



A DIGITAL SUPPORT FUNCTION FOR FACTORY LAYOUT EFFORTS

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Content of the presentation



Motivation

Development

Artifact

Outlook

*

Motivation

➤ Artifact motivation

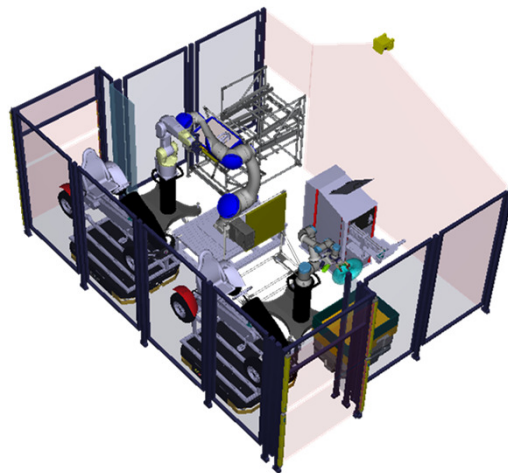
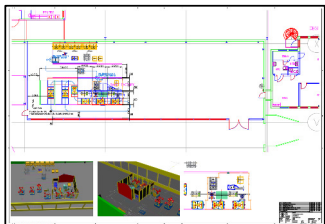


Today the layout work is experience based and needs to account for several aspects. **It should be easy to do right!**



Planning and design process of factory layouts

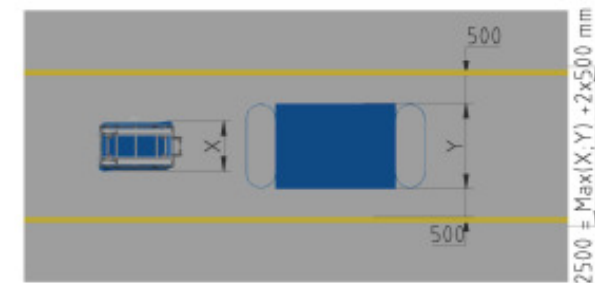
Fechter, M., Seeber, C. & Chen, S. 2018. Integrated Process Planning and Resource Allocation for Collaborative Robot Workplace Design. Procedia CIRP, 72, 51st CIRP



Need to fulfill requirements, laws and regulations



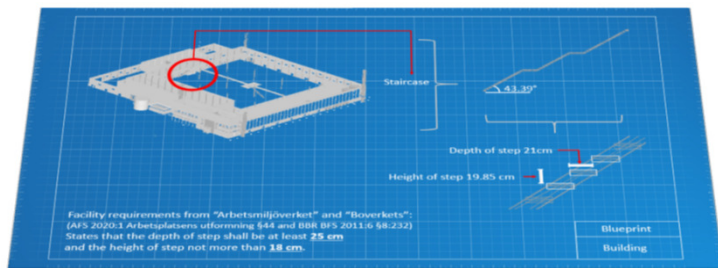
Basic distance requirements



SS-EN 1525
 $\text{Max}(X; Y) + 2 \times 500 \text{ mm}$

Motivation

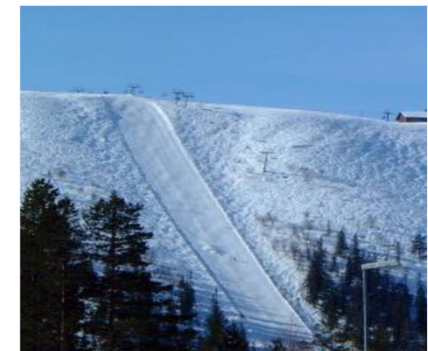
- Artifact motivation – example from current way of working



Built and installed stairs:
following the blueprint drawing with a
tilt of 43.39°



Compare



Sweden's second steepest ski slope:
Väggens, Sälén with a tilt of 45°.

Development

➤ Artifact nature & artifact development

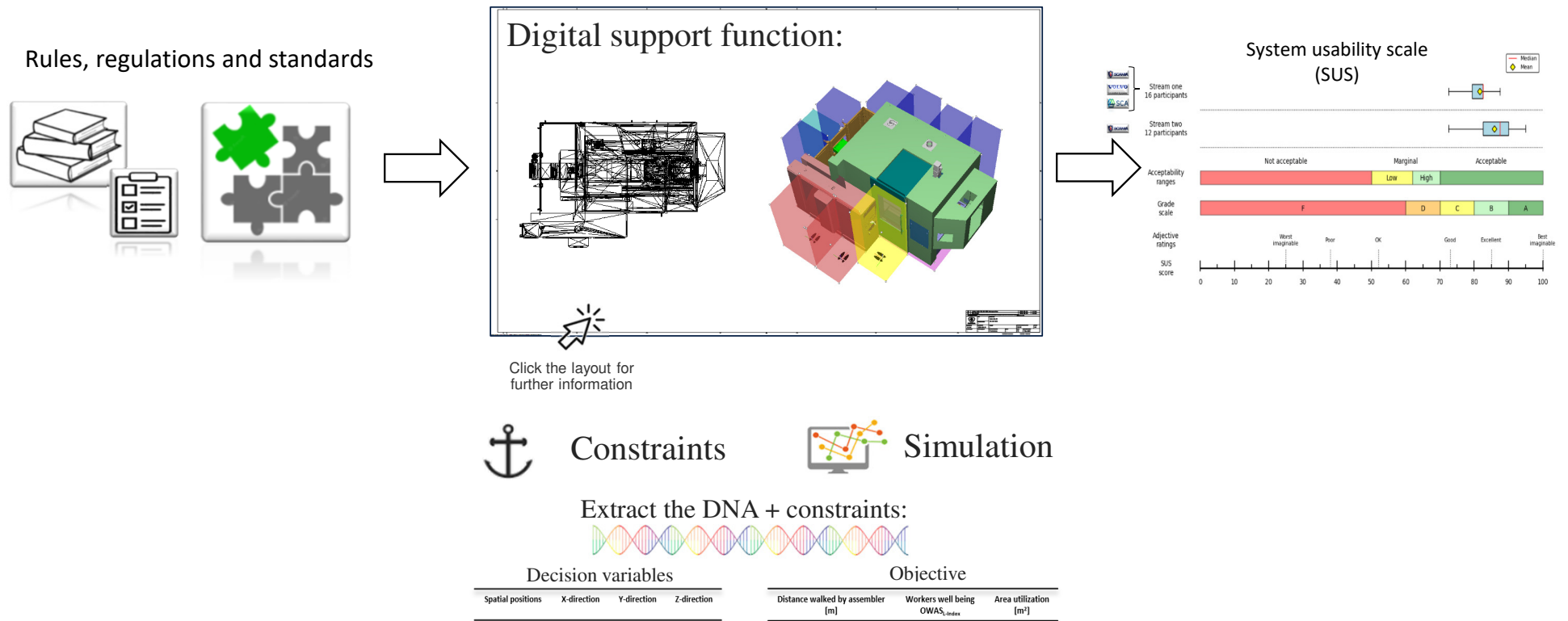


Showcase enhanced **digital support** to **assist layout planners**:

- *executing the associated tasks correctly, efficiently, and **objectively**, when performing the layout planning*
- *to a lesser degree depending on the background and **experience** of the layout planner.*

Artifact

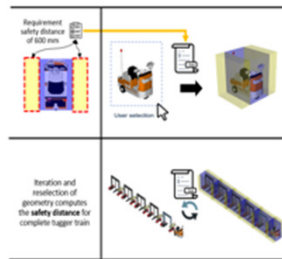
- Artifact content – the digital support function



Outlook

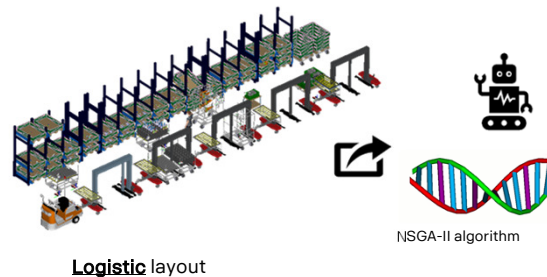
➤ Artifact in use - logistics

Digital support function



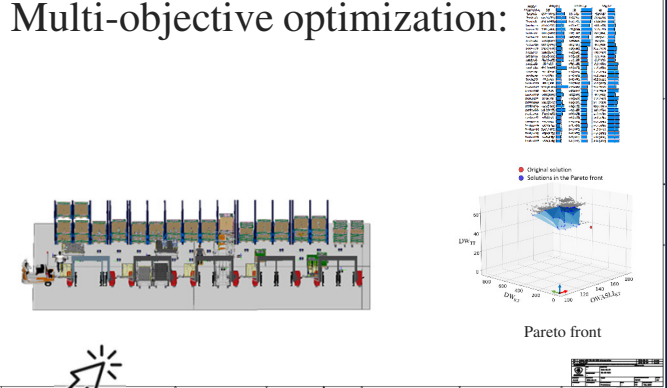
Click the layout for further information

Extract the DNA:



Click the layout for further information

Multi-objective optimization:

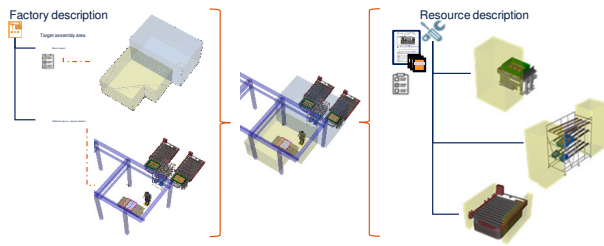


Click the layout for further information

Outlook

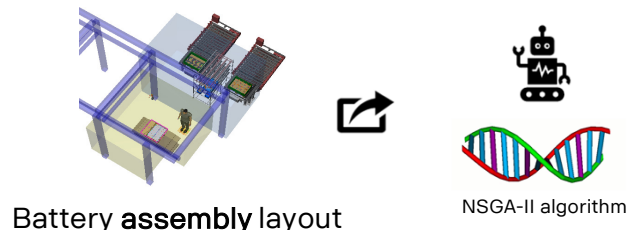
➤ Artifact in use - assembly

Digital support function:



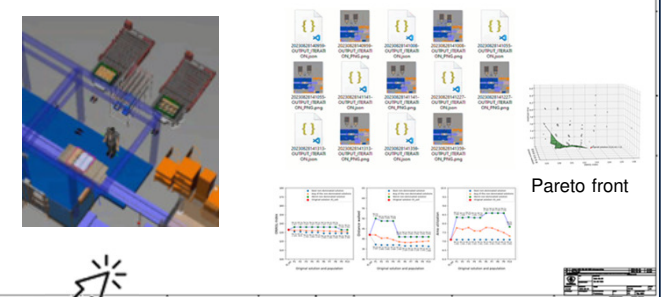
Click the layout for further information

Extract the DNA:



Click the layout for further information

Multi-objective optimization:

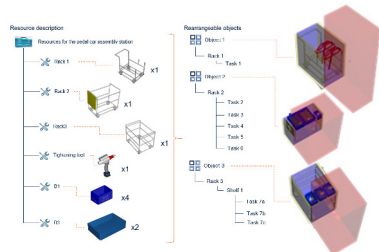


Click the layout for further information

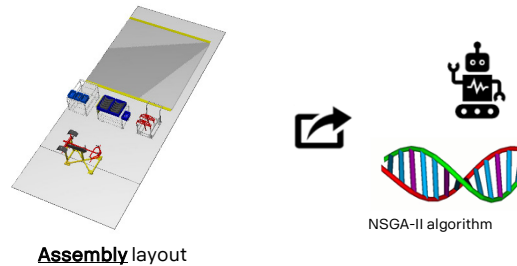
Outlook

➤ Artifact in use - assembly

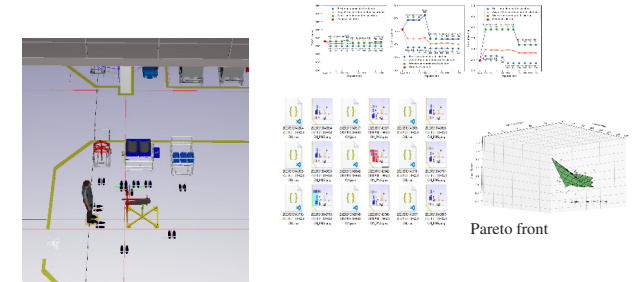
Digital support function:



Extract the DNA:



Multi-objective optimization:



Description

Startscene

Algorithm:
Random

Algorithm:
PSO

Algorithm:
NSGA2

Algorithms:
Random+PSO+NSGA2

Pedal car
assembly station



Tested solutions: 806
Non-dom. solutions: 14

Tested solutions: 806
Non-dom. solutions: 6
out of S(10): 70 solutions

Tested solutions: 806
Non-dom. solutions: 15
out of P(10): 70 solutions

Non-dom. solutions: 13
NSGA2: 11 solutions
PSO: 2 solutions
RANDOM: 0 solutions