The Parable of the Program Baseline

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Enchantment Chapter

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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**

Map of the United States showing Nuclear Security Enterprise sites:
- Hanford Site, Richland, WA
- Lawrence Livermore National Laboratory / Sandia National Laboratories, Livermore, CA
- Nevada Test Site, Las Vegas, NV
- Rocky Flats Plant, Golden, CO
- Kansas City Plant, Kansas City, MO
- Mound Plant, Miamisburg, OH
- FMPC, Fernald, OH
- Los Alamos National Laboratory, Los Alamos, NM
- Sandia National Laboratories, Albuquerque, NM
- Pantex Plant, Amarillo, TX
- Y-12 Plant, Oak Ridge, TN
- Savannah River Plant, Aiken, SC
- Pinellas Plant, Largo, FL

Legend:
- Laboratories (blue)
- Production (green)
- Testing (red)
- Materials (purple)

Timeline of agencies:

1946	1974	1977	2000
Atomic Energy Commission	Energy Research & Development Administration	Department of Energy	NNSA National Nuclear Security Administration

National Nuclear Security Administration

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

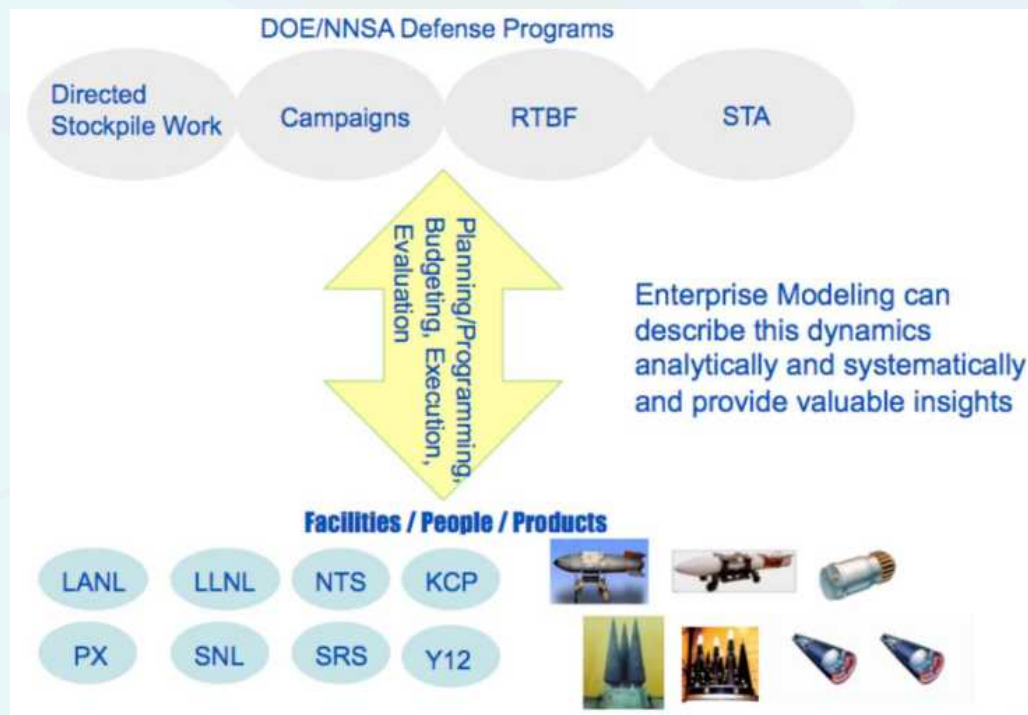- **Programs under Defense Programs**
  - Directed Stockpile Work
  - Campaigns
  - RTBF
  - STA

- **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

DOE/NNSA Defense Programs

Directed Stockpile Work | Campaigns | RTBF | STA

Planning/Programming, Budgeting, Execution, Evaluation

Enterprise Modeling can describe this dynamics analytically and systematically and provide valuable insights

Facilities / People / Products

LANL | LLNL | NTS | KCP

PX | SNL | SRS | Y12

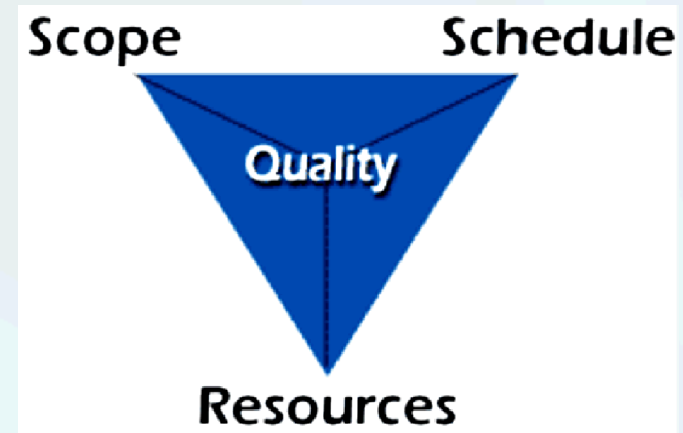# The Program Baseline

- **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
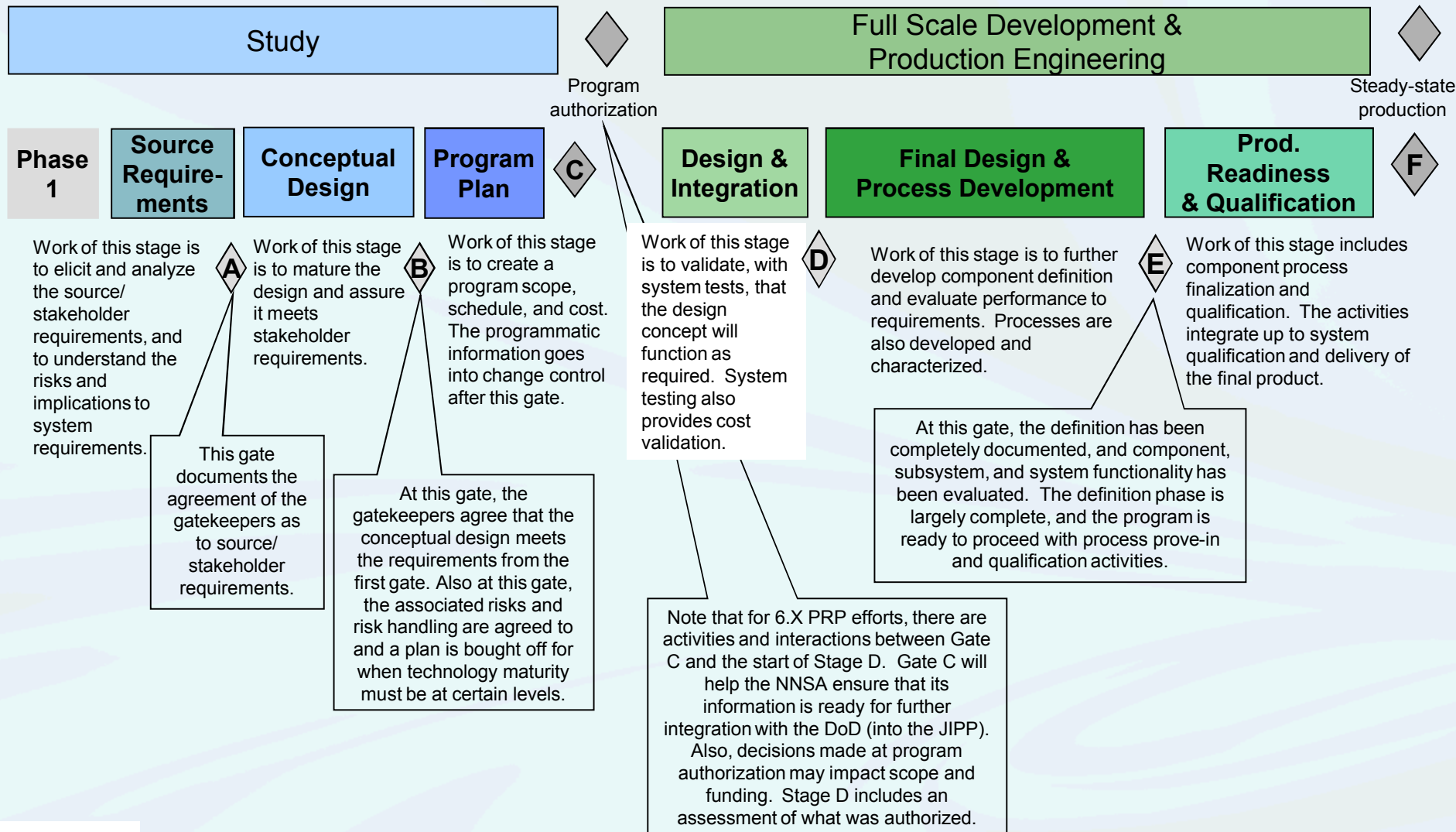   - Language is everything – RRW, Modernization, …
    - Military characteristics
  - Technical basis vs. Political reality
    - Who are the stewards?
    - "It's now or never"
    - "It will die under it's own weight"
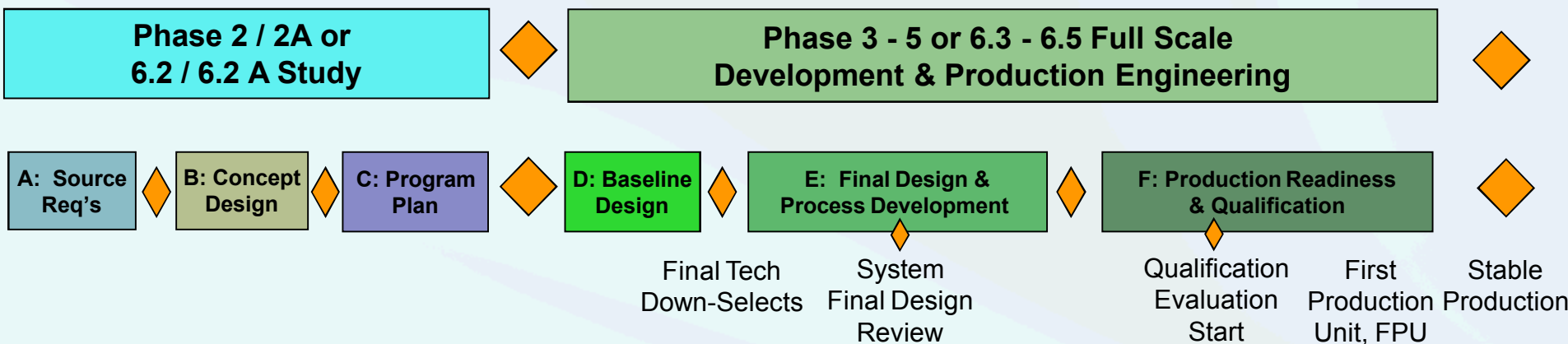- **Budgeting Process**
  - FYNSP (Future Years Nuclear Security Program) vs. Life-of-Program
  - Continuing the continuing resolutions (CR)
  - The 'gated' appropriations language

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 | ◆ | B: Concept Design | ◆ | C: Program Plan | ◆ | D: Baseline Design | ◆ | E: Final Design & Process Development | ◆ | F: Production Readiness & Qualification | ◆ |

Final Tech Down-Selects

System Final Design Review

Qualification Evaluation Start

First Production Unit, FPU

Stable Production

Weapon System MRL	MRL 3	MRL 3	MRL 4	MRL 5	MRL 6	MRL 7	MRL 8	MRL 9
*Subassembly / Component TRL	TRL 5	TRL 5	TRL 6	TRL 6	TRL 7	TRL 7	TRL 8	TRL 9
MRL	MRL 2	MRL 3	MRL 4	MRL 5	MRL 6	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