Cloud-based Rapid Elastic MAnufacturing

WEBSITE CONTACT

Edition 1—2015

CREMA Newsletter

Welcome

to the first newsletter of CREMA. Started in January 2015 and lasting until December 2017, the CREMA project aims in creating an approach for Cloud-based Rapid Elastic MAnufacturing. In order to keep in sync with the increasing demands of the manufacturing industry of the future, companies need to flexibly react to and be able to offer production capacities in a rapid way. Thus companies looking for manufacturing capacity need to be supported by the means to find these capacities, configure them, and integrate them into their own manufacturing processes. This is where CREMA comes in.

The CREMA project, sponsored by the European Commission, creates a flexible way for companies to combine, offer and consume their resources. It ports successful concepts from the field of Everything-as-a-Service (XaaS) and Cloud computing to manufacturing aiming to mirror agile collaboration through flexible and scalable manufacturing processes. CREMA's pan-European consortium is user grounded and combines technology expert SMEs (Ascora, DotNetIT, Information Catalyst), Industry partners (Ubisense), Researchers (Technical University of Vienna, DFKI, IK4-Ikerlan) and Users/Associations Groups (TANet, Tenneco-Walker, FAGOR ARRASATE, GOIZPER).

This newsletter informs you about the CREMA project as a whole and its latest developments and goals.

Written by Dr Sven Abels, ASCORA GmbH CEO and CREMA Coordinator

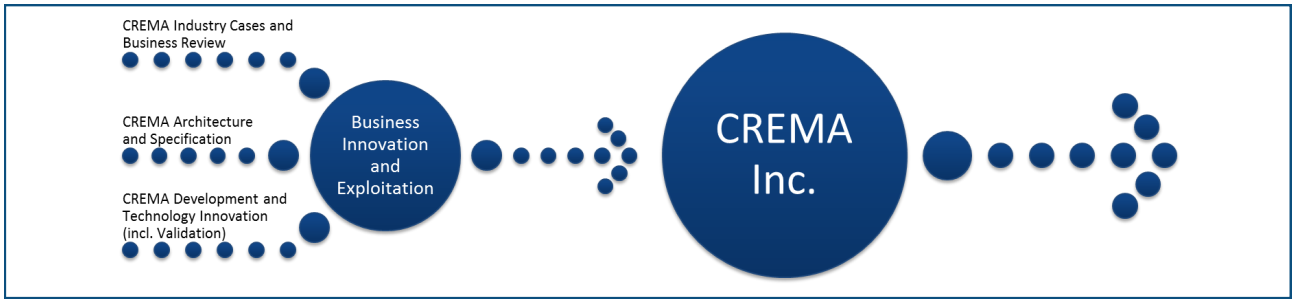
CREMA's Kick-off meeting in Bremen

Establishment, management, adaptation, and monitoring of dynamic, cross-organisational manufacturing processes following Cloud manufacturing principles.

CREMA will develop the means to model, configure, execute, and monitor manufacturing processes, providing end-to-end support for Cloud manufacturing by implementing real systems and testing and demonstrating them in real manufacturing environments. CREMA will focus in three different aspects:

- **Manufacturing Virtualisation and Interoperability:** CREMA will provide fundamental data access and service functionalities to describe, provide, discover, and store data and services from various, heterogeneous sources, including CPS, sensor, wireless sensors networks, smart objects and other Internet of Things technologies.
- **Cloud Manufacturing Process and Optimisation Framework:** CREMA will deliver the functionalities needed to design and execute real-world manufacturing processes of different factories including the design and runtime optimisation functionalities. For this, it provides process managers with the means to model manufacturing processes.
- **Cloud Manufacturing Collaboration, Knowledge and Stakeholder Interaction:** CREMA will also provide frontend and user-oriented functionalities. This includes the means for monetisation of real-world manufacturing assets and services, mechanisms for the monitoring and KPI-based alerting functionalities, finally provision for knowledge sharing and data analytics.

Please take a minute to visit www.crema-project.eu for more information about us and our goals, contact us at hello@crema-project.eu or watch our video in YouTube!



CREMA in Action: the Industry side

Automotive use case powered by TENNECO

Bringing elastic manufacturing to the automotive domain and leveraging monitoring and analytics to achieve production gains

TENNECO UK is a manufacturing plant serving the clean air division of TENNECO and is a Tier 1 exhaust supplier to a number of OEM automotive companies around Europe. Like all manufacturing companies, Tenneco is looking to continuously improve efficiency and incorporate new technology to gain commercial advantage in a very competitive marketplace.

With the new developments in Cloud technology and Big Data handling, TENNECO is looking to benefit from the development proposed by the CREMA project and look at avenues of asset virtualisation, monitoring and alerting as well as other key technologies.

Regensburg

Cardiff

Arrasate

Bremen

Antzuola

Calpe

The application of CREMA to TENNECO will involve virtualising the exhaust production cells by using the Industreweb platform as a shop-floor middleware, and in doing so enabling the selection of manufacturing services representing real production capabilities to fulfil demand. As demand increases, the process will be optimised and engage new suitable robot services to meet that demand. In addition, the Ubisense Smart Factory Platform will introduce real time location tracking of assets, so machine operators, products and robot tooling can be monitored for deviations from production practices.

Production issues will be notified in real-time back to machine operators through the innovative use of Wearables. Devices being investigated include Smart Glasses that will provide an augmented reality view of the process and Smart Gloves that will detect what the machine operator has picked up and indicate where they have made a mistake.

Ultimately, TENNECO believe the outcome of using CREMA will be higher quality, less waste, more responsive processes, and an improved ability to meet customer demand in a timely manner.

Machinery Maintenance use case powered by FAGOR ARRASATE GOIZPER

Improving customer satisfaction and revenue streams by introducing a Cloud Manufacturing platform focused on providing new value-added services

FAGOR ARRASATE and GOIZPER are world-leading specialists in providing the market a wide range of products such as form presses and clutch-brakes respectively. These products incorporate high levels of quality and reliability because their customers come from highly demanding sectors such as all world's top automotive manufacturers, press, home appliances or metallic furniture producers.

This kind of customers requires high manufacturing assets availability due to high cost of production downtimes and the potential impact on delivery times to their own customers. This is why both companies offer their customers technical maintenance and repairing services to minimise the number of unscheduled downtimes and reduce machines breakdowns. A drastic increase of performance in this area is a strategic goal for the companies seeking to improve the service and recognition by their customers.

Using the CREMA platform, both companies aim to create a network of interconnected companies including customers, spare parts suppliers (e.g. GOIZPER is a FAGOR ARRASATE's supplier) and certified maintenance companies. By means of CREMA Cloud Manufacturing services, real time data collected from customers where their machines or components are installed, on-line data analytics and monitoring services will be used in to detect future or current failures. Marketplace together with process design and execution services will be applied to instantiate and keep track of maintenance interventions until recovering normal working conditions on customers.

FAGOR ARRASATE and GOIZPER assume that incorporating the CREMA platform will have a major impact on costs and customer service quality as well as enable them to explore new business opportunities.

Technology of the Year

Cyber-Physical Systems (CPS) and Sensors for Manufacturing

Due to the proliferation of ICT, the manufacturing industy is undergoing substantial transformation in terms of embedded intelligent systems. Hence, integrating the dynamics of physical processes together with computation and networking processes, CPS represent the main highlight of Industry 4.0.

CREMA focuses on Cyber-Physical Systems and is compliant point-by-point with the Vision of the CPS Unit which aims "*to reinforce and expand Europe's leading industrial position in embedded systems and their further development into CPS through developing new system architectures and in the design and deployment tools that address the complexity, and enable the implementation and exploitation of massive amounts of interconnected ICT devices (sensors, actuators, processors microcontrollers, …) embedded in physical objects at different locations. Mastering such complex CPS is essential for European industry to be able to shape, and create value from future development of the Internet towards an Internet of Things (IoT) supported by a Cloud Infrastructure.*"
CREMA is porting successful concepts from the field of Everything as Service (XaaS) by working together in implementing CPS virtualisation and abstraction to provide a unified access to different manufacturing-related sensor data sources and CPS, respectively, enabled through different technologies, e.g., smart objects, wireless distributed and ad-hoc sensor networks.
Recently, Ubisense teamed up with TANet members Sematronix and Control 2K to present their Smart Factory Platform at the SMECluster event in Waterton "The Connected Business Community 4.0" on the 19th November 2015. The usage of Cyber-Physical Systems permits the development of a service layer interacting with the shop-floor. This includes location sensors to track location changes of products and assets including people within the production process.
CREMA is pioneering the way towards the factory of the future in the different scenarios, enabling cooperation between people and machines, and helping to realise the world as imagined by Industry 4.0: seamless integration between manufacturing assets, processes and business systems. The ensuing process changes can drive significant reductions in errors and rework, leading to better throughput at reduced operational effort.

Want to know more? Visit CPS and Ubisense websites.

The Academic side

Bridging the Gap between Manufacturing and the Cloud

Today's smart devices and sensor networks are only the first step towards an Internet of Things (IoT), which will change the manufacturing domain.

Already, we are surrounded by autonomic networked systems, which provide computational resources, offer information and monitor their environments. In the years to come, our daily life will be more and more pervaded by *Ubiquitous Computing* devices, which will be available in manifold forms, are able to act autonomously, and are connected to other devices, Cisco estimates that by 2020, there will be 50 billion devices connected to the Internet. By then, Smart Factories equipped with such technologies will be an everyday occurence in Europe. The proliferation of these technologies leads to Information and Communication (ICT) challenges in the manufacturing domain. The basic question is how manufacturing companies will be able to exploit ICT in order to make their processes more flexible and efficient. One particular approach to integrate, filter, and exploit manufacturing data from these smart devices is the usage of Cloud technologies.
Within CREMA, we are therefore working on bridging the gap between the manufacturing domain and the Cloud. By providing the means to support a dynamic coordination and optimisation of semantic service-based manufacturing processes at design time and runtime in the cloud, we allow for a new level of scalability and flexibility. Cloud-based communication and data exchange between partners in a manufacturing network will take security and privacy demands of the involved stakeholders into account. Further basic research topics addressed in CREMA are the integration and exploitation of data from various, technologically heterogeneous data sources from the IoT and the optimisation of manufacturing processes based on this data.

Want to know more? Visit the CREMA Wiki and TU Vienna Research Group websites.

Partners

ASCORA Consulting - Development - Research
TU WIEN Technische Universität Wien Vienna University of Technology
TANET technology application network
IK4 IKERLAN Research Alliance
Ubisense
DFKI
GOIZPER
TENNECO
DotNet IT keeping business simple
ICE Information Catalyst
FAGOR FAGOR ARRASATE

Factsheet

Program:	H2020
Budget:	€5.3M
Start:	January 2015
End:	December 2017

What will be done next year?

The next year the CREMA team will be focused on the following activities:

Concept, Requirements and Specification	• Business Innovation Model • Market Watch and State-of-the-Art review
Architecture, Functional Specs, Security & Privacy, Integration	• Security and privacy concerns will be made available • Software integration
Manufacturing, Virtualisation & Interoperability	• The semantic CREMA Data Model will be released • Manufacturing maps for sharing information will be easily created • Cloud-based storage prototype will host CREMA data • Several CPS will be connected as Cloud resources • A first simple toolset to manually describe services will be provided
Cloud Manufacturing Process and Optimisation	• The Process Designer tool will be the central design centre • Simple, not yet optimised processes will be easily executed • Selection and integration of optimal manufacturing assets for a particular process • Research on optimisation of service-based processes at design time and runtime
Cloud Manufacturing Collaboration, Knowledge and Stakeholder Interaction	• The Marketplace will provide a service repository • Manufacturing KPIs and rules will be set up • Initial steps to deploy Big Data on manufacturing will be carried out • Collaborational data will be collected from CREMA components • Dashboard will provide containers for several UI elements
Use Case I: Machinery Maintenance	• First tests of CREMA environment on the Machinery Maintenance use case • Feedback to developers
Use Case II: Automotive	• First tests of CREMA environment on the Automotive use case • Feedback to developers
Impact	• Draft of CREMA Business Plan • Plan and organise first CREMA Workshop (research) • On-going collaboration with other projects

P P R E L O L V D B A U M H I X H S E N C O X K
K P N D G E Z R I B I A K R Z A T C L A O P R N
O O O V A A A Y S R C G P C R B Z I A L L T I O
Q Q F S M O R T J H T W D M J K B T S P L I Q W
K Q I E B T R O I Q B U O A P I R N T S A M E L
H N R H S A B N T K G N A I T T W A I S B I V E
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CREMA Wordsearch

Abstraction	Automotive	BigData
BusinessPlan	Cloud	Collaboration
CPS	CREMA	Dashboard
DataModel	Elastic	Exploitation
Harmonisation	Industry	IOT
Knowledge	KPI	Leasing
Machinery	Manufacturing	Marketplace
Optimisation	ProcessDesigner	Releasing
Rules	Semantics	Sensors
Services	Storage	Virtualisation

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