Google

The Case of the Misnamed Cities

CAST Analysis of a Google Maps Incident

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MIT STAMP Workshop, 2025-03-25

Agenda

- The Incident
- RCA
- CAST
- RCA vs CAST
- Takeaways

The Incident

March 25th, 2025

reddit

r/GoogleMaps • 8 mo. ago

Why is Google Maps showing "(balance)" next to some cities and referring to them as metro areas?

Here is a screenshot of what I'm talking about. Never seen this until today. A glitch?

25 8 Share

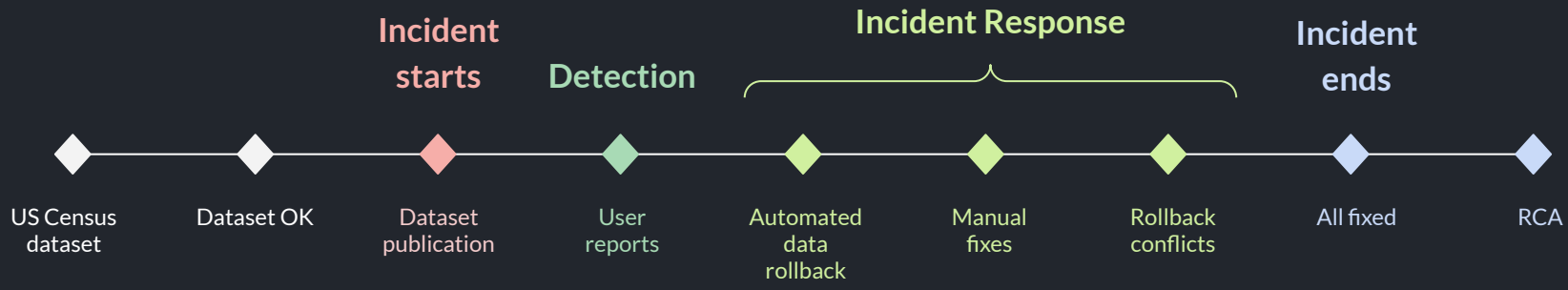






Google

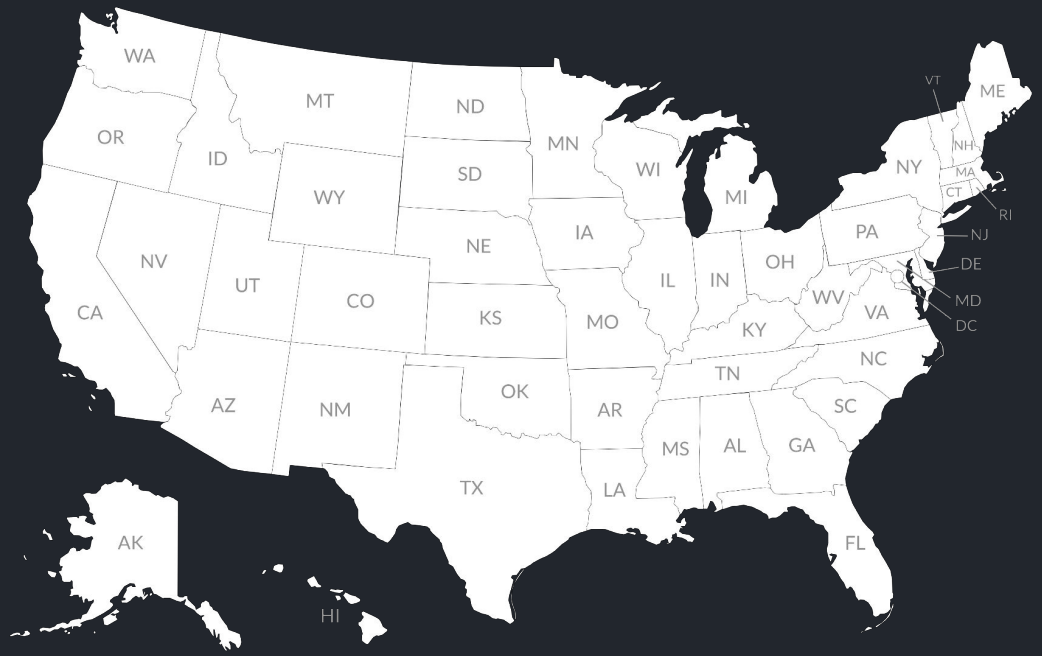
Order of Events



Root Cause Analysis

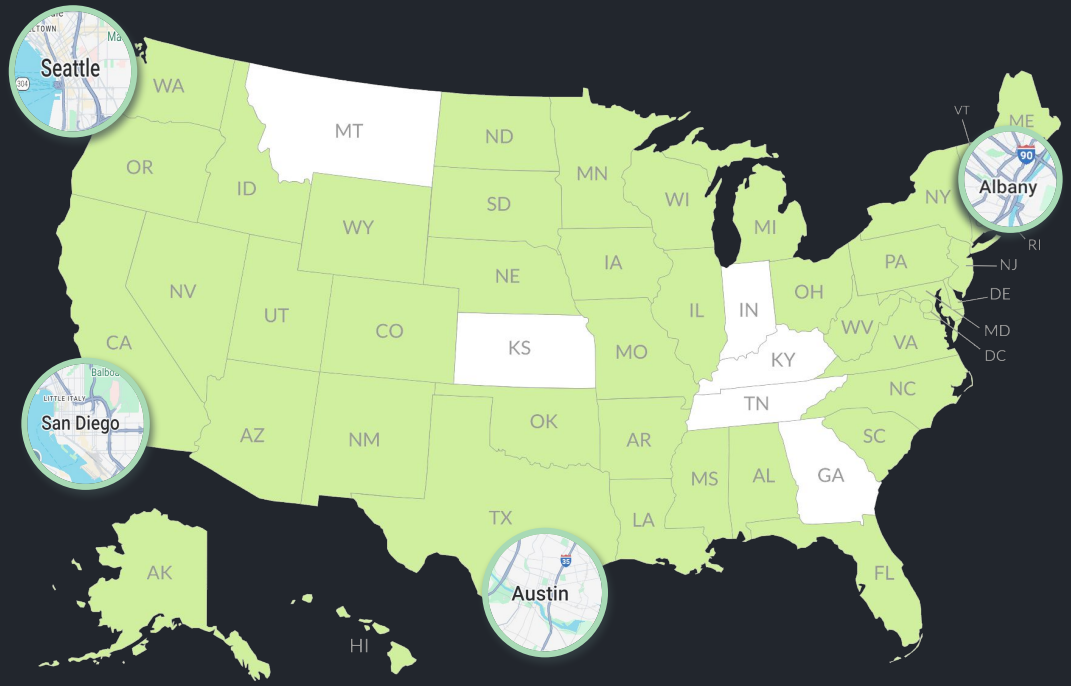
March 25th, 2025

Data for All 50 States

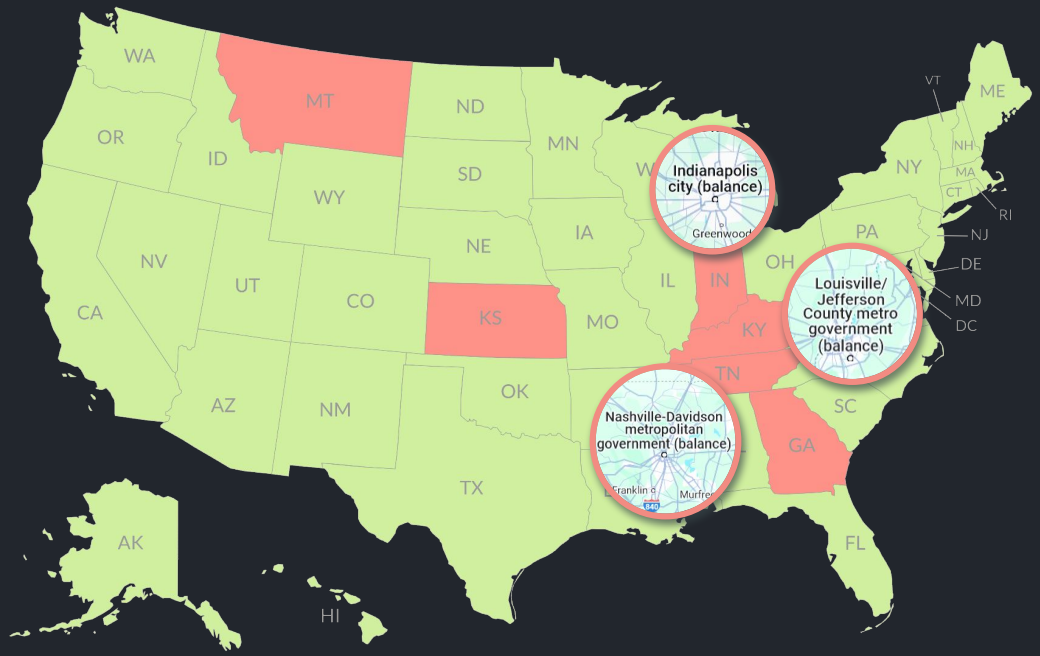


Google

Correct City Names in 44 States



Misnamed Cities in 6 States

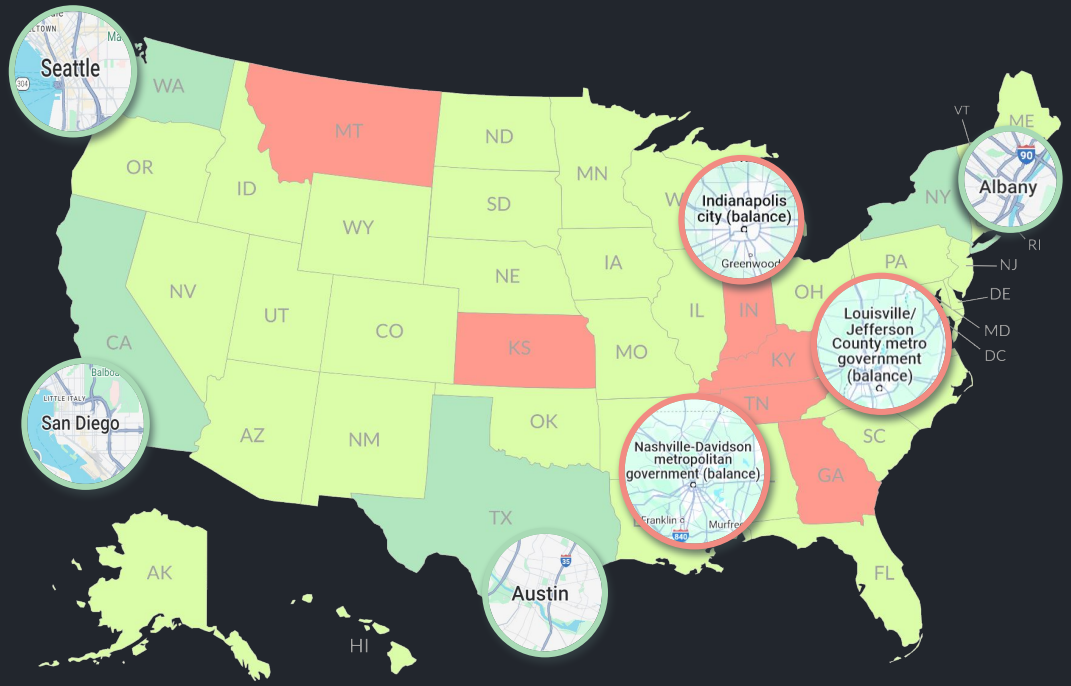


Google

1st Root Cause: Inadequate Evaluation Tooling



2nd Root Cause: Imperfect Sampling of States



Lessons Learned

Things That Went Well

Quick rollback

Things That Went Wrong

Misnamed cities ***should have*** been detected early

Conflicting fixes

Lessons Learned

Things That Went Well

Quick rollback

Things That Went Wrong

Misnamed cities ***should have*** been detected early

Conflicting fixes

Improvement Plan



Tooling



Evaluation

Improvement Plan



Tooling

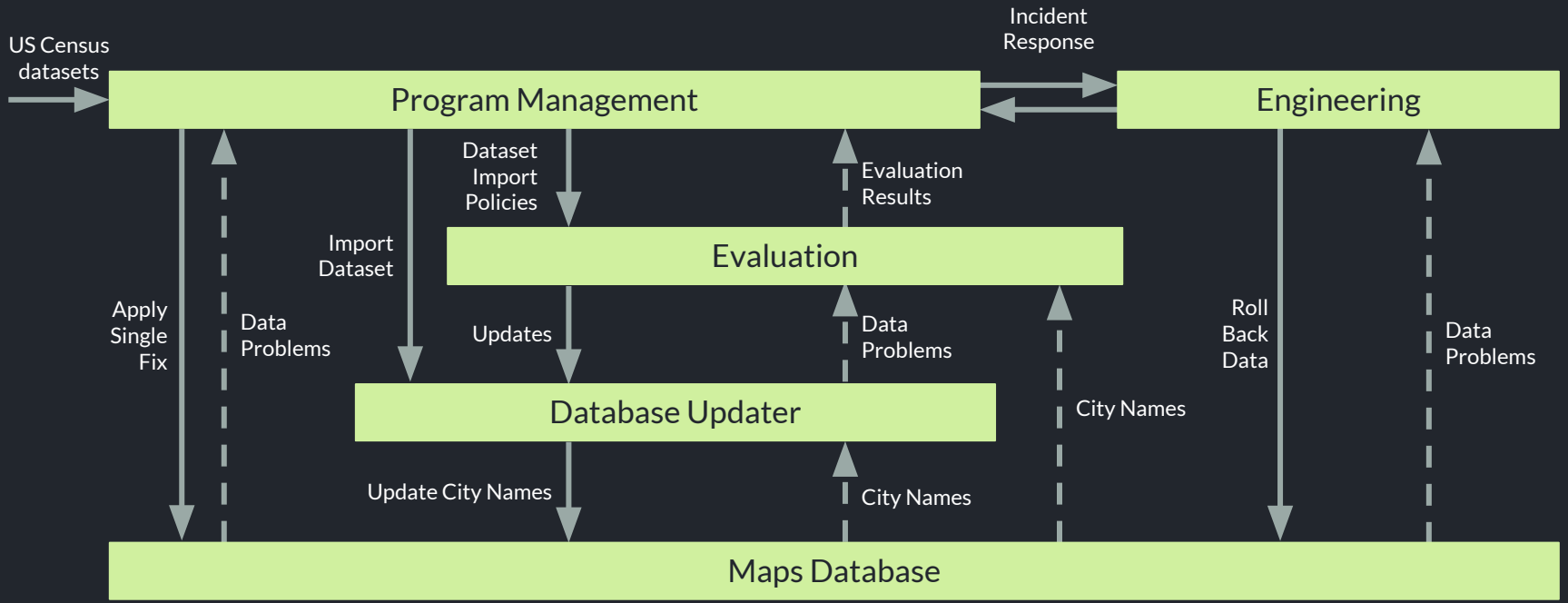


Evaluation

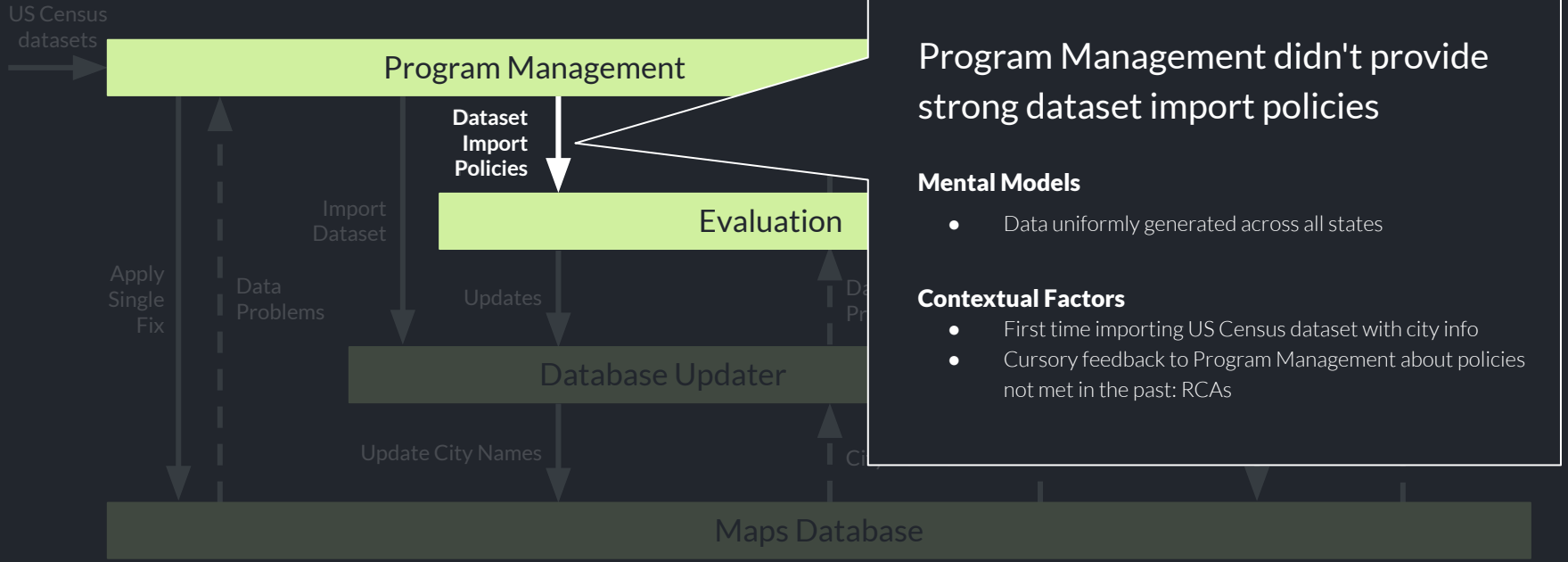
25+ years of of RCA
and nothing else

CAST

Control Structure



Contribution of Program Management



Program Management didn't provide strong dataset import policies

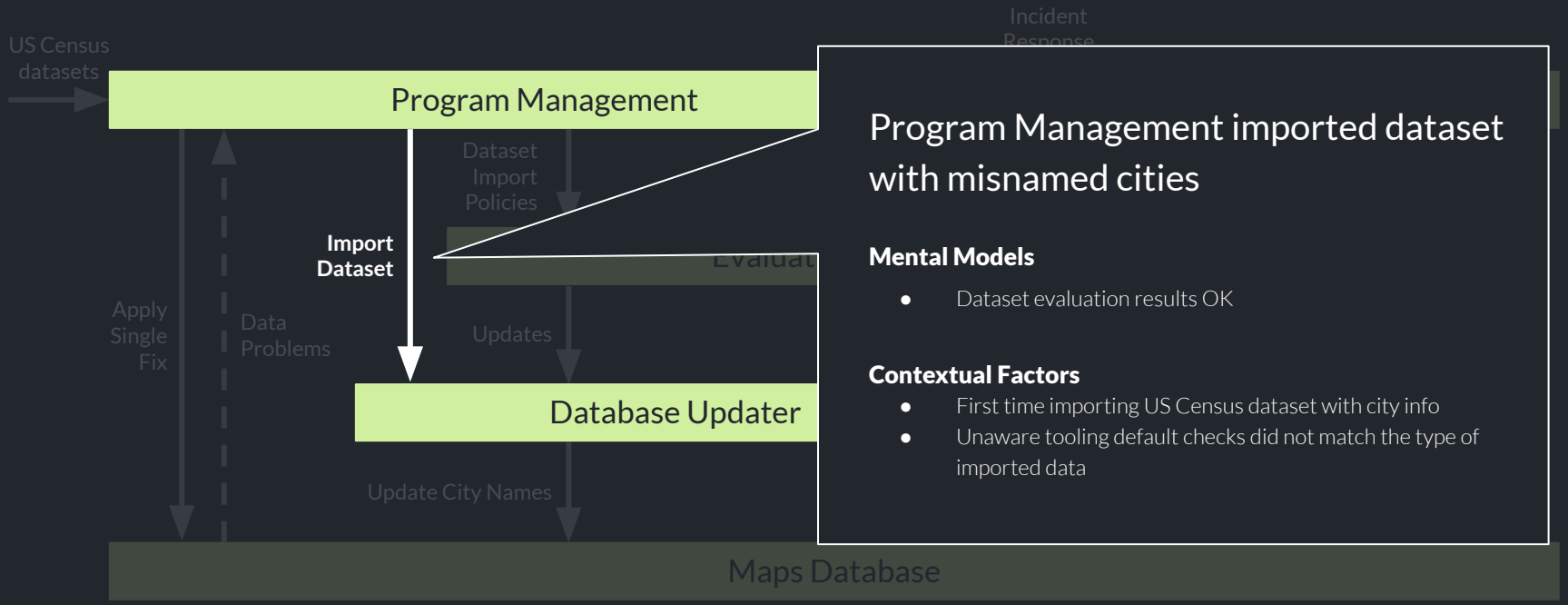
Mental Models

- Data uniformly generated across all states

Contextual Factors

- First time importing US Census dataset with city info
- Cursory feedback to Program Management about policies not met in the past: RCAs

Contribution of Program Management



Program Management imported dataset with misnamed cities

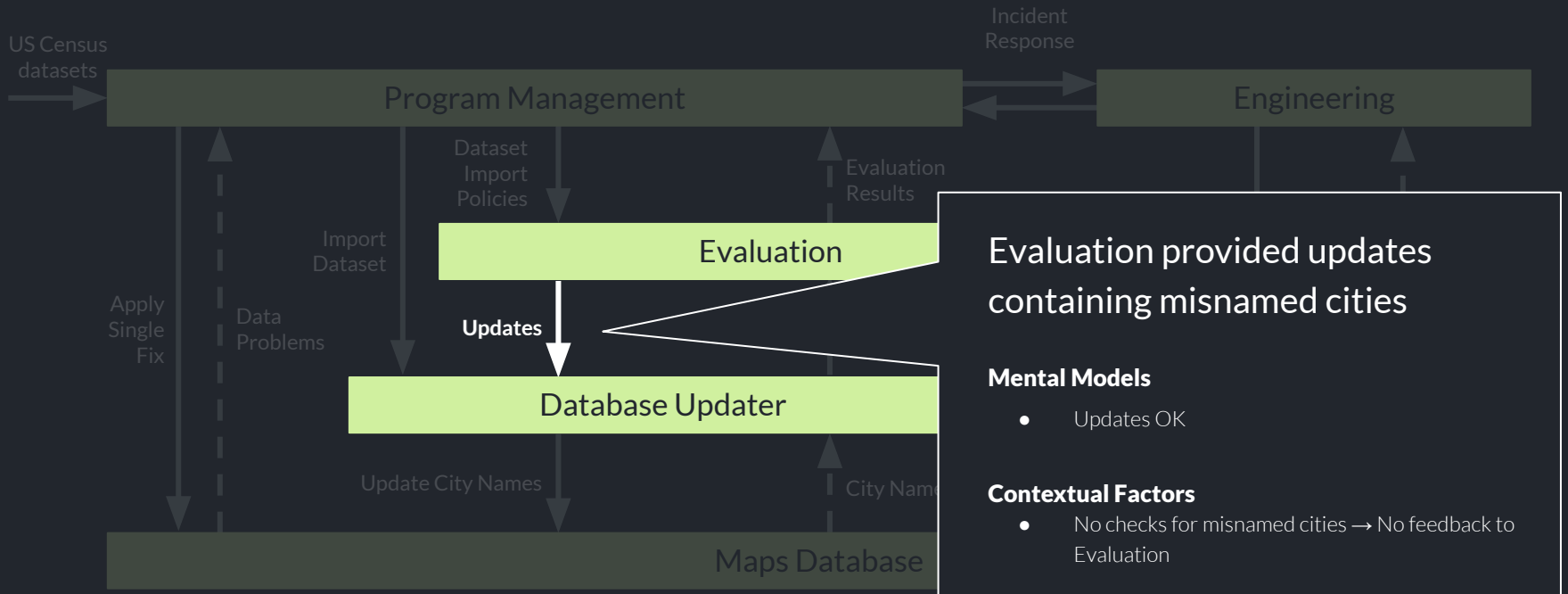
Mental Models

- Dataset evaluation results OK

Contextual Factors

- First time importing US Census dataset with city info
- Unaware tooling default checks did not match the type of imported data

Contribution of Evaluation



Evaluation provided updates containing misnamed cities

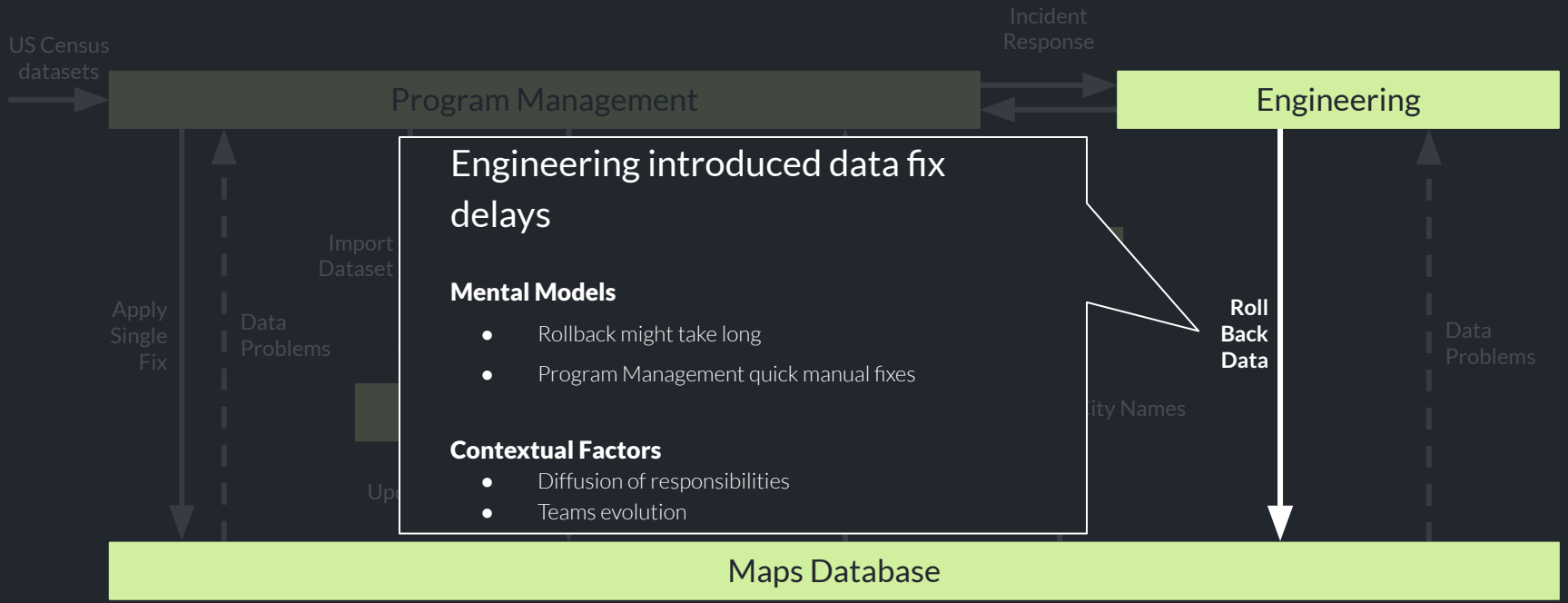
Mental Models

- Updates OK

Contextual Factors

- No checks for misnamed cities → No feedback to Evaluation

Contribution of Engineering



Engineering introduced data fix delays

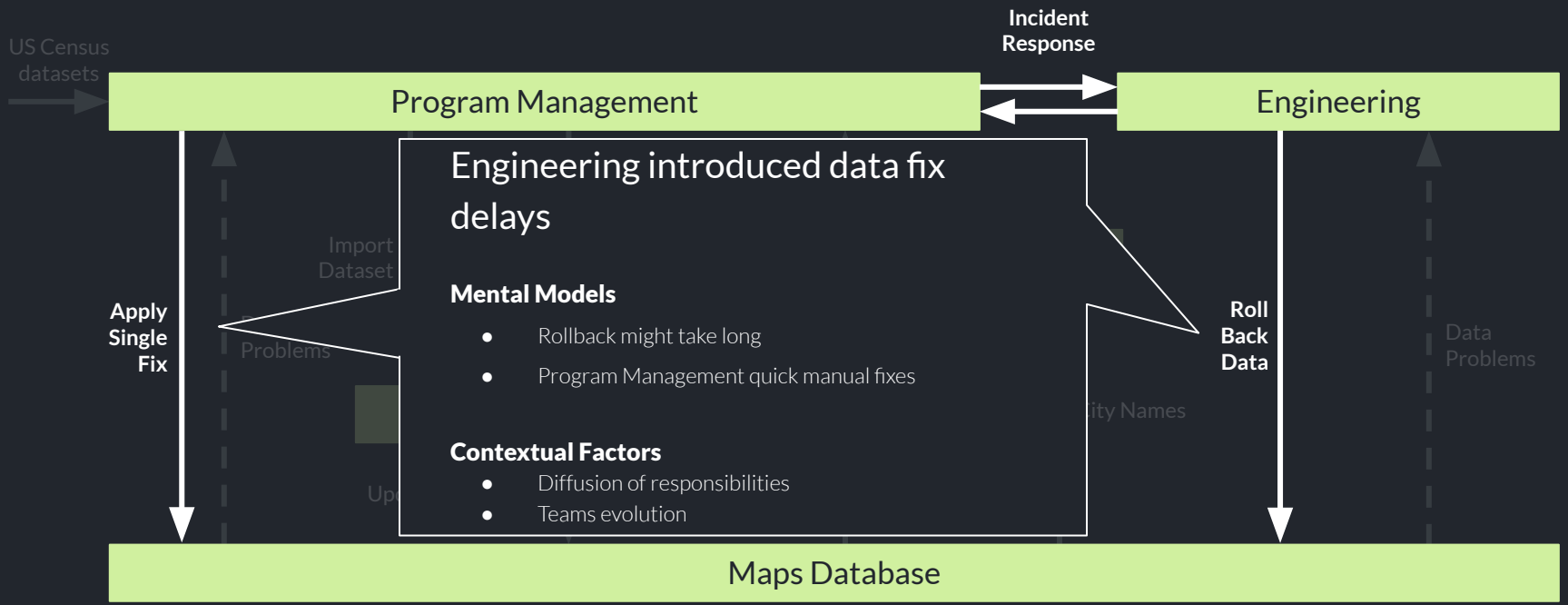
Mental Models

- Rollback might take long
- Program Management quick manual fixes

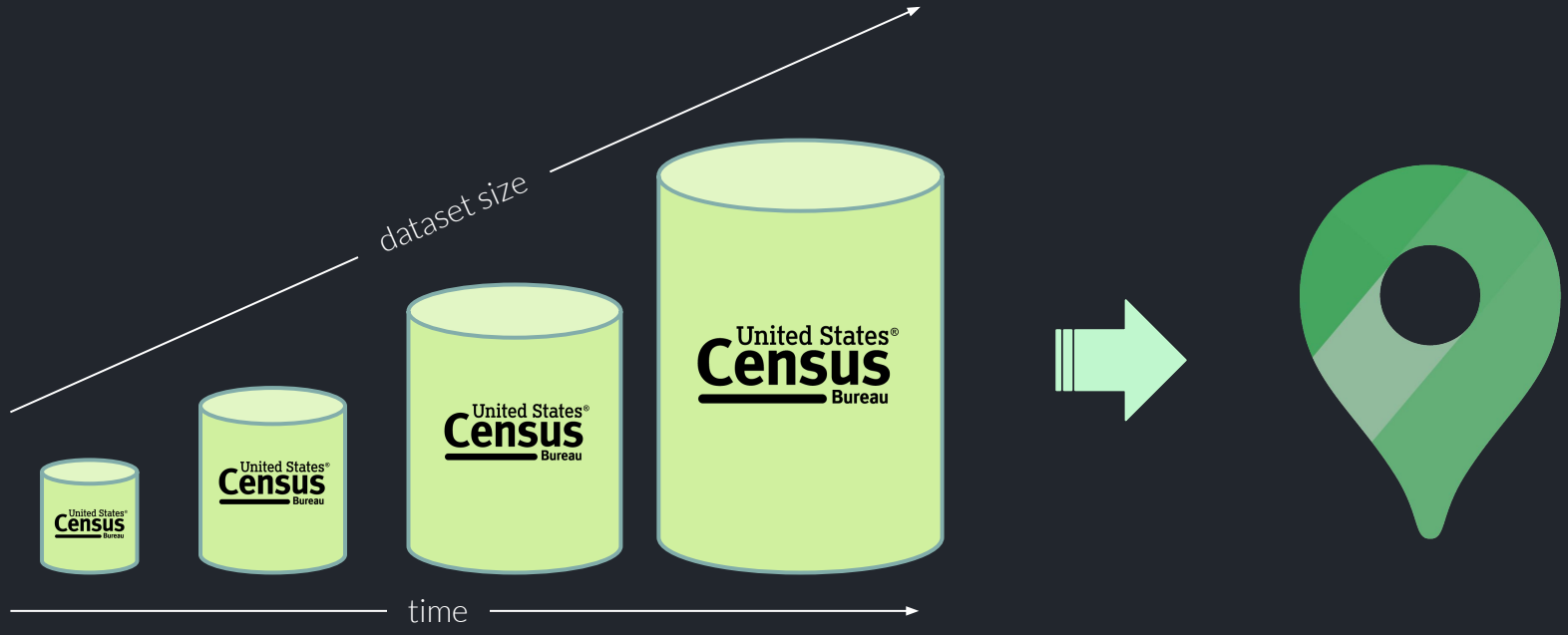
Contextual Factors

- Diffusion of responsibilities
- Teams evolution

Contribution of Engineering



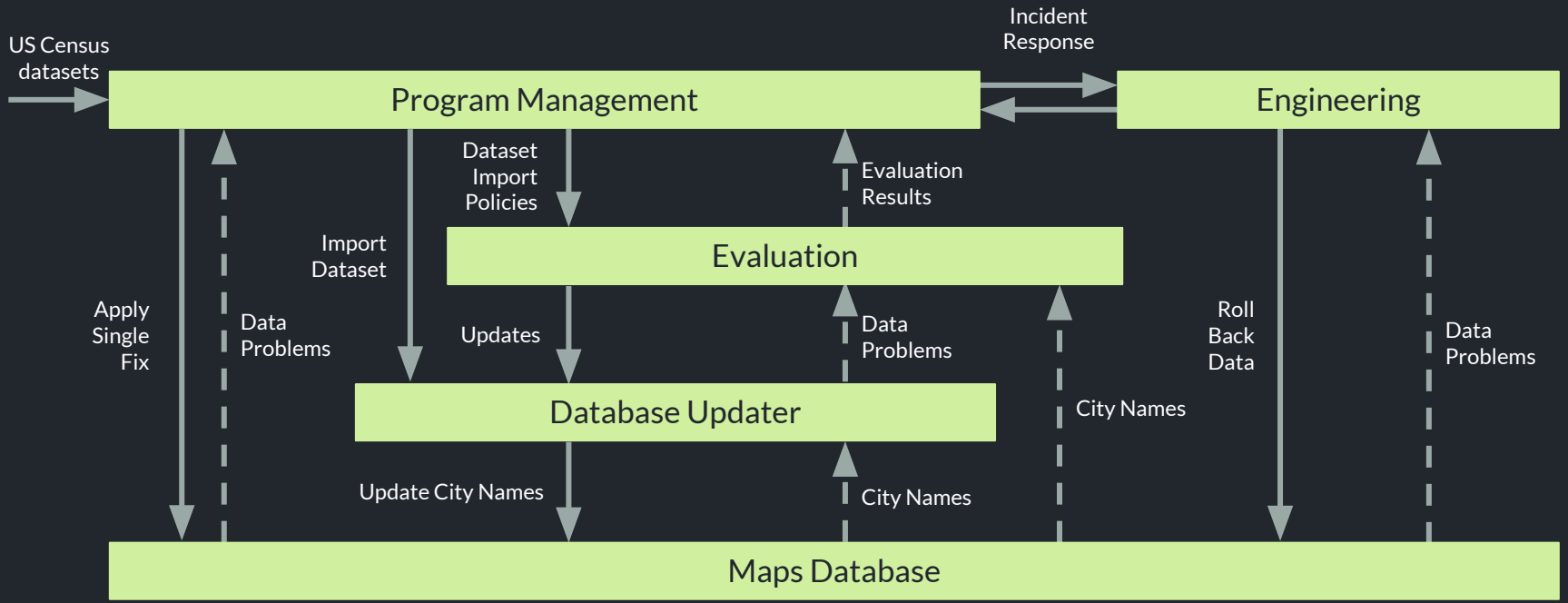
Systemic Factor: Dynamic Environment



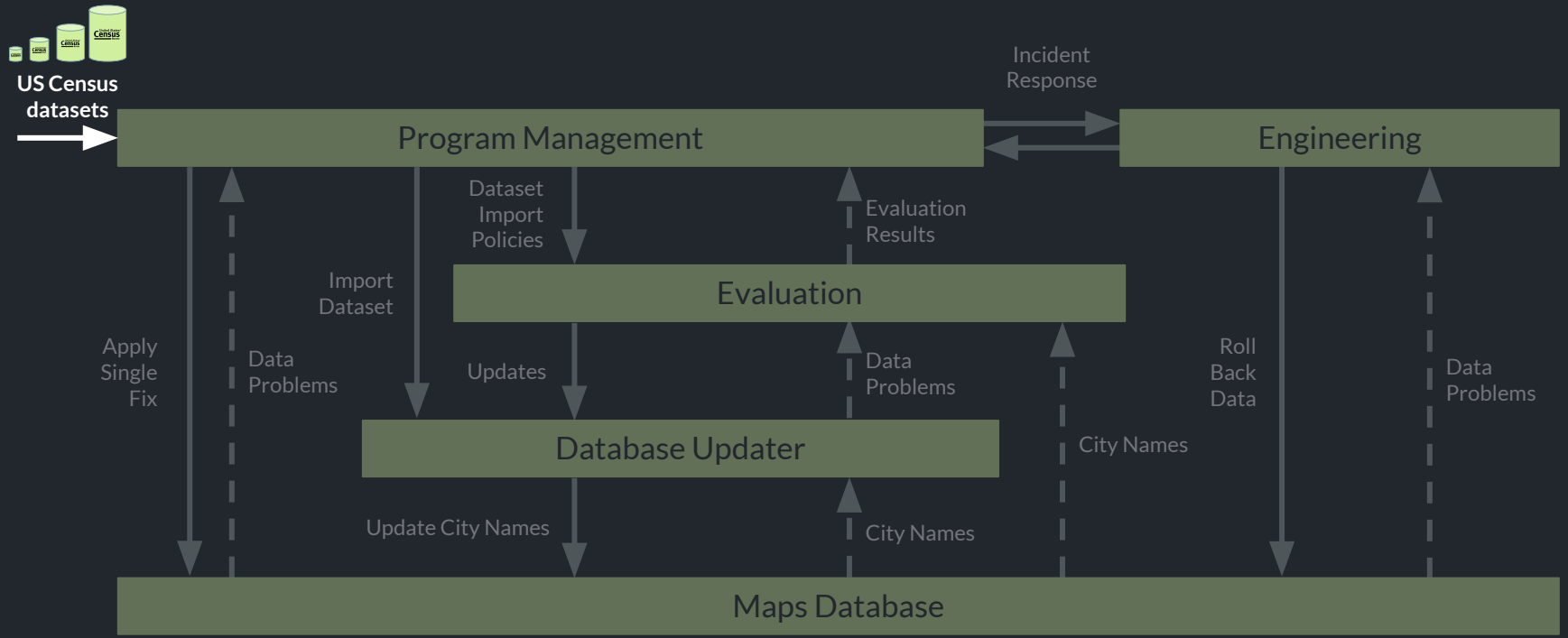
Environment

System

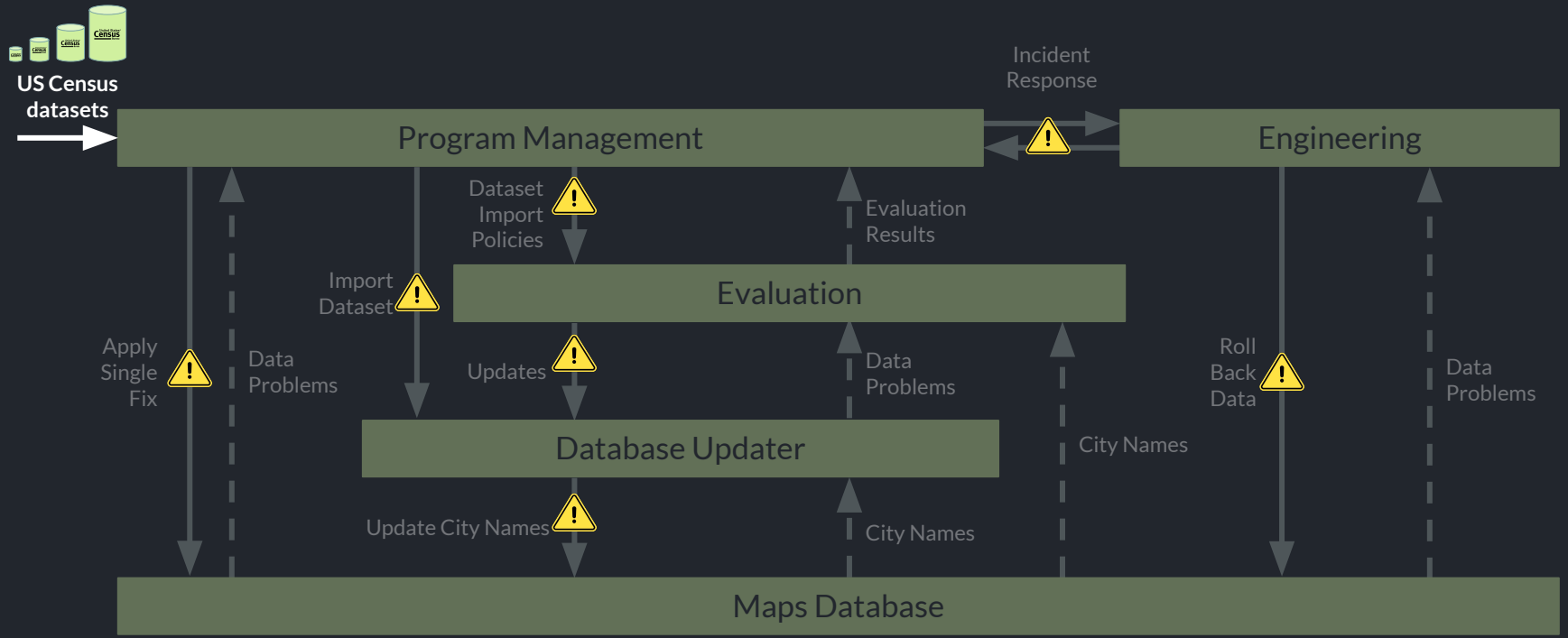
Dynamic Environment



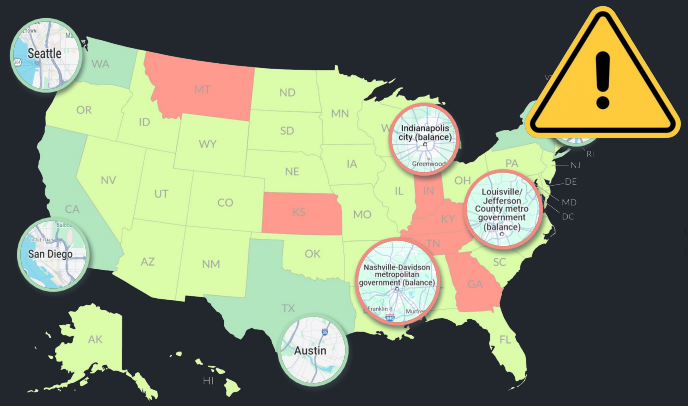
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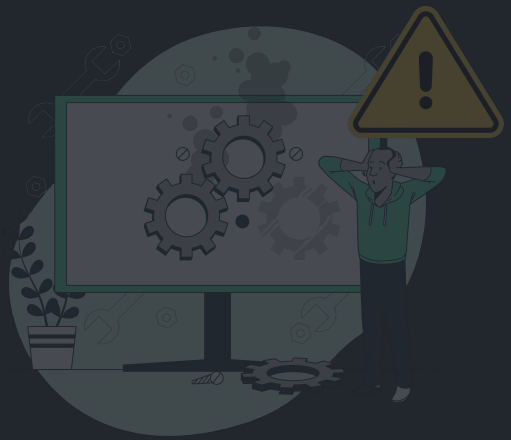


Dynamic Environment



Weakened Controls







Evaluation

Tooling

Incident Response

Weakened Controls







Evaluation

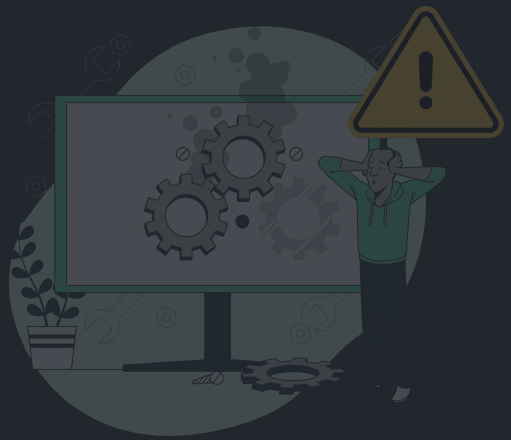
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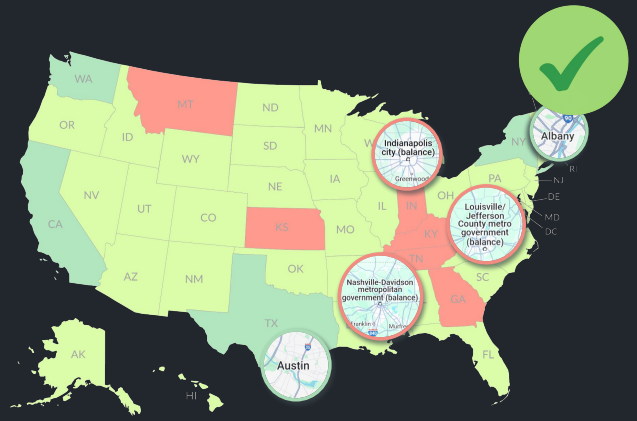


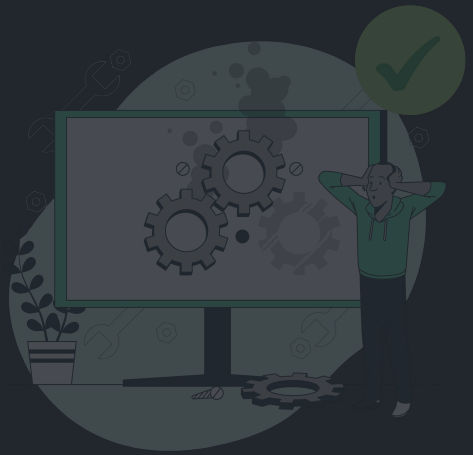
Tooling



Incident Response

CAST Improvement Plan







Evaluation

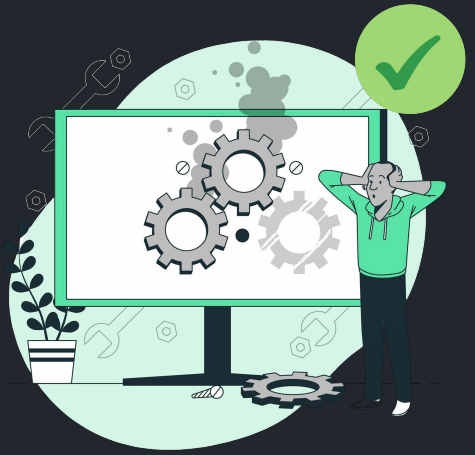
Tooling

Incident Response

CAST Improvement Plan



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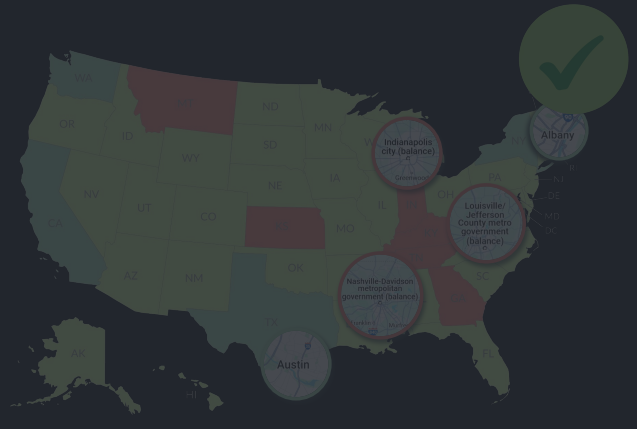


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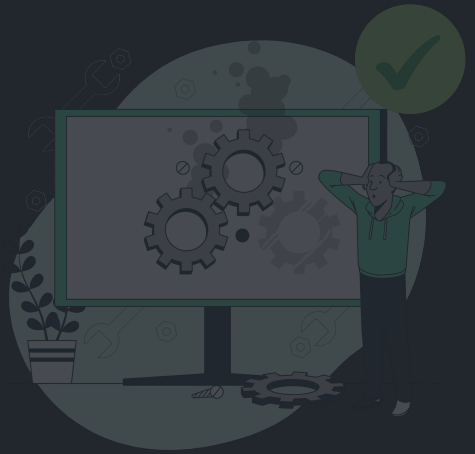


Incident Response

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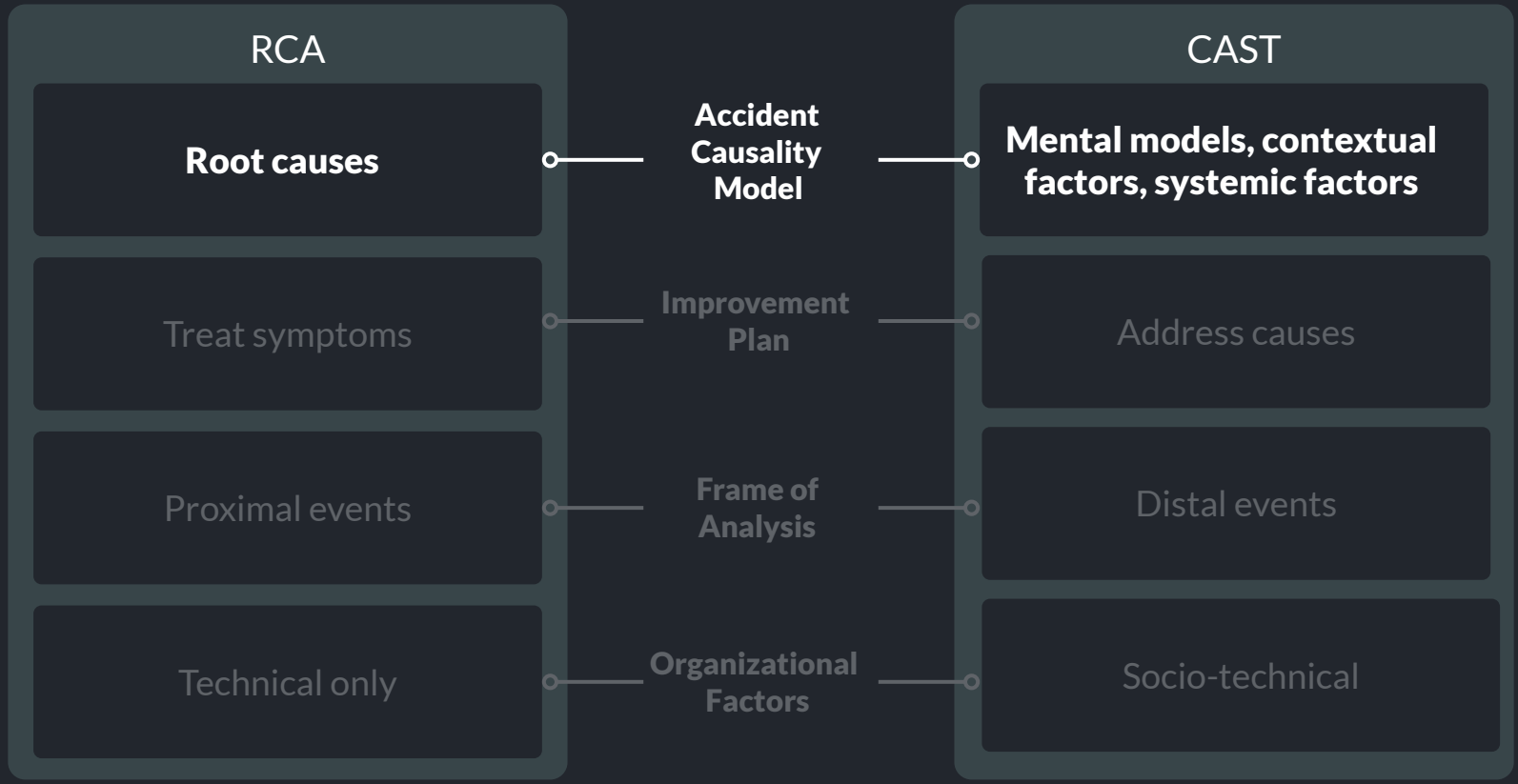
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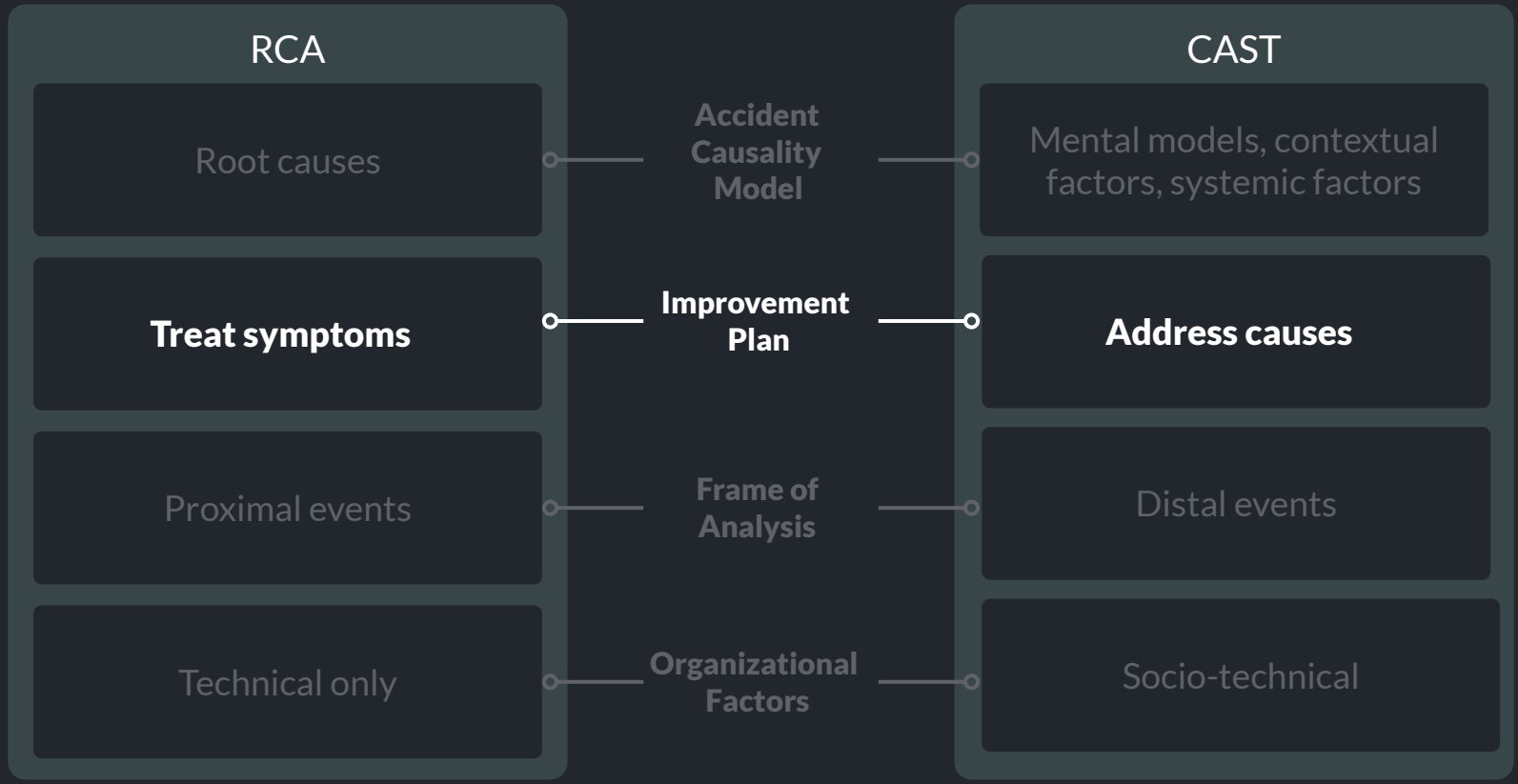
Incident Response

RCA vs CAST

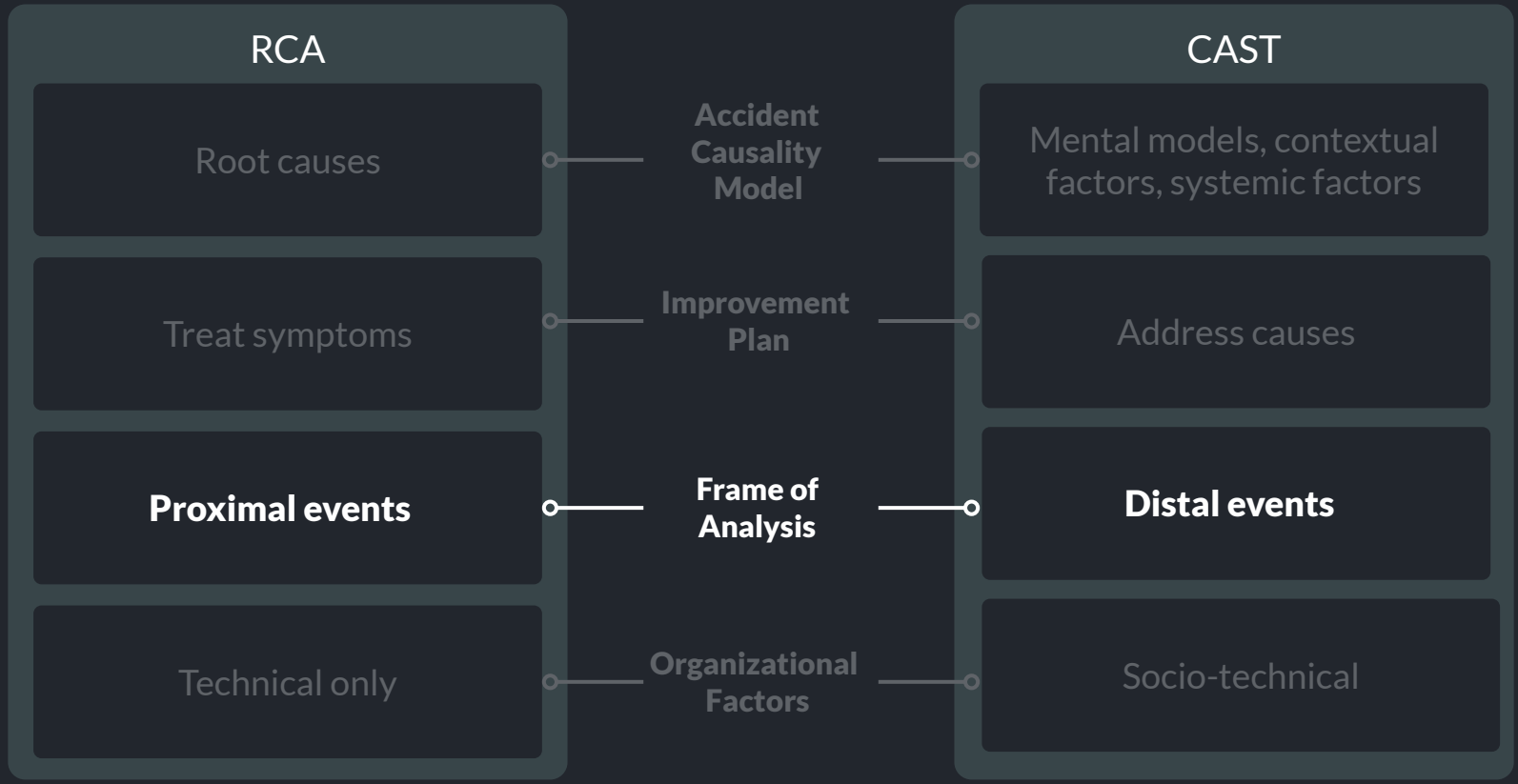
RCA vs CAST


RCA
Root causes
Treat symptoms
Proximal events
Technical only
Accident Causality Model
Improvement Plan
Frame of Analysis
Organizational Factors
CAST
Mental models, contextual factors, systemic factors
Address causes
Distal events
Socio-technical

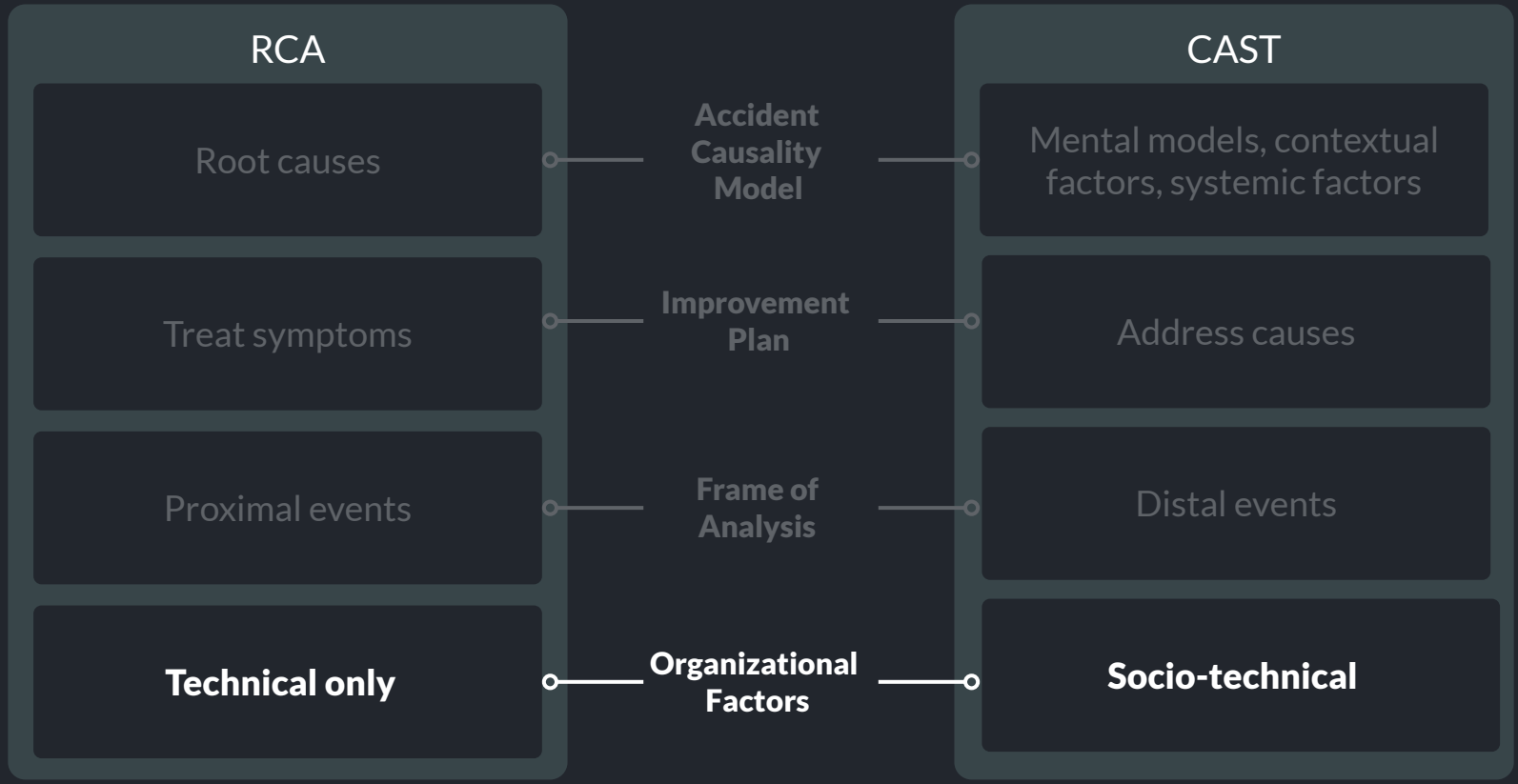
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Takeaways

Takeaways

CAST works on software systems

CAST learnings ≫ RCA learnings

CAST recommendations ≫ RCA recommendations

The End

Illustrations: freepik.com | Maps: www.mapchart.net/usa.html | Reddit: thread 1, thread 2