FLEXINET

Intelligent Systems Configuration Services for Flexible Dynamic Global Production Networks

FLEXINET Project Progress and Highlights

By Bob Young, FLEXINET Co-ordinator

Welcome to the third newsletter of the FLEXINET project.

FLEXINET is a European Union Seventh Framework Programme FP7-2013-NMP-ICT-FOF (RTD) funded under grant agreement no 608627. It started on 1st July 2013 and runs until the end of June 2016. We are now into the second half of the project and are in the process of delivering FLEXINET software tools, configuring them to support our end user needs and will soon embark on the testing and subsequent evaluation of the work to demonstrate the benefits of the FLEXINET approach.

The diverse nature of our end user sectors and the complexity of the factors that impinge on their Product-Service business models and their global production network configuration decisions have led to us to spend considerable time in building a c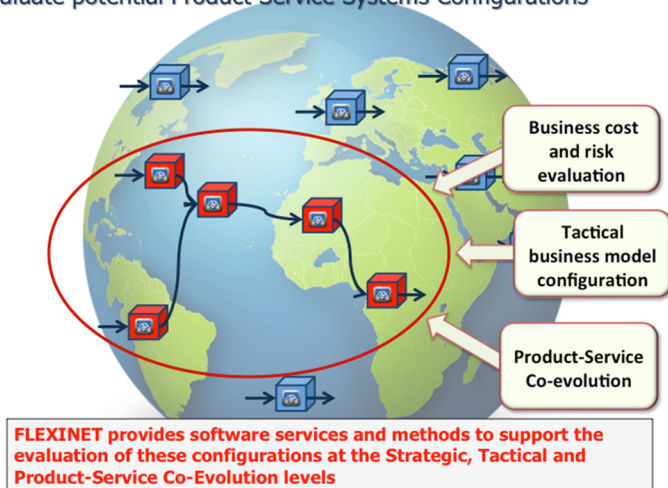lear understanding of how best to develop FLEXINET services to support our end user needs. We now have three well-developed process models for each of our end user companies, showing their "as-is" processes along with their requirements including environmental factors. We have also defined use case scenarios for each of our 3 end users against which FLEXINET results will be tested and evaluated.

The FLEXINET conceptual model for business model innovation is focused on the strategic decisions during the start-up process and strongly related to external factors that influence these decisions. The model consists of six main interrelated components which are environment, domain, risk, value creation, value and financial. Here environment means the environment for the business, which includes important external factors such as political, social, environmental (in the sense of climate), technological and legal. A business rulebook has been produced that will guide business process and provide actionable knowledge.

A world of Production Systems, Service Systems, external factors, risks, markets and business opportunities

Evaluate potential Product-Service Systems Configurations

FLEXINET provides software services and methods to support the evaluation of these configurations at the Strategic, Tactical and Product-Service Co-Evolution levels

The risk component is also a significant consideration in FLEXINET and a risk model for strategic risk assessment of GPNs has been defined based on inoperability models. Inoperability models deal with the risk in a network in terms of the inoperability that is caused to each individual node in a network directly and also as a result of the propagation of inoperability through the network. The risk model considers the dynamics and resilience of the network and allows users to define risk scenarios that include expected disruptive events, resulting in an expected inoperability and an estimated economic loss for different risk scenarios.

A methodology to establish business models at the tactical level has also been defined, describing how to accelerate the establishment of new business models by standard procedures and adaptable

model fragments. This provides the basis for impact analysis and assessment of new business models.

The applications that are to be supported by the FLEXINET software services have been defined in relation to the three service packages that FLEXINET will provide i.e. Economic and Risk Assessment Services (ERAS), Production Network Evaluation Services (PNES) and Product-Service Co-evolution Management Services (PSCoMS).

FLEXINET Software Service approach
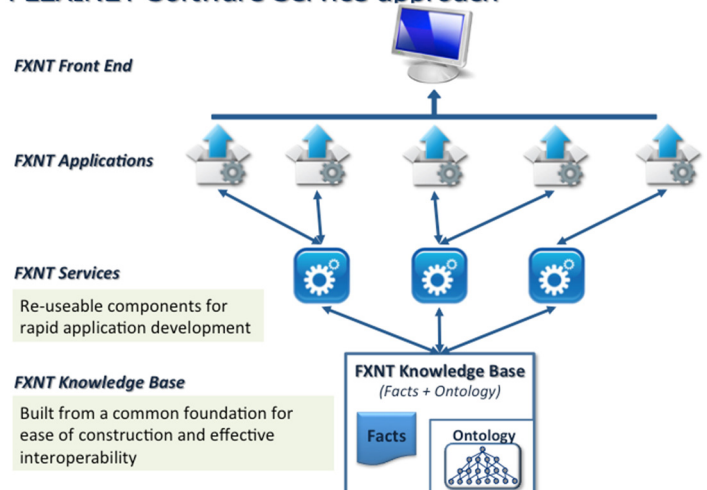
The importance of this approach is that the use of FLEXINET software services provides reusable software components for rapid application development while the FLEXINET ontology provides the underpinning common foundation on which company specific knowledge bases can be constructed and queried via the software services to answer a range of 'what-if' questions.

Product-Service Production Reference Ontologies

ontology becoming more domain specific with each level. The resulting ontologies are partly implemented and in use with the first release software services. Discussions are underway with the standards community and a New Work Item Proposal for ISO TC184 SC4 is under preparation.

The FLEXINET premise is that for ease of construction, effective interoperability and flexible re-use, enterprise ontologies must be built from a common base that utilises a common reference ontology wherever possible. To enable the management of complexity within the ontology and to facilitate re-use across domains the FLEXINET reference ontology has been organised across five levels. Each level inherits concepts from and provides additional concepts to the level above, the

The approach to testing and validating FLEXINET has now been defined and will form a major part of the second half of the project along with the continued development of the FLEXINET software services, ontology and knowledge bases. Three key areas of business support are being addressed. These being (i) how can we best exploit new technologies; (ii) how can we best produce new product-services and (iii) how can we best react to customer queries.

FLEXINET and Intelligent Manufacturing Systems (IMS)

By Bob Young

IMS is an industry-led, international business innovation and research and development (R&D) program established to develop the next generation of manufacturing and processing technologies through multi-lateral collaboration. FLEXINET partners have a project under IMS in collaboration with the Centre for Mechanical Design and Innovation Technologies at the National Autonomous University of Mexico (UNAM). This IMS Manufacturing Technology Platform entitled "Configuration Services for Global Production Networks (CSGPN-MTP)" runs alongside FLEXINET from July 2013 to June 2016. The concept is very much in line with the FLEXINET concept as show in the figure, but with the added contribution from UNAM in the development of sustainability evaluation methods in the design of global products.

As well as being presented at an IMS workshop in Barcelona in February 2014 and partners contributing to the prestigious IMS World Manufacturing Forum held in Milan in July 2014, it is especially pleasing to report that our CSGPN project has been selected by the IMS for presentation in a North American workshop on global collaboration. The US National Research Council in Washington, D.C. is hosting this workshop on 25-26 March 2015. Steve Ray, our USA contact for IMS commented, "David Romero and I will be presenting a few IMS projects… and we agreed that CSGPN would be a great project to brag about". It's great to see the global dissemination aspect of the IMS organisation in operation and spreading our CSGPN ideas!

KSB End-User Perspective of the FLEXINET Project

"Configuration of Global Production Networks: a User Perspective."
By Norbert Gröning and Frank-Walter Jäkel

Today KSB is managing a huge number of product configurations, e.g. more than 360,000 variants for a single pump casing type, that need to be implemented in complex customer environments. Furthermore, KSB continually introduces new products as well as variations of products combining innovative technology and excellent services to provide intelligent solutions. KSB has to manage a comprehensive range of services to round off this customer-focused portfolio. This creates a complex production and service network in more than 100 countries with around 1200 service shops and more than 200 external service partners worldwide, where material flow and processes need to be synchronized and harmonized. The global nature of the production and customer network of KSB implies also legal, environmental and policy constraints which need to be considered when specifying and negotiating new business approaches inside the production-service network.

In this context the KSB use case has the following storyline:

1. A new smart drive was patented by KSB.
2. A holding target is the "technology leadership".
3. The drive provides a good opportunity related to the target.
4. A sub-target is the search for new applications for the drive.
5. New applications call for new business models.
6. New business models require updates or new GPN scenarios.

Across all these points, information flows, loops and knowledge bases are required to archive a seamless correlation between the strategic targets and the final business model and GPN which is drafted in the KSB scenario (Figure 1).
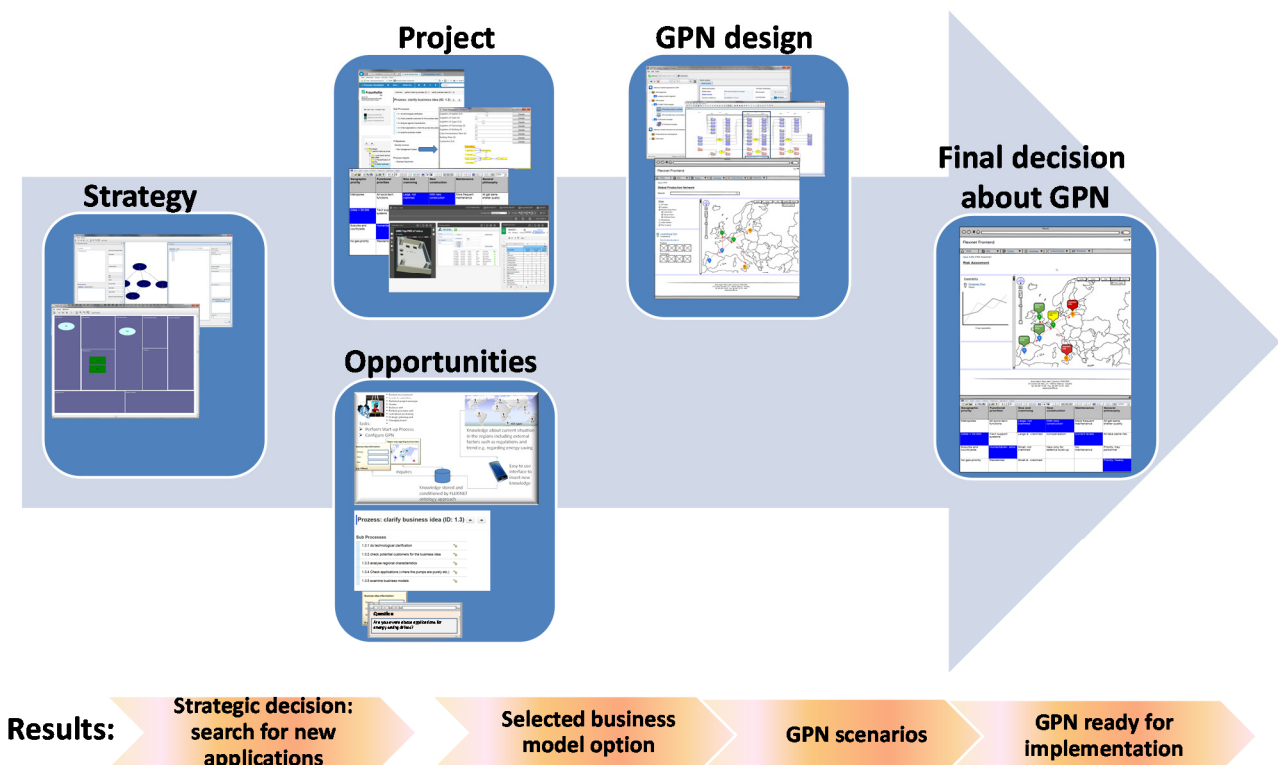

Figure 1: FLEXINET Scenario overview

On this basis 3 use cases are defined:

USE CASE 1: New application areas for a smart drive

This use case includes strategic aspects and target definitions as well as the selection and implementation of new business models. It also includes the gathering of information from the people working in the different regions for KSB. Nevertheless it relies on the ontology to semantically harmonise the information and deliver interdependencies. The final decision on the business models is the outcome of this scenario.

USE CASE 2: GPN design

KSB targets lower process complexity within the GPN design. The GPN design includes the data gathering and the application of the data into different GPN scenarios. This covers product/service relationship, in-sourcing/out-sourcing/partnerships, logistics, restricting factors, etc.. The outcome is a set of potential GPN scenarios which should be further analysed.

USE CASE 3: GPN scenarios evaluation and management proposition

The GPN scenarios need to be analysed in more detail to gather sufficient information of good quality. This will be used to create a management proposition to decide on the go or no-go for the implementation of a GPN. A general no-go will also cancel the selected business model. A go will be the start event to realise the GPN. This might still be supported by analysis and simulation applications in case of changes and unexpected events.

A comparison between the project overview shown in Figure 1 and the planned test scenario is documented in Figure 2.

The anticipated, potential benefits with the aid of FLEXINET methods and tools is illustrated in Figure 3.

Therein we see clearly, that in the past (1990 ff) the **P**roduct **D**evelopment **P**rocess (PDP) started relatively late.

Currently the PDP (state of the art) begins with an early clarification phase. This ensures greater reliability in the planning of the project. However, in our opinion, this is not enough.

We need to perform the idea evaluation and risk assessment very much earlier still in the future. This applies to our new business models, product developments and market entry strategies.

For this purpose we want to use the opportunities provided by FLEXINET. Thus an overall shorter period of time for the market entry (time to market) will be in the medium term.
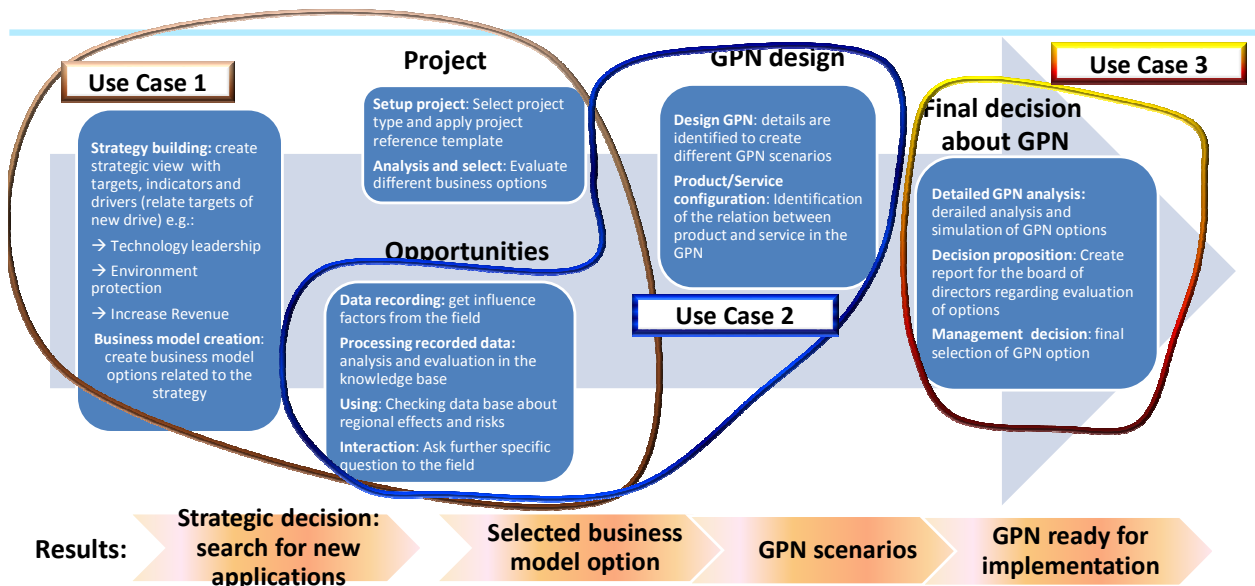

Figure 2: FLEXINET Test Scenario

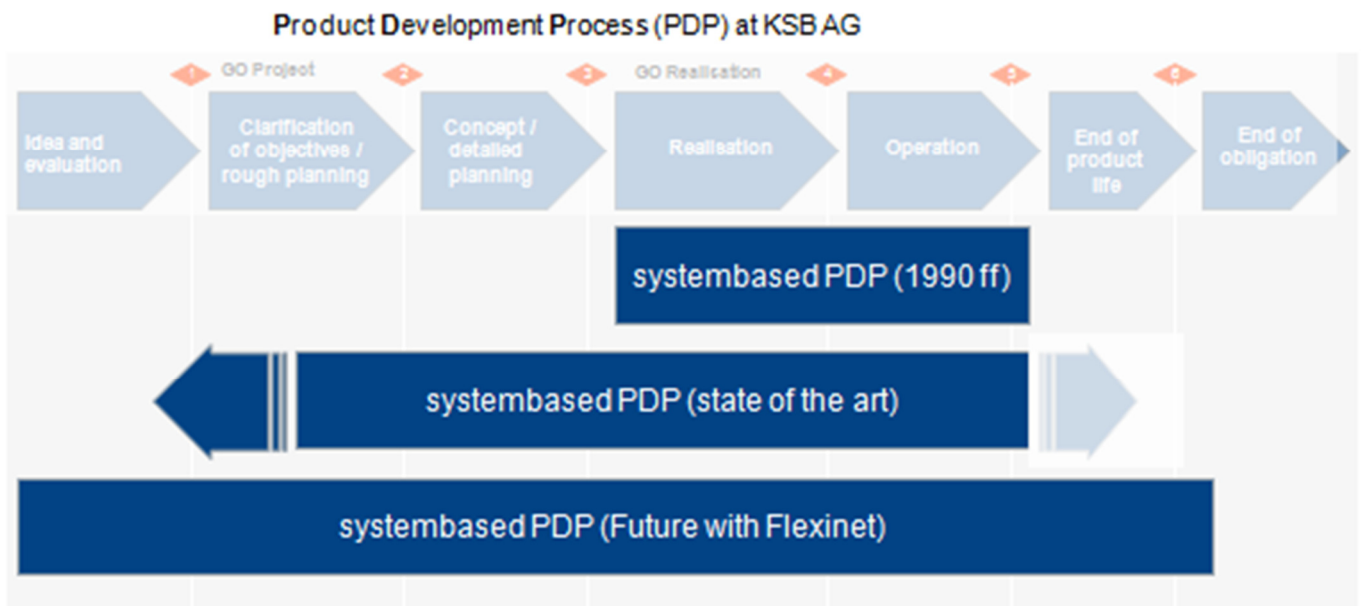## How FLEXINET fits in KSB strategic IT developments?

Product Development Process (PDP) at KSB AG

Figure 3: FLEXINET within the virtualisation strategy of KSB

KSB general project interests:

- Flexible configuration of production risk and economic management with better risk approximation for new business opportunities;
- Decision support systems for selecting the best system network;
- Shorter realisation time for new projects (Proactive measures are more effective than any necessary responses (reactive) to changing conditions);

- More effective use of experiences from previous projects (front loading) within the KSB knowledge base.

As some significant additional results from the participation in the FLEXINET project, we expect:

- KSB specific predefined indicators;
- Better understanding Drivers;
- Clearer view for business options;
- GPN fragments as base of new concepts.

Indesit Perspective of the FLEXINET Project

By Eugenia Marilungo, Giovanni Bombardieri, Eva Coscia and Angelo Quaglia

The growing attention to Product Service Systems (PSSs), seen as a combination and integration of product and services into a system to deliver required functionalities in order to satisfy the customer needs [1], proves to be the new trend for manufacturing companies. They always search new business opportunities respecting product sustainability; in this context, PSS represents a competitive advantage, allows improved environmental benefits and is able to produce synergies among profit, competitiveness and sustainability. Indeed, on one hand combining physical product and intangible services allows

enhancement of the product features, creating an added value through new functionalities, and bringing competitive advantages in a specific target market [2]. On the other hand, PSS moves the business from producing physical products to offering integrated systems of services and products, which are designed to be sustainable thanks to green principles such as dematerialization, better consumption patterns, innovative scenarios of use, more efficient use of resources, and cost savings [3]. Recent studies demonstrated that Information and Communications Technologies (ICT) could validly

support sustainable business by the development of smart products, improved stakeholder communication, increased social inclusiveness, and consumer empowerment [4]. In fact, recent advances in ICT could also give to industrial companies the competences required to develop sustainable PSSs according to the three principles: environment, economy and social wellbeing [5]. Besides, creating PSSs entails two important changes in manufacturing companies: firstly, the traditional product lifecycle has to be enhanced by including also service management; secondly, the product-oriented company model must be extended to realise a service-oriented ecosystem [6]. Indeed, interrelations between physical products and intangible services are complex to model and manage; they require creation of relationships with different stakeholders, where each partner is defined by means of its key resources and strategic factors [7]. According to this view, in order to collaborate across worldwide networks of enterprises, the correct design of a global production network becomes an important capability to emerge in highly global competitive markets [8].

Along with these literature issues, the FLEXINET project aims to provide services able to support design and provision of flexible interoperable networks of production systems that can be re-configured rapidly and accurately. Indeed, competitive manufacturing industries must be able to react to change and to understand the balance of possible options when making decisions on complex multi-faceted problems, understanding how best to configure and re-configure a global production network (GPN). The application of this concept to reconfigure a firm to propose a PSS instead of a traditional product is a challenge and an interesting investigation area. For this reason, new product-service global production network modelling methods are needed in order to identify the critical network relations and knowledge that underlies the business operation. Based on the exploitation of these technologies, FLEXINET will deliver a set of configuration services for flexible network design that will enable comparisons of costs, risks, configuration evaluations and product-service compliance requirements for alternative production network designs. In this context, the FLEXINET project represents an interesting opportunity for supporting manufacturing companies to change their core business from product-centred to service-centred vision, and to reconfigure the current product Design process. This is aligned with Indesit Company scope, starting the servitisation process for some of its products.

The Indesit Company is a world leader company designing and producing household appliances (e.g. dryer, washing machine, fridge, oven, etc.) within white goods sector, and it is usually characterized by a product-centred design process and a vertical supply-chain. The Group's main brands are three: Indesit, Hotpoint and Scholtès, and they differ in target market, style and price. In the white goods sector, that represents one of the areas in greatest renewal in Europe, the main companies are usually assemblers and must collaborate with numerous partners due to the multidisciplinary activities undertaken. As a consequence, generally the main companies have huge ecosystems, which is one of the most strategic elements of success, and have founded their knowledge on the experience and contribution of technological and business partners with peculiar skills. According to the product-service development, currently the Indesit Company sells the physical product, and only a few basic services are offered in a traditional way (e.g. warranty, technical support, service call centre, etc.). The company is approaching the product-service system development in order to improve its products. In this view, products are usually equipped with recent technological components and advanced user interfaces but they are still sold in a traditional manner and their production is still product-oriented. Therefore Indesit needs to have support during the product-service Design process. The product-service that the company would develop is the "Energy saving dryer", and it consists of the
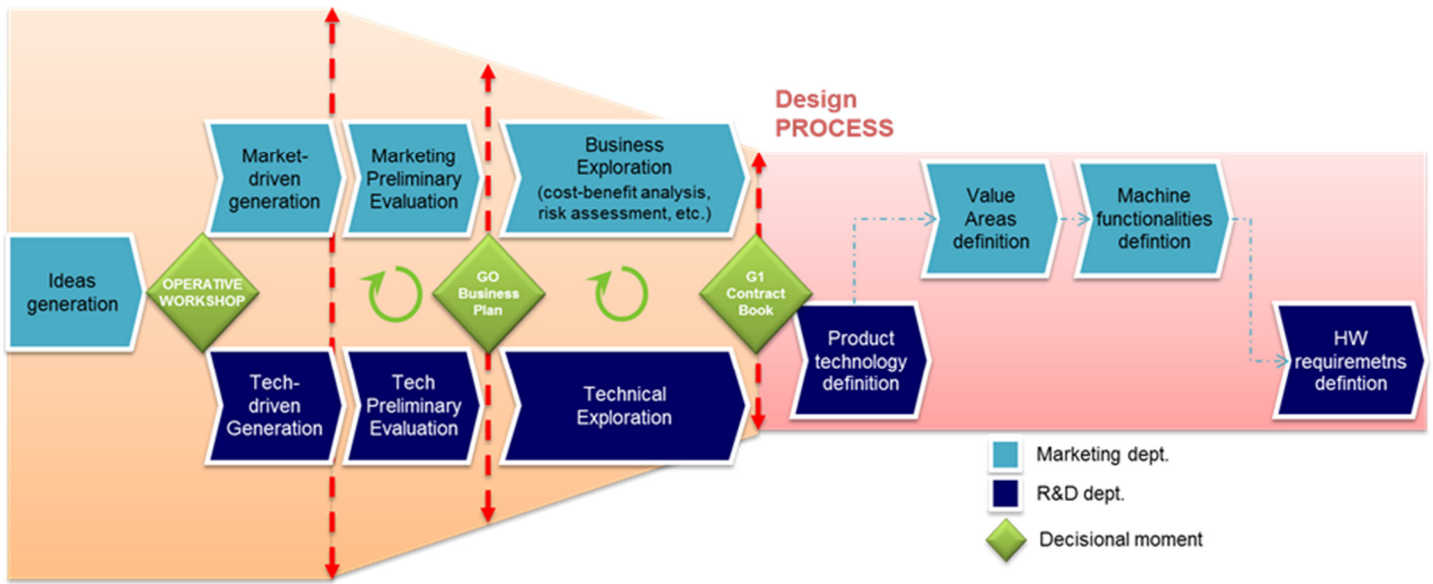
Figure 4: Indesit Company processes: Idea Generation and Design

development of a new machine (an advanced dryer enhanced by connectivity features) and new services (energy awareness and predictive assistance) to improve quality and ease of use the product itself. In order to design this new PSS, Indesit needs a set of new tools and methods able to configure in a flexible way the business model to develop, to identify the proper partners to involve in the Company network, to manage the configuration of the product-service, and also to manage the idea generation process that is the input of the design process itself. Figure 4 shows the Indesit processes involved in the changes required by the "Energy saving dryer" development.

According to these aims, the Indesit Company is an interested partner of the FLEXINET project, where the relevant tools will be delivered. Indeed Indesit provides a test case and piloting experience to verify and validate the methodological and software results produced by the project. More in detail, Figure 5 explains what will be the main Indesit use case in order to test and use the FELXINET tools.

In FLEXINET, Indesit has more technological and scientific partners able to customise their developed methods and tools for the Company. In particular, the FLEXINET partner Holonix has collaborated with Indesit since the early project
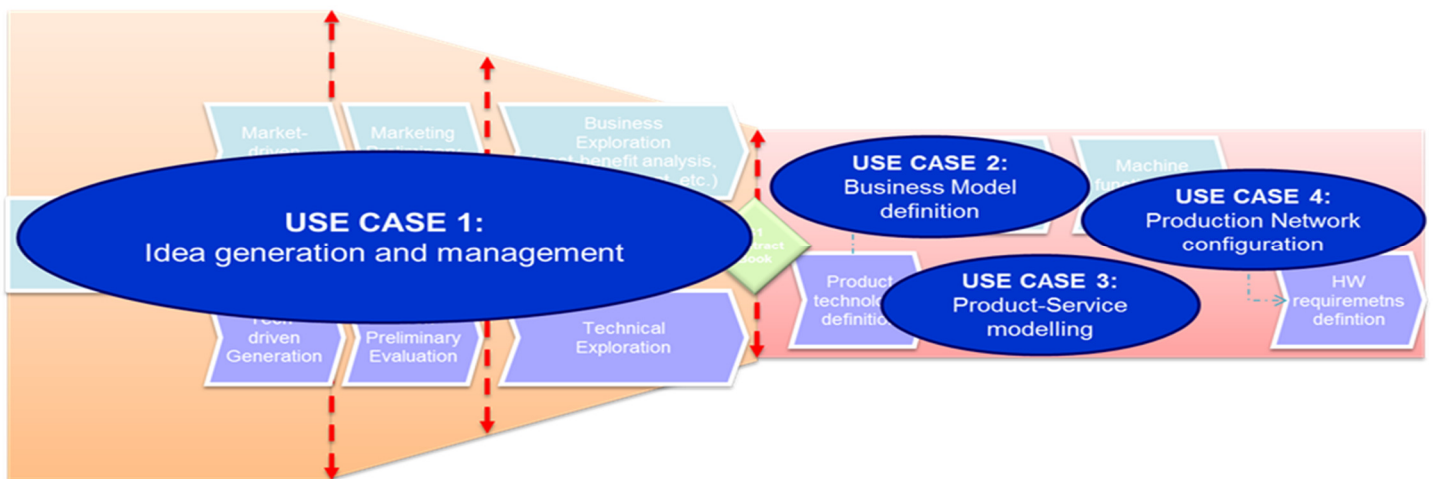

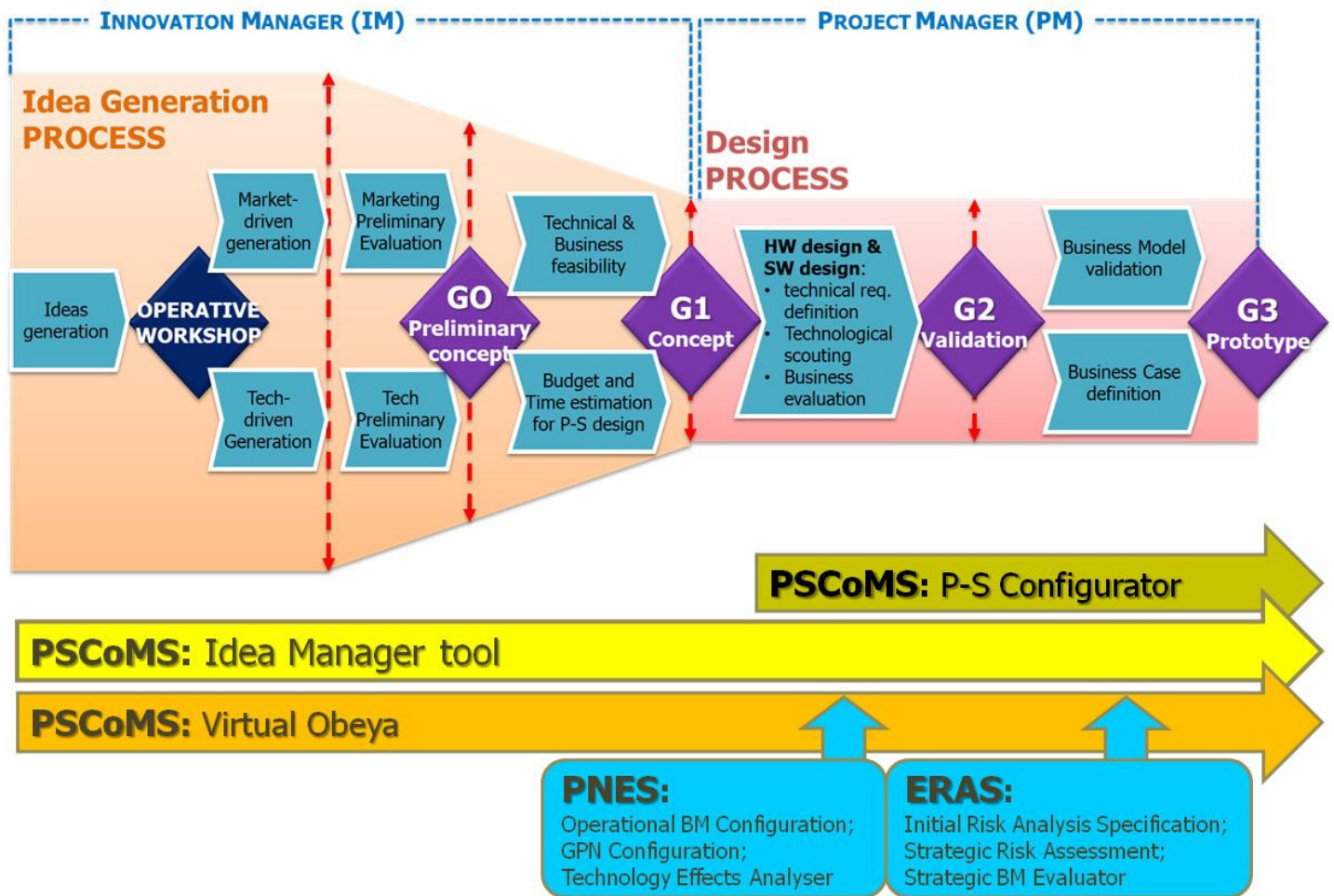*Figure 5: Indesit use cases in FLEXINET project*

Figure 6: FLEXINET tools used by Indesit Company

steps. Holonix is one of the 25 official spin-off companies of the Politecnico di Milano and has the main goal to support companies to innovate their products, processes and services (production, logistics, maintenance etc.) developing ICT tools and using Internet of Things approach, in order to create added value in Product Lifecycle Knowledge. In the FLEXINET project context, Holonix has created several tools collected into the PSCoMS (Product-Service Co-evolution and Management Service) platform, and many of them are used by Indesit, including:

- "Idea Manager", that involves a set of web-based tools designed for offering a more structured approach to the collection and promotion of innovative product-service ideas generated in a big company. More specifically, while in the current semi-structured approach new ideas are received,

collected and discussed using, for example, Post-it® notes on a whiteboard around which discussion can take place, this tool, completely customised for the Indesit use case, is able to manage this early stage, using a consolidated approach to Open Innovation. Indeed, the "Idea Manager" tool is used as the entry point for new ideas, coming from outside the company (external ideas) as well as from inside it. Once in the system, ideas receive votes and comments until a moderator selects some of them which become concepts and they are eligible for further discussion.

- "Virtual Obeya" is a web-based collaboration tool used to create virtual meetings to discuss groups of concepts. The main advantages are that such tool allows communication among different players in different ways: in real time and in the same

place, in different times but in the same place, in real time but in different places, in different times and in different places. Anyway, the concepts are discussed and displayed inside the Virtual Obeya though a strong integration with the Idea Manager tool.

- "Product Service Configurator" is a tool able to support the designer to configure in a structural way its product-service, and also this tool is strongly integrated with the Idea

Manager tool; in fact its inputs are the outputs from the Idea Manager tool.

Currently, the Indesit Company has used the Idea Manager and Virtual Obeya to start the design of an energy saving dryer. Next steps will be to test and use also the Product Service Configurator and the tools belonging to the other two platforms: PNES (Production Network Evaluation Service) and ERAS (Economic and Risk Assessment Service), developed by other scientific and technological FLEXINET partners.

CustomDrinks Perspective of the FLEXINET Project

By José Luis Romero Rey and José Miguel Pinazo-Sanchez

The objective of this project is to improve the working methods of companies with a great of innovation workload in their daily activities. This project aims to analyze the activity of companies from different sectors and develop technology applications, useful in different industrial sectors, to improve the organisation of this innovative activity.

Customdrinks is the only industrial partner in the food-beverage industry involved in the project and, like the other end-users of the consortium, innovation and flexibility are a constant in their daily

activities. The company receives continuously requests from potential clients for the development of new products, seeking to adapt to trends in target markets, as to their content, packaging or design.

The main objective of Customdrinks in the FLEXINET project is to perfect its working system, in terms of operational activity in the interaction with their customers and suppliers, especially while developing new products. To do so, is critical to optimise the management of the innovation cycle of the company, from the original proposal of a new
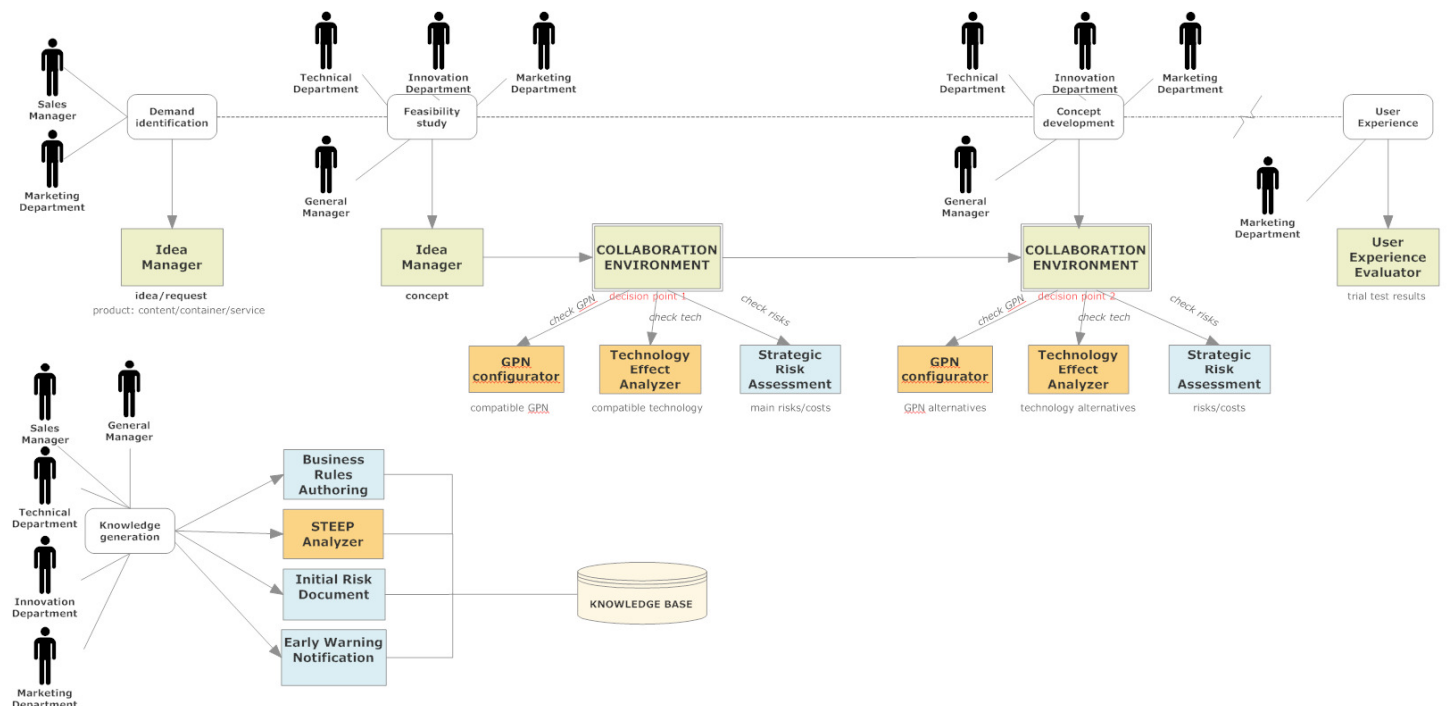

Figure 7: FLEXINET services supporting Custom Drinks

development until the product goes on sale, through the following steps:

1. Project feasibility study in technical, economic and legal terms;
2. Cost optimisation through better production network configuration;
3. New product development itself: drink (test and fail validation), packaging, design, ...

Besides, Customdrinks also intends to draw on experiences in other sectors of the food industry, learning from the perspective of Technology Centres and Universities, as well as gaining experience in the participation of European project.

One of the successes of this project is that moves theoretical concepts to the particular reality of the companies, in which the practical matters with a clear market orientation, have to be imposed mostly.

Moreover, the EU level makes possible participation in a big Consortium constituted of companies with different backgrounds and perspectives, hence the project is enriched by multiple experiences and ways of working.

The specific and real impact of the project results expected by Customdrinks focus on different fields:

- Innovation: application of a methodology that allows effective management of the company activity in the innovation cycle: new product development, known as *Made To Order* (MTO) business.
- Scientific and technological development: implementation of new IT tools, developed *ad hoc*, that allow data collection and easy access for making decisions based on past projects and objectively assessing the risks.
- Economic: save management costs, reduce errors (orders, production scheduling, etc.) and agile response to a new development (we can access more customers and therefore handle more orders).

FLEXINET Partner Profile: HIGHFLEET, Inc.,

By Michael Davis, CEO, HIGHFLEET, Inc.

HIGHFLEET, Inc., of Baltimore, Maryland, U.S.A. is proud to be a partner in the FLEXINET project. We look forward to the next phases of this important program.

HIGHFLEET (HF) provides the solution for making sense of data, whether that data is so-called Big Data, or data from a Data Warehouse, or even a "Data Lake". Successful enterprises will be those that understand what their data means, not those that have the most data. Enlightened with what their data means, the enterprise can plan better, project better and steal a march on the pace of change.

Lots of Data in Lots of Places

Those databases that used to be of interest only to Human Resources, or to Finance, or to Logistics or (you name it) must now be made available to decision makers and planners across the enterprise as if these disparate databases were one coherent information resource.

But coherent and a single resource they most emphatically are not. The data is in a variety of formats, different locations, and accessible in a variety of methodologies. HF solves this problem with a software suite whose core capability is a First Order Logic based Reasoner. Our multi-threaded Reasoner powers our ability to automate analysis across arbitrarily large logic models (ontologies) and appended data. Our suite includes:

- **Integrated Ontology Development Environment (IODE)** in which what we call Logic Models are written and tested. HF largely abandoned the term "ontology" because it became devalued in the U.S.

market and literally lost all meaning. Also, HF writes directly into a logic programming language substantively based on the Common Logic Standard of International Organisation for Standardisation (ISO), in Geneva. Our logic modeling can be viewed as a knowledge capture process. This is very important to FLEXINET in which the business logic of a wide variety of processes must be instantiated in human understandable form that can also be used by computers.

- **The eXtensible Knowledge Server (XKS)** our Reasoner-based Deductive Database that is created from the IODE. The XKS can use H2, Oracle, Postgres or other commercial systems, but for a persistence store only. HF does not use a typical RDB architecture. The XKS can also run on H2 for non-persistent (in-memory) instantiations. Our XKS/Reasoner provides an easily accessible proof tree of conclusions and an auditable view of the process from facts to conclusions.

- **Semantic Federation of Existing Databases (SemFed)** interrogates existing databases and largely automates the construction of a shared logic model, tying all the data resources together so they appear to the user as one coherent data source. This dramatically lowers the cost of implementation, greatly reduces implementation time, and is non-disruptive to the daily operations of the enterprise. SemFed works with a variety of structured data sources, including Excel spreadsheets and structured pdfs. SemFed is also used to access data from the Cloud, Data Warehouses, or Data Lakes. Significantly, SemFed can also greatly improve the analytic capability of Data Warehouses and Data Lakes. Our SW is configured to work in different Cloud providers. Our Reasoner performs analysis and tasking across the shared logic model and appended data created by SemFed.

- **Distributed Workflow Automated System** automates the management of data sources and XKSes. Complex applications may require that data be moved from one system to another on some schedule, or that certain transformations be applied to a data source to optimise the overall workflow, or that an operation should be distributed across multiple hosts. The DWAS uses declarative workflow definitions and a distributed messaging system to manage operations across many hosts.

All of these functions are important to FLEXINET, especially as the program moves into implementation in the next 18 months. Within the scope of FLEXINET a considerable body of knowledge must be instantiated in machine readable form and mapped to a variety of existing and de novo data sources while providing flexible tasking and analyses across the logic model and data. HIGHFLEET is pleased to provide these capabilities.

Examples of HIGHFLEET projects
It is instructive to look at a sample of current HF projects and the commonalities within them, though they address a diverse body of problems.

Anti-Money Laundering (AML) - working with a partner with 400 global banking clients, HF provides a solution to the complex analytic task of detecting indicators of money laundering activity, reducing false positives and providing an audit trail of conclusions. Our automated workflow system also supports Case Management for reporting and documenting detected activity.

Secure access to very large medical records systems - HF and partner firm Protenus, Inc., provide secure, controlled access to complex medical records systems. Our solution also provides analytics to detect suspicious access behavior within the access models.

NASA Earth Sciences - where HF will enable researchers to find and analyze a huge variety of

sensor data relating to Earth Sciences. The collections exist in a very large number of heterogeneous repositories amounting to exabytes of data.

Cyber Security Information Sharing Environment - is powered by HF's SemFed and Reasoner to bring a variety of information together for rapid analysis to support counter methods to computer attacks.

Automated analysis for the U.S. Army - in which HF uses a variety of information on weather, battle field conditions, and "Force-on-Force" data to automate complex analysis to support actions on the battlefield.

Common to all these projects are:

- The need to map a very wide variety of information resources to a common logic model,
- The necessity to drive down implementation costs with fast, non-disruptive implementations,
- Cost effective operations in the completed and implemented system, with the automation of large amounts of analysis and workflow processes, freeing decision makers for higher order cognitive tasks.

A Resilient Production Networks Cluster

By Keith Popplewell

FLEXINET, together with, two other Factories of the Future projects, ROBUSTNET and MANSYS, has established the Resilient Production Networks Cluster. When teams from the three projects met in Brussels in early February this year, at the suggestion of their Commission project officer, to explore the possibility of working together to their mutual benefit, it quickly emerged that although the projects were addressing related domains of research, and recognised a number of common problems, they were certainly not in direct competition. Furthermore several participants in the meeting had previous positive experience of project clustering, and there was unanimous agreement to establish a formal cluster to enable collaboration between the projects, and of course to include additional projects who believe they could contribute to mutual benefit.

Project clusters provide a forum in which researchers and exploiters can explore ways in which they can support each other across projects, and whilst this can and does include technical research collaboration and sharing of results, it also presents a real opportunity to work together on dissemination and exploitation activities, enhancing project impact by organising joint workshops and demonstration events, or joint participation in major trade exhibitions. However clusters are very informal: there is no one way of working for all clusters, and each operates pragmatically to realise the interests of its member projects and any other members. The sections below explain in outline the initial view of the Resilient Production Networks Cluster, which will of course evolve in the coming months and years.

Resilient Production Networks are:
- Robust: combine stability and agility appropriately to not only survive in a changing market and technological environment, but to exploit the opportunities offered by change;
- Cognitive: aware of their capabilities, aware of the demands placed on those capabilities, and above all, aware of and able to implement strategies to respond rapidly and effectively to any inconsistency between current demands and capabilities
- (Self) Adaptive: recognise the need for evolution of products, services and production and logistic processes, and have the ability to adapt immediately and without disruption, to disruptive events;

- Flexible: the only constant they recognise is the need for constant change.
- Resilient: recognise the impact of uncertainty and risk, and adopt methods and tools to predict, measure, and respond to uncertainty, to not only mitigate the effect of uncertainty, but to exploit understanding of uncertainty as a key competitive advantage.

Resilient Production Networks support:

- Co-evolution of products, services and production technology, through their ability to adapt the network configuration to change as a matter of routine;
- Innovation, in response to changing markets and technologies: exploiting their flexibility allows them to encourage disruptive change;
- Integration of systems flexibly across changing network configurations.

Resilient Production Networks Impacts:

- Promote business competitiveness;
- Promote competitiveness of EU markets and industry;

- Enhance ROI by ensuring utilisation of assets (both physical and intellectual);
- Increase and stabilise employment in the EU.

Resilient Production Networks Cluster Objectives:

- Brings together FoF (and other if appropriate) projects focused on methods, tools, services, applications and platforms for strategic, tactical, operational and process support for Resilient Production Networks;
- Offers synergies in project exploitation:
  - o joint promotional workshops;
  - o joint standardisation opportunities.
- Provides opportunities for integration/harmonisation of results: potential for integrated service architecture;
- Cross-exposure and review of use-cases/demos by end-users from all projects;
- Shared storyboards for use-cases;
- Promotion of future calls for proposals for research relevant to Resilient Production Networks

Future Events

We list here a few events in the near future which may be of interest to readers:

Hannover Messe 2015: Technology Cooperation Days: Smart Factories & Industrial Manufacturing, 14 - 16 Apr 2015, Hannover, Germany, http://een.ec.europa.eu/tools/services/EVE/Event/Detail/47a2127b-b8e2-4a11-aa4b-d2117aff0b4a

ISO TC184 SC4 "Industrial data" standards meeting, 20 – 24th April 2015, Vico Equense, Italy, http://www.sc4-if.enea.it/vico/index4.asp

Smart Cities India - 2015, 20 – 23 May 2015, New Delhi, Republic of India, http://www.csw.inf.fu-berlin.de/fomi2015/

6th International IFIP Working Conference on Enterprise Interoperability (IWEI 2015), 27 – 29th May 2015, Nîmes, France, http://iwei2015.mines-ales.fr/

7th Workshop on Formal Ontologies meet Industry (FOMI), 5th August 2015, Berlin, Germany. http://www.csw.inf.fu-berlin.de/fomi2015/

23rd International Conference on Cooperative Information Systems (CoopIS 2015), 28th – 30th October 2015, Rhodes, Greece, http://www.onthemove-conferences.org/index.php/coopis2015

8th International Conference on Interoperability for Enterprise Systems and Applications (I-ESA 2016), 29th March – 1st April 2016, Minho, Portugal

14

Note: if you are organising an event which may be of interest to the FLEXINET community, and would like us to include it in a future issue of this Newsletter, please contact the editor at the address below.

In the Next Newsletter Issue

The next FLEXINET Newsletter will be published in September 2015, and planned content will include:

- Preview of FLEXINET services and applications
- FLEXINET Progress on Standardisation

Contact Points

FLEXINET Co-ordinator	Prof. Bob Young Loughborough University	Email: r.i.young@lboro.ac.uk Telephone: +44 1509 227662
Newsletter Editor	Prof. Keith Popplewell Coventry University	Email: K.Popplewell@coventry.ac.uk Telephone: +44 7557 425324