



# Design and Evaluation Framework for Solutions that Support Work Well-being

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ACE cluster webinar on evaluation methods, November 14 2018



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# INTRODUCTION

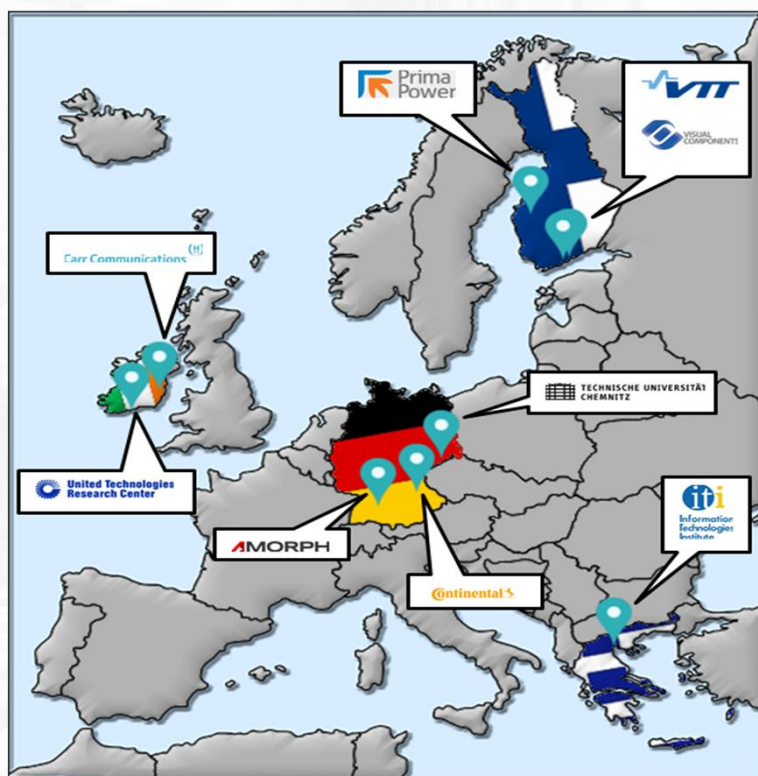
The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement no 723277



# Our project

- Factory2Fit - Empowering and participatory adaptation of factory automation to fit for workers
  - EU Horizon H2020 project (RIA, 1.10.2016 – 30.9.2019)
  - 9 partners
  - EU funding 4,3 ME
  - Coordinator Eija Kaasinen, VTT Technical Research Centre of Finland
- Context: digitalisation, smart factory à more demanding factory work, possibility to develop own work
- Objective is to enhance the role of factory workers
  - Empowering the worker solutions
  - Engaging the work community solutions
- A design and evaluation framework is needed to guide the design to support work wellbeing

# Factory2Fit consortium



	Status <sup>1</sup>	Country
1 VTT Technical Research Centre of Finland Ltd.	R	FI
2 Amorph Systems GmbH	SME	DE
3 Carr Communications	SME	IE
4 Centre for Research and Technology Hellas	R	GR
5 Continental Automotive GmbH	E	DE
6 Finn-Power Oy (Prima Power)	E	FI
7 Technische Universität Chemnitz	U	DE
8 United Technologies Research Center	E	IE
9 Visual Components Oy	SME	FI

<sup>1</sup> R – research institute, U - university, SME – small or medium size enterprise, E – enterprise



# Factory2Fit Project

*Worker-centred solutions for factories of the future*



**Developing and piloting adaptive solutions for factory workers that:**



Engage workers in designing their own work and sharing knowledge



Improve work flow



Support workers in understanding and developing their competences

## Key Benefits



Better work well-being

Improved productivity & efficiency



Better quality products

@Factory2Fit\_EU  
 Factory2Fit\_EU  
 Factory2Fit\_EU  
[www.factory2fit.eu](http://www.factory2fit.eu)

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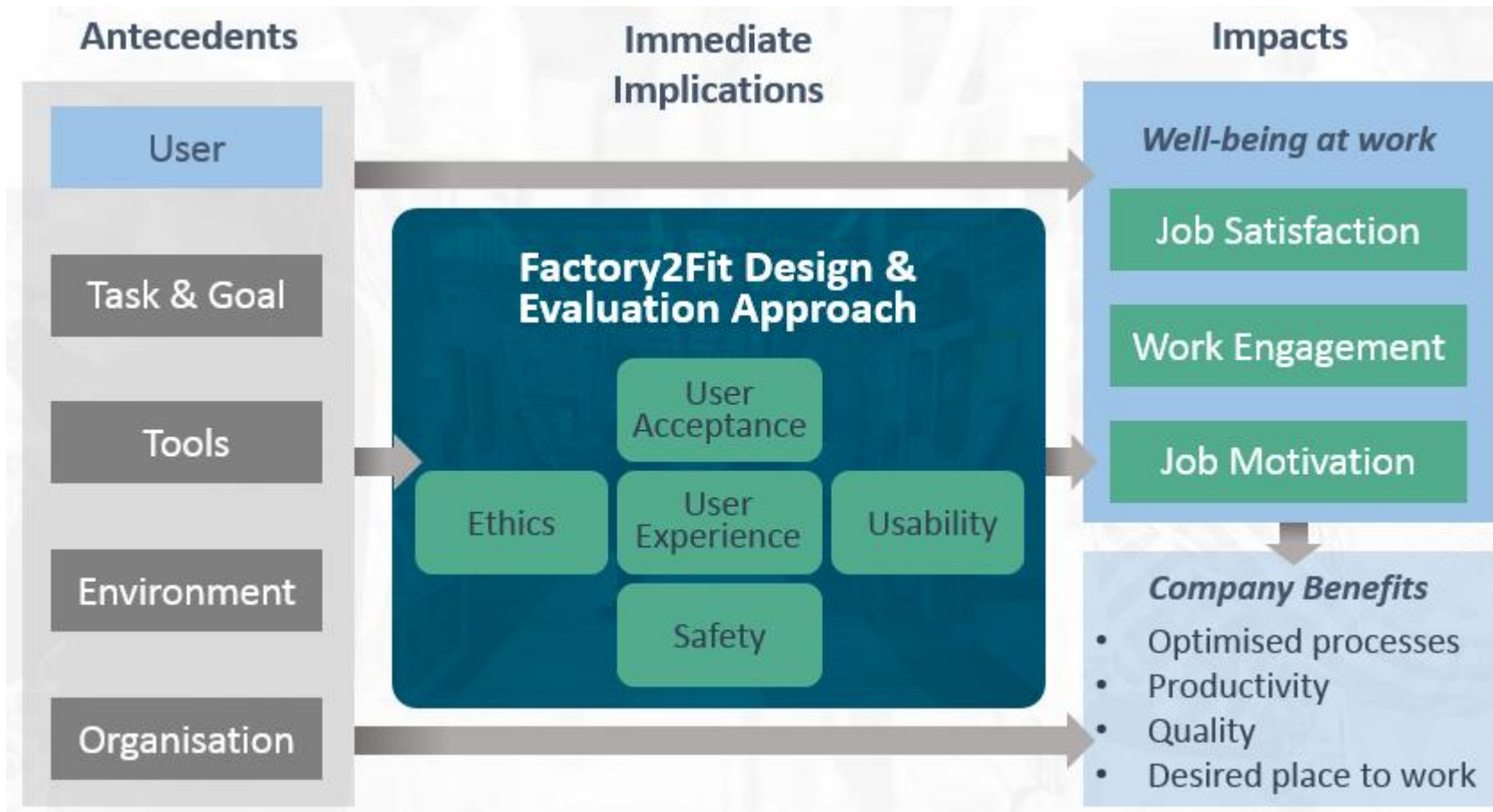


# DESIGN AND EVALUATION FRAMEWORK

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# Factory2Fit Work Well-being Framework



Basic concepts in our project are also evaluation approaches (blue in the centre).  
Some evaluation is targeted to user and well-being at work as well (light blue).





## UTILISING THE FRAMEWORK

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# First experiences and piloting

- Common vision and concepts: In the beginning of the project, co-design was organised among project partners (pilot case representatives, technical designers, researchers)
- Concept/demo evaluation: During the technical development, future user representatives (mainly factory workers) provided feedback in workshops
- Piloting: Soon, as our operator 4.0 tools are developed to the stage of a prototype at least, they are tested in real life
  - Assessment of qualities affecting well-being (“immediate implications”)
  - Impact assessment (“well-being” and “company benefits”)

# Piloting context

- Piloting will take place in three countries and several factories
- Solutions will be evaluated by different research organisations/people, each having their own scientific preferences
- How to ensure that all important matters are covered in the pilots?
  - Ø Minimum set of questions that are at least to be included in all evaluations, the so-called Common Questions

# Common questions for pilots

- A set of questions defined by the members of research organisations
- All perspectives in the framework are included
- Evaluation during pilots is performed in three phases
  - In the beginning, to get a starting point
  - During piloting, to get first impressions (which may change)
  - After piloting, to receive the experiences and conceptions after having really used the solutions
- The same set of questions is spread among the phases
  - In the beginning, only a few questions (5 questions)
  - During piloting, most of the questions (18 questions)
  - After piloting, also the questions related to preferences for the future as well as evaluation of its effect on own productivity (24 questions)



# Questions before piloting (all of them)

## Questions before piloting

1. What is your gender? ☐ male ☐ female ☐ do not want to answer
2. What is your age? \_\_\_\_ years

Below are statements about the solution XY. Please mark with X the most suitable option.

Statement	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
3. I am satisfied with my job.					
4. I find my work interesting.					
5. I feel motivated at work.					

# Questions for first impressions (part of them)

## Questions for first impressions

1. What is your gender? ☐ male ☐ female ☐ do not want to answer
2. What is your age? \_\_\_\_ years
3. Please indicate your experience with XY by choosing one of the expressions below.



Below are statements about the solution XY. Please mark with X the most suitable option.

Statement	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
4. XY makes me feel competent in my work.					
5. The functioning of XY is fluent (no breakdowns etc.).					
6. XY is easy to use.					
7. With XY, my work performance improves.					

# Questions after piloting (part of them)

Statement	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
14. The usage of XY respects my privacy.					
15. I am satisfied with my job.					
16. XY has increased my job satisfaction.					
17. This kind of solution would increase my job satisfaction in the long run.					
18. I find my work interesting.					
19. XY has made my work more interesting					
20. This kind of solution would make my work more interesting in the long run.					
21. I feel motivated at work.					
22. XY has increased my work motivation.					
23. This kind of solution would increase my job motivation in the long run.					



## CONCLUSIONS AND FUTURE WORK

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# CONCLUSIONS AND FUTURE WORK

- We have created a framework to guide design, evaluation and impact assessment activities to create solutions, which support worker wellbeing
- We have used the framework in various activities already before actual piloting in the factory environment
  - Co-creating the common vision and concepts of empowering and engaging solutions
  - Concept/demo evaluation
    - Ø Results: qualitative data (workers' free feedback) is important, can be interpreted through the concepts of UX, usability, user acceptance, ethics and safety

# CONCLUSIONS AND FUTURE WORK

- Identified challenges in pilots and ways to meet them
  - Qualitative data is important → interviews are needed (but everything cannot be covered by them)
  - Framework is complex – could be hard to include all viewpoints in all evaluations → common questions
  - It is essential that the usage of solutions is well trained to users → careful kick-off planning
  - The usage of solutions may be neglected or some problems may arise → “first impressions” gathering also serve in meeting these challenges
  - Company benefits should be evaluated too → impact assessment also with other stakeholders in the company
  - GDPR requires specific care in handling and storing personal data → Informed Consent Form consists of two sections
    - First describing the project, personal data to be gathered, how it will be handled, and participant rights; this is the section that is left in the hands of the participant
    - Second with brief description of agreement related matters, including recording etc. if needed, signed



Thank you for your attention

Any questions?

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