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Fostering the Adoption of ICT-enabled AMTs by European SMEs

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FAME – Fostering the Adoption of
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2018-1-FR01-KA202-04780

Revision History

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Referenced Documents

ID	Reference		Title
1	2018-1-FR01-KA202-04780		FAME Proposal
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Applicable Documents

ID	Reference	Title
1	[PARTNER ORGANIZATION]	[TITLE OF THE REFERENCED DOCUMENT]

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Partner Organization	Deliverable: No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

1

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

Table of contents

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

I. Introduction of ICT-enabled AMTs in leader countries: Germany, Norway and Holland
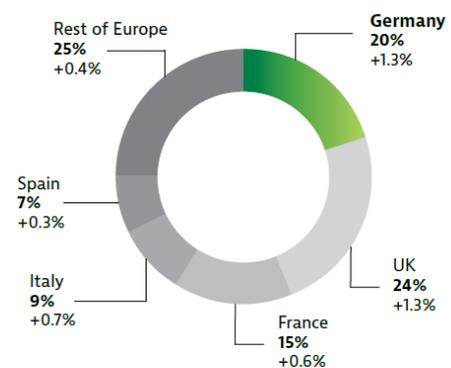
The main idea of this transnational report is to define the the gap between the desired situation ("TO-BE") and the present situation ("AS-IS") concerning the use of ICT-enabled AMT's in SME. As a result we will develop training programs and tools in order to enhance the skills and to grow a network to share the good practices between partners with an emphasis on strengthening the capacity of SMEs through the training, workshops and dynamic demonstrators. For this reason, this transnational report presents the study of German, Norway and Holland good practices in term of use of ICT-enabled AMT's in SME.

A. Research and general state of art of ICT-enabled AMTs by German companies

When analysing the Germany structure of practices in the use of ICT-enabled AMTs by SMEs, it is absolutely essential to understand the impact that SMEs (specifically micro and small enterprises) have on the German economy. These SMEs, made up of less than 500 people, make up almost 60% of all businesses in Germany and employ over 60% of employed persons. The adoption of AMT in Germany is crucial to the reduction of product cost, improvement of the quality of products and services etc. In this report the good practices of SMEs in terms of ICT will be proposed in order to prepare a report representing the Transnational Phase and with the National Phase will reveal the gap between the desired situation ("TO-BE") and the present situation ("AS-IS").

"Germany is the number one in Europe in term of digital growth. Technological advances in IT and software, robotics and sensor technology, and intelligent networks in the IoT are driving the global digital transformation. Germany's ICT is one of the largest in the world. ICT play an essential role in consolidating Germany's industrial production strength and explore national leadership on the way to the truly connected economy" (*Source: "The digital economy in Germany" Issue 2017/2018*). One in four companies in Germany already considers themselves to be "highly digitalized". Moreover Germany is the single largest software market in Europe. Big

European ICT Market 2017 and Predicted Growth Rates 2018

Rest of Europe
25%
+0.4%

Germany
20%
+1.3%

Spain
7%
+0.3%

Italy
9%
+0.7%

France
15%
+0.6%

UK
24%
+1.3%

Source: EITO 2017

PUI

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

3

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

companies as IBM, Microsoft, Oracle and SAP are present on the German software market.

This study shows that the best practices of use of ICT-enabled AMTs in Germany touch essentially to the Management and ICT tools (Fig.1). For the Management the key technologies are: Big Data, Software management platforms for automated processes, BIM management systems. For the ICT tools the key technologies touch to: the Cloud computing, Massive Data Analysis, IoT, Cyber security and CPS.
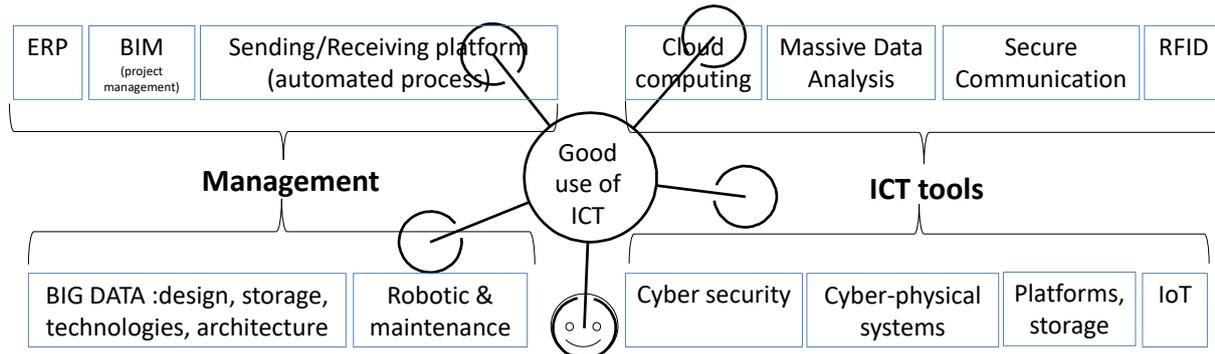

Fig.1 Good practice of use of ICT-enabled AMTs in Germany by category: ICT tools & Management

1. Mangement: Big Data, BIM, ERP, Smart Management Platforms, Cloud Computing for management platforms

According to Source: "Germany – Excellence in Big Data, The Bitkom national industry association 2016" the use of Big Data in Germany is one of the most developed in Europe. The Federal Economic Affairs Ministry's "Smart Data" programme is designed to enable Germany to use ICT to pool its strengths especially for the SMEs. Actually in Germany many different kinds of big data applications are currently in use – in the health industry, civil sector, automatic vehicles, Industry 4.0, intelligent power grids, transport systems of the future and intelligent educational networks. Moreover, big data also serves as a catalyst for new business models – especially in the German and European digital sector. German IT companies in particular are known for their security and reliability. Meanwhile, the Federal Ministry of Education and Research is currently building two large big data centres of excellence in the German cities of Berlin and Dresden/Leipzig.

The following examples represent the Big Data use in German companies:
T-Systems: as a Cloud/Big Data pioneer T-Systems offers a complete, fully integrated value chain with comprehensive consulting, designing, developing, and operation services. The highly standardized, but best-of-breed Big Data technology stack covers all Big Data aspects and combines network, infrastructure, data integration, data management, data access, analytics, visualization, governance and security solutions from leading Big Data vendors. T-Systems utilize a cloud-based and highly scalable production network for individual best-in-class Big Data solutions.
SAP HANA is one of the market leading in-memory data processing and analytics platforms. The SAP HANA platform combines database, data processing, and application platform capabilities in-

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

memory. By providing advanced capabilities – such as predictive text analytics, spatial processing, and data virtualization – on the same architecture, it further simplifies application development and processing across Big Data sources and structures. The key advantages of SAP HANA are: a) real-time computing, b) open platform, c) Basis for major SAP applications, will become underlying technology for all SAP applications.

MindSphere: Reducing cycle times, increasing flexibility, enabling individualized mass production, and minimizing the consumption of energy and other resources – these are the challenges manufacturing companies face today. To remain competitive, they need to improve their entire value chain, from design and production planning to engineering and services. This also means that in order to make the right decisions early, a vast quantity of captured data ("big data") must be analysed, and it must be determined which of all these data are truly necessary. Smart data in the end make it possible to increase production efficiency, tap the full potential of the plant and allow the creation of new digital services. **MindSphere** is an open IT ecosystem, which makes it possible to exchange data across company borders and can also link a wide variety of products, no matter the manufacturer. **MindSphere** is running on SAP HANA cloud platform, one of the most advanced and powerful cloud infrastructures worldwide.

Software AG offers the first end-to-end Digital Business Platform - based on open standards, with integration, process management, adaptive application development, in-memory data, real-time analytics and enterprise architecture management as core building blocks. The modular platform allows users to develop the next generation of application systems to build their digital future today. Big Data technologies are at the core of the Digital Business Platform providing market-leading capabilities for streaming analytics and in-memory data processing. *Apama Streaming Analytics* serves proven complex event processing capabilities to make real-time decisions based on streaming data (e.g. Sensors, Social Media) with the ability to analyze millions of events per second. In combination with the Big Data In-memory technology Terracotta, enterprises are able to process, analyse and predict big data in real-time to implement new business solutions (e.g. Internet of Things, Predictive Maintenance, Fraud Detection, Production Monitoring, Internet-scale applications).

2. ICT Tools: IoT, RFID, ERP, CPS, Smart tool platforms, Cloud, computing, Massive Data Analysis, IT security

According to Source: "Industry 4.0 – Germany Market and Outlook, Issue 2016/2017, GTAI, Germany Trade & Invest" Germany is the world's leading Industry 4.0 nation developing interoperable standards, IT security measures and digital platform economy. The digitalization and the use of advanced digital technologies in German industry are the step to become a world leader in an industrial level in term of: use of predictive maintenance applications, cloud computing solutions;

PUBLIC/DRAFT

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

5

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

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analyze of large amount of data using big data analytics solutions in the field of manufacturing, automation and software-based embedded systems.

The new *federal states in Eastern Germany* are in an excellent position to shape the digital transformation being driven by ICT innovation (*Source: "ICT Industry Clusters in Eastern Germany", INVEST. INNOVATE. INTERNATIONALIZE.*). Where the German Capital Region continues to establish itself as an international start-up hub and IT-software center, the greater Dresden area in Saxony goes from strength to strength as an internationally recognized **semiconductor development (electronic sector)** and production location. The 5G Lab Germany in Dresden is conducting pioneering research into fifth generation mobile communications and its applications – leading to the advent of the "tactile internet" that will unleash the full potential of Industrie 4.0. World-class photonics R&D and production come together in Thuringia, in an industry landscape without peer in Europe. To the north, Saxony-Anhalt's rich **mechanical engineering (metal sector)** tradition has helped the state reinvent itself as a high-tech production hub.

Silicon Saxony is the biggest high-tech network for the microelectronics **(electronic sector)**, smart systems, software, and wireless communication in Europe. The pan-European "cluster" promotes international collaboration in innovative micro- and nanoelectronics for a broad spectrum of cross-sectoral applications.

Saxony-Anhalt is home to ICT companies in the state are active in the software and IT service sectors. Innovative software solutions for the automotive, energy and mechanical engineering industries **(metal sector)** are developed in the state which also boasts a retinue of global hardware players of the repute of **T-Systems** for instance, which operates one of Europe's largest data centers here.

Freshworks is the parent company behind the suite of products that includes Freshdesk, Freshservice, Freshsales, Freshcaller, Freshteam and Freshchat. These products are designed to work tightly together to increase collaboration and help teams better connect and communicate with their customers and co-workers.

Siemens, uberMetrics, VICO – Smart Data Web: The consortium is developing a new type of open knowledge network that gathers relevant public data, analyses it, prepares it individually, and makes it available. "Smart Data Web" aims to create a new knowledge network of data tailored especially to the needs of German industry concerning the Event

PUBLIC/DRAFT

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

6

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

Monitoring in Value and Supply Chains. Germany's key industries such as mechanical engineering, the automotive, chemical, pharmaceutical and electronics industries are based on clusters of highly specialised SMEs that build upon each other in complex value and supply chains. Disruptions in supply chains lead to enormous costs and may in extreme cases have consequences that threaten the survival of companies, SMEs in particular. Therefore, in industrial production processes, it is important to be informed as early as possible about events that could lead to a significant disruption in the value and supply chains.

TRUMPF Werkzeugmaschinen: Platform for Smart Services. One of the major challenges regarding Big Data in industry is the smart evaluation of sensor data and order parameters in production plants. The main challenge for TRUMPF customers is an increasing need for individuality in their products. This individuality of products comes with a main focus on flexibility in their production processes, and a reduction of the lot sizes down to lot size 1. The interaction between those processes, the networking of different machines and software systems, and non-value-adding processes provide a high potential for optimization.

To meet these challenges and lift those potentials Big Data is the key by linking information of different sources and applying intelligent algorithms. The project **"SePiA.Pro"** aims to develop a cloud-based platform solution that offers Smart Services for small and medium-sized companies (SMEs). These services are flexible, portable, transferable and safe and therefore bring benefits for all stakeholders in the process: manufacturers, service providers and operators while data authority stays with the data owners

Metal sector *(the automotive industry)* a good practice are:

ARENA 2036 – Active Research Environment for Next Generation of Automobiles". This is the largest and leading research platform for mobility in Germany with fully digitalized vehicles and lightweight design with integrated functionality. The automotive industry is closely related to the Machinery and Equipment sector (M&E), the second largest industry branches in Germany. Industry 4.0 represents a major growth opportunity for Germany's M&E sector. The added value is a direct effect of the use of Internet of Tings (IoT) and Cyber Physical Systems (CPS) in the factory space. **Speedfactory** situated in the Bavarian region, the Adidas "speedfactory" is an example for agile model for shoe production with: automated manufacturing processes & digital design that privilege customisation and local production over offshore mass production and as result that reduce the design process on a factory level using 3D printing and industrial robots.

Germany is home to the single largest software market in Europe. Driven by infrastructure optimization demand for Big Data solutions, the software help in a manufacturing level linked to digital transformation including ERP systems, IoT and Cloud services. Industry 4.0 provides significant market potential for ICT tools providers whose products support new business and service models on the basis of intelligent networking of objects and actors in a value chain. **IBM Watson IoT Headquarters** in Munich is the first ever cognitive IoT collaboratories – hands-on industry labs where

PUBLIC/DRAFT

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

7

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

clients and partners can work together with the company's, engineers, developers and experts drive collaborative innovation in the automotive, electronics, manufacturing, healthcare and insurance industry. IBM's Watson platform technologies use machine learning and natural language processing to reveal insight from IoT data.

Electronic and Microelectronic sector: today Germany becomes a force in the sector of microelectronics and microsystems because they provide essential toolkit for making Industry 4.0 implementation possible with their objectives of flexibility, increase productivity and reduce costs. As key enablers in industrial automation, electronics and sensors help transform production systems and products into cyber-physical systems. These new microelectronical-mechanical systems (sensors and actuators) buildings blocks (particularly for 3D motion tracking and technical monitoring systems) need to be developed for deployment in future cyber-physical production system (CPPS). The increasing of the level of automation in vehicles creates an extra demand for advanced electronics and sensor technologies from this sector. **Research Fab Microelectronics Germany** is a group of institutes who have developed a concept for a cross-location micro-and nanoelectronics research factory. They propose a single source where industry clients, SMEs and researches institutes will have access to the complete micro- and nanoelectronics value chain.

Infineon Technologies is a company from the semiconductor sector working for the application of automotive products. This company implements the Industry 4.0 in order to be successful and competitive in the semiconductor sector. The production operation and control are interlinked and controlled by IT systems. This networking factory provides information about machine process conditions and communicates in real time with other sites worldwide to continuously control and optimize production and partially involve clients and suppliers from a "global virtual factory" network.

The agricultural sector is one of the world's key industries in terms of growth and future significance. Since upstream suppliers, such as seed or machinery manufacturers, for example, as well as the food industry, are working to optimize their products and services using cutting-edge technologies, agricultural businesses cannot shut themselves off from technological developments taking place in the sectors in which their suppliers and customers operate. Close collaboration with service providers such as contractors and farm machinery syndicates also means there is a greater need for data exchange and cooperation. This will enable farmers to make optimal use of production equipment, e.g., harvesters. It is always a challenge to make the best use of machinery in situations where the weather plays a vital role and time is of the essence, like the harvest, or to deploy special technology to work the fields. This relates to processes involving the site-specific, targeted management of agricultural land. One example is the use of soil sensors that help determine the right time for sowing, fertilizing and irrigating. The sensors record relevant environmental information, such as sunshine duration and soil moisture levels up to a depth of 40 cm, and send it to the cloud in real time. The data is then processed directly and sent back to the farmer and GPS-guided machines, which are partially automated and accurate to within a centimetre. This leads to

PUBLIC/DRAFT

Partner Organization	Deliverable: No.of deliverable
FAME	Version: No.of version
Title of the document	Issue Date: DD/MM/YYYY

8

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

savings in resources and less ecological damage due to the reduced use of herbicides and mineral fertilizers. With "Farming 4.0" leading ICT companies have introduced the German federal government's high-tech strategy into agriculture and together are succeeding in demonstrating how logistics can be extensively orchestrated in the field. Big data helps farmers to work proactively and with some degree of automation, enabling them to put digitization to ideal use. **CLAAS E-Systems:** an advanced data analytics helps improving performance of mobile agricultural machines. **CLAAS** is a leading manufacturer of mobile agricultural machines with primary focus on harvesting technologies. To provide seamless integration of machines from different brands into production processes and Management Information Systems, leading-edge technologies are available. Serious attention is devoted to research and development activities to improve customer benefits, e.g. machine productivity and operational availability. The majority of currently available are equipped with CAN-Bus technology. Based on that, an industry wide standard protocol (ISO11783) to connect machines with implements and infrastructure is established. With focus on direct machine to machine communication, these facts are paving the way to apply new and advanced algorithms for better decisions and higher productivity.

PUBLIC/DRAFT

Partner Organization	Deliverable: No.of deliverable
FAME	Version: No.of version
Title of the document	Issue Date: DD/MM/YYYY

9

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

B. Research and general state of art of ICT-enabled AMTs by Norway companies

PUBLIC/DRAFT

Partner Organization	Deliverable: No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

10

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

C. Research and general state of art of ICT-enabled AMTs by Holland companies

Partner Organization	**Deliverable:** No.of deliverable
FAME	**Version:** No.of version
Title of the document	**Issue Date:** DD/MM/YYYY

11

FAME – Fostering the Adoption of
ICT-enabled AMTs by European SMEs
2018-1-FR01-KA202-04780

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PUBLIC/DRAFT

Partner Organization	Deliverable: No.of deliverable
FAME	Version: No.of version
Title of the document	Issue Date: DD/MM/YYYY

12