



STI · INTERNATIONAL

A Conceptual Roadmap for Scalable Semantic Computing

ICSC 2008

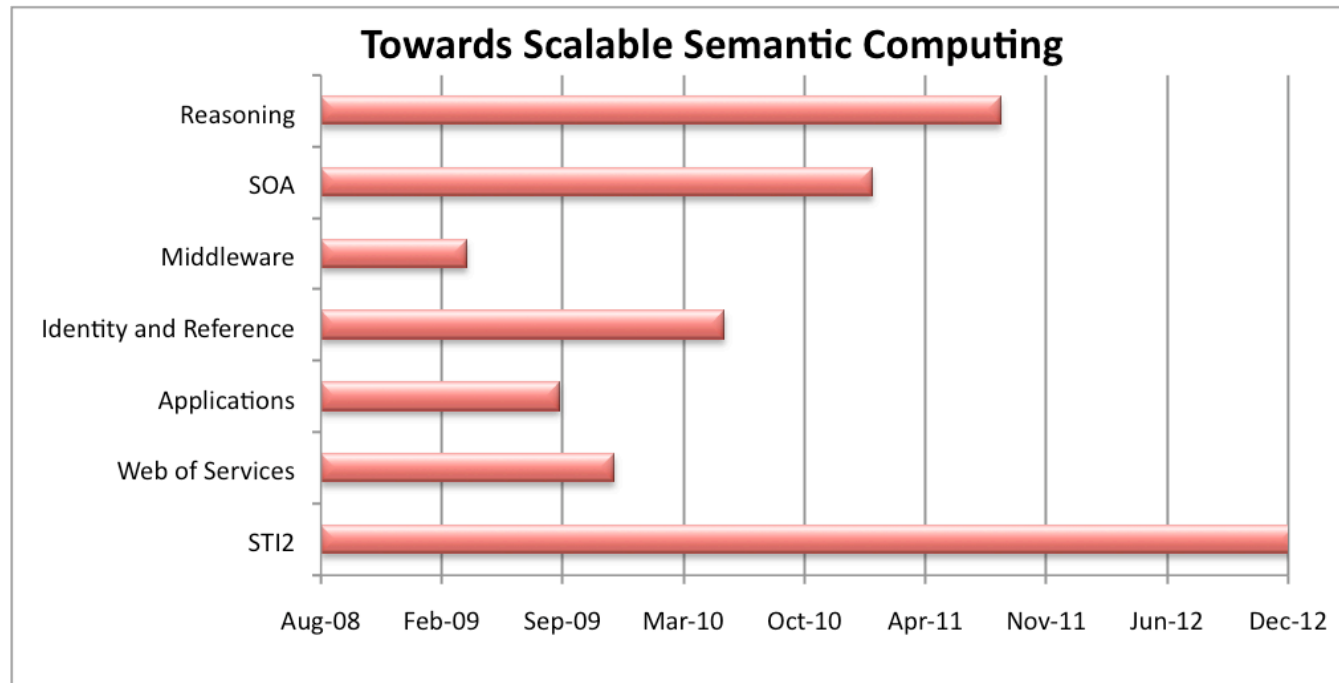
Graham Hench – STI International

- “Conceptual”
- “Roadmap”
- “Scalable”
- “Semantic Computing”

- Finally, the “European View”

SERVICE
WEB 3.0

Roadmap...



- Integration -
 - Integrate with current (traditional) standard procedures and state-of-art (new) technologies
- Sustainability -
 - Provision and maintenance of developed technologies

- Reasoning
- SOA
- Middleware
- Identity and Reference
- Application

- Forget *completeness*
- Faulty presumption: reasoning infrastructures must be founded upon paradigms that are *strictly* based in logic
- Interdisciplinary - Information retrieval, cognition, ontology engineering, statistics, machine learning, probabilistic inference, economics, computational theory, decision theory



A new distributed reasoning framework:

- Retrieve
- Abstract
- Select
- **Reason**
- Decide

- Established field – however design principles contradict “scalable”
- Challenge:
 - Provide a **worldwide** service platform rather than one that merely supports **internal** integration



Meets this challenge with the combination of:

- Web principles and technologies
- Web 2.0
- Semantic Web
- Context Management

- Web services middleware platform, for example, mistakenly provide Web services with a directed communication (message based) apparatus.
- Challenge:
 - Space based middleware must be developed which facilitates persistent publishing, essentially shared virtual storage, in order to transition from directed to undirected communication middleware models.



- Persistent *publishing* rather than *messaging*
- The development of such a semantic space (virtual storage and access space) consists of the combination of three crucial technologies:
 - Tuple spaces
 - Semantic Web
 - Web services

Semantics – Redefine Identity and Reference

- More complex methodologies are demanded of the URI in order to provide a “natural” approach to accessing information (entities and objects, rather than just data and resources)
- Challenge:
 - A framework must be established which implements the reuse of global identifiers for entities



Meets this challenge with the following:

- Issuing of globally unique, rigid identifiers for entities.
- Enabling retrieval and reuse of entities in order to ensure unique reference to objects, thereby allowing for seamless (correct and precise) information integration.
- Referencing external information about entities.

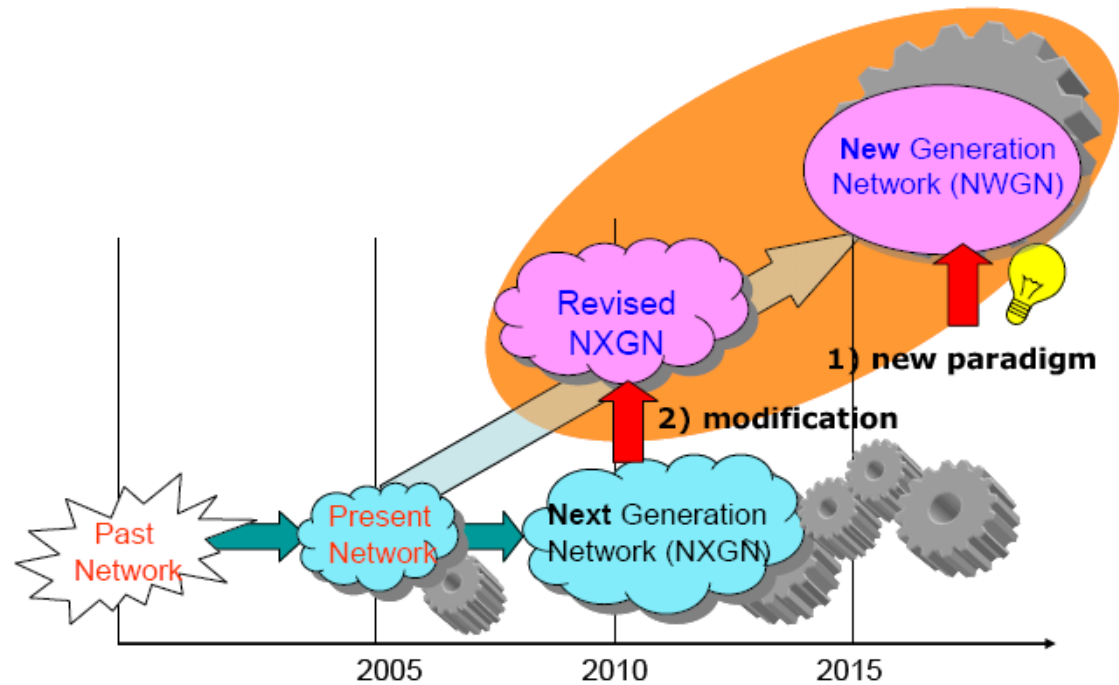
- Scalability challenges rise to the surface in two main scenarios:
 - Increase in the size of the problem
 - Increase in the diversity of the problem
- New prime showcases of scalable semantic computing:
 - Beyond the Semantic Web (beating a dead horse) → Web of Services (Service Web) → Future Internet
 - Business Process Management



- Develops a technological platform constituting BPM enriched with machine readable semantics, which not only allows business experts to manage business processes on their own, but also provides means to further automate the business process life cycle based upon scalability requirements reaching an intra- and inter-enterprise level

- Fresh platform – what's the role of semantic technologies/computing?
- Clearly, **the** scalability test

- Beyond the European view:
 - Japan
 - USA
 - International?



AKARI - New Generation Network (NWGN)

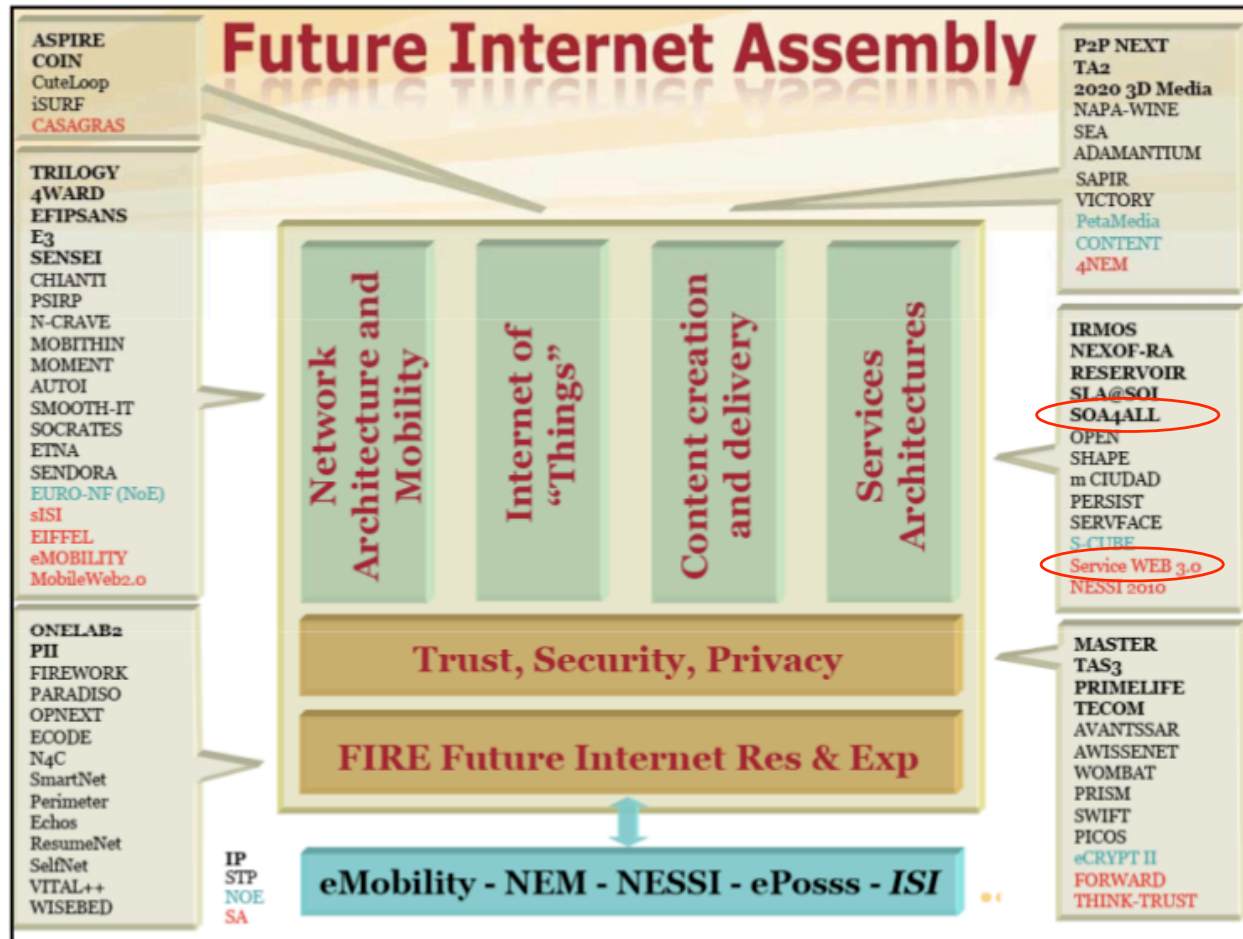
Europe/Japan Collaborative Efforts:

- This year: Cooperation Forum & Symposium – USA?

- **GENI** - develop a shared experimental facility (test-bed) for promoting research and development of new Internet architectures or network services. *Clean slate approach*
- **FIND** - comprehensive network architecture design research towards the establishment of the Internet architecture of the future
- **SING** - Another clean-slate approach to network design focusing upon communications, computing, signal processing and network science
- **NGNI** - development of both the information systems and the networking technologies
- **Europe/USA Collaborative Efforts: ?**

An invitation...

..to join (contribute/critique) the European effort:



How to take part?



- Future Internet Interest Group:
 - Tracks the progress of the Future Internet Initiative, particularly the work of the Services and Architectures working group, for those individuals with a vested interest in the Future Internet.

<http://www.serviceweb30.eu/cms/index.php/future-internet>

Next steps...

- Engineers?
- Linguistic Analysts?
- Visionaries?

A significant paradigm shift must occur which places semantic technologies as the core of modern computing, not a modular part of~ such an architecture is necessary to realize scalable semantic computing