

Connecting With Users Around the World

Opus Suite
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 **Systecon**

30 March 2023

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Tactical Optimisation: From Readiness to Mission Success Practical Workflow Demonstration

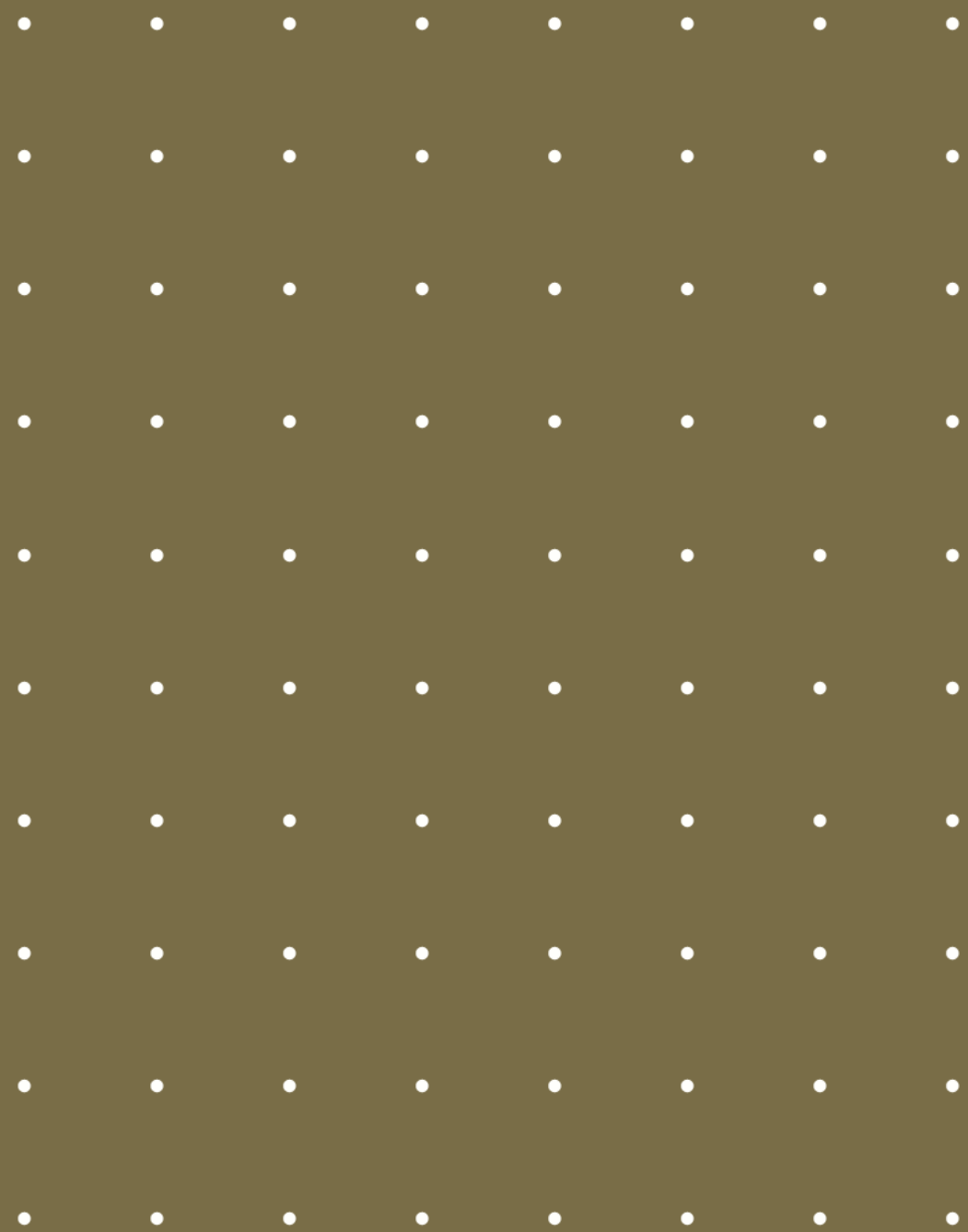
Axel Nyberg
Systecon AB

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suite

 **Systecon**

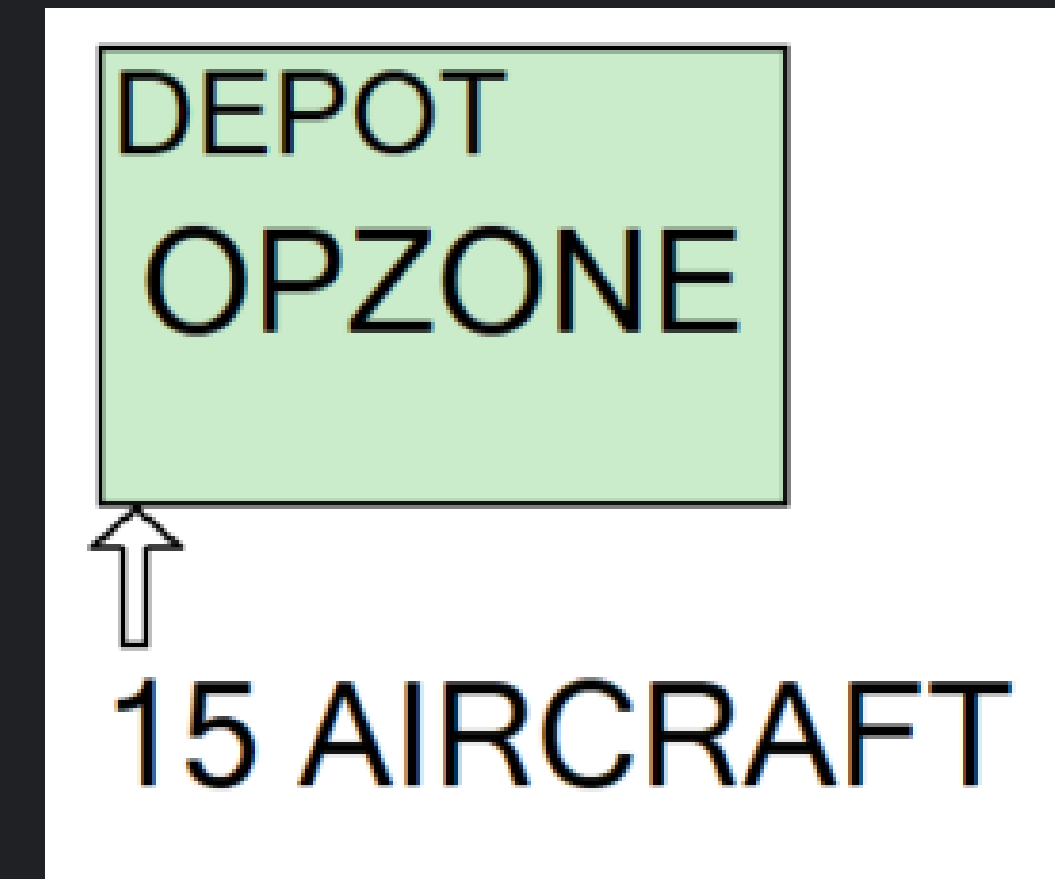
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Scenario

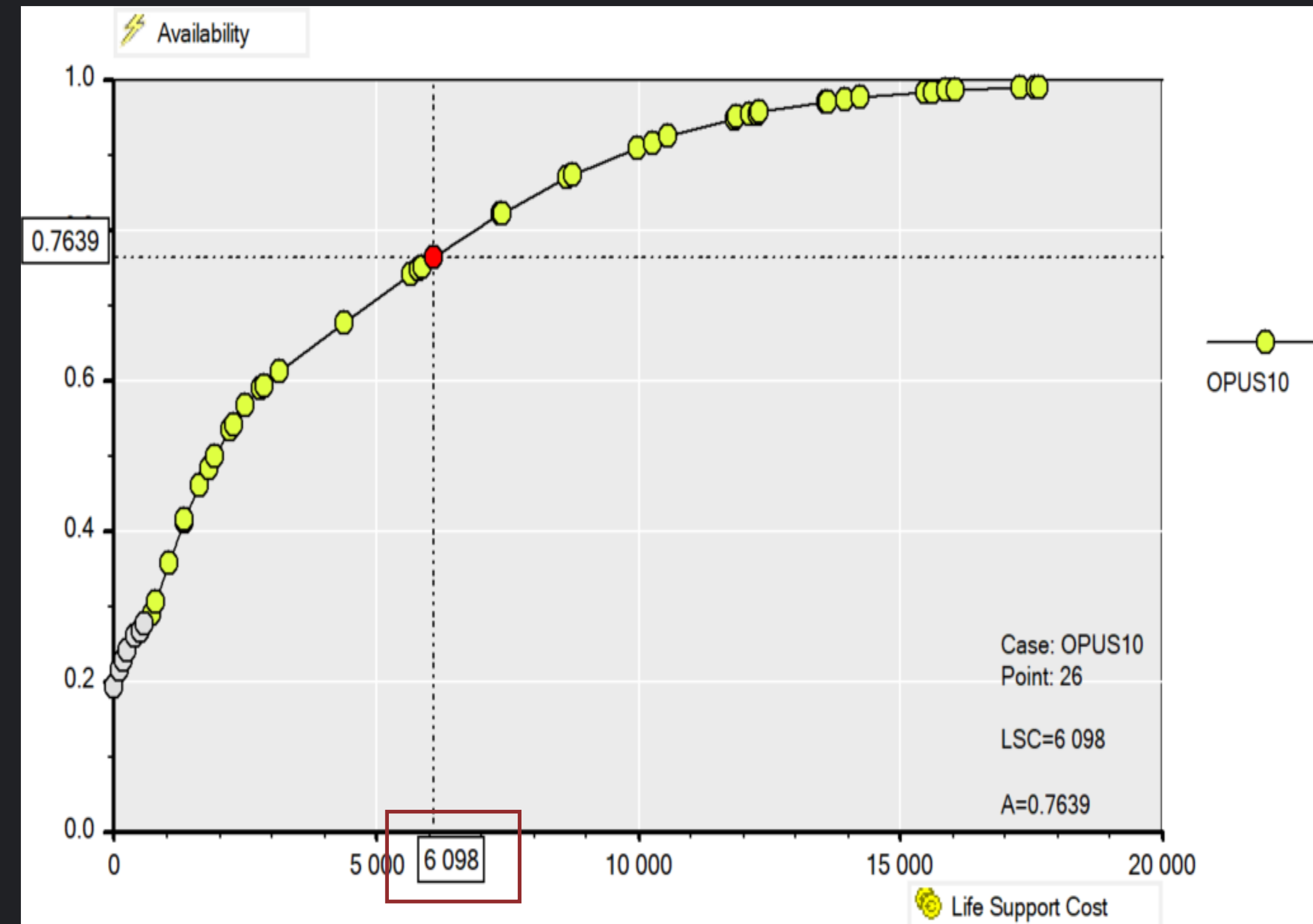
- 15 aircraft
 - 30-day endurance scenario
 - Each day the aircraft fleet will be involved in surveillance missions (7h per day)
 - Each surveillance mission requires at least 12 aircraft
 - Repairs can only be done through replacements
-
- Our assignment: Design a spares Fly Away Kit that meet the following requirements
 - Fly Away Kit weight < 6100 kg
 - Maximize mission success
 - There should be at least 90 % probability to achieve 90 % of the mission time



V AIRCRAFT_VNT [AIRCRAFT_PRODUCT]	
2	BDE_ENGINE / ENGINE, Jet Engine
	BDE_APU / APU, Auxilliary Power Unit
2	BDE_CSD / CSD, Constant Speed Drive
2	BDE_PUMP / PUMP, Hydr. Pump MLG
2	BDE_FCU / FCU, Flight Control Unit
	BDE_STAB CTRL / STAB CTRL, Stab. Controller
2	BDE_GYRO VERT / GYRO VERT, Vertical Gyro
	BDE_DOOR MLG / DOOR MLG, Control Mech Door MLG
	BDE_PITCH COMP / PITCH COMP, Pitch Computer
	BDE_FLAP ACT / FLAP ACT, Flap Actuator

Designing the fly away kit – OPUS10

Should we include all information or just part of the information?
Endurance scenario in Opus10 will give us good solutions.



Enhance the model



Designing the fly away kit – SIMLOX

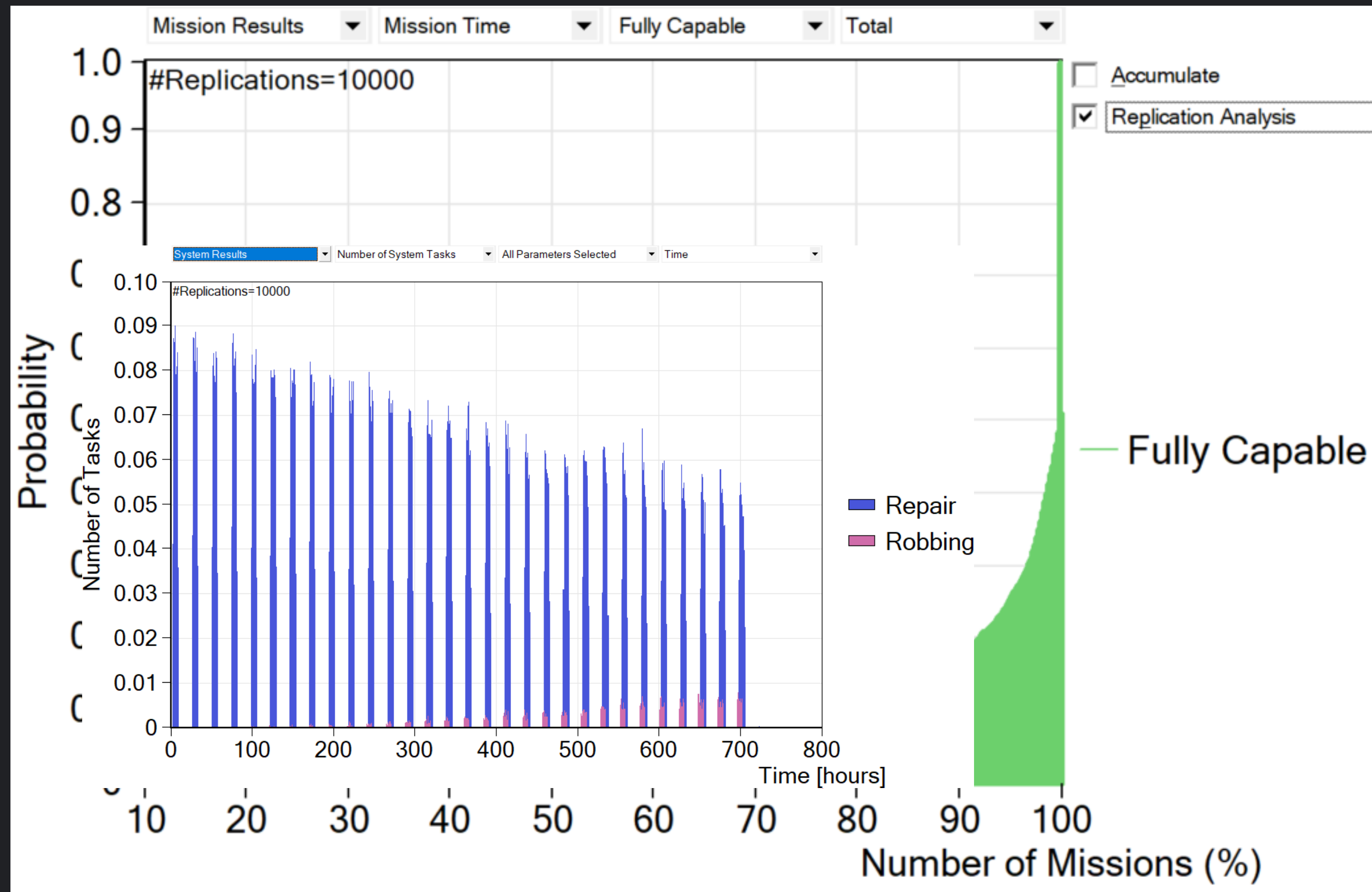
Should we include all information or just part of the information?

Endurance scenario in Opus10 will give us good solutions.

We add information to the model and analyze the effect in SIMLOX:

- Allow cannibalization
- Each mission requires **at least** 12 systems

More interested in mission Success than Availability



Designing the fly away kit – Opus Evo

Same Model as before

Add weights

Selected objective (mission time fraction)

And a max weight (Maximum of 6100 kg)

Run Evo

Add speed





Processing Power

Evo was designed for parallelization

Runs on a laptop or a workstation

Fully scalable when needed

- A few connected computers
- A powerful server
- Cloud (azure)

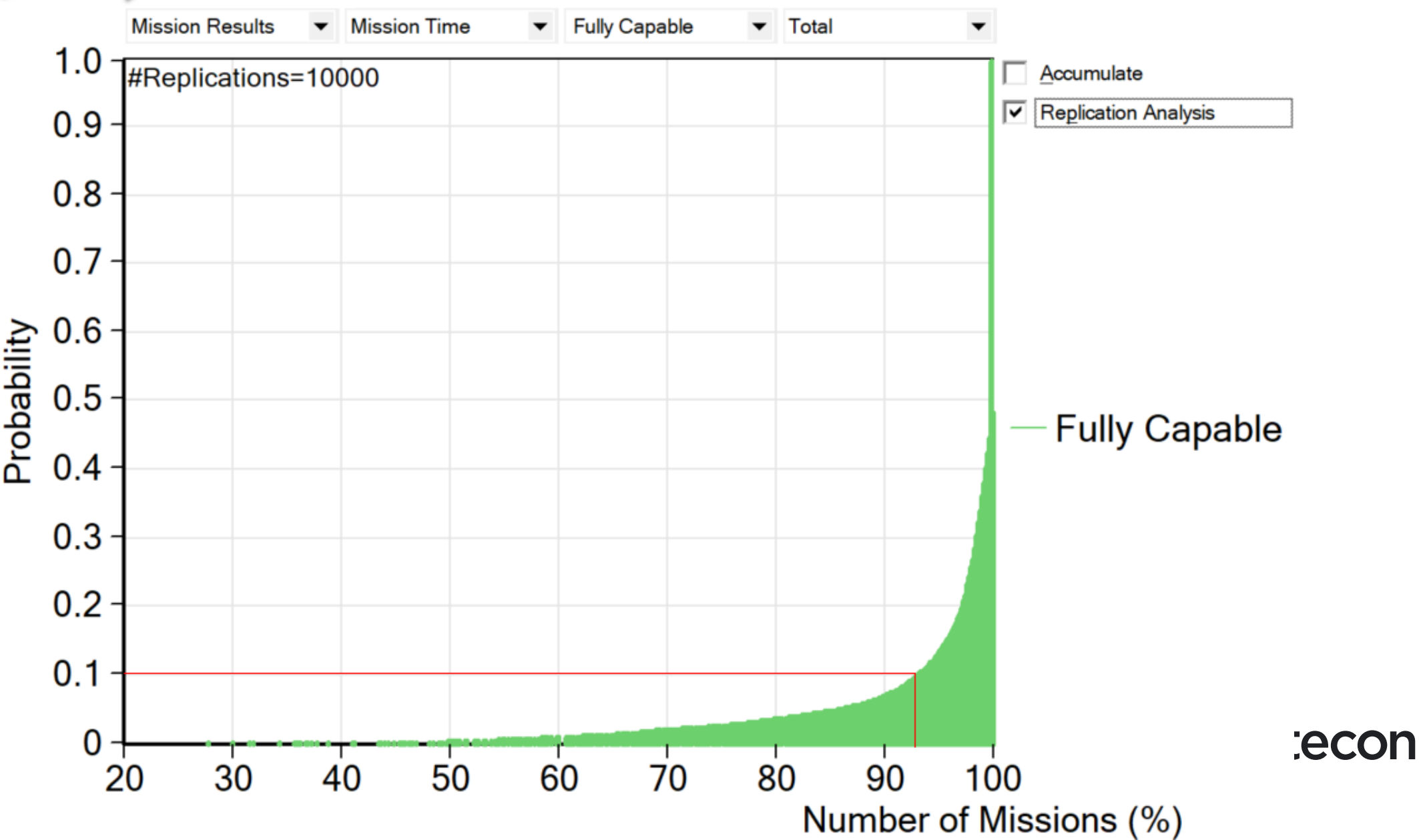
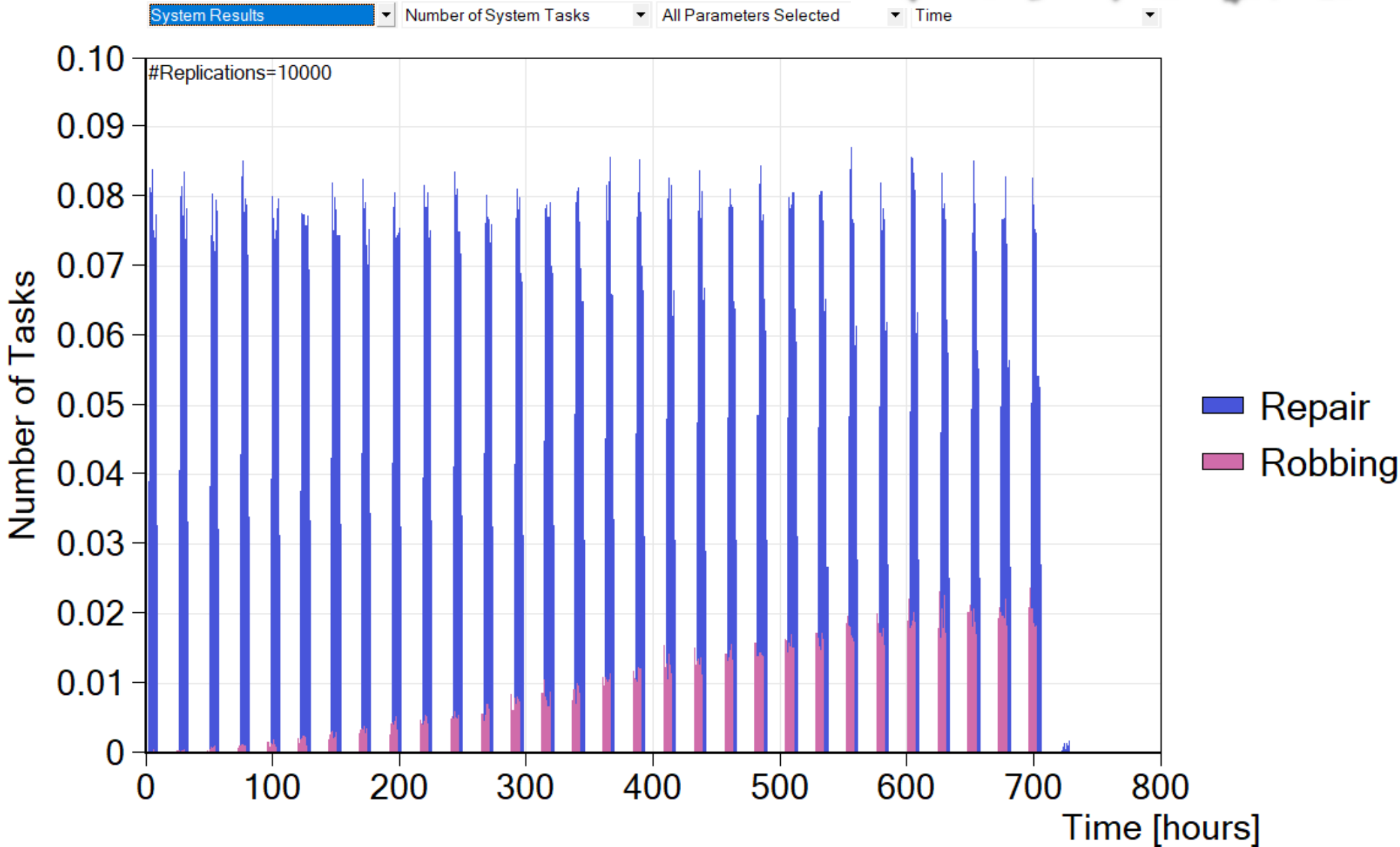
Example (large case):

One laptop	4 cores ~ 4	days
One workstation	10 cores ~ 1.5	days
A decent server	32 cores ~ 12	hours
A fast server	96 cores ~ 4	hours

Or roughly 18 hours on 5 laptops

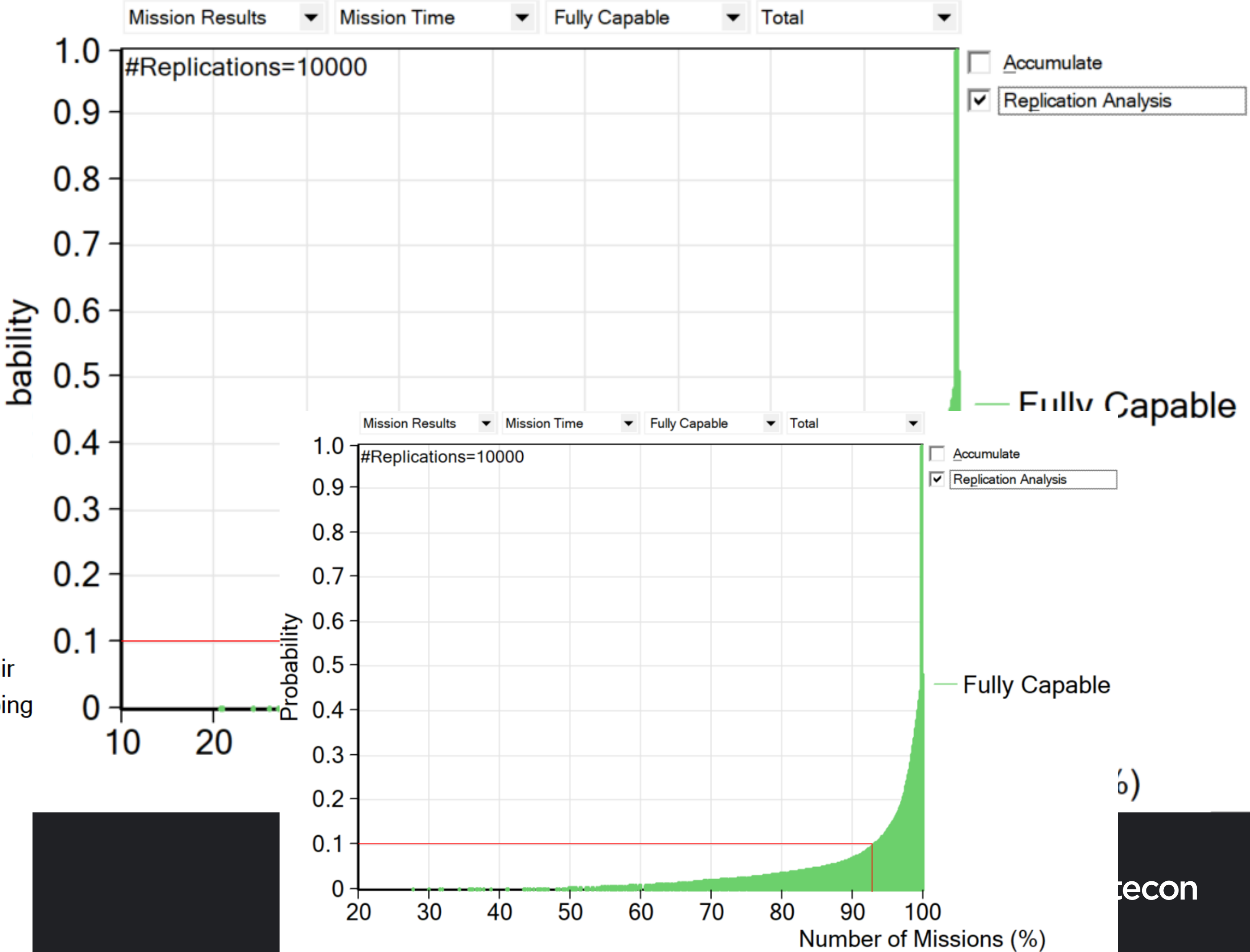
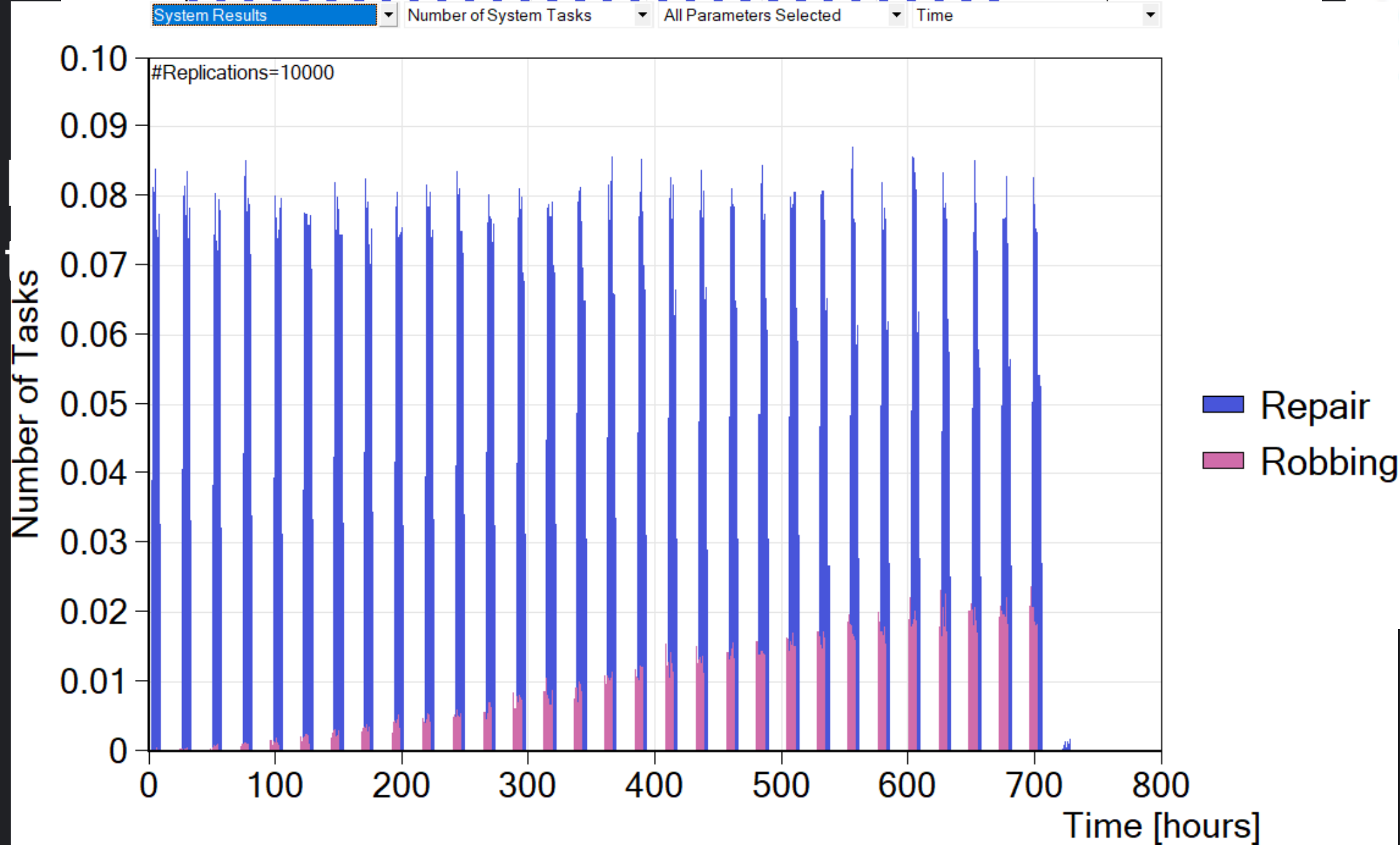
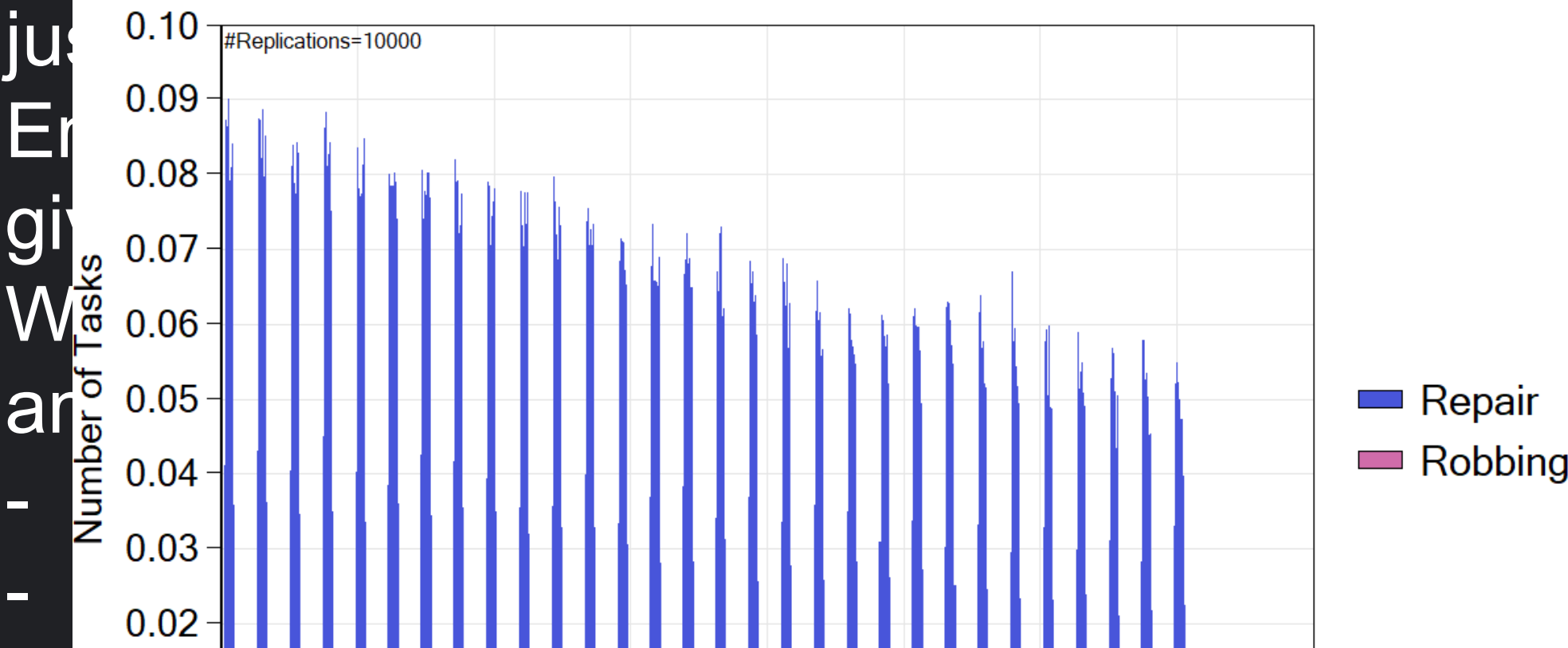
Fly Away Kit 2: OPUS EVO - DEMO

```
Command Prompt
C:\Users\olwi>cd C:\Users\olwi\Desktop\Anvseminarium_2023\02_Dag2\02_EVO\01_SparesPackageOptimization
C:\Users\olwi\Desktop\Anvseminarium_2023\02_Dag2\02_EVO\01_SparesPackageOptimization>OPUSEVO_CLI.exe optimParams.json
-- configuration JSON file: "optimParams.json"
Reading input data
-- input file: C:\Users\olwi\Desktop\Anvseminarium_2023\02_Dag2\02_EVO\01_SparesPackageOptimization\EvaluateMe.sxi
Reading input data
-- input file: C:\Users\olwi\Desktop\Anvseminarium_2023\02_Dag2\02_EVO\01_SparesPackageOptimization\EvaluateMe.sxi
File: C:\Users\olwi\Desktop\Anvseminarium_2023\02_Dag2\02_EVO\01_SparesPackageOptimization\EvaluateMe.sxi
Form: Control
rec 1: (notice #102) Simulation with no stock
Form: SystemDeployment
rec 1: (notice #2097) Implicit unit created: OPZONE
Setting up optimization ...
Starting optimizing ...
Iteration 0. Finished 11:12:37. Best MoE 0.970223.
Iteration 1. Finished 11:12:39. Best MoE 0.970223.
Iteration 2. Finished 11:12:40. Best MoE 0.970223.
Iteration 3. Finished 11:12:42. Best MoE 0.970223.
Iteration 4. Finished 11:12:44. Best MoE 0.973438.
Iteration 5. Finished 11:12:46. Best MoE 0.973438.
Iteration 6. Finished 11:12:48. Best MoE 0.974709.
Iteration 7. Finished 11:12:49. Best MoE 0.974709.
Iteration 8. Finished 11:12:51. Best MoE 0.974709.
Iteration 9. Finished 11:12:53. Best MoE 0.974709.
Iteration 10. Finished 11:12:55. Best MoE 0.976221.
Iteration 11. Finished 11:12:56. Best MoE 0.976221.
Iteration 12. Finished 11:12:58. Best MoE 0.976221.
Iteration 13. Finished 11:12:59. Best MoE 0.980146.
```



Results

Should we include all information or



Thank you.

