Visualisation of Law and Legal Process: An Opportunity Missed

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Abstract. Abstract to follow

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1. Introduction

Legal education and practice are verbal in nature, with written text the primary presentation method common to both[2]. Law students are rarely given the opportunity to develop skills to represent legal concepts using images or graphics, and in practice it is the expert witness more often than the lawyer who presents visual artefacts to the court[3]. The law is a complex ecosystem, rife with ambiguity and discord such that it can be difficult to know how it works, which legislation should be applied, and in some cases whether a defendant's action was even morally wrong[4]. Visual representation can aid those engaging with the law to organise, understand, improve collaboration and aid recall of complicated legal concepts has been understood for many years[5]. Legal visualisations can reduce confusion and miscomprehension for professional and lay-person alike[6], giving rise to a potential for preventing faulty decision-making and avoiding or mitigating errors and the significant costs associated with relitigating matters[7]. This work investigates the use of flowcharts and similar process-oriented diagrams to describe legislation or legal practice processes, seeking whether, how, and to what degree information visualisation techniques are being applied in contemporary legal literature and practice.

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[2] Koch, K. L. (2010). What Did I Just Do? Using Student-Created Concept Maps or Flowcharts to Add a Reflective Visual Component to Legal Research Assignments. *Perspectives*, *118*, 119; *and* Leiman, T. (2016). Where Are the Graphics-Communicating Legal Ideas Effectively Using Images and Symbols. *Legal Educ. Rev.*, *26*, 47-68.

[3] Leiman, *supra* note 2.

[4] Green, S. P. (2004). Moral ambiguity in white collar criminal law. *Notre Dame JL Ethics & Pub. Pol'y*, *18*, 501; *and* Kramer, L. (1996). Choice of Law in Complex Litigation. *NYUL Rev.*, *71*, 547; *and* Ruhl, J. B. (1997). Thinking of environmental law as a complex adaptive system: how to clean up the environment by making a mess of environmental law. *Hous. L. Rev.*, *34*, 933.

[5] Koch, *supra* note 2; *and* Pohjonen, S., & Noso, M. (2014). Contracts–a twist of pearls: A new metaphor to enable a novel perception. *Integrating Contract Theory, Law, and Organization Studies*, 46; and Passalacqua, A. (1997). Using visual techniques to teach legal analysis and synthesis. *Legal Writing: J. Legal Writing Inst.*, *3*, 203.

[6] Leiman, *supra* note 2.

[7] Fang, J. J. (2014). 12 confused men: using flowchart verdict sheets to mitigate inconsistent civil verdicts. *Duke Law Journal*, 287-331, 301.

2. The Case for Information Visualisation

Information visualisation is the study of transforming data, information and knowledge into visual representations that more easily convey meaning[8]. Increasingly, it is recognised that effective information visualisation holds the key to unlocking access to and understanding complexity in data. In 1998 law graduate Mathew J McCloskey advocated that lawyers could benefit from learning how to *see* the law, and in doing so proposed his own approach to *legal map-making* as a visualisation technique to comprehension of the legal landscape[9]. While McCloskey promoted visualisation not as a graphic arts project but as an approach to thinking about law, later authors such as Brunschwig have drawn only on examples more alike visual arts projects to support the claim that use of visualisation in the legal domain is growing[10]. By contrast, it has been demonstrated that information visualisation can be applied to good effect for understanding complexity in legislation[11], legal process and juridical deliberation[12]. However, the focus in legal literature has remained on *visual representation of law*, which is how the culture of law is portrayed in images[13] and film and television[14], rather than on *visualisation of law* to diagrammatically represent legislation and case-law and demonstrate how they can be applied in a step-wise fashion both during law school inculcation, and once qualified, in ongoing legal practice. While we are not the first to claim that the legal domain still lacks effective and ubiquitous methods for information visualisation two decades after McCloskey's call to arms[15], this research is the first to support that claim through a review of the literature across that period.

Finding appropriate tools with which to visualise and communicate information, whether to a professional or lay audience, is a challenging task[16]. In medicine, several studies have investigated the positive effect of visualisations on patients' and clinicians' understanding of medical risk[17]. However, outside of studies promoting their potential to improve legal research learning outcomes during jurist training[18], we were unable to identify any study that had evaluated the potential for visualisations to impact lawyers' and clients' understanding of either the law, or their potential for success in contemplated litigation of criminal or civil matters.

Finding the most appropriate way to visualise information and communicate their messages depends on the presenters' objective, the communication context, and the targeted audience[19]. Target audience likes and dislikes should be taken into consideration, but must not be treated as the gold standard[20]. For instance, some audiences seem to prefer visualisations that are simpler, but simple graphs are not always able to convey complex information which can lead to misunderstandings[21]. Research into the use of visualisation in the medical domain found that

[8] Moere, A., M. Tomitsch, C. Wimmer, B. Cristoph and T. Grechenig. (2012). Evaluating the effect of style in information visualization. *IEEE transactions on visualization and computer graphics*, 18(12), 2739-2748; and Ware, C. (2004). *Information Visualisation: Perception for Design*, 2nd Ed. San Francisco, USA: Morgan Kaufmann Publishers for Elsevier.

[9] McCloskey, M. J. (1998). Visualizing the law: Methods for mapping the legal landscape and drawing analogies. *Wash. L. Rev.*, *73*, 163.

[10] Brunschwig, C. R. (2014). On visual law: visual legal communication practices and their scholarly exploration. *Zeichen und Zauber des Rechts: Festschrift für Friedrich Lachmayer, Erich Schweihofer et al.(eds.), Bern: Editions Weblaw*, 899-933.

[11] Kidd, D. (2009). *Landlords' Consents: A Practical Guide*. Royal Institute of Chartered Surveyors, RICS Books: London; and McLachlan, S., Dube, K., Gallagher, T. & Simmonds, J. (2015). Supporting preliminary decisions on patient requests for access to Health Records: An integrated Ethical and Legal Framework. *Proceedings of the IEEE International Conference on Health Informatics (ICHI) 2015*.

[12] Fang, J. J. (2014). 12 confused men: using flowchart verdict sheets to mitigate inconsistent civil verdicts. *Duke Law Journal*, 287-331.

[13] Brunschwig, *supra* note 10

[14] Moran, L. J. (2012). Visual justice. *Int'l JL Context*, *8*, 431.

[15] Leiman, *supra* note 2

[16] Ancker, J. S., Senathrajah, Y., Kukafka, R., & Starren, J. B. (2006). Design Features of Graphs in Health Risk Communication: A Systematic Review. *Journal of the American Medical Informatics Association*, 13(6), 608–619; *and* Keating, A., & Andersen, C. B. (2016). A graphic contract: Taking visualisation in contracting a step further. *Journal of Strategic Contracting and Negotiation*, *2*(1-2), 10-18.

[17] Han, P. K. J., Klein, W. M. P., Killam, B., Lehman, T., Massett, H., & Freedman, A. N. (2012). Representing randomness in the communication of individualized cancer risk estimates: effects on cancer risk perceptions, worry, and subjective uncertainty about risk. Patient Education and Counseling, 86(1), 106–113; *and* Spiegelhalter, D., Pearson, M., & Short, I. (2011). Visualizing uncertainty about the future. Science (New York, N.Y.), 333(6048), 1393–400; *and* McCaffery, K. J., Dixon, a., Hayen, a., Jansen, J., Smith, S., & Simpson, J. M. (2012). The Influence of Graphic Display Format on the Interpretations of Quantitative Risk Information among Adults with Lower Education and Literacy: A Randomized Experimental Study. Medical Decision Making, 32(4), 532–544. https://doi.org/10.1177/0272989X11424926.

[18] Koch, *supra* note 2.

[19] Speigelhalter et al, *supra* note 14; *and* Visschers, V. H. M., Meertens, R. M., Passchier, W. W. F., & De Vries, N. N. K. (2009). Probability information in risk communication: A review of the research literature. Risk Analysis, 29(2), 267–287.

[20] Ancker et al, *supra* note 13

[21] Schapira, M. M., Nattinger, A. B., & McHorney, C. A. (2001). Frequency or probability? A qualitative study of risk communication formats used in health care. Medical Decision Making, 21(6), 459–467.

doctors performed worst with the visualisation format they liked best, and best with the one they strongly disliked[22].

Effective data visualisation can mitigate issues that arise when deep insight is required to analyse data and make time-sensitive decisions[23]. Visualisations mitigate the complex issues of comprehension, interpretability and navigation as the target audience traverses large amounts of information[24]. Professionals recognise the effectiveness of visualisation techniques; however it is possible that professional scepticism regarding potential benefits acts as a significant limiting factor to their use[25]. While it is difficult to know whether the specific benefits identified in the visualisation literature are generalisable to a legal context, the predominant benefits claimed include that the use of visualisation:

- allows the viewer to understand patterns and relationships not clearly visible within data[26];
- enhances communication of risks to a generic audience, especially a low-numeracy one[27];
- helps professionals to focus on, assimilate and recall issue-relevant aspects[28];
- improves problem solving performance and decision-making abilities[29].

In the medical domain, absence of or ineffective information visualisations has negative effects on clinical care, time efficiency and patient safety[30]. For law, the absence of research in this area means it is difficult to say what would constitute effective or ineffective visualisation, and therefore what effect the absence of ubiquitous information visualisation may be having.

3. Method

The collected literature databases available via the university library, including SCOPUS, DOAJ, AustLii, BAILii, HeinOnline and SSRN were searched using the term:

("law" or "legal") and
("process flow" or "process map" or "flowchart")

Content analysis[31] was used to identify and record instances of concepts under investigation in the literature. General concepts were initially identified deductively based on the objectives of the review. These concepts were refined inductively on first reading of the literature. All data was collected using a structured excel spreadsheet from which graphs and other statistical data were developed.

[22] Elting, L. S., Martin, C. G., Cantor, S. B., & Rubenstein, E. B. (1999). Influence of data display formats on physician investigators' decisions to stop clinical trials: Prospective trial with repeated measures. British Medical Journal, 318(7197), 1527–1531

[23] Sharma, V., Stranieri, A., Firmin, S., Mays, H., & Burstein, F. (2018, January). Approaches for the visualization of health information. In *Proceedings of the Australasian Computer Science Week Multiconference* (p. 23). ACM.

[24] Carpendale, M. S. T. (2003). Considering visual variables as a basis for information visualisation; *and* Hendley, R. J., Drew, N. S., Wood, A. M., & Beale, R. (1995, October). Case study. Narcissus: visualising information. In *Proceedings of Visualization* 1995 Conference (pp. 90-96). IEEE.

[25] Aouad, G., Ormerod, M., Sun, M., Sarshar, M., Barrett, P., & Alshawi, M. (2000). Visualisation of construction information: a process view. *International journal of Computer-integrated Design and Construction*, 2(4), 206-214.

[26] Ancker et al, *supra* note 13; *and* Sharma et al, *supra* note 20; *and* Aouad et al, *supra* note 22

[27] Garcia-Retamero, R., & Galesic, M. (2009). Communicating Treatment Risk Reduction to People With Low Numeracy Skills: A Cross-Cultural Comparison. American Journal of Public Health, 99(12), 2196–2202.

[28] Sharma et al, *supra* note 20

[29] Sharma et al, *supra* note 20; *and* Garcia-Retamero et al, *supra* note 24; *and* Zhang, P. (1996). The impact of information visualization on human problem-solving performance in a complex business domain. Proceedings of the Second Americas Conference on Information Systems (AIS'96), Phoenix, AZ.

[30] Pao, D., Stevens, J., Lockton, D., & Weinstein, N. (2018, July). Electronic Medical Records: Prototype visualisation maximises clinical usability. In *EVA*.

[31] Joffe, H., & Yardley, L. (2004). Content and thematic analysis. *Research methods for clinical and health psychology*, *56*, 68; *and* Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, *15*(3), 398-405.

4. Results

The literature search initially identified 574 articles for consideration. Literature not including some form of flow diagram, those not relevant to law or a legal process, and any articles where the included diagram was not in context to law or a legal process were all rejected. As shown in Figure 1, this resulted in a collection of 71 articles for inclusion in this review.

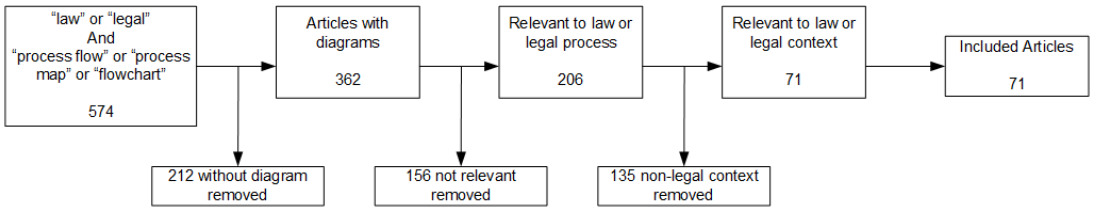


Figure 1. Literature search (PRISMA).

The concepts recorded from the literature are shown in the concept map in Figure 2. Just as it was possible for an article to contain one or more diagrams, it was also possible for an article to belong to one or more legal domains, for example: describing processes relevant to criminal law and procedure *and* criminal appeals[32]; dealing with issues for the remaining spouses and families of deceased military servicemen and women broaching both medicolegal and family law[33]; or forensic investigation and criminal law[34].

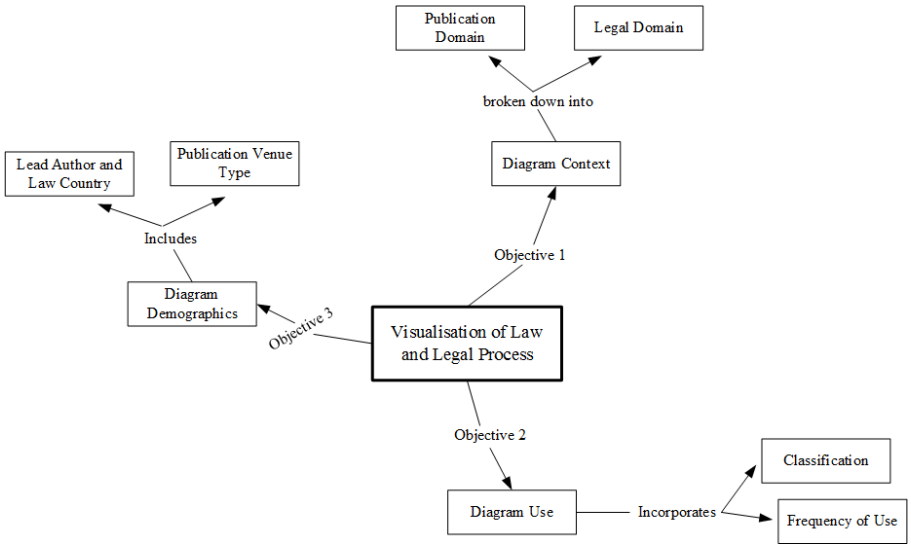


Figure 2. Concept Map for the Visualisation of Law and Legal Processes Literature Review

4.1. Classification of Diagrams

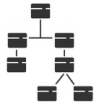
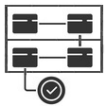
The diagrams in each paper were classifiable into eleven archetypes which are described by order of frequency in Table 1 and listed annually use in Figure 3.

[32] Thomson, R., Huntley, J., Belton, V., Li, F., & Friel, J. (2000). Decision Making at the Firm Level: The of a Criminal Legal Aid Case Management System. *International Review of Law, Computers & Technology*, *14*(2), 221-233.

[33] Camp, W. J. (2009). Health Care Options for Former Military Spouses: Tricare and the Continued Health Care Benefit Program (CHCBP). *Family Law Quarterly*, *43*(2), 227-300.

[34] Asia Development Bank (2009). *Process Map on the Criminal Prosecution of Tax Evasion in the Philippines*. Mandaluyong, Philippines. p 34.

Table 1: Information Visualisations in Legal Literature

Visualisation Type	No. Found	Visual Representation	Description
Concept Flow	49		Also known as *flowcharts* or *process maps*, this diagram visually describes the flow of work for a given activity, or the series of activities that result in a particular outcome. Examples included describing procedures for contesting matters in an Intellectual Property court[35], decision-making for international trade negotiations[36], the process for identifying express or implied restrictions in tenancies[37], and decision-making regarding state and federal tax aspects of perpetuity rules[38].
UML Workflow	15		Also known as an *activity diagram*. Provides a visual representation of the flow of work for a particular activity usually presented using the Universal Modelling Language (UML) notation framework. It describes activities and decisions, and in some cases the parties responsible for specific performance for each. Numerous examples were identified in the literature collection, including both simple[39] and complex[40] models that strictly adhered to the UML standard, along with many other analogous examples that loosely applied this standard[41].
Concept Map	12		This visualisation can take many forms and is capable of representing a broad range of relational information. Examples observed included tree-style maps to represent key aspects of individual litigated legal cases[42], the elements necessary to making a case[43], elements of financial contracts[44], and to prompt lawyers on enquiries that should be undertaken on behalf of the client to ensure due diligence in property matters[45].
Process Map with Swim Lanes	7		A variation of the *concept flow* diagram where activities are described in lanes representing the responsible actor or source for that step. Examples included decision-making flows for multi-organisational prosecutorial investigations[46], sequences of responsibilities for different parties identified from legislation governing service contracts[47], and one extensive example identifying parties and rules from different legislative documents for the decision-making process governing requests for and release of medical records[48].

[35] Tessensohn, J. A., & Yamamoto, S. (2007). To a hammer, everything looks like a nail. *Journal of Intellectual Property Law & Practice*, *2*(8), 519-523.

[36] Zimmermann, H. (2008). How the EU negotiates trade and democracy: The cases of China's accession to the WTO and the Doha round. *Eur. Foreign Aff. Rev.*, *13*, 255.

[37] Kidd, D., & Higgins, G. (2009). *Landlords' Consents: A practical guide*. RICS Books, Oxford. pp 5-7.

[38] Spica, J. P. (2013). A Newly Revised Post Perpetuities Reform RAP Applicability Flowchart for Property Subject to Michigan Law (Excerpts). *Michigan Prob & Est Plan J*, *33*, 4.

[39] McGee, R. W. (2008). Ethical aspects of using government to subvert competition: Antidumping laws as a case study of rent seeking activity. *Journal of Business Ethics*, *83*(4), 759-771.

[40] Yasong, L., & Connor, M. T. (2008). An overview of the judicial protection of patents in China. *Journal of Intellectual Property Law & Practice*, *3*(3), 163-163.

[41] Including: Darmstadter, H. (2010). Precision's Counterfeit: The Failures of Complex Documents, and Some Suggested Remedies. *The Business Lawyer*, 61-83; *and* McGrath, S. A. (2011). Differential Response in Child Protection Services: Perpetuating the Illusion of Voluntariness*. U. Mem. L. Rev., 42, 629*; *and* Sumalla, J. M. T., Lago, M. J. G., Padró-Solanet, A., & Hernández-Hidalgo, P. (2017). The judicial pursuit of the sexual victimization of children: How the criminal justice system processes cases. *International Review of Victimology*, *23*(2), 123-144.

[42] Connolly, M. (2009). Fact management and decision-making skills: adapting the Wigmorean chart for business law students. *The Law Teacher*, *43*(2), 114-152.

[43] Bronitt, S., & McSherry, B. (2010). Principles of criminal law, p207.

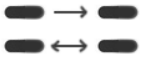
[44] Sebastianutti, P. (2009). What is this thing called international financial law?. *Law and Financial Markets Review*, *3*(1), 64-71.

[45] Abbey, R., & Richards, M. (2019). *Property Law 2019-2020*. Oxford University Press, USA, p71.

[46] Asia Development Bank (2009). *Process Map on the Criminal Prosecution of Tax Evasion in the Philippines*. Mandaluyong, Philippines. p 34.

[47] Passera, S. (2018). Flowcharts, swimlanes, and timelines: alternatives to prose in communicating legal–bureaucratic instructions to civil servants. *Journal of Business and Technical Communication*, *32*(2), 229-272. p 12.

[48] McLachlan, S., Dube, K., Gallagher, T., & Simmonds, J. A. (2015, October). Supporting preliminary decisions on patient requests for access to health records: An integrated ethical and legal framework. In *2015 International Conference on Healthcare Informatics* (pp. 199-207). IEEE. p 6.

Lifecycle Diagram	5		Also known as a *cycle diagram*, this representation is used to show how a series of chronological events interact continuously, whether as a simple repeatable process or to incrementally improving practice. Cycles were observed for legal research[49], legal design[50], and general contract law[51].
Mind Map	4		The mind map is hierarchical and usually centres around a single target concept to show the relationships both between different sub-concepts, and between sub-concepts and the target concept, as an approach to visually organise information. Examples observed in the literature were generally educational tools to improve student comprehension and approaches to legal research and assignment writing[52].
Timeline	2		The timeline presents a chronology of events or milestones that may be important to an undertaking or project. The timeline describes an overview of key points arranged along a line, usually from left to right, and doesn't generally stray into finer detail. Two examples were identified in the literature: a simple linear diagram describing the lifecycle duration of a contract[53], and a more comprehensive example describing the sequences for different events in the criminal justice system[54].
UML Data Model	2		This diagram is an object-oriented class model describing the overall structure of data or the complete relational structure of all tables and elements of a database. This diagram is usually presented using standard UML notation. Only two examples of this diagram type were identified in the literature collection[55].
Twist of Pearls	1		The authors of the single paper[56] with this type of diagram describe it as symbolising the lifecycle of contracts. They portray the twist of pearls diagram as a visualisation where the twist, or string, represents the temporal continuum, and the pearls identify definition and evaluation points along the path to formation and implementation of a contract. A brief search was conducted, however no other description or example of this type of diagram could be located.
Relational Model	1		Another novel type observed in only a single source[57]. The authors explain the diagram as one which is describing the relation between two contrasting items through time. Visually, this simplistic diagram presents as an arrow representing either the unidirectional or bidirectional relationship between two items being described.
Checklist	1		Generally used by airline pilots and surgeons as a way to reduce failure by compensating for the limits of human memory and attention, at its most basic the checklist is a 'to do list' of necessary action items. One example was identified to prompt lawyers as to actions necessary in furtherance of dismissal of a matter[58].

[49] Jones, Y. P. (2016). Expansive Legal Research. *Int'l J. Legal Info.*, *44*, 241, p 251.

[50] Berger-Walliser, G., Barton, T. D., & Haapio, H. (2017). From visualization to legal design: A collaborative and creative process. *Am. Bus. LJ*, *54*, 347-392, p 366.

[51] Hough, T., & Kuhnel-Fitchen, K. (2014). *Optimise Contract Law*. Taylor and Francis, London.

[52] Cantatore, F., & Stevens, I. (2016). Making connections: Incorporating visual learning in law subjects through mind mapping and flowcharts. *Canterbury L. Rev.*, *22*, 153; *and* Carr, C., & Johnson, M. (2013). *Beginning criminal law*. Routledge.

[53] Haapio, H., & Passera, S. (2012, July). Reducing contract complexity through visualization-a multi-level challenge. In *2012 16th International Conference on Information Visualisation* (pp. 370-375). IEEE.

[54] Mayeux, S. (2018). The idea of the criminal justice system. *Am. J. Crim. L.*, *45*, 55.

[55] Conrad, M., Funk, C., Raabe, O., & Waldhorst, O. (2007, September). A lawful framework for distributed electronic markets. In *Working Conference on Virtual Enterprises* (pp. 233-240). Springer, Boston, MA; *and* Thomson, R., Huntley, J., Belton, V., Li, F., & Friel, J. (2000). Decision Making at the Firm Level: The of a Criminal Legal Aid Case Management System. *International Review of Law, Computers & Technology*, *14*(2), 221-233.

[56] Pohjonen, S., & Noso, M. (2014). Contracts–a twist of pearls: A new metaphor to enable a novel perception. *Integrating Contract Theory, Law, and Organization Studies*, 46, p 56.

[57] Gallego, R., Novo, M., Fariña, F., & Arce, R. (2019). Child-to-parent violence and parent-to-child violence: A meta-analytic review. *European Journal of Psychology Applied to Legal Context*, *11*(2), 51-59.

[58] Nel, J. K. (2014). *The Dismissal: A Practical and Informative Toolkit to Ensure a Fair and Effective Dismissal*. Knowres Publishing.

4.2. Further Analysis

This research also sought whether usage patterns for these diagrams could be identified, and if those patterns had changed over time or across legal domains. The frequency of diagram use by year of publication was recorded and is shown in Figure 3. As the most frequently used, it is not surprising that concept flows were found every year where visualisations were identified. However, there were no discernible patterns in the distribution of visualisations during the two decades of literature included in this review.

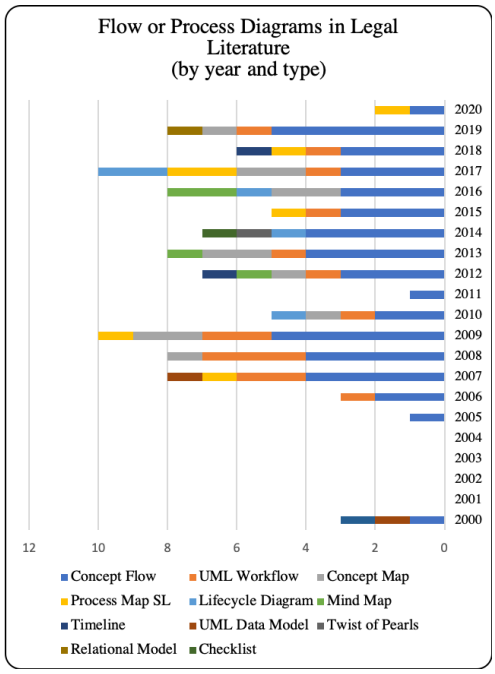


Figure 3. Flow or Process Diagrams in Legal Literature by Year and Type

The legal domain for both the *publication venue* and *subject matter context* were recorded. Six publication venue domains were identified with the majority of literature falling within the domains of *general law* or *legal education*, as shown in Figure 4. Information Sciences was the only publication domain not to use the *concept flow* diagram type, relying instead on more scientific visualisations common to that domain, including those based on the UML notation framework.

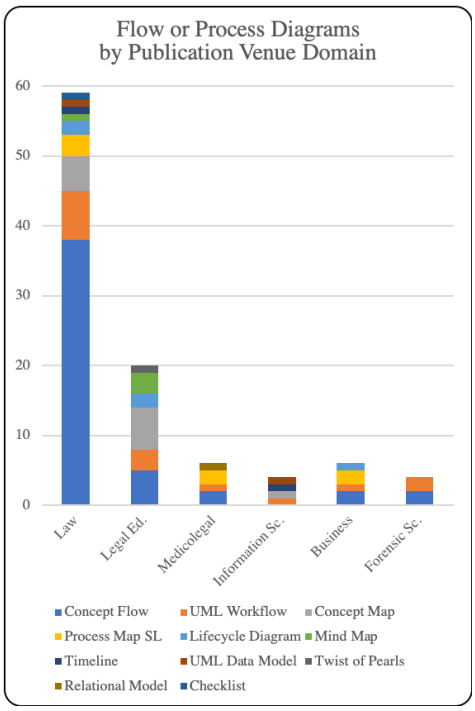


Figure 4. Flow or Process Diagrams by Publication Venue Domain

Twenty-six separate legal domains were identified from the subject context of the literature, as shown in Figure 5. The legal subject domain with the highest frequency of information visualisations was that of contract law. However, many of these could be characterised as focusing on smaller and often simpler sub-components of what are much larger processes or subject areas, such as identifying whether particular terms are consistent or cancel each other out in a contract[59], identifying of only the start (date of signing), notice period and end points of a contract on a timeline[60] shown in Figure 6, or the pathway process shown in Figure 7 for international money transfer of loan contract funds from a debtors bank to the creditor's bank[61].

[59] De La Torre, C., & Allen, G. (2006). The Battle of the Forms—There Is a Purpose. *Journal of Legal Studies Education*, *23*(2), 195-216, p 206.

[60] Haapio et al, *supra* note 47, p 373.

[61] Sebastianutti, P. (2009). What is this thing called international financial law?. *Law and Financial Markets Review*, *3*(1), 64-71, p 255.

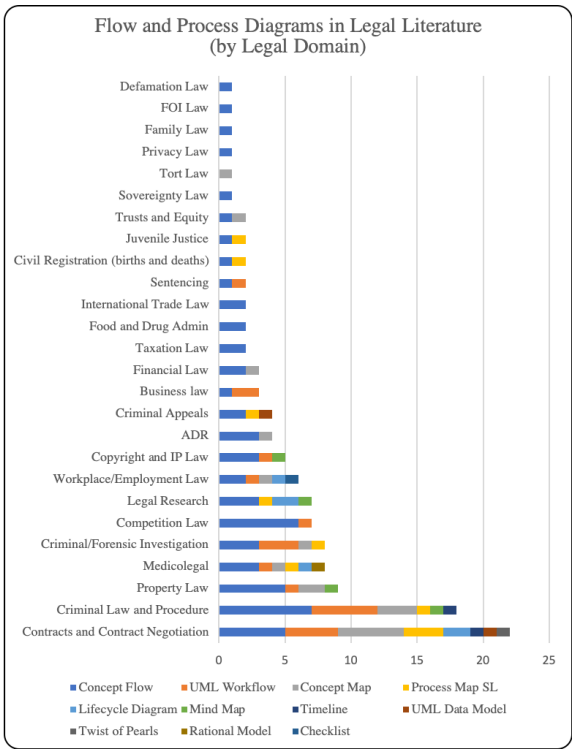


Figure 5. Flow or Process Diagrams by Legal Domain (subject context)

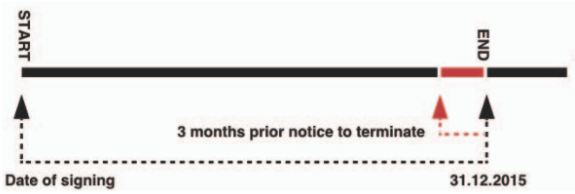


Figure 6. Contract Timeline from Haapio et al, 2012.

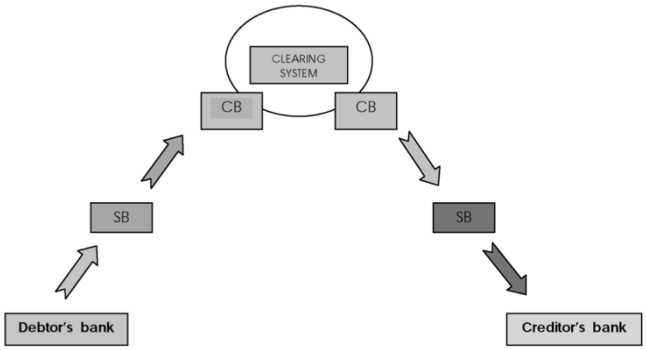


Figure 7. Loan Contract International Fund Transfer process from Sebastianutti et al, 2009.

Diagrams in the area of Criminal Law and Procedure were observed almost as often, but appeared more mature. A key focus in this area was visualisation of critical decision-making processes such as those reproduced here for sentencing[62] in Figure 8, and civil jury deliberations[63] in Figure 9.

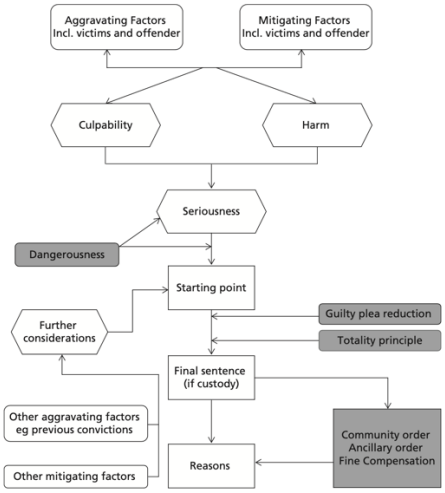


Figure 8. Criminal sentencing decision-making process from Dhami, 2013.

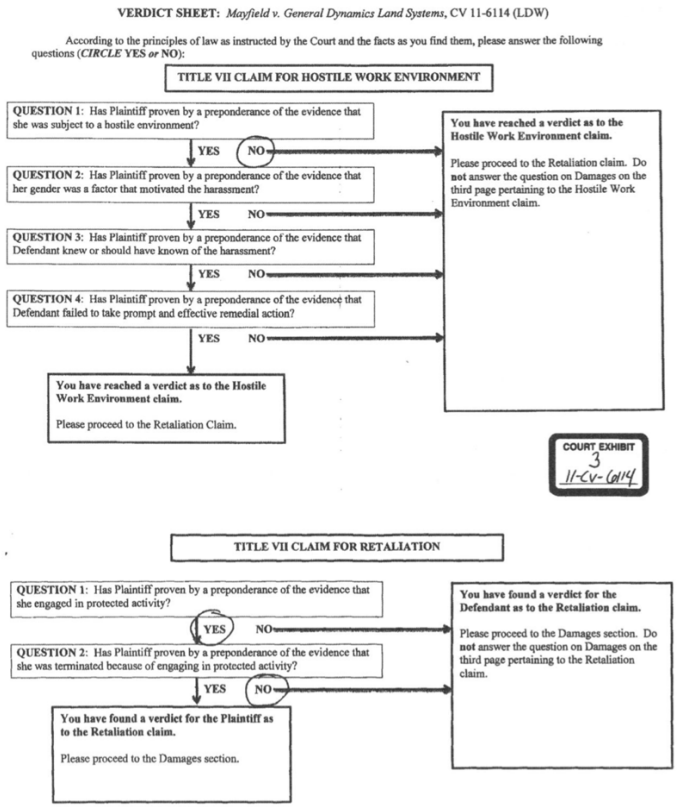


Figure 9. Civil jury deliberations decision-making process from Fang, 2014.

[62] Dhami, M. K. (2013). A 'decision science' perspective on the old and new sentencing guidelines in England and Wales. *Sentencing Guidelines: Exploring the English Model*, 165-181.

[63] Fang, J. J. (2014). 12 confused men: using flowchart verdict sheets to mitigate inconsistent civil verdicts. *Duke Law Journal*, 287-331.

4.3. Diagrammatic representations of legislation

Much legislation is imbued with latent pathways; where the application of one section leads to consequences in another, or is governed by rules or categories specified in yet more sections. Yet, in spite of this it was rare to find diagrams that visualised the reasoning or decision-making processes of legislation. Three examples, presented in order of complexity, were identified in our literature collection. The first was a small number of swim lane tables showing relevant sections of one law governing responsibilities of parties in a supplier/purchaser relationship[64]. The second provides a basic overview of the journey from registration of security to enforcement and seizure of financed property under Australia's Personal Property Securities Act[65]. The third was the much more comprehensive swim lane flowchart shown in Figure 10 of the various actors and New Zealand legislation that interact during consideration when a records-holder makes decisions on whether to release an individual's personal medical record[66].

5. Discussion

Our literature review supports previous but quantitatively unsubstantiated claims that the largest collection of studies in this area of legal scholarship seek visualisation in contracts, and that the most frequent approach for visually representing legal theory or process was the concept flow, or *flowchart*[67]. It is well established that diagrams outperform text alone in supporting attention, information reasoning, comprehension and problem solving[68]. However, our review shows that only a very small percentage of legal manuscripts present legal concepts in visual form. This discussion considers four key areas, and in each it challenges those who draft, practice, research and teach law to consider how they could improve upon current approaches to improve everyone's understanding of legal concepts and processes.

Lay Comprehension:

Considerable literature on lay-comprehension of law and legal concepts focuses specifically on clarity and comprehensibility of judicial instructions and how well juries understood and apply directions in arriving at decisions[69]. While an important area for academic consideration, once a case has been handed over to the jury it is too late to begin consideration of whether those not trained in law but present in court have understood what has occurred. Confusion around legal obligations and rights pervades all aspects of life. Improving the approach used to communicate law and legal concepts to lay people increases participant agency, and improves legal practice and outcomes[70]. It has been shown that the average person has little comprehension of the content of most legislation, and their perspective on police, crime, judges, prisons and trials does not often exceed what is found in popular culture[71]. Indeed, even some of the documents prepared to advise the general public of their rights contain such complicated *legalese* that they become more incomprehensible than the legislation they describe[72].

In our role as lawyers, *how can we more effectively explain to our clients the obligations, impacts and rights imposed by written documents and legislation?*

[64] Passera, *supra* note 47, p 12.
[65] Cantatore et al, *supra* note 52, p 165.
[66] McLachlan et al, *supra* note 11, p 204.
[67] Passera, *supra* note 47, pp 5-7.
[68] Passera, *supra* note 47, p 6.
[69] See, e.g., McKimmie, B. M., Antrobus, E., & Baguley, C. (2014). Objective and subjective comprehension of jury instructions in criminal trials. *New Criminal Law Review*, *17*(2), 163-183; *and* Fox, M. P. (2019). Legal Consciousness in Action: Lay People and Accountability in the Jury Room. *Qualitative Sociology*, 1-32; *and* Spivak, B., Ogloff, J. R., & Clough, J. (2019). Asking the right questions: Examining the efficacy of question trails as a method of improving lay comprehension and application of legal concepts. *Psychiatry, Psychology and Law, 26(3),* 441-456.
[70] Moore, J., Plano Clark, V. L., Foote, L. A., & Dariotis, J. K. (2020). Attorney–client communication in public defense: A qualitative examination. *Criminal Justice Policy Review*, *31*(6), 908-938.
[71] Friedman, L. M. (1989). Law, lawyers, and popular culture. *The Yale Law Journal*, *98*(8), 1579-1606.
[72] Eastwood, J., Snook, B., & Luther, K. (2014). On the need to ensure better comprehension of interrogation rights. *Canadian Criminal Law Review*, *18*(2), 171.

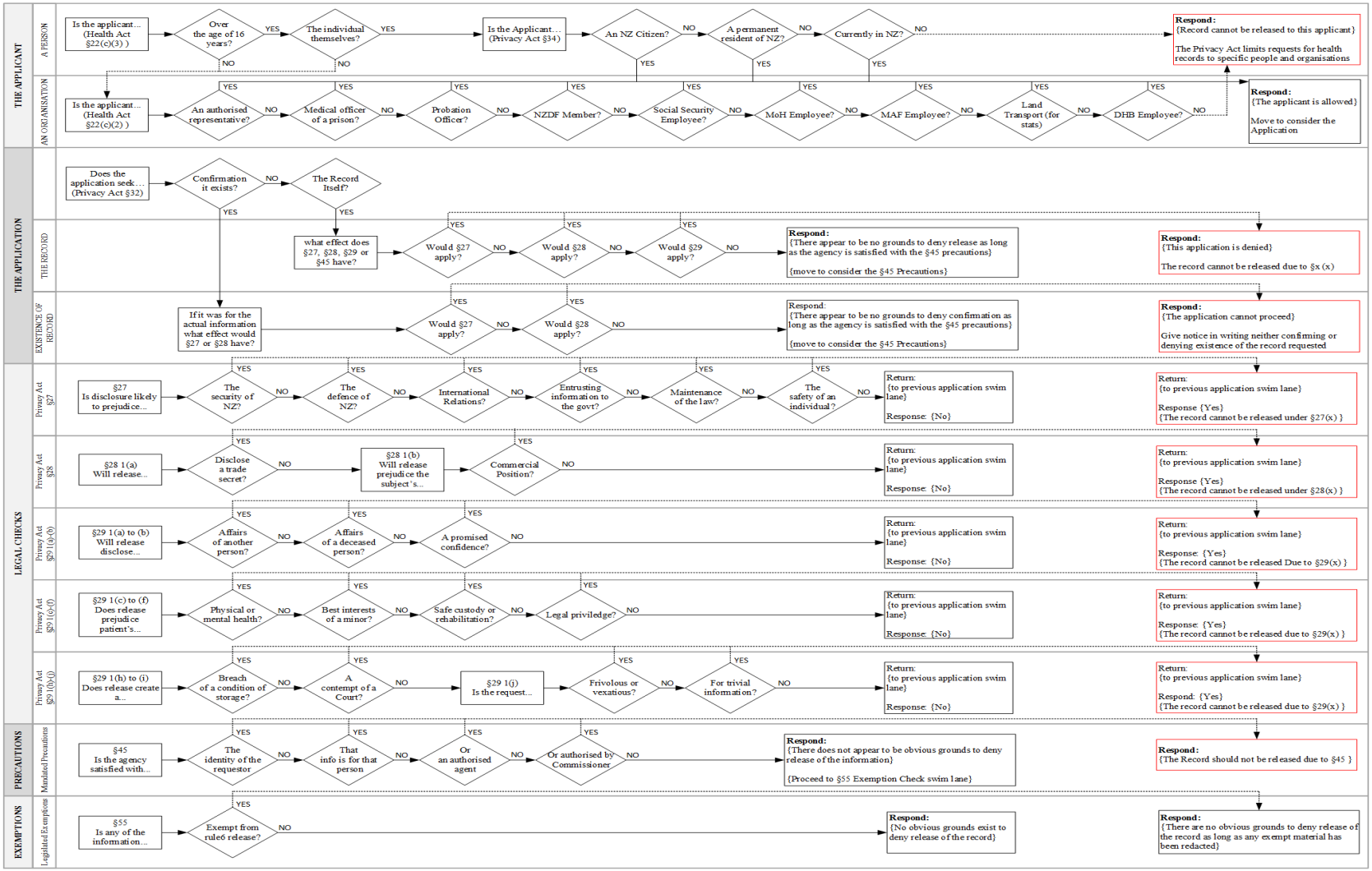


Figure 10. Release of Personal Medical records decision-making process from McLachlan et al, 2015.

Access to Justice:

A number of approaches have been employed to evaluate information visualisation of law and legal process with unrepresented litigants[73]. The overwhelming findings of these experiments has been to identify that visualisation, in combination with plain language explanation, increases overall comprehension and improves an untrained person's ability to raise valid legal arguments[74]. In this way visualisation has been shown to have a positive effect on access to justice.

In our roles as legislators and court staff, *how can we empower and enable everyone, especially those without legal training, to engage with and understand legislation and the application of law in everyday contexts?*

Legal Education and Meaning:

It has been said that lawyers possess a natural ability to create mental images of the law to situate themselves within the flow and circumstances of a case and visualise the next steps based on precedent and past experience[75], yet even experienced lawyers can struggle to understand legislation[76]. Authors have written in strong support for visual techniques to be taught[77]. However, aside from one reported example in 2011 at the University of Basel[78] there is little evidence in the curriculum and textbooks of most law schools that this call has been heard.

In our role as law school teachers, *how can we effectively inculcate law students with a broad appreciation for visualisation as a tool to improve and enhance their future legal practice*?

Adoption:

Australia began a push to improve the design of legislation to aid in comprehension of law through means other than text in 1995. The first call in Canada to make plain language and plain design legislation that would be visually inviting and comprehendible came in 2000. Lawmakers in the United States received their first instruction from President Nixon to construct new law in *layman's terms* in 1972[79]. An executive order so ignored that it was to be repeated by no less than three sitting presidents that followed; Carter, Clinton and Obama[80]. For the United Kingdom the call began in 2016, and to date there is little to show to suggest it has resulted in legislative structural change. Legal researchers such as Margaret Hagan who runs the Visual Law project at the Open Law Lab of

[73] See, e.g., LawHelp Interactive, PRO BONO NET, https://lawhelpinteractive.org (last visited Jul. 25, 2020); LEGALZOOM, https://www.legalzoom.com (lastvisited Jul. 25, 2020) (allowing unrepresented litigants to fill out legal forms faster). See generally Helena Haapio, Lawyers as Designers, Engineers and Innovators: Better Legal Documents Through Information Design and Visualization,17TH INT'L LEGAL INFORMATICS SYMP. Other forms, such as online simulations and video games, also present legal information in formats accessible for larger lay audiences. See, e.g., Are You Going to Court on Your Own?, CTLAWHELP.ORG, https://ctlawhelp.org/represent (last visited Jul. 25, 2020) (site with the pro se online simulation "Represent"); Jackson, D. & Davis, M. Gaming a System: Using Digital Games to Guide Self-Represented Litigants1–16 (Ne. Univ. Sch. of Law Faculty Publ'n, Research Paper No. 252–2016, 2016), https://ssrn.com/abstract=2719926. See e.g.., Greiner, D., Jimenez, D. & Lupica, L. Self-Help Reimagined, 92 IND.L.J. 1119, 1136 (2017) ("[W]e propose that self-help materials include illustrations, more specifically, cartoons and stick figures."); see also Haapio, H., Plew. D., & de Rooy, R. Next Generation Deal Design: Comics and Visual Platforms for Contracting, *19th International Legal Informatics Symposium*. (2016) (proposing "new approaches to the use of visualisation to overcome [contracting pitfalls]. [It] categorise[s] contract visualisation and introduce[s] comics and visual interfaces for deal-making as examples of two new categories."); Stefania P. & Haapio, H. Transforming Contracts from Legal Rules to Communication Tools: A Human Information Interaction Challenge, 1.3 COMM.DESIGN.Q. 38, 41 (2013) (showing how "visualization can help users overcome much of the complexity inherent in contracts and gain better insights," comparing "visual contracts and traditional, text-only contracts, through the experiences and the perceptions of contract users," and employing "examples taken from [qualitative] interviews and focus groups.").

[74] Roznai, Y., & Mordechay, N. (2015). Access to Justice 2.0: access to legislation and beyond. *The Theory and Practice of Legislation*, *3*(3), 333-369.

[75] McCloskey, *supra* note 9, p 191.

[76] This is why law, like medicine, comes with inhabited by large number of specialties. And even within some specialties, like for example tax or intellectual property, there are sub-specialties where counsel only deal with very particular types of issues. The law is dynamic and constantly evolving - whether because new laws replace old or because caselaw changes the meaning or application of legislative provisions. Further, 'laws' are never settled or completely understood until they have been interpreted, tried and tested, in more than one case, by the courts.

[77] See e.g., Cantatore et al, *supra* note 52; *and* Leiman, *supra* note 2;

[78] See "Producing, Analyzing, and Evaluation Legal Visualizations: A Pioneering Course at the Department of Law, University of Basel, Switzerland" (https://community.beck.de/gruppen/forum/producing-analyzing-and-evaluating-legal-visualizations-a-pioneering-course-at-the-department-of-law-unive)

[79] Burton, S. (2018). The case for plain-language contracts. *Harvard Business Review*. January-February Review https://hbr.org/2018/01/the-case-for-plain-language-contracts (last visited Jul. 29, 2020).

[80] Burton, *supra* note 78.

Stanford University[81] have undertaken research and spoken in favour of the need for visualising complicated legal text and concepts in *clear, digestible graphic presentations*[82]. Hagan's Visual Law project website provides a number of lay-approachable examples explaining caselaw and legal processes that were authored in the period from 2012-13. Many of these approaches fall somewhere within the remit of the *plain language movement*, which has at times been derided and misunderstood while equally being lauded for its capacity for sense and clarity[83]. While the plain language movement is a significant step in the right direction, those advocating for legal information visualisation would argue plain text alone is insufficient; that members of the public with legal problems, lawyers and law students will always find plain text matched with visual tools and graphic alternatives easier to understand than text alone[84]. Aside from commentary from a former employee of a major Australian law firm describing his prior role as *Head of the Plain English Department* developing plain language versions of service agreements for that firm's clients[85], little persuasive evidence was found to suggest success for *plain language* intentions for legislation and policy by the governments discussed above. While the authors of a 2012 review looking at visualisations of legislation sought to be positive in their conclusions about the prototypes appraised and progress they considered had occurred in the two decades prior to their work, the outcome of their review[86], as ours, paints a bleak picture for the actual degree of adoption and impact of visualisation in law generally.

In our role as legal researchers, *how can we encourage lawyers to adopt visualisation approaches into their legal processes and writings?*

6. Conclusion

One-fifth of the twenty-first century has already been expended. Even as computing technology, an avalanche of information and increasingly more complicated new legislation continue to overwhelm both lawyer and lay-person, as we have seen here, the call for plain-language laws coupled with information visualisation remains unanswered. The potential for well-crafted visualisations to improve law students, lawyers' and the general public engaging with the legal system to understand and contextualise both the law and legal processes cannot be overstated. Yet, when we consider the many thousands of academic articles, textbooks, case reports, websites, blog posts and other media published each year on an almost limitless range of legal topics, that the use of visualisations as seen in this literature collections never exceeds ten in any given year is unfortunate. More than that, it is a major failing that lays squarely at the feet of every person involved in drafting, teaching, researching and practicing law. In exposing this continuing omission across the juridical sciences, this paper has also posed four challenges to those groups and posits one final question:

How can we expect our communities to be cognisant of and adhere to legislation that has become so verbose and complicated as to be incomprehensible to even the educated man?

[81] http://www.openlawlab.com/about/

[82] http://www.openlawlab.com/project-topics/illustrated-law-visualizations/

[83] Balmford, C. (2002, September). Plain Language: beyond a 'movement. In *Fourth Biennial Conference of the PLAIN Language Association*.

[84] Leiman, *supra* note 2.

[85] Balmford, *supra* note 72.

[86] Curtotti, M., & McCreath, E. (2012, October). Enhancing the visualization of law. In *Law via the Internet Twentieth Anniversary Conference, Cornell University, October* (Vol. 9).