marie Sklodowska Curie Actions;
- Research Infrastructures.

The sub-program "Excellence in science" is described as follows:

> The activities are inherently forward looking, building skills in the long term, focussing on the next generation of science, technology, researchers and providing support for emerging talent (...). In view of their science-driven nature and largely 'bottom-up' investigator-driven funding arrangements, the European scientific community will play a strong role in determining the avenues of research followed under the programme (Council of the European Union 2012, 33).

The most important of these four elements is the European Research Council. With the ERC starting in 2007, European research funds were for the first time allocated with full legitimacy to individual-related, investigator-defined projects and the highly competitive ERC quickly resulted in informal rankings between institutions and countries. But it is revealing that the subprogram is called "Excellent Science". Does this imply that Research for Industrial Leadership and on Societal Challenges are not excellent science?

The priority "Industrial leadership" comprises:

- Leadership in enabling and industrial technologies;
- Access to risk finance;
- Innovation in SME's.

And we are told *"The activities will follow a business driven agenda"* (Council of the European Union 2012, 33).

The third priority "Societal Challenges" addresses "priorities identified in the 2020 strategy and aims to stimulate the critical mass of research and innovation efforts needed to achieve the Union's policy goals:

- Health, demographic change and well-being;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, resource efficiency and raw materials;
- Europe in a changing world – inclusive, innovative and reflective societies;
- Secure societies – protecting the freedom and security of Europe and its citizens.

The implicit theory is that the research funding spent on calls in these areas will actually bring about progress in achieving these policy objectives. So far, however, there is little evidence that this is actually the case, and almost no money is spent in the current and prior framework programme to find evidence for this.[9] This very much looks like problem solving by rhetoric and inputs.

If one actually examines the work programmes in the 7th framework programme, it seems that in the physical and life sciences investigators have been more successful in making sure that research can be conducted according to the state of the art. However, in social science, the topic with which I am most familiar, few opportunities seem to be provided within the calls to develop theories, databases and methods or to allow the time frames for those involved which would permit doing first-rate research. Let me illustrate the rhetoric by looking at the Societal Challenge "Europe in a changing world – inclusive, innovative and reflective societies", because there is abundant expertise for this area in this institution and in this room. Let me just quote a few lines from the rubric "inclusive societies" with its sweeping scope:

> The main challenges to be tackled concerning European models for social cohesion are migration, integration, demographic change, the ageing society and disability, as well as the reduction of poverty taking into account the different regional and cultural characteristics....The focus of activities shall be to understand and foster and implement: a) the mechanisms to promote smart, sustainable and inclusive growth; b) trusted organizations, practices, services and policies that are necessary to build resilient, inclusive, participatory, open and creative societies in Europe, in particular taking into account migration, integration and demographic change (Council of the European Union 2012, 118).

Let me come to some tentative conclusions. We are currently in no good empirical position to make robust generalizations – outside ERC grants – about the salience of the past framework and other European programmes, either in regard to scientific excellence or in regard to other professed goals, like technological innovation. I know of impressive work, such as EQUALSOC or the European Laser Lab, and I know of studies which just seem like activities for activities' sake and pseudoscience. But let me make a number of observations and conjectures:

[9] There is no lack of evaluation reports, which, however, hardly fulfil this criterion, but are mostly concerned with structural issues of programme fit, see http://ec.europa.eu/research/evaluations/index_en.cfm?pg=archive

1. The rhetoric of fairly general values and of a multitude of policy goals can be found in great abundance in the relevant documents – page after page after page. Whoever writes proposals in these areas has to identify with or at least pay lip service to these values and goals – either a cynical attitude is fostered or external goals are internalized. While in the overall programmes the rhetoric of general values and equally general policy goals tend to coalesce, we find excessively narrow definitions in the work programmes. Hence a cognitive frame tends to be imposed which stands far apart from the precision, clarity and autonomy which are otherwise standard in our research enterprise.
2. Very much in contrast to the situation in Weber's time, ideological conflicts are not at the fore, but a fairly high consensus on these values and objectives seems to prevail. Only very rarely are value and goal conflicts addressed, such as that between social innovation and social inclusion. This might imply that conflicts between our habitus as scientists and our normative commitments as citizens have become minimal. But I have my doubts.
3. There seem to be large discrepancies between what is necessary to achieve certain scientific goals and the durations, forms of organisation and level of funding. Investment in fundamentals like costly equipment, databases and training seems – with exceptions – marginal. The tail appears to be wagging the dog, probably more so in the social sciences than in the biomedical, technical and natural sciences.
4. Secondary rationality is common, in the sense that researchers adopt the goals of the calls to get hold of a part of the cake. I am on the advisory board of a network with a large group of researchers I highly respect, but what they have to submit to in terms of deliverables, micro-control and of so-called stakeholder influence subverts their scientific aims and diverts their careers. Project coordinators become executive agents, the whips of the EU prescriptions. Moreover, if we get high returns for doing work related to normative goals, returns in access to research funds, prestige and collegial as well as private attention, there is always the temptation to take short cuts. If primarily non-scientific goals make up the mandates for research, there is always the danger that claims to be able to solve problems are exaggerated.
5. In its short history, EU science has moved from research funding on behalf of economic interests, to research funding in the EU policy interest, to research funding in the public interest. The old layers still very much show and there is an apparent lack of specificity and confusion with regard to the respective criteria for success.
6. No doubt, the emergence of the European research area gives ample evidence of how large and important the science subsystem has become in Europe in comparison to other social subsystems and European policy areas (although the research budget is still dwarfed by the agricultural and structural fund). The former General Secretary of the ERC, Ernst-Ludwig Winnacker, has even claimed that science is the only policy area which holds Europe together and where there are no major rifts.
7. Europe is becoming increasingly important as our research funding environment. The EU increasingly wants to coordinate and structure not only its own research budget, but, for example via joint programming and ESFRI, national research budgets too. The functional necessity of constantly having to obtain research funds and even funds for the training of doctoral students is nowadays an almost pervasive fact of scientific life across most disciplines. This requires a degree of adaptivity to constantly changing research topics and programmes, which appears to be hard to reconcile with Weber's construct of personality. Maybe, the ability of science to define and impose its own norms and criteria for truth, objectivity and methodological rules is not in danger. But autonomy in regard to the selection of research questions, topics and the usage of research results is clearly at risk. In a more pessimistic perspective, the autonomous value sphere of how to do science might be in danger too. The challenge for the social scientist is then to specify the institutional conditions under which the pursuit of worthy causes might be reconcilable with the highest standards of scientific conduct. With the partial exception of the ERC, the EU science effort obviously suffers from an overload of values, goals and policies. Because of this, it also suffers from an

underdeveloped sober clarification of means-ends relationships. What does it take to do industrial research successfully? What does it take to do policy-related research successfully, and what does it take to conduct science in the public interest? Too much of the European research effort is organized under one organizational umbrella with too many non-specific rules and too much administrative burden. This umbrella is too close to the political level of decision-making. In such a situation, Weber's solution, stressing the personality of individual researchers with an ultimate value commitment to science, is unrealistic and historically outmoded. What we need are institutional designs for European research funding which allow for three things: first, clarity of purpose; second, protection from direct political influence; and third, an institutional commitment to the values of science. The German research landscape with its differentiated agencies once removed from politics, with varying degrees of autonomy and varying degrees of oversight and closeness to political research goal setting might not be such a bad template.

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