

A Systematic Approach to Technical Design Reviews for Distributed Development Teams

*5th Annual INCOSE Great Lakes Regional Conference
November 2011*



*Chris Unger
GE Healthcare*



imagination at work



Introduction to GE Healthcare
Why Technical Design Reviews?
5 Key Elements of TDR Deployment
Sustaining Mechanisms

GE Healthcare

\$17B global business unit of GE

30,000 employees worldwide

\$1B+/year in R&D investment

Core strengths in bio-sciences,
technology, business



A global company with engineering teams aligned regionally to provide customer-focused solutions



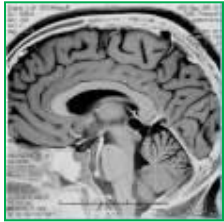
Americas

Europe
Middle East

Japan
China
India

Broad solutions for healthcare

Broad-based Technologies



Diagnostic imaging & surgery technologies



Clinical products



Medical diagnostics

Information Technology



Integrated admin. & clinical



Electronic medical records

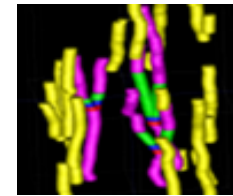


Picture Archiving System (PACS)

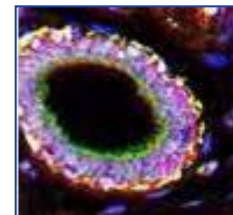
Life Sciences



Discovery tools



Protein & cell sciences



Clinical tissue biomarkers

Putting the TECHNICAL in Technical Design Review



- Senior TCP oversee the work of other engineers to ensure the quality of the design, and
- Engineering should employ statistical tools in the design process

Delivering products whose performance, safety, and reliability are maintained despite variability in customer usage and environment

Five Key Elements of TDR Deployment

Program Level



1. Good Technical Review plan and follow-up

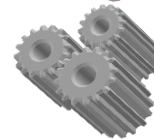
Individual TDR Level



2. Subject Matter Expert engagement, asking good questions



3. Use of functional excellence in design, including Design for Six Sigma



4. Reviews are well organized and executed

Product Team / Business Level

5. Subject matter experts are available, inputs are valued, and future experts are mentored

How to Populate the TDR Calendar?

Select the Most Critical Areas; Risk Based

- *Outputs that are changing*
- *Anything that has a high risk for failure and/or safety*
- *Any design/system aspects, which are driving key program deliverables, such as schedule, cost, reliability, customer requirements, human factors/usability, software interfaces, etc.*

Select Items Based on Design Complexity

- *Larger, more complex designs should have multiple, phased reviews with specific focused topics*
- *Include the need to review complex sourced designs at intermediate points of the vendor's development*
- *Consider the need to re-review (or not) any ATD (Advanced Technology Development) project delivery or reused subsystem in the context of the requirements and environment of the pulling program*

Timing: When should a review be held?

Reviews should focus on affecting the critical design decisions being made within the program.

If you hold the review too soon, there is little to review.

If you hold it too late, you have committed to the design.

Hold the review:

Soon enough to affect the design (multiple options still being considered)

Late enough to have something to review (design concepts, some design analysis, possibly some test results)

The GE Healthcare TDR Calendar Template

The template is grouped into two sections:

TDR Plan Content (slowly changing)

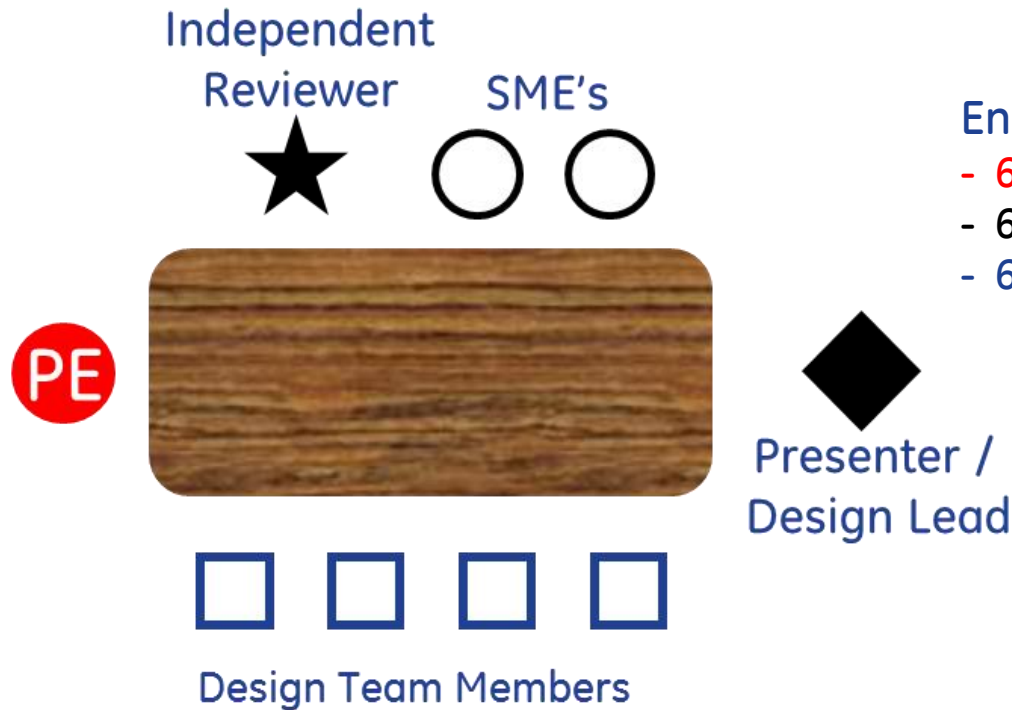
- Review 'area' or group,
- Review name
- Specific detailed critical review topics
- Review Type, or TDR Phase
- Review Owner
- TCP Approver
- Required reviewer(s)

*Review the plan 'content' like
any other design deliverable...
It has huge 'leverage'*

TDR Plan Status (will be updated throughout the project life)

- Review Planning Status (review date, if desired)
- Review Record location
- Tracking number of issues, actions

The Ideal Technical Design Review Membership



Enabling Six Sigma toolset

- 6 σ Master BB Tool Usage (Guide)
- 6 σ BB Tool Usage (Coach)
- 6 σ GB Level Tool Usage (User)

Should you use an 'external/independent' reviewer?

Pros

- Brings new viewpoints, special skills
- Encourages linkages across teams

Cons

- Has less ownership than internal
- Needs 'education' on application
- Harder to find for followup

Use Selectively

Centralized vs. Distributed Model?



Differing needs

- From web based service software to Life Support Systems... allow local approval of deviations by senior technical staff

Customization vs. Chaos

- Standardized tools & training...but product team pull
- Standard self-evaluation matrix...have 'best in class' reviewed with self-rated 'needs improvement'

Example: Japan



Situation

Strong Experts

Disciplined

Hierarchical

Response

DRBFM

Purchase of Japanese

Best Practices

Example: China



Situation

Weak Experts

Excited Use of templates

High Turnover

Response

Use global experts

High Training

Sustaining Mechanisms



Systems and Structures

- Self-assessment benchmark
- Regular reviews with senior management
- Celebrations of wins
- Continuous Improvement (corrective and preventive actions)

A technical review should:

Leverage Expertise

- ✓ Involve experts in the review process
- ✓ Take advantage of the experts across the business

Increase Interaction

- ✓ An in-depth technical review where engineer to engineer dialogue is key
- ✓ The presenter must be well prepared and ready to answer tough questions

Operate at the Right Level

- ✓ Reviews conducted at system level capture interface design challenges
- ✓ Technical reviews should go to PWB, code unit, and small mechanical assembly levels

Enhance Learning

- ✓ Provide opportunity for engineers to learn new technologies and/or processes
- ✓ Accelerate the development of engineers



Questions?