# Advanced infrastructure for medical equipment management and services helps cut healthcare costs

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*The ITEA 2 AIMES project has developed a fully integrated service infrastructure for medical equipment management and services to help cut the ever growing cost of high technology healthcare. It covers the integration of management tools into an appropriate communications infrastructure with distributed condition monitoring, diagnosis and remote access to medical equipment. It also enables management and tracking of mobile medical devices using radio-frequency identification (RFID).*



**ENABLED SERVICE QUALITY**
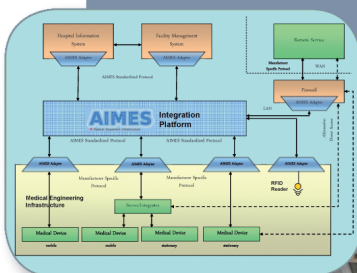
The medical equipment service and maintenance sector is dominated by original equipment manufacturers and closed systems. However, the market has become more complex and challenging, driven by a combination of different new technologies and the extensive use of software applications and networks applied to specific customer's solutions. There is also a great challenge in finding specialists to perform service on high-tech medical equipment.

## Growing cost pressures

Growing cost pressures within the public healthcare system have forced customers to make comparisons based on life-cycle costs and local service organisation accessibility to meet the need to balance increased demands for higher system availability, expert know-how, field service availability and materials logistics with the need for more economic customer solutions. Moreover, healthcare providers want to have information technology (IT) systems offering totally integrated asset, quality and supplier management that cover both new and legacy equipment.

New concepts in service management are therefore essential to meet the challenges. As a result there is now a strong move to independent service organisations and third-party subcontractors with open systems to avoid product line lock-in. Advantage is also being taken of the state of the art to take preventive actions based on the provision of efficient knowledge sharing and education methods for shared service solutions.

Today, more than 50% of the total life cycle cost of medical equipment lay in technical service. Yet work processes in this sector are particularly old fashioned with no integrated supply chains and service requests relying on paper and phone ordering. This is a reflection on how IT has developed within the healthcare domain with a series of isolated IT islands.

There is a particular problem in smaller rural hospitals where equipment failure – such as a computer tomography (CT) scanner – can mean that no alternative is available.

## Fully integrated approach

AIMES set out to develop a fully integrated approach that would reduce manual processes, cut errors and improve quality through the use of modern electronic business processes.

The project started with a set of assumptions:

1. The **service platform** should be flexible and extensible to new requirements and technologies, with mobility- and context-awareness for devices and technicians;
2. It should be based on a **service oriented architecture** (SOA) integration infrastructure with separation of workflow and process information messages;
3. **RFID technology** was necessary for locating and allocating equipment in a cost-effective way – this is crucial in a modern large hospital that can have 20 or 30,000 medical devices in use – with state-of-the-art web-integration technologies to keep track inside and outside the hospital;
4. The software **Enterprise-Service Bus** should be used as the main underlying infrastructure integrator for communications, providing fundamental services through an event-driven and standards-based messaging engine; and
5. **Data mining and knowledge extraction** should be exploited in new applications to enhance maintenance though increased use of preventive and predictive servicing.

Key elements involved: logistics management of medical equipment, including inventory control, tracking and dynamic scheduling, supported by appropriate tools and RFID based on overall equipment models; maintenance of medical equipment concerning not only the development of algorithms to support condition monitoring, diagnosis, prediction and so on, but also the use of co-operative tools for service management, particularly planning of interventions and co-ordination of therapies with equipment use; and development of adaptable user interfaces depending on the specific task.

In addition, the ITEA 2 project focused on the development and experimentation of a suitable infrastructure to enable these applications in terms of networking of equipment, tools and personnel in a mobile and secure environment, networking with external equipment manufacturers and service partners.

An important question lay also in the need to develop new business models for suppliers and hospitals for all this to make economic sense.

## Technological advances

Technological advances include the development of an RFID reader with the necessary certification for use in hospitals. This product has already been nominated for several design awards and will be commercialised by project partner FEIG.

An end-to-end mobility- and context-awareness demonstration was created using a mobile device based on standard smart phones. This showed that from identification of a problem in the hospital until the resolution of the incident by the device manufacturer's service technician and even the billing could be done without leaving the IT domain. This was completely new in the medical equipment service field and demonstrated the added value of using mobile devices and mobile technology.

AIMES also demonstrated end-to-end integration between hospitals and manufacturers. The ITEA 2 project showcased one manufacturer which connected a lifeline monitor via web-service technology to the integration infrastructure without any service organisation behind it. The hospital could access the device directly and get status information from it. A large part of this work was subsequently proposed to the ISO 11073 committee on health informatics – medical/health device communication standards as an extension to the standard to cover technical service. It was accepted for consideration.

Device manufacturers can leverage the results for the service integration with hospitals on all possible levels of their (remote) service organisations. For example, although Siemens already has a very high degree of predictive and preventive maintenance built into the device, still the integration with the processes of the hospitals is considered to be beneficial and the logical next step. For others, the integration on the device level opens up whole new business opportunities for the creation of a service business together with the healthcare organisation.

Dräger Medical – another manufacturer of medical devices – demonstrated its belief in this approach by putting the necessary AIMES extensions into its proprietary integrated service gateway hardware to enable the company to access its own devices in hospitals and use AIMES results in the future. While this is now part of its products, there is no integration scenario to exploit it as the hospitals do not yet have the facilities in place.

## Benefits at all levels

Overall the project has been a success as it was essential that Europe took action in this area where for example IBM and Oracle are already very active in the USA. Moreover, suppliers, health services and patients will all benefit as the outcome will be lower costs for high technology healthcare.

More information: http://www.aimes-project.eu