

The Report on the 1st Consensus Building Meeting in Slovenia

The 1st Consensus Building Meeting (CBM) in Slovenia was held on 14th April 2010 at Inea d.o.o., Ljubljana as the supplementary event of Annual Assembly of Slovenian Technology Network for Process Control Technology. The meeting was entitled „Strategic Research Topics on the Areas of Industrial Informatics and Embedded Systems in Slovenia“.

The Consensus Building Meeting was attended by participants from:

1. R&D Institutions
 1. Faculty of Electrical Engineering, Ljubljana
 2. Faculty of Electrical Engineering and Computer Science, Maribor
 3. Jožef Stefan Institute, Ljubljana
2. Clusters:
 - Technology Network for Process Control Technology (representative of 33 stakeholders)
 - Technology Centre for Automation, Robotics and Industrial Informatics (representative of 14 stakeholders)
3. Most eminent Slovenian engineering companies/solution providers from the areas of industrial automation, industrial informatics and Embedded Systems:
 - FDS Research d.o.o., Ljubljana
 - Kolektor Sinabit d.o.o., Idrija
 - Raci d.o.o., Ljubljana
 - GOAP d.o.o., Nova Gorica
 - Špica International d.o.o., Ljubljana
 - Robotina d.o.o., Hrpelje
 - LikoPris d.o.o., Vrhnika
 - INEA d.o.o., Ljubljana.

After the presentation of I3E project and its aims the agenda for further discussion was proposed:

1. State of the art in developed countries on the Industrial Informatics Sector
2. State of the art in the Industrial Informatics Sector in Slovenia
3. Relevant research topics and application areas in Industrial Informatics Sector for Slovenian stakeholders

ADD 1. State of the art in developed countries on the Industrial Informatics Sector

The participants elaborate and agree on the following conclusions regarding the current state in the developed countries (e.g. USA, Germany, Italy, Japan, etc) in the Industrial Informatics (and Embedded Systems) Sectors:

- The highly developed countries have formulated serious strategies and development programs in these areas 10 to 20 years ago.
- Most of the industry in these countries is highly automated and supported by Industrial Informatics technology.
- The current tide of industrial informatics is based on integrating different levels of control and different devices; on optimizing different functions; on holistic consideration of complex problems; on optimizing the life cycle of automation and information systems; on complete computer-aided design, maintenance and other production support functions; on integrated enterprise management; on asset optimization, etc.
- The information technologies has been and still are highly prioritized in European projects
- The proper balance between technology, organization and human is emphasized.

- The applications of information technologies and embedded systems are migrating into areas of transport, medicine, intelligent buildings, support of elderly people, etc.
- The main development trends are dictated by multinational firms, but there are also many small and medium-size enterprises successfully working in these areas.
- The innovation environment is very advanced (the main keywords are: knowledge, cooperation, integration etc.)

Further conclusions, related on the usage of industrial informatics technologies, can be summarized as follows:

- Integration of production management (marketing, purchase, production, sells, distribution, planning) using various industrial informatics products. Introduction of CMM (Collaborative Manufacturing Management) model in the systems of automatic control (connecting SCADA systems with ERP system).
- Trend in ERP systems development is towards increased cost efficiency of a production company.
- Target customers for ERP systems are today beside big companies also SME companies. The main aim is to increase a reply to customers' needs, a short product lifecycle, product diversification, minimal inventories, extremely short lead times, the concurrent processing of different products and short delivery times.
- Extensive use of internet for exchanging information among buyers and suppliers
- Use of smart sensors and actuators (autocalibration, auto-tuning, embedded PLC, LCD displays).
- Modern control methods in process control (adaptive control, fuzzy, MPC, G-scheduling, auto-tuning, modelling and optimization).
- Optimization of production using production scheduling and various types of production models.
- Introduction of consistent models of simulation and optimization (Process Simulation and Optimisation PSO) for production resources management
- PLC design on the basis of open connectivity, on standard SW platforms and PLC's upgrade with industrial PC.
- Design of HMI interfaces with in built PLC functions, touch screen display, web server, ethernet communication protocol and integration with IPC.

ADD 2. State of the art in Slovenia

As an introduction to discussion on the state of the art on the Industrial Informatics and Embedded Systems Sectors in Slovenia, the results of the analysis, which was performed few years ago, was presented. The analysis was performed through inquiries. The first inquiry was targeted at the users of industrial informatics, in particular enterprises active in the various manufacturing and process industries, energy, gas and water supply firms, as well as construction. The results of both inquiries show a very detailed insight into the current status of industrial informatics (including control technology, automation as well as information technology) within both, users and suppliers, of this technology. The conclusions of the inquiries can be summarized as follows:

The most important conclusions from **user companies**:

- Automation and information technology is quite broadly used in Slovenia, however to very different extent and at different hierarchical levels within a company.
- About 90% of interviewed firms plan to change or complete the existing equipment or technology.
- The level of integration in particular control systems is moderate.

- Advanced technology is exploited very rarely
- The interviewed companies assign the greatest benefits of automation and information technology to the increase of quality, increase of flexibility and greater amount of production.

The summary of the most important findings from industrial informatics and embedded systems **suppliers** is given below.

- The suppliers of industrial informatics technology in Slovenia mostly offer services related to the execution of (engineering) projects and sell imported equipment while the extent of own products or equipment being sold to users is very low.
- The offered technologies are of good quality however, adapted to lower quality demands of domestic market
- The offers of domestic suppliers are normally not very specialized.
- Investments into own products development are relatively low.
- There are needs and interest for greater mutual cooperation and association with the academic institutions.

ADD 3. Relevant research topics and application areas in Industrial Informatics Sector for Slovenian stakeholders

Conclusions of the CBM

1. The participants of the CBM agreed that most of the above conclusions **are still valid** in Slovenia.
2. During the discussion some additional conclusions were elaborated:
 - The lag in industrial informatics exploitation in comparison with highly developed countries is dependent on the particular industrial sectors; in general it exists and it can be assessed to 5-15 years; there are also some industrial sectors in Slovenia (e.g. pharmaceutical industry), which hold the same level of industrial informatics as in the developed countries.
 - In Slovenia, the emphasis is still on the basic functions of automation and information technology whereas in the developed countries the balance between technology, organization and human is increasingly emphasized.
 - The most important problems of industrial informatics implementation in Slovenian companies are the lack of knowledge, lack of professional and experienced staff and lack of investment funds.
 - The suppliers of industrial informatics products in Slovenia are relatively small and consequently have no critical mass of professional staff and knowledge.
 - The main advantages and opportunities of industrial informatics product suppliers in Slovenia are: great flexibility, their access to imported technologies through foreign partners, tight cooperation with domestic users, access to knowledge in domestic research and development institutions, etc.

- An overall problem is a weak innovation environment in Slovenia, which does not support efficient exchange and dissemination of knowledge.
 - During the last few years the world's economic recession makes difficult any major investments in industrial informatics implementation in Slovenia.
3. The consensus was reached that the future development on the Industrial Informatics and Embedded Systems Sectors should focus on the following professional sub-areas:
- development of information technology for efficient production management and control,
 - control of complex systems and processes,
 - new methodologies and IT solutions for fault detection and quality control,
 - development of IT support of logistic processes in production, transport, etc.
 - development of technologies supporting the quality of living (dwelling),
 - new technologies decreasing the pollution of natural environment (more efficient control of waste water treatment plants, control of low carbon energy production plants, smart grids, HVAC systems in buildings, private homes, etc)
 - embedded systems for automation of machines and devices
 - new technologies enabling the development of new tools and building blocks for control systems.
4. The CBM stakeholders confirmed that the proposed application domains (Informatics for industrial systems, nomadic environment, private spaces and public infrastructures) for II and ES are also relevant for Slovenia. The **emphasis in Slovenia should be** mainly on the development of II and ES for
- informatics for industrial systems
 - public infrastructures.
5. The CBM stakeholders agreed that all presented research topics are relevant as the research directions that would contribute to implementation of II and ES in Slovenia. In the Industrial Informatics the most relevant future research topics from Slovenian point of view are marked with *:
- *Intelligent/adaptive production systems
 - *New industrial models and strategies
 - *Rapid/digital manufacturing
 - Networked production
 - Interoperability and standardization
 - Virtual enterprises – high performance networking.
- In the Embedded Systems the most relevant future research topics from Slovenian point of view are marked with *:
- *Composability
 - *Architecture dependability
 - *Safety
 - *Middleware and Seamless Connectivity
 - Design Methods and Tools
 - Sensor networks.
6. The CBM participants defined the most relevant application areas for Slovenia on all four application domains (see also point 3).

For **Informatics in Industrial systems** the ranked application areas (in descending order) are:

Agile and flexible manufacturing

New SW solutions should enable maximal flexibility and adaptability of a production company to current customer's demands, market conditions and technical capabilities of a shop-floor. The general goal is improving of shop-floor control, production flexibility, production efficiency, resource exploitation, safety of production, profitability, lower maintenance costs, improved product quality and in the final stage to reach lean and "100% available factory".

Integration of systems

There is a need to develop different SW products to support holistic management of a production company taking into account not only technical aspects of production but also organisational, financial and other aspects of production. This includes a support for decision making (decision support system for production management, supply chain management systems, on-line assessment of production performance indicators) as well as the use of advanced control methods on at the shop-floor and integration of all information and DCS systems in a factory. The integration of various DCS and information systems (SCADA, MES, ERP) into holistic information system assumes an on-line access to all data stored in various databases. On the basis of various data new useful information about a current status of a company can be extracted and used for more efficient and correct decision making on different management levels.

Advanced control systems

The complexity of production processes is rising and this fact requires new solutions for control systems. For efficient, reliable and safe control of industrial processes new control methods should be implemented. Various advanced theoretical concept as model based control, adaptive control, fuzzy control, predictive control, gain scheduling and various methods for on-line fault detection, estimation of degradation, etc. could together with new hardware platforms (DSP, FPGA) contribute to a great extent to more dynamic control and higher adaptability to the changes on shop-floor and to more efficient, reliable and safe production control.

Energy management in manufacturing

Industrial production is a big consumer of electric, heat, water, gas, coal and other energies provided either from a public infrastructure or from internal energetic plants. On the other hand, industry can provide significant amounts of waste energy in the form of steam, hot water or hot flue gases as the output of its technological processes. New technologies based on exploitation of renewable sources and industrial wastes are also emerging.

For all these reasons, new industrial informatics solutions need to be developed; systems for total on-line monitoring of energetic flows in a company, systems for energy consumption smoothing, systems for reducing peak energy consumption and new concepts of energy management (e.g. smart grids) can significantly reduce energy consumption and costs in industry.

For **Nomadic environments** there were no suggestions.

For **Private spaces** domain the propositions for application areas (in descending order) are:

Energy management in residential houses

Private houses are relatively big consumer of various energies. The consumption can be effectively lowered also by constant monitoring and control of energy consumers, reusing waste heat energy, intelligent heating and ventilation systems (HVAC), use of effective combined heat and power cogeneration systems and new types of energy sources (e.g. solar panels, wind turbines, fuel cells, geothermal energy). An implementation of new solutions requires the design of new kind of embedded systems, sensors and algorithms being capable of on-line management of all energy consumers and sources in an intelligent way, for example using the concept of "home smart grids".

Smart houses

The Smart house application area deals with an emerging practice of increased automation of household appliances and features in residential dwellings, particularly through electronic means. The techniques employed in Smart house include the automatic or semi-automatic control of lighting, doors and windows, Heating, Ventilation and Air Conditioning, security and surveillance systems, control of home entertainment systems, houseplant watering, pet feeding, changing the ambiance "scenes" for different events (such as dinners or parties), and the use of domestic robots. Wireless communication systems and a central controller are essential parts of a smart house control system that should provide increased functionality, accessibility, reliability, security and good ambient atmosphere/living comfort in a residential house.

Health monitoring and support for elder population

The population of the SEE region is ageing. In Slovenia the share of the population over 65 year is currently 17,5%. Many elderly live alone, some live with their children, but most younger adults work during the day. For many old people their quality of life is also affected by poor health. There is a need to ensure the elderly people can monitor their health condition and have adequate medical or social treatment and support in case of emergency. Contemporary technologies have enormous potential to help elderly people live more independent. New personal systems and sensors for monitoring blood pressure, cholesterol levels, pulse and respiration rates, weight and height, pain levels and mood have to be development. The personal data can be dispatched to special medical centres for further analysis and eventual taking adequate measures. New communication media and newly developed easy-to-use SW products can also be helpful to stay connected to public services and active within society

For **Public infrastructures** domain the relevant application areas in Slovenia (in descending order) are:

Intelligent energy management

Slovenian energy agencies support the transition to more sustainable energy with the global aim to support sustainable development in the energy context, making a balanced contribution to achieving the general objectives of security of energy supply, competitiveness, and environmental protection. Energetic system should become more flexible and able to respond to customer's demands, dynamic consumption and unpredictable failures of its subsystems. Due to the growing consumption, new classical energy objects are currently built in Slovenia together with the installation of new renewable sources of energy (photovoltaic installations have reached in Slovenia in 2010 10 M Watts). As the energy management is becoming more and more complex, new concepts and systems of on-line management of all energy consumers and sources in an intelligent way are needed, for example using the concept of "smart grids".

Waste management

Waste management (collection, transport, processing, recycling or disposal, and monitoring of waste materials) is becoming serious problem in Slovenia. The latest data show that in Slovenians contribute around 400 kg of waste/resident/year. The existing waste deposits and waste treatment plants are old fashioned and don't meet the regulations of EU community. Nearly the same problem is with the existing wastewater treatment plants. For these reason, there is a strong governmental initiative to stimulate waste selection, establish on line monitoring and to build new waste treatment and recycling facilities. Both industrial informatics and embedded systems can contribute to this aim with new intelligent solutions on the fields of waste monitoring and advanced control of new waste treatment and recycling facilities.

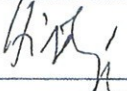

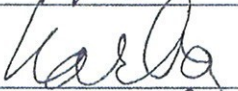

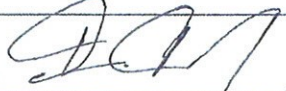
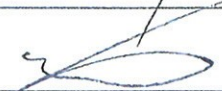
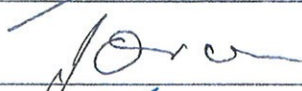


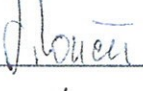
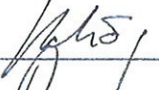


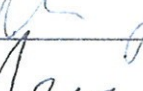
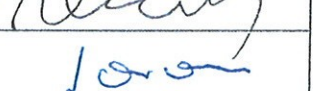

Public transport

In Slovenia and SEE region there is a need to for improvements of logistics in public transport systems (trains, bus transport, traffic information, maritime transport...) in order to assure fast, efficient, safe and accessible transport and mobility of people and goods. Slovenia currently works on the project for road taxes accounting using GPS system and has already installed full traffic information system on its motorways, but a lot of effort has still to be done in the railway system, traffic in the cities and parking facilities. This is an opportunity to facilitate new intelligent solutions from the area of embedded systems will can assure improved traffic monitoring and control, better controlled road infrastructure (active road safety support, traffic management systems with more cooperative vehicles, active bridges, secure tunnels ...), automatic parking facilities, efficient toll collecting, efficient access control.

Intelligent public information systems

Modern societies heavily depend on efficient and reliable services in public infrastructures and administration (governmental offices, railway/bus stations, airports, public buildings, entertainment facilities, city parks, car parking locations, sport objects, etc). . The services and control of existing infrastructures is nowadays often inefficient and too often people are confronted with long queues, capacity problems, unreliability of services and even dangerous situations. To give faster and more comfortable public services these objects should have different user friendly information desks/panels, intuitive interfaces to naturally respond to user's needs, a variety of sensors for tracking of visitors, various alarm systems, systems for emergency evacuation control, etc. There is obviously the opportunity for embedded system society to provide new intelligent solutions.

LISTA PRISOTNIH - SEJA SVETA MREŽE, dne 14.4.2010

	član mreže	oseba	podpis
1	TVP	Armin Hiršelj	
2	TOLARNA DA FERI	Boris Tolarenca	
3	FE	Rihard Karba	
4	IJS	Stanko Stručnik	
5	FDS	FRANCISKO TRDIČ	
6	KOLEKTIVNA SINARIT	STJAN Kukojin	
7	^{IJS-} VLADIMIR JOVAN	Vladimir Jovan	
8	RACI	Jurej ČRBTANJ	
9	GOAP	LEON KRALJ	
10	ROBOTINA	ANDREJ VERBANČIČ	
11	SPICA	Aleš HABIČ	
12	Liko PRIS	PJGELJ	
13	IJS	Dejan Grilcer	
14	Liko PRIS	VEDIŽAVEC ACRJA	
15	INSA	Zoran Domuselj	
16	Center AAI	V. Jovan	
17			
18			
19			
20			

DNEVNI RED SEJE SVETA MREŽE TM TVP IN USKLAJEVALNI SESTANEK ZA PRIORITYETNE TEME :

Tč.	Zadeva	Vodil	Gradivo (referenčni dokumenti)
0	Določitev delovnega predsedstva, zapisnikarja in overoviteljev zapisnika	Z. Marinšek	
1	Pregled zapisnika in poročilo o izvršitvi sklepov 3. seje SM 31.03.2009	Z. Marinšek	ZAP-09-003_seja_SM_tmTVP.pdf
2	Poročilo o delu in zaključni račun PL2009	Z. Marinšek	Porocilo o delu in zakljucni racun za poslovno leto 2009_za SM.pdf Fin_komisija_PL09-zapisnik.pdf
3	Izhodišča za poslovni načrt 2010	Z. Marinšek	Izhodisca za poslovni nacrt 2010 maz po seji PO_v4-precisceno.doc
4	Predlog članarine za PL 2010	Z. Marinšek	
5	Smernice mreže za projekte v sklopu mreže	Z. Marinšek	Smernice mreže za projekte v sklopu mreže_v1.pdf
6	Predstavitev predloga strateške razvojne agende za področje industrijska informatika in vgrajeni sistemi (I3E)	V. Jovan, D. Gradišar	
7	Razno:		

Referenčni materiali so bili poslani z vabilom na sejo, dne 11.4. in 12.4.2010.

Opomba:

Vsi referenčni dokumenti so na internem portalu TVP