

# Insights on Digital Engineering Impact on Design Cycle Time with the LyneisRework Cycle

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# Agenda

- Motivation
- Digital Engineering implementations addressing cycle time
- The Lyneis Rework Cycle
- How would DE implementations impact the Rework Cycle?
- Future Work

# Motivation

- DoD Digital Engineering Strategy

- Published June 2018, Guideline published 2020
- Modernize design, development, operation and sustainment
- Transform acquisition and implementation
- Improve speed for critical capability delivery to the warfighter
- Connected data in a digital environment
- Continued evolution of the strategy: DE Measurement Framework, etc.

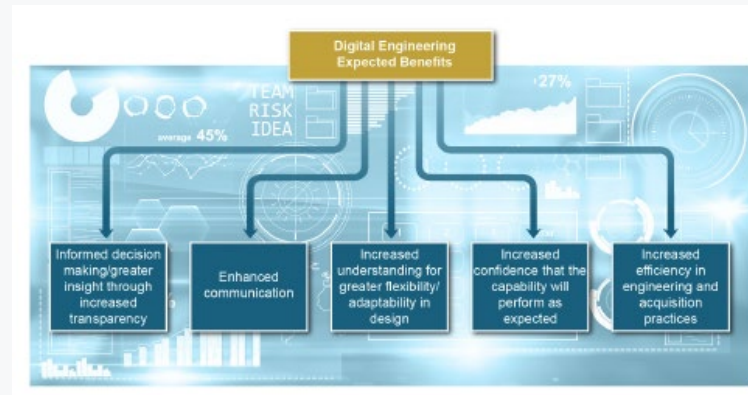
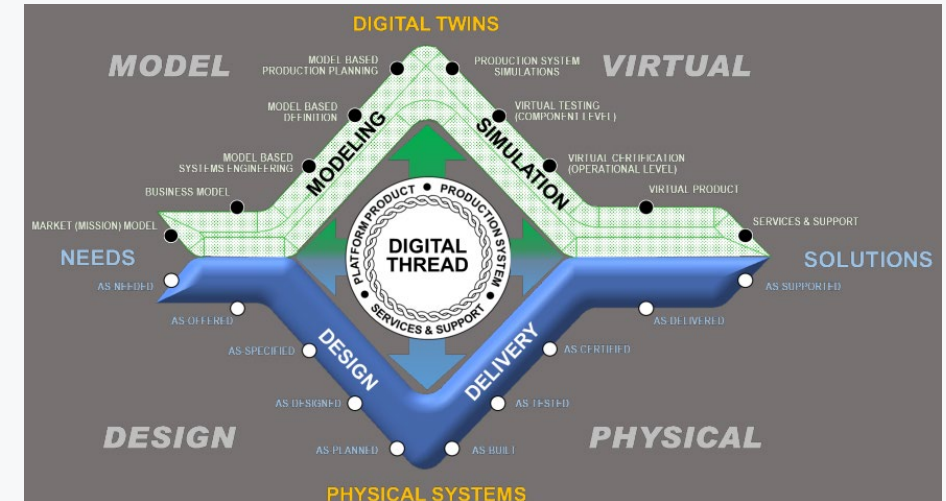


Image credit: DoD Digital Engineering Strategy, June 2018

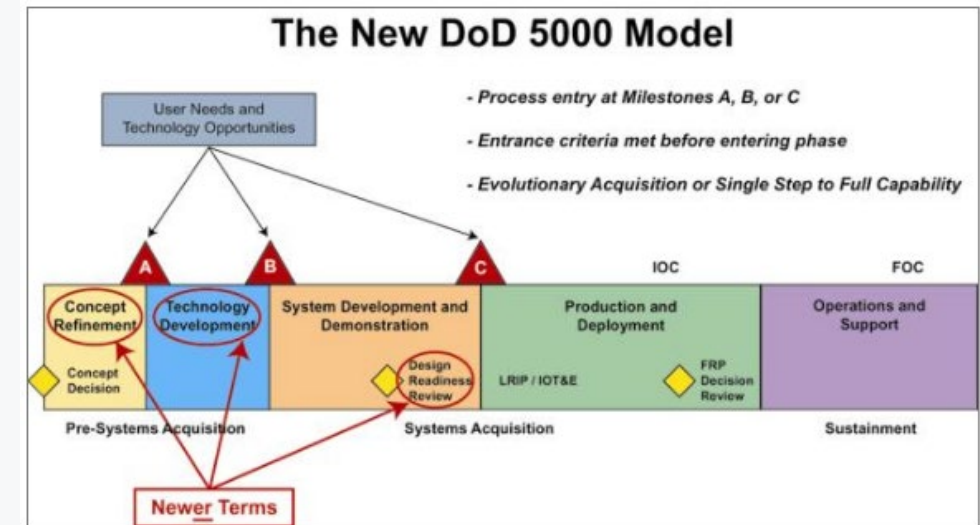


# Digital Engineering Implementations to address Cycle Time

- Integrate tools and data exchange methods to remove gaps
- Automate tasks that do not involve human decisionmakers
- Reduce human entry errors



INCOSE: [https://www.incose.org/docs/default-source/midwest-gateway/events/incose-mg\\_2018-11-13\\_scheurer\\_presentation.pdf](https://www.incose.org/docs/default-source/midwest-gateway/events/incose-mg_2018-11-13_scheurer_presentation.pdf)

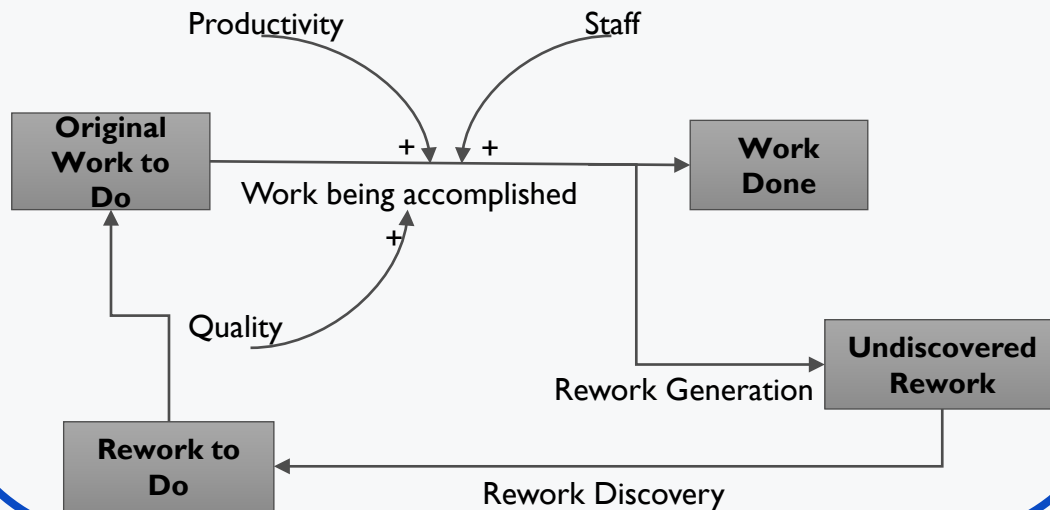


<https://www.inflectra.com/Ideas/Whitepaper/Systems-Development-with-DOD-5000.aspx>



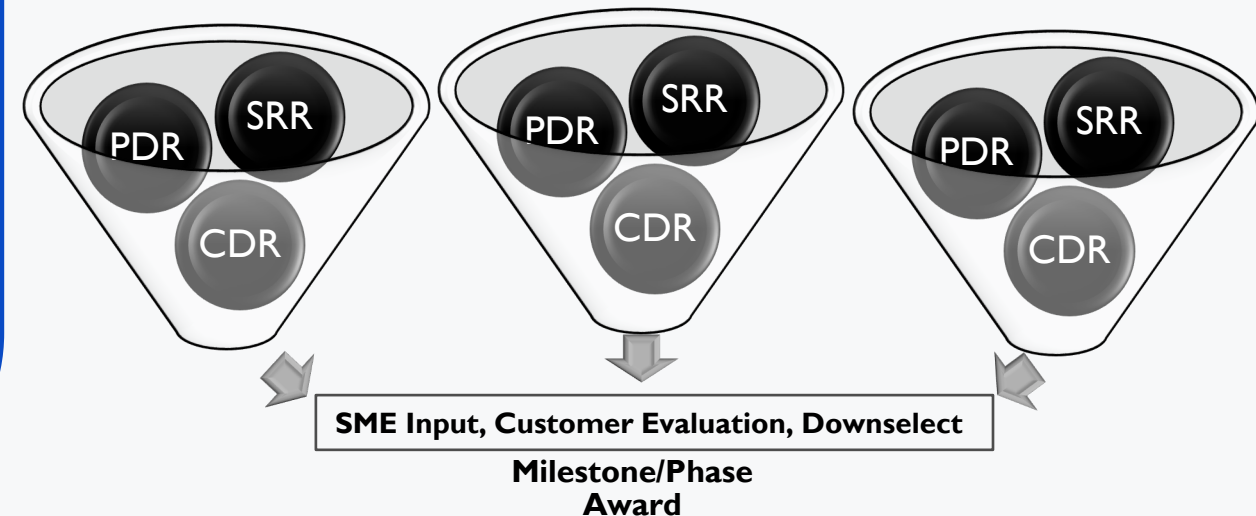
# How Do we Evaluate Success at Reducing Cycle Time?

- Within Design Cycles
  - Automated tasks
  - Reduce human touch time and entry errors
  - Do not replace human decision-making



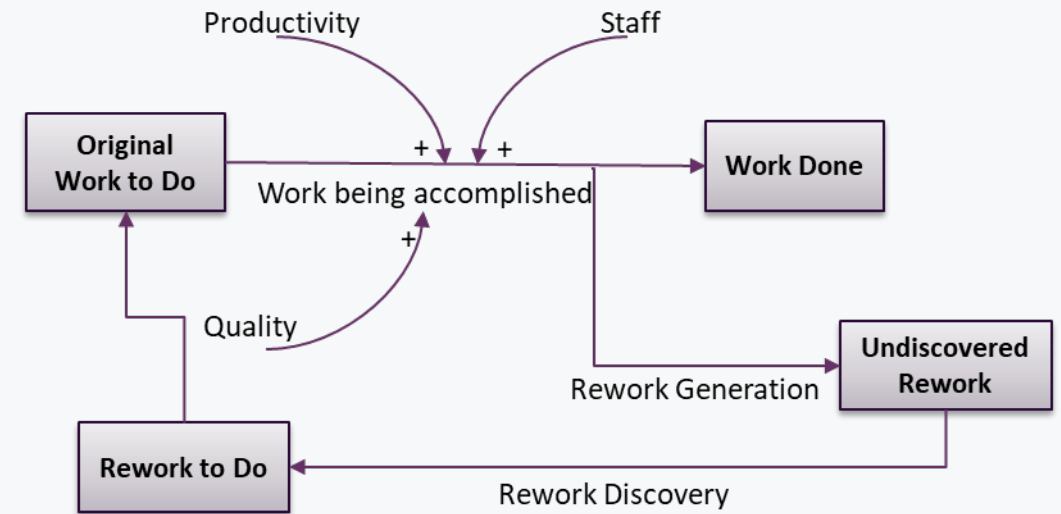
- Decision-Making in Lifecycle Progression

- Large human decision-making involvement
- Uses outputs of DE and design cycles for decision-making



# Digital Engineering as the Rework Cycle

- Dr. James Mlyneis MIT
  - Systems Dynamics Model for Project Management
  - System Dynamics can translate theories to equations representative of social and physical systems, such as engineering design cycles
    - Descriptions of processes, interactions are converted to stock and flow equations
    - Model can be simulated to identify impacts of change
    - Both direct and indirect impacts can be represented in the model via feedback loops



*The basic rework cycle*

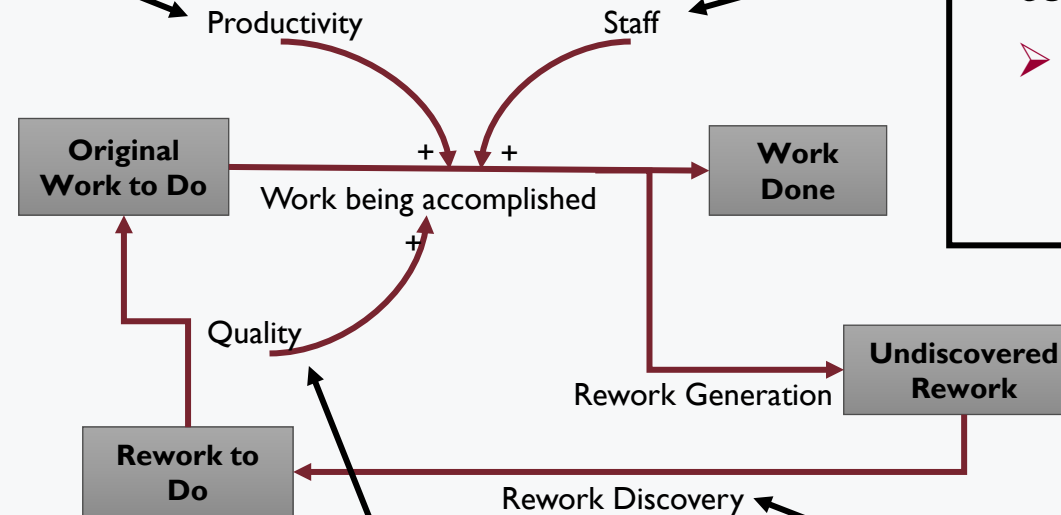
# How does DE impact time to complete the rework cycle?

- DE automation reduces human delivery time for other tasks, thus increasing productivity

- Evaluate a range of factors to see how DE automation increasing productivity impacts cycle time

- DE automation may decrease the Staff required to complete tasks

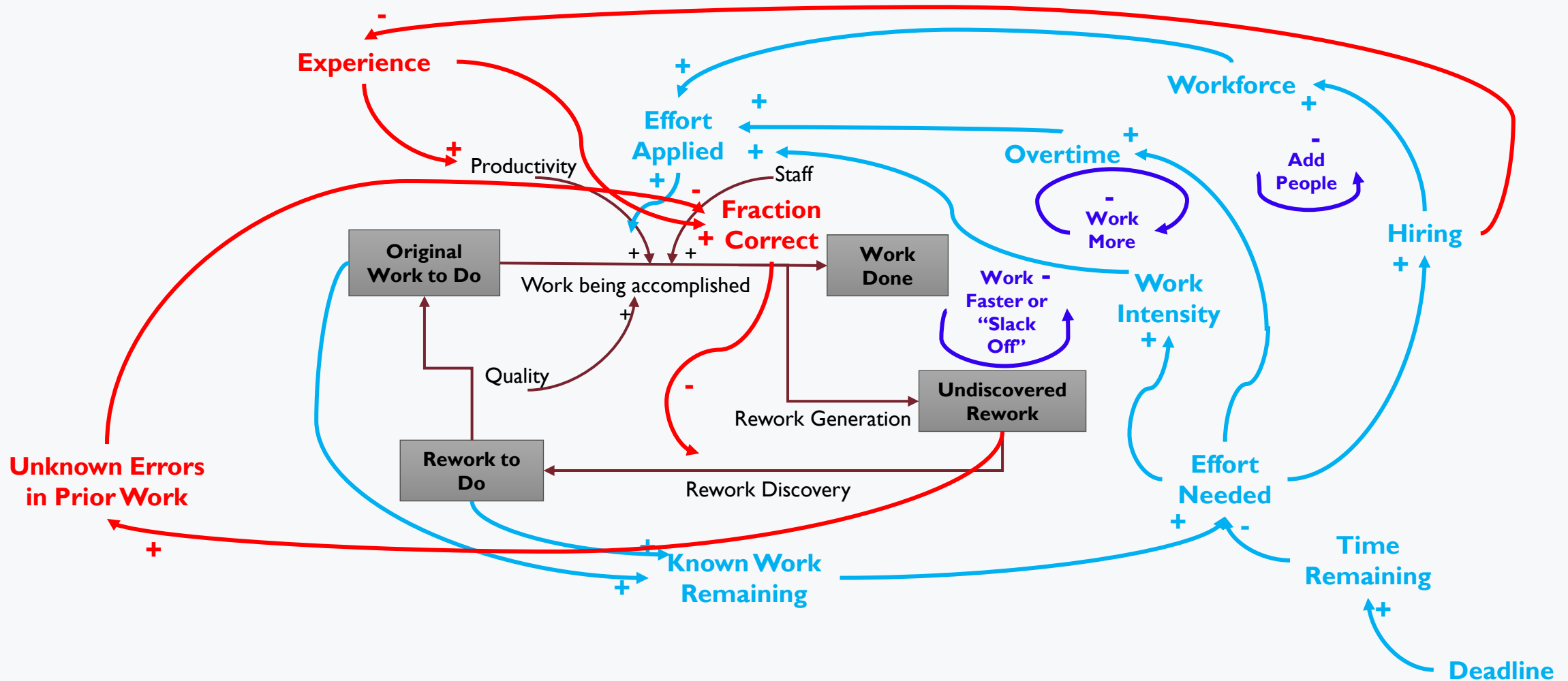
- Evaluate a range of staffing to see how DE staff reduction impacts cycle time



- DE implements automated error checking
  - This increases Quality and reduces the Undiscovered Rework stock

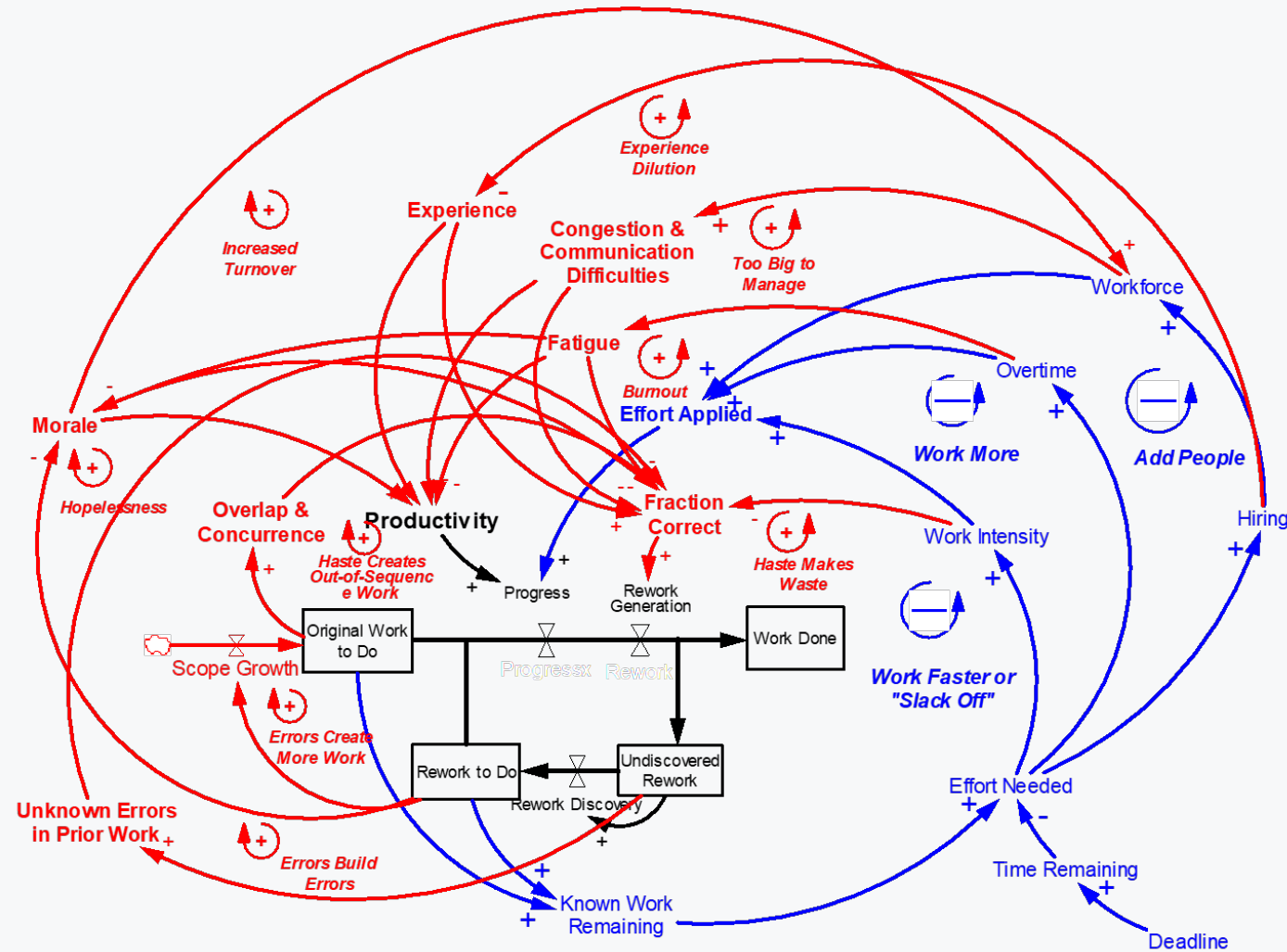
- DE implements automated notifications
  - This reduces the Time to Discover Rework through automated alerts

# But how does DE address other feedback loops?



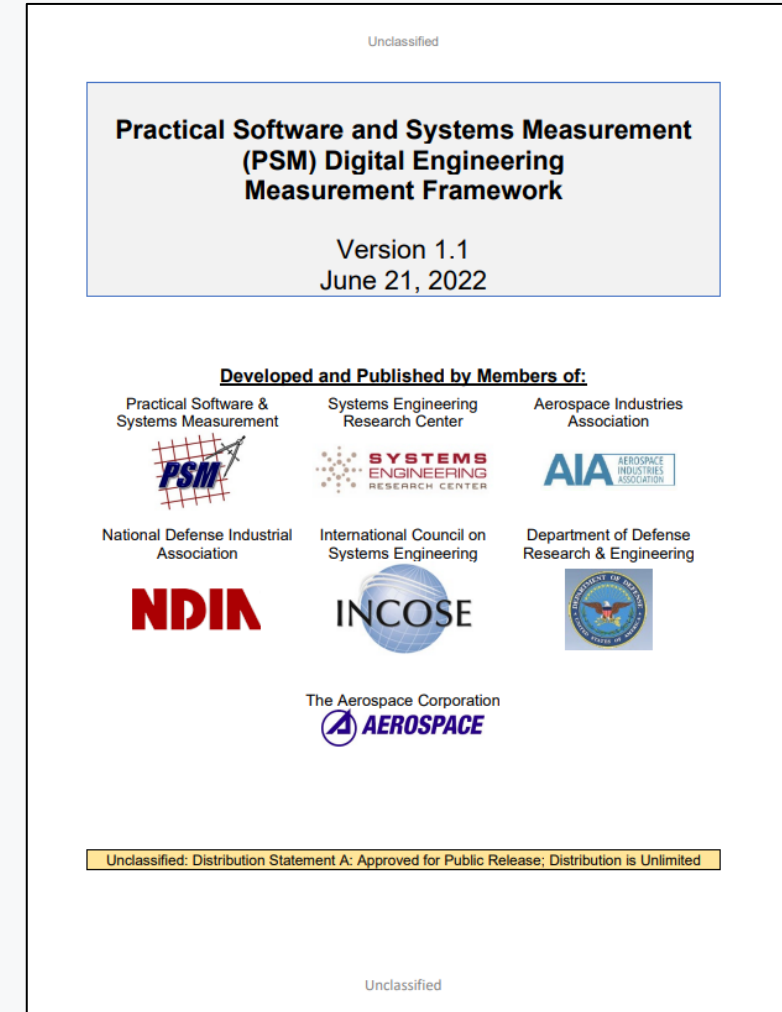


# The “Qualitative” Model



# Next steps for impact of DE using the Rework Cycle

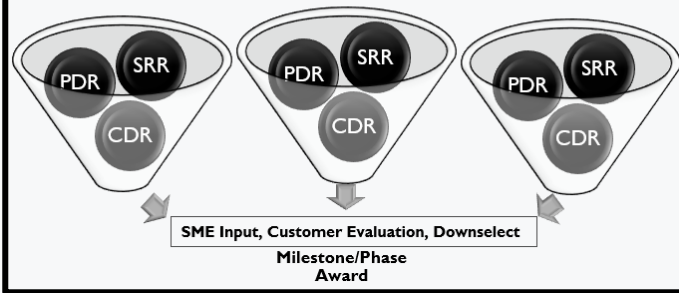
- Perform sensitivity analysis of expected DE impacts on the Rework Cycle elements
  - Understand where expected benefits have greatest impact
  - Identify changes that could occur due to feedback loops
  - Identify potential new causal loops created by DE
- Determine if this study reinforces or brings new discussion to the DE Measurement Framework



# Future Work for DE impact on Cycle Time

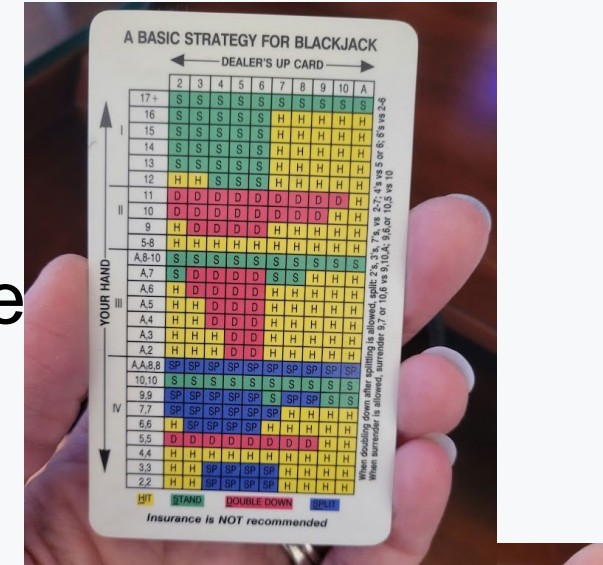
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- Study behavior of decision makers using Agent Based Modeling (ABM) and a surrogate model

- Define agents to represent decision-making behavior
- Evaluate how DE changes the environment and changes decision-making behaviors
- Review impact of behaviors on cycle time



The plays shown in this basic strategy table are commonly recognized as correct for a four-deck game. However, for ease of use while sacrificing very little on accuracy, this strategy is recommended for any number of decks (1, 2, 4, 6, 8). Generally, it will reduce the casino advantage to less than 1% over the long run.

The table has been separated into four sections according to frequency of use. Section I should be learned first, followed by sections II, III, and IV.

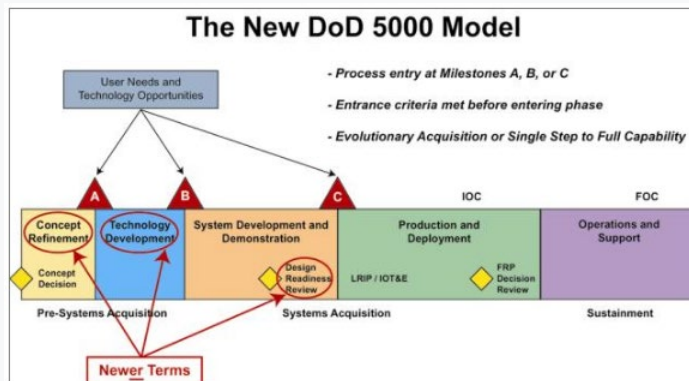
The correct play is found where your hand, initially consisting of 2 cards, intersects with the dealer's up card. Section I should be played according to the table—standing or hitting as indicated regardless of the number of cards you have. If your hand in sections II and III is made of 2 cards, you would play according to the table. If your hand is based on 3 or more cards, doubling down is usually not allowed. Also, some locations permit doubling down on 10 and 11 only. Hit when you can't double down with the exception of standing on an A, 7 against a dealer 3-6. Section IV consists of pairs only. Play your hand as indicated.

Of less importance than the above plays is the information concerning doubling down other than splitting and surrender. These options are not widely permitted. Therefore, always ask the casino personnel if in doubt as to what rules are in force.

In regards to money management:

1. Gamble only with money that you can afford to lose (spend on entertainment).
2. Budget your gambling money for the trip, for each day, and for each playing session.
3. Increase your bet only when winning.

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