

The Principles of Product Development Flow in an AI World

AI will not repeal The Principles of Product Development Flow but enable them.



Steve Zielinski, CSEP

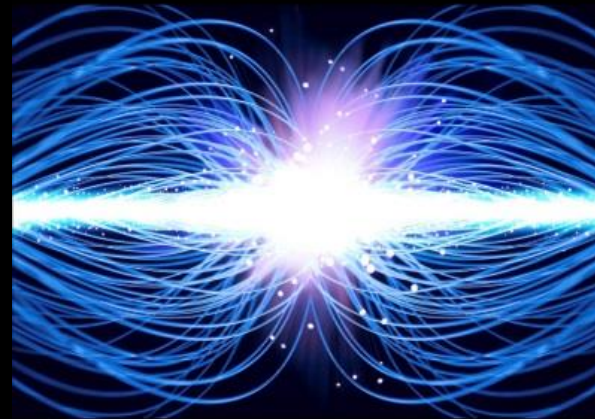
Vice President of Systems and Software
Engineering at Future Cardia

BA University of St. Thomas
BEE University of Minnesota
MSDD University of St. Thomas

PMP, CSEP

The Great Convergence

Merging
Lean, Agile, and, Knowledge-based
New Product Development



Steve Zielinski

The CSEP Study Guide for INCOSE SEH v4

Steve Zielinski, CSEP
and the staff of
SystemsEngineeringPrep.com



Forward by
William G. King Jr. IntPE, ESEP

Promise and Disappointment

- Enthusiasm and Confusion abound regarding using Large Language Models.
 - It seems so promising, yet companies are struggling to identify use cases.
 - Why?



A Diffuse Technology

- The traditional paradigm for implementing a “software solution” is difficult to apply.
- Companies have become accustomed to someone (e.g. Oracle or SAP) providing a centralized app to solve their problems.
- AI/LLM does not fit that paradigm.
 - It is “diffuse” (decentralized).
 - You’ll also hear it referred to as a “General Purpose Technology”.

What to do?

E8: The Principle of Small Decisions: **Influence the many small decisions.**²

Some concrete examples

1. Where are the retries?

My flow stopped until I could consult the expert.

LLM's are very good at extracting information from large document sets. In this case C code.

How often in your org is someone's work paused while a second person is consulted for the answer? How often do they know the answer as opposed to knowing where to look?

Example #2

2. “Hi all,
I am working on some of the planning documents and protocols,
and I need a number for the requirements to reference. Can one of
you get a DCR set up to assign a P/N to the requirements so that I
can reference where applicable?”

Flow stopped while the expert “pulled a number”.
















Hardly a high value activity for either party.

Agentic workflows can execute the request directly rather than interrupt a second person.

Example #3

- Meeting minutes
 - How much time is being used in your org to create meeting minutes?

SELECT TEMPLATE

 Chronological FREE Short summary of the meeting by chapter	 General MOST USED Capture any call's insights and key takeaways.
 Sales Unpack a prospect's needs, challenges, and buying journey.	 Sales - SPICED Notes based on the sales methodology by Winning by Design.
 Sales - MEDDPIC Notes based on the popular sales methodology.	 Sales - BANT Notes based on the popular sales methodology.
 Q&A Recap questions with answers.	 Demo Showcased journeys and impact.
 Customer Success Experiences, challenges, goals, and Q&A.	 One-on-One Updates, priorities, support signals, and discussion.
 Project Update Breakdown each task's status, discussion, and next steps.	 Project Kick-Off Vision, targets, and resources.
 Candidate Interview Delve into a candidate's experience, goals, and responses.	 Retrospective Capture processes to start, stop, and continue.
 Stand Up Track daily progress, tasks, and obstacles.	

More ambitious

- This next example will require help from the organization ...

“Establish customer-defined value ...”¹

- **Automated Requirement Gathering**

- LLMs can analyze and interpret customer feedback from Natural Language sources (Natural Language Processing).
 - Sentiment analysis of unstructured data.

Example:

- A company could use an LLM to monitor customer reviews and social media mentions, identifying common themes or requests, which are then automatically turned into a list of product requirements or features.

¹The Toyota Product Development System: Integrating People, Process and Technology, 2006 Morgan and Liker.

Natural Language Understanding that is easy, robust, and cost-effective

Effort Level: HIGH

Derived CSAT: 2 / 10

"I actually had to go to two locations to make this return. I ended up taking over two hours to complete this errand with all the driving - what a **waste of time** for a \$19 return!"

Emotion: Frustration

Derive the hidden, implicit meaning behind words with AI-powered NLU that saves you time and money. Minimize the cost of ownership by combining low-maintenance AI models with the power of crowdsourcing in supervised machine learning models.

Our NLU analyzes your data for themes, intent, empathy, dozens of complex emotions, sentiment, effort, and much more in dozens of languages and dialects so you can handle all your multilingual needs.

First Principles Prioritizes Integrating AI into Scrum

Teams will be 30-100 times faster by 2030 (or unemployed)

- **Productivity is 5x with Microsoft Copilot so Microsoft laid off 12% of its workforce in 2023 and rehired AI expertise for 80% of layoffs.**
- **AI is improving 10x every six months, 500 times faster than Moore's Law**
- **Industry analysts project 30-100x team performance by 2030. Scrum@Scale will be a facilitator of that change.**
- **The Scrum/AI model will evolve similar to the games of Chess and Go. When the world champion became a computer, humans were depressed.**
 - One year later a team of humans with AI on laptops took the world championship back from the computer.
 - The winners said it was the synergy between three factors – the humans, the machines, and the process.
- **AI is currently projecting that Scrum@Scale with team member AI tools and the AI being a full-fledged independent member of the team in all Scrum events will be the surviving model by 2030.**





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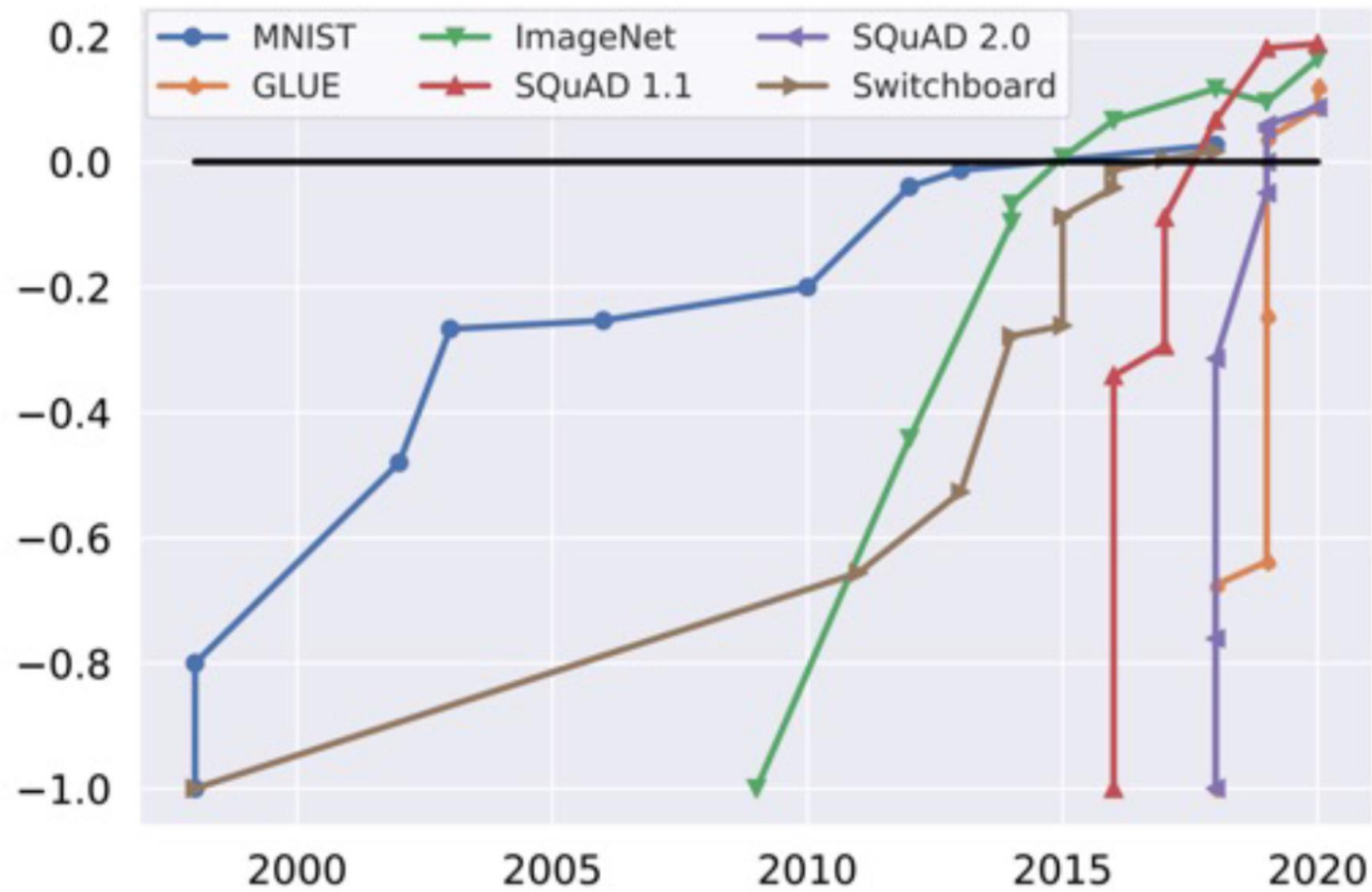


Figure 1: ML-benchmark saturation relative to human performance (black line) [Kielia et al., 2021].

SQuAD2.0 combines the 100,000 questions in SQuAD1.1 with over 50,000 unanswerable questions written adversarially by crowdworkers to look similar to answerable ones. To do well on SQuAD2.0, systems must not only answer questions when possible, but also determine when no answer is supported by the paragraph and abstain from answering.

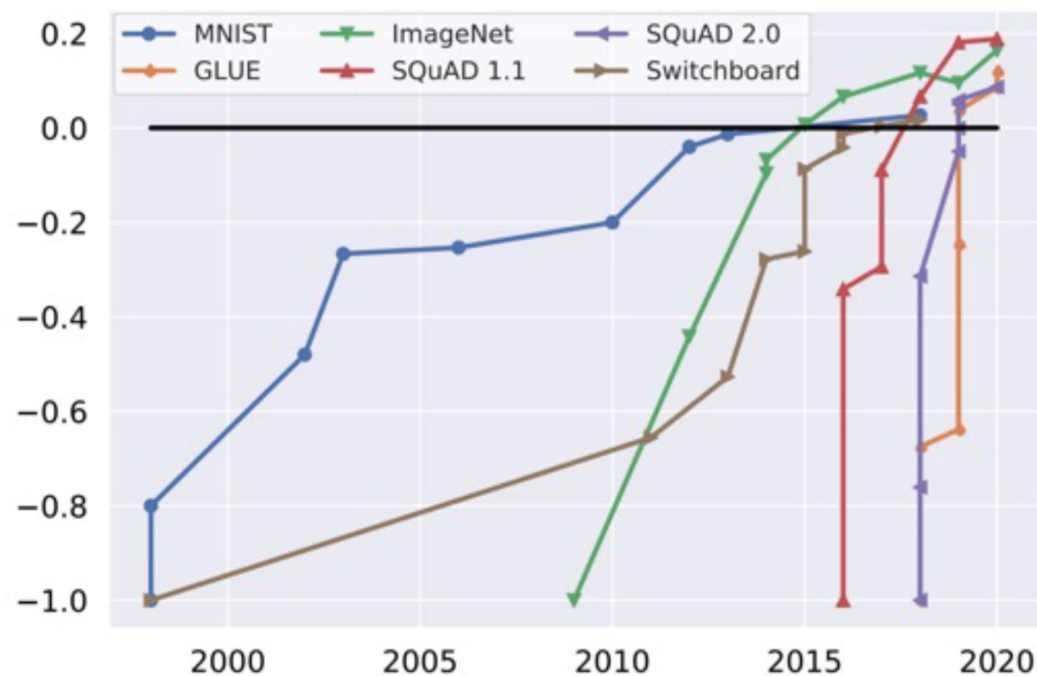


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The General Language Understanding Evaluation (GLUE) benchmark is a collection of resources for training, evaluating, and analyzing natural language understanding systems.

Switchboard: Recognition of conversational speech over telephone.

Code – “the killer app”

Amazon Q, our GenAI assistant for software development

- The average time to upgrade an application to Java 17 plummeted from what’s typically **50 developer-days to just a few hours**. We estimate this has **saved us the equivalent of 4,500 developer-years of work (yes, that number is crazy but, real)**.

- In under six months, we've been able to upgrade more than 50% of our production Java systems to modernized Java versions at a fraction of the usual time and effort. And, our developers shipped 79% of the auto-generated code reviews without any additional changes.

- The benefits go beyond how much effort we’ve saved developers. The upgrades have enhanced security and reduced infrastructure costs, providing an **estimated \$260M in annualized efficiency gains**.



Andy Jassy, CEO at Amazon



Amazon Q

The most capable generative AI-powered assistant for software development and company knowledge

If you'd like, I could describe in more detail how one might go about creating this animation, or explain any specific part of the peristaltic pump mechanism shown in this image.

SZ Can you create an animation for a piston pump?

Certainly! I'd be happy to create an animation for a piston pump using a React component. This will demonstrate the basic principles of how a piston pump operates.

</>

Piston Pump Animation

Click to open component

Published

I've created a React component that animates a simple piston pump. Here's how it works:

1. The animation shows a cross-section of a piston pump with a cylinder, piston, inlet valve, and outlet valve.
2. When you click the "Start Pump" button, the piston begins to move up and down within the cylinder.
3. The blue area represents the fluid in the cylinder. As the piston moves, you can see the fluid level changing.
4. The inlet and outlet valves are represented by circles that change color (red when closed, green when open) based on the piston's position.

This animation demonstrates the key principles of a piston pump:

1. Suction stroke: As the piston moves up, it creates a vacuum that opens the inlet valve and draws fluid into the cylinder.
2. Discharge stroke: As the piston moves down, it increases pressure in the cylinder, closing the inlet valve and opening the outlet valve to expel the fluid.
3. Cyclic operation: The continuous up and down motion of the piston creates a pumping action.

Piston pumps are widely used in various applications due to their ability to handle high pressures and their versatility in pumping different types of fluids.

Would you like me to explain any part of the code or the piston pump mechanism in more detail?

← Piston Pump Animation

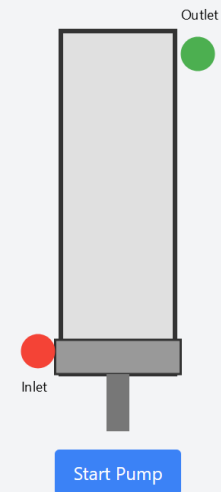


Preview

Code

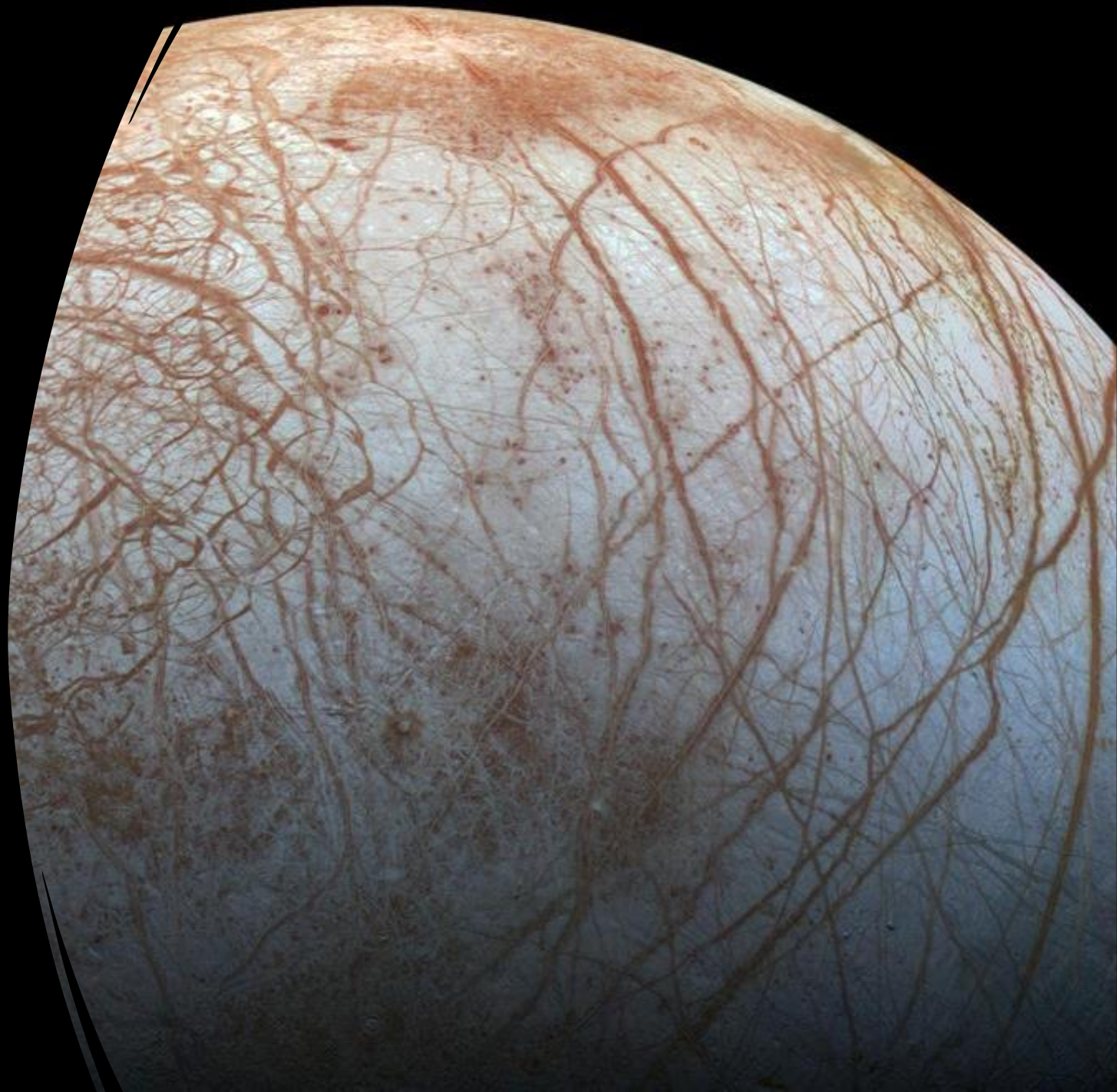


Piston Pump Animation



Creating apps we would not have attempted before

- I and my colleagues are writing software to accomplish tasks we would not have attempted before.
- We would have recognized the time commitment as too large to even attempt the task.
- Now, we are creating those apps and/or visualizations.



A brief history of Artificial Intelligence starting around the cybernetics movement

From cybernetics to AI
The idea that humans and machines are essentially the same gives rise to a project where scientists began to seriously consider what it would take to develop machines with human-like intelligence.

The "birth of AI" in the works of the cybernetics movement
Bringing together the functioning of machines and organic beings

1942: Accelerated code breaking Alan Turing used the Bombe machine using the Enigma machine of an accelerated code during WWII

1949: "The Manchester Baby" runs its first program

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1943: Machines and behavior "Behavior, Purpose, and Teleology" by Rosenbluth, Wiener, & Bigelow

1943: "Artificial Neurons" A Logical Calculus of the Ideas Immanent in Nervous Activity by McCulloch & Pitts

The birth of neural networks

"Artificial Intelligence"
Introduced into the nomenclature by John McCarthy

The constitution of computer programs that engage in tasks that are currently more satisfactorily performed by human beings because they require high-level mental processes such as: perceptual learning, memory organization and critical reasoning.

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McCarthy, Minsky, Rochester, Shannon

1956: DENDRAL Expert System: hypothesis formation and science inferences & Logical Conclusions
Feigenbaum & Lederberg

1959: UNIMATE First Industrial Robotic arm available commercially
Created by George Devol

1960: The Imitation Game Computing Machinery and Intelligence by Alan Turing

1967: The Perception learns to identify shapes; an early form of machine learning
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... and more to come in Milwaukee. I'll be walking through Generative AI from project concept to testing.

A night-time photograph of the Milwaukee skyline, featuring several illuminated skyscrapers. The image is overlaid with a semi-transparent blue digital interface consisting of glowing lines, nodes, and circular patterns, suggesting a theme of technology or data. The text is overlaid on a dark, semi-transparent rectangular area in the lower-left portion of the image.

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Milwaukee, Wisconsin

September 30 - October 3, 2024

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