



# Swedish Quality Management Academy

Quality & Environmental Management at Luleå University of Technology

# Luleå University of Technology

- Improvement work
  - Health care
  - Lean
  - Six Sigma
- Process management
- Process industry
  - Statistical methods
  - Project management
  - Experiments
  - Traceability
- Maintenance/functional product
- **Projects in progress**
- *Lean SMEs*
- *Traceability in Continuous Processes*
- *Capability Measurements for Autocorrelated Data*
- **Partners**
- LKAB, SSAB, Västerbotten Municipality Council, SAAB Aerospace, Billerud, KI
- **Researchers involved**
- Bjarne Bergquist, Professor: [bjarne\\_b@ltu.se](mailto:bjarne_b@ltu.se)
- Rickard Garvare, Docent, Senior lecturer, [rickard.garvare@ltu.se](mailto:rickard.garvare@ltu.se)
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- Jan Block, PhD Candidate, [jan.block@saabgroup.com](mailto:jan.block@saabgroup.com)
- Peter Johansson, PhD Candidate

# Bjarne Bergquist

- **Research interest**
  - Statistical methods for Quality Improvements (DoE, SPC)
  - Six Sigma, Lean
  - 3rd Gen. Quality Management
- **Objective**
  - The objective of my research is to improve methods for knowledge creation based on process data, to describe and evaluate effects of applying improvement methods, to revitalize the quality management concept
- **Background**
  - Extraordinary successes of Quality Management implementations as well as frequent failures means either that Quality Management is not a panacea or that many have difficulty in applying it correctly.
- **Case studies at hand**
  - LKAB
  - Lindbäcks Bygg AB
  - BoxModul AB



- **Academic relevance**
  - The Quality Management field has been criticized for lacking credibility and lacking theoretical foundation, and there is an unfortunate lack of empiric evidence to support many claims. It is of utmost importance for the field as a whole that we continuously improve and discard methods, tools, and norms that do not lead to the goal of the organizations, e.g. sustainability and fulfillment of stakeholder goals.
- **Industrial relevance**
  - The projects I work with are all in cooperation with industry. Other research activities (e.g. stakeholder management) are also in progress driven by own curiosity, but those are sponsored by university funds.
- **Projects in progress**
  - Traceability in Continuous Processes
  - Statistical tools for Continuous Processes
  - Production Based Logistics (Maintenance)
  - Lean Six Sigma in SMEs
- **Partners**
  - LKAB, Lindbäcks Bygg, BoxModul. SAAB Aerospace, Billerud, SSAB,
- **Expected results**
  - Increased use of quality improvement methods and increased focus on quality as a strategic imperative for the organization.
- **Researcher**
  - Bjarne Bergquist
  - Professor
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# Johan Sandström

## Research interests

- Ethics, sustainability and management control
- Stakeholder theory and globalization

## Objective

- To increase our understanding of how organizations work with sustainability-related problems and of how they can become a more active part in solving them.

## Background

- The neglect of globalization, ethics and sustainability in the fields of organization and management, especially of how organizations work with these issues in practice

## Case studies at hand

- A handful of large multinational corporations (particularly their Swedish subsidiaries)

## Academic and industrial relevance

- More empirically grounded studies on how organizations' work with sustainability-related issues

## Projects in progress

- Internal consequences of sustainability reporting
- Stakeholder theory and globalization: consequences in terms of power and responsibility
- Dirty work and stigmatized organizations

## Partners

- Umeå University, Uppsala University, Örebro University, University of Tasmania (Australia)

## Expected results

- Better understanding of what happens when sustainability-related issues travel into organizations and how these processes can be made to work more effectively in terms of solving sustainability-related problems

## Johan Sandström, PhD, associate professor

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# Peter Söderholm

## Research interests

- Risk management and dependability management, mainly related to transports and their infrastructure

## Objective

- To contribute with knowledge about how integrated risk management can support decision makers to make informed choices, prioritize actions and distinguish among alternative courses of action

## Background

- Risk management is necessary to deal with uncertainties whether and when organizations will achieve their objectives
- However, there is a scattered practice of risk management since it has been developed over time and within many sectors in order to meet diverse needs
- Hence, it is necessary to integrate the scattered risk management practice to be more effective and efficient

## Case studies at hand

- Trafikverket (Swedish Transport Administration)

## Academic and industrial relevance

- Increased criticality of infrastructure to ensure socio-economically viable, efficient and sustainable transportation for citizens as well as for trade and industry
- Increased need of risk-based decision making to deal with uncertainties related to transports and their infrastructure

## Projects in progress

- Risk management related to management by rules, performance and mission
- Enterprise risk management and internal control
- Integration of incident, accident, continuity and crisis management

## Partners

- Trafikverket (Swedish Transport Administration)

## Expected results

- Standards, guides, procedures and codes of practice for integrated risk management

## Peter Söderholm, PhD, associate professor

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# Rickard Garvare

## Research interests

- Diffusion, dissemination and Implementation of quality management concepts in organizations
- Stakeholder theory and 3<sup>rd</sup> generation quality management
- Statistical methods for quality improvement

## Objective

- To contribute to bridging the gap between what is known and what is done in terms of quality management

## Background

- The general lack of theory in the field of quality management
- The fundamental problem of effectively transforming evidence based and formalized knowledge into established practice within organizations merits further investigation

## Case studies at hand

- Västerbotten County Council (2 studies)
- Jämtland County Council
- Sörmland County Council

## Academic and industrial relevance

- There is a need for empirically sound theory within the field of quality management
- Understanding key aspects of successful spread of concepts within organizations is highly important to many industries

## Projects in progress

- Towards sustained learning and innovation in health service: Studies of the Memeologen improvement approach
- National guidelines for health promotion: The challenge of going from evidence to clinical practice
- New ways for innovative development of health and social services
- Learning and cooperation when implementing ICDP in the Umeå region

## Partners

- Karolinska Institutet, Umeå University and Västerbotten County Council

## Expected results

- Improved understanding of learning, i.e. how knowledge becomes workplace practice and how locally established best practice becomes widespread and recognized knowledge

## Rickard Garvare, PhD, associate professor

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# Raine Isaksson

## Research interest

- Synergies of TQM and Sustainable Development
- How to measure Sustainable Development and Sustainability?
- Sustainable Cement Production
- Sustainable building material supply chains in Third World countries

## Objectives

- The main objective is to understand how to improve effectively and efficiently in order to make best use of resources
- Another objective is to use process based system models as part of benchmark improvement

## Background

- Costs for poor quality still are high in most branches
- A branch, like the building industry, with limited competition has generally higher potential for improvement
- Building supply chains generally and those in developing countries particularly hold significant improvement potential

## Case studies at hand

- Block making in Dar es Salaam, Tanzania
- Company wide improvement in Sokoto, Nigeria
- How Sustainable Development is dealt with by Swedish Universities

## Academic and industrial relevance

- Improving customer and supplier value produced compared to costs and carbon emissions

## Projects in progress

- The cement based building material supply chain in Dar es Salaam
- From windmills to wind power - identifying success factors and barriers to change - multi-disciplinary project studying the evolution of wind power in Gotland

## Partners

- Tanzania Portland Cement Company
- Cement Company of Northern Nigeria

## Expected results

- Improved results for stakeholders involved
- Improved models for and understanding of effective and efficient change

## Raine Isaksson

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Process and Management consultant Isaksson & Isaksson



# Erik Vanhatalo

## Research interest

- Design of Experiments in process industry.
- Statistical methods for quality improvement, including statistical process control, multivariate methods and time series analysis.
- Traceability in continuous processes

## Objective

- To improve methods for industrial experimentation, process analysis, and traceability with a focus on the process industry sector.

## Background

- Process industries often run large-scale, complex continuous processes around the clock. These processes exhibit special issues such as process dynamics, reflux flows, multivariate response space and costly experimentation. These and other issues impede the use of statistical tools in the sector.

## Case studies at hand

- LKAB Experimental Blast Furnace (EBF).

## Academic and industrial relevance

- The research aims to develop already existing statistical tools (both theoretically and applied) to better fit the needs of the process industrial sector. The research is run in close collaboration with industry.
- The contribution is to both the field of quality technology and applied statistics.

## Projects in progress

- Statistical tools for continuous processes
- Traceability in continuous processes

## Partners

- LKAB, SSAB, Billerud
- Promote (at LTU)

## Expected results

- New and improved methods for experimentation and process analysis that help to increase the use of statistical quality improvement tools in industry.

## Erik Vanhatalo, PhD

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# Fredrik Backlund

## Research interest

- Asset management
- Reliability management
- Project and process management

## Objective

- The objective of my research is to explore and improve the use of (physical) asset management, AM, specific in basic production industries.
- Continuous improvements within project management and processes is another research scope.

## Background , Academic and industrial relevance

- AM is widely used in industry and has been of interest within the research society for a long time. However, the concept is still diffuse and improved understanding is necessary for an efficient and effective use of AM.
- Many projects are failing, even though a great amount of documented experiences and guidelines are available. Continuous improvements in project processes seems to be lacking.

## Case studies at hand

- LKAB
- Vattenfall

## Projects in progress

- Asset management – A stakeholder perspective, in collaboration with Vattenfall
- Continuous improvements in project management, in collaboration with LKAB

## Expected results

- Improved understanding and better use of the AM-concept, i.e. more efficient and effective use.
- Improved understanding and better use of continuous improvements in project management.



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# Helena Ranängen, PhD- student

## Research interest

- Environmental Management and Corporate Social Responsibility.

## Objective

- The research objective is to explore corporations' integrated CSR practice, what and how corporations practice CSR in order to inspire and support the CSR practice in other organizations and industries.

## Background

- Today is CSR a topic in every country around the world even if the importance attached to it may differ in each country. The different needs lead to different approaches in the developing versus developed countries. National differences, for example the power of the state or the education and labour systems, also contribute to the different approaches of CSR.
- Scholars have identified the industries that utilize natural resources, such as mining and crude oil and forestry, to be in the fore front in practicing CSR. This is very interesting from a Swedish perspective since Sweden has a lot of resource-based industries and the research of the CSR practice from a Swedish perspective in these industries are limited.
- Much of the existing literature within the subject CSR practice is focusing on the philanthropic activities of large companies and very little is about the integration and implementation of social responsibility in the corporate business.

## Partner

## Research project

## Expected results

- Improved understanding for how corporations practice their social responsibility in the industries that utilize natural resources, such as mining and crude oil and forestry.



**Helena Ranängen**  
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# Martin Holmbom, PhD-student

## Research interest

- Performance-based logistics and strategies for enhanced lifecycle management of aircraft fleets.

## Objective

- To contribute to the knowledge of performance-based logistics and how it is implemented in aircraft industry and also to develop methods and tools for lifecycle management of aircraft fleets.

## Background

- Performance contracting for advanced technical systems has become increasingly common in recent years. Performance contracting implies that a supplier of support services offers a specified performance level to a fixed price. Due to that a new business model known as performance-based logistics has emerged. Performance-based logistics is today a well known concept within defence and aviation industries around the world.

For an aircraft support provider the transition to performance-based logistics put new demands on the organisation. For example, the ability to deliver high performance over time requires skills and knowledge in lifecycle management and how to handle aircraft modifications.

## Partner

- SAAB Support and Services

## Research project

- Enhanced Life Cycle Assessment for Performance-based Logistics

## Expected results

- Improved understanding of contracting for performance.
- Methods and tools for parallel phase-out and phase-in of different versions of aircraft, rotables and support equipment.



**Martin Holmbom**  
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# Peder Lundkvist, PhD-student

## Research interest

- Statistical Tools and Methods for Quality Improvements in Continuously Processes (DoE, SPC).

## Objective

- Contributions to the Use of Designed Experiments and Capability Indices in Continuous Processes.

## Background

- Experiments are vital tools for process and product improvements and innovations in industry. When conducting experiments we send disturbances into a system and monitor the system reactions. In this way we may tie our changes in factor level(s)  $x$  to a possible change in the response(s)  $y$ . When the system complexity increases and when it is hard to delimit and measure properties of both  $x(s)$  and  $y(s)$ , the complexity of the experiment also increases. Special complications for performing experiments occur when experimenting in continuous production processes, frequently found in process industry.
- Since experiments are costly, it is useful to maximize the information output while at the same time minimize the resources for producing this information. Hence, it is important to examine where improvements (new experiments) are needed. One way to compare different processes is by formally assessing process capability, the process' ability to perform within specific limits, by using process capability indices. However, process industry data is often highly autocorrelated, which affects the validity of the process capability.

## Case studies at hand

- SSAB, LKAB and Billerud.

## Research projects

- The overall purpose of this research is to contribute to the field of designed experiments and process capability indices in continuous processes, where the main issues are autocorrelated processes and non-independent variables. This purpose has been divided into the following three aims:
  1. Explore, identify, describe and suggest solutions to potential problems that can occur when planning, conducting and analyzing full-scale experiments in continuous processes,
  2. Develop different approaches for the use of capability indices in continuous processes, and
  3. Explore, identify and describe the use of process capability indices together with design of experiments in continuous processes.

## Expected results

- Develop and Evaluate Statistical Tools and Methods for Quality Improvements in Continuously Processes.



**Peder Lundkvist**  
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# Thomas Zobel

## Research interests

- Implementation of voluntary commitments towards sustainable development in organizations
- Organizational and environmental effects of voluntary environmental concepts and tools
- Sustainability issues in tourism - Ecotourism

## Objective

- To contribute to the knowledge concerning how organizations can integrate sustainability issues into their strategy and everyday work and how they can more actively contribute to sustainable development

## Background

- The general lack of proactive response by organizations concerning environmental problems and other sustainability issues
- The problem to go from strategy and visions to working with sustainability in practice

## Case studies at hand

- None at the moment

## Academic and industrial relevance

- The need for empirical studies on how organizations work with sustainability issues in practice
- The need for studies based on more objective quantitative data focusing on effects on voluntary commitments towards sustainable development in organizations

## Projects in progress

- Environmental effects and organizational experiences of environmental management systems
- Implementation of corporate social responsibility in the mining industry
- Go Eco! Environmental services for SMEs

## Partners

- Centek AB, regional development agencies I six European countries

## Expected results

- Improved understanding of how sustainability issues can be integrated into organizational strategy and everyday work and how these processes can contribute to sustainable development

## Thomas Zobel, PhD, assistant professor

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