Harnessing AI for innovation – building new spearheads in Ostrobothnia

The results presented below are based on:

- Ideas and input generated during the workshop "Harnessing AI for Innovation" held 20.5.2025, involving 48 participants
- Semi-structured interviews conducted with 41 company representatives from Ostrobothnia's manufacturing industry. Main sectors included: Food, metal, plastic products manufacturing, energy production, ICT and automation, transportation, electric motors.

Applying advanced digital solutions, data-driven value creation, and artificial intelligence (AI) is essential for progressing key spearhead sectors in the region—including advanced automation, energy technology, and the circular, carbon-neutral economy.

Understanding *where* and *how* to apply AI—and equally, where not to—is recognized as a critical development priority for boosting the competitiveness of the region's manufacturing industry.

In summary, the results indicate a demand for:

- Practical AI tools

- Well-defined business cases

- Regionally supported collaboration models

To meet this need, a wide range of development initiatives must be undertaken. There is a clear opportunity for:

- Regional RDI investments in AI deployment and governance readiness

- Upskilling efforts targeting leadership, operational roles, and hands-on AI applications

- Establishing shared infrastructure and data ecosystems to reduce barriers to AI scalability

The first section addresses five categories of bottlenecks to be jointly solved. These categories of bottlenecks can serve as a framework for guiding the planning and execution of future development projects.

AI-related bottlenecks and challenges to be jointly solved in Ostrobothnia:

1. **Data fragmentation, security, and quality issues** are currently hindering AI deployment and the development of use cases. Data related challenges include e.g.:
   - Determining and achieving data reliability, data quality/cleanness/organization, data validation, data traceability. That is, existing data is not AI-ready. Also, data is existing in silos which hinders companies from becoming truly data-driven internally. Need for planning and investing in smart data-architectures to advance the application of AI.
   - Data management and security
   - Lack of open data, open interfaces
   - Sharing data between organizations and inter-operability, data flow and getting information to move faster from one place to another

- o Digital IT maturity and lack of data in companies due to for example old systems, technology and machine park)
- o Skills in data interpretation and handling huge amounts of data

2. **Upskilling and lack of skilled people, skills gaps**
   - o Getting companies to work with Data and AI literacy ("the ability to read and write") at different organization levels is key for identifying opportunities for development and understanding where AI can be a good solution to adopt. Make sure that AI does not become siloed.
   - o Industry – university - education collaboration:
     - ▪ Matching education to industry needs, linking studies and work circumstances better, need for more thesis workers
     - ▪ Applied education with hands-on-projects, get students to work on real solutions and cases, AI courses with application to use cases, using student observations from summer training to process and product development
     - ▪ Training programs for re-skilling
     - ▪ Companies to support education on AI deployment and integration into workflows
     - ▪ Collaboration between vocational education and training & universities on AI deployment and integration into workflows
     - ▪ Organisation of Hackthons and sprints
   - o Include AI more broadly in educational courses and topics to increase students' understanding of its multidisciplinary nature and create cross-disciplinary skills
   - o Lack of AI-mentoring initiatives
   - o Need for skilled people in software engineering, programming, smart data architectures, modelling, simulation, development of digital twins
   - o Need for cutting-edge expertise in the application of AI to industrial processes or energy markets (i.e. broader skills than programming or AI)
     - ▪ *"You need to know the core process (to which AI is applied) more than ever. The IT coder will for sure be found as long as we genuinely know what the role of applying AI will be. What is optimized? What are the market conditions?" The electricity market or energy market is highly complex. There are dynamic effects. And to be able to even discuss it credibly requires experience and vision*.**"**
   - o Need for expertise and education in ML Ops (Machine learning operations)
   - o Keeping up with a fast development of AI tools and opportunities

3. **Unclear business case, difficulties in scaling beyond pilots, unclear logic for data-driven value creation**
   - o Lack of understanding of user/customer needs: "*What kind of data would customers really want to pay for? What's the added value?*"
   - o Difficulties in profitability, ROI and finding the business models
   - o Research and industry are disconnected
   - o Skills in scaling solutions to the market
   - o Large knowledge gap between pilots and real deployment and profitability

4. **Digital divide within the supply chain & in SMEs** in terms of competence, resources and investments

    o Increase interoperability and interconnection of machines, systems and data between companies' production processes in the supply chain

    o Basic AI readiness (from data to mindset and digital maturity) – Getting SMEs to the same level of understanding and tools used for example in design, product development, modelling, simulation: "*When we go further in digitalization [...] SMEs/subcontractors need to be prepared to do things differently, to process that information with different tools and this way the overall process is more efficient*"

    o Many SMEs have no clue where to start/large differences among SMEs' understanding and analyses of how AI will affect the industry and the specific business: "*Artificial intelligence will change industrial manufacturing enormously. It's such a big thing, it changes so much that we can't understand it.*"

    o Lack of strategic understanding of AI, not just technically, but also at leadership level. I.e. Strategic AI leadership and business coaching should be strengthened in companies

    o Need for focus on AI deployment, integration into operations. E.g. practical use & implementation at factory floor

5. *Siloed ecosystem(s), lack of shared infrastructure and collaboration platforms on AI, lack of ecosystem support*
    o New working models for AI-agile ecosystems, incl. e.g.:
        ▪ Sharing more common visions between companies, researchers, educational actors
        ▪ Need for creating environments where 'small' solutions can quickly be adopted, creating benefits and building confidence
        ▪ Need for enabling experimental development and learning cross companies and research also without big projects. Benchmarking the adoption of AI in businesses to help them speed up adoption
        ▪ Create networks and forums for companies to share and show examples
    o AI requires more cooperation and becomes a matter of ecosystem building for companies:
        ▪ More cooperation between universities in and outside of Ostrobothnia
        ▪ Move from siloed enterprise to extended enterprise: customers, supply chain and other local SMEs deeply connected and the data flow shared
    o Too narrow ecosystem or side ecosystems with silo thinking constitute a risk
    o Need for greater visibility and stronger profiling of the region related to digital know-how and AI within the green transition to attract cutting-edge expertise, workforce, customers: *If you talk about digitalization, AI, machine learning, we don't attract those talents here. So maybe you should somehow get a digital cluster. [...] I would say to continue spinning on this energy cluster, which is already today probably one of the largest energy clusters in Europe. It is possible to somehow broaden it and show the (AI) technology and expertise that we have, that we are actually good at developing things here in those areas as well."*

To summarize, key enabling factors for enhancing a data-driven development are investments in data and data security along with increasing knowledge in data interpretation, showing use cases, and implementing actions/infrastructure investments that help diminish the gap between experiments/pilots and real deployment and profitability/scaling of solutions.

Potential RDI-themes to tackle

AI and Advanced Production Methods

Applying AI for system efficiency and (production) optimization and/or for asset and process intelligence through topics such as:

- Machine vision/object recognition, AI vision-based reasoning (next-gen computer vision)
- Robotic process automation
- AI-based automation, machine learning with AI and cyber security
- Developing intelligent and interconnected production systems
- Human Machine Interaction, Human Machine Interface, Human-centric AI design
- Obsolescence of management for automation module development
- Synthetic model training e.g. use of existing 3D (generate pictures)
- AI augmented products and services: AI for Quality control in manufacturing, AI in service, maintenance, safety, predictability, safety, Augmented reality
- Humanoid robotics in industry

AI, energy technology and system-level solutions for renewable energy production

Applying AI for system efficiency and optimization and/or for asset and process intelligence through topics such as:

- AI & Industrial Processes: Application of AI in new industrial processes and value chains such as hydrogen, sector integration, district heating solutions, battery manufacturing
- AI and energy/resource efficiency, digital twins
- Advanced optimization of energy systems: how to optimize energy production and storage towards the market: need for AI systems, calculation capacity
- Excess heat to use
- Flexible and sustainable AI energy consumption
- Smart grids, transmission and distribution technology, optimization, predictive analysis
- AI augmented products and services: AI in service, maintenance, safety, predictability, safety

AI and circular and carbon-neutral economy

"What is happening now is that AI is coming into the factory and into the production process. So that means that everything we can offer in terms of traceability, in terms of life cycle data, so all of that has a huge value for the customer."

- AI and advanced digital solutions, digital twins for circular processes, such as:
    - Life cycle analysis, Environmental Product Declaration and Digital Product Passports and other certifications
    - Data and solutions for more traceability and measurement in processes
- Material calculation and optimization

Application of co-pilots, agents

- Simulation of benefits gained by moving to agentic AI workflows
- Automated coding
- AI and customer interaction: Agents to assist frontline workers, Customer behaviour prediction
- Understanding mechanical and physical behaviour in – model

AI & security, critical systems, resilience, dual-use

Other RDI themes addressed:

- AI processing satellite imagery
- AI & logistics and maritime solutions
- Research infra for AI chips
- AI as an enabler to future-proofing SMES – help companies think outside of the box
- AI ethics and trust, AI sustainability and acceptability, how to ensure that the AI systems developed now are sustainable & ethical
- Human-robot interaction
- Democratic AI
- AI Literacy
- Humanoids in construction
- Humanoid robotic in society
- Cloud and Edge Infrastructure Technologies: Chip level support (EDGE), Azure or similar user licenses, Own open source (private) cloud
- Application of AI in public sector domains, elderly care, schools