THE FUTURE OF LAW: RELATIONAL JUSTICE AND NEXT GENERATION OF WEB SERVICES

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I. INTRODUCTION

This paper deals with some hopes and some concerns about the future of law, which I believe specifically related to the future of the Internet and the next generation of Semantic Web services.[1]

I will contend three theses about the integration of knowledge, regulation and semantic technology that may shed some light on how the future of law and the Internet looks like:

> (1) There is a lack of scientific, reliable knowledge on how the Internet is really working and in which measurable way semantics is affecting development; so we would need a better integration of communication, social and computer technologies to run the web.
>
> (2) Usually, researchers in Artificial Intelligence and Law divide IT and Law into two different domains: (i) IT law —data protection, copyright, security, domain names...— and (ii) IT for lawyers —e-government, e-court, Online Dispute Resolution, Multi-Agent Systems...[2] Recent developments in semantic technologies, Natural Language Processing (NLP), legal ontologies, information retrieval technologies (IRT) and the Web 2.0 and 3.0 may contribute to the convergence of the two approaches into a single techno-legal one.

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[1] Marta Poblet and I wrote two more joint papers connected to this same subject. P. CASANOVAS, M. POBLET, "Adding Semantics to the legal Domain", ESTC-08, Vienna, 2008; P. CASANOVAS, M. POBLET, "Justice via the Internet: Hopes and Challenges of Law and the Semantic Web", 2009, P. CASANOVAS, M. POBLET, "Law Via de Internet", ITTIG, Florence 30th October 2008.

[2] M. APISTOLA and A. LODDER, "Law Firms and IT. Towards Optimal Knowledge Management", *Journal of Information, Law and Technology*, 2005, No 2/3, pp. 1-28. A. LODDER and A. OSKAMP, "Law, Information Technology and Artificial Intelligence" in: A. LODDER and A. OSKAMP Eds, "*Advanced Technology in the Legal Domain. From Challenges to Daily Routine*, Dordrecht, Springer, 2006, pp. 1-22. M. LAURITSEN, "Artificial Intelligence in the Legal Real Workplace", in: A. LODDER and A. OSKAMP Eds, "*Advanced Technology in the Legal Domain. From Challenges to Daily Routine*, Dordrecht, Springer, 2006, pp. 165-176.

> Second generation of Semantic Web technologies is one of the means to facilitate this convergence.
>
> (3) Therefore, I think that a pragmatic and cognitive approach based on a better knowledge of legal users, scenarios and contexts may be helpful to develop SW applications and legal Web Services. I will call later *relational justice* this hybrid, mixed-up field, as a subset of *relational law* of contracts and *restorative justice* of crimes (private and public law).

I will rely on recent work and projects carried out by Internet scholars and by Semantic Web developers to foster a fruitful dialogue between AI & Law scholars and legal theorists. Nevertheless, in this paper, more technical issues such as knowledge representation, knowledge acquisition, legal ontology building and methodology will be put aside.[3]

1. *What is happening with the Internet?*

Internet is growing every day. At the end of 2007, the Web had 1.3 billion users, and the growth rate in percentage for the period 2000-2007 was 920.2 % in the Middle East, and 882.7 % in Africa. Those are good news, even if we take into account the fact of the unequal distribution of resources and opportunities across the Web. However, in spite of tis amazing growing, the old problem of gathering and representing content remains. How all the generated information flow may be retrieved, organized and shared in a feasible and reasonable way?

In a recent Conference on the Future of the Internet for the STI Assembly[4], John Domingue[5] drew a broad landscape, in which a multitude of connected IT services are offered, bought, sold, used, repurposed, and composed by a worldwide network of service providers, consumers, aggregators, and brokers. This would result in a new way of offering, using, and organizing IT supported functionality, in which interoperability through Web 2.0, sensors, multi-media and what is called "The Internet of

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[3] See the state of the art in legal ontologies in J. BREUKER, P. CASANOVAS, M. C. A. KLEIN, E. FRANCESCONI, "The Flood, the Channels and the Dykes: Managing Legal Information in a Globalized and Digital World", in: J. BREUKER, P. CASANOVAS, M. C. A. KLEIN, E. FRANCESCONI (eds), *Legal Ontologies and the Semantic Web. Channelling the Legal Information Flood*, Amsterdam, IOS Press, 2009.

[4] ESTC, Vienna, September 26th 2008.

[5] V. R. BENJAMINS, J. DAVIES, R. BAEZA YATES, P. MIKA, H. ZARAGOZA, M. M. GREAVES, J.M. GÓMEZ-PÉREZ, J. CONTRERAS, J. DOMINGUE, D. FENSEL, "Near-term Prospects for Semantic Technologies", IEEE Intelligent Systems, January/February 2008, pp.76-88.

Things" (and not only interconnected pages) would reach a great number of end users (government, companies, businessmen, employees, scientists, employees, consumers and citizens).

In this vision, Semantic Technologies would be the key for the Web 3.0. The term *Web 2.0* emerged from a 2004 brainstorming session among officials of O'Reilly Media, Inc., and MediaLive International.[6] The term *Web 3.0* was coined by John Markoff of the New York Times in 2006. Those terms may be seen as slippery concepts[7] or as shortcuts as well to refer to the interoperability and tagging allowing inputs from the users (Flickr, YouTube, Wikipedia, Facebook ...), and to adding semantics in more expressive languages to link objects and to share ontologies behind platforms and Web services.

As stated by many scholars, above all, the Web 2.0 is a *social network*, allowing people to connect each other and adding value through tagging to the websites that they populate with content. This content should be better organized through semantic technologies. This social pragmatic approach is all what SW is about.

Back to 2001, when the idea was spread out with an increasing strength, James Hendler envisaged a situation in which agents could easily construct ontologies to interoperate among them. An ontology-language (Hendler thought of *DARPA Agent Markup Language*, DAML + OIL) could be "easily" used to define ontology not of services but of the terms needed to describe the invocation of services. Using the example of a finite-state machine, this ontology would contain classes such as *State* and *Link* and have special Subclasses such *StartState* and *EndState*. Contents and properties could be described to give links a head and tail, to give states a list of the links that lead out from them, and to give a state an identifying property (Universal Resource Identifier).

Then, it would be easier to produce a domain ontology to perform social links. E.g. a "standard web sale" could be defined in some service ontology comprising a particular set of states and links.

The final result would be not only an intelligent human-interaction interface, but agent-to-agent communications that would produced social effects and perform social acts such as buying, selling and paying "between two Web agents that can use proof checking to confirm transactions".

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[6] D. E. HARMON, "The 'New' Web: Getting a Grip on the Slippery Concept of Web 2.0", *Lawyer's PC*, 2006, vol. 23, n. 1, pp. 1-5.
[7] *Ibid.*

> "An agent can send an annotated proof to other agent. The annotations can be pointers to a particular fact on the Web or to an ontology where a particular rule resides. The agent receiving this proof can analyze it, check the pointers and check that the ontology is one it can read and agree with. This lets the agents recognize that a valid transaction has occurred and allows the funds to be transferred."

Hendler called this perspective "service logics", and he predicted that this would be easy to achieve for the Web.

But nearly nine years later, this is still a hope, or an unfulfilled promise. *Where are all the agents?* is the title of one of his challenging letters from the editor for IEEE Intelligent Systems. After being involved in the creation of Darpa Agent Markup Language (DAML) and the Ontology Web Language (OWL), a standard since February 2004, Hendler recognizes that although there are enough ontologies, interoperability at the data level is being solved and the existence of open source toolkits, still, there are no intelligent-agent based systems operating in the web and no venture-capital really available (no business plan)[8]. So, "what happened"?

Putting aside the technical aspects, the answer may be related to the obstacles the Internet is facing today which are hindering a real science of the Web. This is again a matter of lack of knowledge. This may be a bit surprising, but the same social and economic networks that are fostering the growing of the Internet are actively becoming obstacles to the development of its full potential, and lawyers have some responsibility on that. This was anticipated, e.g. by Dan Hunter in 2003 when he warned IT lawyers about "the anti-commons paradox": "we are enclosing cyberspace, and imposing private property conceptions upon it. As a result, we are creating digital anti-commons where sub-optimal uses of Internet resources are going to be the norm".[9]

But let's start with the explanations on social links among pages which constitutes the kernel of Web 2.0 before going into it.

The power of the web emerges through the link space realized between Web pages. This is known as *the network effect*. From the physical point of

[8] In the same sense, BENJAMINS et al., *supra* note 5: most SW applications deal with search, and only a few of them are deployed with corporate budgets.
[9] D. HUNTER, "Cyberspace as a Place and the Tragedy of Digital Anti-commons Paradox", *California Law Review*, 2003, No 91, p. 439.

view (the first layer of the Internet), this is a *scale free network*.

The difference between a random and a scale-free network is the following[10]: (a) The random network is homogeneous: most nodes have approximately the same number of links; (b) The scale-free network is inhomogeneous: the majority of the nodes have one or two links, but a few nodes have a large number of links, guaranteeing that the system is fully connected.

At a large scale, many social phenomena show this kind of decreasing connectivity: fast development of diseases and epidemics, gossiping, city sizes or, even, the distribution of the human sexual contacts for males and females.[11] In the connectivity distribution P (k), k is the number of links connecting to a node. Scale free-networks are characterized by a power law decay of the cumulative distribution $P(k) \sim k^{-\tau}$, meaning that the probability of attaining a certain size t is proportional to $k^{-\tau}$. When τ is greater than or equal to 1 we are under a Zipf law.[12] For the web, scale-free networks may be formed due to preferential attachment, i.e. new links are established preferentially between nodes with high connectivity. Therefore, "the rich do get richer".[13]

The "network effect" has also come to be known as Metcalfe's law. In the early 1980s Bob Metcalfe explained to his customers why they needed more Ethernet boards than they were buying, because while the cost of the network grew linearly with the number of connections, the value was proportional to the square of the number of users.[14]

However, it is worthwhile to keep in mind that all those reckonings, in a way, are hypothesis, *Gedanken experiments*. Researchers have come slowly to realize that we don't know many things about the real size and functioning of the Internet, including the effects of adding semantics to the web. Hendler, Berners-Lee et al. have recently recognized this fact:

> "Google receives more than 100 million queries per day, and if 20% of them are unique, then more than 20 million links, represented as

[10] JEONG, 2003.
[11] F. LIJEROS, C. R. EDLING, L. A. NEVES AMARAL, E. H. STANLEY, Y. ABERG, "The Web of Human Sexual Contacts", *Nature*, 2001, No 411, pp. 907-908.
[12] L. A. ADA, B. A. HUBERMAN, "Zipf's law and the Internet", *Glottometrica*, 2002, No 3, pp. 143-150.
[13] F. LIJEROS et al., *o.c.*
[14] J. HENDLER, J. GOLBECK, "Metcalfe's Law, Web 2.0 and the Semantic Web", *Web Semantics: Science, Services and Agents on the World Wide Web*, 2008, Vol 6, No 1, February, pp. 14-20.

> new URIs that encode the search term(s), should show up in the Web graph every day, or around 200 per second. Do these links follow the same power laws? Do the same growth models explain these behaviors? *We simply don't know*."[15]

2. *Legal markets, ITC law and ITC for lawyers*

The though criticism that Kimberly Claffy, from the CAIDA San Diego Supercomputation Center, hold recently before the Stanford lawyers is entitled *Ten Things Lawyers should Know about the Internet*.[16] Many obstacles prevent good measurements both of the Internet and of the Web. Claffy summarizes in four points the main problems they encounter in mapping the web: (i) *security*: "the fundamentally insecure software ecosystem"; (ii) *scalability*: "the fundamentally unscalable routing and addressing architecture"; (iii) *sustainability*: "the fundamental unsustainable economic architecture"; (iv) *stewardship*: "a stewardship model broken along so many dimensions, that solving or even studying the first three points is no one responsibility."

The situation is this one.[17] National legislation sometimes does not help either, like in the case of the European ID cards.[18] However, I believe that

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[15] J. HENDLER, N. SHADBOLT, W. HALL, T. BERNERS-LEE, D. WEITZNER, "Web science: An Interdisciplinary Approach to Understanding the Web", *Communications of the ACM*, July 2008, Vol 61, No 7, pp. 60-69.

[16] K. C. CLAFFY, "Ten Things Lawyers should Know about the Internet", 2008, http://www.caida.org/publications/papers/2008/lawyers_top_ten/ (accessed October 10th 2008).

[17] "Because no systemic measurements activities exist for collecting rigorous empirical Internet data, in many ways, we don't really know what the Internet actually is. Thus, we don't know the total amounts and patterns of data traffic, the Internet's growth rate, the extent and locations of congestion, patterns and distribution of ISP interconnectivity, and many other things that are critical if we're to understand what actually works in the Internet. These data are hidden because ISPs consider such information proprietary and worry that competitors could use it to steal customers or otherwise harm their business. The information might not even be collected because no economic incentive exists to do so, nor do any regulations require this collection." K.C. CLAFFY, S.D. MEINRATH, S.O. BRADNER, "The (un)Economic Internet?", *IEEE Internet Computing*, May-June 2007, pp. 53-58.

[18] "The result of legislation is that it has prevented the adoption of electronic identification instead of promoting it. The failure is evident by looking at what has been achieved so far. After 10 years of intense bureaucracy and tens of millions of Euros, we have not been able to implement a national eID scheme in Sweden. Even though there is a Swedish national ID card (INIDEL) capable of holding an electronic ID, it is empty. The card is essentially a brick! Essentially we are at the same point now as we were a decade ago. It is clear that something is fundamentally wrong." F. LJUNGRREN, "Complexity is the Achilles Heel of eID. The Swedish

professional behaviour under economic, political and cultural corporate constraints has much more to do with all of this.

In *Urban Lawyers*, Heinz and Nelson revisit their precedent study of 1982 on *Chicago Lawyers*.[19] Their insights are derived from a comparison of two surveys of the Chicago bar. The first was conducted with 777 lawyers in 1975 (when the profession was still numerically stable). The second was conducted on 787 Chicago lawyers in 1994 and early 1995. The authors show that the profession has experienced a dramatic change. For the first time, women, African Americans and Latinos have been involved in the profession, but in marginal roles in law firms and in lower-status practice settings. There is a growing divide between prestigious (corporate and tax law) and less-prestigious fields of law. A greater proportion of Chicago lawyers focus their work on corporate clients, get much more money and their economic values have become close to the business interests. Therefore, the profession has become more segmented and more conservative.

Brian Tamanaha (2006) conceptualized the emergent situation as a new "legal instrumentalism" opposed to a principled and more integer conception of the law that American lawyers had in the seventies and eighties.[20] Lawyers' relentless competition, the billable hour's system, and pressures to the partners to bring in clients have shaped new legal professional practices contrary to a vision of law as a matter of principle and reason. I am afraid he is right.

Some recent data may give some support to this statement, because the expansion of lawyering is related to an increasing use of ITC tools, as shown by the ABA surveys. In 2008, e.g., over 40% of the USA firms indicated an average $ 8.000-$ 17.000 spending per attorney. 72% of respondents report that the firm files court documents electronically, up from 55% in the 2007 survey.[21]

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eID system", *ENISA Quarterly Review. Security and Interoperability of eID*, 2008, Vol. 4 No. 3, pp. 16-18.

[19] J.P. HEINZ, R.L. NELSON, R.L. SANDEFUR, E.O. LAUMANN, *Urban Lawyers: The New Social Structure of the Bar*, Chicago, University of Chicago Press, 2005.

[20] B.Z. TAMANAHA, *Law as a Means to an End: Threat to the Rule of Law*, New York, Cambridge University Press, 2006.

[21] American Bar Association Technology Resource Center, *2008 ABA Legal Technology Survey Report: Online Research*, http://meetings.abanet.org/ltrc/index.cfm?data=20080909 (accessed September 18th 2008).

Respondents are asked how they collaborate on documents. The methods reported most often are e-mail attachments (92%, up from 80% in the 2007 survey), fax (65%), Microsoft Word track changes or equivalent (64%), and in person (58%). Nearly all respondents report the ability to check work e-mail while away from the office (98%). The method reported most often by respondents as used to check e-mail while away from the office is via Smartphone/BlackBerry (59%).

According to the *The American Lawyer 100 Report* —the top-grossing law firms in the United States— total revenues reached $ 64.6 billion and increased 13.6 % in 2007. At the top rank, two big firms, Skadden Arps Slate Meagher & Flom and Lathan & Watkins, reached more than 2 $ billion (gross revenue) and 1.17 and 1.05 $ million per lawyer. We may wonder whether such numbers are sustainable in the new economic landscape after the crisis of the Wall Street financial model. Lawyers themselves are starting to wonder whether such numbers are sustainable.[22] Some prudence is required before answering such a question.

However, those are not surprising news. Describing increasing legal revenues related to the so-called *big bang* of lawyers is a well-trodden path by economists, legal theorists and Law & Society researchers. Table 1 shows the reckoning of expected value from 2003 to 2008.

Country	Value in 2003	Growth 2002-03	Expected value in 2008
USA	140.3 billion $	5.6 percent	174.1 billion $
UK	28	3.6	31.6
France	14.7	14	16.7
Australia	5.9	11.6	9.4
South Korea	1.35	-3.3	1.9
China	1.34	7	1.9
Japan	0.9	8	1.6

Table 1. Legal markets size. Source: Euromonitor.

What is new is the convergence between lawyering and technical knowledge either of the Internet or the World Wide Web (WWW).[23]

[22] A. PRESS, J. O'CONNOR, "Lessons of the Am Law 100: Is the Golden Age Over?", *The American Lawyer*, 05/01/2008.

[23] M. POBLET, P. CASANOVAS and V.R. BENJAMINS, "Technology and Law: The Not So Odd Couple", in: P. WARREN, J. DAVIES and D. BROWN (Eds), *ICT Futures. Delivering Pervasive, Real-time and Secure Services*, Chichester, John Wiley & Sons Ltd, 2008, , pp. 201-211. J. BREUKER *et al., supra* note 3.

Practicing law becomes easier as long as legal operators use electronic devices to perform their jobs. Of course, we may take into account that size makes a big difference between soloists and corporate lawyers. But, still, ICT for lawyers is an emerging flourishing field both for small and big companies. Law firms may diverge in the toolkits they use and seek for, but not in the fact that their daily work rely increasingly on the use of technology. Semantic technology is being developed in the law field according to these needs.

Collaborative tools (extranets, *blawgs*, wikis..) and meta-data use (watermarking documents, digital times stamping, *clickwrap* agreements...) are being commonly adopted, especially by young lawyers. Less attention is paid for the moment to XML technologies and legal multimedia trends (beyond videoconferences).

But perhaps the best example of how ICT law and ICT for lawyers are related and will be even more related in the next future is the e-Discovery development.

E-Discovery is experiencing a spectacular growth because of the nature of the legal process itself. Electronic Data Discovery (EDD, or e-Discovery) may be defined as "a process (or series of processes) in which electronic data is sought, located, secured, and searched with the intent of using it as evidence in a civil or criminal legal case, or as part of a court-ordered or government sanctioned inspection".[24] Electronic Stored Information (ESI) is difficult to recover and retrieve because of its massive character. It is usually saved on back up tapes that are not labeled, catalogued or organized properly. Indexing and tagging requires both legal knowledge and computer expertise.

Moreover, as Will Uppington has noticed, EDD is a field in which it becomes necessary to combine concept and keyword search with content categorization technologies.[25] Therefore, there is room enough for a

[24] S. ATTFIELD, A. BLANFORD, *E-discovery viewed as integrated human-computer sensemaking: The challenge of 'frames'*, 2008, http://eprints.ucl.ac.uk/9135/1/9135.pdf (accessed August, 31st, 2008)

[25] "Surely, concept search technology is better than old, boring keyword search. Well, actually it's not that clear-cut. The problem with concept search technology is that while it might find more relevant documents than plain keyword search, it will also likely find more false positives. Imagine searching for documents containing "terminate" in an employment matter and your concept search technology automatically searching for "fire", "dismiss", etc. as well. You'll find more documents related to the termination of employees, but you'll also find a lot more non-relevant documents concerning house fires, the fire department, etc. So concept search can

plurality of approaches, which lie on the different purposes and aims of users.

End users —customers, citizens, rulers, administrators...— and not only law firms or tech companies are real players in the field as well, because eventually someone has to pay the high costs of e-Discovery programs, as players have become to understand.[26]

3. *Web Services and Second Semantic Web generation*

The main objectives of next generation of the Semantic Web are related to this plural and hybrid approach. What conception of law may be figured out to comply with them? I will link the two issues in my answer in the next two sections.

Comparing first and second generation of Semantic Web applications, E. Motta and M. Sabou identify several features of the new orientations: (i) reuse (vs. semantic data generation); (ii) multi-ontology systems (vs. single-ontology systems); (iii) openness with respect top semantic resources, (iv) scale as important as data quality, (v) openness with respect to Web (non-semantic resources), (vi) compliance with the Web 2.0 paradigm, (vi) openness to services.[27]

Personalization, user-centered approaches, semantic wikis, hybrid ontological solutions, synergies between folksonomies and ontologies, scalability and meta tagging of great amounts of web-stored available data,

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help address the under-inclusive problem with keyword search, (though it won't solve it) and can be helpful during analysis. But it can often increase the over-inclusive problem." W. UPPINGTON, *Concept Search Versus Keyword Search in Electronic Discovery*, 2008 http://www.clearwellsystems.com/e-discovery-blog/2008/11/12/concept-search-versus-keyword-search-in-electronic-discovery/ (accessed January 15th 2009).

[26] "[Hewlett-Packard] says using lawyers to search through 100 gigabytes of data would cost about $ 180.000. But since its software automatically culls irrelevant documents, attorneys in such a case would have to go through only a small portion of that data —for a cost of about $ 25.000. [...] Recently, tech companies and lawyers have taken steps to solve their conflict. Some law firms that handle big business cases —such as Fenwickand San Francisco's Howard, Rice, Nemerowski, Canady, Falk & Rabkin, among others— now consult with clients on which e-Discovery software to choose and how to use it". J. SCHECK, "Tech Firms Pitch Tools for Sifting Legal Records", *Wall Street Journal*, 22 August 2008.

[27] E. MOTTA and M. SABOU, "Next Generation Semantic Web Applications", in: R. MIZOGUCHI, Z. SHI AND F. GIUNCHIGLIA (Eds), [ASWC 2006], "The Semantic Web", LNCS 4185, Heidelberg and Berlin, Springer, 2006, pp. 24-29.

and web-services orientation seem to be the next step.[28]

Especially Dieter Fensel envisages the future of the SW as a "Web of services" in which "scalable interoperability not only requires semantics, but it cannot even imagined without the usage of semantics".[29]

In 2004, Fensel and Bussler provided a fully-fledged framework —Web Modeling Service Framework (WMSF)— to provide a conceptual model to develop services according to the principle of maximal decoupling complemented by a scalable mediation service: (i) strong decoupling of the various components that realize an e-commerce application; (ii) strong mediation service enabling anybody to speech with everybody in a scalable manner.

Web Services connect computers and devices with each other using the Internet to exchange data and combine data in new ways. They may be defined as software objects that can be assembled over the Internet using standard protocols to perform functions or execute business processes. It seems to me that Fensel and Busser's dynamic framework does not translate Hendler's original idea of "services logic", but goes in the same direction.

In contrast, many experienced researchers —mainly from Yahoo— recall that information retrieval is still one of the main functionalities of the Web. Bridging SW and information retrieval technologies faces scientific problems on knowledge representation and natural language understanding that remain still unsolved. The Semantic Web would fail to achieve the impact envisioned a decade ago on search on the World Wide Web. The question is this one: Why has the Semantic Web had so little effect on search services?

"We put forward three possible reasons. First, this integration is an

[28] V. R. BENJAMINS *et al*, *supra* note 5. J. DAVIES, M. GROBELDNIK, D. MLADENIĆ, "Challenges of Semantic Knowledge Management", in J. DAVIES, M. GROBELDNIK, D. MLADENIĆ (Eds), *Semantic Knowledge Management. Integrating Ontology Management, Knowledge Discovery, and Human Language Technology*, Heidelberg and Berlin, Springer Verlag, 2008, pp. 248-251. P. WARREN, J. DAVIES and D. BROWN, "Conclusions", in: P. WARREN, J. DAVIES and D. BROWN (Eds), *ICT Futures. Delivering Pervasive, Real-time and Secure Services*, Chichester, John Wiley, 2008, pp. 229-233. D. FENSEL, *STI Technical Report 2008-01-10*, STI Innsbruck, 2008, http://www.sti-innsbruck.at/fileadmin/documents/SemanticTechnology.pdf.

[29] *Supra* note 28. D. FENSEL and C. BUSSLER, The Web services Modeling Framework (WSMF), 2004.

> extremely hard scientific problem. Second, the Web imposes hard scalability and performance restrictions. Third, there's a cultural divide between the Semantic Web and Information Retrieval disciplines."[30]

This is true, and I am not discussing it. But *hybrid* theoretical approaches and more pragmatic perspectives are possible as well. In other words, it is not necessary to carry out first a complete fundamental research on the web to develop toolkits and strategies. Knowledge and the Internet in a whole are growing faster than that, stemming from practice and competition among technology companies and research institutes. We learn and we develop and test new languages, applications and theories with the same blow. Relying on this experience, a sharp distinction between fundamental and applied research does not make a lot of sense in this domain. The science of the Internet may combine many different approaches at the same time.

This has been noticed, again, by Jim Hendler when describing how Web 2.0 and web 3.0 are technically related. Table 2 shows the way Web 3.0 extends current Web 2.0 applications using Semantic Web technologies and graph-based, open data.[31]

<table>
<tr><td colspan="2">Web 3.0</td></tr>
<tr><td rowspan="2">Web 2.0</td><td>Semantic Web (RDFS, OWL)</td></tr>
<tr><td>Linked Data (RDF, SPARQL)</td></tr>
</table>

Fig. 2 Source: Jim Hendler (2009)

We may bear in mind, as shown by the *Gartner Hype Cycle for Legal and*

[30] R. BAEZA-YATES, P. MIKA and H. ZARAGOZA, "Search, Web 2.0, and the Semantic Web", in: V.R. BENJAMINS (Ed), *Near-term Prospects for Semantic Technologies, IEEE Intelligent Systems*, January/February, 2008, pp. 80-82.

[31] "RDF Schema (RDFS) and the Web Ontology Language (OWL) provide the ability to infer relationships between data in different applications or in different parts of the same application. These Semantic Web languages allow for the assertion of relationships between data elements, which developers can use, via custom code or an emerging toolset, to enhance the URI-based direct merging of data into a single RDF store". J.HENDLER, "Web 3.0 emerging", *IEEE Intelligent Systems*, January 2009, p.89 (pp. 88-90).

Regulatory Information Governance (16 July 2007) that SW is not a completely mature technology, at least not yet.

A Hype Cycle is a "graphic representation of the maturity, adoption and business application of specific technologies". Since 1995, Gartner has used Hype Cycles to characterize the over-enthusiasm (*hype*) and subsequent disappointment that typically happens with the introduction of new technologies. Hype Cycles also show how and when technologies overcome the hype, achieve practical benefits, and become eventually accepted. This may happen now with Semantic Technologies.

However, there are more reasons of theoretical nature to explain the actual development of the SW towards a combination of top-down, bottom-up and middle-out strategies. It has been repeated many times in the literature that the Semantic Web should not be confused with Artificial Intelligent techniques. AI is about engineering. On the other side, the SW is a "web of data": "a technological infrastructure to enable large scale data interoperability".[32] In this sense, the SW has to be combined with other artificial devices to be effective. Adding semantics to the web, alone, does not solve either classical AI problems or satisfy users' needs and demands.

This is especially true in the law field, because in spite of the already many available ontologies, very few applications have been built up following SW specifications. Law is not one of the main domains in which SW developments have been applied.[33] Ontologies are hard to build and especially to maintain. Martin Hepp talks about the *expressivity-community size frontier*: "the more detailed and expressive the ontology, the smaller the actual user community will be because it increases the resources necessary for reviewing and understanding the specification and associated documentation, which makes committing to the ontology reasonable only for a smaller number of individuals".[34]

If SW is not only a web of information, but a web of knowledge, then the

[32] M. D'AQUIN, E. MOTTA, M. SABOU, S. ANGELETOU, L. GRIDINOC, V. LOPEZ and D. GUIDI, "Toward a New Generation of Semantic Web Applications", *IEEE Intelligent Systems*, May/June 2008, pp. 20-28.

[33] Law is not even mentioned in survey on the subject by J. CARDOSO, "The Semantic Web Vision: Where We Are?", *IEEE Intelligent Systems*, September/October 2007, pp. 84-88. According to him, education, computer software, government, business services and life sciences are the main domains of SW applications.

[34] M. HEPP, "Possible Ontologies. How Reality Constraints the Development of Relevant Ontologies", *IEEE Intelligent Systems*, January/February 2007, pp. 90-96.

nature of knowledge to be modeled does matter as well. In the SEKT project[35], we defined legal knowledge as being practical, dynamic and changing according to the community that is producing and using it. There is a lay knowledge of law, and a *professional legal knowledge* (PLK) which is shared across members of a legal social group (lawyers, attorneys, judges, prosecutors...) having in common their experience and practical knowledge of the law (Casanovas et al. 2004, 2005). These features facilitate the building of *ontologies of professional legal knowledge* (OPLK).

However, this leads to a kind of paradox, because assembling, classifying, sharing and reusing experiences are different and not necessarily coordinated and consistent tasks. Consistency between sharing and reusing cannot be taken into account. Some strategy is explicitly required if the object to be modeled is *experience* or *practical knowledge*, as Enric Plaza (2008) is pointing out in the so-called EDIR cycle (Express, Discovery, Interpret, Reuse). This is still an open discussion.

4. *Relational Law and Relational Justice*

Let's go into the *experiences of law* now. Law, and not only the web, is changing fast too. Traditional fields of legal drafting, private contracting, judicial sentencing and administrative management have been enlarged with all the Online Dispute Resolution (ODR) initiatives and new forms of self-regulation and access to justice. In sharp contrast to corporate law practices, the web fosters new *personal* strategies. Citizens —as individual persons as much as citizens belonging to a political body— require a greater participation and faster and more effective ways of facing their legal activities. Dialogue, flexibility and autonomy seem to be the aim of new legal forms of *relational administration* and *relational justice*.[36]

Originally, we coined this concept for the sake of Restorative Justice, in a broad sense. *Relational Justice* (RJ) was defined as a bottom-up justice, the justice produced through cooperative behavior, agreement, negotiation, or dialogue among actors in a post-conflict situation (the aftermath of private

[35] P. CASANOVAS, M. POBLET, N. CASELLAS, J-J VALLBÉ, F. RAMOS, V. R. BENJAMINS, M. BLÁZQUEZ, J. CONTRERAS, J. GORROÑOGOITIA, D10.2.1.Legal Scenario, OPL Ontology and Architecture. EU-IST Project IST-2003-506826, SEKT (Semantically Enabled Knowledge Technologies), Deliverable Programa IST. 191 pp. http://www.sektproject.com/rd/deliverables/wp10/sekt-d-10-2-LegalScenario.pdf/view.

[36] P. CASANOVAS and M. POBLET, "Concepts and Fields of Relational Justice", in: P. CASANOVAS, G. SARTOR, N. CASELLAS, R. RUBINO (eds), *Computable Models of the Law: Languages, Dialogue, Games, Ontologies*, LNAI 4884, Berlin and Heidelberg, Springer Verlag, 2008, pp. 323-339.

or public, tacit or explicit, peaceful or violent conflicts) (Casanovas and Poblet, 2007, 2008).[37] The RJ field included ADR and ODR, mediation, commercial, labor and economic mediation, victim-offender mediation (VOM), restorative justice (dialogue justice in criminal issues, for juvenile or adults), transitional justice (negotiated justice in the aftermath of violent conflicts in fragile, collapsed or failed states), community justice, family conferencing, and peace processes.

However, recent developments of the Internet and recent trends in the Semantic Web area have convinced us to expand and change this definition in a more framed and regulatory way. *Relational Justice* may be defined as the substantive and formal structure that allows end users, in the broader sense (as citizens, consumers, customers, clients, managers, officials...), to participate in the making of their own regulation and legal outcomes through all the mixed and plural strategies that the Semantic Web framework allows. This implies the coexistence of legal and social norms, rights and duties to be shared by subjects (artificial or natural agents) in a structured environment. Therefore, user centered strategies of the next SW generation fit into a middle-out legal approach in which there are rights to be protected and duties to be put in place. The expressive content of Web 2.0 may be shaped as well by the service-oriented motivation of the Web 3.0.

From a more traditional point of view, relational justice may be described as a subset of *relational law*. This is not a new concept, either in public or private law. Regulatory bonds through the emergence of a shared context are the base of several sociological descriptions [38] and well-known classifications of contracts —e.g. the notion of *relational exchange norms*.[39]

On the other side, global justice and governance have been described many times as *relational*, to emphasize the contrast with public law theories based on the abstraction of a social contract to found some kind of sovereignty. For some criminologists, relational justice is a perspective to bear upon the problems raised by the criminal justice system: "to regard crime primarily as a breakdown in relationships; even in those cases where the offender does not know the victim, a relationship can be said to exist

[37] *Ibid*., P. CASANOVAS and M. POBLET, "Micro-foundations of Restorative Justice", in: R. MACKAY, Ch. PELIKAN, J. DECLERCK, B. v. STOKKOM (eds), *Images of Restorative Justice Theory*, Frankfurt, Ed. Polizei und Wissenschaft, 2007, pp. 235-256.

[38] S. MACAULAY, "Non-contractual relations in business: a preliminary study", *American Sociological Review*, 1963, No 28, pp. 55-67.

[39] I. R. MACNEIL, "Relational Contract: What We Do and Do Not Know", *Wisconsin Law Review*, 1985, No 3, pp. 483-525.

by virtue of their being citizens together, bound together by rules governing social behavior".[40]

Legal theorists with a high degree of commitment with the Restorative Justice movement use to emphasize the role of privileged actors to counter-balance power in the political arena. For instance, in their thorough and well-known book *Global Business Regulation* (2000), John Braithwaite and Peter Drakos state at the end: "Our conclusion is that NGOs are the key to invigorating global good governance".

Nevertheless, we think that Web 2.0 and Web 3.0 are beyond political activism, and this perspective may not be easily captured under private or public law either. The magnitude of relational bonds and trends becomes evident once we show the numbers. It is worthwhile to quote here explicitly a forthcoming paper by Colin Rule[41], from e-Bay:

"If you have any doubt that consumers are moving to online commerce, take a look at eBay, the online auction company. In the 13 years since it was founded, eBay has grown into the largest marketplace in the world. In the first half of 2008, there were more than one billion product listings added to eBay worldwide. At any given moment, there are more than 100 million listings around the world, and approximately 7.1 million listings are added each day. eBay users trade almost every kind of item imaginable, in more than 50,000 categories. On eBay, a pair of shoes sells every 7 seconds, a cell phone sells every 7 seconds, and a car sells every 56 seconds. The daily volume of trade on eBay is greater than the daily volume of the NASDAQ.

Unsurprisingly, all of these transactions generate a lot of consumer disputes. Even though less than 1 percent of purchases generate a problem, the incredible volume on the site means eBay handles more than 40 million disputes a year, in more than 16 different languages".

It has been highlighted the *democratic* model that the Web 2.0 implies. People can cooperate and build up in common their ideas.[42] Enriching this process seems a quite natural move from the Semantic Web perspective. But this is not an easy task.

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[40] M. SCHLUTER, "What is Relational Justice?", in: J. BURNSIDE and N. BAKER (eds), *Relational Justice: Repairing the Breach*, Winchester, Waterside Press, 1994.

[41] C. RULE, "Making Peace on eBay: Resolving Disputes in the World's Largest Marketplace", *ACResolution Magazine*, Fall 2008. I thank Colin for allowing me to quote his still unpublished paper.

[42] E. MOTTA, "Knowledge Publishing and Access on the Semantic Web: A Sociotechnological Analysis", *IEEE Intelligent Systems*, May/June 2006, pp. 88-90.

Web services, collective work (Petrie 2008) and, lately, service parks (Petrie and Bussler 2008) constitute the natural path leading from Web 2.0 to Web 3.0 too. However, this means accepting that what Charles Petrie calls *the Academic Web Services Dream*, "a dream of an open and free Internet that could offer everyone a nearly infinite choice of services and ways to combine them" is changing as well. Big players count and are able to offer more flexible and friendly user services to a kind of customer seeking for brand and simplicity. Sets of services come with their own set of rules, adding complexity to the managing of the service and the interface with users. From a legal point of view, managing conflicts are as important as managing transactions, and copyright and copyleft are coexisting and overlapping in the web.

Those are some of the reasons why we chose as a research strategy building up legal platforms, easily accessible, and cooperating into the development of electronic agents able to negotiate, to reach agreements and help in regulatory tasks.

As Kalfoglou et al. (2004) noticed at the beginning of this process, "the increasing use of Web services to express computation on the SW points to a purely procedural notion of agency, while the kinds of reasoning which are envisaged in the description of the SW appear to require something more complex, e.g. proactive behavior".

Agency, trust, dialogue protocols, dialogue games and social policy require a cooperative effort coming from lawyers, legal theorists and computer scientists. Some of the new trends have to concentrate on well-known areas with unsolved problems (such as information retrieval); some of them point to the same direction as SW developments (as Web services do); some of them face genuinely new challenges that anticipate the cognitive behavior of users in the web (as legal multimedia, imaging and the building of multimedia ontologies introduce). But *all of them* require a fast change of perspective in favor of interdisciplinary knowledge and cooperative work at theoretical level.

Moreover, computation is increasingly applied to solve or at least to manage social and regulatory problems than in the past where led to the only application or enforcement of law. Security and immigration are privileged fields in EU and USA. Business and corporate governance is another organizational field in which regulation is reached through a combination of principles, protocols, legal rules, ontologies and automatic (or semiautomatic) computation of internal logs. Thus, not only law, legal concepts and reasoning may be conceived and explained as a *cognitive*

technology[43], but the social situated knowledge that enables law to be created, implemented and shared in an increasingly technological social and organizational environment.

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[43] G. SARTOR, *Legal Reasoning: A Cognitive Approach to the Law. Vol. 5. Treatise on Legal Philosophy and General Jurisprudence*, Berlin, Springer, 2005