

What if law shaped technologies?

Technology does not operate outside its legal context. Law reacts to technological developments through the adoption, for example, of health and employment rules, or tax and risk assessment standards, to prevent technological advances from undermining human rights, environmental standards and democratic values. Law imposes critical choices upon objectively uncertain scientific judgements and value-biased knowledge. But what if law, overcoming the pacing and regulatory connection problems, could restore human agency in the face of overwhelming technological developments, shape the diffusion and adoption of technology in its various forms and even anticipate technological trends?

Legal provisions contain or imply decisions about the scope and ownership of intellectual property, about the permissible degree of extraction and processing of personal data, and about who is allowed to access technological outputs. These legal interventions mostly take the form of a reactive approach to today's wide range of technological risks. The law's ex-post-facto intervention, in this respect, may not necessarily constitute a weakness; the vagueness inherent in legal provisions may compensate for unforeseeable cases that require the questioning of traditional assumptions about the socio-technical context in which law will operate.



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However, disruptive technologies develop at such an exponential pace that traditional legal oversight mechanisms are outpaced by the rate of technological change, the evolution of which is so rapid that it can escape the language of existing regulations. By the time new regulations become legally binding, they are often only able to address a minor part of the wider technological effects which have already spread beyond the conceptual scheme of law.

As a result, the pre-existing legal structure may prove a poor match for new types of disputes raised by disruptive technologies. And the gaps are getting wider as technology advances ever more rapidly. So can the legal system overcome the temporal gap between the emergence of a technology and the subsequent need to exercise control over its possible effects, and retain both flexibility and responsiveness? What regulation is justified by a particular technology? Are particular legal instruments better suited to controlling particular technological developments characterised by high scientific uncertainty or high development costs? How can law regulate uncertain and unknown futures in the face of limited knowledge?

Uncertainty and lack of knowledge can be dealt with through the introduction of 'sunset clauses', which make rules subject to revision after a predetermined period of time, and forward-looking ex-ante regulatory impact assessments. Alternatively, under such conditions, regulation by agency may be considered a useful supplement to the traditional regulation by contract, as, in the case of the former, the regulatory regime can then be adjusted in a timely and more flexible manner in the light of market and technological developments. The question is if, given the constraints of a 'hard law' approach, legal systems are ready to adopt 'prospective and homeostatic' instruments, capable of adapting themselves to a changing technological landscape? In the frame of EU law, this role can be exerted, for example, by the numerous

agencies established at the EU level in technology-based domains, such as the European Food Safety Authority, the European Chemicals Agency and the European Medicines Agency. These decentralised authorities have been empowered to adjust the EU regulatory regime to the latest technological developments by issuing expert opinions, decisions and guidelines, which, despite their non-binding legal character, constitute authoritative points of legal reference, due to their specificity, expert-driven nature and evidence-based approach.

Some countries like the UK, the USA, Switzerland and Australia have tried to bridge this gap by offering what is known as a 'regulatory sandbox'. These initiatives aim to provide space where, primarily, fintech (financial technology) firms can test their innovations in a less restrictive regulatory environment for a limited period. This helps the firms in question to get licences and develop in a way that will make them compliant but in a more efficient manner.

What does the legal conceptualisation of technology mean for European policy-making?

Though the early stages in the development of a technology, when there are still many unknowns, are a challenging time for developing a legal framework, they can also be an opportune time for taking advantage of the flexibility of a new approach. Although no law can encode the entire complexity of technology as it is, let alone predict its future development, there is an imperative need for EU law to develop a proactive and iterative function, to anticipate technological trends and future risks of activities that are in constant evolution. While technology itself is not a reason to regulate, such a proactive approach could ensure that disruptive technologies are deployed in a way that is consistent with established principles and values.

In the frame of EU law, the adoption and application of the precautionary principle and the principle of intergenerational equity could affect the way a specific technology is framed and, if necessary, contained. The precautionary principle basically holds that, since every technology and technological advance poses some theoretical danger or risk, public policy should be crafted in such a way that no possible harm will occur when the technology is deployed. The principle of intergenerational equity requires legislators in the field of technology regulation to consider the impact current decisions will have on future generations' interests in a variety of contexts, including fiscal policy, pension fund regulation and financial regulation more generally.

The role of delegated and implementing acts in the frame of the EU rule-making process is crucial, as their adoption may lead to the prioritisation of one technological path over another. Despite their apparent technical nature – given that their activation is triggered by scientific and technological developments – these acts might involve important political choices and have a significant impact on citizens' daily lives. They are used in a wide range of policy areas, for example, implementing measures on energy labelling, authorisation of certain types of food additives and civil aviation safety control equipment. Technology assessments that forecast the social and economic impacts of new technologies, and regulatory impact assessments that attempt to predict the social and economic impacts of proposed EU legal acts are usually conducted ex ante, and may shape technological trajectories in an upstream manner.

The apparent effectiveness of regulatory sandboxes may also pave the way for the creation of testbeds for new technologies in the domain of the Internet of Things and driverless cars. The ability of the law to break with established traditional perceptions of technology, and operate in uncharted territory, will depend on the willingness of EU legislators to introduce new types of legal instruments.

It would also require the introduction of new forms of engagement with the evolving nature of scientific and technological ecosystems. While some 'black swan' technological events will remain impossible to predict, a real-time regulatory system that constantly analyses scientific trends would go a long way towards ensuring that regulatory policy proactively adapts to an evolving disruptive ecosystem, and influences the design of technologies.