DisNOG 2

Applying Lean MFG Principles to Networking through Factorio

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Hello!

I am Darrel Manalang

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Objectives

Spark Interest

- Learning from Lean Manufacturing
- Provide a glimpse of my own DevOps journey

Provide Actionable Tips

- A few things I learned from Lean
- Low-Tech with wide application

Factorio and Manufacturing - What? Why?

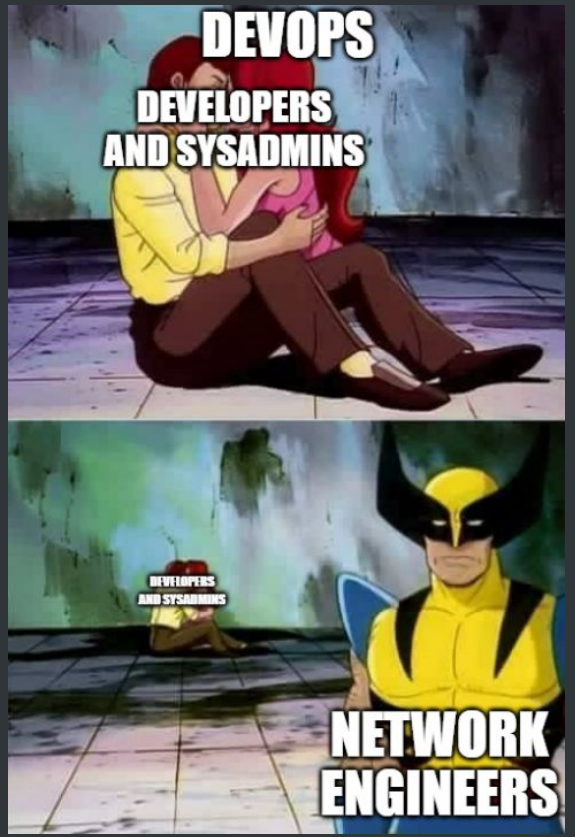
The Struggle

- Working in the wild west of a large startup
- 4-man on-call rotation
- Searched for a better way

Factorio and Manufacturing - What? Why?

DevOps did not work for me

- Solutions were not as applicable to networking
- Lack of a separate PROD env
- Automation tools were underdeveloped or not available



Factorio and Manufacturing - What? Why?

Creating My Own Methodology

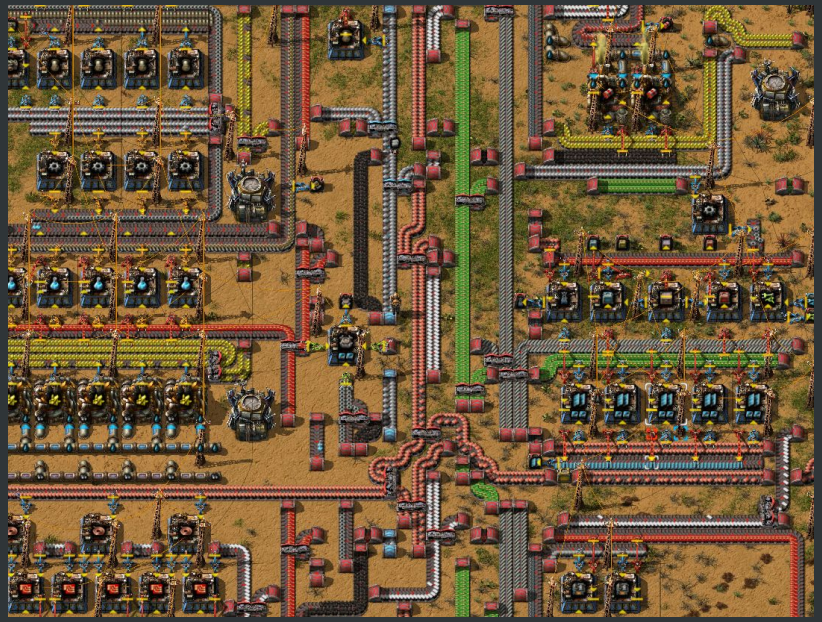
- DevOps is heavily influenced by Lean
- Start with Lean and apply to Networking
- One Problem: Manufacturing made less sense to networking, than software development

Factorio and Manufacturing - What? Why?

Factorio

Manufacturing automation game where you:

- Mine resources
- To turn them into finished goods
- To research technologies
- To launch a rocket

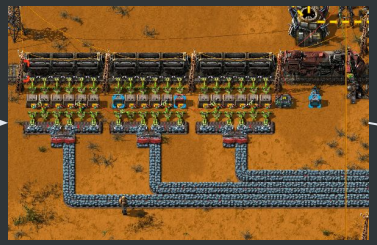


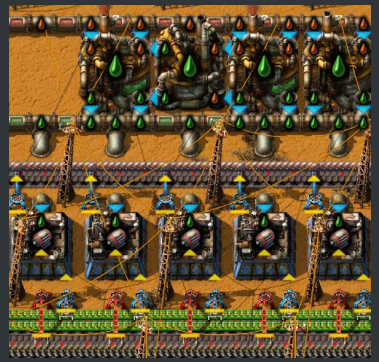
Factorio and Manufacturing - What? Why?

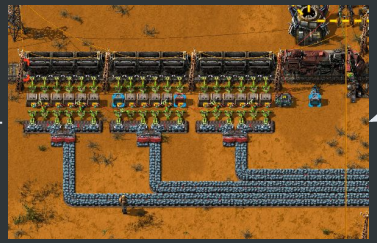
Factorio as a learning Vehicle

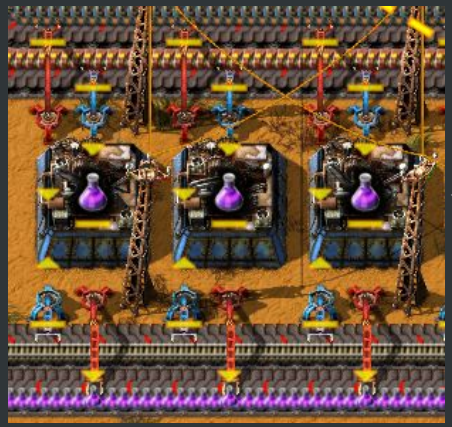
- Popular among engineers
  - https://www.reddit.com/r/factorio/comments/ikqt5k/any_real_life_engineers_here/
- Feels vaguely like work for a variety of different engineering professions
- I could apply Lean Mfg to Factorio and bring back to Networking

Electric Engines Example: The Problem









Electric Engines Example: The Solution

Reduce Batch Size and WIP

Benefits

- Faster lead times
- Less value tied up in the system
- Lower latency between change and result

Mitigating Drawbacks with the Andon Cord

- Disruptive - Reveals issues previously hidden by inventory levels
- System is less forgiving

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Network Engineering Learnings: Alerting and The Andon Cord

Alerting and the Andon Cord

The Andon Cord at Toyota

Cord along the mfg line to pull and stop production

- Encouraged to pull anytime an issue was found
- Everyone would stop working to identify the cause and implement a solution
- System became more streamlined after each event
- Reduction in pulls/day is concerning

Alerting and the Andon Cord

Too Many

- Can't get any planned work done
- Alert Fatigue

Resolution:

Increase inventory levels

(Decrease alerting sensitivity)

Too Few

- Learning stagnates
- System reliability degrades over time

Resolution:

Decrease inventory levels

(Increase alerting sensitivity)

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Network Engineering Learnings: Reducing Batch Sizes

Reducing Batch Sizes

In Manufacturing

- Provide value sooner
- Able to change tasks more quickly
- Defects are detected sooner

Applied to Networking

Reduced a static route -> BGP cutover to a batch size of 1 route

- Was done during the day
- Small impact, success or failure
- Was able to schedule the change earlier, and detect an issue in my change sooner

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Network Engineering Learnings: The Dangers of WIP

The Dangers of WIP

In Manufacturing

- Value (money) tied up in the system
- Consumes space

Resolution: Pull System

- 100% utilization is avoided
- Work is requested from downstream

Applied to Networking

More dangerous - our inventories are invisible

- Incomplete tasks
- Incomplete projects

These are a few examples. There's plenty more to learn from Lean.

Thank you!

Any questions?

You can find me at:

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