Responsible Innovation in brief

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Research in innovation is booming at *every university in the world*. Thousands of scholars have turned into 'innovation experts' in the last decade. They study the legal, fiscal, cultural, psychological and socio-economic conditions that are conducive to innovation, they describe best practices and make recommendations on how to be more innovative. Innovation may bring a lot of good to society, but innovation is not a good in itself. History provides many examples of innovations and new technologies that have had serious negative consequences and that just failed to address significant problems. In order to avoid innovations that have negative societal impact and that fail to address central societal issues, systematic attention to moral values and societal problems should be central to the study and practices of innovation in engineering and the applied sciences. The concept of Responsible Innovation provides guidance on how this may be achieved.

Responsible Innovation has become a prominent topic in thinking about ethical and social aspects of innovation and new technology in the last 5 years. It brings together researchers from different fields of study, such as history of science and technology, science and technology studies, technology assessment, science communication and the ethics of technology. It retains the useful aspects of all these fields and adds some new useful aspects at the same time. Responsible Innovation in a broad sense refers to *reflection, analysis and (public) debate concerning the moral acceptability of new technology and innovation* and implies among other things that we must be willing to pose and answer questions such as

(1) "Are our efforts in applied science, technology and engineering likely to contribute to the solution of the big problems of our age",
(2) "Are we proceeding in a responsible way to arrive at the solutions to our global problems?"
(3) "can technical solutions be shaped so as to accomodate the plurality of moral and societal values and the needs of all parties affected"?

The term "Responsible Innovation" in this sense was - as far as we have been able to trace - first introduced and elaborated in a Dutch Research Council Program on *Socially Responsible Innovations* around 2006 (see www.nwo.nl/mvi;

Van den Hoven, 2014). Other research organisations across Europe have started to fund research along these lines not long after that. The Dutch program continues to serve as a benchmark for many more organisations in other countries. Proceedings of the annual conference in The Hague (Van den Hoven, 2014) take stock of the dozens of research projects that have been carried out during recent years. The EU has combined many activities and funding schemes in (i) ethics of research and development, (ii) Ethical, Legal and Social Issues (ELSI) and (iii) Technology Assessment (TA) under the large European Framework Programmes with the idea of Responsible Innovation and the central thought of the so-called Lund Declaration, which was drafted under the Swedish presidency in 2009 and which stipulates that applied science and engineering and Research and Development should be focused on the Grand Societal Challenges.

On november 21 of 2014 this policy was endorsed and further extended in the *Rome declaration on Responsible Research and Innovation* under the Italian Presidency of the EU (URL: https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf)

Although thinking about Responsible Innovation may have had its roots in Europe it is a concept with a true global purchase. We live in a hyper-connected world, our **science** provides knowledge of the fundamental building blocks and processes in nature, and our **technology** hardly leaves anything on the planet untouched. It is of the essence to help ourselves to an adequate and shared conception of responsibility for our innovations and new technologies: Are our innovations saving lives, are they producing jobs equitably, are they helping to save the planet from heating up, are they safe and secure, do they also respect our privacy, and do they respect the freedom and autonomy of people? If not, how can **we** make them so?

Responsible innovation can, as a concept, be understood in a *substantive* and in a *procedural* sense. As a procedural notion, responsible innovation refers to a process of innovation that meets certain procedural norms, like accountability, inclusiveness, due care and transparency (to stakeholders and to society). As a substantive notion, responsible innovation refers to results and outcomes of innovation processes in the form of products, systems or services, i.e. innovative technologies, which reflect and accommodate moral values.

The central idea of Responsible Innovation is that innovation or invention, in the sense of 'adding new technical functionality to the world' should no longer serve as the main aim of our collective efforts in applied science, technology and engineering. It is not just any new gadget that should make us marvel. Innovation processes, systems and investments should preferably be focused on addressing

societal challenges and our urgent global problems, in climate, health, planning, energy, water and quality of life. Approaches to innovation and research can count as *responsible* only if

(1) risks, potential harms, wellbeing, values, needs, rights and interests of relevant parties affected by the innovation are adequately taken into consideration at a very early stage
(2) issues of governance, regulation, inspection, monitoring and reporting about innovations are adequately dealt with
(3) relevant knowledge and information is shared and communicated between affected parties in a timely way
(4) legitimate deliberative institutional arrangements, decision making instruments, communicative infrastructure are provided to relevant parties and individuals
(5) Options, possibilities, alternatives, scenario's, choices are conspicuously represented and presented to relevant agents and actors

Responsible Innovation thus becomes typically (i) a multidisciplinary effort, (ii) situated at the early stage of the development of new technology, representing a (iii) design orientation. These are three characteristics that make Responsible Innovation stand out with respect to other forms of ethical and societal reflection on technology. The fact that *Responsible Innovation* is also (iv) an on going process, that (v) it is open, inclusive and involves all affected parties and stakeholders, and is (vi) reflective, is the *genus* of all ethical activity in the real world, and is not the *specific difference* of Responsible Innovation.

Of these differentiating features (i) – (iii), I think the most radical conceptual innovation associated with the idea of Responsible Innovation is *the design approach to ethics*, i.e. the idea that designs can and ought to be morally evaluated and *vice versa* that ethics can be undertaken in *a design mode*. One could even argue that an ethics in the age of high technology that does not specify implications in greater detail for how the world ought to be *designed* is gratuitous, impotent and irrelevant. Deliverables of research in Responsible Innovation thus characteristically take the form of designs or concrete proposals of how problems can be solved, preferably in such a way that unsettling moral or societal dilemmas are resolved. This may occur when conflicting values are accommodated by novel design and new functionality. Values that often come into conflict are efficiency, economic growth, safety, security, sustainability, autonomy and control, privacy, transparency, wellbeing and health. We have described elsewhere that the hallmark of 'true innovation' is that it provides a way out of situations of *moral overload*, i.e. situations where it looks as if there is no way to satisfy all of our moral values and honour all of our moral obligations. A responsible innovation in that case is a clever design that allows us to 'eat our cake and have it'. (Van den Hoven, 2012)

Technology has become a main determinant of the quality of life of individuals and the quality of society. New technologies contribute to human well-being, but they may also introduce considerable risks to humans, the environment and future generations. Smart devices and infrastructures such as smart electricity meter, smart electricity grids and CCTV camera systems RFID applications in tracking and tracing goods and people can contribute to sustainability and safety, but they may also diminish our privacy and security. We therefore have every reason to make sure that the new technologies we develop as a society respect a range of values we hold dear. Various governments, companies and research funding agencies (most notably the European Union and the Netherlands Organisation for Scientific Research, and those in Germany, UK and Sweden) have recognized this need for ***responsible*** *innovation*.

Eight Chinese Technical Universities – including Tsinghua - have now established strong ties with research taking place in Europe in Responsible Innovation. The collaboration is shaped by means of exchange programs with the 3 Technical Universities Ethics Centres in The Netherlands– united in the 3TU.Ethics Centre – where Research in Responsible Responsibility is strongly represented (http://ethicsandtechnology.eu/spotlight/5tu-ethics-collaboration)

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