SIEMENS

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Siemens Interests in the Future Internet

Abstract

Siemens heavily uses Internet rooted ICT technologies in its products and solutions and increasingly relies on the Internet as a ubiquitous service infrastructure. Since Siemens provides solutions along the whole value chain from the infrastructure and the related networked embedded systems to the business processes, Siemens interests in Future Internet research also spans the complete range from Information/Business Services to Communication/Networking Services.

Siemens Interests

The Internet is increasingly becoming a vital part of most Siemens' solutions. At the same time manifold Internet rooted ICT technologies are applied even in self-contained industrial environments.

Siemens's strategic interest within the EU Future Internet activities is thus to

- make sure that the Future Internet as ubiquitous service infrastructure matches the requirements of future solutions in Energy, Industry and Healthcare.
- make sure that the Future Internet rooted ICT and service technologies are deployed and available on a wide scale and thus applicable to Siemens products and systems.

This requires addressing the whole spectrum of ICT and service technologies according to Siemens' needs: The Future Internet technologies need to assure high reliability, determinism, ease of use and security to fulfill the stringent industrial requirements. Easy and standardized interfaces are required towards the service and application layers. Finally the service layer needs to be built in a way that the services can be used in a Service Oriented Architecture (SOA) using a wide range of technologies to meet industrial requirements.

Siemens' primary focal points in the EU FI activity

- ***Use Cases & Scenarios***
  Due to Siemens' broad solution business, various use cases in the areas Energy, Industrial Automation, Building Automation, Mobility (people and goods) and Healthcare are of major interest. Recently large effort has been spent by Siemens in the usage areas 'Smart Grid', 'Transport, Mobility & Logistics' and 'eHealth' within the European Future Internet Initiative taking over even the lead in the Smart Grid area.
  In any case, the major focus of the large-scale experimentation should be proving scalability and interoperability. For instance in the Smart Grid area, billions of devices (sensors, actuators), several 100 millions of prosumers, many millions of electric cars and 100.000s of smaller to medium power plants (esp. renewables) need to be considered. This is not only a question of bandwidth but also a problem of complexity for control algorithms, management systems and data handling/messaging. For a proof of concept, a pan-European Smart Grid test environment needs to be setup throughout different countries, involving a large number of participants majorly based on renewable energy

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generation, whereas the Future Internet test platform is used for communication and control purposes.

- ***Communication Services: easy-to-use & auto-configuring***
  The future networking technologies need to support the communication services required in the industrial domains like energy automation, building automation, industrial automation, transportation & logistics: Prominent examples for such services are deterministic communication, ultra reliable communication and highly secure communication. The communication services need to be easily accessible by the overlying services/applications via a suitable interface and per se be secure. Moreover, the specific requirements for communication between (highly) distributed embedded systems need to be considered. Ultimately, every object (e.g. of a part of a building, part of an industrial plant, …) will be a computing device which has to be identified and needs to be able to communicate with other objects ("Internet of Things", IoT).
  Specific topics to be addressed are scalable addressing schemes, communication protocols and platforms for the IoT, auto-configuration and autonomic management of field networks (self-diagnosis and repair).
- ***Standardized interfaces***
  Solutions often build on a variety of ICT protocols and technologies and the solutions themselves need to handle the heterogeneity to match the diverse market requirements. Pushing for standardized interfaces will help to make sure that the solutions do not have to explicitly consider the multiplicity of underlying protocols and technologies. In many cases Siemens solutions also span several usage areas (e.g. Smart Building and Smart Grid, Smart Automation and Logistics). To avoid dedicated developments for every single usage area, standardized interfaces are required whenever different usage areas interact, e.g. for data exchange or comprehensive control processes. If possible, domain-specific interfaces with similar functionality should be developed into domain-independent standards.
- ***Cloud Services***
  Providing services via clouds seems to be an important business opportunity due to the resource efficiency. A deep understanding which services are suitable candidates to be offered via a cloud is required to identify where solutions can be offered more cost competitive via cloud technologies. Moreover, the required technologies on infrastructure and communication service layers have to be understood and developed.
- ***SOA for all Layers***
  Service oriented Architecture (SOA) principles, proven in the enterprise domain, in conjunction with data centric architectures can be used as core design concepts on all layers in a comprehensive way. The different context and requirements of systems for Energy, Industry and Healthcare have to be taken into account as these domains differ significantly from the Enterprise domain. SOA solutions and techniques require significant adaptation to meet constrains in terms of real-time, limited hardware resources, predictability, reliability and availability.
- ***Future Internet Business Models***
  Innovative technical approaches open the space for new market players and business models. This requires the identification of new markets and the development of solutions which helps others to position themselves in these new markets. A continuous and detailed analysis of new business models in promising usage areas is necessary.

Conclusion

Summarizing, research on comprehensive Future Internet solutions for Energy, Industry and Healthcare requires a use case driven systems architecture approach. Siemens hence recommends a holistic Future Internet research agenda taking the major usage area requirements into account while covering all relevant service related as well as communication related issues. To support this approach contributions in the usage area activities as well as in the development of the Future Internet technologies are foreseen by Siemens in the context of the European FI PPP program.