



MacGyvering Cost Estimating: Equipping Estimators with a Swiss Army Knife for the AI Era

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Who is MacGyver

- Angus “Mac” MacGyver - title character and the protagonist in two TV series
 - 1985–1992 original series and 1994 specials
 - Richard Dean Anderson
 - 2016–2021 series
 - Lucas Till
- Favorite Tools
 - Swiss Army knife
 - Duct tape, paper clips, chewing gum, Timex watch, strike-anywhere matches
- Trained as a US Army EOD Technician



Agenda

- • Introduction
- • Evolution of AI Tools in Estimating
- • Key Concepts: LLMs, ML, RAG
- • Tool Impact: Enabler or Obstacle
- • Characteristics of AI Tools
- • Reengineering Pricing
- • Early Cost Strategy
- • SME Estimating
- • Risk Integration
- • Next-Gen Analog Estimating
- • Broader AI Tools
- • Summary & Takeaways

Introduction

- Estimators today juggle fragmented tools.
- Inefficiencies echo MacGyver's improvisation.
- Proposal: A unified AI-driven cost estimating platform.
- Purpose: Transform estimating into a strategic, cohesive process.

What could we do if we had a “Swiss Army knife” Cost Estimating Tool

Past AI/ML Research

- Since 2007, only 6 ICEAA presentations out of 56 Titles focused on process improvements using AI/ML.
- This paper is unique in integrating AI tools for comprehensive estimating process transformation.

Rise of AI-Enhanced Tools

- Traditional tools = patchwork.
 - Excel, Word, Pricing tool, python, etc.
- AI platforms = unified, scalable, adaptive.
- Swiss Army knife metaphor: multi-functional, precise, efficient.



Key AI Concepts

- Large Language Models (LLMs) : Interpret text, draft narratives.
- Machine Learning (ML): Spot trends, anomalies, predict outcomes.
- Retrieval-Augmented Generation (RAG): Combines data retrieval with text generation for context-rich output.
 - Index's specific content to provide the LLM with an enhanced search criteria

Tools Can Help or Hurt

- Automating broken processes leads to amplified inefficiencies.
- Organizations must reengineer workflows to benefit from an AI implementation.

Core Features of AI Cost Tool

- Easy to use interface.
- Populate estimating structures from integrated AI/ML tools.

Data Security & Infrastructure

- Role-based access, encryption, private clouds.
- GPU/TPU computation.
- Zero-trust architectures, MLOps pipelines.

An AI Enhanced Cost Estimating tool set will be Hosted on an Internal Platform

Reengineering Estimating

Reengineering Pricing Function

- Redistribute pricing competencies across business and contracts teams.
 - Knowledge of which direct and indirect rates to apply (Business)
 - Ensuring proper pricing algorithms are applied to estimated hours and dollars (Business & Contracts)
 - Compliance with RFP and governance rules (Contracts)
- Reduces burnout, increases collaboration and consistency.
- Example:
 - Old model: siloed roles, stress peaks near deadlines.
 - New model: balanced load, collaborative estimation.
 - Outcome: more accurate, faster proposals.

Early Cost Strategy

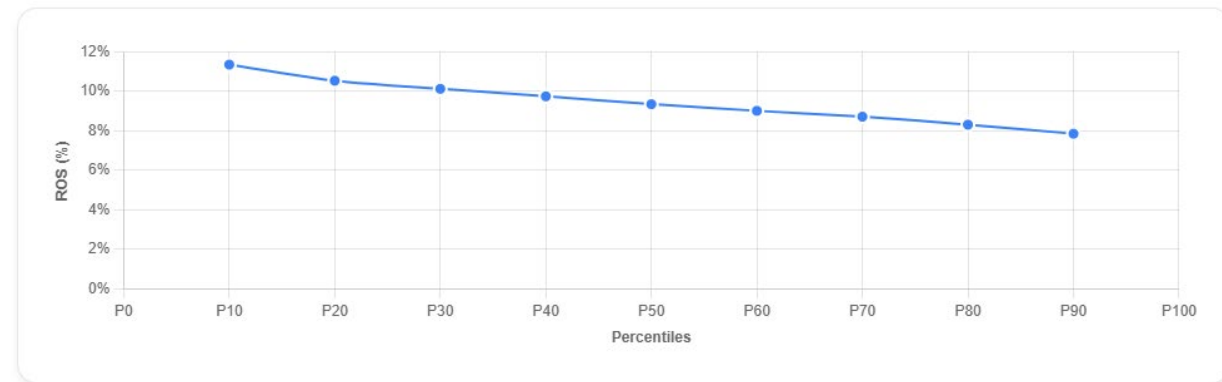
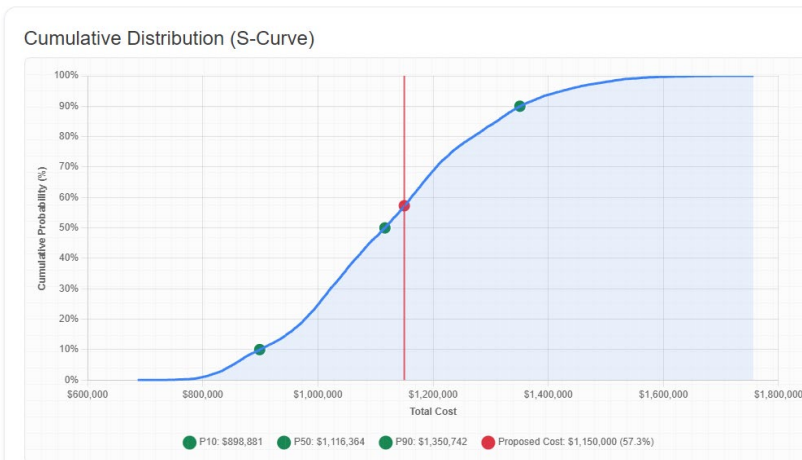
- Start ROMs early with SME input + AI tools.
- Develop WBS quickly and refine with incoming RFP data.
- Enable early price-to-win evaluations.
- Example:
 - Initial WBS + AI-derived ROMs refined as RFP details emerge.
 - Compare against PTW to inform trade studies.
 - Final proposal is agile and data-backed.

Empowering SMEs

- AI enables SMEs to estimate directly.
- Automates data retrieval, model selection, BOE drafting.
- Preserves expert judgment while increasing efficiency.

Risk Assessment Integration

- Embedded Monte Carlo simulations.
- Input ranges for key cost drivers.
- Outputs: S-curves, profitability reports, transparent assumptions.



Next-Gen Analogous Estimating

- Rapid ROM based on historical analogs.
- Feature-matching and confidence scoring.
- From task-level data to top-line summaries.

Broader AI Proposal Tools

- PTW analysis via LLMs.
- NLP for compliance, drafting, proofreading.
- Sentiment and proposal scoring tools.

Summary & Challenges

- AI = strategic enabler.
- Needs process change, cultural buy-in, high-quality data.
- Challenges: resistance, data readiness, integration.

Final Takeaway

- “If MacGyver estimated costs today, he’d ditch patchwork spreadsheets and use an AI Swiss Army knife.”