





The Parable of the Program Baseline

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Abstract

Establishing the Program Baseline especially for government programs is an emergent process. The program baseline includes scope, schedule, and resources, but is paced and swayed by the timing of budget process and political maneuvering.

How does a program team maintain integrity of right action on behalf of the nation in the midst of ambiguity?

What is the role of requirements and the requirements process that most Systems Engineers know and love?

This talk presents the story of the ambiguous nature of establishing a program baseline for a nuclear weapon program. It will present the hard questions that frame the conversation about nuclear weapons at the national level.





Nuclear Security Enterprise (NSE)

- Evolving Nuclear Security Enterprise (NSE)
- The enterprise has been significantly downsized and consolidated since the end of the Cold War.
- Government oversight Management change over time









NNSA Defense Programs

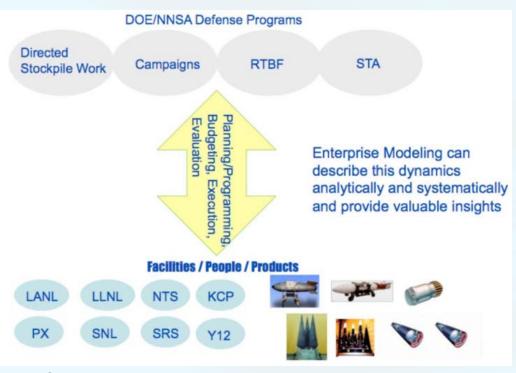
- Programs within NNSA (27% of DOE Budget)
 - Defense Programs; \$7.6 B
 - Naval Reactors; \$1.2 B
 - Defense Nuclear Nonproliferation;
 \$2.5 B
- Programs under Defense Programs
 - Directed Stockpile Work
 - Campaigns
 - RTBF
 - STA

Workforce

- Eight agencies
- Eight DOE site offices
- Federal Program Management staff in DC and Albuquerque

"The FY 2012 President's Budget Request provides \$11.78 billion to invest in a modern, 21st century nuclear security enterprise, implement the President's nuclear security agenda, and improve the way the NNSA does business and manages its resources."

Mar 2, 2011, testimony by NNSA Administrator D'Agostino







The Program Baseline

Resources

- Budget
- People
- Infrastructure
- Dependant Systems

Schedule

- Qualification schedule
- First Production Unit (FPU)
- Production schedule
- Initial Operating Capability (IOC)

Scope

- Military requirements
- Surety requirements
- Architectural themes
- Historical approaches to "assurance"









The Parable of a Program Baseline

- The *stewards* gathered and decided what needed to be done on high-reliability, one-of-a kind systems, including a system that was designed originally in the early '60s. They were asked to be "responsive" after a disruptive change in the world. A "new approach" was conceived that called for a fundamental shift to an "architected" system that could be used on multiple systems.
- A rumor started that the *stewards* were violating the "nothing new" rule. Partisan politics reared its ugly head. The *stewards* were stopped in their tracks.
- The system that was originally designed in the early '60s was losing life, it was time to make decisions. Everybody knew this time was coming and all that was planned and budgeted was a tune-up because they expected the new approach would be used over the long term.
- Thwarted, the day came to decide exactly what was going to happen for this system. A tune-up wouldn't due. The *stewards* talked and talked ... and talked. They talked themselves into a program they believed they could stand behind as *stewards*.
- Unfortunately, the planned program differed greatly from what the stewards felt they needed to do. As the program baseline became clear, time passed.

Programs get canceled or significantly down-scoped as a result





Non-linear Nature of the Program Baseline

Politics

Operating in the tension

"seek the peace and security of a world without nuclear weapons"

and

"as long as nuclear weapons exist, the United States will maintain a safe, secure, and effective arsenal"

- Nothing "new"
 - No Phase 1-5, only 6.1-6.6
 - Language is everything RRW, Modernization, ...
 - Military characteristics
- Technical basis vs. Political reality
 - Who are the stewards?
 - "It's now or never"
 - "It will die under it's own weight"

Budgeting Process

- FYNSP (Future Years Nuclear Security Program) vs. Life-of-Program
- Continuing the continuing resolutions (CR)
- The 'gated' appropriations language





Product Realization using Integrated Phase Gates

Study



Program

authorization

Full Scale Development & **Production Engineering**



Steady-state production

Phase

Source Requirements

Conceptual Design

Program Plan

Work of this stage

schedule, and cost.

The programmatic

into change control

information goes

after this gate.

is to create a

program scope,



Design & Integration

the design

concept will

function as

testing also

validation.

Work of this stage is to validate, with system tests, that also developed and characterized. required. System provides cost

Final Design & **Process Development**

Prod. Readiness & Qualification



Work of this stage is to elicit and analyze the source/ stakeholder requirements, and to understand the risks and implications to system requirements.

Work of this stage is to mature the design and assure it meets stakeholder requirements.

This gate documents the agreement of the gatekeepers as to source/ stakeholder requirements.

At this gate, the gatekeepers agree that the conceptual design meets the requirements from the first gate. Also at this gate, the associated risks and risk handling are agreed to and a plan is bought off for when technology maturity must be at certain levels.

Work of this stage is to further develop component definition and evaluate performance to requirements. Processes are

Work of this stage includes component process finalization and qualification. The activities integrate up to system qualification and delivery of the final product.

At this gate, the definition has been completely documented, and component, subsystem, and system functionality has been evaluated. The definition phase is largely complete, and the program is ready to proceed with process prove-in and qualification activities.

Note that for 6.X PRP efforts, there are activities and interactions between Gate C and the start of Stage D. Gate C will help the NNSA ensure that its information is ready for further integration with the DoD (into the JIPP). Also, decisions made at program authorization may impact scope and funding. Stage D includes an assessment of what was authorized.





Recommended Minimum TRLs and MRLs

Phase 2 / 2A or 6.2 / 6.2 A Study

Phase 3 - 5 or 6.3 - 6.5 Full Scale **Development & Production Engineering**



A: Source Req's



C: Program Plan



MRL 3

TRL 5

MRL 3

E: Final Design & **Process Development**



F: Production Readiness & Qualification



Final Tech Down-Selects Final Design

MRL 4

MRL 4

System Review Qualification Evaluation Start

MRL 7

First Stable **Production Production** Unit, FPU

MRL 8

Weapon System MRL *Subassembly / Component TRL MRL

TRL 5 MRL 2

MRL 3

TRL 6

TRL 6 MRL 5

MRL 5

TRL 7 MRL 6

MRL 6

TRL 7 TRL 8 MRL 7 MRL 8



MRL 9





Requirements Process to Date

- 2008 Full Scope became official, though not completely understood
- 2009 Gate A (Source Requirements)
 - Collected and scrubbed the requirements . . . challenged where appropriate
 - Requirements in flux, but some technical decisions were made
 - Budget commitments made to technology maturation were not realized
- 2010 Major Scope on Hold by Congress
 - Nuclear Posture Review (NPR) in progress funding gated by congress
 - Difficult to determine budget estimates
 - First schedule slip final schedule remained
- 2011 Gate B (Concept Design)
 - Back to full scope, ramp-up required
 - With technical teams engaged, a better FYNSP estimate made, still not final Program Authorization estimate
 - Sticker shock-wave
 - Gate B Budget disconnect with trade-offs necessary
- 2012 Gate C (Program Plan) and 6.3 Authorization
 - Weapon Design and Cost Report (WDCR)
 - Program Baseline does not add up
 - Let the compromises begin!





Nuclear Conversation

- What do we consider to be our Nuclear Deterrent?
 - People with critical skills?
 - Infrastructure to develop and produce systems?
 - Delivery platforms and nuclear payloads?
 - Rumbling the ground?
 - Non-proliferation systems?
- Is the Nation committed to a Nuclear Deterrent?
 - Yes? If so, what could change that commitment?
 - No? What would inspire commitment?
 - Deterrent no longer relevant?
- What is the nation willing to pay for a Nuclear Deterrent?
 - Pay on a system by system basis? Does not scale linearly
 - Pay for the deterrent capability? . . . "ante up"

Ambiguous or "luke-warm" commitment is not a good idea

