First International Workshop on Requirements Engineering and Law (RELAW)

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Abstract

Requirements engineering is the practice of identifying and specifying system requirements to achieve a specific purpose. Government laws and regulations are written to achieve societal goals, and thus have a direct impact on system requirements and designs. Engineers and regulators need methods and tools to focus the discussion of legal compliance in terms of observable criteria to ensure that systems comply with relevant laws. The First International Workshop on Requirements Engineering and Law was held in conjunction with the 16th IEEE Requirements Engineering Conference in Barcelona, Spain. The purpose of this workshop was to bring together researchers, lawyers and engineers to coordinate discussion on emerging issues in this area. This report summarizes the workshop structure, the paper discussions and break-out session that yielded important terminology and future research goals.

1. Introduction

Over the past several decades, we have experienced tremendous growth in business practices, products and services that use information to achieve stakeholder goals. This growth presents important challenges wherein product manufacturers and service providers must comply with government laws and regulations. Recent legal compliance challenges include electronic voting, patient medical records, corporate governance and national identification cards. To address similar challenges, this growth has drawn the attention of regulators, lawyers, engineers and academics in a shared pursuit to understand the historical and social impact of existing laws and regulations on emerging technology. The costs to brand, infrastructure and the public of violating the law are often prohibitive and the challenges to ensure that software systems comply with the law are viewed differently by those involved.

The First International Workshop on Requirements Engineering and Law (RELAW) is a multi-disciplinary, one-day workshop held in conjunction with the IEEE 16th International Requirements Engineering Conference (RE’08) and held in Barcelona, Spain on September 9th, 2008. The workshop brought together 23 practitioners and researchers from industry and academia to investigate challenges to ensuring that software systems comply with the law. The workshop probed important issues, including the processes for identifying relevant laws and jurisdictions, aligning laws with system requirements, managing requirements and changes in the law and demonstrating how systems comply with relevant laws through evidence-based mechanisms such as documentation, testing and certification.

The workshop invited authors to submit short papers under the following topics of interest:

- Identifying, prioritizing and integrating relevant laws, treaties and jurisdictions
- Legal requirements acquisition, specification, analysis and validation
- Formal and informal modeling of laws, policies and requirements
- Traceability between laws, policies and requirements
- Coordinating requirements change and the evolution of law
- Introducing existing products and services into new jurisdictions
- Requirements verification; documenting and auditing evidence of compliance
- Acceptable degrees of compliance assurance and system certification

The RELAW program committee consists of 18 academic, industry and government experts in software and requirements engineering, system certification, standards conformance and law. The workshop received 14 paper submissions. Each paper was reviewed by three program committee members, including at least one member who is an expert in requirements engineering. Papers that had a law-practitioner focus, as opposed to a requirements-engineer focus, were also reviewed by at least one legal expert. Based upon the program committee recommendations, nine papers
were selected for presentation at the workshop and publication in the IEEE workshop proceedings.

2. Workshop Structure

The RELAW workshop constitutes the first time that the requirements engineering community came together to discuss legal requirements challenges in a one-day, structured, discussion-centered format. Because the convergence of law and requirements engineering is relatively new, the workshop was organized to achieve three fundamental goals: (1) standardize vocabulary and terms from multiple disciplines; (2) refine objectives and identify unsolved industry and research problems; and (3) find agreement on validation objectives for proposed solutions. These goals were selected to accelerate research and collaboration in this important emerging research area.

The workshop format consisted of four sessions: three papers sessions that focused on foundations and broader challenges, formal methods and models, and domain-specific challenges, followed by a fourth break-out session. The break-out session sought to reify the workshop goals in the context of the paper presentations and ensuing discussions. The workshop paper discussions are summarized in Section 3 and the insights drawn from the break-out session are summarized in Session 4.

3. Paper Discussions

The workshop papers were presented in three sessions with the following themes: foundations and broader challenges, formal methods and models, and domain-specific challenges. The discussions following these presentations are summarized in this section.

3.1. Foundations and Broader Challenges

The first session consists of three papers that sought to establish important terminological differences between legal and requirements engineering practice and to review the challenges to aligning requirements with laws. The first presentation by Alberto Siena highlights the differences between the Hohfeld legal concepts [2] and goal-oriented requirements engineering concepts. The discussants agreed with the presenter that non-compliance must be detected, early. However, an empirical multi-case study and grounded analysis were required to understand how compliance differs at design time, run time and recovery time.

The second presentation by Alzbeta Krausova, reviewed several challenges, including information acquisition, choice of laws, legal ambiguity and change in laws. The ensuing discussion concluded that compliance means “to maintain a defensible position in a court of law” [BAK06], for example, by preventing legal challenges or guaranteeing that one can defend themselves against a legal challenge in court.

The first session concluded with a presentation by Sepideh Ghanavati that sought to evaluate the role of tool-support in managing traceability between requirements models and legal documents. The discussion emphasized that legal statements and models must be preserved in their unedited, original form and interpretations of the law, in the form of derived artifacts, must be traceable back to relevant statements in law.

3.2. Formal Methods and Models

The second session covers topics in formal methods and models used to represent and reason about legal requirements. The first presentation by Philip Miselementine positions outsourcing in the context of maintaining a-priori and a-posteriori evidence of compliance with government regulations. The discussion raised a parallel to enforceable and accountable policy, respectively [BAK06].

The second presentation by Luigi Logrippo raised the question of logical consistency within and between laws and the distinction between legal goals, which describe non-functional properties of legal environments, and legal rules, which specify actions to be taken in certain legal contexts. The discussion noted that logically consistent models may contain errors that result in legal interpretations that are inconsistent with the real world.

The second session concluded with a presentation by Jean-Frédéric Étienne that included a method to identify hidden assumptions from properties stated in regulations. The existence of hidden assumptions reinforces the incompleteness of regulations and the need for techniques to identify valid implications of legal requirements.

3.3. Domain-specific Challenges

The third session contained three presentations that covered domain-specific challenges in virtual worlds, social networking, privacy, and automotive. The first presenter, Holger Kienle, compared and contrasted the legality of several acts in real and virtual worlds. For example, killing an avatar in virtual worlds may not be illegal, whereas, real-world gambling laws may govern gambling in virtual worlds. These parallels illustrate how innovative systems can yield new and unexpected interpretations of old laws.
The second presentation by Aaron Massey described an alignment between two privacy taxonomies, illustrating how web-based privacy policies are restricted to fewer concerns than privacy in physical spaces. Several discussants suggested that techniques to model risk and counter-measures could be employed to formalize the comparison between these taxonomies.

The third presenter, Birgit Penzenstadler, described several industry tools that are being used to align automotive features with relevant laws and regulations. Several discussants questioned whether existing requirements engineering tools were sufficient to address this traceability challenge or if a custom solution was needed in some domains.

4. Break-out Session

Session 4 consisted of a break-out session that was organized into four groups: compliance/verification, formal modeling, traceability/evolution and interdisciplinary challenges.

4.1. Compliance and Verification

The compliance/verification group began with the “defensible” definition from Section 3.1 and sought to elaborate the meaning of compliance in practical terms. The group observed that trust assumptions affect how different organizations in different domains implement legally compliant systems. For example, the finance industry employs a practice called separation of duties, which requires stakeholders to perform service, approval and audit procedures, independently. Conversely, at least one automotive manufacturer permits individual engineers to define their own compliance design criteria by interpreting relevant regulations. In finance, if a single individual controls the service and approval mechanisms, for example, they could obstruct verification by manipulating the transaction record. In the automotive domain, however, engineers have specialized knowledge and incentive to develop safe, verifiably correct components. Finally, the group concluded that auditors rarely certify systems as “compliant with laws” — they generally certify that systems do not exhibit observable violations of law under a testing regime that is focused on best practices and identifying common vulnerabilities.

4.2. Formal Modeling

This group identified a number of issues and proposed some open research questions.

The first issue concerns the important dual role ontologies play in this area of research. Firstly, as pointed out in Siena’s presentation, the concepts of Law are different from stakeholder goals. Secondly, in any application where requirements need to be extracted from legal documents, care is needed to define application-specific concepts precisely. For example, in an airport security setting that needs to comply with government security regulations, one needs to define precisely what is a “dangerous object”, “authorized personnel” and the like.

An important reason for developing formal models is to establish formal properties of these models. Inference engines play an essential role in this regard. There was consensus in the discussion that off-the-shelf inference engines — such as model checkers, SAT solvers and planners — are by-and-large adequate for the task. Discussants also agreed that the formal properties that matter in a legal setting go beyond generic properties of formal models, such as consistency and completeness.

Turning to open problems, discussants agreed that the generation of formal models from natural language text remains a hard, time consuming and error-prone task that calls for new concepts, tools and processes. The doctoral thesis work of Breaux constitutes important progress in this direction. A second open problem is the degree to which legal constraints need to be formalized in order to extract from them requirements. A third open problem concerns the transformation of formal models of law into compliant implementations through a systematic process.

4.3. Traceability and Evolution

The traceability/evolution group considered the challenge of aligning requirements with laws and tracking interpretations and changes in the law. Three levels of artifact traceability were considered throughout the day, from system requirements to: a legal document, a paragraph and a sentence in a legal document that governs that requirement. In addition, laws prescribe acting on certain events that can only be detected at run-time. Traceability affects system implementation and architecture because these events, and the decisions that are taken in response to such events, must be traced back to relevant laws. This latter form of traceability raises the question of how much traceability is required to create a defensible position in a court of law.

Evolution is defined as changes in contracts, service-level agreements and the law, including supplemental guidance intended to clarify laws and regulations. Regarding future challenges to managing evolution, this group identified the need to represent and track deltas in both laws, legal interpretations of such
laws and changes in system requirements and specifications. What constitutes an interpretation of law in the context of requirements engineering is viewed as an open research problem. Moreover, the group identified how changes in law correspond to changes in system requirements and specifications as an open problem.

4.4. Interdisciplinary Challenges

The last group sought to identify challenges that were not covered by the other three topics in the breakout session and the resulting discussion focused on three prominent interdisciplinary challenges. The group frequently identified the challenge of standardizing terminology between law, engineering and business. The group suggested increased collaboration between lawyers and engineers, for example, by involving engineers in drafting regulations and by inviting lawyers to co-author research papers, as an approach to address this challenge. The second challenge concerns how engineers can effectively coordinate laws cross-nationally to legally distribute products and services across borders. This challenge includes sub-challenges, such as how to integrate laws from multiple jurisdictions. The third challenge concerns how to conclude that an interpretation of an intended ambiguity in the law is reasonable.

5. Conclusion

The workshop concluded with great excitement and enthusiasm for future work and collaboration in this area. The workshop diversity, including lawyers, practitioners and researchers, is perceived to be a strength of this workshop. The emphasis on requirements distinguishes this workshop from others forums, such as the International Conference on Artificial Intelligence and Law (ICAIL) and the International Conference on Deontic Logic in Computer Systems (DEON) that focus on the intersection between law and artificial intelligence or logic, respectively.

6. Acknowledgements

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7. References