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SEVENTH FRAMEWORK PROGRAMME

ProGReSS

Contributions to the GREAT Glossary

Authors

Michael Davis
Stephan Lingner
Kelly Laas
David Kaplan

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Name of the Coordinator:	Prof. Doris Schroeder (dschroeder@uclan.ac.uk)

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Context (Doris Schroeder)

One of the tasks of the GREAT project is the production of an RRI glossary. It was decided at the Brussels RRI meeting in September 2013 that other projects should contribute to this endeavour.

Go5 (inofficial name of 5 RRI Co-ordinators, Brussels Meeting, September 2013)

We were sent a list of glossary items that had already been identified and invited to contribute others. We made a case for the items that you can now find in this document. I made a case for shorter entries with different headings for the "global glossary" (hence, a case for a template change) and our example entry for "inclusive innovation" was accepted as the template for further work.

We submitted the entries we had identified as requested to GREAT after an internal peer review by myself. This document is not an official deliverable for us and has only minimal formatting.

Appropriate Technology (Kelly Laas)

Appropriate technology is technology suited to the environment in which it is used. In this approach, technology should be designed with users foremost in mind, and suited to the long-term needs of the community in which it is utilized. Appropriate technology is typically small-scale, decentralized, labor-intensive, energy-efficient, environmentally sound, and locally controlled. This approach also seeks to make use of local knowledge and abilities, and tends to seek to spread productive employment widely and produce products that meet basic needs. Appropriate technology takes a long-term approach, assuring that the individuals using it can maintain it, and not require expensive or hard-to-acquire replacement parts or specialized knowledge not held by members of the community. Creating appropriate technology can be a challenge, as one author states. "Defining the 'appropriateness' of a technology in a general manner is difficult, as it is hard to specify the context in advance. An appropriate technology has to be feasible and implementable. But, more than that, it has to achieve the goals that have been set." (Baker, 52)

The appropriate technology approach is related to RRI insofar as it provides an analysis of "responsible innovation": This approach stresses equity and an ethic of justice for all and seeks to increase the well-being of every member of the community and tries to give the community more control over the newly implemented technology.

For some, the term "appropriate technology" simply means "primitive technology" or "outdated technology, but this is a basic misconception. The appropriate technology approach does not seek to withhold technological advancements from developing nations. When advanced or new technologies can be incorporated into the local agricultural or manufacturing system without significant negative effects (as, for example, cell phones seem to have), they should be used. However, advanced or new technologies should not be adopted when they benefit some to the detriment of others (Bakker 60) or simply because they are "cutting edge".

Appropriate technology is a viable option for preparing communities for high technology. When appropriate technology projects are well-planned, the people involved learn enough both to keep it running and to improve it. When people operating the technology are in control, their expertise and mastery should increase, leading to further improvements. (Hazeltine, 278).

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Conflict of Interest (Michael Davis)

Conflict of interest: a situation in which some person (whether an individual or corporate body)

1) is in a relationship with another requiring exercise of judgment in the other's behalf and
2) has a special ("secondary" or "unusual") interest tending to interfere with the proper exercise of such judgment.

Conflict of interest is not simply bias or a conflict between interests. Bias is a deflection of judgment in a determinate direction; **a conflict of interest is, in contrast, a tendency toward bias that might or might not be realized**. A conflict between interests (conflict of interest*s* or conflicting interests) is any situation in which two or more interests conflict, whether within one person or between persons. Conflicting interests only become a conflict of interest if somebody asks for one's judgement.

So, for example, I hold a large share in a certain business, but am otherwise uninvolved in their activities. The business wants to recruit a new director. My 22-year-old nephew applies.

I may have a **bias.** Not only do I like my nephew but am also inclined, without much evidence, to believe he would make a fabulous director. That's not a conflict of interest; I simply assume something about my nephew's abilities. If I were less partial, I would realise that he is unlikely to be a good director without some job experience. I do have **conflicting interests,** though: If the business does well, I benefit financially (something serving my long-term interests). If my nephew gets a job, the family may be happy (serving another long-term interest) but the business may fail. Hence, one of my interests conflicts with another, though I do not have a conflict of interest. In contrast, I would have a **conflict of interest** if the Executive Board asked me to serve on the appointing committee. If I agreed to serve, I would have to exercise judgment on the company's behalf while I had an interest tending to make my judgment less reliable than it would otherwise be. Unless I disclosed the conflict of interest, I would betray the trust of the Executive Board. But even if I did disclose the conflict, I would remain a less reliable member of the appointing committee than I would be if my nephew were not involved. I would still have a conflict of interest.

Insofar as RRI involves bringing interested parties into the research and innovation process, it may create conflicts of interest for researchers or innovators that would otherwise be absent, for example, by bringing in someone who would pressure researchers to follow one approach rather than another for a reason extraneous to the research itself.

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Engineering (Michael Davis)

There is no good formal definition of engineering because, like other professions, engineering is a self-defining institution continually redrawing its boundaries as conditions change within and outside. Here are three commonly used definitions, each good enough for most practical purposes, but nonetheless open to counter-example:

- "Business, government, academic, or individual efforts in which knowledge of mathematics and/or natural science is employed in research, development, design, manufacturing, systems engineering, or technical operations with the objective of creating and/or delivering systems, products, processes, and/or services of a technical nature and content intended for use." The National Research Council, p. 36.
- Engineering is the application of "knowledge of the mathematical and natural sciences gained by study, experience, and practice to develop ways to economically utilize the materials and forces of nature for the benefit of humankind." National Society of Professional Engineers, p. 3.
- "Engineering is the application of scientific, economic, social, and practical knowledge in order to design, build, and maintain structures, machines, devices, systems, materials and processes. It may encompass using insights to conceive, model and scale an appropriate solution to a problem or objective." http://en.wikipedia.org/wiki/Engineering (Nov. 16, 2013).

What most definitions have in common is understanding engineering as a certain practice (involving mathematics and science) concerned with helping people and things work together better. Engineering is never "value free". The relevant values are now often expressed in a "code of ethics" (as well as implied in engineering's technical standards). Though, like science, engineering does generate considerable public knowledge, its aim is to help people in certain ways. In this respect, engineering is quite distinct from science (understood as the pursuit of knowledge whether for its own sake or for power over nature). There are many branches of engineering, the largest of which are: civil, biomedical, chemical, electrical, mechanical, and materials engineering. There are also many activities called "engineering" that are not strictly engineering, for example, "social engineering", "genetic engineering", and "financial engineering". There are even some activities, such as "marine engineering", that are both, that is, one activity by that name is what ordinary sailors do (look after machinery on a ship) while another activity by that name is engineering proper (the design of mechanical systems for ships).

An engineer strictly speaking (a "professional engineer") can be identified by some combination of academic credentials (a curriculum yielding a bachelor's degree in engineering) and experience of the appropriate kind (doing certain work reasonably well). The engineering curriculum is much the same the world over. A "Professional Engineer" ("PE") is an engineer strictly so called who, in addition to being an engineer, is licensed by a government agency. In some countries, such as Canada, all professional engineers are required to be licensed; in others, such as the US, some are; and in others, such as the Netherlands, none are.

Engineers are creators of technology, but they are not its only creators. Among other creators of technology are: architects, chemists, computer scientists, industrial designers, geneticists, machinists, physicians, technicians, and even amateur inventors. The closer research gets to practical innovation, the more likely it is that engineers will be involved—to ensure safety, reliability, usefulness, and economy. While engineers typically create technology (through "engineering design"), they also routinely engage in other forms of technical work, especially, forensics, inspection, management, and testing. Though engineers should welcome RRI (because it serves the purpose of engineering), they may in fact prove hostile if RRI is presented as a demand without any obvious way to carry it out. Engineers need detailed technical standards to carry out general policies (such as RRI), standards they typically write or at least help to write.

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Inclusive Innovation (David Kaplan)

"Inclusive innovation is the means by which new goods and services are developed for and/or by the billions living on the lowest incomes" (Foster and Heeks, 2013:1)

There are a variety of similar terms that are employed in different contexts:

- pro-poor innovation
- below the radar innovation
- bottom of the pyramid innovation
- grassroots innovation
- frugal innovation.

(Horton, 2008; Kaplinsky *et al* 2009; Smith et al, 2012)

All of these terms refer to the production and delivery of innovative solutions to the problems of the poorest and most marginalised communities and income groups globally.

Inclusive innovation mirrors a wider concern and growing interest in "inclusive growth" – growth which would be of particular benefit to the very poor.

It is possible to conceive of a number of different levels at which "inclusivity" could potentially operate:

- In the definition of the problems to be addressed through innovation being relevant to the poor;
- In the process of innovation itself where the poor are actively engaged in some manner in the development and application of innovative solutions to their problems;
- In the adoption and assimilation of innovative solutions whereby the poor acquire the capacities to identify and absorb innovative solutions to their problems;
- In the impact of innovation such that the innovation outputs enhance the consumption and/or incomes of the poor. (Foster and Heeks, 2013).

The expanding incomes of millions of poor consumers that is most evident in China, but also in many other countries of the world, has attracted business and notably the large global corporations to innovate so as to meet the needs of this fast growing market – resulting in the reorientation of business strategies for innovation. (Pralahad, 2009). Here innovation may be of benefit to the poor but the poor relate to innovation solely as consumers – passive recipients of innovation. Many protagonists and advocates of inclusive innovation would however look to the inclusion of poorer people as active participants in the processes of innovation (Cozzens, S and Sutz, J. (2012). This perspective defines inclusive innovation also in terms process. It seeks innovative activity that, in some way, has the potential to enhance the capacities of poor people such that they are not the mere passive recipients of innovation but are actively engaged and through this engagement are in some way "empowered." This perspective "…sees technology projects as seeding progressive social transformation in communities" (Smith, Fressoli, Thomas, 2013)

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Intellectual Merit (Michael Davis)

Intellectual merit: A term of art used by the US's National Science Foundation (NSF) to refer to those aspects of proposed research likely to improve scientific knowledge or understanding. The term replaced the criteria of *research competence* and *merit of the research*. Any assessment of intellectual merit should answer the following five questions:

1. What is the potential for the proposed activity to [advance] knowledge and understanding within its own field or across different fields…?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

For NSF, intellectual merit is paired with another standard of evaluation, "broader impact" (essentially any benefit to society beyond advancing scientific knowledge or understanding). While interpreting "broader impact" seems to have proved troublesome from its first introduction in 1997, interpreting "intellectual merit" has not.

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Policy Advice (Stephan Lingner)

The term “policy advice” stands for the targeted knowledge transfer between policy makers (actors) and advising experts. Simplified, this transfer involves a two-way communication. First, issues which require a policy decision are communicated from the actors to the advisors (e.g., challenging questions on bioethical issues put forward by the parliament). Subsequently, guiding knowledge is provided from the advising party.

The process aims at informed choices by the actors and thereby the formulation of reasonable policies (see also “Policy” within this glossary). The actors typically come from the executive and legislative branches of the political sphere and from policy administration, but also from civil society, economy, science and/or humanities, depending upon the specific contexts and problems at stake. Advisory bodies can be recognised individual experts or specific institutions, such as think tanks or experts’ commissions.

Whilst policy advice is not a new phenomenon, its importance has grown considerably since modernity especially in democratic societies. The reason for this is twofold:

(1) Scientific and technological progress offers new but often confusing options for innovation while making socio-technological life-worlds progressively complex. This complexity challenges decision makers especially with regard to significant uncertainties on the realisation of intended consequences of their choices as well as on related possibly harmful side-effects of action.

(2) Corresponding chances and risks might be unevenly distributed between different societal groups; a problem of justice.

Appropriate advice can therefore contribute to the reduction of ambiguity of policy decisions and thereby broaden societal acceptance.

A common approach for policy advice is described by Kamp (2014). According to this approach, policy advice will be given at different levels:

(3) the simplest form of advice aims at finding, adapting and securing the appropriate means to the ends of the actor.

(4) In particular cases, the application of certain means might be either restricted by societal norms and values or followed by inacceptable side-effects. However, they may also collide with implicit secondary aims of the actor, which have to be explicated. Following this step, the advice has to adapt the proposed means and measures to both, external and internal factors. The consideration of side-effects and secondary aims might thus result in finding alternative actors’ strategies without major restrictions.

(5) However, this outcome cannot be guaranteed in all cases, which is why only certain actors’ aims might turn out to be achievable at the same time. Therefore, the relevant (secondary) aims have to be prioritised for their selection and for subsequent finding of related comprehensive acting strategies.

Concluding, policy advice is a sophisticated task. The complexity, uncertainty and ambiguity of possible choices are reasons why policy advice often needs iterative reflection between experts and their clients. It is therefore rarely realised on an ad-hoc basis, today.

Providing policy advice is not un-contentious. The considerable interpretation demands of modern knowledge and the practical utility prospects of externally funded research have strong evaluative and normative implications from different societal perspectives, which might challenge the advisors' impartialities (Habermas 1969; notably pp. 120-145). Especially, the settings of commissioned consultancy might cause advisory dilemmas due to conflicts of interests, thus leading to lobbyism. Publicly funded policy advice is instead in need of experts as "honest brokers". Corresponding guidance for good practise is still evolving (see for instance Weingart et al. 2008).

The final success of policy advice depends on the performance of the knowledge transfer between the advisory parties, the quality of the expert's knowledge and the realisation of the acquired acting knowledge.

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Science (Michael Davis)

In the broadest sense relevant to RRI, *science* is systematic, publicly defensible knowledge in general. In this sense, mathematics, engineering, law, and even theology are as much sciences as physics, chemistry, and biology are. But, over the last century or so, the meaning of *science* has narrowed. *Science* now more often refers only to those forms of science (in the first sense) that seek to describe, understand, or explain some aspect of the temporal world, including the bodies, minds, and activities of living things. (See, for example, Nagel, 1961; Kuhn, 1962.) It is in this sense that physics, psychology, economics, and even history are sciences but mathematics, engineering, and computer science are not. Mathematics is not because its concern is (primarily) entities that do not exist in time (numbers, angles, sets, and so on); engineering is not because its concern is (primarily) not describing, understanding, or explaining the temporal world but improving it; computer science is not because its concern is humanly constructed abstract objects (actual or possible software), not the temporal world (not even physical computers). What these two senses of *science* have in common is that in both science is primarily a set of propositions or body of knowledge, an intellectual achievement.

Recently, however, *science* has come to refer as well, or instead, to an institution, that is, the collection of research communities that together produce science (in the second sense)—or, at least, tries to. Science in this cooperative sense is a social, as well as an intellectual, achievement. (See, for example, Longino, 1990.) It is in this third sense that, for example, *some* mathematicians, engineers, and computer scientists are properly described as scientists because they belong to the research community of a particular science (for example, the mathematicians, engineers, and computer scientists who help to construct and operate the Hadron collider or interpret its results).

Generally, scientific research communities are distinguishable from other research communities that also seek systematic knowledge of the temporal world in seeming to follow relatively reliable methods of inquiry. So, for example, astrology, phrenology, and the like do now not count as sciences in this sense while anthropology, climatology, and the like do. To say that science (in this sense) has relatively reliable methods is not to say that there is a single “scientific method”, much less that the method of science is perfected, fixed, or invariable across disciplines. Science has no single method of inquiry, just a collection of methods that seem to be more reliable than others for this or that science (or sub-science). Thus, deduction, simulation, controlled experiments, systematic observation, and standardized surveys all seem to be relatively reliable methods of inquiry—and therefore scientific—while dreaming, relying on biased reports, intuiting, and so on do not. Some methods may be more useful in one science; others, in another. For example, controlled experiment is much easier in physics, chemistry, or biology than in archeology, geography, or political science. (Kitchner, 2003; Wylie, 2002)

Since reliability is a matter of degree, the exact boundary between science and would-be science (whether a pseudo-science, failed science, or candidate science) is subject to debate. How reliable must a method be before it is reliable enough to count as “scientific” for the purpose of distinguishing a science properly so called from a would-be science? A would-be science is a research community that claims to be scientific but generally relies for defense of its claims on methods that have proved relatively unreliable or, at least, have yet to prove reliable. (Ove, 1996)

Sciences are sometimes divided into “pure” and “applied”, “natural” and “human”, or “physical” and “social”. While perhaps useful for certain practical purposes, such as creating convenient departments in a large grant-making agency, these divisions do not seem to be fundamental, or even useful, for understanding science. Consider, for example, synthetic biology. Is it pure or applied, natural or human, physical or social? Synthetic biology is pure insofar as it is about the possible arrangements of elements into molecules, but applied insofar as it actually seeks to *build* complex molecules associated with life. It is natural insofar as the building blocks it works with are naturally occurring, but human insofar as some of the molecules it builds exist nowhere in nature but are human—and, indeed, social—constructions.

Science, in any of these three senses, may exist in many places and times. Science may, however, also fail to exist in some places and times. A particular culture may know a great deal about the world but have no science. To be a science (in any of the three senses distinguished here), the knowledge in question must be systematic, not a mere collection of facts, data, or information. Of course, how much system the knowledge must have to count as "systematic" is another question open to debate.

The three senses of *science* (systematic publicly defensible knowledge in general, such knowledge only of the temporal world, and communities that produce such knowledge) are relevant to PROGRESS in two ways. First, they are a reminder that much of RRI is about more than science in either the second or third sense—and perhaps even the first. RRI is about improving the human life, not just about describing, understanding, or explaining anything. Science (in the second or third sense) has only a subsidiary role in RRI, that is, shedding enough light in an otherwise dark space to allow the work of useful invention to go on there. Much of RRI (the research as well as the development) may be the work of engineers, industrial designers, marketers, lawyers, accountants, technical writers, and the like who, if "scientists" at all, are so only in the first sense of *science*. They may contribute to RRI without contributing to science (in the second or third sense).

Second, the three senses are also a reminder that the grant-making agencies that administer RRI may, given *their* purposes, have to interpret "science" more broadly than would otherwise be appropriate. So, an agency concerned with the support of "science" might, if assigned the task of encouraging RRI, have to fund much of the process by which "pure research" turns into useful innovation. It might therefore have to fund the engineers, industrial designers, marketers, and so on necessary to such innovation even if they come into the process only after the science has been done (science in any of the three senses).

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Technology (Michael Davis and Kelly Laas)

Technology: any *useful* artifact embedded in a social network that designs, builds, distributes, maintains, uses, and disposes of such things—and, by extension, such a network as a whole. So, for example, while a hammer lost in space is only an artifact, a hammer at work in a factory is technology (part of a technological network).

Technology so understood is never "value free"; it is, by definition, part of a social network and social networks, being purposive systems, must have ends in view and other values helping to shape the design, building, distribution, maintenance, use, and disposal of its artifacts (values ordinarily including morality).

This is probably the sense of "technology" most relevant to RRI. After all, the innovations in question in RRI are technological in the sense that, whatever they prove to be, they are intended to be useful artifacts properly embedded in society. Since some criticism of RRI may rely on one of several other senses of technology, it is worth listing the most prominent here—to avoid confusion and provide a vocabulary for making the relevant distinctions.

1. Despite its Greek roots (*techne* = art, skill; and *logos*=study, account), the word "technology" seems to date from no earlier than the 1600s. It then meant the scientific study of skill or craft, for example, the observation of a brick maker to learn the secrets of brick-making. Like the rest of science then (from archeology to zoology), technology was typically an avocation of gentlemen, those with enough wealth that they did not need to work for a living. The aim of technology in this sense was knowledge, not practice.

2. Early in the 19th century, "technology" developed a new sense, one that soon crystalized in the polytechnic, a school for the study of certain "techniques", not historic crafts but the new craft now called "engineering". Engineering was both scientific and mathematical in ways traditional crafts were not. The polytechnic was a school of advanced education but one that, doing without Latin (as well as Hebrew and Greek), was separate from the university. Technology in this sense did not include (even if it might use) the products of law, medicine, or any of the other forms of practical knowledge that the university taught. Once Latin ceased to be necessary for a university education, the way was open for polytechnics to become technological universities and for universities to establish schools of technology (whether so called or called instead schools of engineering, applied science, or the like).

3. Related to this early 19th century sense of technology, are three others. First (3a), there is technology as tool, especially any tool requiring special training to repair or manage. In this sense, a hammer would not be technology but an automobile or computer would be. From this sense (a tool too complex for ordinary people to repair), it is only a small step to thinking of technology as a "black box", an incomprehensible force that operates on "society" more or less from the outside (or, at least, seems to). It is in this black-box sense (3b) that critics of technology might claim that "technology rules our lives" or that technology is opposed to humanity. It is also only in this sense (or one close to it) that it is an open question whether technology is ever "value free".

A third sense of "technology", the most recent (3c), is technology as "cutting edge" tools, that is, those tools that seem most innovative. For a half century, any development having to do with computers has been called "technology" in this limited sense. Now "genetic engineering" and "nanotechnology" are as well. This sense of "technology" generally relies on a narrowing of one or another of the other senses of "technology" described here.

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Technology Assessment (Stephan Lingner)

Technology assessment (TA) aims at the analysis and evaluation of scientific and technological advance and its consequences for individuals, society and the environment. Its roots emerged in the early environmental crises of the western world in the 1960s and 1970s. Even today, in the 21st century, the tension between technologic and societal development is unresolved. Hence, there is still a need for TA.

TA-relevant problems and conflicts about certain new or emerging technologies centre on their uncertain and possibly harmful side-effects and on perceived unequal distributions of corresponding chances and risks within society. At the same time, TA has to appreciate the societal chances of technology development and to unravel any barriers of desirable innovation, which might for instance stem from outdated regulations or public misconceptions. Ultimately, TA aims at the formulation of reasonable technology options and/or corresponding recommendations for research and innovation policy or technology regulation. In this way, it is a means for decision support in the relevant fields of policy advice (see also “Policy Advice” within this glossary).
TA is mostly organized in inter-, respectively trans-disciplinary settings in order to accomplish its complex mission at the interface of science and society. Apart from the subject-matter of related sciences, the main contributing disciplines are social sciences, epistemology, ethics and jurisprudence all of which reflect upon the issue at stake. Corresponding TA projects are mostly conducted along the following lines:

(1) problem definition,
(2) stock-tacking of the matter from different disciplinary or stakeholder perspectives,
(3) inter- or trans-disciplinary reflection of the initial survey,
(4) conclusions for the acting level, drawn from a.m. critical reflections,
(5) dissemination and transfer of the results to the addressees.

TA was first institutionalised at the “Office of Technology Assessment (OTA)” in the USA. The OTA was shut down later, but TA-institutions had meanwhile been set up in most European countries (Banta 2009). Beyond relevant institutions at the national level the “European Technology Assessment Group (ETAG)” conducts TA-studies on behalf of the European Parliament. Another prominent TA-network is the “EPTA (European Parliamentary Technology Assessment)”.

Institutionalised TA is not a methodological monolith. Different perspectives and approaches developed, which correspond to specific problem areas, assessment methodologies and target groups (v. Est/Brom 2004). For instance, national facilities of parliamentary technology assessment (PTA) aim specifically at policy advice for the legislative power (Ganzefles/v. Est 2012). By contrast, health technology assessment (HTA) deals with the challenges of medical technology and its growing intervention depth into human life. HTA's clients are not only the legislator, but also the practitioners in this field.

The process of mostly expert-based TA was criticised as lacking broader legitimation. This gave room for the advent of participatory TA (pTA), which foresees the inclusion of lay people in the TA assessments. pTA is especially favourable, where contextual and local knowledge is essential or where individual interests are directly affected. This type of TA is, for example, adequate prior to site selection decisions of industrial plants. By contrast, the strength of the experts’ approach lies in reflecting those TA problems, which address more fundamental questions and/or long-term issues of science and society.

There is also a continuum of TA in a narrower sense towards more general academic "Science and Technology Studies" (STS) or towards classical risk analysis in health institutions. The one-sided and risk averse focus of some early TA approaches had been blamed as "technology *arrestment*" while being blind for positive outcomes of technological innovation. This observation gave, for instance, rise to the comprehensive concept of innovation and technology analysis (ITA) in Germany.

Another general problem of TA and its appropriate assessment horizon is known as the "Collinridge dilemma", which is characterised on the one hand by the locked-in problem of technology governance *ex post* and on the other hand by the principally incomplete or uncertain decision basis from *ex ante* evaluation (Collinridge 1980). A practical way out of this dilemma is offered by constructive TA (CTA), which tries to embed itself deeply into the whole technological development process in a systematic way. Similar or further conceptions are "real-time TA", "vision assessment" and "prospective TA" (Grin/Grunwald 2000; Liebert/Schmidt 2010). However, the diversity of the above mentioned TA approaches should not be understood in terms of exclusiveness: Some of the above mentioned TA categories have an orthogonal relation to each other, which, for instance, would allow for HTA and PTA assessments at the same time.

Sceptics sometimes ask whether TA has any significant impact on technology development and innovation. In many cases, a clear proof for either thesis is hard to find. The reason behind it is that impact measures and evidence are often missing. However, the specific self-attribution of the roles of TA institutions within certain innovation processes might give some indication about their (suspected) effectiveness (Decker/Ladikas 2004).

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Values (Michael Davis)

According to most dictionaries, the term “value” has several senses, including color value, linguistic value, mathematical value, and musical value. The three senses most relevant to RRI seem to be:

First, “value” may refer to the entity valued: “Among our values are money, football, and sex.” In this sense, nothing is a value unless someone values it. Universal values are what everyone values, whether as an end (such as health or pleasure), a means (adequate medical care or protection from bad weather), or both (exercise or companionship).

Second, “value” may refer to the standard by which something is to be valued, for example, usefulness (the pragmatist's standard of value), money (the economist’s standard of value), or beauty (the aesthete’s standard of value). “Value pluralism” is the view either that some people value some things while others do not, or that standards of value in actual use differ from one person to another, or that there are no universal standards of value (that is, no standards that everyone should adopt, even at their rational best). While the first two interpretations of value pluralism are factual claims that seem to be true, the third is controversial—in part at least because it is probably not factual. A “theory of value” is a controversial claim (or set of claims) about what the standard of value is or should be (for example, that pleasure is the sole measure of what is good or that pleasure, beauty, truth and justice are all good in themselves and incommensurable). The term “value judgment”, though reasonably interpreted as any application of a standard (that is, as an evaluation), is usually used with the implication that value pluralism in its controversial sense is true and that any “value judgment” is arbitrary or at least subjective. This use of “value judgment” is itself controversial.

Third, “value” can refer to the consequence of applying a standard to an entity (yielding an “evaluation”), for example, “The value of my car is less than a euro” or “Whatever the market says, by the standard of beauty, this building has great value.” An entity may be valuable in this third sense even if no one values it. It is valuable, has value, and is a value if, according to the standard in question, it should be valued.

The word “values” may refer either to the plural of one of these three senses or some other (“usefulness and beauty are both values”) or may instead refer to what a person, group, or organization happens to treat as fundamental, or at least important, standards or evaluations (“These are our values”). In this sense, “European values” might include human rights, justice, equality, privacy, and so on. These are European values if, but only if, Europeans in general, or at least Europe as an organized entity, judge those standards to be worth a great deal of effort to enforce or those states of affairs to be worth a great deal of effort to achieve.

Given the diversity of meaning that “value” has, it may seem prudent to avoid use of both “value” and “values” in any discussion of RRI. Yet, though prudent, such avoidance is not possible. The term, usually plural, is already deeply embedded in Europe’s vocabulary. So, for example, one important definition of RRI says (in part) that it is “to effectively evaluate both outcomes and options in terms of moral values (including, but not limited to wellbeing, justice, equality, privacy, autonomy, safety, security, sustainability, accountability, democracy and efficiency)”. (Directorate-General 2013, 55-56, Italics added.) Here “values” seems to mean “standards”. On the other hand, von Schomberg, 2013, p. 10, has suggested that the term “socially desirable” in his definition of

RRI be interpreted (in part) to include “European values”, quoting a number of European officials using the term in all its ambiguity, for example, “’Europe is a community of Values’ (Van Rompuy, First European Council President, 19 November 2009).”

So, the best advice seems to be to ask which sense of “value” is meant when avoiding the term altogether impractical.

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