

# Achieving Astronomical Gains in Information Flow

**QUEST to the Moon!**

Anusha  
Dixit



Alex  
Leipold



Neehar  
Peri



Uday  
Warier



Emma  
Wilkins



# Background



Background

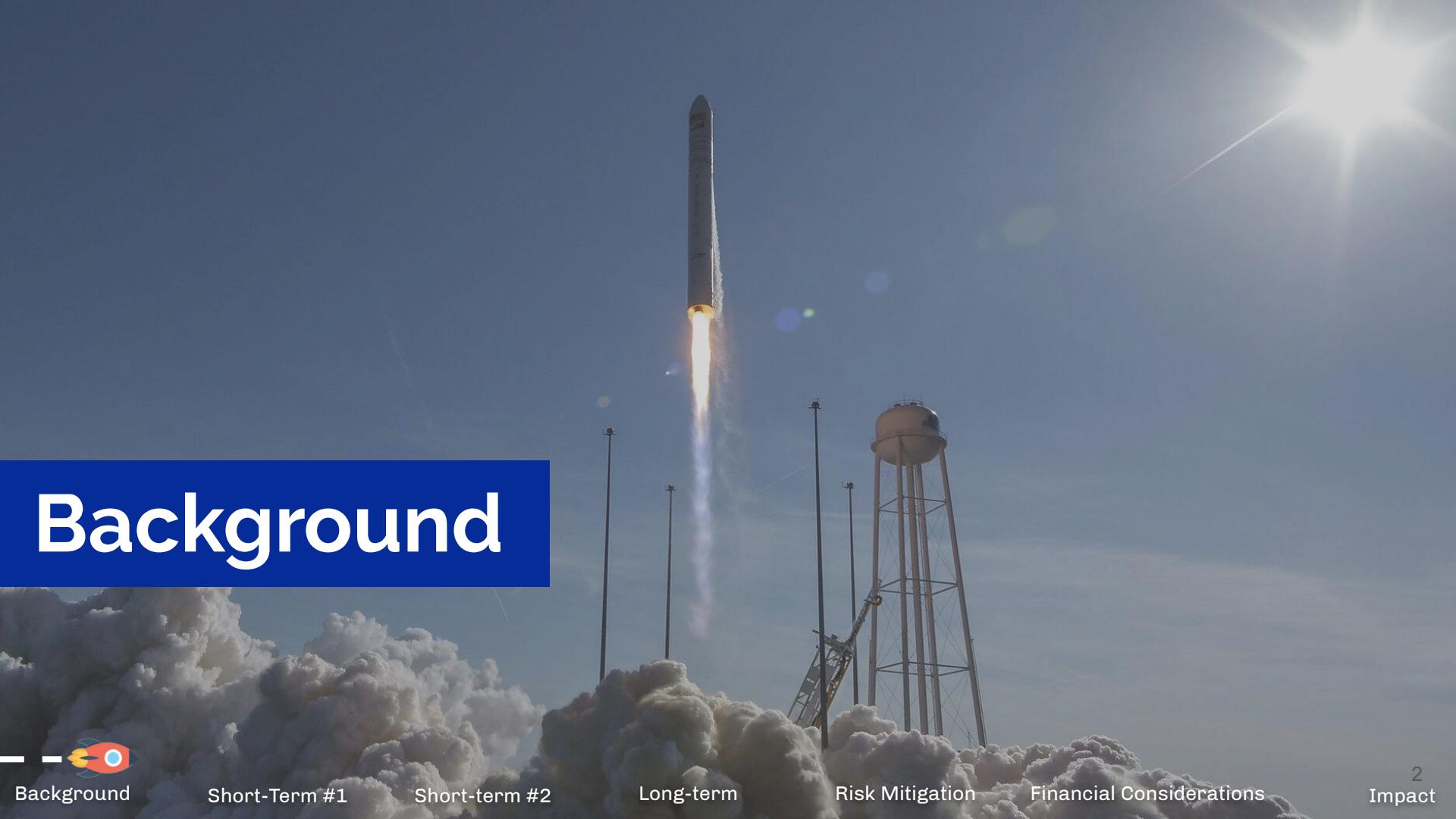
Short-Term #1

Short-term #2

Long-term

Risk Mitigation

Financial Considerations



# Client



# NORTHROP GRUMMAN



Feb

Mar

Apr

May

## First Site Visit: Learning

- 14 interviews with 9 stakeholder groups

## Second Site Visit: Hypothesis Confirming

- 13 interviews with 11 stakeholder groups

## Recommendations: Hypothesis Testing

- 3 surveys, 2 wireframes, 1 pilot
- Presentation to Engineering Steering Committee

## Recommendations: Implementation

- Presentation to leadership with final recommendations and implementation plan

Reduce Inventory Waste

Update Documentation  
with Visuals

Maintain Lessons Learned  
Over Time

Prioritize Deviations Queue

Optimize Production  
Objectives

# Opportunities for Improvement

Involve all Stakeholders in  
Planning

Differentiate Job  
Requirements

Establish Instant  
Communication Platform

Streamline Handoff  
Process



Feb

## First Site Visit: Learning

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Mar

## Second Site Visit: Hypothesis Confirming

- 13 interviews with 11 stakeholder groups

Apr

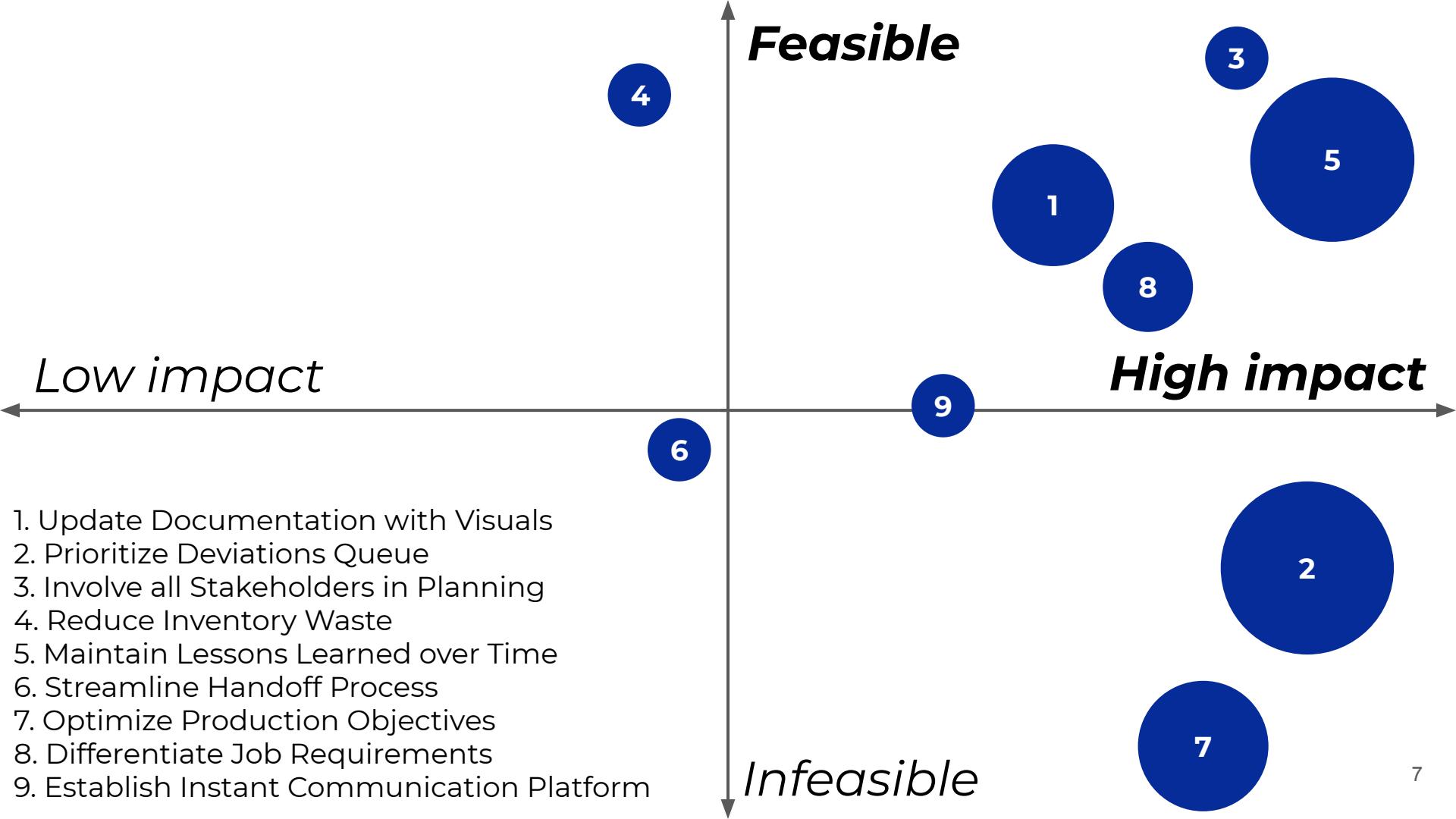
## Recommendations: Hypothesis Testing

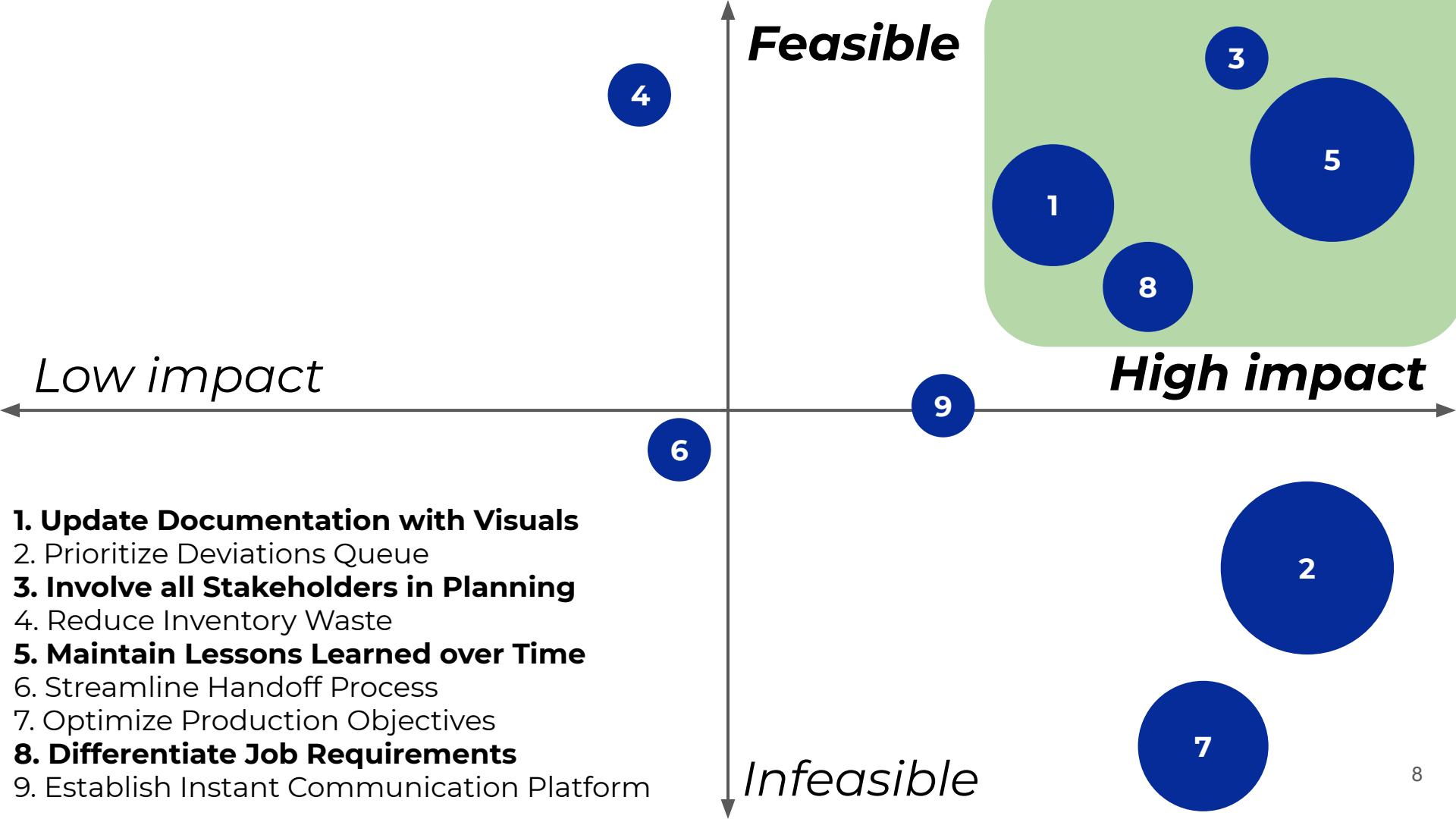
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May

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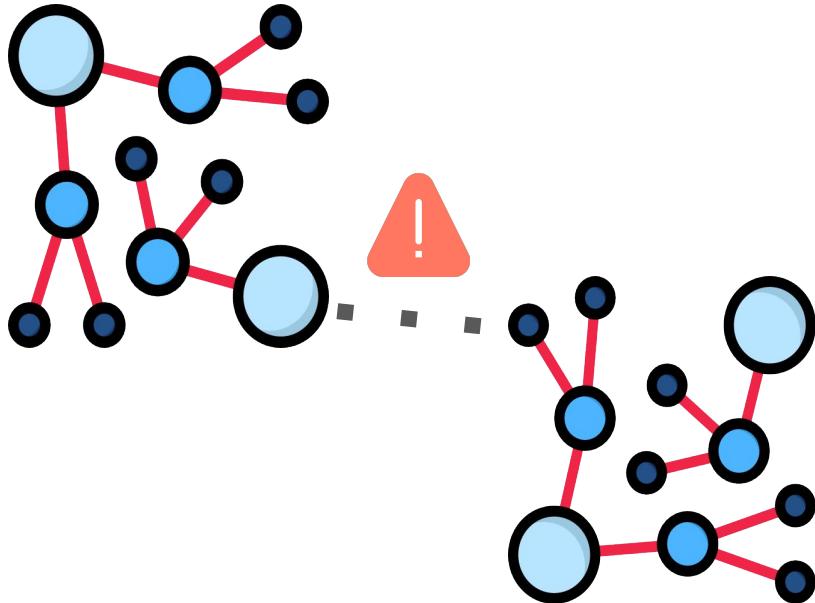
## Recommendations: Implementation

- Presentation to leadership with final recommendations and implementation plan

# Short-Term Recommendation #1



# Kickoff Meetings



## Current State



Kickoff meetings do not include all stakeholders and lack a unified structure

# Meeting Agenda Template



## INFORMATION ABOUT CONTRACT

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## RESPONSIBILITIES OF STAKEHOLDERS

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## CUSTOMER REQUIREMENTS

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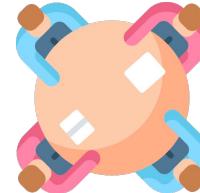
## SME WITH PAST EXPERIENCE

Name:  
Email:  
Phone:  
KMS link:

## PROJECT TIMELINE

- June 2020  
XXX
- July 2020  
XXX
- August 2020  
XXX
- September 2020  
XXX

## Ideal State



Engage **all** stakeholders at start of program

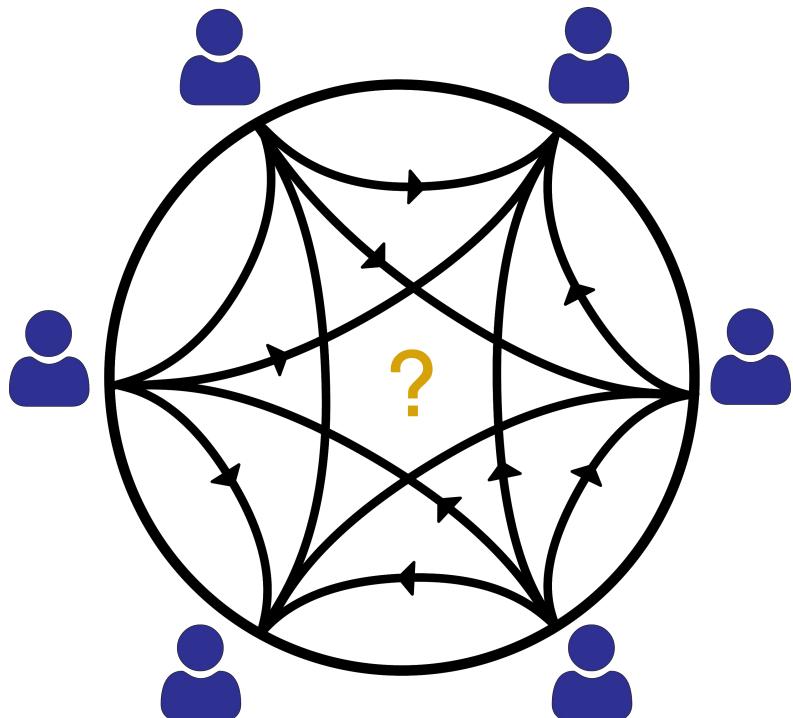


Improved planning and scheduling

# Short-Term Recommendation #2



# Roles and Responsibilities



## Current State

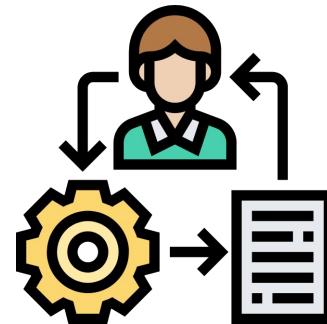
- 1 Employee roles are fluid over a project
- 2 Personnel changes lead to confusion

Complex processes lead to **bottlenecks** in identifying roles and responsibilities

# Roles and Responsibilities

	Role A	Role B
Deliverable #1	R	C
Deliverable #2	A	
Deliverable #3	C	A
Deliverable #4	I	R
Responsible		
Accountable		
Consulted		
Informed		

## Ideal State



Maintain record of **dynamic** roles and responsibilities through **RACI Matrix**

# Validation

**70%** believe kickoff meetings would generate **“a great deal” of value**

**60%** believe the role definition process is **“somewhat effective”**

Could “give downstream stakeholders **advance warning** of a need for resources”

# Long-Term Recommendation



Background

Short-Term #1

Short-term #2

Long-term

Risk Mitigation

Financial Considerations

Impact

# Knowledge Management



## Current State



How did we use that piece of machinery 3 years ago?



How did we design that part in the last project we had with this client?

## Ideal State



Use a Knowledge Management System to capture **key decision points** and **lessons learned**



Your Videos

Dashboard

Upload

Edit

Comments

Step 1 Step 2 Step 3 Step 4

**Video Name**  
 Required Field

**Video Description**  
 Required Field

**Tags**  
tooling mixing / casting insulation lining  
assembly casting testing final assembly  
ignition TSRM

**Generated Narration** Leave As Is Edit

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**Next**

Text and video-based knowledge management system (KMS)



Ease of upload



Ease of modification



Ease of searchability



## Project C: Using Machine 2 for Process C

Shelly F.  
8/25/2020

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### Comments

Mark B. 2 weeks ago  
Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut ero labore et dolore magna aliqua?

Shelly F. 2 weeks ago  
Lorem ipsum dolor sit amet, consectetur adipisicing elit!

### Ask A Question

Type something...

Text and video-based knowledge management system (KMS)



Ease of upload



Ease of modification



Ease of searchability



Upload Video

Filter By:

## Recent Video Views:



## Project B Relevant Videos:



Text and video-based knowledge management system (KMS)



Ease of upload



Ease of modification



Ease of searchability

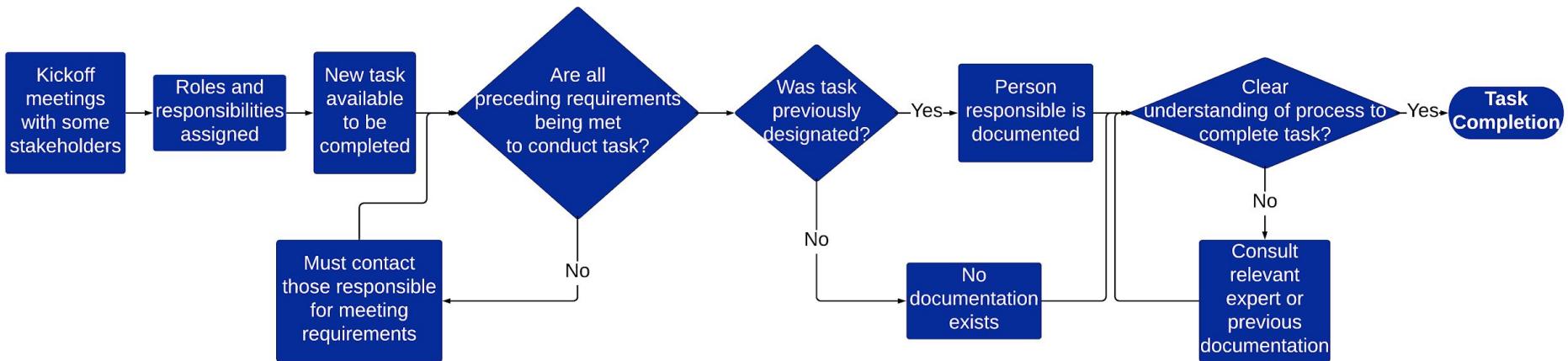
# Validation

**79%** are aware of the current text-based lessons learned repository

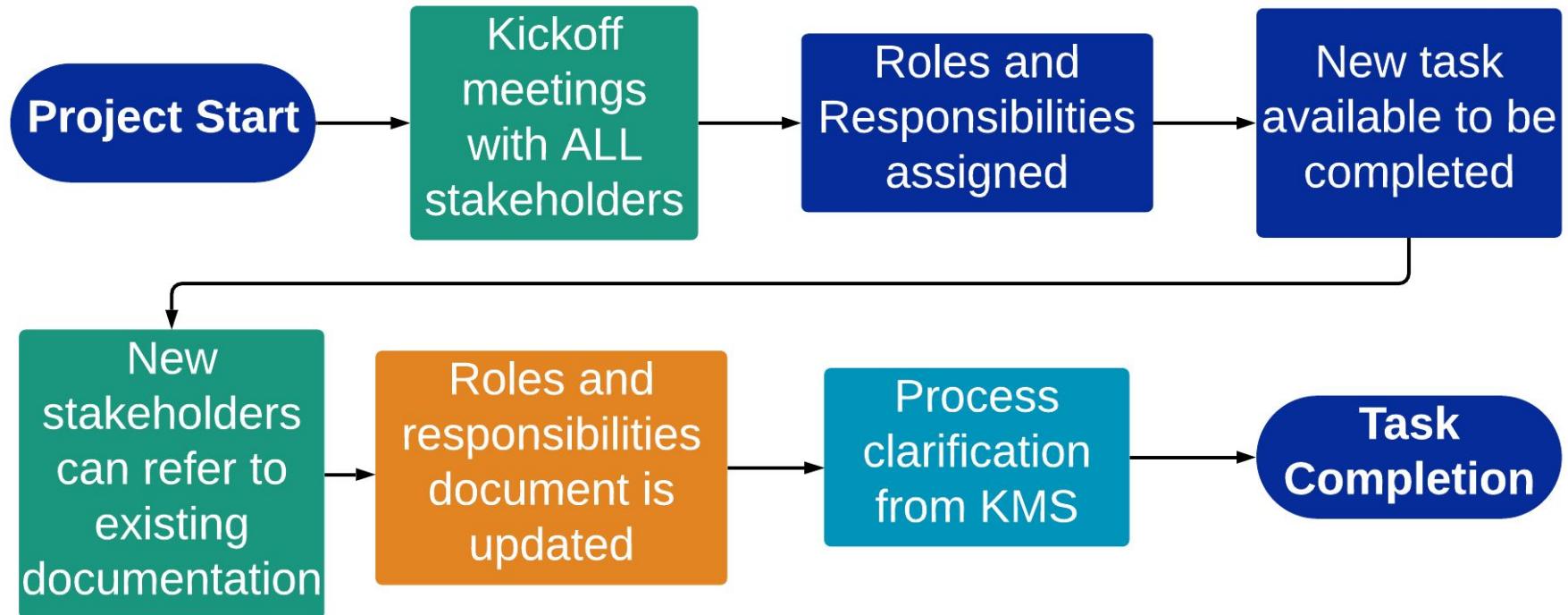
**63%** indicated that they don't regularly use this repository

"This system **would be great** because the current system(s) have information everywhere and it's difficult to find what you're truly looking for"

# Original Process Flow



# Improved Process Flow





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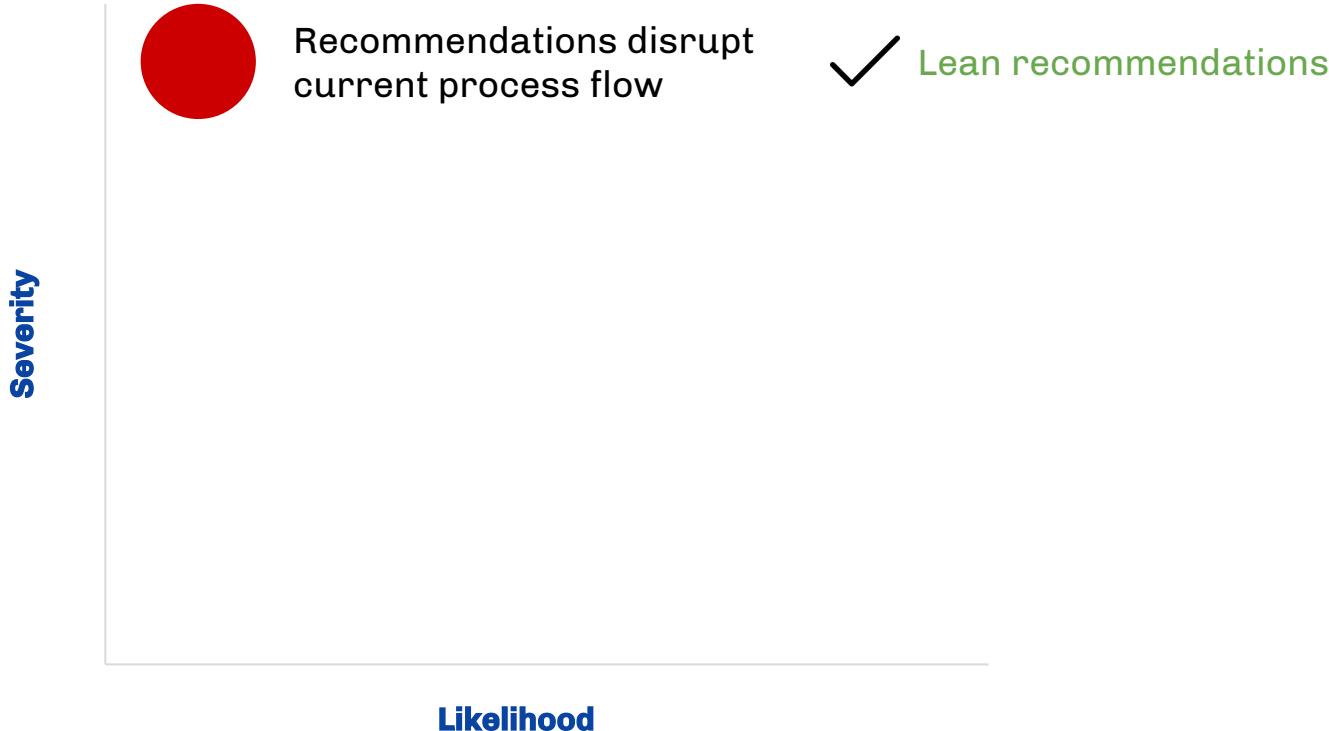
May

## Recommendations: Implementation

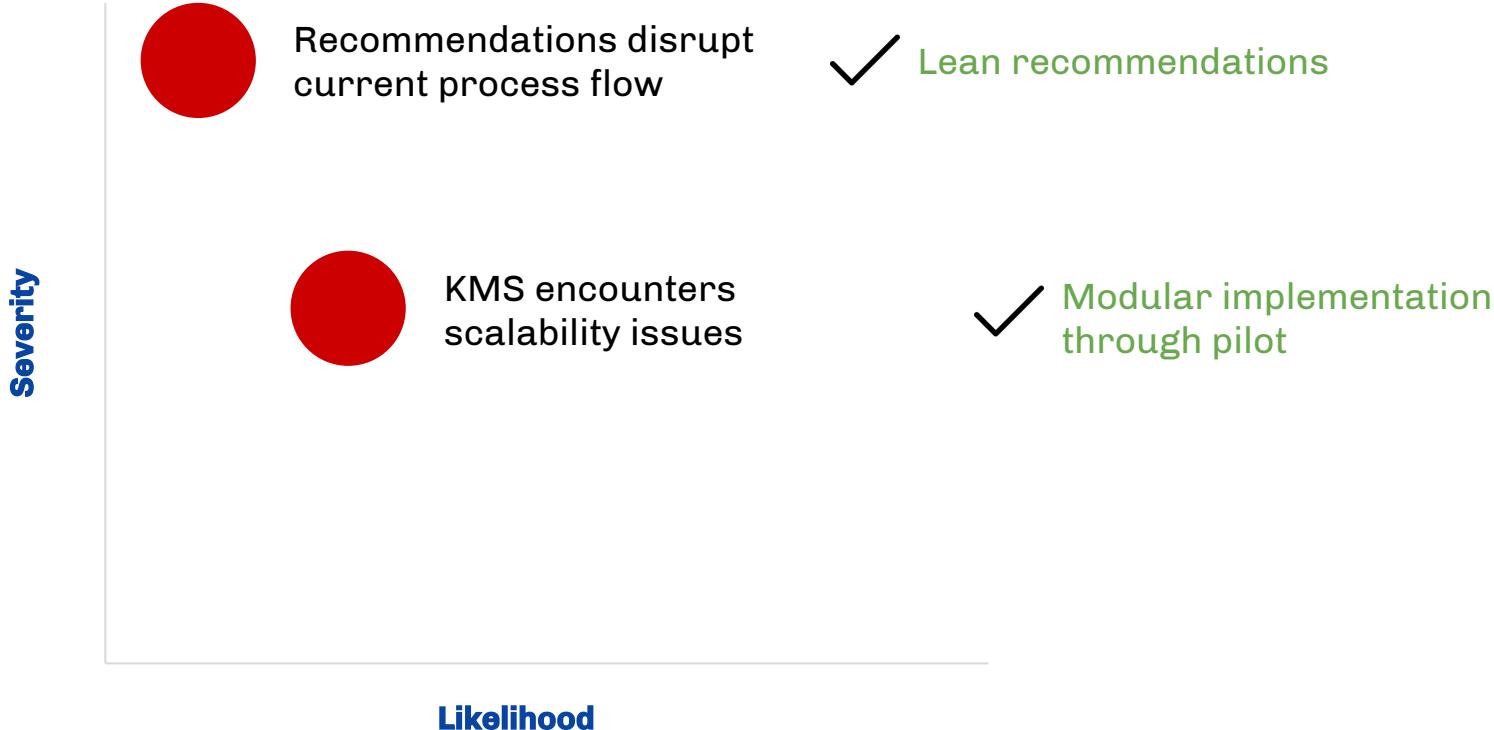
- Presentation to leadership with final recommendations and implementation plan

# Risk Mitigation

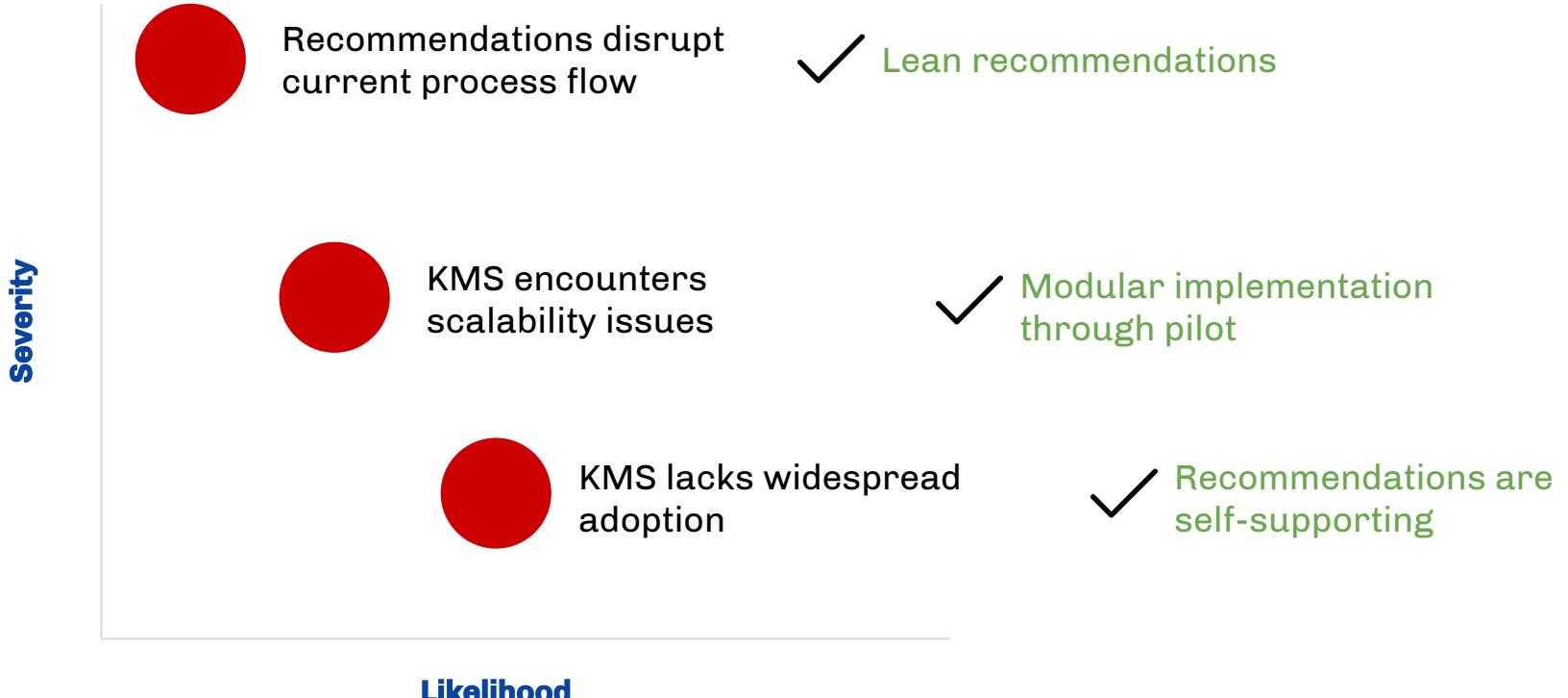
# Risk Mitigation



# Risk Mitigation



# Risk Mitigation



# Financial Considerations

# Financial Considerations



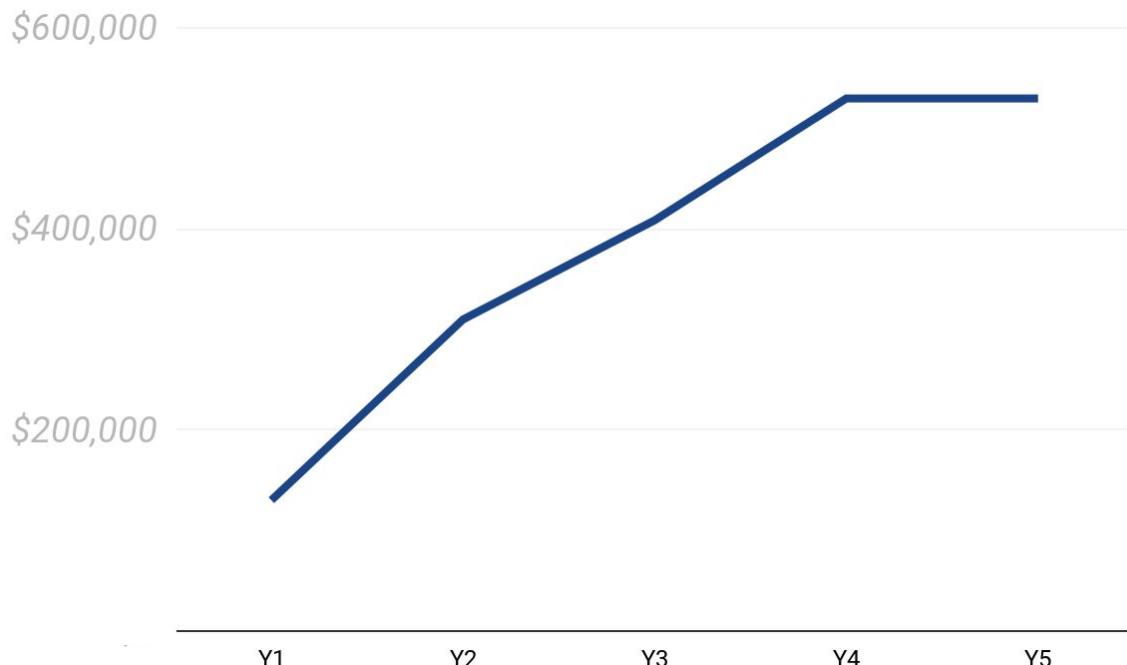
**\$380,000**

*In average annual savings*

**PRODUCTIVITY GAINS**

**PROACTIVITY GAINS**

**ROOT CAUSE ANALYSIS**



# Impact

Background

Short-Term #1

Short-term #2

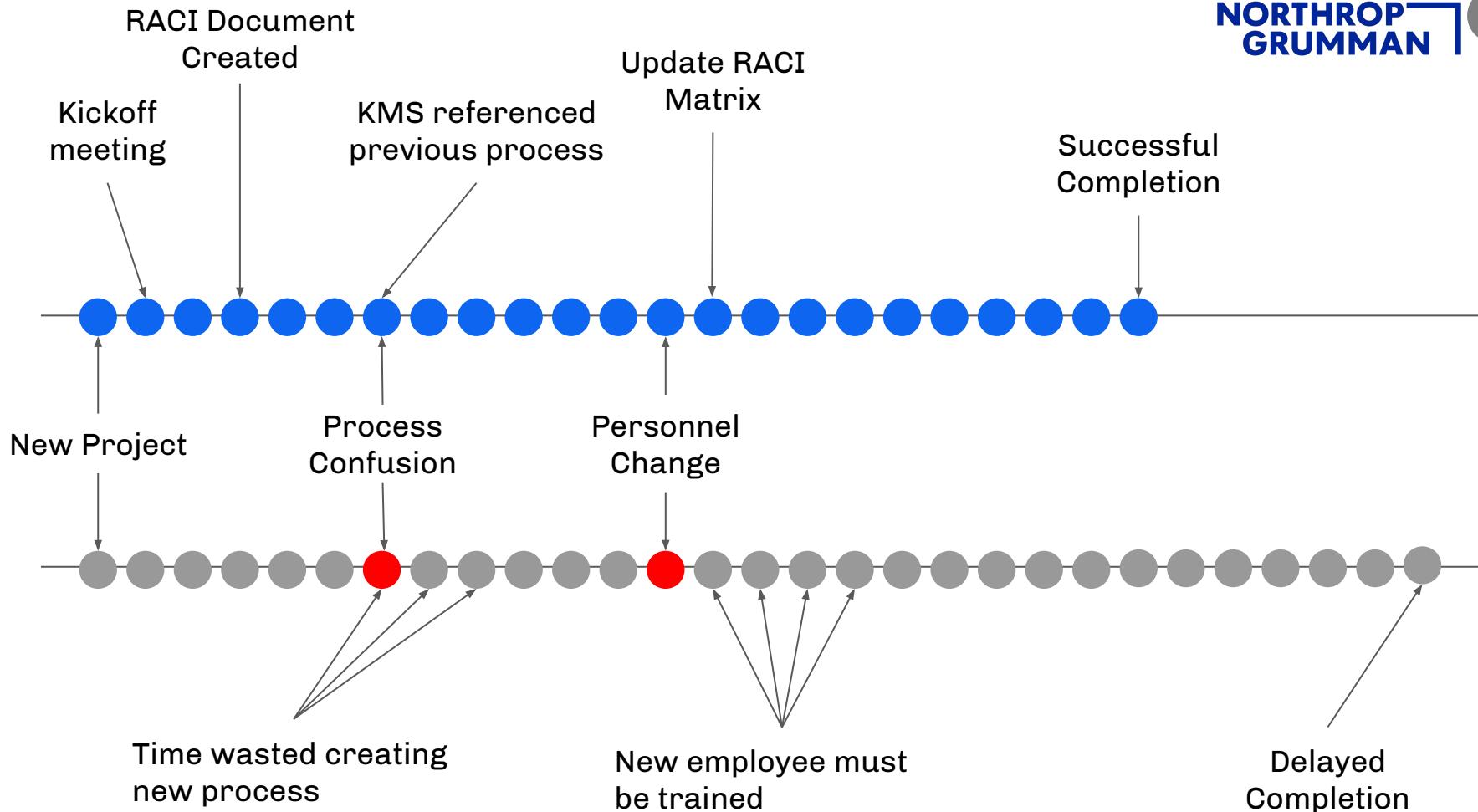
Long-term

Risk Mitigation

Financial Considerations

32





# Benefits



Increase  
Productivity



Capture Employee  
Knowledge



Facilitate Continuous  
Improvement

# Thank you!

# Appendix



# Appendix A: Video-based KMS



[Upload Video](#)[Filter By:](#) 

## Recent Video Views:



## Project B Relevant Videos:



## Machine 1 Relevant Videos:



## Videos by Arthur M.:



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Filter By: 

## Recent Video Views:



## Project B Relevant Videos:



## Machine 1 Relevant Videos:



## Videos by Arthur M.:



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[Process C](#)

[Machine 2](#)

[Machine 5](#)

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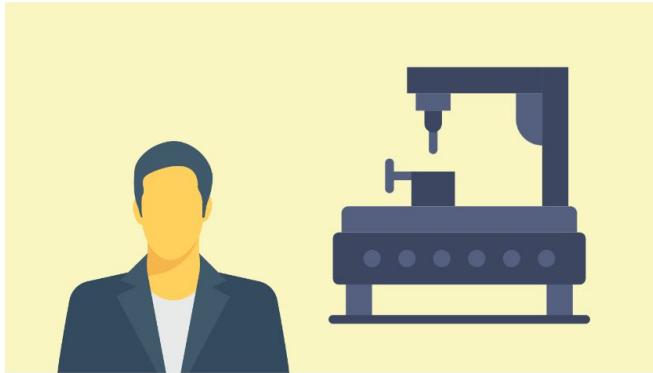
Wireframe By: Quest to the Moon!  
Anusha Dixit, Alexander Liegold, Neeraj Peri,  
Uday Warier & Emma Wilkins  
From the University of Maryland QUEST Program

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### Project C: Using Machine 2 for Process C

Shelly F.  
8/25/2020

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#### Comments

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 **Shelly F.** 2 weeks ago  
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#### Ask A Question

Type something...

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Edit

Comments



**Project A: Using Machine 4 for Process B**

Draft

None

Mark B.  
8/27/2020



**Project A: Using Machine 5 for Process B**

Visible

**Project A Employees**

Mark B.  
8/27/2020



**Project A: Using Machine 6 for Process B**

Visible

None

Mark B.  
8/27/2020



**Project A: Using Machine 1 for Process B**

Visible

None

Mark B.  
8/27/2020

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4

Step 1 Step 2

Step 3

Step 4



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or

Choose file

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Anusha Dixit, Alexander Liepod, Neelir Peri,  
Uday Warier & Emma Wilkins  
From the University of Maryland QUEST Program



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Video Name

Required Field

Video Description

Required Field

Tags

tooling    mixing / casting    insulation    lining  
assembly    casting    testing    final assembly  
ignition    TSRM

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# Appendix B: Text-based KMS

Filter By Project

Select

Search All...

Search

Sort By

Select

## New Question

### Your Previous Questions



Name Surname

1h ago

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Name Surname

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Name Surname

1h ago

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Name Surname

1h ago

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Filter By Project

Select

Filter By Client

Select

Filter By Date

Select

Sort By

Select

Search...

Search



Name Surname

1h ago

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Name Surname

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Write a Response...



Name Surname

1h ago

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Write a Response...



Name Surname

1h ago

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Name Surname

1h ago

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Name Surname

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Write a Response...



Filter By Project

Select

Search All...

Search

Sort By

Select

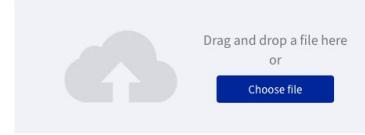
New Question

Question:

Required Field

Topics

tooling    mixing / casting    insulation    lining  
 assembly    casting    testing    final assembly  
 ignition    TSRM



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# Appendix C: KMS Pilot

Name	Date	Customer Requirement	Description of Problem	Description of Solution
Example Project Engineer #1	4/2/20	Impulse vs. Volume	Customer requests material X with an impulse of Y within certain volume Z	Used material A instead, achieved maximum impulse possible within volume constraint

# Appendix D: Cost-Benefit

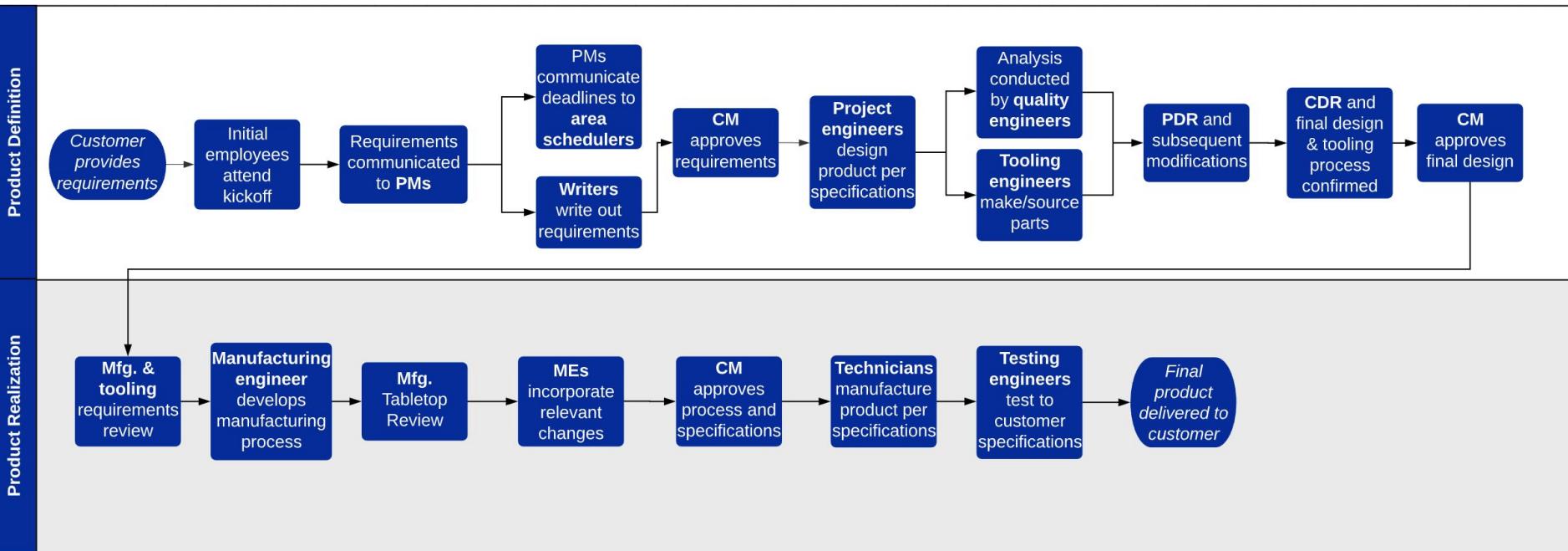
# Key Assumptions



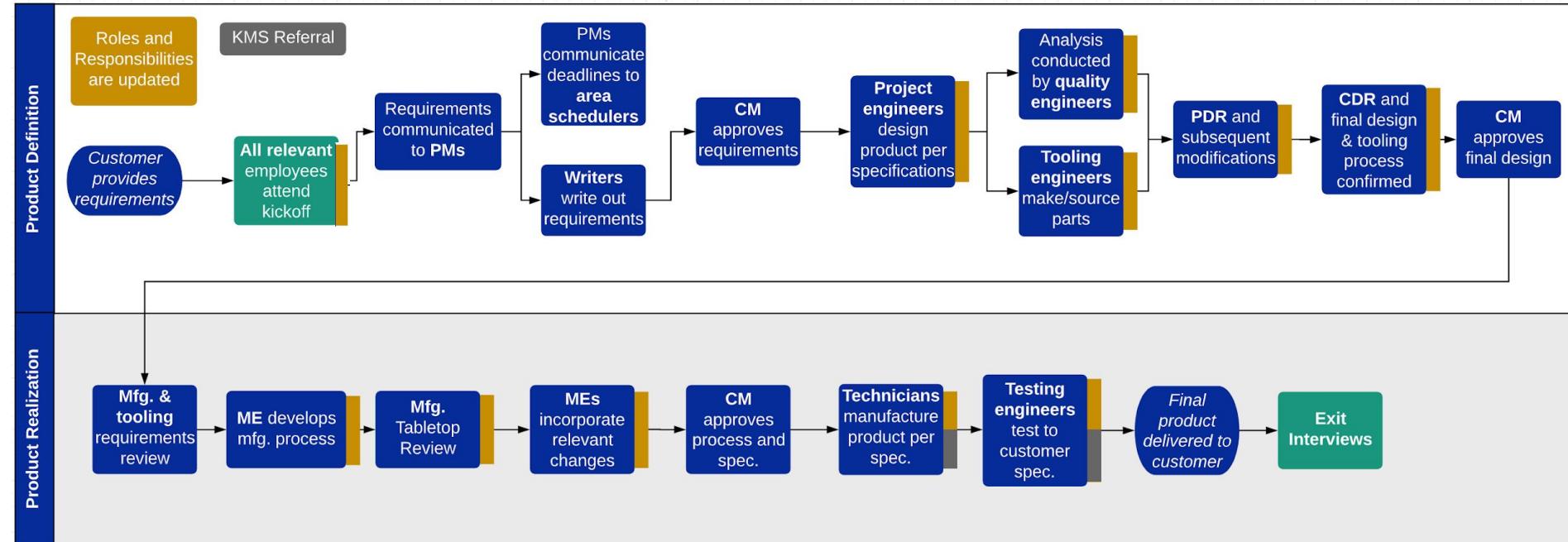
<b>Cost of Body Camera</b>	\$315 (including body strap attachment)
<b>Number of Buildings Using Cameras</b>	28
<b>Hours for Command Media Update</b>	80
<b>KMS Development Costs</b>	\$36,000 (200 hours at Engineering exempt rate)
<b>Yearly Maintenance Costs</b>	\$63,000 (annual budget for engineering software)
<b>Hours to Develop Training Resources</b>	40
<b>Number of Stakeholders Trained</b>	79 (ME, PE, PM) in first month; 124 in seventh month

# Appendix E: Process Flow

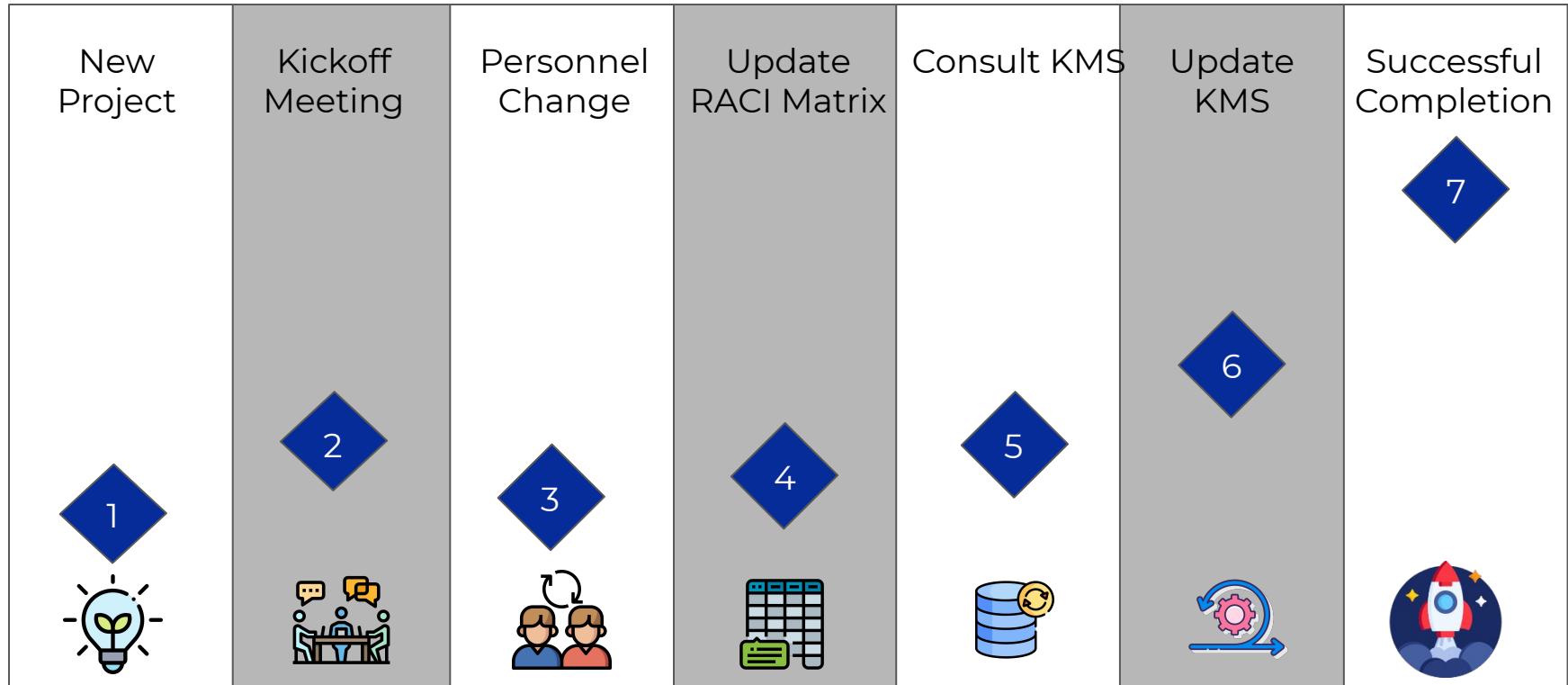
# Initial Process Flow Chart



# Final Process Flow Chart



# Journey Map



# Roles & Responsibilities

	Project Manager	Configuration Management	Project Engineers
Product Specification Documents	R	A	I
Design Analysis Results	A		C,I
Tooling Design Process Release	C	A	C,I
Model/Drawing Release	C	A	R

Responsible for completing that step in the process

Accountable for ensuring that step is completed

Consulted prior to the completion of that step

Informed of the results once that step is completed

## Identified Deviations

- 1 Modifications of customer requirements
- 2 Changes in team personnel

## Recommendation



# Financial Opportunity



**\$XXX,XXX**

Net Present Value of  
Recommendations

**X.X Years**

Payback period

**XX%**

IRR

Graph to come



# Status Presentation 2

## QUEST to the Moon



A



[spotify.com/artist/  
AlexTheBavarian](https://spotify.com/artist/AlexTheBavarian)



Nandos  
Peri-Peri



Emma  
Cooley



Under  
Wear-ier

# Status Presentation 2

## QUEST to the Moon



Inertia  
Winn-Dixie  
[spotify.com/artist/  
AlexTheBavarian](https://open.spotify.com/artist/0uXQHqfzJLcOOGvZC9Dw)



Emma  
Cooley  
Under  
Wear-ier

**NORTHROP GRUMMAN**  
KNOWLEDGE MANAGEMENT SYSTEM

Filter By Project   Filter By Client   Filter By Date   Sort By

Selected   Selected   Selected   Selected

Search...   Search

Name Surname 1h ago  
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Write a Response...

# Survey Insights



## Kickoff Meetings

**64%**

*n = 14*

indicated that kickoff meetings would generate  
“a great deal” of value

## KMS

**86%**

*n = 14*

are aware of the current text-based repository

**71%**

don’t regularly use it

# Journey Map



- Pick a stakeholder (i.e PE) and go through a hypothetical project
  - Start of a new project- attends kickoff meeting
  - Updates role and responsibilities
  - Receives customer requirements and drafts initial design
  - Runs into problem, uses KMS to solve it, updates KMS with lessons learned
  - Personnel change with other PE's- delegates responsibilities differently based on roles change
  - Ending state attained much faster as a result of recommendations (happy project engineer)

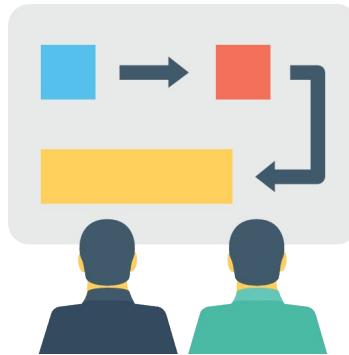
Client

**NORTHROP  
GRUMMAN**

# Scope



Focusing on **improving information flow** at  
Elkton, MD site



Primary sources of disruption are **process deviations** and **manufacturing deviations**



Aim to streamline information flow and **minimize** any gaps

# Knowledge Management



## Current State

*Current lessons learned repository lacks widespread use.*

## Our Recommendation

Text and video-based knowledge management system (KMS)



Ease of upload



Ease of modification



Ease of searchability

# Video-Based

NORTHROP GRUMMAN

Search videos...

Upload Video

Filter By:

Mollie S.

Recent Video Views:

Project B Relevant Videos:

Machine 1 Relevant Videos:

Videos by Arthur M.

# Text-Based

NORTHROP GRUMMAN

Filter By Project  Filter By Client  Filter By Date

Sort By

Mollie S.

Search...  Search

Name Surname 17 ago  
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Name Surname 17 ago  
Write a Response...

Name Surname 17 ago  
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**Upload Video**

**Process C**

**Machine 2**

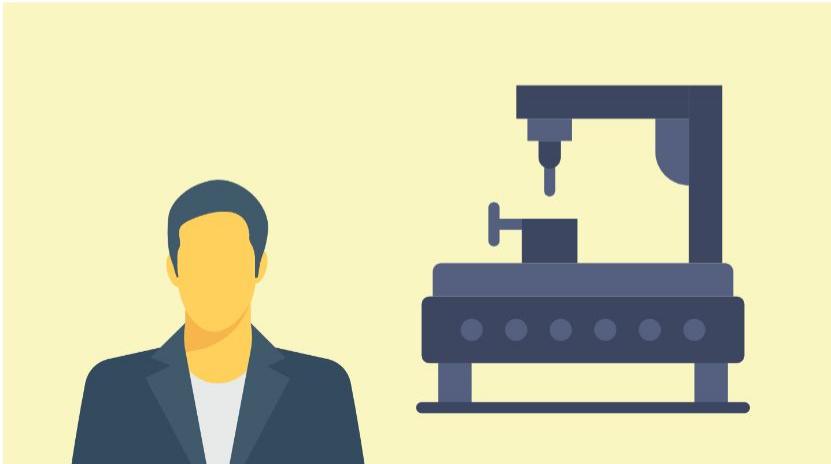
**Machine 5**

## Relevant Videos According to Search:



## Other Videos You Might Be Interested In:



**Upload Video****Process C****Machine 2****Machine 5**

## Project C: Using Machine 2 for Process C

Shelly F.  
8/25/2020

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### Generated Narration



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### Comments

 **Mark B.** 2 weeks ago  
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 **Shelly F.** 2 weeks ago  
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### Ask A Question

Type something...



Your Videos

Dashboard

Upload

Edit

Comments

## Recent Uploads

Filter ▾

Video	Title	Visibility	Restrictions
<input type="checkbox"/>	<b>Project A: Using Machine 4 for Process B</b> Mark B. 8/27/2020	Draft	None
<input checked="" type="checkbox"/>	<b>Project A: Using Machine 5 for Process B</b> Mark B. 8/27/2020	Visible	<b>Project A Employees</b>
<input type="checkbox"/>	<b>Project A: Using Machine 6 for Process B</b> Mark B. 8/27/2020	Visible	None
<input type="checkbox"/>	<b>Project A: Using Machine 1 for Process B</b> Mark B. 8/27/2020	Visible	None



Your Videos

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Filter ▾

Video

Title

Visibility

Restrictions

Step 1
2
3
4
Step 2
Step 3
Step 4

**Video Name**

**Video Description**

**Tags**

tooling
mixing / casting
insulation
lining
assembly
casting
testing
final assembly
ignition
TSRM

**Generated Narration**

Leave As Is
  Edit

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**Next**



Filter By Project

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Search All...

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Sort By

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New Question

## Your Previous Questions



Name Surname

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Filter By Project

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Filter By Project

Select

Search All...

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New Question

Question:

Required Field

Topics

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- [mixing / casting](#)
- [insulation](#)
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- [final assembly](#)
- [ignition](#)
- [TSRM](#)



Drag and drop a file here  
or

Next

# Video-Based KMS

# Text-Based KMS

# Kickoff Meetings

## Current State

*Kickoff meetings do not include all stakeholders and lack a unified structure*

## Our Recommendation



Engage all stakeholders at start of program



Establish program norms and expectations



Improved planning and scheduling

- Date, time, location of meeting
- Overall info about contract (PM considerations)
- Relevant stakeholders
  - Responsibilities for each stakeholder
  - Timeline of responsibilities
- Overall project timeline/requirements
  - Deadline for each step
- List of customer requirements
- SMEs for each area (refer back to KMS)

# Roles & Responsibilities

## Current State

*Costly delays from deviations in roles & responsibilities due to:*

- 1 Modifications of customer requirements
- 2 Changes in team personnel

## Our Recommendation



*Dynamic roles and responsibilities documented through RACI Matrix*

# Risk Mitigation



1. Recommendations are major changes that may disrupt current process flow in unanticipated ways
    - a. Likelihood: Low, Severity: High
  2. Employees may not use KMS to the extent that they need to
    - a. Likelihood: Medium, Severity: Low
  3. KMS might not scale to all stakeholders
    - a. Likelihood: Low/Medium Severity: Medium
- 
1. Recommendations built as lean as possible to correspond with current flow
  2. Mitigation- KMS built into other recommendations, implementation of KMS will be in currently used system
  3. Modular implementation of KMS with pilot, so NG can see what works for which stakeholders