OAK RIDGE National Laboratory | SPALLATION NEUTRON SOURCE

April 20, 2026

Upgrading an Operational Control System to EPICS 7

EPICS Collaboration Meeting Spring 2026

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U.S. DEPARTMENT of ENERGY

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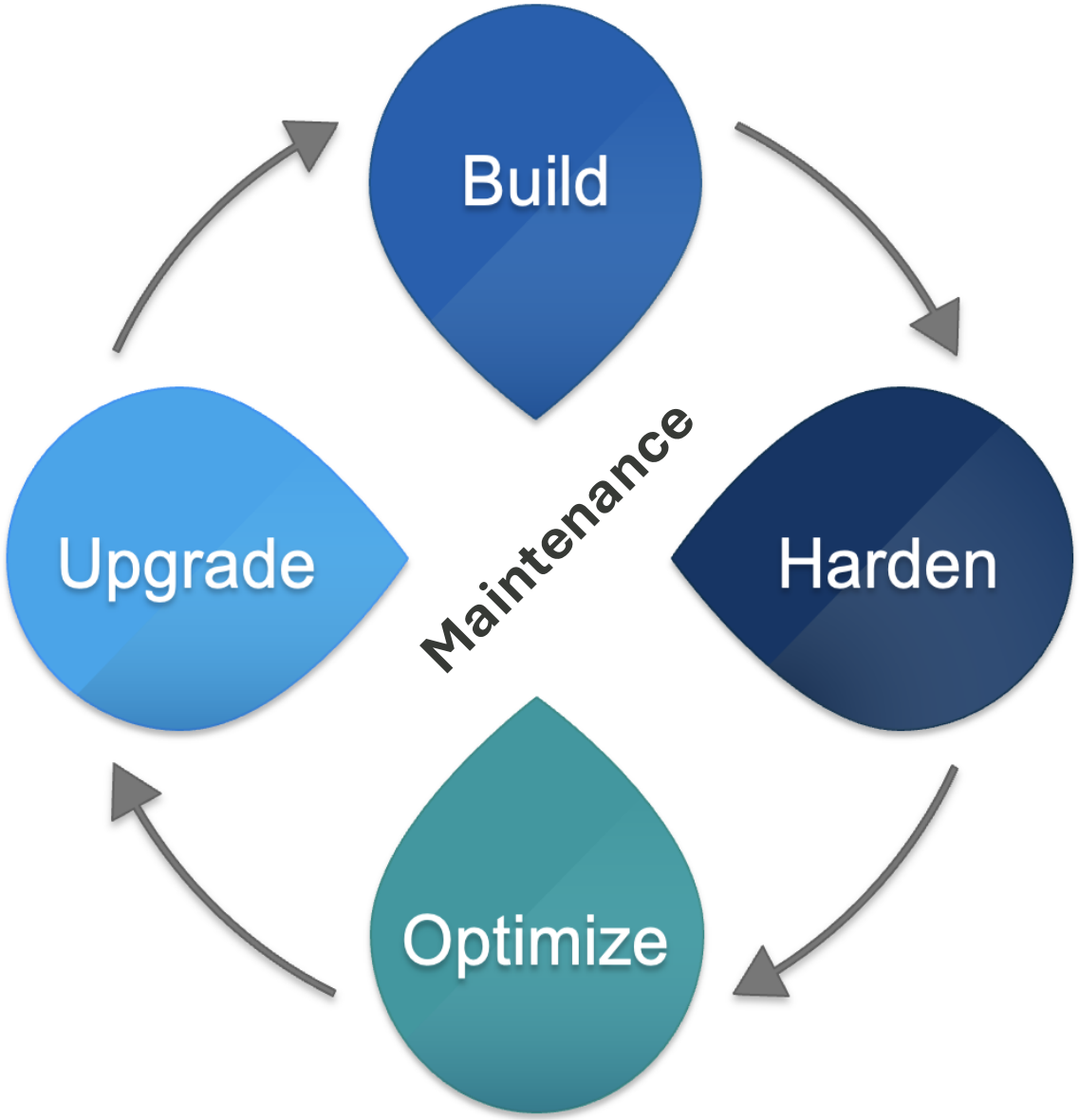
Sustaining Operations - lifecycle



- Control system is built, but never finished
- Some controls elements turnout to be unreliable

- May need optimization
- Emergent scope; customers want more diagnostics, new features, capacity may be challenged

- Maintenance; parts of the control system start to become **obsolete** right away
- Machine or facility upgrade projects

Software becomes obsolete

Support

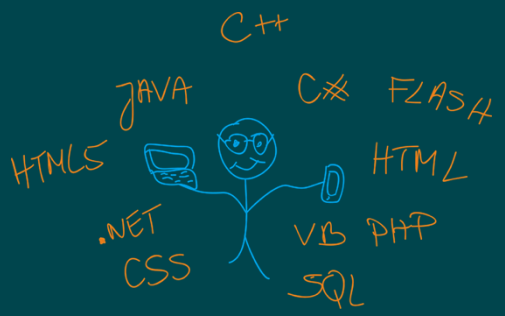
Can software be supported?

- Vendor
- Staff
- Contractor
- Community
- Affordably?

Incompatibilities

Can software keep working as other system factors change (hardware, OS, other software)

- Hardware
- Operating system
- Other software
- Network



Relevance

Can the software continue to meet customer needs?

- Sustains performance
- Performs needed functions
- Can be adapted for emergent requirements

Integrity

Can software perform reliably, correctly, securely?

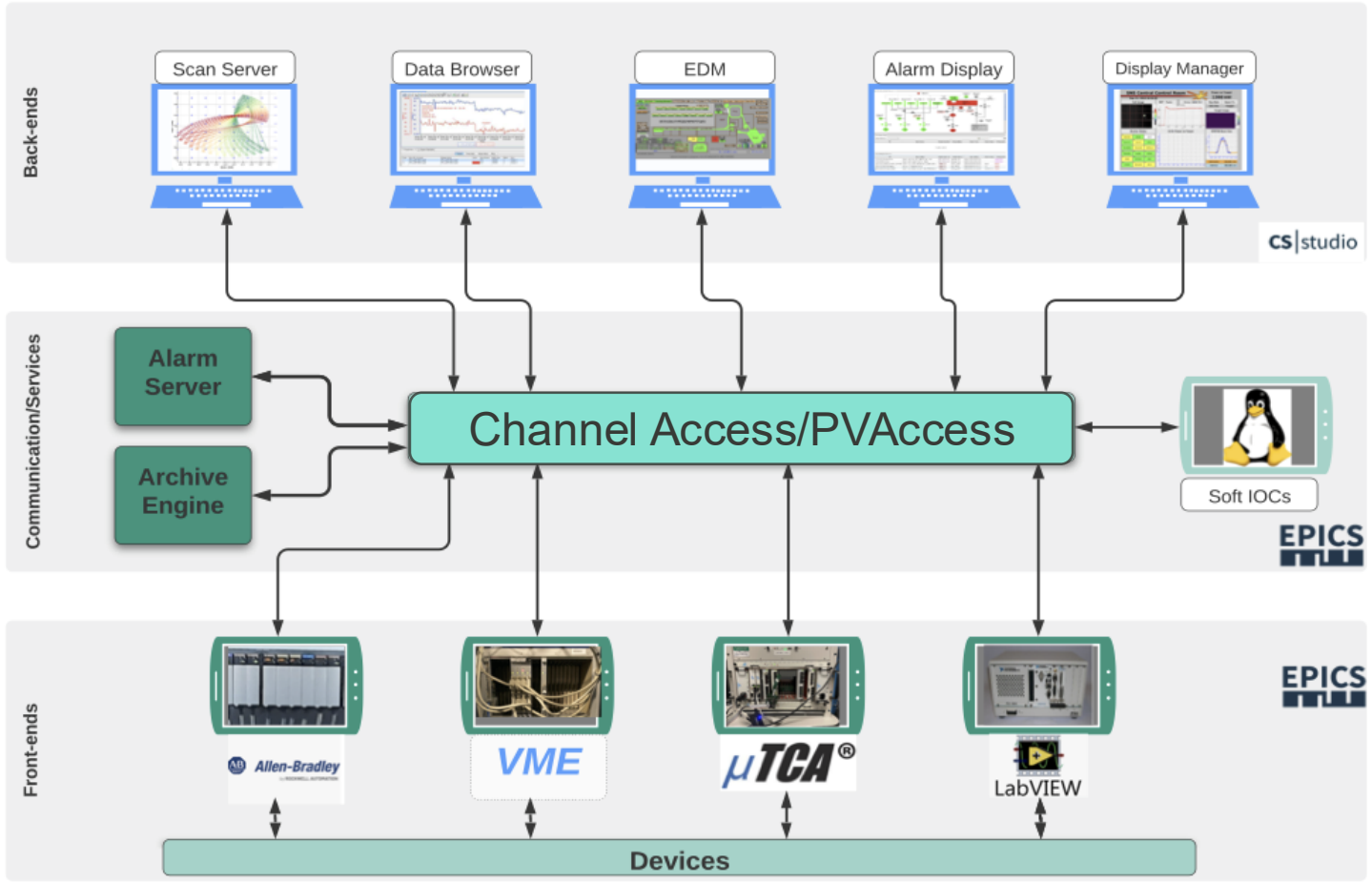
- Produces correct results every execution
- Operates without interruption, pauses, reboots, intervention
- Protected from unauthorized access

EPICS Architecture makes phased upgrades possible

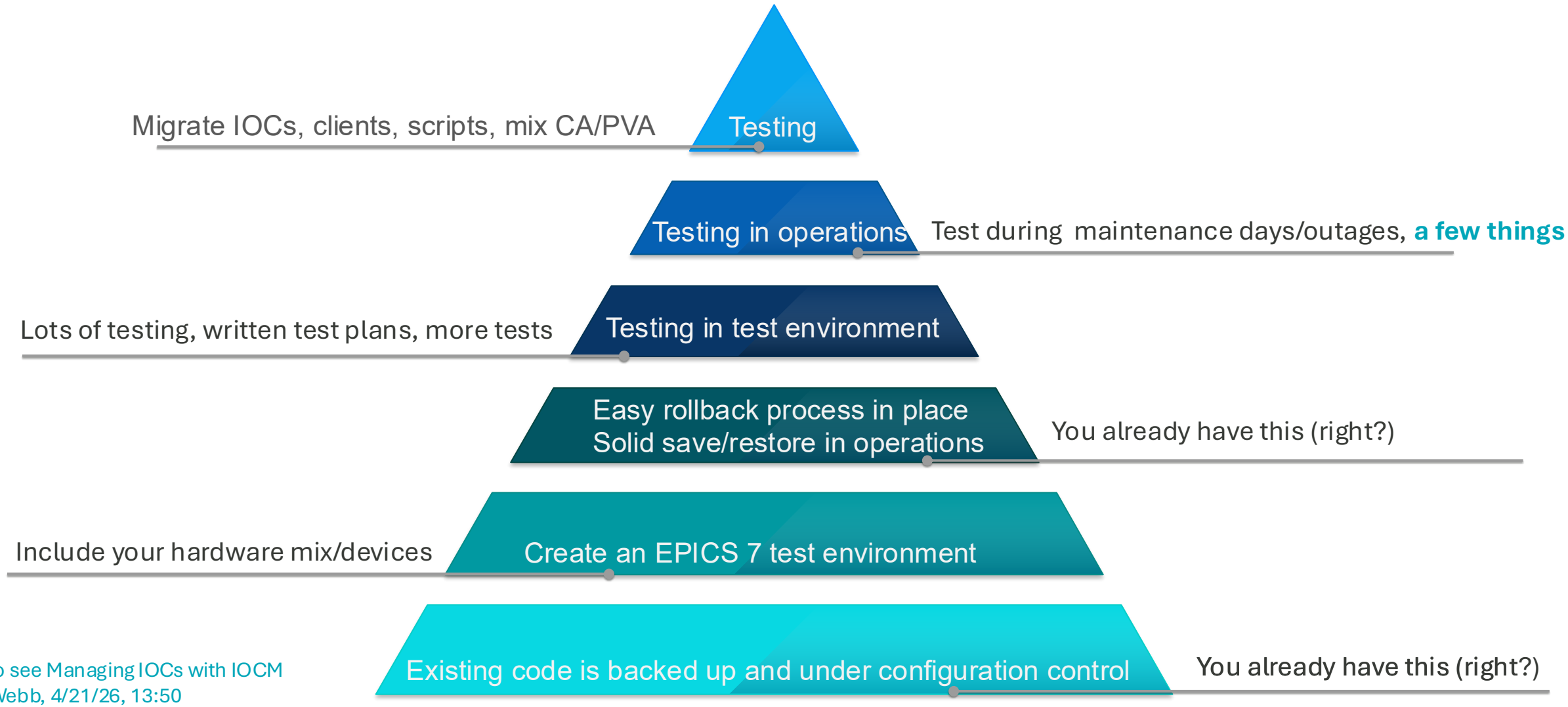
Tools at the UI level can run in parallel or be replaced without disruption
Scripts at this level depend on function

PV Access peacefully coexists with CA
New services can run in parallel
Soft IOCs can be replaced one or more a time

IOCs performing control functions can be replaced one or more at a time during maintenance



Start with a strong foundation

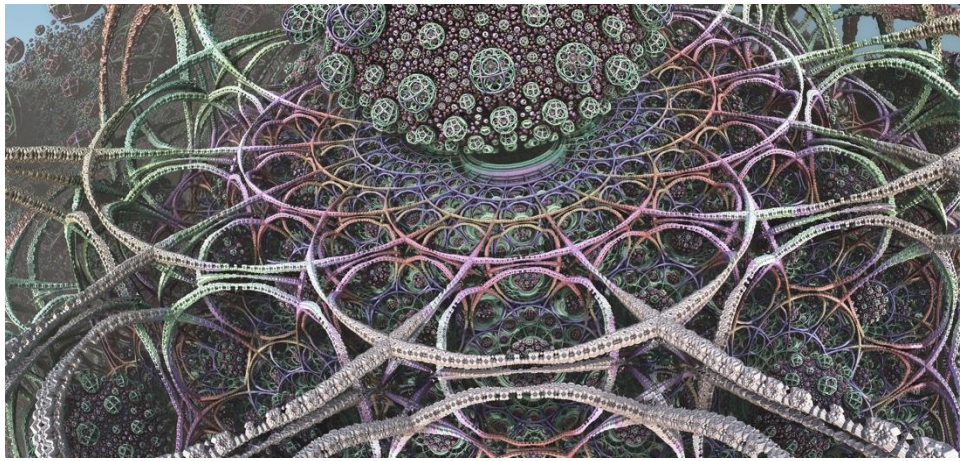


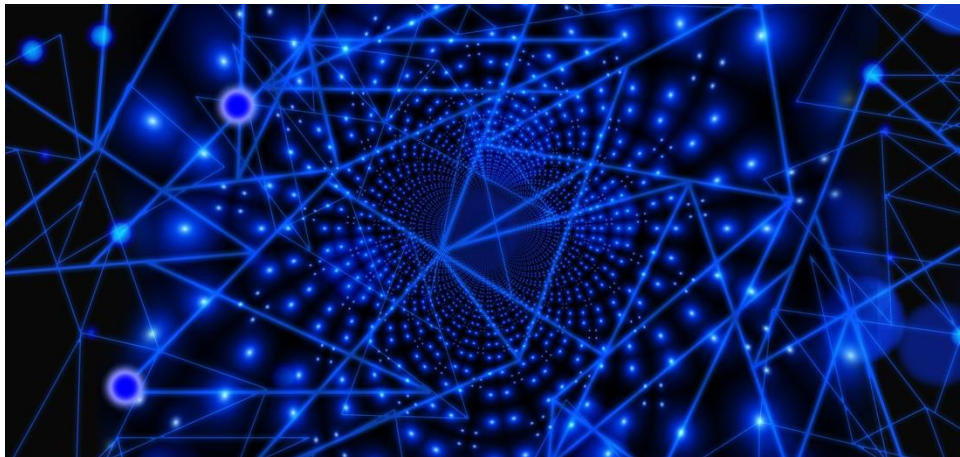
Also see Managing IOCs with IOCM
B. Webb, 4/21/26, 13:50

Goal: Seamlessly upgrade control system during normal operations cycle

It’s complicated

- Prepare software changes
- Make incremental upgrades on maintenance days or outages; return to working order at the end of each period
- Plan the work, phase in, coordinated team effort
    - Soft IOCs
    - Hard IOCs
    - EPICS Clients – Phoebus is ready, EDM will not be not be supported
    - Other clients – User donated software (scripts) may need modifications
    - Communications, run both protocols, then phase out CA
    - Get ready for Secure EPICS
- Test changes, rollback if issues are discovered while testing



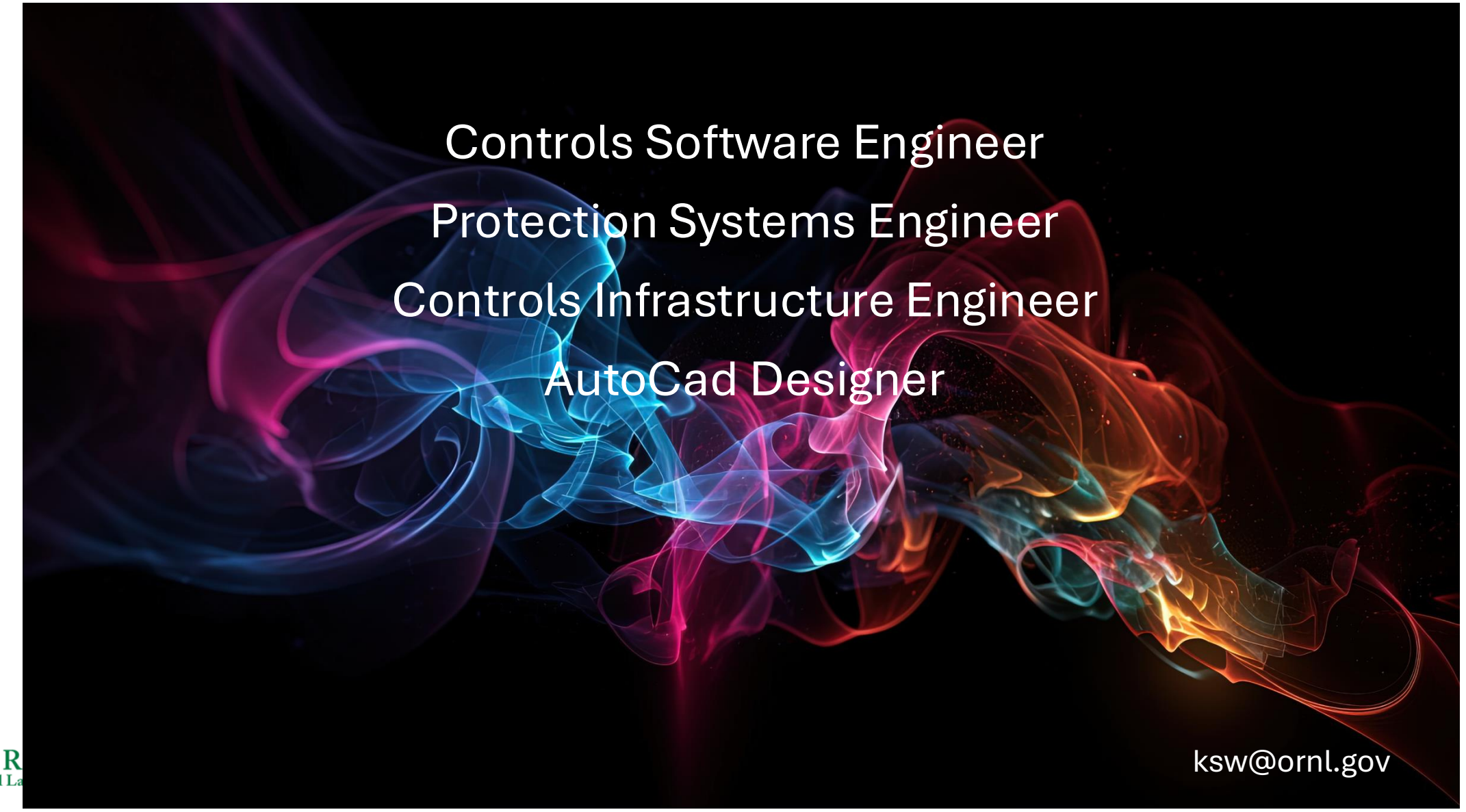


Success!

EPICS 7 provides a strong foundation for our new reality

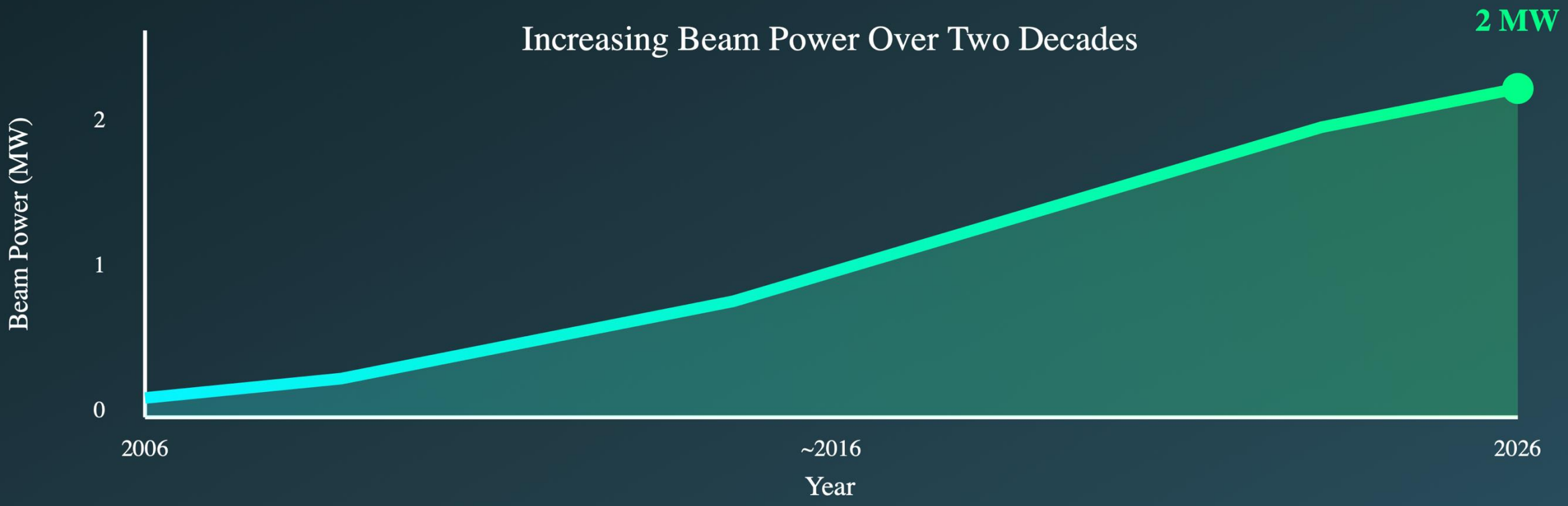
- Staying cyber compliant/secure => Secure EPICS – time to manage all those certificates
- Support endless undefined ML/AI experiments => Without additional infrastructure?
- Automate everything or more
- Thanks to all the developers who worked to make EPICS 7 a success without requiring huge code changes to migrate!

It takes a lot of people!
SNS Control System Section is hiring



20 Years of Neutron Production

Spallation Neutron Source (SNS)



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