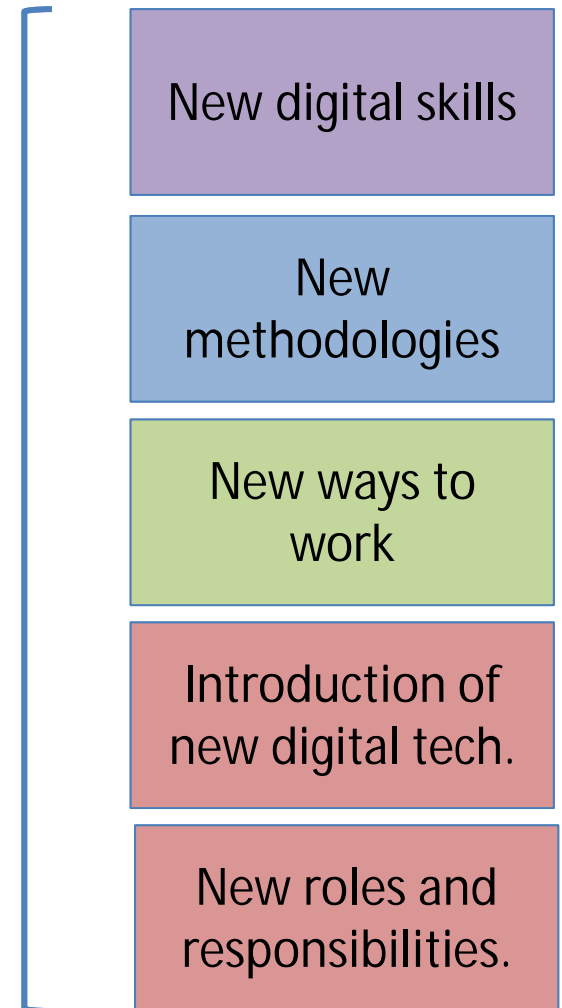
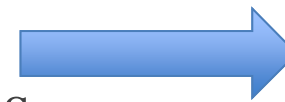


Studying Digital Literacy and AI Adoption in Software Engineering & Technology Companies

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- Many IT organizations and software companies are transitioning into **digital service companies**
- This transformation process is a major change for an organization.
- In this study, we explore how skills, technologies, methods, ways to work and processes are changing in Finnish IT companies due to digital transformation.
- This paper focuses on studying the adoption of Artificial Intelligence (AI) in IT organizations



- The business growth and digital transformation have a significant impact on organizational structures of software development.
- There shall be less traditional software development and coding in the future.
- Complexity of IT projects is growing (Cloud, Artificial Intelligence, Extended Reality, Internet of Things, Digital Twins)

Companies need to pay more attention to competencies required by the digital era.

Every employee in the company should understand his/her role during and after the digital transformation process

Governments world-wide are investing hundreds of millions for increasing competences of artificial intelligence, such as conversational AI, ML, MV

- The **research problem** of this study is: “How traditional IT companies are approaching AI and advanced digital technologies?”
- The problem was divided into four research questions
- **Research method:** Interview study
- **Data collection:** 8 interviewees from various business domains in service provision such as ICT, energy, misc. services, marketing and advertisement
- **Data analysis:** Thematic content analysis technique



Research questions

- 1) How evolution of AI & digital literacy skills is supported by software development/ICT organizations' managers?
- 2) How AI and related technologies are used in software development/ICT organizations?
- 3) How AI affects the daily business operations of a software development / ICT organization?
- 4) How AI is linked to software development/ICT organizations' productivity?

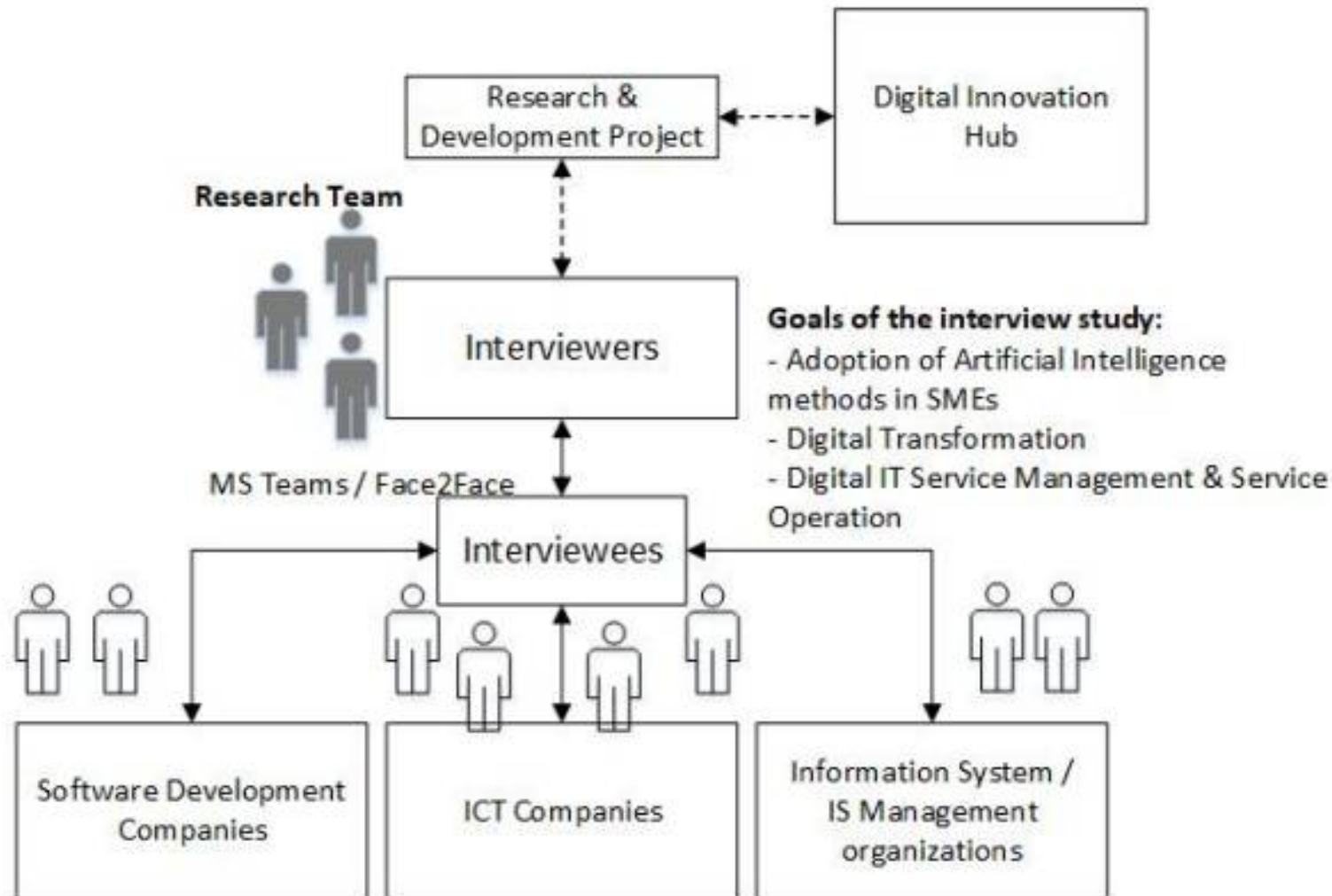


Fig. 1. Context of our interview study

- How evolvement of AI & digital literacy skills is supported by software development/ICT organizations' managers and employees?
 - “By **innovating new services that utilize AI** and **identifying** demand and **customer need** for AI solutions. Additionally, we have **recruited AI specialist** to our company.” **Class:** Recruitment of AI specialists, Identify customer's AI needs, Service innovation
 - “I have not participated myself in AI training events. However, I support aims to do work tasks smarter. I participate in introduction of AI in those parts that are understandable for me. **I act more like a coach / inspirator in AI matters.**” **Class:** Support for smarter work, Coaching
 - “**I participated** in Elements of **AI course** and studied AI topics myself. I have also explored **AI-powered apps** that support our business such as Trello Butler. We have saved quite a lot of efforts with that app (avoided around 6000 UI clicks).” **Class:** Personal AI learning, Exploring AI features
 - “I have a 'bad' habit to link all interesting articles and videos to our team's Slack. Thus, **information sharing** is one way to support. **Class:** Sharing AI-related information.
 - “We have organized **general information sessions to our personnel** and encouraged our staff to make their work more visible and we have also **rewarded employees** based on it. **Developing AI competences** is among **employees' personal goals.**” **Class:** Organizing AI information sessions to staff, Rewarding staff on AI work, Linking AI to employee's personal work goals.

Findings of the interview (2/4)

- How AI and related technologies are used in software development/ICT organizations?

MV

- Machine vision and machine learning as well as Natural Language Processing in our products and services. For example, in care facilities one can listen operational instructions. **Class:** NLP, Machine vision, Machine learning)

NLP

- We use data lakes, Azure cloud technologies and maintain user information concerning Office 365 services. I do not know about usage of AI technologies. **Class:** Azure cloud, data lake, O365

ML

- Azure for managing user right information, AWS cloud in server management, we also store information to Dropbox cloud storage, Google Ads for promoting our products and services. **Class:** Azure cloud, AWS cloud, Dropbox, Google Ads

AWS

- We have AWS virtual servers, cloud based file management and a web-based support system (a contact form for ordering new items). Some applications we use have AI features. **Class:** AI-powered apps, AWS cloud, cloud file storage



Google Cloud

- We do not use Machine Vision in our own work but for customers we do. We use Machine learning and neural networks a lot. We use cloud services almost for everything. Azure, AWS, Google.. We have a service portal that we have built on ServiceNow. **Class:** Azure cloud, AWS cloud, Google cloud, Machine vision, Machine learning, Service portal

NLU

- We have NLP/NLU (an AI-based bot), we use Azure and AWS and self service portal. **Class:** Azure cloud, AWS cloud, NLP, NLU, AI bot, Service portal

- Impacts of AI to daily business operations?
 - “**Customer service:** for us customer service is the biggest part of our business. Thus, everything that makes it more effective shall improve our business most. **It can bring automated recording of cases and workflow automations.**”
 - **These issues free more work time and improve the data validity.** From the perspective of financial management, the whole invoicing could be automated and checked that accounts and reference numbers are correct. ”
 - “**Employee satisfaction has increased, customer service process is faster, throughput times are better,** AI has had comprehensive effects to customer satisfaction, automation works more effectively and with less errors than a human.”
 - “We launch increasingly **more chatbots in customer service and logistics and inventory management utilizes AI.** ”

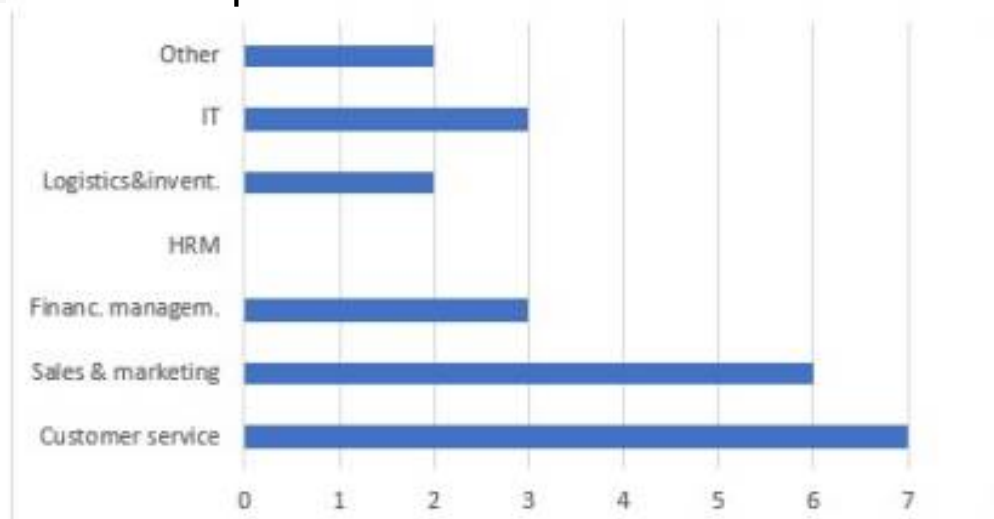
- How AI is linked to software development/ICT organizations' productivity?
 - “Related to financial management **AI decreases workload in invoicing**. If we can introduce better solutions, we can reduce management's workload.
 - “Yes of course there is a link if we can get things that **makes work faster** and actually helps when we do not do unnecessary manual work. AI has to be brought into right targets. We welcome AI. Sure, there are things in various domains where AI can help.
 - “Manual work is not among the most motivating work. Through automation, we have **more time for creative work**.
 - “To a significant extent, AI results in productivity and it should be introduced more and more. It **makes work faster and predictive** and **correlates with profitability and productivity**.

Analysis (Thematic content analysis)

Impact of AI

How AI is supported by management?

- Recruitment of AI specialists,
- Service innovation
- Identify customer's AI needs
- Support for smarter work
- Coaching/inspiring
- Personal AI learning,
- Exploring AI features in products
- Sharing AI-related information
- Organizing AI information sessions to staff
- Rewarding staff on AI work
- Linking AI to employee's personal work goals
- No support



How AI is linked to productivity?

- Decreased workload
- Eliminates manual work
- Makes work faster
- More time for creative work
- Helps in processing large amounts of data
- Automated ticketing
- Enables focusing on demanding work
- Creates basis for predictions
- Affects profitability
- Smoother and effective operations

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Thank you!

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