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# ASPIRE project

Advanced Sensors and lightweight Programmable  
middleware for Innovative Rfid Enterprise  
applications

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# Outline

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- RFID issues
- What is a middleware platform?
- ASPIRE objectives
- RFID Info Day and SME survey

## What is ASPIRE?

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- **ASPIRE** stands for "Advanced Sensors and lightweight Programmable middleware for Innovative Rfid Enterprise applications".
- ASPIRE is a European project that aims at facilitating Small and Medium Enterprises the deployment of the innovative and enhanced versions of Radio Frequency Identification (RFID) systems.
- ASPIRE will research and provide a radical change in the current RFID deployment paradigm through innovative, programmable, royalty-free, lightweight and privacy friendly middleware.

## Current state-of-the-art RFID

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- Current RFID systems can be classified in different manners.
  - According to the power source: active, passive and semipassive.
  - According to the frequency: LF, HF and UHF.
  - According to the standard: EPC, ISO, or NFC.
- Market applications are dominated by HF tags for smart and vicinity cards.
- However, UHF tags which have longer range are gaining momentum for item level, stock and inventory, and supply and cold chain management.
- NFC applications have also an interesting future because they use mobile phones as readers.

- RFID still poses cost barriers for SMEs
- RFID privacy and security threats are slowing down its deployment.
- RFID middleware and software platforms are proprietary and hence vulnerable to intrusion.
- RFID middleware is resource intensive, thus requiring expensive computer and IT systems.
- RFID solutions inefficiently use current telecommunication networks and connections to transmit just a few bytes of data.

## What is a middleware platform?

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- A middleware platform is an abstract entity that provides the connection between the low-level procedures of devices and link layer protocols and the application events.
- RFID middleware platforms provide the end user with a management system of the network of readers and the management of the scanned RFID info itself.
- However current RFID middleware is resource intensive and proprietary, which increases the total cost associated with RFID.

## ASPIRE objectives

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- ASPIRE will change the current RFID deployment paradigm, through introducing and boosting a shift towards royalty-free RFID middleware, while also placing the middleware at the heart of RFID infrastructures.
  
- To support this paradigm ASPIRE will develop and deliver a lightweight, royalty-free, programmable, privacy friendly, standards-compliant, scalable, integrated and intelligent middleware platform that will facilitate low-cost development and deployment of innovative fully automatic RFID solutions.

## Royalty-free

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- ASPIRE will offer a licensing scheme enabling free use of its RFID developments.
- Royalty-free middleware will essentially contribute to a wider adoption of RFID in SMEs.
- Open source software has shown to be secure and fully competitive.
- Developer contribute to enhance features and debug issues

- Part of the ASPIRE middleware will be able to run over low-cost specialized microsystems which possess RFID sensing, filtering and communication capabilities.
- In this way, ASPIRE will implement lightweight middleware libraries for mobility scenarios where computing resources tend to be constrained.
- Implementation of fully fledged filtering functionality will take place in the core middleware platform (running in an application server), to enable the middleware to be used in conjunction with the low-cost readers that provide limited or no filtering functionality at all.
- The ASPIRE middleware will not be resource intensive. Thus, it will be possible to run it in low-end servers, such as those possessed by the majority of European SMEs.

## Programmable

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- The ASPIRE RFID middleware platform will provide solution developers and integrators with the opportunity of configuring simple solutions using solution templates and tools.
- The configuration process will involve minimal coding, or even no coding at all for simple solutions-applications. Programmability will also allow visual development (i.e. based on an appropriate development environment) for a class of simple applications.
- Overall, programmability will significantly lower costs and efforts associated with application development and integration.

- On top of RFID programmability, the ASPIRE RFID middleware platform will incorporate intelligence enabling context-analysis and reasoning over numerous sensors observations. Reasoning will enable the ASPIRE middleware to alleviate problems associated with the RFID network (e.g., incorrect readings).
  
- Having the intelligence within the middleware platform will allow using low-cost hardware (e.g., interrogators, gateways, tags) for the RFID solutions.

## Standards-compliant

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- The ASPIRE RFID middleware developments will comply with existing RFID standards, starting from EPC standards (i.e. mainly on filtering and eventing) for both intra-enterprise and inter-enterprise applications development.
- Support for non-EPC tags will also be pursued since EPC costs might be important for some SMEs.
- Other standards envisioned: NFC, ISO.

- The ASPIRE platform will be capable of supporting numerous massively distributed tags, as most likely required in realistic applications for the networked enterprise.

- The ASPIRE middleware will cater for minimalist data generation, which incorporates the principles of data quality, limitation and conservation into the logic itself.
- The ASPIRE tag data will not be created in the first place, kept for longer than required, or distributed to non-incumbents.
- Privacy is closely related to the royalty-free licensing, since privacy friendly middleware should by definition be open to public scrutiny.
- This does not solve all privacy issues but it reduces their effects

- The ASPIRE platform will offer a complete integrated environment for specifications, development, integrations and experimentations of the RFID components and concepts through a concurrent innovation engineering framework.

## RFID Info Day and SME survey

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- ASPIRE consortium is organizing RFID Info Days at each of the participant countries.
- The objective is to inform SMEs about the technology RFID, and to get to know their requirements and their concerns about this technology.
- The participant SMEs will fill a survey that will help the consortium to better know the infrastructure and the conditions in which the RFID systems have to be deployed.