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Dear Readers,

Logistics is playing a special role in the state of Saxony-Anhalt’s future growth and value added. Important companies from the logistics sector such as the Otto Group are already here. The international DHL hub for air freight is being built in Leipzig. With the prospect of the new parcel service Red Parcel Post likewise starting in the region, Central Germany is evolving into a center of logistics in Germany and Europe. Apart from an advantageous geographic location, Saxony-Anhalt also provides attractive infrastructural and labor conditions.

The development of the logistics hub on an international scale will present an opportunity to locate other service providers here and to create a crystallization point for potentials for economic development. The evolving complexity of products and the growing diversity of variants are presenting new opportunities and fields of activity for logistics service providers: Customized finishing, assembling and order picking are becoming more and more important. In return, local SMEs are using international distribution centers and access points to better connect to the global market. By declaring logistics one of its targets of support, the Ministry of Economics and Labor has underscored the special importance of logistics for Saxony-Anhalt’s economic development.

The excellent research scene in Saxony-Anhalt supplies highly qualified personnel and know-how. In the field of logistics, the Fraunhofer IFF and the Institute for Materials Handling and Construction Machinery, Steelwork and Logistics IFSL deserve special mention. From their development of intermodal transport logistics concepts to their applied research, these institutes not only benefit enterprises and industry but also service companies. As the complexity of logistics problems increases, the demand for research and innovative solutions is rising. Practical research work and the successful implementation of projects at clients’ facilities are strengthening Saxony-Anhalt as a center of logistics. Research is instrumental for our region’s further economic development.
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Imprint
Groundbreaking for the Virtual Development and Training Centre

»This groundbreaking is an important moment in the twelve year history of our institute. The expansion is proof that Saxony-Anhalt is opening opportunities for economically profitable work. The decision to build the VDTC in Magdeburg is a clear commitment to this center of research« said Institute Director Prof. Michael Schenk.

With the new VDTC building, the Fraunhofer-Gesellschaft is setting an example in Saxony-Anhalt that is receiving international attention. The European Union, the Federal Government and the State of Saxony-Anhalt are funding this project.

Construction progress can be watched by webcam at www.vdtc.de.

ViVERA Excellence Network Kick-off

The »Virtual Excellence Network for Virtual and Augmented Reality ViVERA« started its work with a kick-off event on February 22, 2005. The network pools the research resources of ten institutes and universities nationwide. The German Federal Ministry of Education and Research located the network management in Magdeburg. In the presence of BMBF Parliamentary State Secretary Ulrich Kasparick and numerous other prominent guests from government and the research community, the members of the excellence network presented themselves and their competencies, which will be pooled in the newly created network, at the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg. Prof. Michael Schenk, Director of the Fraunhofer IFF and spokesman for the ViVERA Network, underscored the importance of virtual reality and augmented reality technologies for enterprises’ competitiveness. The pooling of existing competencies in the ViVERA Network will trigger broad integration of these technologies in companies.

On the occasion of the ViVERA kick-off, BMBF Parliamentary State Secretary Ulrich Kasparick asserted: »Innovation is vital for Germany in order to secure our society’s standard of prosperity in the long term. In particular, small and medium-sized enterprises will profit from the outstanding research competence in the field of virtual and augmented reality within ViVERA.« The BMBF is providing the excellence network ViVERA with funding of 4.5 million euros until 2007.
Innovation Forum on the Resource Wood

As part of the BMBF project of the same name, a two day Innovation Forum on the »Resource Wood« was held on January 26 and 27, 2005 at the Maritim Hotel in Magdeburg. More than 300 experts from politics, business, research and government met in Magdeburg to identify paths to a sustainable wood processing industry. The wood processing industry in Saxony-Anhalt has enormous potential and is confronting great challenges. In his closing remarks, Stefan Quitt, CEO of the FLG, said that the creation of networks will be the prerequisite for the success of the wood processing industry in Saxony-Anhalt.

The Forstdienstleistungs- und Landschaftspflege GmbH Sachsen-Anhalt was responsible for the project work.

The Fraunhofer Institute for Factory Operation and Automation IFF Magdeburg took over the technical direction of the event.

www.ressource-holz.de

EC Bridge: China and EU Jointly Researching Logistics Solutions

The notion of logistics is relatively novel in China. Local providers are largely unsure what is behind the term. The demand side behaves much the same way. To this day, logistics in China is focused on transportation.

As part of the EU project EC-Bridge, the Fraunhofer IFF was in charge of compiling a trend mapping study for China focused on the topic of, eLogistics. It turned out that logistics’ comparatively high cost shares of value added represent the core problem of logistics in China. Logistics costs are approximately 17 percent of the GDP. By comparison, this figure is 7 percent in Germany. Likewise, storage and transport costs are comparatively high and make up 30 to 40 percent of the total cost for capital goods, up to 60 percent for food and 70 to 80 percent for some chemicals. Reasons for these comparatively poor performance values are the large inventories, which in turn are the result of inadequate material flow control and inappropriate information systems. Other deficits are the storage infrastructure, information processing and the integration and reliability of logistic processes.

The complete trend mapping study can be read at http://www.ec-bridge.com.

Kay Matzner presented the results of a trend mapping study at the Chinese-European Networking Symposium in Peking on March 17 and 18, 2005.
Fraunhofer IFF Performing Joint Research with Asian Institutes

In December 2004, the Fraunhofer IFF concluded concrete agreements on cooperation with renowned research and training institutions. Acting Director of the Fraunhofer IFF Dr. Gerhard Müller and Head of the International Competence Center Logistics Ralf Opierzynski travelled to Thailand and Taiwan for the signing.

The Fraunhofer IFF will be working together with the Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan even more closely in the future. Interest is concentrated on the energetic utilization of renewable raw materials on the basis of fluidized bed gasification with downstream treatment and conversion processes. With a staff of more than 6000, the ITRI is the largest research organization in Taiwan. It is a partner in the »Biomass Asia« network in which other research organizations from China, Japan, Korea, Thailand, Vietnam and Singapore collaborate.

Cooperative Agreements with Leading Russian Logistics Institutes

The Fraunhofer IFF concluded agreements on research and cooperation in the field of logistics with leading research organizations in the Russian Federation. The Rector of the State Automobile and Road Technical University MADI and the Acting General Director of the Russian Federation's State Research Institute of Aviation Systems GosNIIAS signed the agreement during a visit to Magdeburg in September 2004. The object of cooperation is the basic and advanced training of students, the training of specialists in business and joint research and development projects in the field of logistics.

The State Automobile and Road Technical University MADI is the leading Russian university in the field of logistics and transportation. The State Research Institute of Aviation Systems GosNIIAS is the Russian Federation’s most important research organization in the field of the aircraft industry and aviation research.

In addition, the Fraunhofer IFF signed a Memorandum of Understanding (MoU) with the Thai-German Institute (TGI) in Chonburi, Thailand, which is the largest industrial training and educational center in Thailand. Already completed joint projects will be used in the future as the basis to intensify the transfer of technology and know-how in the field of logistics.
Future collaboration was sealed when the Thai-German Institute TGI and the Fraunhofer IFF presented their Memorandum of Understanding.

A Successful IFF Spin-off

In April 2003, Udo Ramin, then Division Director of the Division of Information Logistics, left the Fraunhofer IFF and, together with other Fraunhofer IFF associates, established the Magdeburg branch of the Aston IT Consulting GmbH.

Aston Consulting GmbH provides services in the field of ERP system consulting and implementation, predominantly on the basis of Microsoft Axapta. Since the December 2004 merger of Aston Business Solutions with the Tectura AG, Ramin has been successfully heading the former Aston branch office as a Tectura branch office. The branch office is located at Listemannstrasse 10 in Magdeburg and now has around 20 employees.

Tectura is Microsoft Business Solution’s largest partner in the world and is represented in over 20 countries. Tectura develops and implements integrated business solutions in the sectors of plant and mechanical engineering and process manufacturing such as life science, pharmaceuticals and chemicals. The Magdeburg branch concentrates on »industrial services« focused on plant engineering, service management and multi-project and resource management.

Tectura is a successful partner in the .NET Competence Center for the development of Web services and industry solutions for SMEs and government. Other partners in this European competence center for business processes are Microsoft Germany, T-Systems, the Fraunhofer IFF and the State of Saxony-Anhalt. The Fraunhofer IFF has assumed the research role in the competence center and ensures the transfer of knowledge to the business community.

Opening of the LogMotionLab

The »LogMotionLab« was opened on June 23, 2004 as part of the 7th IFF Science Days. Fraunhofer IFF research associates presented their logistics competence based on the widest variety of RFID technologies. The »LogMotionLab« provides extensive options for testing and piloting.

A model scenario of a go-cart race was used to demonstrate a small part of the capability of localization and communications technologies in the interplay of digital and real technology.

The graphic shows the exact course of a driven lap. Colors reproduce the speeds.

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Logistics Lectures from Industry Pros

In the 8th Logistics Guest Lecture Series, industry pros presented intelligent logistics solutions at the Fraunhofer IFF. Outstanding speakers from the field highlighted how companies are using logistics to tackle the current market challenges and take advantage of logistics as a competitive edge. Examples of topics were shorter delivery times, increasing product complexity or the increasing diversity of variants.

A highlight of this year’s lecture series was certainly the presentation by Kay Middendorf, Managing Director of Tchibo Logistik GmbH at the close of the series on June 14, 2005. Mr. Middendorf spoke on »Success Factors of Consumer-oriented Logistics«. Tchibo was awarded the 2004 German Logistics Prize for its concept »A new experience every week«. Tchibo’s concept is based on an unparalleled continuous linkage of retail, service and industry in the consumer goods sector.

The series’ patron, Minister Karl-Heinz Daehre, delivered opening remarks at the final guest lecture on June 14, 2005.

12hundred: Magdeburg Celebrates Its Birthday

1200 years of Magdeburg is a good reason to celebrate! The Kaiser Otto Prize was awarded for the first time in the Magdeburg cathedral. Its recipient was former Federal President of the Federal Republic of Germany, Dr. Richard von Weizsäcker.

Afterward, the prominent guests met at the official reception given by the mayor in the former national bank next to the cathedral: Among others, Richard von Weizsäcker, German Finance Minister Hans Eichel, Gesine Schwan and Dr. Peter Eigen, Minister President Wolfgang Böhmer and Nashville, Tennessee Mayor Bill Purcell.

Congratulations included the Fraunhofer IFF represented by Acting Director Dr. Müller. The Fraunhofer IFF presented its visual-interactive model of Magdeburg and invited prominent figures on a virtual tour of the city.
How are robots actually built?

The first Jugend-Akademie led children on an exciting voyage of discovery in the world of robotics. Just as at a real university, the future engineers learned all about humans’ intelligent helpers in lectures, seminars and project afternoons.

The young engineers built their first own service robot together with Fraunhofer associates, Otto von Guericke University and the »One Stone« network for child and youth education.

The Stadtsparkasse’s foundation for youth work is supporting the project with 5000 euros.

Dr. Ulrich Schmucker explains to child students how the walking robot Katharina functions.

Siemens and Fraunhofer IFF Sign Cooperation Agreement

Transponders will change logistics for a long time to come. Most notably, the combination of RFID with other localization and communication technologies has great potential to configure logistic flows more securely and more reliably. In this context, Siemens Business Services GmbH & Co. OHG and the Fraunhofer Institute for Factory Operation and Automation IFF have agreed to cooperate closely.

Fraunhofer IFF will jointly develop scenarios and operational solutions for different sectors.

About the cooperation with the Fraunhofer IFF, Ulrich Assmann from the management of Siemens Business Services said: »In RFID projects, Siemens is a one source provider for all IT and process consulting including software and hardware. The Fraunhofer IFF associates’ research and development know-how enables us to test RFID solutions in the LogMotionLab and optimally customize them for our clients.«

The test lab technically outfitted by Siemens Business Services is equipped with the majority of RFID technologies currently on the market and in development. Individual systems can be tested for their practicability. The research associates are able to analyze and simulate clients’ logistics flows in their lab. They test which technologies best match a particular client’s requirements and develop prototypical solutions. If a client is convinced by a solution’s advantages, Siemens Business Services is ready as an experienced implementation and IT partner to integrate the RFID solution in the client’s systems.

Prof. Michael Schenk, Director of the Fraunhofer IFF, and Ulrich Assmann, Siemens Business Services Management, met at the Fraunhofer IFF to sign the cooperation agreement.
Information is evolving into one of the most important factors in logistics. New information and communications technologies are allowing better and better solutions to support logistics processes.

In this context, particular importance is attached to the integration of RFID systems. These are integrated in products and carry a multitude of information. Intelligent logistics is fundamentally shaped by intelligent logistic assets, which move autonomously and self-controlling in logistics networks. The »Internet of Things« is emerging in which, for example, containers, assemblies and single components use embedded I&C technologies to find their own way through internal and external networks.

Regional and global flows of materials, goods and products must meet several requirements in order to support intelligent logistics: All partners involved must apply uniform standards. They must be networked with one another. The accompanying information must be parallel to or in part even ahead of the flow. Standardized processes and measurands are needed to ensure the quality of logistics and to be able to plan and control the logistics service.

Intelligently Controlling Logistics

Prof. Michael Schenk and Dr. Klaus Richter

The international exchange of goods and products is steadily growing. Yet the information technologies now in use are unable to sufficiently organize the flows of goods both more securely and reliably: The losses from misdirected containers, palettes or luggage each run in double or triple digit millions. Modern solutions not only have to provide the capability to reliably identify mobile assets of different types and in changing environmental conditions but beyond that also to localize them, communicate with them, navigate them and control them.
Standardization also includes a raster which defines when, where and during what event data is acquired. All actors involved log their asset, for example, upon receipt and shipment. Logistics processes can thus be evaluated and compared. The stipulation of standards makes it possible to integrate DP between sender, logistics service provider and receiver. As a result, inter-company planning and control of the flows of goods based on time, quantity and location are possible.

The increase in speed and highest demands on process reliability and level of service on the one hand and the complexity of the processes on the other hand are necessitating new control concepts: Active action and navigation must be possible in every link of the logistics chain. Intelligent logistics systems of the future allow event-oriented navigation, planning and control as a function of the status of the logistic asset and the process chain.

Knowledge Is Power…
On the way to intelligent logistics, strategic importance is attached to controlling information and communication flows. This is only possible by using the newest information technologies and integrating them in existing system landscapes. New control concepts demand high quality integration of information and communication. This is characterized by information flowing concomitantly and ahead. RFID technology (Radio Frequency Identification) is crucially important for new I&C concepts for logistics. RFID based identification, localization and communication combined with Internet applications form the foundation for intelligent logistics networks.

RFID technologies make it possible to provide diverse information decentrally on logistic assets. The data carriers can be communicated with on the basis of alternating electromagnetic fields without either physical or visual contact. A significant advantage of RFID technology over conventional auto-ID systems is the rewritability of the memory chips by read/write antennas with standardized data protocols. The assets themselves can then be communicated with when they are in motion. Special active RFID components equipped with radio technology such as mobile radio or GPS can also be localized. They represent another important building block for intelligent logistics: The asset itself provides information about its location at any moment.

Linking RFID and sensor systems creates the prerequisite for automated recording of events and statuses. Different sensors are available for measurands such as temperature, pressure, humidity and acceleration. If goods are overheated or overcooled or if sensors detect unacceptable vibrations, this information can precede the goods. Thus spare parts can be delivered early and nasty surprises are prevented when the goods are received and functionally tested. In combination with VR scenarios, human-machine interfaces can be designed to be user friendly. Visual-interactive scenarios on mobile terminals can be used to evaluate the acquired data and present it user friendly. Moreover, VR based training systems can be used to optimize human machine interaction.

The interaction of the different components generates a complete system based on high-tech I&C technologies. As a result, logistic assets can be navigated along the entire value added chain. Their integration along the entire value added chain represents a fundamental prerequisite for the design of intelligent logistics systems from which great opportunities for new innovative services can be derived for the future. Predictions of a boom for RFID systems are not only based on the steadily rising use of RFID chips but also in particular on the embedding of RFID technology in diverse superordinate I&C systems such as ERP for example.

Customization as an Opportunity and a Challenge
The trend toward customization is opening new fields of activity for logistics service providers. The increase in customized product variants is leading to new value added chains, which enable customized finishing decentrally and partially outside the production facility. This is leading to new divisions of labor and requires new forms of customer contact. As the division of labor takes on new forms, logistics service providers have to increase their know-how. This is impossible without additional knowledge about the product. Only an increase in know-how and integration in the digital information chain for order processing will enable logistics service providers to offer product-based services.

The capability to pass along the »increase« of knowledge to the logistics service providers must first be ensured however. RFID technology is particularly suited for doing this. Data necessary for the logistics service provider can be stored directly on the product in order to perform the stipulated services. If the quantity of data that has to be available is larger, access to a database would be suitable: In this case, only identification data would be delivered with the product. All other data is available in a commonly used database system. Thus any quantity of data desired is available at any time. The technical connection is over mobile radio and the Internet.

By using RFID technology, logistics service providers can more easily implement value adding services for customers. A model warehouse management application illustrates this: When an RFID system is introduced, the logistics service provider can reduce his expenses if he takes over the stockkeeping for the customer. Storage and disbursement are auto-
matedly registered by the RFID system. Introducing inventory management and taking inventories «at the push of a button» additionally suggest themselves. The data acquired from this is processed and transmitted with the current warehouse data to the customer. It would also be possible, for example, to automatically fill the warehouse if its inventory falls below a minimum.

Quo Vadis Logistics?
Logistics is no longer conceivable today without modern I&C technologies. The worldwide traffic in goods and increasing legal requirements necessitate traceability and concomitant information flows. The increasing complexity of logistics chains is accompanied by demand for information transparency. RFID technologies make it possible to optimize the capacities used and to control them based on status and events. The use of electronic labels (transponders) has many advantages here. The components are individually writable and can be identified and localized—depending on the technology used—over distances of several hundred meters without visual contact between asset and reader. Not only are new technologies in the manufacture of transponders expanding the range of uses but further development of polymer technology in particular will also cut manufacturing costs.

Linking the information flow with the material flow is one of the primary objectives in logistics. Goods should be identifiable the whole way along the value added chain, i.e. from their production to the end consumer. If this is assured, then this is called a secure supply chain. This is the case however only when all participants in this chain use the RFID technology among their companies. Otherwise
this is merely a secured transit of goods between individual members of the value added chain.

Increasing security precautions in international freight traffic can only be satisfied with the aid of high-tech I&C technologies. With their »24 Hour Rule«, for example, US authorities demand that shipping companies and other carriers send exhaustive delivery data over a defined electronic interface. This must be done twenty-four hours before the loading of any ship setting course for an American port of destination. The close interconnectedness of international supply chains causes them to react to even the smallest changes and disruptions. If such changes are not immediately communicated, they have a negative impact on any smooth continuity of the supply chain.

The general trend toward customized solutions in the sector of capital and consumer goods is confronting logistics with new challenges: The lot sizes of individual shipments of goods are becoming smaller. In international transportation, that means customs clearance costs are also increasing. RFID technology can be used here in the future to simplify and thus also expedite customs formalities at the borders to trade zones. The potential to expedite one’s own transportation has frequently been exhausted or needs larger investment in infrastructure.

Other trends in retail such as product liability or rising profits in Internet commerce are compelling logistics service providers to expand their portfolios to include return management. Thus another component is being added to the logistics control loop to be controlled, in which a logistics service provider can assume a prime position.

The challenges in logistics described makes new forms of customer retention possible. Newly acquired product know-how among logistics service providers offers additional opportunities in the service sector. This product know-how can only be acquired by
integrating the concepts of the digital factory into logistics. This consequently leads to a digital logistics system. A digital logistics system can be used to organize all necessary stages of work in order to be able to confront the new challenges of logistics that is quality assured and controllable all the time.

LogMotionLab
The Fraunhofer IFF »LogMotionLab« (Lab for Moving Logistic Assets) provides support to face these new challenges in logistics successfully. In the »LogMotionLab« RFID technologies are tested and neutrally assessed for their practicability for specific business processes. The lab considers itself a service center for companies, working together with clients to develop, test and utilize different potential applications of RFID technology in logistics processes.

In a testing facility of around 1800 m² located at the Fraunhofer IFF, visitors to the »LogMotionLab« will find a large part of the RFID technologies currently on the market or in development:

- Numerous data carriers for use in the industrial environment
- Mobile and stationary read/write systems for automatic identification and data processing
- Demonstrators for demonstrating typical RFID scenarios
- Sensor systems for recording and counting flows of goods and pedestrians (e.g. for e-ticketing applications)
- Technologies for localizing assets indoors and outdoors (RFID, wireless LAN, GPS, GSM, Loran-C)
- Infrastructure for piloting and customized solutions
- Numerous Web services for the integration of external condition data
- Devices for communication (cell phone, notebook, organizer)
- Hardware and software for data and order management

»LogMotionLab« users have a variety of advantages:

- They can assess the technical potentials of RFID technology and calculate their cost effectiveness under field conditions.
- They can conduct customized tests – both in the lab and at their own facilities connected to their logistics processes – and develop and produce training scenarios
- They can develop and produce training scenarios.

The equipment of the LogMotionLab, the consulting know-how of the Fraunhofer IFF and its partners and the basic knowledge of the University Magdeburg are ready for clients and interested parties to take advantage of them. No investments need to be made in RFID systems at this stage. If test operation is convincing and the RFID technology should be integrated in real operations, an experienced consulting and implementation partner such as Siemens provides support.

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Value adding services that logistics service providers can offer their customers are warehouse management, shipping preparation with issue of delivery invoice, packaging and plastic wrapping, labeling, order picking, final packaging and assembly. Logistics service providers can also take over quality control.

The intensified utilization of the Internet as a potential for client purchases is not just causing the individual providers’ transportation services to increase. In addition, return management must also be established. There is potential for logistics service providers to become active here too. Ultimately, by taking over the monitoring and organization of the entire transportation route along the value adding chain, a logistics service provider is able to optimize both the customer’s external and internal transports. Among other things, this includes the fields of transport planning, supplier and carrier training, operative transport monitoring, interventions in transports underway, short notice authorization of special transports and comprehensive reporting.
Timber production and processing is a complex process with many parties involved and completely different tasks. New technologies and organizational forms are needed to improve the information flow and the collaboration among all the parties involved and to make Germany internationally competitive in the forestry and wood processing industries. The Fraunhofer IFF has presented a solution, which demonstrates how requirements and prerequisites of the individual actors from the forestry and wood processing industry can be satisfied in an integrated logistics chain from the forest to the factory.

In a run-up project, the state of Saxony-Anhalt studied the basic organizational and technical conditions in the regional forestry and wood processing industries. The study clearly revealed that, for the forestry and wood processing industries in Saxony-Anhalt, demand exists for the development of a pilot system. New technologies should optimize the logistics chain from the forest to the factory for all actors. Apart from the wood processing industry’s demand for cost effectiveness and optimization, special significance is also attached to environmental protection to ensure management protects resources on a long-term basis.

The German forestry and wood processing industries are subject to enormous economic pressures. High labor costs and intense competition ensuing from foreign wood deliveries are significantly affecting the wood market in Germany. The Fraunhofer IFF has presented a technical solution for the forestry and wood processing industries. It is based on Internet technologies and employs mobile applications.

Requirements of an Integrated Wood Logistics Chain
The »Wood Logistics Demonstrator« is aimed at developing and producing a technical pilot solution for Saxony-Anhalt’s regional forestry and wood processing industries. The demonstrator contains an Internet platform for the planning, control, monitoring and controlling of wood logistics chains. Access to a shared database makes it possible to better coordinate processes among those involved in the logistics chain »from the forest to the factory«. Further, new technical possibilities of on site data acquisition and processing are being tested.

The development of the demonstrator presupposes the incorporation of many factors: Technological, economic and ecological interrelations have to be balanced with the basic regional conditions of forestry operations and...
Development of cost cutting potentials
- By minimizing inventories (stacks)
- By optimizing transport
- By minimizing fuel consumption, among other ways, by minimizing search processes
- By servicing and maintaining technical infrastructures
- By protecting the environment and conserving nature
- By providing for conservation, sustainability and reclamation

Greater efficiency of the value adding and logistics processes
- By inviting bids for services
- By establishing cooperations and extending offers to cooperate
- By coordinating, controlling and monitoring resource use
- By improving planability (information exchange when coordinating and synchronizing subprocesses)

Increased transparency
- Of activities, events, conditions and developments

These functions are made available with the demonstrator’s various components in the Internet or on mobile terminals and can be supplemented by basic functions such as user, rights and master data management. Consequently, every party involved has the capability to select individually required functions and to customize the demonstrator’s range of functions for individual use.

The demonstrator’s core and basis is a data model, which links the individual components and their data with each other. Setting up a communications platform on the basis of the demonstrator is planned for the future. The regional actors’ existing enterprise resource planning systems and datasets will be connected to the platform.

Phases in the wood logistics chain

Integrated Logistics Chain from the »Forest to the Factory«: Saxony-Anhalt Wood Logistics Demonstrator

Wood Logistics Chain

The Functions of the »Wood Logistics Demonstrator«
Increasing cost efficiency and overall efficiency and ensuring environmental protection and nature conservation were uppermost during the development of the »Wood Logistics Demonstrator«.

On the one hand, the demonstrator provides a technical platform. On the other hand, its also provides advanced equipment such as mobile terminals for testing. Forest owners, forest management and processing service providers, carrier companies and the wood processing industry have the following functions at their disposal:
- Planning, monitoring and control of logging and of transport contracts and processes;
- Integration of road condition and weather information for active and environmentally compatible navigation of humans and machines;
- Localization and event-based navigation of mobile assets in the forest;
- Fast, integrated (paperless) and correct data transmission;
- Coordination and condition-based control and monitoring of wood flows;
- Reduction of forest pollution by providing environmentally relevant information in wood logistics processes.

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Main foci During Implementation of the »Wood Logistics Demonstrators«

Development of cost cutting potentials
- By minimizing inventories (stacks)
- By optimizing transport
- By minimizing fuel consumption, among other ways, by minimizing search processes
- By servicing and maintaining technical infrastructures
- By protecting the environment and conserving nature
- By providing for conservation, sustainability and reclamation

Greater efficiency of the value adding and logistics processes
- By inviting bids for services
- By establishing cooperations and extending offers to cooperate
- By coordinating, controlling and monitoring resource use
- By improving planability (information exchange when coordinating and synchronizing subprocesses)

Increased transparency
- Of activities, events, conditions and developments

Improved information and communication without media breaks
- To improve up-to-dateness and security
- To facilitate documentation and statistical work

Prevention
- Through logistics process planning and control incorporating aspects of environmental protection and nature conservation
- Through prompt information on and communication of aspects of environmental protection and nature conservation
The Components of the »Wood Logistics Demonstrator«

The »Wood Logistics Demonstrator« consists of the following components:

1. Contract management allows tendering and bundling services. In addition, orders are planned, controlled and monitored here. The users' master data is also managed.

2. A tool for monitoring status is also available. The status of orders or sites or quantities of stacks can be systematically monitored. Unusual events, losses or temporary restrictions of lands or roads can be monitored as can the status of resources.

3. A navigation and routing system allows optimizing transportation on the basis of economic or ecological parameters and makes it possible to calculate transportation costs.

4. Auxiliary services facilitate resource management, make weather and storm information available and provide functions such as driver logs.

5. Environmental information is an intrinsic part of the platform services and supports preventive information, data collection and systematic aggregation and combination with logistics data. It supports sustainable forest management by providing information to those involved and incorporating environmental aspects such as designated protected areas when planning and executing work in a forest (e.g. routing allowing for protected areas, monitoring of forest management and its consequences such as damage, etc.)

These coordinated components and the common data model provide interacting functions.

The »Wood Logistics Demonstrator« not only demonstrates technological solutions for support but also organizational requirements for the improvement of the information flows.

The desired effect of cutting the costs of the wood logistics chain and optimizing it crucially depends on the willingness of the parties involved not only to provide information but also to incorporate the information provided in their own planning.

Outlook

In the run up to the piloting phase of the demonstrator, various parties in Saxony-Anhalt have been recruited in the two selected test regions of Burgstall and Blankenburg. They intend to test the application and suitability of the various technologies in on site use.

The test phase will result in the regional actors of the forestry and wood processing industries being more extensively coordinated. Sustainably organized workflows including collectively accepted user and rights concepts will be initiated. Components and services to be shared as well as coordinated cost and operator models will be prioritized for an integrative complete system and the aforementioned services, technologies and functions.

The Fraunhofer IFF has already begun initiating this discussion process and will be doing far more than just acting as a moderator overseeing the interface to the »Wood Logistics Demonstrator«.

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Automatic guided vehicles for automated internal transportation have been around since the mid 1960s. So far, approximately 20 000 vehicles have been built throughout the world. The majority of manufacturers and users of such driverless vehicles are in Germany. When the vehicles are used together with peripheral equipment and a master control, this is called an automatic guided vehicle system. If the use of automatic guided vehicles is to move forward, upgradable and open master controls have to be developed. Existing systems from various manufacturers are incompatible with each other. The Fraunhofer IFF was involved in developing a master control that allows integrating different manufacturers’ components in one system.

If the manufacturer discontinues a product line it is impossible to use another manufacturer’s vehicles and components in its place. That is why small and medium-sized enterprises in this sector especially have difficulties establishing themselves on the market.

Communication for All Components
In the project FAHRLOS (Fahrzeugleitsteuerung - Open Source), a modular framework called openTCS (Open Transportation Control System) was developed, which is the foundation for complete vehicle master controls. Several firms and a consultant from the VDI working group »Automatic Guided Vehicle Systems« were represented in the project consortium and contributed their knowledge and requirements of a master control.

In addition, the companies provided assurances that the software developed would be used in future systems. On the basis of openTCS they can provide their own master controls to upgrade their own driver units and components. To do this, plug-in mechanisms and standard formats have been used to design the interfaces for the easiest integration possible.

The manufacturers’ obligation to deliver the control software with open source code leaves the option open for users to integrate other manufacturers’ modifications and upgrades in the future.

Disclosure of the source code brings users and manufacturers a great advantage: A standardized master control will increase the acceptance of automatic guided vehicle systems. In view of their systems’ greater flexibility, vendors and manufacturers of components will profit from greater sales. Therefore the objective of the project is also to bring the framework developed to the largest possible circle of users.
Automatic Guided Vehicle Control Center
The master control’s most important task is processing the transport orders, i.e. the transportation of goods from one handing station to the next. To do this, automatic guided vehicles are used, which move autonomously along induction rails or are laser-navigated from signal point to signal point. In the field, the transport orders are broken down into individual transport orders from signal point to signal point and processed successively: The vehicle is transferred from one signal point to the next. This makes optimal traffic routing possible and makes allowances for the shortest route and blocked roads. The signal points also manage road occupancy. In order to prevent collisions, only one vehicle may be traveling in one occupied stretch of road. Vehicle dispatching assigns an optimal vehicle at the beginning of a transport order and manages deadheads and battery charging cycles.

The interface between master control and vehicle forms the vehicle driver unit. This can be easily integrated by the manufacturer in the openTCS master control. Through the driver unit, the vehicle reports its current position to the master control and converts commands into actions. Apart from »pure« vehicles orders, there are other commands depending on the type of vehicle, which can be defined during transport planning. These range from »honk in the following section of road« to »reduce speed« up through unload or load at a transfer station.

Go get the car...
Transport orders can be issued by different entities, e.g. manual user input, system signals, superordinate material flow control or internal mechanisms. All necessary components are interconnected in one network.

This includes the master computer as well as programmable controllers, user terminals and material flow computers. The user terminals permit the input of orders and the monitoring of all components of the system. Internal mechanisms react to signals from sensors or to programmed operations in the control core.

Configurable actions: Users can customize the master control for their specifications and requirements.

Modeling: All information important for the vehicle system is entered into the layout.
Thus it can be stipulated that the transportation system activates actions or orders when there are particular ambient conditions. A system scanner can, for example, activate a transport order or open and close an automated guided vehicle’s rolling door.

Complete System Design
To generate the system layout, the developers have a modeling tool at their disposal to develop all components. Signal points are linked with routes and transfer stations, potential parking for vehicles is specified, vehicle types and vehicles are defined, maximum speeds are set, etc.

A simulation can be used to check the optimal utilization of the generated layout with internal mechanisms, vehicles and routes. Vehicle-like loopback drivers are used to simulate the processing of transport orders. As a result, driving assignments are processed exactly as in the real system.

Various resources, primarily developed at the Fraunhofer IFF, are available to generate realistic loads.

In a load generator, as many load sources as desired can be configured, which issue transport orders periodically or stochastically. The frequency of dispatching can be specified in hourly resolution as a load distribution curve.

A special tool is the load recorder, which can log all transport orders both in real and simulated operation.

As a result, on the one hand, real system operation can be reenacted with varying layouts. On the other hand, even load cycles recorded once can be used again and again for better comparability of simulation results.

FAHRLOS on the Move
As a symbol of the success of development, a demonstration system with two different types of vehicles was erected at the Fraunhofer Institute IML in Dortmund at the close of the project and presented on March 18, 2005. In addition, several consortium partners have already announced they will be using the master control software for automatic guided vehicle systems yet this year.

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The project FAHRLOS (Fahrzeugleitsteuerung – Open Source) developed a modular framework called openTCS, which is the foundation for creating complete vehicle system master controls. It conforms with the VDI Guideline 4451 Blatt 7 (see diagram) and makes all the functions described available in software.

The following partners were involved in the project:

- Bleichert Förderanlagen GmbH, Osterburken
- Daum+Partner Maschinenbau GmbH Engineering, Aichstetten
- Fox GmbH
- Fahrzeugautomatisierung, Lehrte
- Fraunhofer Institut for Factory Operation and Automation IFF, Magdeburg
- Fraunhofer Institut for Material Flow and Logistics IML, Dortmund
- Götting KG, Lehrte
- iMAR GmbH, St. Ingbert
- ifak Institut für Automation und Kommunikation e.V., Magdeburg
- Siemens AG Produktionssysteme
- VDI-Arbeitskreis »Fahrerlose Transportsysteme«
- Weissenburg Industrie-Technik Maschinenbau GmbH & Co. KG, Wedel
eLOGMAR-M

Mobile Communications Solutions to Support the Logistics Processes in Maritime Applications

Dr. Eberhard Blümel and Dr. Steffen Strassburger

The control of maritime logistics chains is a complex task with many different actors. Merchants require information about their goods. Carriers rely on exact information about delivery times and places. Containers are sent on global journeys. In the Port of Hamburg, for example, around 370 million containers were handled in 2004. That means one million per day. Information on the containers must be available not only to the port operator but also other partners such as customs officials and insurance agencies. The particular challenge of the eLOGMAR-M project is to create a platform that can be used by all partners in distributed environments.

The project eLOGMAR-M builds upon the results of already successfully completed EU-projects. These preceding projects researched the potentials for optimization through computer simulations in Baltic ports. On the basis of the results, prototypical IT solutions were developed to support the logistics processes. Typically, these solutions were for stationary use at one or more locations.

The applications being aimed for are geared toward the management and control of logistics processes along a selected maritime trade route: »Baltic Sea feeder ports – Western European hub port (Hamburg) – Mediterranean ports – Chinese ports«. This maritime trade route serves as a practical scenario for the tests and the demonstrators to be developed.

The project includes partners from all the nations involved in this trade route. The list of partners covers 18 institutions from 9 countries. A core group of partners comes from the Baltic states of Latvia, Estonia and Lithuania, since, as new members of the European Union, they need special efforts to adapt their infrastructure to the transportation network of the other European partners.
Other partners come from Germany (e.g. Hamburg, Frankfurt and Magdeburg) and have established logistics competencies. Along the trade route, the partners are rounded out in the Mediterranean region with partner organizations from Greece (Salonika). The consortium is completed by two Chinese partners that work in the field of logistics.

Apart from the research organizations in the consortium headed by the Fraunhofer IFF, logistics service providers are represented as end users from the port sector, e.g. operators in the ports of Klaipeda in Lithuania, Riga in Latvia, Kokkola in Finland and Salonika in Greece. The Hamburg Marketing GmbH is involved in the project as the German partner, contributing important impulses and innovations.

One of the project’s primary objectives is dealing with the problems of organizing a pool of cooperating partners, who collaborate in a distributed work environment along the selected trade route. This requires the integration of their electronic information resources such as databases, information systems and Web servers and portals.

Support for and research of new work methods for actors in the logistics and maritime sectors are connected with the demand for mobile access to these resources. In the future, technologies such as WAP, GPRS, UMTS, and hot spots for wireless LAN will make work and communication with mobile terminals part of the logistician’s everyday life. To this end, eLOGMAR-M is researching suitable forms of use and will be demonstrating the potential in several demonstrators to be created.
The knowledge acquired is being transferred in different ways. On the one hand, the solutions generated are being integrated in the Baltic Sub-Regional Competence Center in Riga and being made available to the public. Potential users can inform themselves about the IT services and mobile solutions developed. The Web server installed there makes part of the solutions available over the Internet. They can be accessed by a normal PC as well as by mobile terminals.

On the other hand, a series of workshops and conferences specifically geared toward users in the maritime sector is being organized as part of eLOGMAR-M. Cities in the Baltic region such as Riga (Latvia), Klaipeda (Lithuania), Tallinn (Estonia) and in China such as Peking and Shanghai have been planned as conference venues.

The eLOGMAR-M project is pursuing the following objectives:

1) Study and analysis of logistic and maritime transportation processes, mobile services and e-work as well as basic legal conditions and regulations;
2) Training of specialists in maritime logistics and quality management systems;
3) Implementation of an Internet-based, interactive website as the gateway to a potential network;
4) Demonstrator of an Internet-based, collaborative work environment with mobile access;
5) Transfer of results in workshops, formation of expert groups and publication of a project manual describing the experiences from eLOGMAR-M.

Current information on eLOGMAR-M can be viewed and contact can be made on the eLOGMAR-M website http://www.elogmar-m.org.

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Automated container terminals as an example of ultramodern technology in the Port of Hamburg.
Corporate management games are particularly well suited for training students and trainees about business issues and how to deal with decision making situations replete with conflict. On the basis of a scenario, all the players assume their assigned roles and endeavor to complete their specific tasks as part of the complete process. What is more, the ability to think complexly in complete relationships is further developed. This is supported by the players being able to take on various roles (job rotation). By trying out the different roles, they are trained in taking action and making decisions without any real damage being done to a company.

The management game »Distributions Center for Pharmaceutical Products« is set up and successfully tested at Otto von Guericke University Magdeburg. Prof. Dietrich Ziems and Arnhild Gerecke

Logistics Management Game: «Distribution Center for Pharmaceutical Products» Is Set Up and Successfully Tested at Otto von Guericke University Magdeburg

Corporate management games are particularly well suited for training students and trainees about business issues and how to deal with decision making situations replete with conflict. On the basis of a scenario, all the players assume their assigned roles and endeavor to complete their specific tasks as part of the complete process. What is more, the ability to think complexly in complete relationships is further developed. This is supported by the players being able to take on various roles (job rotation). By trying out the different roles, they are trained in taking action and making decisions without any real damage being done to a company.

The search for a sophisticated management game scenario for logistics entails finding realism and clarity on the one hand and diverse creative freedom and representativeness of the problems on the other hand. The processes in a distribution center were selected because logistics is the main company-wide process here (see graphic), which is built up from clearly structured process stages, operations and jobs, encompasses flows of various types of objects and many typical decision making situations and demands a considerable range of communication and information flows. Two fundamental organizational concepts can be compared and tested in this scenario: First, classical (and very clear but complex) document-supported organization and then paperless, computerized processes using barcode labels, transponders and scanners.

When conceiving the design of the second organizational form, players are supposed to develop the change measures necessary in the operations and work out the differences and the potentials for cost cutting. Apart from material planning for customer orders, stockkeeping and warehouse management, core processes in a distribution center are order picking and shipping based on delivery routes. Order picking can be processed in a single stage, i.e. order-based, or in two stages, i.e. item-based. Both methods require different preparation of the picking lists and the processing operations, which are likewise tested as potential forms in the management game scenarios.
Activities and Decisions in the Management Game

The Distribution Center for Pharmaceutical Products (based in Magdeburg at Universitätsplatz) caters to pharmacies in the Magdeburg area. The »enterprise's« goal is to deliver to its customers on the day ordered.

Before the management game starts, players are familiarized with the individual jobs and roles and given the task of defining and specifying raw data, e.g. quantity ordered, minimum inventory and reordering quantity on the basis of past customer purchase data.

The completed set of production order forms is distributed to the manager of order picking and shipping.

Production Order Manager:
Once the production order has been received, the production order manager uses a volume calculation to set the number of order picking containers needed. This number simultaneously corresponds to the number of picking lists to be issued for each order, which have to be put out for the picker for the afternoon or evening route according to the principle of FIFO. A copy of the production order is supplemented with the assigned picking list numbers and forwarded to the packer in shipping. After receiving the copy, the picker sets up a spot for customer storage where the picker can set the order picking containers belonging to the order.

Picker:
In the order picking warehouse, the picker takes a picking list and takes the required number of goods from the warehouse bays. If a storage container has been emptied in the process, its KANBAN card is taken and delivered to warehouse management. After working off the picking list, the picker deletes the quantity removed from the physical inventory list of the order picking warehouse and calculates the quantity of new stock. The picker places the order picking container in the storage spot set up in shipping.

Packer:
If all the order picking containers belonging to the order have arrived at shipping, the packer conducts a cross-check. If deviations from the order cannot be established, the items are packed in transport boxes (packages) and released to the shipping manager.
Shipping Manager:
The shipping manager prepares the shipping documents (invoice, delivery slip and receipt) and the delivery order for the carrier. Afterward the shipment is made ready in the shipping department based on delivery zone and route.

Carrier:
The carrier reports to the shipping manager at the stipulated time and takes over the delivery order after checking the quantity of packages. The carrier delivers the shipment with the accompanying documents to the customer and accepts acknowledgment of receipt, which is then handed over to the shipping manager on the next trip to the distribution center.

Warehouse Manager:
The warehouse manager’s primary job is to fill the storage spot signalized as empty in the order picking warehouse by using supplies from the supply warehouse by taking a KANBAN card. The quantity stored is transferred as a debit from the supply warehouse’s inventory list and an entry in the order picking warehouse’s physical inventory list. If, when the customer order was received and the corresponding items were reserved, the limit set on the reordering quantity was fallen below, supplies are ordered from the manufacturer. Analogous to the customer order, order forms must be completed and sent to the manufacturer.

Manufacturer:
The manufacturer puts together the assortment of articles desired by the distribution center including shipping documents and then gives the carrier the delivery contract.

Incoming Goods:
After receiving the goods, the worker in receiving collects the goods, stores them in the supply warehouse and enters the quantities in the supply warehouse inventory list. In addition, the delivered quantity of the respective article is reported to order processing, whereupon this updates the inventory in the logical inventory list.

Management Game Assessment
Characteristics of logistics process performance and quality are analyzed in the assessment. The number of orders dispatched is compared with the number of orders delivered. Whether it was possible to keep the delivery promise to deliver to the customer on the day ordered is also checked. The expediency of warehouse management’s limit set on the reordering quantity is critically reviewed. Noticeable bottlenecks in flows of goods or information are discussed, the causes analyzed and appropriate measures taken to eliminate them. In the process, even the arrangement of workplaces in a room can be changed. As a rule, the management game is repeated using these changed basic conditions and settings to test and determine the effects of the measures.

Status and Outlook
So far, the management game in its conventional, document-based organizational form with one-stage order picking process has been played numerous times by German and Serbian college students in groups of eight to sixteen and also by school students. The participants’ assessments of the motivation, the clarity, the possibilities for creative freedom and the acquisition of knowledge are very encouraging even when at least four hours apiece are needed for management game preparation and follow-up. To shorten the orientation in the roles and sequences of activities in the jobs, job instructions have been developed for the players to follow. Specified forms and documents simplify the work. Errors in conventional data acquisition and transmission and manual picking necessitate plausibility checks and the setup of quality control loops. The initial allocation of job responsibilities of different scope to individual roles and jobs leads to bottleneck situations and delays in the order cycle time and to waiting in downstream jobs. As a rule, the first improvement measures have been proposed in discussion, it being essential to eliminate not the symptoms but the causes.

The second stage of expanding the management game, i.e. the extensively paperless organizational form, will employ a warehouse management system and coded ID information for documents, containers, goods, shipments, etc. The installations required are being developed and implemented by the Fraunhofer Institute for Factory Operation and Automation IFF at this time.
The automotive industry is being given a key role in developing and expanding the structures in Eastern Europe. The automotive industry has already been investing enormous sums in Eastern Europe for years. As Chairman of the Board of the Rautenbach AG, Prof. Scheel reported on this based on his experiences. He highlighted what this development means for the automotive suppliers in the Wernigerode region. First however, an overview of the role of the accession states as trading partners and the market situation in the automotive industry.

Opportunities and Risks through Eastward Expansion of the EU

Prof. Burghard Scheel

In his inaugural lecture, Prof. Burghard Scheel took a close look at the opportunities and risks the eastward expansion of the EU presents automotive suppliers. In his opinion, the opportunities for the automotive suppliers in the Harz outweigh the considerable risks.

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Automotive Industry and Eastward Expansion of the EU

The German economy’s foreign trade volume more or less doubled in the period from 1993 to 2003. The dynamics of the economic relationships between Germany and the accession states is substantially stronger: German foreign trade with the accession states quadrupled in the same period. Around eight percent of German exports already went to Central and Eastern Europe in 2003. With a foreign trade volume of around 115 billion euros, the EU accession states were Germany’s second most important trading partner after France in 2003. Public discussion addressing topics such as »job outsourcing« or »low-wage countries« frequently overlooks the enormous importance of these countries for the German economy.

Immediately after opening politically, the candidate countries gave the »automotive manufacturing« sector highest priority. Among other things, a rationale for this economic policy strategy came from diverse well-known institutes’ forecast of considerable volume growth in the automotive market. An 85 percent increase of the number of motor vehicles is expected for Eastern Europe by 2015.

In view of the market’s development, some aspects of growth deserve closer examination. At the moment, the carmakers’ manufacturing depth is at around 20 percent. This percentage will sink further. It is forecast that growing shares of manufacturers’ value added will be shifted to suppliers.
This shift of the value added is being offset by a concentration process: Fewer and fewer automotive suppliers are responsible for a growing share of the value added. The necessity of a global presence – accompanied by rising demand for capital and human resources – is forcing the making of strategic decisions and the setting of courses for the future. On the basis of tradition (e.g. SKODA, Czech Republic) and systematic use of locational factors such as low labor costs, tax exempt investments and low income tax, Eastern Europe has succeeded in building up a considerable value added volume – and the trend is continuing.

Car production in the accession states will increase from 1.5 million units a year today to around 4 million units in 2007. All the investments for this are in the implementation phase. Thus the »EU of Eastern Europe« will move closer to the world’s »big five« manufacturing countries.

While the production volume and the value added in the candidate countries is growing dynamically, assessments of the development of sales figures are rather cautious and reserved. At this time, the development of the GDP or buying power suggest they will not catch up to Germany quickly.

On Site Competition: Opportunities for Suppliers
Rising production capacities at lower buying power in the accession countries will lead to a considerable share of the vehicles produced there being exported: This will primarily hit the saturated West European market. The »harbingers« of all manufacturers’ cost cutting measures indicate how seriously improvement of competitiveness is needed. Particular importance is attached to labor and production costs. The accession countries’ labor cost advantage will not be adjusted to the Western European level in the short term. That also means that production costs will also influence locational decisions in the long term and jobs will be relocated as a consequence.

Given the initial situation, the risks actually seem to outweigh the opportunities. However the decisive point is that we are dealing not only with quantitative but also with qualitative growth. This is where the opportunities are for German automotive suppliers. Strong growth for automotive suppliers can be expected in the sector of autobody structure and electrical engineering/electronics in particular. However, suppliers are facing a challenge of organizing global value added networks in which only highly qualified research and development, administration and production are settled in Europe, while manufacturing and assembly are frequently relocated. Setting up such a global value adding network constitutes a great challenge particularly for SMEs. New forms of cooperation make a three percent increase of profitability – i.e. the EBIT margin – possible for suppliers as well as for carmakers. Developing this potential will respond to the cost pressure burdening the automotive suppliers in Germany.

For supplier business in the region around Wernigerode, investments against the background of a quantitatively and qualitatively growing automotive market absolutely make sense. Since there is a direct relationship between company size and foreign activity, company size represents a weak point for SMEs in the region. They are too small to position themselves globally and distribute their value adding chains over the continents. Cooperations and strategic partnerships become all the more important here.

According to an IKB study, SMEs do not display any marked readiness for advanced collaboration however.

SMEs in particular should take greater advantage of the opportunities provided by closer collaboration. The eastward expansion of the EU – right in our front yard so to speak – is especially suited for this. The networks already existing on corporate and academic levels are an excellent foundation and should be expanded and consolidated in the direction of Eastern Europe.

With a reference to the high investment capacity in the automotive, chemical and mechanical engineering sectors, Prof. Scheel underscored his assessment that the opportunities from eastward expansion of the EU are clearly greater than the risks and will bring the Wernigerode region additional benefits. Prof. Scheel identified the most important prerequisite for this with a quote from BASF boss Hambrecht: »…if we want it then.«

About the Person
Prof. Burghard Scheel was chairman of the board at Rautenbach AG until December 31, 2004, is chairman of the Fraunhofer IFF Board of Trustees and has been honorary professor at the Harz University of Applied Sciences since summer semester 2004. After graduating with a degree in industrial engineering, he worked for the BASF Group in various positions, worked as a management consultant and managed the privatization department in the Treuhand Agency in Magdeburg.
At the beginning of this century, many shareholders complained about falling stock prices or experienced a nasty shock in the new market. Rational AG stockholders did not. The price of Rational stock rose by around 80 percent in the last five years.

There is a simple sounding reason for this yet its concrete implementation in the entire company is anything but trivial: Consistent orientation toward processes and customer orders. Production and delivery play major roles.

Just like many other companies too, the Rational AG had evolved by the mid 1990s into a extremely functionally oriented company with nearly 100 percent production to stock. That inevitably led to large inventories and long delivery times. The company managed to radically reengineer its production system to be oriented toward processes and based on customer orders with only a few interfaces left. Three important elements that deserve mention are integrated Kanban control, RATIONAL one-piece-flow and segmenting. Outcomes of these radical modifications have been smaller stocks, adherence to customers’ desired schedules, constantly rising double digit productivity, significantly improved quality and dramatically shorter lead times. As a »by-product« Rational AG was awarded a large number of prizes, among others, the 2003 GEO Award (Global Excellence in Operations) in the »Factory of the Year« competition.

During this reengineering process, the Fraunhofer IFF and the Rational AG collaborated to create the management game ULF (logistics-based company management). ULF developer, Dr. Rico Wojanowski, worked closely together with Mr. Wassmus, in charge of processes at Rational AG, in order to develop a management game as close to practice as possible. In the starting situation, the management game ULF reproduces in simplified form the extremely functionally oriented structure at Rational AG with all its disadvantages in the mid 1990s. In the management game, players can then try in several rounds of play to reengineer the modeled company into a successful order-oriented company. The management game was and is being used to prepare Rational employees for restructuring processes and to increase acceptance of company-wide reengineering. The complete restructuring process can be reproduced in the management game.

Management Games

Rational AG Employees Use the Management Game ULF to Get into Shape for the Future

Tobias Reggelin and Kay Matzner
At a two-day seminar conducted by Fraunhofer IFF research associates Kay Matzner and Tobias Reggelin in February 2005, members of the Rational AG management team were able to experience for themselves in the management game ULF what it means to work in an extremely functionally oriented company. The players were required to come up with solutions to lead the company depicted in the management game back to the path to success. At the end of the seminar, the employees had succeeded in engineering a company structure completely oriented toward processes and orders. The experiences communicated are an important foundation for the employees' further positive development and thus ultimately the positive development of Rational AG's in the future.

The Fraunhofer IFF and Rational AG intend to collaborate on other management games for training at the Rational AG.

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An Ideal Entry into the Field

Dr. Rico Wojanowski works at Gildemeister where he is responsible for centralized process optimization in the management of production and logistics. The industrial engineer with a degree in mechanical engineering and a Diplom degree in business studies earned his doctorate in engineering in 2002. From 1999 to 2004, Wojanowski was a project manager at the Fraunhofer IFF. In 2002 to 2003 he completed a postdoctoral degree at McGill University in Montreal.

Dr. Wojanowski, you earned your doctorate from the Chair of Logistic Systems in Magdeburg. As winner of the German Logistics Prize what have you learned that’s new?

Gildemeister is a high speed company. In order to be able to survive on the strongly contested machine tool market, the company has developed a pronounced professionalism, reacting quickly to market requirements and acting consistently. The resource and time management throughout all management levels necessary to do this is something that you can only learn in the respective milieu of a world market leader. The project experience I acquired at the Fraunhofer IFF prepared me well for this and made my entry substantially easier.

When you look back at your education from the field, where do you see a need for improvement in academia?

In part, there are some quite simple things that are immensely important in the company, which are not adequately taught at the university however. I’m thinking for example about management using performance indicators. Whoever is able to read these correctly understands a company and sees all the significant strengths and weak points. Something like that absolutely can be taught at a university. To do that, universal and clear case studies are needed in which students can immerse themselves bit by bit and which help them understand corporate reality later.
And where did your education prepare you particularly well for your present job?

For me as an industrial engineer, very clearly for its diversity. Precisely at an equipment manufacturer like Gildemeister, a certain understanding of technical aspects is extremely helpful. Yet the business issues already brought up naturally predominate in daily work. Here you don’t always have to immediately know everything in detail but a broad repertoary of principles, methods and tools is extremely helpful. I’m able to fall back on a broad base here. Very important in particular are my experiences from my first years working at the Fraunhofer IFF. Independently structuring and working on projects, being integrated in a project team and working orientated toward the goal and time are skills you virtually have to learn as you work from the bottom up. And here the Fraunhofer IFF was the ideal entry and its positive corporate culture was extremely formative.

How is Gildemeister involved in training future employees?

Above all by building confidence and making demands. It’s rather amazing how quickly future employees at Gildemeister are allowed to and are supposed to assume responsibility. I myself am working on a young team that is constantly being given new projects and thus is continuously being challenged and cultivated.

Our production facilities are also constantly looking for students who get to know the company and its divisions through a Diplom thesis related to practical work or an internship. In this way, future employees can distinguish themselves and gather their first experiences.

In 2002 Gildemeister won the German Logistics Prize and the European Award for Logistics Excellence. Is that a reason to relax?

No, because customers aren’t going to buy our machinery just because we won a logistics prize. Successful logistics principles are naturally the ones the competition quickly copies. A look at our development clearly shows that, in the meantime, we are the last German machine tool manufacturer among the top 5. Most notably the Chinese are catching up with breathtaking speed. In Germany, we can only make up for that with commitment and fitness, every day to be precise.

Nevertheless we naturally remain an open company that proudly shows off its plants. The advanced management principles you can see there are already standard for us and thus secure our edge. We are constantly working on continuously improving our processes, even without any prize.

Where do you personally see the greatest challenges a company like Gildemeister has to master in the field of logistics?

Market challenges induced us to change from production machinery to technology machinery. In short, that means increasingly fewer products off the shelf and increasingly more complex and more customized solutions instead. Lot size 1 is standard. Nevertheless we have an assembly line on which four machines can be assembled in a mix of models. At the same time, Gildemeister is also the leader in innovation. Every year, 15 to 20 new machines in part with revolutionary new technology are started up in the concern. The start up curve is very steep. That demands good standard start up management. It is essential not only to master technical challenges but also to coordinate the various divisions’ numerous interfaces. Despite all our experience, every start up causes turbulences that have to be quickly brought under control.

How does Gildemeister prepare itself for these future challenges?

Through integration and coordination. Gildemeister strategically orients itself toward the market requirements. In the process, every plant naturally has its strengths and weaknesses too. It is essential to foster or eliminate these. To this end, a capacity network has been created, which does exactly this job.

At the same time, processes are being standardized and worked on throughout the group to prevent waste. Every logistician is familiar with the effectiveness of methods such as Kaizen and lean production. These were “modern” in the 1990s. Yet, precisely today, they have to be continued consistently and not be allowed to fall off or be pursued as an end in itself.

What still personally ties you to the Fraunhofer IFF?

Apart from plenty of experience I use and apply every day, many good memories and personal friendships too. Since I already had insight into many projects during my time at the Fraunhofer IFF, I know the right contacts whenever relevant problems crop up at Gildemeister. Thus at this time we are jointly considering how a virtual lathe or milling machine can be used to canvass customers. At present, there are still too many expensive machines in our showrooms, which could perhaps soon be replaced by a virtual twin.
Secured Chains of Goods

Mobile Logistic Asset Identification, Localization, Monitoring and Control

GPS, GSM or Loran-C are used to localize vehicles, transport units or containers. RFID technology identifies their contents and sensor systems can measure current data such as temperature, pressure or vibration. Radio modules transmit the newly collected information to a control station. The combination of technologies makes time and location-dependent controlling of logistics processes possible inside and outside buildings and thus makes it possible to quickly act and react in all stages of a logistics chain.

Value Adding Services for Applications Critical for Security

- Ongoing tracking and tracing of valuable goods and transport units
- Running inventory of defined warehouse zones
- Online monitoring of transshipment processes

Pedestrian Flow Control

Pedestrian Flow and VIP Identification, Localization and Information

The combination of wireless LAN, active transponder systems and video sensors makes it possible to localize persons inside and outside buildings, at trade fairs or on the premises. Thus it is possible to record the movements of individual persons and pedestrian flow properties such as density, dynamic and distribution.

Security Management

- Monitoring of public areas such as airports, train stations, stadiums and recreational centers

Event Management

- Monitoring and control of pedestrian flows at large-scale events such as sporting events, trade fairs and conventions

Material Flow Control

Asset Identification and Control in Material Handling Systems

RFID is employed to identify and localize logistic assets within material flow systems. If necessary, VR technologies can be used to visualize assets on a 2-D/3-D logistic control panel. Mapping the material flow system with all relevant processes and statuses allows analysis of the system in real-time and thus makes it possible to control material flows based on their status.

Smart Material Logistics

- Material handling systems for automotive and aircraft industries, plant engineering, logistics centers and all manufacturing enterprises

Container Management

- Complete monitoring and control of complex material handling systems

»IFF Smart Box«

Pedestrian Flow

Material Handling System
Life Cycle Management

Dynamic Condition Documentation on Technical Systems

Components, assemblies or engines are identified and authenticated by means of an electronic nameplate based on RFID. Additional, current information is stored directly on the asset on its RFID chip.

Maintenance and service work can be continuously recorded directly on the asset for documentation and traceability. The integration of local sensor systems and the use of mobile scanners makes rapid access to condition information possible directly on site on the asset.

Dynamic History File

- Up to date documentation of equipment information from servicing, maintenance, reconfiguration or upgrading of equipment on the asset itself

Equipment Management

- Overview of condition, features and location of complex and spatially ramified asset structures

Maintenance Management

- Active management, monitoring and control of maintenance jobs by automated communication between asset and control station

Mobile Lab

Mobile Measuring Station for On Site Use

Along with its demonstrators, the LogMotionLab has a mobile test environment available, which can be used at clients’ facilities in a real environment. The objective is to analyze logistics processes and identify, localize and control logistic assets en route or on site.

Mobile Control Station

- Monitoring and control of RFID aided logistics processes without on site connection

Mobile Measuring Station

- Recording and analysis of logistic processes in the field

Mobile Test Environment

- Testing of prototypical solutions in real operational environments

RFID Certification

Test Environment for Preparing for the Certification of RFID Aided Logistics Processes

LogMotionLab has a test environment to test the reliability of RFID solutions under different physical and organizational conditions. Standardized and reproducible test conditions allow qualified statements.

The tests serve as the basis for future certification in collaboration with accredited »Core Gremium Certification« bodies of the LICON consortium.

Test Platform for Courier Express Shipping Services

- Reliability tests for RFID solutions as a function of a package’s packaging, content, position and transport environment

Test Platform for Industrial Logistics

- Reliability tests for RFID solutions for internal and external company logistics as a function of basic physical and organizational conditions and asset condition
Third Place for Magdeburg at the Mobile Award

In May 2004, Tobias Reggelin, Sandy Boeker and René Bärecke took third place at the largest German Internet management game. In December 2003, around 600 teams had competed against one another in the Internet to make the fictitious sporting equipment manufacturer Leopoldt & Schätzle market leader. The team of Tobias Reggelin, in the meantime faculty member of Prof. Michael Schenk’s chain of Logistic Systems, and former fellow students Sandy Boeker and René Bärecke presented a convincing concept and reached the finals. The Magdeburg team ultimately took third place among the last eight finalists.

The hitherto largest German Internet management game was initiated by Detecon International in cooperation with the German Federal Ministry of Economics and Labor.

Fraunhofer-Gesellschaft PR Prize for the Fraunhofer IFF

Fraunhofer-Gesellschaft President Prof. Hans-Jörg Bullinger presented winner Anna-Kristina Wassilew her prize at the meeting of institute directors on March 17, 2005.

After living in France for several years, the Magdeburg native returned to Germany in 1996. She studied Communications and Media Sciences (specializing in Public Relations), German Studies and French at the University of Leipzig. At the same time she worked at media firms, advertising agencies and press offices. After graduation, she took over the management of media and public relations at a musical company in Magdeburg in 2002.

Since February 2004 Ms. Wassilew has been shaping media and public relations at the Fraunhofer IFF – with great success as anyone can see.
New Management for the Division of Logistics

Holger Seidel has headed the Division of Logistics Systems and Networks at the Fraunhofer IFF since January 2005. In his studies, Seidel specialized in factory planning and logistics. As an engineer for production organization, he acquired his first professional experience at a manufacturer of heavy machinery in Magdeburg. As assistant lecturer in the Department of Factory Planning and Logistics he helped pave the way for the founding of the Fraunhofer IFF in 1991. Since 1992 he has managed research and industry projects at the Fraunhofer IFF, predominantly in the field of factory planning, logistics, SCM and reorganization.

In 1997 he became Head of the Department of Factory Planning and Logistics and has been Deputy Division Director since 2001.

Dr. Klaus Richter moved to the position of Deputy Division Director in January 2005. Dr. Richter studied mechanical engineering, specializing in materials handling technology and earned his doctorate in 1985 from the School of Material Handling Systems at the Technische Hochschule Magdeburg. Afterward, he worked as an engineer for computer aided planning and design of material flow systems in a company for loading and transport equipment in Leipzig. From 1991 to 1999 Richter researched and taught at the University in Magdeburg in the fields of CAD industry software and material handling engineering and systems. Richter has headed the Department of Material Handling Engineering and Systems at the Fraunhofer IFF since 2000.

New Marketing and Public Relations Manager

Herbert Siegert has been Marketing and Public Relations Manager at the Fraunhofer IFF since November 2004. Siegert studied Physical Education, Sociology and Psychology and worked as a journalist for various newspapers. After additionally studying media and public relations, he organized diverse PR projects. Before moving to the Fraunhofer IFF in Magdeburg, he worked for the Messe Schweiz in Basel for two years where he oversaw PR work for an international trade show.

Herbert Siegert, Marketing and Public Relations Manager at the Fraunhofer IFF.
Double Doctorates

On September 30, 2004 the School of Mechanical Engineering awarded two doctoral candidates their degrees. Dr. Dietmar Bufka and Dr. Peter Hochrainer only have praise for the school and the Fraunhofer IFF’s outstanding advising and their excellent, efficient and pragmatic collaboration. The Fraunhofer IFF, to which both still maintain regular contact, provided them good prospects for the future.

Dr. Dietmar Bufka studied mechanical engineering at the University of Stuttgart. During and after his studies, he acquired his first professional experience in the automotive industry. Since 1998 he has been a manager at A.T. Kearney GmbH in Stuttgart, responsible for managing complex and international consulting projects in the automotive industry. Parallel to this she is intensively involved in developing the majors of Logistics Industrial Engineering specializing (WLO) and Cultural Sciences, Knowledge Management and Logistics (KWL – Cultural Engineering) and developing practical concepts. At her initiative, for example, new contents were introduced to the curriculum in the discipline of »Logistics Networks«.

Innovative Teaching

Dr. Elke Glistau has been a member of the faculty of the Institute for Materials Handling and Construction Machinery, Steelwork and Logistics at Otto von Guericke University Magdeburg since 2000. Her areas of specialization encompass production logistics, logistics process analysis, logistics system planning and information logistics. She studied industrial engineering and worked afterward as an associate lecturer at the Technische Hochschule »Otto von Guericke« in Magdeburg and in the company organization of the Magdeburg Armaturenwerk. In 1988 she simultaneously earned her doctorate in engineering and her title as university lecturer (facultas docenti). From 1988 to 2000 she was assistant professor at the School of Ergonomics, Factory Automation and Factory Operation at Otto von Guericke University Magdeburg. From 1995 to 2000 she was also Director of the Division of Company Organization at the Fraunhofer IFF in Magdeburg.
The sensitivity analysis from Vester is being employed to control complex systems, which has already proven itself in the education of cultural engineers, and the newly acquired software 4flow vista is being used to model supply chains.

In cooperation with the universities in Miskolc (Hungary) and Santa Clara (Cuba) a multilingual textbook is being compiled on the use of quality management methods in logistics. It should appear in 2005. One concern is adapting and practically applying the methods of quality management in logistics. This innovative field is an integral part of logistics process analysis for basic and advanced education.

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Dr. Peter Hochrainer studied materials sciences at Montan University Leoben in Austria. He acquired his first professional experience at Audi AG and Siemens AG. Since 2001 he has been a project manager for Siemens in-house consulting in Munich responsible for complex and international consulting projects in different fields of business of the Siemens AG. While working, he earned his doctorate under Prof. Michael Schenk from the Chair of Logistic Systems. His dissertation was on »Project Controlling to Improve the Implementation Quality of Industry Projects«. In 2004 he concluded his doctoral studies and defended his dissertation on the same day as Bufka. The result was a joint doctoral degree ceremony. Hochrainer’s conclusion: »I would especially like to point out Professor Schenk and Augustin’s excellent advising of my dissertation by critically discussing the content of my work, making constructive suggestions on elaborating thematic foci and providing new food for thought«. In addition, he stressed the outstanding organizational and scheduling support from the institute’s main office. He was excellently integrated in the doings at the Fraunhofer IFF and thus was able to establish and deepen contacts to industry and the university in Magdeburg.

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A high bay warehouse in the printing industry. RFID technology is perfect for warehouse organization.
RFID labels not only look good, they also make logistics processes more efficient and more transparent.
GALLERY
The IFF Smart Box is chock full of intelligent technology: It knows what it holds, it communicates with a control station, it can be located by GPS and it only opens for the right access authorization.
June 22 - 24, 2005
8th IFF Science Days 2005
The center of attention at the 8th IFF Science Days was an international conference entitled »Virtual Reality and Augmented Reality in Product Life Cycle Management and the Digital Factory«. The 8th IFF Science Days included additional events around other fields of Fraunhofer IFF research.

June 22, 2005
Wood Logistics
This workshop addressed actors and service providers’ demands on the utilization of spatial data in the forestry and wood processing industries and presented results from current research on and development of the optimization of the logistic chain in the forestry and wood processing industries.

June 23, 2005
RFID and Telematics in Logistics
This workshop addressed the optimization of the security, usability, acceptance and comfort of a logistician’s working environment. Experts discussed methods for measuring a logistician’s motion-oriented operations and possibilities for being able to utilize data acquired with the support of RFID and telematics.

For current information and the program visit: www.iff.fraunhofer.de.

November 24 - 25, 2005
11th Magdeburg Logistics Symposium:
Intelligent Logistics Processes: Concepts, Solutions, Experiences
The 11th Magdeburg Logistics Symposium is geared toward logisticians in research and the field who deal with the problems of integrating intelligent information and communications technologies in logistics processes from a technical and economic perspective and are interested in exchanging ideas about development trends, concepts, solutions and experiences during their implementation.

The following keynote lectures are planned for the opening of the symposium:

– Intelligent Joint Production and Its Challenges for Logistics: The Example of the Airbus A 380
– Identification: Toll and Road Pricing
– Localization in the Centimeter Range: The Galileo System

For current information on the symposium visit the website: www.magdeburger-logistiktagung.de

Other Events

September 14 - 21, 2005
EMO - International Machine Tool Trade Fair,
Hannover

October 10 - 11, 2005
Intertech 2005 - The International SME Business and Technology Partnering Event,
Magdeburg

October 11 - 13, 2005
7th Magdeburg Mechanical Engineering Days,
Magdeburg

October 11 - 15, 2005
CeMAT 2005 - The World’s Premiere Showplace for Intralogistics,
Hannover

October 13 - 14, 2005
5th MAHREG Innovation Forum,
Magdeburg

October 18 - 20, 2005
Fraunhofer Festival of Research,
Magdeburg

October 19 - 21, 2005
22th German Logistics Congress of the German Logistics Association BVL,
Berlin

October 26 - November 30, 2005
Guest Lecture Series
Virtual Reality: Humans and Machines in Interactive Dialog,
Fraunhofer IFF Magdeburg

November 8 - 9, 2005
6th Professional Conference on Factory Planning,
Ludwigsburg

November 8 - 9, 2005
10th IIR Production Congress – SYMPRO,
Hamburg
The Fraunhofer IFF and »One Stone« thank the Stadtsparkasse Magdeburg's youth foundation for their friendly support of the Jugend-Akademie.
Cargo hold of an Airbus Beluga. The Fraunhofer IFF outfitted the loading equipment with transponders.