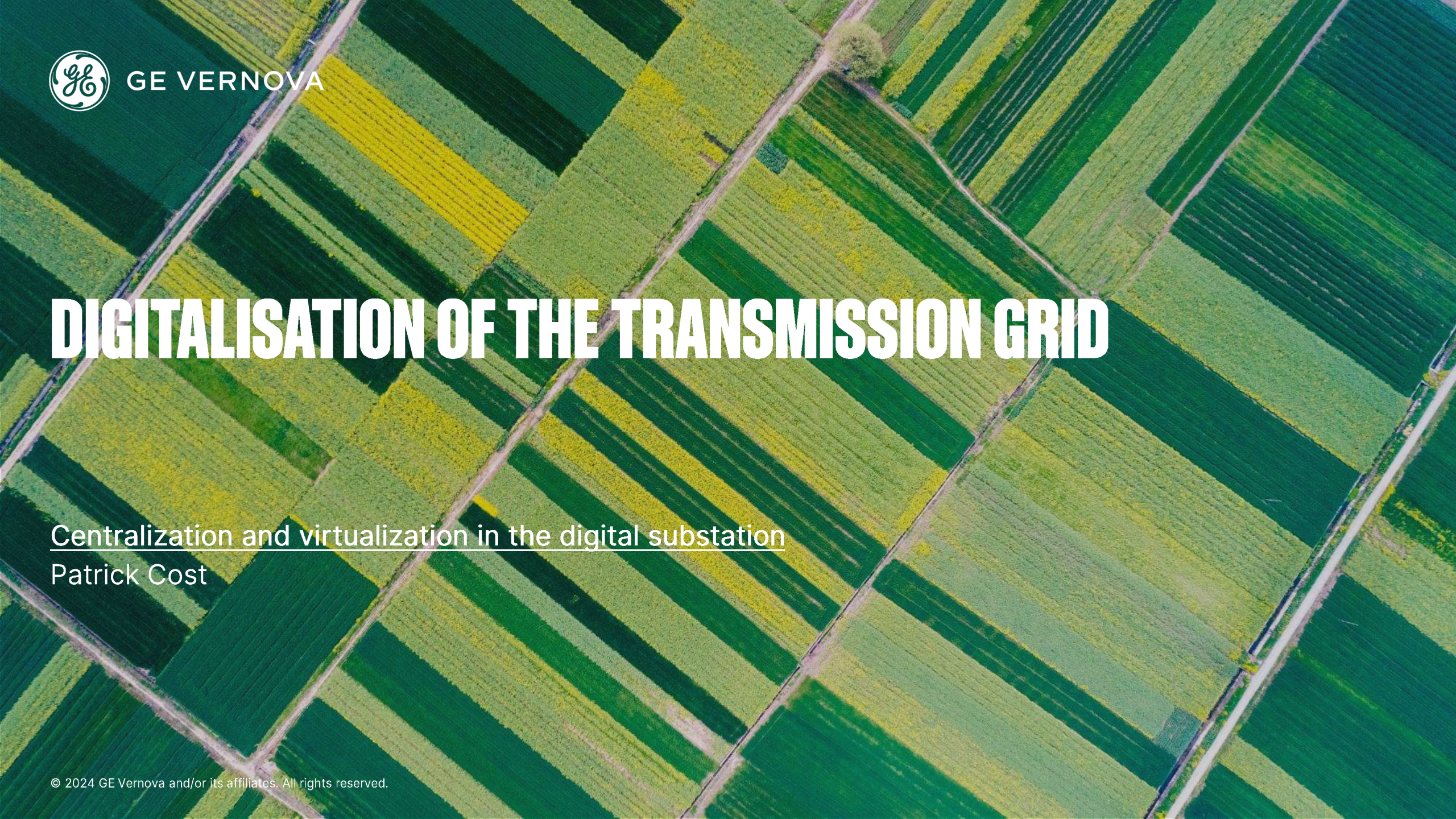

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DIGITALISATION OF THE TRANSMISSION GRID

Centralization and virtualization in the digital substation

Patrick Cost

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CHALLENGE

International Energy Agency outlook estimates that investments in the Net Zero Scenario 2021-2030 will go from 2.2 TUSD to 4.7 TUSD.

Global electricity demand shall rise 6 to 7 TWh and is 150% higher in the Net Zero Emissions scenario by 2050.

PROBLEMS

ASSETS

- Ageing installed based infrastructure
- Substation Asset sustainability
- Interoperability

GRID

- Stability and resilience due to lower grid inertia & inverter-based resources
- Lack of flexible control solutions to operate

INVESTS

- Capital allocation trade off
- Limited resources

SOLUTIONS

Monitor ageing infrastructure by increasing non-operational data for asset performance and monitoring

Accelerate **fast deployment** on new technologies with the objective to reduce hardware to enhance further maintainability

Operate faster locally

Optimize and provide **operational data** with better quality for faster zonal controls

Be **flexible**, versatile and autonomous (self learning)

Increase Safety and reduce OPEX for faster deployment

Enhance functional reliability by providing substitutions solutions

Simplify Engineering to operate at fixed resources

Deliver interchangeable applications & solutions

Abstraction

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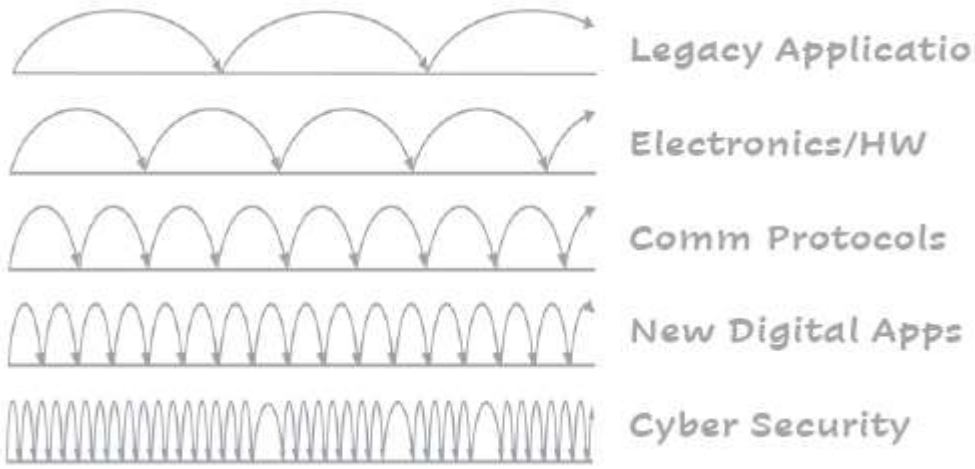
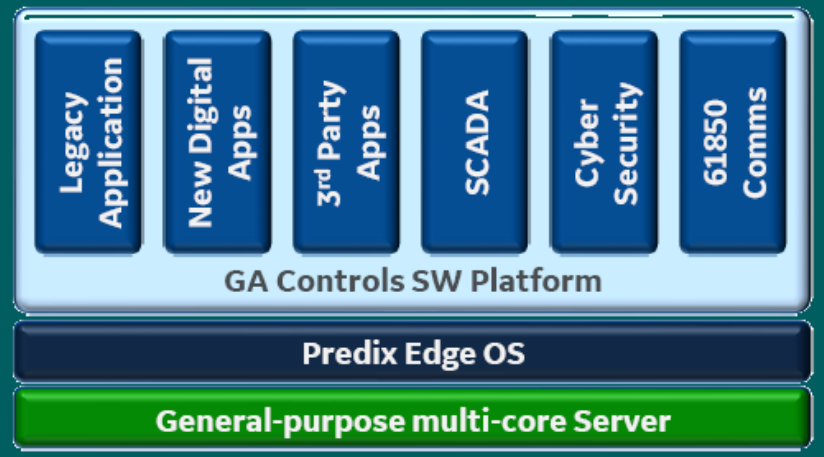
Different technologies have different lifecycles



Abstraction of dependencies is needed to achieve long term lifecycle management

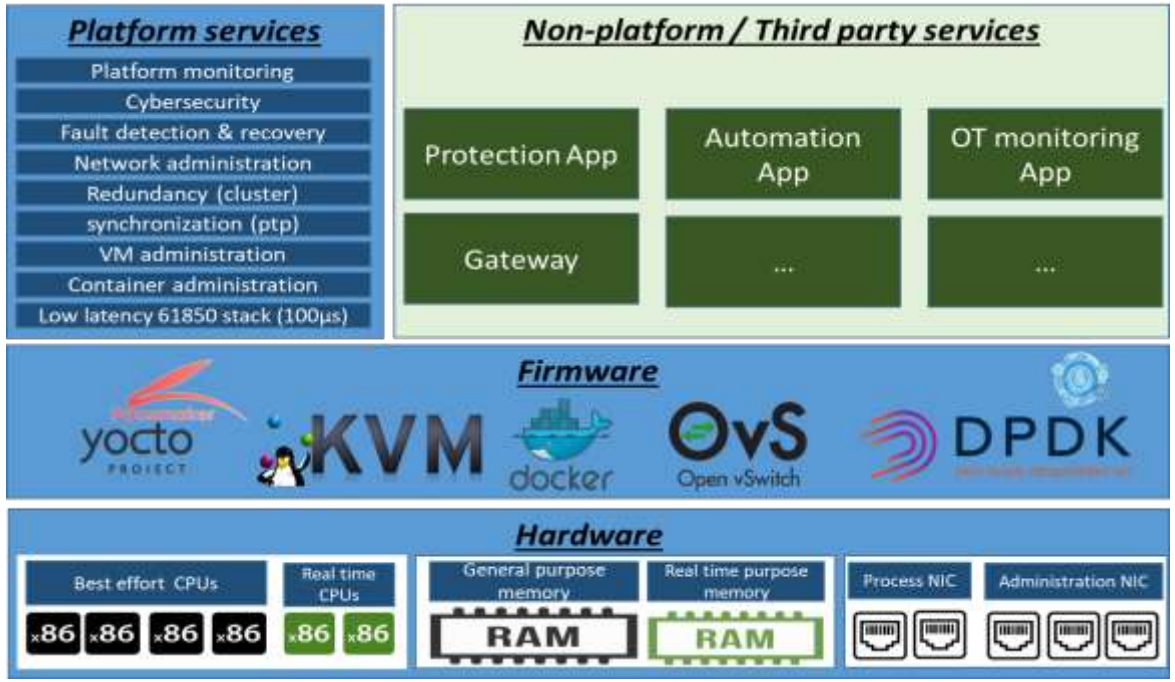
Today

Tomorrow



1. Hardware
2. Firmware (O/S)
3. Platform services
4. Applications

Scalability
Latency
Reliability
Interoperability



Distribution

E4S alliance

Transmission

LFENERGY SEAPATH

vPAC alliance

Questions and challenges

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1. Proprietary versus open-source solutions
2. Ownership & guarantees when multi-party app interactions is deployed
3. Utility industry readiness for fully-digital substations, i.e. IEC 61850 adoption
4. Developing specifications through industry standards & guides


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