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Innovative logistics – a triple helix approach

- Mats Johnsson

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Set up the research activity

- 20 companies with interest in innovative logistics for the future
  - ROI
- City of Helsingborg
- Lund University
- 25 researcher in the logistics field
  - Engineering logistics
  - Production Management
  - Packaging Logistics
- VINNOVA, sponsoring organization
  - Doctors and Licentiates
  - New products
  - Research excellence
  - Involved companies and organizations to initiate the reserach
  - Patented products
  - New companies, startups

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NGIL
Next Generation Innovative Logistics
VINN Excellence Center
At Lund University

Mats Johnsson
Managing Director

Packaging Logistics, Engineering Logistics,
Production Management

Innovative logistics

- ”I know that God will not give me anything I can´t handle. I just wish that He didn´t trust me so much.” (Mother Teresa)
- How can we go from unconscious incompetence to conscious competence regarding the academic and the industry world?
  - Academic and industry is the same
  - We think we know what is important for
  - We understand that there is a differnce
  - We know understand the differenceand we know how to act
- Think out of the box

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Results

- 16 projects initiated by companies
- Each project has to involve a minimum of two companies and two researchers from different disciplines
- Companies must be active in the project with cases, research activities, etc.
- We want company people to partly spend their time at the university. Also that researchers spend more time at companies working with them in the organisation
- Involve company people as project leaders.

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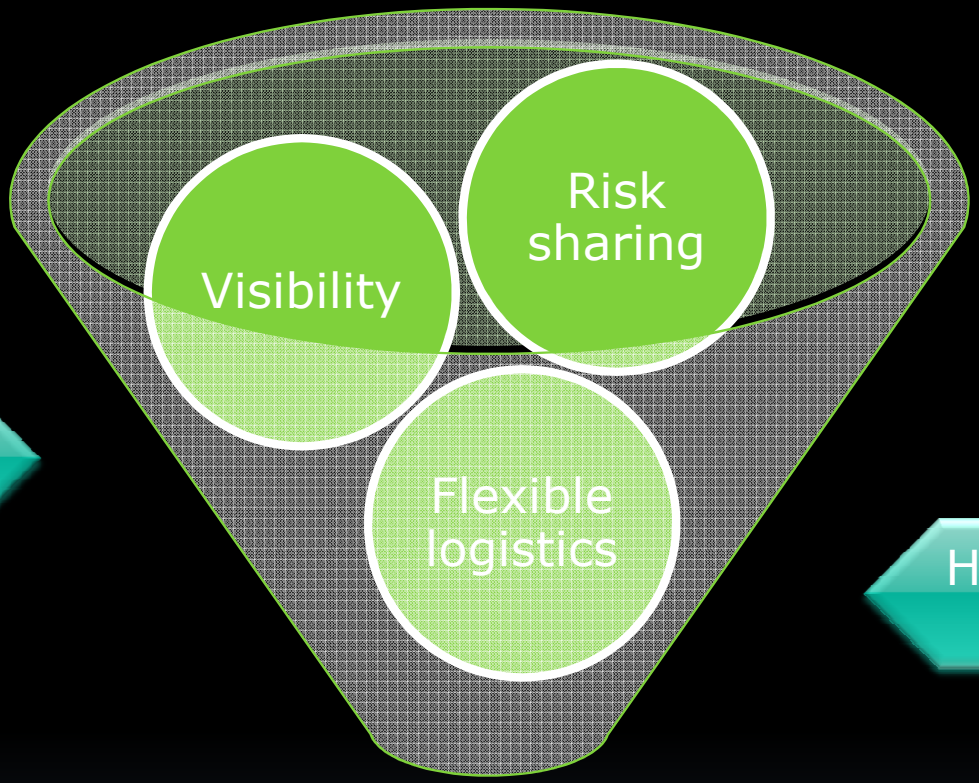
Focus areas



Traceability

Secure logistics

Humanitarian logistics

Research projects

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Typical results

- A method for measuring the food quality in the supply chain. Based on laser technique. Will be patented.
- New algorithms for planning and running warehouses, calculating safety levels
- How to use different techniques for better traceability of food products
- New protocol for RFID tag. Car industry
- New methods and models for analyzing logistics
- Evaluation of intermodal systems
- Systems for evaluating packages

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HUMLOG related activities

- Supply Chain Security and Visibility - Improving humanitarian supply networks for food and medicine
  - Marianne Jahre
    - SAAB Aerotech, Tetra Pak

By focusing on sourcing, procurement and distribution of development aid, this project search for methods of increasing the performance of humanitarian supply chains. Based on changes such as better preparedness, capacity building and coordination, the aim is to map, analyse and evaluate local and global chains for medicines and food with particular focus on the consequences for supplier relationships and use of IT-tools to increase supply chain visibility and security.

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HUMLOG related activities

- Innovative Packaging
  - Fredrik Nilsson
    - SCA Packaging, Tetra Pak, Apoteket

The purpose of this research project is to explore and increase the knowledge of packaging innovation processes in a supply chain context. The rational is that increased value can be enhanced for both supply chain actors and consumers if packaging innovation becomes an interoganisational issue. Innovations may affect cost in logistics, distribution, production; increase sales in improve value for customes, an affect positively to environmental issues.

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Innovative Packaging

The purpose of this research project is to explore and increase the knowledge of packaging innovation processes in a supply chain context. The rational is that increased value can be enhanced for both supply chain actors and consumers if packaging innovation becomes an interoganisational issue. Innovations may affect cost in logistics, distribution, production; increase sales in improve value for customes, an affect positively to environmental issues.

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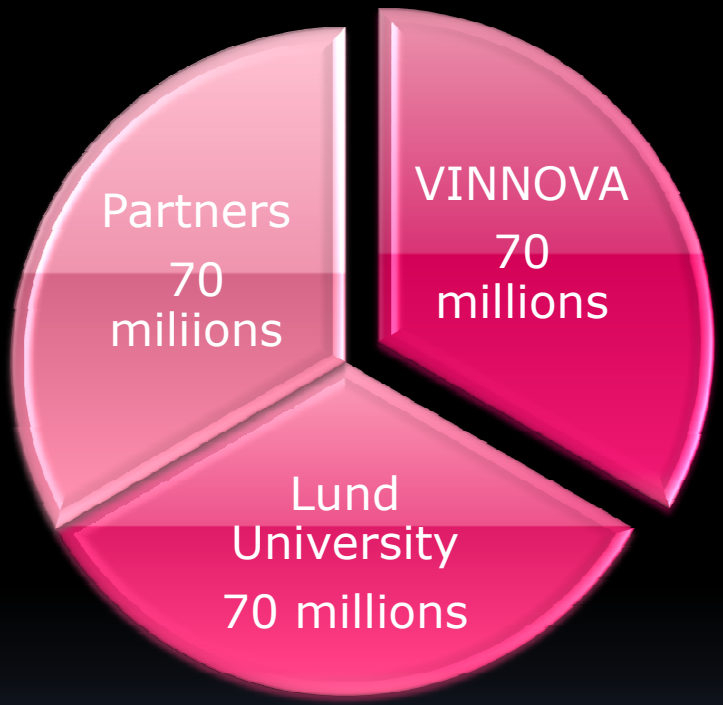
Resources
- to deliver research for 210 millions SEK over 10 years



Research must build research excellence

Research must be initiated by partners

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Competence cluster

Supply Chain integration

Cranfield University School of Management

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ATLANTA·LOGISTICS·INNOVATION·COUNCIL

Secure Logistics

VINNVÄXT
INNOVATION i Gränsland

Food and distribution for old people logistics, production and distribution

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VINNVÄXT
robot dalen

VINN EXCELLENCE CENTER iPack INDUSTRY UNIVERSITY INSTITUTE

Computing and wireless communications printed electronics

ZARAGOZA LOGISTICS CENTER

Visibility and risk

Inbound logistics, automatic order picking and palletizing

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- **Ongoing projects:**
- *Barriers and driving forces for increasing Supply Chain Visibility: Impact of business models and incentives*
- *SC 2025: Identify and analyze factors that are critical to the success of the supply chain 2025 from a northern Europe perspective*
- *Evaluation and use of extended information in integrated supply chains*
- *Alignment of Supply chain profit & risk sharing mechanisms with Supply chain structures & business models*
- *Risk sharing through supply chain traceability*
- *Using the Process concept, methods and tools to improve adaptability in supply chains;*
- *Partner in Marco Polo project*
- *100% Connectivity - potential impact of on-line solutions on Next Generation Supply/Demand Chain;*
- *Service-level differentiation*
- *Analysis of food quality with gas spectroscopy analysis*
- *Environmental Assessment of Innovative Logistics*
- *Demonstration of ISO 18000-6C tag usage for automotive data formats*
- *Packaging innovation - a supply chain issue*
- *Design and Control of Sustainable Supply Chains*

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Involved Resources

- **22 industry partners**
  - Building value chains – integration of the partners in the supply chain
- **3 academic partners (logistics)**
  - 35 researchers (seniors and PhD students are involved)
    - Engineering Logistics
    - Production Management
    - Packaging Logistics
- **2 academic partners (non logistics)**
  - Electro Engineering (RFID)
  - Physics (sensor technology for visibility)

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Status

- 14 ongoing research projects
- 19 research projects have been started since Jan 2006
- > 40 scientific articles and reports
- 12 workshops
- 11 seminars
- participation in > 60 conferences
- 7 PhD courses
- 2 project ideas that have potential for patents
- Innovative Logistics Award 2007 to Stora Enso
  - CDM controlled delamination material – less transport packaging material and better handling
- Innovative Logistics Award 2008 to IKEA
  - Loading ledge

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Examples of key issues to address:

- Reducing congestion
- Delivering improved information
- Track and trace
- Minimizing the environmental impact of transport
- Improving business efficiency and enhancing workforce productivity
- Risk management of the supply chain

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Partner organizations

- Alfa Laval
- ALRIFAI NUTISAL AB (556706-9264)
- Bioett AB (556583-9866),
- CeLIT (19 801104-3992),
- DSV (556045-6674),
- Ericsson (org no)
- Frigoscandia Distribution AB (556052-0263),
- Helsingborgs Hamn Aktiebolag (556024-0979),
- ICA Sweden AB (556582-1559),
- Lindab Aktiebolag (publ) (556068-2022),
- MA-System AB (556199-7494), in cooperation with PipeChain,
- MECA AB (556169-0412)
- Odette Sweden
- Region Skåne (232100-0255),
- RFID Constructors (org no)
- SAAB (Publ) (556036-0793)
- SonyEricsson
- Swedish Customs (202100-0969)
- Tetra Pak
- Trelleborg port AB (556008-2413) and
- UBQ AB
- Volvo Car Corporation (556074-3089) in cooperation with Volvo Logistics

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Innovative Logistics Award

- 2007
  - Stora Enso; CDM Controlled Delamination Material
- 2008
  - IKEA; Loading Ledge
- 2009
  - IT system for container handling at ports

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Broad seminars

Innovative Technologies for Innovative Logistics
NGIL seminar 28 March 2007

Photos: Helsingborgs Hamn AB, Anoto Group AB, VOLVO, Identec solution, TNT Freight, ACREO, Niclas Kindahl, Fotofabriken, Cypak AB

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Welcome to NGIL's seminar
Innovative Technologies for Innovative Logistics

The purpose of the seminar is for the companies to come together and learn about some current and emerging technologies that may enable logistics and get inspiration from some companies that have interesting new technologies.

Time: Wednesday 28 March, 0900-1600
Place: Enoch Thulin, IDEON Center, Betahuset, Scheelevägen 17, Lund

09.00 - 09.30	Coffee and Registration
09.30 - 09.45	Welcome. The purpose of the day and an introduction to Next Generation of Innovative Logistics, *Managing Director Mats Johnsson, NGIL*
09.45 - 10.45	*White paper - Technologies for capturing identity, status and location for real time visibility.* A report that presents relevant technologies from a logistic perspective. *Technical Director Olle Hydbom, Bioett*
10.45 - 11.15	*What is the status regarding RFID and its applications from a research perspective.* Some insights from the research front. *PhD-student Henrik Pålson, Packaging Logistics*
11.15 - 12.00	**CYPAK** presents *innovations that enable intelligent RFID technology, designed for secure and time stamped data capturing.* Their products increase data quality and support the overall IT-automation efforts in the development of new pharmaceuticals, enabling secure data flow from individual dosage to analysis databases. *Co-founder and VP Marketing Stina Ehrensvärd, CYPAK*
12.00 - 13.00	Lunch
13.00 - 13.30	**Anoto** shows how their pen can be used in applications to *secure the flow of information* and to eliminate the backlog of paper reports in logistic systems. *Developer Petter Ericson, Anoto Group*
13.30 - 14.00	**Acreo** presents how their printed electronic paper can be used to create *smart paper- and plastic packaging systems* to secure handling of food, pharmaceutical products and value documents, e.g. passports. *Manager Göran Gustafsson, Acreo*
14.00 - 14.15	Coffee and fruit
14.15 - 14.45	**Bioett** presents how its sensor can be used to analyse the supply chain and monitor the heat exposure to create transparency in the whole value chain. *R &D Director Ernst Wehtje, Bioett*
14.45 - 15.15	**RFID Constructors,** live demonstration of the new *information carrier, the RFID-tag*, for visibility in complex supply chains and for life cycle item identification. *Managing Director Niklas Hild, RFID Constructors*
15.15 - 15.45	**Secure Logistics**, live demonstration of its two technologies: TamperSeal™, a *wireless intrusion alarm* for all types of transport packages for detecting thieves and smugglers, and Luminiscent Nano Pigments™, *invisible ID marks,* which are hard to counterfeit and can be read through packages, for unique item identification or authentication of pharmaceutical and food products, animals, timber, steel parts, and packages. *Founder Sten Wandel Secure Logistics*
15.45 - 16.15	Discussion and final remarks

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INFORMATION ABOUT NGIL NEXT GENERATION INNOVATIVE LOGISTICS

Volume 3
August 2007

Mats Johnsson, Managing Director NGIL

Olle Hydbom, BIOETT & Stina Ehrenswärd, CYPAK

Ernst Wehtje, BIOETT

Sten Wandel, Secure Logistics

VINN Excellence Competence Centre

I would like to welcome you all back from a relaxing and not too rainy vacation. This autumn is very important for NGIL and its future. Projects initiated by NGIL are now starting to generate results.

NGIL will be evaluated on October 8. VINNOVA will be visiting Lund with an expert group. They will analyse what NGIL has achieved during the first 1½ years of its 10 year period. The focus will be on organisation and cooperation with companies. Next time, they will evaluate scientific results and if the projects have led to any new implementations at the participating partners or new patented products.

The first results from started and completed NGIL projects have now been delivered. So far, two reports have been mailed to all NGIL partners. Shortly, a white paper and a simulation study will also be distributed.

NGIL activities focus on three main areas: visibility, risk sharing and flexible logistics. We have had workshops in the first two areas and will have a third concerning flexible logistics on October 16. More information about this later. The results from completed projects and deliverables from ongoing projects will be presented and discussed later this autumn in seminars and workshops.

NGIL's Annual Meeting will take place on November 15 on the top floor of the Turning Torso. The keynote speakers will be from our Scientific Advisory Board. NGIL will also present the winner of its **INNOVATIVE LOGISTICS COMPANY 2007 AWARD** for the first time.

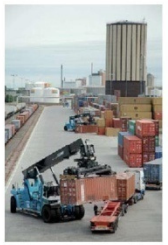
NGIL is not managing any educational projects but the Centre is involved in master theses and courses at LTH. We are glad to announce that two new logistics education activities have started at CAMPUS, Helsingborg: *IT and Logistics* and *Logistics Service Management*. You will be reading more about these in later newsletters.

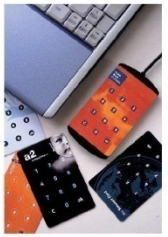
Mats Johnsson, Managing Director

Reflections from the Workshop on Innovative Technologies for Innovative Logistics

More then 50 people attended the Innovative Technology for Innovative Logistics Workshop held on April 28. Those attending had the opportunity to listen to several interesting and entertaining presentations by representatives from ANOTO, CYPAC, ACREO, BIOETT, Secure Logistics and RFID Constructors. The speakers elaborated on how their technologies can be used in different logistics applications. Olle Hydbom from BIOETT gave an overview of the state of the art for different technologies and Henrik Pålsson from LTH discussed what is needed from a research point of view. Olle Hydbom's presentation and work will soon be available in a white paper that will be distributed to all participants and NGIL partners. This report is also related to the VISITEC project that you can read more about under "ongoing research activities". The presentation generated several interesting discussions during the day. From a NGIL perspective we are happy to conclude that this type of eye-opener event is an important part of NGIL's responsibility as a competence centre. If you have areas or topics you think should be covered, do not hesitate to contact us.

Read more about NGIL at www.NGIL.se





Ongoing research activities

After the Innovative Technologies for Innovative Logistics Workshop on April 28, the projects presented below were selected for funding by the NGIL Board. Research is now in progress in these areas and you are welcome to contact the person responsible if you are interested in participating or if you would like to follow the progress of the projects. The project *Using the Process Concept, Methods and Tools to Improve Adaptability in Supply Chains* has been approved but not yet started. You can read more about the projects on the NGIL web site: **www.NGIL.se**

Real Time Visibility Techniques Study (VISITEC)

To know when, where and what in a supply chain is extremely important in modern logistics in order to optimise supply chain management. Different techniques and infrastructures that support this type of information flow exist. New and innovative technologies for automatically registering ID, position and status of an object are a prerequisite for innovative logistics. This includes both global targeting such as tracking containers on a ship or train, or local solutions such as finding single items in a warehouse or in a retail store. Today there are a variety of systems developed to solve such problems using different techniques for different problems. In the next generation of logistics there could be more generic solutions, or better integrated and improved versions of current ones, to obtain real time visibility on both a global and local scale of all material, products, packages, load units, vehicles, equipment, and in some cases, even people and animals.

The purpose of the project is to conduct a comprehensive survey of technologies for managing identification, authentication, location and status reporting of goods, packaging, load units and other assets in a logistics chain, in real time. The project will survey how these technologies are applied to the product or package, verified, read, and how the information is transmitted to the control centre.

Project leader: Sten Wandel

100% Connectivity: Potential Impact of Online Solutions on Next Generation Supply/Demand Chain

In the world today the wheels of communication spin ever faster and our lives are more and more connected. Mobile phones, laptops, WiFi solutions and PDAs make it possible for us to be virtually always on-line. But to what use? Are these solutions transferrable to business solutions in general and supply/demand chain solutions in particular?

One general hypothesis is that having 100% connectivity could result in the establishment of a pipeline for electronic collaboration. Once a pipeline is created for basic transactions, it could be expanded to increase the supply chain visibility by sharing critical planning and status information. This information could include sales activity, forecasts, inventory positions, work-in-process and the status of shipments.

However, to reap the potential benefits of innovative technology and applications, companies need to put the different technology pieces together to make up a coherent portfolio strategy of how to use connectivity enablers to increase the effectiveness of their supply/demand chain. Companies most likely will have to take a portfolio strategy to connectivity.

Examples of project aims are to conceptualise flexible logistics programmes and information connectivity as two important aspects of logistics flexibility, and to examine the role of information connectivity in making flexible logistics programmes successful.

Project leader: Daniel Hellström

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Portal for innovative logistics research

VINNOVA

Conferences, projects, books, journals, etc.

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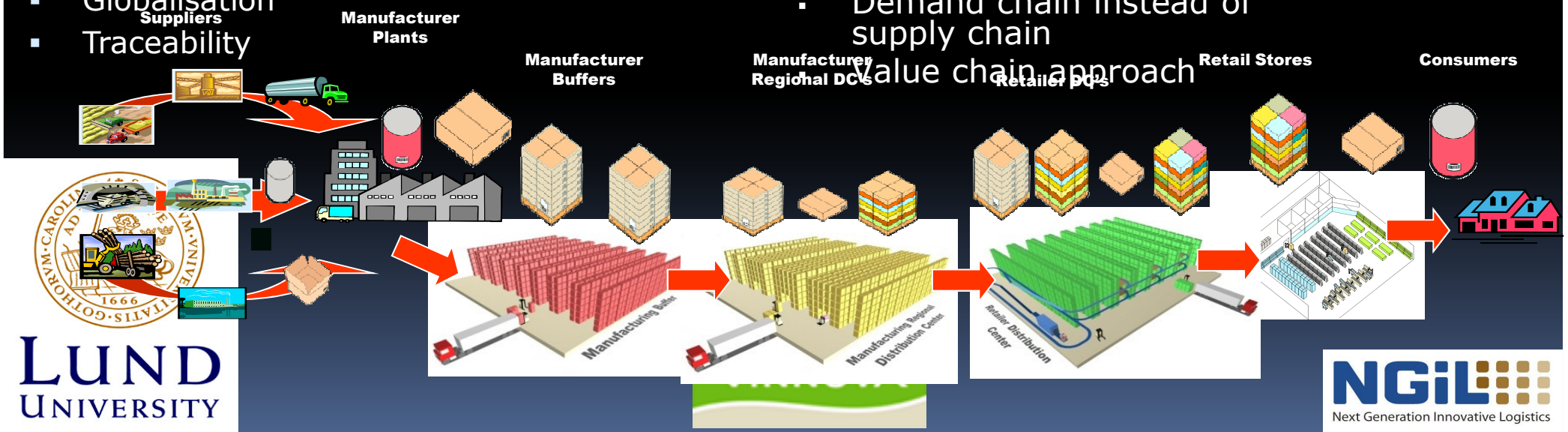
For more information

- www.NGIL.se
- Thanks

Driving forces

- New materials
- New products
- New markets
- Better Information Technology
- Faster distribution flows
- Environmental requirements
- New customer needs
- Globalisation
- Traceability

- Decentralisation/Centralisation
- Smaller batches
- Shorter lead-times
- Less suppliers
- Customer oriented production
- Deliveries in sequences
- Time windows are hours
- Demand chain instead of supply chain
- Value chain approach



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By focusing on sourcing, procurement and distribution of development aid, this project search for methods of increasing the performance of humanitarian supply chains. Based on changes such as better preparedness, capacity building and coordination, the aim is to map, analyse and evaluate local and global chains for medicines and food with particular focus on the consequences for supplier relationships and use of IT-tools to increase supply chain visibility and security.

3 cases Unicef, 1 in SAT in project. More case studies will be undertaken by master students in Saab, Unicef and Tetra Pak.

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Project process (old)

2 weeks

2 weeks

Proposal from researcher, two companies, two academic divisions

Programme committe analyse and write a recommendation to the board on each project

Board of directors decide what projects to finance based on recommendations

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Project process (new)

Based on decided areas of excellence, research clusters

Board of directors discuss with programme committe and steering group

Write a call based on partner need and research excellence focus

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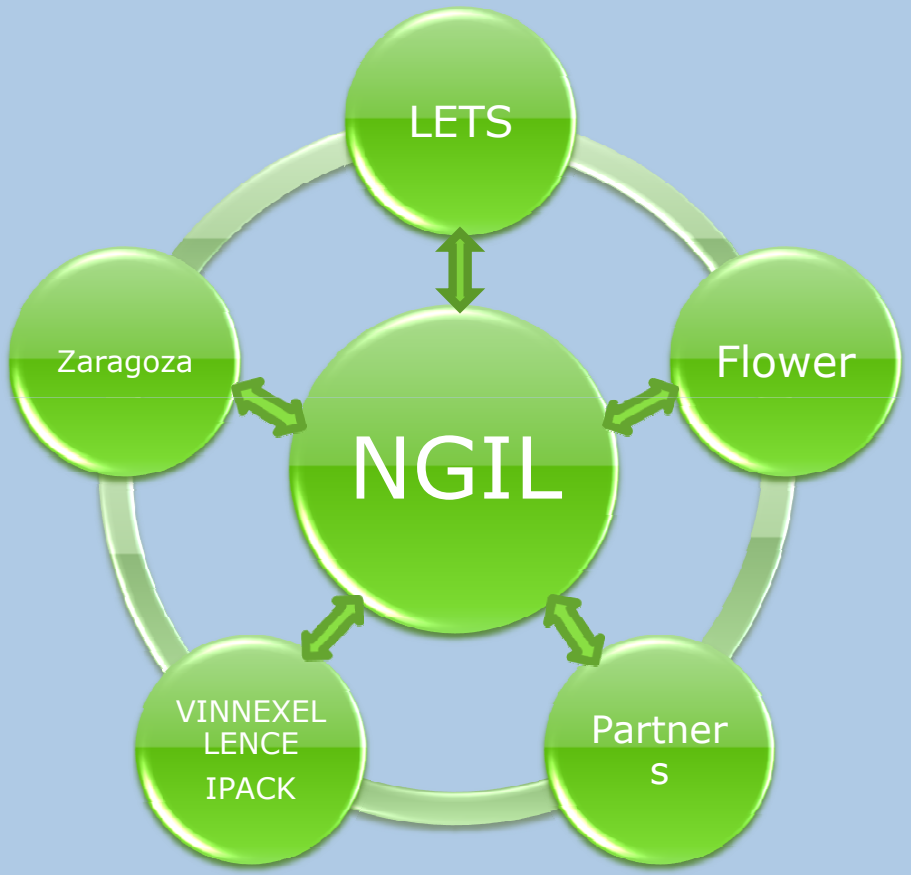

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Potential NGIL activities

- Newsletters
- Study visits
- Explorative Master Thesis
- Company driven short studies
- Cross company projects

- Broad seminars
- Focused workshops
- Round tables
- Academic conferences

- Academic driven studies
- Visiting Industry Research Associates
- Industry PhD students

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Board of Directors

- Pro-rector, Professor Ulla Holst, Deans office, LTH
- Magnus Renman, SCA Packaging
- Sten Åke Tjärnlund, Alrifai Nutisal1
- Urban Bjöörn, Volvo Car Cooperation (Chairman of the board)
- Tommy Paulsson, Frigoscandia Distribution
- Jan Ahlström, Sony Ericsson
- Åke Skarstam, Alfa Laval
- Patrik Rydén, Øresund Logistics2
- Sven-Erik Andersson, UBQ3
- Professor Gunilla Jönson, Packaging Logistics, LTH
- Professor Marianne Jahre, Engineering Logistics, LTH
- Professor Sven Axsäter, Production Management, LTH
- ProfessorBengt Wesslen, CAP Centrum för amfifila Polymerer4, LTH

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Programme committee

- Tommy Paulsson, Frigoscandia Distribution (chairman)
- Mats Boll, Volvo Logistics
- Peter Jönson, ICA Sverige
- Ernst Wehtje, Bioett
- Annika Olsson, Packaging Logistics
- Johan Marklund, Production Management
- Everth Larsson, Engineering Logistics
- Patrik Jonsson, Chalmers, (external member)
- Fredrik Larsson, Establish, (external member)

- NGIL, Stefan Sjöholm secretary
- NGIL, Mats Johnsson, adjunct

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Welcome to NGIL Workshop on Flexible Logistics
- making logistics operations more flexible and adaptive through simulations

With increasing complexity in supply networks, managing logistics operations will place new demands on logistics management. This means that 1) new approaches are needed for managers to manage logistics processes and 2) new methods and models to deal with logistics operations and activities in a more effective way are needed. This raises important questions, such as:

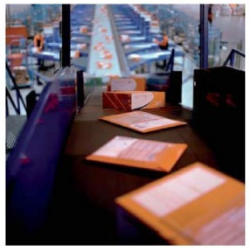
•What type of approaches and methods can help logistics decision-makers in generating increased strategic as well as operational flexibility and adaptivity?

•In addition, what types of approaches, methods and tools can be used to deal with unscheduled dynamic events and changes?

We will address these issues with the concept of adaptive logistics and with the use of simulation as a method and tool to deal with tomorrow's logistics issues and problems.

The purpose of the workshop is for the partners in NGIL to identify interesting research questions and potential projects in the area of flexible and adaptive logistics. To provide a basis for the discussion, the first part of the day will be devoted to presentations from companies and researchers involved in previous projects, sharing their conclusions and what they perceive to be the future challenges. After lunch there will be group discussions on how these questions can be approached in future research projects. The morning session of the workshop is open for all who are invited, while the afternoon session is for NGIL partners only.

When: 16 October 2007
Where: Örenäs castle, outside Lund (Attached is a "How to get there").




Focused Workshops

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Programme:

09.00 – 09.30 Coffee and Registration
09.30 – 09.50 Introduction Mats Johnsson and Fredrik Nilsson
09.50 – 10.15 Adaptive logistics - a new business logic for logistics
and Report from pre-study. Fredrik Nilsson, Packaging Logistics
10.15 – 10.30 Break and refreshments
10.30 – 11.15 Complexity approaches on operations and logistics problems
Vince Darley, Eurobios, London
11.15 – 12.00 Demand Capacity Planning
Håkan Jöne
12.00 – 12.30 Modeling and simulation of supply chain inventories – experiences and results from ongoing NGIL project with Volvo Parts. Johan Marklund,
12.30 – 13.15 Lunch
13.15 – 13.30 Status of NGIL and what is a NGIL project like? How does the application process work? Mats Johnsson, Management Director NGIL
13.30 – 13.40 Workshop start up, Jonas Karlsson (Örenäs castle, workshop rooms)
13.40 – 14.40 Group discussions to identify issues for different kind of projects.
15.00 – 15.15 Coffee
15.15 – 16.00 Presentation and discussion of potential research projects

Registration: send an e-mail to Jonas Karlsson, jonas.karlsson@plog.lth.se before October 5.

Welcome!
Fredrik Nilsson and
the NGIL Management Group




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Visibility areas

- The accessibility of relevant information for supply chain and logistics decisions. What are the primarily restrictions based on the willingness to integrate systems and share information across organizational structures.
- Closely related to this problem is the level of centralization versus decentralization of the decision making process. What type of technology?
- It is crucial to figure out how the available information should be used, that is, what is the relevant information needed for efficient control.

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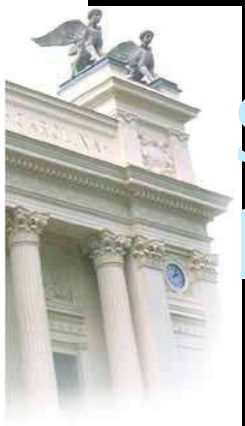

Supply Chain Risk Management and Risk Sharing areas

- The 'logistics' unit of analysis, where the more business functions or companies along the supply chain that are focused, the more complex the problems will be.
- The type of risk/uncertainty (e.g. operational accidents, operational catastrophes, and more strategic uncertainties) that could differ in nature and, consequently, may not be treated together or in the same study or managerial approach
- Issues could be how investments should be shared when changing logistics and supply chain structures (organizational or physical), jointly investing in supply chain capacity, or implementing new interorganizational concepts (like Vendor Managed Inventory, Collaborative Planning, and Forecasting & Replenishment).

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Flexible logistics areas

- Unscheduled dynamics – resource breakdowns, markets move, accidents happen, customer demand changes, etc.
- The optimal solution may be very brittle and sensitive to changes in the context
- Many organizations interacting with different information and different goals, i.e. a firm is exposed to the whims of external players
- What new methods and tools can be used to deal with unscheduled dynamics, everyday changes and co-ordination? Additionally, what novel approaches can support and help decision-makers in finding the most leverage in their improvement efforts?

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Engieering Logistics

- Supply chain risk management – assessment, mitigation and risk sharing
- Process based business development
- Customer driven logistics innovation
- Performance measurement – process, company, supply chain, region and nation
- Visibility and security – to counter deviations, thefts, counterfeit and terrorism
- Vendor managed inventory
- Distribution – distribution centres, main gates and environmental impact
- Procurement and supplier relations – e-business
- Logistics in the telecom and the construction industry

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Production Management

- Models for evaluating deterministic and stochastic multi-level production-inventory systems.
- Design and evaluation of control policies for replenishment and allocation of inventories in supply chains, subject to different assumptions of information availability.
- Inventory control/multi-echelon theory – Methods for determining safety stocks and lot sizes.
- Evaluation and design of centralized and decentralized planning and control systems.
- Evaluation and design of lateral transhipment policies in inventory systems.

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Packaging logistics

- Design of a product, its package and packing, as well as the adaptation and control of the distribution system and the administrative and information systems associated with the processes throughout the entire chain from raw product, via various processing stages, to the distribution to the end user, and on to recycling and recovery.
- Packaging logistics can also contribute to modern product development and design, by ensuring that products are designed so that they can be distributed with a minimum use of resources from production to consumption.
- Supply chain visibility and adaptive logistics are, and have been, important research areas since packaging identification technologies, such as RFID, are seen as enablers for visibility and adaptive logistics systems.

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