30th Annual INCOSE international symposium

Virtual Event
July 20 - 22, 2020

KONGSBERG

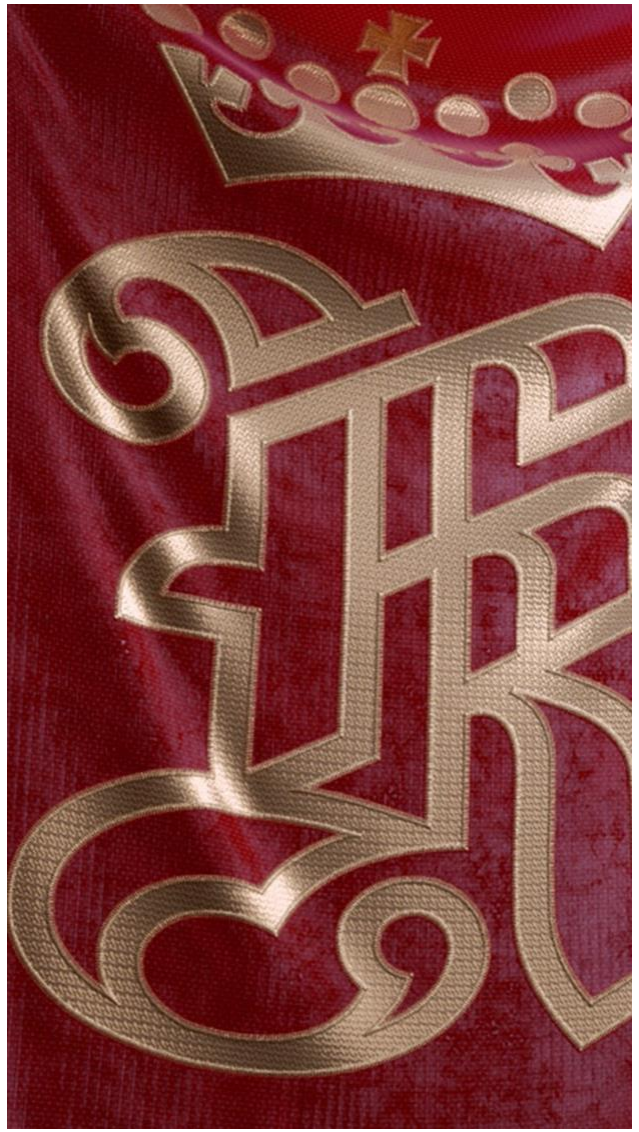
University of South-Eastern Norway

Lundin Energy Norway

Creating and Applying Total Cost Model: A Case Study in Last Time Buy Estimation

Authors: Lasse Andre Sletaker, Arild Gonsholt, Gerrit Muller, and Satyanarayana Kokkula

www.incose.org/symp2020



7 400
EMPLOYEES

34
COUNTRIES

2018

$1.7 billion
REVENUES

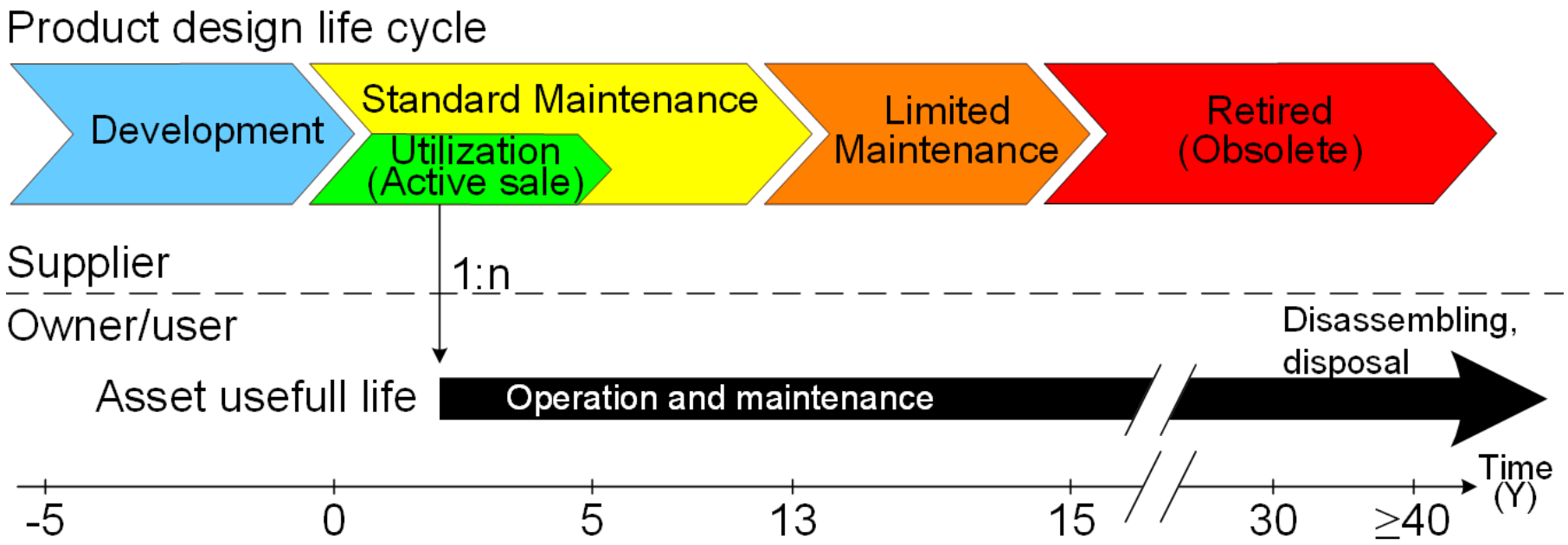
PRODUCTS ONBOARD
30 000
VESSELS

Kongsberg Maritime (KM)

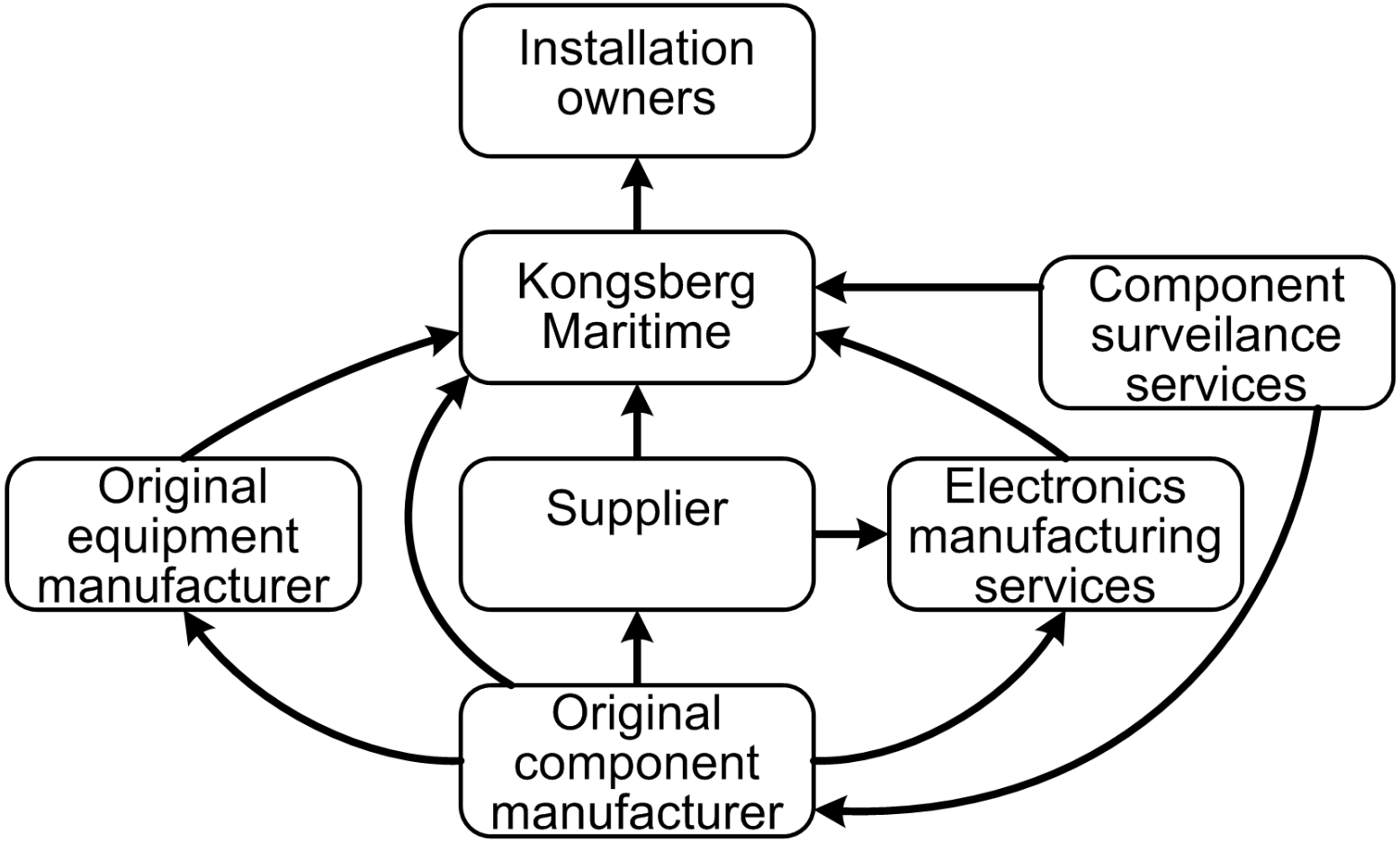
KONGSBERG

Oil & Gas
Seaborn Transportation
Sensors and Robotics
Propulsion Systems
Dech Machinery

Design owner and design user



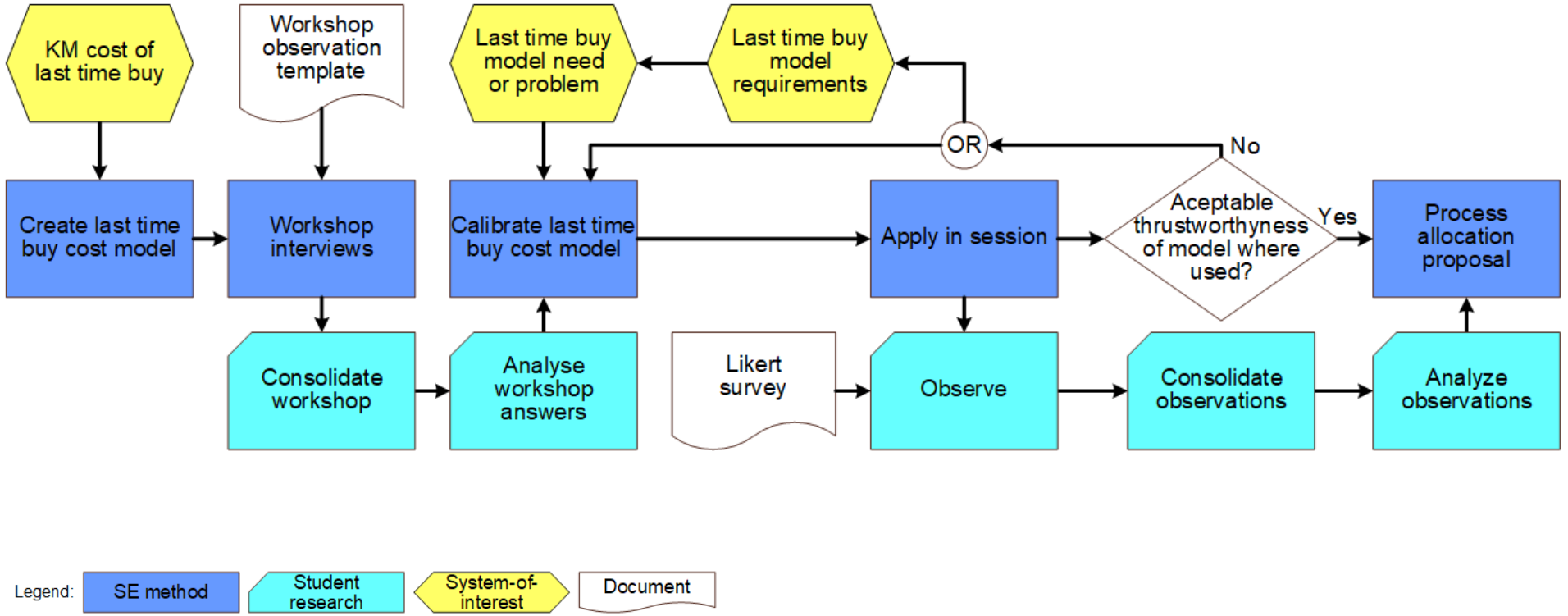
Supply chain network



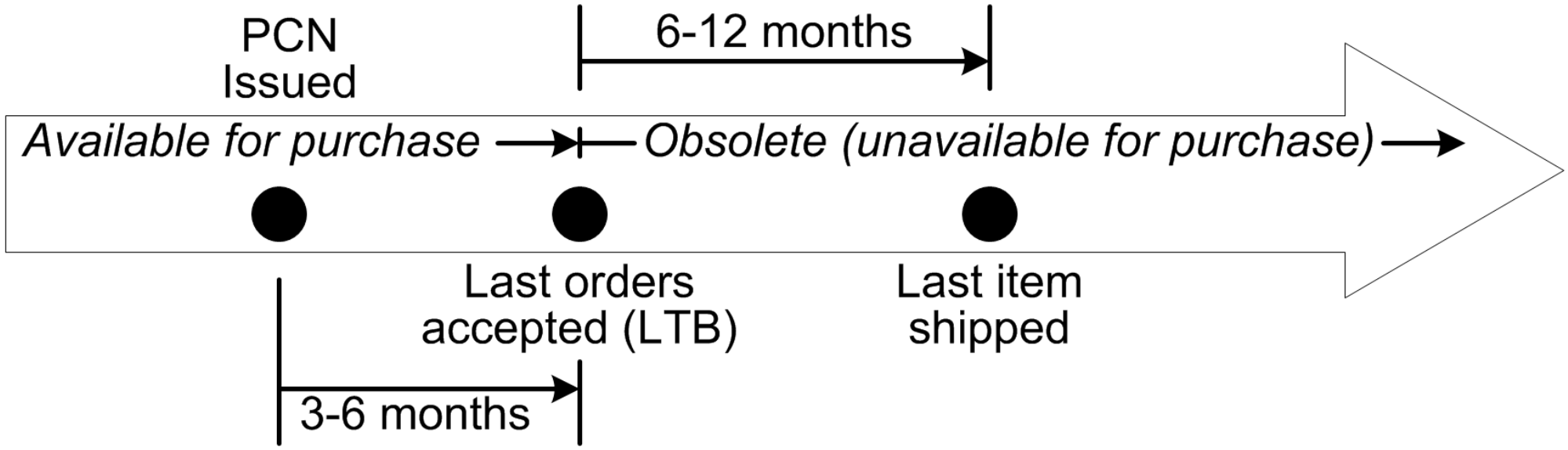
Research questions

- Which components are probable last time buy (LTB) candidates?
- How close to reality is the estimated total cost of LTB model?
- How will the total cost of LTB model results, including its preconditions, influence portfolio roadmap and financial budgeting?

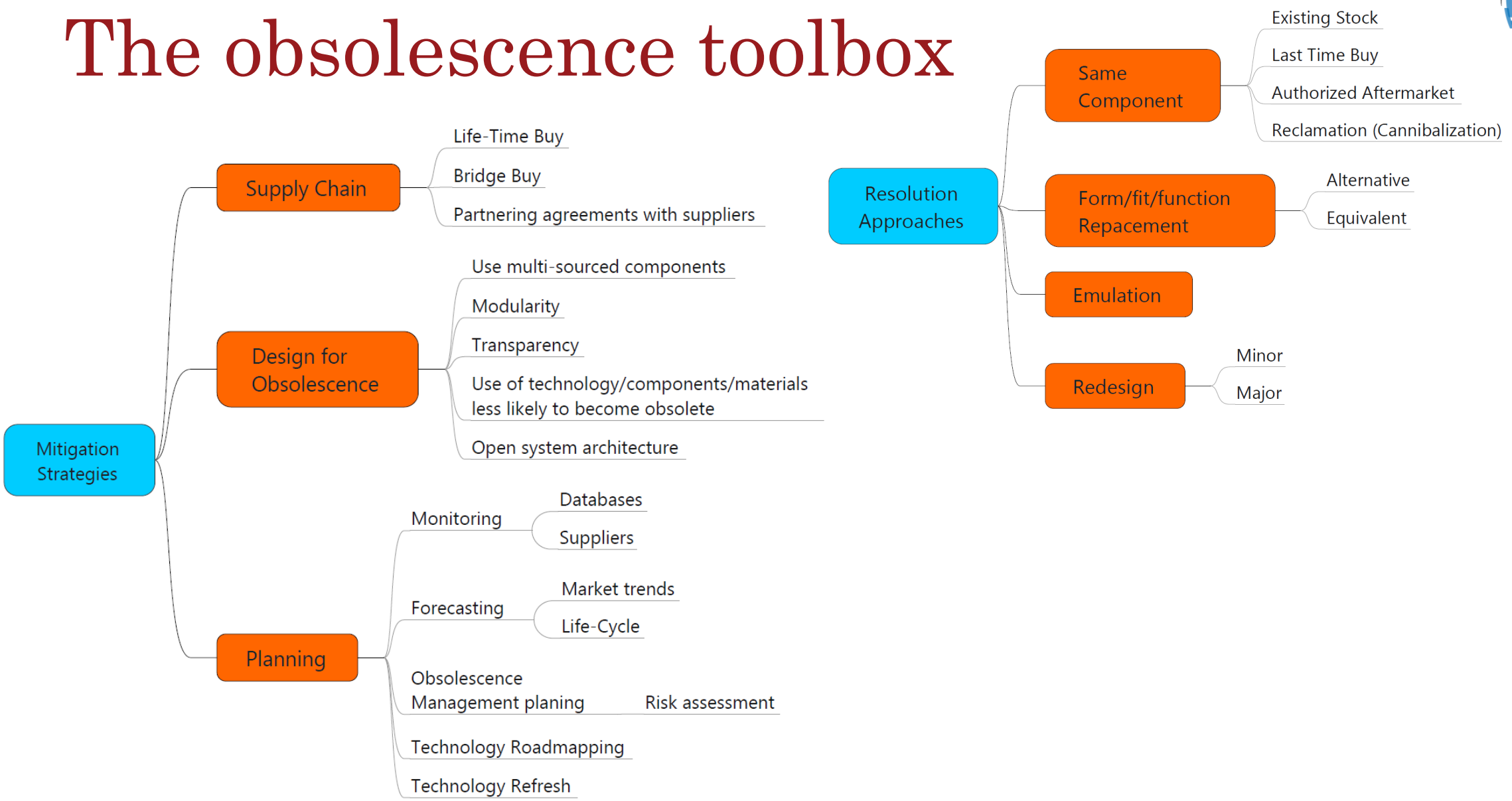
Research approach



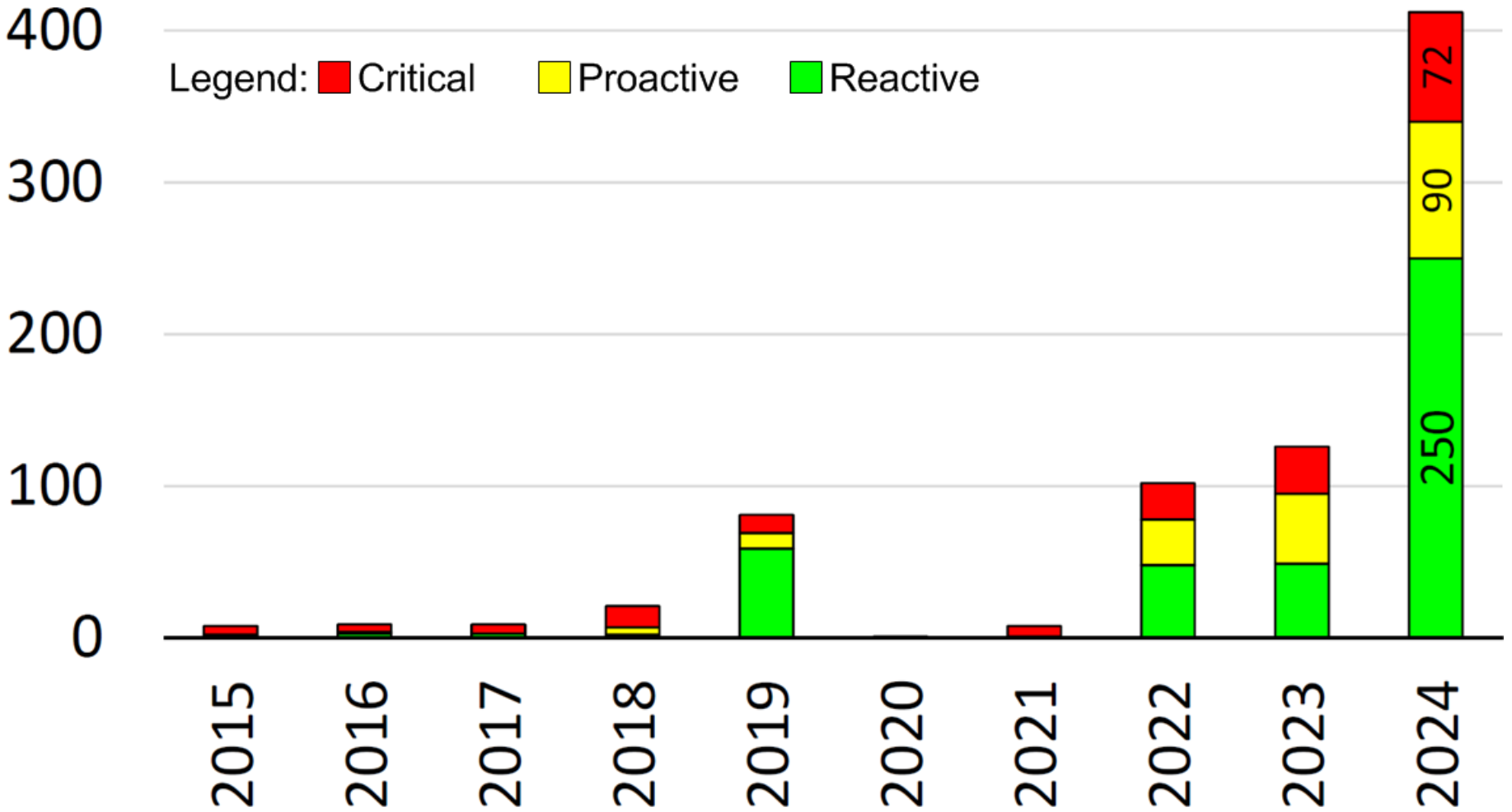
Obsolescence notification process



The obsolescence toolbox



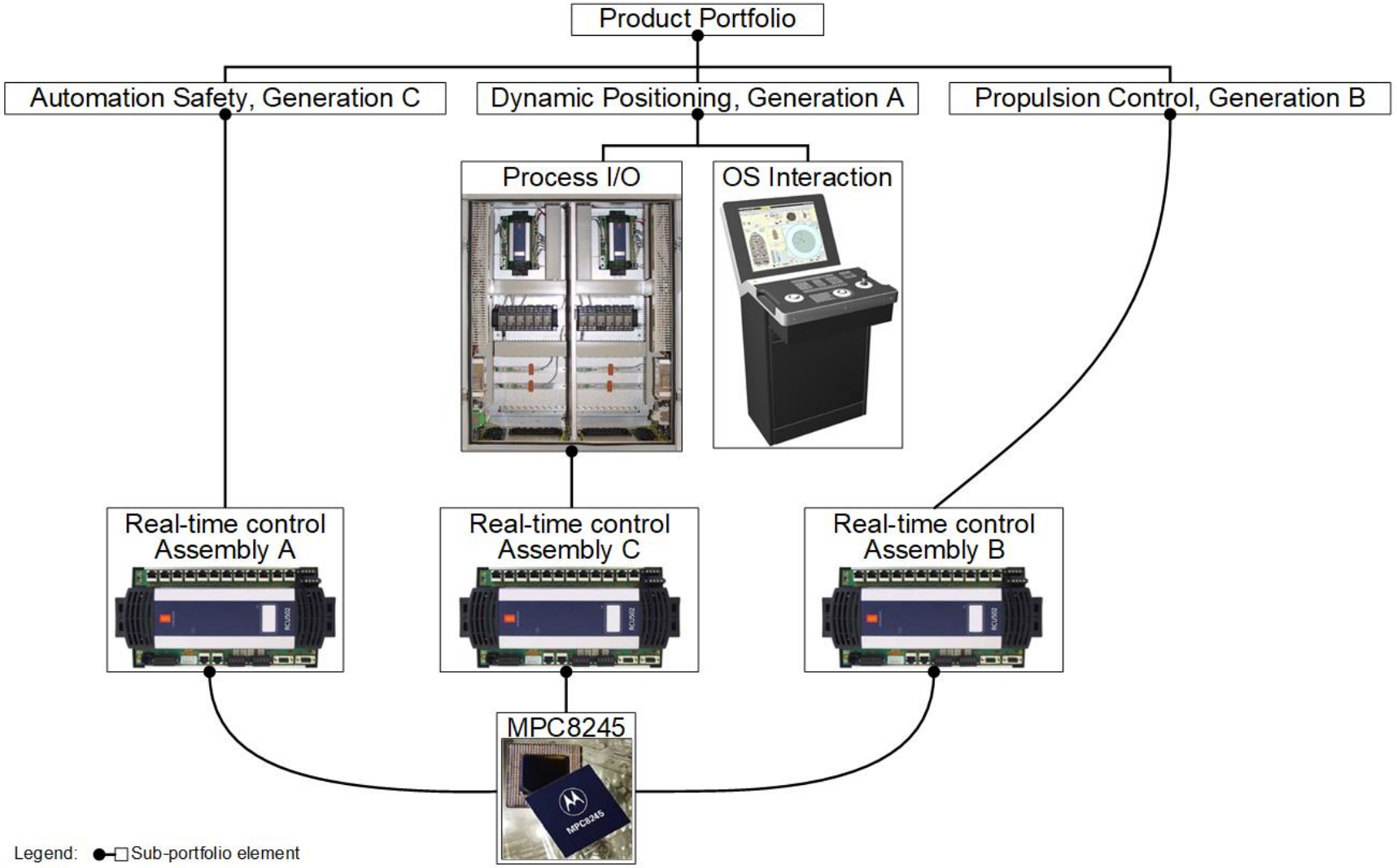
Last time buy dates on KM components



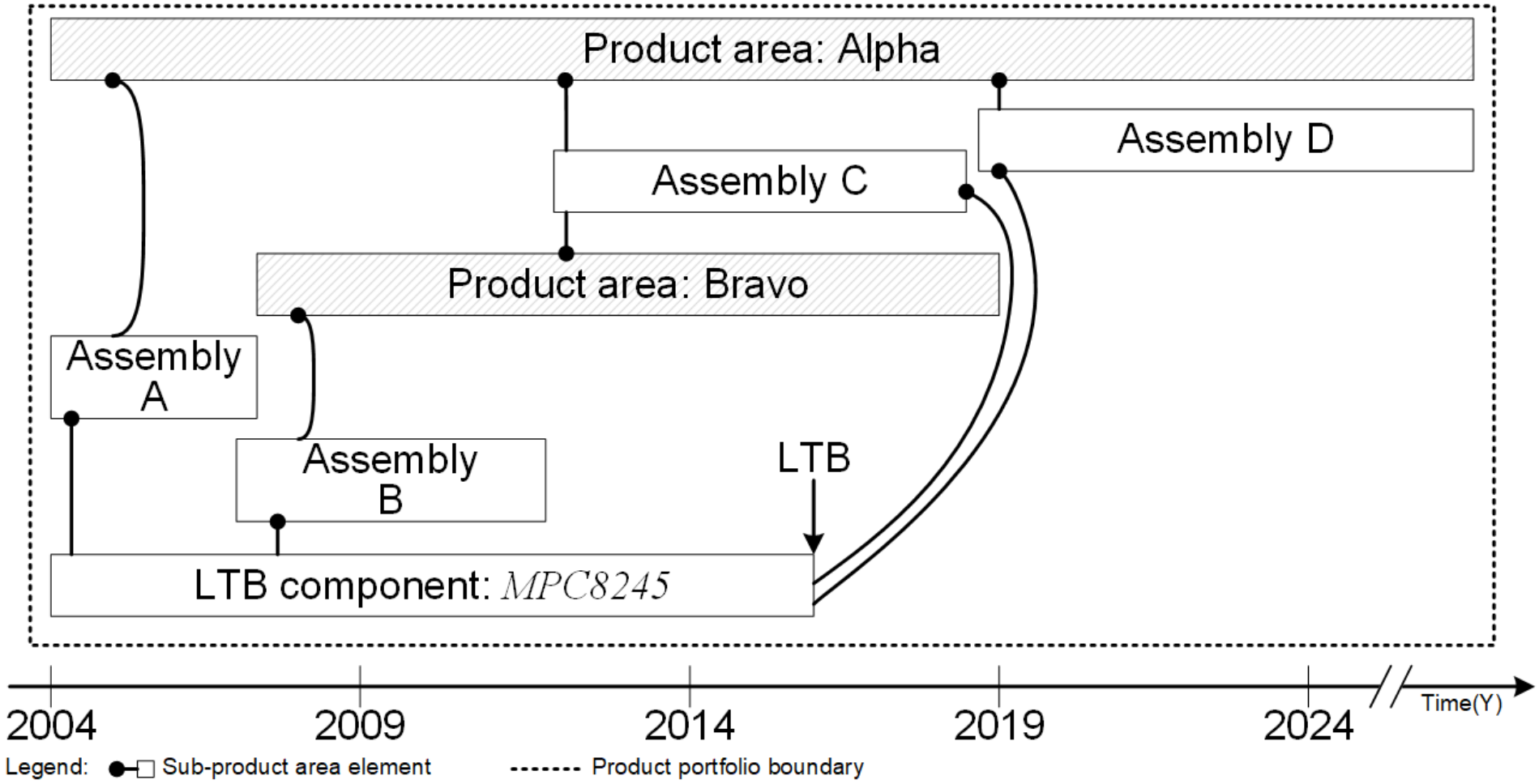
Total cost of LTB estimation model

Material cost		Overhead cost		Cost of capital		Cost of buffer		
Purchase cost of needed material	+	Reoccurring cost of storage and handling	+	Annual capital return loss on remaining warehouse inventory	+	Purchase and liquidation cost of buffer material	=	Total cost of LTB

Case: Products use of MPC8245 µC



Case: 2015 LTB MPC8245 µC

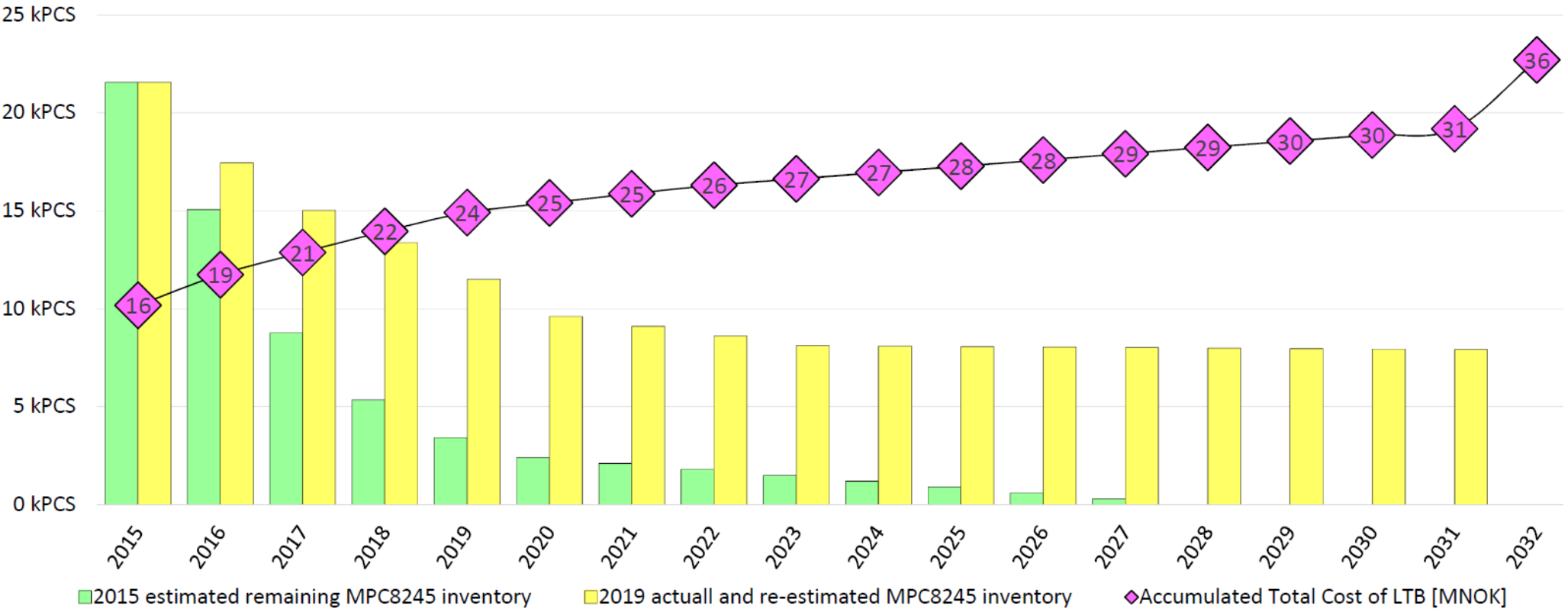


MPC8245 total cost of LTB estimations

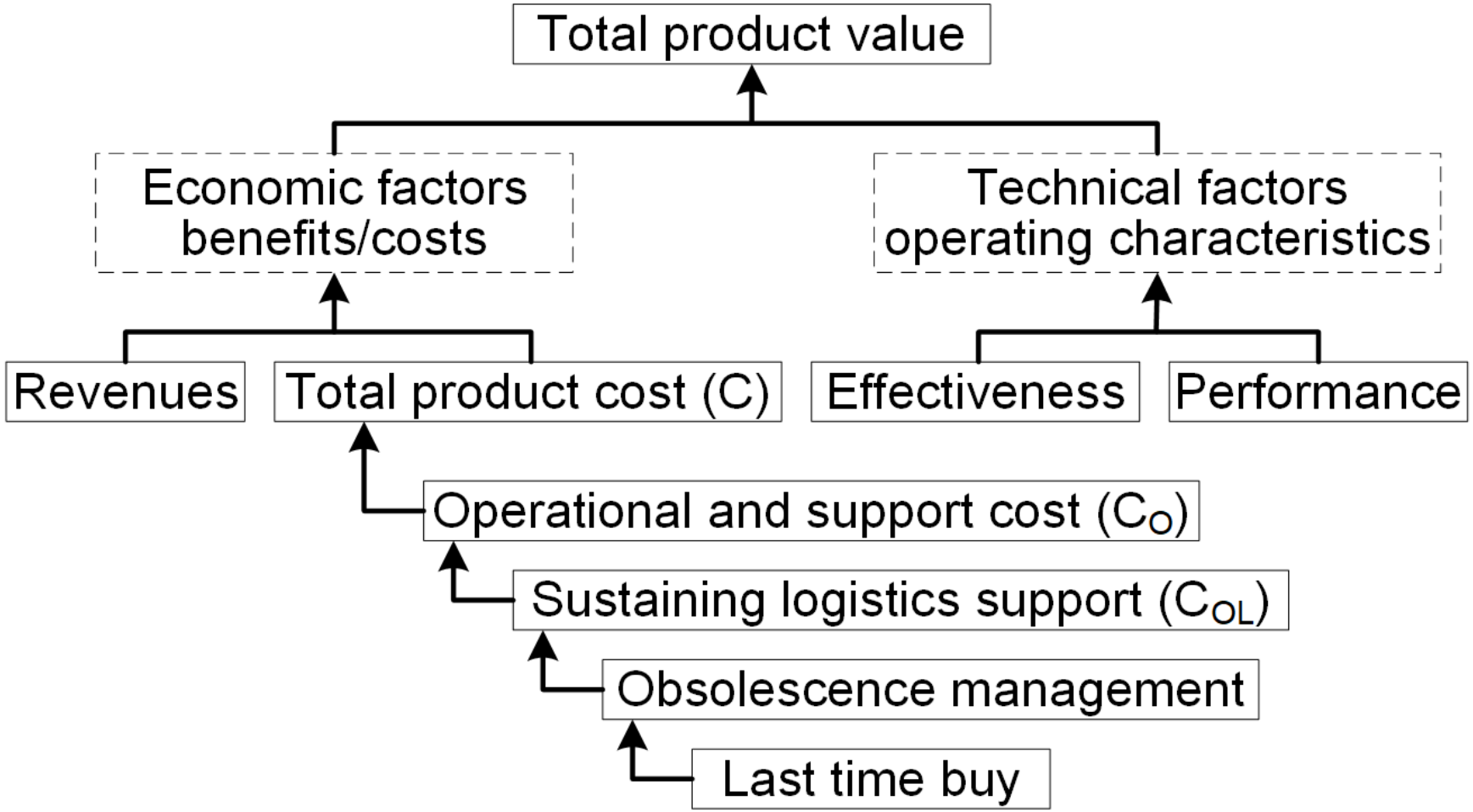
	Material demand kPCS	Material cost MNOK	Overhead cost MNOK	Cost of buffer MNOK	Cost of capital MNOK	Total cost of LTB MNOK
2015 estimates	21.5	15.1	2.7	0	2.2	20.2
2019 re-estimates	13.6	9.6	1.9	0	1.6	13.2

10 million Norwegian Kroner ≈ 1 million US Dollars

MPC8245 comparison



Obsolescence in total product value



Conclusion

Which components are probable LTB candidates?

- ✓ The properties and use of a component are decisive to its obsolescence criticality
- ✓ Of all components the critical have highest probability of LTB if obsolete.

Conclusion

How close to reality is the estimated total cost of LTB model?

- ✓ Calculation mechanism must be tuned to the window of model usefulness
- ✓ More cases are needed to establish window of model usefulness

Jennings, C., & Terpenny, J. P. (2015). Taxonomy of factors for lifetime buy. *Industrial and systems engineering research conference.*

Feng, D., Singh, P., & Sandborn, P. (2007). Lifetime Buy Optimization to Minimize Lifecycle Cost. *Aging Aircraft Conference.*

Conclusion

How will the total cost of LTB model results, including its preconditions, influence portfolio roadmap and financial budgeting?

- ✓ To manage obsolescence affordably, obsolescence risk must be a part of product evolutionary planning
- ✓ Estimation model must capture actual cost adding to the total cost of LTB
- ✓ Implementation require interfacing the model to company accounting and reporting structures

30th Annual INCOSE international symposium

Virtual Event
July 20 - 22, 2020

www.incose.org/symp2020