Analytical Life Cycle Management in the context of Reliability

Agenda

- Presentation
- Definition of Analytical LCM
- Importance of analytical LCM when considering reliability
- The untapped potential of analytical LCM
- Summary and conclusion

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F-35


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ARTHUR

Systecon provide

- Opus Suite® - LCC and LCM Software for Complex Technical Systems
- Advanced modelling support
- Methodology and process development, to assist customers in LCM, ILS and LCC-analysis, particularly in LCC/LCM-based acquisitions of systems and support
- We are thought leader and foster Best Practice in analytically driven LCM

We are LCM evangelists and proud of what our customers accomplish with our tools


LYNX


GLOBAL EYE


GIRAFFE

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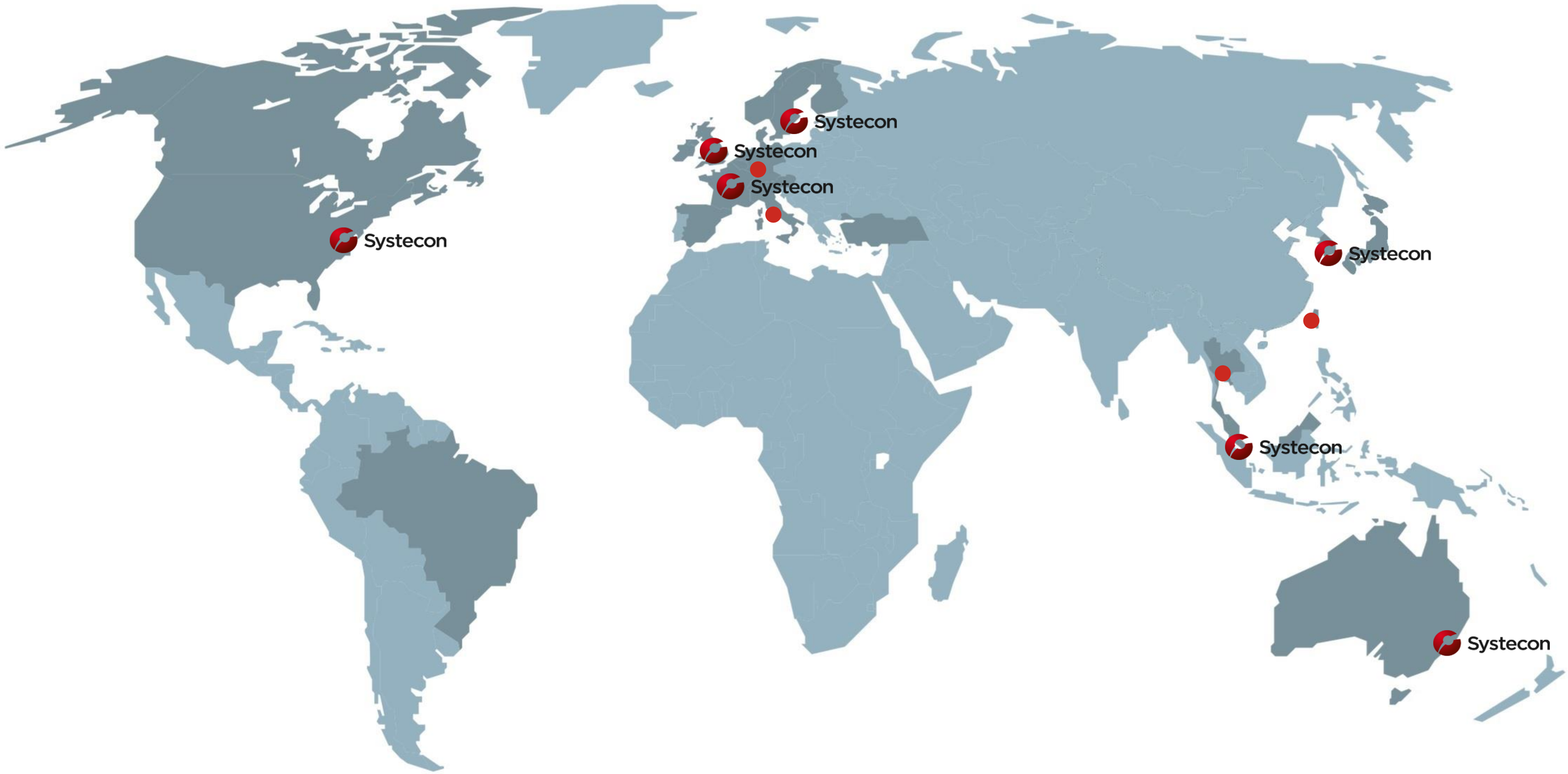

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Opus Suite user community – Defense Authorities

Sweden

Netherlands

Switzerland

Australia

Brazil

NAHEMA

Norway

Belgium

Turkey

Singapore

Japan

OCCAR

Denmark

France

US Navy

Korea

KTH

UK

Spain

US Air Force

Taiwan

AerologLab

Germany

Italy

US Army

Thailand

Opus Suite user community – Defense Industries

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- **Mikael Löfgren – Business Development**
- Background from
  - Swedish Ministry of Defence
    - ➢ Policy Development
    - ➢ Defence Export
  - Swedish Defence Material Administration
    - Program Management (JAS39 Gripen)
    - Capability Development – The Air Domain
      - Radar & Missile development
      - Ground Based Air Defence
  - Swedish Armed Forces
    - Army – Ground Based Air Defence

Mikael.lofgren@systecongroup.com

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Definition of LCM

Life Cycle Management

- An umbrella of methods and processes for strategic management of a product or system in all lifecycle phases.
- The overarching purpose is to achieve the desired performance or effectiveness to the lowest possible whole life cost, thru a structured approach to seek and find the best balance between conflicting items such as availability and cost.
- The basic idea of analytically driven LCM:
  - Link information and analysis with strategy, processes and decisions.
  - Translate real-world issues into analytical questions and use information and facts to improve decision-making.

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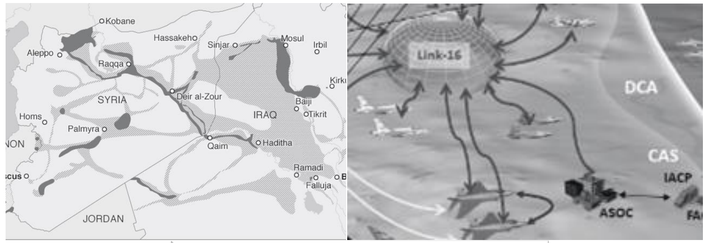
Definition of Analytical LCM



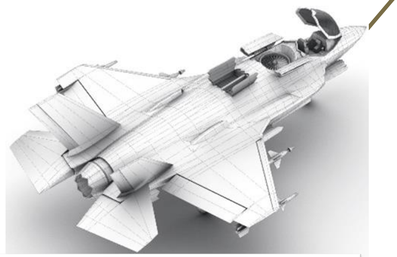
OPERATIONAL CONCEPT

READINESS

COST EFFICIENCY

AGILITY

THROUGHOUT
LIFE CYCLE



TECHNICAL
SYSTEM DESIGN

SUPPORT
SYSTEM DESIGN

MODELLING SIMULATION OPTIMIZATION EVALUATION

DATA DRIVEN

ITERATIVE
Challenge & develop

- Key questions & assumptions
- Data gathering – relevance, quality
- Analysis – turn data into actionable insights
- Communicate - decision makers and other stake holders

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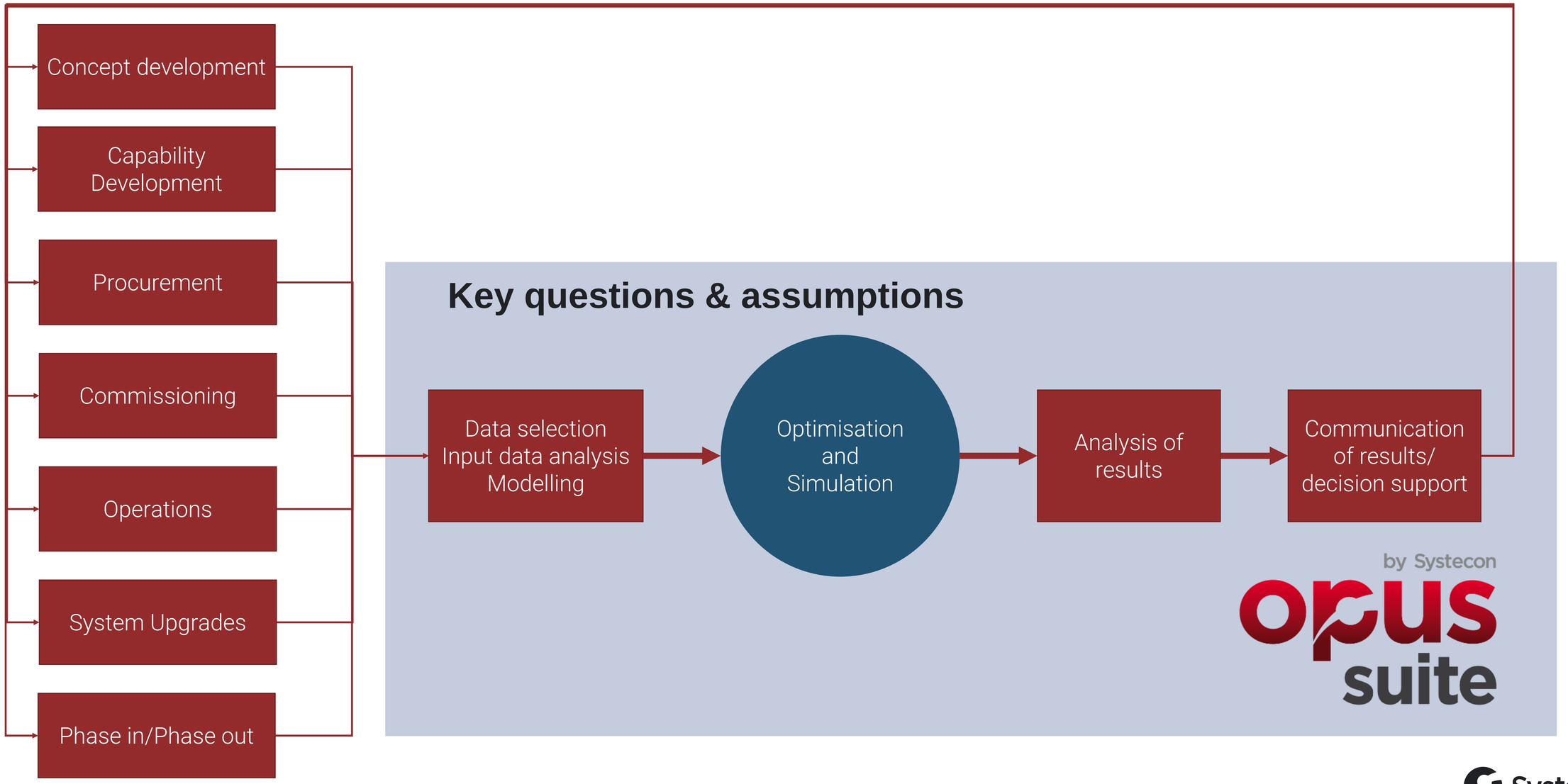
Definition of analytical LCM



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Importance of analytical LCM when considering reliability

- Having an LCM mind set is imperative for all stakeholders, not only the user/operator.
  - Industry
    - Optimizing Support, D-level maintenance to maximize revenue or minimize risk
  - Authorities/Government
    - Taking control of the total cost of ownership, securing the performance over time, increase availability
  - Academia
    - For new technologies and in research to support circular economy, upcycling, sustainability and resource effectiveness – Ensuring “*best bang for the buck in future systems*”

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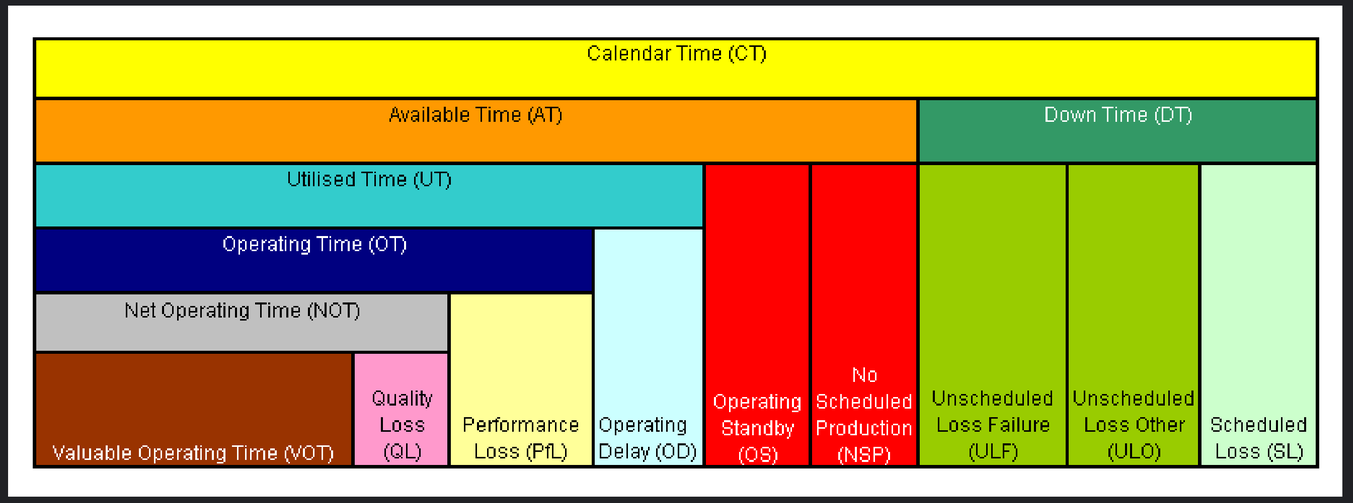
Importance of analytical LCM when considering reliability

- Therefor it is important that
  - The LCM properties is a natural focus when working with reliability
  - System reliability characteristic affecting the effectiveness is evaluated constantly
  - The maintenance system is adequately trimmed
  - Potential improvements are identified

- Analytical LCM tools can be used to identify
  - Which improvements are meaningful/effective
  - when shall changes shall be made
  - What actions will improve reliability the most



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The untapped potential of analytical LCM

1. Data Availability
   – More accurate input
2. Large-scale computing
   – More knowledge from data
3. Integration and iteration
   – Iteration and quick turnaround

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Data Availability – More accurate input

1

Phenomena

- Exponential growth of available data
- Real time storage and close real time access
- The use of standard formats and protocolls
  (S3000L, 1388, 00-60 etc.)

Effect

- More data to evaluate = more detailed decision support from analytical LCM
- Easier exchange of data between systems – between actors, thus rrelevant to apply analytical LCM in all stages of the Life Cycle

Data is key to making good decisions and Analytical LCM turns data into knowledge

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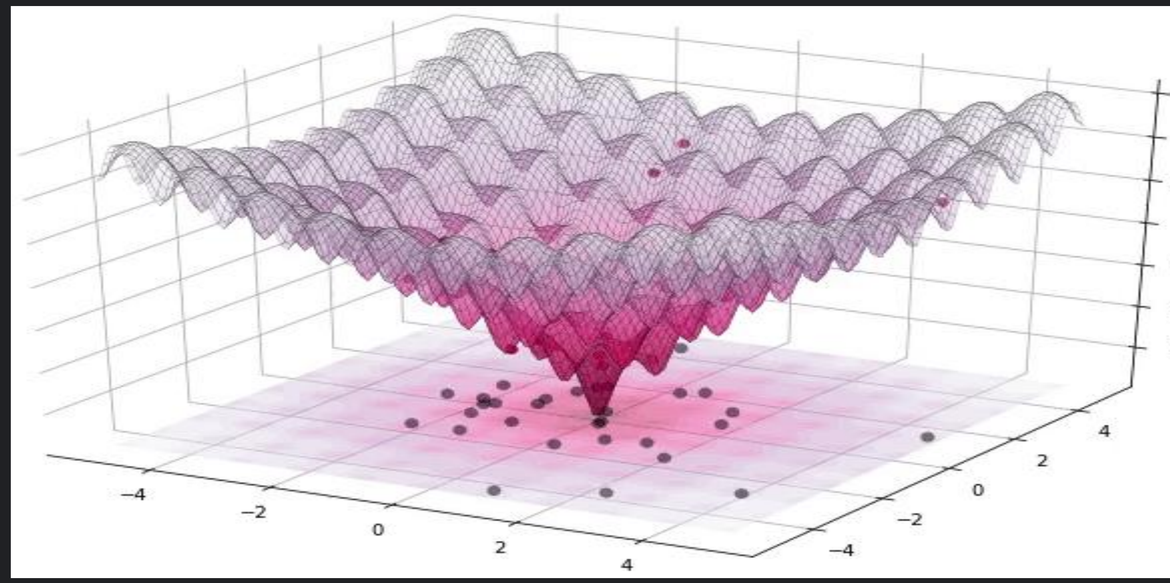
Large-scale computing – More knowledge from data

2

Phenomena

- Large scale computing (network)
- Growth of processing power
- CPU resources in ordinary everyday equipment



Effect

- Simulations of more complex scenarios
- Calculations with intensive algorithms - Heuristics, AI/machine learning
- Possibility to perform multilayer simulation to optimize with a large set of contradicting border constrains

Great analytical capability is key to getting the most knowledge out of the data gathered

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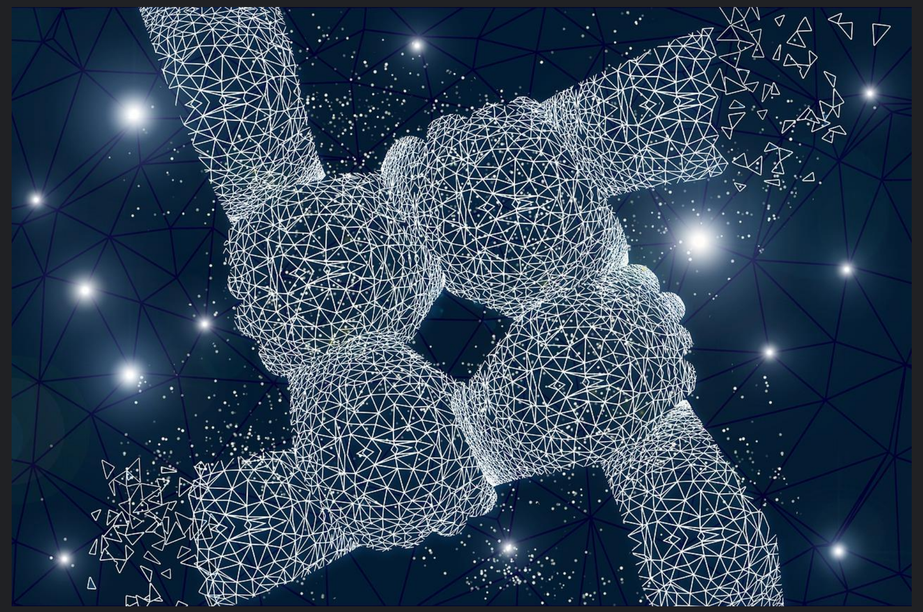
Integration and iteration – Iteration and turnaround

3

Phenomena

- System Integrations (analytical LCM capabilities with Maintenance Systems, ERP, PLM, Fleet management etc.)
- Network solutions
- Standards (ASD S-Series for ILS)



Effect

- Integration supports a digitalized process, reducing workload and save time
- Integration support rapid iteration and rapid iteration enables agility, increases the quality and accuracy of the Analytical LCM and strengthen stakeholder involvement
- Unveil extraordinary potential (1+1 > 2)

Integration and iteration is key to shorten the time to get results and decision support

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Summary and conclusions

- The power of digitalization drives the capability of analytical LCM
- Moving
  - From Strategic to Tactical decision support
  - From averages over time, to specifics in real time
  - From one-time action to a repetitive, iterative and continuous ongoing process in an integrated environment
  - From Hard-time to planned on condition (individualized, predicted and coordinated)

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Summary and conclusions

- Extrapolation indicates that Analytical LCM will
  - answer “classical” analytical questions faster and more accurate – More of the same
  - …but will also incorporate new questions, related, but different and much more demanding – If you can evaluate it, it can be optimized

The biggest impact of digitalization is yet to come and will continue to support the development in analytical LCM

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Thank you.

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