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**RETHINKING THE AUTOMATION OF LEGAL CONCEPTS IN LEGISLATIVE REGULATION THROUGH ARTIFICIAL INTELLIGENCE SYSTEMS**

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**TABLE OF CONTENTS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CHAPTER 1** | **INTRODUCTION……...………………………………………………..……** | |  | **4** |
|  | 1.1 | Overview……………………………………….….…………………… |  | 4 |
|  | 1.2 | Hypothesis……………………………………………………..……… |  | 6 |
|  | 1.3 | Methodology……………………………………………………...…… |  | 6 |
|  | 1.4 | Structure and Scope of Analysis…………………………..…….. |  | 7 |
|  |  |  |  |  |
| **CHAPTER 2** | **DEFINING THE LIMITS OF HUMAN INTERVENTION IN AUTOMATING LEGISLATIVE DRAFTING…………………………….** | |  | **8** |
|  | 2.1 | Limits of Human Endeavour?..…………………………………… |  | 8 |
|  | 2.2 | Traditional Legislative Drafting Approaches and the Need for Change……………………………………….……………………. |  | 10 |
|  | 2.3 | Legal Reasoning and Automated knowledge Systems: Should Drafters Permit the Rise of the Machines?............... |  | 12 |
|  | 2.4 | Is Artificial Intelligence up to the Task of Legislative Drafting?............................................................................ |  | 14 |
|  |  |  |  |  |
| **CHAPTER 3** | **AUTOMATING THORNTON’S FIVE STAGES OF LEGISLATIVE DRAFTING …………………………..……………………………………….** | |  | **16** |
|  | 3.1 | General Note…………….….…………………..……………………. |  | 16 |
|  | 3.2 | Stage 1-Understanding ………………………………….………... |  | 17 |
|  | 3.3 | Stage 2- Analysis……………………………….…………………… |  | 20 |
|  | 3.4 | Stage 3-Design……………………………………………………….. |  | 21 |
|  | 3.5 | Stage 4: Composition and Development…………………….…. |  | 23 |
|  | 3.6 | Stage 5: Scrutiny and Testing………………………………….... |  | 26 |
|  |  |  |  |  |
| **CHAPTER 4** | **OPPORTUNITIES AND CHALLENGES IN AUTOMATING LEGISLATIVE DRAFTING: SOME CASE STUDIES…….………….** | |  | **28** |
|  | 4.1 | Underlying Assumptions……………………………………….... |  | 28 |
|  | 4.2 | Where we are Now……………………………………….……….… |  | 29 |
|  | 4.3 | System Architecture and Functionality………………….……. |  | 30 |
|  | 4.4 | Some Solutions Developed for Automated Legislative Drafting |  | 31 |
|  | A. | Propylon- Legislative Work Bench……...……………………….. |  | 31 |
|  | B. | TeraText………………...……..……………………………………… |  | 32 |
|  | C. | EnAct…………………..………………………...……………….…… |  | 32 |
|  | D. | Akoma Ntoso…………………………...…………………………….. |  | 32 |
|  | E. | NormeInRete (NIR) ………………………………………………..... |  | 32 |
|  | 4.5 | Challenges Faced in Computer Assisted Drafting……………. |  | 33 |
|  |  |  |  |  |
| **CHAPTER 5** | **CONCLUSION: THE FUTURE OF INTELLIGENT TOOLS IN LEGISLATIVE DRAFTING ………………..……………………………..** | |  | **36** |
|  | 5.1 | Reflections on Automating Thornton’s Five Drafting Stages……………………………………………………………….…. |  | 36 |
|  | 5.2 | Automating Legislative Drafting or Redefining Legal Solutions?.......................................................................... |  | 37 |
|  | 5.3 | Conclusion……………………………………………………………. |  | 37 |
|  | **BIBLIOGRAPHY…………………….………………………………………..** | |  | **39** |

**CHAPTER 1 INTRODUCTION**

1.1 Overview

This dissertation critically analyses the potential, opportunities and challenges in automating legislative drafting through intelligent tools. The multidimensional nature of legislative process and the increasing pressure on the drafter to produce effective draft legislation as a means of societal risk management necessitates the development of more efficient means of legislative drafting.

The legislative drafting process has historically involved legislative draftspersons formulating legislative concepts and reducing them into legislative text. Legislation usually begins with policy decisions made by the government in power. Stefanou notes that in most liberal democracies policy initiation is usually the domain of the Executive (Government).[[1]](#footnote-1) Thornton additionally notes that societal regulation is the field in which the drafter toils in order to frame the elucidation of policy decisions that have legal consequences for society’s members.[[2]](#footnote-2)

Based on policy, the drafter surveys relevant existing laws and determines what new legislative messages to communicate and how best to communicate them.[[3]](#footnote-3) Thornton stresses that legislative drafting is one component of the wider legislative process, where an idea or concept about the society’s social framework becomes government policy and later transformed into legislative shape through the drafting process before eventual enactment to ultimately enjoy legal force as law in the statute book.[[4]](#footnote-4)

Since legislative drafting generally tends to be highly specialised and reclusive, its utilisation of multidisciplinary tools is very slow and traditional approaches to drafting largely remain fundamentally static. Resultantly, the drafting process has not witnessed significant methodological change since the institution of formal drafting offices. There are slight variations in the approaches to legislative drafting in common law and civil law jurisdictions that have little impact within the context of the analysis of computer assisted legislative drafting and the applicability of artificial intelligence. Greenberg notes for example that substantial legislative practice and principle within the UK Government centred on a tiny group of specialist legislative drafters in Whitehall.[[5]](#footnote-5) These drafters were directly responsible for drafting almost all primary legislation within the UK through which process they notably exerted an indirect but significant influence on legislative practice generally.[[6]](#footnote-6) Within the specialist group, principles and practices were passed on by tradition, discussion and through intensive one-to-one training through which individual generations passed their understanding to succeeding generations. This was meant to ensure a continuity of understanding of fundamental constitutional principle, while maintaining scope for innovation by the rising generation in appropriate areas.[[7]](#footnote-7) This approach also means that rapid innovation is generally restricted and driven by the ‘mentors’.

Legislative drafting has struggled to keep pace with the various technological advances and this has necessitated re-engineering the approach to legislative drafting to be technologically synergistic. This may involve departure from generally utilised drafting conventions, especially when drafting with automated intelligent tools. Susskind appropriately describes the context of this discussion by stating that-

…artificial intelligence can perhaps best be regarded not as derived, by analogy, from the rigorous conceptions of philosophers, psychologists and linguistic scientists, but as a label used to refer to what it seems that certain computer systems possess to some degree. Such systems, having been so designed and construed to perform those tasks and solve those problems that together if performed by human beings are taken by us to be indicative of intelligence, can be said to exhibit Artificial Intelligence.[[8]](#footnote-8)

The role of information technology in legislative drafting has been formally examined since the introduction of the first commercially available desktop computer. In the early 1950s Herbert Simon, Allen Newell and Cliff Shaw conducted experiments in writing programs to imitate human thought processes. The experiments resulted in a program called Logic Theorist, which consisted of rules of already proved axioms. When a new logical expression was given to it, it would search through all possible operations to discover a proof of the new expression, using heuristics. This was a major step in the development of artificial intelligence (AI).[[9]](#footnote-9)

Bennion[[10]](#footnote-10) in conjunction with the Central Computer Agency conducted an official experiment in computer usage for legislative drafting at the Parliamentary Counsel Office in Whitehall in 1974-75,[[11]](#footnote-11) lasting two and a half months, making use of the Greater London Council's IBM computer.[[12]](#footnote-12) Computer assisted legislative drafting is therefore not a novelty.

Encouraging Computerised legislative drafting is critical when examined in light of the drafter’s essential requirements throughout the drafting process. Thornton notes that some essential equipment for producing effective draft legislation in a drafting office includes a language dictionary, synonym dictionary, language usage guide, sentence construction guide, grammar usage guide, judicially defined words and phrases, judicial dictionaries, statutory interpretation guides, legislative composition guides, legislative forms and precedents and legislative drafting resource material or manuals.[[13]](#footnote-13) These items are now widely available as part of automated computer systems.

1.2 Hypothesis

The hypothesis of this dissertation is that the legislative drafting process can be made more efficient through the systematic adaptation, application and use of automation and computerised intelligent tools.

1.3 Methodology

The research proposes to prove the hypothesis by analysing the application of automated and computerised intelligent tools by extrapolating the extent of computerisation and automation in Thornton’s five stages of legislative drafting.[[14]](#footnote-14) Thornton’s five stages of drafting are (a) understanding; (b) analysis; (c) design; (d) composition and development; and (e) scrutiny and testing. The reason for this approach is that current research tends to take a kaleidoscopic view of the various stages of legislative drafting as opposed to a panoramic view. This has resulted in an incomplete analysis of the entire automation spectrum of legislative drafting. The analysis of Thornton’s five stages of drafting will facilitate a systematic identification of the areas where automation has been emphasised and where it has either been neglected or is not capable of practical application in relation to automation of legislative drafting using intelligent tools.

This analysis will also use the information-oriented approach and the Artificial Intelligence approach in legimatics.[[15]](#footnote-15) While taking into account the contribution of the two legimatics approaches, the discussion will place emphasis on the legislative drafting as a core discipline and proceed to analyse the issues to be considered from this perspective. The methodology will also test the applicability of automating of Thornton’s legislative drafting stages to demonstrate the efficacy and deficiencies in computerised legislative drafting. The analysis will also examine a number of case studies on the use of computerised legislative drafting.

The analysis of the various issues for consideration will be as general as possible in relation to the two main approaches to legislative drafting from the common law and civil aw traditions. In some instances where specific issues are applicable to a specific style or approach to drafting then the particular issue will be addressed according to the idiosyncratic context under which it falls.

1.4 Structure and Scope of analysis

This dissertation consists of six chapters. Chapter 1 deals with the hypothesis and methodology of the research and defines the scope of the specific areas to be examined. Chapter 2 examines the limits of automation of human characteristics and functions during the drafting process and the extent to which human activities undertaken during the drafting process can be automated. Chapter 3 deals with Thornton’s five stages of drafting and how these can benefit from automation and use of computerised intelligent tools. Chapter 4 examines the opportunities and challenges inherent in automating legislative drafting. Chapter 5 looks at the future prospects for the automation of legislative drafting using computerised intelligent tools and evaluation of the effectiveness of approaches taken to the automation of drafting so far. Chapter 6 provides a summary of the issues discussed and recommendations, where appropriate and identifies areas for potential future research. Additional methodological elements of this dissertation will include the consideration of various themes about automation generally and use of intelligent tools.

**CHAPTER 2 DEFINING THE LIMITS OF HUMAN INTERVENTION IN AUTOMATING LEGISLATIVE DRAFTING**

2.1 Limits of Human Endeavour?

The legislative drafting process is a complete process from idea to enactment, involving actions from various parties at different stages. In considering the potentialities and limits of automating legislative drafting, analysis of the parametric limits of human involvement in the legislative process is essential so as to determine the precise measure of automation of legislative drafting that is practically achievable and necessary.

From the outset, it has been conceded that a public servant who specialises in drafting legislation cannot simply be replaced by an intelligent or knowledge-based computer system.[[16]](#footnote-16) Eijlander postulates that it is inconceivable that computer technology, particularly knowledge based computer systems will take over any of the drafter’s core activities because drafting legislation contains too many unpredictable variables. This makes it impossible for intelligent computer systems to formulate usable statutory provisions themselves.[[17]](#footnote-17) This however does not preclude the development of artificially intelligent systems for legal logic simulation.

Eijlander’s argument further does not imply that automation and artificial intelligence cannot make the drafting stages more efficient. Eijlander acknowledges this by stating that computer technology can support various drafting activities and identifies four support types namely-

1. facilitating accessibility and applicability of established knowledge and scholarship in the legislative field;

(b) promoting communications and information exchange among players in the legislative process;

(c) making relevant data and information more easily accessible; and

(d) examining bills for consistency and effects, such as their financial impact.[[18]](#footnote-18)

This feature of automated drafting systems in assisting the cognitive aspects of legislative drafting will be further examined and demonstrated in the next chapter.

From antiquity, human beings are always striving to conquer their environment by innovating in their performance of tasks through the use of technology. Culture in general and any culture in particular progresses with steps that are determined by its technology.”[[19]](#footnote-19) Flemisch and others observe that generally, scientific and technological progress, in close collaboration with cultural achievements, provides advantages that ancestors could only dream of. Advances in hardware and software capabilities hold promise for creation of increasingly intelligent and automated machines.[[20]](#footnote-20) Broadly, the question of the proper dynamic balance of abilities, authority, control and responsibility amid humans and increasingly capable technology is one of the fundamental questions for any prospective human–machine system, and for any society.[[21]](#footnote-21)

It is acknowledged that ‘scientific knowledge itself requires a preliminary technological substratum for its progress.’[[22]](#footnote-22) The limits of such innovation are only determined by the limits of human imagination and ingenuity.[[23]](#footnote-23) The limitations of human intervention in processes that are essentially intellectual and particularly logical in nature cannot be analysed without a detailed and candid look at neurological processes, especially replication of neurological processes through automation and use of computerised intelligent tools is attempted.[[24]](#footnote-24)

Legislative drafting, especially in the conceptualisation stage is neurologically intense, which consequently makes determining where the human role ends and the computer role begins in the drafting process quite a challenge if analysed within the true spectrum of the drafter’s function in relation to the legislative drafting process. This analysis will not discuss the neurological processes involved in legislative drafting, except mentioning as Russell and Norvig have observed that although artificial intelligence systems attempt to replicate human neurological functions, their primary aim is not to replicate the human brain function as it is generally understood in the neurological sense as to create artificial humans. Russell and Norvig further note that if one argues that a given program thinks like a human, one must determine how humans think and get inside the actual workings of human minds.[[25]](#footnote-25)

Russell and Norvig identify three ways to determine human thought namely introspection, psychological experiments and brain imaging. Russell and Norvig argue that once there is a sufficiently precise theory of the mind, it becomes possible to express that theory as a computer program.[[26]](#footnote-26) Both neuroscience and artificial intelligence acknowledge that as long human beings continue to exist and develop their culture, technology will correspondingly develop in various areas, including automation of normative concepts and computerised legislative drafting. There is therefore no clear delineation as to where human intervention ends and automation begins in the legislative drafting process. By the very nature of the drafting process, the role of the drafter and the technology at the disposal of the drafter will remain symbiotic.

2.2 Traditional Legislative Drafting Approaches and the Need for Change

Historically, legislative drafting has generally relied on communication and words as its formal operational tools for the dissemination of normative concepts. The two major characteristics of the drafting process on a fundamental level are thinking and writing. Thornton notes that words are, as opposed to a mere tool, the raw material with which drafters work and are inextricably connected to the drafter’s thought processes and are devoid of passivity, stability and fixity or purpose commonly found in tools such as a chisel or hammer.[[27]](#footnote-27) The traditional approach to legislative drafting in an increasingly complex and automated world that demands large volumes of diverse legislative and legal risk management resources puts the drafter under increasing pressure to produce high quality drafts in the fastest and most efficient way possible. To achieve this, drafters cannot rely on traditional pen and paper drafting techniques supported by countless hours in the library where the most urgently required materials are never available and have to be shared with insurmountable legions of other library users.

Generally, legislative drafters are self-sufficient and use individual resourcefulness to manage aspects of their work that can be automated using intelligent tools. The impediments to the drafter effectively trusting technology enough to surrender certain functions to technology result from their training and traditions associated this training, in an environment generally devoid of technological context. Drafters mostly rely on sheer brain power and individual problem solving ability than structured databases and knowledge management systems at their disposal.

Dickerson notes that for smaller assignments drafters mentally construct and remember outlines. For more complicated and extensive projects, written outlines prove invaluable.[[28]](#footnote-28) Dickerson further notes that outlines force drafters to think problems through and determine whether they have exhausted the source material. Initially clearing up problems of basic arrangement saves cherished time because readjustments are more difficult and risk greater error when deferred.[[29]](#footnote-29) Dickerson finally notes that outlines are tools by which colossal complicated problems are divided into smaller, manageable ones. With a good outline to work from, drafters attack discrete components separately, while remaining mostly undistracted and un-harassed, by considerations affecting the other components. Dickerson credits this as being the most important single device for solving complicated problems.[[30]](#footnote-30)

Dickerson’s observations highlight several issues about defining the limits of human intervention and promoting automation in order to make the drafting process more efficient and effective. An example is Dickerson’s reference to drafter’s mentally noting outlines for legislation. Although seemingly trivial, this presents risk of information loss resulting from head trauma, illness, mental incapacity and death. The utilisation of automated data storage would facilitate storage of various data items and avoid unduly straining the human brain and ensure creation of ‘backups’ in case of any contingency. The creation of written outlines and the need to avert changes of restructuring bills in latter drafting stages is premised on the drafter manually making changes without the aid of computerised intelligent tools, which should increasingly and practically be the case.

Crabbe emphasises the importance of structuring and appropriate design of legislative text by noting that after reading, processing and internalising the drafting instructions, the subsequent important step is the preparation of the legislative scheme.[[31]](#footnote-31) Crabbe adds that the quality of the Bill hangs on the scheme, which represents the drafter’s mental image of how the Act of Parliament would look in structure, quality, substance and form.

The drafter deals with the logical sequence of the various aspects that affect the Bill and organises the symmetrical arrangement of sections. At this stage, form and substance take their proper places and the law and its administration are equally balanced.[[32]](#footnote-32) Further, without the legislative scheme the resultant Act would appear as a patchy, sketchy, ill-conceived and ill-prepared piece of work. The legislative scheme enables the drafter perceive whether the Act will be workable and whether the court’s task will be simplified in the construction of the entire Act.[[33]](#footnote-33) Crabbe finally notes that the legislative scheme effectively “the architectural plan of the building that is called an Act of Parliament.”[[34]](#footnote-34)

From Crabbe’s elaboration, structuring of documents is an essential feature of drafting and although often done manually, can easily be automated and is therefore a further area where the limits of human intervention can be appropriately drawn. As will be observed later in this analysis, there has been tremendous work done in the area of structuring of legislative text, especially using eXtensible markup language (XML) applications in order to facilitate computer assisted drafting and web based applications.[[35]](#footnote-35)

The major challenge to automating legislative drafting continues to be the human element. Although artificial intelligence superficially attracts lawyers and provides clear opportunities for automation, lawyers are sceptical about the possibility of extracting legal expertise from human experts, transferring it into computer systems and consequently making it available to less knowledgeable users.[[36]](#footnote-36)

While recognising the need for drafters to embrace and utilise technology, development of applications must take into account the ability of the drafter to effectively leverage the technologies. In discussing the usability concerns, Dijkstra discusses the Technology Acceptance Model (TAM),[[37]](#footnote-37) which projects use of information systems by explaining user behaviour by analysing beliefs users have towards the information system. In TAM, computer use is affected by the behavioural intention influenced by user attitude towards utilising a computer program,[[38]](#footnote-38) especially perceived usefulness, which is the user’s conviction whether a computer system will assist in achieving the user’s goals and perceived ease of utility, which is the user’s conviction whether use of a computer system will be relatively free of effort.[[39]](#footnote-39) The drafter’s major concern is the ability of computerised drafting to produce a Bill that complies with the internal rules of the drafting office and formal parliamentary requirements.

In summary, although frequently claimed that it is not feasible to develop expert systems, Susskind notes at least five dimensions to resolving feasibility namely jurisprudential soundness, technical possibility, commercial viability, organisational suitability and strategic appropriateness.[[40]](#footnote-40) The development of effective computerised intelligent tools therefore hinges on the positive resolution of the feasibility issues identified, which arise at the various stages of the drafting process.

2.3 Legal Reasoning and Automated knowledge Systems: Should Drafters Permit the Rise of the Machines?

Legislative drafting places heavy reliance on largely intuitive cognitive legal reasoning that drafters use from conceptualisation of drafts to the final legislative text.[[41]](#footnote-41) To delineate the extent of computerisation in Thornton’s five drafting stages, the logical genesis to identify human limitations in the drafting process and determine the extent to which human cognitive functions can be replicated in computerised systems. Notably, conceptualisation of what drafters do during the drafting stage, and the information they use, are scarce in the artificial intelligence line of thinking. The major characteristic of this approach is the technology pull, because artificial intelligence concepts and techniques define the possibilities and impossibilities of computerised drafting assistance.[[42]](#footnote-42)

According to Voermans, drafting is an intricate decision-making process demanding great skill and knowledge and therefore mostly performed by specialists. To assure quality drafts, drafters approach drafting methodically. Although approaches vary, some general characteristics of legislative design are discernible.[[43]](#footnote-43) Voermans observes that generally speaking, methodological approaches consist of various iterative and interdependent stages like problem definition, problem analysis, selection of the most practicable and effective solution and implementation of a solution in a legislative text and evaluation.[[44]](#footnote-44)

The issue under consideration is not whether drafting can be computerised within the context of word processing but rather whether computerisation can be done from the perspective of automating cognitive reasoning. In short, can the conceptualisation stage of drafting be automated in a manner practically beneficial to the drafter? This has been debated, with varying views which are not generally congruent. Branting argues on how far human intervention in certain cognitive tasks can be made more efficient by automation when discussing frameworks for self-explaining legal documents.[[45]](#footnote-45) Branting observes that legal problem solving subsumes a number of distinctive elements, including analysis of the legal consequences of tangible or hypothetical sequences of actions, client advice, argumentation, transaction planning, and drafting legal documents, which is a significant and essential professional skill for legal professionals.[[46]](#footnote-46)

Branting’s observation demonstrates that the scope for automating human cognitive processes continues to attract academic discourse and demonstrate potential. The key issue to be critically addressed remains whether legislative drafting should be automated simply because this is possible, or because automating drafting will ultimately positively contribute to the rule of law through the drafting of quality and effective legislation.

In further arguing the cognitive role the drafter plays and how automation can enhance it, Voermans notes that drafting is not just a matter of putting down policy choices into words but involves a complex decision-making process which involves making practical choices regarding content, structure, structure elements and ultimately phrasing and wording of a draft.[[47]](#footnote-47) To add to the cognitive conundrum, Voermans argues that frequently legislative drafting also entails making or reviewing policy decisions, wherein competing requirements must be met. Voermans further notes that the requirements are not exclusively homogeneous in nature comprising legal standards and aspects of legislative policy and technique, but also heterogeneous in nature resulting from various factual conditions associated with specific subject matter, or from existing policies regarding the field of a proposed draft.[[48]](#footnote-48)

Although the determination of the extent to which cognitive reasoning should be automated appears generally to be a technical one, this is not entirely true because as Sjöberg notes, apparently technical considerations have important legal implications. There is therefore a need for a holistic approach to the development of infrastructures involving technical, organisational and legal characteristics. For example, particular importance should be attached to a non-proprietary approaches to system design in order to reduce dependencies on certain industry solutions.[[49]](#footnote-49) This is necessary to avoid impeding the automation of legislative drafting.

By examining the cognitive requirements of legislative drafting, it is evident that the cognitive role the drafter performs in relation to a draft cannot be completely automated to a point where the drafter then becomes redundant and drafting becomes completely automated. This however does not preclude scholars from innovating design of legislative solutions to address the cognitive challenges associated with legislative drafting. The importance of legislative drafting necessitates constant innovation to facilitate increased efficiency in order to cope with society’s demands.

2.4 Is Artificial Intelligence up to Task of Legislative Drafting?

Since drafting requires substantial cognitive contribution from the legislative drafter, it is evident that legislative drafting will foreseeably futuristically continue requiring active input from the drafter as long as it relies on conventional drafting systems and processes.[[50]](#footnote-50) Wahlgren in discussing interaction of artificial intelligence and law notes that the suggestion that the field of AI and law should strive towards the development of a theory reflecting an overall structure must not be misunderstood.[[51]](#footnote-51) The fact that a research area is diversified and multifaceted is not necessarily a negative characteristic, but rather, in many cases, a sign of vitality and broadness.[[52]](#footnote-52)

Wahlgren states that in the field of AI and law, some may contend that presently there is very little counterbalance to the multiplicity of approaches that have been presented which, if not confronted, will result in the obvious risk that AI and law in the near future will be perceived as a general label with little or no substance of its own.[[53]](#footnote-53) This observation presents a very real challenge for computerised drafting because drafting presently faces credibility challenges as a specialised field without other disciplines which it seeks to rely upon coming under scrutiny.[[54]](#footnote-54)

In discussing computerised legislative drafting, Voermans argues that in the information-oriented approach, legal and legislative problem solving processes are perceived as information problems since systems designed according to the information-oriented approach assist users through processing and providing accurate information to unravel the information problems which emerge in resolving specific difficulties based on precise understanding of the information needs of a problem-solving process.[[55]](#footnote-55)

Voermans argues that in the AI-based approach, legal and legislative problem-solving are determined as reasoning processes which require knowledge. In systems built following the AI-oriented approach, endeavours are made to represent the knowledge needed to solve specific legal or legislative complications and model them in a way which allows a computer system to ‘reason’.[[56]](#footnote-56) Consequently, legal AI systems potentially solve legal problems through automated legal reasoning. The construction of AI-based systems requires precise understanding of how specific legal complications are resolved and the nature of the specific knowledge used in problem solving.[[57]](#footnote-57)

The practicality of automation and artificial intelligence in legislative drafting has since the early 1960s continued to evolve with more complex functions increasingly being technologically performed. In discussing the increased use of computerised drafting, Schulte notes that the brevity of legislative sessions, the large and growing legislative workload, the multiple committee assignments for each legislator, the rapid turnover among members and the limited research support staff all play a role in prompting legislatures to opt for the computer.[[58]](#footnote-58)

So far, one apparent issue is that legislative drafters increasingly need to be deliberately trained to accept the inevitability of technological change and embrace it as an opportunity for improving efficiency. Having examined the parameters of human participation in drafting and the potential role of automation, the next stage of this analysis will examine Thornton’s five stages of drafting and the status and applicability of automation and computerised intelligent systems.

**CHAPTER 3 AUTOMATING THORNTON’S FIVE STAGES OF LEGISLATIVE DRAFTING**

3.1 General Note

The most systematic method of examining computerised legislative drafting within the context of this discussion is to relate automated systems and intelligent computerised tools and their applications to Thornton’s five stages of legislative drafting.[[59]](#footnote-59) In performing this task, it is important to realise that the replication of legislative drafting is predicated on legislative theory and generally rooted in the behavioural sciences. According to Barth, an adequate legislative theory begins by sufficiently explaining why people behave the way they do when faced with a rule of law. He argues that people generally choose among the constraints and resources provided by their peculiar country-specific environments, where the rule of law and its threats and promises constitute but one among many factors.[[60]](#footnote-60)

Siedman and Siedman posit that most extant theories concerning legislation make no pretence of guiding drafters in their task. Instead, they focus on other aspects of the legislative process in ways denying even the possibility of using legislation rationally to bring about social change. Pluralist theorists typically perceive legislation as the outcome of 'bargaining' between interest groups.[[61]](#footnote-61) The perception of drafting in these terms has massive implications for successful parametric automation of Thornton’s five stages of drafting.

Turnbull notes that drafters are preoccupied with scarcity of time and governments are notoriously impatient and frequently make impossible demands on their drafters.[[62]](#footnote-62) He argues that the result of the obsession with time is that drafters constantly face the dilemma of whether to deliver a Bill quickly or produce a good draft.[[63]](#footnote-63) Turnbull further notes, quoting Sir Harold Kent, that Parliamentary Counsel in the United Kingdom boast that they have never to date failed to deliver a Bill by the deadline, ‘right or wrong’.[[64]](#footnote-64) Turnbull further observes that in Australia, drafters attempt to ensure that the Bill is right and meets the deadline, but this places great stress on the drafter and sometimes proves impossible.[[65]](#footnote-65)

Automation of drafting is therefore necessary both for the efficiency of the drafter as well as for access by users. Sjöberg notes that a government’s choice to implement its services for legal information supply using specific solutions in preference to others immediately excludes and includes citizens in the access sphere.[[66]](#footnote-66) Sjöberg further observes that in emergencies, online access in due time to governmental information may prove to make the difference between death and survival.[[67]](#footnote-67) Legal information supply is therefore vital.[[68]](#footnote-68) Automation plays a role in ensuring this access, even for legislation.

In environments where legislative quality and legislative drafting procedures are considered questionable, the drafting of legislation beginning from its semantics, with the aid of semi automation can arguably improve the quality of legislation. In particular, its consistency, intelligibility and usability may improve as well as the efficiency and effectiveness of the drafting process.[[69]](#footnote-69)

Before examining the dynamics of automation of the drafting process in Thornton’s five stages of drafting, it is worth remembering that computer-aided drafting software is generally commonplace in the contemporary legal environment, especially regarding document assembly. Lawyers, paralegals, secretaries, and individuals are able to work through question and answer dialogs, which in some instances incorporate reference material, and the system assembles a draft document. Alternatively, a user picks forms, clauses, and other components based on requirements from libraries which provide various options and choices.[[70]](#footnote-70)

Observably, this discussion neutrally describes the drafting process itself, both under the civil law and common law drafting traditions. The application of technology in both drafting traditions can be as customised or as generic as the users determine and as far as the technologies permit. [[71]](#footnote-71)

3.2 Stage 1-Understanding

Thornton identifies the first stage of drafting as involving self-awareness of the drafter’s role and the task at hand. The drafter accordingly has to fully appreciate the purpose of the proposed legislation. The drafter needs to analyse and appreciate the mischief or defect to be rectified or remedied by the legislation.[[72]](#footnote-72) This process necessarily involves extensive background research into the policy objectives of the legislative proposer regarding the specific issues.[[73]](#footnote-73) The existence of appropriate raw material through adequate instructions is indispensable to this stage of drafting.[[74]](#footnote-74)

According to Thornton the essential requirements for effectively understanding instructions are varied. First and foremost, Thornton argues that a fundamental appreciation of the intended purpose or achievement of the legislation lies at the very heart of legislative proposals to dispel doubt as to the “spirit and intent” of the proposals.[[75]](#footnote-75) In analysing the intent of legislation, automated systems could examine whether proposed measures are supported by existing nationally available policy and legislative material. They can also determine whether the proposed policy satisfies international obligations and best practice, depending on the legislative means proposed for the adoption of the policy as articulated by the legislative proposer.

Gostojić *et al* note that in order to make decisions, legal professionals use legislation *corpus* as a knowledge base of legal norms and their relations, since legal norms are applied as they are formulated in legislation.[[76]](#footnote-76) Additionally, traditional legislation retrieval and browsing systems operate based on text retrieval and browsing.[[77]](#footnote-77) At this initial stage which involves understanding of instructions, automated and intelligent systems find great utility in information retrieval and research as well as information management through tools such as indexing of data. Susskind observers crucially that the broadly established objectives of workers in the fields of expert systems and knowledge based systems is to utilise computerised technology to make scarce expertise and knowledge more extensively available and accessible.[[78]](#footnote-78)

A further aspect of understanding instructions relates to the means through which the policy objective is achievable.[[79]](#footnote-79) As has been noted earlier, the holistic appreciation of draft legislative proposals is optimal if tools are available to facilitate a panoramic rather than kaleidoscopic view of the problem.[[80]](#footnote-80) Thornton notes that instructions at this stage may contain hypothetical examples of the intended working of proposed schemes. Further, the impact on existing circumstances and laws is also examined at this stage. Issues like retrospective effect of the legislation also fall to be determined in the early instance at this stage.[[81]](#footnote-81) All this happens while consultation is continuing involving the drafter, legislative proposers and various other relevant stakeholders[[82]](#footnote-82) where applicable since in some jurisdictions drafters deal with policy to a limited extent.[[83]](#footnote-83)

The aspects related to hypothetical situations and consultations can increasingly be automated and benefit from use of intelligent tools.[[84]](#footnote-84) Various knowledge systems have been developed to assist legal decision making. This functionality can continually be adapted to assist the drafter with legal simulations. Indexed databases also facilitate an overview of the legal framework more efficiently. Buchanan and Headrick note that in order to begin designing an intelligent system, people have to know more about the mental processes a lawyer uses to resolve legal problems. It is only then that people can begin to structure legal thought processes in order for a computer to imitate the processes. System designers can identify some of the lawyer’s mental steps using various models.[[85]](#footnote-85)

Although intelligent systems help consolidate legal knowledge, they do not solve the problem of legal rule fragmentation. In the present context rule fragmentation occurs where legal norms which regulate one social relation or elements of one legal norm are contained in different legislation or different elements of a piece of legislation. Rule fragmentation is identified as one of the main reasons for the ineffective and inefficient utility of legislation.[[86]](#footnote-86)

Gostojić *et al* observe that semantic retrieval and browsing of legislation, based on the meaning of the legal norms contained in the legislation, provides an optimistic solution to fragmentation.[[87]](#footnote-87) Once systems allow semantic indexation, this would ensure consistency in semantic application of words in statutes and significantly minimise inconsistent use of the terms. Internal structural consistency of the statute would follow since words intended to have the same meaning can easily be identified, mapped, tagged and then used in an appropriate context when drafting. Semantic indexation goes a long way in eliminating double regulation because the ability to detect norms that are already embodied in legislation increases.

In order for drafters to fully benefit from the research potential available through various databases, drafters should avoid obstacles like access restrictions, platform incompatibility, restrictive access costs and administrative hindrances. Barriers that impede the drafter’s free access to information need to be addressed as automation increasingly becomes a pervasive element of the drafter’s work culture and orientation. In an increasingly globalised world the drafter needs mass exposure to expert or highly specialised information on issues affecting the proposed legislation.[[88]](#footnote-88)

Once the drafter understands the instructions presented by the legislative proposer, the next stage is the analysis of the instructions.[[89]](#footnote-89)

3.3 Stage 2- Analysis

Analysis involves consolidating the understanding of the instructions through further examination once the drafter has understood them. Thornton argues analysis of the instructions is conducted in relation to the existing legal framework, special responsibility areas and practicality.[[90]](#footnote-90)

Thornton contends that if laws in force at a particular time in a society are considered to be a coherent whole, every new legislative provision in a law is amending in nature.[[91]](#footnote-91) Although a law may not appear on the face of it to amend an existing law, the fact that it changes the existing legal topography effectively means that no matter how subtle, changes occur nonetheless. Thornton particularly argues that laws in *pari materia* must be studied since courts generally construe existing laws together. This stage also includes searching similar laws in other jurisdictions for comparison.[[92]](#footnote-92) As noted when discussing the benefits of automation in understanding instructions, the use of automated libraries and databases of laws within and outside the jurisdiction becomes increasingly important for analysis. Many countries provide online access to laws, with the majority of these databases being XML based.[[93]](#footnote-93)

Although drafters do not generally concern themselves with policy matters, during the analysis stage of drafting they take note of areas of potential danger inherent in proposed policy and legislative measures including personal rights; private property rights; retrospective legislation; inconsistency with international obligations and standards; doubtful territorial or constitutional competence and unnecessary bureaucracy.[[94]](#footnote-94) Examining these areas, computerised indexed information on existing laws and their judicial interpretation embodied in court decisions is a crucial asset to the drafter.

The analysis stage becomes more efficient if aided by automated systems capable of tagging and cross referencing certain data sets that help identify legislation which has been judicially scrutinised. One means of scrutiny is through semantic mark-up. Biagioli and Grossi note that semantic mark-up of legal texts requires, first and foremost, development of appropriate meta-data sets, which capture the formal structure of legal text instead of its content. The meta-data then requires systematic interconnection in order to reveal the semantic structure underlying the mark-up.[[95]](#footnote-95) Artificial intelligence possesses great potential for advancing the development of semantic metadata, which increasingly requires more stringent contextual homogeneity.

A final aspect of the drafter’s function in the analysis stage involves assessing the proposed measures for their ability to be administered effectively and equitably. Thornton notes that one way of assessing practicality is to determine whether the provisions will be enforceable after the draft has been completed, peer reviewed and further scrutinised. This stage, although largely reliant on the cognitive abilities of the drafter, is capable of partial automation through simulations based on the draft provisions.[[96]](#footnote-96) It is however doubtful whether the simulations would be effective due to the range of variables requiring imbedding into a computerised system to successfully simulate legal causality at the stage preceding that at which automated legal decision making currently occurs.[[97]](#footnote-97)

Having examined the first two of Thornton’s five stages of drafting, the specific roles of various technologies become clearer and areas that have received active attention or been neglected continue to emerge. After the analysis stage of the legislative process, the drafter moves on to the design stage.

3.4 Stage 3-Design

Thornton’s third stage is design. At this stage the drafter considers whether legislation is necessary to address the concerns identified in the instructions after analysis.[[98]](#footnote-98) Where legislation is necessary, the drafter creates the essential structure of the draft legislation before textual drafting. Thornton observes that design stage is an opportunity to examine material in its entirety, weigh the relative importance of the various subject elements and mentally group related concepts and determine the general presentation of material.[[99]](#footnote-99) Document assembly applications can assist the design stage prior to the textual drafting. The use of such systems at this stage however needs some customisation as it varies from the current computerised document assembly applications used for documents such as court forms and standard from contracts.[[100]](#footnote-100)

Discussing computer assisted legislative design, McIver notes that numerous legislative systems require documents to comply with established templates that dictate the types of structural elements allowable in text, such as chapters, parts, sections or subsections and how these are used. Additional rules place constraints on the way language itself is used in some instances.[[101]](#footnote-101) Since 2004 the United States House of Representatives established numerous styles by which legislation may be structured. These have consequently been expressed in the form of XML DTDs or schemas.[[102]](#footnote-102)

Thornton argues that design schemes must have some specified general characteristics. Design needs to strive for the greatest level of simplicity whilst still achieving the objectives of the proposed legislation. The actual positioning of provisions and structural elements such as short titles, commencement provisions, application provisions, definitions, interpretations and other provisions should ensure internal consistency with the general style of drafting the jurisdiction. The design should ensure that the arrangement of material, especially of a conventional nature is presented in a way that ensures cognisance of political realities to ensure successful passage of the law.[[103]](#footnote-103)

It is evident from the challenges the drafter faces at design stage that algorithms that generate legislative schemas and knowledge based systems would enable the drafter to increase the speed with which the drafter designs the legislative scheme before undertaking textual drafting. In designing a scheme the drafter must always recognise that the ultimate user must be able to use the legislation effectively.[[104]](#footnote-104) The Renton Committee noted that the interests of the ultimate user of legislation should always take precedence. The Bill should be primarily regarded as a future Act and drafted and arranged based on that premise.[[105]](#footnote-105)

Although often neglected, design is one of the stages that require as much automation and use of intelligent tools as possible since it is extremely intensive and takes a huge toll on the drafter. Responding to a question on timing of statute law review, a witness to the Renton Committee stated that although computers would never replace draftspersons, they could take over a significant amount of the arduous work of perusing through the books and manually checking resource materials.[[106]](#footnote-106)

A key feature that needs to be taken into account in the computerisation of Thornton’s design stage is that the basic structure of legislation may vary from jurisdiction to jurisdiction and therefore a ‘one size fits all’ or unduly restrictive or prescriptive system is not desirable as it inhibits the drafter’s freedom to innovate. This is potentially problematic since certainty in automation requires the elimination of variables that lead to imprecision in algorithms. Moran recognises that basic structure varies from jurisdiction to jurisdiction and observes that in Australia and Canada the citation clause is found at the beginning of an Act while in the United Kingdom it is at the very end of an Act. Additionally, in Australia and Canada definitions are generally located towards the beginning whereas in the United Kingdom they are toward the end.[[107]](#footnote-107)

In considering options for automation of legislative schema, Moran notes that another key factor is the amending formulas employed for textual changes to existing legislation.[[108]](#footnote-108) Moran further notes that lay-out or schema greatly affects the appearance of the final legislative product and identifies factors relevant to scheme design, including the font and its size, the amount of white space left on a page and the size and format headings.[[109]](#footnote-109)

The issues regarding automating the design stage require practical application and translation into automated systems especially where jurisdictions provide official legislation in electronic formats which are directly accessible by the various users. Automation of the design stage is an important area requiring more focus and concerted effort in order to make the overall drafting process more relevant.

3.5 Stage 4: Composition and Development

Composition and development is the fourth stage in the legislative drafting process. This stage involves the actual textual drafting of the Bill. For Thornton this stage a process in itself because, except for rudimentary Bills, the initial draft Bill signifies the start of a consultative process on the draft with the client and an ensuing succession of revised drafts necessitated by the consultation.[[110]](#footnote-110) Thornton states that during the development process, considerable mental fortitude is essential and progressively increases rather than declines. This stage requires continuous proof reading and cognitive processing in order to ultimately arrive at an acceptable draft.[[111]](#footnote-111)

Although the use of automation is most prolific at composition and development, it is also the most controversial stage as the automation inevitably results in attempts to ‘box’ a process that should ideally be freely creative. The use of automated proofing tools however proves invaluable at this stage. At this is the stage of drafting several scholars reflect on automated legislative drafting and the most automation occurs for development of efficient computerised drafting systems.

The composition and development stage ensures that as the Bill structure becomes increasingly robust, increasing attention is paid to the relationship each provision has in relation to other provisions and the role of each part to the coherent whole.[[112]](#footnote-112) Thornton emphasises that clear writing and logical and observable structure significantly contribute to comprehensibility although not guaranteeing trouble-free communication and ease of use due at times to complexity of the subject matter.[[113]](#footnote-113) Because of this complexity, style modelling is constantly performed in order to ensure legislative consistency. One effective means that has been applied in ensuring standardised structuring and language used in drafts is the use of computerised drafting assistance software.

The use of precedents in drafting has its acknowledged usefulness. Thornton notes that being largely imitative and inevitably pressured for time, the drafter constantly seeks relevant legislative precedents. Precedents offer useful idea source material useful in determining whether drafting instructions deal with all aspects they should deal with.[[114]](#footnote-114) The fact that precedents to a limited extent may contribute to the actual drafting entails that any systems designed to assist the drafting process need to feature information retrieval, textual support and balance creative processes with consistent legislative document structure. The composition and development stage provides several nuances and complexities that the use of computerised intelligent tools should constantly strive to surmount.

Discussing automation concerning composition and development, Haan notes that although textual support affords legislative drafters intelligent editors that embed the legislative format and information retrieval offers the relevant background information, drafters continually spend significant amounts of time codifying their ideas into rules.[[115]](#footnote-115) This is a cognitive function which tends to provide a great challenge in automating and imbedding into intelligent tools.[[116]](#footnote-116)

In applying intelligent tools to legislative drafting, drafting convention neutrality is necessary in the development of these intelligent systems. Moore argues that any systems, technological or otherwise, transported from one jurisdiction to another must recognise the significant cultural and legal differences between the jurisdictions. Caution must therefore be taken in automating systems not to overemphasise the differences as has been the case in the past.[[117]](#footnote-117)

In automating composition and development, the systems developed should be used to design solutions that provide optimal access to the resultant legislation. Moens and Logghe argue that in a constitutional state, it is imperative that legislation is accessible for every citizen.[[118]](#footnote-118) They further state that a substantial requirement for the use of digital legislative documents is that they must be uniquely defined using transparent and uniform identification of the data objects.[[119]](#footnote-119) Accordingly, statutes, statute components and articles, and versions must be identified in a clear and uniform way, which simplifies electronic management. Moens and Logghe state that using a unique identification frame when drafting legislation refers to the formal aspects of the statutes. They further observe that standardised rules for drafting legislation are not commonly used.[[120]](#footnote-120)

A further aspect of composition and development worth recognising relates to drafting style and how adaptable style is when automating composition and development. Voermans notes that style is concerned with the wording, structure and superstructure of legislative text, and its legal-cultural identity within its individual legal system environment and how that system is influenced by its origins, such as the civil or common law tradition.[[121]](#footnote-121) The argument relating to origins of style is however increasingly redundant, especially when examined in light of automated legislative drafting.[[122]](#footnote-122)

Haan argues in relation to automating composition and development that when legislation about law application has to be drafted, just the legal sources have to be modelled and moulded into the explicit reasoning architecture.[[123]](#footnote-123) Haan further argues that the best way is to utilise a legal knowledge based system that has already demonstrated its advantages, so its reasoning modules appropriately model the required category of legal reasoning.[[124]](#footnote-124) Legislative drafting has potential for simulation to check the consistency of the drafter’s reasoning process once the drafter has concluded the initial composition and development of the draft.

Thornton notes that composition and development incorporates extensive revision of the initial draft by both the drafter and the legislative proposer. This involves deliberations with sponsors and other interested parties and results in various amendments and criticisms of the draft. By the time the drafter reviews a Bill multiple times, sometimes ten or eleven times, the drafter’s ability to detect errors significantly diminishes and automated proof reading is therefore vital.[[125]](#footnote-125) Having examined four of Thornton’s five stages, the fifth stage to be examined is the scrutiny and testing stage, which deals with the scrutiny and testing of the draft text.

3.6 Stage 5: Scrutiny and Testing

The scrutiny and testing stage requires tremendous self-discipline because it requires the drafter to critically and objectively examine and review the draft as a complete legal instrument.[[126]](#footnote-126)

Scrutiny and testing requires intimate examination of the correctness of the drafter’s legal reasoning. Haan stresses that in order to assess its correctness legal reasoning can be tested by building fixed test cases which precisely anticipate law application outcomes. This testing method examines the legal reasoning structure preceding drafting and testing new legislation.[[127]](#footnote-127) For example, a fictional regulation can be drafted, in which exceptions and exclusions are embedded and which when availed to legal experts demonstrate generally identical reasoning patterns and provide precisely the same responses.[[128]](#footnote-128)

By far the most important utilisation of technology in scrutiny and testing is automated style checking, proof reading, error detection and document lifecycle management, which become progressively important with the increased reliance on electronic legislation. Moens and Logghe observe that for efficient management of digital documents, automated support during the complete lifecycle of the documents is essential to be incorporated in the creation and drafting process, document exchange, publication, archival in databases and retrieval. Automated support is also required for the management of the different versions of drafts.[[129]](#footnote-129)

Höfler and Sugisaki discuss prospects for automating style checking for legislative texts and an intelligent system for assessment of draft laws. They note that this would move drafters away from manual assessment, which is time-consuming and easily inconsistent because of the number of authors and editors involved in the drafting process.[[130]](#footnote-130) Ziegler notes that in order to assess the effectiveness and efficiency, a researcher needs to collect information on the attributes considered to impact effectiveness and efficacy.[[131]](#footnote-131) The only challenge becomes ascertaining what technique or combination of techniques is optimal for a precise evaluation.[[132]](#footnote-132)

Ziegler argues that it would be a significant advance in establishing the precision of legislation if mechanisms existed for automating the logic review process. Ziegler however acknowledges that methods for automated proof or disproof of a system of legal rules when examined at the more abstract level as a set of purportedly logical premises have been available for years.[[133]](#footnote-133) Admittedly, researchers have, however, mainly been able to check legislation for redundancy and contradiction in relation to syntactical context, as opposed to both syntactical and semantic analysis. Ziegler argues that currently, the tendency in research is towards the development of dependable logic review procedures for specific categories of legislation.[[134]](#footnote-134)

The scrutiny and testing stage demonstrates potential for automation although it still remains subject to limitations especially in simulating legislation as a means of anticipating efficacy.

Because the nature of legislative drafting entails highly specialised application, solutions devised to deal with challenges in the various stages of the drafting process need to take into account the special needs of the drafter.

Having examined the five stages of drafting the automation potentialities and challenges inherent throughout them, the next chapter will examine the opportunities and challenges in automating legislative drafting. The central question to be answered is whether there is a sustainable future for computer assisted legislative drafting.

**CHAPTER 4 OPPORTUNITIES AND CHALLENGES IN AUTOMATING LEGISLATIVE DRAFTING: SOME CASE STUDIES**

4.1 Underlying Assumptions

Having examined Thornton’s five stages of legislative drafting and assessed the potential for their automation, it is necessary to examine some automated systems used by various jurisdictions and determine which of Thornton’s five stages benefits from the most automation. This will help identify areas that require more focus in developing computerised intelligent tools. For decades, specific aspects of drafting that were being automated were identified and certain spheres for breakthrough and challenges were examined despite lawyers’ general technology scepticism.[[135]](#footnote-135)

Hélène Bauer-Bernetobserves that the introduction of computer technology in law necessitates concerted effort toward improved organisation and as such, compels individuals to identify in one way or another imprecisions of legal language and legal thought.[[136]](#footnote-136) She further argues that for legislative drafters, information science comes with pressure toward greater discipline in presentation and organisation of statutes, and that to optimise the performance of documentation systems, drafters should pay special attention to the numbering of sections, chapter and paragraph headings, formulation of introductions to statutes and the applicable principles of drafting.[[137]](#footnote-137)

Fitzpatrick has discussed how technologies sometimes take a defined path because it is the most socially accepted or trusted path or because it is simpler to build upon work initially conducted in a particular way and subsequently build upon derivative work with infinite possibility of further utilisation of derivative work. Fitzpatrick notes that although this approach has tended to yield some positive results, this does not necessarily mean that the results attained are the best.[[138]](#footnote-138) This phenomenon present in work relating to computer assisted legislative drafting, which centres on XML applications utilising Microsoft Word as the basic word processing tool, despite the existence of other word processors. Although a significant number of drafting offices may use proprietary software as a basis for designing their computer assisted drafting platforms, a number may rely on different platforms.[[139]](#footnote-139)

The need for different approaches to the design of the basic framework of various applications is premised, sometimes mistakenly, on assumption that all drafting work and applications use or ought to use the same basic framework. This means that there is no universally acceptable solution developed to aid legislative drafting and furthermore there remains tremendous scope for innovating new systems.[[140]](#footnote-140)

4.2 Where we are now

Voermans notes that interest and research into legimatics, especially in Europe is thriving. Voermans further notes that after Layman E. Allen, and Mark Sergot among others, demonstrated that computer science, particularly AI-techniques, bore significant relevance for legislative drafting, different projects throughout the world were initiated.[[141]](#footnote-141) Voermans additionally observes that researchers such as those at the *Italian 'Istituto per la Documentazione Giuridica del C.N.R.*' have pioneered in this field since 1986.[[142]](#footnote-142) Voermans further says that it is considered that state-of-the-art computer-assistance for legislative drafting potentially means beneficial support in the arena of systematic quality-control of bills.[[143]](#footnote-143)

Computer systems that facilitate legislative drafting require certain characteristics to practically benefit drafters. According to Meons and Logghe, drafting and modification of legislative text must guarantee the technical characteristics of the documents, such as correct structure, identification codes, mark-ups for essential reference data and appropriate electronic exchange formats essential for subsequent publication and database storage.[[144]](#footnote-144)

In some jurisdictions, legislation is officially published in digital format requiring the essential support for assuring the quality, genuineness and a long term preservation of the documents. Meons and Logghe note that on publication, the official versions of legislative text and its reference data can immediately be stored in databases. Consequently, when a provision of an existing statute requires modification, access to the correct, official, latest version of the provision in digital format is available. Modified text versions and the accompanying legislation that justifies the modification can then be electronically published and archived.[[145]](#footnote-145)

Computer assisted legislative drafting is by no means an easy task to facilitate or accomplish as a standalone process. Moens and Logghe observe that despite decades of research into automated support for legislative drafting and attempts to implement practical systems, the most successful systems are components of larger workflow systems for electronic document management, and provide simple interfaces and consistency check functions for drafting the texts.[[146]](#footnote-146) It has been noted that little attention is paid to the existence and management of historical versions of legislative text when automatically supporting the drafting. Historical versions, however, are at the core of management of legislation. Further, research into document structures and properties of digital legislation and of other legal documents has hitherto received little attention.[[147]](#footnote-147)

4.3 System Architecture and Functionality

The examination of automated systems takes two dimensions. One dimension looks only at outward appearance of user interface while the other looks at the system architecture. The examination of automated drafting systems therefore needs bear these two dimensions in mind. In order to fully appreciate the current development of the various applications and projects that are occurring around computer assisted legislative drafting, some basic conceptual issues are worth remembering.

Voermans and Verbaten state that compared to other forms of legal problem-solving, legislative problem-solving, which involves decision-making directed at legislative enactment, significantly depends more on world knowledge and equally encompasses, throughout the different phases, substantial political, economic and social-scientific reasoning.[[148]](#footnote-148) Voermans and Verbaten further argue that the legislative process does not primarily result in legally valid or invalid conclusions *per se*, but rather in “relatively appropriate” solutions, or in convincing arguments. Comprehensive automation of legislative reasoning by means of artificial intelligence methods and techniques is arguably still not feasible, owing to the complexity of reasoning and the structure of the knowledge involved.[[149]](#footnote-149)

Voermans and Verbaten do not eliminate the relevance of legal computer science and artificial intelligence techniques for definite legislative activities, even though they may depend on legal knowledge. They further argue that legislative support systems will require development in conformity with the exact characteristics of legislative activities.[[150]](#footnote-150)

Yannopoulos argues that in order to implement expert systems, special programming languages such as PROLOG and LISP are generally utilised.[[151]](#footnote-151) Several of the mechanisms required for an expert system are inherent in the language and several inference engines for expert systems are similar to the PROLOG inference engine.[[152]](#footnote-152) Yannopoulos suggests that another solution for modelling of legal decision making is use of an expert system shell, which provides researchers with ready-made inference mechanisms on which to design and construct expert systems, thus eliminating the requirement to design and write the code for a highly individualised inference engine. Yannopoulos further elaborates that shells are created by eliminating the domain-specific knowledge of an existing expert system and retaining the inference sub-system, which is subsequently applied to a different problem domain.[[153]](#footnote-153)

Yannopoulos demonstrates that with the right focus the theoretical and technological basis exists for the design of standalone drafting support systems. The systems however, would have to be basic enough for even the most technologically antipathetic drafter to increase their drafting efficiency.

Another important issue to note is that the choices of approaches in development of drafting assistance systems necessitates consideration of standardisation to the greatest extent possible, especially where useful data sets exist on a global scale in a variedly diverse range of formats and structures.[[154]](#footnote-154) Agnoloni *et al* have posited that in recent years a standardisation process of legislative documentation, motivated by the migration of legislative data collections on the web, has commenced both in the National and European environment.[[155]](#footnote-155)

From the preceding arguments, various approaches adopted to develop effective systems architecture to facilitate computer assisted legislative drafting will invariably lack the precision that the human mind possesses when cognitively performing a similar task. This is because of the current inability of systems to adequately catalogue, map and extrapolate the diverse range of variables that require ‘human sensibility and common sense’ to appropriately factor into the drafting process. [[156]](#footnote-156)

4.4 Some Solutions Developed for Automated Legislative Drafting

A. Propylon- Legislative Work Bench

The legislative work bench is used for computer assisted legislative drafting, among other functions.[[157]](#footnote-157) Features include Bill drafting, automated consolidation and codification, viewing document changes over time, improved understanding of legislative intent, legislative content indexation and faceted searches[[158]](#footnote-158) It is used in the Kansas State Legislature, North Dakota State Legislature, Pennsylvania State Legislature, Ohio legislature, Ireland and Northern Ireland.[[159]](#footnote-159)

B. TeraText

The TeraText provides accesses to the correct state of the law at any point in time.[[160]](#footnote-160) It is utilised in Canada, Australia, and Papua New Guinea to manage and at automate numerous Bill drafting and publishing stages. It is the basis of the EnAct system in Tasmania and Papua New Guinea, Legislation Information System (LEGIS) system in New South Wales and Australian Federal Parliament, and the Legislation Editing and Authentic Publishing (LEAP) system developed for the Singapore government.[[161]](#footnote-161) It provides fragmentation capabilities allowing management of large pieces of legislation both as whole documents and as individual components to be versioned independently of the whole document.[[162]](#footnote-162)

C. EnAct

EnAct is an intelligent legislative drafting, management solution, web-based electronic repository and delivery system designed to enable the Tasmanian Government (Australia) to produce, distribute and enable public access to reliable, up-to-date, searchable consolidated Tasmanian legislation. The Legislation Publication Act 1996 established the legislation in EnAct as the authorised version.[[163]](#footnote-163) The key features of the system include automatic consolidation of amendment legislation on commencement; true ‘point-in-time’ searching of consolidated legislation; automated drafting and amendment tools and advanced indexed searching and browsing.[[164]](#footnote-164)

D. Akoma Ntoso

This is an open XML standard initiated in 2004-2005 within the project ‘Strengthening Parliaments’ Information Systems in Africa’. Akoma Ntoso describes structures for legal documents in XML, references documents within and across countries using URIs and systematically adds metadata to documents using ontologically sound approaches.[[165]](#footnote-165)

E. NormeInRete (NIR)

This project aims at making the retrieval and navigation among normative documents in a distributed environment easier. A specific law drafting environment, NIREditor, produces normative documents according to the NIR standards. Particularly, it handles the formal structure and the semantics of a law according to legislative drafting rules. Specific tools able to automatically transform legacy contents according to NIR standards and to detect the semantics have been devised. A module able to plan a new bill from a conceptual point of view is proposed.[[166]](#footnote-166) The Italian legal domain has identified regular structure in legal provisions, making it possible to use a text editor to mark up semi-automatically structural partitions and normative references.[[167]](#footnote-167)

Apparent from the sample solutions available for computer assisted legislative drafting is that they are generally XML based. Although these solutions exist and are potentially available to various jurisdictions, there are underlying capacity issues that require resolution before some jurisdictions can effectively use them. Despite this, there continue to be projects developed for the promotion of drafting efficiency.

4.5 Challenges Faced in Computer Assisted Drafting

The development of XML based computerised legislative drafting systems has been undertaken through various governmental and intergovernmental projects in various jurisdictions with varying success. The projects identified various challenges restricting development of computerised legislative drafting applications, such as manual acquisition and input of data into databases, which is tedious and expensive and requires skilled specialists.[[168]](#footnote-168) In order to address the challenges associated with XML structuring, projects such as the Belgian Agora Lex Project were devised.[[169]](#footnote-169) The model enables requesting the valid text of a statute at each moment in the history of the statute as it is valid in a territorial area.[[170]](#footnote-170)

The Agora-Lex project demonstrates that management of digital legislation is complex. The main reason for the complexity is that legislative drafting historically uses manual practices which have not successfully taken into account that because of its general overload, legislation needs to be automatically managed. The legislation is currently not made for being part of a workflow in which documents are electronically exchanged.[[171]](#footnote-171) This characteristic has also resulted in ontological deficiencies in some databases. [[172]](#footnote-172) In some jurisdictions, the laws relating to the format and numbering conventions of legislation impose additional obstacles to the development of electronic legislation management systems.[[173]](#footnote-173)

Although XML demonstrates versatility of use in automating legislative drafting, some challenges have been identified that are associated with the use of XML based documents for legislation.[[174]](#footnote-174) It has been noted that in recent years, various legislatures have perceived the XML based standards as the best route to leveraging IT.[[175]](#footnote-175)

At face value, legislative documents such as bills and statutes appear to have a predictable, hierarchical structure, making them very amenable to the standard XML model. Although XML plays a significant role in legislatures, the indiscriminate application of many standard XML patterns and tools potentially creates more problems than it resolves. For example, algorithms applied in page layout systems to determine line and page boundaries are extremely varied and no two XML-based back-ends would establish line and page breaks in identical places.[[176]](#footnote-176)

Other challenges of XML based drafting concern legislative formality for legislative validity of statues. Critically, integral to the XML standard model is the concept of an information schema.[[177]](#footnote-177) Although on the face of it, devising information schema should be simple, in reality there is an incredible assortment of terminology and equally tremendous non-overlapping definitions of similar terminology. Because of identified challenges,[[178]](#footnote-178) arguably some of the largest XML failures in legislative information technology applications have resulted from developers not appreciating the boundaries of the XML standard model in legislative environments.[[179]](#footnote-179)

The application of technology to legislative drafting in Thornton’s five stages, based on the solutions available currently demonstrates promise for increasingly efficient systems for computer assisted legislative drafting, especially in an internationalised context.[[180]](#footnote-180) The role of the drafter in the process of automation as an advocate for change also needs to be highlighted and encouraged at every opportunity as a major user of automated drafting systems.[[181]](#footnote-181) Additionally, underlying policy choices in the legislative process have a cascading effect on the ability of automated legislative drafting systems to cope with the volume and scope of legislative demands placed upon them.[[182]](#footnote-182) Having examined the opportunities and challenges that have been presented by the development of computerised systems and their contribution to legislative drafting, the next chapter will examine future prospects for computerised legislative drafting.

**CHAPTER 5 CONCLUSION: THE FUTURE OF INTELLIGENT TOOLS IN LEGISLATIVE DRAFTING**

5.1 Reflections on Automating Thornton’s Five Drafting Stages

Thornton’s five stages of drafting in essence are procedures for the development and simulation of a legal regulatory system through a five stage process. Thornton’s five stages have undergone some form of automation, whether intentionally targeted at the drafting process itself or as part of a broader legimatics objective, with attendant challenges may require a concerted approach reminiscent of Jenks’ legislative drafting bureau.[[183]](#footnote-183)

One notable factor that will impact the future prospects for the development of computer assisted drafting is the taking into account of the actual work of the drafter before a draft is created by the drafter and is inputted into a computerised system. Seidman and Seidman observe that social science has scarcely discussed the drafter’s role and that political scientists are inclined to perceive the law-making process as one dominated by power.[[184]](#footnote-184) They further argue that relevant literature neglects the drafter’s designer role of with the consequence that until the very recent rise of legisprudence, legal academia perceived drafters as mere scriveners.[[185]](#footnote-185) The development of computerised legislative solutions has in some cases adopted this trend with the result that solutions have been designed in a manner that constrains the ability of the drafter as a legislative designer.

As things stand currently, most legislative drafting programs are predicated on an individual drafter manually creating a fairly structured draft to which intelligent tools available for legislative drafting are applied. Essentially, in the absence of human intervention from the origin, with the current state of technology, no drafting can take place. Perhaps the real question becomes not which direction automated legislative drafting should take, but rather whether formalised paper-based legislation should continue as the basic tool for legislative risk management and social regulation.

Seipel notes that ICT is made up of rudimentary elements which have existed since the advent of the technology, whose relative significance and visibility continually evolve. These are automation, information, communication, integration, and sensation.[[186]](#footnote-186) In light of this observation, the process of legislative drafting has to evolve along these lines in order to meet the demands of the ever changing information and integrated society. The days when the drafter insisted on sitting behind a desk surrounded by piles of legislation in thick heavy loose leaf leather bound volumes are rapidly becoming a thing of the past. The increasing recognition of electronic laws means various countries will increasingly automate their legislative drafting process.

5.2 Automating Legislative Drafting or Redefining Legal Solutions?

Wahlgren argues that legislation is presently to be under immense strain. Technical innovation, internationalisation and the development of legal information modify assumptions at an increasingly accelerating rate. Wahlgren argues that such developments do not simply affect the issues to be regulated but further challenge the concept of legislation *per se*. Wahlgren states that it is in numerous ways obvious that conventional methods of solving legal problems are increasingly becoming less efficient, and that different solutions must be considered.[[187]](#footnote-187)

The developments that have taken place in the area of computer assisted legislative drafting have been significant enough exponentially reduce turnaround times and solutions continue to improve as the technology advances, despite challenges related to language structuring, logic and the semantics.[[188]](#footnote-188) From the current trajectory of the development of computer systems facilitating legislative drafting, it is possible to surmise that the effort being undertaken internationally by drafting offices and parliaments is towards increasing automation of legislative drafting and electronic publication of laws. This is the only concrete way of managing the ever increasing volume of legislative text both in form of primary and secondary legislation.[[189]](#footnote-189)

5.3 Conclusion

This discussion examined the potential, opportunities and challenges of automating legislative drafting through the use of intelligent tools in order to prove the hypothesis that the legislative drafting process can be made more efficient by the systematic adaptation, application and use of automation and computerised intelligent tools.

From the discussion and analysis undertaken, it is apparent that although automating part of the legislative process can assist the drafter in the drafter’s core function, automation is not an end in itself especially because of the nature of the drafting function. The fact the freedom to creatively resolve legislative problems by the drafter requires vast imagination and innovative thinking means that the process cannot be constrained within the ‘straight jacket’ of restrictive design of automated systems and intelligent tools.

This analysis has also demonstrated that the automation of the legislative drafting process is in no way perfected and that research to improve the tools available for the automation of legislative drafting continues. Further, although some intelligent tools are available to conveniently facilitate the more efficient execution of legislative drafting tasks, these tools still operate in an environment that has challenges associated with language and the semantic associations of words in legislation and in databases.

The analysis of Thornton’s five stages of drafting also demonstrates that the composition and development stage has received the most devoted attention as a process independent of a wider information management process not specifically associated with legislative drafting. The tools available for assisting the understanding, analysis, and scrutiny stages, although widely available have not been specifically designed purely for legislative drafting support and are still subject to issues associated with open and closed data sets available online and associated access protocols. The need for legislative databases to be more interconnected or accessible to legislative drafters on as global a scale as possible also becomes increasingly important and various initiatives continue to facilitate such access.

It has also been noted from the discussion that there is greater effort to harmonise the approach to development of tools that facilitate the legislative drafting process, particularly in light of the changes of style that periodically occur based on need. There still remains a great need for research into the automation of legislative drafting to have a greater balance of researchers from both the drafting and the information technology and related fields in order to adequately anticipate and resolve the challenges associated with automated legislative drafting within the broader legimatics framework. Artificial intelligence provides promise for the development of increasingly efficient tools to facilitate the legislative drafting process and ensure that the drafter applies appropriate methods to meet the demands of the information age.

Most important of all however is the realisation that no amount of automation can replace the need for highly trained and competent draftspersons that can effectively leverage the technology developed to optimise their efficiency in the execution of their core function of drafting effective legislation.

In conclusion, the automation of legislative drafting is the only practical direction for the simplification of an otherwise laborious process that is often taken for granted, especially because of the misconception that the bulk of the legislative drafting work takes place within the precincts of a parliament as opposed to occurring in a drafting office under the watchful eye of the Executive organ of government.

**BIBLIOGRAPHY**

Aamodt, S. and Wang, S. *Welcome to Your Brain*, (Bloomsbury, 2008).

Agnoloni, T., Francesconi, E. and Spinosa, P. “xmLegesEditor: an OpenSource Visual XML Editor for supporting Legal National Standards”, Institute of Legal Information Theory and Techniques (ITTIG-CNR) Italian National Research Council at <http://www.ittig.cnr.it> on 3 June 2015.

Arnold-Moore, T. “About Time: Legislation’s Forgotten Dimension” TeraText Database System White Paper Series (2002).

Arnold-Moore, T. “Point-in-time publication of legislation (XML and legislation) Automating consolidation of amendments to legislation in common law and civil jurisdictions” (2004) at <http://www.frlii.org/IMG/pdf/2004\_frlii\_conference\_tja.pdf> on 19 May 2015.

Auletta, G. Colage, I. and Jeannerod, M. (eds), *Brains Top Down- Is Top Down Causation Challenging Neuroscience?,* World Scientific Publishing Company Pte Ltd. (2013).

Baars, B. and Gage, N. (eds*), Cognition, Brain, and Consciousness: Introduction to Cognitive Neuroscience,* Academic Press, (2010).

Barth, F. "Models of Social Organization" (Royal Anthropological Institute Occasional Paper 23 [Glasgow: University Press] 1966).

Bauer-Bernet, H. “Effect of Information Science on the Formation and Drafting of Law” (1973-1974) 14 Jurimetrics J. 235.

Bear, M. Connors, B. and Paradiso, M. *Neuroscience Exploring the Brain*, Walters Kluwer, (4th North American Edition, 2015).

Bennion, F. “A Computer Experiment in Legislative Drafting” (1975) Computers and the Law: Documents List: 1975.004 at <www.francisbennion.com> on 26 March 2015.

Bennion, F. “The Renton Report” 125 NLJ (10 Jul 1975).

Biagioli, C. “Law Making Environment” Istituto per la Documentazione Giuridica, Italian National Research Council.

Biagioli, C. and Grossi, D. “Formal Aspects of Legislative Meta-Drafting” ICR, University of Luxembourg, Luxembourg.

Biagioli, C. *et* *al*, “Legislative drafting support tool based on XML standards” ITTIG - Institute of Legal Information Theory and Technologies at < http://www.ittig.cnr.it> accessed 1 June 2015.

Biagioli, C. *et* *al*, “The NIR Project Standards and tools for legislative drafting and legal document Web publication” ITTIG - Institute of Legal Information Theory and Technologies at < http://www.ittig.cnr.it> on 1 June 2015.

Gordon, T. (ed.), *Legal Knowledge and Information Systems. Jurix 2004*: The Seventeenth Annual Conference. Amsterdam: IOS Press, 2004.

Bourcier, D. (ed.), *Legal Knowledge and Information Systems. Jurix 2003: The Sixteenth Annual Conference*, Amsterdam, (IOS Press, 2003).

Bowman, G. “The Art of Legislative Drafting” Sir William Dale Annual Memorial Lecture, [2005] 7 Eur. J.L. Reform 3 for a practical elaboration of Thornton’s five stages of legislative drafting.

Kralingen, R. et al, *Legal Knowledge Based Systems JURIX '96* *Foundations of Legal Knowledge Systems*. (Tilburg University Press 1996).

Breuker, J., Leenes, R. and Winkels, R. (eds.), *Legal Knowledge and information Systems. Jurix 2000: The Thirteenth Annual Conference. Amsterdam* [2000] IOS Press.

Brighi, R. *et al*, “Towards Semantic Interpretation of Legal Modifications through Deep Syntactic Analysis” at <http://www.normeinrete.it> on 2 June, 2015.

Buchanan, B and homas Headrick, T “Some Speculation about Artificial Intelligence and Legal Reasoning” (Nov 1970) Stanford Law Review, Vol 23, No 1, 40-62.

Carter R. *et al*, *The Human Brain Book* (DK Publishing 2014).

Cormacain, R. “Have the Renton Committee’s recommendations on electronic access to legislation been fulfilled?” (2013) 19(3) Web JCLI.

Crabbe, V. *Legislative Drafting* (Cavendish, 1993).

Dickerson, R. *Legislative Drafting*, (Greenwood Press, 1954).

Dijkstra, J. “User interaction with legal knowledge-based systems” *Legal Knowledge and information Systems. Jurix 2000*, 11-21.

Falconer, P. Smith, C. and Webster. C. (eds.), Managing Parliaments in the 21st Century, IOS Press/Ohmsha/IIAS, Amsterdam, Berlin, London, Tokyo, Washington DC, 51-57.

Fitzpatrick, G. “An Essay on Information Technology and Trust” in Cecelia Magnusson Sjöberg (ed.), *Legal Management of Information Systems-Incorporating Law in E-Solutions, Studentlitteratur,* (Lund, 2005), 78.

Flemisch, F. *et al* “Towards a dynamic balance between humans and automation: authority, ability, responsibility and control in shared and cooperative control situations” Cogn Tech Work (2012) 14:3–18.

Francesconi, E. *et al* “A linguistic-ontological support for multilingual legislative drafting: the DALOS Project” (ITTIG-CNR) Italian National Research Council at <http://www.ittig.cnr.it> on 3 June 2015.

Gostojić, S. *et al*, “Ontological Model of Legal Norms for Creating and Using Legislation” ComSIS Vol. 10, 152 No. 1, January 2013.

Greenberg, D. “Dangerous trends in modern legislation” P. L 2015.

Greenberg, D. “The Nature of Legislative Intention and Its Implications for Legislative Drafting [2006], Statute Law Rev 27 (1) 15.

Haan, N. “Tools for automated legislative drafting” at <http:// lri.jur.uva.nl~nienke> on 3 June 2015.

Höfler S. and Sugisaki, K. “From Drafting Guideline to Error Detection: Automating Style Checking for Legislative Texts” Association for Computational Linguistics (April 23, 2012) Proceedings of the EACL 2012 Workshop on Computational Linguistics and Writing, Avignon, France, 9–18.

Höfler, S., Bünzli, A. and Sugisaki, K. “Detecting Legal Definitions for Automated Style Checking in Draft Laws” at <http://www.cl.uzh.ch/research/techreport/TR\_2011\_01.pdf> on 19 May 2015.

International, 'EnAct' (lawin.org 2013) <http://lawin.org/enact> on 10 August 2015.

Jenks, W “The American Journal of International Law”, (Apr., 1945) Vol. 39, No. 2 163-179.

Johnson, S. *Where Good Ideas Come From: the Natural History of Innovation*, (Riverhead Books, 2010).

Kauffman, B. “Automated Legislative Information Systems: A New Tool for Legal Research” [1983] 76 Law. Libr. J, 233.

Krishnamoorthy, C. and Rajeev, S. *Artificial Intelligence and Expert Systems for Engineers,* (CRC Press LLC, 1996).

Lambert, D. “Automating Cognitive Routines”, Proceedings of the 6th International Conference on Information Fusion, (2003 Cairns, Australia) 986 - 993.

Lauritsen, M. “Current Frontiers in Legal Drafting Systems” A Working Paper for the 11th International Conference on AI and Law, Stanford University June 2007.

Legislative Workbench (LWB) Technical White Paper Version 1.0 Propylon Inc. at <https://www.propylon.com/images/pdf/lwb\_white\_paper.pdf> on 1 June 2015.

Lepofsky, D. “Universal Design in Legislation: Eliminating Barriers for People with Disabilities” [2009] Statute Law Rev 30 (2) 97.

McIver, W., “Software Support for Multi-Lingual Legislative Drafting” CIRN 2004 Conference and Colloquium: Sustainability and Community Technology, Monash University, Prato, Tuscany, Italy, September 29 - October 1 2004.

Moens, M. ‘XML Retrieval Models for Legislation’ in T. Gordon (ed.), *Legal Knowledge and Information Systems. Jurix 2004: The Seventeenth Annual Conference*. Amsterdam (IOS Press 2004) 1-10.

Moens, M. “Legislative Databases: Current Problems and Possible Solutions [2002] Int J Law Info Tech 10 (1) 1.

Moore. A.T. *et al*, 'Connected to the Law: Tasmanian Legislation Using EnAct', 2000 (1) The Journal of Information, Law and Technology (JILT) at <http://www.law.warwick.ac.uk/jilt/00-1/arnold.html> on 1 June 2015.

Moran, E. “Legislative Drafting Without Borders” [2012] 1 I.J.L.D.L.R. 170.

Nyman-Metcalf, K. and Täks, E. “Simplifying the law-can ICT help us?” [2013] Int J Law Info Tech 21 (3) 239.

Palmirani, M. “Akoma Ntoso: XML Open Standard for Legal Resources” Washington, House of Representatives 4 November 2009, World e-Parliament Conference 2009.

Paz, E. et al, *A Brief Illustrated History of Machines and Mechanisms,* (Springer, 2010).

Propylon Legislative Workbench at <https://www.propylon.com/index.php/products/legislative-workbench-lwb> on 1 June 2015.

Regan, P. “Enacting Legislation—a Civil Servant’s Perspective” (2012) Statute Law Review 34(1) 32–38.

Renton Committee, “The Preparation of Legislation” (Cmnd. 6053, 1975).

Renton, D. “Failure to Implement the Renton Report”, (An address given by the Rt. Hon. Sir David Renton, Q.C., M.P., [later Lord Renton] to the Statute Law Society on 6 April 1978). Sweet and Maxwell 18.

Revell, D. “Enhancing the Legislative Process: The Value of the Legislative Drafter – [2011], Statute Law Rev 32 (2) 149.

Russell, S. and Norvig, P. *Artificial Intelligence: A Modern Approach*, (3rd Edn, Pearson Education, Inc, 2010).

Sack, W. “Artificial Human Nature” Design Issues, (Summer, 1997) Vol. 13, No. 2, A Critical Condition: Design and Its Criticism, The MIT Press.

Santhanam, R. and Elam, J. “A Survey of Knowledge-Based Systems Research in Decision Sciences (1980-1995)” (May, 1998), Vol 49, No. 5 445-457.

Sartor, G. *et al*, *Legislative XML for the Semantic Web- Principles, Models, Standards for Document Management*, (Springer, 2011).

Sartor, G. Palmirani, M. and Biasiotti, M. *Legislative XML For The Semantic Web- Principles, Models, Standards for Document Management*, (Springer, 2011).

Schulte, L. “A Survey of Computerized Legislative Information Systems” [1979], 72 Law Libr. J, 99.

Seidman, A and Seidman, R ‘ILTAM: Drafting Evidence-Based Legislation for Democratic Social Change’ (2009) Vol. 89, BUL Rev, 435-485.

Seidman, A. and Seidman, R. “Drafting Legislation for Development: Lessons from a Chinese Project” The American Journal of Comparative Law, (Winter, 1996) Vol. 44, No. 1, 1-44.

Seipel, P., “Law and ICT. A Whole and its Parts” at <http://www.itkommissionen.se/dynamaster/file\_archive/030121/b1014e7c957c06525d934d7046bf8e70/2.1%20%20In%20Search%20of%20a%20Perspektive%20-%20Peter.Seipel.pdf> on 1 June, 2015.

Sjöberg, C. “Legal Information Supply and the Digital Divide” Stockholm Institute for Scandinavian Law 1957-2010.

Soeteman, A. (ed), Legal knowledge based systems JURIX 94: The Foundation for Legal Knowledge Systems, Lelystad: Koninklijke Vermande, 1994.

Stefanou, C. and Xanthaki H. (eds), *Drafting Legislation A Modern Approach* (Ashgate, 2008).

Susskind, R. “A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning” The Modern Law Review, (Mar., 1986), Vol. 49, No. 2, 168-194.

Susskind, R. *Essays on Law and Artificial Intelligence* (1993) Complex 7/93, Norwegian Research Center for Computers and Law 3.

Susskind, R. *The End of Lawyers?* (Oxford University Press, 2008).

Susskind, R. *The Future of Law, Facing the Challenges of Information Technology* (Oxford University Press, 1996).

Susskind, R. *The Susskind Interviews* (Sweet & Maxwell, 2005).

Susskind, R. *Tomorrow's Lawyers* (Oxford University Press, 2013).

Susskind, R. *Transforming the Law* (Oxford University Press, 2000).

Svensson, J.S., Wassink, J.G.J. and van Buggenhout B. (eds.), *Legal knowledge based systems JURIX 95*: *Intelligent Tools for Drafting Legislation, Computer – Supported Comparison of Law*, (1993 Lelystad: Koninklijke Vermande).

Svensson, J.S.. Wassink, J.G.J and van Buggenhout B. (eds.) Legal Knowledge Based Systems: Jurix '93: Intelligent Tools for Drafting Legislation, Computer-Supported Comparison of Law, (Lelystad: Koninklijke Vermande 1993).

TeraText at <http://www.teratext.com/products/teratext-for-legislation.asp> on 10 August 2015.

Thornton, G. *Legislative Drafting*, (4th edn, Butterworths, 1996).

Todd, P. and Benbasat, I., “The Use of Information in Decision Making: An Experimental Investigation of the Impact of Computer-Based Decision Aids”, MIS Quarterly, (Sep., 1992) Vol 16, No 3 373-393.

Turnbull, I. “Problems of Legislative Drafting”, [1986] Statute L. Rev. 67.

Ubena, J. “How to Regulate Information and Communications Technology? A Jurisprudential Inquiry into Legislative and Regulatory Techniques” (Stockholm: Jure, 2015).

Voermans, W. “Computer-assisted legislative drafting in the Netherlands: the LEDA system”, 1 at <http://www.researchgate.net/publication/268001034\_Computer-assisted\_legislative\_drafting\_in\_the\_Netherlands\_the\_LEDA-\_system> on 1 May 2015.

Voermans, W. “Modelling the draughtman's craft: the LEDA-project Legimatics and legimatica-projects in the Netherlands”, 109-132. at <https://openaccess.leidenuniv.nl/bitstream/handle/1887/3658/360\_070.pdf?sequence=1> on 3 June 2015.

Wintgens, L. (ed), *Legisprudence: A New Theoretical Approach to Legislation* Proceedings of the Fourth Benelux–Scandinavian Symposium on Legal Theory (Hart Publishing, 2002).

Voermans, W. “Styles of Legislation and Their Effects, [2011] Statute Law Rev 32 (1) 38, 42.

Voermans, W., Fokkema, van Wijk, W. “Free the Legislative Process of its Paper Chains: IT-inspired Redesign of The Legislative Procedure” at <http://ssrn.com/abstract=1855595> on 1 June 2015.

Wahlgren, P. (ed.) *IT Law* (2004) Scandinavian Studies in Law Vol. 47, Stockholm Institute for Scandinavian Law.

Winkels, R. and Haan, N. Automated Legislative Drafting: Generating paraphrases of legislation” at <http://www.buscalegis.ufsc.br/revistas/files/anexos/3048-3042-1-PB.pdf> on 1 June, 2015.

Worthley, J. “Legislative Information Systems: A Review and Analysis of Recent Experience” The Western Political Quarterly, (Sep., 1977) Vol. 30, No. 3, 418-430.

Xanthaki, H. “European Union Legislative Quality after the Lisbon Treaty: The Challenges of Smart Regulation” [2014] Statute Law Rev 35 (1): 66.

Xanthaki, H. “Legislative drafting styles: is there really a common versus a civil law divide?” (2009).

Xanthaki, H. “Legislative drafting: a new sub-discipline of law is born” ALS Student Law Review, Volume 1, Issue 1, Autumn 2013, 57-70.

Yannopoulos, G. *Modelling Legal Decision Process for Information Technology Applications in Law*, (1998) Kluwer Law International, 135.

Ziegler, P. “Information Collection Techniques for the Evaluation of the Legislative Process”, (1988 Statute L. Rev.) 160-185.

Ziegler, P. “The Status of Normalized Drafting: The Need for Theory Building and Empirical Verification” (1989, 27 Osgoode Hall L. J.), 337.

**Table of legislation**

Acts of Parliament Act 1960 (CA 7) Ghana.

Acts of Parliament Act Chapter 3 of the Laws of Zambia.

1. Constantin Stefanou, ‘Drafters, Drafting and the Policy Process’ in Constantin Stefanou and Helen Xanthaki (eds), *Drafting Legislation A Modern Approach* (Ashgate, 2008) 4. [↑](#footnote-ref-1)
2. G. Thornton, *Legislative Drafting* (4th edn, Butterworths, 1996) 1. [↑](#footnote-ref-2)
3. Ibid 1. [↑](#footnote-ref-3)
4. Ibid 124. [↑](#footnote-ref-4)
5. Daniel Greenberg, ‘Dangerous Trends in Modern Legislation’ (Jan 2015) P. L. 96,97. [↑](#footnote-ref-5)
6. Ibid 97. [↑](#footnote-ref-6)
7. Greenberg (n 5) 97. [↑](#footnote-ref-7)
8. Richard E. Susskind, ‘A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning’ (Mar., 1986) Vol. 49, No. 2 The Modern Law Review 168, 171. [↑](#footnote-ref-8)
9. C.S. Krishnamoorthy; S. Rajeev, *Artificial Intelligence and Expert Systems for Engineers,* (CRC Press LLC, 1996) Para 1.2. [↑](#footnote-ref-9)
10. F. A. R. Bennion, ‘A Computer Experiment in Legislative Drafting’ (1975) Computers and the Law: Documents List: 1975.004 at <www.francisbennion.com> accessed on 26 March 2015. [↑](#footnote-ref-10)
11. Ibid. [↑](#footnote-ref-11)
12. See also John A. Worthley, ‘Legislative Information Systems: A Review and Analysis of Recent Experience’ (Sep., 1977) Vol. 30, No. 3, The Western Political Quarterly 418. [↑](#footnote-ref-12)
13. Thornton (n 2) 127-128. [↑](#footnote-ref-13)
14. Ibid 128. [↑](#footnote-ref-14)
15. Wim Voermans, ‘Computer-assisted legislative drafting in the Netherlands: the LEDA system’ 1 at <http://www.researchgate.net/publication/268001034\_Computer-assisted\_legislative\_drafting\_in\_the\_Netherlands\_the\_LEDA-\_system> accessed 1 May 2015. [↑](#footnote-ref-15)
16. Philip Eijlander, ‘The possibilities and limitations of using intelligent tools for drafting Legislation’, in: J.S. Svensson, J.G.J. Wassink, B. van Buggenhout (eds.), *Legal knowledge based systems JURIX 95*: *Intelligent Tools for Drafting Legislation, Computer – Supported Comparison of Law*, (Lelystad: Koninklijke Vermande, 1993) 5, 6. [↑](#footnote-ref-16)
17. Ibid 6. [↑](#footnote-ref-17)
18. Ibid 6. [↑](#footnote-ref-18)
19. Emilio Bautista Paz, Marco Ceccarelli , Javier Echávarri Otero and José Luis Muñoz Sanz, *A Brief Illustrated History of Machines and Mechanisms* (Springer, 2010) xi. [↑](#footnote-ref-19)
20. Frank Flemisch, *et al* ‘Towards a dynamic balance between humans and automation: authority, ability, responsibility and control in shared and cooperative control situations’ (2012) Cogn Tech Work 14, 3. [↑](#footnote-ref-20)
21. Ibid 17. [↑](#footnote-ref-21)
22. Bautista Paz *et al* (n 18) xi. [↑](#footnote-ref-22)
23. See Steven Johnson, *Where Good Ideas Come From: the Natural History of Innovation*, (Riverhead Books, 2010). [↑](#footnote-ref-23)
24. See Rita Carter *et al*, *The Human Brain Book* (DK Publishing 2014); Mark F. Bear, Barry W. Connors and Michael A. Paradiso, *Neuroscience Exploring the Brain* (4th North American Edition, Walters Kluwer 2015); Bernard J. Baars and Nicole M. Gage (eds*), Cognition, Brain, and Consciousness: Introduction to Cognitive Neuroscience* (Academic Press 2010). [↑](#footnote-ref-24)
25. Stuart J. Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, (3rd Edn, Pearson Education, Inc, 2010) 3. [↑](#footnote-ref-25)
26. Ibid 3. [↑](#footnote-ref-26)
27. Thornton (n 2) 2. [↑](#footnote-ref-27)
28. R. Dickerson, *Legislative Drafting* (Greenwood Press 1954) 32-34. [↑](#footnote-ref-28)
29. Dickerson (n 28) 32-34. [↑](#footnote-ref-29)
30. Ibid 32-34. [↑](#footnote-ref-30)
31. V.C.R.A.C. Crabbe: *Legislative Drafting* (Cavendish 1993) 16. [↑](#footnote-ref-31)
32. Ibid 16. [↑](#footnote-ref-32)
33. Ibid 16. [↑](#footnote-ref-33)
34. Ibid 16. [↑](#footnote-ref-34)
35. See Giovanni Sartor, Monica Palmirani and Maria Angela Biasiotti, *Legislative XML For The Semantic Web- Principles, Models, Standards for Document Management*, (Springer 2011). Examples include Cat4Trad and solutions from XMaLpha Technologies, Arbortext, or Propylon. [↑](#footnote-ref-35)
36. Richard Susskind, ‘Essays on Law and Artificial Intelligence’, (1993) Complex 7/93, Norwegian Research Center for Computers and Law, 3. [↑](#footnote-ref-36)
37. See Jaap J. Dijkstra, ‘User interaction with legal knowledge-based systems’ in: Joost Breuker, Ronald Leenes and Radboud Winkels (eds.), Legal Knowledge and information Systems. Jurix 2000: The Thirteenth Annual Conference. Amsterdam: (IOS Press 2000), 11. [↑](#footnote-ref-37)
38. Ibid 11-21. [↑](#footnote-ref-38)
39. Ibid 11-21. [↑](#footnote-ref-39)
40. Susskind (n 36) 3. [↑](#footnote-ref-40)
41. Ann Seidman and Robert B. Seidman ‘ILTAM: Drafting Evidence-Based Legislation for Democratic Social Change’ (2009) Vol. 89, BUL Rev 435, 448. [↑](#footnote-ref-41)
42. Wim Voermans, ‘Modelling the draughtman's craft: the LEDA-project Legimatics and legimatica-projects in the Netherlands’ 109 at <https://openaccess.leidenuniv.nl/bitstream/handle/1887/3658/360\_070.pdf?sequence=1> accessed 3 June 2015. [↑](#footnote-ref-42)
43. Voermans (n 42) 116. [↑](#footnote-ref-43)
44. Ibid. [↑](#footnote-ref-44)
45. L. Karl Branting and James C. Lester, ‘A Framework for Self-Explaining Legal Documents’ in Kralingen, R. *et al*, Legal Knowledge Based Systems JURIX '96 Foundations of Legal Knowledge Systems. (Tilburg University Press 1996)1. [↑](#footnote-ref-45)
46. Ibid 1. [↑](#footnote-ref-46)
47. Voermans (n 42) 116. [↑](#footnote-ref-47)
48. Voermans (n 42) 116. [↑](#footnote-ref-48)
49. Cecilia Magnusson Sjöberg, ‘Legal Information Supply and the Digital Divide”’ Stockholm Institute for Scandianvian Law 1957-2010 400. [↑](#footnote-ref-49)
50. See John Ubena, *How to Regulate Information and Communications Technology? A Jurisprudential Inquiry into Legislative and Regulatory Techniques* (Stockholm: Jure, 2015). [↑](#footnote-ref-50)
51. P. Wahlgren, ‘A General Theory of Artificial Intelligence and Law’, in: A. Soeteman (eds), *Legal knowledge based systems JURIX 94: The Foundation for Legal Knowledge Systems*, (Lelystad: Koninklijke Vermande 1994) 79,82. [↑](#footnote-ref-51)
52. Ibid 82. [↑](#footnote-ref-52)
53. Wahlgren (n 51) 82. [↑](#footnote-ref-53)
54. See Helen Xanthaki, ‘Legislative drafting: a new sub-discipline of law is born’, Volume 1, Issue 1, Autumn 2013, ALS Student Law Review 57-70. [↑](#footnote-ref-54)
55. Wim Voermans, “Computer-assisted legislative drafting in the Netherlands: the LEDA system”, 1, at <http://www.researchgate.net/publication/268001034\_Computer-assisted\_legislative\_drafting\_in\_the\_Netherlands\_the\_LEDA-\_system> accessed 1May 2015. [↑](#footnote-ref-55)
56. Ibid 1. [↑](#footnote-ref-56)
57. Ibid 1. [↑](#footnote-ref-57)
58. Linda Schulte, ‘A Survey of Computerized Legislative Information Systems’ (1979) 72 Law Libr J 99, 100. [↑](#footnote-ref-58)
59. See Geoffrey Bowman, ‘The Art of Legislative Drafting’ Sir William Dale Annual Memorial Lecture (2005) 7 Eur. J.L. Reform 3. [↑](#footnote-ref-59)
60. Frederik Barth, ‘Models of Social Organization’ (Royal Anthropological Institute Occasional Paper 23 (Glasgow University Press 1966) in Ann Seidman and Robert B. Seidman, ‘Drafting Legislation for Development: Lessons from a Chinese Project’ (1996) Vol. 44, No. 1, The American Journal of Comparative Law 1, 11. [↑](#footnote-ref-60)
61. Seidman and Seidman (n 60) 19. [↑](#footnote-ref-61)
62. I.M.L. Turnbull, “Problems of Legislative Drafting”, (1986) Statute L. Rev 67, 71. [↑](#footnote-ref-62)
63. Ibid 71. [↑](#footnote-ref-63)
64. Ibid 71. [↑](#footnote-ref-64)
65. Ibid 71. [↑](#footnote-ref-65)
66. Sjöberg (n 49) 400. [↑](#footnote-ref-66)
67. Ibid 400. [↑](#footnote-ref-67)
68. Ibid 400. [↑](#footnote-ref-68)
69. Stevan Gostojić, Branko Milosavljević, and Zora Konjović, ‘Ontological Model of Legal Norms for Creating and Using Legislation’ (January 2013) Vol. 10, 152 No. 1, ComSIS, 152. [↑](#footnote-ref-69)
70. Marc Lauritsen, ‘Current Frontiers in Legal Drafting Systems’ (June 2007) Working Paper for the 11th International Conference on AI and Law, Stanford University. [↑](#footnote-ref-70)
71. See Wim J.M. Voermans, Welmoed Fokkema, Remco van Wijk, ‘Free the Legislative Process of its Paper Chains: IT-inspired Redesign of The Legislative Procedure’ at: <http://ssrn.com/abstract=1855595>; and Voermans, W., Kolkman, P. and Kralingen, R., ‘The Impact of Electronic Subways on Government Decision-Making Processes,’ in: Peter Falconer, *et al* (eds), *Managing Parliaments in the 21st Century*, (2001) IOS Press/Ohmsha/IIAS, Amsterdam, Berlin, London, Tokyo, Washington DC 51-57. [↑](#footnote-ref-71)
72. Thornton (n 2) 128-129. [↑](#footnote-ref-72)
73. See Daniel Greenberg, ‘The Nature of Legislative Intention and Its Implications for Legislative Drafting’ (2006), Statute Law Rev 27 (1) 15. [↑](#footnote-ref-73)
74. Ibid 129. [↑](#footnote-ref-74)
75. Greenberg (n 73) 131. [↑](#footnote-ref-75)
76. Stevan Gostojić, Branko Milosavljević, and Zora Konjović (n 69) 152. [↑](#footnote-ref-76)
77. Ibid 152. [↑](#footnote-ref-77)
78. Richard Susskind, *The Future of Law, Facing the Challenges of Information Technology* (Oxford University Press, 1996) 121. See also Richard Susskind, *Tomorrow's Lawyers* (Oxford University Press, 2013); Richard Susskind, *The End of Lawyers?* (Oxford

    University Press, 2008); Richard Susskind, *The Susskind Interviews* (Sweet & Maxwell, 2005); and Richard Susskind, *Transforming the Law* (Oxford University Press, 2000). [↑](#footnote-ref-78)
79. See Paul Regan, ‘Enacting Legislation—a Civil Servant’s Perspective’ (2012) Statute Law Review 34(1) 32–38. [↑](#footnote-ref-79)
80. See Chapter 1 para 1.3. [↑](#footnote-ref-80)
81. Thornton (n 2) 131-132. [↑](#footnote-ref-81)
82. Ibid 133. [↑](#footnote-ref-82)
83. Stefanou (n 1) 7-8. [↑](#footnote-ref-83)
84. See Georgios N. Yannopoulos, *Modelling Legal Decision Process for Information Technology Applications in Law*, (1998) Kluwer Law International 135. [↑](#footnote-ref-84)
85. Bruce G. Buchanan and Thomas E. Headrick, ‘Some Speculation about Artificial Intelligence and Legal Reasoning’ (Nov 1970) Stanford Law Review, Vol 23, No 1, 40, 51. [↑](#footnote-ref-85)
86. Gostojić *et al* (n 69) 152. [↑](#footnote-ref-86)
87. Gostojić *et al* (n 69) 152. See also S. Blair Kauffman, “Automated Legislative Information Systems: A New Tool for Legal Research” [1983] 76 Law. Libr. J 233. [↑](#footnote-ref-87)
88. See Sjöberg (n 49) 400. [↑](#footnote-ref-88)
89. See Peter Ziegler, ‘The Status of Normalized Drafting: The Need for Theory Building and Empirical Verification’ (1989 27 Osgoode Hall L J) 337. [↑](#footnote-ref-89)
90. Thornton (n 2) 133. [↑](#footnote-ref-90)
91. Ibid 133. [↑](#footnote-ref-91)
92. Ibid 133. [↑](#footnote-ref-92)
93. See Sartor *et al*, *Legislative XML For The Semantic Web- Principles, Models, Standards for Document Management*, (n 84); and C. Biagioli, E. Francesconi, P. Spinosa, M. Taddei, “The NIR Project Standards and tools for legislative drafting and legal document Web publication” ITTIG - Institute of Legal Information Theory and Technologies at <http://www.ittig.cnr.it> accessed 3 June 2015. [↑](#footnote-ref-93)
94. Thornton (n 2) 134-137. [↑](#footnote-ref-94)
95. Carlo Biagioli and Davide Grossi ‘Formal Aspects of Legislative Meta-Drafting’ ICR, University of Luxembourg, Luxembourg. [↑](#footnote-ref-95)
96. See Peter Todd and Izak Benbasat, ‘The Use of Information in Decision Making: An Experimental Investigation of the Impact of Computer-Based Decision Aids’ (Sep, 1992) Vol 16, No 3, MIS Quarterly 373-393. [↑](#footnote-ref-96)
97. See Yannopoulos (n 83) 135. [↑](#footnote-ref-97)
98. Thornton (n 2) 138. [↑](#footnote-ref-98)
99. Ibid 138. [↑](#footnote-ref-99)
100. See Marc Lauritsen, “Current Frontiers in Legal Drafting Systems” A Working Paper for the 11th International Conference on AI and Law, Stanford University, June 2007. [↑](#footnote-ref-100)
101. William J. McIver, Jr., “Software Support for Multi-Lingual Legislative Drafting” CIRN 2004 Conference and Colloquium: Sustainability and Community Technology, Monash University, Prato, Tuscany, Italy, September 29 - October 1 2004 ,9. [↑](#footnote-ref-101)
102. McIver (n 101) 9. [↑](#footnote-ref-102)
103. Thornton (n 2) 138. [↑](#footnote-ref-103)
104. Ibid 138 [↑](#footnote-ref-104)
105. Renton Committee, ‘The Preparation of Legislation’ (Cmnd. 6053, 1975), para. 10.3. See also F. A. R. Bennion, ‘The Renton Report’ 125 NLJ (10 Jul 1975) 660-662 and Ronan Cormacain, ‘Have the Renton Committee’s recommendations on electronic access to legislation been fulfilled?’ (2013) 19(3) Web JCLI. [↑](#footnote-ref-105)
106. David Renton, ‘Failure to Implement the Renton Report’, (An address given by the Rt. Hon. Sir David Renton, Q.C., M.P., [later Lord Renton] to the Statute Law Society on 6 April 1978) Sweet and Maxwell 18. [↑](#footnote-ref-106)
107. Eamonn Moran, ‘Legislative Drafting Without Borders’ (2012) 1 IJLDLR 170. [↑](#footnote-ref-107)
108. Ibid 170. [↑](#footnote-ref-108)
109. Moran (n 107) 170. [↑](#footnote-ref-109)
110. Thornton (n 2) 143. [↑](#footnote-ref-110)
111. Ibid 143. [↑](#footnote-ref-111)
112. Ibid 144. [↑](#footnote-ref-112)
113. Thornton (n 2) 158. [↑](#footnote-ref-113)
114. Ibid 166. [↑](#footnote-ref-114)
115. Nienke den Haan, ‘Tools for automated legislative drafting’ at <http:// lri.jur.uva.nl~nienke> accessed 3 June 2015. [↑](#footnote-ref-115)
116. See Dale A. Lambert, ‘Automating Cognitive Routines’, Proceedings of the 6th International Conference on Information Fusion, (2003 Cairns, Australia) 986 - 993. [↑](#footnote-ref-116)
117. Timothy J Arnold-Moore, ‘Point-in-time publication of legislation (XML and legislation) Automating consolidation of amendments to legislation in common law and civil jurisdictions’ (2004) para 2.2 at <http://www.frlii.org/IMG/pdf/2004\_frlii\_conference\_tja.pdf> accessed 19 May 2015. [↑](#footnote-ref-117)
118. Marie-Francine Moens and Maarten Logghe, ‘Digital Legislation: Reflections on the Agora-Lex Project’, 2, at <http://liir.cs.kuleuven.be/publication\_files/6MoensLoggheBis.pdf> accessed 1 June 2015. [↑](#footnote-ref-118)
119. Moens and Logghe (n 118) 3. See also David Lepofsky, ‘Universal Design in Legislation: Eliminating Barriers for People with Disabilities’ [2009] Statute Law Rev 30 (2) 97. [↑](#footnote-ref-119)
120. Moens and Logghe (n 118) 3. [↑](#footnote-ref-120)
121. Wim Voermans, ‘Styles of Legislation and Their Effects’, [2011] Statute Law Rev 32 (1) 38, 42. [↑](#footnote-ref-121)
122. Ibid 52. See Helen Xanthaki, “Legislative drafting styles: is there really a common versus a civil law divide?” (2009). [↑](#footnote-ref-122)
123. Nienke Den Haan, “Towards Support Tools for Drafting Legislation”, in: J.S. Svensson, J.G.J. Wassink and B. van Buggenhout (eds.) *Legal Knowledge Based Systems: Jurix '93: Intelligent Tools for Drafting Legislation, Computer-Supported Comparison of Law*, Lelystad: (Koninklijke Vermande 1993), 23-30. [↑](#footnote-ref-123)
124. Haan (n 123) 23-30. [↑](#footnote-ref-124)
125. Thornton (n 2) 173. [↑](#footnote-ref-125)
126. Thornton (n 2) 173. [↑](#footnote-ref-126)
127. Haan (n 123) 23-30. [↑](#footnote-ref-127)
128. Ibid 23-30. [↑](#footnote-ref-128)
129. Marie-Francine Moens and Maarten Logghe (n 118) 2. [↑](#footnote-ref-129)
130. Stefan Höfler and Kyoko Sugisaki, ‘From Drafting Guideline to Error Detection: Automating Style Checking for Legislative Texts’ Association for Computational Linguistics (April 23, 2012) Proceedings of the EACL 2012 Workshop on Computational Linguistics and Writing, Avignon, France, 9–18, 9. See also Stefan Höfler, Alexandra Bünzli and Kyoko Sugisaki, “Detecting Legal Definitions for Automated Style Checking in Draft Laws” at <http://www.cl.uzh.ch/research/techreport/TR\_2011\_01.pdf> accessed 19 May 2015. [↑](#footnote-ref-130)
131. Peter Ziegler, “Information Collection Techniques for the Evaluation of the Legislative Process”, (1988 Statute L. Rev.) 160-185, 160. [↑](#footnote-ref-131)
132. Ziegler (n 131) 160. [↑](#footnote-ref-132)
133. Ziegler (n 131) 160. [↑](#footnote-ref-133)
134. Ibid 160. [↑](#footnote-ref-134)
135. Richard Susskind (n 86) 3. [↑](#footnote-ref-135)
136. Hélène Bauer-Bernet, “Effect of Information Science on the Formation and Drafting of Law” (1973-1974) 14 Jurimetrics J. 235, 238. [↑](#footnote-ref-136)
137. Ibid 241. [↑](#footnote-ref-137)
138. Greg Fitzpatrick, ‘An Essay on Information Technology and Trust’ in Cecelia Magnusson Sjöberg (ed.), *Legal Management of Information Systems-Incorporating Law in E-Solutions, Studentlitteratur,* (Lund, 2005), 78. [↑](#footnote-ref-138)
139. In Zambia for example draft Bills are prepared in WordPerfect. [↑](#footnote-ref-139)
140. See Wim Voermans, ‘Computer-assisted legislative drafting in the Netherlands: the LEDA system’, 1, at <http://www.researchgate.net/publication/268001034\_Computer-assisted\_legislative\_drafting\_in\_the\_Netherlands\_the\_LEDA-\_system> accessed 1 May 2015. [↑](#footnote-ref-140)
141. Voermans (n 42) 109-132. [↑](#footnote-ref-141)
142. Voermans (n 42) 109. [↑](#footnote-ref-142)
143. Ibid 109. [↑](#footnote-ref-143)
144. Moens and Logghe (n 118) 3-4. [↑](#footnote-ref-144)
145. Ibid 3-4. [↑](#footnote-ref-145)
146. Marie-Francine Moens, “Legislative Databases: Current Problems and Possible Solutions [2002] Int J Law Info Tech 10 (1) 1, 16. [↑](#footnote-ref-146)
147. Voermans (n 42) 16. [↑](#footnote-ref-147)
148. Wim Voermans and Egon Verbaten, “Leda: A Semi-Intelligent Legislative Drafting-Support System”, in J.S. Svensson, J.G.J. Wassink and B. van Buggenhout (eds.) (1993). Legal Knowledge Based Systems: Jurix '93: Intelligent Tools for Drafting Legislation, Computer Supported Comparison of Law 81. [↑](#footnote-ref-148)
149. Voermans and Verbaten (n 148) 81. [↑](#footnote-ref-149)
150. Ibid 81. [↑](#footnote-ref-150)
151. Yannopoulos (n 84) 135. [↑](#footnote-ref-151)
152. Ibid 135. [↑](#footnote-ref-152)
153. Yannopoulos (n 84 135. [↑](#footnote-ref-153)
154. See R. Santhanam and J. Elam, ‘A Survey of Knowledge-Based Systems Research in Decision Sciences (1980-1995)’ (May, 1998), Vol 49, No. 5, 445. [↑](#footnote-ref-154)
155. Tommaso Agnoloni, Enrico Francesconi, Pierluigi Spinosa, “xmLegesEditor: an OpenSource Visual XML Editor for supporting Legal National Standards”, Institute of Legal Information Theory and Techniques (ITTIG-CNR) Italian National Research Council at <http://www.ittig.cnr.it> accessed 3 June 2015. [↑](#footnote-ref-155)
156. See Carlo Biagioli, ‘Law Making Environment’ Istituto per la Documentazione Giuridica, Italian National Research Council at < http://www.ittig.cnr.it/Ricerca/Testi/Biagioli92.pdf> accessed 1 June 2015. [↑](#footnote-ref-156)
157. RFP Response -Legislative Systems Replacement Project, 6. [↑](#footnote-ref-157)
158. Propylon Legislative Workbench at <https://www.propylon.com/index.php/products/legislative-workbench-lwb> accessed 1 June 2015. [↑](#footnote-ref-158)
159. Legislative Workbench (LWB) Technical White Paper Version 1.0 Propylon Inc at <https://www.propylon.com/images/pdf/lwb\_white\_paper.pdf> accessed 1 June 2015. [↑](#footnote-ref-159)
160. Tim Arnold-Moore, ‘About Time: Legislation’s Forgotten Dimension’ TeraText Database System White Paper Series (2002). [↑](#footnote-ref-160)
161. TeraText at <http://www.teratext.com/products/teratext-for-legislation.asp> accessed 10 August 2015. [↑](#footnote-ref-161)
162. Ibid. [↑](#footnote-ref-162)
163. Arnold-Moore T *et al*, 'Connected to the Law: Tasmanian Legislation Using EnAct', 2000 (1) The Journal of Information, Law and Technology (JILT) at <http://www.law.warwick.ac.uk/jilt/00-1/arnold.html> accessed 1 June 2015. [↑](#footnote-ref-163)
164. International, 'EnAct' (lawin.org 2013) <http://lawin.org/enact> accessed 10 August 2015. [↑](#footnote-ref-164)
165. Monica Palmirani, ‘Akoma Ntoso: XML Open Standard for Legal Resources’ (4 November 2009) Washington, House of Representatives, World e-Parliament Conference 2009. [↑](#footnote-ref-165)
166. C. Biagioli, E. Francesconi, P. Spinosa, M. Taddei, “Legislative drafting support tool based on XML standards” ITTIG - Institute of Legal Information Theory and Technologies at <http://www.ittig.cnr.it>. [↑](#footnote-ref-166)
167. Raffaella Brighi, Leonardo Lesmo Alessandro Mazzei, Monica Palmirani and Daniele P. Radicioni, “Towards Semantic Interpretation of Legal Modifications through Deep Syntactic Analysis” at <http://www.normeinrete.it> accessed 2 June 2015. [↑](#footnote-ref-167)
168. Moens and Logghe (n 118) 1. [↑](#footnote-ref-168)
169. See Alexander Boer et al., ‘A Content Management System based on an Event-based Model of Version Management Information in Legislation’ in T. Gordon (ed.), Legal Knowledge and Information Systems. Jurix 2004: The Seventeenth Annual Conference. Amsterdam: IOS Press, 2004 19. [↑](#footnote-ref-169)
170. Moens and Logghe (n 118) 2. [↑](#footnote-ref-170)
171. Ibid 3. [↑](#footnote-ref-171)
172. See Enrico Francesconi, Pierluigi Spinosa, Daniela Tiscornia, ‘A linguistic-ontological support for multilingual legislative drafting: the DALOS Project’ (ITTIG-CNR) Italian National Research Council at <http://www.ittig.cnr.it> accessed 3 June 2015. [↑](#footnote-ref-172)
173. See the Acts of Parliament Act - 1960 (CA 7) of Ghana and the Acts of Parliament Act Chapter 3 of the Laws of Zambia. [↑](#footnote-ref-173)
174. For a detailed discussion on XML retrieval models for legislation see Marie-Francine Moens, ‘XML Retrieval Models for Legislation’ in T. Gordon (ed.), *Legal Knowledge and Information Systems. Jurix 2004: The Seventeenth Annual Conference*. Amsterdam (IOS Press 2004), 1-10. [↑](#footnote-ref-174)
175. Legislative Workbench (n 159) 8. [↑](#footnote-ref-175)
176. Ibid 9. [↑](#footnote-ref-176)
177. See Marie-Francine Moens, “Legislative Databases: Current Problems and Possible Solutions [2002] Int J Law Info Tech 10 (1). [↑](#footnote-ref-177)
178. See Richard E. Susskind, ‘A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning’ The Modern Law Review, (Mar., 1986), Vol. 49, No. 2, 168, 192 on the deficiencies of expert systems in automating legislative drafting effectively. [↑](#footnote-ref-178)
179. Legislative Workbench (n 159) 9-11. [↑](#footnote-ref-179)
180. See Alexander Boer *et al* ‘Knowledge Management for Legislative Drafting in an International Setting’ in D. Bourcier (ed.), *Legal Knowledge and Information Systems. Jurix 2003: The Sixteenth Annual Conference*, Amsterdam, (IOS Press, 2003), 91-100. [↑](#footnote-ref-180)
181. See Donald L. Revell, “Enhancing the Legislative Process: The Value of the Legislative Drafter – [2011], Statute Law Rev 32 (2), 149. [↑](#footnote-ref-181)
182. See Helen Xanthaki, “European Union Legislative Quality after the Lisbon Treaty: The Challenges of Smart Regulation” [2014] Statute Law Rev 35 (1): 66 on the peculiar challenges presented by the EU policy processes to the legislative drafting and regulatory process. [↑](#footnote-ref-182)
183. C. Wilfred Jenks, ‘The American Journal of International Law’, (Apr., 1945) Vol. 39, No. 2, 163-179. [↑](#footnote-ref-183)
184. See Seidman and Seidman (n 41) 443. [↑](#footnote-ref-184)
185. Ibid 443. [↑](#footnote-ref-185)
186. Peter Seipel, “Law and ICT. A Whole and its Parts” at <http://www.itkommissionen.se/dynamaster/file\_archive/030121/b1014e7c957c06525d934d7046bf8e70/2.1%20%20In%20Search%20of%20a%20Perspektive%20-%20Peter.Seipel.pdf> accessed 1 June, 2015. [↑](#footnote-ref-186)
187. Peter Wahlgren (ed.), ‘IT and Legislative development’, in *IT Law*, (2004) Scandinavian Studies in Law Vol. 47, Stockholm Institute for Scandinavian Law, Stockholm, 602. See also Wim Voermans, ‘Rationality in Legislation by Employing Informatics?’ in Luc J Wintgens (ed), *Legisprudence: A New Theoretical Approach to Legislation* Proceedings of the Fourth Benelux–Scandinavian Symposium on Legal Theory (Hart Publishing 2002) 127; and Warren Sack, ‘Artificial Human Nature’ Design Issues, A Critical Condition: Design and Its Criticism, (Summer, 1997) Vol. 13, No. 2, The MIT Press 55-64. [↑](#footnote-ref-187)
188. See Haan (n 123) 23-30; Radboud Winkels and Nienke den Haan, Automated Legislative Drafting: Generating paraphrases of legislation’ at <http://www.buscalegis.ufsc.br/revistas/files/anexos/3048-3042-1-PB.pdf> accessed 1 June 2015. [↑](#footnote-ref-188)
189. See Katrin Nyman-Metcalf and Ermo Täks, ‘Simplifying the law-can ICT help us?’ (2013) Int J Law Info Tech 21 (3) 239. [↑](#footnote-ref-189)