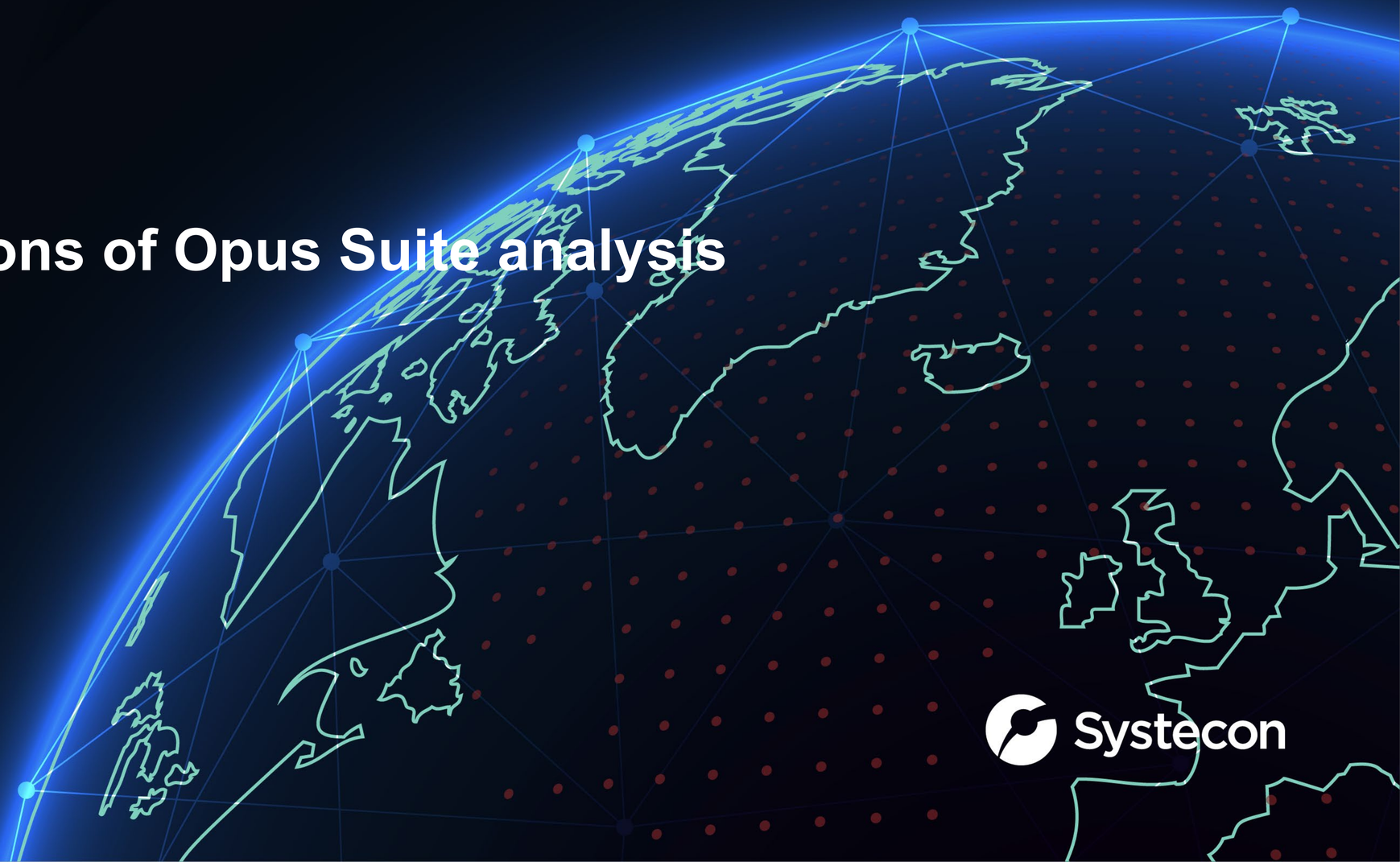
Opus Suite Conference | FUSARO

14 May 2025

Real-world applications of Opus Suite analysis

Younes Lousseief, Systecon AB



by Systecon opus suite

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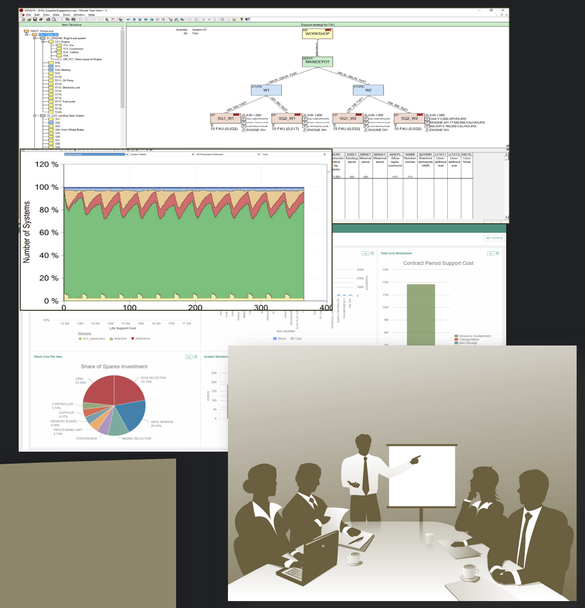
Life Cycle of a model



Value generated

Modeling effort

TIME

Decisions Decisions Decisions Decisions Decisions Decisions Decisions Decisions Decisions

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Michael Johnston

- Systecon Australia
- Experience
  - Avionics Technician, Royal Australian Air Force (15 years)
  - Maintenance Requirement Determination, Groundbased Radar, Australian MoD (1 year)
  - Logistics Modelling and Analysis, Aviation sustainment program, Australian MoD (13 years)
  - Supply Chain Analyst, Boeing Defence Australia, Aviation sustainment and aqcuisition (5 years)
  - Analyst & Consultant, Systecon Australia (4 years....)

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Agenda

1. Performance and cost impact of operational changes
2. Performance and cost impact of supply chain degradation or disruption
3. Item Obsolescence
4. Initial spares solution to support a mid-life upgrade
5. Managing materiel requirements during system withdrawal
6. Materiel requirements for contingency operations

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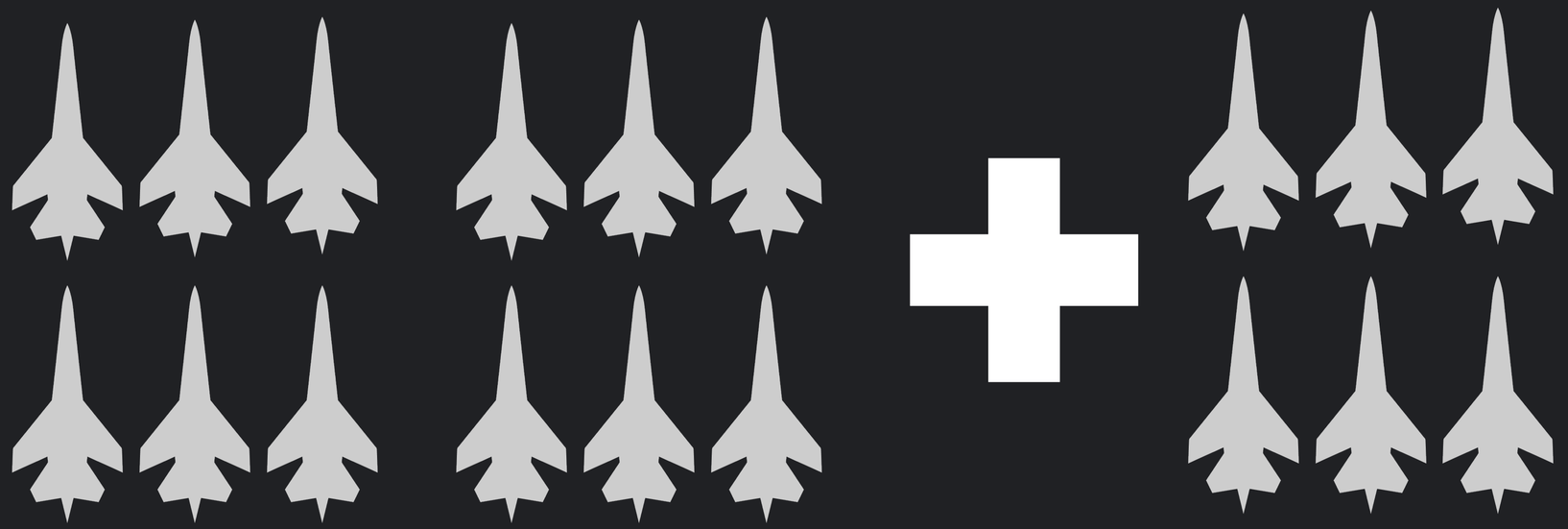
1. Performance and Cost Impact of Operational Changes

Performance and Cost Impact of Operational Changes

'What-If' Fleet Size Increased by 50%



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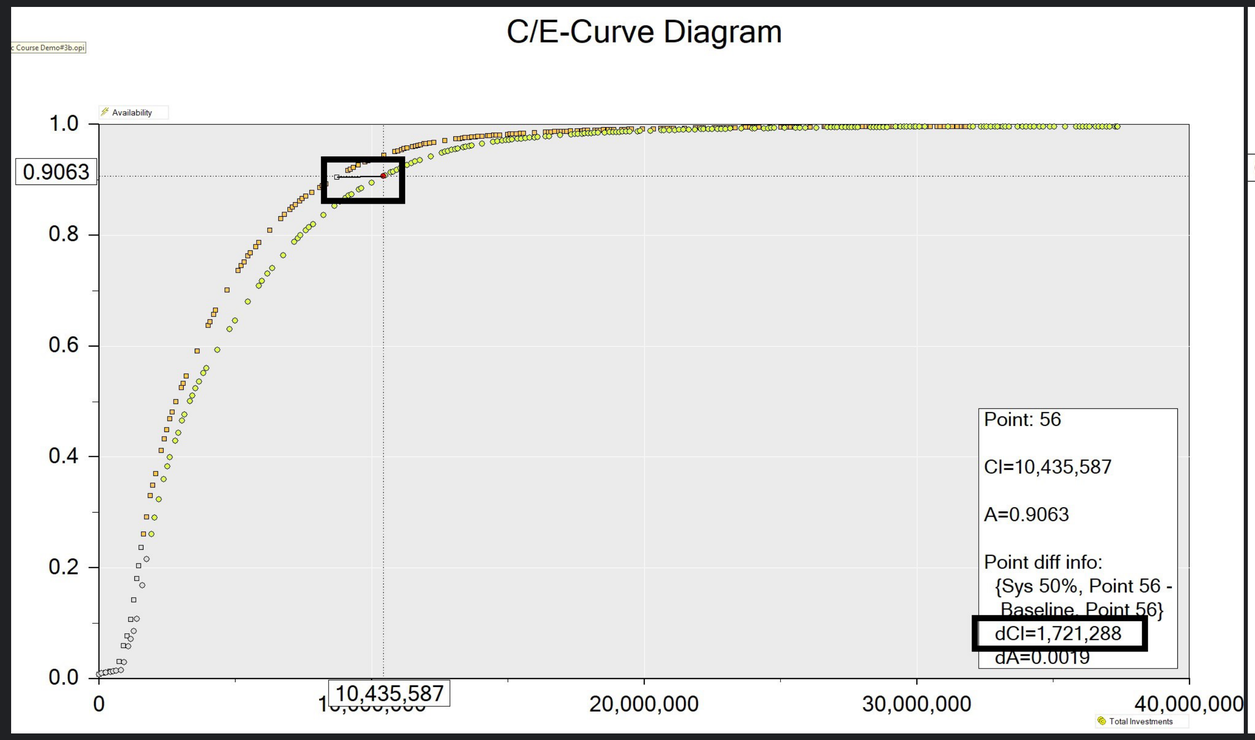
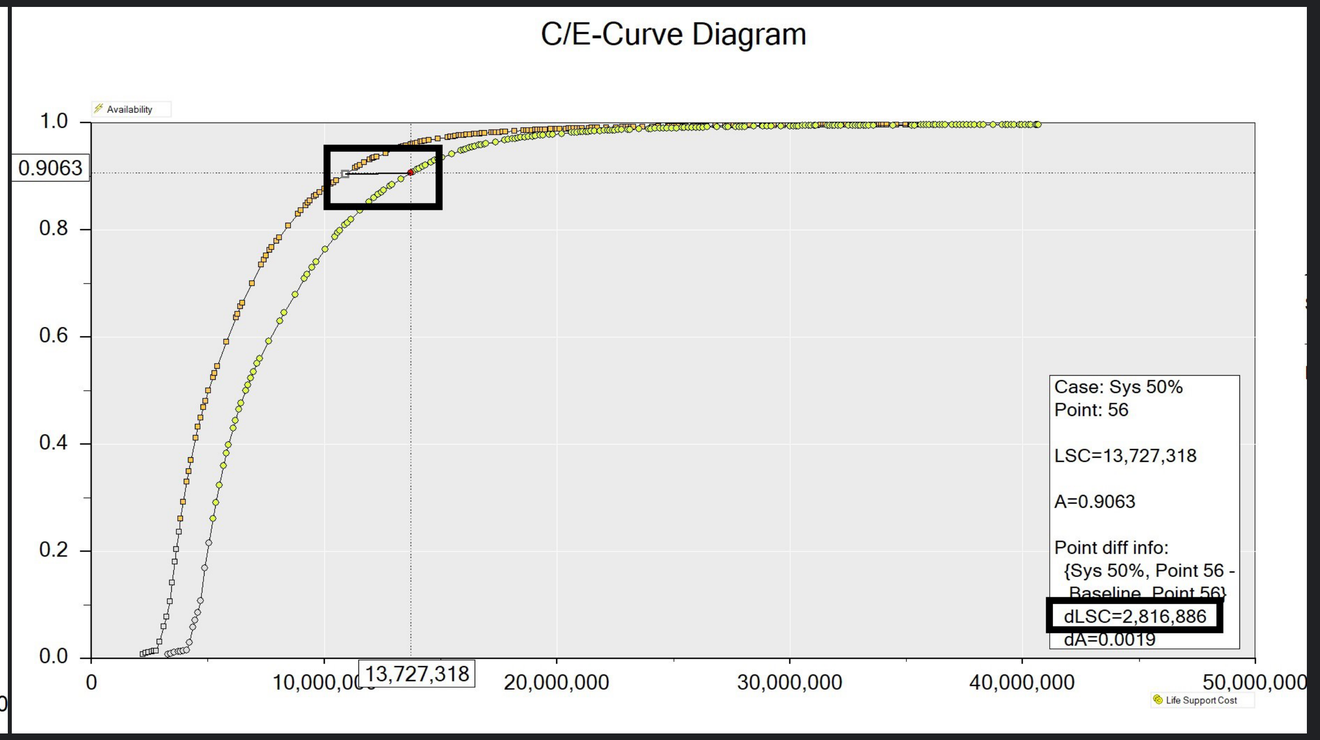
'What-If' Fleet Size Increased by 50%



19.8% Increase in Cost of Initial Spares Solution



25.8% Increase in Life Support Cost (20 Years)

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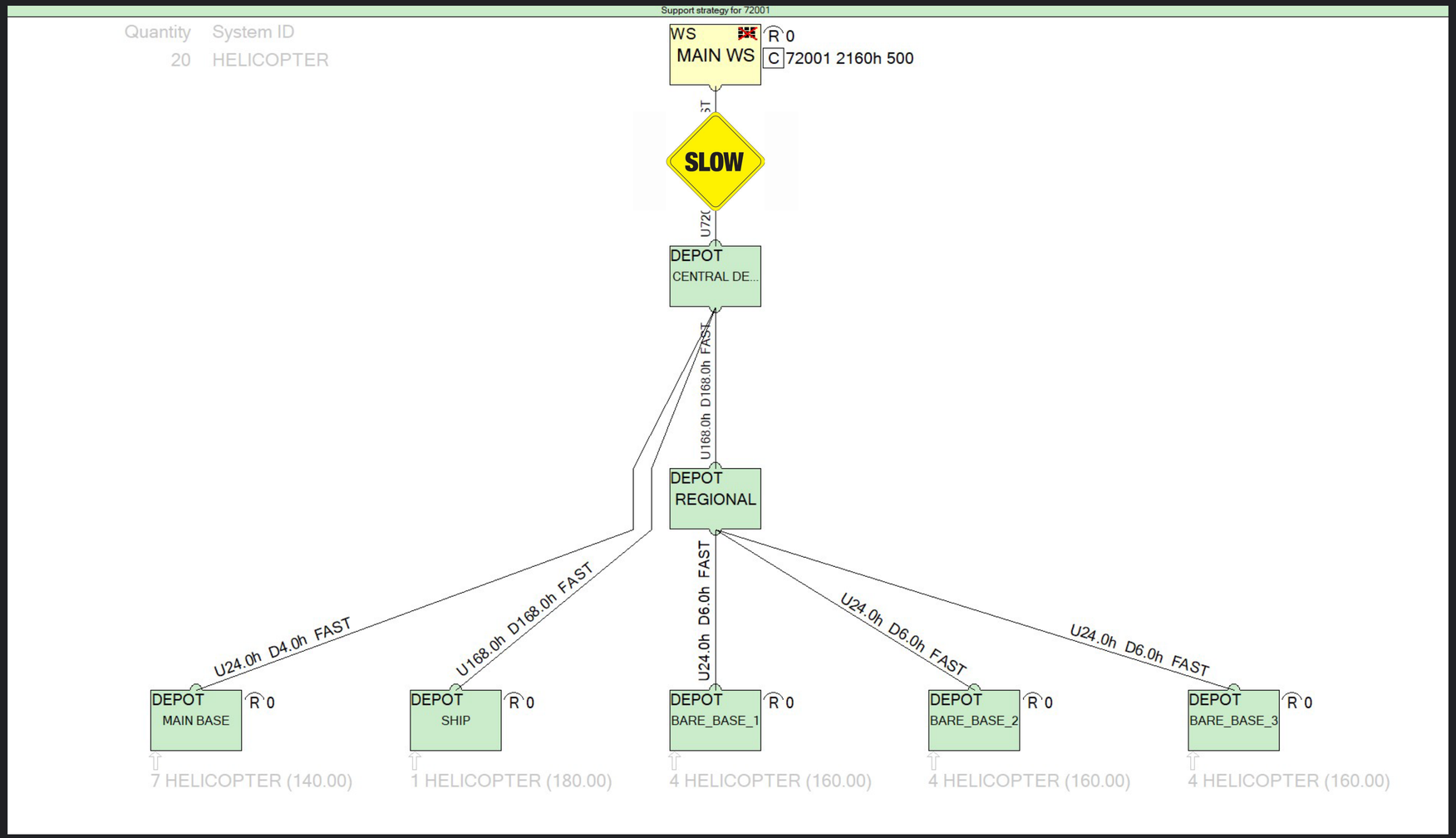
2. Performance and Cost Impact of Supply Chain Degradation or Disruption

'What-If' Supply Chain Legs Disturbed



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'What-If' Supply Chain Legs Disturbed

Item Results			A*	B	C
			Exec Course Demo#1	Exec Course Demo#3b	Exec Course Demo#3b
			56	64	64
	Item	Statio	P	STSIZ	STSIZ
1.	72001	*	3	4	1
2.	72002	*	1	1	0
3.	72003 Engine RH	*	4	5	1
4.	72004	*	1	2	1
5.	72005	*	3	3	0
6.	72006 Engine LH	*	3	5	2
7.	72007	*	3	4	1
8.	72008	*	1	1	0
9.	72009	*	1	1	0
10.	720010	*	2	2	0

Now we know which items are sensitive to the change in our supply chain

What do we do?

Is buying more spares the answer?

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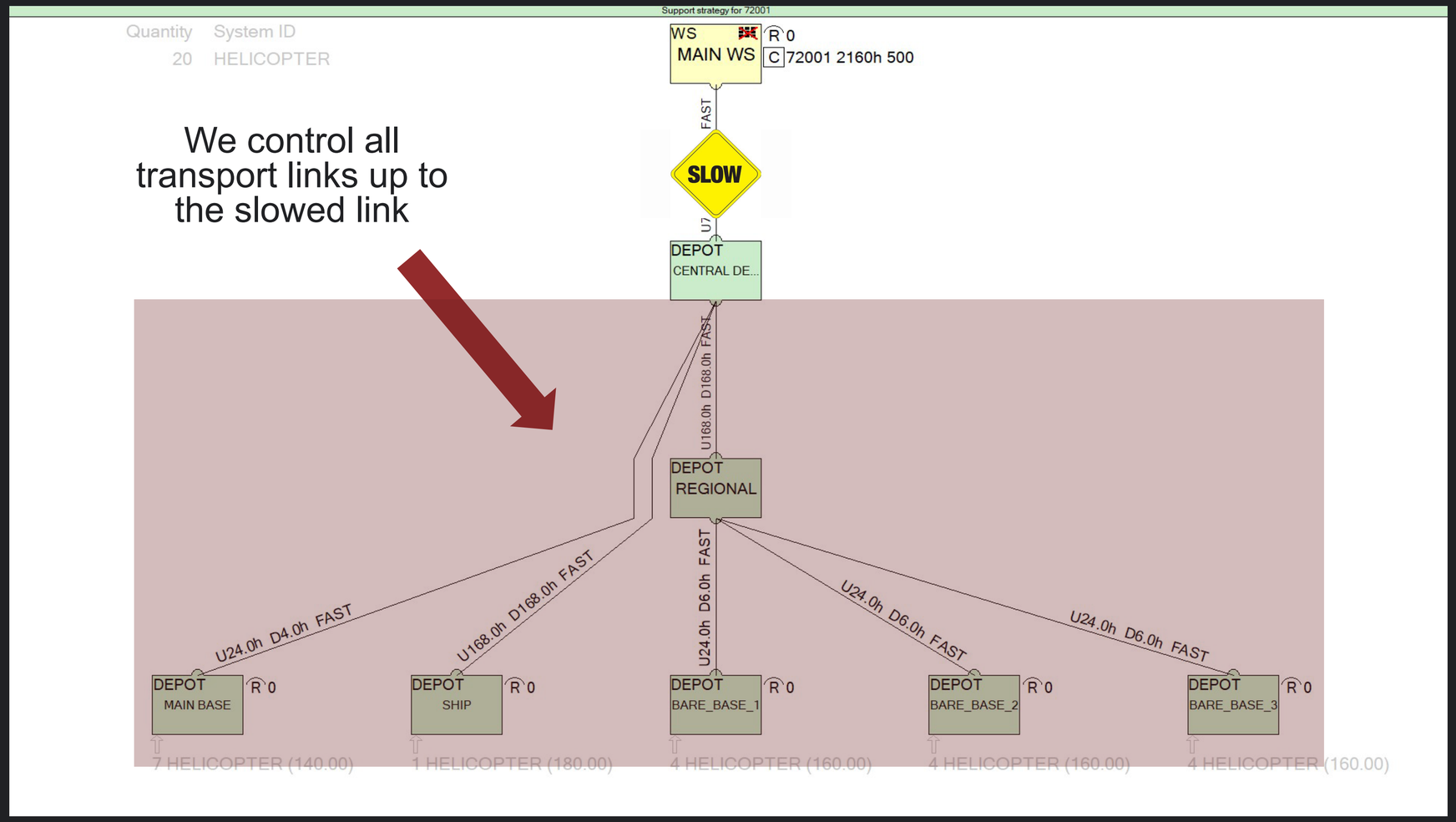
'What-If' Supply Chain Legs Disturbed



For the links we control:

- Communicate constraints to operators
- New policy for sensitive items
- Expedited transport

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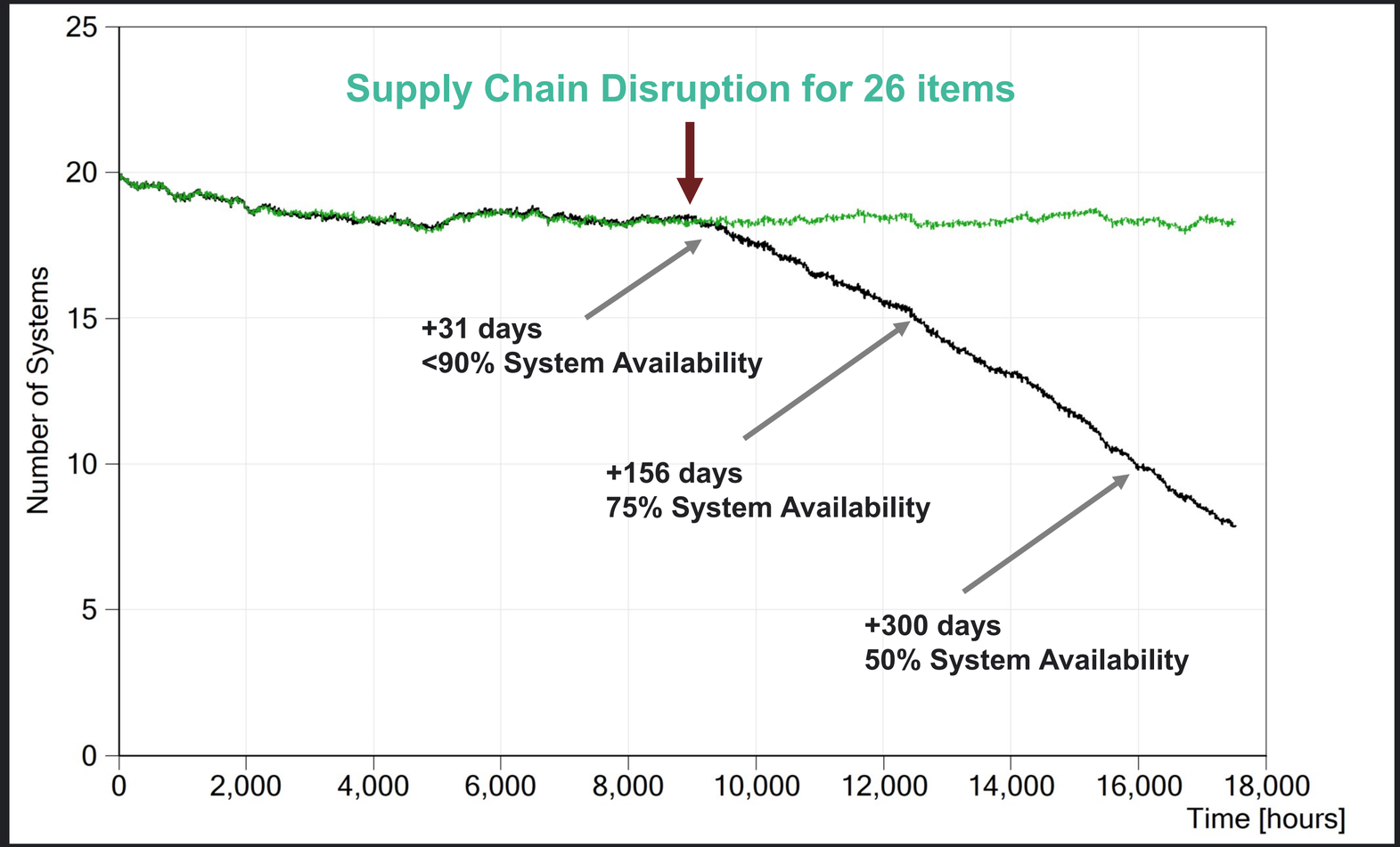
'What-If' Supply Chain Ends



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3. Item Obsolescence

Components Are Us

111 Airport Way, State of Bliss, Utopia
555-555
CompAU@internet.net

04 May 23

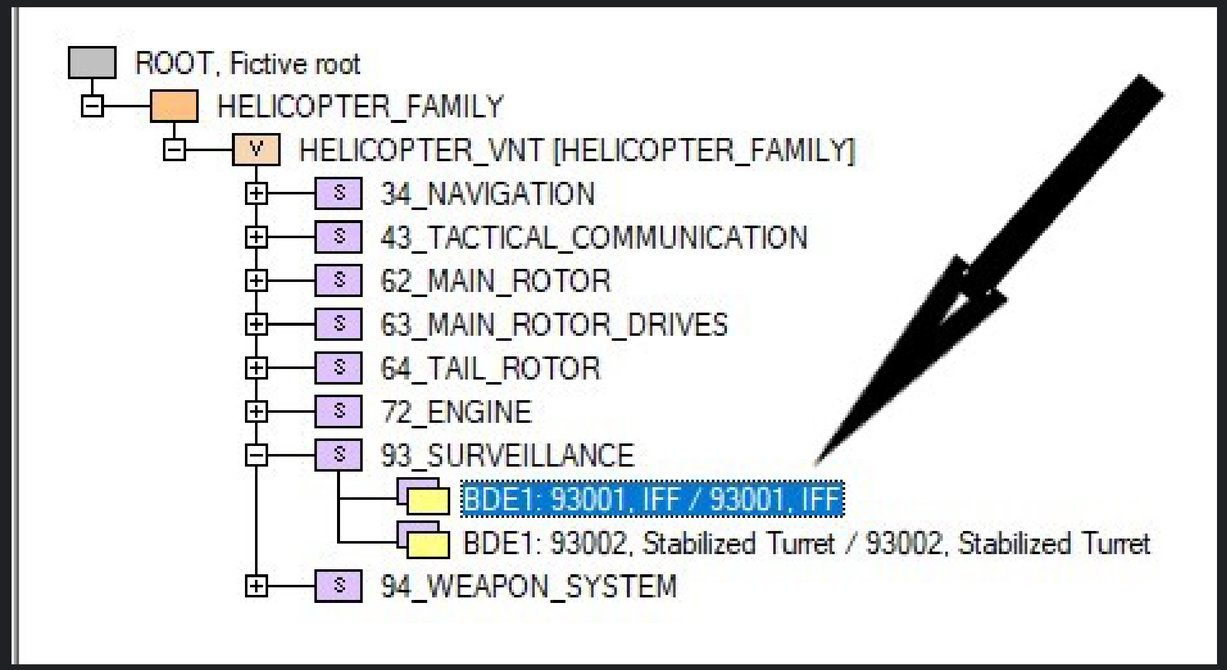
To whom it may concern,

We regret to inform you that the production and repair of Part Number 93001 will be discontinued from 01 Jan 24 due to obsolescence of sub-components and test equipment. We are pleased to offer one last opportunity to procure this item, with orders required by 01 Oct 23.

Warm regards,

Your Name
Manager

Item Obsolescence



How long till stock out?

How long do we need to support it?

Do we need to buy any, if so, how many?

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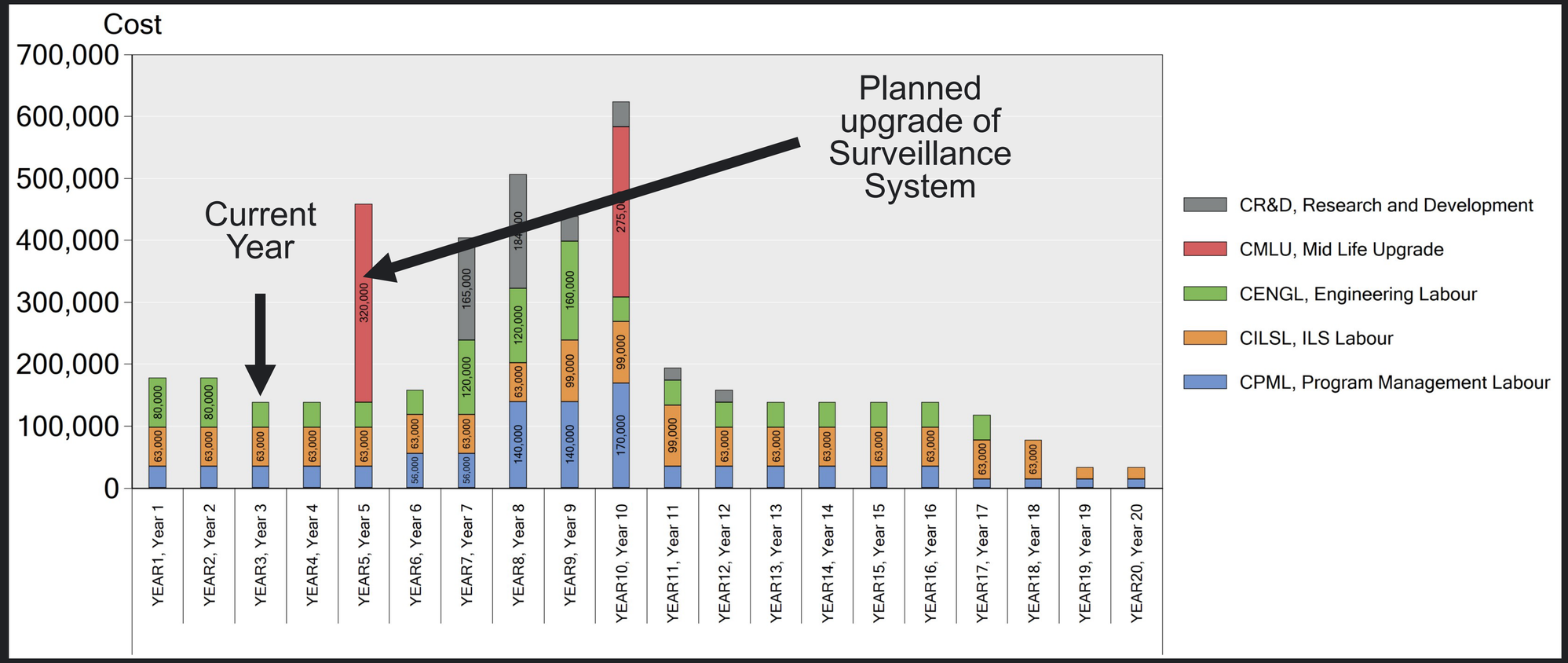
Item Obsolescence



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Item Obsolescence

With only 2 years to cover till the system is replaced, do we:

- Buy additional spares to cover the period?
- Work with the Capability Owner to understand if every System needs the IFF installed all of the time?

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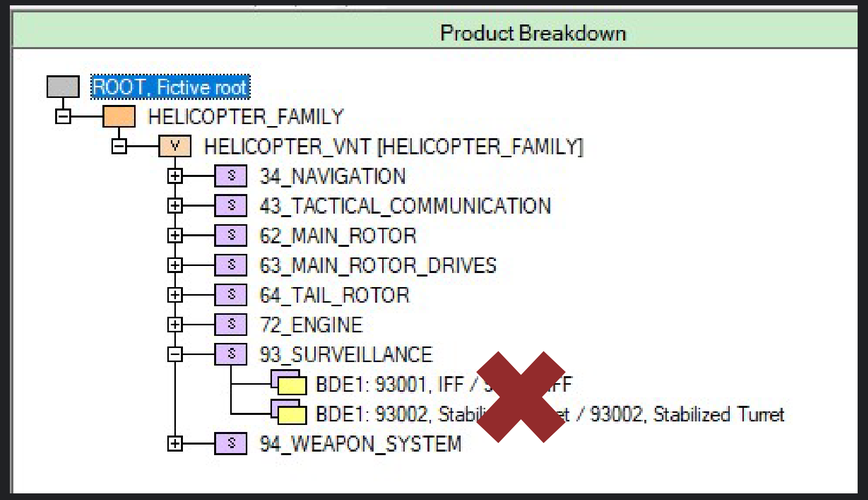
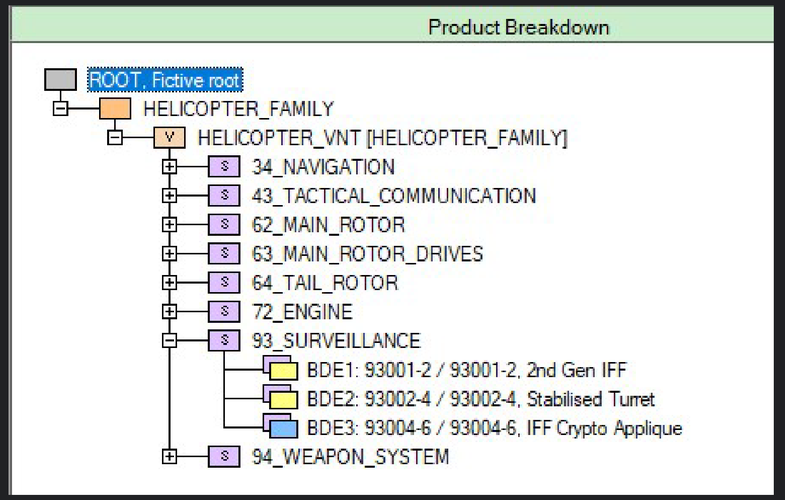
4. Initial Spares Acquisition for Minor Project/ Mid Life Update

Initial Spares Acquisition for Minor Project/Mid Life Update





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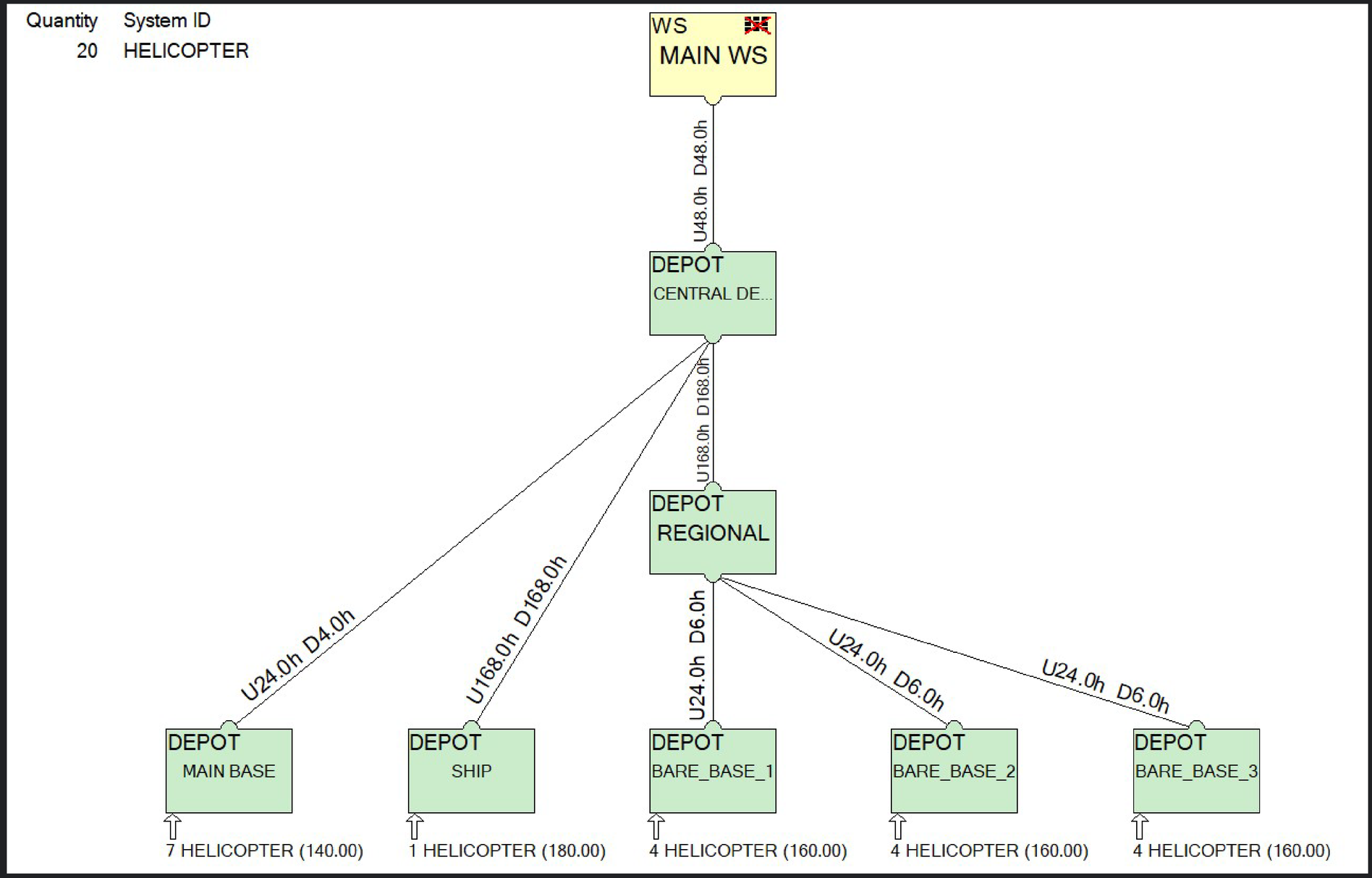
5. When Can Repair Capabilities be Turned Off During Fleet Draw Down

System Withdrawal from Service



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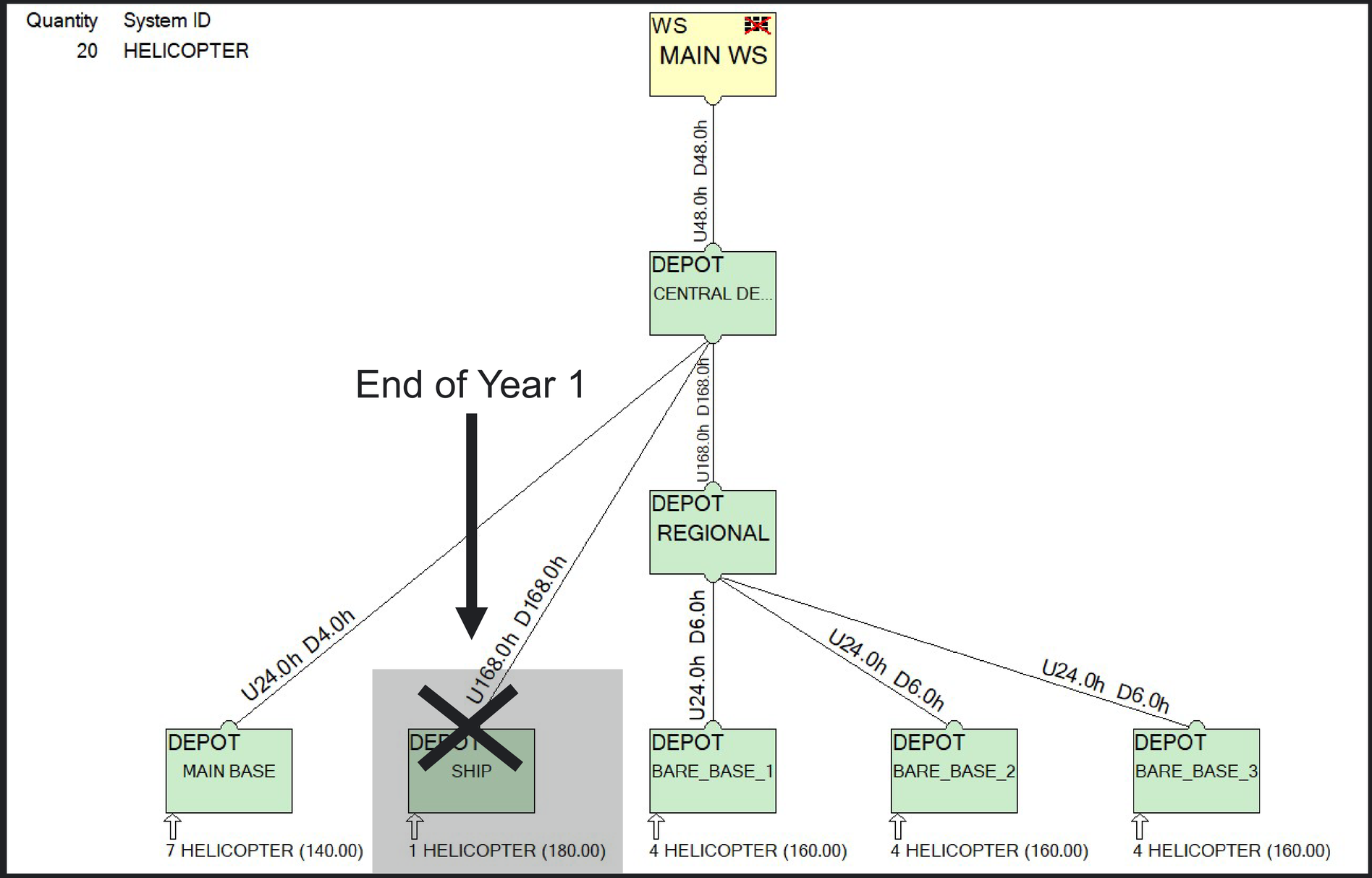
System Withdrawal from Service



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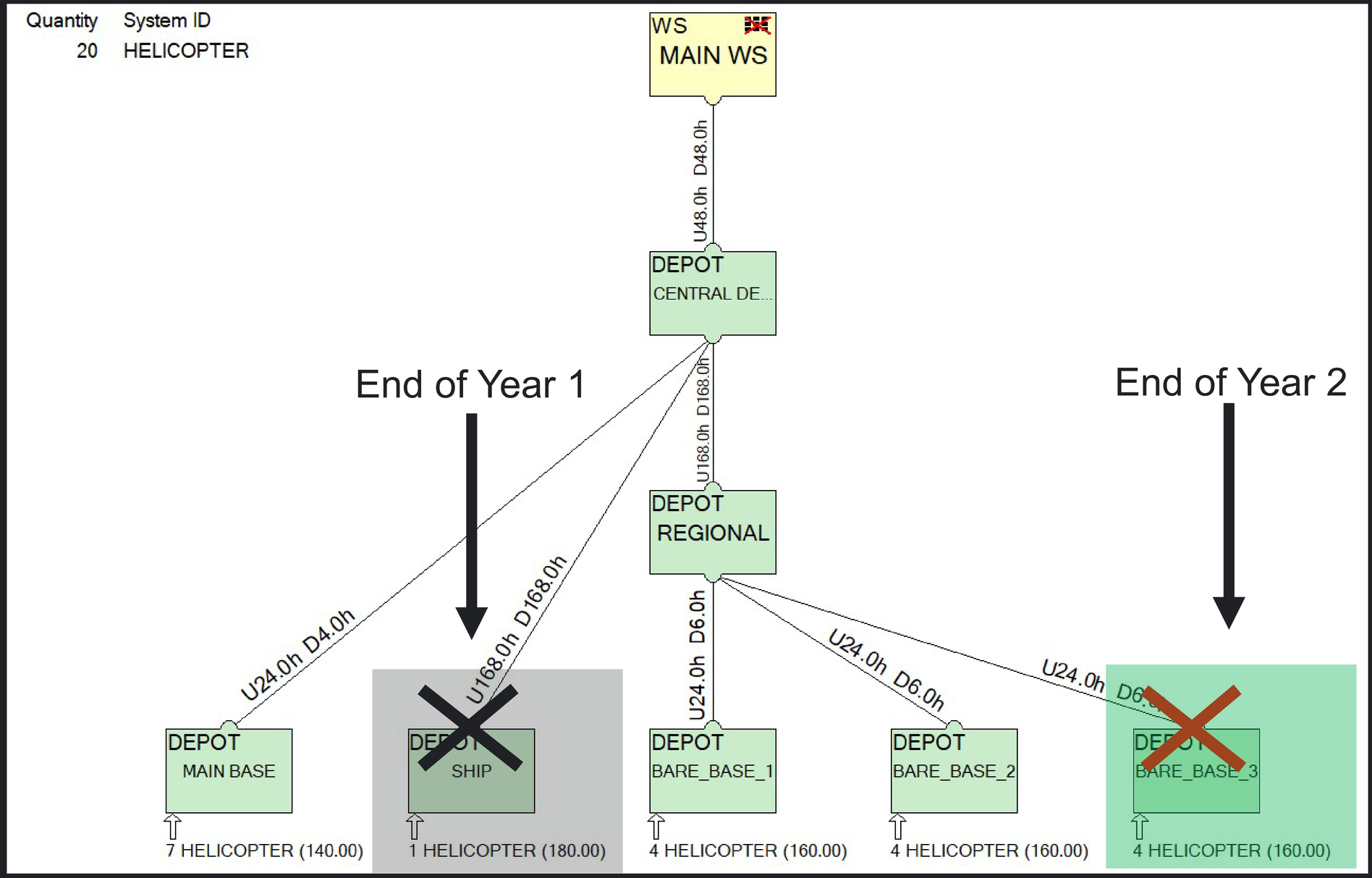
System Withdrawal from Service



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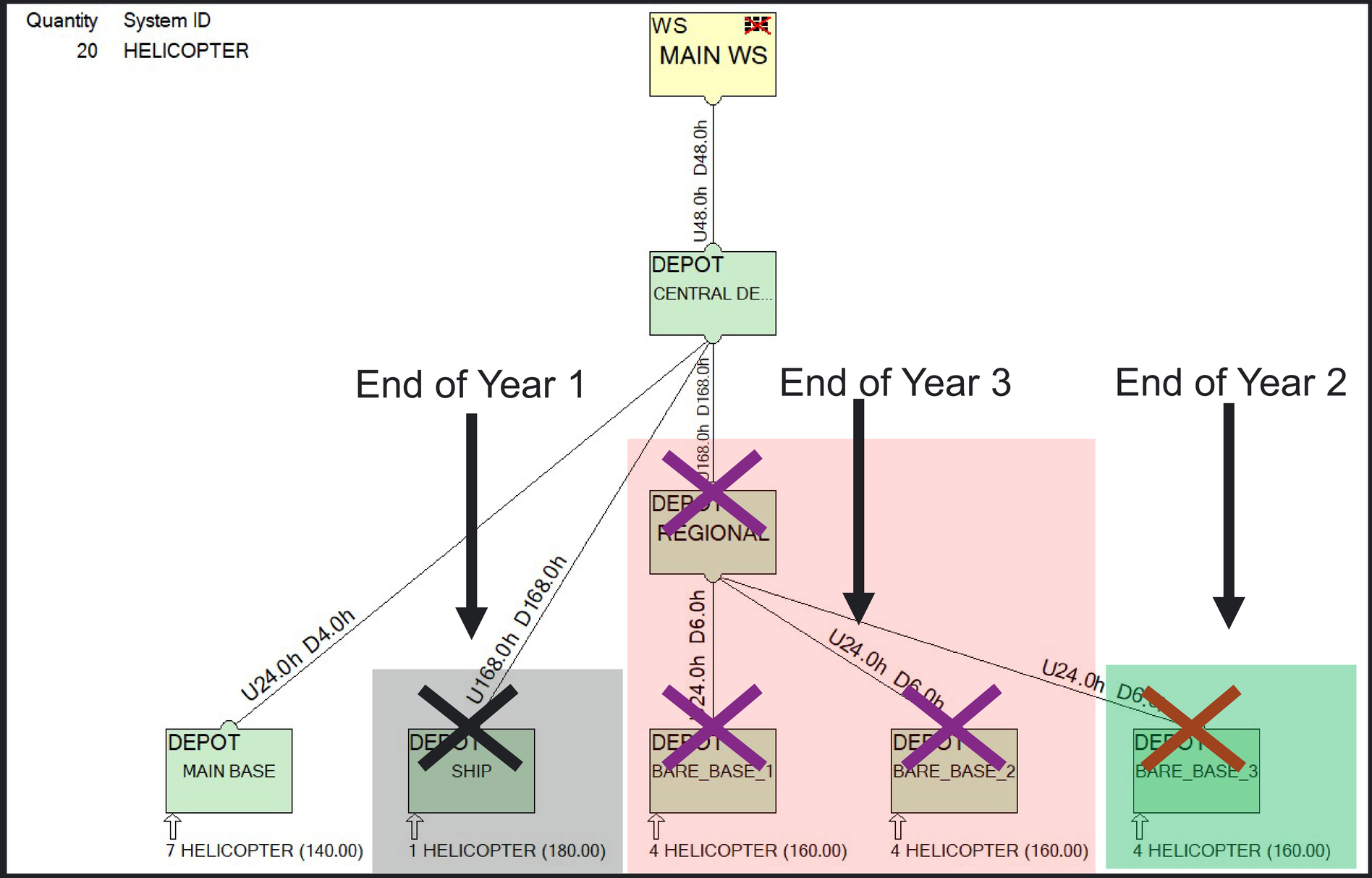
System Withdrawal from Service



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System Withdrawal from Service

Spares requirements

Ensuring operational effectiveness requirements will be maintained when systems are progressively withdrawn from service,

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System Withdrawal from Service

Item Cannibalisation

Determination of items that should be targeted for cannibalisation and when from systems withdrawn from service

System Withdrawal from Service

MRO* Termination

Determination of when repairable item repairs and overhauls should be ceased, and associated MRO contracts terminated.

*MRO = Maintenance Repair and Overhaul

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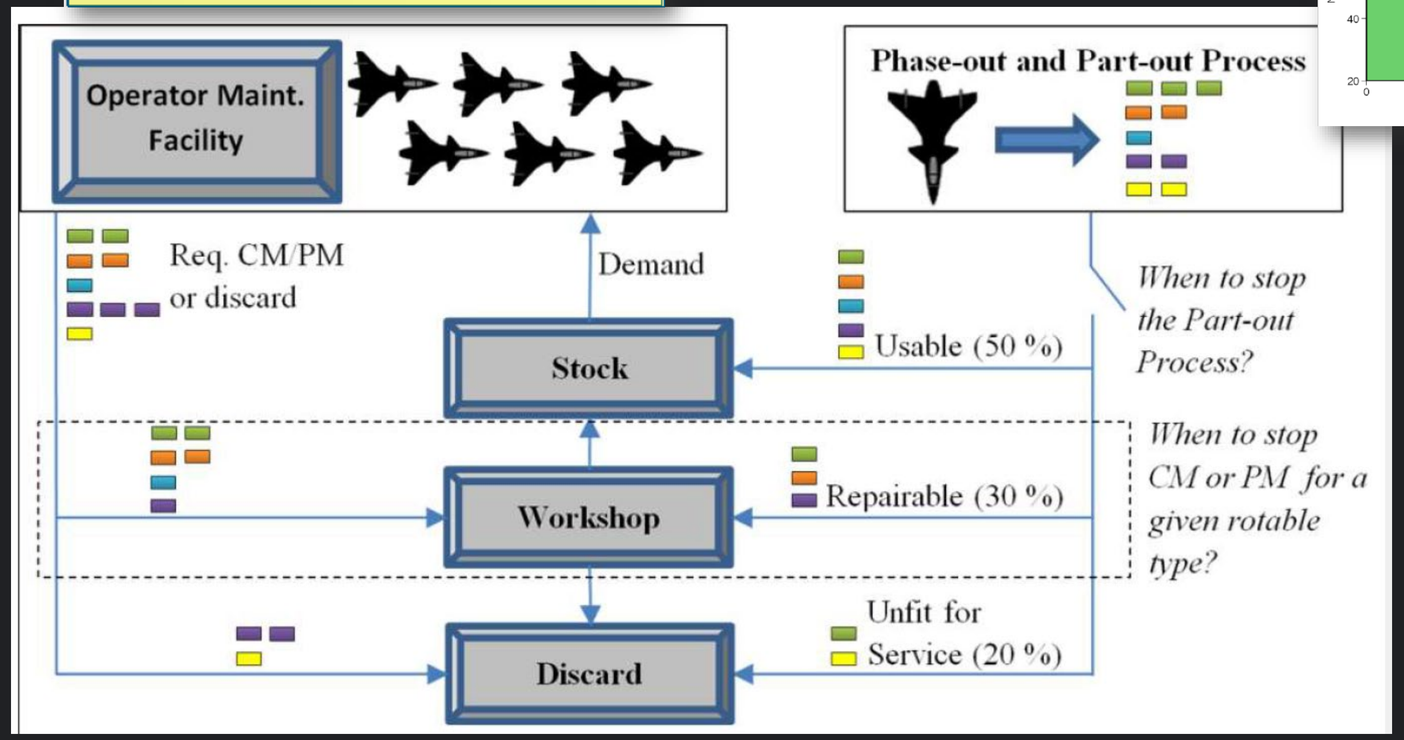
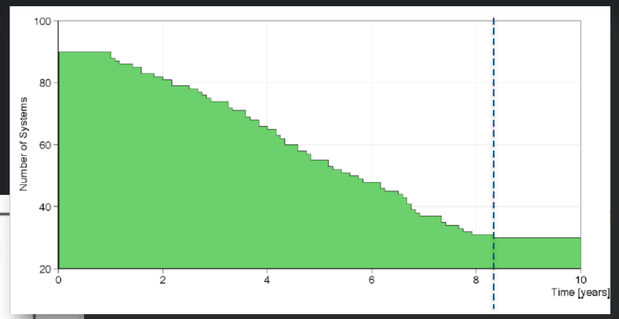
Optimized phase-out strategy

Optimization problem:

$$min\ Cost(t_{CP}, t_{COL})$$

s.t. *no increase in Backorders*





Item ID	t_{CM}^{opt}	t_{PM}^{opt}
Warning Beacon	7.65 years	3.20 years
Relief Valve	6.62 years	4.11 years
Transducer	1.37 years	7.53 years
Cut-Off Valve	7.53 years	3.88 years
A/C - Start Generator	7.65 years	5.82 years
Hydraulic Generator	5.71 years	1.26 years
Electric Motor	4.79 years	6.74 years
Electric Jack	7.65 years	4.68 years
Oxygen Hose	2.74 years	7.88 years
Cooling Turbine	7.53 years	4.00 years

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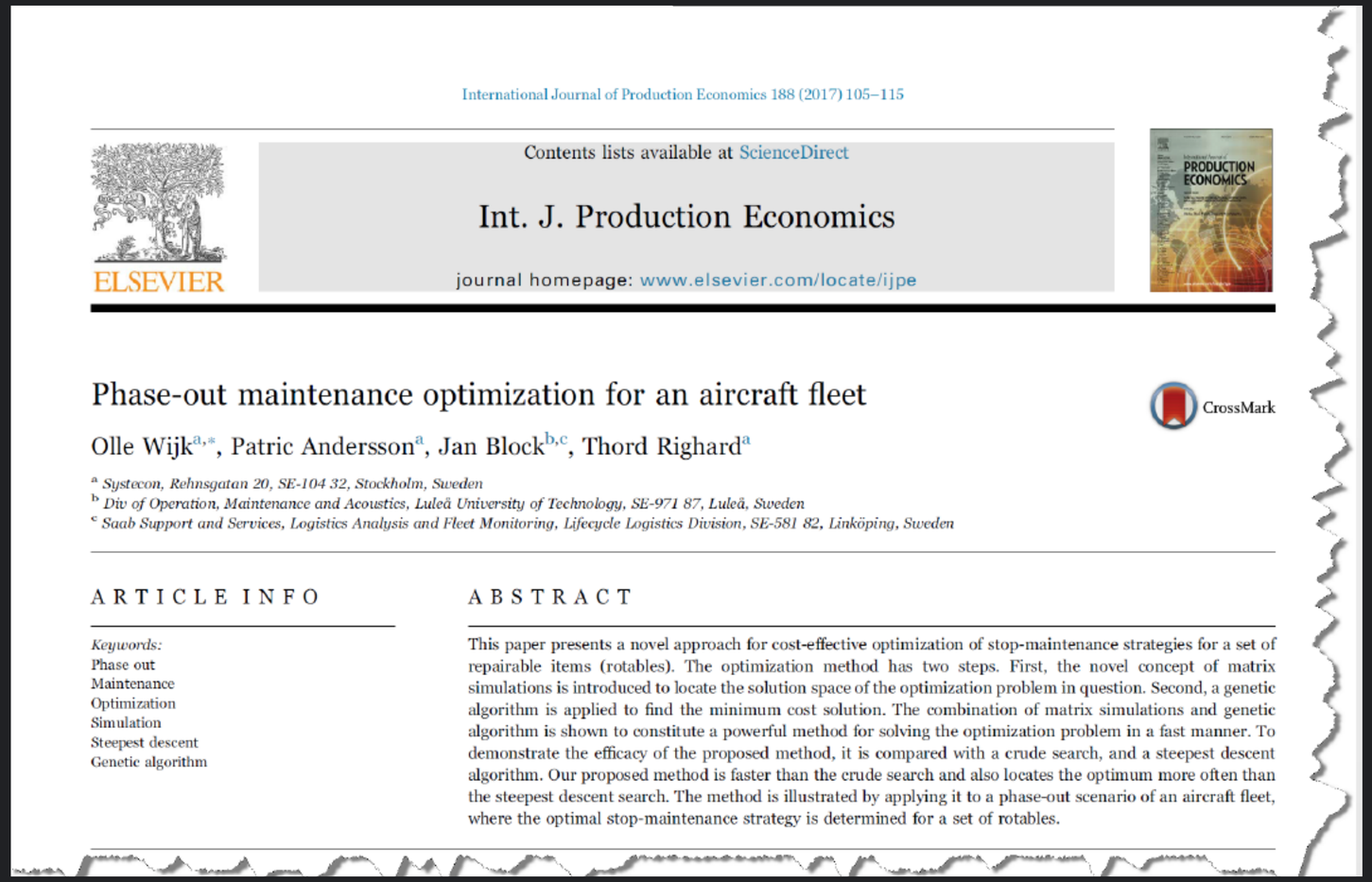
Optimized phase-out strategy

Publication



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Phase-out maintenance optimization for an aircraft fleet

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Optimization
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Steepest descent
Genetic algorithm

ABSTRACT

This paper presents a novel approach for cost-effective optimization of stop-maintenance strategies for a set of repairable items (rotables). The optimization method has two steps. First, the novel concept of matrix simulations is introduced to locate the solution space of the optimization problem in question. Second, a genetic algorithm is applied to find the minimum cost solution. The combination of matrix simulations and genetic algorithm is shown to constitute a powerful method for solving the optimization problem in a fast manner. To demonstrate the efficacy of the proposed method, it is compared with a crude search, and a steepest descent algorithm. Our proposed method is faster than the crude search and also locates the optimum more often than the steepest descent search. The method is illustrated by applying it to a phase-out scenario of an aircraft fleet, where the optimal stop-maintenance strategy is determined for a set of rotables.

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6. Materiel Requirements for Contingency Operations

Recognize the conversation?

Why do we need so many spare parts?

But we don’t have a budget for that!

If we go to war...

Well this is system for military use!

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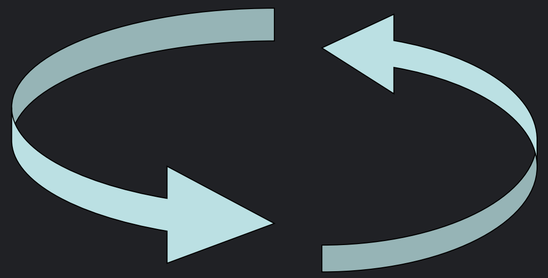
Materiel Requirements for Contingency Operations

To understand the Materiel requirement, we must model the whole Supply Chain.

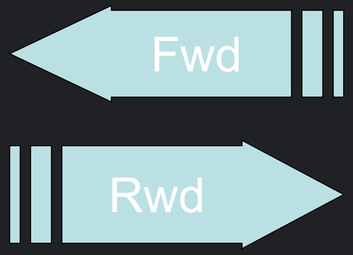
Deployed Location



Operations and maintenance

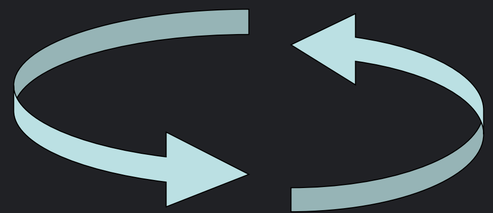
Capability Owner

Deployed Supply Chain



Joint Logistics Command

MOB / RTS



Operations and maintenance

Capability Owner/ System Program Office

Component Repair

AUS & CONUS & Europe

System Program Office

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Process

Capability Owner

Deliberate Planning

Operational Plans

System Program

Modelling & Analysis

Costed Analytical “Solution”

Capability Owner + System Program office

Solution Development

Agreed Deficiencies

Capability Owner + System Program office

Execution of Agreed Solution

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Developing a Solution

Supply

Solution Levers could include:

1. Rear Supply Chain improvement (MOB to Repair)
2. Forward Supply Chain improvement (MOB-FOB)
3. Cannibalize systems not in use.
4. Purchase additional materiel.

Execution

Capability Owner
+
System Program office

Solution Development

System program Office Modelling & Analysis

Demand

Solution Levers could include:

1. Review work up plans
2. Review Planned Operations
3. Potential engineering/reliability system changes

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Key Takeaways

1. You don’t build a model for a one-time-use.
2. The model doesn’t need to be very complex.
3. A model helps to pin-point important aspects to consider in a decsion.

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Grazie per l'attenzione

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