The application of future-oriented technology analysis (FTA) to law: the cases of legal research, legislative drafting and law enforcement

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Abstract

Purpose – *This paper seeks to propose the application of future-oriented technology analysis (FTA) to law. As law traditionally reacts after events and is resistant to change and transformation, the article argues for equipping legal activities with a set of tools, methods and approaches that enables them to acknowledge and anticipate the various possible futures that will guide society.*

Design/methodology/approach – *The paper describes a series of real world examples and case studies – pilot projects, research consortia and academic programmes – that are already employing FTA methodological approaches to pursue their objectives.*

Findings – *Based on these examples, the article explains the various benefits that the application of specific FTA methodological approaches (such as scenario-planning, modelling techniques and backcasting) may bring to three specific legal fields: legal research, legislative drafting and law enforcement. The article also examines the prospective perils that systematically applying FTA to law may bring about. While the introduction of FTA tools and techniques to law is deemed extremely important and useful, the paper also draws attention to the problems and challenges that this entails, indicating paths for future research.*

Originality/value – *Future-oriented legal studies are rare and, what is worse, the ones that exist lack proper methodology, failing to encompass the use of forecasting methods or foresight tools in the development of their studies. This paper attempts to fill the gap produced by this notorious lack of methodology in the legal analysis of the future, and presents a new methodological approach to law. It proposes the application of future-oriented analysis (FTA) – as a common umbrella term that encompasses foresight, forecasting and technology assessment methods and tools – to the legal sphere.*

Keywords *Law, Future-oriented analysis, Foresight, Scenario planning, Modelling, Strategic planning, Forecasting*

Paper type *Research paper*

1. Introduction

Future and Law[1] are two words that are rarely found in the same phrase. Law tends to adapt to the passage of time through a gradual process, and hesitates to anticipate forthcoming developments. Law, in this sense, has a deeply-embedded reactive nature. The typical juridical mind works backwards, looking at the past in order to address the present, while forgetting the future. In their efforts to establish a legal framework characterised by the fundamental values of order, stability and predictability, legislators, lawyers and jurists tend to construct legal systems that are overly rigid and, as such, resistant to change and transformation. Shaped by the values and parameters of legal security and certainty, the legal mind seems to have developed a phobia as regards uncertainty and risk, neglecting – as a consequence – the use of forecasting techniques, foresight methods and technology assessment procedures. As a result, the scope of legal research supporting policy decision-making tends to be rather restrictive, looking solely to the immediate past in order

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to find the factual evidence to justify its policy recommendations. In addition, recently drafted legislative instruments tend to be rapidly outdated, and law enforcement is frequently ineffective. Future-oriented legal studies are rare and, what is worse, the ones that exist lack proper methodology, failing namely to encompass the use of forecasting methods or foresight tools in the development of their studies. This paper attempts to fill the gap produced by this notorious lack of methodology in the legal analysis of the future, and presents a new methodological approach to Law. It proposes the application of future-oriented analysis (FTA) – as a common umbrella term that encompasses foresight, forecasting and technology assessment methods and tools – to the legal sphere.

2. Future-oriented technology analysis (FTA)

''Future-oriented technology analysis'' (FTA) was the term created to encompass the different tools and strategies that seek to anticipate and – in some cases – shape technological futures[2]. It was first used by the European Commission's (EC) Joint Research Centre Institute for Prospective Technological Studies (JRC-IPTS) as a common umbrella term for technology foresight, technology forecasting and technology assessment[3]. The JRC-IPTS, through the FTA overarching concept and a series of sponsored biennial seminars[4], has provided a common place and platform where various communities dealing with different aspects of future envisioning (such as technology foresight, technology forecasting and technology assessment communities, along with the broader field of future studies) have come together to discuss and learn from each other. As Johnston (2008) noted, the objective of the first of these seminars ''was to analyse possible overlapping fields of practice between technology foresight, forecasting, intelligence, roadmapping, and assessment.''

As a comprehensive term, FTA is firmly anchored ''in the relation between science and technology on the one hand, and social needs on the other'' (Cagnin and Keenan, 2008), acknowledging thus the co-evolution of science and technology (S&T) together with society in their approach and work.

In conceptual terms, the dialogue and the literature produced under the FTA common umbrella term have contributed greatly to the distinction and articulation of the many different methods, strategies and tools designed to anticipate and shape technological futures (Rader and Porter, 2008). In addition, this particular community of scholars and practitioners has also managed to provide a collective definition of FTA, detailing its common characteristics and principles. FTA, in this respect, has not only provided a common framework through which to define, distinguish and articulate the growing number of instruments, approaches and procedures, it has also created its own identity, devising a set of principles that define their fundamental characteristics.

3. Law and FTA: case studies

3.1 Introduction

FTA activities, techniques and research have registered an impressive growth over the past decade. In this respect, Saritas (2011) comments that ''[a]s the complexity of societies has increased, the scope of FTA activities has widened to cover a wide variety of issues. This has been mainly due to the increasing importance of technological and organisational innovation; the development of service economies; and other developments such as rapid globalisation, and changing nature of demographical structures, cultural practices, environmental affairs and social services.'' Furthermore, the number of studies focused on the connection between FTA and the field of social sciences and humanities has substantially increased (Barré and Keenan, 2008). Regarding the application of FTA to other fields of knowledge and inquiry, Cagnin and Keenan (2008) have called attention to the need for a wider examination of FTA tools and approaches. These authors claim that an examination of this kind should draw on the relevant disciplines of social sciences and humanities (SSH), such as epistemology, political science, sociology, economics, and management and organisation science. They believe ''[t]hese will provide a variety of interpretative lenses that offer the possibility to expand our conceptualisation of FTA, which

will in turn improve the prospects for evaluating processes and outcomes'' (Cagnin and Keenan, 2008). Despite these important developments and recommendations, little has been said about the interlinkages between Law and FTA. In the wide spectrum of sectors, areas, disciplines and contexts to which FTA has been applied and developed, Law has been - strangely enough – left out[5]. In this context, I would add Law to the list of social science disciplines through which FTA should be examined, and would propose that their conceptualisation be expanded to the legal sphere.

To be strictly accurate, one could say that FTA has already been applied to the legal context. This application, however, has not provided direct and concrete results. The application of FTA to Law has been heavily mediated and filtered by political processes and factors, which – in the end – have undermined the potential benefits of any synergy. FTA, in this way, has been used to provide advice and to support the political decision-making process[6] which, only after a series of political iterations, culminates in the enactment of pieces of legislation. Despite the influence that the utilisation of FTA tools may exert on the finally enacted laws, there is no direct and unfiltered channel bridging one with the other (the unpredictable dynamics of the political process get in the way). Nevertheless, things appear to be changing as a number of initiatives seem to be pointing to a direct application of FTA to Law.

In the following sections, a series of initiatives (existing and/or prospective) regarding the application and use of specific FTA tools and approaches in Law, namely to legal research, legislative drafting and law enforcement, will be examined.

3.2 Legal research

3.2.1 Law of the Future Joint Action Programme. In a rather unusual initiative within the general framework of legal research, the Hague Institute for the Internationalisation of Law (HiiL) began in 2010 ''a unique forward-looking exercise in the field of law: the Law of the Future Joint Action Programme'' (Muller *et al*., 2011)[7]. As stated by its organizers and promoters, the project ''is based on the premise that prospective thinking about law is not only desirable but also required in order to ensure that law and legal systems do not become obsolete, ineffective or unjust'' (HIIL, 2011).

This programme (also denominated as The Law of the Future project – LOTF) ventured into the study of the future by posing one fundamental question to the legal community of scholars and practitioners: ''how will law evolve in the next twenty years?'' In order to attain a response (or several of them), LOTF embarked on a long-term process of broad consultation and exchange of views, based on which it later designed a number of alternatives visions of Law in 2030. This project, most welcome for its originality and ambition, followed moreover a methodological approach that comprises two important FTA tools: Delphi studies and scenario-planning. In the following section, I shall briefly explain how each of these tools were used in this particular research project.

Delphi – think pieces.

> In the early stages of the project[8], key thinkers from different parts of the world were invited to write what was described as ''think pieces'', that is, short, informal and non-annotated essays which aimed to answer the following question:
>
> ''What do you see as the most significant challenges for the development of the law within your track (and/or in relation to other tracks)? What developments are we likely to see in the coming two to three decades? What do those developments mean for national legal systems in the international legal order as a whole?'' (Muller *et al*., 2011).

The objective of the think pieces was to fuel the discussion and provide the necessary material and input for the scenario construction process. The consultation of experts as a methodological approach to the study of the future of law resulted in a very original and creative exercise. It not only contributed to the construction of the various alternative scenarios that the project had planned to present, but it also made possible the very first publication of a legal nature that addresses the future of law in such a broad and over-arching scope[9]. The collection of those think pieces encompassed important (and, some of them, mind shattering) descriptions of the major forthcoming developments and

changes that the various branches and areas of law will go through in the future. This innovative application of the Delphi method to Law resulted in an impressive collection of themes and visions, encompassing topics as diverse as the future of international law, national constitutional orders and private law, along with the future of legal theory, the future of space law and the alternative futures of crime and prisons. Contrarily to the ''traditional'' Delphi method, which tends to lead to consensual assessments of the future (Blind, 2006), the objective of these think pieces was to collect, within a legal context, a range of varied ideas about the future.

Scenario planning – law scenarios for 2030. Based on the analysis of the various expert think pieces submitted, the Law of the Future Joint Programme Action advanced to its second phase: scenario-planning. This was, in fact, the strategy tool chosen by the project to reflect on alternative futures for law and legal systems.

Scenario planning constitutes one of the most common FTA methods used in future studies[10], as it allows experts in foresight to define their own visions of the future, creating their own narratives and visualisations of forthcoming developments. Unlike other disciplines, such as economics and business science, scenario planning is not very common in Law. This kind of narrative exercise tends not to be very appealing to the legal mind, which is usually more concerned with the ''real'' and immediate world, limited to a short time span and resistant to prospective thinking and alternative planning.

Despite the fact that scenarios have already been used in legal-oriented studies, such as the European-funded projects SWAMI[11] and FIDIS[12], their application has been limited, sporadic and largely descriptive. As such, the scenarios used in these few cases constituted descriptive visions of techno-futures, illustrations which aimed to describe specific situations and actions in forthcoming technological worlds. These scenarios were thus used to support the policy/legal recommendations advanced in projects of this kind, and not to problematize or present alternative visions of the future. Furthermore, they were not of a legal nature (of what law would look like), but instead about what the world will look like after the implementation of certain emerging and future technologies (such as the vision of Ambient Intelligence or the prospect of human enhancement). They thus constituted isolated and factual narratives of a future technological world, which aimed to alert the policy maker to the legal implications of such prospective scenarios.

The Law of the Future project embraced scenario-planning in a very distinctive manner. The idea was not to describe what the world will look like, and then derive a series of legal recommendations to the policy makers, but to tackle Law itself – that is – to describe what Law *per se* will look like in the future, or better, to describe the various possible aspects that Law may have in the future. The approach is thus a global and systematic one, looking at Law and legal systems from a series of different angles and perspectives. In this way, and as already mentioned with regard to the consultation process and the think piece contributions, LOTF aimed to cover an extensive range of legal dimensions and dynamics, looking at constitutional, institutional and administrative law (public actors and relationships with the public administration); private law (private actors and horizontal relationships); and criminal law (public power and punishment). Moreover, the project planned to study all of these legal dimensions at national and international levels, including both the public and private spheres.

The legal scenarios thus set out to be global and systemic. Their planning, as mentioned above, derived from the initial Delphi phase, in which legal experts were consulted for their visions of the future of Law in their respective areas. After this preparatory phase, the Law of the Future project followed a meticulous methodology. As such, the LOTF team first identified a series of major global trends, both societal and legal. While the societal trends concerned, for example, the increase of population or the scarcity of natural resources; the legal trends dealt with the possible shift from a predominantly national to a predominantly international legal environment, or the potential shift from a predominantly public legal regime to a mixed public-private regime or even predominantly private regime. The LOTF team then derived from these trends a number of key uncertainties. The latter consisted, specifically, of the two following legal contingencies: the continuous internationalisation of

rules and institutions or its stagnation or reverse; or the continuous expansion of the predominant role of private governance mechanisms or the reinstatement of state-connected institutions and legal regimes. These key uncertainties and contingencies allowed the LOTF team to systematically explore possible futures, providing the foundation for the following three alternative futures or scenarios for 2030 (described along with their own basic characteristics)[13]:

1. The Global Constitutionalism scenario: continued growth of international law and international legal institutions; the rules and institutions have a predominantly public nature.
2. The Legal Borders scenario: the process of expansion of international rules and institutions reverses and legal borders thickens; dominated by state-made law borders; regional organizations emerge as a key part of developing legal borders.
3. The Legal Internet Scenario: growth of international rules and institutions, which go hand in hand with a growing dominance of public-private or even private governance mechanisms.

These scenarios, as explained in the project, provide ideal types of the alternative futures of the global legal environment. They are the analytical coordinates that together make up a compass, which can be used to analyze the direction in which the global legal environment is moving. It also allows us to predict which triggers and events will push the global legal environment in which direction. Furthermore, the scenarios can be used ''to assess how existing strategies perform in different global legal environments. They can be used to decide on preparatory measures and they provide intellectual roadmaps to answer the 'what if' questions'' (HIIL, 2011).

To conclude, it is important to note that, as an ongoing and dynamic project, the objective of the LOTF is to further develop these scenarios, revising them periodically. Furthermore, the project also aims to develop ways to observe which scenarios are unfolding, complementing the scenarios with a system of monitoring mechanisms, legal contingency planning, and preparatory measures. In this respect, ''The Law of the Future Monitoring Mechanism'' seems especially promising, as it opens the doors to the application of other FTA tools to legal research, combining qualitative with quantitative methods[14].

3.3 Legislative drafting

3.3.1 FuturICT. The FuturICT project (www.futurict.eu) is a multidisciplinary international scientific endeavour with a special focus on techno-socio-economic-environmental systems. The idea is to have ''something like a 'flight simulator' (or 'policy wind tunnel') to explore techno-socio-economic-environmental systems, in order to give decision-makers a better, integrated picture and multiple perspectives on the hard problems we are facing'' (Helbing, 2011). As Helbing (2011) explains, the ultimate goal of FuturICT ''is to understand and manage complex, global, socially interactive systems, ... [r]evealing the hidden laws and processes underlying societies'' (www.futurict.eu). The objective is thus ''to learn how to design and manage techno-socio-economic-environmental systems in a resilient and sustainable way, to minimize serious instabilities, uncontrollable systemic shifts, conflict, crime and war.''

As a project which aims to advance our understanding of human and environmental systems, FuturICT will basically act as a Knowledge Accelerator, speeding the present towards the future by providing knowledge about tomorrow through data about today. It is, in short, a sophisticated modelling system with the ambitious plan of turning massive amounts of data into knowledge and technological progress. The project proposes using real time data (financial transactions, health records, logistics data, carbon dioxide emissions, or knowledge databases such as Wikipedia) to construct a model of society capable of simulating what the future holds for us. For this purpose, FuturICT will build a sophisticated simulation, visualisation and participation platform, called the Living Earth Platform, composed of three levels: the techno-socio-economic ''flight simulator'' (also termed as ''Living Earth Simulator''), a ''Planetary Nervous System'', and a ''Global Participatory Platform''.

While the ''Living Earth Simulator'' will ''require the development of interactive decentralized supercomputing that scales up to global-level systems and allows one to study the impact of different possible decisions, i.e. to explore various future scenarios at different degrees of detail, employing a variety of perspectives and methods'' (Helbing, 2011); the ''Planetary Nervous System'' will work as global sensor network, collecting data in real-time and allowing ''one to do reality mining on a global scale and to measure the socio-economic-environmental footprint of human actions, i.e. to create a greater awareness of the possible implications of human-decision making'' (Helbing, 2011). Finally, FuturICT will also build a ''Global Participatory Platform'' in order to support the decision making of policy makers, business people and citizens, and to facilitate better social, economic and political participation. Interestingly enough, the ''Participatory Platform will also craft populated virtual worlds very much like our real world, but with the possibility to create variants of them. In other words, through serious multi-player online games, we will be able to explore possible futures – not only different designs of shopping malls, airports, or city centres, but also different financial architectures or voting systems'' (Helbing, 2011). This platform will power interactive observatories, which will be in charge of detecting and mitigating crises.

Of the many important and interesting features of this scientific endeavour, I am particularly interested in the participatory dimension of the project, reflected in its proposal to use modelling systems (along with its data mining procedures) to better enable and assist decision making and political participation processes. In effect, the use of modelling systems corresponds to one of the most recent trends in FTA. At a more general level, the increasing availability of information in electronic form and the computing techniques and processes for exploiting such data constitute the most recent methodological developments in the field of FTA. In effect, FuturICT and the wide spectrum of ICT improvements and applications that this project encompasses constitute a good example of the new generation of methodological developments that is shaping FTA. Through the use of modelling techniques and simulation platforms like the one described above, the anticipation of the future is increasingly being carried out through the advanced tools that help process, search, mine, organize, display and interpret electronic information resources[15]. The escalating use and relevance given to ICT tools in FTA illustrate, moreover, how the techniques used to envision the future have grown in complexity and sophistication.

3.3.2 ''Future-verification'' assessments. In order to render upcoming laws as ''future-proof'', the obligation to perform ''future-verification'' assessments of long-standing laws may be seen as a possible example of FTA instruments or procedures applied to the legislative making and revision processes. Accordingly, and before a given law is enacted or revised, legislators would need to explain both the future need and the future consequences that a particular piece of legislation would address (preferably through the support of scenario planning and/or the use of modelling analysis). In order words, legislators would define their desirable futures in laws, using the latter as enablers of their vision of the future. This *modus operandi* goes by the name of backcasting, a method according to which the desired future is first envisioned and only after this, the steps and actions to attain that future are defined. It is a process that goes backwards, connecting the future to the present. After a given period of time, a law of this kind would go through a ''future verification'' assessment, in which the desired future envisaged by the legislator would be compared with the future effectively attained (that is, the present) by this piece of legislation.

3.4 Law enforcement

Faced with increasing budgetary constraints, the police have turned to new technologies to improve their efficiency, using ICT to optimize their increasingly scarce and limited resources, such as the lack of an adequate number of personnel. ''Predictive policing'', in this respect, has been used in the US to define the work of computer scientists in exploring data models that predict and map crime. This activity enables law enforcers to anticipate and prevent criminal activity, interpreting patterns of data to better deploy police resources. Constrained to do more with less, predictive policing marks a paradigm shift in fighting crime, focusing not only on reaction but also (and mainly) on prevention. In other words, the reactive and responsive approaches that traditionally characterised the work of police

forces has been complemented with a research-based approach that strives to detect, anticipate and thus prevent (prospective) criminal activity. As noted elsewhere:

> Reporting, collecting, and compiling data are necessary but not sufficient to increase public safety. The public safety community relies heavily on reporting what has happened already. Annual crime reports, monthly summary reports, and year-to-date reports all focus on events in the past. Even alerts focus almost exclusively on incidents that occurred in the past, albeit with increasing speed and efficiency. The predictive-policing vision moves law enforcement from focusing on what happened to focusing on what will happen and how to effectively deploy resources in front of crime, thereby changing outcomes (Beck, 2009).

Predictive policing constitutes the next step in intelligence-led policing (ILP)[16], which encourages the use of criminal intelligence to support collaborative, multijurisdictional approaches to crime prevention, while emphasizing the role of analysis in tactical and strategic planning (Beck, 2009). Based on comprehensive computer statistics, technology has allowed the law enforcement community to rapidly identify and address crime hot spots, enhancing the effectiveness of police response in countering criminal activities.

A concrete example of a predictive policing technology can be found in CompStat, a computerized crime mapping system developed by NYPD in 1993 and now used by police departments nationwide. In brief, CompStat is a crime-mapping software application that highlights areas where criminal activities have occurred, driving ''police action with surgical precision to maximize organizational efforts, forecast needs, and assess results with timely and accurate information'' (Gascón, 2005). As Beck (2009) explains, ''[b]y bringing all crime and arrest data together by category and neighbourhood, CompStat revolutionized policing, enabling officers to focus their efforts in problem areas, armed with real-time information, accurate intelligence, rapid deployment of resources, individual accountability, and relentless follow-up'' (Beck, 2009)[17].

It is important to bear in mind that, contrary to what some fictional movies may lead one to think (e.g. the 2002 movie *Minority Report*, which portrays a future where criminals are caught before they commit their crimes, www.imdb.com/title/tt0181689/), ''predictive'' analytics are obviously not intended to target individuals for future crimes that they have not yet committed (and that they would allegedly commit in the future). As explained by Beck (2009):

> Predictive policing, like any public safety resource or tool, must be used legally and ethically. The analytic methods used in the predictive-policing model do not identify specific individuals. Rather, they surface particular times and locations predicted to be associated with an increased likelihood for crime. Identifying and characterizing the nature of the anticipated incident or threat increase the ability to create information-based approaches to prevention, thwarting, resource allocation, response, training, and policy. These fact-based approaches promise to increase citizen and officer safety alike.

4. Discussion

4.1 Advantages of using FTA in law

The FTA methods and instruments described above (Delphi surveys, scenario-planning, backcasting, modelling systems and simulation platforms) offer a number of important advantages when applied to the legal context. Law – in the tripartite structure followed in this article: legal research, legislative drafting and law enforcement – is only now adopting some of these FTA tools. In this way, the benefits of a more encompassing and systematic application of FTA to the legal sphere are yet to be uncovered and evaluated. This section will describe some of these benefits and advantages.

At a general level, the application of FTA to legal research constitutes an appeal to the creativity of the researcher and to the realisation of the full potential of his or her academic freedom. In this context, and contrary to mainstream academic though and methodology, I argue in favour of speculative (and disruptive) thought applied to legal research and teaching, as this would allow legal scholars and students to ''think outside the box.'' In this sense, FTA should not only be integrated into legal culture, but also into legal academic curricula. In this respect, it is interesting to note that the famous H.G. Wells, back in 1933 and

in a BBC broadcast program, underlined the need for professors of foresight, arguing that ''we are surrounded by numerous professors of the past, but not one of the future'' (Miles and Keenan, 2003). Along these lines, I believe that Law Schools would very much enrich their programs by creating the post for Professors of Legal Foresight and by establishing the course of Legal Future (in the same way as they provide the well established and fundamental courses of Legal History).

In this context, one should remember the futurist Herman Kahn's words when addressing the question of why we should speculate far ahead. In effect, it is not because one could predict the future, but because:

> Such studies, even if only partially successful, contribute to interesting lectures, provocative teaching, and stimulating conversation, all of which can broaden horizons and increase creativity – by no means negligible benefits. More important, these studies can affect basic beliefs, assumptions and emphases (Kahn and Wiener, 1967).

In addition, the application of FTA to legal research may also unblock the legal mind from current paradigms and assumptions, avoiding what is known in foresight as the ''Zeitgeist Problem,'' that is, ''the tendency to be captive to the 'spirit of times' and to assume that tomorrow's problems and visions will be very much the same as today's'' (Rader and Porter, 2008).

Regarding specific FTA tools, survey approaches – such as the Delphi methodology used by the LOFT project – carry specific benefits to Law. Such methods will potentially enable researchers and legislators to identify future regulatory gaps and needs. These surveys constitute adequate tools to collect information and to provide a range of different ideas based on which scenarios can afterwards be designed and presented.

In this context, the greatest virtue of the scenario-planning technique is not to predict how the future may look like, but to allow for the future to come into being in the minds of the people of the present, that is, to allow for the future to be imagined, communicated and problematized. Through the use of scenario-planning techniques, the future leaves the realm of the unknown and the impossible, transiting to the domain of the possible. Future, in other words, becomes a hypothesis.

In a more schematic way, scenarios constitute an instrument of construction, communication and problematisation of the future. First, and regarding the constructive aspect, scenarios are building processes: they give a form to the future, translating it into compelling narratives, stories and visions. Second, scenarios constitute channels through which such visions and narratives are communicated to larger audiences. As part of the storytelling endeavor that has accompanied and shaped humanity throughout its entire history (from mythological oral tales to current technologically-intermediated means of communication), scenarios allow for different imagined conceptualisations of the future to be transmitted, communicated and shared. Scenarios, in brief, allow for people to ''access'' and ''learn'' about the future (that is, about a particular imagined version of the latter). Third, scenarios not only build and communicate, they also problematize the future. Through the use of this strategic tool, the future is laid down in an operation table, being then diagnosed and scrutinized. In procedural terms, scenario-planning – at the meta-level – conceptualises the future as an open question, advancing then various possible answers and solutions. This is particularly so in the case of the construction of alternative scenarios, in which the future is segmented in a number of different (and sometimes conflictive and opposing) hypothesis.

In this way, and in the legal context, the production of scenarios is extremely useful for dealing with the inexorable uncertainty of the Future[18]. As LOTF has demonstrated, uncertainties can be explored through scenarios that envisage possible and alternative futures, preparing legal systems for the matrix of different possibilities that compose the future. Scenarios, in this respect, should be used ''as a tool to deal with uncertainty, rather than as a claim to know the future'' (HIIL, 2011). Furthermore, the methodological integration of scenario-planning with other FTA tools also promises to bring important benefits to the study, drafting and enforcement of law. This is the case of modelling systems, such as FuturICT.

The application of modelling techniques to the legal domain represents a step further in the use of ICT, Artificial Intelligence (AI) and other advanced computer applications to this particular area. Up until now, the application of ICT to Law has enabled the development of new models for understanding and working with legal systems (through, for instance, knowledge based systems and intelligent information retrieval). With the development of modelling techniques and instruments such as the one described above, the impact promises to be even greater. In effect, the application of this particular ICT-based FTA instrument to Law will enable the development of innovative models for researchers, legislators and legal practitioners to better understand the world in which Law needs to operate. ICT developments allow not only for new ways to understand legal systems, but also for sophisticated ways to understand and even to anticipate the world where laws will be applied to.

Furthermore, the combination of scenario-planning with other FTA instruments and methods, such as modelling analysis and simulation platforms, brings additional advantages to Law. In effect, the systemic collaboration between different FTA methods, namely between quantitative and qualitative methods is becoming increasingly popular and widely adopted[19]. By extrapolating future trends and drivers, as well as by assessing alternative visions of the future, scenario-planning can be associated with modelling analysis to allow legislators to test different legal options and regulatory solutions within simulated environments. The alternative set of visions provided by scenario-planning can be used to formulate and simulate different data-models of the future world. Jurists will then be able to assert, for instance, the potential impact that different legal reforms can have when applied to different and prospective world conditions. The combination between these tools (scenario-planning, modelling techniques and simulation platforms), as we saw in the FuturICT case study, may prove to be extremely useful not only to legal research activities, but also to legislative making processes.

In this respect, I believe that the employment of modelling systems in political discussion and deliberation exercises should also be used in the preparatory phases of legislative procedures. In view of that, I propose the idea of attaching modelling systems and simulation platforms to parliamentary activities of law-making processes as another example of a FTA technique applied to Law. In this particular, I trust that Parliaments would benefit greatly from the use of modelling and simulation techniques aimed at uncovering future societal, economic and environmental trends. Through the use of modelling instruments, legislators would not only be able to receive relevant information of future societal trends (which would certainly aid lawmakers to better determine the content, objectives and direction of their legal reforms proposals), they would also be able to test and simulate the application of hypothetical laws, assessing the impact of different regulatory options. Modelling techniques would allow legislators and decision makers to test the prospective impacts and consequences of a given change in legislation. The effects of legal changes and reforms could thus be anticipated and tested in safe and experimental environments. Modelling is, in this sense, a powerful instrument and an important source of information that should be used to improve legislative making processes.

Still within the field of law-making, modelling systems could be combined with other FTA methods, such as backcasting and future verification procedures. The latter could – in this way – help legislators to better enact new laws and revise existing ones, contributing to better law-making and to the need to produce better accounts of effective and demonstrable impact of legislation. The application of this set of FTA instruments would not only contribute to the process of evaluating the impact of specific laws in society, it would also render legislators and legal practitioners more attentive (and also more accountable) to the outcomes and impact of enacted or revised legislation. In this context, the incorporation of FTA methods and tools to law-making activities accompanies the growing interest in Regulatory Impact Assessment (RIA) by European policy makers. As Blind (2006) observes, this growing interest reflects a series of recent developments:

> First, within a framework of tighter governmental budgets and stronger international competition, policy-makers involved in regulatory policies are being held more accountable for the significant economic resources, as well as the political capital invested in regulatory management systems

> now established in most OECD countries. Second, there is a growing interest in exploring how regulatory policies can be more evidence-based and supported by empirical findings. More evidence-based approaches to the assessment of regulatory quality allow a review of the effectiveness of policy tools used in practice, a review of their performance, but also an improvement of the design and implementation of future policies.

FTA can thus contribute to the fulfilment of these two goals, providing the evidence and the empirical data required for this new generation of evidence-based legislative procedures and policy actions, as well as reinforcing the political accountability of policy (and law) makers.

With the incorporation of FTA instruments, the revision of laws and the design of future ones would be complemented with better quality assessment procedures. The, the impact of these laws could be reviewed, evaluated and forecasted in greater depth and accuracy. While RIA evaluations usually employ indicators, case studies and surveys as the most commonly used approaches (Blind, 2006), FTA would add to this methodological list other approaches that could render the evaluation of current laws, as well as the process of replacing them with new ones, a more reliable and evidence-based procedure. FTA, in this respect, could also reinforce the development of *ex ante* impact assessments (the ones performed prior to the enactment of a new legislation, as requested – for instance – in the European Union (European Commission, 2002), as well as the performance of *ex post* evaluation of regulations (which is part of the progress development of regulatory policies, complementing *ex ante* evaluations – (Organisation for Economic Co-operation and Development, 2003).

> *Ex ante* impact assessment is required to check all possible impact dimensions and to evaluate the likelihood of their realisation and their strengths. *Ex post* impact assessments are able to evaluate the efficacy and the efficiency of regulatory instruments by measuring and monitoring their performance (i.e. data gathering and reporting strategies) and practices to review existing regulations (Blind, 2006).

On this point, backcasting and ''future verification assessments'', processes which evaluate existing laws and their performance by contrasting their initial (and desirable) visions of the future with the one effectively accomplished; together with the use of scenarios, models and simulations to anticipate the set of possible implications that a new proposed law may produce, bear important similarities with the combination of *ex ante* with *ex post* impact assessments.

For these reasons, and many others that could be further envisaged, law-making processes would greatly benefit from the use of modelling techniques and other FTA instruments based on ICT procedures. For the sake of clarity, it is important to note that I am not arguing in favour of law-making processes based exclusively and blindly on data crunching exercises. Laws should not come out of calculators, but from qualified and sensitive human beings. Law, nonetheless, is in serious need of what has been called elsewhere of ''systematic anticipation'' (Burger, 1977). In this respect, legislators should have at their disposal the largest quantity and quality of information available about the society, the people and the environment that their laws address and apply to.

Important advantages derived from applying FTA to Law can also be found in the field of law enforcement, namely regarding the case of predictive policing and the CompStat tool (described above). The latter constitutes an innovative approach to law enforcement. In fact, it reveals that the successful application of FTA to Law encompasses all of its different domains, ranging from studying the law to drafting and enforcing it. Based on data mining techniques, intelligence-based tactics and information communication strategies, predictive policing demonstrates that Law, also in its enforcement phase, can benefit from the use of future-oriented methods and instruments. Predictive policy, as we saw before, brings important benefits to law enforcement authorities, namely the prevention of criminal activity and the better management and deployment of police resources.

To conclude, the application of FTA to Law is important in several aspects: to orient and streamline legal research, identifying the most relevant topics and areas that law will need to act on; to analyse and test the potential impacts of different (and forthcoming) hypothetical

laws, contributing to the modernisation of current legislative processes; and to reinforce the means and procedures through which law can be enforced.

4.2 Problems and challenges of using FTA in law. Future research

The introduction of FTA tools and techniques to Law, as this paper attempted to demonstrate, is extremely important and urgently necessary. Nevertheless, it is important to bear in mind that the application of FTA to Law also carries a serious of problems and difficulties. The following section summarises some of the most pressing challenges and problems that the interaction between FTA and Law may bring about, drawing attention to the focal points of needed research in this field.

4.2.1 Evaluation, assessment and quality measurement. Following the ideas presented in the legislative-making section, laws should ideally establish their vision of desired future, being later on confronted and evaluated according to the future effectively accomplished. The problem we face with such proposal is how to exactly measure the performance and degree of success/failure of a given law. How could one assess if laws, in effect, came close to the future they aimed at designing and constructing? This problem, moreover, may also affect the application of FTA to legal research. In this particular, the question one encounters is how to measure the quality and the appropriateness of the legal research based on a specific FTA (determining, for instance, the continuity of the financial investment presupposed in the application of FTA tools?). Given the systemic unpredictability of the future[20], how can FTA-based or oriented laws and legal research be effectively evaluated? Further research is needed in this area, namely in terms of formulating quality standards and assessment methods[21] for such activities (which is, in addition, a problem of FTA *per se*). The assessed quality of an FTA-based law or research is vital for the consolidation and continuity of this approach, as otherwise the suggested application of FTA to Law may run the risk of losing credibility in the eyes of policy and decision makers.

4.2.2 Neutrality and objectivity. The process of law-making is often tortuous and obscure. The legislative preparatory phase may be depicted as a battle field, where a myriad of different actors and institutions try to orient specific laws according to their own different (and sometimes opposite) motivations, objectives and goals. The role of lobbying groups and their attempts to shape laws in their favour is, in this respect, a paradigmatic example.

In defending the application of FTA to Law we may run the risk of rendering the law-making process even less transparent and controllable. The attachment of a specifc law to a given idea of Future renders the former (at least to some extent) dependent on the vicissitudes and manipulations that may affect the production of such idea or vision of future. In other words, we may run the risk of having a specific vision of the future directly produced in order to attain the passing of a given law. The problem we here face is the one of having foresight used as a lobbying instrument, employed to fulfil certain political or entrepreneurial objectives instead of being used as a neutral and scientific instrument in support of better law making and legal research. The future, in this respect, should be envisaged in an objective and neutral way, at least as much as possible. This, one should bear in mind, is not always the case. As Staton (2008) argues:

> The future is the site of conflicting and competing discourses and ideologies, it is the site of politics, regardless of the claim that is sometime made for foresight that it is a neutral space for debate and consensus formation. Foresight is a place where governments can and will try to stabilise, naturalise their roles, institutions jostle for positions, where sectors or fields fight for resources and where no one is ever likely to envisage their own demise, however inevitable or necessary or helpful as anything other than a crisis to be prevented.

Means and procedures to control the neutrality of the future when linked to legal activities should be further researched, avoiding thus the risk of having the future (either envisaged in the form of scenario, or through data model analysis or simulation platform) captured and colonized in favour of particular interests, or to pursue specific and hidden agendas. Although it is difficult to circumvent the lobbying interests and the political bias surrounding the legislative process, the application of foresight methods and tools to Law should be as scientifically-sound as possible.

4.2.3 The incorporation of FTA quantitative approaches to law. Another important challenge regarding the application of FTA to Law concerns the adequate role and use of automated tools of data processing and mining in law making, researching and enforcing. Here, it is important not to overrate the importance of the data output achieved through such tools, as laws should not be made dependent on data crunching mechanisms, but use them as a valuable and supportive instrument. Legal research, legislative-drafting and law enforcement should preserve their ''humanity'', conserving a degree of discretion, flexibility, interpretation and creativity that only humans can give. Law is a fundamental human activity, made of opinions, judgements, arguments and interpretations. The application of FTA quantitative approaches to Law should not replace the ''human touch'' in Law, but assist their scholars, judges and practitioners in doing a better job.

Further research is therefore needed on better ways to incorporate quantitative FTA approaches to legal activities, studying how – for example – modelling techniques can assist Law without threatening its independence as a fundamental human (and not machine driven) activity.

4.2.4 Distinction and legitimacy. The combination of Law and FTA also raises the question (and challenge) of how to keep FTA and Law distinct and separated. An eventual systematic application of FTA to Law runs the risk of blurring the boundaries between Science and Law, as one would be tempted to draw legitimacy from the other and vice-versa. In the case of FTA-based laws, would a given piece of legislation be legitimised (and therefore enacted) due to the scientific foresight method employed, or – on the contrary – would the foresight method be legitimised because of its coupling with the enactment of a specific law? Here we might encounter an interesting (and ultimately) dangerous mix between Law and Science, with the crafting of odd notions as ''science-based law'' or ''legally-based science''!

As mentioned previously, it is important to keep Law as Law, that is, a human activity of judgements, interpretations, opinions and values, which may (and should) make use of scientifically oriented tools and approaches, such as the ones of FTA, as complementary and supportive instruments of discussion and decision. FTA should help Law and not transform itself into Law. In this respect, future work should be conducted regarding the boundaries between Science and Law, as a way to render Law a future-oriented activity that uses scientific methods without transforming itself into one of them.

5. Conclusions

This paper has proposed a new methodological approach to Law, reflecting on the application of FTA tools and methods (such as Delphi surveys, scenario-planning, backcasting and modelling techniques) to the legal sphere, and applying them to three specific cases: legal research, legislative drafting and law enforcement.

Through this analysis, the paper underlines the roles that FTA can play in managing uncertainty and addressing the challenges that Law needs to cope with in terms of research, enforcement and legislative making. Rather than today's primarily ''reactive'' work, according to which Law responds to observed economic trends and past societal events, the paper demonstrates that Law will need to focus on proactive, future-oriented analysis and techniques. Furthermore, in offering a series of specific cases and examples of FTA tools applied to Law, the paper also attempts to illustrate some of the benefits and advantages that these instruments may bring, such as making Law a more creative and transformative endeavor.

Another important set of arguments presented in this paper concerns the necessary caveats that should be made and the limitations of applying FTA to Law. Bearing in mind that the Future is ultimately unpredictable, one should always be aware that the aim of the application of FTA to Law is not to foresee exactly what the future holds (which is, moreover, impossible) or to apply in the present the most perfect laws for the future. The aim is, instead, more modest but nonetheless important: to equip the various legal activities, from research to law-making, with a set of tools, methods and approaches that enable Law to acknowledge and anticipate (if not construct) the various possible future developments that will guide society.

In this way, and as explained in the last section of the article, there are important problems and challenges regarding the application of FTA to Law that must be taken into account. As a final note, I would recommend both enthusiasm and caution. It is of utmost importance to apply FTA to Law, but we must be aware of the inherent limitations and challenges. In effect, and this applies also to Law, more important than foreseeing the future is to actually discuss it, or as Henry Bergson (1948) has put it: ''The idea of future is more fecund than future itself''[22].

Notes

1. The term ''Law'', written in capital letters, encompasses the ensemble of actions and actors involved in areas and activities as diverse as legal research, legislative drafting and law enforcement.
2. For a historical review of the development of Future-Oriented Technology Analysis, see Johnston (2008).
3. These various tools and strategies differ according to the range of technology targeted, the time horizon span, their goals and outcomes, etc. For a clarification on the differences and similarities among the wide array of terms, methods and approaches that are included in the umbrella term of FTA, such as technology forecasting, technology assessment, roadmapping, technology foresight, and foresight, see Rader and Porter (2008). For the distinction between technology assessment, foresight and technology forecasting made by the European Science and Technology Observatory Network (ESTO), see Rader (2001). The latter was, moreover, revised in Rader (2001, p. 4); and revised in Tübke *et al.* (2001): JRC - IPTS.
4. These seminars, moreover, have given way to the publication of a series of various journal editions, such as the special editions of *Technological Forecasting and Social Change* vol. 75(4); *Technological Analysis and Strategic Management* vol. 20(3); *Technological Forecasting and Social Change*, vol. 72(9); as well as to the publication of the book Cagnin *et al.* (2008).
5. Although not referring specifically to Law, but to the broader term of regulatory policies, it is important to mention the paper of Knut Blind: Blind (2006).. The paper presents and develops three methodological approaches (indicator-based approaches, surveys and foresight studies – Delphi methodology and scenarios) that are adequate to conduct regulatory foresight, and which allow the identification of future fields for regulatory policy intervention. The paper thus underlines that foresight methodologies can be applied for identifying and prioritizing the future areas of regulation.
6. These were the cases of the future-oriented technology assessment exercises conducted during the period 1974-1995 by the US Office of Technology Assessment (OTA). Such studies, as noted by Johnston (2008) ''served to inform Congressional interests as they considered legislative policy options''. Along the same parliamentary lines, but on the other side of the Atlantic, we currently have the example of the Scientific Technology Options assessment (STOA), which advises the European Parliament in policy issues involving scientific and technological options. Recurring again to Johnston's (2008) observations, ''[t]he studies for the STOA panel of the European Parliament have served to pinpoint critical aspects of technologies and their application which might require the attention of legislators at some later point in time''. Regarding technology assessment, it is interesting to note that it ''originally emerged with the aim of contributing to the balance of power between the legislative and executive branches of government, but has increasingly moved towards providing knowledge suitable for actively shaping technology'', in Rader and Porter (2008).
7. For an overview of the objectives, the timeline and the structure of the project see www.lawofthefuture.org
8. The project organized the discussion around three tracks: Constitutional/institutional/administrative law; Private law/private actors/ horizontal relationships; and Criminal law/public power and punishment. The organizers of the programme underlined that those tracks were not to be conceptualized as doctrinally ''closed'' compartments. Instead, such tracks should be seen as inter-related clusters of general questions and characteristics (possibly overlapping with one another), which could be analyzed not only from a legal standpoint, but also from an economic, political or a social perspective.

9. Given the rich insights, ideas and visions contained in the collected contributions, the expert think pieces were afterwards compiled in an edited volume, published both in hard copy as well as in digital format, being freely accessible as an e-publication. See Muller *et al.* (2011).

10. For a comprehensive guide as to how scenarios can be developed and used, see Börjeson *et al.* (2006).

11. The SWAMI project (Safeguards in a World of Ambient Intelligence) aimed to identify and analyse the social, economic, legal, technological and ethical issues related to identity, privacy and security in the forecasted but not yet deployed Ambient Intelligence (AmI) environment. See Wright *et al.* (2008).

12. The FIDIS project (Future of Identity in the Information Society) aimed to shape the requirements for the future management of identity in the European Information Society (EIS) and to contribute to the technologies and infrastructures needed. See Rannenberg *et al.* (2009).

13. For a detailed analysis of those trends, uncertainties, scenarios (including its likely triggers), as well as of the strategic implications for national legislators derived from the analysis of those scenarios, see HIIL, 2011. Law Scenarios to 2030. Signposting the legal space of the future.

14. A concrete example of a combination between quantitative and qualitative methods in FTA, namely between scenario and modelling analysis, can be found in the so-called International Futures (IFs). ''Ifs'' is a large-scale, integrated global modeling system which acts as a powerful tool for the exploration of the long-term future of closely interacting policy-related issues (including human development, social change and environmental sustainability). The central purpose of IFs is to facilitate exploration of global futures through alternative scenarios, as its interface facilitates data analysis, display of forecasting results and scenario analysis. For further details see Hughes *et al.* (2011).

15. For an overview of data mining technologies and their use for competitive advantages, see Porter and Cunningham (2005).

16. For an overview of the origins of intelligence-led policing, together with a detailed analysis of its main concepts, processes and practice, see Ratcliffe (2008).

17. For more information on the CompStat, see Delorenzi *et al.* (2006).

18. For two views sustaining the impossibility to anticipate the future, see Staton (2008); and Tuomi (2011).

19. For an overview of the main issues and challenges associated with the combination between quantitative and qualitative methods in the field of FTA, along with a proposal for a way to overcome those barriers, see Haegeman *et al.* (2011). For a discussion of how expert quantitative and qualitative information may be joined coherently, see Loveridge and Saritas (2011).

20. For two views sustaining the impossibility to anticipate the future, see Staton (2008); and Tuomi (2011). Regarding the latter paper, Tuomi reconfirms the thesis of the unpredictability of the future, arguing that foresight has systematically missed important future developments due to its reliance on categorizations and measurement systems optimized for the Industrial Age models of production. According to the author, foresight needs a paradigm shift in the Knowledge Society, overcoming the epistemic models of FTA that inherently assume a world that evolves as an extrapolation of the past, failing to grasp the truly creative and novel aspects of the future. This paper, furthermore, explores the basic ontological and epistemological concepts that underlie foresight and FTA.

21. Peter De Smedt, as a result of a scoping study comparing a series of Impact Assessment (IA) exercises and research policy cases within the European Commission (EC), identified ''a potential gap between the contributions of researchers and the types of assessment tools that policy makers seem most able or willing to use.'' As a consequence, the author noted that ''research outcomes do not fully reach the policy makers'' and that ''specific initiatives are needed to shape the collaboration between science and policy''. As a proposed solution, De Smedt argued that ''[f]urther initiatives on IA tools should therefore include a joint collaboration between researchers and policy makers to develop a shared understanding of what constitutes a satisfactory agreement, i.e. relevant, accurate, and legitimate, using the appropriate combination of scientific tools.'' See de Smedt (2010).

22. The original phrase is in French: ''*L'idée de l'avenir, grosse d'une infinité de possible, est donc plus féconde que l'avenir lui-même*'', Bergson (1948).

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