# Architecting Systems to Architecting Agility

## Recurring Patterns Part 2

Part 4 of 7: Efficiency Communication & Treadmill

# Pattern 3 The Efficiency Gap

## Speed Cost Sensitivity Needs

- We weren't always as **fast or cost-sensitive** as the business needed.
- Example Connected vehicle/IoT data explosion.
- Default response often scaling horizontally (Hadoop Spark).

# Efficiency Gap Big Data Costs

## Investment Skills vs Alternatives

- While powerful these required **significant infrastructure investment** specialized skills.
- Felt more focus needed on **efficient data modeling** partitioning lifecycle mgmt.
- Could potentially achieve goals at

**fraction of cost/complexity**.

Delivering insights faster.

# Efficiency Gap AI Training Costs

## Training From Scratch Dilemma

⚙ Witnessed worrisome trend teams globally training **large AI models from scratch**.

⚙ Using hundreds/thousands GPUs incredibly **expensive time-consuming**.

# Efficiency Gap Lean AI Practices

## Faster Cheaper Alternatives Ignored

⚙ Often cheaper faster alternatives existed.

⚙ **Fine-tuning** pre-trained models using **RAG/CAG**.

⚙ Could yield satisfactory results quickly economically.

⚙ Best practices for **lean AI**

**development** not always prioritized.

# Pattern 4 Communication Silos

## The Challenge of Unheard Voices

⚙ In large complex programs (autonomous driving global IoT)...

⚙ Ensuring critical **technical feedback reached decision-makers** at right time was constant challenge.

# Communication Silos Lost Insights

## Technical Debt Maintenance Costs

- Recall architects/engineers raising concerns about accumulating **technical debt**.
- Pointing out long-term **maintenance costs** of chosen stacks.
- Concerns sometimes **deprioritized or addressed too late** due to deadlines

silos.

# Communication Silos Consequences

## Predictable Problems Friction

- Not malice just the **friction inherent** in large complex systems.
- Led to predictable scaling problems performance bottlenecks costly refactoring.
- Valuable perspectives lost.

# Pattern 5 The Tool Treadmill Intro

## Solving Problems Creating Complexity

⚙ Industry evolution felt like solving one problem...

⚙ Only to introduce **another layer of complexity** to master.

# Tool Treadmill Example Microservices

## Autonomy vs Distributed Complexity

⚙ Monoliths to microservices (essential for SOTA scaling).

⚙ Offered team autonomy independent scaling.

⚙ But introduced **distributed systems complexities** (service mesh tracing sagas K8s).

# Tool Treadmill The Energy Drain

## Keeping the Machinery Running

⚙ Each step solved limitation but demanded **significant investment** learning managing new tooling.

⚙ Spent considerable energy just **keeping the machinery running**.

# Lesson

## Foundation For Change

- Recognizing these patterns complexity requirements efficiency communication tool complexity...
- Laid the groundwork for seeking a different approach.

# Series Index

Part 1: The Pivot

**Access Part 1 PDF**

Part 2: The Technologist's Vantage Point

**Access Part 2 PDF**

Part 3: Pattern 1 Complexity Requirements

**Access Part 3 PDF**

Part 4: Pattern 2 Efficiency Communication Tool Treadmill (Current)

**Access Part 4 PDF**

Part 5: Vision AI Catalyst Plant Manager Example

**Access Part 5 PDF**

Part 6: AI Transforming the SDLC

**Access Part 6 PDF**

Part 7: Architecting Agility The Mission

**Access Part 7 PDF**

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