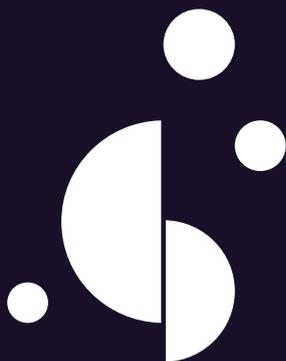


Renewing regulation

'Anticipatory regulation'
in an age of disruption

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and Jen Rae

March 2019



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Credit and thanks is also given **Mark Bunting** for his work on an initial draft of the paper.

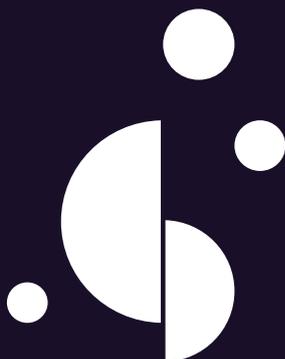
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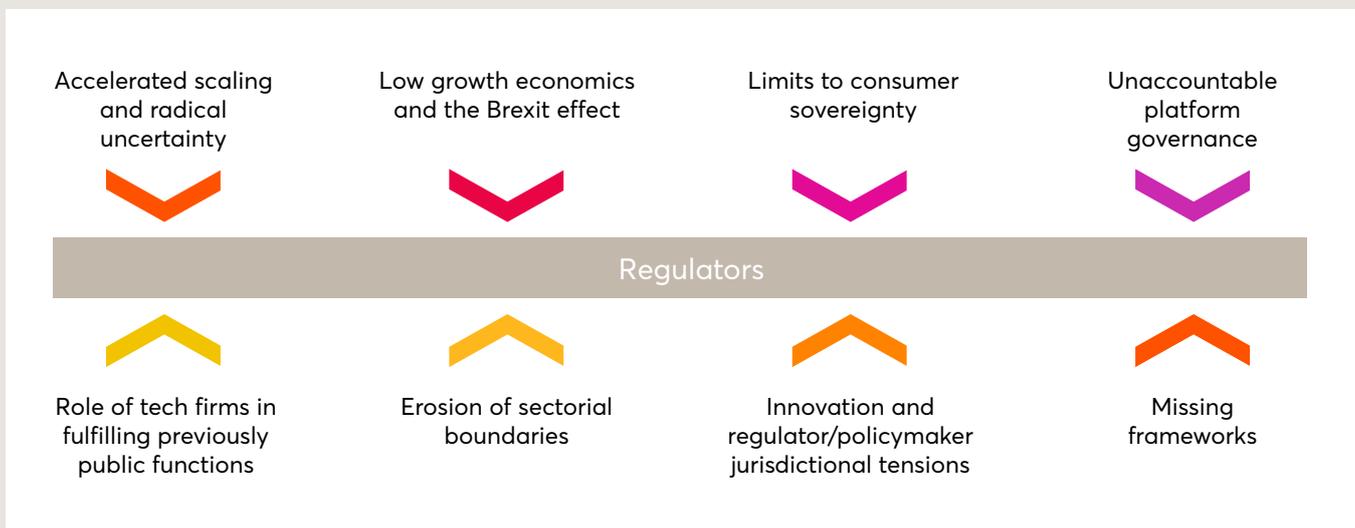
Executive summary

In the past decade there have been two major global crises of regulation – the first triggered by the 2008 financial crisis, the second by attacks on the integrity of the 2016 US Presidential election. Both are also crises of innovation, posing urgent questions about how we secure the benefits of innovation in ways that command public confidence and without courting unacceptable risks. They demonstrate that innovation, in particular the commercial deployment of innovation, is – or should be – at the centre of regulators' concerns.

This is not just an issue about finance and social media. There are a range of emerging or maturing technologies – artificial intelligence, the internet of things, drones, gene editing and digital health services – that promise both great economic and social benefits, but also entail new kinds of risk. Each could evolve on many different trajectories, the most sustainable of which are likely to be the product of an interplay between public and private actors. Unhelpfully, public and political discussion about regulation has typically pivoted between theoretical (or theological) arguments about whether we should have 'more' or 'less' of it, and whether activity x or y should be regulated. Far less attention has been paid to the actual practice of regulators, in particular as it relates to innovation.

Regulators have been caught in the crossfire of these debates, unsure when and where they should be facilitating (or even stimulating) innovation, treating it with benevolent indifference or trying to control it or its consequences. Meanwhile pressures have been building up on regulators from a range of different sources:

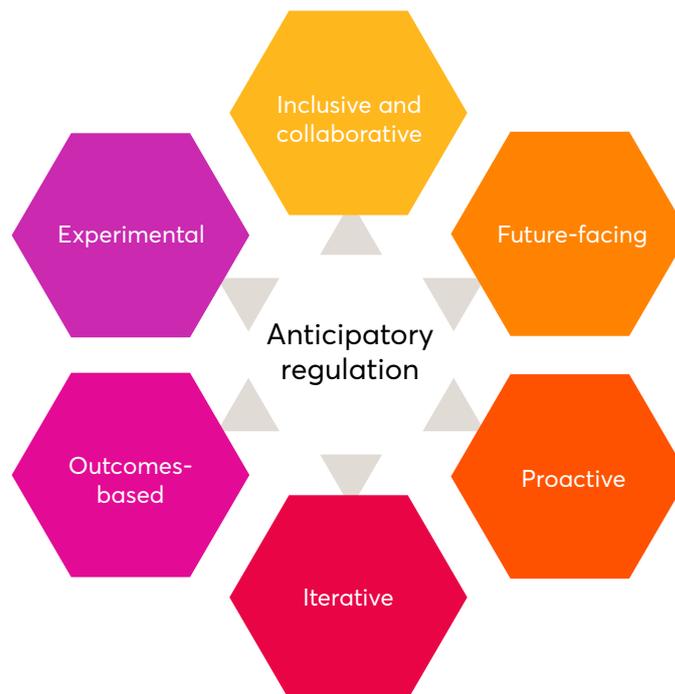
- New forms of technological disruption that can scale with unprecedented rapidity and cut across inherited regulatory jurisdictions;
- Growing political pressure to create the most conducive environment for innovation and entrepreneurship in the context of a slowdown in productivity growth (sharpened in the UK by the prospect of Brexit);
- A new, increasingly formalised understanding of consumer behaviour that problematises the notion of consumer sovereignty underlying much regulatory practice; and so on.



In relation to innovation, the risk of always fighting the last war with familiar tools is particularly high. In response to these pressures we have seen many proposals for new rules and new institutions, but less discussion of how rules are made and how regulators work. This is an important gap: our view is that the underlying challenges require new regulatory practices and stances, not just (or always) new regulatory initiatives or bodies.

Over the last three years Nesta has been working to develop a new theory and practice around regulation, which we call 'anticipatory regulation'. We have done this through papers and research; convening key stakeholders; as well as designing practical projects directly with regulators in areas like banking, drones and law.

The anticipatory approach emphasises flexibility, collaboration and innovation. It is built on six principles which in many ways contrast with traditional regulatory practice:



Inclusive and collaborative, in engaging the public and diverse stakeholders where new technologies and how they are deployed raise ethical issues, and in leveraging the capabilities of businesses, cities and civil society to secure policy goals.

Future-facing, in developing resilient, adaptive strategies that can cope with the inherent uncertainty of fast-changing markets.

Proactive, in engaging with innovators and innovation early in the cycle to provide predictability and enable timely, proportionate responses to issues that may scale rapidly.

Iterative, in taking a test-and-evolve rather than solve-and-leave approach to novel problems, for which there may be no established playbook.

Outcomes-based, in focusing on validating companies' efforts to achieve well-defined goals, rather than setting rules, and particularly on incentivising platforms to support regulatory objectives.

Experimental, in facilitating diverse responses to regulation of early-stage opportunities and risks, and where national or global policies and standards are still to be established.

Adopting these principles may require regulators to develop, or further develop, new kinds of capabilities. But in themselves they are not about intrinsically having more or less regulation. Indeed asking if 'more or less' is needed is usually the wrong question to ask. Neither do these principles entail regulators dialling risk up or down in the areas they regulate – though they would serve to empower regulators to better manage evolving risks and take advantage of emerging opportunities.

These principles are being applied by various regulators in different countries, in perhaps their most advanced form in financial services regulation reflecting a radical rethink following the financial crisis. But these changes, which take regulation out of its traditional comfort zone, are generally incremental and fragmented, and only rarely embedded in the core of regulatory practice. A lack of mechanisms for spreading best practices also inhibits greater regulatory innovation.

Initiatives such as the Regulators' Pioneer Fund (RPF) in the UK represent an opportunity for regulators to experiment with anticipatory approaches and learn from one another. They also demonstrate the appetite among regulators to engage and, implicitly, a recognition of the limits of traditional regulatory stances towards innovation.

But more needs to be done. In particular, regulation and regulatory practice need to be recognised as crucial elements of the industrial strategies that are being developed and implemented in the UK and elsewhere. Indeed, the quality of regulatory practice in relation to innovation will be an increasingly important source of competitive advantage in the global economy. For countries such as the UK whose continued and growing prosperity depend on world leadership in the commercial deployment of technological innovation, this is, therefore, a vital issue. This demands new ways of conceptualising what high-quality regulation is, and this paper aims to contribute to this discussion. While the focus in this paper is on the UK context, we believe the issues are similar in many other countries, states and cities around the world.

To embed these practices and way of working into the UK's regulatory system we believe there are a number of interventions that need to be made:

1. Skills and capability building

It may be hard for regulators to know when to use these anticipatory regulation practices or how to deploy them, and even if they know what they want to do they do not necessarily have the right skills or capacity to be able to do it.

Recommendations

- As well as supporting learning-by-doing through more initiatives like the RPF, **the Government should invest in training, cross sector learning and capacity building programmes.**
- **The Government should also invest in the development of toolkits and best practice guides covering innovative regulatory approaches.**

2. Understanding and spreading what works

Future initiatives must be paired with robust evaluation to understand the impact of different approaches and to identify how public (or other) funding can be best spent. Little robust evidence currently exists on the impact of different regulatory practices or the context in which they 'work'.

Recommendations

- Any government funded project should include defined funding and support for robust evaluation (least 10 per cent of the total value of the fund).
- UKRI should lead a wider research programme looking at the impact of regulation and regulatory practice on meeting the UK's Industrial Strategy priorities including Grand Challenges, sector deals and innovation investment targets. This could be partly be achieved through specific research funding from the research councils, drawing on wider academic and industry expertise.
- A new hub for expertise bringing together theory and practice in regulatory innovation could be set up to collate and provide well-evidenced guidance to regulators.

3. Coordination and collaboration

A large part of the change explored in this paper is a move away from individual regulatory action towards a more collaborative, coordinated and systematic approach. International collaboration will also become more critical post-Brexit if the UK is to reap all the potential benefits of an innovative regulatory system.

Recommendations

- As well as individual regulators setting up access points for innovators (such as the MHRA's innovation office) the **Department for Business, Energy & Industrial Strategy should set up a cross regulatory single entry point for innovators**, that itself capitalizes on the best available technology to enable innovators to 'self serve' to a much greater extent than is currently possible.
- **Regulators and government should develop more structured approaches to international collaboration, building on the opportunities 'regulatory diplomacy' could create**, for example by building partnerships with relevant international regulators or potentially running a version of the RPF jointly with another relevant country.

4. Moving first and responding quickly

Identifying emerging opportunities and challenges in a timely fashion is important but ultimately pointless unless the Government and regulators are also able to respond quickly. This would require flexible and fast ways to mobilise the right stakeholders and resources to make something happen.

Recommendations

- To ensure resources are available for regulators to put responses in place once new opportunities or threats are identified through horizon scanning activities, the **government and regulators should identify and set aside small budget pots to facilitate timely action** around emerging areas.
- The decision on when and how to use these funds would need to be taken quickly, but is also potentially highly political. **An independent panel, similar to the RFP judging panel, could be convened at various cycles to highlight areas where and what kind action should be taken, potentially with the power to allocate these small budgets.**

5. Role of politicians

Politicians have a crucial role to play in providing regulators with the mandate to be more innovative in the way they function so they can better support or stimulate innovation in the economy. Without political support, pressures on regulators will push them to focus on short term priorities and avoiding risk.

Recommendations

- **Ministers should make clear future commitments to this agenda through further funds and other supporting initiatives** to give regulators the confidence and backing to adopt the principles of anticipatory regulation.
- The **Ministerial working group should also make a commitment to openly explore deeper systemic regulatory questions** that may stand in the way of achieving a system wide anticipatory regulation approach.

Changing practices and capabilities among individual regulators may need to be reinforced by more systemic reform. For example, are existing regulatory remits and mandates still fit for purpose? What kind of institutions are needed to embed 'anticipatory' approaches into whole regulatory systems? What is the right balance between regulatory independence and political direction on emerging risks and trade-offs? Beyond this paper, these questions will need to be explored further if we are to achieve a regulatory system fit for the future.

Our age of disruption - technological, political, social - is demanding the renewal and reimagining of institutions of all kinds, and the regulatory system is no exception. Navigating this transition will be challenging but for countries such as the UK, with its strong track record of regulatory innovation, it also presents many opportunities and now is the time to seize them.

2

Regulation and innovation – new narratives, new practices

Narratives of regulation – a recent history

In the decades preceding the 2008 financial crisis, the purposes and practices of regulation commanded little public attention or discussion. The prevailing and apparently settled narrative was that regulation was an unwelcome, albeit sometimes necessary, hindrance to the workings of largely self-correcting markets. Its role was to define targeted interventions that would correct precisely identified market failures, which were aberrations from the axiomatic assumptions underpinning the competitive market model of economic theory (with the burden of proof resting with those proposing intervention).

The presence of market failure was necessary but not sufficient to justify intervention – the (high) risk of government failure and unintended consequences also needed to be taken into account. Regulation was overwhelmingly identified in political discourse with 'red tape', possibly well-meaning but in practice largely serving to strangle entrepreneurship and innovation and fatally prone to capture by powerful interest groups. At its crudest, this mode of thinking saw market-driven innovation in all its forms as a monolithic good and regulation as something approaching its antithesis.

There was, of course, some truth to this narrative. Even where it is warranted, regulation does raise barriers to market entry and can serve as a moat for sluggish incumbents. A risk averse regulator, accustomed to being in the public glare only when things go badly wrong on its watch, has a powerful incentive to put barriers in the way of innovation (in particular in its most disruptive forms). This does not have to be a deliberate strategy – carelessness towards innovation can achieve the same outcome. Regulators were caught in a bind – perceived as being the enemies of innovation and under political pressure to prove this wrong, while also having high powered incentives to at best neglect, and at worst stymie, innovation.

A crisis and opportunity

A consequence of the 'red tape' narrative of regulation was to pay scant attention to the downside risks that innovation can also entail. In the run up to the 2008 financial crisis the financial services sector was celebrated as a powerhouse of useful innovation, and there was a broad political consensus that regulation needed to be 'light touch' to enable innovation to flourish, or perhaps self-regulation could be relied on to serve the public interest.¹ The promise was that innovation would enable more efficient allocation of financial risk, with attendant benefits for the real economy. The downside risks associated with these innovations – which as it turned out brought the world economy uncomfortably close to disaster – were not just downplayed but could not be acknowledged.²

The financial crisis was by common consent to an important degree the product of deep conceptual and consequent regulatory failure and demonstrated the high stakes at play in (mis)regulation of innovation. It also dealt a serious blow to the idea that a regulators' role in relation to innovation was simply to 'get out of the way'. Financial innovation, in all its forms, is no longer assumed to be uniformly positive. In the countries worst affected by the crisis, it resulted in a burst of regulatory activism to reduce systemic risk in the financial sector and an increased willingness to intervene to protect consumers. At the same time, in some countries (beginning in the UK) financial regulators started efforts to facilitate and support useful innovation, with the establishment of regulatory sandboxes.

New Challenges to old approaches

Fast forward to 2019, and regulation once again looms large in public discussion, but this time as a potential guardian of the efficient functioning of markets and public safety. This is clearest in the ongoing debate about the power, practices and business models of digital conglomerates including Facebook and Alphabet (parent company of Google, which is in turn parent company of YouTube), and their impact on both our economic and social life.

These platform businesses have established what appear to be preeminent positions in their respective markets,³ transforming many other industries in the process. This situation has emerged over the past 15 years with remarkably little regulatory action. But their impact on public life – including on the right to privacy, human wellbeing and democratic infrastructure – is now under intense political scrutiny, with questions surrounding attacks on the integrity of the 2016 US Presidential election through social media serving a similar alarm function as the 2008 financial crisis. The practice of 'moving fast and breaking things' reaches its limit with the US electoral process.

Calls for regulation

There is an increasing presumption (including in some cases from the businesses themselves) that the dominant digital platforms should be subject to greater regulation and possibly competition remedies. But these increasingly urgent calls to 'regulate x' have yet to translate anywhere into a coherent plan of action. We are currently in a regulatory 'phoney war', with governments considering their next steps (including proposals for a social media regulator in the UK) and the businesses positioning themselves to respond.

Regulation is belatedly being called to the rescue, but it is not clear we know what we want from it or how to make this happen. There is also a suspicion that we may be helpless to change digital infrastructure that has become so deeply interwoven into our public and private lives, and that the balance of power now lies in the favour of the commercial players rather than the state. As governments and regulators consider how to reach a more sustainable position, they may conclude that it would be better not to start from here.

While the pendulum has swung in the public narrative about regulation, from villain to (potential) hero, most regulators' practices in relation to innovation have – with some notable exceptions described in this paper – changed little over time. There is a growing public and political expectation that regulators engage differently with innovation, but it is possible that the pendulum will swing back again with regulatory practice little changed. A risk is that regulators make themselves irrelevant when in fact they have a crucial role to play in enabling useful innovation that serves the public interest.

Regulation and innovation

For all their differences, the recent regulatory crises in financial and digital services both derive from challenges in managing the social impacts – positive and negative – of innovation. Both are examples of regulatory forbearance allowing useful innovation to metastasise into more problematic forms, eventually triggering emergency regulatory and policy responses. With the benefit of hindsight, it is clear that neither case represents an optimal regulatory strategy with respect to innovation.

While these crises can be seen as allowing too much of the wrong kind of innovation, this does not imply on the flipside that regulators have successfully removed themselves as a barrier to potentially useful innovation. For example, regulation and regulatory practices can still impose subtle barriers to early-stage innovators – for example through unnecessary complexity, opacity or ambiguity, unpredictability or lack of coordination between regulators where innovations cut across inherited regulatory jurisdictions. In other cases, the lack of high-quality standards or infrastructure⁴ – which the market itself may have little incentive to create – may impede useful innovation.

This version of regulatory failure is much harder to diagnose as it results in the absence of innovation that might have otherwise happened, rather than an obvious, visible crisis. But governments around the world increasingly recognise that they are competing with one another for scarce innovation talent, and that the regulatory environment is an important factor. This need not imply a regulatory race to the bottom to attract investment in innovation - it is clearly a fallacy that countries with the weakest regulatory infrastructure provide the best environments for useful innovation.

The need for new solutions

Both kinds of failure – allowing too much harmful innovation and impeding useful innovation – point to a need for regulators to find new ways of engaging with innovation as it emerges and evolves, which will equip them to ensure that the economic and social benefits are captured while better understanding and managing the risks. We argue in this paper that achieving this will require a new kind of regulatory practice, with innovation becoming central to regulators' concerns and regulators purposefully taking on their role in the innovation ecosystem.

This runs counter to the view – still widely held – that regulators should aspire to, and can attain, the role of neutral external observers of market innovation, intervening as necessary to manage risks. This view is understandable for regulators that want to maintain and advertise their fragile independence from politics. But regulators are always actors in the innovation ecosystem, if only because no regulation (or indeed the decision not to regulate) can be neutral in its impact on the trajectory of market-driven innovation.⁵ This view also has the practical disadvantage of absolving regulators from engaging deeply with innovation relevant to their respective areas of responsibility – with the result that they are less able to identify sources of risk or how their own practices could adapt to better facilitate useful innovation.

The stakes are high. While the public and political focus today is on how we should regulate the digital conglomerates, many emerging or maturing technological innovations also raise urgent questions that have not yet achieved similar prominence – for example facial recognition technology, the internet of things, drones, quantum computing, gene editing and digital health services. All have the potential to deliver significant benefits, economic and social, but they also raise serious issues of public concern. For none of these and other game-changing technological innovations is the ideal trajectory that they have a free hand to evolve until a public crisis emerges. Regulators and regulation have a crucial role to play in engineering these better trajectories.

Defining regulation

'Regulation' is notoriously hard to define and to distinguish clearly from law on the one hand and executive-led policy on the other. There is no stable consensus across countries or time of where the boundaries between these should lie. One recently offered definition of regulation illustrates the difficulty: "*Organised attempts to manage risks or behaviour in order to address a collective problem or concern*".⁶ This definition might include self-regulation, though in this paper we focus on regulatory institutions of the state.

In practice, there are many different types of regulatory institution, each with different scopes of action and types of objective, often reflecting the circumstances of their creation rather than the current state of play in the spaces they regulate. Regulators enjoy at least some degree of independence in how they pursue objectives conferred on them by statute or the executive, the idea being that insulation from political interference enables better decision-making and trade-offs, for example by taking greater account of long-term costs and benefits.⁷

The trend in many countries over time has been for the executive to increase the responsibilities of regulators at the expense of its own powers, as exemplified by the rise of the independent central bank. But this is a relatively recent experiment in governance and is, of course, reversible.

While defining regulation is difficult, 'managing risks or behaviour' is central to most regulators' responsibilities. First and foremost, regulators are expected to keep the public safe, and calls for new or increased regulation tend to coincide with perceptions of heightened risk or harm. Given this, it is no coincidence that innovation is so often at the heart of regulatory dilemmas and failures.

Innovation expands the range of what is possible and in doing so usually creates risk, in the economist's sense of widening the distribution of possible outcomes. These risks are typically both on the upside and the downside, which is what makes innovation a hard problem for regulators.

Regulation – a positive agenda

There is a much stronger consensus today, than there has been for decades, that regulation and regulators have crucial roles to play in preventing serious public harm resulting from innovations and their deployment. A 'negative' role for regulation in preventing public harm has never been controversial⁸ – what has arguably changed, in the light of recent crises, is that the public is now less willing to give the benefit of the doubt to self-regulating markets or commercial platforms.

More controversial is the idea that regulators may have a 'positive' role to play in shaping how markets evolve, and in particular in which innovations are developed and deployed and how. For many, this would represent an overstepping of the mark by regulators, which do not have the information, capabilities or democratic legitimacy to second guess markets and are always prone to capture by commercial interests.

But this presupposes another fallacy, namely that the 'negative' role of regulators in preventing harm is neatly separable from a more 'positive' role in shaping markets and commercial innovation. The recent crises of regulation – in financial services and digital platforms – suggest that an exclusive focus on harm avoidance does not even succeed on its own terms.

In both cases, by the time the harms became apparent they had already imposed significant costs. It could be argued that the regulatory failures were technical or contingent in nature and not bound up with a regulatory stance focused overwhelmingly on harm avoidance – perhaps the harms could have been forestalled with better foresight. But it seems at least as likely that, without positive objectives and the willingness and ability to pursue them, regulators will often be outflanked by markets and harm will materialise.

Regulation for innovation

This need not mean that regulators should try to micromanage markets, with the resulting deadening effect on experimentation, innovation and entrepreneurship. The choice between this approach and an exclusive (and often ineffective) focus on harm prevention is a false one. In practice, regulators do typically have positive goals relating to the public good enshrined in their remit that go beyond mere harm avoidance, including for example, objectives relating to competition, innovation and fair market outcomes. There is legitimate debate to be had about what responsibilities should properly sit with elected policymakers versus independent regulators, but the current range of objectives pursued by regulators is inconsistent with a 'neutral observer' model of regulation and actual regulatory practice.

It is a contention of this paper that pursuing these goals, in a context in which innovation is constantly creating new challenges and opportunities, requires a new model of regulatory practice. It describes this model, which we call 'anticipatory regulation', and the building blocks of this practice.

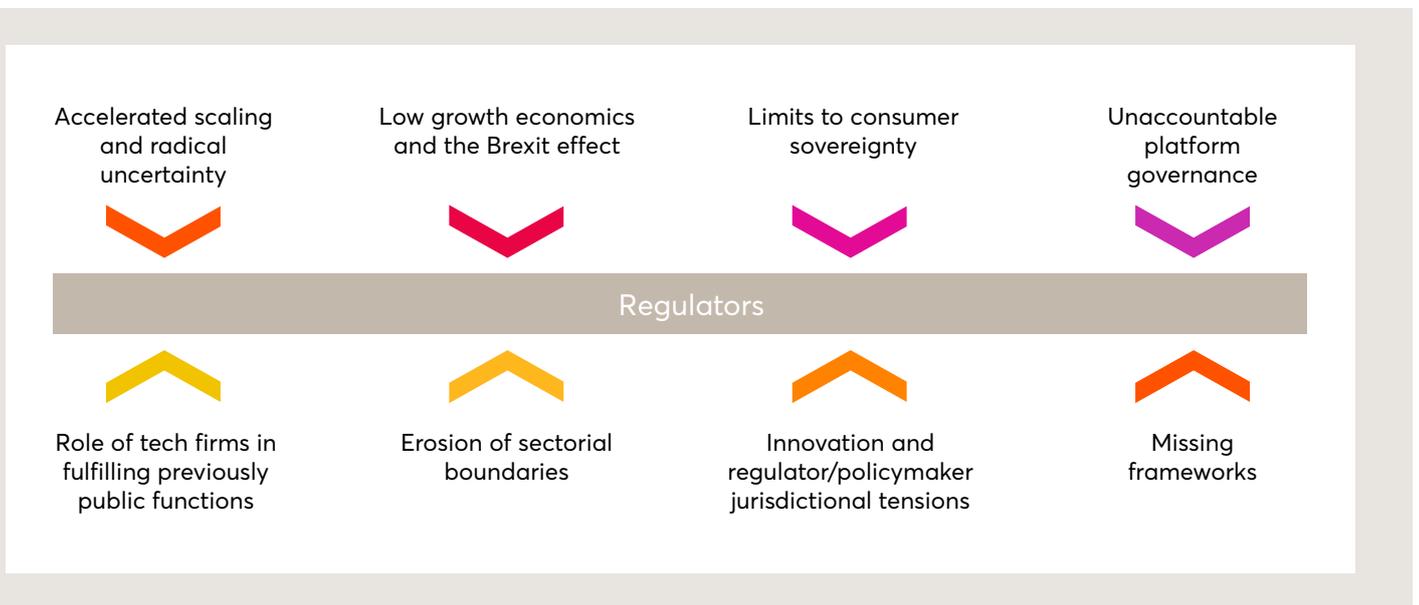
The wide-ranging and growing impacts of technological disruption combined with emerging pressures and challenges for regulators have thrown regulation back into the spotlight. As regulators grapple with these complex issues, there is a greater need for new tools and ways of working that help both governments and regulators better adapt to a changing world and use regulation as an effective tool to stimulate and direct innovation (as well as mitigating public harm).

This paper seeks to help regulators and governments understand how they can use an emerging set of approaches, referred to as 'anticipatory regulation', to maximise the opportunities and mitigate the risks of rapid technology-driven market change. It both highlights the emerging challenges and pressures regulators face, as well as a set of anticipatory regulation principles that provide an alternative way of dealing with these issues. It primarily considers the position of the UK and by drawing on international examples, looks at how new initiatives such as the Regulator's Pioneer Fund (RPF) could be used to ensure the UK continues to play a leading role in regulatory innovation.

3

Challenges and pressures on regulators

A number of factors are coming together to create unique challenges or exacerbate the existing issues regulators face. Many of these problems lack a regulatory playbook, are not easily described in traditional market failure terms or readily addressed through interventions to promote competition.



Erosion of sectorial boundaries

General-purpose technologies such as new methods of data capture and processing, artificial intelligence and other digital technologies have wide-ranging impact across traditional sectorial boundaries. Few individual regulators have the technical capabilities, market insight or leverage to cope with the broad range of issues that such general-purpose technologies create in their domains. There is a growing capability and power asymmetry between regulators and, in particular, global technology firms, with the latter having a virtual monopoly on the best technical talent and immense financial firepower with which to protect their commercial interests. An effective response requires new models of coordination and cooperation between regulators and other organisations where such general-purpose technologies create shared challenges.

Again, regulators may not have remits or powers to address new technologies, business models or market entrants. For example, online software and applications are largely outside of Ofcom's scope. Ofcom's governing framework in its original form, the 2003 Communications Act, does not include the words 'Internet', 'online' or 'web' ('broadcasting' occurs almost 500 times). Some problems, such as cybersecurity, span multiple regulators' remits, creating potential problems of coordination and duplication.

Accelerated scaling and radical uncertainty

Many technologies today can scale with unprecedented speed, creating a great deal of short- and long-term uncertainty around their wider consequences. Permissionless innovations (which require little or no regulatory approval) can become 'facts on the ground', with millions (or billions) of users, before regulators have engaged with their potential implications. Facebook has in 15 years reached 2.3 billion monthly active users, and virtual market saturation in many economies. This rapid growth can enable new types of public harm, for example: the ability of illegal content to disseminate with unprecedented scale and rapidity through online channels. Where this rapid scaling is global, regulatory action at the national level can be impractical, and yet infrastructures to respond effectively and quickly do not typically exist at the supranational level.

As well as speed of adoption, the complexity and uncertainty around emerging technologies and other global trends can challenge individual regulators' capacity to understand their potential trajectories, and to distinguish hype from reality. With their highly constrained resources, this presents regulators with difficult choices about where to focus.

Low growth economics and the Brexit effect

Despite technological change, measured productivity growth in the UK and elsewhere, and real wage growth for most workers, has been subdued for many years, and not only in the wake of the financial crisis. One manifestation of this is the recently unprecedented phenomenon of younger generations in established economies feeling worse off and less optimistic than their parents.⁹ The reasons for this, and prospects for the future, are poorly understood and the subject of intense debate.¹⁰

Combined with the challenges and opportunities provided by Brexit, This unwelcome trend has heightened the need to find new drivers of growth for the UK economy. The government's Industrial Strategy sets out Grand Challenges to help put the UK at the forefront of the industries of the future. It recognises the important role of regulation, stating for example that '[the Strategy] will develop an agile approach to regulation that promotes innovation, the growth of new sectors, and innovative market entrants.'

Limits to consumer sovereignty

Regulatory regimes developed in the latter part of the 20th century, many of which still exist today, sought to introduce consumer choice into highly regulated or natural monopoly sectors such as energy and retail banking. These have had some success, with a growth in choice and switching by consumers. But the behavioural turn in economics¹¹ has increasingly emphasised the limits to the model of well informed, optimising actors engaging in markets which these developments presupposed.

But many consumers lack 'market literacy', capacity or motivation to engage with the opportunities presented by competitive markets, or may be held back from benefiting by more subtle barriers.¹² Which? research concluded that very few consumers are 'fully literate',¹³ with vulnerable consumers particularly at risk, raising concerns about unfair market outcomes and, and at worst, exploitation.¹⁴

Regulators are increasingly under pressure to find a balance between 'paternalistic' interventions to protect specific subsets of consumers and setting market-wide rules that seek to promote competition. This is difficult territory for regulators as distributional concerns have traditionally been less of a focus than overall market efficiency. Questions around inequality and who benefits from new products or services have been moving up the political agenda and are set to become more important as the distributional impacts of the 'fourth industrial revolution' start to be felt.

Innovation and regulator/policymaker jurisdictional tensions

As is the case with 'fairness', regulators often lack – or feel they lack – the legitimacy to make decisions about values that are less subject to quantification. This is particularly problematic in the context of innovation and uncertainty, where quantitative approaches to decision-making may be unavailable or misleading. While a range of techniques now exist to assess the public's priorities in these cases, it is not always clear how these should be applied. Usually government must set strategic direction, but too frequent or granular intervention can undermine regulatory independence, create regulatory uncertainty and discourage private investment.

At the same time, the resources that governments and regulators have at hand, their central position as a receiver and distributor of information (Nodality); authority to determine what is legal (Authority); assets in the form of money and other resources (Treasure); and resources in the form of people, knowledge and skills (Organisation), are largely insufficient in the face of very large multinational technology companies like Amazon, Apple and Google.¹⁵ This is where coordinated national and supranational initiatives are becoming more important.

Unaccountable platform governance

Commercial digital platforms play an increasingly important role in our lives, and some of these are the greatest commercial success stories of our times. Where technology lowers barriers to entry, platforms often emerge to facilitate trade. Platform operators set rules to maximise the platforms' value; since this is generally related to the value it delivers to its users, incentives are broadly aligned. Sometimes platforms can even be better positioned as regulators than public agencies – they have more information and strong incentives for efficiency, innovation and increased participation. They can iterate rules and sanctions to incentivise good behaviour and prevent abuse.¹⁶ But increasingly we are seeing digital platforms achieve a scale that begs questions about their ability to exploit dominant positions. For example, the European Commission is investigating allegations of an anticompetitive conduct by Amazon, relating to interdependencies between Amazon's roles as both sales platform and retailer.

Private governance may not be compatible or aligned with the goals of public regulation in other ways. For example, platforms may not address externalities or bad actors, as the Electoral Commission has argued with respect to transparency of political advertising.¹⁷ It is also hard to know how effectively platforms govern their markets as they hold the data and published transparency reports rarely provide a comprehensive assessment of the impact of their policies and enforcement activities. The commercial incentives of platforms may mean their approaches to seeking consent for personal data sharing (for example between apps and platforms) comply with the letter of the law but not the spirit of informed consent.

Growing role of firms in fulfilling previously public functions

As the transformative power of technology drives some public agencies to the limits of capacity and jurisdiction, private companies have acquired growing responsibility for some previously state-led functions. Social media and video sharing services increasingly play a vital role in enforcing anti-terrorism law online, and potential changes to EU copyright legislation could extend their responsibilities. Regulators may not be equipped with the remits, expertise or data to respond to problems like these, which are more to do with law enforcement than regulation in its traditional sense.

The opportunity and challenge

In recent decades the UK has enjoyed a strong reputation for effective regulation based on careful assessment of evidence, well-designed, consultative processes and the development of innovative processes. For example, the UK has been an attractive destination for private investment in privatised regulated utilities such as energy and water; the UK was seen as a leader in Internet policy, making it an attractive environment for investment and innovation; UK regulatory impact assessments were influential in shaping EU legislation; and the Financial Conduct Authority's (FCA) Regulatory Sandbox has inspired similar initiatives among regulators across the world.

Continuing this innovation in regulatory practice reduces the scope for regulation by outrage and ad hoc political interventions in response to crises. Innovators value the ability to experiment but this is not their exclusive concern – they also place a premium on predictability, transparency, openness and sustainability. The UK is at a disadvantage relative to, for example, the United States in terms of the size of its internal market and opportunities for different approaches to experimentation afforded by its federal structure. Post-Brexit, the UK will need to work even harder to attract the businesses of the future. But the UK can build on its reputation for good governance to become, and to be recognized to be, the world's best regulatory environment for innovation, without this simply meaning the most permissive environment.

4

Anticipatory regulation

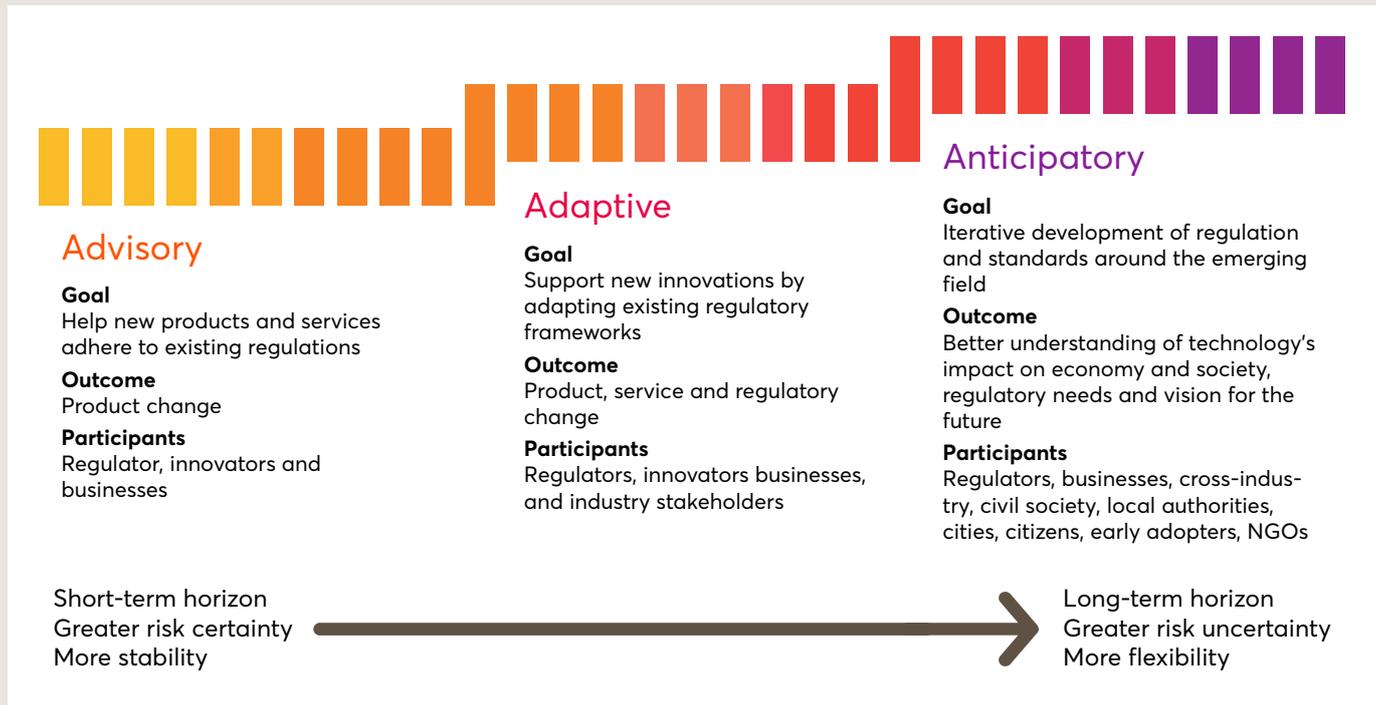
Towards an anticipatory approach

In response to the issues described above, we are beginning to see the emergence of new regulatory practices that have started to reshape the role of regulation in supporting innovation. New approaches such as the FCA's sandbox or the development of various testbeds for autonomous vehicles around the world are at the forefront of this change. We are beginning to see a radical shift in both the theory and practice of regulation with the emergence of a new field that Nesta is calling 'anticipatory regulation'.

Anticipatory regulation as an approach to regulation provides a set of behaviours and tools – i.e., a way of working – that is intended to help regulators identify, build and test solutions to emerging challenges. In previous work, Nesta has developed a framework to describe three modes of regulation – advisory, adaptive and anticipatory – that have appeared in this burgeoning area.¹⁸ These three modes vary in their goal, approach and who they involve but all demonstrate a more proactive, engaged role for regulators in the innovation process (see Box 1). Building on this framework and examples of anticipatory regulation across the world, six key anticipatory regulation principles begin to emerge.

We believe these six principles represent the vital elements of a regulatory system that enables, or stimulates, innovation for the public good in a timely and proactive way, while also protecting the public against harm and creating better markets. To respond to emerging challenges presented in this paper and deliver value for the economy, society and the environment, regulators need to start working in a more anticipatory way – embedding these principles into the way they work.

Box 1. AAA model for anticipatory regulation



Advisory

Advisory approaches are designed to make it easier for businesses with new products or services to approach regulators and work with them to test and then adapt the product or service under existing regulations. Innovators benefit from temporary relaxations in the full regulatory regime to test the potential impacts of their products or services, but the final goal is to fit within existing regulation. The regulator is able to play a more proactive, engaged role in the development and testing of new innovations in that sector.

E.g. Dubai Financial Services Authority's Innovation Testing Licence

Adaptive

Adaptive approaches are employed when a regulator wants to help facilitate the development of new products or services but existing regulatory frameworks may have to be adapted to do so. In this case, the objective is to first better understand the value of these new products or services by testing them in a restricted environment, then work to adapt both the innovation and/or existing regulations to bring the product or service to market. As with advisory approaches, participants are given regular advice and granted temporary regulatory relaxations. Unlike the advisory approach, if necessary regulatory barriers are identified, then permanent changes to the existing regulations can be explored – generally on a case-by-case basis.

E.g. FCA's Project Innovate

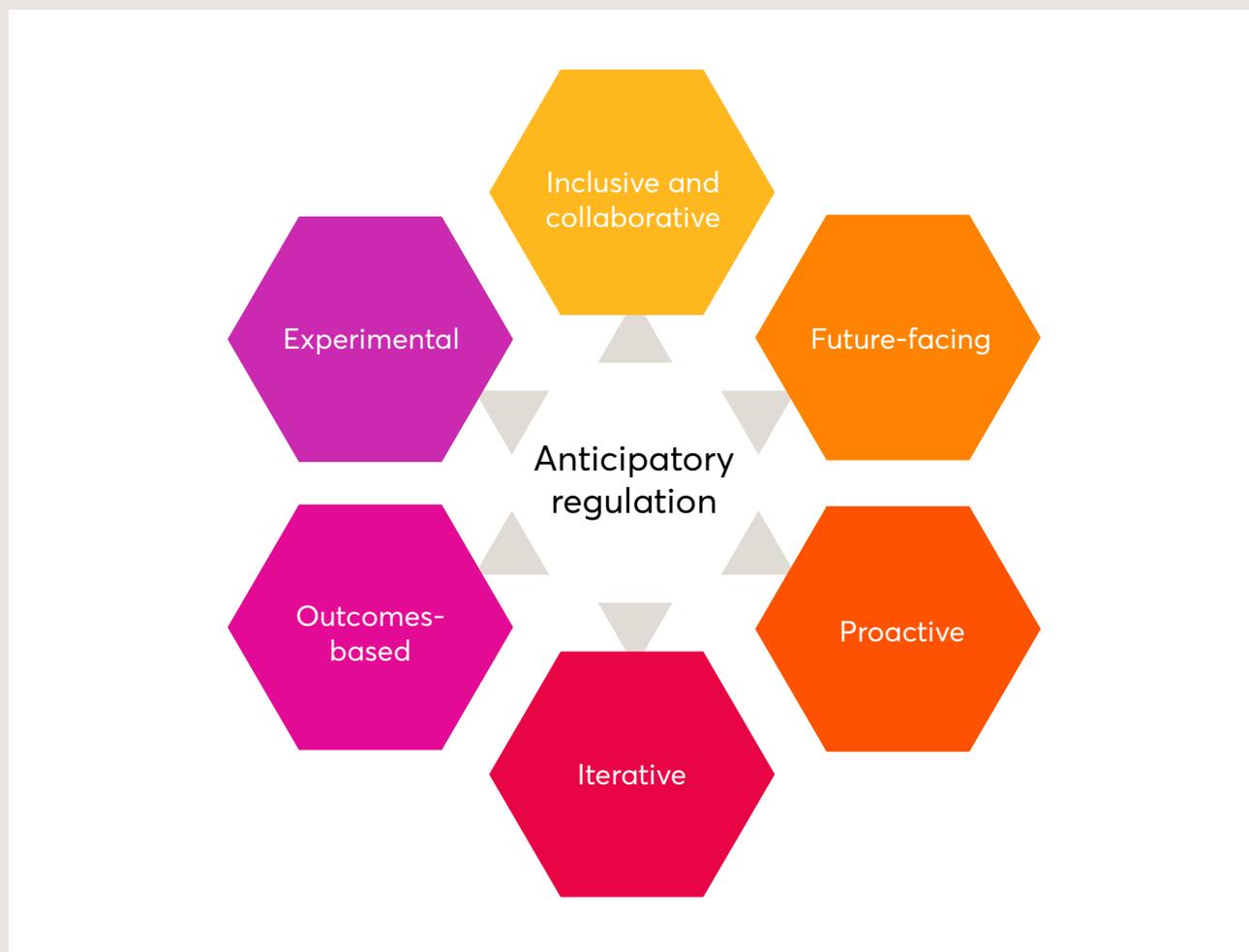
Anticipatory

The primary goal of anticipatory approaches is to better understand what the impacts of an emerging technology (which may not be developed enough for use) might be on the economy and society and, therefore, what the potential regulatory needs will be. It is more forward-facing than either advisory or adaptive approaches, meaning regulators have to deal with more uncertainty, less evidence and a greater number of possible risks. Here the regulator is not only playing a more active role in supporting innovation but also in building an information and evidence base via direct research activities.

E.g. Singapore Autonomous Vehicle Initiative (SAVI)

For more detail see *A working model for anticipatory regulation*¹⁹

Six principles of anticipatory regulation



Inclusive and collaborative

This covers two elements: **firstly, better engagement with a wider set of stakeholders** – including the public, companies, innovators, NGOs, city authorities, local government and other regulators – around emerging issues or the potential impacts of regulation. Contributions from all of these actors will help shape better policies and regulations, particularly given the wide-ranging implications, and ethical issues, surrounding next-generation technologies like AI and gene editing systems.

One of the biggest risks in deploying these technologies is to attempt to bypass public engagement and legitimation – the public reaction to GM crops is an obvious example where this has gone wrong. Inclusivity also helps generate solutions to problems that don't respond well to traditional regulatory approaches or reliance on exclusive reliance on market forces, for example consumer disengagement.

In practice, more inclusive processes are needed as well as better frameworks to help regulators or government decide when and how it is best to engage these diverse actors. Drawing from what has already been done, experimenting with new methods (for example, through initiatives like the Regulators' Pioneer Fund) and learning from other areas, such as design or open policy making, will help develop these new frameworks.

Citizens' juries and co-design

For example, citizens' juries can be an effective way to increase public understanding of a regulatory issue, gain insight into public views and discern the circumstances in which the public may consider regulation to be important (see Box 2).²⁰

Other initiatives have sought to incorporate co-design or human-centred design principles into the development of specific regulations. For example, the city of Toronto worked with MaRS solutions Lab on the development of regulations around the sharing economy, building on work the Mowat Centre have done on user-centred approaches to policymaking.²¹ Through workshops and interviews with regulators, industry representatives, sharing economy firms, insurance providers, and other experts and citizens, MaRS developed a number of recommendations that led to the creation of a new Vehicle-for-Hire bylaw creating a private transportation company (PTC) licence with provisions on data collection, accessibility, and insurance.²²

Open policy making platforms can provide another opportunity for stakeholders to engage directly in the regulation drafting process. For example, the regulations.gov website is both a source of information on the development of US Federal regulations and a platform for anyone to directly comment on draft regulations. These comments are sent to the relevant agency and once the final regulations have been published it is possible to see how the agency responded to different comments or suggestions.²³

Box 2. Involving the public in regulatory decision-making

Use of tools for public engagement has become more common in regulatory contexts in recent years – for example, citizens' juries, assemblies, consultative commissions and panels. These are not new (the Association of British Insurers ran juries on the use of genetic test results for insurance decisions 20 years ago) but interest has been renewed in their potential to legitimise, and build public trust in, co-governed processes and technology.

Public involvement can have four related purposes for regulators:

1. To set priorities based on public values;
2. To broaden the range of perspectives represented;
3. To identify issues that may not otherwise be articulated or prioritised;

4. To observe moral imperatives of good (just, fair) governance.

More experimentation and testing of new technologies in the public domain (for example, autonomous vehicles testbeds) makes the case for greater public engagement even stronger – particularly when the unintended consequences can be very serious (see Uber's autonomous vehicle fatality). Without engagement, public trust in technologies may be undermined, as it was with genetically modified foods. However, 'democracy theatre' – engagement for engagement's sake – wastes resources and can undermine, rather than sustain, public trust.

Public engagement is not always a central part of what regulators do and there is a need for more guidance on when, how and why regulators should use different types of public engagement tools.

The second element refers to the way **regulators are starting to leverage the capabilities of external actors**, including other regulators, companies, government agencies, cities, civil society, universities and citizens, to identify and address emerging opportunities and risks. This is particularly important where regulators have to deal with cross-sectoral issues or do not have the in-house capabilities or knowledge to deal with emerging challenges. The growing importance of data and AI as a core part of many business models, products and services combined with continuing issues governments and regulators face in recruiting the right talent has led to an important capability gap. While regulators may struggle to fill this gap in the short term, they are able to utilise the expertise of other organisations.

Collaborating with other agencies – NHTSA and NASA

In trying to understand whether an acceleration fault found in Toyota cars was an issue with software or hardware, the National Highway Traffic Safety Administration (NHTSA) lacked the expertise to properly test and evaluate the software systems. In the end, they were able to call on NASA, who have deep expertise in complex software and hardware issues, to study Toyota's electronics systems and ascertain it wasn't a software issue.²⁴ This is a rare example of cross-agency support but one that illustrates the value in leveraging the expertise and capabilities of other government agencies or other regulators. Finding ways to make these collaborations more sustainable could be hugely beneficial but would require coordination, potentially by specific bodies like the newly created Centre for Data Ethics and Innovation.

Other forms of collaboration have proven to be equally valuable. A number of regulators are working closely with universities, for example, through Autonomous Vehicle (AV) testbeds in London. Some agencies, such as The National Telecommunication Regulatory Authority (NTRA) in Egypt, work closely with universities and scientific institutions on a regular basis to bridge the gap between academic activities and technical developments, policy visions and market needs.²⁵

Emerging role for cities

Cities are also playing an important role, whether that is in bringing together the energy and transport regulators with citizens, innovators, companies and others around the development and deployment of electric vehicles in Brighton and Hove or creating space for experimentation in Singapore. As Chris Lee, Member of the Hawaii House of Representatives from the 51st district, has remarked, *"While it is difficult to distil the city's specific role, states and cities share infrastructure responsibility, which can be exploited positively."*²⁶ Collaborations between national government, regulators, private companies, innovators, local government and citizens can help get things done faster and create better outcomes. This is particularly important where innovation generates new potential harms that cannot be easily evaluated by regulators alone, and where issues cut across sectors and local jurisdictions or raise political questions.

Future-facing

One of the biggest challenges regulators face is the inherent uncertainty associated with future developments in technology, changing markets, economic developments and shifts in society. All these factors impact what regulators might need to regulate (or not), the mechanisms they use and how appropriate existing or new regulation might be in the future. While it is not possible to predict what the future will be like, it is important to understand how things are changing and what kinds of futures these changes could create. The value of doing this is to develop more resilient strategies, policies or regulations in the face of this uncertainty.

There are three important elements of being future-facing:

- Firstly, **identifying what is changing in the world** through what is often called 'horizon or environmental scanning';
- Secondly, **exploring the potential impacts of that change**, for example what impact might driverless cars have on liability or on the way people use cars;
- Lastly, **looking at how different changes or impacts of change might interact to create different situations** (often called scenario).

Singapore's Committee on the Future Economy (CFE)

This is a core part of Singapore's approach to economic development and regulation, and arguably why they are a world leader in many regulatory developments from financial sandboxes to AV testbeds. The foresight and futures work of Singapore's CFE supports the creation of a regulatory environment that favours innovation and risk-taking, adopting a 'never say no' approach to new business models. Regulatory agencies are encouraged to allow new models to be piloted and to collaborate on reviews of regulation (see Box 3 for more information).

Horizon scanning

A number of UK regulators already undertake some sort of future-facing activities, particularly horizon scanning work to identify emerging risks and opportunities. For some agencies like the Food Standards Agency and Human Fertilisation and Embryology Authority, this is a core part of their role on an ongoing basis. The objective of horizon scanning is to identify developments that could fundamentally change or disrupt existing markets or regulatory systems in unexpected ways. As an ongoing process it also helps to track how important trends or drivers of change develop.

Impacts of change

Some regulators also take a more future-facing approach to their research as the impacts of certain changes become clear. Ofcom, for example, uses part of its budget to research areas or technologies which may become important for future spectrum use and efficiency. This is usually where gaps exist because companies or research institutions do not prioritise certain areas, for example, high frequencies. As lower frequency spectrum becomes scarcer and technology unlocks higher frequencies for commercial use, Ofcom is using its research capacity to inform forward-looking policy and support the market to exploit these frequencies.

Future scenarios

Much less common is the third element: using future scenarios to explore what different possible futures could look like and their implications. While horizon scanning is useful for surfacing potential changes or disruptions, it doesn't help to explore what the impacts of those changes might be or how these changes might come together to create a different future. This is where scenarios are valuable: they provide a concrete, tangible way to explore what a single future may look like and, therefore, how technological developments or policies/regulations may interact with that world.

Stress-testing policies or regulations against alternative future scenarios can help determine its robustness in the face of different technological, societal or economic developments. Some regulators have undertaken specific one-off projects to do this, for example the FCA's Future Horizons work used 'stories' to create imaginary narratives (scenarios) on what the next 15 years could look like as well as publishing 23 expert papers to better understand different ways in which the future could play out.²⁷

Unfortunately, regulatory foresight, undertaken by regulators, is still largely the exception and is more often part of larger science and technology foresight exercises driven by other stakeholders.²⁸ A lack of appreciation and experience is a barrier to adoption but if overcome, foresight would provide huge value to regulators. To extract the full value of these approaches they must be embedded in the way regulators work, becoming part of the culture, as the process is as valuable, and sometimes more valuable, than the outputs.

Proactive

To respond effectively to problems and opportunities that may scale quickly, regulators need to take a more proactive approach, actively engaging with innovators and innovations early to track emerging issues, assess possible opportunities and define positive outcomes.

There are several ways in which regulators can, and do, play a more proactive role in the innovation ecosystem:

- **Openness and accessibility** – For businesses, particularly smaller organisations who do not have existing links, regulators can feel like unapproachable agencies, only there to stop activities rather than support novel initiatives. The creation of advice centres (sometimes called Innovation Hubs), one-stop shops and better routes to engaging the relevant regulators have helped to break down perceived barriers. This not only helps businesses reach out sooner so they can seek support navigating the regulatory landscape, but it also means regulators get sight of new business models and innovations in a timely manner.
- **Opening up data** – Some regulators are starting to use open data as a tool for driving competition and potentially seeding innovation elsewhere. Open banking reform in the UK (discussed below) is a good example of this but much more could be done. Data sets that regulators already hold and their ability to require companies to make certain types of data available can create plenty of downstream value, for example as a way of reducing the dominance of the big platform companies or allowing consumers more control over their data.

- **Stimulating innovation** – Some regulators are taking an even more active approach to market innovation, defining outcomes that would create public value and setting up processes to allow innovations in this area. This is where the challenge approach is particularly effective. For example, Nesta is working with the Solicitors Regulation Authority on a challenge to stimulate AI-powered innovations that could serve to widen access to justice, and to inform the regulator's approach to these new technologies. Nesta's Open Up Challenge (see below) is another example).
- **Supporting and testing innovations** – Perhaps most importantly, many regulators are creating spaces to allow experimentation and testing of new products and services or new business models which may struggle under existing regulatory frameworks but provide significant public value. These spaces are often called sandboxes, testbeds or living labs and cover many different types of technology and innovation.

The Sandbox approach

This has been a key element of many of the global sandbox initiatives such as the FCA's Project Innovate. In 2015 the FCA, aware that existing barriers were limiting new business models based on emerging technologies, chose to tackle this challenge directly. As Chris Woolard, its Director of Strategy and Competition, put it: *"Do we shy away from the challenges technology brings and cling to the status quo? Or should we seek to use our unique position to harness the power of innovation for the good of consumers and markets?"*²⁹ The FCA engaged with a wide range of firms and industry bodies to assess the feasibility of a 'regulatory sandbox' to drive innovative competition in financial services. To date, 89 firms have participated and 90 per cent of the firms from the first cohort have taken products to market. The FCA's assessment found that access to regulatory expertise in the sandbox reduced the time and cost of getting innovations to market, increased regulatory certainty and facilitated access to finance.

Stimulating innovation

Other initiatives have sought to use regulation as a way of driving innovation around a particular strategy or public need. In 2016, the Competition and Markets Authority (CMA) proposed the introduction of a common open banking standard across the largest banks as a remedy for ongoing issues in the UK retail banking market. The policy is unusually proactive in its attempt to use technology and standards to shift a major market towards a new, more innovative equilibrium. Open banking enables third parties to access a bank customer's accounts, with the customer's permission, to access the customer's data and initiate payments on their behalf.

As part of the same remedy package, Nesta is leading the Open Up Challenge, which creates financial incentives for third parties to develop useful innovations that build on open banking functionality, rewarding the most impactful. The challenge provides participants with anonymised data from the banks to support their product development, proactively encouraging experimentation by innovators, enabling them to test new products and services that will help achieve the overall goals of greater innovation and competition. The UK's pioneering role in implementing open banking is being followed by several other countries, including Australia, Canada, Germany and Mexico.

Driving innovation in mobility through regulation and legislation

Another example is from Finland, where transport reform towards a system of Mobility-as-a-Service (MaaS) is partly being driven through changes in the way transport is regulated. A core component of MaaS is not distinguishing between different forms of transport but instead looking at mobility from the point of the view of the whole system. To support this the country has moved away from developing separate laws for taxis, public transport, roads etc and instead are creating a new, technology neutral, transport code that incorporates all transport modes into one piece of legislation to create a level playing field.

As Anne Berner, Finland's minister of transport and communications, has commented *"No longer are we doing transport policy and communications policy. We are doing policy for networks, for services, for data management and data handling to bring different fields together. And that has helped us understand what MaaS is all about and the kind of legislation and regulation it needs."*³⁰ Austria's strategy to automation and mobility is taking a similarly systemic and outcomes driven approach.³¹

Iterative

When regulators have to take on new functions for which they lack an established playbook, or need to deal with uncertain market developments, a flexible, iterative learning approach is needed rather than a 'solve-and-leave' mentality. Where regulations are being developed for a new area or introduce substantial changes, it is difficult to know exactly what the impacts will be. Utilising a more experimental, trial and error approach, at least at the beginning, rather than immediately creating definitive rules can help build evidence on what works to achieve the desired outcomes. Standards, testbeds/sandboxes or exhorting best practice are different ways in which regulators can provide more flexible interventions.

Using sunset clauses and defined points of review can also help identify when and how existing regulation may need to be revisited to achieve their existing or new goals in a changing environment. They can also add some regulatory certainty to the process as stakeholders would know when regulation may be adapted. If sunset or review clauses are going to be used, however, it is important that the review is thorough and well resourced, employing the principles we have set out here. Here again, there is a need for better guidance on where and when different approaches, from standards to sandboxes, are most appropriate.

Outcomes-based

Given the disadvantages of command-and-control regulation in dynamic markets, regulators should focus on defining desired outcomes, agreeing measures of success, and validating regulated organisations' efforts to achieve them (and resisting pressures to increase regulatory prescription). Moving towards outcomes rather than rules-based regulation can have a number of advantages while spurring innovation in the way regulated firms respond to deliver these outcomes.

It can help reduce the scope for firms to game or 'creatively comply' with set rules and focusing on outcomes is more resistant to the impacts of change compared to rules-based regulation. This approach is particularly relevant in areas where there is the potential for widespread technological disruption or systematic change in the way services are delivered.

Impact of an outcomes-based approach

Outcomes-based regulation, however, means big shifts in where responsibility lies and the relationship between regulators and regulated firms. This means a new skill set is also needed, again for both regulators and regulated organisations. There are important lessons to learn about how to manage this relationship under an outcomes-based system from the approach to principles-based regulation in the run up to the financial crash.³²

Outcomes-based regulation means there is a greater reliance on firms' internal management who are required to think through the application of regulatory requirements. It is vital regulators maintain a healthy level of scepticism rather than over trusting senior management to deliver on the defined outcomes. More intensive supervision rather than light touch interactions helps to incentivise firms to reorientate their business models and aims towards the defined public good outcomes.

Outcomes need to be well-defined; the likelihood of semantic uncertainty is high between regulators and others which can lead to unwanted outcomes. Indicating best practice when it comes to measures of success and incentivising regulated organisations to make relevant data available will help regulators achieve the outcomes they are after.

Adopting outcomes-based regulation

A recent example of the adoption of more outcomes-focused regulation is in the development of autonomous vehicles. Traditional road safety regulation consists of detailed rules and specifications of safety features. But as a quintessentially dynamic technology, autonomous vehicles are evolving rapidly, and safety standards must evolve with them. There is a high degree of information asymmetry; the people who understand how AV 'safety features' are or could be developed work for AV companies, not regulators.

The US NHTSA, which regulates vehicle safety design and performance, has expressed willingness to update regulatory schemes, and hosted 'listening sessions' with operators and industry bodies, to reduce uncertainty in a regulatory environment that is developing rapidly, and publicly.

Rather than prescribing inflexible rules, the NHTSA issued voluntary guidance enshrining 12 safety design principles, including cybersecurity, human-machine interface, crashworthiness, consumer education and post-crash behaviour (this approach was partly inspired by a UK non-statutory code of practice produced by the Department for Transport). Companies decide how best to meet these principles and are encouraged to publish Voluntary Safety Self-Assessments to validate their efforts and establish an evidence base. States are advised not to codify this guidance into law, preserving flexibility and enabling the NHTSA to remain a single point of authority over safety regulation.

Lastly, it's important to remember outcomes-based regulation will always sit beside rules and risk-based regulation. As a result, they should be developed together so they do not counteract one another.

Experimental

Top-down, whole-market regulation is ineffective when sectoral barriers erode, barriers to entry are low and the impact of emerging problems or opportunities is different in different contexts. Regulators need to facilitate diverse responses by companies and others to test new innovations or regulatory interventions and build knowledge around possible impacts.

Cities in particular have been very effective at convening the right actors and stakeholders, creating space for experimentation and thereby demonstrating the effectiveness of different approaches. This is important where national regulation is impractical and supranational frameworks do not exist, as with autonomous vehicles. Local experiments can inform the gradual process of national and international standardisation.

Cities and local experimentation are playing a critical role in the development and deployment of many technologies. The deployment of drones in the UK's cities could have many valuable applications, including public good use cases like hazardous environment inspection, marine port monitoring, medical supply delivery and monitoring/managing city infrastructure. The implications of this shift for people, cities and the environment are wide-ranging and need to be addressed comprehensively if drones are to be deployed in ways that command public acceptance.

Cities as centres of experimentation

The Flying High Challenge, led by Nesta, has convened key stakeholders (policymakers, regulators, city governments and industry) to demonstrate the demand for drones in a number of public good use cases while identifying technical, economic and regulatory barriers to their testing and deployment. The next stages of Flying High will include testing drones in controlled and real environments, requiring regulatory exemptions. The project is seeking to achieve a shared vision of the future – alignment between regulators, government, cities, industry, local government and the public and better understand the implications of greater drone use. The conclusion of these trials will aim to inform future drone regulation in the UK and shape global regulatory standards.

This approach is aligned with the way AVs are being explored in a number of countries. In the US for example, while there are a set of national safety design principles set out by the NHTSA, states are responsible for rules about vehicle operation and driving – licensing, testing and so on. They can move more quickly than federal agencies, early movers acting in effect as 'regulatory laboratories'.

There is considerable diversity: in California, companies have to apply for a right to run AVs, and report crashes and 'disengagements' (when a human driver takes over control). In New York, companies must get approval every time they put a car on the road. Arizona has no rules, just an executive order from the governor ordering state agencies to *"Undertake any necessary steps to support the testing and operation of self-driving cars."*³³

This experimental regime has the added benefit of enabling diverse jurisdictional solutions, with each state (and the NHTSA) keeping a close eye on the regulatory movements of the others thereby enabling them to learn from one another.

The hoped-for outcome is a 'race to safe innovation': states compete to create an environment conducive to innovation within a federal safety framework, and companies compete in trying to solve safety risks. While some accidents are inevitable, progress has been rapid: in early 2018 California approved the public testing of remote-monitored autonomous vehicles, rather than with human co-drivers, meaning companies can now apply to launch genuinely driverless cars on California roads.³⁴

Box 3. Singapore: embracing technological disruption

The previous examples discuss responses to specific issues, but Singapore has arguably taken an 'anticipatory' approach to its whole economic policy. Singapore's economic achievements, which place it today among the most prosperous countries in the world, stem from an ambitious, forward-looking and well-funded economic development agenda which has delivered rapid growth and improvements in social welfare over recent decades.

In 2016, aware that the country's *"Economy needed to develop a capacity to adjust to changing circumstances more spontaneously [to] allow the economy to make its way more smoothly through disruptive changes stemming from technological progress"*,³⁵ Singapore created the CFE.³⁶

It reviewed Singapore's economic strategies for the following decade, including the role of regulation. The process consulted over 9,000 stakeholders, including trade associations and chambers, public agencies, unions, companies, executives, workers, academics, educators and students. The Committee's recommendations encouraged regulators to facilitate innovation in key emerging technologies and take down regulatory barriers they identified as obstructions to innovation.

Implementation of the CFE's recommendations is overseen by the Future Economy Council (FEC),³⁷ that comprises members from government, industry, unions, and educational and training institutions, chaired by the Minister for Finance. He emphasises the importance of engaging with all

stakeholders: *"This is an effort that requires everyone – the unions, TACs (trade associations and chambers), businesses, training institutes and Institutes of Higher Learning – to work together closely."*³⁸ Such a commitment to inclusive regulation ensures the FEC hears a broad range of perspectives on the interactions between regulation and innovation.

The CFE's foresight and futures work³⁹ supports the creation of a regulatory environment that favours innovation and risk-taking, adopting a 'never say no' approach to new business models. Regulatory agencies are encouraged to allow new models to be piloted and to collaborate on reviews of regulation. As the CFE's report puts it,

*"Our processes and regulations have provided a safe and predictable environment for our people and enterprises, but have grown established and less flexible over time. The Government will need to be nimbler given the rapid pace of innovation and increasing global competition. We must take risks and be willing to make fundamental changes to support the emergence of potentially-disruptive business activities... Disruptive businesses made possible by innovation and technology present unfamiliar regulatory territory, where existing rules may not apply or are not able to apply, but they reflect a long-term trend and the new reality. They also present more choices to consumers. We need to embrace disruptive businesses and keep abreast of technological advancement. We should have an innovation-friendly and agile regulatory environment to allow new growth sectors driven by new technologies to emerge."*⁴⁰

Regulatory innovation tests and sandboxes are established in collaboration with industry to enable trials of new products and services; the results are then used to inform the drafting of new regulations or the revision of existing ones. Some specific initiatives include:

- The SAVI,⁴¹ established in 2014 to start research into AV transportation and test-bedding. SAVI includes an open platform where the industry, research institutions and the authorities can jointly conduct self-driving trials and explore new applications and solutions. As a result, Singapore *"Has created one of the most permissive regulatory regimes in the world to test driverless cars."*⁴²
- The Monetary Authority of Singapore has built a Smart Financial Centre⁴³ in Singapore that includes an open banking platform and sandboxes to test promising FinTech innovations in the market. The centre also operates a Financial Sector Technology & Innovation scheme⁴⁴ that provides funding to support the early-stage development of novel solutions to financial industry problems.
- Singapore has taken a 'codes and guidelines to the industry' approach to telehealth regulation instead of a legislative one. To complement these guidelines, which set out best practices for the delivery of telemedicine, the Singapore

Medical Council also published a handbook providing the rationale behind the ethical standards and explaining how doctors can achieve such standards. The Health Sciences Authority (equivalent to the MHRA) has created a Pre-Market Consultation Scheme to consult on the classification of telehealth product and the regulation applying to each category.⁴⁵

- The Energy Market Authority (EMA) has introduced a regulatory sandbox⁴⁶ to support energy innovations. The energy market sandbox allows EMA to assess the impact of new products and services before deciding on the appropriate regulatory treatment. The results of the sandbox trials can also trigger the permanent amendment or relaxation of certain regulations.

The Singaporean approach has several of the anticipatory regulation framework characteristics: it is future-facing (in its creation of the Committee on the Future Economy), inclusive (with the CFE and FEC engaging regularly with a wide range of stakeholders), proactive (with specific programmes facilitating engagement with innovators), and experimental with its 'never say no' approach to new business models. Singapore also encourages collaboration among regulators to achieve global goals.

5

Mainstreaming anticipatory regulation

While many examples of anticipatory regulation are emerging across the world they are often fragmented, incremental advances and incommensurate with the scale of the challenges and opportunities regulatory agencies face. There are few examples of systematic approaches at the regulator level, and even fewer at the level of whole regulatory systems other than possibly the Singaporean system, though the UK is beginning to move in this direction. It is clear that we are still in the experimental phase of this transition, but moving beyond this will require being prepared to double down on and invest in what works.

The Regulators' Pioneer Fund (RPF) is an important step, providing £10 million for regulatory initiatives that will help businesses bring innovative products and services to market. The Fund encourages regulators to collaborate to explore cross-cutting issues, taking either advisory, adaptive or anticipatory approaches, and to experiment with approaches outside of their normal practice. It requires bidders to have clear plans for monitoring and evaluation, with adequate data capture and review systems, and to provide data on impact to the administering body in order to capture best practice. The strong response to the Fund from regulators is evidence of pent up demand among regulators to do more in this area. The Fund will hopefully be an important catalyst for UK regulators to adopt a more anticipatory approach in their work.

Beyond the fund there are greater opportunities to support and stimulate regulatory innovation. While funds are a useful catalyst for change they need to be matched with other initiatives that help fill skills and capability gaps, develop and spread knowledge on best practice, and incentivise better coordination and collaboration.

Crucially if the UK wants to position itself as a first mover when it comes to both emerging technologies and innovative regulatory practice it will need to match activities like horizon scanning with early and purposeful action. Other countries are already making progress on this agenda, for example the Canadian government is now setting up a Centre for Regulatory Innovation.⁴⁷ If the UK wants to lead the way, the time to act is now.

Skills and capability building

The examples explored in this paper demonstrate that regulators have the ability and appetite to develop and adopt anticipatory methods, but it may be hard for them to know when to use specific methods or how to deploy them. As Keith Sequeira of the European Commission puts it: there is a *"Lack of theory and collective, cross-industry knowledge on new legislative techniques and processes currently being experimented in certain industries that could also be applicable to others."* Equally even if regulators know what they want to do they do not necessarily have the right skills or capacity to be able to do it.

The vagaries of different funding models mean some regulators have more capacity than others to make use of foresight techniques, engage directly with the public or work in an outcomes-focused way. But moving to a system-wide anticipatory regulation approach, in particular in the context of increasingly cross-cutting technological innovation, will require all regulators to significantly build on these existing capabilities, while also embedding them in the culture of the organisation (even if some capabilities could be leveraged through other organisations – see the 'Inclusive and collaborative' principle).

Recommendations

- As well as supporting learning-by-doing through more initiatives like the RPF, **the Government should invest in training, cross sector learning and capacity building programmes.** These programmes could be developed and delivered by regulators themselves or non-governmental bodies. There should be a strong focus on innovation, foresight, public engagement, experimentation and collaboration.
- **The Government should also invest in the development of toolkits and best practice guides covering innovative regulatory approaches.** Guides and toolkits will help other regulatory agencies replicate innovative approaches in use across the world and should be developed in a way that takes into account the variation between sectors, regulators and jurisdictions.

Understanding and spreading what works

We expect that the social return on public investment in regulatory innovation could be unusually high – regulators' budgets are relatively small but they have (or can have) an outsized impact on how the economy evolves. More initiatives like the RPF, ideally on a standing basis so that regulators can plan for the longer term, will be needed to encourage and support further regulatory innovation.

These investments must be paired with robust evaluation to understand the impact of different approaches and to identify how public (or other) funding can be best spent. Little robust evidence currently exists on the impact of different regulatory practices or the context in which they 'work'.

Recommendations

- **Any government funded project should include defined funding and support for robust evaluation (least 10 per cent of the total value of the fund).**
- **UKRI should lead a wider research programme looking at the impact of regulation and regulatory practice on meeting the UK's Industrial Strategy priorities including Grand Challenges, sector deals and innovation investment targets.** This could be partly be achieved through specific research funding from the research councils, drawing on wider academic and industry expertise.
- **A new hub for expertise bringing together theory and practice in regulatory innovation could be set up** to collate and provide well-evidenced guidance to regulators.

Coordination and collaboration

A large part of the change explored in this paper is a move away from individual regulatory action towards a more collaborative, coordinated and systematic approach. This will have multiple benefits – including reducing costs for both innovators and regulators, building on best practice wherever this sits, and empowering regulators relative to massively better resourced commercial players.

This will require regulators to collaborate more and indicates a vital role for other organisations in coordinating action and supporting collaboration. Specifically with respect to data and AI this is likely to emerge as a key function of the Centre for Data Ethics and Innovation but equally regulatory networks could be harnessed more effectively. International collaboration will become more critical post-Brexit if the UK is to reap all the potential benefits of an innovative regulatory system.

Recommendations

- As well as individual regulators setting up access points for innovators (such as the MHRA's innovation office) the **Department for Business, Energy & Industrial Strategy should set up a cross regulatory single entry point for innovators**, that itself capitalizes on the best available technology to enable innovators to 'self serve' to a much greater extent than is currently possible. A possible model is the Danish Government's cross ministerial single point of entry for new (digital) business models.⁴⁸
- **Regulators and government should develop more structured approaches to international collaboration, building on the opportunities 'regulatory diplomacy' could create**, for example by building partnerships with relevant international regulators or potentially running a version of the RPF jointly with another relevant country.

Moving first and responding quickly

Identifying emerging opportunities and challenges in a timely fashion is important but ultimately pointless unless the Government and regulators are also able to respond quickly. This would require flexible and fast ways to mobilise the right stakeholders and resources to make something happen. Available resources would need to be defined ahead of time as well as a clear decision-making process around where and how to invest. Actions could include more intensive study through task forces with a timeline for more practical action (through initiatives like sandboxes), more direct action such as the development of strategic plans and use of challenges to stimulate valuable innovation or the creation of new organisations like the Centre for Data Ethics and Innovation (CDEI). These decisions would have to be made in a transparent and defensible way.

Recommendations

- To ensure resources are available to for regulators to put responses in place once new opportunities or threats are identified through horizon scanning activities, the **government and regulators should identify and set aside small budgets to facilitate timely action** around emerging areas. This mechanism function in tandem with future RPF initiatives.
- The decision on when and how to use these funds would need to be taken quickly, but is also potentially highly political. **An independent panel, similar to the RFP's judging panel, could be convened at various cycles to highlight areas where and what kind action should be taken, potentially with the power to allocate these small budgets.** This panel would be composed of ministers, senior members of government (from various relevant), regulators and a number of independent representatives (subject knowledge and regulatory innovation experts).

Role of politicians

Politicians have a crucial role to play in providing regulators with the mandate to be more innovative in the way they function so they can better support or stimulate innovation in the economy. Without political support, pressures on regulators will push them to focus on short term priorities and avoiding risk. There are also deeper systemic questions that need to be explored by ministers (discussed below) that are central to transitioning towards an anticipatory regulation system.

Recommendations

- **Ministers should make clear future commitments to this agenda through further funds and other supporting initiatives** to give regulators the confidence and backing to adopt the principles of anticipatory regulation.
- The **Ministerial working group should also make a commitment to openly explore deeper systemic regulatory questions** (see below) that may stand in the way of achieving a system wide anticipatory regulation approach.

6

Do we need radical reform?

While regulators can already take action to address the emerging challenges they face, such as embedding the anticipatory approaches we have presented here, there may be deeper rooted issues with the current structure and function of regulators which limit the scope of their response. This raises some deep questions about management of the economy that are beyond the scope of this paper. The UK legal and regulatory environment for innovation is world class in many respects, and one of its strengths has been its ability to adapt to new circumstances. The question for policymakers is how to combine the best of what has evolved over decades and centuries with the changes needed to thrive in an age of disruption.

Systemic questions

We believe there are a number of key systemic questions at the heart of regulation that need to be explored:

- Do regulatory mandates and remits need to change and if so how, as markets and the economy continue to shift?
- Is sector-focused regulation struggling to cope with changing markets, and how should it interact with horizontal regulation?
- Should innovation be made an explicit part of regulators' remit, without diluting their responsibility for consumer safety?
- Would even stronger guarantees of regulatory independence better enable regulators to support innovation? How might this be achieved?
- How should regulators work with new and existing 'non-regulatory' bodies, like the Centre for Data Ethics and Innovation or cities?
- What is the proper role for public engagement and communication as part of a wider regulatory process? What is regulators' accountability to the public with respect to innovation?
- How can we better facilitate the interaction between parliament, government and regulators in setting and shaping regulations?
- How far should regulation be used to create new markets or shape existing ones?
- How should regulators be funded?

7

A vital opportunity for the UK

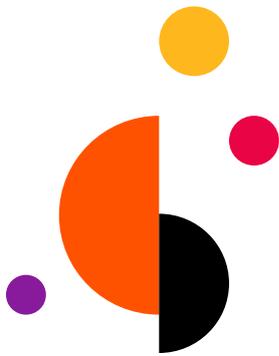
Through the Regulators' Pioneer Fund and other initiatives there is a chance to spur regulatory innovation right across the UK economy. The UK has the opportunity to position itself as a country with a world-leading environment in which to safely and responsibly develop new technologies, and in ways that command long term public support. To achieve this however will require regulators to adopt a different mindset and approach to the emerging challenges they face, more fully utilising existing powers and assets as well as new tools and leveraging the value of other actors in the innovation ecosystem.

The goal is a regulatory system that can better support innovation, allowing companies to safely test their products and services, and ultimately attracting new industries to invest in the UK. At the same time the UK must be wary of over politicising regulation, in a post-Brexit race to the bottom in an attempt to appeal to businesses. Embedding anticipatory regulation as a core part of regulation and innovation in the UK beyond the Pioneer Fund will require a more systematic approach to evaluating "what works" in regulatory innovation, and action from government where more systemic impediments exists. The UK can build on its longstanding reputation for high quality regulation to continue to occupy a leading global position as the demands on regulation and regulators change,

Endnotes

1. In April 2006, The Economist described Goldman Sachs as being "on top of the world", partly as a result of its "breakneck innovation". The same article considers the possibility of financial institutions and the financial system as a whole getting into trouble, arguing that "In the past [...] such [bank] collapses did less damage to the financial system than the regulatory over-reaction that followed them".
2. (Then) IMF Chief Economist Raghuram Rajan's argument in 2005 that financial development may have in fact made the world riskier was famously dismissed as "slightly luddite" and "misguided" by former US Treasury Secretary Lawrence Summers.
3. Google's global market share in search is approximately 90 per cent in desktop and 95 per cent in mobile (source: <http://gs.statcounter.com/search-engine-market-share/mobile/worldwide>). Facebook has 2.3 billion monthly active users (Q4 2018, source: <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>), with 68 per cent of US adults using Facebook (source: Pew Research Center).
4. For example, standards for customer data portability, or infrastructure for electric vehicles.
5. It is surely not a coincidence that relatively lightly regulated industries (such as retail and digital services) are more similar across countries than heavily regulated sectors (such as retail finance).
6. Yeung, K. (2017) 'Are Human Biomedical Interventions Legitimate Regulatory Policy Instruments?' Oxford Handbook of Law, Regulation and Technology.
7. Of course, this outsourcing of decision-making can also serve to isolate elected representatives from accountability for difficult decisions.
8. See for example Adam Smith on the regulation of interest on lending: "The legal rate [of interest], it is to be observed, though it ought to be somewhat above, ought not to be much above the lowest market rate. If the legal rate of interest in Great Britain, for example, was fixed so high as eight or ten per cent, the greater part of the money which was to be lent would be lent to prodigals and projectors, who alone would be willing to give this high interest." An Inquiry into the Nature and Causes of the Wealth of Nations (1776), Book II, Chapter IV.
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10. A decades-long decline in economic dynamism and high-growth startups is now well established for the US, and there is growing evidence of its relationship to declining productivity growth in that country. See for example: Decker, Ryan A., Haltiwanger, J., Jarmin, R. S. and Miranda, J (2017) 'Declining Dynamism, Allocative Efficiency, and the Productivity Slowdown.' 107 (5). American Economic Review. Available from: <https://www.aeaweb.org/articles?id=10.1257/aer.p20171020> [accessed 28 February 2019].
11. As exemplified by the awarding of the Nobel Memorial Prize in Economic Sciences to Daniel Kahneman (2002), Robert J. Shiller (2013) and Richard Thaler (2017).
12. For example, in the UK energy market some consumers may fear the impact of a switch on their credit rating, which in turn could limit their ability to access credit on reasonable terms.
13. Which?, Consumer Literacy: Capabilities and the real consumer, June 2013.
14. For example, 57 per cent of energy customers are on standard variable tariffs, with customers of the biggest firms paying over £300 more annually than they need to, according to Ofgem; the poorest households spend more than 10 per cent of weekly expenditure on energy (BEIS, op. cit). The FCA reports that banks source 50 per cent of their current account profits from 10 per cent of customers, and that 2 per cent of accounts pay over 50 per cent of overdraft charges (see: <https://www.fca.org.uk/news/press-releases/fca-publishes-update-wide-ranging-review-retail-banking-sector>). Which? calculated that British consumers lost up to £1.2 billion annually by not exercising their consumer rights, and this seems likely to be a conservative estimate.
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