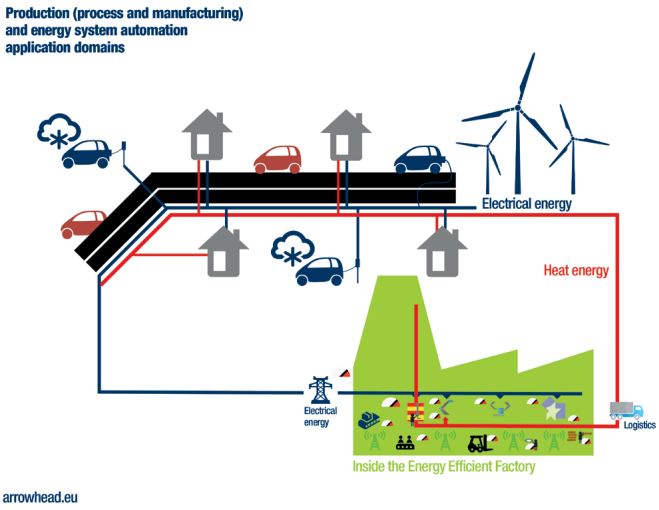
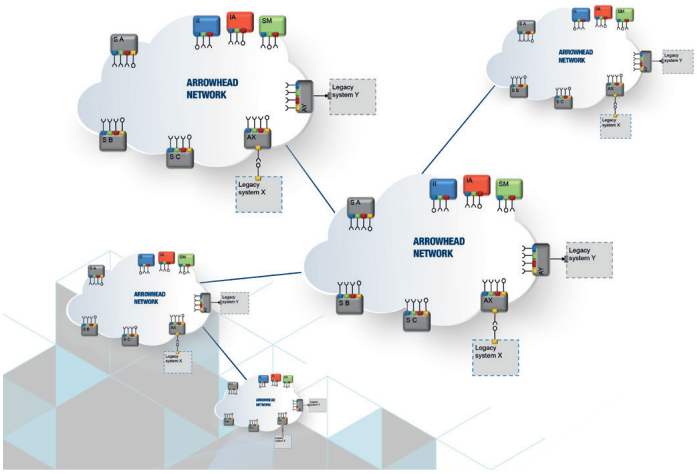
ARTEMIS Call 2012 Project
332987

ARROWHEAD

Service Interoperability enabling collaborative automation





EXECUTIVE *summary*

Arrowhead's vision is to enable collaborative automation by creating the Arrowhead Framework, fostering interoperability at device service level. The Arrowhead Framework is applied to multiple application areas within smart production, smart buildings, smart energy and electro mobility, all in response to EU societal challenges.

CONTRIBUTION *to SRA*

Arrowhead contributes to the following SRA high-level targets:

- To enable the realisation of collaborative automation through the creation of Arrowhead Framework to foster service interoperability.
- To close the design productivity gap between potential and capability, compared to 2011 levels, by:
  - reducing system design cost and development cycles by 15%
  - managing a complexity increase of 25% with a 10% reduction on effort
  - reducing re-validation and recertification time and effort by 15%
  - achieving cross-sectoral reusability of Embedded Systems devices and architecture platforms.

MARKET INNOVATION *& impact*

The global objective of market innovation in Arrowhead is to create market trust and technology guidance by providing a service interoperability test-bed and tools, service business model understanding, and by piloting the application of the Arrowhead Framework in more than 20 demonstrations. The initial results will be disseminated to relevant actors, and through the involvement in the standardisation that is relevant to the Arrowhead vision.

The strategy adopted in the project has four major dimensions:

- Innovation based on business and technology gap analysis paired with market implementation based on end-user priorities and long-term technology strategies.
- Application pilots with technology demonstrations in real working environments.
- A technology framework enabling collaborative automation and closing innovation-critical technology gaps.
- An innovation coordination methodology for complex innovation "orchestration".

The Arrowhead innovation methodology is currently applied to a vertical structure involving the mining company, Boliden, supplier Metso and SKF associated with 2 SMEs, Wapice and EISTEC and one research institute, VTT, paving the way to increased production flexibility and availability within Boliden's operation and using next generation automation solutions that make use of the advancement of automation technology in Arrowhead.

RELEVANCE & CONTRIBUTIONS *to Call Objectives*

In response to the ARTEMIS Call 2012, Arrowhead wants to enable collaborative automation to create maximised production efficiency and flexibility, increased energy efficiency and flexible use of energy. This will be demonstrated in the areas of smart buildings and public infrastructure, electro mobility, smart production and smart energy.

R&D INNOVATION *and technical excellence*

The global objective of the technology innovation in Arrowhead is to provide the basic common interoperable technology – the Arrowhead interoperability framework – that makes it possible for systems and devices (new as well as legacy) to integrate and interact based on a loosely coupled service-based approach, thus enabling service-based collaborative automation.

The Arrowhead project aims to address the technical and applicative challenges associated with cooperative automation by:

- providing a technical framework adapted in terms of functions and performances
- proposing solutions for integration with legacy systems
- implementing and evaluating cooperative automation through real experiments in applicative domains: electro-mobility, smart buildings and infrastructures, smart industrial production, smart energy usage and the virtual market of energy
- pointing out the accessible innovations arising from new services
- leading the way to further standardisation work.

The Arrowhead project targets five business domains: Production (process and manufacturing), Smart Buildings and Infrastructures, Electro-mobility, Energy Production and Virtual Markets of Energy. In these domains there are a number of technological architectures used for implementing SOA solutions. One of the grand challenges for Arrowhead is to enable interoperability between systems that are inherently based on different technologies. One main objective is to achieve this and thereby keep the advantages of SOA, e.g., the flexibility obtained by the loose coupling. The strategy focuses on identifying the fewest common denominators needed and selecting the most suitable common solutions. In the process, four central SOA questions for guiding the work have been identified:

- How does a system that is a service provider make its services known to a service consumer?
- How does a system that is a service consumer discover services it wants to consume?
- How does a system that is a service provider decide if a system that wants to consume its services is authorised to do that?
- How to orchestrate system of systems, i.e. enabling an orchestration body to control which of the provided services a system will consume?

The answers to these questions are collected under the generic label of the Arrowhead Framework

PROJECT *partners*

3E N. V.
Aalborg Universitet
ALMA MATER STUDIORUM-UNIVERSITA DI BOLOGNA
Aktiebolaget Elektronik-Konstruktion Innovation (Abelko)
ACCIONA Infraestructuras S.A.
Airbus Operations SAS
Akhela srl
Artelys
AITIA International Informatikai Zartkoruen
AIT Austrian Institute of Technology GmbH
AVL List GmbH
BITRON SPA
BNearIT AB
Boliden Mineral AB
C2 SmartLight OY
CAMPUS 02 University of Applied Science Graz
Commissariat à l'énergie atomique et aux énergies alternatives (CEA)
Centro Ricerche Fiat scpa
Ceske Vysoke Uceni Technicke v Praze
CORE AS
EISTEC AB
EUROTECH SPA
EVOPRO INNOVATION KFT
Evolaris next level GmbH
Fagor Electrónica S. Coop
Fluidhouse OY
Fomento de San Sebastián
Ford Motor Company
Fotonic i Norden AB
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FUNDACION TECNALIA RESEARCH & INNOVATION
Fundación Tekniker
GEWISS SPA
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INSTITUT POLYTECHNIQUE DE GRENOBLE
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Ikerlan S. Coop
INDRA Sistemas S.A.
INDRA Software Labs, S.L.U.
Infineon Technologies Austria AG
Instituto Superior de Engenharia do Porto
Integrasys S.A.
LKAB, Luossavaara Kirunavaara AB
Luleå tekniska universitet
Lyse Energi A/S
Magillem Design Services SAS
Metso Automation OY
Midroc Electro AB
Mondragon Goi Eskola Politeknikoa S. Coop
Neogrid Technologies ApS
NODA Intelligent Systems AB
NorDan AS
NXP Semiconductors France SAS
Orona S Coop
Outokumpu Chrome Oy
Personal Space Technologies B.V.
Politecnico di Torino
Riga Technical University
Schneider Electric industries SAS
Seluxit APS
Sirris HET COLLECTIEF CENTRUM VAN DE TECHNOLOGISCHE INDUSTRIE VZW
Aktiebolaget SKF
Stiftelsen SINTEF
ST Microelectronics S.r.l.
Smart Meter Ltd
Sodimas
TTY-SAATIO Tampere University of Technology
TEKNOLOGIAN TUTKIMUSKESKUS VTT
TECHNISCHE UNIVERSITAET GRAZ
Thales Communications & Security SA
THT-Control OY
ULMA Embedded Solutions
UNINOVA Instituto de Desenvolvimento de Novas Tecnologias
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University of Oulu
University of Warwick
Wapice Ltd
Zense Technology

ARTEMIS

www.artemis.eu

ARROWHEAD

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START
March 2013

DURATION
48 months

TOTAL INVESTMENT
€67.7M

PARTICIPATING ORGANISATIONS
78

NUMBER OF COUNTRIES
15