RegTech Opportunities in the Platform-Based Business Sector

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Abstract The notion of RegTech has emerged in recent years, but its application appears to have been mostly limited to the use of technology to assist with organisations' compliance with regulatory requirements. A model is presented that encompasses RegTech's full scope, embracing its capacity to address the needs not only of regulatees, but also of regulators and the intended beneficiaries of regulatory regimes. The model is then applied to the recently-popularised platform-based business model, whose mature form is evidenced by Uber and Airbnb. A range of opportunities is identified for practitioners and researchers to contribute to the application of information technologies in the regulatory space.

Keywords: regulation, FinTech, RegTech, infrastructural regulation, uber.

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1 Introduction

The term 'RegTech' emerged in 2015 to refer to technologies supporting regulatory processes. Reflecting its origins as a variant of FinTech, the main interest has initially been within financial services corporations. It has also been viewed narrowly from the perspective of those organisations, and hence the emphasis has mainly been on compliance aspects.

The conference theme for the Bled eConference in 2020 is 'Enabling Technology for a Sustainable Society'. Organisations generally, but especially in the private sector, have their focus on the short term. As a result, sustainability issues are beyond their horizon. Sustainability is therefore dependent on interventions by other parties, especially parliaments, policy agencies and regulatory agencies whose function is to address externalities and protect public good interests. Researchers, particularly those funded from the public purse, have an obligation to not just reflect the interests of the for-profit corporations that drive economic progress, but to also conduct research that contributes to the sustainability of the economy, society and the environment (Clarke & Davison 2020). For researchers into applications of IT, that obligation translates into the need to consider RegTech's broader application.

This paper accordingly encompasses not only compliance applications but also RegTech's potential to serve the interests of regulators, and of beneficiaries of regulatory schemes. Previous work has developed a framework whereby IS professionals and academics can properly understand regulatory regimes, can identify opportunities for the development and deployment of RegTech, and can conceive, design and deliver appropriate technological support to relevant organisations. The purpose of this paper is to briefly present that framework and to demonstrate its efficacy by applying it to one particular and very topical form of business.

The platform-based business model has been much-discussed in recent years, and the Airbnb and Uber approaches have generated particular excitement. The model is a variant of the longstanding notion of 'marketspace' (Rayport & Sviokla 1994, Clarke 2001). I adopt here the approach of Taeuscher & Laudien (2018), who propose four defining features of a platform-based digital marketplace (p.320):

- digital marketplaces connect independent actors from the demand and supply sides via a digital platform;
- these actors enter direct interactions with each other to initiate and fulfil commercial transactions;
- the marketplace platform provides an institutional and regulatory frame for transactions; and
- the platform does not substantially produce or trade goods or services itself.

The large majority of the academic literature on platform-based corporations is concerned with business strategy, business models, and the application and exploitation of Internet, Web and mobile technologies to achieve the aims of that corporation, subject to the constraints of adequately reflecting the interests of the actors on the demand and supply sides. The focus here, however, is primarily on the regulation of the behaviour of platform-based corporations, in order to satisfy the interests of other parties. Those parties include not only platform users, but also other entities that are affected by the platform's operations, industry sectors and segments as represented by industry and consumer associations, government policy agencies, and organisations that perform regulatory functions in relation to the relevant marketplace.

This paper commences by reviewing RegTech's origins and nature. An assessment is provided of the literature that has emerged during the first few years since the term was coined. A framework is then presented for studying the field of regulation and the opportunities for technology to support it. Characteristics of platform-based business models are discussed, and the framework for RegTech research applied to such models in order to identify opportunities and provide insights into the framework's value.

2 RegTech

The term 'RegTech' appears to have been first published in a UK Government report of March 2015 on financial technologies (UKGOS 2015), sometimes referred to as 'the Blackett review'. The earliest occurrence found using Google News is a single, fleeting mention in an article on the UK Budget (Glick 2015). The earliest mentions found by Google Scholar are Arner et al. (2015) and Treleaven (2015).

The contraction derives directly from the use by software marketers of the term 'FinTech' to refer to technologies applied within the financial services sector, particularly those that are perceived to be disruptive or potentially profitable. The motivation for projection of the term RegTech was the desire for "regulatory reporting and analytics infrastructure ... typically to improve efficiency and transparency [in financial regulation]" (UKGOS 2015, pp.12, 47).

The RegTech notion was very quickly co-opted by the financial services industry association, the Institute of International Finance, without attribution (IIF 2015). IIF adopted a narrow definition of "the use of new technologies to solve regulatory and compliance requirements [in the financial services sector] more effectively and efficiently" (IIF 2016, p.2). A slightly different but also narrow approach was adopted by the UK Financial Conduct Authority: "RegTech is a sub-set of FinTech that focuses on technologies that may facilitate the delivery of regulatory requirements more efficiently and effectively than existing capabilities" (FCA 2016, p.3). Academic papers on the topic have generally adopted such definitions as their starting-point (e.g. Arner et al. 2015, Daly & Butler 2018, Anagnostopoulos 2018, Currie et al. 2018). In Butler & O'Brien (2019), it was reported that the UK's financial regulators had developed a proof-of-concept tool for 'Digital Regulatory Reporting', expressing laws and policies in machine-processable form.

It is only natural for the idea to loom large for financial services corporations. This is because of the imposts arising from regulatory measures to safeguard against the economic and social costs arising from the spectacular failure of softer regulatory forms, resulting in financial crises (RBA 2014). In addition, the industry has borne the brunt of frequently-changing interventions by legislatures and law enforcement agencies under the pretence that organised crime, the drug trade, human trafficking, terrorism and child pornography will all be magically defeated provided that the public accepts that every financial transaction must be identified and monitored (Zagaris 2004, Gilmore 2004).

RegTech providers naturally 'follow the money' and focus on large corporations that have substantial obligations imposed on them by formal regulatory instruments, and hence need to perform onerous compliance activities. The financial services industry will inevitably remain an important focus. RegTech's potential scope is, however, far wider than that. Other industry sectors are subject to formalised

regulatory requirements, and many looser and less stringent business processes can also benefit from technological support.

Regulatory arrangements are important wherever natural controls fail to curb excesses. This paper contends that, particularly in view of the scale of contemporary economies and societies, technologies need to be harnessed in support of activities of all participants in regulatory processes. This paper conceptualises the central concept in this paper as follows:

> ***RegTech*** *means technological applications in support of the activities of regulators, of regulatees, and/or of entities that are intended to be beneficiaries of regulatory activities*

This paper works on the assumption that regulation is an applications area for IT in just the same way as are Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), eHealth and Geographical Information Systems (GIS). As with any such applications area, both professionals and researchers require some degree of technical expertise in the area in order to make well-informed and meaningful contributions. The following section briefly identifies relevant literature. That is then built upon by presenting a framework for the development of research projects and programs in the area.

3 The Emergent RegTech Literature

The previous section noted the first uses of the term 'RegTech' in 2015. A series of searches was conducted in order to detect the rate and nature of development of a literature on the topic, commencing with the source that draws on the largest catchment area, and moving on to collections with a narrower focus. A detailed explanation of the search techniques that were applied is in the Annex to this article. This section provides an outline of the searches, and a summary of the findings.

The first round of searches had their focus on the term 'RegTech'. Despite the steady growth in hits on Google Scholar, very few mentions were evident in the Basket of 8 journals and the AIS eLibrary, and none at all in Bled Proceedings 2001-19. The second round searched in the same venues for variants of the term 'regulation'. This identified considerably more papers, although considerable numbers were of limited relevance to the purposes of the study. The end result was 40 journal articles, of which 24 are in Basket of 8 journals, and 36 papers in IS-cognate conferences.

A few systematic literature reviews exist (Cleven & Winter 2009, Akhigbe et al. 2015, Hashmi et al. 2018). A number of research agendas have been presented (Coglianese 2004, Abdullah et al. 2010, Cousins & Varshney 2014, Akhigbe et al. 2017). Few of the works are highly-cited, however. The largest Google citation-counts that were identified were between 70 and 80 for Coglianese (2004) and Abdullah et al. (2010), and about 40 for Duncombe & Heeks (2003).

Most of the published research has been specifically from the perspective of regulatees, with the primary focus on compliance, and the limitation of damage to regulatees' interests. Some papers are concerned with operational aspects of IS, in particular the influence of regulatory measures on IT applications and their use (Mlcakova & Whitley 2004). Others study regulatory regimes' impacts on system design (El Kharbili 2012, Knackstedt et al. 2014), on business process management (Schultz 2013, Fellman & Zasada 2014, Sadiq & Governatori 2015), and on shared infrastructure (Reimers et al. 2015). Difficulties in achieving compliance were considered in Smith et al. (2010) and Gozman & Currie (2014), while Clemons & Madhani (2010) considered circumstances in which new business models overwhelm existing regulatory mechanisms.

Regulation's strategic impacts were recognised even during the early years of strategic IS research, although a great deal of the literature regards regulation almost exclusively as a constraint rather than as an opportunity, with regulation referred to as a 'hurdle', 'barrier' or 'issue' confronting business. On the other hand, impacts of regulatory regimes on strategic IS can be not only significant, but also positive or enabling (Knackstedt et al. 2013). One example is where regulatory measures provide comfort to the individuals and organisations that buy products and use services. Further, to the extent that regulators take enforcement actions against

corporations that fail to fulfil their compliance obligations, the negative impacts of maverick competitors can be reduced, and the positive images associated with mainstream providers can be enhanced. In addition, regulatory measures can create or strengthen barriers to entry by competitors (Klapper et al. 2006, Lane & Koronios 2001), and can increase barriers to exit by customers. Moreover, in some sectors, regulatory arrangements can strongly influence and even dictate industry structures and processes (Rukanova et al. 2009, Watson et al. 2010, Rai et al. 2015).

This study is less concerned with the mainstream of compliance by organisations with regulatory requirements to which they are subject, and instead has its primary focus on the interests of organisations that perform regulatory functions, and of the intended beneficiaries of the regulatory measures, most commonly consumers and small business. The literature search identified a modest number of papers that have the design of regulatory measures as the central focus (Neo 1992, Clarke & Jenkins 1993, Williams 1994, 1996, Hosein & Whitley 2002, Knackstedt et al. 2013), while some acknowledge that regulators have a perspective different from those of regulatees (e.g. Gomber et al. 2018).

The search in the accumulated Bled corpus identified 11 papers that were relevant to this focus. Of those, 6 examined public policy issues, and from the perspective of the the public interest rather than that of corporations. The issues arose in the contexts of spectrum management (Delaere & Ballon 2007), pharmaceutical pedigree (Higgins et al. 2009), financial market surveillance (Alic et al. 2013, Alic 2015), drug counterfeiting (Kipp & Schellhammer 2019) and taxi services (Heikkila & Heikkila 2019). A further 5 papers considered a range of regulatory mechanisms (Polanski 2005, 2006, Clarke 2006, Burgemeestre et al. 2010, Smit et al. 2016).
Key conclusions from the survey of the literature are that the IS discipline has paid only limited attention to regulation, that the large majority of such studies have been compliance-oriented, but that some research is conducted with regulators and beneficiaries in mind.

The author contends that considerably more opportunities are available to IS practice and IS research, provided that a sufficient framework is established to enable those opportunities to be addressed. IS professionals can make practical contributions to the quality of regulatory regimes, as well as to the application of

information technologies in support of compliance with those regimes. There are of course also many implications for IS research.

4 A Framework for RegTech Research

In previous work, the author has reported on the development and exposition of a framework whereby IS professionals and academics can properly understand regulatory regimes, can identify opportunities for the development and deployment of RegTech, and can conceive, design and deliver appropriate technological support to relevant organisations (Author 2018). This section provides a necessarily very brief rendition of that framework. The following sections then demonstrate its value as a means of considering how RegTech can be applied in a particular sector.

During the pre-theoretic phase in a new sub-field of IS, a research framework provides structure to themes and issues, including descriptions of fundamental concepts and processes (Wand & Weber 2002, Avgerou 2008, Newell & Marabelli 2015, Clarke 2019). The framework presented here comprises four models. The first model draws on the literature to articulate the **Nature and Purposes** of a regulatory regime. The model defines the function that regulation performs, identifies the central players – distinguishing regulators, regulatees and beneficiaries, and describes the relationships among them, the processes whereby regulation is achieved, and the criteria whereby the appropriateness or otherwise of a regulatory regime can be evaluated

The second model partitions the space, by distinguishing the **Layers** within which regulatory measures are commonly conceived (Ayres & Braithwaite 1992, Drahos 2017, Drahos & Krygier 2017). The highest levels of Figure 1 depict the formal alternatives, and beneath that are shown the self-governance alternatives, and two forms of systemic governance.

Of particular significance for the analysis presented here, the second-lowest Layer is 'infrastructural regulation'. Regulatory functions can be performed by physical artefacts, such as the mechanical steam governor. IT' can be harnessed to the same purpose. A highly-cited expression of this is 'West Coast Code' (Lessig 1999, Hosein et al. 2003). This involves features of the infrastructure supporting or reinforcing positive aspects of the relevant socio-economic system, and precluding or inhibiting

negative aspects. Those features may be byproducts of the artefact's design, or they may be retro-fitted onto it, or architected into it. A simple example is the prevention of a transaction being conducted until particular data has been entered and authenticated.

The framework overviewed in this section is intended to support the analysis of individual industry sectors and segments. The following section outlines a category of industry sectors that have been attracting considerable attention, and that represent an appropriate basis for testing the framework's suitability for its intended purpose.

The third model articulates the categories of **Players** that act within the regulatory space. The fourth model, **Play**, examines the dynamics within that space, as each of those actors seeks to satisfy its own interests.

Figure 1: A Hierarchy of Regulatory Mechanisms

Figure 2 builds on the basic set of regulators, regulatees and beneficiaries, and embodies a sufficiently deep model to support analysis of complex real-world environments.

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The combined understanding of the regulatory space, layers, players and plays enables not only policy-makers, but also IS executives, practitioners and academics, to perform the 'sense-making' activities that necessarily precede the conception, design, development and deployment of new IS, and the adaptation of existing IS. The framework also provides the foundations for description, interpretation and critical analysis of the comprehensiveness, effectiveness and efficiency of a design, and assessment of its likely impact.

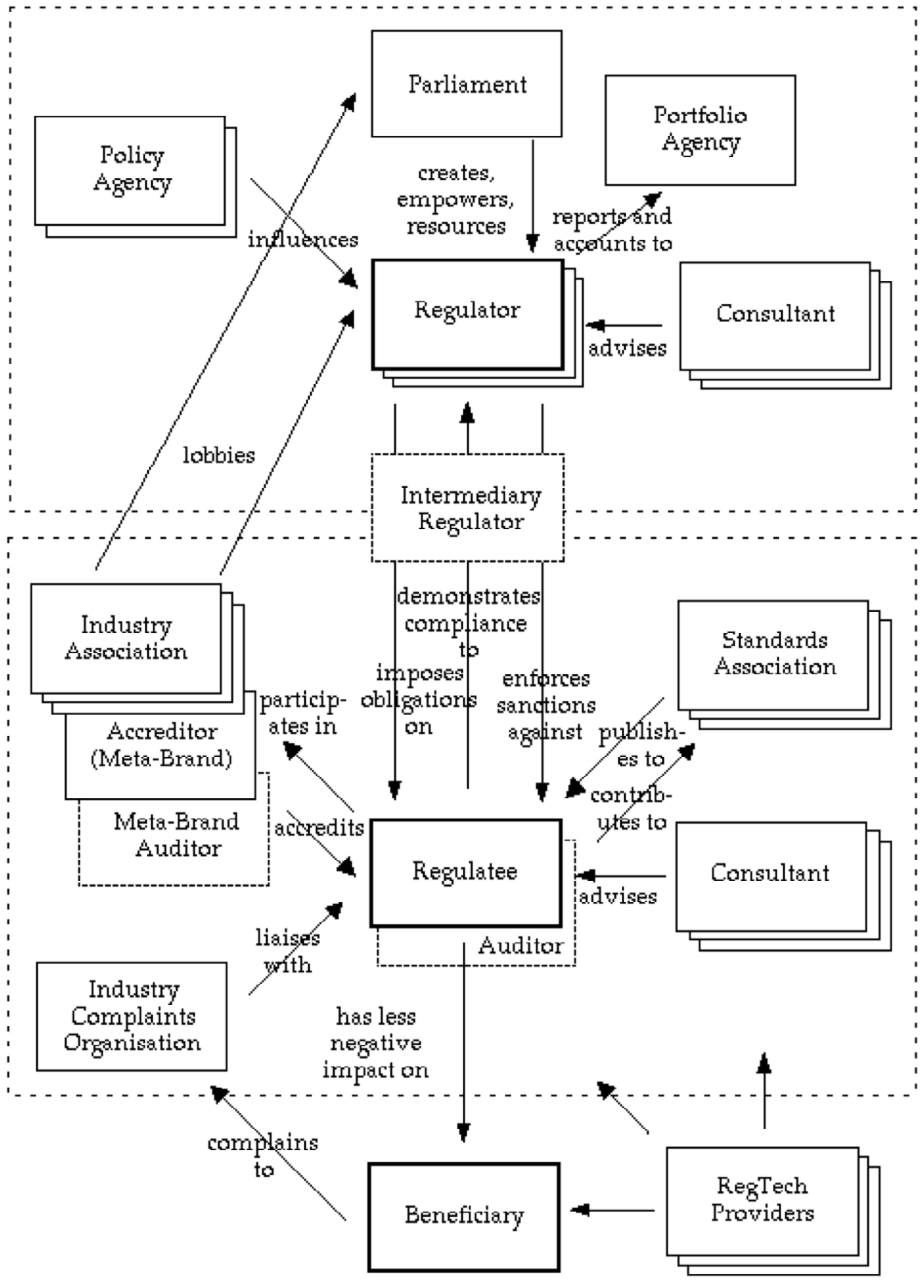

Figure 2: Players in Regulatory Schemes

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5 The Platform-Based Business Sector

A definition of platform-based digital marketplaces was provided in the Introduction to this paper, based on Taeuscher & Kaudion (2018). A regulatory agency recently offered a simplified description of digital platforms as "applications that serve multiple groups of users at once, providing value to each group based on the presence of other users" (ACCC 2019, p.41). Platform-based corporations consolidate suppliers into a managed collective, and provide them with means of being matched with customers. Exemplars of such sharing or crowdsourcing platforms that have attracted particular attention in recent years include eBay (since 1995), booking.com (1996), Expedia (1996), Tripadvisor (2000), Mechanical Turk (2005), YouTube (2005), Airbnb (2008), Freelancer.com (2009), Pinterest (2009) and Uber (2009). Claims are made by and for such platforms that they provide information infrastructure to enable more efficient matching of supplier capabilities with customer needs and more efficient use of assets and labour to deliver services.

The emergence and proliferation of the platform model has excited a great deal of enthusiasm in the formal and informal business media (Kavadias et al. 2016, Smith 2016, Uenlue 2017a, Kumara et al. 2018, Teece 2018). Common themes are inefficiencies arising from longstanding regulatory arrangements, and the benefits of de-regulation (Cannon & Summers 2014, Geradin 2015, Wallsten 2015, Kaplan & Nadler 2015). A sub-set of the conversation is concerned with the adaptation of regulatory schemes. In some jurisdictions, regulatory schemes have collapsed and negative impacts of unregulated markets have been felt, resulting in a focus on re-regulation (Ballon & Van Heesvelde 2011, Rauch & Schleicher 2015, Wyman 2017, Heikkilä & Heikkilä 2019).

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New platforms typically launch by harnessing new entrants, e.g. consumers with used assets to sell (e.g. eBay), home-owners with spare space that in the past has not been systematically let out for use by other people (Airbnb), and car-owners who have not previously offered fee-for-service car-rides (Uber). Many such schemes have taken advantage of loopholes in existing regulatory schemes to under-cut the prices in existing, regulated markets and thereby gain a meaningful market-share. This can achieve the ratchetting down of the regulatory regime, and may also enable the recruitment of existing suppliers into the scheme. In time, a re-concentration of market power may occur, accruing to the platform-based company, and this may in turn enable price-increases. Stock market valuations suggest a belief among investors that operations that initially make very large losses are likely to later achieve super-profits from the monopoly power that they develop.

Alternatively, a parliament or a regulator may assert its authority. This is likely to force the disruptor to comply with the law and significantly adapt its business model, thereby reducing its cost-advantage. It may even preclude the corporation from operating in that jurisdiction unless it establishes a local subsidiary that adopts a materially different business model.

Responses by regulators in some sectors have been very slow and piecemeal, whereas others have moved more decisively. An Australian regulatory policy agency has recently examined digital content platforms, in particular Google Search, Facebook, YouTube and Instagram, with a focus on their impacts on news reporting and journalism (ACCC 2019). It found that the fundamentally different approach taken by digital content platforms is enabling them to avoid a range of existing regulatory

measures, and that this has created serious threats to transparency, to competitive markets in digital content and in advertising, to the economic viability of news reporting, and to consumers' interests. Its Report recommended many adaptations to the regulatory regime for digital content.

The following section draws on and applies the concepts and insights provided by the framework for RegTech research outlined earlier, in order to identify contributions that can be made by technology, and by the IS profession and discipline, to the regulatory processes involved in the platform-based business sector.

6 RegTech Opportunities in the Platform-Based Business Sector

The Framework for RegTech Research introduced earlier was originally articulated to enable the analysis of sectors that have established a degree of maturity and stability. However, it can also assist in analysing circumstances in which disruption is occurring. It provides a basis for mapping the existing regulatory context that the disruptor is challenging. It can assist in reviews of the hierarchy of regulatory mechanisms, with a view to strengthening enforcement of existing requirements, or to easing the regulatory burden while still achieving the purposes for which what are now seen as unduly onerous requirements were imposed. Further, it can assist in identifying areas of particular inefficiency or disadvantage, which may represent an opportunity for de-regulation or rationalisation.

This section applies the Framework to the new platform-based entrants disrupting existing industry sectors, as outlined in the previous section. It commences by considering platforms in the abstract, then examines the regulatory implications of Uber's operations.

6.1 Generic RegTech Opportunities

Many of the generic measures identified in the Annexes to Author (2018) have application to the platform-based approach. In all of the upper five layers of Figure 1, system features need to support **formal and self-regulatory mechanisms**. When incidents are reported, and complaints are made, management systems are needed, to ensure that each case is logged, tracked and managed, and the findings are used

to stimulate action. Statistical reporting, on operations generally, on exceptions, on incidents and on complaints, needs to go beyond support for operational management to enable the organisation to achieve compliance, demonstrate to regulators that it has been achieved, and hence avoid the additional costs of unnecessary interruptions to the business management focus of managers and executives.

Regulators of platform-operators need case management systems for own-motion investigations and the handling of individual complaints. Some need information systems to manage registration or licensing. RegTech can also serve needs of beneficiaries of regulation, although in many cases an intermediary, representative or advocacy organisation may need to act as a proxy for their interests. Laws, policies, codes and undertakings need to be accessible and searchable. Guidance is needed in relation to particular patterns of corporate behaviour and the extent to which they are and are not reasonable, and are and are not compliant with laws, policies, codes and undertakings. Complaint preparation needs to be supported by guidance notes, templates and/or document-generators. Individual complaints, but particularly representative complaints on behalf of all or a class of individuals, need support, e.g. correspondence generation and filing, and reminders of deadlines for responses.

Infrastructural regulation has attracted remarkably little attention in many industry sectors and segments. Many regulatory schemes are of long standing, and their design reflects much less sophisticated computing, data management and data communication technologies than are now available. Yet researchers appear to have overlooked the scope for IT to make greater contributions. For example, published research agendas for digital platforms (e.g. de Reuver et al. 2018, Constantinides 2018) make only limited mention of regulation, and almost none of infrastructural regulation. Even a book concerned with public values overlooks the possibility (van Dijck et al. 2018).

An important exception is Boudreau & Hagiu (2009). The focus of those authors is on the platform-operator regulating its contributors and users for the good of itself, not with the regulation of the market segment as a whole for the benefit of external beneficiaries. However, there are likely to be ways in which the self-interest of the

platform-operator coincides with the interests of other parties, giving rise to at least some incidental public benefits.

The Annexes to Author (2018) catalogue generic infrastructural measures that have application to the platform-based approach. Regulatees need data and process integrity controls, access controls, audit trailing, and automated monitoring of audit trails, all embedded within their operational systems. Platform-operators also require exception-detection mechanisms embedded within their systems, to provide themselves with the opportunity to address individual problems and systemic issues, and to do so before they give rise to harm to regulatory beneficiaries and come to the attention of regulators. Automation of statistical reporting to the corporation's executives ensures forewarning of compliance issues that need addressing, such that anticipatory action can be taken in advance of queries from regulators.

Regulators, meanwhile, can be most effectively supported by automated statistical reporting directly from regulatees' systems, and auto-notification of exceptional individual cases. Direct access to databases in regulatees' systems exists in some financial services contexts. Operational features can be embedded in regulatees' systems that are for the benefit of the regulator rather than the regulatee, such as the prevention of transactions where mandatory conditions are not fulfilled. Examples arise particularly in the context of share trading platforms. Scope also exists for infrastructural features for regulatory beneficiaries, such as auto-reporting to individuals when access to their personal data occurs. This approach is already common when individuals' passwords are changed, or an access occurs from a new IP-address, but it has also seen application in some healthcare contexts.

6.2 A Test-Case: The Uber Platform

The particular platform that has attracted most attention, by consultants and academics alike, is the Uber 'ride-sharing' platform, which has had major impacts in many economies. In addition to its own significance, Uber has stimulated a range of look-alike disruptors in ride-services markets. Many of these are additional or alternative new entrants in the market for taxi-fares, or a substitute for taxis (e.g. Lyft, Bolt, Didi, Ola). In some cases, however, they have instead displaced use of public transport, bicycle-riding and walking. Other Uber-like start-ups have been in

the motor-cycle and motor-vehicle courier markets (e.g. Foodora, Sherpa, Zoom2U), and in the heavy goods vehicle arena (e.g. Flexport, Convoy, Saloodo).

On the supply side of the Uber platform, drivers are attracted by ready access to work, no need to have any knowledge of local geography, flexible hours, the ease and speed of joining up, and the limited need for business management. On the demand side, Uber's value proposition comprises easier ordering, shorter delay before pickup, cheaper trips, and no-effort payment. For a comprehensive review of Uber's business model, see Uenlue (2018).

Perceptions of Uber's impact vary, because of enormous differences in contexts across the company's areas of operation (Carson 2018). In the author's regional city, for example, taxis continue to dominate weekdays, but are challenged by Uber in the evenings and on weekends. This appears to be in part 'cherry-picking' behaviour, servicing only the periods offering lower idle-time factors and higher prices (termed 'surge' by Uber). In the process, this adds capacity when it is most needed. Anecdotally, another key factor is that most Uber drivers in the city in question use it only as a second income, and have a full-time weekday job. One study suggests that whereas large cities may have seen Uber and its imitators take as much as half of what was previously the taxi-market, the market-share achieved in smaller cities and large towns appears to be far lower, and the impact in regional and rural areas very limited (IPART 2019).

Uber is a particularly appropriate choice as a case study on RegTech opportunities, because its culture generally is somewhat extreme (Jordan 2017), and prominent within that culture is its **wilful disregard for existing regulatory regimes**. The range of regulatory non-compliance Uber has been accused of is very wide (Henley 2017, DWO 2018). More than half of the issues arise from the nature of the business. A major category is operation without the necessary business licences and not meeting the standards to qualify for one - such as driver qualifications and local knowledge, worker protections and a sufficiently broad area of service. In some jurisdictions, Uber has been associated with an elevated incidence of driver offences such as indecent assault. Another cluster involves breaches of competition law (price-fixing, collusion, misleading practices), and of tax law. Breaches of labour laws have also been common (wrongfully denying employee entitlements and rights, using the pretence that they are independent contractors). Many platform-based

corporations have ushered back in the much-maligned 'piecework' mode of remuneration for labour, with substantial reductions in workers' income camouflaged by the enthusiastic use of terms such as 'gig economy' and 'crowdsourcing' (Kaine et al. 2017, Akhtar 2019).

Even where acting entirely legally, Uber and other ride-sharing platforms can have material impacts that require **adaptation by regulators**. For example, there is evidence that Uber is exacerbating traffic congestion in many cities, leading to adjustments to congestion fee regulations in order to achieve a reduction in traffic and recover displaced use of public transport (Bond 2019, Giordano 2019). In Heikkilä & Heikkilä (2019), the scope is investigated for applying the commons governance principles of Ostrom (1990).

The model of **regulatory players** in Figure 2 is readily applicable to the specifics of Uber. As the diagram indicates, multiple regulatory schemes and policy agencies are relevant. A particular challenge that arises from Uber's operation in multiple countries is the diversity of approach, structure and processes among Regulators. In the most comprehensive analysis seen to date of the regulatory aspects of the Uber-driven taxi market, Wyman (2017) identified the "pillars of taxi regulation" as entry, fares, consumer safety, worker protections and universal service requirements (pp.31-74). In some analyses, the Beneficiaries are customers, while in others they are Uber's drivers, and on occasions the jurisdiction's revenue-collection function is in focus. A category of Consultants of particular relevance in Uber's case is what Uenlen refers to as 'lobbyists', whose role is to hold off regulatory enforcement.

Several further insights arise that suggest refinements to the current players model. A key issue in the Uber context is that **drivers are regulatees** (in relation to their competencies, their responsibility for their vehicle, and their behaviour in relation to customers), **but also beneficiaries of regulation** (in relation to their working conditions and remuneration). This highlights the need for the model to depict 'Beneficiary' as a plural rather than a singular entity, so as to encompass both passengers and drivers. There is also a need to support different **segments within heterogeneous populations**, differentiating, for example, business customers from consumers, controlled markets such as for school transport, and urban, suburban, regional and remote locations (Heikkilä & Heikkilä 2019). An important segment is customers in wheel-chairs, who may be impacted quite differently from ambulant

ride-seekers. Similarly, on the supply side, drivers fully-dependent on ride-sharing for their livelihood have somewhat different interests from part-time, second-income drivers.

Another challenge is the need for some **'Business Partners'** to be factored into analyses. Of particular importance are technology providers that deliver custom-built or customised tools for collecting and managing data, matching demand and supply, providing convenience and ease-of-use, and satisfying customers' and drivers' hedonic needs. Motor vehicle providers may also become significant, to the extent that they deliver, or trial, Uber-favouring features such as embedded vehicle-tracking, automated navigation, and driverless operation. Uber's partners may of course intersect with the 'RegTech Providers' that are already included in the model – resulting variously in cross-leveraging and compromise.

The framework, particularly if subjected to some modest adaptations, therefore provides a strong basis for describing the concepts and processes underlying platform-based business sectors. How well does it deliver against its second purpose, the identification of opportunities for the development and deployment of RegTech in a specific context such as Uber and similar ride-sharing services?

The previous section identified a range of generic opportunities. Most of those ideas are applicable to the specific case of Uber, but both qualifications and adaptations are necessary. At the formal regulatory and self-regulatory levels, statistical reporting and analysis loom large for Uber. It generates a vast treasure-trove of data, not only from the high volume of transactions, but also from its embedded and extensive tracking of both drivers and customers. Apart from supporting strategic decision-making, the analysis of this data supports Uber's ongoing battles with regulators. In part, this battle is engaged indirectly, by addressing the media, the public, policy agencies and parliamentarians. The company's focus is less on compliance and more on demonstrating that the game has changed, that it has changed for the better, and that (preferably) selective de-regulation or (at worst) re-regulation is needed. This can be achieved through anecdotes, supported by data, that convey the image of the platform business model delivering public value.

A key example of this is supply-side elasticity during peak demand periods. The conservatism long evident in most jurisdictions has resulted in no more taxis being available during high-demand periods than at other times, e.g. few jurisdictions issue peak-hour-only taxi-permits. This is reinforced by the rusted-on norm of a fixed tariff – in many cases with higher overnight rates, which is the inverse of the rationalist economic recommendation to use upward price-flexibility to stimulate supply. (Even conservative government public transport services use time-of-day-dependent tariffs in order to shift some of the demand to off-peak periods). Uber's data on ride-availability during 'surge pricing' periods is capable of demonstrating the efficacy of price-flexibility in varying supply and thereby satisfying customer needs. This goes well beyond predictable morning and evening CBD demand, to include sporting and entertainment event peaks and (perhaps less convincingly) wet weather peaks.

Given the central role that IT plays in the Uber platform, there is a heavy emphasis on infrastructural regulation. For Uber to continue to hold regulators at bay, ongoing public goodwill is vital, and hence the media needs to carry feel-good stories, to not discover newsworthy bad news, and most of all to not have the opportunity to snowball bad news stories. This depends on early problem identification, and early action to pre-empt negative reports. That in turns requires automated exception and incident reporting, and an incident management system that nags those responsible for managing issues, all deeply embedded in the corporation's operational systems.

Regulatory purposes can also be served. In order to bolster the argument that existing regulatory regimes are appropriate, quality reporting processes are needed on service-quality, driver-performance and safety-incident reports, supported by apps in the same way that ride-requesting is supported - and even by the same apps. The resulting data can be funnelled through services not controlled by the platform, such that Uber cannot massage the results. Similarly, direct transaction-feeds to regulators can be built into such systems to enable monitoring of key factors such as resource-utilisation, load-patterns, pollution-generation, and revenue-flows to individual drivers.

There is limited evidence of such discussions in the literature, although Wyman (2017) gives consideration to the contributions that could be made by RegTech: "Technology might be harnessed to address concerns that formally removing the existing legal limits on the number of street-hailed taxis might lead to oversupply in certain geographic areas. ... [V]ariable congestion charges might be used ..., and the app provider might be charged with collecting the congestion charge on behalf of the governmental authority" (p.39).

Similar approaches can be applied to the many other instances of platform-based markets. However, the opportunities may not always be apparent to regulators. For example, in the Short-term Holiday Letting (STHL) market segment, driven by the Airbnb model (Uenlue 2017b), a review of options for reconsidering the role of regulation (NSW 2017) was limited to formal laws and self-regulation, and completely overlooked the possibility of using information technology as a tool within the mix.

This case study provides evidence in support of the contentions that RegTech creates many opportunities for IS practitioners and researchers, and that the Framework for RegTech Research outlined in this paper enables their discovery and supports their articulation.

7 Conclusions

This paper has outlined a Framework for RegTech Research. It has also considered the usefulness of that Framework in understanding regulatory layers, players and play, and in identifying opportunities for applications of IT to regulatory matters. The particular context on which the Framework's usefulness was demonstrated is the currently very topical field of platform-based businesses.

An examination of the existing literature concluded that, to the limited extent that regulatory applications and RegTech have been addressed, the interests of regulatees dominate research discussions and research design. A great deal of the literature is concerned with organisations achieving compliance as efficiently as practicable (where the regulator is strong) or achieving the appearance of compliance (where it

is not). Even in this mainstream area, the Framework assists in unearthing additional research opportunities.

Although this study generated many suggestions in relation to compliance by corporations with regulatory requirements, the paper's most significant contributions lie elsewhere. Consistently with the conference theme of 'Enabling Technology for a Sustainable Society', the main focus has been on IT applications and features that support regulators, or serve the interests of the intended beneficiaries of regulation – most commonly individuals and small business, but in some contexts the physical environment.

The interests of regulators and of the beneficiaries of regulation are currently not well served by research. The Framework creates the scope for a great many projects and programs that contribute to the greater good rather than just to the interests of particular corporations. Opportunities exist for IS theorists and professionals to study aspects of the platform approach beyond business models, extending to strategic impact, and to public policy. Researchers can make contributions to rational debate in disrupted markets. Professionals can design and prototype IS and IS features that implement or support desired safeguards and controls, and that do so not only effectively, but also efficiently, flexibly and adaptively.

Annex

Details of the Literature Search:
http://rogerclarke.com/EC/Bled-RTFB-Annex.pdf

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