



PROJECT RESULTS

Advanced middleware

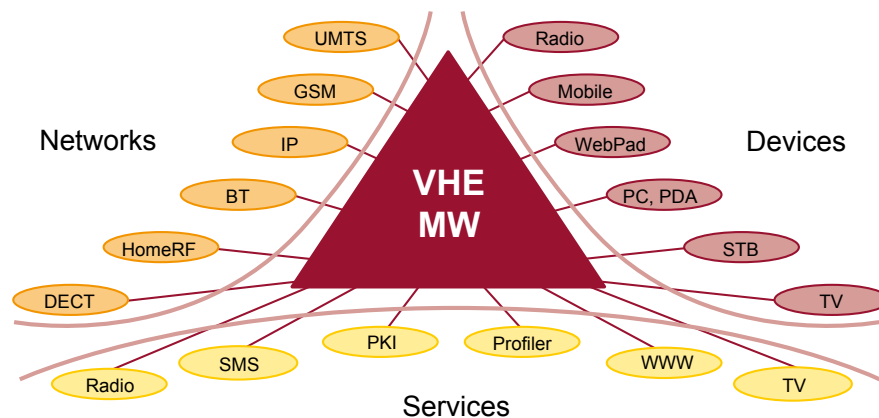
for Virtual Home Environments

Market expectations for wireless data communication products and services are high due to the strong growth in cellular voice communication. There is also a rapidly growing market for information appliances and convergence products such as GSM-enabled palm computers. Such developments were the driving force behind this project, which developed common mechanisms to support ubiquitous information access.

Key software technology
VHE Middleware has developed an enabling middleware that is the key software technology for compiling mobile applications, i.e. arbitrary combination of devices, services, and networks. This middleware constitutes a network and device

to contact back-office services ad hoc, independent of the environment (wired or wireless), the access device (mobile phone, PDA, desktop, or terminal) and the type of user (residential/business). The middleware supports combinations and extensions of:

- mobile terminals with smart card, GSM/GPRS/UMTS cellular wireless connection, and Bluetooth/WLAN/HomeRF/DECT local wireless connections to other appliances
- set-top boxes for TVs with smart card, wired cable TV connection, wired PSTN/ISDN telecom network connections, and Bluetooth/WLAN/HomeRF local wireless connection to other appliances
- services with personalized content.



integration technology that aids abstraction from the technical details of specific protocols, which is extremely beneficial to software developers.

The advanced middleware developed in the project is used in both servers and end-user terminals. The enabled Virtual Home Environments (VHEs) will allow users to customise and enjoy services whether they are in the home, office or car. A generic connection service enables users

An era of wireless RF data communication
Thanks to the availability of low-cost communication for the home, there is considerable demand for standards-based enabling software technologies like VHE. According to a recent US forecast, the 2.8 million subscriptions to broadband Internet services in 2000 are expected to grow to 40 million by 2005.

With the imminent arrival of low-cost broadband RF systems with considerably more bandwidth than

VHE Middleware (ITEA 99013)

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Partners

- Fujitsu-Siemens
- Nokia
- Orga Kartensysteme
- Paderborn University
- Philips
- Robert Bosch
- Siemens
- VTT Electronics

Countries involved

- Belgium
- Finland
- Germany
- The Netherlands

Start of the project

September 1999

End of the project

June 2002



PROJECT RESULTS

the maximum offered by ISDN and PSTN and low cost-of-use due to packet-switched technology in cellular communication systems, we are entering an era of wireless RF data communication for consumer applications.

Examples of RF data-communication standards for consumer applications are General Packet Radio Services (GPRS, an extension of GSM), Digital Broadcasting (DAB), Digital European Cordless Telephony Standard, WLAN, HomeRF and Bluetooth. The first steps have been set by the ETSI towards a Universal Mobile Telecommunication Standard (UMTS) offering outdoor bandwidths up to 2 Mb/s. This will facilitate the integration of high-bandwidth communication technology into high-volume consumer products.

These emerging wireless communication products offer European industries a unique opportunity to become leaders in enabling software technologies because:

- major new wireless standards have been determined in Europe
- European companies are leaders in the markets for GSM/DECT telephones/components and for DAB components/terminals
- European consumer electronics companies have pioneered standards for digital in-home networks, for operating systems for mobile terminals (e.g. EPOC32/Symbian), and for smart cards.

Broad acceptance of the benefits by end-users is crucial. This is why the project focused on software technologies that enable attractive 'virtual home environments'.

Smart wireless solutions

VHE Middleware is contributing to building the European industry leadership in middleware for end-user terminals with wireless connections and the corresponding infrastructure.

The software technologies resulting from the project are essential for:

- multi-standard terminals that offer ubiquitous services and applications via wireless indoor and outdoor RF communication
- compact user interfaces that use agents, speech and handwriting recognition, and multi-modality to make the underlying technology invisible to users
- advanced smart cards with a wide variety of functions.

The partners are actively exploiting the project results, for example:

- BOSCH is designing 'infotainment' products that offer users independence of location and devices.
- FUJITSU SIEMENS is incorporating the work done on wired and wireless communications into VHE middleware-related communication products (e.g. modems and Powerline).
- ORGA is using browser plug-ins that access smart cards for client and server authentication of its products, and is intending to use project results in the emerging market for Card Application Management systems.
- PHILIPS' market position will be strengthened by extensions to the Bluetooth standard proposed during the project, which are expected to be implemented by a large number of consumer electronic companies.
- SIEMENS BUSINESS SERVICES is actively exploiting the project results concerning service offers to operators for mobile entertainment solutions.

VHE Middleware has also actively contributed to several standards groups such as ECMA Java, Bluetooth, and MEXE (Mobile Station Application Execution Environment).

ITEA Office

Eindhoven University of
Technology Campus
Laplace Building 0.04
PO box 513
5600 MB Eindhoven
The Netherlands
Tel : +31 40 247 5590
Fax : +31 40 247 5595
Email : itea2@itea2.org
Web : www.itea2.org

ITEA - Information Technology for European Advancement - is an eight-year strategic pan-European programme for pre-competitive research and development in embedded and distributed software. Our work has major impact on government, academia and business.

ITEA was established in 1999 as a EUREKA strategic cluster programme. We support coordinated national funding submissions, providing the link between those who provide finance, technology and software engineering. We issue annual Calls for Projects, evaluate projects, and help bring research partners together. We are a prominent player in European software development with more than 5,000 person-years of R&D invested in the programme so far, and another 10,000 anticipated over the next five years.

ITEA-labelled projects build crucial middleware and prepare standards, laying the foundations for the next generation of products, systems, appliances and services. Our projects are industry-driven initiatives, involving complementary R&D from at least two companies in two countries. Our programme is open to partners from large industrial companies, small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

