Machine Learning FRAM

2023/6/19

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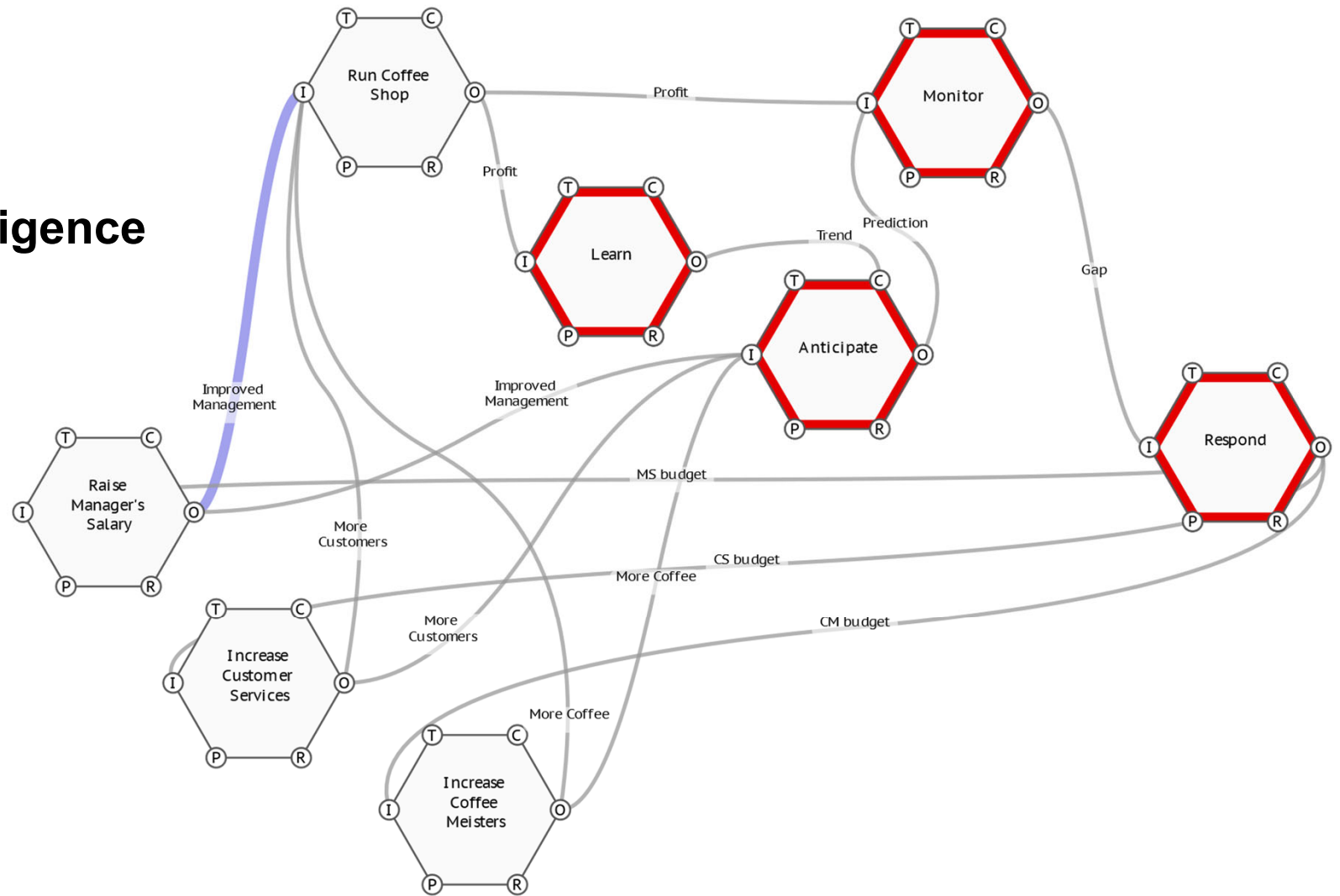
David Slater

Rees Hill

Erik Hollnagel

Purpose:

To build **Artificial Intelligence** using FRAM
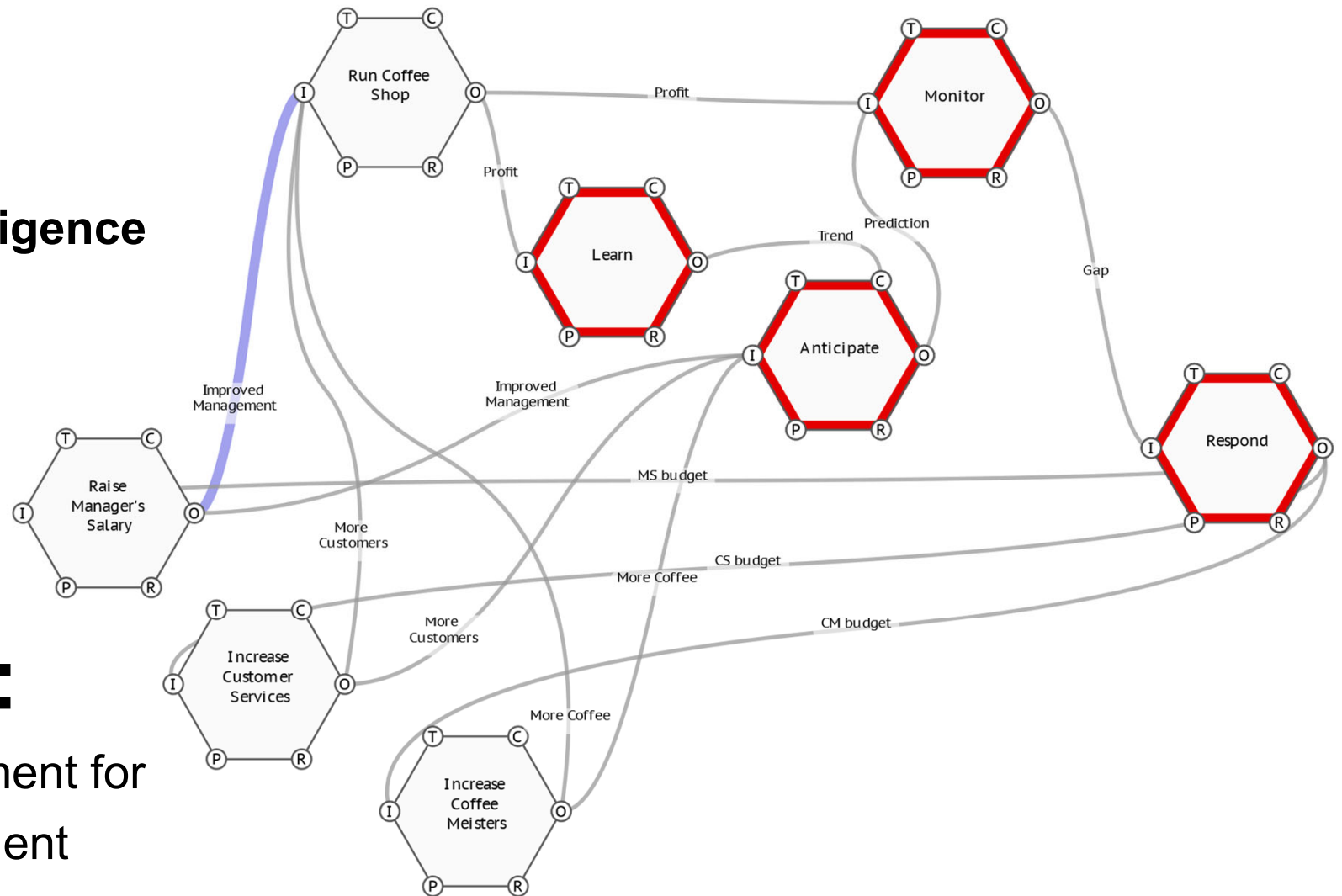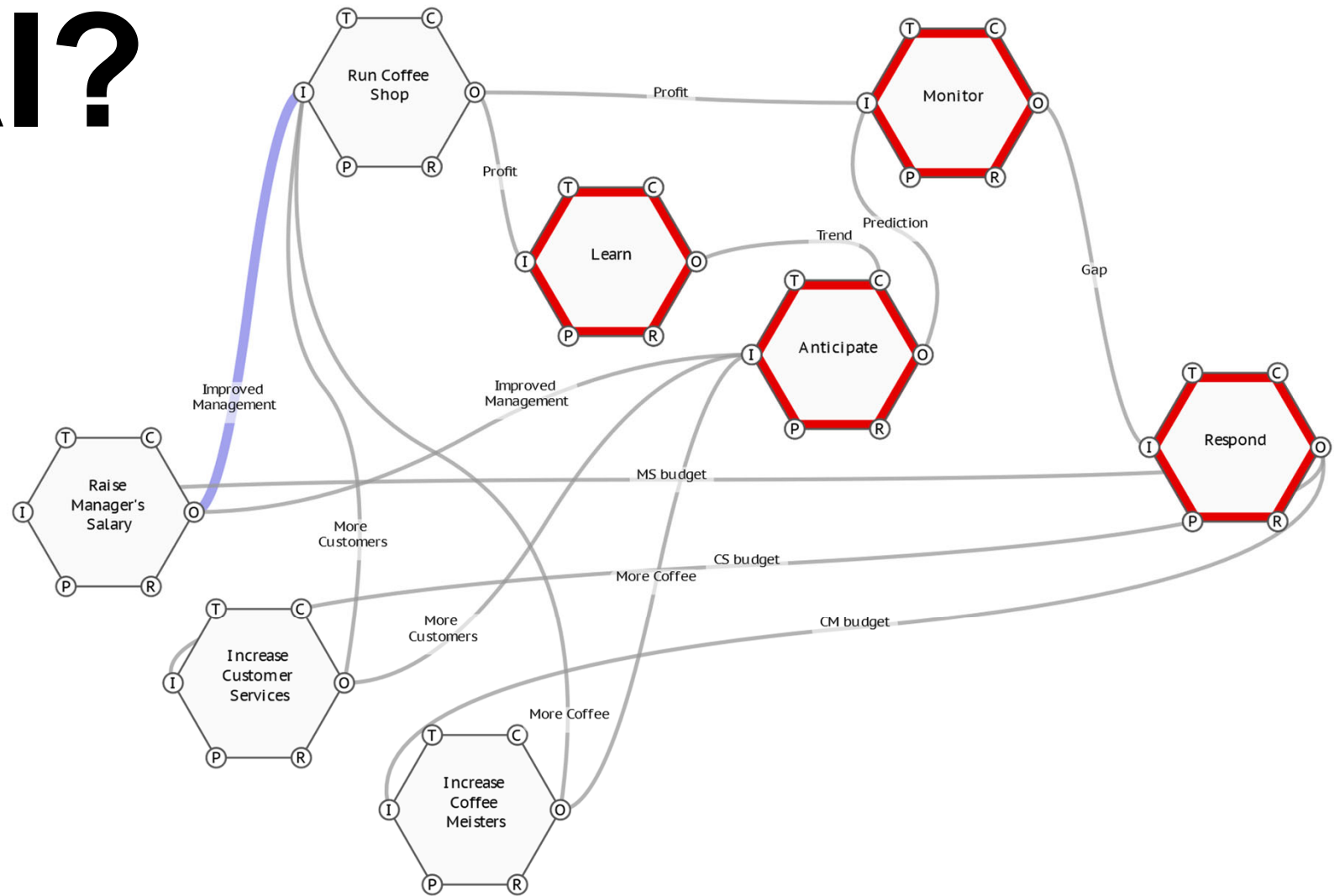
Purpose:

To build **Artificial Intelligence** using FRAM

Application:

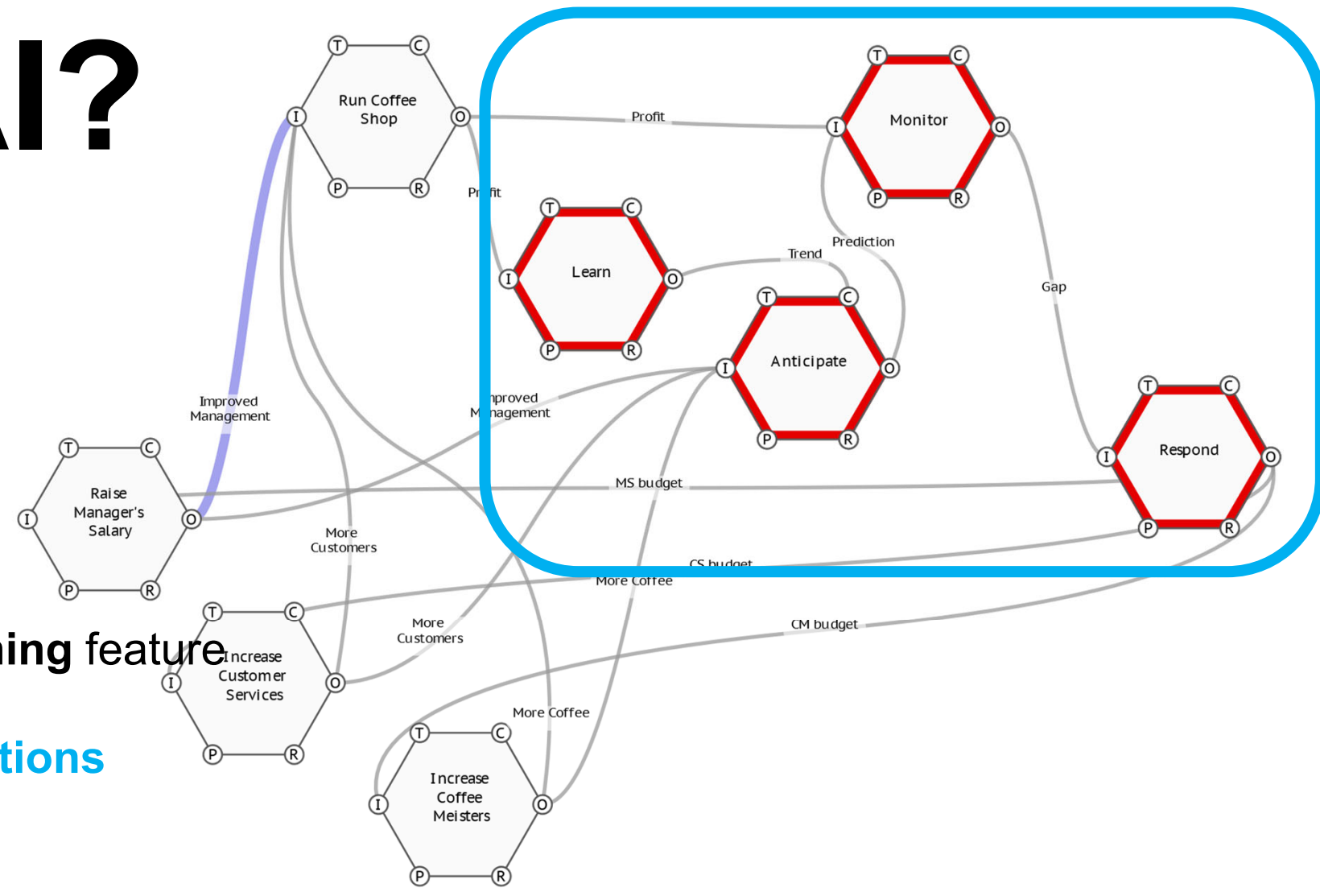Optimization of Investment for Coffee Shop Management

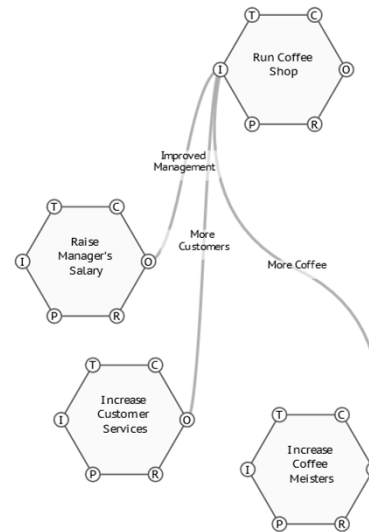# Why AI?

Why AI?

Because

Adding **Machine Learning** feature
=
Adding **Resilient Functions**

How to build AI by FRAM
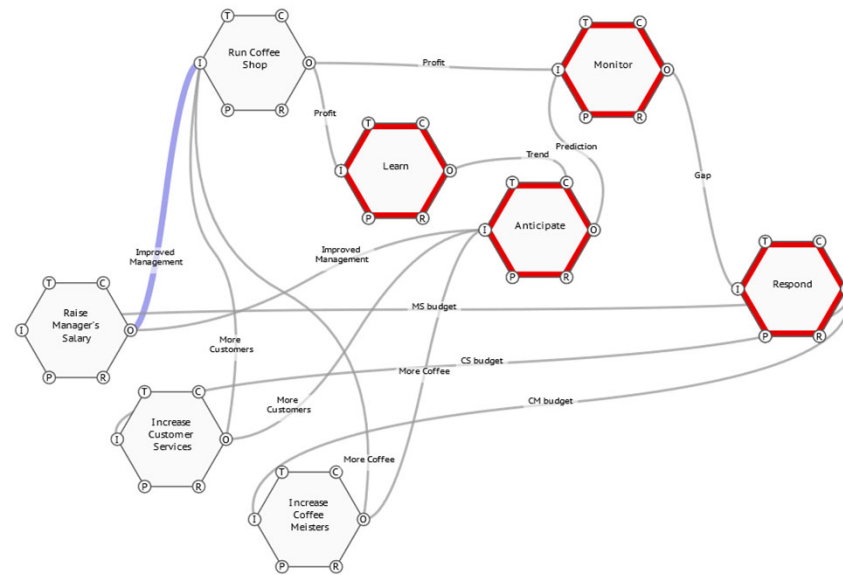
How to build AI by FRAM
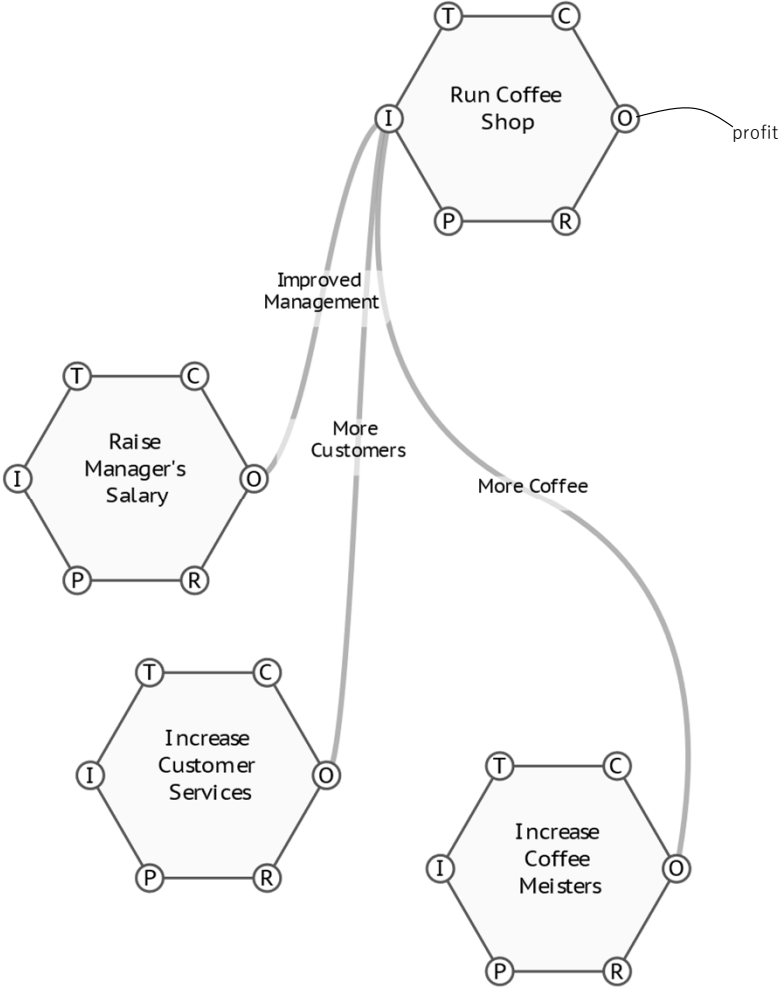
Stage 1: Build Domain Specific Part

How to build AI by FRAM
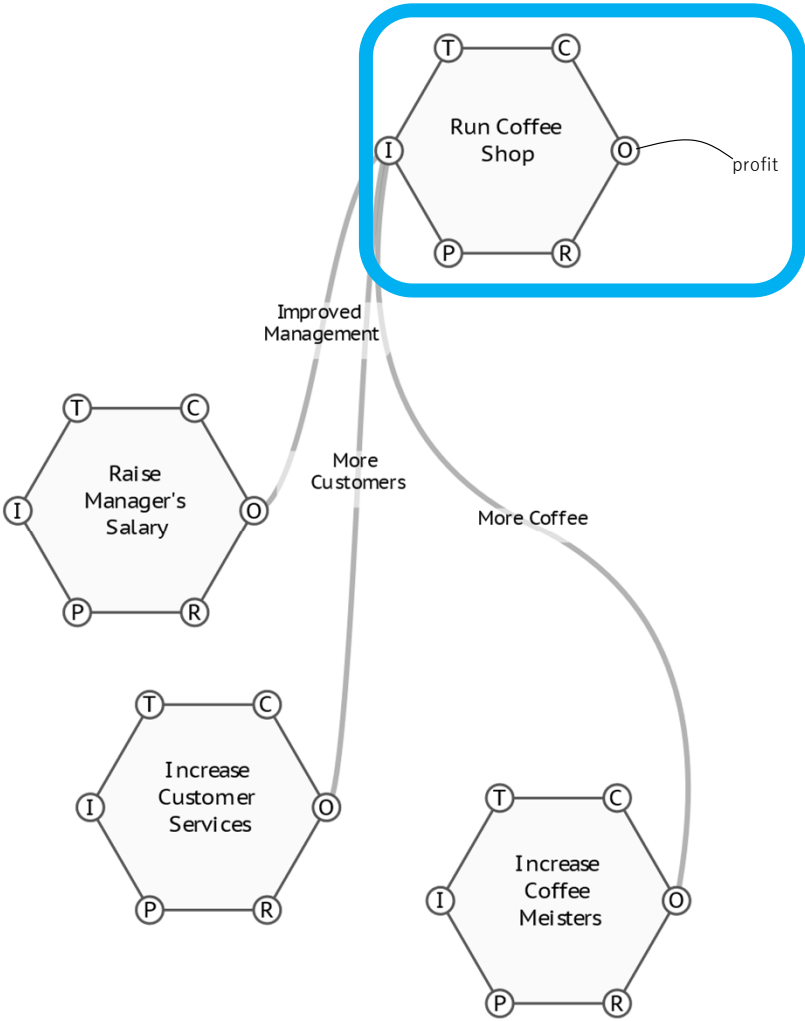
Stage 1: Build Domain Specific Part
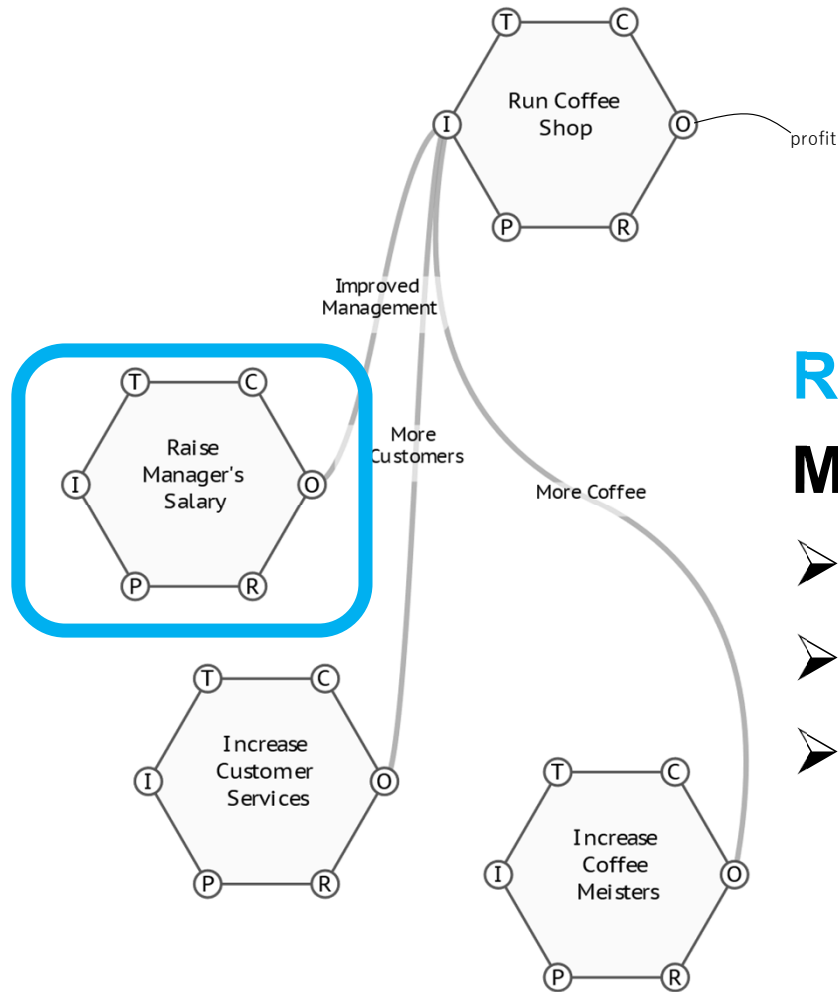## Stage 2: Add Machine Learning Feature

Stage 1: Build Domain Specific Part

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Run Coffee Shop

➤ **Input 3 types of investments.**

➤ **Produce profit.**

Stage 1: Build Domain Specific Part

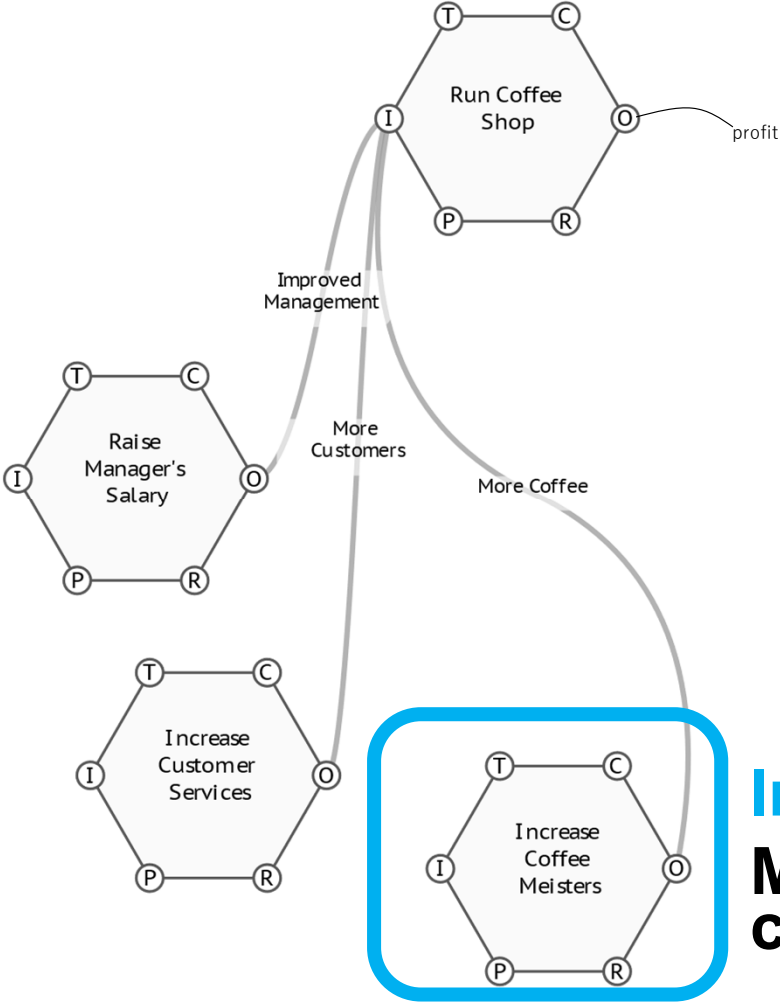**Raise Manager's Salary (MS)**

More MS for:

➢ **Better Marketing**

➢ **Better Advertisement**

➢ **Shop Interior Improvement**
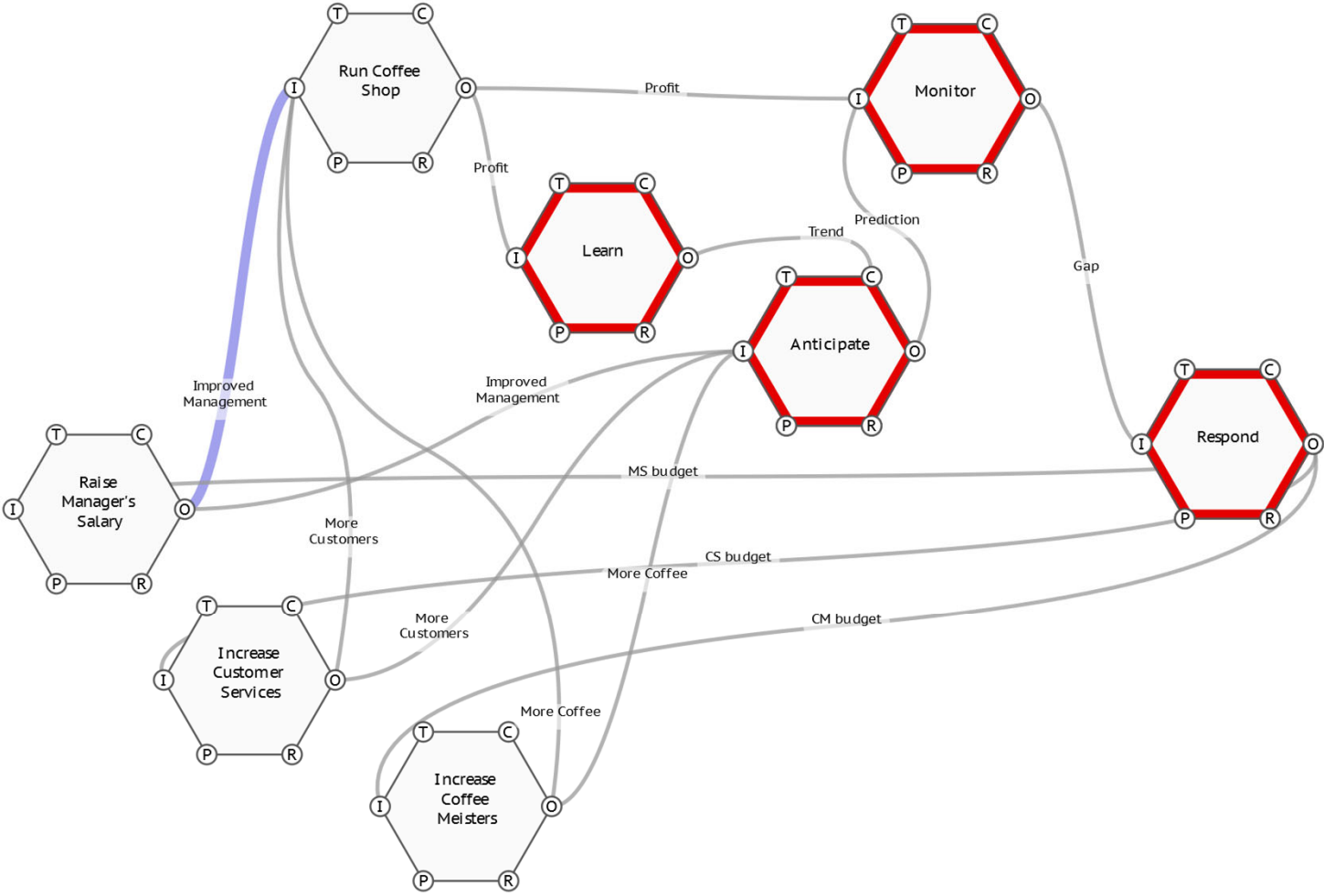
Stage 1: Build Domain Specific Part
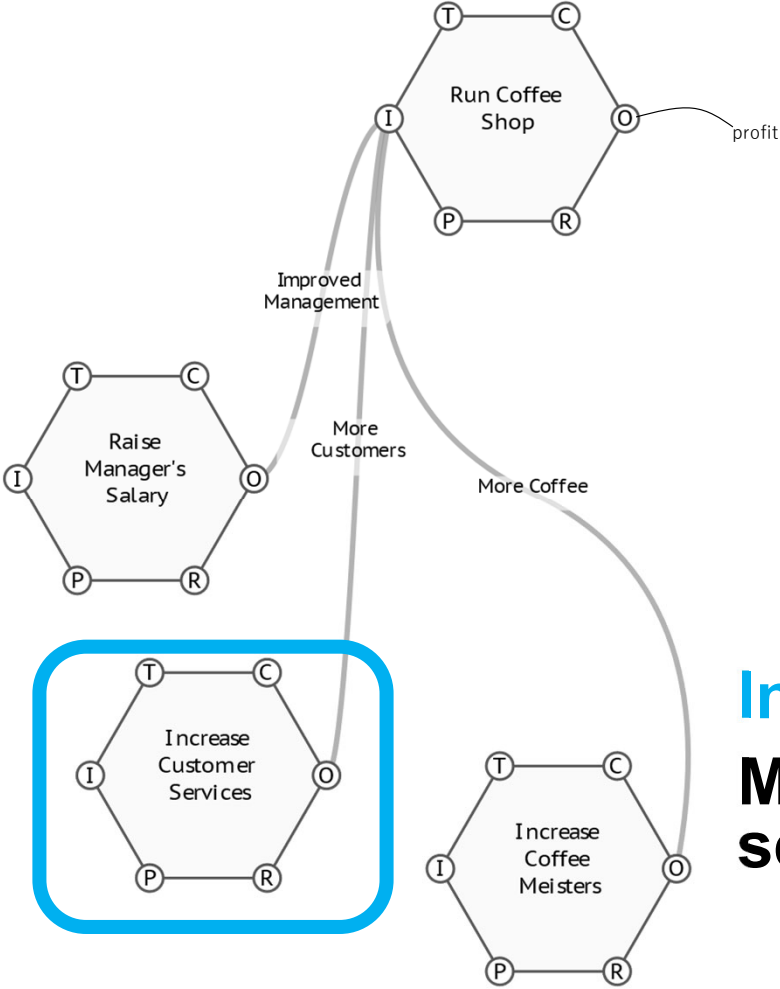
Increase Customer Services (CS)

More CS personnels for better services

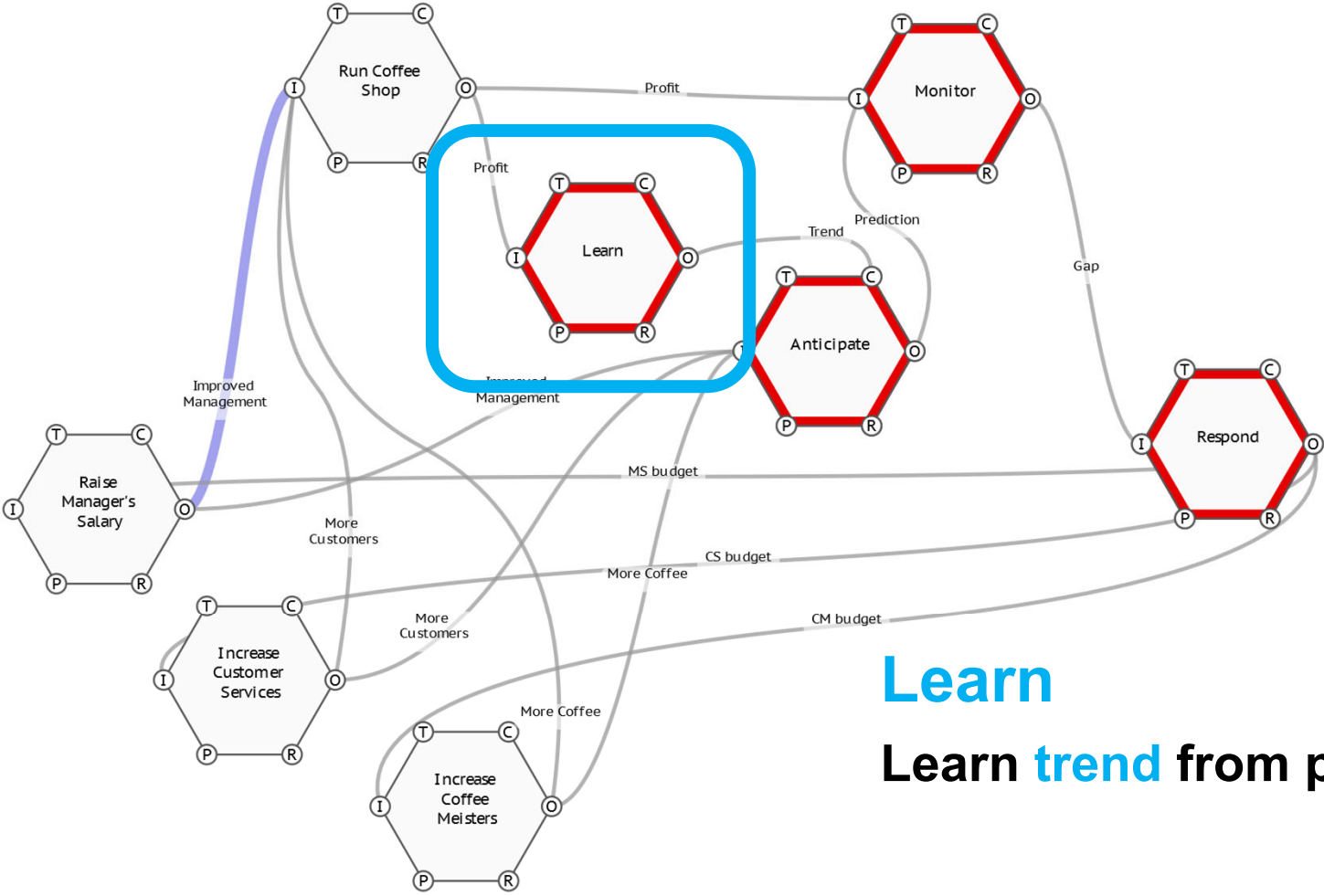# Stage 1: Build Domain Specific Part

Increase Coffee Meisters (CM)

More CM for more coffee and customer satisfaction

Stage 2: Add Machine Learning Feature

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Learn
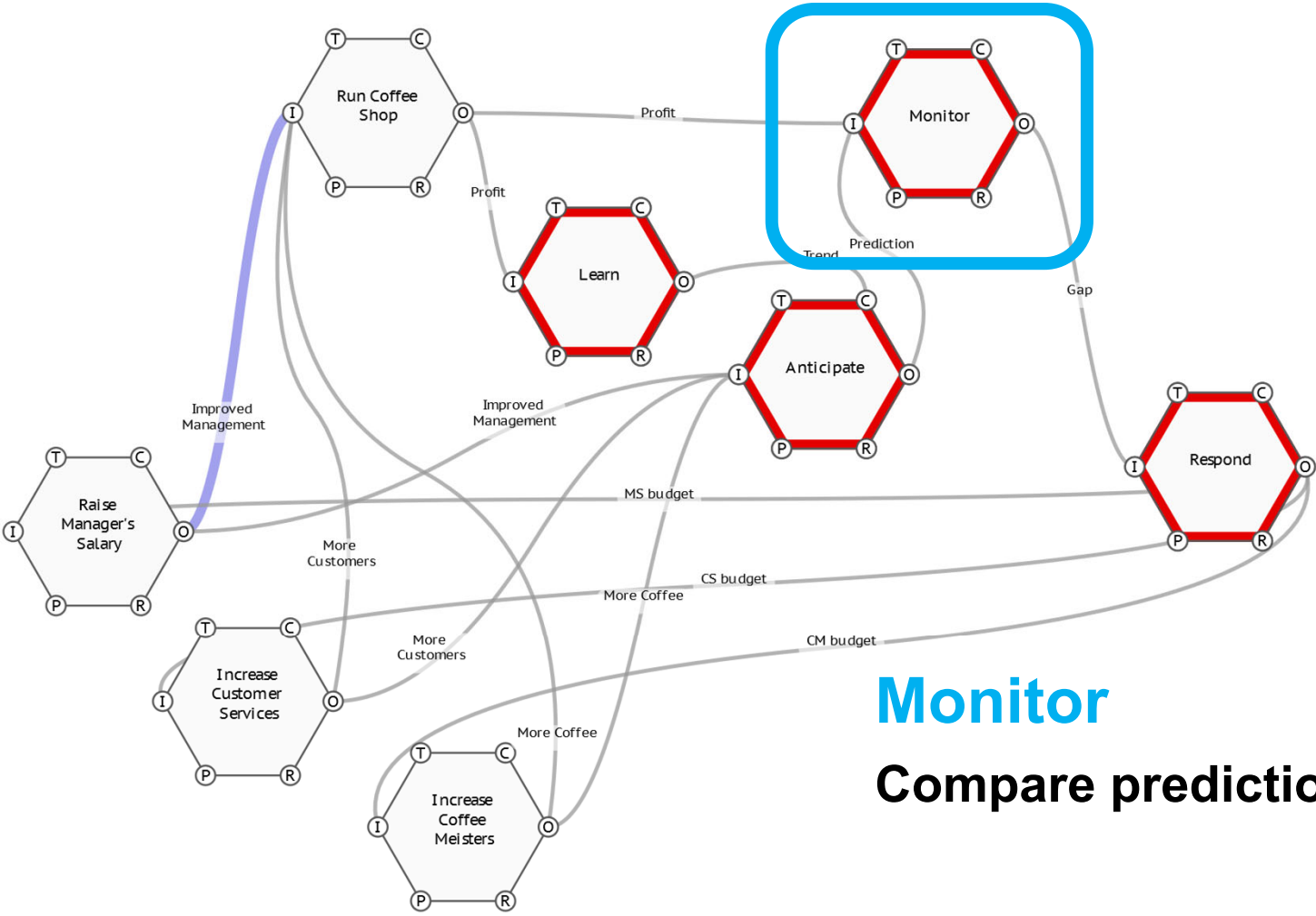
Learn trend from past record.

Stage 2: Add Machine Learning Feature
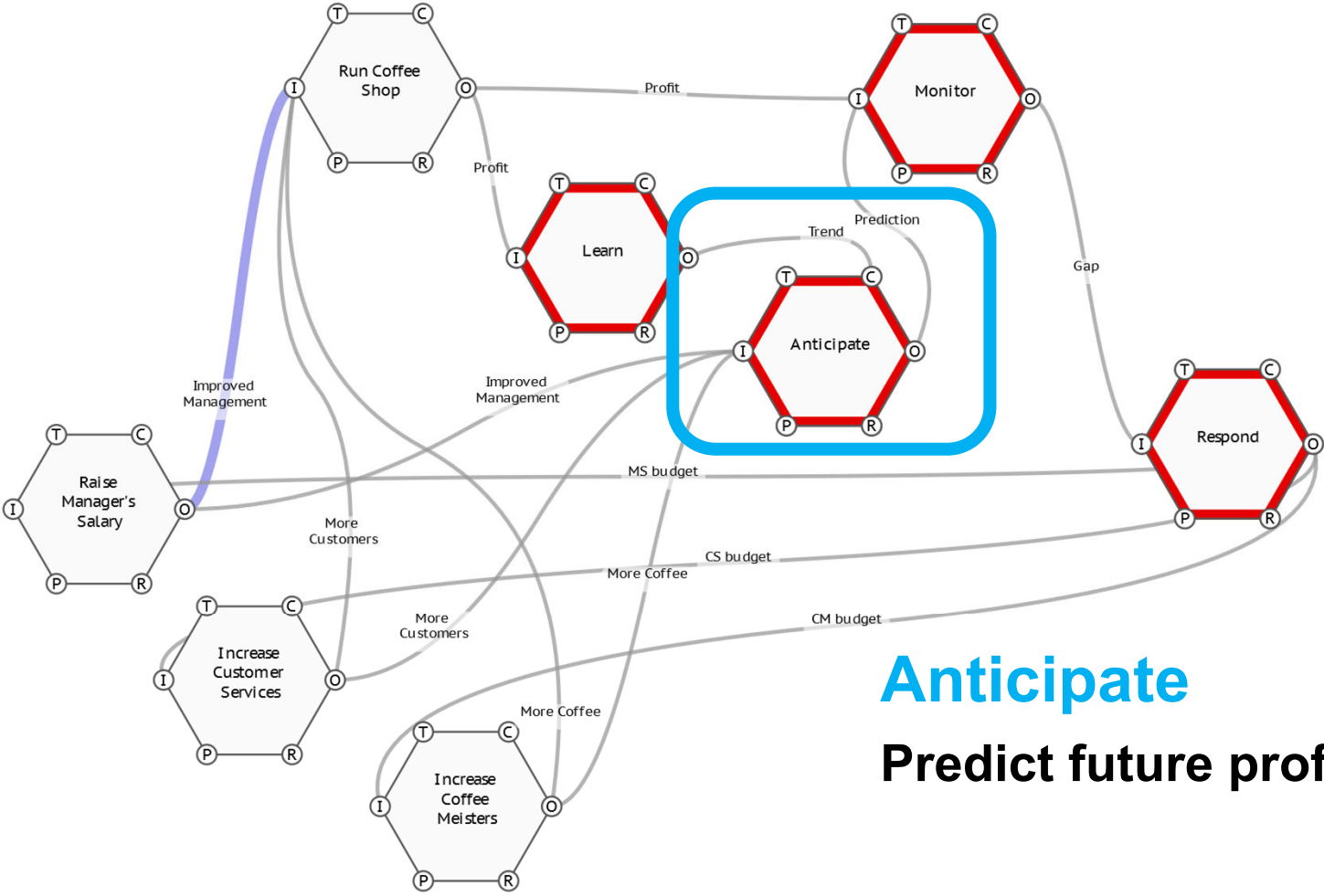
Anticipate

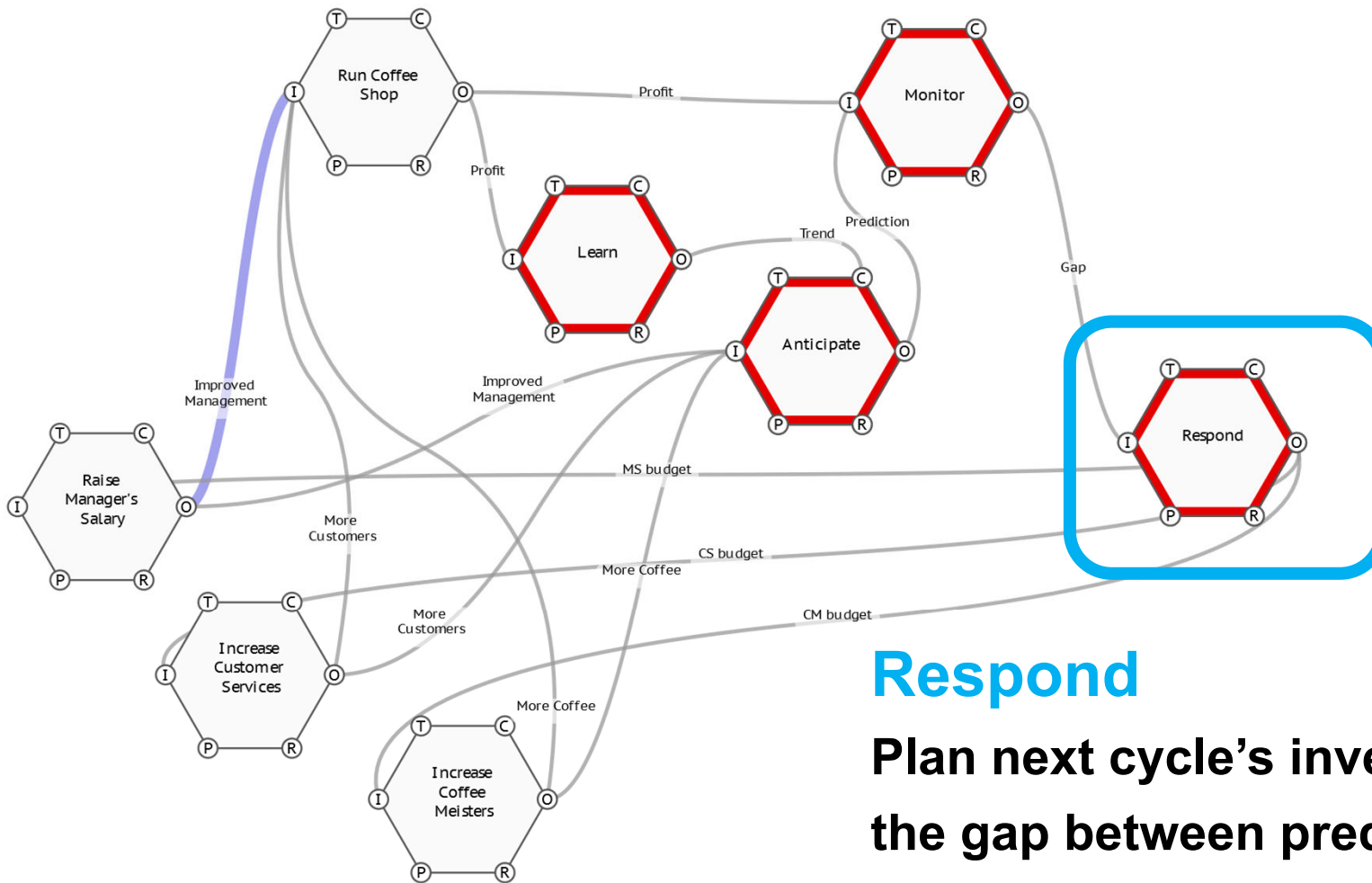Predict future profit from current Investments.

Stage 2: Add Machine Learning Feature

Monitor

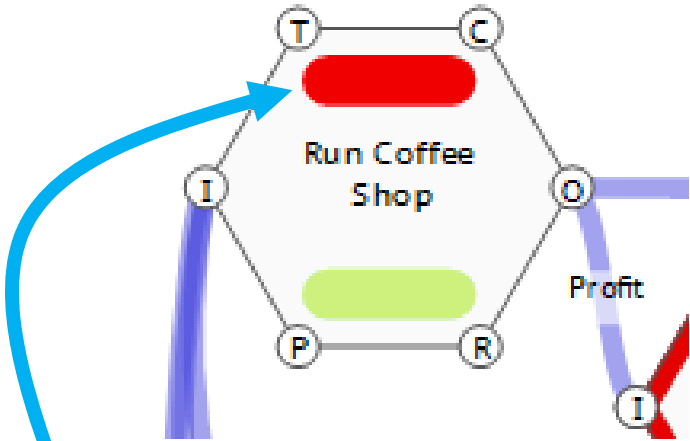**Compare prediction and the actual profit.**

Stage 2: Add Machine Learning Feature
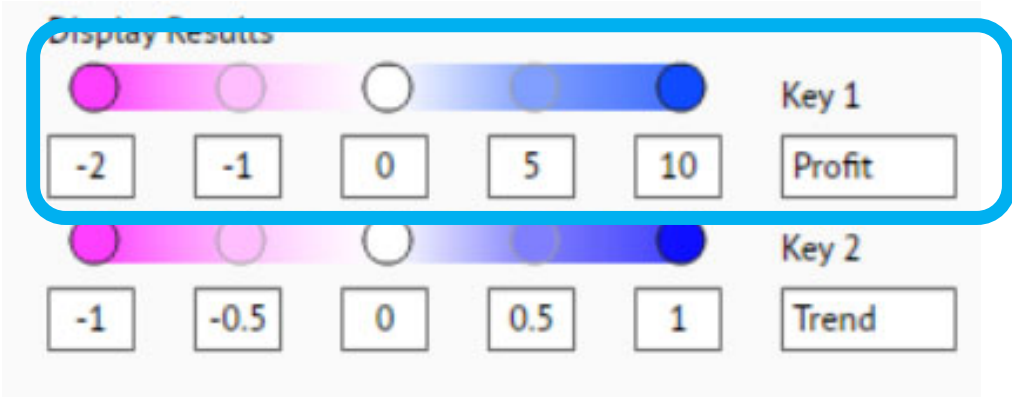

Respond

Plan next cycle's investments to compensate the gap between prediction and actual profit.
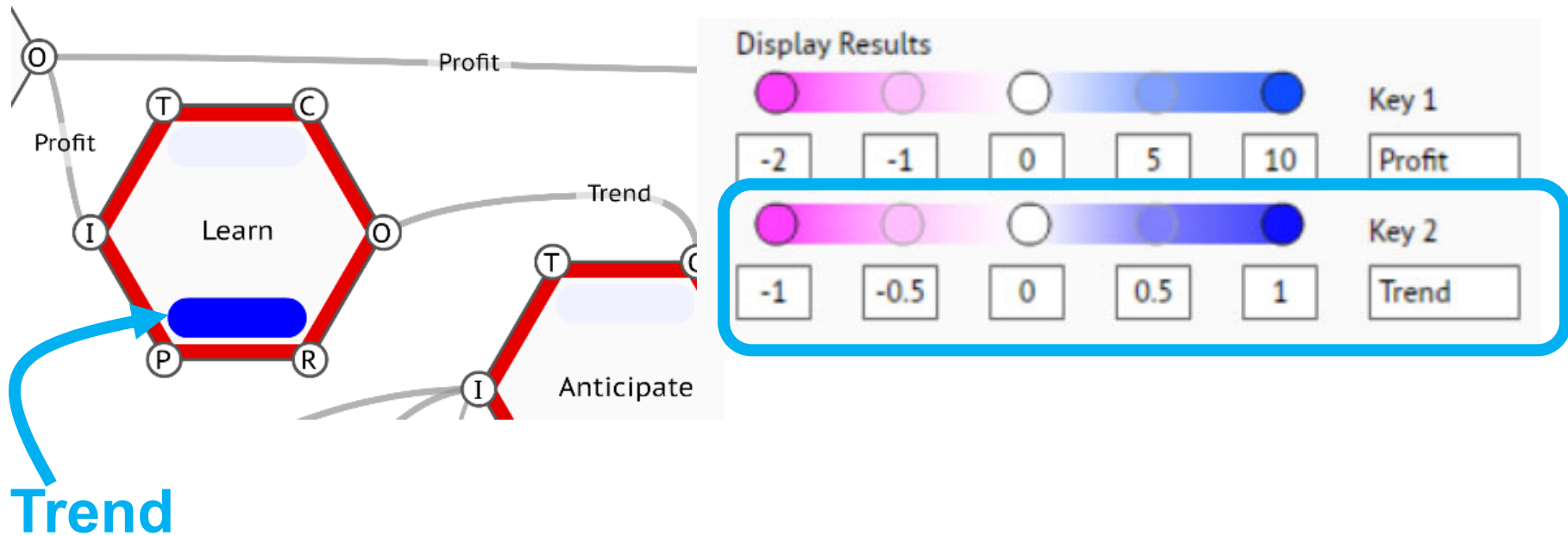
System Performance Indicator

Profit

"Profit" is shown by upper color to check system performance.

Blue color means positive profit.

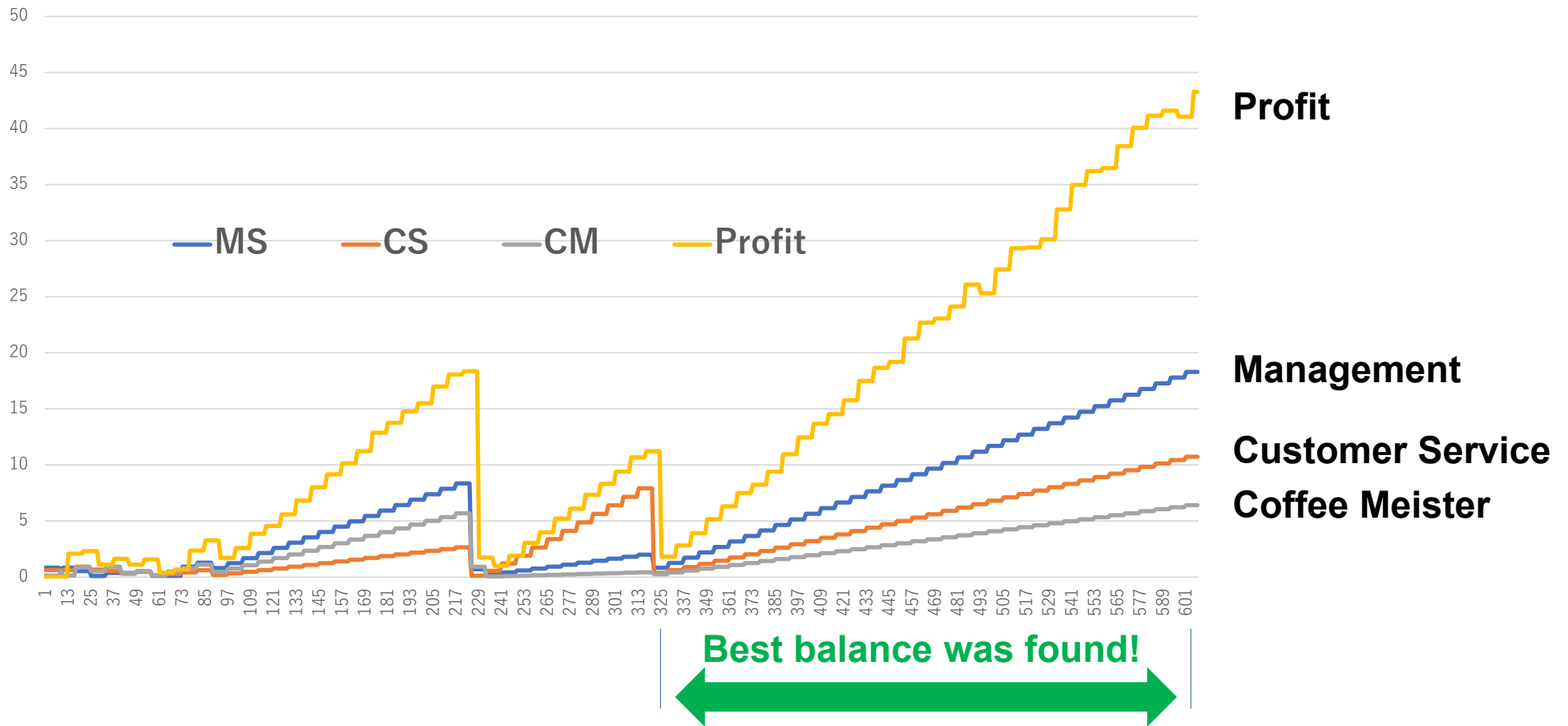# Learning Convergence indicator

Trend

"Trend" is shown by lower color to check convergence.

White color means profit has reached to high level in steady state (low gradient).

Demo

Result

Profit

Management

Customer Service

Coffee Meister

MS — CS — CM — Profit

Best balance was found!

Success Factor

> **Try & Error of setting a parameter "prediction rate" in "Anticipate" function was found to be the key for good convergence.**

Profit Prediction = (Total Investments) * 1.1

Conclusion

➤ **Adding Machine Learning feature is equivalent to adding Resilience feature to the system.**

➤ **Your FRAM model becomes a quantitative success factor finding machine.**