THE DD-SCALE CONSORTIUM

- HAAGA-HELIA University of Applied Sciences, University of Helsinki and University of Tampere
- TEKES
- ABB Oy, Comptel Oyj, Napa Group and Nokia
THE SUB-PROJECT ORGANIZATION

- This presentation covers the final report of the DD-SCALE-sub-project with
  - HAAGA-HELIA University of Applied Sciences
  - University of Tampere, research group CIRCMRI
  - two case companies
OVERALL OBJECTIVES OF THE DD-SCALE CONSORTIUM

- The general objective for the DD-SCALE consortium was to

  **What?** improve the competencies, methods and tools

  **For whom?** for software development work and operations with comprehensive performance evaluation systems

  **Why?** in order to improve their work expertise practices in managing dynamic distributed operations in the global value networks.
FOCUS OF THE SUB-PROJECT

- This sub-project focused on two work packages (WPs) within the consortium:

**WP1:**
Appropriate performance measures
– a concept for efficiency and performance monitoring framework

**WP3:**
Distributed global software development operations management:
Location/site efficiency comparison & customer value driven organizing principles of distributed R&D work
RESEARCH APPROACH

▪ **Overall approach:** Design Science Research, where the aim is to design an artefact and create new knowledge that answers to specified business needs [Hevner, *et al*., 2004]

▪ **The study also adopted** elements of action research, in that researchers and practitioners collaborated in the research efforts and ensuring the relevance of the results [Baskerville and Wood-Harper, 1996]

▪ **Theoretical background:** intellectual capital, performance management, distributed software development and knowledge work literature were investigated to gain understanding of the current state of research and focal concepts within the problem domain

▪ **Research as a “search process”** [Hevner, *et al*., 2004]: Meetings and workshops were held throughout the study with the case companies and research partners firstly, to define, analyze and formulate the initial research problem, and later to reflect on the progress and results
DATA COLLECTION AND ANALYSIS

▪ The data was collected through interviews and workshops with the DD-SCALE research partners and international R&D professionals of the two case companies. Also the DD-SCALE project meetings entailed detailed research data and enriched building the big picture of the object of study. Interviews were conducted both in Finland and India.

▪ The overall 21 resulting transcriptions were analyzed by qualitative, research data based content analysis with the aim to find and categorize relevant elements [Schreier, 2014] related to productivity and high performance of software engineering work

▪ Atlas.ti -software was utilized in coding and categorizing the data

▪ The analysis progressed iteratively from raw coding to a refined set of categorized elements. During the analysis the results-in-progress were processed among the researcher team with reflections to theory and other researchers’ feedback.
RESULTS

- The key output of this sub-project is a baseline for an intellectual capital based evaluation framework for Dynamic Distributed Software Development.

- The evaluation framework aims to conceptualize the dimensions and elements of productivity in distributed software development work. It consists of 320-430 low level indicators, 88-98 clusters to which those indicators have been aggregated, 16 higher level categories, and finally, three central perspectives of intellectual capital (Human, Structural and Relational capital [Huang, et al., 2007]).

- The practical purpose of the framework is to support management in evaluating the various capabilities required for high-performance distributed software work [Kamaja, et al., 2016].

- Other results include
  - a literature based conceptual framework of factors impacting distributed software development
  - a stand-alone company-specific report that summarizes the interview results from India
  - several scientific publications
  - practical use cases for the evaluation framework
  - new openings for collaboration
  - opportunities for further research
OVERVIEW OF THE ANALYSIS PROCESS AND RESULTS

- The figure shows the data analysis process, results and their uses at a high level [Kamaja, et al., 2017]:

DATA COLLECTION (Texts)

- Transcribed interviews
  - Transcribed workshops

Finding relevant points/text fragments as MANIFESTATIONS

Manifestations interpreted as PRELIMINARY INDICATORS

Classifying and creating TAXONOMY

Finalised INDICATORS, CLUSTERS and MAIN GROUPS

DD-SCALE EVALUATION FRAMEWORK

- Capability Indicator System
- Question Sets
- Productivity Impact Evaluation Guidelines
EVALUATION OF THE RESULTS

▪ Overall, the project met its objectives, and the results have already been utilized in practice

▪ During the project, the team gained new and in-depth understanding of the
  ▪ research and practical needs of measuring knowledge work
  ▪ practical needs and challenges in global software work
  ▪ different evaluation categories and dimensions of software work productivity
  ▪ potential metrics and their associated use opportunities and challenges in organizations

▪ There is a call for further research especially in
  ▪ utilizing the results in practice
  ▪ evaluating and refining these baseline results
  ▪ designing a software tool around the evaluation framework
USING THE RESULTS

- The current results can be used in organizations in various ways:
  - to support the evaluation of effects of process changes
  - to support a gap analysis of existing measurement systems
  - as a management check list in evaluating organizational development efforts
  - to support the evaluation of the state of various factors in different teams or organizational areas

- Further, the findings of this project offer an excellent basis for future research in evaluating and developing the capabilities in dynamic distributed knowledge work
THE TAKEAWAYS

1. Related to the findings
   - The interconnections between software work productivity, required competences and management practices of distributed work are dynamically changing on various levels and dimensions of organizations
   - Key is how to manage these interconnections and relationships

2. Related to the research process
   - Consistent and continuous collaboration with research partners and company participants is a significant factor in meeting the goals and ensuring the relevance of the results in a real business environment


OTHER COLLABORATION FORUMS


- A visit to the Mid Sweden University to present the results-in-progress in the Distributed system development (Distribuerad systemutveckling) conference in Östersund, Sweden on 18-19 May, 2016

- A two-week master’s student visit to the Nordic Institute of Asian Studies of University of Copenhagen, Denmark in relation to the empirical data collected in India, February, 2016

- Presenting the results-in-progress in an event of Information Processing Association in Pirkanmaa Region (Pirkanmaan tietojenkäsittely-yhdistys, Pitky), June, 2015
WHAT NEXT?

- We plan to continue our research in this intriguing field of distributed knowledge work and global value networks
- The next research project is currently being designed together with Haaga-Helia University of Applied Sciences and CIRCMI research group of University of Tampere
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REFERENCES


Images on the cover slide: [www.ddscale.fi](http://www.ddscale.fi), [www.pixabay.com](http://www.pixabay.com)