

GALORATH

Generative AI for Agile: Closing Cost Cost Estimation Gaps with Efficient Preplanning

This presentation will focus on using generative AI to complete or assist with the preplanning task of developing functional requirements, thus lowering the associated costs and time.

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Agile SW Dev. Cost Estimation Challenge

- Agile's flexibility limits detailed preplanning
- Cost estimation requires defined requirements
- The paradox: How do we estimate cost when requirements are fluid?

The Problem of Unfixed Requirements

- Cost estimates traditionally align with project scope and relatively fixed requirements
- Agile assumes the scope will not change, but the requirements are fluid and should be defined during development and not before

Common Methods/Solutions

- Analogous Estimation
 - Using past systems for rough cost comparisons
 - Issues: Access to data to adequately compare capabilities and difficulty in tracking and comparing progress
- Parametric/Function Point Estimation
 - Sizing the effort based on defined functional requirements
 - Issues: High entry cost and contradiction to Agile

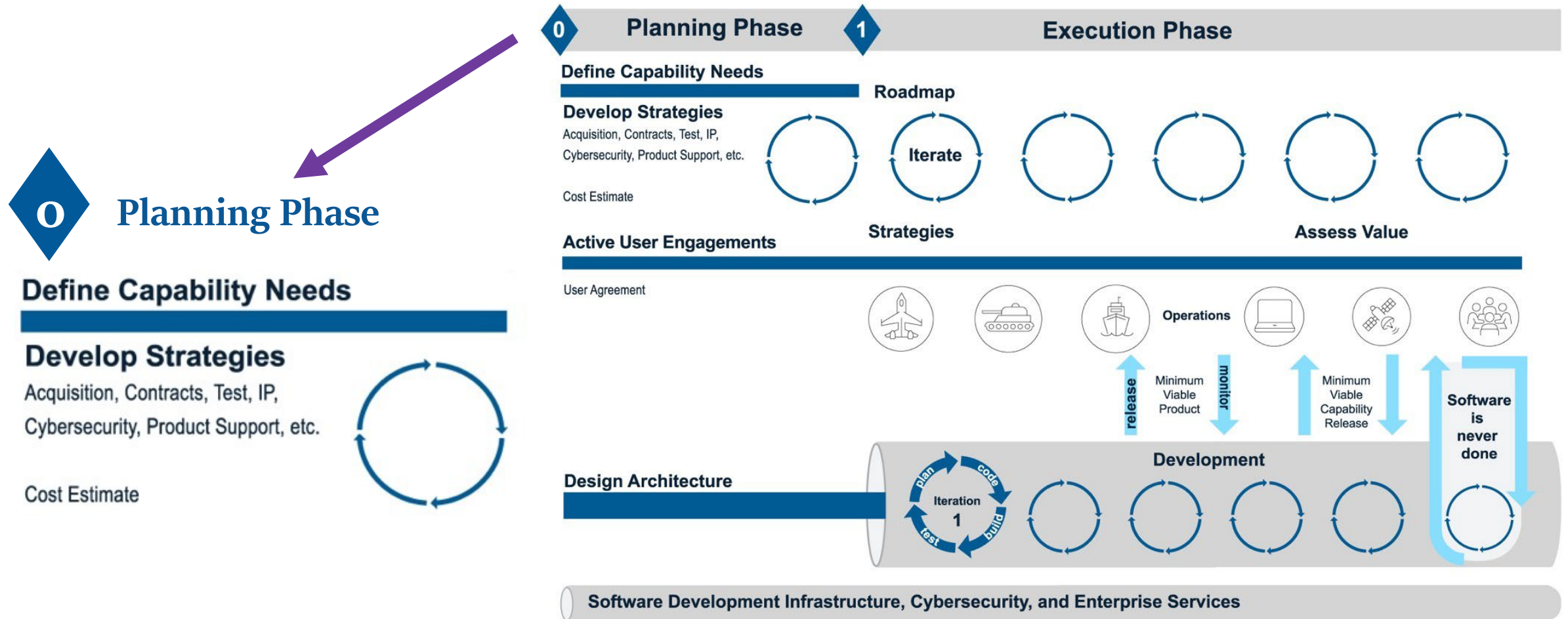
Parametric/Function Point Method

- Requires creating a **conceptual** design that identifies functional components and requirements
- High entry cost:
 - Requires a preplanning team of experts to create functional requirements
- Anti-Agile
 - Takes resources away and slows down the development process (“Time is money”)
 - Wasted effort if assumptions turn out incorrect (often the case)

Using AI to Bridge the Gap

- Generative AI is inherently designed to identify patterns and infer missing information
- Agile projects have high-level goals or requirements but lack the details on how to fulfill them
- Therefore, we should be able to use AI to do what it's inherently designed to do and provide the missing details for a concept design of a **viable** solution

DoD Acquisition Lifecycle - Agile Methodology Overview



Source: Dr. Brad Clark and Isla Kim, “Enhancing Agile with Gen AI for Better Cost Estimation”, 2025

Agile Methodology AI* Assistance -1

- While the evolutionary nature of Agile involves the progressive discovery of customer requirements, **there is a “concept” or “idea” of what the system should do**
- Given a high-level description of the system, an AI can be prompted to suggest more details
- This requires domain experts to do the prompting
- **“How”** you prompt an AI is critical to getting the correct information
- Use generative AI to assist or automate critical preplanning tasks, such as **developing high-level functional requirements**
- Phase 0
 - 0: In this phase, requirements are based on high-level ideas or concepts. **“Prototype”** requirements can be developed using AI. After review, the prototype requirements are used to create a ROM cost and schedule estimate
 - Phase 1+: In this and succeeding phases, the requirements are based on previously implemented requirements and extended using AI
- Benefit: AI assistance can support cost, schedule, and risk estimation while preserving Agile's speed.

Source: Dr. Brad Clark and Isla Kim, “Enhancing Agile with Gen AI for Better Cost Estimation”, 2025

* In this presentation, the term AI is used to refer to artificial intelligence based on Generative Pre-Trained Transformer (GPT) models called **Large Language Models (LLM)**

Agile Methodology AI Assistance -2

- Once a high-level set of “prototype” requirements has been developed, they are reviewed by stakeholders for completeness
- With the review complete, the prototype requirements can be sized (using functional size measurement, e.g., Simple Function Points) and used in Rough Order of Magnitude (ROM) cost, schedule, and risk estimates
 - Simple Function counts data and transaction items in the requirements
- Using an automated function point counting tool will speed this process, e.g.,
 - Cadence
 - ScopeMaster
- Automated counting tools also identify ambiguous, undefined, or conflicting requirements
- AI assistance begins with “**Prompting**” an AI Large Language Model

House Renovation Example

- Removing a load-bearing wall, and would like a list of potential materials required
- First Prompt: I am removing a load-bearing wall in my kitchen and would like a list of materials and tools required. What information do you need to provide an accurate list?
 - Software Equivalent: I am developing software for a security and monitoring system, and would like a list of functional requirements. What information would you need to provide such a list?
- Second Prompt: responses to the questionnaire, AI-generated

Live Demonstration

Conclusion

- The goal is to use AI to assist in developing functional requirements for a viable/concept solution that we can then size using various sizing methods (e.g., Function Points)
 - Reducing needed support and time
 - Allowing for better tracking and comparing
- Next Steps: Implement this concept for an entire software development effort and present findings at the next ICEAA conference



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