SET-BASED DESIGN OF VERIFICATION STRATEGIES

2019 Acquisition Research Symposium

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Grado Department of Industrial & Systems Engineering

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What is the HARDESTthing engineers do?

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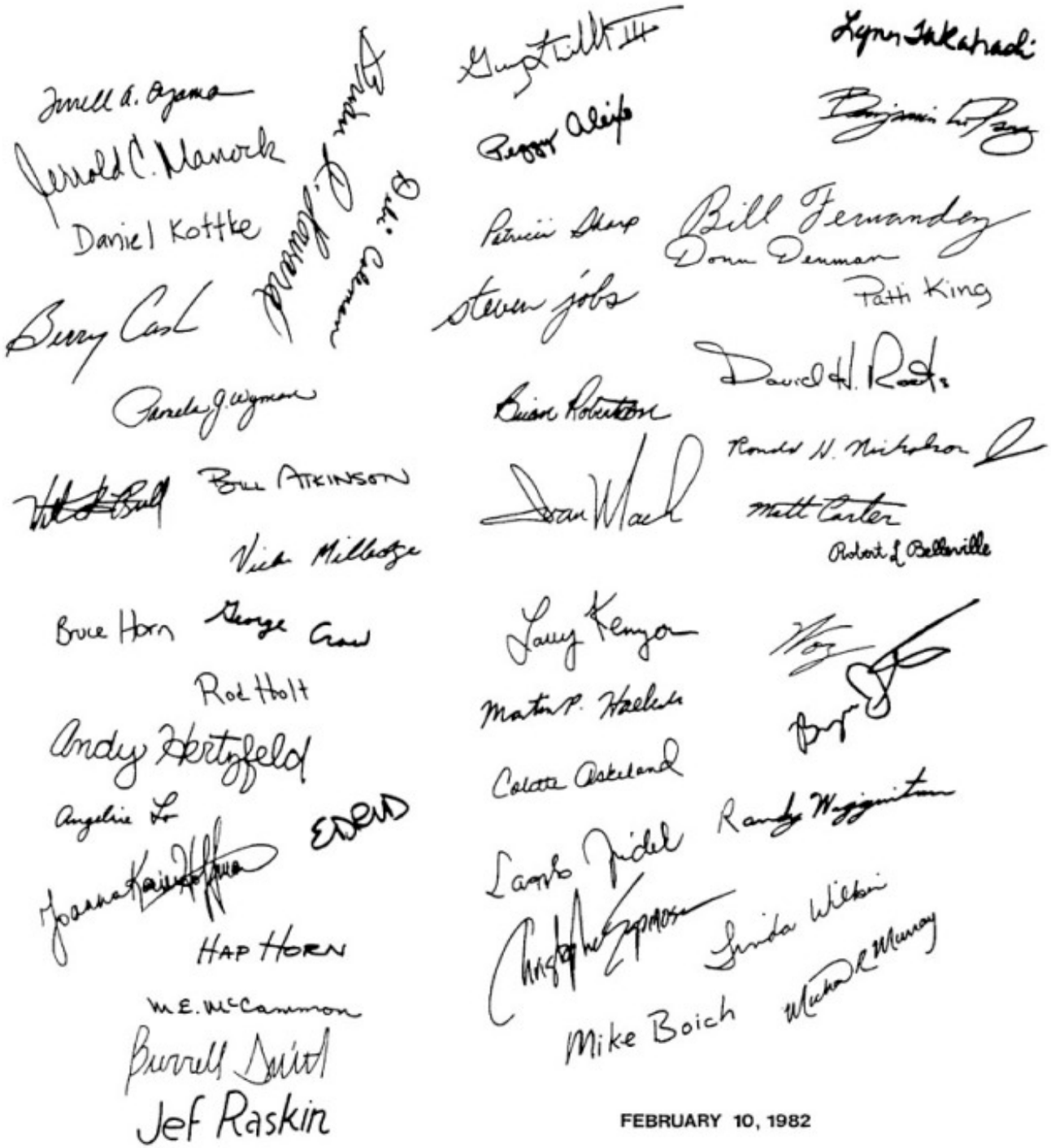

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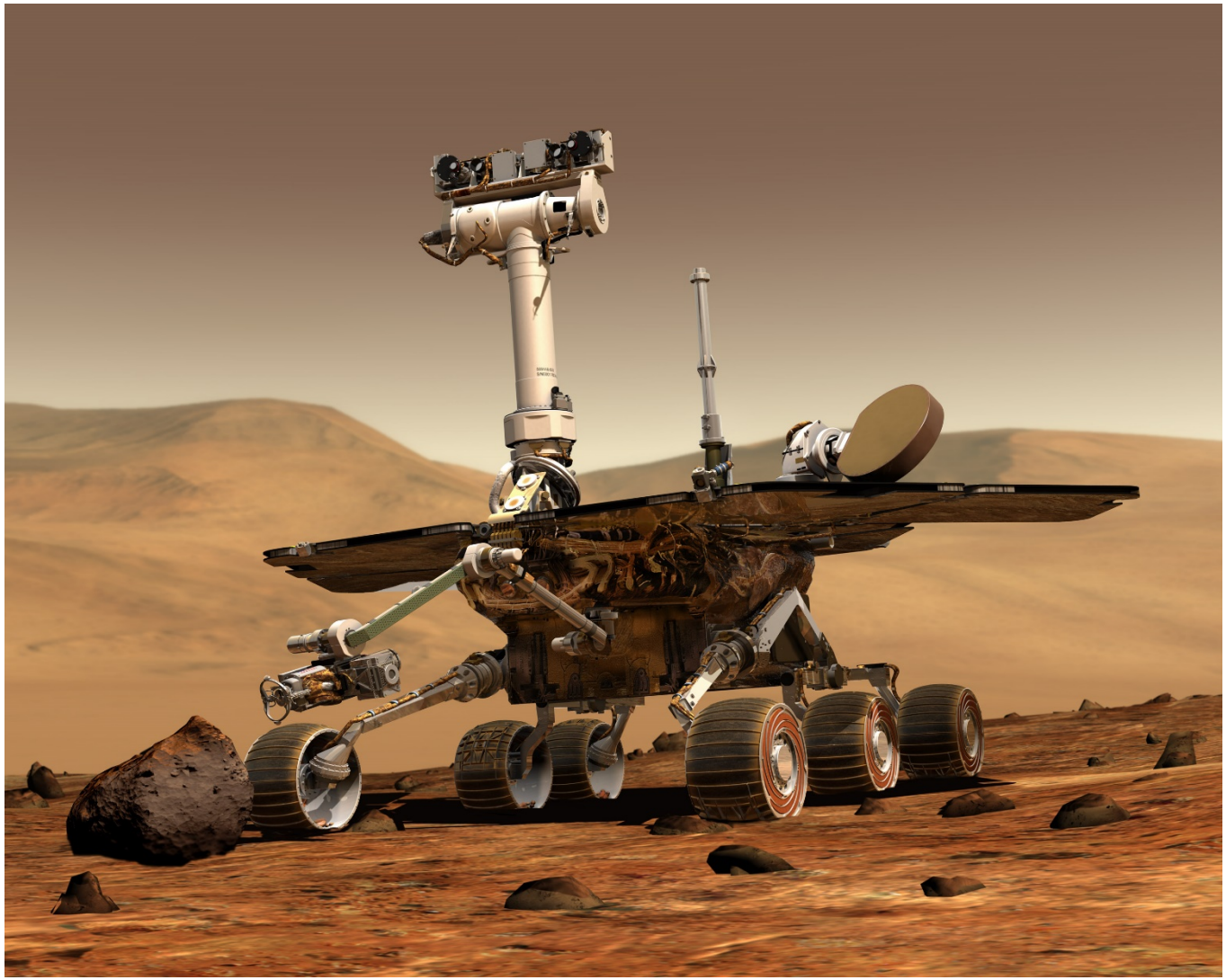

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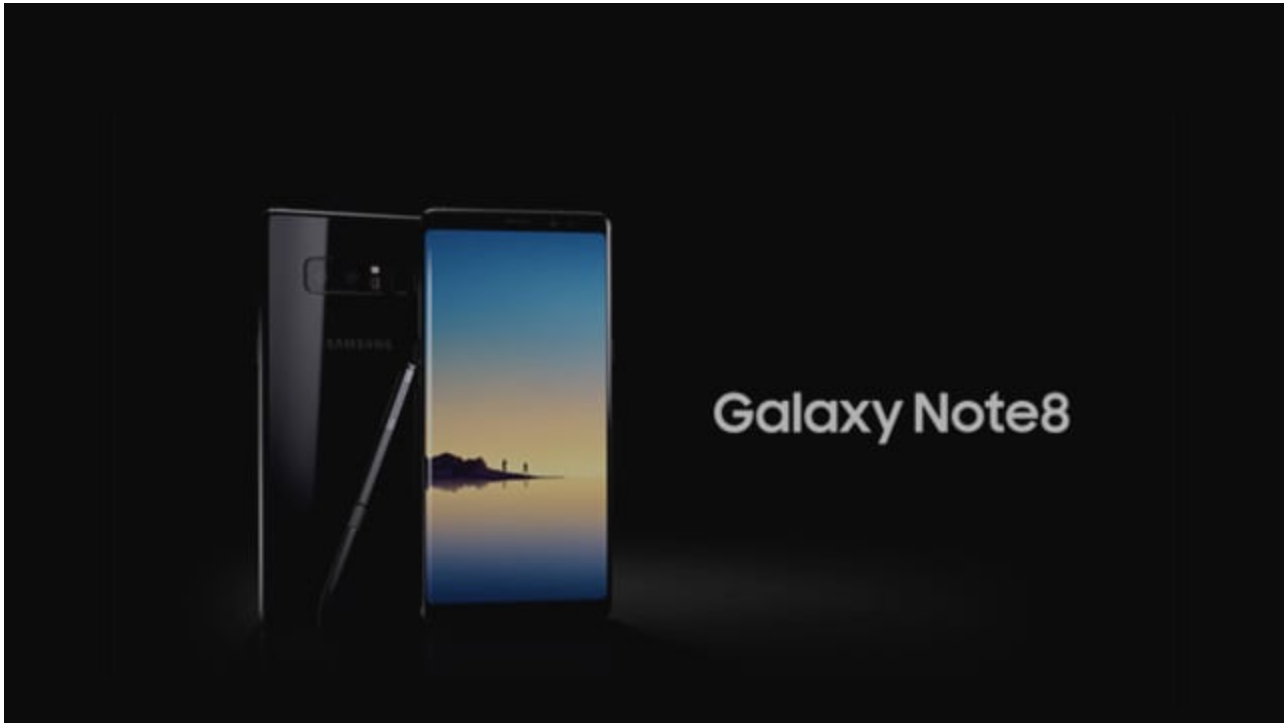

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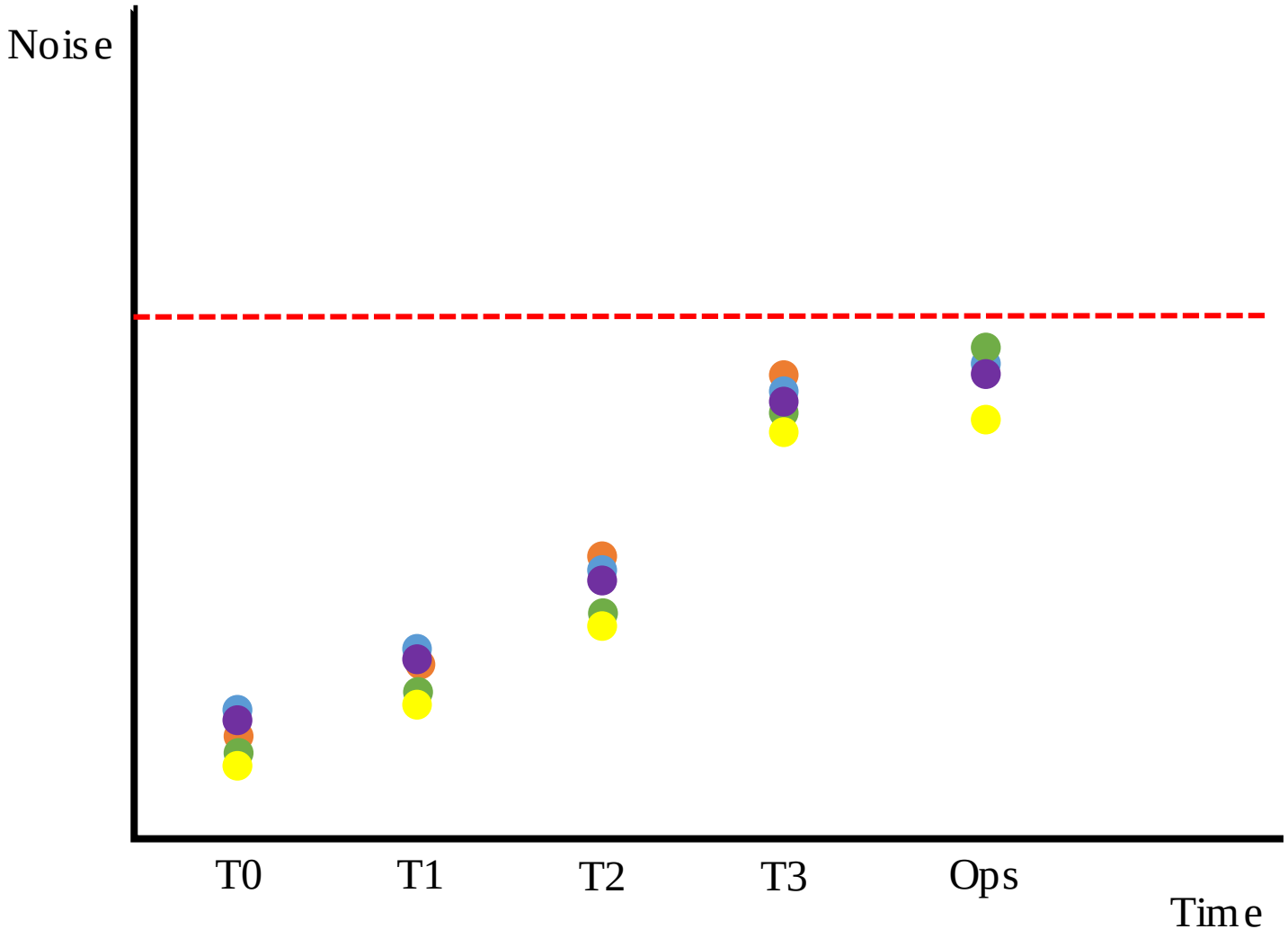

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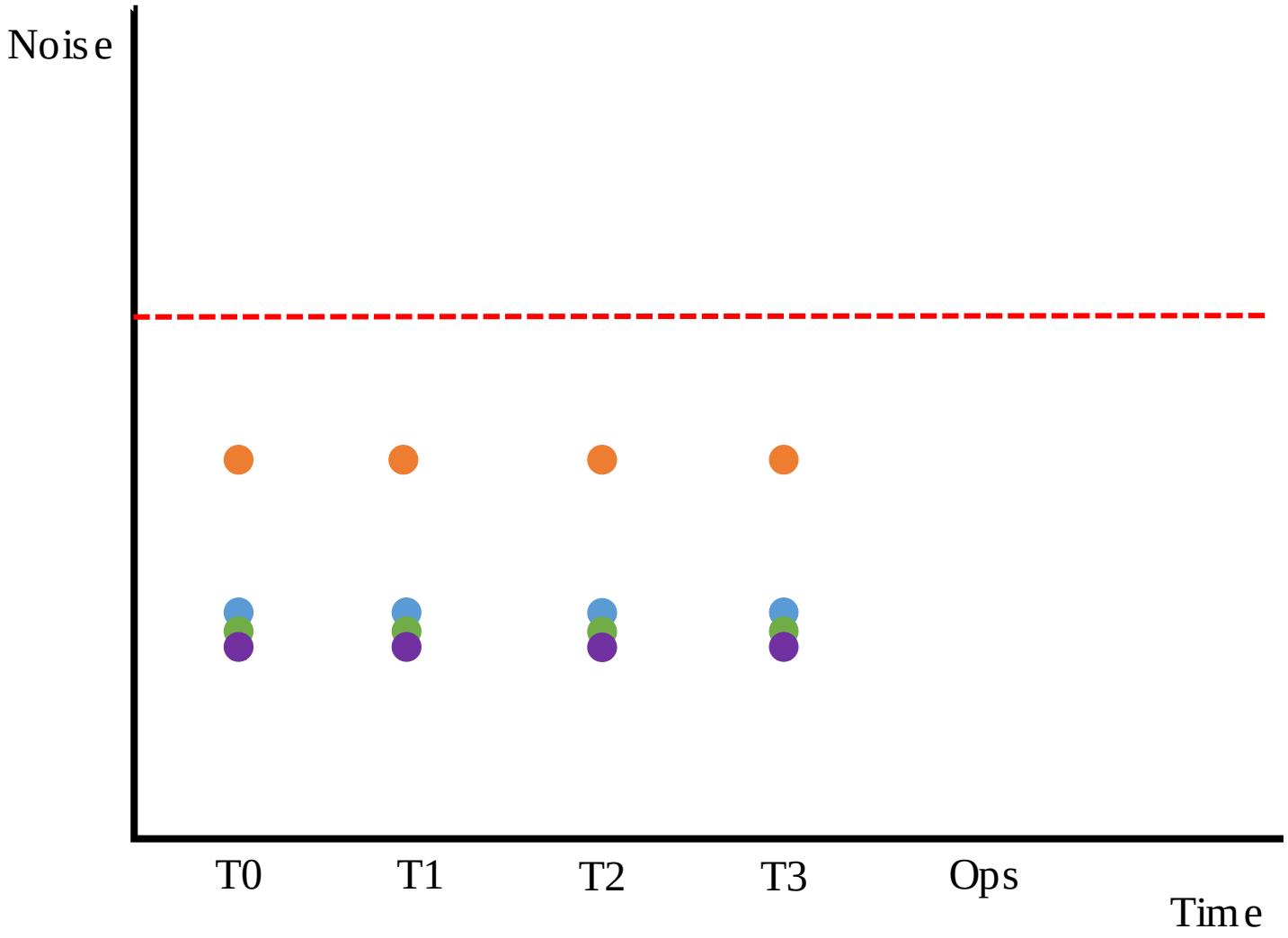

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A verification activity is objective.

The confidence we gain is not.

Verification is not objective.

Verification is an agreement.

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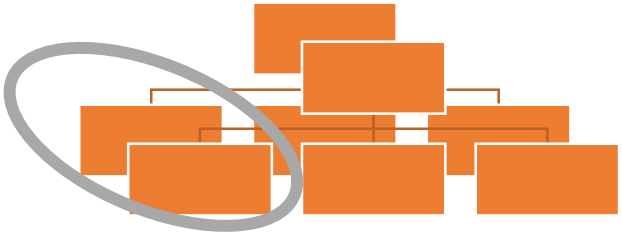
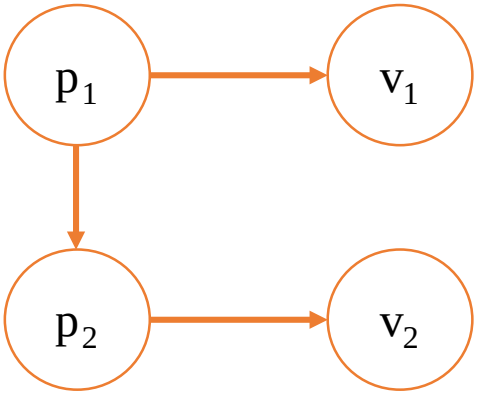
p_1: physical properties of model

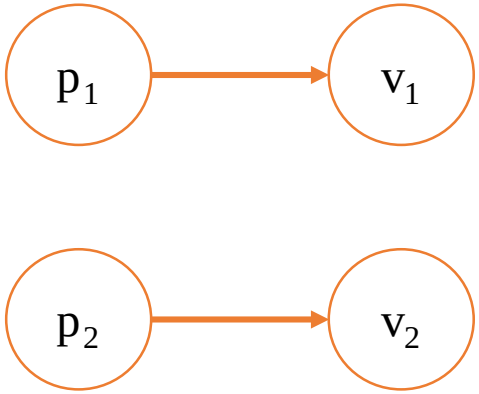
p_2: mass of final product

v_1: estimated mass with model

v_2: measured mass of final product







$$P(p_2 \mid v_1) \neq P(p_2)$$

$$P(p_2 \mid v_1, v_2) = P(p_2 \mid v_2)$$

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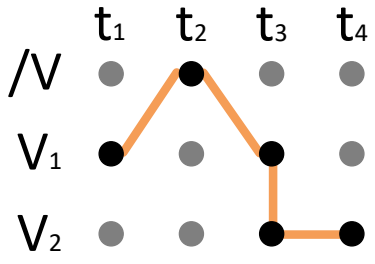
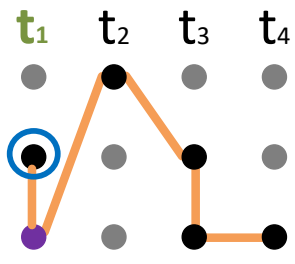
Current paradigm



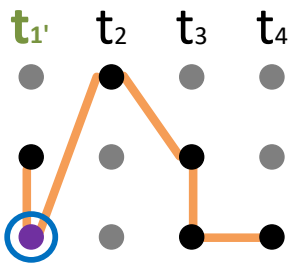
This is the **optimal** strategy, agreed upon contractual signature.

$C_{original} = \Sigma C_{black\ dots}$



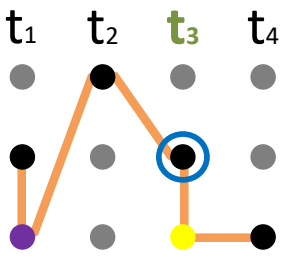
Circled activity showed **low margin**. Unplanned purple activity needs to be added through **CR**.

$C_{final} = C_{original} + \Delta_{purple}$



Circled activity showed **nominal margin**. No change to strategy.

$C_{final} = C_{original} + \Delta_{purple}$



Circled activity showed **ample margin**. Yellow activity provides no value, but it is executed.

$C_{final} = C_{original} + \Delta_{purple}$

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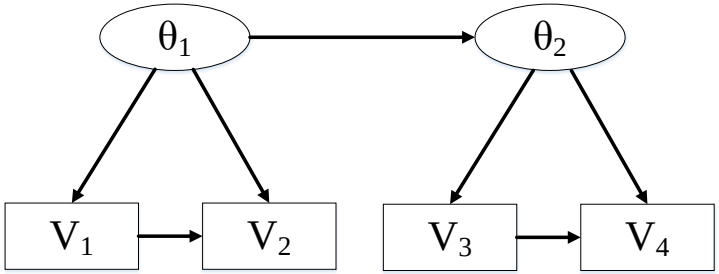

$$E\left[C_T\left(S\right)\right]=\sum_{V\in\mathbf{V}}C_V\left(V\right)+\sum_{k=1}^{o}\sum_{j=1}^{n}\sum_{v\in L\left(T_j\right)}P\left(v\right)P(\theta_{jk}\,|\,v)\delta\left(\theta_{jk}\,|\,v\right)C_R\left(\theta_{jk}\right)+\sum_{k=1}^{o}\sum_{v\in\mathbf{V}^*}P\left(v\right)P\left(\theta_k=e\,|\,v\right)C_I\left(\theta_k=\mathrm{e}\right)$$

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STEP 1 Determine optimal verification strategy at Time 1.

STEP 2 Choose first (timewise) verification activity (or subset of verification activities).

STEP 3 Execute activity and update Bayesian network.

STEP 4 Determine optimal remaining verification strategy and return to Step 2.

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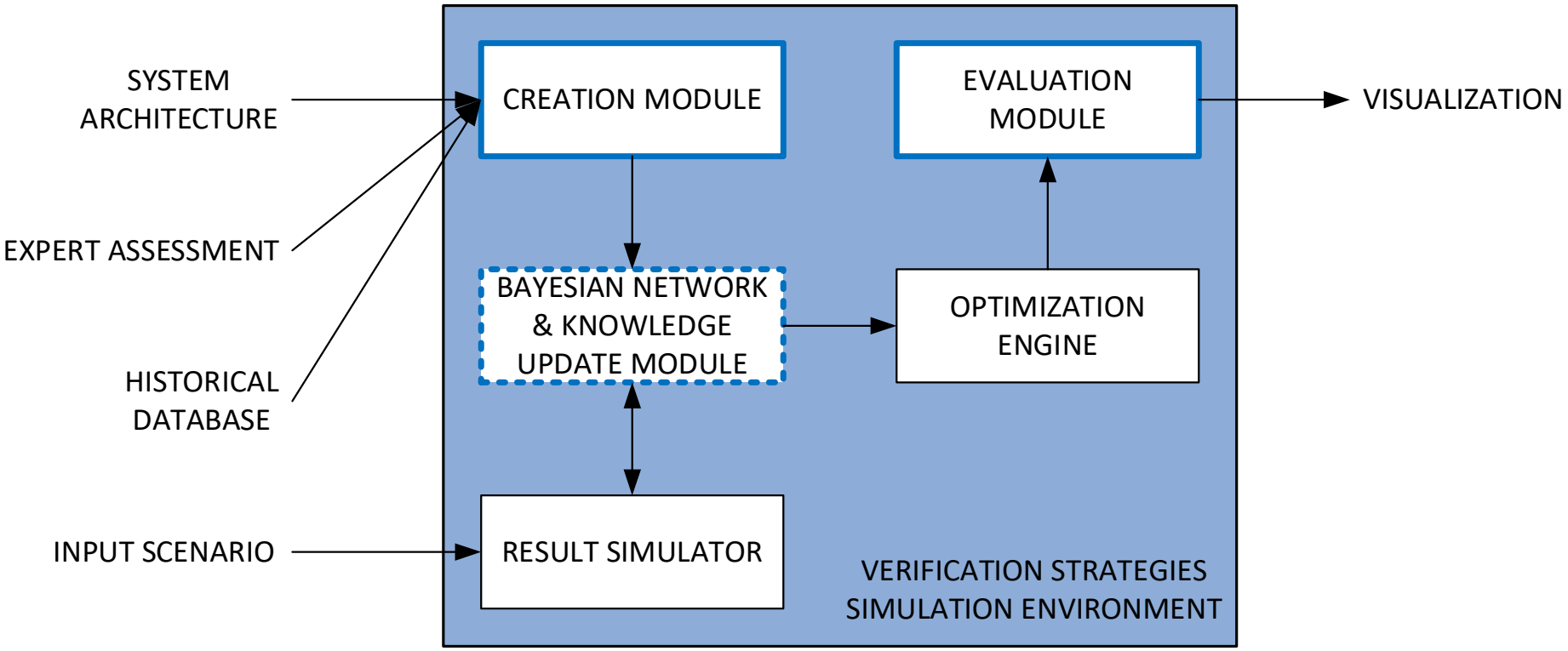

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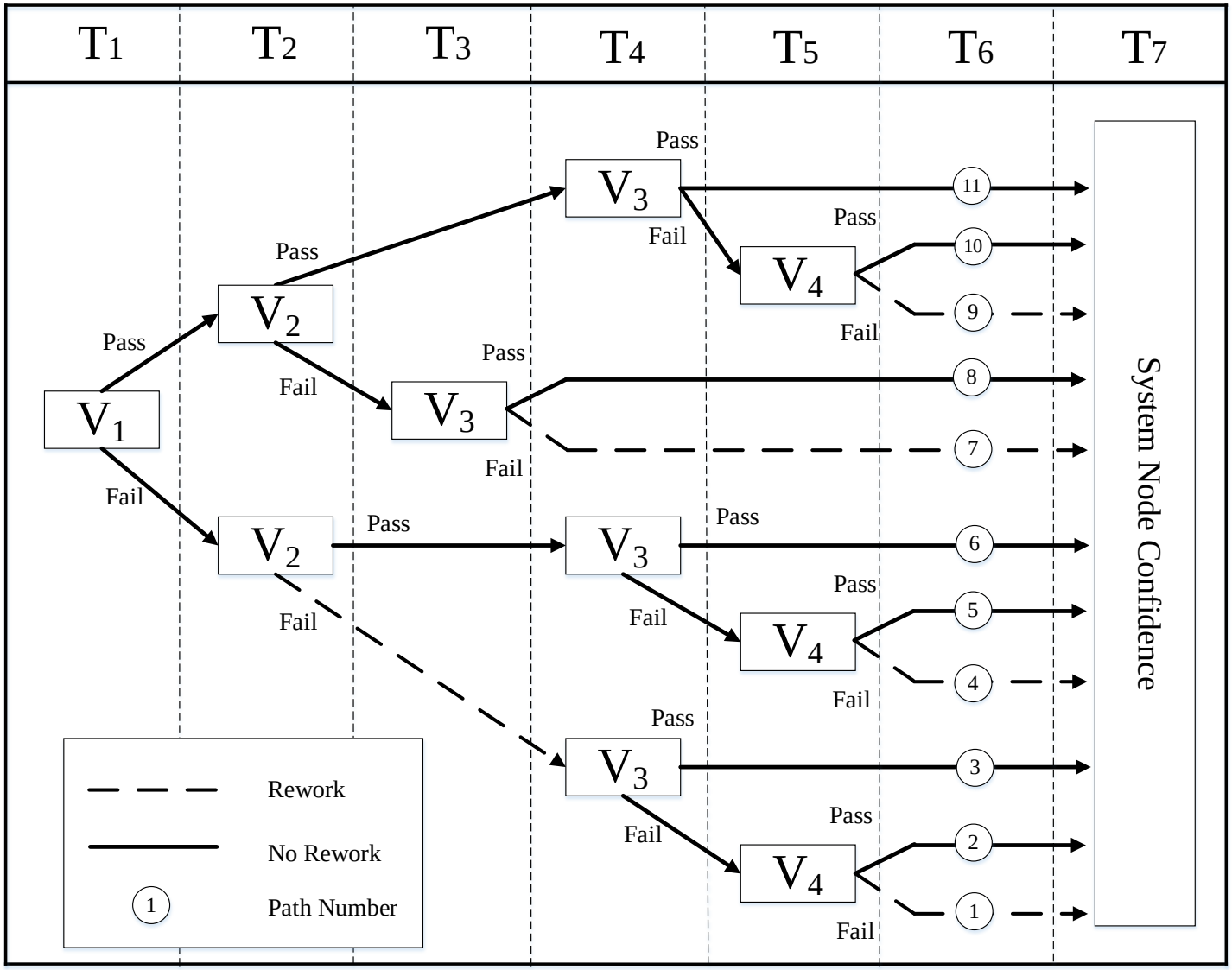

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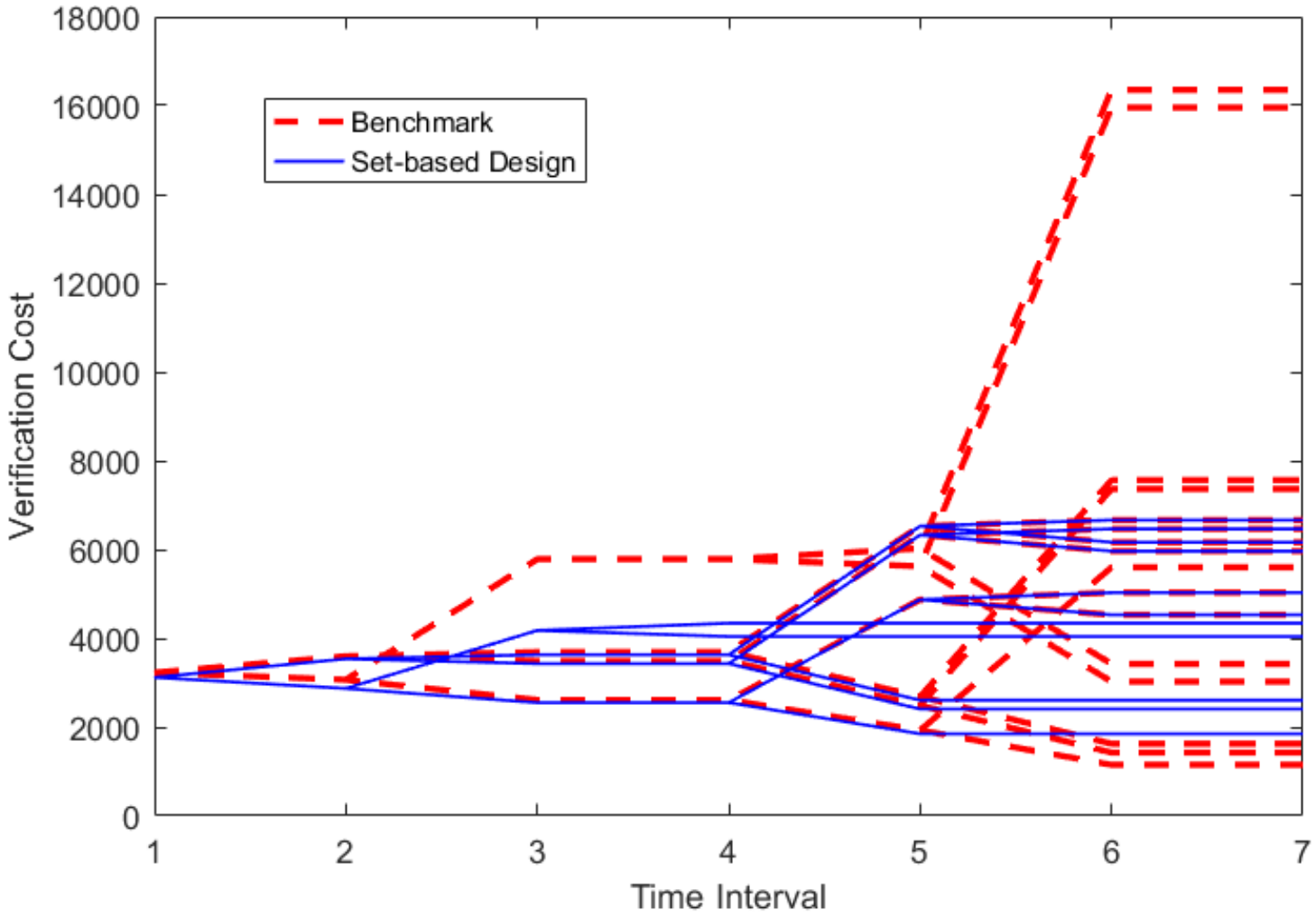

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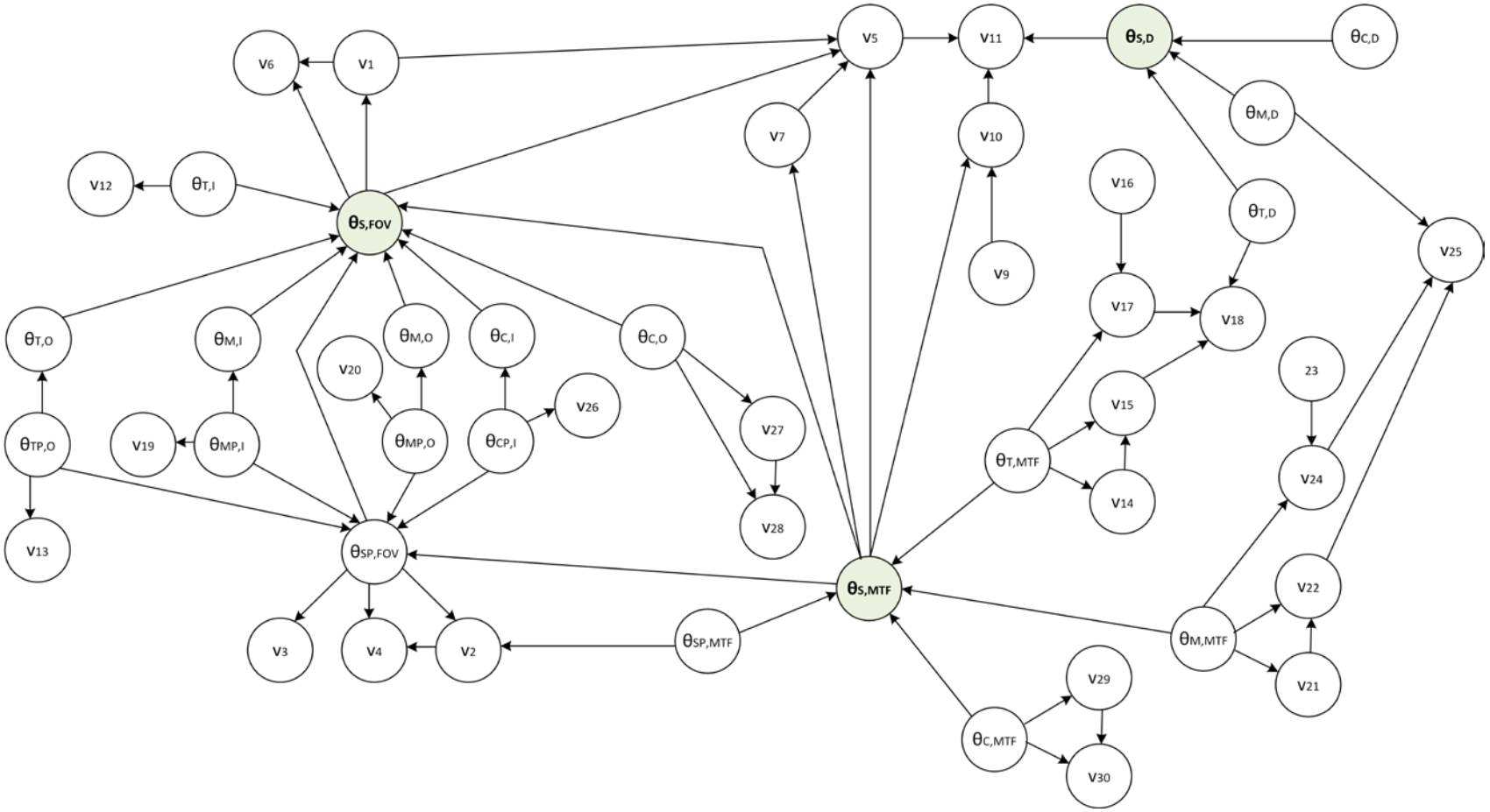

Currently working on this…

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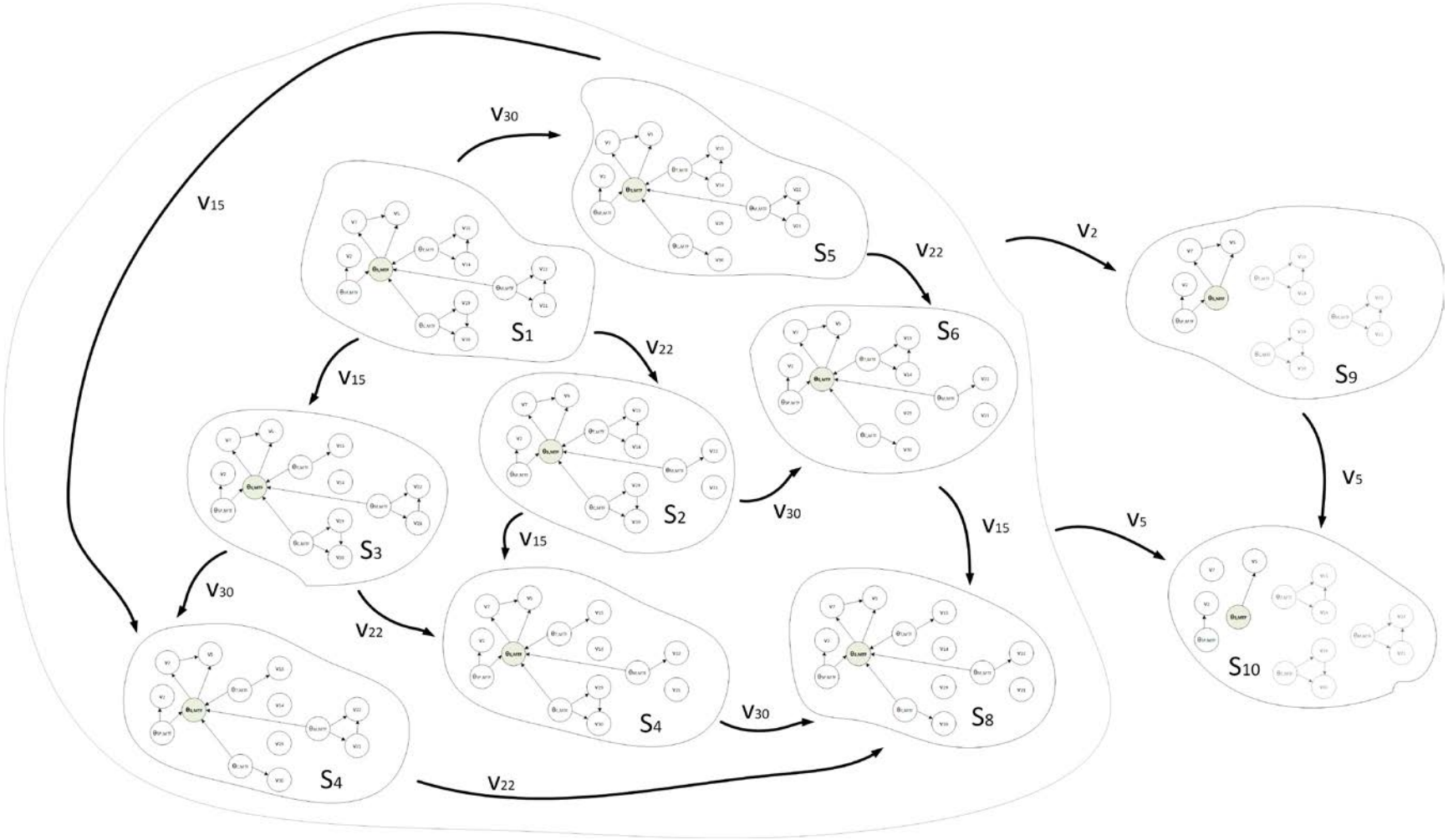

Planning to work on this…

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WRAPPINGUP

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CONTRACTING
verification activities must be

Dynamic

Adjusted after results

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