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.

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