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INFORMING DoD PROGRAM PLANNING THROUGH THE EXAMINATION OF THE CAUSES OF DELAYS IN ACQUISITION USING ACQUISITION DATA

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A Word About Schedules & Schedule Data



SCHEDULE

- Stepchild of the trifecta—Cost, Schedule, Performance
- Cost as most important, most visible factor
- ...also the most measured of the three
- Performance as most important for the warfighter
- Schedule treated as least important, therefore least measured

SCHEDULE DATA

- Stepchild of acquisition data—tracked and reported but not like cost
- Data hard to find
- Schedule is seen in the context of a cost driver
- Schedule important for the warfighter—when will it be delivered?
- Needs to be mined

Goals | Methodology



This year's focus

- Three part, multi-year effort: Find the Data—Apply it

1. **Discover**—Develop ways to identify and extract schedule information using the OSD acquisition information databases
2. **Classify | Analyze**—The second goal is to identify important delay factors, so those factors can be considered in project schedule planning
3. **Apply**—Demonstrate how the identified schedule data can be proactively used by DoD Project and Program Managers
4. **Repeat**

Methodology

Discover

- SAR Data (pdf)
- OSD Developed Search/ Extraction
- .xlsx Files

Classify | Analyze

- Change Explanations
- Dates
- Data Analysis
- 4,000+ Initial Lines
- ~1000 lines discarded
- 3,058 defined

Apply

- Delay Reasons and time as schedule planning inputs
- Causal Loop Diagrams
- System Dynamics



AutoSave OFF | SARschedule_section_with_changeexplanation - Saved to my Mac | Search Sheet

Home | Insert | Page Layout | Formulas | Data | Review | View

Calibri (Body) 12 | Wrap Text | Merge & Center | Conditional Formatting | Format as Table | Cell Styles | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter

A1 | fx | uri

1	uri	Additional delays in missile flight testing have impacted program schedule. Revised													IRSche	GetSARSch			
2	urn:us:mil:os	milestones will be submitted in the proposed Acquisition Program Baseline to be													LSE	FALSE			
3	urn:us:mil:os	concurrent with Low Rate Initial Production (LRIP) Defense Acquisition Board (DAB). The													LSE	FALSE			
4	urn:us:mil:os	current estimate for program schedule milestones is based on a single successful													LSE	FALSE			
5	urn:us:mil:os	intercept requirement to enter LRIP. Current Estimate changes since the December 31													LSE	FALSE			
6	urn:us:mil:os	1997 SAR are: Service Final DT&E - Complete from FEB 99 to FEB 00 Low Rate Initial													LSE	FALSE			
7	urn:us:mil:os	Production Decision (DAB) from AUG 98 to FEB 99 Low Rate Initial Production Contract													LSE	FALSE			
8	urn:us:mil:os	Award from AUG 98 to MAR 99 Low Rate Production First Delivery from AUG 99 to MAR													LSE	TRUE			
9	urn:us:mil:os	00 IOT&E - Start from MAR 99 to MAR 00 IOT&E - Complete from MAY 99 to APR 00													LSE	TRUE			
10	urn:us:mil:os	Milestone III Production Decision from AUG 99 to JUN 00 Full Rate Production Contract													LSE	TRUE			
11	urn:us:mil:os	Award from OCT 99 to OCT 00 First Unit Equipped from SEP 99 to JUN 00													LSE	TRUE			
12	urn:us:mil:os	Configuration 3 Follow On Test from MAR 99 to SEP 99 and Configuration 3 First Unit													LSE	TRUE			
13	urn:us:mil:os	Equipped from SEP 99 to DEC 99.													LSE	TRUE			
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Ready | 100%



Airborne & Maritime



Discover, Classify/ Analyze, Apply

- Identify historical schedule delay factors (SDF)
 - Lit review
 - Develop standardized factors and explanations
- Using SDF as basis, translate PM comments into the standardized factors
 - Read every entry (initially over 4000), determine SDF
 - In some cases more than one factor
 - References to previous time periods/ years
- Factors:
 - Internal/ External source of delay
 - Primary/ Secondary Reasons for delay
 - Actual delay in months
 - Increase/ Decrease of delay (some “Actuals” reflect events as having happened 1-2 months prior to scheduled)
- Use statistical techniques to explore/ assess data

Discover, Classify/ Analyze, Apply



Identified Historical Delay Factors

Competition at the prime contractor level.

Concurrency, overlap in time and effort between the development and production phases of a program.

Funding adequacy/ stability

Existence of prototyping.

Separate contracts for each phase of the program.

Priority of the program to the service relative to other ongoing programs.

External guidance such as OSD or Congressional direction, reviews, restrictions, and designations.

Joint management with other agencies.

Program complexity, or interactions with agencies external to the program.

Technical difficulty.

Concept stability, or stability in mission, operational concepts, and doctrine.

Contractor performance changes/ Contract changes

External events such as inflation, earthquakes, labor strikes, etc.

Major requirements stability.

Program manager turnover

Rework

Design Freeze

Historical Delays Factors

SAR Identified Primary Schedule Delay Factors

Administrative changes to schedule including updates to APB, ADM changes, decision delays as well as associated secondary delays

Technical

Testing delays

Delay in availability of key capabilities/ facilities (launch vehicle/ testing facilities/ IOT&E units)

Budget/ Funding Delays

Delays attributed to the Contractor

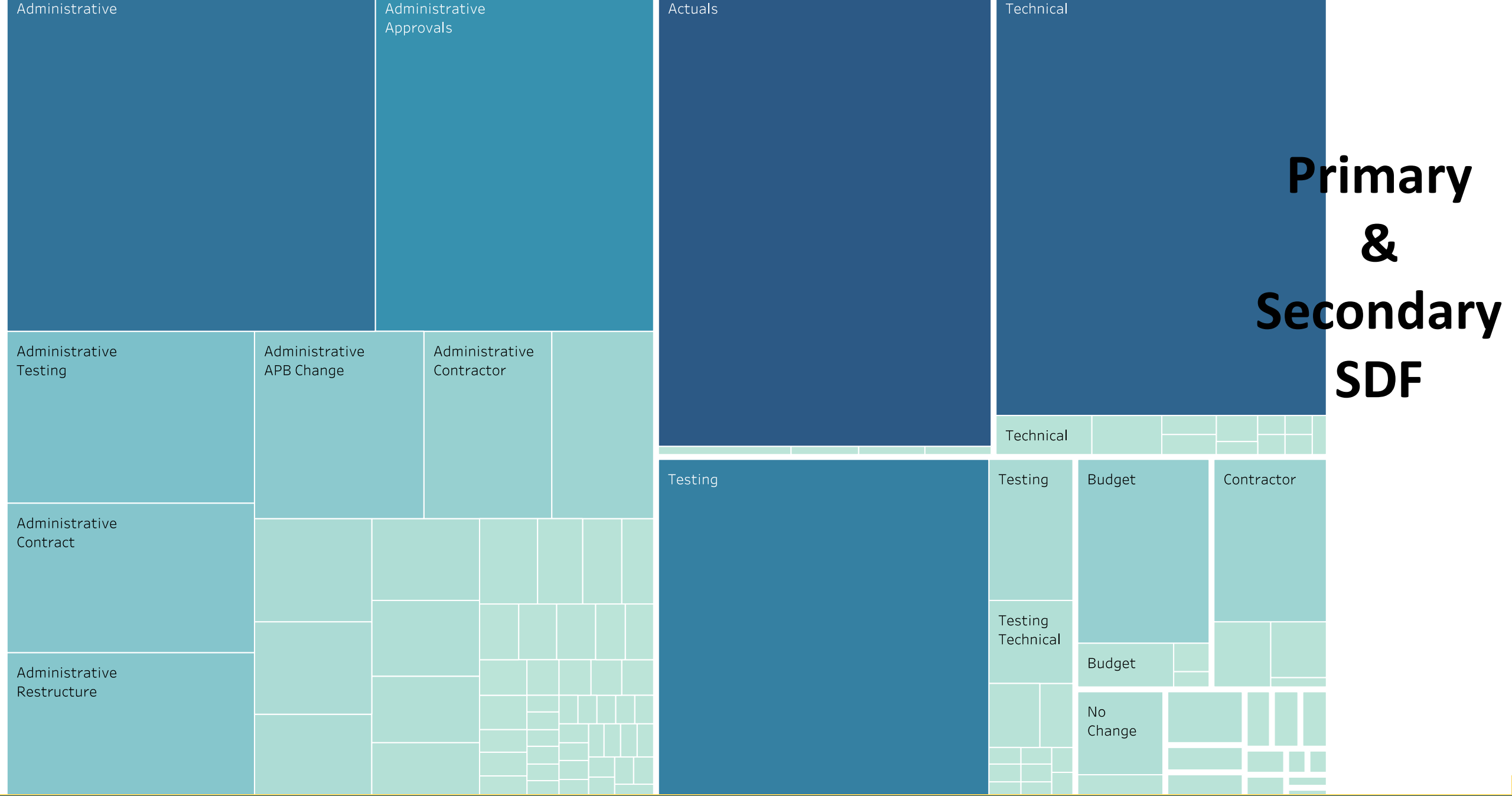
Delays because of Rework

External events such as inflation, earthquakes, labor strikes, etc. (Force Majeure)

Delays due to Contracting/ Contract Negotiation/ Award delays

Actuals (updating previously reported dates to actual occurrence)

Primary SDF
(top 6 by #)

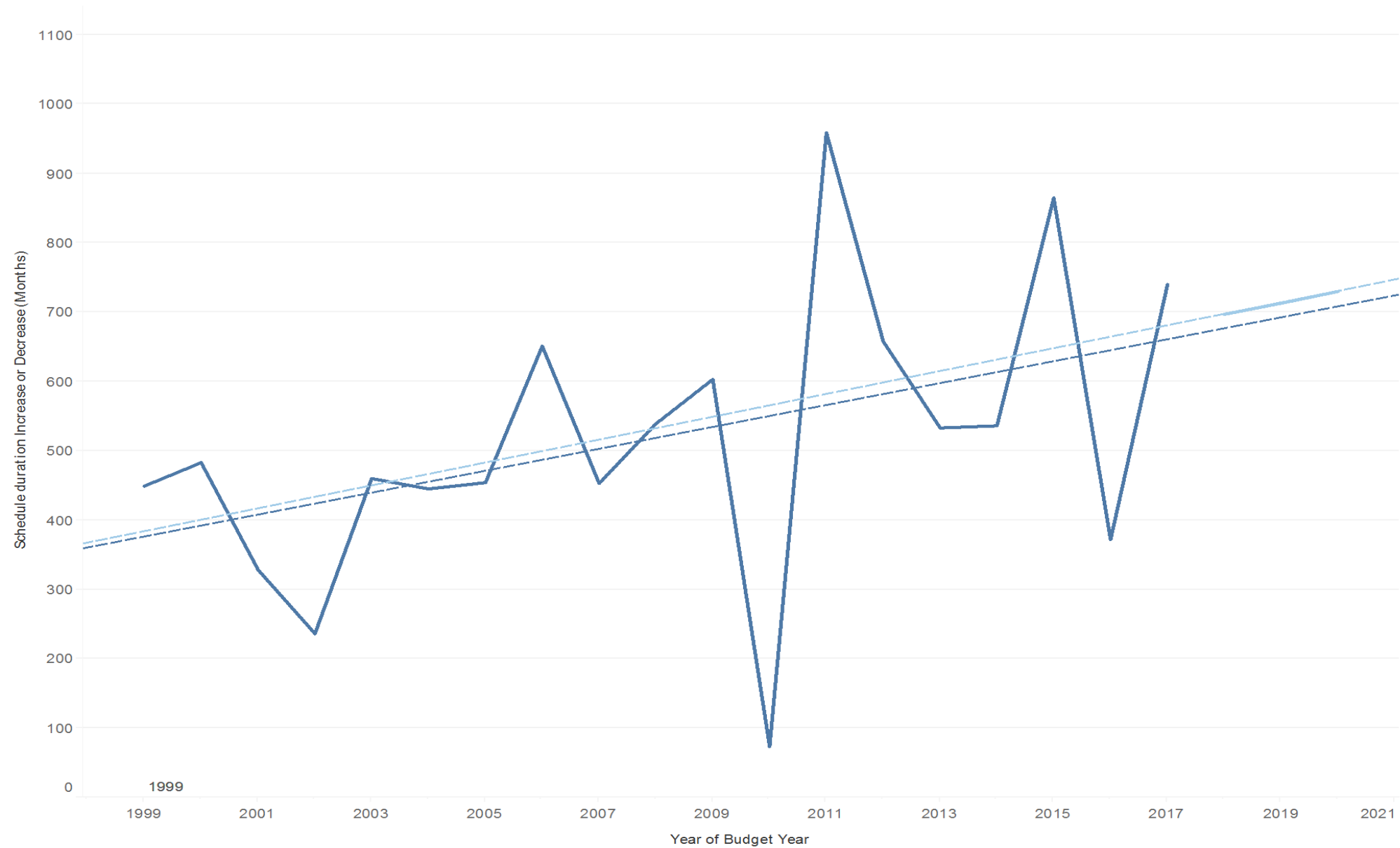


Primary & Secondary SDF

Forecast



Forecast indicator
Actual
Estimate



Program Delay

+ Trend

The trend of sum of Schedule duration Increase or Decrease (Months) (actual & forecast) for Budget Year Year. Color shows details about Forecast indicator.

Need further exploration:
2010—4 reports/ 2 systems
2011—37 reports/ 63 systems

Program Delay

Program Delay

By Program



Challenges

- Although SAR is structured, there are significantly different ways of describing schedule changes (across Services and Program offices)
- Translating prose to SDF and actual time
- Double counting
- Multiple dates/ different dates recorded
- Aligning Schedule data to milestones and associated changes
- Macro vs. Micro approach in this analysis—Examination of trends and SDF at micro level will be critical for understanding



Observations

- Significant differences in describing schedule changes
- Information on schedule change is sometimes listed in sections other than schedule (i.e. Executive Summary)
- SAR Schedule information may or may not agree with other schedule measures
- Potential of “knock-on” (second and third order) effects of SDF could lead to better understanding of changes.



Next Data Steps

- Capture complete date changes
- Explore causality and relationships within SDF
- Compare SAR schedule data with other DAVE schedule data sources



Discover, Classify/ Analyze, Apply

Discover

- SAR Data (pdf)
- OSD Developed Search/ Extraction
- .xlsx Files

Classify | Analyze

- Change Explanations
- Data Analysis
- 4000+ Lines

Apply

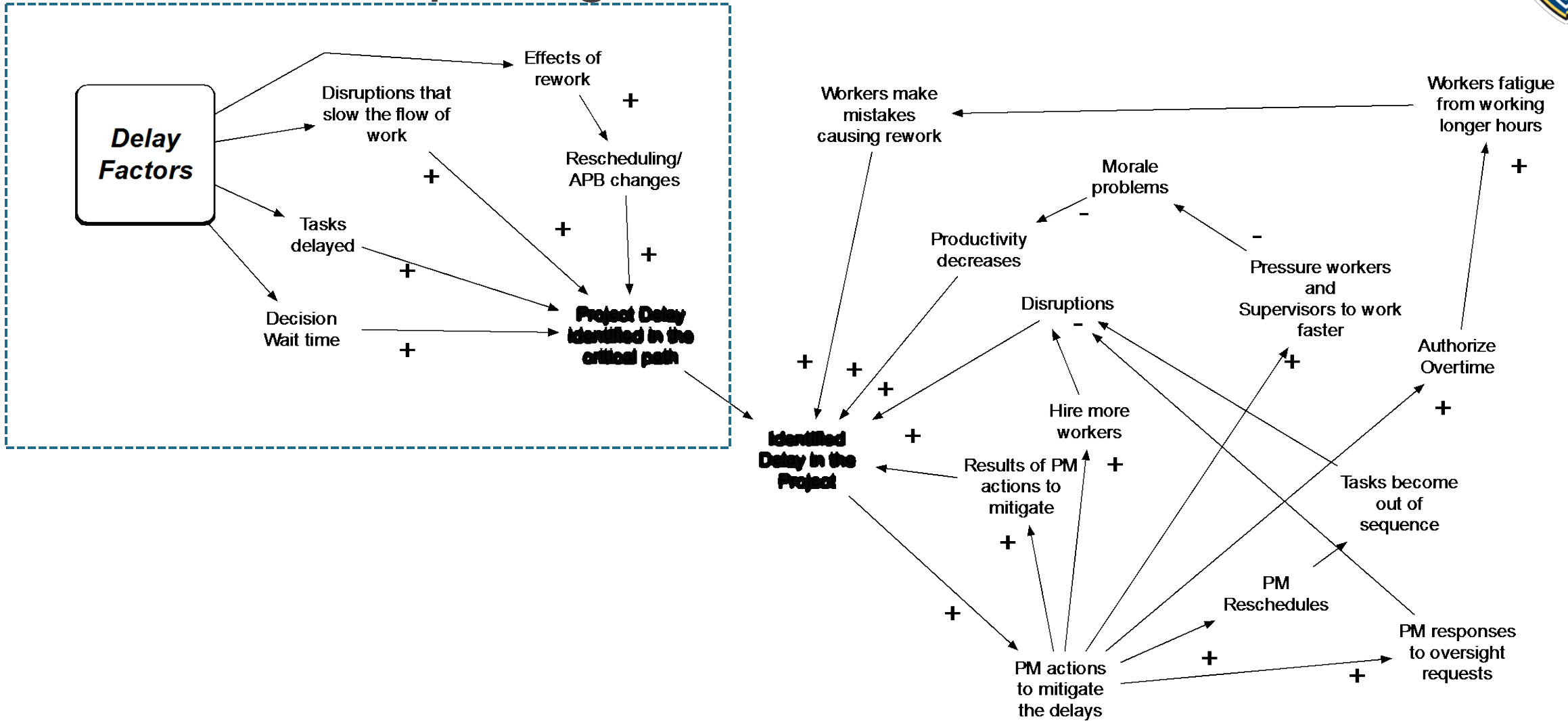
- Delay Reasons as program planning inputs
- System Dynamics



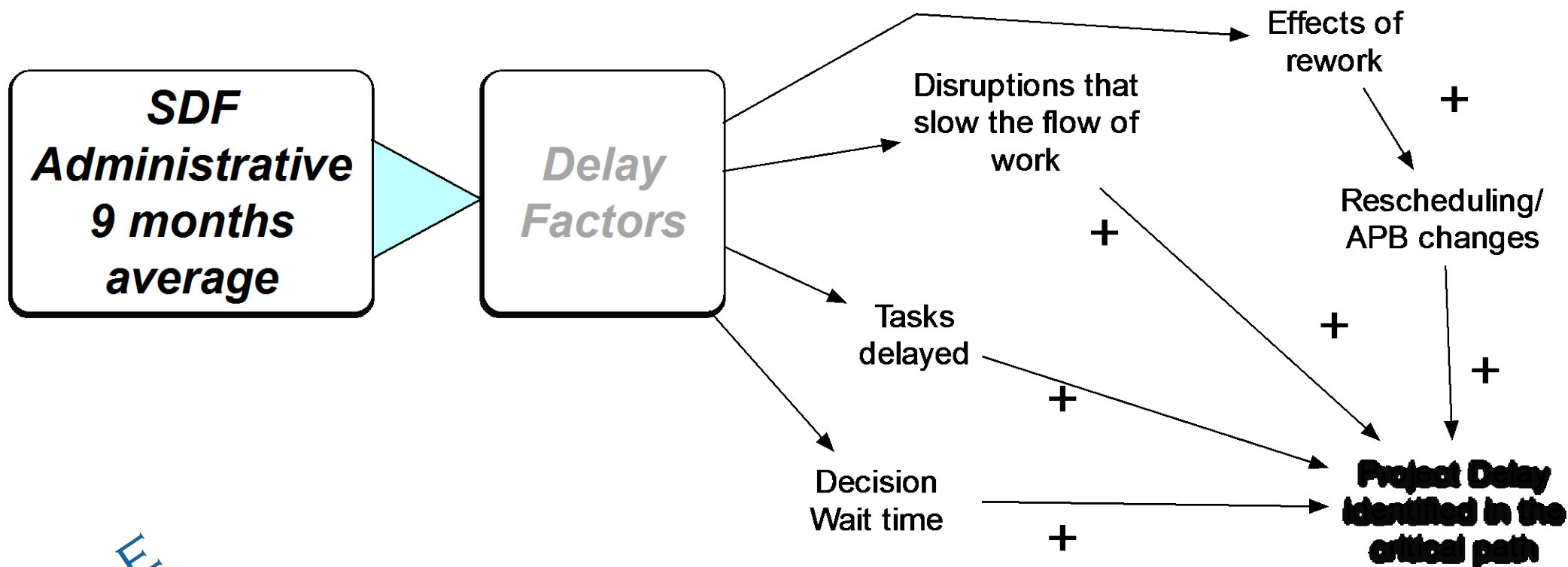
Schedule Planning

- Current scheduling methodology focused on CPM/ PERT
- Most commercial software approaches incorporate CPM/ PERT and acknowledge the stochastic nature of estimation
- However, once determined, task durations are treated as if they are deterministic
- Weapon system development is a dynamic system, and...
 - Single causes of schedule problems are possible but rare
 - Instead, mismanaged dynamics and misperceptions of feedback
- Rework is one of the most consistent reasons for delays

Causal Loop Diagram (simplified)



SDF in Schedule Planning



EXAMPLE



Using SDF for Schedule Planning, consideration of:

Schedule Delay Factor
Administrative changes to schedule including updates to APB, ADM changes as well as changes resulting from Nunn-McCurdy processes and program restructuring
Technical
Testing delays
Delay in availability of key capabilities/ facilities (launch vehicle/ testing facilities/ IOT&E units)
Budget/ Funding Delays
Delays attributed to the Contractor
Delays because of Rework
External events such as inflation, earthquakes, labor strikes, etc. (Force Majeure)
Delays due to Contracting/ Contract Negotiation/ Award delays
Actuals (updating previously reported dates to actual occurrence)



Project

Tasks





Project

2 Tasks



Conclusion



Discover

- Deep dive to micro level
- Explore joining other SAR data & other DAVE data

***Create New
Database that Could
Provide a Valuable
Tool for PMs***

Apply

- Delay Reasons as program planning inputs
- Develop model explaining dynamics of SAR “program”