

LegalTech Education – Considerations for Regulators

Adam Wyner

Associate Professor of Law and Computer Science

School of Law and Department of Computer Science

Swansea University

<https://azwyner.info/>

<https://www.swansea.ac.uk/staff/law/adamwyner/>

azwyner@gmail.com

a.z.wyner@swansea.ac.uk

1. Introduction

As is widely acknowledged, legal practice is dramatically and quickly changing. There are new demands on how legal professionals practice, what clients expect, how the government¹ and judicial systems provide legal information and services, and how firms and legal professionals provide services to the public, companies, government, and judiciary. While there are several drivers of change, we focus on the application of computing technologies to legal information, processes and services, which we refer to as LegalTech². We construe LegalTech broadly, covering large scale, public access to data and services on the Internet, creation of structured legal information, analysis and implementation of legal services, and advances in techniques of Artificial Intelligence (AI) applied to legal data and processes.

One of the impacts of LegalTech is on education in Law Schools and ongoing professional development. This paper's purpose is to address the following three issues to assist legal services regulators:

1. To understand the challenges presented by the use of computing technologies to deliver legal services to consumers;
2. To understand whether legal education is currently addressing these challenges and how it may need to change to do so;
3. Taking into account the legal services regulators' statutory objectives, including the protection of consumers and the public interest, and existing educational

¹ <http://dgsoc.org/egov-2019/>

² For the purposes of this paper, we define LegalTech, also known as LawTech, as follows. LegalTech, where Computer Science applies to the Law, contrasts with Law applied to technology. For example, LegalTech would be automated analysis of patents, while Law applied to technology would be Intellectual Property law applied to software. LegalTech is also distinct from application of Internet and Computing Technologies (ICT) in legal contexts, e.g. electronic access to court documents during a proceedings, video recording of court cases, document management, digital signatures, correct and safe use of email, smart phones, accounting and word processing software.

frameworks, to propose what regulators can do to ensure that legal education addresses these challenges and provides lawyers with the knowledge and skills required to shape and use technology to deliver legal services effectively and ethically.

The first two points are background context for the third point, which concerns what regulators can do to *future-proof* lawyers. The main body of the paper addresses the third point, developing the first two more briefly.

In this paper, we propose what regulators can do to ensure that legal education addresses the challenges presented by LegalTech in order to provide lawyers with the knowledge and skills required to shape and use technology to deliver legal services effectively and ethically. In Section 2, we outline several propositions which we recommend that the regulators promote. For each proposition, we give a rationale, supporting justification, the context of underlying trends, relation to LegalTech education, and actions regulators might take to promote the propositions. Section 3 reviews the challenges in delivery and education, which further reinforce the propositions and supporting information. Section 4 discusses ways LegalTech education may be future-proofed, addressing the challenges and in keeping with the propositions.

It is worth emphasising that the paper's intended scope is how to deliver research-led LegalTech education, which would keep lecturers and learners up-to-date and prepared for current practice and future developments. While some of the trends and suggested actions may impact a range of areas of legal practice, it is another matter how lawyers, law firms, government departments, and the judicial system see fit to address the trends.

2. Propositions

To provide lawyers with the knowledge and skills required to shape and use technology, we propose that regulators promote:

1. Standards for and openness of legal information and processes;
2. Integration of professional legal services with government legal services and the judicial system;
3. Responsible AI;
4. Alignment of LegalTech education with the Legal Services Board's regulatory objectives;
5. Hybrid courses and programs in Law and Computer Science.

In the following, we develop these propositions, providing rationale, supporting justification, context, bearing on education, and a range of possible action points.

2.1. Standards for and openness of legal information and processes

Rationale: increasingly, diverse participants are *digitally communicating and automatically processing* legal information and processes.

The supporting justification is based on underlying trends of: standardisation, liberalisation and globalisation of the legal services market, knowledge flow, open data/software, and open government. In addition, standards for and openness of legal information and processes are the grounds necessary for research-led teaching and learning, by which knowledge and skills are kept at the forefront of practice and future developments. We discuss each of these.

In the following, we discuss the context of the proposition. Standardisation, as opposed to customisation, is to make processes, components, and roles have the same basic features. Generally, a standard is consensually developed by a variety of interested parties. It achieves compatibility, interoperability, safety, replicability, quality control, and commoditisation, allowing all parties in a common activity attain mutual gains. Variation of content and some customisation are possible within a standard, but the greater customisation, the greater the friction amongst participants' interactions. In the Law, examples where standardisation may be highly beneficial could include conveyancing, dispute resolution, bankruptcy proceedings, and many others. Highly repetitive, widespread processes particularly suit standardisation. Other areas with highly articulated variation or of relatively rare occurrence may be beyond the scope of standardisation.

Liberalisation and globalisation have both diversifying and standardising impacts on the legal services market. Liberalisation of the legal services market in the UK arose from the Legal Services Act 2007 (LSA2007)³, which encouraged competition and alternative business structures. In addition, proposed changes to the Solicitors Qualifying Examination (SQE)⁴ is giving rise to alternative and diverse ways to qualify. There are related changes to qualifying as a barrister. The alternative business structures and diverse ways to qualification enable the delivery of legal services by professionals who are not lawyers by traditional qualifications, such as by in-person paralegals or virtual assistants. Such delivery gives more clients more opportunities to access legal services. However, specialist legal expertise in such services may require legal knowledge to be designed into the support tools. As the different means to deliver legal services ought to, by and large, deliver comparable results for similar legal issues and information, standardisation becomes important. Similarly, globalisation of legal firms and practices also drives standardisation⁵, as information which is communicated or processed within one globally dispersed firm to offices or outsourced to other firms or processing facilities must share an understanding about the information and what is to be done.

Standardisation and globalisation demote the value of some aspects of a firm's *stock of knowledge*, which is the *privately held* knowledge that a firm or lawyer uses in working with a client - what the client pays for is access to this stock. However, the dynamics of the current

³ <https://www.legislation.gov.uk/ukpga/2007/29/contents>

⁴ <https://www.sra.org.uk/sra/policy/sqe/pilot/sqe2-pilot-assessment-specification/> Subject to approval by the Legal Service Board. As discussed below, this is particularly interesting, as the specification of Functioning Legal Knowledge can be understood as a pre-requirements, computational analysis of roles, actions, and properties.

⁵ <https://www.lawsociety.org.uk/news/documents/future-of-legal-services-pdf/>

business environment are inhospitable towards this *stock of knowledge* approach, which define knowledge silos that cannot be related to other silos. Rather, the environment is highly hospitable towards *flows of knowledge*⁶, where structured knowledge or data flows from parties which have libraries of information (knowledge servers) to and from other parties which process the information (knowledge processors). The environment no longer statically isolates servers and processors, but rather interlinks them in a *dynamic network* of servers and processors. In this environment, the *use* of knowledge and data is more productive than *holding* knowledge and data. Flows of knowledge encourage innovation, reduction of redundancy, and lower costs.

Driving the flows of knowledge has been open data and open source software, both of which provide publicly accessible and reusable information or processing. Open data facilitates reuse or novel application of the data. Open source software avoids lock-in to custom frameworks, makes data portable, enables system upgrades, provides transparent security, and lowers cost by sharing development. To take advantage of these virtues and knowledge flow, government departments, the judicial system, companies, and individuals increasingly make use of and contribute to such open tools and data.

Open government builds on open data, open source software, and standards⁷, aiming to modernise public administration by supporting:

- efficiency, transparency, accountability, accessibility, inclusivity, portability, data transformation, and simplification of core governmental processes and services;
- to improve the quality of legal information and processing by testing legal systems for consistency (Does the system give rise to contradictions?) and correctness (Does the system achieve the required goals?);
- to reduce the costs of public administration;
- to encourage public support for and engagement with democratic institutions by participation, transparency, and personalisation of services, yielding *natural compliance*, wherein citizens abide by the laws, as the laws make sense with respect to their intended good behaviour.

Public administrations are holders of substantial stocks of knowledge, which are translated into flows of knowledge, where users access and interact with legal information and processes. There are various instances of this: government open standards⁸; the National Archives' publication of legislation as an online, open-source resource enriched with machine-readable code⁹; HM Courts and Tribunal System's development and provision of online access to justice tools for online divorce, probate, civil money claims,

⁶ John Hagel III, John Seely Brown, and Lang Davison. 2009. The Big Shift. Harvard Business Review. <https://hbr.org/2009/07/the-big-shift-measuring-the-forces-of-change>

⁷ Also known as eGovernment, Transformational Government, Open Government, and eParticipation. See for example, <http://dgsoc.org/egov-2019/>

⁸ <https://www.gov.uk/government/collections/open-government>
<https://www.gov.uk/government/collections/open-standards-for-government-data-and-technology>
<https://www.gov.uk/government/groups/open-standards-board>

⁹ <http://www.legislation.gov.uk/> uses the markup language LegalDocML, which is an OASIS standard. https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=legaldocml
<http://www.legislation.gov.uk/projects/drafting-tool>

social security appeals and online plea services¹⁰; HM Revenue and Customs online calculators¹¹; Government online benefits calculators¹²; and case law¹³ and contracts¹⁴ online. To the extent that legal service providers make use of or are used by government information and services, they must abide by and adapt to the knowledge structures and practices of public administrations.

We have proposed that the regulators promote standards for and openness of legal information and processes, where the rationale is that increasingly, diverse participants are digitally communicating and automatically processing legal information and processes. We discussed several trends which justify the rationale, including standardisation, liberalisation and globalisation of the legal services market, knowledge flow, open data and open software, and open government.¹⁵

Bearing on LegalTech education, standards for and openness of legal information and processes are the grounds necessary for research-led teaching and learning, by which knowledge and skills are kept at the forefront of practice and future developments. Without standards for and openness of legal information and processes, LegalTech education risks: being ad hoc and unsystematic, leading to incompatible skills, knowledge, and applications; employers unable to rely on the skills and knowledge of staff; lower overall productivity by failing to keep up with current trends or future integration. With these points in mind, all students will need to understand the rationale, trends, and underlying concepts and drivers for standards for and openness of legal information and processes. For technically inclined students, they will need to demonstrate competence, to a greater or lesser degree depending on their professional role, in:

- understanding, working with, or developing open legal information and processes;
- understanding, working with, or developing open standards for legal information and processes.

In promoting standards and open legal information and processes, the regulators could take one or more of the following actions:

- encourage lawyers, law firms, government departments, and the judiciary to contribute to the development of standards for legal information and processes;
- cooperate and collaborate with open standards making organisations;
- provide forums for the development of standards for legal information and processes;

¹⁰ <https://www.gov.uk/guidance/the-hmcts-reform-programme>
<https://mojdigital.blog.gov.uk/2019/11/01/moj-digital-and-technology-strategy/>
<https://mojdigital.blog.gov.uk/digital-capability-embedding-digital-styles-of-working-in-moj/>
<https://mojdigital.blog.gov.uk/open-internet-tools-guidance/>

¹¹ <https://www.gov.uk/log-in-register-hmrc-online-services>

¹² <https://www.gov.uk/benefits-calculators>

¹³ <https://www.bailii.org/>

<http://www.worldlii.org/>

¹⁴ Open Oil https://repository.openoil.net/wiki/Main_Page and Open Legal Contracts <https://www.docracy.com/>

¹⁵ For a recent argument on open data and standards, see *A Data Commons for Law*:
<https://medium.com/legal-design-and-innovation/a-data-commons-for-law-60e4c4ad9340>

- create repositories to gather, maintain, and provide access to standards for legal information and processes;
- establish working committees to develop standards for legal information and processes;
- serve as bodies to approve of open standards for legal information and processes;
- regulate the application of standards for legal information and processes;
- encourage lawyers, law firms, government departments, and the judiciary to make available appropriately scaled open data of legal information and documentation on processes;
- facilitate the creation of open data of legal information and documentation on processes;
- create repositories to gather, maintain, and provide access to open data of legal information and documentation on processes.

In the next section, we turn to the integration of professional legal services with government legal services and the judicial system.

2.2. Integration of professional legal services with government legal services and the judicial system

Rationale: professional legal services interface with government legal services and the judicial system, which are promoting standards for and openness of legal information and processes.

The supporting justification is implied by standards for and openness of legal information and processes.

We have above discussed the trends towards standardisation, liberalisation and globalisation of the legal services market, knowledge flow, open data/software, and open government. Where professional legal services interface with or access information and processes from government legal services or the judicial system, the implication is that the former will increasingly integrate with the latter.

In the following, we discuss the context of the proposition. Standards for and openness of legal information and processes are already operational in government legal services and the judicial system, increasingly with the support of technology. Professional legal services, government services, and the judicial system are to a great extent operating towards the same goal – large scale coordinated social behaviour based on legally constrained individual and organisational behaviour. While each component (professional legal services, government legal services, and the judicial system) serves a different role towards this goal, they collaborate with respect to interrelated legal information and processes: that is, the government makes, publishes, and activates the law; the judicial system adjudicates disputes and violations in regard of the law; and legal services provide advice, guidance, and support for parties about the law. For example, an individual might bring a complaint, via legal services, to court about an individual's citizenship classification with respect to the British Nationality Act (1981). The various components are, essentially, working with the same legal information and related processes – what are the facts, the law, and the steps towards resolution of the

matter. Without existing standards for and openness of legal information and processes, the legal system could not function; that is to say, such integration already exists, and increasingly based on technology.

Where legal information and processes are being digitally communicated and automatically processed, professional, government, and judicial legal systems will also be sharing in and making use of the standardised, open, digital legal information and systems. For example, not only would the British Nationality Act (1981) be represented in a standard machine-readable form, but so too would the relevant regulations, processes, and case law; each of the components would be making use of all this information in the application of the law in a particular instance.

We have proposed that the regulators promote integration of professional legal services with government legal services and the judicial system. The rationale is that where professional legal services interface with the government's legal services and the judicial system, the former must adapt to the latter's standards for and openness of legal information and processes.

Bearing on LegalTech education, all students will need to understand how and in what ways governments and the judicial system make use of standards for and openness of legal information and processes as well as the relationship to and impact on professional legal services. For technically inclined students, they will need to demonstrate competence, to a greater or lesser degree depending on their professional role, in:

- understanding, working with, or developing standards for and openness of legal information and processes that are operative in the government's legal services or judicial system;
- understanding, working with, or developing integrations between professional legal services and the standards and data of the government's legal services as well as the judicial system.

In integrating professional legal services with government legal services and the judiciary, the regulators could take one or more of the following actions:

- encourage lawyers and law firms to contribute to the government's and judiciary's development of standards for legal information and processes;
- support development of standards for and openness of legal information and processes by the government legal services and judicial system;
- provide forums for the technical integration between professional legal services with the government's legal services and the judicial system;
- establish working committees to develop integrations;

In the next section, we turn to responsible AI.

2.3. Responsible Artificial Intelligence

Rationale: a legal system that makes use of Computer Science or Artificial Intelligence (AI) must be perceived as responsible.

The supporting justification is that as the public and organisations need trust and confidence in the functioning of the legal system, so too does a legal system supported or represented by technologies in Computer Science or AI. A key way to engender such trust and confidence is adherence to standards for and openness of legal information and processes.

In the following, we discuss the context of the proposition. Developments in Computer Science, particularly in AI, have heightened concerns about automation of “intellectual” operations of reasoning, information analysis, and classification along with the execution of actions that are triggered by the outputs of these operations. For example, there are ongoing developments in autonomous vehicles and medical diagnosis, which might operate without human intervention or consideration of human values; that is, there are concerns that an AI’s intellectual and action capabilities will rapidly operate beyond the capacity of people to control or understand them, leading to potential subordination or deviation from human norms.

Such concerns have led to discussions of “ethical” or “responsible” AI, wherein the means would be found to harness AI within the scope of human control and understanding. The underlying driver is the concern that individuals and societies will not use AI systems, so not gaining the potential advantages, unless they can trust them and believe they promote fundamental personal, human, and social values.

These concerns are heightened in a legal system supported or represented by technologies in Computer Science/AI. For instance, algorithms based on large data are being used to determine risk assessment in making arrests, contributing to judicial opinions, and deciding parole. However, such systems may use biased data and opaque algorithms, which may undermine public confidence in the judicial system.¹⁶

It is, of course, essential that LegalTech engender trust and confidence in the legal system, so responsible AI needs to be intrinsic to data and services.

While a large and growing discussion, for our purposes, here we briefly mention the seven principles of the Responsible AI Policy Framework (RAIPF)¹⁷. The RAIPF can be used to organise discussions about the ethical and moral implications as well as requirements on technology.

1. Ethical purpose and societal benefit: AI systems should be developed and used in a way to respect human agency and respect human rights. The broad social implications of an AI system should be considered, and the direct consequences of the system should be monitored.
2. Accountability: Some person(s) in an organisation should be accountable for the compliance of the AI system. Governments and organisations should develop policies such that the AI system adheres to the RAIPF.

¹⁶ <https://www.lawsociety.org.uk/support-services/research-trends/algorithm-use-in-the-criminal-justice-system-report/>

¹⁷ Based on Collective Authors, 2019, Responsible AI: A Global Policy Framework, published by the International Technology Law Association. <https://www.itechlaw.org/ResponsibleAI>

3. Transparency and explainability: The AI system's purpose, reasoning or analysis, and data ought to be transparent and expressible in humanly understandable terms.
4. Fairness and non-discrimination: AI systems should be as fair and non-discriminatory as human counterparts. It should be clear what the system can do, its limits, and the sources of the system's design. Datasets on which models are created ought to be unbiased.
5. Safety and reliability: The ethical or moral principles that guide an AI system should be stated and incorporated into the system's operation. The safety and reliability of the system ought to be thoroughly tested.
6. Openness and fair competition: Data should be open access; frameworks and software should be open source, particularly for academic research and development. To foster fairness, AI systems should be designed to comply with competition and anti-trust laws.
7. Privacy: AI systems ought to comply with the norms and regulations for privacy, while the law ought to enable organisations to collect and process personal data.
8. AI and intellectual property: Existing intellectual property rights ought to be respected by AI systems.

Several of these principles, e.g., (3)-(7), are topics of intensive, current academic concern in Computer Science, where the leading idea is how to incorporate the principles into the design of AI algorithms and implementations¹⁸. Just how this is accomplished in practice is not yet settled. Moreover, responsible AI may be incorporated into LegalTech and Computer Science education, if only to introduce topics for discussion about software development, although this too is a recently emerging topic.

The proposed principles are intended to be adhered to by any organisation developing, deploying, or managing AI systems. Private/commercial, government, and academic organisations may be constrained along a continuum, with auxiliary principles applying to serve the particular circumstances. However, the rationale for applying the principles across the board is strong – to foster broad-based trust in the technology, data interchange, and modularisation. An organisation's credibility as a trader of data and decisions is tied to adherence to the principles. Technological development and its exploitation thrives off of the opportunities underwritten by the principles. These points have important implications for LegalTech education.

It should be emphasised that many of the principles for responsible AI reinforce the need for standards for and openness of legal information and processes, since without them, responsible AI cannot be achieved.

We have discussed ethical and moral issues related to AI technologies applied to legal services, highlighting one list of principles.

Bearing on LegalTech education, all students will need to understand how the ethical and moral principles apply to AI technologies to legal practice. For technically inclined students, they will need to demonstrate competence, to a greater or lesser degree depending on their professional role, in:

- understanding, working with, or applying ethical and moral principles in the development of AI technologies.

¹⁸ See, for example, The Second AAAI/ACM Annual Conference on AI, Ethics, and Society, <http://www.aies-conference.com/wp-content/uploads/2019/01/AIES-Program-2019.pdf>. Also see, Google's Responsible AI Practices, <https://ai.google/responsibilities/responsible-ai-practices/>

In promoting responsible AI in the provision of legal services, the regulators could take one or more of the following actions:

- promulgate principles of responsible AI amongst lawyers, law firms, government departments, and the judicial system;
- cooperate and collaborate with organisations developing responsible AI in legal services;
- provide forums for the discussion and development of responsible AI in legal services;
- establish working committees to promote responsible AI in legal services;
- serve as bodies to approve of responsible AI principles;
- regulate the application of responsible AI in legal services.

In the next section, we consider the alignment of LegalTech education with regulatory objectives.

2.4. Alignment of LegalTech education with the Legal Services Board's objectives

Rationale: LegalTech education ought to promote the Legal Services Board's objectives as much as current, general legal education does.

The supporting justification is that LegalTech education is, in kind, no different from legal education. The same purposes are, in principle, served by technological means as are served by non-technological means – lawyers serving the law to clients. Just as regulated lawyers are trained and obligated to abide by regulatory authority, so too must those either developing or working with technology. This justification is closely related to the requirement that LegalTech abide by principles of responsible AI, though here more closely aligned with the regulators' principles.

In the following, we discuss the context of the proposition. To elaborate on the proposition, consider the objectives of the Legal Services Board (LSB), which is mandated to regulate the legal services sector so it serves the public interest and consumers.¹⁹

The LSB has eight statutory Regulatory Objectives²⁰, which also apply to the ten approved regulators it oversees:²¹

- a. protecting and promoting the public interest;
- b. supporting the constitutional principle of the rule of law;

¹⁹ See the current business plan 2018/2019 and the draft business plan for 2019/2020

²⁰ https://www.legalservicesboard.org.uk/about_us/Regulatory_Objectives.pdf

²¹ The points we discuss here could as well be addressed, albeit with appropriate refinement and additions, to the approved regulators over which the Legal Services Board has oversight: Association of Chartered Certified Accountants, Association of Costs Lawyers, The Bar Council, Chartered Institute of Legal Executives, Chartered Institute of Patent Attorneys, Chartered Institute of Trade Mark Attorneys, Council for Licensed Conveyancers, Institute of Chartered Accountants in England and Wales, The Law Society, Master of the Faculties.

- c. improving access to justice;
- d. protecting and promoting the interests of consumers;
- e. promoting competition in the provision of legal services;
- f. encouraging an independent, strong, diverse and effective legal profession;
- g. increasing public understanding of the citizen's legal rights and duties;
- h. promoting and maintaining adherence to the professional principles.

In addition, amongst LSB's Strategic Objectives for 2018-21²² are:

- i. Increasing innovation, growth and the diversity of services and providers

Finally, relevant to LegalTech education, the LSB's Business Plan 2019-20²³ includes:

- j. Ongoing competence: The regulators have appropriate frameworks for continuing assurance of professional competence throughout the careers of the people they regulate;
- k. Public Legal Education: The LSB is perceived as being at the forefront of enhancing public legal education and promoting access to justice
- l. Technology: Access to legal services is increased through the promotion of responsible technological innovation that carries public trust

While we may consider how these objectives are promoted in current legal educational practice, for our purposes the issue is how they could be promoted in LegalTech education. To facilitate this, we comment on the groups of the objectives:

1. facilitate access to and understanding of justice (c, d, g, and k);
 - education ought to encourage development of accessible, expressive computational tools which facilitate access to justice, consumer interests, and the public understanding of the law.
2. engender trust amongst practitioners, government departments, the judiciary, and the public (a, b, g, and l);
 - in addition to (1), ensuring that computational tools explicitly link to the law so as to assure users they are following the rule of law.
3. engage and train practitioners (f, h, i, and j);
 - motivate ongoing and diverse training in LegalTech; monitor and assess adherence to professional principles in computational tools.
4. drive market development (e, f, and h).
 - promote competition and diversity in the LegalTech marketplace.

A matter that warrants further development is the extent to which the policy objectives would need to be further articulated such that it is easier to transparently verify whether or not they have been achieved; that is, with respect to a given instance, one would want to be able to recognise whether or not some lawyer, firm, or tool meets the objective. For LegalTech education and computational tools, this is best realised as metrics that can be used to address whether and to what degree some aspect of LegalTech education or

²² [https://www.legalservicesboard.org.uk/news_publications/publications/pdf/2018/LSB_Strategic_Plan_2018-21_\(final\).pdf](https://www.legalservicesboard.org.uk/news_publications/publications/pdf/2018/LSB_Strategic_Plan_2018-21_(final).pdf)

²³ https://www.legalservicesboard.org.uk/news_publications/publications/pdf/2019/Final_business_plan_2019-20.pdf

computational tool provides evidence of, e.g. improved access to justice. This would remain for future work.

We have discussed how the regulators could promote an alignment between LegalTech education and the Legal Services Board's objectives.

Bearing on LegalTech education, all students will need to understand how the Legal Services Board's objectives (or those of regulators over which it has oversight) bear on legal technology; that is, the extent to which a particular does or does not address the objective. For technically inclined students, they will need to demonstrate competence, to a greater or lesser degree depending on their professional role, in:

- considering and realising the objectives in the development of AI technologies, e.g. points (1)-(3) above.

In promoting alignment of LegalTech education with the Legal Services Board's objectives, the regulators could take one or more of the following actions:

- provide forums for the discussion about the way and extent to which a legal technology promotes the objectives;
- establish working committees to assess the way and extent to which a legal technology promotes the objectives;
- provide an indication (metric) that a legal technology adheres to the objectives.

In the next section, we consider hybrid courses and programs in Law and Computer Science

2.5. Hybrid courses and programs in Law and Computer Science

Rationale: for LegalTech education to adapt to the changes in the provision of legal services and developments of technologies applied to legal information and services, hybrid courses and programmes are needed.

The supporting justification is that LegalTech tools are developed from intrinsically inter- and multi-disciplinary knowledge and practice across Law and Computer Science. Such knowledge and practice are not specifically identifiable in either discipline separately. Moreover, hybrid courses and programs could lead towards novel interdisciplinary principles, techniques, and practices that would come to define LegalTech systems. For instance, common principles, generic techniques, and standard practices of Computer Science which are used for program development and design would become part of the LegalTech skill set, including requirements, design, implementation, evaluation, and revision; theoretical analysis that is then realised in system design; modularity, reuse, interconnectivity; and collaboration in teams with diverse skill sets. Programming itself is but one part of a rich skill set. By the same token, legal knowledge and practice is not familiar to Computer Scientists; it would serve as a topic of inquiry and development.

The context of the proposition is broadly the dramatic changes in how legal services are provided and developments in LegalTech, driving changes in legal training.

Bearing on LegalTech education, hybridisation can be developed in several ways, which we discuss briefly here and develop further below. First, law school students can take some appropriately scoped courses on computer science topics; for example, some aspects of

formal methods (e.g. logic) and algorithms might be useful for LegalTech education, but not to the depth and extent as taught to computer science students. Similarly, computer science students could be introduced to a limited range of legal concepts and processes. Second, there could be projects carried out by mixed teams of Computer Science, Law School, and (perhaps) Management students, who have an assignment to complete under supervision. The widespread Law School curriculum, e.g. covering topics such as Criminal Law, Property Law, and so on, could each have a lecture on how LegalTech currently applies to that particular area. Third, ongoing revisions to legal education such as the Solicitor's Regulatory Authority SQE assessment specification²⁴ can be construed as a roadmap for the computational analysis of the law; the specification breaks down legal roles, processes, and attributes in a manner characteristic of computational thinking, facilitating the development of computational tools to support legal practice. Teaching the specification in this way hybridises LegalTech education.

In promoting hybrid courses and programs in Law and Computer Science, the regulators could take one or more of the actions discussed in Section 4.

2.6. Summary

In this section, we have discussed the propositions, providing rationale, supporting justification, context, bearing on education, and a range of possible action points. In the next section, we turn to some challenges in the delivery of current LegalTech education. In a subsequent section, we turn to some additional proposals towards integrated LegalTech education.

3. Challenges in Delivery and Education

In this section, we explore some of the relationships and implications between the user groups, provisions in the marketplace, the currently available approaches to LegalTech education, and the propositions outlined above for regulators and LegalTech education.

3.1. User Groups

There are (at least) five user groups which face different challenges presented by the use of computing technologies to deliver legal services – consumers, lawyers/law firms, legal aid providers, the government, and the judicial system. We point out how user issues relate to LegalTech education and their relevance to regulators. The rationale for addressing each of these groups is primarily due to the ongoing open integration of data, systems, and services across the groups.

For consumers, there may be basic practical matters which cannot be taken for granted, such as access to the internet, computer, or smart phone or skill in navigating the internet, computer, or application. The consumer must be able to identify the relevant service to access as well as whether the service is from a reputable source. Assuming these, the issue is whether the consumer has the knowledge, skill, and resources to interact with the service in a comfortable and sensible manner; that is, whether the design of the services,

²⁴ Functioning Legal Knowledge for SQE2
<https://www.sra.org.uk/sra/policy/sqe/pilot/sqe2-pilot-assessment-specification/>

the *human-computer interface*, is sensible to the consumer, considering layout, information flow, auxiliary information, and complexity. A well-developed piece of software caters to a myriad of user needs, which takes time and resources to develop. Currently, it is unclear if some method exists for auditing computing technologies to serve the client's best interests.

Consumer issues relate to the regulatory objective to *facilitate access to and understanding of justice*. The implication for LegalTech education is that *human-computer interface* issues, including a substantive, empirically-based understanding of the consumers' point of view and experience, must be addressed.

The Law Society²⁵ identified barriers lawyers and law firms face in adopting LegalTech:

- Legacy systems – there are high value systems in place that would need to be accommodated, which lowers the incentive to invest.
- Technical barriers – the development of new tools is expensive in terms of time, money, fault management, and human resources.
- Billable hour model – this is still the standard framework for billing, rather than a value-added, piece-work model.
- Security concerns – firms want to assure clients that their communications and documents are handled securely.
- Regulatory lag – firms need clear and consistent regulatory guidance before new technical solutions are adopted.

The barriers that lawyers and law firms face relate to the regulatory objective to *engage and train practitioners* as well as to *drive market development*. However, several of the barriers are matters more highly related to business practices and processes rather than LegalTech *per se*, e.g. the billable hour model, regulatory lag, and willingness to invest in new technologies, which are not within the scope of LegalTech education. Where LegalTech education may play a role is in understanding or addressing technical barriers and security of systems. To some extent, the marketplace, discussed below, may address some of these concerns, where the regulators may have a role to play.

Legal aid providers, e.g. The Law Centres Network²⁶ and Citizens Advice Bureau²⁷, while similar to lawyers and firms in private practice, face a different range of issues. As legal aid is non-commercial and largely serving clients with limited means, they face overtaxed resources²⁸ for existing person-to-person interactions, let alone the resources to develop computing technologies to assist in delivery. The gap between the need for delivery support mechanisms and the current provision indicates that a key objective to *facilitate access to and understanding of justice* is not being addressed. LegalTech education leading to increased legal aid resources could significantly impact large-scale delivery of legal aid.

²⁵ Law Society's LawTech Adoption Report

<https://www.lawsociety.org.uk/support-services/research-trends/documents/law-society-lawtech-adoption-research-2019/>

²⁶ <https://www.lawcentres.org.uk/>

²⁷ <https://www.citizensadvice.org.uk/>

²⁸ <https://www.theguardian.com/law/2019/jul/15/legal-advice-centres-in-england-and-wales-halved-since-2013-14>

The Government and the Judicial system are consumers and providers of legal information and services as outlined earlier in Section 2.2. The Government is, in several respects, the most advanced of the users mentioned here, although largely constrained to defining the law and information on the law rather than directly providing legal services; that is, it is not integrated as it might be with other legal services or legal service providers such as the judicial system, legal practice, or legal aid. The judicial system is, at this point, largely concerned with internet and communication technologies rather than structured legal content and processes for legal professionals and clients. LegalTech education could contribute to understanding of legal content and processes for both Government and the judicial system. With respect to these users, the regulators would want to promote *trust amongst practitioners, government, and public* as well as *engagement with and training of practitioners*.

In this section, we have considered a range of users of LegalTech, the challenges they face in delivery, and the opportunities for regulators to promote their objectives with respect to the users and LegalTech education. In the next section, we look at the LegalTech marketplace and how it relates to the objectives and education.

3.2. LegalTech Marketplace

As pointed out at the start, the LegalTech marketplace is expanding and developing rapidly. Two useful openly accessible indicators of the current state of topics can be found in Codex Techindex²⁹ and Legal Geek Startup Map 2019³⁰. Large scale legal information service providers such as Thomson Reuters³¹ or LexisNexis³² provide similar services.

The CodeX Techindex currently indexes 1278 companies, grouping them into 9 top level topics. The Legal Geek Startup Map 2019 has fewer companies, but a richer taxonomy, containing 4 top level topics, 9 sub-topics, and 39 sub-sub-topics. We illustrate a selection:

- Managing the business
 - People and resources
 - Recruitment, Education, Training
 - Finance and Operations
 - Legal Practice Management
- Managing and performing work
 - Knowledge
 - Knowledge Search
 - Legal Analytics
 - Matters
 - Case/Records Management
 - Risk
 - Cybersecurity
 - Regulatory Compliance
 - Rights management
 - IP Rights Management

²⁹ CodeX Techindex, accessed 28.01.2020, <https://techindex.law.stanford.edu/>

³⁰ Legal Geek Startup Map, accessed 28.01.2020, <https://www.legalgeek.co/startup-map/>

³¹ Thomson Reuters, accessed 28.01.2020, <https://www.thomsonreuters.com/en.html>

³² LexisNexis, accessed 28.01.2020, <https://www.lexisnexis.co.uk/>

- Performing work
 - Documents and contracts
 - Contract/Documents Analysis
 - Drafting Support
 - Litigation
 - Litigation Analytics
 - Online Dispute Resolution
 - Transactions
 - Transaction Platforms

There is clearly a great diversity of computational tools available across a spectrum of tasks that a lawyer, firm, or other organisation might need to carry out. One broad distinction is between software: to facilitate business processes, e.g. billing and human resource management, which apply to any organisation; and to process specifically legal information and processes. We focus on the latter, which is more relevant to our purposes. As the marketplace generally points to commercial, proprietary applications, the data and software is usually restricted intellectual property. Moreover, the training that is required to use the software may either be an *app out of the box*, which requires no training but is useful for relatively limited, straightforward tasks, to applications that require extensive, advanced company provided training. We may understand that these tools support regulatory objectives *to engage and train practitioners and drive market development*.

There are, however, limitations of the marketplace that do not serve regulatory objectives. First, it is not feasible to critically assess and compare proprietary applications, since the functionalities of the tools are largely shielded behind a paywall and/or non-disclosure agreements. The consequence is that it is difficult for analysts and developers to understand the functionalities of the applications. Nor, by the same token, can the characteristics of responsible AI be checked. Second, the opacity of the applications does not encourage the evolution of applications. Both of these points hinder market development. Third, there are limits on who accesses the tools and what legal knowledge is provided, e.g. commercial applications may be too costly for legal aid and may not serve to inform the public about their rights. Fourth, the applications do not facilitate the communication of information or processes within their market sector or across market sectors. This is relevant as it locks a consumer into a provider and hinders communication between applications, as would be otherwise in a network of modules in larger legal processes. Broadly put, the current marketplace does not abide by standards, open source data, or open source software; an implication is that the available applications do not facilitate integration of professional legal services with government legal services and the judicial system. Finally, proprietary applications and the training for them are generally not appropriate for LegalTech education since the knowledge and skills one acquires from proprietary applications may not be transferrable to other applications or work environments.

In this section, we have considered the LegalTech marketplace, particularly with regard to regulatory objectives and relevance to LegalTech education. In the next section, we look at the current state of LegalTech education.

3.3. LegalTech Education

Turning to whether legal education is currently addressing the conceptual and methodological challenges in teaching and learning LegalTech, we consider how Law Schools and ongoing Professional Development are responding to changes in LegalTech.

Currently, the answer is that there is a fairly limited range of programmes and courses on offer in current degree programmes³³ and auxiliary programmes³⁴. We primarily consider programmes with more than one course, though there are notable courses on programming for lawyers or app development³⁵. Some of the programmes are offered online, while others are campus based. Generally, the intended audiences are the same, broadly, students of law, lawyers (attorneys, solicitors, barristers), judges, paralegals, law librarians, government staff, and others who work in the legal profession. Many programmes are ambiguous in what is construed as LegalTech, offering a mix of courses on Law applied to Computer Science along with Computer Science applied to Law. We focus just on the latter. Relatedly, some programmes emphasise responsible AI over computational techniques; we consider the latter.

By examining these materials, we can make a selection of LegalTech course topics³⁶:

- Distributed ledger/blockchain;
- Legal design;
- Automation;
- Operations analysis;
- Programming;
- Machine Learning;
- Visualisation;
- Legal analytics of big data;
- Legal modelling/legal ontologies;
- Natural language processing;
- Dispute resolution;
- Network analysis;
- Semantic Web/Knowledge Graph;
- Logics for Law;
- Argumentation in Law.

However, no academic programme teaches all (or even most) of the topics, some choosing to focus on a narrower range, often on a *hot topic* such as the Blockchain. Unlike

³³ Artificial Lawyer's list of LegalTech courses: <https://www.artificiallawyer.com/legal-tech-courses/>

³⁴ List of current summer schools (August 2019) in LegalTech:

LEX: Managing Legal Resources in the Semantic Web <http://summerschoollex.cirsfid.unibo.it/>

Summer School on Law and Logic <https://lawandlogic.org/>

Summer School on AI and Law <https://aiandlawsummerschool.org/>

LegalTech Academy <https://ciel-swanease.info/2019/04/16/announcing-the-legaltech-summer-school-swanease-university-august-5-9-2019/>

Bucerius Summer Programme in Legal Technology and Operations:

<https://www.daad.de/deutschland/studienangebote/international-programmes/en/detail/5583/>

Asser Winter Academy AI and International Law:

<https://www.asser.academy/register/WinterAcademyAI2020.aspx>

³⁵ For example, in the US Law Schools of Georgetown University and Harvard University, there are courses that cover legal examples with more or less standard approaches to Python programming. At the UK Manchester University Law School, there is application development using a visual development tool.

³⁶ For some other topics, see The Law Society's LawTech Adoption Report

<https://www.lawsociety.org.uk/support-services/research-trends/documents/law-society-lawtech-adoption-research-2019/>

a well-developed programme of study, there is little systematic or comprehensive structure to the syllabi, wherein course topics flow from one to the other to build up a rich, complex, and integrated skill set. Consequently, programmes have a rather disjointed and ad hoc character. Moreover, many of the topics are taught on short courses which, while giving a student a brief impression, are not sufficient training to apply in a working environment.

Thus, we can see that currently, there is an unstructured heterogeneity to current course offerings and, generally, only offered in a relatively shallow way. This makes it challenging for students to know what to work on as well as for Law schools or legal firms to know what to offer. The positive view is that it is a highly creative time.

To make more sense of the heterogeneity, consider educational objectives, and relate to our theme of open data and knowledge, we can abstract somewhat as in Figure 1, viewing LegalTech education along two parameters – the axes of “Tech applied to Law” and the “Technical Capability” required to work with or develop tools. Some indicative tasks are associated with spaces in the graph.

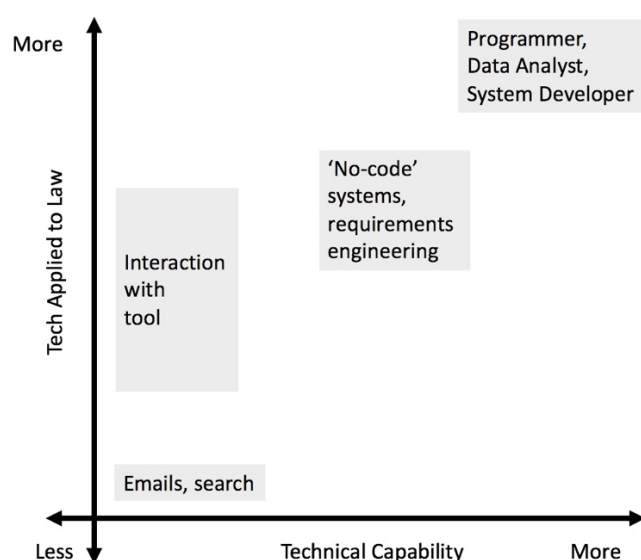


Figure 1 Dimensions of LegalTech Education

Traversing the diagonal (from less Technical Capability/less Tech Applied to Law to more Technical Capability/more Tech Applied to Law) correlates with the extent to which the learner acquires transferable, portable, flexible, and adaptive knowledge and skills. The traversal (lower left to upper right) correlates, as discussed below, with learning objectives such as expressed in Bloom’s taxonomy of educational objectives³⁷, where the lowest objective is memorisation of basic information and the highest objective is presentation of arguments about opinions, ideas, or systems. The diagonal is also related to the range from closed data and systems (lower left) to open data and systems

³⁷ Bloom’s taxonomy of educational objectives
https://en.wikipedia.org/wiki/Bloom%27s_taxonomy

(upper right), as the upper right corner relies on accessible and standardised information and tools.

What is unclear in the current context of LegalTech education is the position of courses and programmes in the dimensions, particularly with respect to the educational objectives and relationship to open data and systems. By the same token, it is not understood what learners or employers want with respect to the dimensions.

The propositions (1)-(5) of Section 2 direct teaching and learning into the upper left quadrant of Figure 1. This quadrant requires higher application of technology to law relative to the lower left quadrant (e.g., lawyers who use email), yet lower technical capability relative to the upper right quadrant (e.g., lawyers with competent programming skills). The upper left quadrant is, then, a middle ground for teaching and learning of LegalTech

In this section, we have briefly outlined some of the challenges to LegalTech teaching and learning. In the next section, we discuss how LegalTech education may adapt and evolve to address these challenges.

4. Future-proofing LegalTech Education

In addressing the question *What regulators can do to ensure that legal education addresses the challenges outlined above and provides lawyers with the knowledge and skills required to shape and use technology to deliver legal services effectively and ethically*, we have outlined several high-level generic propositions for the regulators to promote. These propositions are set against current challenges in delivery of legal services and provision of LegalTech education. Our proposals for future-proofing LegalTech education are set with respect to the propositions and challenges. We first offer requirements by which regulators can identify the technical knowledge and skills for a lawyer to serve law to consumers and business. We then look for guidance about technical education from Computer Science, the most closely allied field to LegalTech, basing our remarks on British Computing Society guidance.

4.1. Requirements for LegalTech Education

To address the general question, then to develop *requirements*, we first look at more specific questions:

- What technical knowledge and skills would a lawyer need to understand in order to serve law to consumers and business using some LegalTech tool?
- What education would provide the technical knowledge and skills?

The answer to both questions depends essentially on where the learner and employer place their work in the space of Figure 1. Depending on the task and consumer's needs, the knowledge, skills, and tools could be, e.g., in the lower left quadrant, while for other tasks and needs, in the upper right quadrant. In the lower left quadrant, there is less direction about education to give, since training may be provided by the vendor in a proprietary context. For the upper right quadrant, higher level, more generic skills would be needed, such as already on offer with degrees in a Law School or in a Department of Computer Science. LegalTech is not yet ready to fix a syllabus; it is unlikely that such a

fixed syllabus will be available anytime soon, given its intrinsic interdisciplinarity and current dynamic environment. Relatedly, current job positions in LegalTech are, like many positions in the science and technology sector, ever evolving; relying on fixed knowledge and skills hazards a high risk of rapid obsolescence.

Indeed, future proofing LegalTech education requires a constantly active, evolutionary, and informed approach based on an ongoing analysis of requirements. To determine the requirements for different positions and the education needed to attain them, the regulators must identify *requirements* with respect to the following four components:

- Current or future roles and job specifications in LegalTech, e.g. Legal Engineer, Client Relationship Specialist, Data Engineer, LegalTech Analyst;
- Requirements for serving the law with respect to users and providers;
- Concepts and technologies in Computer Science (rather than on the tool providers);
- Educational objectives associated with the range of knowledge and skills.

The four components must be coordinated into identifiable positions and educational pathways to those positions. Moreover, the components ought to be consistent with the five propositions outlined in Section 2.

For some of the components, we have available resources as indicated:

- Roles and job specifications, e.g. job announcements and published resources³⁸;
- Computer Science concepts in general³⁹ and in AI⁴⁰ in particular;
- Educational objectives⁴¹.

In terms of identifying the requirements for serving the law to users and providers, this would seem to be a study that remains to be done at the requisite scale and complexity. It would appear that current LegalTech tools and solutions are specific and heterogeneous; we do not yet have a perspective on, e.g. the suite of tools for LegalAid or the integration of legal information for professional legal services, government legal services, and the judicial system.

The rather open-ended preceding discussion may seem both frustrating and unclear, where one would want something more like a fixed syllabus leading to identifiable jobs. However, we can take some reassurance by considering teaching and learning in the closely allied field of Computer Science, which has thrived in the face of dynamic change, complexity, and a diversity of applications (other fields in Science, Medicine, or the Social Sciences might offer similarly useful comparisons).

4.2. Computer Science Training

To understand what may be required in LegalTech training, it is instructive to consider in some detail how technical training is done in the allied field of Computer Science, which

³⁸ e.g., Susskind (2017) *Tomorrow's Lawyers*, Oxford.

³⁹ <https://www.bcs.org/>

⁴⁰ https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf

⁴¹ For example, Bloom's taxonomy of educational objectives
https://en.wikipedia.org/wiki/Bloom%27s_taxonomy

covers a highly diverse range of qualifications, levels, and applications. This is done in some detail so that regulators can gain a substantive sense of what application development truly requires and provides. Some guidelines might be adaptable to LegalTech. As LegalTech is developed by multi-disciplinary teams involving Computer Scientists, Lawyers, and end-users, the points here may be used to set a common framework of understanding and collaboration.

We take guidance from the British Computing Society (BCS)⁴², the chartered institute for Information Technology, which sets standards for the education of IT professionals and computer scientists, accrediting University degrees and certifications of IT professional status. Our discussion is in three parts - qualifications, principles, and general observations. The BCS advocates a principled, systematic, and responsible approach to software development, which is distinct from informal programming, i.e. *hacking*.

While there are a range of courses of study for degrees or professional certifications, not all aspects of a course might be useful or essential to a specialist in LegalTech. As suggested above, some selection is required. Nor, by the same token, is it essential for a legal professional to acquire the same level of knowledge and expertise as the Computer Scientist. For our purposes, the goal is for legal professionals who aim to work in LegalTech to acquire a level of knowledge and experience so as to enable collaboration in teams of mixed expertise. That is, a lawyer ought to have sufficient knowledge of relevant aspects of Computer Science in order to participate in data and system specification, design, and evaluation as well as to be able to critically evaluate data and systems. A legal professional who lacks such knowledge may serve as a 'domain expert' – one who is consulted about a domain – rather than as someone who engages in LegalTech research and development. The purpose here is to indicate the direction of travel towards such knowledge and experience.

In Appendix A, we outline some key information from the BCS about principles, qualifications, topic areas, and related skills. This information is relevant to the extent that one wants LegalTech professionals to be aware of and trained in elements of Computer Science. We draw together and comment on some of the key points of Appendix A.

First, the importance of theoretical understanding is strongly emphasized; that is, while practical skills, e.g., a particular programming language or project development, are important, they must be founded on fundamental knowledge of maths, logic, and the theory of computation. The underlying rationale is, perhaps, more important than the assertion. Theory is important as it engenders novelty, guards against error, enables insightful critique, and facilitates the acquisition of new tools and techniques. At no point in the BCS statements of principles do we see endorsement of a specific tool or approach. In a constantly evolving environment, one can reduce the risk of obsolescence by applying fundamental knowledge and skills which abstract away from specific instances. Relatedly, it is counter to the educational enterprise to train students to be *locked-in* to one tool or system. In Computer Science, students are exposed to open-source programming languages and support tools, giving students the options of which to work with. Students are given the means to learn how to learn, rather than only the means to carry out a specific task.

⁴² <https://www.bcs.org/>

Second, domain analysis is a recurrent theme. While Computer Science has theoretical branches which make no reference to any other field of study, e.g. computational complexity, computer scientists often apply their knowledge and skills to another domain, e.g., health, telecommunications, or engineering. In such applications, it is essential to have the capacity to *engineer* requirements that are derived from domain experts. Users are central to the practice.

Two additional points are worth highlighting. Systems must address security and ethical issues as relevant for the domain and the users. And finally, thorough testing (verification and validation) is essential in the delivery of a solution.

Before closing this subsection, we discuss briefly one way to see the role of the domain expert in software development. Other ways may recommend more sophisticated roles for the domain expert in system development. Let us suppose there is a software engineer, who is responsible for developing a technical solution, and a domain expert, who has expert knowledge and experience of a domain, e.g., the law. The engineer and the domain expert are collaborating to develop a software solution. In developing software, there are several development methodologies, each with its own cycles and roles. The issue is what is the domain expert's role in development?

We illustrate this briefly with reference to the waterfall model. This consists of a sequence of five development steps, which we list along with some main actions and questions to raise:

- *Requirements*, where the software engineer gathers information from the domain expert about what the system is intended to do given input by users, what the output should be, and how users are to understand and use the output.
 - What are the concepts, problems, or issues? How is something practiced? What is the data? What are the goals? What is the reasoning? What is the output?
- *Design*, where an "architectural" plan or model is made of the system, often given as a diagram of users, data, and processes.
 - What are the elements, relations, and properties? What are the actions? Who provides what data? Who executes what actions? What are the outcomes? What is the algorithm or logic?
- *Implementation*, which is code writing.
- *Validation and verification*, where the software system is evaluated and tested to determine if it is doing what it is intended to do.
 - Is the software appropriate for the user's needs? Does the system conform to the given specifications?
- *Revision*, where issues arising in validation and verification are used to revise the requirements and design, followed by reimplementing and further validation/verification.
 - How should the program be changed – what should be added, removed, or modified?
- *Maintenance*, where the program is kept up-to-date and functioning over time.

Implementation is only one part of the overall development cycle. In this development cycle, the domain expert may participate in several steps and to greater or lesser

degrees. In the requirements step, the domain expert's role is essential, since the software engineer is drawing out and making explicit the tacit knowledge and practice of the domain expert. In the design step, the role of the domain expert is rather significant, in that, the software engineer aims to develop a design that accurately represents the data, uses, and goals of the domain expert. In this step, the domain expert needs to understand the language of design; the analogy may be made between an architect and a client, where the client needs to understand key aspects of the architectural design in signing off on the plans. At the implementation stage, the software engineer may work autonomously, unless the domain expert has acquired software development capabilities which enable participation in programming. Supposing the implementation is done, we turn to the validation and verification stage, where the software engineer again collaborates closely with the domain expert to check that the interactions, input data, and output data comport with the domain expert's expectations. At this stage, faults or missing results may be identified, which lead to revisions of the design, implementation, and re-assessment (validation/verification). It might also be that auxiliary requirements are introduced. Once the system is stable, it is put into use, during which time a software engineer sees to its ongoing maintenance.

This software development narrative, which is one version of software development, highlights the various roles and interactions between software engineers and domain experts over the course of development of some implementation.

In this section, we have reviewed how Computer Science approaches learning given highly diverse topics in a very dynamic context. Some of the principles proposed by the BCS would seem to be transferable to LegalTech.

5. Conclusion

At the start of the paper, we stated that the paper's purpose is to address three issues for legal services regulators:

1. To understand the challenges presented by the use of computing technologies to deliver legal services to consumers;
2. To understand whether legal education is currently addressing these challenges and how it may need to change to do so;
3. Taking into account the legal services regulators' statutory objectives, including the protection of consumers and the public interest, and existing educational frameworks, to propose what regulators can do to ensure that legal education addresses these challenges and provides lawyers with the knowledge and skills required to shape and use technology to deliver legal services effectively and ethically.

The third point, we addressed in Section 2 by developing a series of propositions, which provide high-level guidance. These were justified with respect to a range of diverse contextual developments. The first two points, we addressed in Section 3 with a discussion of the challenges in legal services delivery and education. In Section 4, we addressed how LegalTech may be future-proofed. While not offering a formula to do so, we offered some requirements with pointers to further information; we also provided some comparison to the related field of Computer Science, where issues about teaching and learning in the face of technological change arise. Throughout, we have emphasised

resilience, flexibility, adaptivity, portability, lifelong learning, and a critical, analytic approach tools. Our propositions in support for open source data and open source software tools are aligned with these high-level capabilities since, without them, the learner would be *locked-in*.

In the following, we reiterate some main points raised in the paper, highlighting what regulators can do to ensure that legal education addresses the challenges outlined above, providing lawyers with the knowledge and skills required to shape and use technology to deliver legal services effectively and ethically. The legal services regulators should promote:

1. Standards for and openness of legal information and processes;
2. Integration of professional legal services with government legal services and the judicial system;
3. Responsible AI;
4. Alignment of LegalTech education with the Legal Services Board's regulatory objectives;
5. Hybrid courses and programs in Law and Computer Science.

Appendix A: BCS Qualifications, Topic Areas, and Related Skills

The BCS indicate a range of qualifications from the relatively elementary (e.g., Spreadsheets, Presentation Software, Animation, Video Editing, and Social Networking safety), through to Higher education levels, and professional certifications for IT professionals (e.g., Management, Development, Service Delivery and Quality).⁴³ For instance, the BCS Professional Graduate Diploma in IT includes the following modules, which we have selected as likely to be relevant to LegalTech⁴⁴:

- Software engineering
- Knowledge based systems
- Realising the user interface
- Web engineering

Professional certifications can be had in the following topics, again selecting those that are likely to be relevant to LegalTech⁴⁵:

- AI
- Business analysis
- GDPR and data protection
- Information security
- Project and programme management, and consultancy
- Solution development and architecture
- User experience

While the above are specific qualifications, a University degree takes over three years of full-time study with more course work on programming languages, the theoretical underpinnings of Computer Science (maths, logic, and formal language theory), and optional topics (data-mining, machine learning, vision, natural language processing, and others).

Let us then turn to the guidelines for accreditation of University undergraduate Computer Science honours degrees, which give us a sense of the ideology and the manner in which the course materials are provided.⁴⁶ Note that the guidelines below do not mention any particular programming language, technique, or implementation, nor data sources or structures, as it is understood that the particulars all change in ways that must be accommodated. This goes to the heart of our previous discussion of open data and open source software; Computer Scientists are rarely trained on proprietary data or systems, which would unduly restrict their further development. Thus, the goal of the guidance is to offer general principles that can be realised in adaptive manners as circumstances warrant.

⁴³ One can also find a detail list of Computer Science courses and detailed syllabi from the Association for Computing Machinery: https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf

⁴⁴ <https://www.bcs.org/get-qualified/international-higher-education-qualifications-heq/bcs-professional-graduate-diploma-in-it/>

⁴⁵ <https://www.bcs.org/get-qualified/certifications-for-professionals/>

⁴⁶ This section draws on the BCS Guidelines on course accreditation (BCS-GCA), Information for universities and colleges, May 2018, <https://www.bcs.org/media/1209/accreditation-guidelines.pdf>

There are some general statements:

“BCS believes that preparation for a role as an information systems professional requires a sound theoretical understanding and practical experience. It also believes that students must gain a full appreciation of the wider issues of ethical standards, legislative compliance and the social and economic implications of information systems practice.” BCS-GCA p.4

In the context of discussing the range of endeavours in which Computer Science is situated, it is said:

“To properly underpin all of these endeavours, it is important to have personnel who truly understand the principles associated with building and maintaining high quality systems – the key characteristic attributes being usable, reliable, secure, safe, dependable as well as being easy to test, maintain, manage, and so on. For those wishing to build systems that are truly useful, it is often vital to have an understanding of aspects of the domain of use. Acquiring that insight may involve a deep understanding of the application domain and this may involve considerable study; as applications become more sophisticated, this will be even more important.” BCS-GCA p.4

Broadly, a Computer Science honours programme is such that:

“The programme should provide breadth and depth in the area of computing and should be influenced by relevant research and industry trends, with adequate theoretical underpinning.” BCS-GCA p.7

More detailed requirements are classed in terms of cognitive, practical, and transferable skills along with report requirements, from which we make a selection⁴⁷. The point here is that these may be relevant to a greater or lesser extent depending on the level of intended attainment as in Figure 1.

Cognitive abilities

- Knowledge and understanding of essential facts, concepts, principles and theories relating to computing and computer applications as appropriate to the programme of study
- The use of such knowledge and understanding in the modelling and design of computer-based systems for the purposes of comprehension, communication, prediction and the understanding of trade-offs
- The ability to recognise and analyse criteria and specifications appropriate to specific problems, and plan strategies for their solution
- The ability to analyse the extent to which a computer-based system meets the criteria defined for its current use and future development
- The ability to deploy appropriate theory, practices and tools for the specification, design, implementation and evaluation of computer-based systems

⁴⁷ These are clearly related to Bloom’s taxonomy.

- The ability to recognise the legal, social, ethical and professional issues involved in the exploitation of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices
- Knowledge and understanding of information security issues in relation to the design, development and use of information systems
- Knowledge and understanding of methods, techniques and tools for information modelling, management and security
- Knowledge and understanding of mathematical and/or statistical principles appropriate to the nature of the programme

Practical abilities

- The ability to specify, design or construct computer-based systems
- The ability to evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem
- The ability to recognise any risks or safety aspects that may be involved in the operation of computing and information systems within a given context
- Use appropriate theoretical and practical processes to specify, design, deploy, verify and maintain information systems, including working with technical uncertainty
- Define a problem, research its background, understand the social context, identify constraints, understand customer and user needs, identify and manage cost drivers, ensure fitness for purpose and manage the design process and evaluate outcomes
- Apply the principles, methods and tools of systems design to develop information systems that meet business needs

Transferable skills

- An ability to work as a member of a development team including recognising the different roles within a team and the different ways of organising teams
- The development of transferable skills that will be of value in a wide range of situations. These include problem solving, working with others, effective information management and information retrieval skills, numeracy in both understanding and presenting cases involving a quantitative dimension, communication skills in electronic as well as written and oral form to a range of audiences and planning self-learning and improving performance as the foundation for on-going professional development

In addition to the requirements for the course of study, there are expectations on undergraduate individual projects. For instance, project reports have a particular structure, which should include (as previously, a selection) the following. What is worth keeping in mind is that every project in Computer Science ought to be accompanied by a report that explains the system in full:

Project Report Expectations

- elucidation of the problem and the objectives of the project
- an in-depth investigation of the context and literature, and where appropriate, other similar products
- where appropriate, a description of how verification and validation were applied at these stages
- where appropriate, a description of the use of tools to support the development process
- a critical appraisal of the project, indicating the rationale for any design/implementation decisions, lessons learnt during the course of the project, and evaluation (with hindsight) of the project outcome and the process of its production (including a review of the plan and any deviations from it)
- Finally, broadly speaking, the reports ought to demonstrate the cognitive, practical, and transferable skills outlined above, along with creativity, synthesis of ideas, and self-criticism.

A report might also include a user manual (how to interact with the system), a maintenance manual (how to install, run, and update the system), testing results, and the full code.

Appendix B: A Checklist of Questions for Regulators to Consider about LegalTech Education

All the points are stated generically, but are intended to address the development, promotion, or delivery of legal information and processes in order to facilitate and support research-led teaching and learning of LegalTech.

Standards for and openness of legal information and processes

Are the values and advantages of standardisation promoted? What standards are used for legal information and processes? How does liberalisation and globalisation impact the legal services market? Is the flow of knowledge facilitated or is in stock knowledge maintained? Is the information and data compatible with other information and data sources? Is the structure of the information and data explicit and machine readable? Which attributes of open government in public administration and the judicial system promoted and facilitated? Are lawyers and law firms encouraged to contribute to the development of standards for legal information and processes? Do lawyers and law firms cooperate and collaborate with open standards making organisations? Are there forums provided for the development of standards for legal information and processes? Have repositories been created to gather, maintain, and provide access to standards for legal information and processes? Have working committees been established to develop standards for legal information and processes? Are there bodies which serve to approve of open standards for legal information and processes? Have lawyers and law firms been encouraged to make available appropriately scaled open data of legal information and documentation on processes? Has the creation of open data of legal information and documentation on processes been facilitated? Are there repositories which gather, maintain, and provide access to open data of legal information and documentation on processes?

Integration of professional legal services with government legal services and the judicial system

How and to what extent are lawyers and law firms adhering to standards for and openness of legal information and processes as provided by government legal services and the judicial system? How and to what extent are lawyers and law firms integrating the operation of their legal information and processes with those of government legal services and the judicial system? Are lawyers and law firms encouraged to contribute to the government's and judiciary's development of standards for legal information and processes. Do lawyers and law firms support the government's legal services and judicial system's development of standards for and openness of legal information and processes. Are there forums for the technical integration between professional legal services with the government's legal services and the judicial system. Are there working committees to develop and integrate systems of lawyers and law firms with government and judicial legal systems?

Responsible AI

Do the systems for legal practice support and abide by the principles of responsible and ethical AI? Does the system have an ethical purpose and provide societal benefit? Does the system have the means to facilitate accountability? Is the system transparent and are its processes and results explainable? Is the system fair and non-discriminatory? Are limits and biases made

clear? Is the system safe and reliable? Does the system promote fair competition and comply with competition and anti-trust law? Do the systems comply with the norms and regulations for privacy? Does the system respect existing intellectual property rights? Do lawyers and law firms cooperate and collaborate with organisations developing responsible AI in legal services? Are there forums for the discussion and development of responsible AI in legal services? Are there working committees to promote responsible AI in legal services? Are there bodies that approve of or regulate the application of responsible AI principles in legal services?

Alignment of LegalTech education with the Legal Services Board's objectives

Is the public interest being protected and promoted? Is the constitutional principle of the rule of law being supported? Is access to justice being improved through the promotion of responsible technological innovation that carries public trust? Are the interests of consumers being protected and promoted? Does the provision of legal services protect and promote the public interest? Does the provision of legal services promote competition? Is an independent, strong, diverse, and effective legal profession being encouraged? Is the public understanding of the citizen's legal rights and duties being increased? Is adherence to the professional rights and duties being promoted and maintained? Is innovation, growth, and diversity of services and providers being increased? Are there appropriate frameworks for continuing assurance of professional competence throughout the careers of legal services providers? Are there forums for the discussion about the way and extent to which a legal technology promotes the regulator's objectives? Are there working committees to assess the way and extent to which a legal technology promotes the regulator's objectives? What indicative measures are there that a legal technology adheres to the regulator's objectives?

LegalTech Education

What are the current or future roles and job specifications in LegalTech? What are the requirements for serving the law with respect to users and providers? What are the requirements for LegalTech education broadly and narrowly with respect to subtopics? How are Law School students taught about current or potential LegalTech applications? What are the current, available LegalTech programmes and how do they serve the requirements for LegalTech? What are the audiences for LegalTech programmes? In which quadrant defined by "Tech Applied to Law" and "Technical Capability" is a LegalTech programme intended or provided? In a programme or course, to what extent are the knowledge and skills transferable, portable, flexible, and adaptive? What are the educational objectives of a programme or course with respect to Bloom's taxonomy? What hybrid courses of Law and Computer Science are there? What common principles, generic techniques, and standard practices of Computer Science are incorporated into teaching and learning in LegalTech? What topics in Computer Science are taught as part of LegalTech training? What topics in Computer Science could be taught as part of LegalTech training? What topics about the Law are taught as possible content areas for project development in Computer Science? How does LegalTech education enable legal professionals to collaborate in teams of mixed expertise? What BCS principles, qualifications, topic areas, and related skills are taught in a LegalTech programme? What is the role of knowledge of theoretical computer science in LegalTech training? How are security and ethical issues addressed? How is system development, covering requirements, design, implementation, verification, validation, revision, and maintenance incorporated into LegalTech training?