SLS Integrated Quality and Communication

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Communications are critical and, like engineering and manufacturing efforts, they can also be imperfect.

Systemic imperfections: different meanings for words/acronyms, different Bodies of Knowledge and styles of thinking, and different Program cultures.

Individual challenges: listening, articulation, information, personalities.

Poor communication can be costly: A Brief Story . . . .
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8735.2, 8.2.1: Program/project offices, with NASA SMA Lead and SMA office support, shall determine and assign GMIPs based on an analysis of risks related to contract noncompliance.
SLS REQUIREMENT CAPTURE

SLS-RQMT-014

SLS-RQMT-014, 6.8.4: The Government intends to use a combination of GMIPs and In-Line Assessment (ILA) to verify safety/mission critical attributes of the flight hardware and assembly/manufacturing and checkout processes.
SLS-RQMT-014, 6.8.4: The Government may utilize ILA for those safety/mission critical attributes where a documented qualitative RBA [Risk-Based Assessment] is performed, which evaluates the safety and quality characteristics of the process and/or inspection point, and where it is shown that there is sufficiently low risk . . . of an undetected defect inherent in that process or specific inspection point.
Requirements flow to MSFC Project Documents

GMIP or RBA Rationale for ILA
QE Decisions: Flexible Surveillance Strategies

Requirements flow to MSFC Project Documents

GMIP or RBA Rationale for ILA

MSFC Req’ts Flow
SLS Communication Space
QE Decisions: Flexible Surveillance Strategies
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RMO, MSFC and PC QE Pre-Delivery Activities Occurring in Element/PC Communication Space:
- Audits
- Print and Plan Reviews
- GMIP or RBA/ILA Determination
- MRRs and TRRs
- Nonconformance/MRB
- Acceptance Review
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Mature Projects Allow for Less Government Oversight: *More ILAs*
New Designs Require More Government Oversight: More GMIPs

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Heritage Designs purchased in OTS-style contract

QE Decisions: Flexible Surveillance Strategies
Flexible Requirements Enable QE Decisions

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QE Decisions: Flexible Surveillance Strategies

ESD

MSFC

SLS

STAGES

BOOSTER

ENGS

SPIE

PC/Subs

PC/Subs

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PC/Subs
Good Communication begins with

*Active Listening*: ????
Good Communication begins with *Active Listening*: stays focused, refrains from interjecting remarks and suspends judgment until the speaker is finished.
Cross-Program Hardware and Work Flow

GSDO-PLN-1195 Cross-Program Process and Agreements for Launch Site Ground Operations describes activities/responsibilities to support flight hardware processing at KSC. Flows back to Elements via SLS-PLAN-269 SLS Operations Implementation Plan.
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• **The Systems Engineering and Integration (SE&I) SMA team** acts as the ‘integration layer’ for SMA at the program level

  • Interface with the Systems Engineering (SE) Discipline and Lead Systems Engineer (LSE) on SE&I topics that impact SLS Program SMA
  • Interface with the SLS Engineering Disciplines and associated Discipline Lead Engineers (DLEs) that makeup the SLS SE&I Team
  • Assesses SLS at the system level and integrates across SLS Element and SLS Flight Software (FSW) SMA teams
  • Acts as primary SMA resource to assess proposed changes to SLS specifications, requirements, plans, reports, models, and other data items that define SLS design and functionality
Cross-Program Hardware and Work Flow

ESD

MSFC SLS

MSFC SE&I

PC/Subs

STAGES

SMA

SE&I

EGS

SMA

EGS

SMA

BOOSTER

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ENGS

SMA

SPIE

PC/Subs

Cross-Program Communication Space

KSC EGS

KSC OPERATIONS PC

= OMRSs (Operational and Maintenance Requirements and Specifications) flow handling, processing and maintenance parameters to EGS.

WADs (Work Authorization Documents) use prints, specs, OMRSs for input to KSC Ops docs.
**Systems:** facilitate information flow, but some of them are difficult to learn and some of them don’t “talk” to each other yet.

**Teams:** NASA’s Exploration System Development Program is *built on teaming concept.*

**Systems and Teams = Integration Success**
Learning another Center’s System is an opportunity:

- Gain access to information you need
- Understand task-related thinking
- Learn the Languages of Cross-Program Teammates

Makes You a BETTER COMMUNICATOR!
Technical Cultures & Cross-Program Teaming

“But I don’t need ANYBODY to tell me how to do my job!” TRUE, but . . .

- Quality Engineers = system control, continuous improvement mind, but must understand the design, analytical products, manufacturing processes, assembly processes . . .
- Design Engineers = visualization mindset, but need input on manufacturability, inspectibility . . .
- Analysis/Model Engineers = mathematical/algorithmic mindset, but need design details . . .
- Manufacturing Engineers = shop-floor, “chip-making” mindset, but need Key Characteristics . . .
- Assembly Engineers = shop-floor, “task-oriented” mindset, but need OEM input to assemble . . .

Every engineering “mindset” derives from a Body of Knowledge (BOK). THEY ARE INTERDEPENDENT. ALL ARE REQUIRED FOR SLS!
NC Processing: Planned & “Under Construction”

“Reachback” for NC Process Support =
“Call Trees” are currently under construction in several Cross-Program Communities
NC Processing: Planned & “Under Construction”
What about when Cross-Program Systems are not “talking”? System difficulties and disconnects are *Opportunities in Disguise:* ???

System disconnects promote manual work-arounds and, thus, *Cross-Program teaming.*
Communication Challenges Multiply As T-0 Approaches

https://www.youtube.com/watch?v=FG409y1WN4M&feature=youtu.be
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