

Regulation and the enabling and constraint of technological innovation – two sides of the same coin

Workshop report (Washington DC, 30 June 2009)

Building on IRGC's work on the risk governance of individual innovative technologies, IRGC's Scientific and Technical Council (S&TC) along with 17 – mainly US-based – experts gathered for a full-day workshop to engage in a broad discussion on how regulation can enable and/or constrain technological innovation.

The workshop topic was introduced by Joyce Tait (S&TC member and project leader for IRGC's synthetic biology project). In the following initial session, **case examples of regulation of innovation in specific areas were presented:**

- In biotech (nanotechnology), free-running coupling was established as a main problem, leading to uncertainty, which in turn stifles innovation. The issue of how and by whom coupling should best be controlled was raised, and it was suggested that this best be done through public-private partnerships. Other related concerns raised were the scientific uncertainties and the problem of definitions.
- The DARPA-model (based on the Defense Advanced Research Projects Agency; originally for developing new military technologies) employed in the US ensures communication and exchange between industry and science, to instigate productive partnerships and secure funding for fruitful research and development projects. A factor in the success of the DARPA-model is the scientific knowledge of the DARPA project managers
- In the ICT sector, while there is limited regulation on a technical level, the sector has a 'tradition' of being affected by anti-trust legislation. Regulation thus fosters innovation through enabling competition, e.g., AT&T, IBM, Microsoft. The need for a global dialogue to solve compatibility issues, e.g., WTO, ISO standards, was mentioned.
- In the energy sector, regulation can promote environmentally friendly innovation, both directly, but also indirectly through keeping costs down and levelling the playing field. Targets are often too ambitious, because in reality change is often incremental, e.g., we have hybrid, rather than zero-emission, cars. Subsidies is a way for government to "pick winners", although they are a less stable form of regulation than standards. Policy certainty and predictability are key in order to enable investment in R&D. Conversely, one participant argued that policy stability could stifle innovation, through reducing flexibility to adapt to changing circumstances. There could be perverse incentives for players to reverse achieved progress in order to enjoy e.g., subsidies, in which case innovation is constrained. Finally, the public demand for innovations is often uncertain.

The second session dealt with the **risk dimension of regulation and technological innovation.**

- The US approach was described as rather hands-off, while the European practice was described as being based on expert consensus and occasionally applying the precautionary principle (PP).
- One recommendation was to first frame the decision and the alternatives ("get the science right, and get the right science"), and then proceed to regulatory details. Some discussion was devoted to the diverging conceptions of the PP, exploring the spectrum of how it is interpreted – from the maximum change approach (consistency; formalistic; PP as the rule), to the minimum change approach (flexibility; contextual; PP as a perspective).
- There was general agreement that there is an abundance of interpretations of the PP, and that the definition depends on the context in which it is used. It was suggested that the key words of the PP are "lack of knowledge" and "cost-effective".
- One participant argued that too much precaution can limit the acquisition of knowledge, since we are prevented from learning from our mistakes. Others felt that neglecting the

PP would come at a high cost (ultimately people's lives) and that it was all a matter of getting the knowledge base right.

- Subsequently, the role of insurance was discussed. Insurance coverage is necessary for innovations to be commercialised, but insurance for new innovations often is subject to exclusion clauses. Insurance companies often require legal compliance from their clients, which serves as an incentive to adhere to existing regulations.

Moving on to the third session, which was devoted to **key regulatory factors that enable or constrain technological innovation**, the discussion (with some repetition from the previous sessions) is summarised as follows:

Regulation can enable innovation by

- *Reducing uncertainty* (framing what can be done now and in the future; IP)
- *Reducing the cost of market entry* (open for competition; anti-trust)
- *Levelling the playing field* through forcing competitors to share the cost of innovation (compatibility issues)

Regulation can constrain innovation by

- *Picking ('wrong') winners* (preventing the 'best' solution from winning)
- Too much precaution *prevents acquisition of knowledge*
- Creating *perverse incentives*

Innovation enabling policy approaches

- *Policy stability/consistency* enables long-term planning and investments
- *Flexibility* (in a predictable way) allowing for changing circumstances (eg five year cycles)
- Regulation and standards need to be *globally applied and enforced*, especially for emerging technologies given the risks involved.
- Regulation must be the result of *participatory processes* involving government, industry and scientists (cf. DARPA model). Challenge: information sharing

In the final session, **obstacles for an optimal relation between regulation and technological innovation** were identified. The role of the internal culture of organisations was deemed important, as were political climate and public perception, which vary significantly between countries and between (public/private) sectors. One participant noted that there seems to be two 'camps' in the overall discourse: one that believes that regulation is too constraining on innovative technologies, and another that feels that it is not constraining enough to minimise associated risks (partly because some risks are not sufficiently well evaluated).

Toward the end of the workshop, some **potential areas for future IRGC work were suggested**, including:

- moving more into social risks (risk culture and the need for *compliance* with regulation, rather than regulation as such);
- the role of trade/customs/tariffs in relation to risk and innovation;
- time-horizons for investments;
- educating regulators regarding the impact of regulation on innovation;
- regulatory pathways;
- aviation;
- green chemistry;
- exploring existing policy variants in different countries;
- determining the impact of regulation on innovation in selected countries (is it constraining or enabling?).