

Answer to the European Commission public consultation on the early challenges regarding the "Internet of Things"

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General Comments

The Internet of Things (IoT) will be an important cornerstone in the Future Internet, which in turn will have a tremendous impact on European competitiveness. Therefore, Europe should play a leading role in both the development of innovative IoT applications as well as their rapid uptake throughout the economy. We appreciate therefore that the Commission is taking this challenge seriously and has produced this working document.

In general, the working document fits well with SAP's point of view, which has been outlined in a recent white paper [1]. In particular, the Commission is right in stressing the fact that the Internet of Things is more than just RFID-tagged objects, but rather also includes other technologies (sensors, actuators, embedded systems etc.) as well as the whole infrastructure with software and services; and in particular that services and innovations in that space are key to unlock the potential of the Internet of Things.

However, we believe there are a few points where this working document could be improved. First of all, the document seems to have mainly applications in mind that concern end consumers. While these will be very important in the long term, in the short to medium term it is crucial that enterprises start to invest in leveraging these technologies. Therefore, applications with a clear business benefit for enterprises should receive a higher consideration. There is not always a need for a fully deployed Internet of Things infrastructure. For many enterprise-relevant scenarios, such as in the manufacturing sector, a more limited, company-internal "Intranet of Things" can act as a first stepping stone towards the more global Internet of Things vision, which will support large-scale inter-enterprise business scenarios. While the working document mentions an "Internet of My Things" in the consumer sector, the "Intranet of Things" in the above mentioned sense is unfortunately missing.

Please find below more detailed comments on individual sections of the working document.

Example applications in section 2

We believe that more convincing examples could be found than the ones listed. We have described applications where we see a high potential also for enterprises in the aforementioned white paper [1] as well as in a recent research paper [2]. For example, we see significant economic potential also in the manufacturing domain, which is not mentioned at all in the current working document, as well as in the public and financial sector.

More detailed comments on the examples are captured in the following table:

| Example | Comment |
|----------|--|
| Retail | One thing to be added here is that the IoT will enable both consumers as well as enterprises to see that no integrity obligations regarding the product have been violated. The resulting <i>supply chain integrity</i> includes aspects such as product authenticity, product origin and composition, cool chain or other storage violations, total carbon footprint, transport restrictions and other compliance requirements. |
| e-Health | The example stated is valid, but it should be made more explicit about the prospect of so-called <i>ambient assisted living</i> , enabling citizens and especially the elderly to live at home in their usual environment longer. This will help manage the increasing costs that come with the ageing society, but more importantly, it also increases the quality of life of the citizens. |

| | |
|-------------|--|
| Medication | Here the ageing society problem is mentioned. The example could though easily be merged with the previous example. The described example of using sensors to select shower temperature to avoid scalding is not very convincing. It has little to do with special needs, and a simple blocker as is common on faucets today does the job already. |
| Energy | The automatic adjustment of heating and lighting to room conditions and occupancy is just one aspect how the IoT will revolutionize the energy markets of the future. Much more important however are advanced metering infrastructures (AMI). They will have a significant impact on existing and future energy management models and systems. Decision and policy makers will be able to base their actions on real-world, real-time data rather than on predictions. Households and companies will be able to react to market fluctuations by increasing or decreasing consumption or production, thus directly contributing to increased energy efficiency. Furthermore, this is a precondition for managing and accounting a highly distributed energy production, as more and more private households become energy producers through e.g. solar panels. . |
| Environment | The statement here is very – and in our opinion too – generic. The environmental monitoring mentioned is only one part, but the actual environmental benefits come from process improvements in manufacturing, supply chain and logistics. |

Section 3.2.3 on Identity Management and Naming

We definitely agree with the Commission’s view that the governance of a future Internet of Things infrastructure should be decentralized in order to ensure openness, non-discriminatory access and availability of critical resources.

Section 3.2.4 on Identity Management and Naming

First of all, a distinction should be made between the ID of an object, and the technology used to tag an object with such an ID. RFID, barcodes, magnetic stripes etc. are examples of the latter. More important however is the actual ID itself, as it is used in software services. In order to be able to address the billions of entities in the Internet of Things, we need to be able to identify them with a globally unique ID. That ID can also be used to find other information about the entity of interest. Several ID schemes have been proposed, like the EPC, the ucode in Japan, or even using IPv6 addresses for this. In addition, many industry-specific ID schemas exist today. From a software vendor’s perspective, it would be desirable to have a harmonized schema for globally unique object ID’s. Not only would it be easier to build general software solutions since it wouldn’t be necessary anymore to support a plethora of different identifier schemes. Much more importantly, it would also allow to reap the full business value that proponents of the Internet of Things are claiming: An object that appears in different – even unrelated – business processes can be identified in the same manner without the need for expensive mapping techniques, and information about the object and its state can therefore easily be correlated and used in different contexts: This may lead to a much more fine-granular knowledge what is happening in the real world and thereby also enabling better business decision making.

A hierarchical name space structure is envisaged for such a harmonized, globally unique ID, where different organisations will be responsible for assigning IDs in a particular name space region. This not only allows to easily incorporate existing ID schemas – which will be necessary at least for a transitional period –, but it will also make sure that there is no single registration authority whose failure would cause a breakdown of the whole system.

The industry is aware of the importance of this topic. In particular, SAP has initiated a series of industry expert workshops on this topic, the first of which took place during the Internet of Things conference in Nice in October 2008.

Annex II on Research and Innovation

The issues mentioned as requiring further research and development is in our opinion not complete. While we agree that these issues certainly merit further research, in particular the last one on platform services and manageability, we believe that the following issues should be added:

- Applications, business cases and business models. As mentioned in the beginning, it is essential to have enterprises invest in the technologies and to find the right applications as well as proven business cases. Only that will lead to sustainable and large scale deployments in the real world. Currently, there are still only niche markets and/or many application ideas where it is unclear who would benefit enough from it to invest in.
- Deployment and Life-Cycle Management. The initial deployment of hundreds or thousands of technology devices into the world, as well as their maintenance (e.g., battery lifetime) and management are still major road blocks on the road to the ubiquitous Internet of Things vision.
- Liability. With thousands of devices deployed that execute some functions autonomously, the question arises who would be liable if something goes wrong. Is it the manufacturer of the device? Or, is it the owner of the device? The operator of a network of such devices? The organisation on which premises the device is installed? Or the ISV whose software is running on the device? Today, there are no clear answers for these questions.

References

1. SAP White Paper, "Toward a European Strategy for the Future Internet", October 2008
2. S. Haller, S. Karnouskos, C. Schroth, "The Internet of Things in an Enterprise Context". Future Internet Symposium, Vienna, 2008. <http://www.fis2008.org/images/fis2008-haller-final.pdf>