Mixed Integer Programming versus Evolutionary Computation for Optimizing a Hard Real-World Staff Assignment Problem

Jannik Peters ▪ Daniel Stephan ▪ Isabel Amon ▪ Hans Gawendoicz ▪ Julius Lischeid ▪ Lennart Salabarria
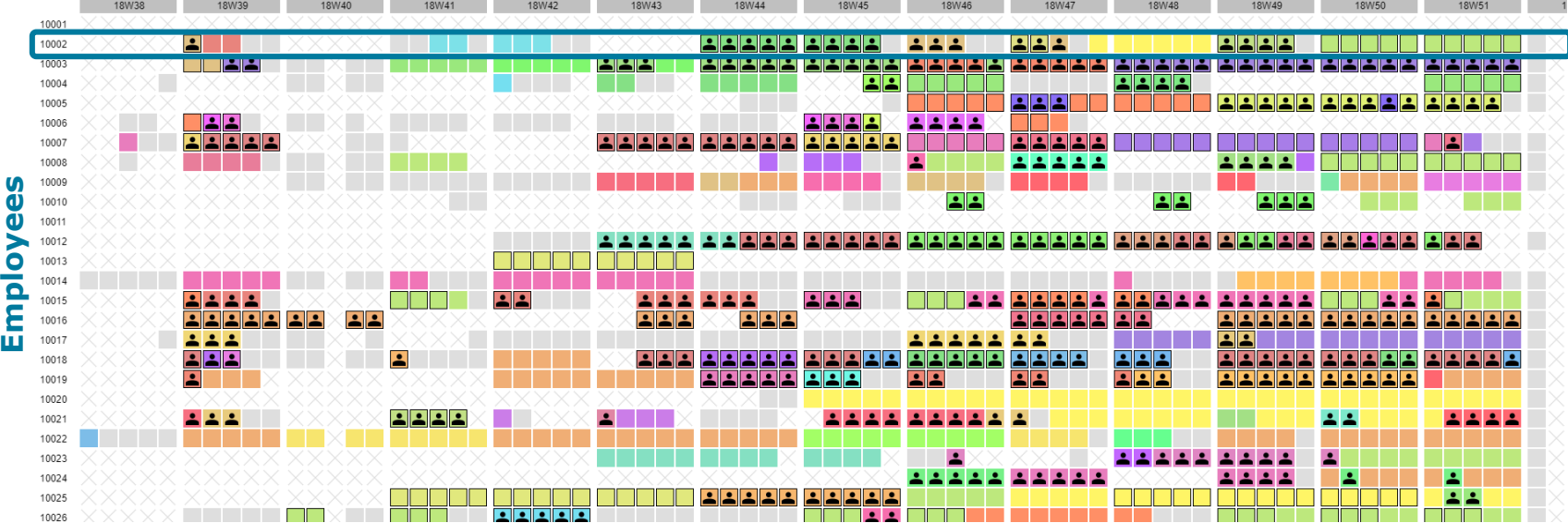Jonas Umland ▪ Felix Werner ▪ Martin S. Krejca ▪ Ralf Rothenberger ▪ Timo Kötzing ▪ **Tobias Friedrich**
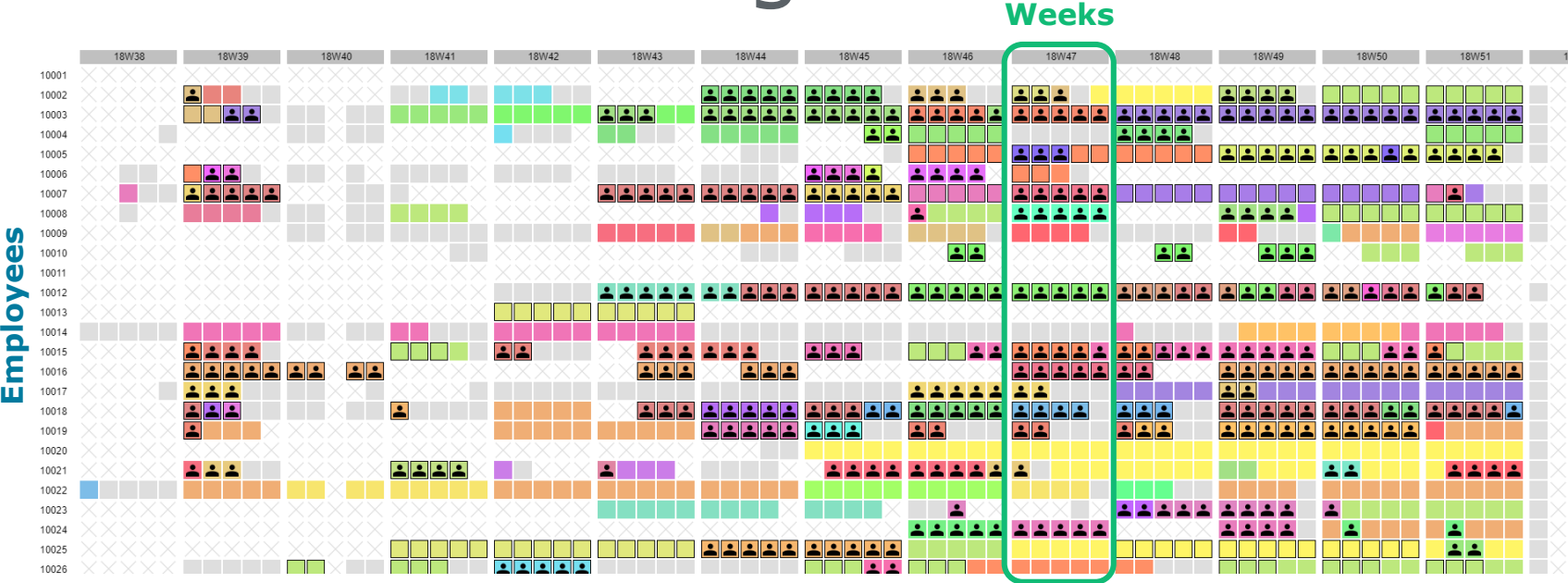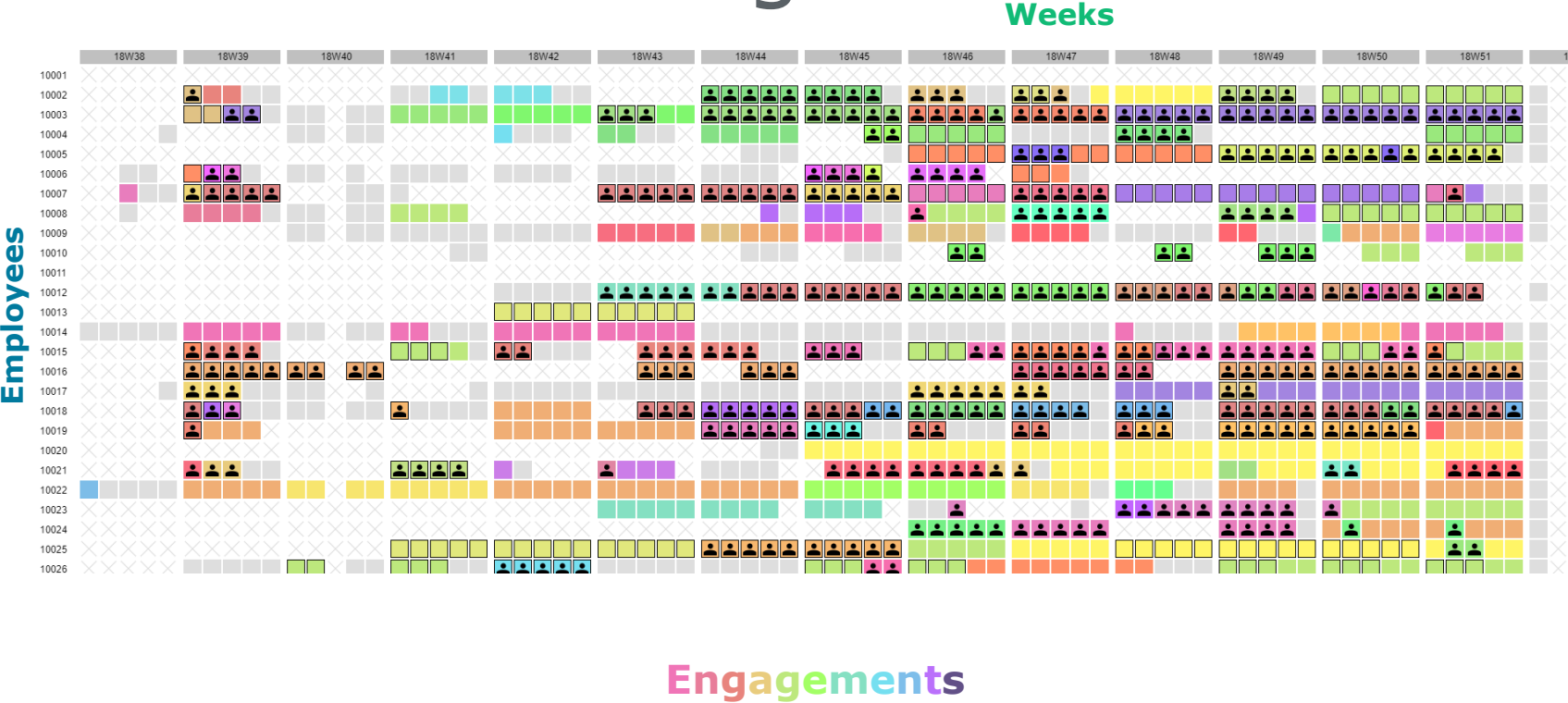
Professional Service Providers

Deloitte.

pwc

KPMG

EY
Building a better
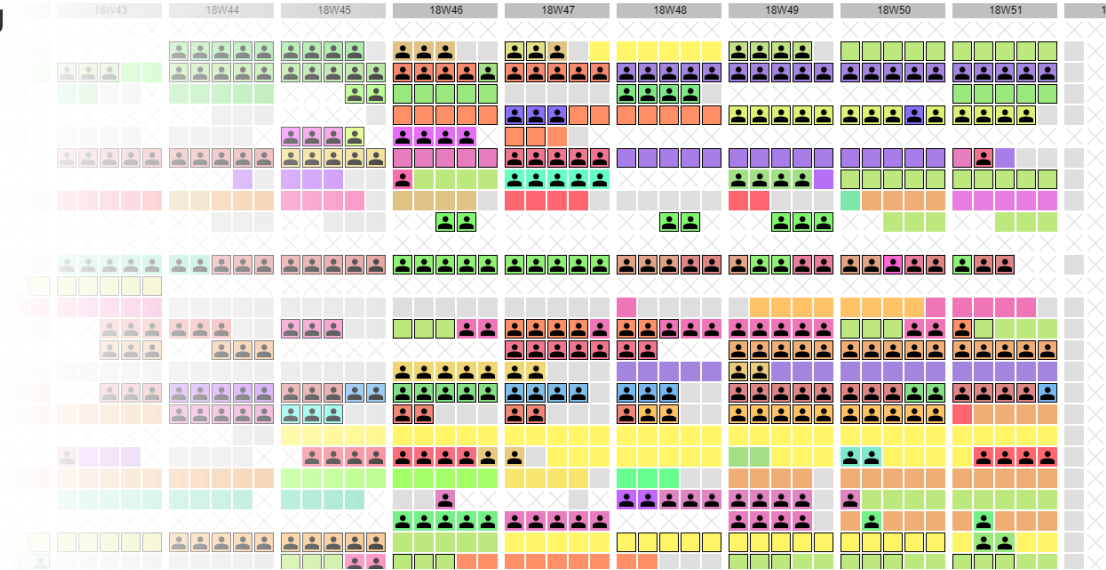working world

Staff Scheduling
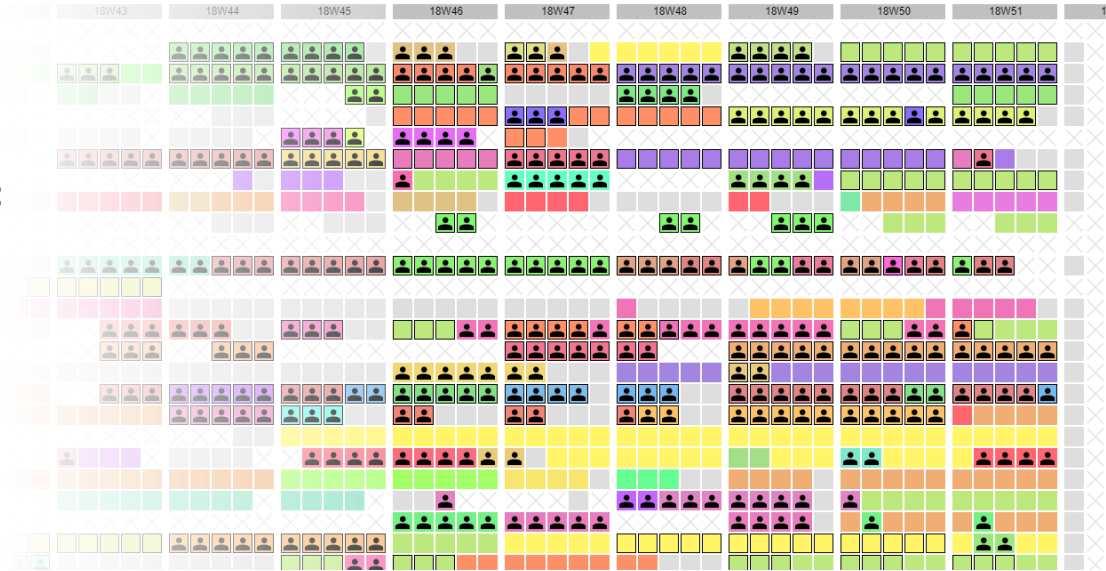
Staff Scheduling

Staff Scheduling

Objectives

» **Assign employees according to their skill levels to engagements**

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» **Employees should work on similar engagements as last year**

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» Employees should work on similar engagements as last year

» **As few employees per engagement as possible**

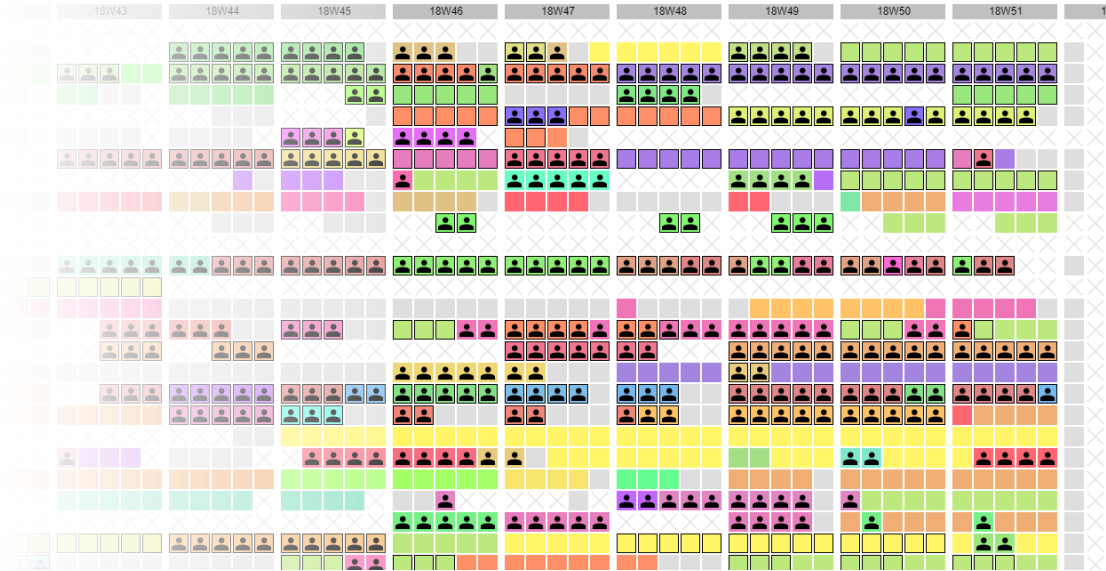# Objectives

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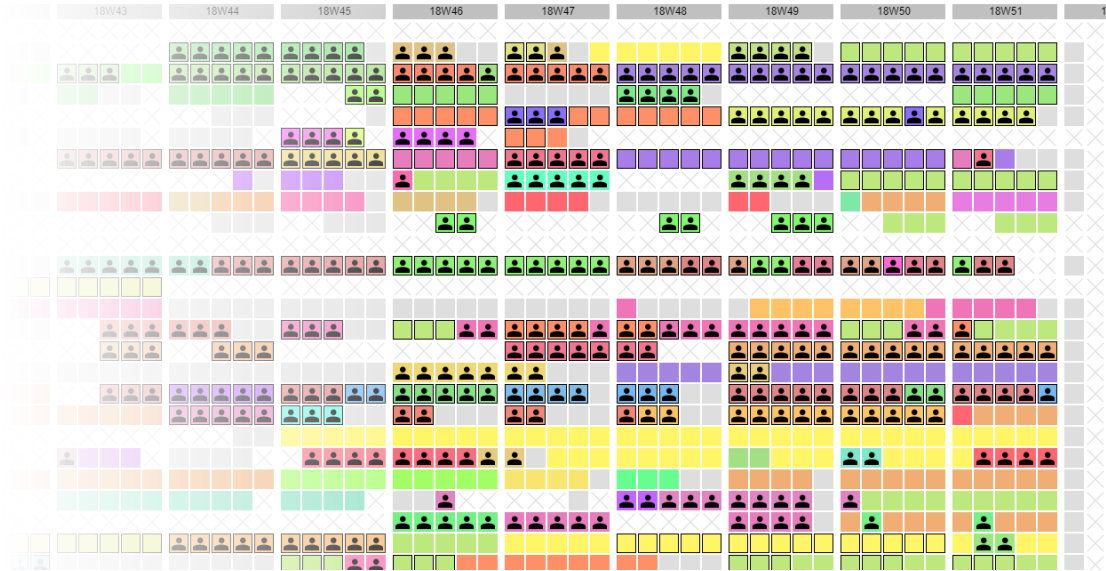
» **Employees should work consecutively**

4

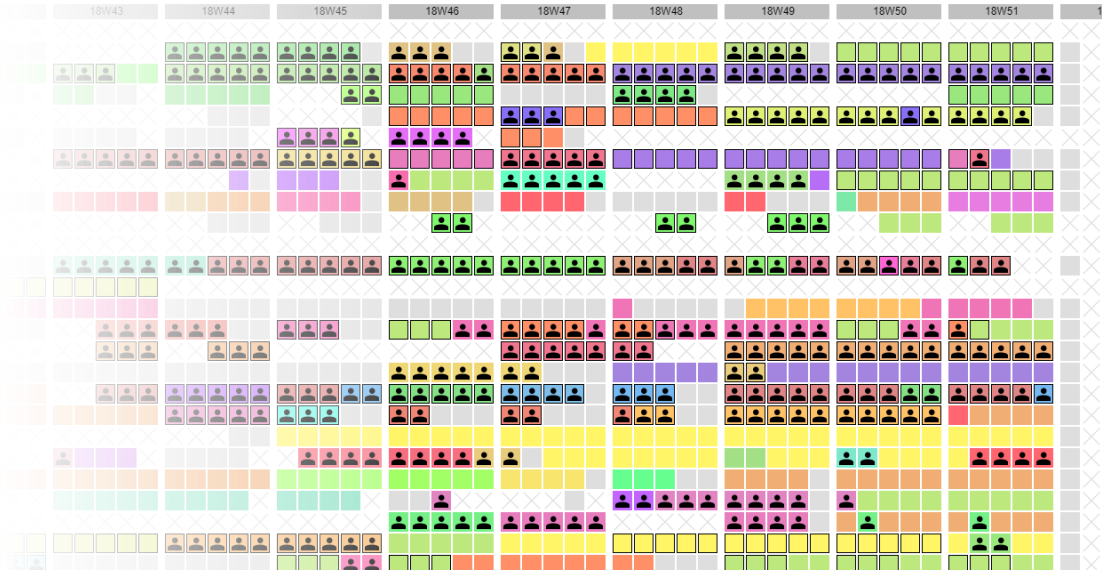# Objectives

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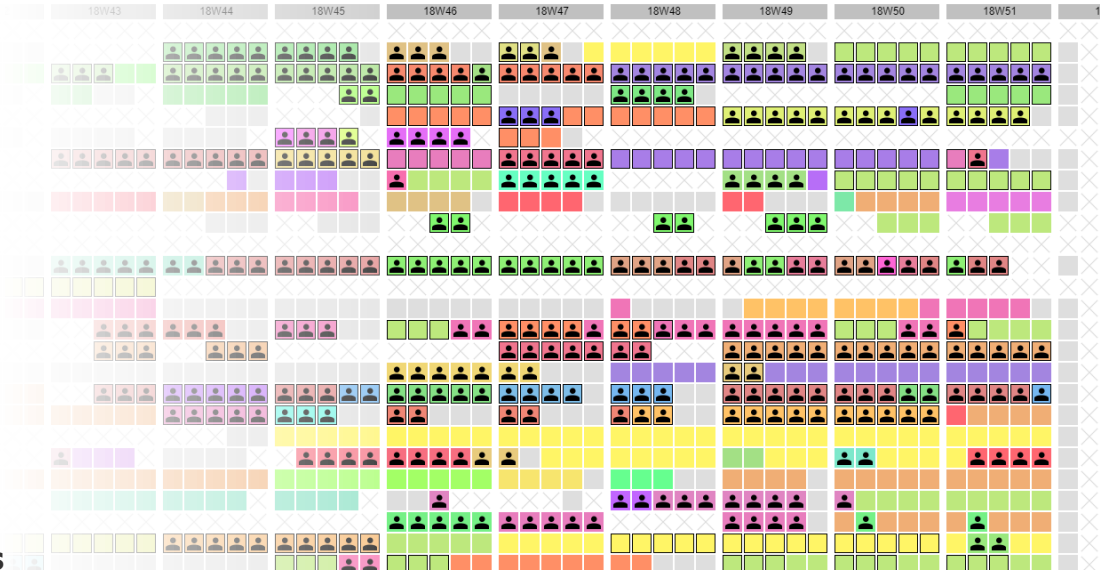» Employees should work consecutively

» **Minimize the travel distance**

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» **Working hours of employees should be fully utilized**

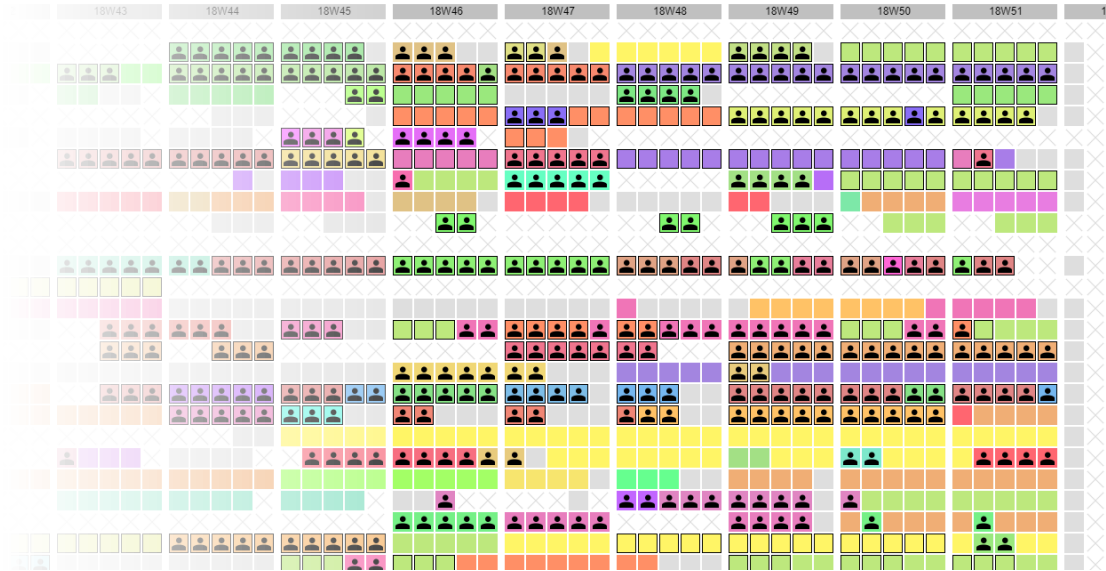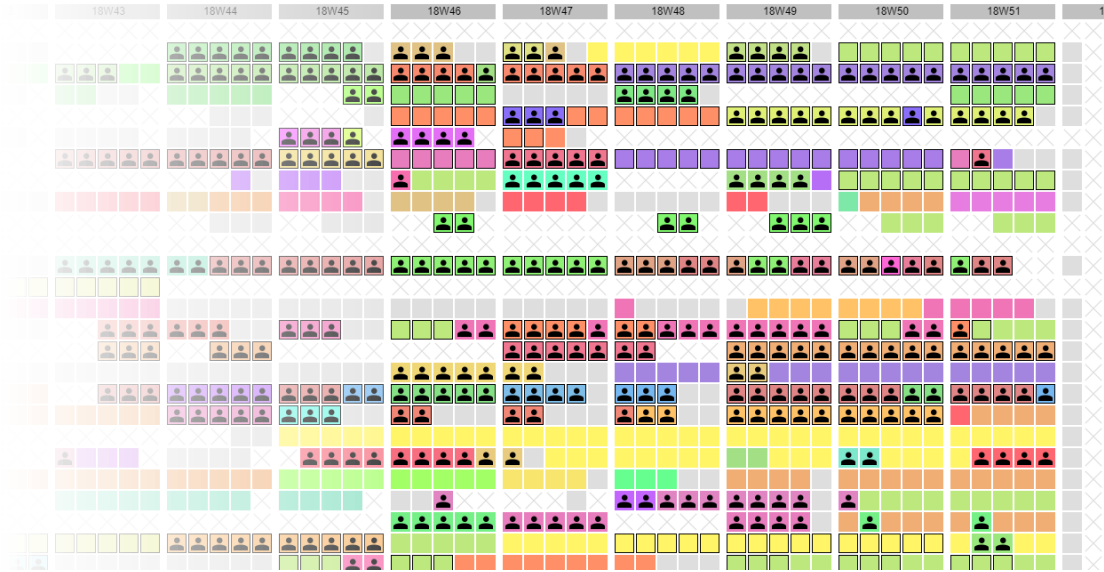# Objectives

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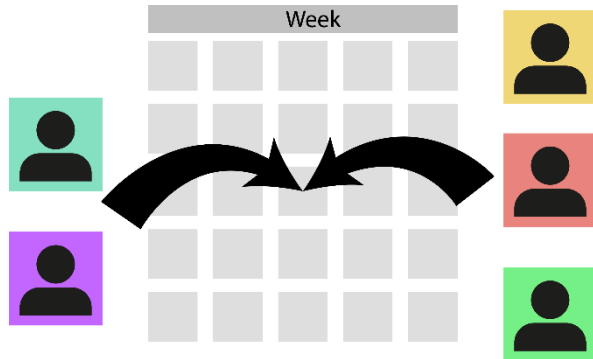
» Minimize overtime working hours

Previously done manually by managers.
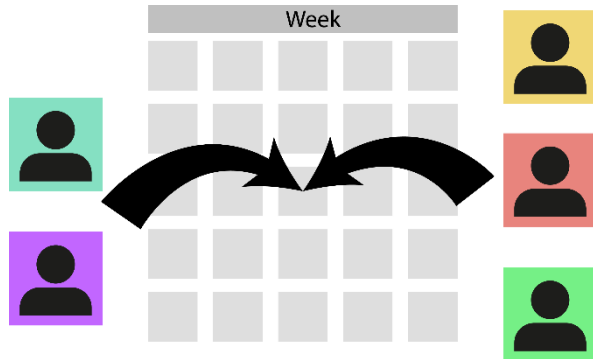
4

A Two-stage Approach

– Using a Memetic EA

1. EA assings staff to days and projects

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– Using a Memetic EA

1. EA assings staff to days and projects

2. Min-cost Max-Flow assigns skills and hours per day

Mutation Operators

Add a block

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Mutation Operators

Add a block

Remove a block

Mutation Operators

Add a block

Remove a block

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Add a block

Remove a block

Unify engagements
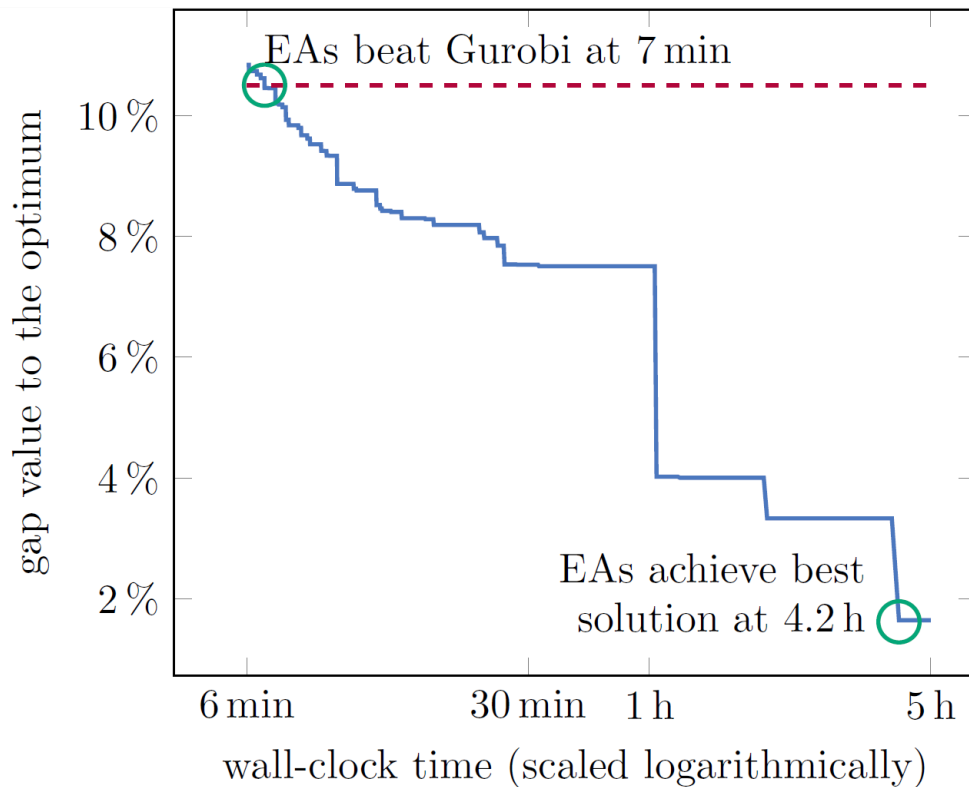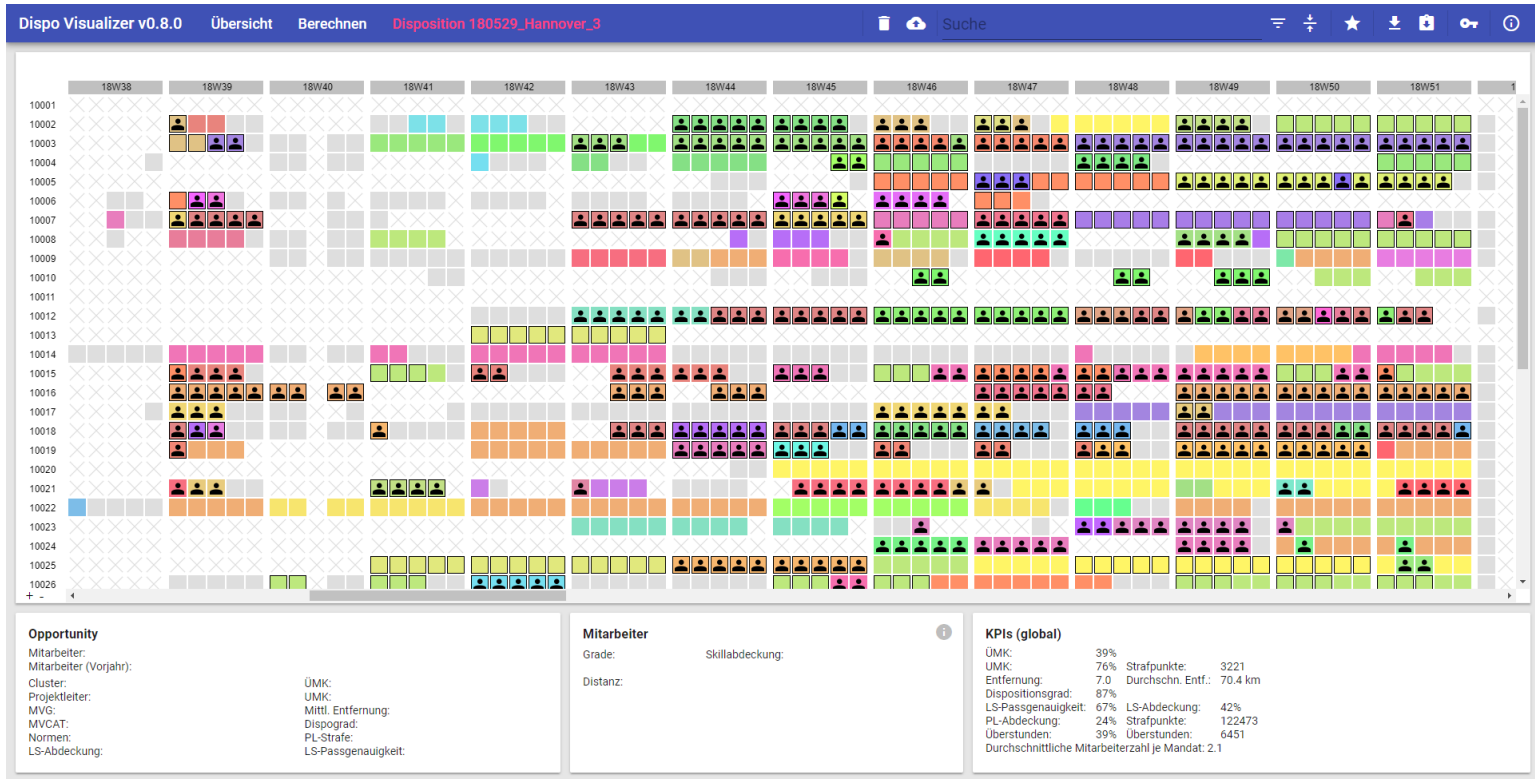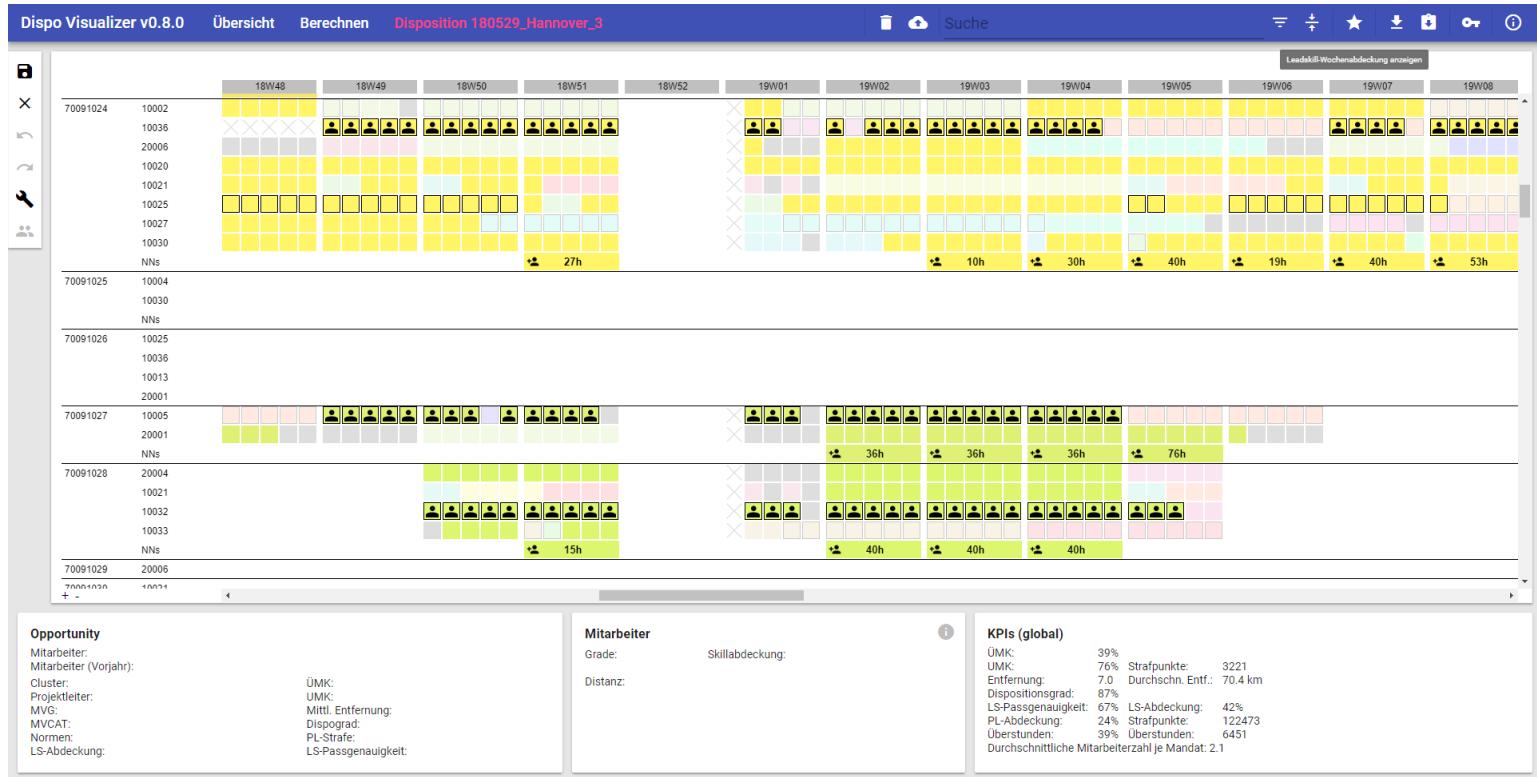
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Remove a block

Unify engagements

EA versus Gurobi

Our Tool

Our Tool

Our Tool