Lean Life Cycle Management

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Experiences with maintaining simulator excellence with limited resources

How do you maintain high levels of simulator performance and availability with reduced staff and decreasing budgets?

Plant Closings
Nuclear Promise
Project Momentum
??

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Plant Background

- **Duane Arnold is a single unit GE BWR, generating since 1974**
  - 1912 MWTh, 650 Mwe

- **INPO 1 for four consecutive review cycles**

- **Power Purchase Agreement keeps unit on line**
  - Current agreement runs through 2021, guarantees some profit
  - "Lowest cost BWR in the country by far" – Tom Vehec, DAEC SVP

Simulator History

- **CORYS Simulator**
  - Upgraded exclusively by CORYS personnel.
  - PPC is SAIC design, running original code on an open source VMS emulator in a Slackware Linux O.S.

- **Staff count started out at 6 in 1989, dropped to 1 in 2006, back up to 3 two years later**
  - Staff reports to General Supervisor, Operations Training
  - No direct supervisor since 1997
  - Software engineer does project planning, work management
  - Hardware / Modification Engineer, shared with plant
  - Test Operator

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DAEC Philosophy

- **KEEP IT SIMPLE STUPID**
  - Station philosophy has always been to be very careful about upgrades and new projects.
    - No Integrated Digital Control systems
    - Results in a very simple operating plant but difficult to upgrade.
    - Benefit is that capital and O&M costs remain low, risk is that of aging systems bringing the plant down

Simulator Management in a Lean Environment

- **The DAEC simulator has operated with reduced staff count and no immediate supervision since 1997. How do we manage upgrade projects and maintain adequate performance for operator training?**

  - *Simulator staff is a group of non-instructors within Ops Training: "we know we need them but we're not sure what they do".*
  - *"Boy they sure have a lot of computers!"*
  - *"Don't try to explain what you did, just tell me if you fixed the problem or not!"*
  - *"Why does the simulator need so much money? Let's just take a little, they won't miss it."*

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DAEC Simulator Upgrade History

- **Despite being a very lean group for a very long time, upgrades have happened:**
  - 2000: rehosted to PC's
  - 2003: upgraded I/O
  - 2006: upgraded Core / Thermal Hydraulics
  - 2015: upgraded BOP / ECCS
  - Plus an assortment of room upgrades, recorders, NUMACs, RM1000's, PPC equipment along the way.

Strategies of a Lean Organization

- ***The Simulator is plant equipment***
  - *Plant needs to understand this in order for the simulator to be successful*
- **Simple and frequent communications**
  - nothing formal, just an e-mail once in awhile to training mgt, ops training personnel
  - Benefit is to foster trust in the organization – build transparency
- **Simulator base capital fund**
  - Yearly fund for simulator upgrades. Only approval required for expenditure is the Training Manager.
- **SRC involvement – but not necessarily a lot of formal meetings**
  - Target a key group of stakeholders that have an interest in making the simulator better

Plan ahead: It's worth the effort

- **LCMP document**
  - Surprising how valuable a long-range plan can be.
    - Reference document for upgrade list
    - Fosters trust, appearance of competence in planning
    - Upgrades become part of a process
    - Forces you to keep inventory which prevents items from being forgotten about

- **Resource negotiations**
  - Start identifying people who can help with a project as soon as it's started, allow for people to free up valuable time

<u>Focus</u>

- **Very little resources exist for 'nice to do' projects**

- **Remember why they're paying you**

Make friends

- **IT department**
  - PPC guru upgraded the VAX hardware and terminals
    - Less failures, better performance
  - Telecom technician programmed the telephone switch to provide a secure calling system that redirects calls to the booth.
    - Very low cost
- **I&C**
  - Hardware maintenance will probably be handled primarily by this group
  - Target people who are willing to learn the simulator
- **Simulator Vendor**
  - Pay the maintenance agreement – buys you leverage during a crisis

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Strategies that should work but don't in a lean environment

- **Tacking on a simulator upgrade to a plant project**
  - Every dollar gets scrutinized
- **Assuming that just because Ops wants something, it's going to happen**
  - Business unit gets final say when budgets are tight
- **Assuming that once a contract is awarded the funding will be there**
  - Lean organizations steal if they think they're going to come up short
- **Assuming that if it's a hardware upgrade that you'll get what you want**
  - Odds are better but still not a guarantee

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In a Nutshell

- **A lean simulator staff only works if the rest of the organization is lean**

- **If staff is cut, other costs go up**
  - Increased outsourcing to IM,I&C, vendor

- **Challenges come when increased scope doesn't come with extra help**
  - Triple constraint of scope – quality – time comes into play.