Predicting FHWA Metrics for TAMP

Southeastern States Pavement Association Conference – October 2019

THE KERCHER GROUP

Agenda

- Brief Introduction and Background
- What's the problem?
- How can we fix it?

23 CFR 490 - Targets

Intro

- 4 Year Cycle Performance Periods
- 3 reports per cycle:
  - Baseline Report
  - Mid Performance Progress Report
  - Full Progress Report

  - Gap analysis in TAMP

§ 490.107 Reporting on Performance Targets – State DOTs

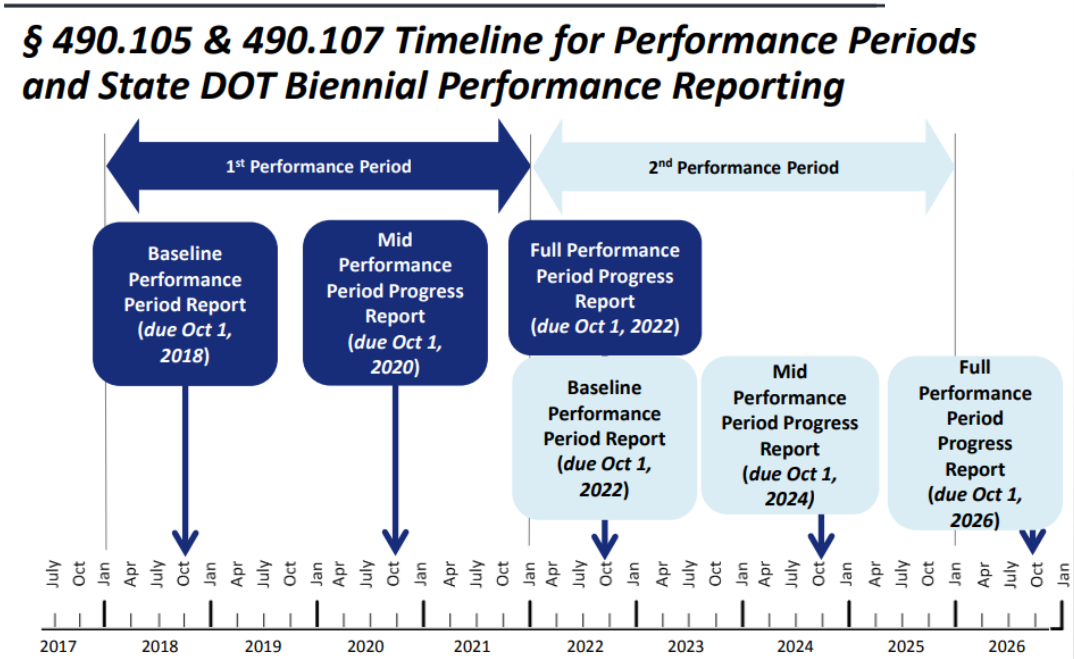
- Baseline Performance Period Report:
  - Baseline condition/performance;
  - 2- and 4-year targets; etc.
- Mid Performance Period Progress Report:
  - 2-year condition/performance;
  - 2-year progress in achieving performance targets;
  - Adjusted 4-year targets (optional);
  - Investment strategy discussion; etc.
- Full Performance Period Progress Report:
  - 4-year condition/performance;
  - 4-year progress in achieving performance targets;
  - Investment Strategy discussion; etc.

(https://www.fhwa.dot.gov/tpm/rule/170531pm2.pdf)

23 CFR 490 - Targets

Intro

- Report every 2 years



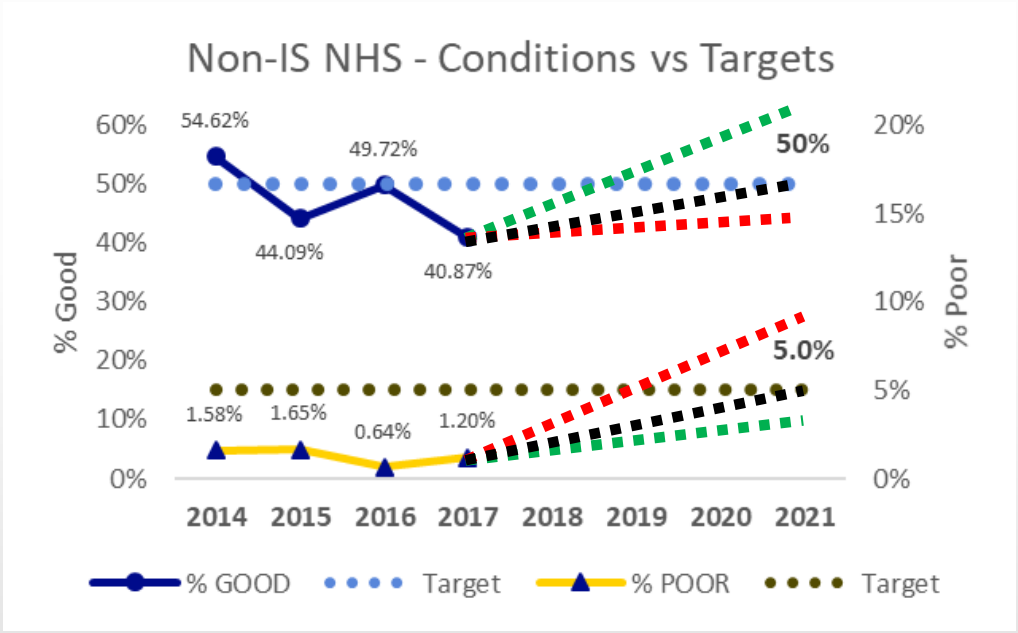
(https://www.fhwa.dot.gov/tpm/rule/170531pm2.pdf)

MAP-21/FAST Act requirements

Intro

- Historical Data
- Targets
- Gap Analysis (delta)

- Setting Targets, and Gap Analysis relies on Metric Projections
  - On target?
  - Better?
  - Worse?



Source: WVDOH Initial TAMP

Presentation Objectives

Intro

Problem

- Describe how sectioning in a pavement network can affect the reporting of federal performance measures

Solution

- Show how an agency can use its current pavement management system to project federal performance measures at the 1/10th mile level

Uses

- Discuss how this allows States to use optimized, PMS generated, mixes of fixes, for whatever scenarios they wish to analyze

Projection of Federal Metrics

The Problem

- Need to predict where we will be in 2, 4, 10 years…

  …based on the Federal Metrics

- So given a Workplan of future treatments (from any specific investment strategy)…

  …what are those Federal Metric values going to be?

Geographical Dependency

The Problem

- The problem is that Pavement Management operates at a management section level
  – with measures *per management section*

- There is **no guarantee of correlation** between management section metrics and federal metrics because

  Poor's and Good's need to line up

Example of Geographic Dependence

The Problem

Comparison of Two States

The Problem

- Opposite correlations
- Huge difference in scale

State 1	TPM Statistics		
% Good			
	Actual	**Average Estimate**	**Distribution Estimate (Max Coincidence)**
Non-Interstate NHS	59.75%	62.47%	62.62%
Interstate	54.73%	63.44%	63.07%
% Poor			
	Actual	**Average Estimate**	**Distribution Estimate (Max Coincidence)**
Non-Interstate NHS	1.21%	1.18%	1.48%
Interstate	0.84%	0.55%	1.18%

State 2	TPM Statistics	
% Good		
	Actual	**Average Estimate**
Non-Interstate NHS	49.86%	47.87%
Interstate	59.19%	58.44%
% Poor		
	Actual	**Average Estimate**
Non-Interstate NHS	1.09%	0.30%
Interstate	1.30%	0.37%

- Correlation is clearly unpredictable

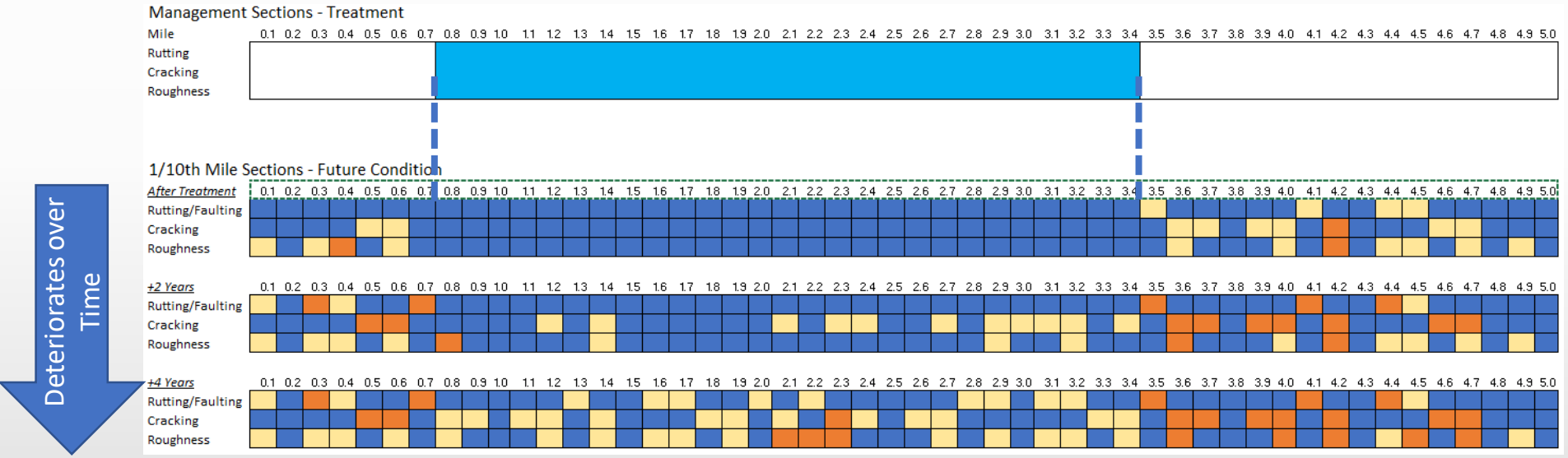
So what's the Solution?

Solution

- At least Two Options:
  - Run optimization analysis at 1/10th mile level
    - Report projected Federal Metrics and set/revise Targets
      - Very time consuming
      - Non-practical resulting projects
  - Run optimization using normal management sections, using your own state performance measures
    - Overlay resulting workplan on 1/10th mile segments and project
    - Report projected Federal Metrics and set/revise Targets
      - No change to normal process
      - Accurate federal Metric projections

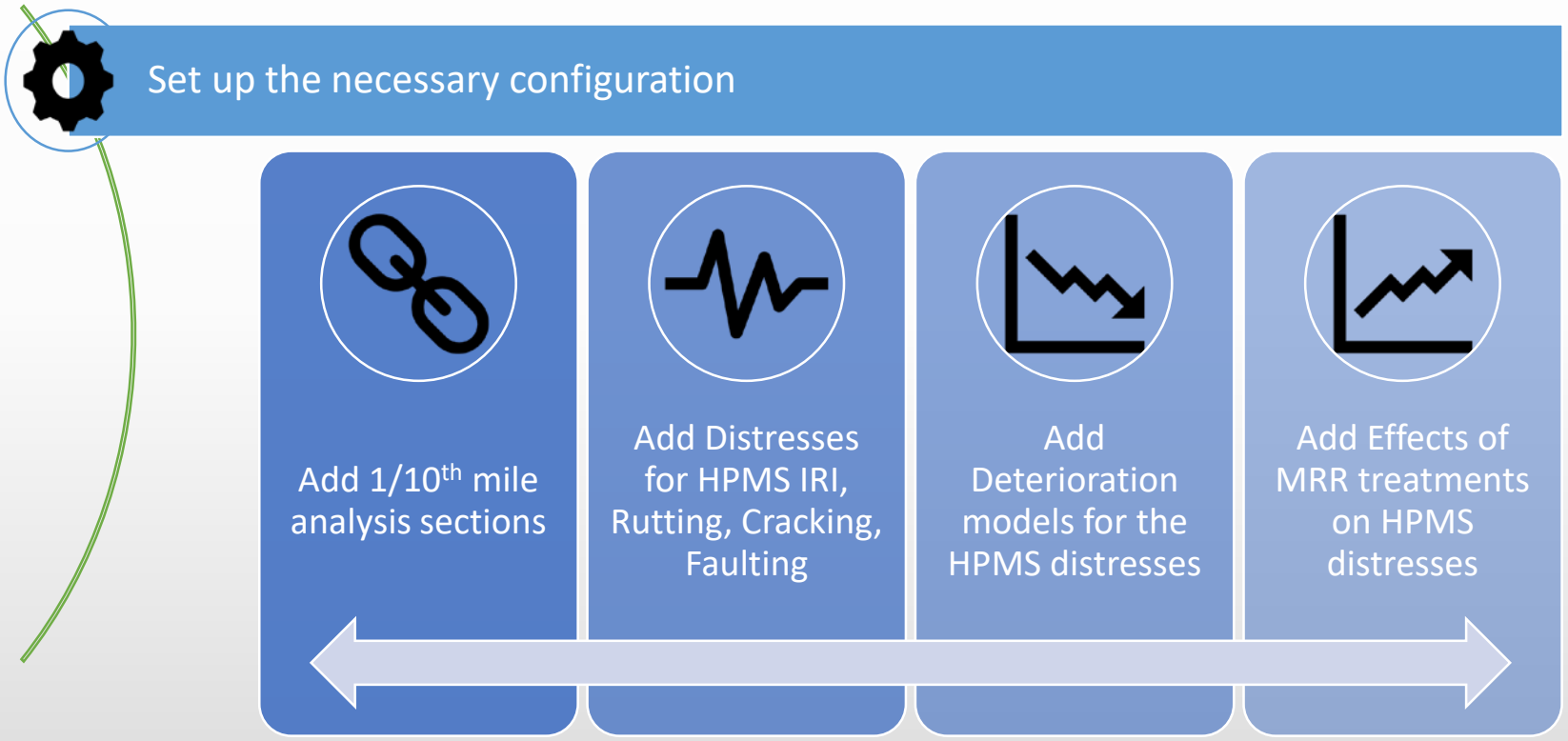
Manage normally – Overlay Workplan

Solution



Steps to Address the Problem

Solution



Steps to Address the Problem

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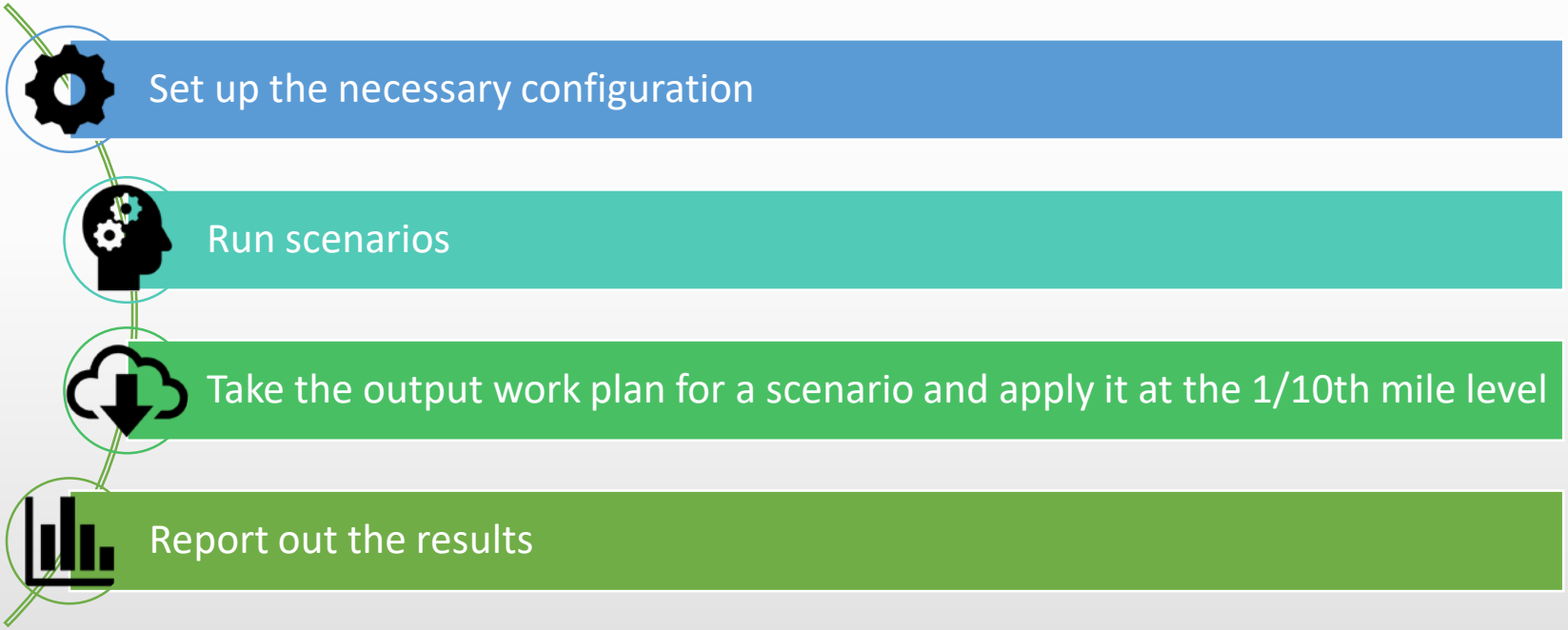
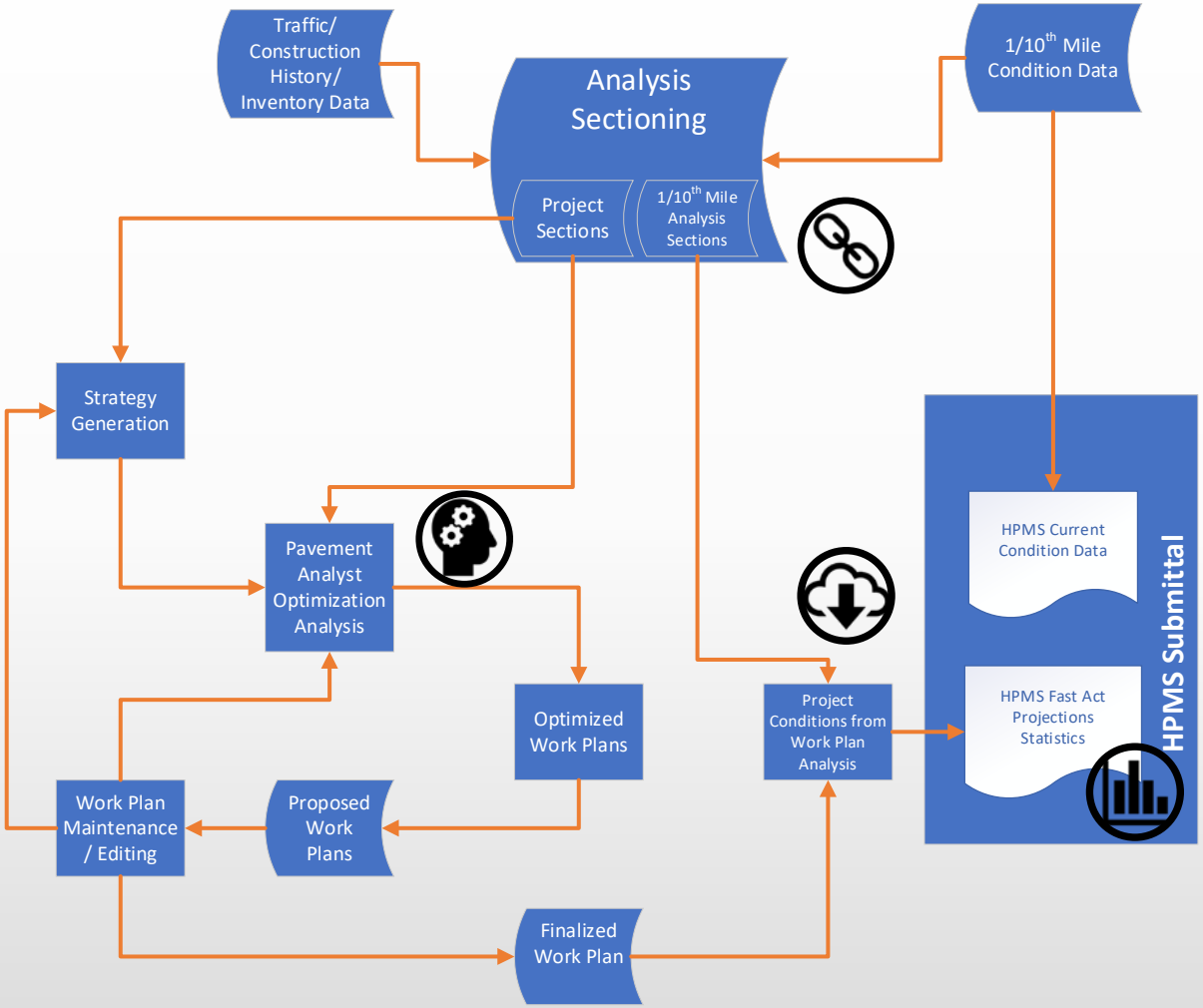


Workflow

Solution

- Additional Configuration
- Additional HPMS distress modeling



Optimization at Management Section Level

Solution

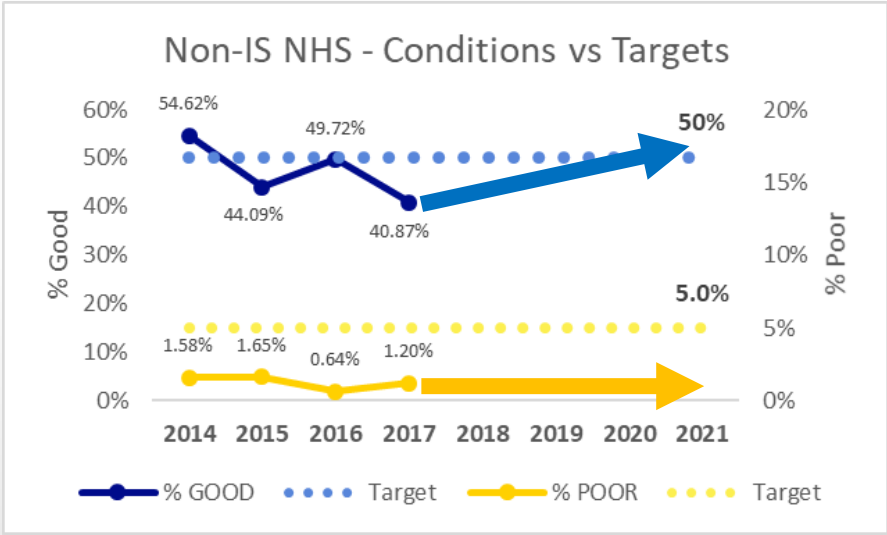
- A number of states have already implemented this method

- Benefits:
  - Modeling the system, including the distribution AND the geographical dependency
  - Process can just be added to the end – no major changes to agency's current process
  - Independent of the Software Vendor

Caveats

Solution

- Cannot use the Federal Metric Targets as objective function (unless running whole optimization at 1/10th mile)
- But can still test out any number of Investment Strategies
- Can also use 'real' optimization to set and hit targets with maximum efficiency and savings

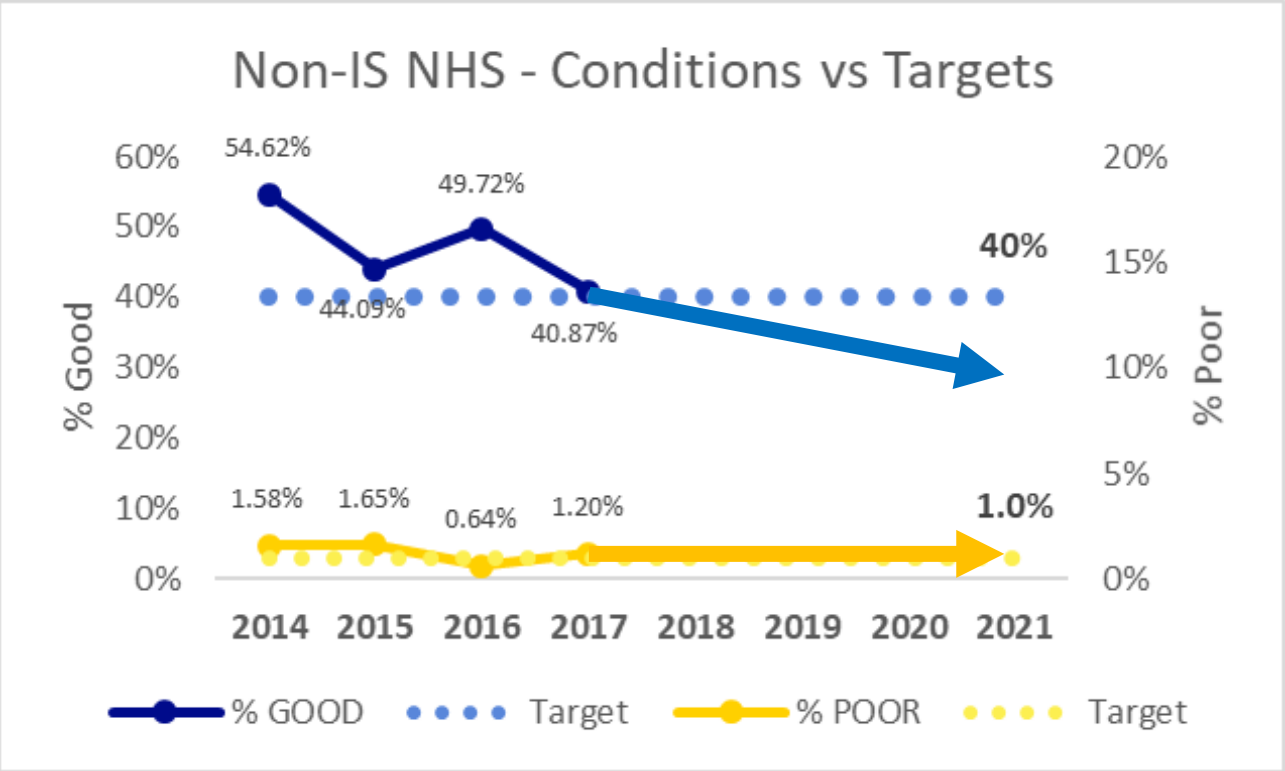


Source: WVDOH Initial TAMP

PMS in Target Setting

Solution

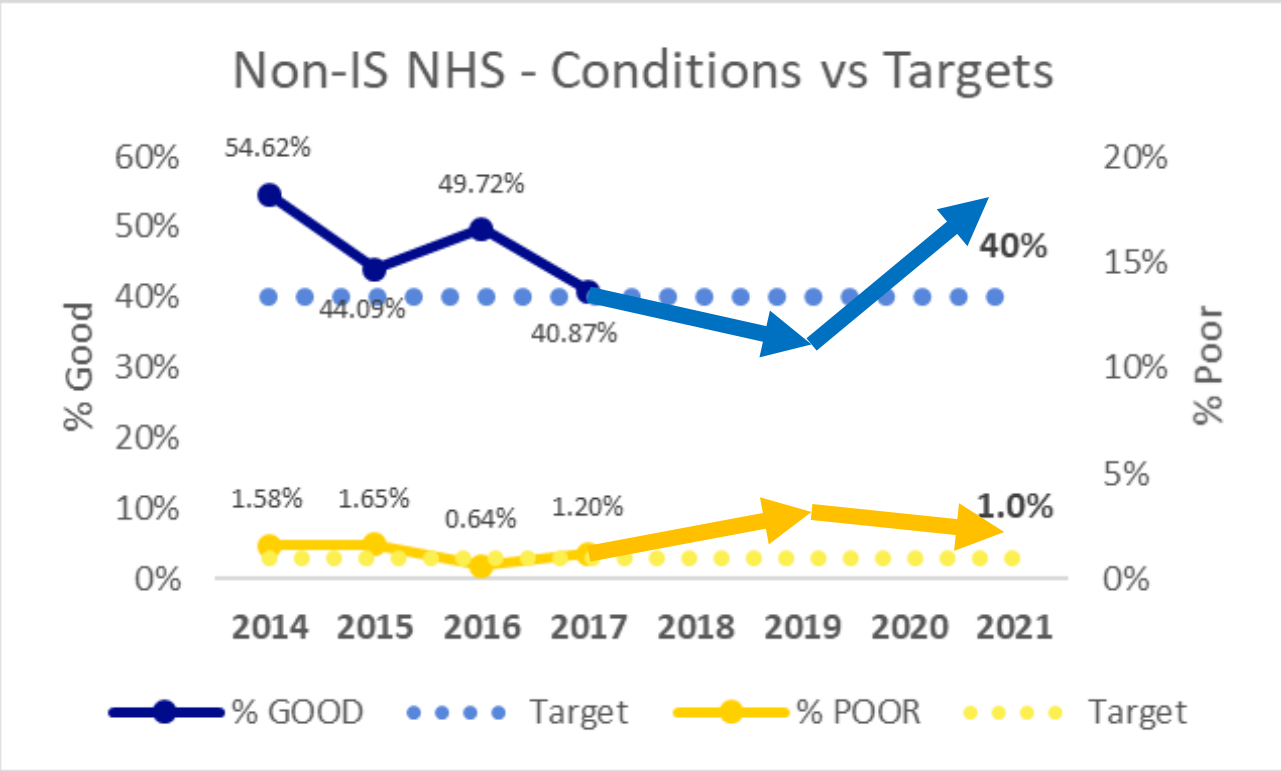
- Scenario 1: Specific Funding stream



PMS in Target Setting

Solution

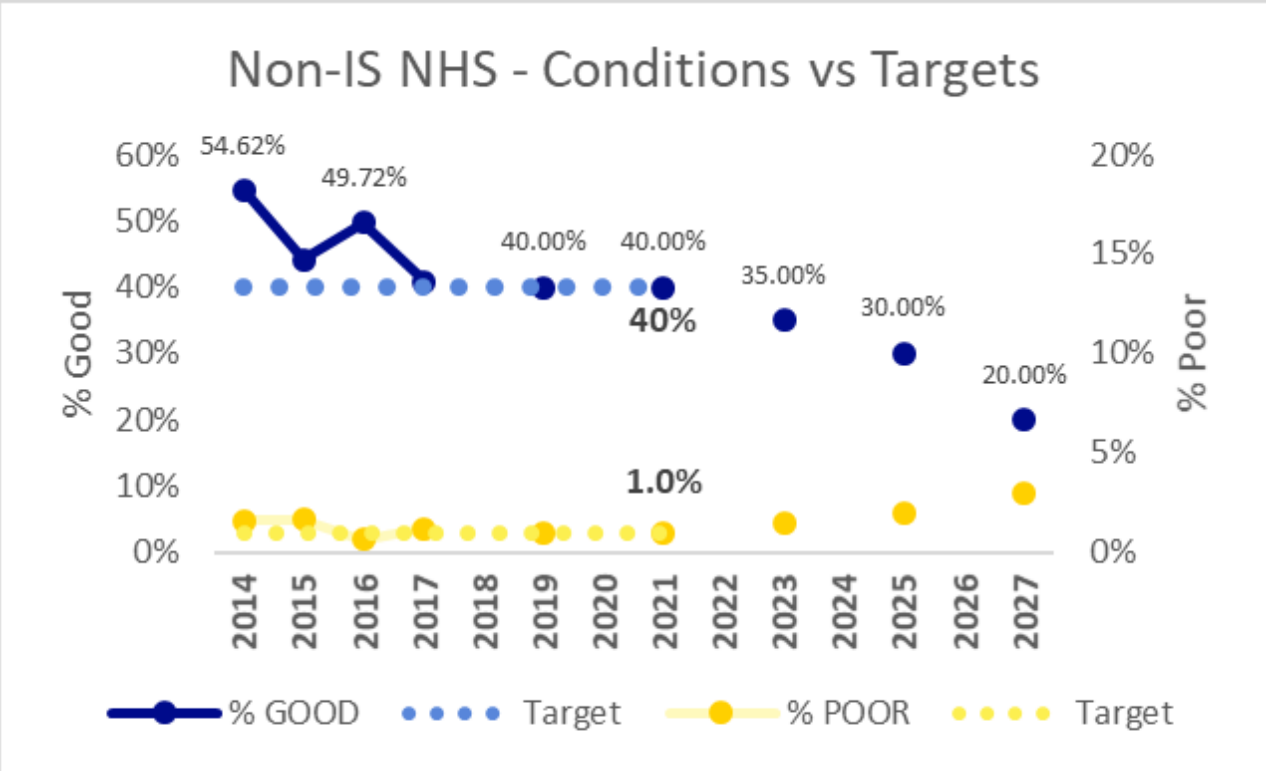
- Scenario 2 : Different Funding stream
- May still be optimum to get worse before you get better



PMS in Target Setting

Solution

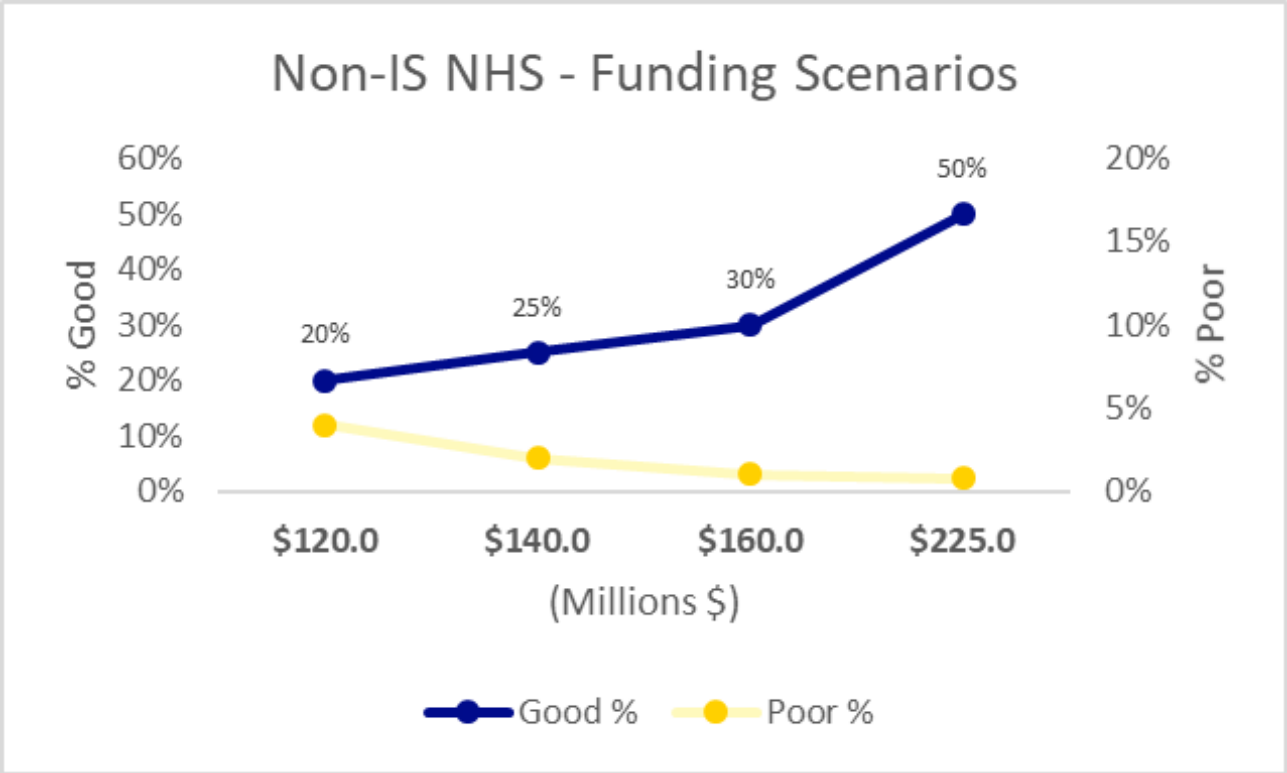
- Scenario 3 : Different Funding stream
- Also want to be able to predict the long term



Multiple Scenarios

Solution

- Average Funding Scenarios



Conclusions

Solution

- Really important to be able to predict Federal Metrics at the 1/10th mile level so you can:
  - Still optimize your solutions for a specific scenario, but
  - Set realistic Targets, and
  - Accurately assess Gaps

- Correlation may work, but managing ‘normally’, and then modeling the system at the 1/10th mile level is relatively easy and seems like a better way

- Has the advantage of agencies keeping their existing measures, metrics and goals, but allowing projection of Federal Metrics for reporting purposes

Questions? Contact details?

Q&A

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