

# Software Acquisition and the Color of Money

**It's complicated**

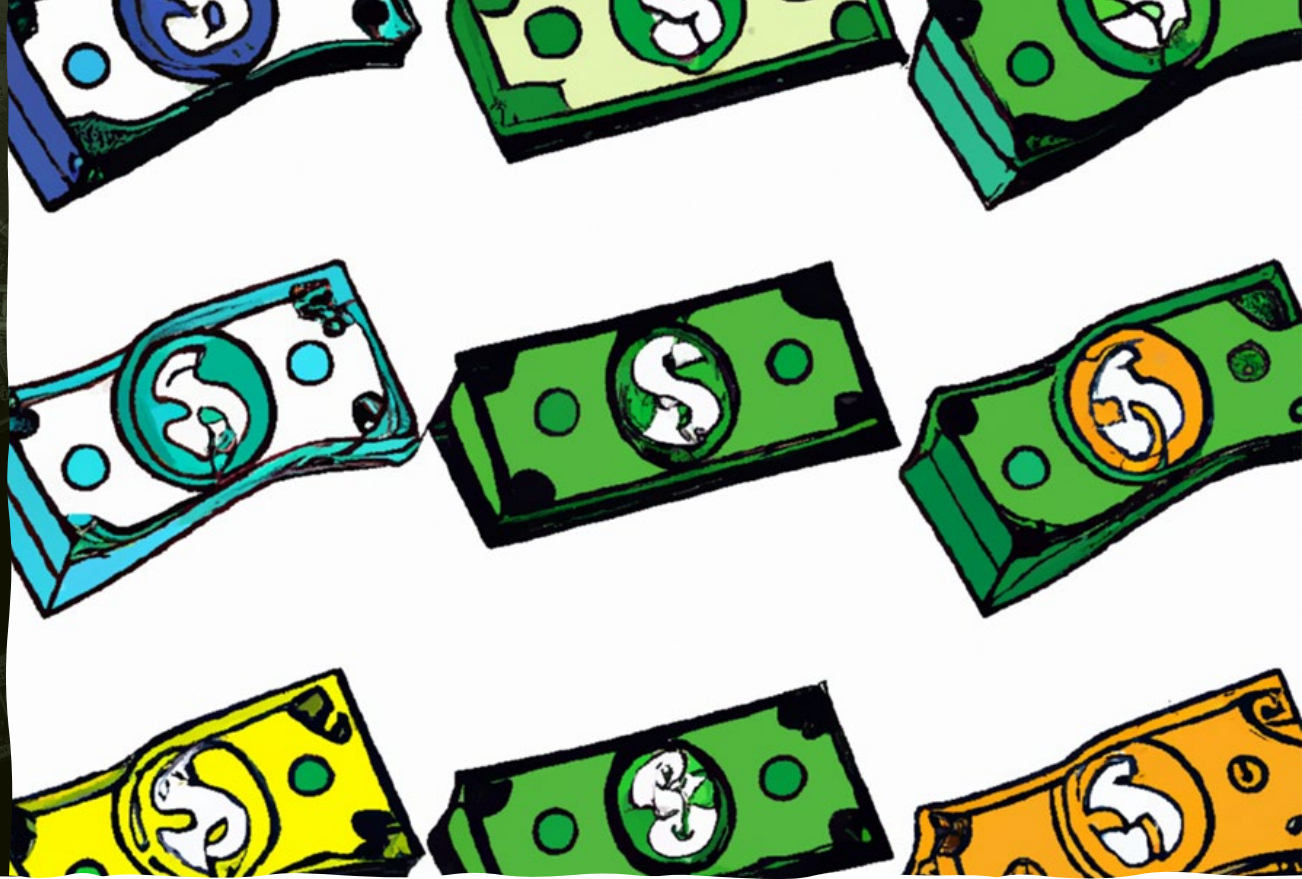
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# Research Question

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Does the budget appropriation category impact software acquisition?

**FY22 Fourth Quarter  
Report to Congress  
on the  
Software and Digital Technology  
Pilot Programs**

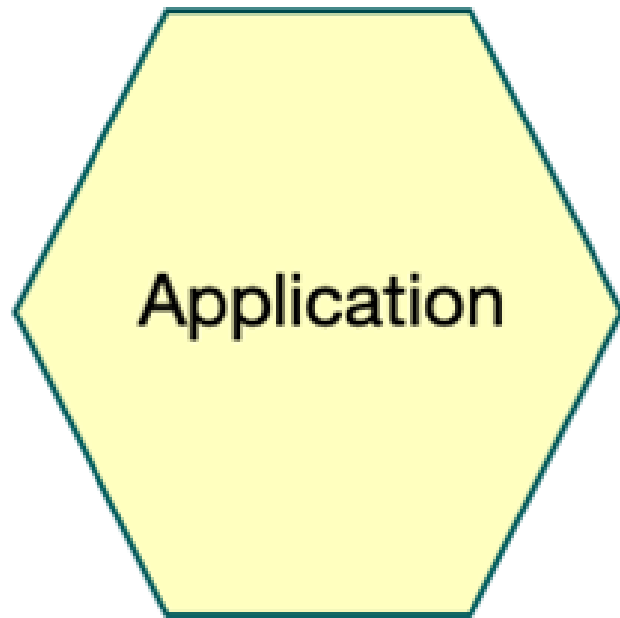
Literature-  
Based  
research  
methodology



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Acquisition and Sustainment

November 2022

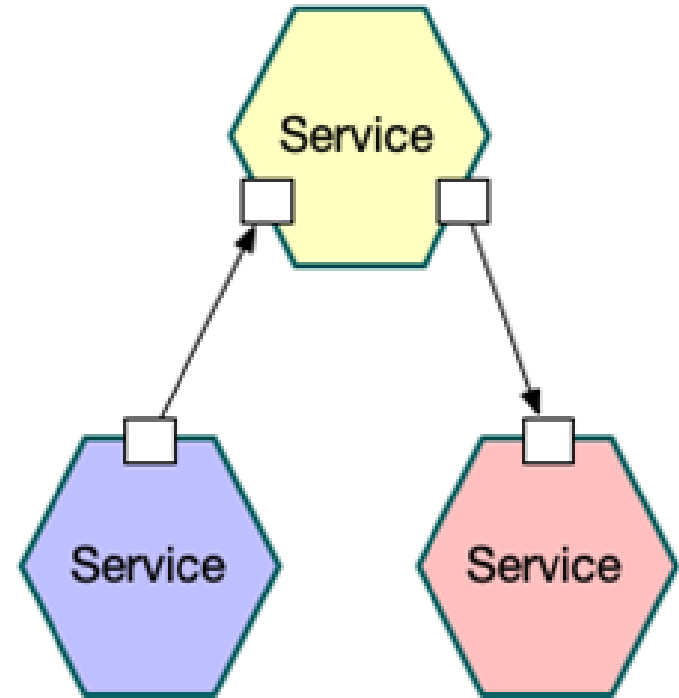
## Monolithic architecture



Waterfall

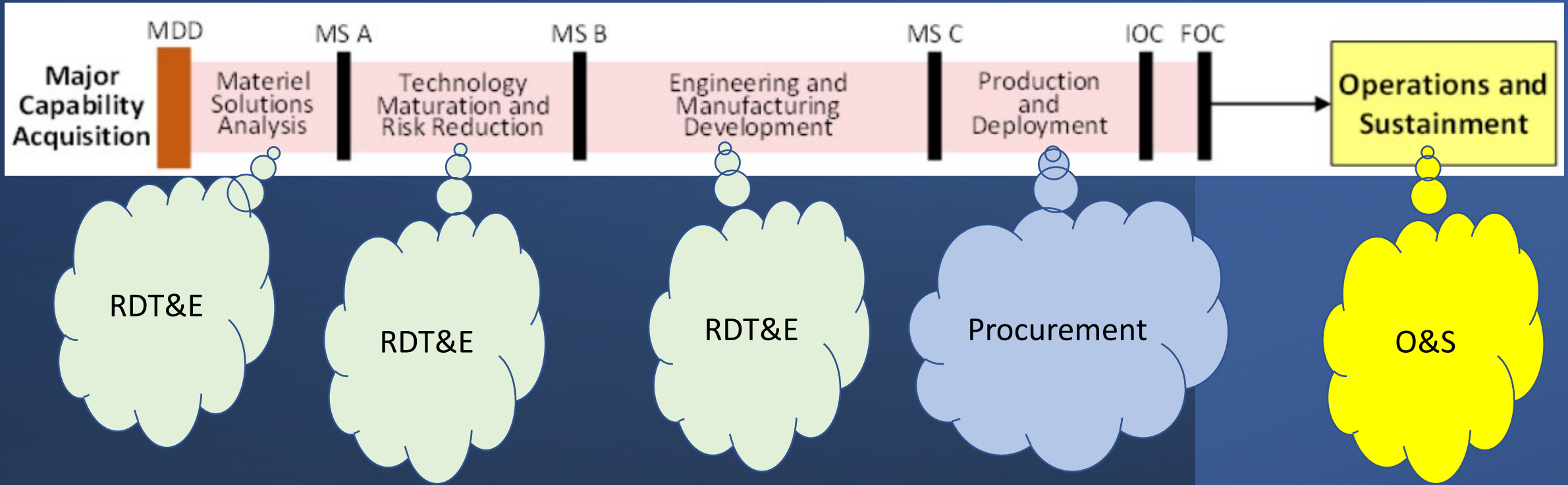
or

## Microservice architecture



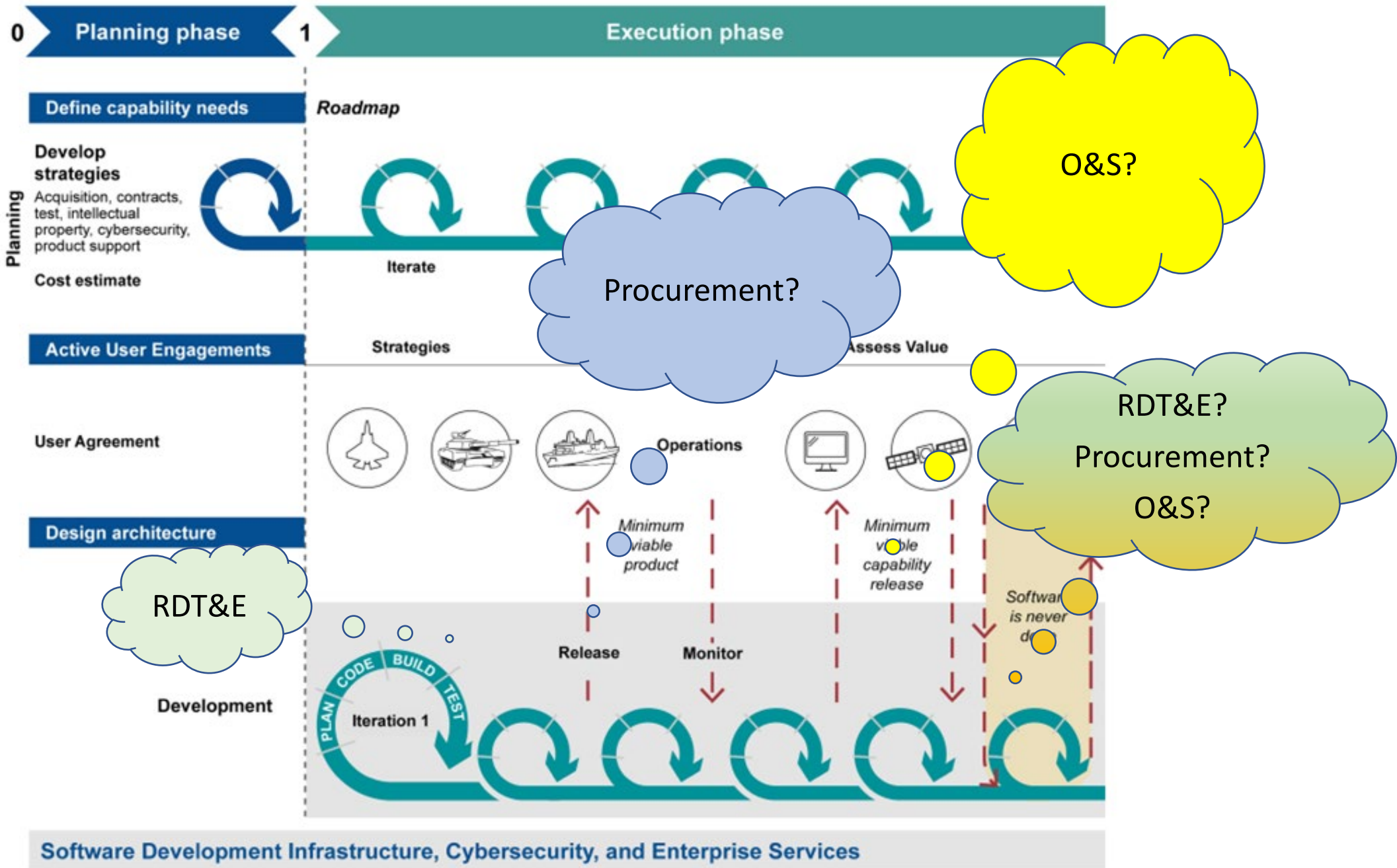
Modern Software

# Waterfall Methodology



# Problem

The Budget Appropriation Funding Problem when shifting to a commercial software acquisition processes



# Qualitative

- Answer “Why?” question
- Observation, Symbol, Word etc.
- Observe and interpret
- Grouping of common data /non-statistical analysis

Purpose

Data type

Approach

Analysis

## FY22 Fourth Quarter Report to Congress on the Software and Digital Technology Pilot Programs



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<b>Factor Influence on:</b>	<b>Dealing With Funding Cuts</b>	<b>Meeting New User Priorities</b>	<b>Procuring New Commercial Licenses</b>	<b>Reacting to Software Obsolescence Issues</b>	<b>User Training</b>
BA-8 Single Appropriation	High	High	High	High	Low

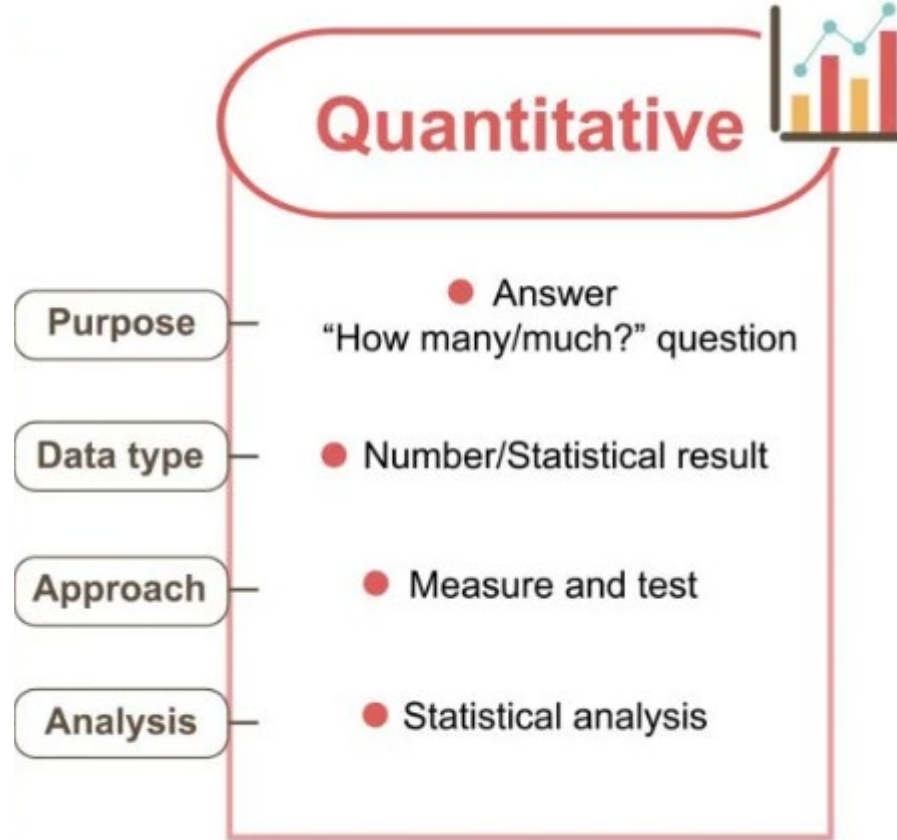


FY22 Fourth Quarter  
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<b>Factor Influence on Measure</b>	<b>Product Delivery Lead Time</b>	<b>Release Frequency to Operational Environment</b>	<b>Deployment Frequency to Production</b>	<b>Mean Time to Restore</b>	<b>Change Fail Percentage</b>
BA-8 Single Appropriation	High	Medium	Medium	Medium	Low



## Factors Influence on Measure

- The Influence of the software factory and process changes have significant impacts

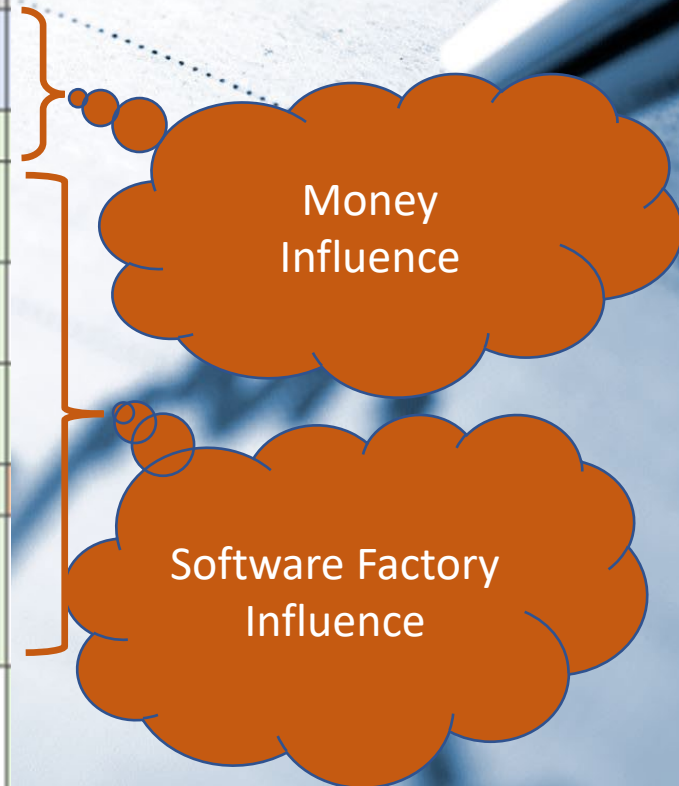
# Product Delivery Lead Time for Software

How long it takes to implement and launch software updates?

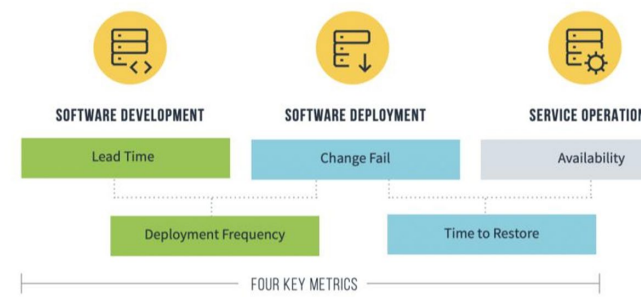
It begins when developers or users identify a product change and continues to the point when a solution goes live for user



Factor Influence on Measure	Product Delivery Lead Time
BA-8 Single Appropriation	High
Total Funding	High
Developer Staffing	High
Developer Skill	High
Development Environment	High
Test Facilities	High
Developmental & Operational Test Support	High
Time to get Authority to Operate	Low
Capability Complexity	High
User Ability to Accept Releases	N/A
Contracting Methods	Medium



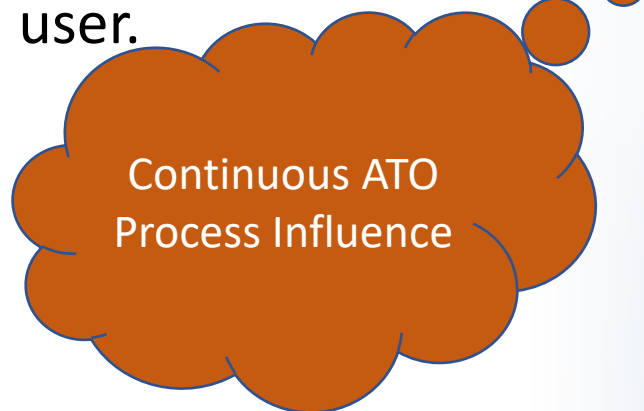
## PERFORMANCE METRICS



# Release Deployment Frequency

Cadence of deployments in terms of time elapsed between deployments.

Shows how frequently the team delivers value to the customer/end-user.



Factor Influence on Measure	Deployment Frequency to Production
BA-8 Single Appropriation	Medium
Total Funding	Medium
Developer Staffing	High
Developer Skill	Low
Development Environment	Medium
Test Facilities	High
Developmental & Operational Test Support	High
Time to get Authority to Operate	High
Capability Complexity	High
User Ability to Accept Releases	High
Contracting Methods	Low

Factor Influence on Measure	Release Frequency to Operational Environment
BA-8 Single Appropriation	Medium
Total Funding	Medium
Developer Staffing	Medium
Developer Skill	Low
Development Environment	Medium
Test Facilities	High
Developmental & Operational Test Support	Low
Time to get Authority to Operate	Medium
Capability Complexity	High
User Ability to Accept Releases	N/A
Contracting Methods	Low

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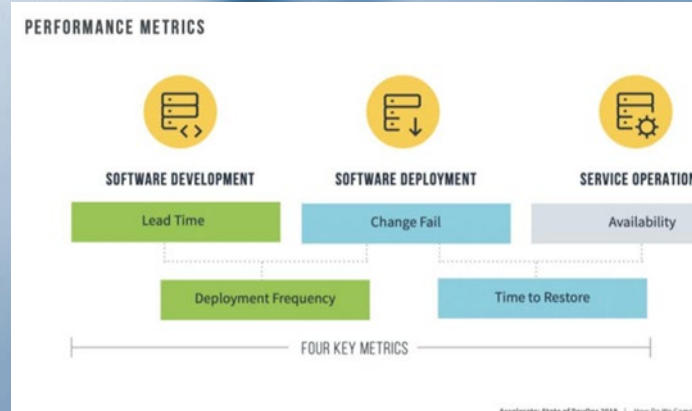
# Change Failure Rate

% changes going into production that require rework.

Influence High Across the board

Factor Influence on Measure	Change Fail Percentage
BA-8 Single Appropriation	Low
Total Funding	Medium
Developer Staffing	High
Developer Skill	High
Development Environment	Low
Test Facilities	High
Developmental & Operational Test Support	Low\\
Time to get Authority to Operate	N/A
Capability Complexity	High
User Ability to Accept Releases	N/A
Contracting Methods	N/A

Software Factory People Influence



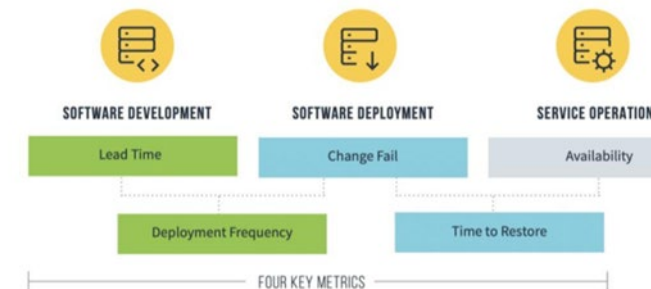
# Mean Time to Resolution (MTRR)

How long to get your code back up and running, if there is an incident.

Factor Influence on Measure	Mean Time to Restore
BA-8 Single Appropriation	Medium
Total Funding	Medium
Developer Staffing	High
Developer Skill	Medium
Development Environment	High
Test Facilities	Medium
Developmental & Operational Test Support	Medium
Time to get Authority to Operate	Low
Capability Complexity	High
User Ability to Accept Releases	N/A
Contracting Methods	N/A



## PERFORMANCE METRICS





Does the budget appropriation category impact software acquisition?

1. For Modern Software Factories post MVP/MVCR = Absolutely
2. For Monolithic Major Capability Development = Not really

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High Influencers on software acquisition should be addressed by leadership in policy or by process





# High Influencers on software acquisition programs

Shift to iterative software development for product delivery using a software factory construct

- Use “strangler pattern” to decompose monolithic software to reduce **Capability Complexity** buy using microservice applications

Contract using fixed priced, Time and Materials, or Services contracts

- **Developer skill and staffing** Pivot to performances based contracts that have a 6 month (+) award
- If it’s not going well, there is a “auto-termination” by not executing CLIN options
- No EVMS required

# High Influencers on software acquisition programs

Implement processes to shift away from Monolithic testing and certifications of capability

- Work to get continuous **Authorities To Operate** (cATOs) for active cybersecurity
- Implement an integrated solution that can continuously monitor, assess, record and report security and compliance status on an ongoing basis.

Funding needs to shift from incremental to iterative

- Modern Software Factories work on the premise that user driven capabilities will continue past initial fielding (MVP or MVCR). “software is never done”
- **Product delivery lead times** and **Release Deployment frequencies** are highly depended on Total or BA-8 funding stream being continuous.

# Other Ideals on software acquisition programs

Software Factory budgets in the PPBEs should be a single appropriation category (RDT&E)

- Yearly budget submits are based on the capability development costs negotiated with Sponsor/User

Level of effort service-based contracts for software factories allows re-tasking on higher priority needs within the Fiscal year

- Ebb and flow multiple award task orders provide flexibility which are primarily labor costs and reasonable profit.

Software Factories should not be recreated for every acquisition, but rather leverage Government owned and operated cloud based DevSecOps environments (Platform One/Black Pearl/The Forge)

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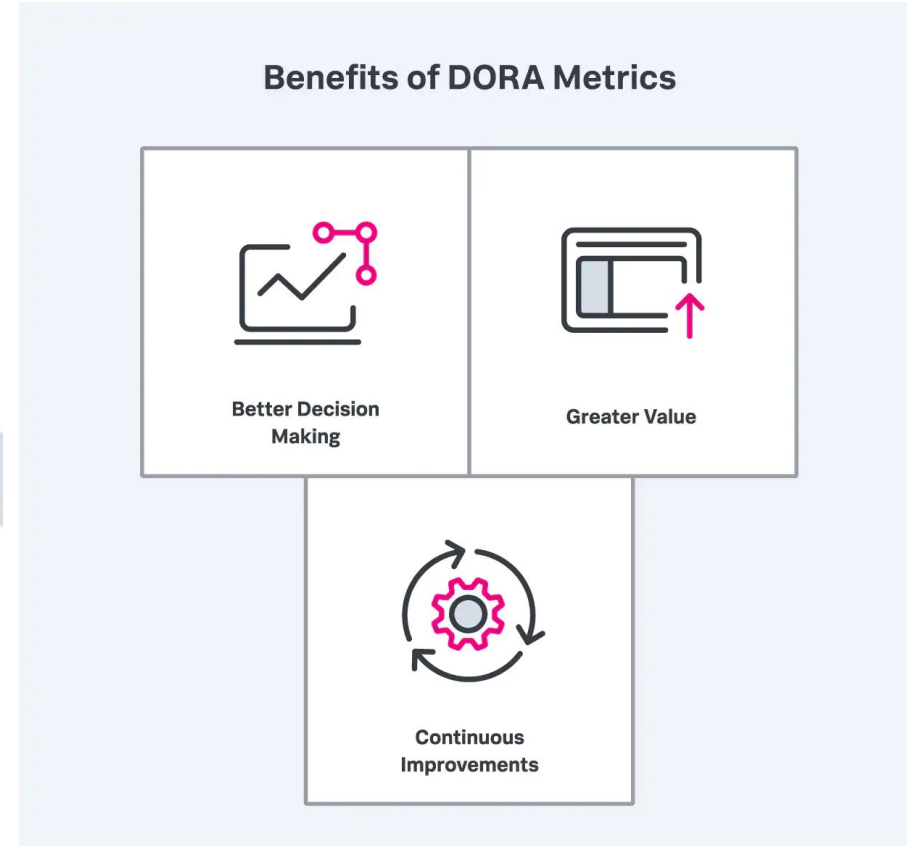
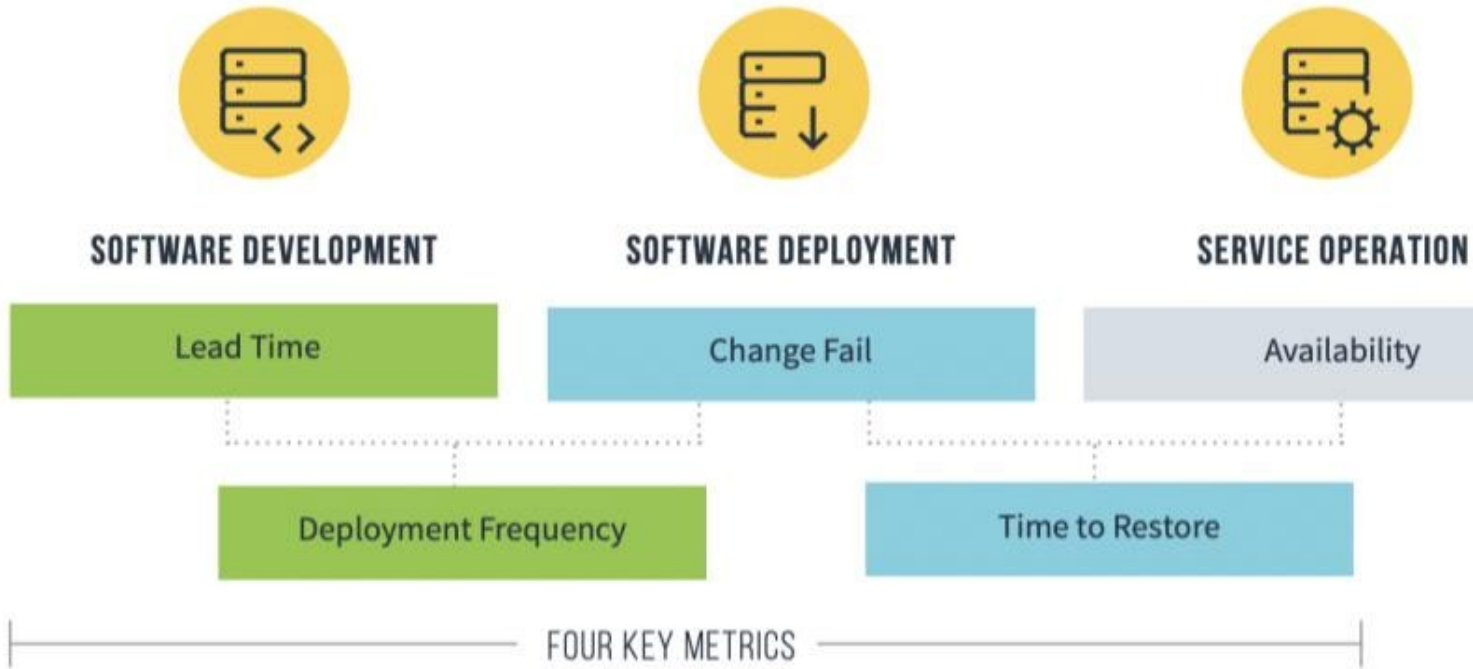
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## PERFORMANCE METRICS

DORA metrics are a set of commercial standards used to measure the performance and efficiency of various engineering systems and processes.



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Developer Skill	High	Low	Low	Medium	High
Development Environment	High	Medium	Medium	High	Low
Test Facilities	High	High	High	Medium	High
Developmental & Operational Test Support	High	Low	High	Medium	Low\\
Time to get Authority to Operate	Low	Medium	High	Low	N/A
Capability Complexity	High	High	High	High	High
User Ability to Accept Releases	N/A	N/A	High	N/A	N/A
Contracting Methods	Medium	Low	Low	N/A	N/A

<b>Factor Influence on:</b>	<b>Dealing With Funding Cuts</b>	<b>Meeting New User Priorities</b>	<b>Procuring New Commercial Licenses</b>	<b>Reacting to Software Obsolescence Issues</b>	<b>User Training</b>
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Developer Staffing	Medium	High	N/A	Medium	Medium
Developer Skill	N/A	Medium	N/A	Medium	Medium
Development Environment	Medium	Medium	Medium	Medium	Low
Test Facilities	Medium	Medium	N/A	Medium	Low
Developmental & Operational Test Support	Low	High	N/A	Low	N/A
Time to get Authority to Operate	Low	High	N/A	Low	N/A
Capability Complexity	High	Medium	N/A	High	High
User Ability to Accept Releases	Low	Medium	N/A	Medium	High
Contracting Methods	Medium	Medium	Low	Medium	Low

# Influence of BA-8 (Colorless Money)

## Quantitative

<b>Factor Influence on Measure</b>	<b>Product Delivery Lead Time</b>	<b>Release Frequency to Operational Environment</b>	<b>Deployment Frequency to Production</b>	<b>Mean Time to Restore</b>	<b>Change Fail Percentage</b>
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## Qualitative

<b>Factor Influence on:</b>	<b>Dealing With Funding Cuts</b>	<b>Meeting New User Priorities</b>	<b>Procuring New Commercial Licenses</b>	<b>Reacting to Software Obsolescence Issues</b>	<b>User Training</b>
BA-8 Single Appropriation	High	High	High	High	Low



<b>Metric</b>	<b>High Performers</b>	<b>Medium Performers</b>	<b>Low Performers</b>
<b>Deployment frequency</b> – How often the organization deploys code.	One demand (multiple deploys per day)	Between once per week and once per month	Between once per week and once per month
<b>Change lead time</b> – Time it takes to go from code commit to code successfully running in production.	Less than one hour	Between one week and one month	Between one week and one month
<b>Mean time to recover (MTTR)</b> – Time it takes to restore service when a service incident occurs (e.g., unplanned outage, service impairment).	Less than one hour	Less than one day	Between one day and one week
<b>Change failure rate</b> – Percentage of changes that results in either degraded service or requires remediation (e.g., leads to service impairment, service outage, requires a hotfix, rollback, patch, etc.)	0-15%	0-15%	31-45%

# The "Dev" in DevSecOps

