Sharing Meaning Between Systems, Devices, Users and Cultures

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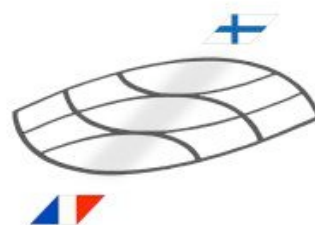**Research Fellow, Nokia Research Center Cambridge**

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My Game Plan

Characterizing the Semantic Web

↓

Serendipitous interoperability

↓

My thoughts about "culture" *

↓

Emergence of the Semantic Web

↓

Questions (and maybe even answers)

* this is likely to be **highly** unauthoritative…

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Characterizing the Semantic Web

- **World Wide Web is human-oriented**
  - this is both good and bad
  - difficult to automate (particularly <u>unforeseen</u> situations)
  - in order to employ machines more, we need <u>data</u>
    - (current content is, largely, no good…)

- **Semantic Web aims at making it easier to automate things**
  - this has implications wrt. interoperability

- **Semantic Web is an "interoperability technology"**
  - contrary to many examples about "Web 2.0", the Semantic Web aims at achieving many things "ad hoc"
    - e.g., *ad hoc* mash-ups by non-computer savvy people
  - shared (and accessible) semantics is the key to interoperability

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On Interoperability

- **Interoperability depends on <u>sharing</u>**
  - sharing is difficult

- **Traditional approach to interoperability: standardization**
  - either one has to <u>anticipate everything</u> about the future, or one has to <u>limit the world</u> somehow
  - (neither alternative is attractive)

- **In today's world, interoperability increasingly matters…**

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Why Does Interoperability Matter?

- **Paradigm shift in personal computing: <u>Ubiquitous Computing</u>**
  - order(s) of magnitude more connected devices
  - dynamic connections, new and/or non-trusted environments
  - this is an "interoperability nightmare"

- **Semantic Web is an alternative to achieving interoperability**
  - less emphasis on *a priori* standardization
    - standardize <u>how</u> to say things, not <u>what</u> to say
  - enables future-proofing

- **[Berners-Lee, Hendler & Lassila 2001] emphasizes <u>agents</u>**
  - ⇒ goal: "<u>serendipitous</u> interoperability"…

ser•en•dip•i•ty | ˌserənˈdipitē |

noun

the occurrence and development of events by chance in a happy or beneficial way: a fortunate stroke of serendipity | a series of small serendipities

About Serendipity

- **Serendipity is the <u>defining</u> characteristic of the Semantic Web**

- **Serendipity in <u>interoperability</u>**
  - can we interoperate with systems, devices and/or services we knew nothing about at design time?
    - (this is useful in many ubiquitous computing scenarios)

- **Serendipity in <u>information reuse</u>**
  - when information has accessible semantics, this is easier…

- **Serendipity in <u>information integration</u>**
  - can information from independent sources be combined?
    - NB: issues of <u>identity</u> are amplified
  - even simple forms of reasoning can help
    - e.g., *inverse functional properties* of OWL

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What about "Culture"…?

- **Different domains (of discourse) are "cultures" of their own**

- **Examples from scientific disciplines:**
  - biology vs. economics
  - ecology vs. physiology vs. molecular biology
  - proteins: folding vs. expression vs. interactions

- **Different domains have languages of their own**
  - e.g., "acronym pollution"

- **Scientific disciplines also use conceptual models (about the world) that are different from others'**
  - e.g., different levels of abstraction

Cultural Differences & the Semantic Web

- **Semantic Web was designed to**
  - accommodate different points of view
  - be flexible about <u>what</u> it can express
    - not preferential towards any particular domain or application

- **Serendipity of combining information in new ways**
  - we cannot anticipate all the possible ways in which information is used, combined
    - $\Rightarrow$ there is value to merely making information (data) available
  - using Semantic Web formalisms lowers the threshold for "serendipitous reuse"

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Lessons Learned from the WWW

- **New business models**
  - advertising (Yahoo, Google)
  - marketplace (Amazon, eBay)
  - "give it away" (Netscape)

- **Benefits to making information (= content) available**
  - (without forethought as to how it might eventually be used)
  - people do unexpected things…
  - network effect: new services resulted from things being "linked up"

- **High traffic is not necessarily a prerequisite for high value**
  - niche "cultures": anyone can publish

- **What business models can we expect on the Semantic Web?**
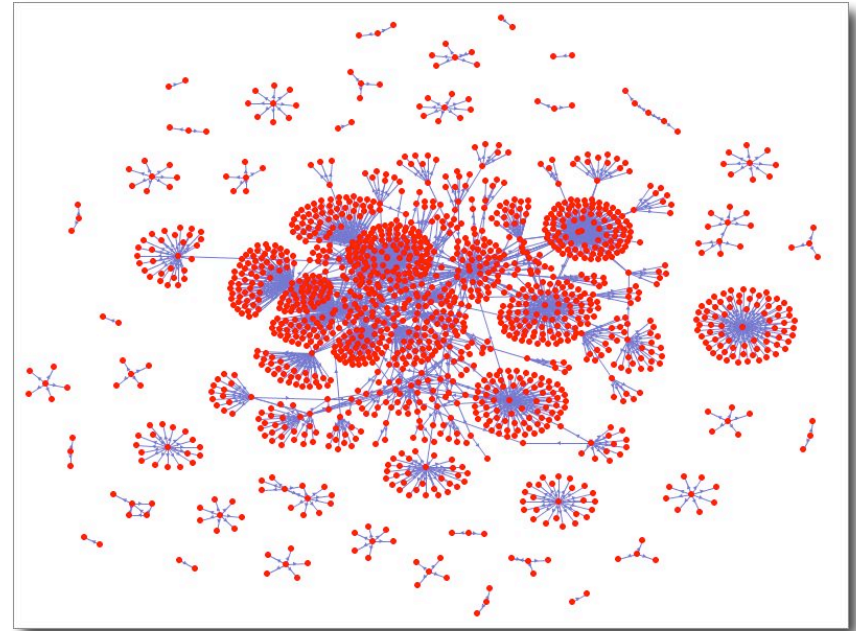
Source: Mindlab, U of Maryland

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Semantic Web Needs <u>You</u>!

- **Make information available**
  - use RDF, OWL

- **Do not "reinvent"**
  - instead, borrow from others
  - i.e., use existing schemata

- **The Semantic Web will emerge from the serendipitous, "cross-cultural" <u>reuse</u> of information**

Source: Library of Congress

Questions? Comments?

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- **http://www.lassila.org/blog/**

- **Thanks to:**
  - Deepali Khushraj
  - Marcia Lassila
  - Susie Stephens

Can we go now?

Reaction from
test audience…

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