

# VAN – Developing the Future of Industrial Communication

Presentation of the European R&D-Project "Virtual Automation Networks"

by Dr.-Ing. Axel Klostermeyer  
Siemens A&D PT2 P

Since a few years one of the leading trends in industrial communication is its penetration by IT technologies. Due to their origin in the office world, indeed, these technologies and concepts do not reach the industrial standards in areas as security, wireless, safety, and real-time. To keep Europe's dominant market position for automation systems, the Integrated R&D-Project "Virtual Automation Networks" - which is funded by the European Union -, first, has to cope with the technical challenges which follow from this paradigm change and, second, has to avoid dependencies from the mostly non-European producers of the relevant IT technologies. Correspondingly, the objective of VAN is to adopt, modify and extend common office communication/IT solutions according to the above mentioned standards - aiming at real knowledge-based, intelligent, agile manufacturing enterprises. This implies new dimensions in the horizontal and vertical integration between office and industrial automation domains, focused on a new dimension of a uniform networking of production and manufacturing processes. As a target scenario such an "Industrial System Environment" is shown in Figure 1.

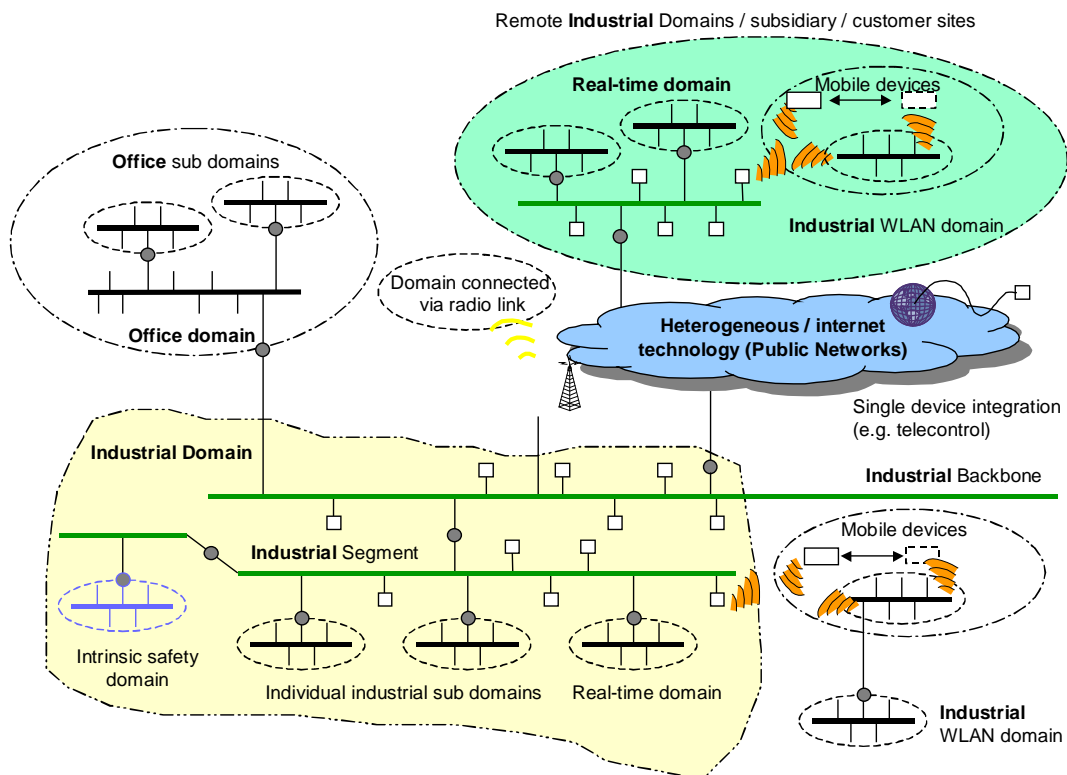


Figure 1: The Virtual Automation Network

A Virtual Automation Network is a heterogeneous network integrating wired and wireless field level communication networks, Local Area Network, Internet, and wired or/ and wireless telecommunication systems. The network also has to enable widely distributed application programs to co-operate and fulfill common control applications. An end-to-end connection through a heterogeneous network has to guarantee a location awareness, required scalable real-time behaviour, security and privacy, a very high degree of intrusion protection, and safety.

Concluding, **the research and development results** of VAN will be:

- an **open automation architecture** covering specific industrial and automation needs to perform a dynamic industrial communication environment for a life cycle covering management of production and manufacturing systems, automation products and services;
- **adoptions of office communication/IT technologies**, extended by the required new functionalities in automation systems;
- **embedded devices communication architectures**;
- **scalable real-time, safety and security** technologies and capabilities over all levels of a (virtual) network;
- a **scalable solution** for the use at small and large locations;
- **standardised interoperable solutions**, also applicable by SMEs;
- **integration concepts** and guidelines for private and public Ethernet and Internet based networks;
- concepts and development of corresponding **engineering tools** for easy and efficient development and installation of embedded industrial communication devices in industrial plants;
- an **easy integration** of the solutions and concepts **into embedded systems and devices with restricted resources** to reduce time to market for new devices and functions;
- a **prove of interoperability** of VAN technologies in reference devices, tools and applications;
- architectures, concepts and technologies for the **European Leadership** in easy and efficient modern knowledge-based, networked manufacturing system development;
- a **plain enrichment** of also service related features for automation products and processes;
- a proposal for **European and International standardisation** of the VAN results.

To achieve these objectives, the VAN project is structured into 11 workpackages. The first 10 workpackages cover the technological content of VAN, including the project's exploitation and dissemination. WP11 deals with project management.

Figure 2 shows the kernel technological workpackages and their dependencies to achieve the VAN objectives.

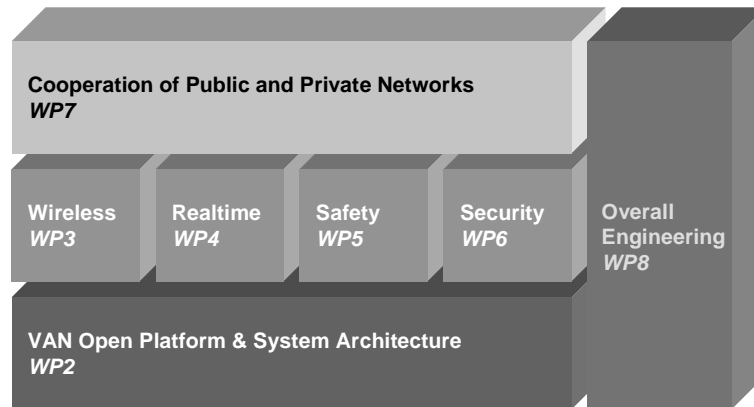


Figure 2: Overall Workpackage structure considering the technical aspects of VAN

The basis for the migration of the different technologies is WP2 (Open Platform & System Architecture); in WP2 an open infrastructure for automation components for the VAN goals will be defined. Based on the results of this WP different solutions for wireless communication, safety, security and real time aspects will be investigated and developed. As already shown in figure 1, concepts and solutions shall be developed to link the automation pyramid e.g. with the Internet (WP7: Cooperation of Public and Private Networks). The set up/installation procedure for the technologies and prototypes is handled by the engineering definition and prototypes which is the goal of WP8.

To achieve these ambitious goals, the following 14 partners from all over Europe are taking part in this joint research and development activity:

- **Siemens A&D PT2**, Nürnberg, Germany - coordinator;
- **AUCOTEAM GmbH**, Berlin, Germany;
- **Brno University of Technology, Brno**, Czech Republic;
- **CARTIF Foundation**, Boecillo, Valladolid, Spain;
- **Fidia S.P.A.**, San Mauro Torinese, Italy;
- **Heitec AG**, Fürth, Germany;
- **ifak e.V**, Barleben, Germany;
- **Machining Centers Manufacturing S.P.A.**, Vigolzone, Italy;
- **Phoenix Contact Electronics**, Bad Pyrmont, Germany;
- **Politecnico di Milano**, Milan, Italy;
- **Schneider Electric GmbH**, Seligenstadt, Germany;
- **Teleport Sachsen-Anhalt GmbH**, Barleben, Germany;

- ***Otto-von-Guericke-Universität Magdeburg***, Magdeburg, Germany;
- ***Forschungszentrum Karlsruhe GmbH***, Eggenstein-Leopoldshafen, Germany.

To engage with actors beyond the consortium and the research community, mainly four kinds of activities are foreseen. First, the spreading of the results within the relevant vendor organisations; secondly, the establishment of a close contact to the relevant user organizations; third, exhibiting the main results of the VAN project at fair booths of the main participants and, fourth, bringing the main results of the research work into the academic education at the participating universities.

VAN started on September 1<sup>st</sup> 2005 and has a duration of 4 years.