

# Conclusion

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The contributors to this book have attempted to develop a multidisciplinary approach towards the role of regulation in technological innovation. Far from providing a uniform solution on how regulation is responding, or should respond, to technological developments, the contributors have presented a spectrum of related arguments and opinions. Clearly, the emergence of new technologies, the complex blends of public and private actors and new trans-governmental networks within the regulatory space have created a major regulatory challenge for the current technology trends in various sectors. In this regard, 'regulation of innovation is by definition dynamic, and certainly does not deserve a one size fits all approach'! In line with the findings and opinions voiced by the 'smart regulation movement', the innovation and regulation 'relationship' demonstrates a shift from government to governance. Not only does the regulation of innovation need to be responsive to the specific characteristics of innovation opportunities and technological narratives, and thus be sensitive to the possibilities of tailoring regulation as a mixture of concepts and forms, but it also clearly bears witness to the need to connect public and private stakeholders through and towards regulatory interaction. When it comes to innovation, 'regulatory governance' involves both regulation and governance. This observation is particularly important given the fact that the open dynamics of technological innovation require a shared awareness from all stakeholders as to the opportunities and risks involved, and a shared need to accommodate change while retaining sufficient mutual trust and certainty.

Further, an important aim of this book is to support and elucidate regulatory relevance as regards fostering innovation while, at the same time, considering the need for regulation to strike a balance between fostering innovation and protecting against technological risks. In the context of this book, the element of fostering innovation refers strongly to the Lisbon agenda and to the observation that the advancement of innovation through regulation is scientifically underexplored and not well understood.

To rectify this state of affairs, we have argued that a multidisciplinary approach is needed if regulation is effectively to foster and secure technological innovation. In this book, we have endeavoured to present such a multidisciplinary approach through a range of contributions that are grouped in three sections. The first section set out to provide a general analysis and appraisal of the regulation and innovation relationship, featuring such comparative advantages as legal designs and informal regulation. The second section was built around specific sectors (in particular telecommunication infrastructures and related services, competition law and regulated industries, border management, energy innovation and PPP), with a focus on issues related to regulating technological innovation. The final section brought forward the much-debated issue of emerging technologies and the challenges they present to innovation and regulation. In this section, the issues of regulatory partnerships in nanotechnology, patent quality and the use of existing patents were debated.

Besides generating a call for greater awareness of innovation and regulation (an ambition that we believe all the authors have met) the chapters provide various methodological insights and approaches towards analysing the technology revolution and the regulatory challenges in specific sectors, emerging technologies and interests. In searching for the optimal solution to encourage effective technological innovation, the contributors' suggestions, as taken from their methodological insights, are twofold. First, that regulation develops as technology advances and revolutionises, which implies a need to open up science and technology development, foster a balance between state power and public scrutiny, and aim for smart rules and regimes. Second, by focusing on the process of patenting emerging technologies and regulating nanotechnology, the

need for an ex ante regulatory design is highlighted. New technologies are no longer regarded as entirely passive entities that are developed by inventors and used by customers; rather, they involve complex networks of actors and outcomes, and regulation should act to control and limit the effects of such technology developments.

In the introduction we presented three critical questions that this book addresses:

- what type of regulatory framework would best fit the needs of technology and innovation developments?
- what competences or authorities should be given to the regulatory actors and other stakeholders to shape the future paths of technology innovation?
- what lessons can we distil from other regulatory fields, and how we can apply what we have learnt to further enhance the development of technology innovation?

Although not intended to capture exclusively this book's subject matter, it makes sense to reflect on these questions and on how the authors and the overall book have approached these issues and what is seen as the way forward with regard to the challenges in regulating technological innovation.

As to the first question (What type of regulatory framework would best fit the needs of technology and innovation developments?), we feel that our observation in the above preamble stands: that in regulating technology innovation there is no single innovation-specific type of regulatory framework that can be expected to respond adequately to the full diversity found in technological and innovative sectors. Having said this, across the various contributions to this book it becomes clear that regulators' responsiveness to 'innovation specificity', dealing with related dynamics and conflicting interests, must be matched with legal certainty, both with regard to companies that aim to invest in innovation (while securing a return on their investment) and to consumers and third parties who aim to be free from hazardous technological risks (and desire adequate and enforceable technical standards). Such certainty could be provided in various regulatory forms and procedures, some of which may place government centre stage (e.g. as legislator or leading customer), but others where government merely ensures the basic rules of the game, within which private actors determine innovative pathways. Clearly, the design and introduction of regulation that fosters innovation must be subject to both ex ante and ex post impact assessments, as regulation is inevitably a major component of the institutional space that allows innovation to flourish.

Regarding the second question (What competences or authorities should be given to the regulatory actors and other stakeholders to shape the future paths of technology innovation?), it is clear that a 'smart' broadening of the regulatory scope must be recognised. While many of the above remarks still bear witness to government setting the stage, in practice we have clearly moved from government to governance including in terms of regulatory engagement with innovation. The element of informal law, or of self or private regulation, is ubiquitous in innovation narratives. With this observation in mind, the matter of competences and authority to regulate must be seen from a different perspective. Here, not so much the traditional Rule of Law but rather legal pluralism and regulatory constitutionalism become the new challenges in regulatory governance. This is a profound challenge, not merely in finding appropriate alternatives to replace previous safeguards of legitimacy and effectiveness, but also because innovation cannot thrive if the institutional surroundings are unstable and unpredictable in terms of the state of play they project (such as a level playing field), their enforcement and possibilities for change. Moreover, innovation is at risk if there are no genuine constraints on the possibility of an ever-expanding hybrid regulatory web, with corresponding embedded interests and

administrative burdens.

Finally, with regard to our third question (What lessons can we distil from other regulatory fields, and how we can apply what we have learnt to further enhance the development of technology innovation?), we have seen that the regulation of technological innovation builds upon wider regulatory theory – references to which were made in the introduction to this book. Against this backdrop, the various contributors have touched upon a variety of fields – such as telecommunications, health and safety, intellectual property, environment, energy and nanotechnology – within which the innovation narrative is studied from a regulatory angle. Clearly, these analyses show that, although each narrative comes with its own regulatory specificities, comparisons are important as with technological innovation comes social innovation, and social institutions must or will change in the wake of technology thrusts. The revolution in innovation and more specifically the development of new technologies involve high levels of uncertainty (uncertainty over the development of these technologies, over their uncontrolled introduction into process technology and consumer products and over difficulties in providing effective private regulatory supervision) and it is important for regulation to become a key factor in establishing the necessary social innovation, and to safeguard a careful transition to, and practice of, new inventions while considering more than mere technological interests. The chapters in this book make clear that by establishing an inclusive regulatory design of information flow, and an open interchange among stakeholders on the burdens and benefits of technological innovation, the influence and the acceptance of these innovative developments will be increased, benefiting both public and private actors.

As editors, we feel that this book is a step towards enhancing our understanding of the regulation and innovation relationship. We are convinced that such an ambition requires a multidisciplinary approach as innovation narratives come with a high complexity, reflected in the relationships between the technological and social mechanisms involved, which need to be sufficiently understood to employ regulation successfully to advantage innovation. We hope that readers appreciate our efforts and we look forward to their opinions.