

# Simple Strategic Planning Visualization Tool



*PRESENTED BY*

C. Davis (Author/Presenter)

J. Samberson, B. Steinfeldt, J. Gilbride (Co-Authors)

Challenge

Feasibility Evaluation

Context of NSE Activities

Tool Requirements

Tool Overview

Benefits

Extension

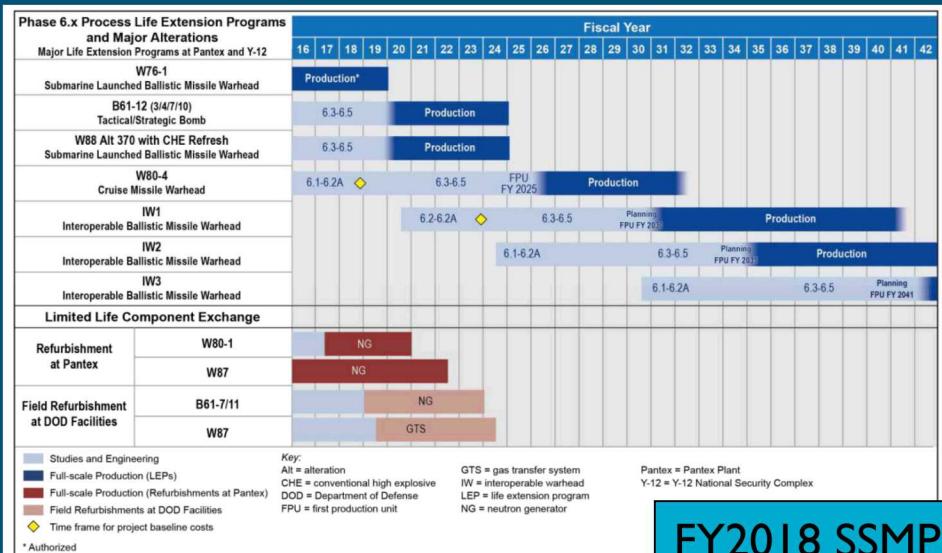
Q&A

# Challenge

- The National Nuclear Security Administration (NNSA) has the mission to maintain the nation's nuclear deterrent through life extension programs and major alterations
- FY2018 Stockpile Stewardship and Management Plan (SSMP) identified timeline of activities over next quarter century
- Three months later, the Nuclear Posture Review identified a need for significant changes to the plan:
  - Modify a small number of existing warheads on submarine-launched ballistic missiles for a low-yield option
  - Pursue a modern nuclear-armed sea-launched cruise missile
  - Complete the W80-4 one year earlier
  - Start the W78 replacement warhead one year earlier
- The Nuclear Security Enterprise (NSE) needed to assess the feasibility of these (and ultimately other) proposed stockpile changes



<https://www.energy.gov/nnsa/missions/maintaining-stockpile>

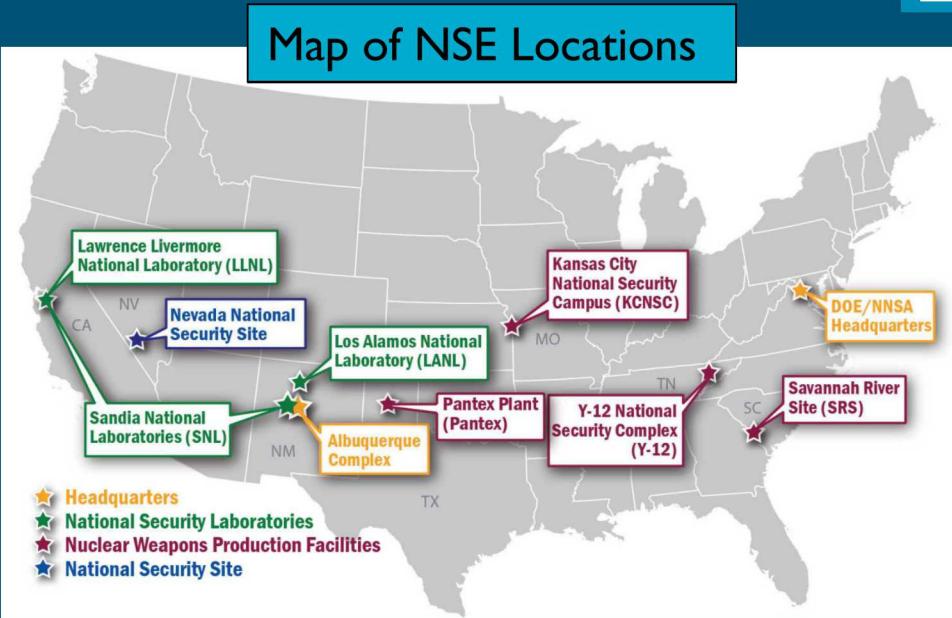


FY2018 SSMP

[https://www.energy.gov/sites/prod/files/2017/11/f46/fy18ssmp\\_final\\_november\\_2017%5B1%5D\\_0.pdf](https://www.energy.gov/sites/prod/files/2017/11/f46/fy18ssmp_final_november_2017%5B1%5D_0.pdf)

# Feasibility Evaluation

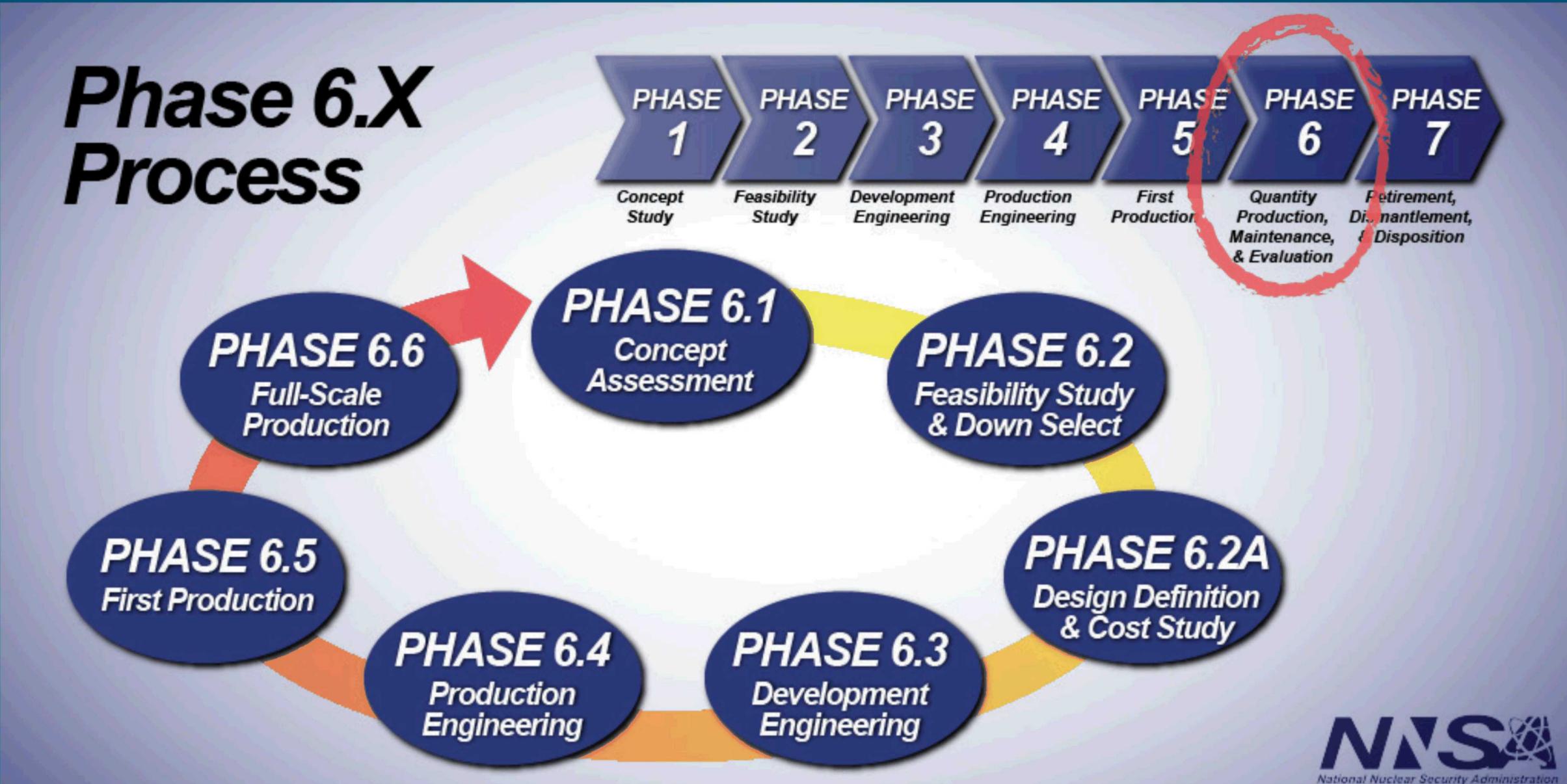
- Stockpile feasibility analysis must:
  - Include key (constraining) activities/elements of entire NSE
  - Reflect business rules and operations of the NSE
  - Represent all phases and activities of weapon system:
    - Design
    - Development
    - Production
- Tool proposed to automate and expedite analysis
  - Simple strategic planning visualization tool for NSE operations
  - Show overview of numerous parallel activities across decades with an ability to highlight points of significant resource demand
  - For hands-on use by high-level decision makers
  - Deployed on individual computers at various locations within the NSE and not require special software licenses
  - Involve input of simple, focused data sets, and run in real-time



<https://www.energy.gov/sites/prod/files/2018/10/f57/FY2019%20SSMP.pdf>



<https://www.energy.gov/sites/prod/files/2018/06/f53/6x%20process.pdf>



# Tool Requirements

Parameter	Minimum Requirement
Time Duration	> Thirty Years
Temporal Resolution	Monthly/Annual
Stockpile Composition	Eleven Weapon Systems
Constituent Elements	Six Key Components/Subsystems
Editable Variables	System/Subsystem Identifiers (Design Options) Weapon System Quantities Production Completion Date Phase Durations Component Quantities Production Yield Production Lead Time Workload Equivalencies Design/Production Capacities
Output	Gantt Chart Design/Production Charts (Column Charts with Capacity Line) Production Schedule



# Tool Overview

---

# 6.XVT Instructions

Phase 6.X Visualization Tool v0.13\_MORS.xlsx - Excel

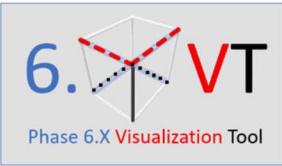
File Home Insert Draw Page Layout Formulas Data Review View ACROBAT Tell me what you want to do

Clipboard Font Alignment Number Styles Cells Editing

General Conditional Formatting Table Normal Bad Good Neutral Calculation Check Cell Explanatory Input Linked Cell Note

Insert Delete Format AutoSum Fill Sort & Filter Find & Select Clear

K3

**Introduction**

Phase 6.X Visualization Tool (6.XVT) is part of a toolset for NNSA to use to evaluate future stockpile scenarios and compare demand across the Nuclear Security Enterprise (NSE) with known capacity constraints. Constraints under consideration include number of weapon systems simultaneously going through a given phase of the Phase 6.X design, development, and production process, as well as nominal production capacities. Tool inputs include the stockpile weapon system(s) definition and number of weapons, component constituent definition, weapon system First Production Unit (FPU) date, and phase durations. Additional component parameters / descriptors are entered representing component production requirements and metrics. On the Summary Charts, inputs allow capacity variance capability. The outputs include the start and stop dates for each phase in a weapon system, the overall schedule Gantt chart for each weapon system, and the component resource needs schedule against capacity for weapon system deployment execution.

Data is entered by the user in the "Data Entry" worksheet (details below under "Instructions/Inputs"). Information in 6.XVT is organized through use of the "Outline" feature in Excel, allowing the user to click on the **1**, **2**, or **3** buttons at the top left corner of the worksheet. The **1** button shows only a single row at that level of the outline simultaneously. The **2** button shows component detail for each weapon system. The **3** button shows component detail for each weapon system.

**Data Outline Features**

presented both on the "Data Entry" worksheet and the "Summary Charts" and "System Charts" worksheets. "Hide Detail" by clicking either on the **+** and **-** buttons in the left margin of the worksheet, or by clicking on the **1**, **2**, or **3** buttons at the top left corner of the worksheet. The **1** button shows only a single row at that level of the outline simultaneously. The **2** button shows component detail for each weapon system and the Phase 6.X summary across all weapon system. The **3** button shows Phase 6.X detail for each weapon system.

**Instructions/Inputs**

1. Go to the "Data Entry" worksheet by either clicking on the tab (below) or clicking on the **1** button at the top left corner of the worksheet. (Mnemonic for subsequent steps: follow colors in order of rainbow - red, orange, yellow, etc.)
2. Review the number of **Weapon System** entries in the stockpile section. If the number of entries is insufficient, review and modify the **Tool Inputs** as required, contact the [tool developer](#) to request an expansion to the number of weapon systems.
3. If the number of **Weapon System** entries is sufficient, review and modify the **Tool Inputs** as required, contact the [tool developer](#) to request an expansion to the number of weapon systems.
4. Enter the **# in Stockpile** for each weapon system. To include the FPU, click the **1** button at the top left corner of the worksheet. (Mnemonic for subsequent steps: follow colors in order of rainbow - red, orange, yellow, etc.)
5. Review the number of **Weapon Component** entries for the stockpile section. If the number of entries is insufficient, review and modify the **Tool Inputs** as required, contact the [tool developer](#) to request an expansion to the number of weapon components.
6. If the number of **Weapon Component** entries is sufficient, review and modify the **Tool Inputs** as required, contact the [tool developer](#) to request an expansion to the number of weapon components.
7. Enter the **End Date** for the completion of the First Production Unit (FPU) per weapon system. This will define the end of Phase 6.5, First Production. If phases per weapon system are not visible, expand the data outline either by clicking on the **2** button at the top left corner of the worksheet, or by clicking on the **+** button in the left margin next to the **Weapon System** name.
8. Select the **Duration** of each Phase of the 6.X process for each weapon system through the pull-down list of acceptable durations. Start Date and End Date values will automatically be calculated. (Note: Phases are assumed to start on the first day of the designated month and end on the last day of the designated month; therefore, both starting month and ending month are included in the phase duration. Also, it is assumed that there is no delay between the end of one phase and the beginning of the next.)
9. Enter the Multiple (M), Overbuild (O), Yield (Y), Equivalent Unit (EQ), and Lead values for each component in each weapon system. (If the data outline structure is compressed, reveal the stockpile quantity entries by clicking the **3** button in the top left corner.) These parameters are defined as:

**Hyperlinks and E-mail Addresses**

**Mnemonics for Instructions**

Ready Instructions Data Entry Summary Charts System Charts +

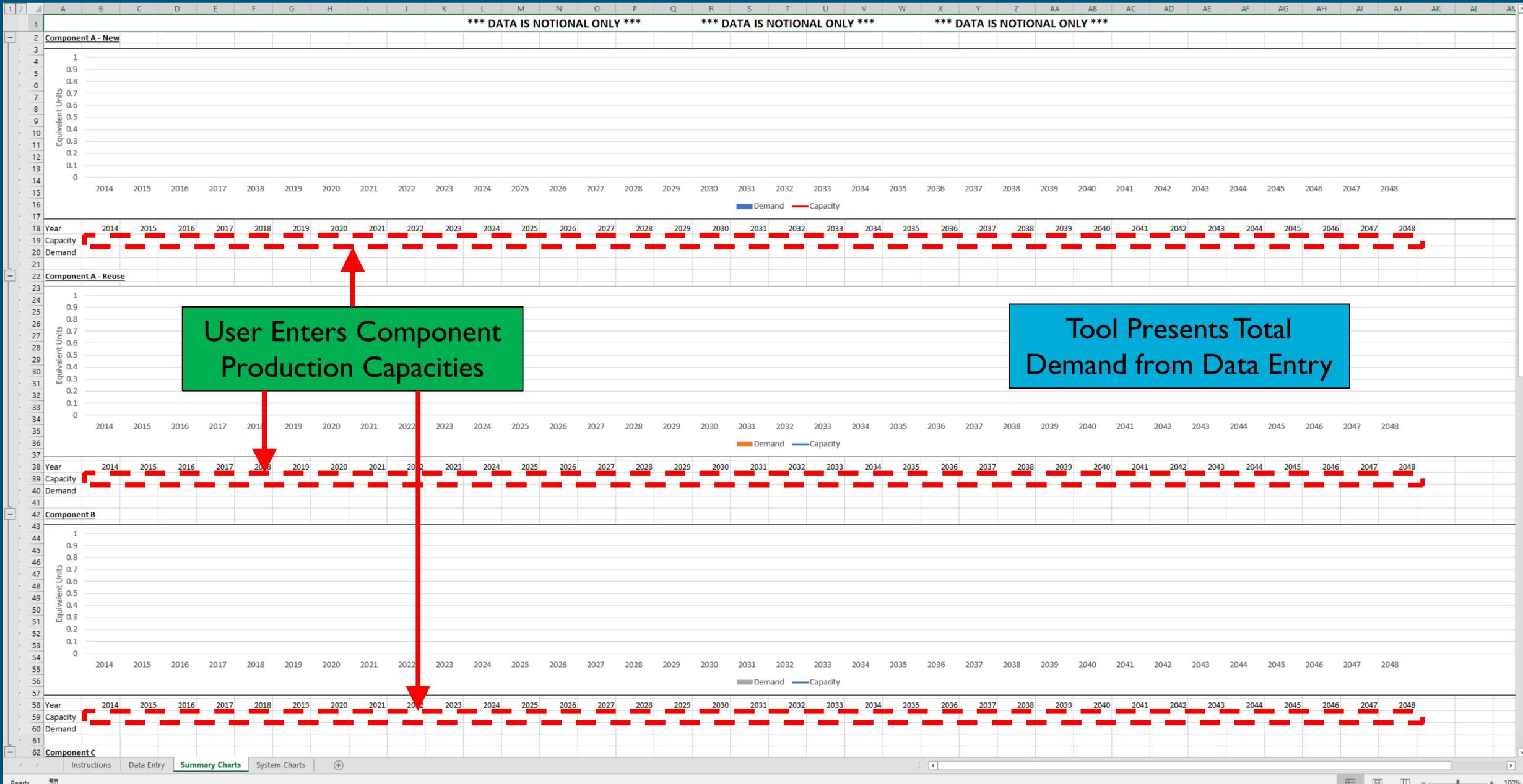
## 6.XVT Data Input: System Definition and Phases

A	B	C	D	E	F	G	H	I	M	N	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW																						
1	*** DATA IS NOTIONAL ONLY ***														* DATA IS NOTIONAL ONLY *																																							
2	Weapon System	Phase ID#	Phase Title						Duration		Start Date	End Date	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17																				
3	# in Stockpile	Phase ID#	Weapon Component	M	O	Y	Total	EQ	Lead																																													
All Systems Activities	Phase 6.2	Feasibility Study and Design Options						Note: Numbers to the right indicate number of systems in given phase per time period																			Tool Generates Heatmap, Highlighting Simultaneous Activity																											
	Phase 6.2A	Design Definition and Cost Study																																																				
	Phase 6.3	Development Engineering																																																				
	Phase 6.4	Production Engineering																																																				
	Phase 6.5	First Production																											Tool Calculates Start and End Dates																									
	Phase 6.6	Full-Scale Production																											First Production Unit																									
	Phases 6.2-6.6	Feasibility Study → Full Production																											Tool Generates Bars to Illustrate Durations																									
	Phase 6.2	Feasibility Study and Design Options																																																				
	Phase 6.2A	Design Definition and Cost Study																																																				
	Phase 6.3	Development Engineering																																																				
	Phase 6.4	Production Engineering																																																				
	Phase 6.5	First Production																																																				
	Phase 6.6	Full-Scale Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				
	Phases 6.2-6.6	Feasibility Study → Full Production																																																				

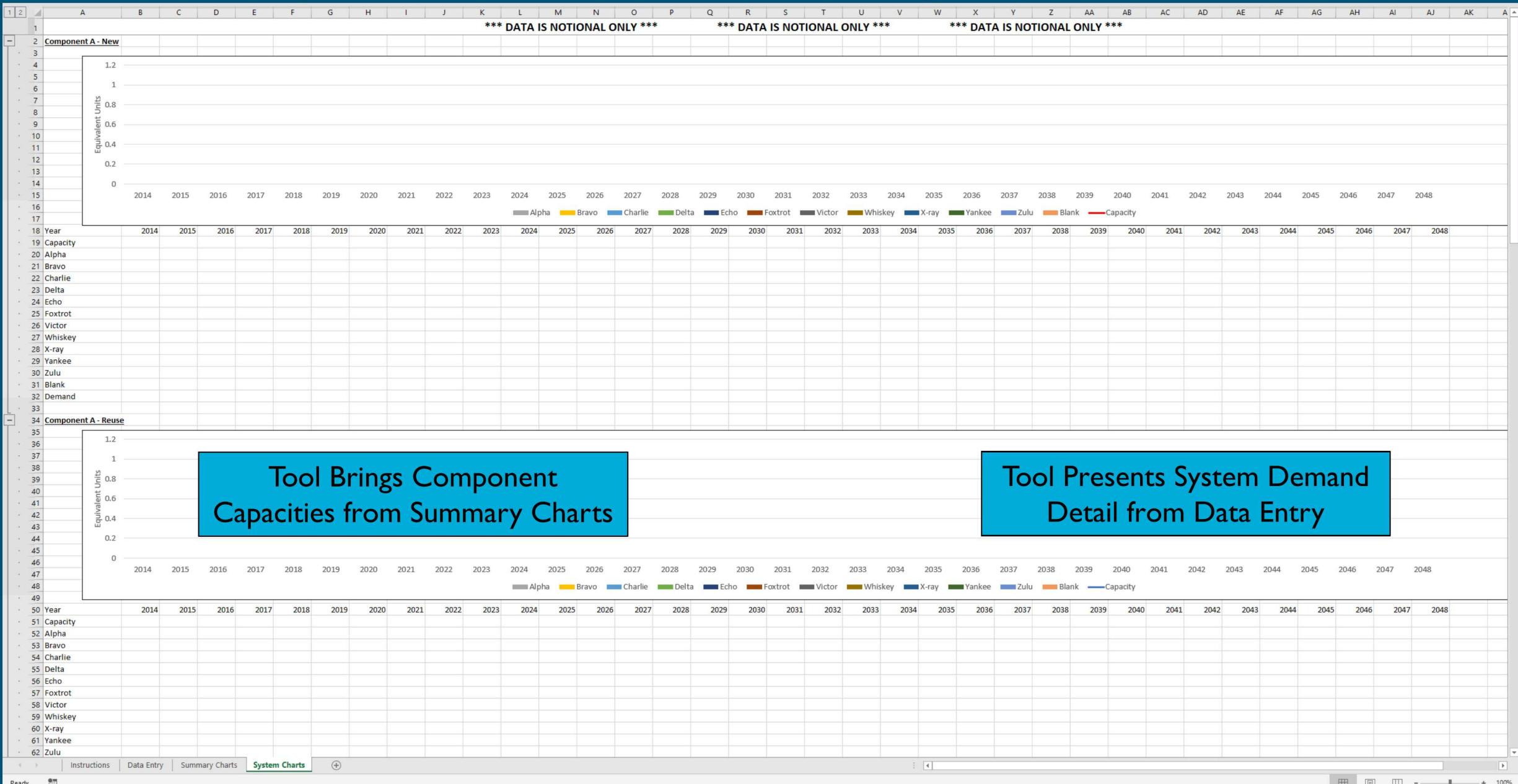
10

## 6. XVT Data Input: Component Definition and Production

# 6.XVT Output: Total Demand/Capacity Charts



# 6.XVT Output: System Detail Demand/Capacity Charts



## Benefits

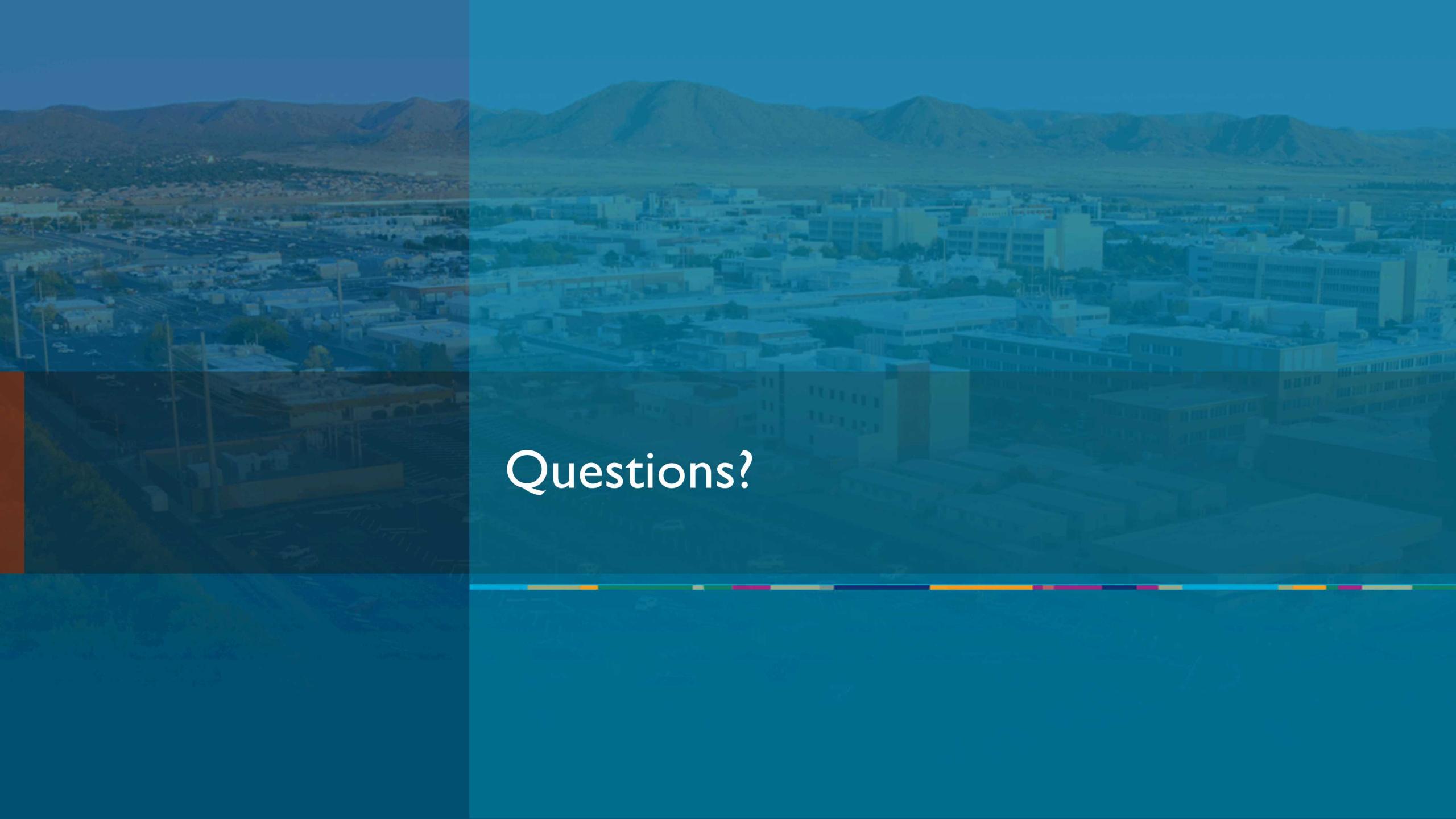
- Tool allows for quick evaluation of stockpile scenario feasibility
  - Evaluation of number of systems going through a particular phase - allows for consideration of demands of design, development, and production activities
  - Allows for rapid adjustment to start dates and phase durations to deconflict peak simultaneous demands
  - Presents an example component production schedule for comparison with resource capacity
  - Takes into consideration difficulty of production of individual components to allow for variability across stockpile
- Can be generalized for other domains

## Extension Outside NSE Domain



Approach can be applied outside NSE domain to allow for simplified visualization for long-range portfolio planning:

<b>NSE Domain</b>	<b>Generalized Application</b>
Stockpile	Project Portfolio
Weapon Systems	Projects
Phases	Tasks
Components	Resources
Multiplier, Yield, Equivalencies	Resource Efficiency, Cost
Production Capacity	Resource/Budget Limitations



Questions?

---



# Backup Material

---

# Abstract

The Nuclear Security Enterprise (NSE) is projecting a period of significant work over the next few decades with a number of proposed weapon system modifications undergoing design, development, and production cycles, often with simultaneous competing activities. Decision-makers within the NSE are requesting simple tools that allow visualization of these simultaneous activities to quickly identify potential points of overload on constrained resources in all phases of work so that schedules might be adjusted or other alternatives considered. To meet the intended needs of the user community, the tools must be easily deployed on individual computers at various locations within the NSE, not require special software licenses, involve simple input of focused data sets, and run in real-time. To meet these needs, a simple visualization tool based in Microsoft Excel has been developed to show numerous parallel activities at a high-level across decades with an ability to highlight points of significant resource demand. Representation of production rates are captured to compare demand for a given schedule with resource availability, honoring business rules generally applied to the NSE. Weapon system design options are represented in simplified terms to allow users to consider future weapon stockpile needs and compare those with NSE facility capabilities and capacities. This presentation will provide an overview of the current development tool architecture, along with examples of output for decision-makers in support of their long-range portfolio planning.

# U.S. Nuclear Warhead Lifecycle Phases

