Aiding Workforce Acceptance of Digital Engineering

SPEC INNOVATIONS

BLUF

- Digital Engineering (DE) provides challenges for members of the workforce that lack a technical background and/or extensive training with the selected DE toolset
- Challenges can be categorized as both cultural and technical
- Many simple mitigation methods, when used together, can reduce acceptance barriers and increase workforce engagement with DE

Contents

Assumptions

- Management buy-in for DE
- DE toolset offers a range of capabilities including requirements management, modeling, simulation, verification, and program management
- DE toolset fully integrated
- DE toolset funded and deployed
- DE processes defined and tested
- DE toolset and processes usable by trained Systems Engineers (SEs)

Non-SE Touch Points with DE

- DE provides challenges for members of the workforce that lack a technical background and/or extensive training with the selected DE toolset, reducing acceptance and limiting engagement
- Typical non-SE touch points with the DE toolset include:
  - Technical Reviews (e.g., PDR, CDR)
    - External SMEs assessing requirements, designs, and plans
    - External SMEs documenting comments and issues
  - Recurring Programmatic Activities
    - Managers publishing schedule information
    - Managers collecting developmental and programmatic metrics
    - Managers conducting informal progress reviews
  - Evaluation Events (e.g., OT, Exercises)
    - Event organizers publishing schedule information
    - Event evaluators documenting assessments

Acceptance Challenges
Cultural

- Cultural challenges are those imposed by employees or the workplace organization
  - Employee Skillsets
    - Familiarity with document based tools (e.g., MS Office) and processes
    - Some employees may be reluctant to try new DE tools and methods; potentially worried about ability to use effectively
  - Organizational Structure
    - Established for non-DE workflow
    - Often results in institutionalized resistance to DE processes
  - Established Processes
    - Legacy review processes do not match DE workflow
    - Potential for perceived lack of rigor in DE processes (e.g., exploring a model vs. reviewing a document)
  - Trust
    - DE may be perceived as not as effective or rigorous as the familiar
    - Potential employee concerns about increased effort required for task (i.e., workload)
    - Negative impressions may result from previous efforts failing to live up to marketing hype

Acceptance Challenges
Technical

- Technical barriers are those imposed by the toolset
  - Magnitude of Toolset Change
    - Understanding functionality of pieces within toolset ecosystem
    - Performing activities with new, unfamiliar DE tool mechanics; exacerbated by different UIs within hybrid DE toolsets
  - Paradigm Shifts
    - Holistic focus; breaks data stovepiping
    - Non-linear processes (e.g., examine the database) may result in many paths to same goal
  - Performance
    - Hardware and/or network not sized to handle DE toolset
    - Users may attribute long response times and time outs to DE toolset; potentially revert to legacy tools and methods
  - Cybersecurity
    - Restrictions on ease of use features (e.g., collaborative tools) make using DE toolset more difficult

Mitigation Methods

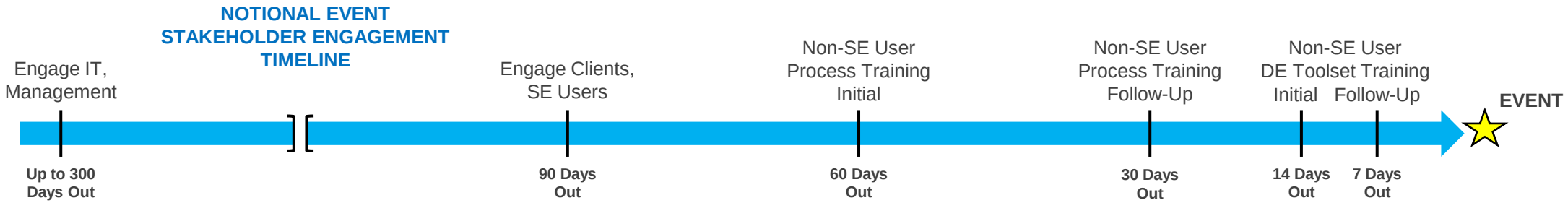
- Workforce acceptance challenges can and should be mitigated
- Potential mitigation methods include:
  - Education and Training
  - Stakeholder Engagement
  - Dashboards
  - Hybrid Reviews
  - Review Scripts

Mitigation Methods
Education and Training

- Implement an education and training program for:
  - DE Processes
    - Deliver prior to introducing DE toolset in order to obtain buy-in and provide context
    - Describes what DE toolset will accomplish (i.e., ‘Big Picture’); addresses differences from legacy methods
    - Delivery mechanisms may include:
      - Classroom/virtual instruction
      - Distributed instructional briefings
      - Electronically posted notices
  - DE Toolset
    - Deliver after users understand DE processes
    - Describes how to implement processes with DE toolset (i.e., mechanics)
    - Delivery mechanisms may include:
      - Classroom/virtual instruction
      - How-to wikis and DE toolset vendor web resources
      - Mentoring
    - Provide follow-up DE toolset training as close as possible to need date (e.g., event)

Mitigation Methods
Stakeholder Engagement

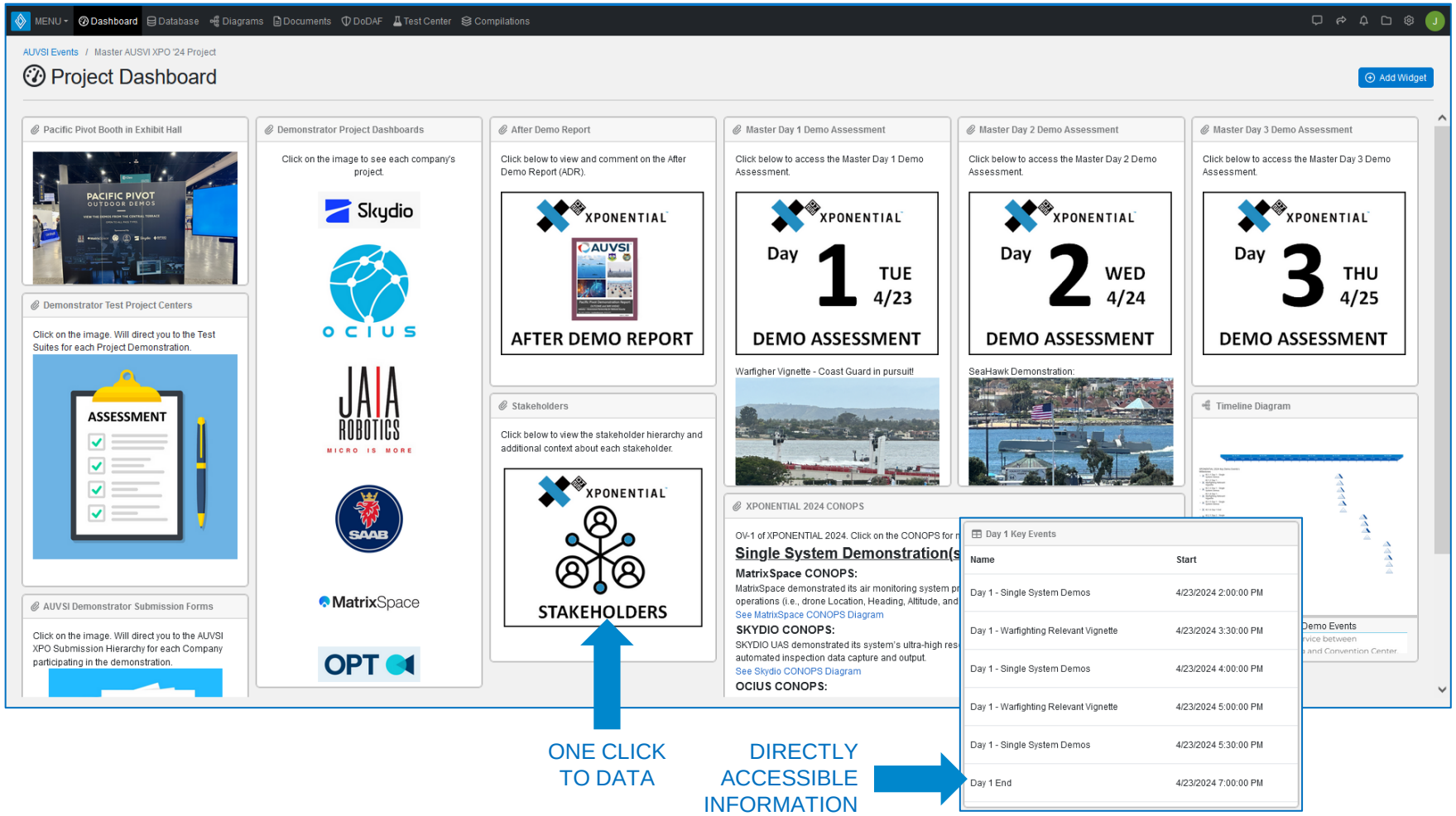
- Engage stakeholders early and often – publish and promote DE strategy
- Stakeholders to engage for events:
  - Management – engage on user training schedules; need for SE mentors
  - IT (infrastructure, cybersecurity) – engage on application interactions through firewall; when possible, engage on network bandwidth and endpoint device capabilities (e.g., memory, processor speed/capability, SSD, etc.)
  - SE Users – engage to identify SE mentors for non-SE users; interactions with non-SE users
  - Clients – engage on touch points with DE toolset and processes; invite to training events; provide evidence of cost/schedule risk reduction and enhanced productivity on other efforts
  - Non-SE Users – engage on process and toolset training events; connect with SE mentors



Mitigation Methods
Dashboards

- Dashboards act as information hubs allowing rapid access to summary data and rendered products
- Customize to facilitate ease of data access
  - Identify information need by users to carry out tasks; evolve over time
  - Provide ‘One Click’ access to internal project views and external information
  - Directly display task relevant information in textual and chart format

AUVSI XPO 24 DASHBOARD LANDING PAGE

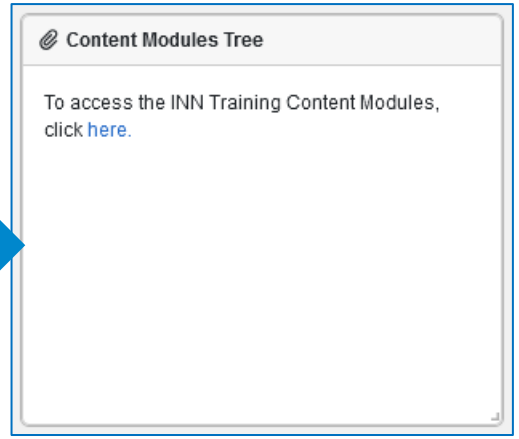


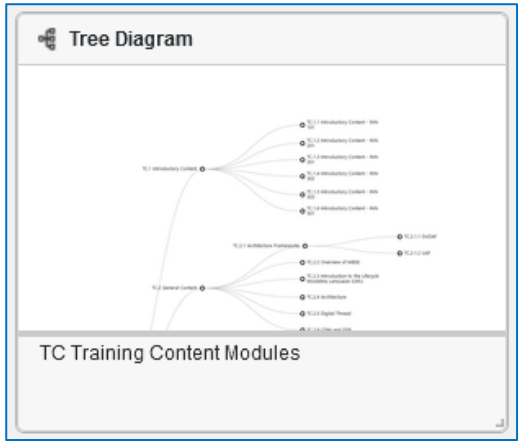
Mitigation Methods
Dashboards

- Reduce reluctance to use toolset by constructing dashboards that engage users
  - Provide relevant information in formats that don't overwhelm with detail
  - Update dashboard as program progresses
  - Make use of colored tiles to provide 'One Click' access

THREE DASHBOARD WIDGETS TO ACCESS TRAINING CONTENT MODULES TREE DIAGRAM

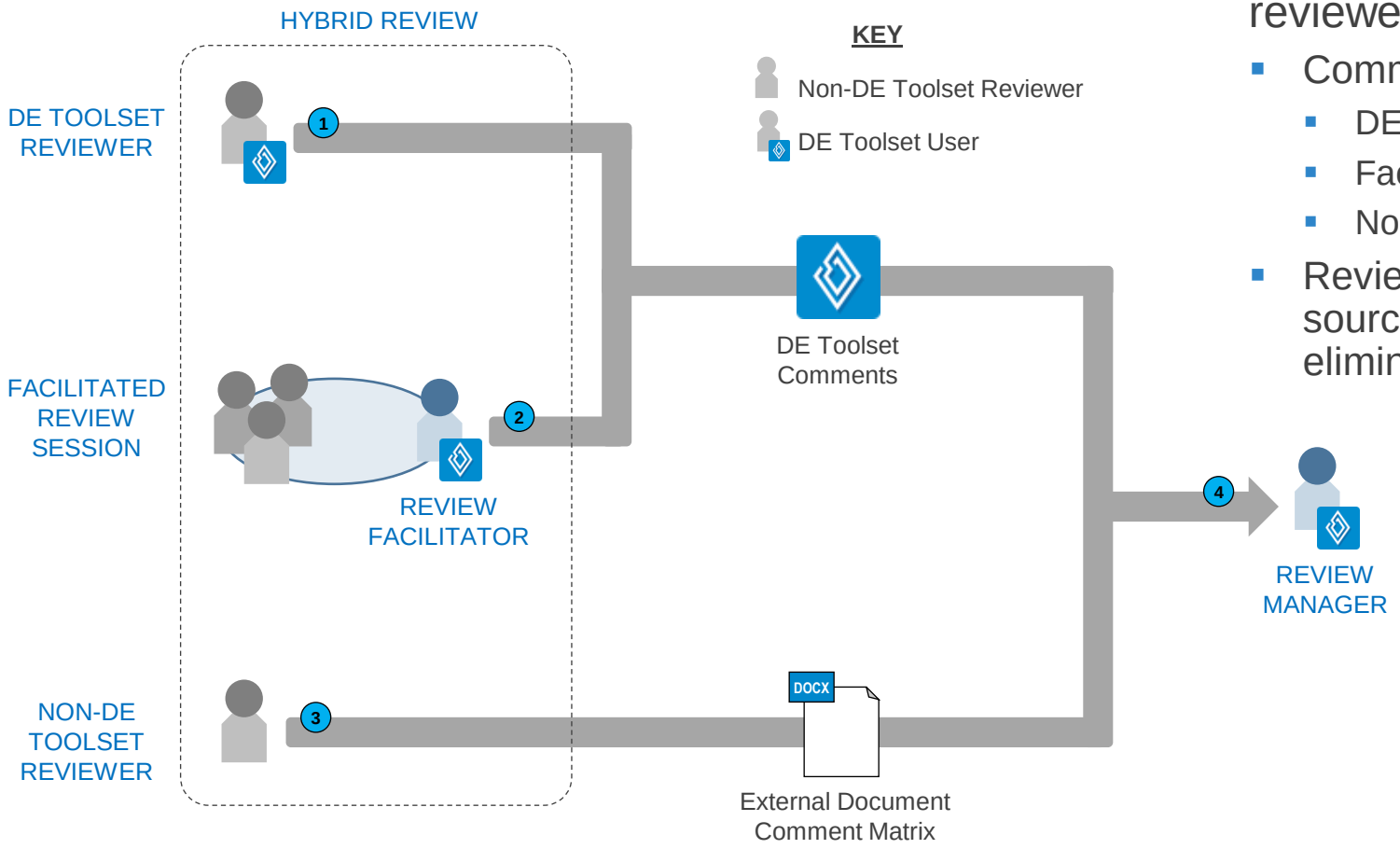
LEAST ENGAGING FOR USER





MOST ENGAGING FOR USER

Mitigation Methods
Hybrid Reviews



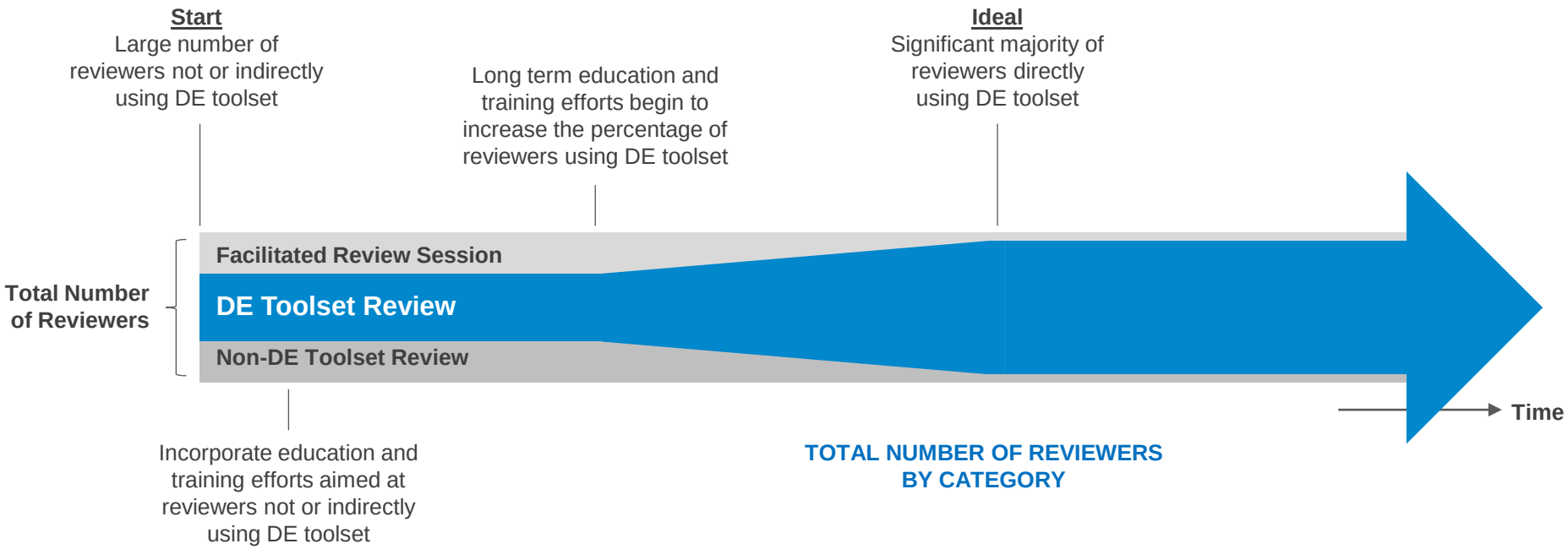
- Hybrid reviews may be necessary when some reviewers are unable to access DE toolset
  - Comments may come from three sources:
    - DE Toolset Reviewers
    - Facilitated Review Sessions
    - Non-DE Toolset Reviewers
  - Review Manager collates comments from all sources; overlapping comments combined to eliminate duplication

HYBRID REVIEW RESPONSIBILITIES

1. Reviewers with DE toolset access enter comments directly into DE toolset
2. Reviewers without DE toolset access attend review workshops where a Review Facilitator enters comments directly into DE toolset
3. Reviewers without DE toolset access that are unable to attend a review workshop enter comments against select exported content into a comment matrix
4. Review Manager collates and combines comments from all sources

Mitigation Methods
Hybrid Reviews

- End goal of implementing a hybrid review process should be to transition as many reviewers as possible to directly using the DE toolset
  - View as a mechanism to introduce the DE toolset into the review process
  - Incorporate DE toolset education and training to increase user acceptance in subsequent reviews



Mitigation Methods
Review Scripts

- Review Script guides and instructs reviewers in the conduct of the MBR
  - Maintained as a hyperlinked document, preferably within DE toolset
  - Contains an overview, items to review, and status update instructions

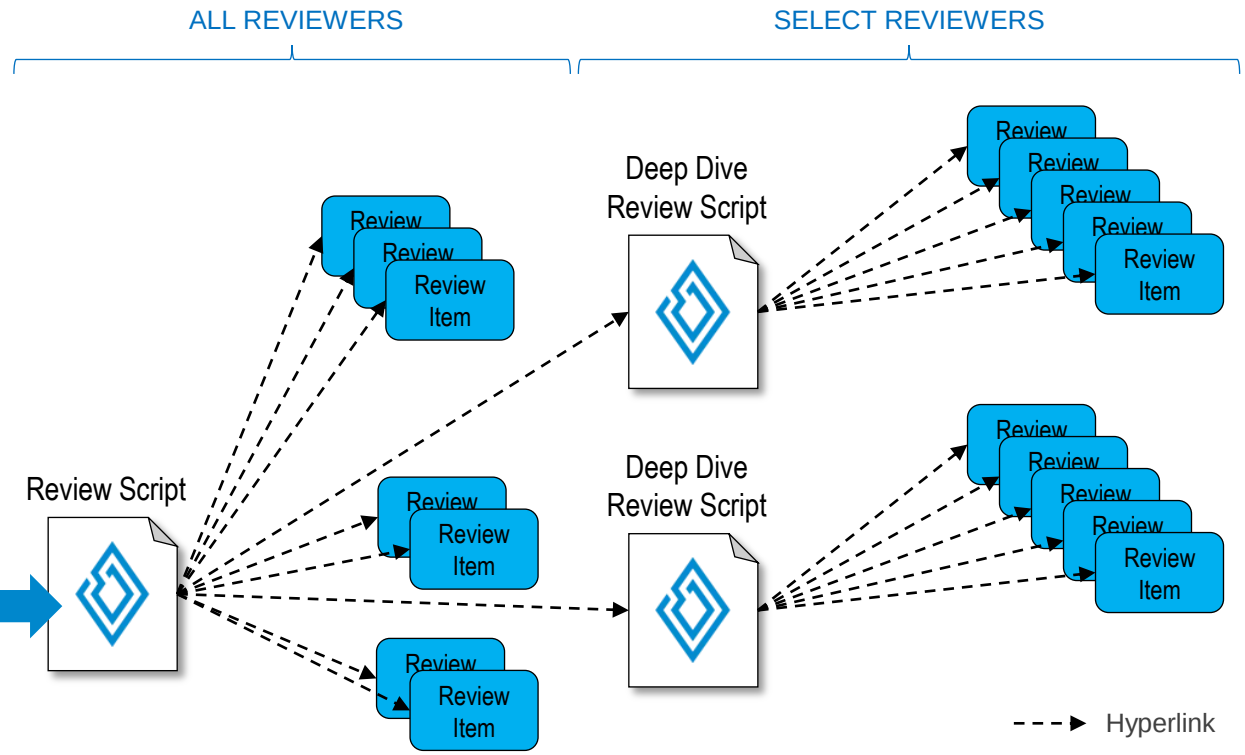
REVIEW SCRIPT OUTLINE

REVIEW OVERVIEW
Contains an overview describing the review process, instructions on review procedures, and items to be reviewed

REVIEW ITEMS
Provides linkage to criteria determined review items (i.e., entities), detailed reviews, and background materials

TBD.0.	Review Overview
TBD.0.1.	Review Background
TBD.0.2.	Review Instructions
TBD.0.3.	Review Item Overview
TBD.1.	Review Item 1
TBD.1.1.	Review Item 1.1
…	
TBD.n.	Review Item n

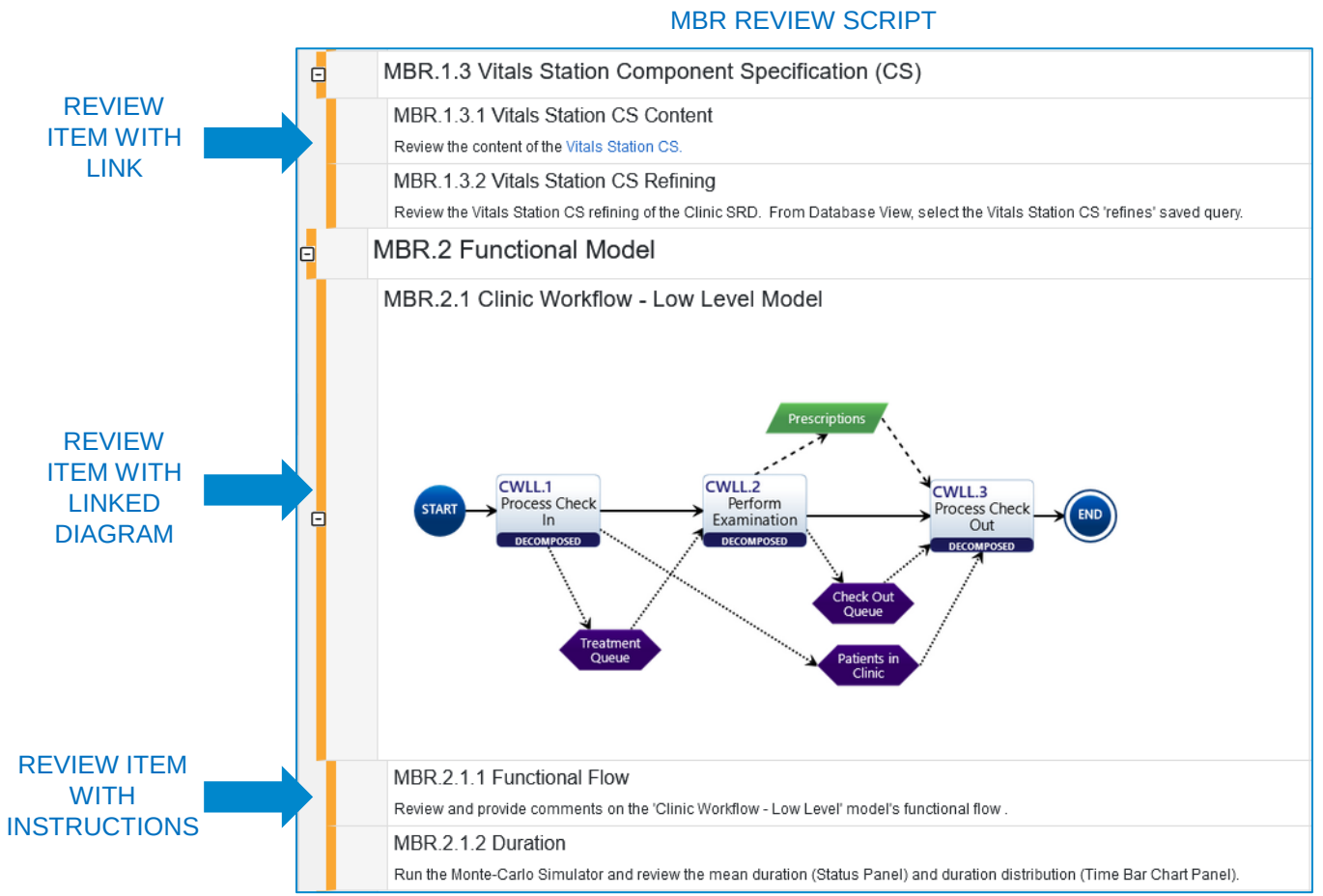
TDB refers to the review abbreviation (e.g. SRR, PDR, etc.)



- Review criteria determines the items to be included within the Review Script
- Detailed model reviews for select reviewers are contained within Deep Dive Review Scripts

Mitigation Methods
Review Scripts

- Review Scripts address concerns about DE process rigor
  - Provide review structure
  - Ensure that critical items are not overlooked
  - Capture the review criteria such as requirements, goals, and objectives
  - Embed links to models demonstrating the fulfillment of criteria
- Review Scripts can contain:
  - Review instructions
  - Links to content (e.g., models, documents)
  - Embedded content (e.g., images, diagrams)
  - Links to Deep Dive Review Scripts



Mitigating Acceptance Challenges

- Each acceptance challenge requires a different combination of mitigation methods
- Increased workforce engagement with DE is accomplished by:
  - Providing the context in which the DE processes will operate
  - Building trust in the DE processes
  - Delivering the education and training necessary to implement the DE processes with the toolset
  - Simplifying workforce access to relevant information within DE toolset
- Be proactive and plan ahead to incorporate mitigations, many have long lead times

Acceptance Challenges with Mitigation Methods	Education and Training	Stakeholder Engagement	Dashboards	Hybrid Reviews	Review Scripts
	Mitigation				
Cultural Challenges					
Employee Skillsets	X		X	X	
Organizational Structure		X			
Established Processes					X
Trust		X			X
Technical Challenges					
Magnitude of Toolset Change	X		X	X	
Paradigm Shifts					X
Performance		X			
Cybersecurity		X			

Summary

- Digital Engineering (DE) provides challenges for members of the workforce that lack a technical background and/or extensive training with the selected DE toolset
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