

Causal Insight in
Technology &
Innovation Benefits
Forecasting &
Realization



Keeping the Pace

Continuing our Success on the
Asset Management Journey

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Consultant, Innovation Strategy & Project Management

*Causal Insight in
Technology and
Innovation Benefits
Forecasting
& Realization*



Introductory Question

What communication and prediction technique would best help infrastructure owners and their agents justifiably invest in and realize the benefits of significant construction process innovation...

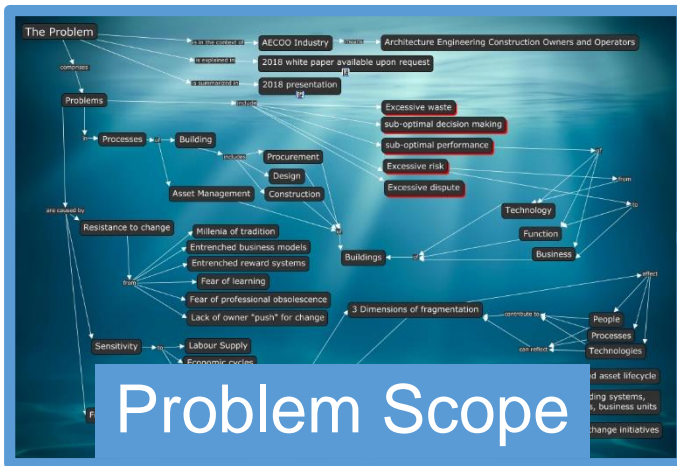
...specifically the transformation of project and asset information management...

...as a key enabler of better decision making and sustainability throughout the project and remaining built asset lifecycle?

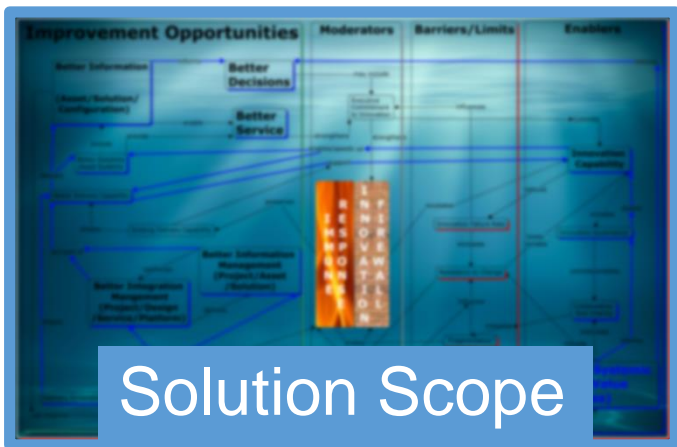
Introduction

- Potential solutions to other similarly systemic/complex problems would beg a similar question
 - i.e. relevance of this presentation is not limited to buildings or construction projects
- Question comes from a desire to better bridge the gap between construction and O&M
- Relates to asset management readiness, asset information management, innovation and continual improvement

Outline of Approach



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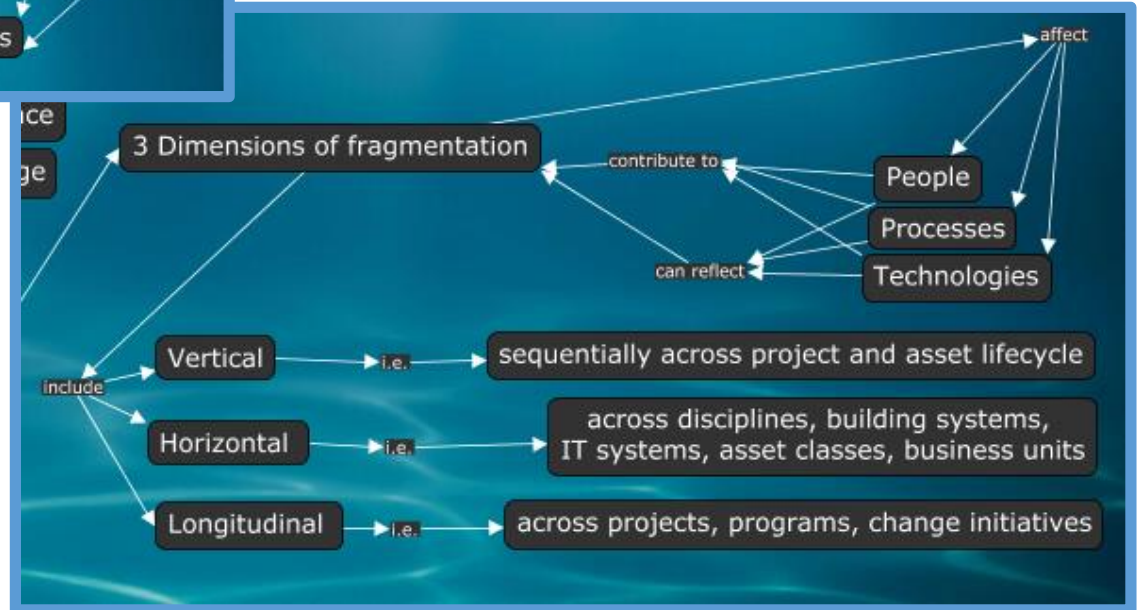


Intermediate Modeling steps



Benefits realization simulation platform (not demonstrated here)

Essence of the Problem



Industry Specific Solution Approaches

Part of the solution is Building Information Modeling (BIM)



“digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition”

- Construction Project Information Committee (UK)

Industry Specific Solution Approaches

BIM works best with integrated procurement

For example, it can relate to and enable the collaborative *Integrated Project Delivery* (IPD) procurement structure*

For Canada, there is now a new contract designed to enable this:



* for more information on IPD see links at the end

Industry *Agnostic* Solution Approaches

A framework for forecasting and managing/realizing potential benefits is another **integrating** component

- to promote and support **value-based thinking**
 - not just cost and risk focus
 - assisting “bigger picture” perspective
- for any complex program
- in any industry

Industry *Agnostic* Solution Approaches

There is an increasing need for frameworks that increase **causal/systemic insight (value awareness)**.

- due to the increasing complexity and uncertainty of problems and solutions

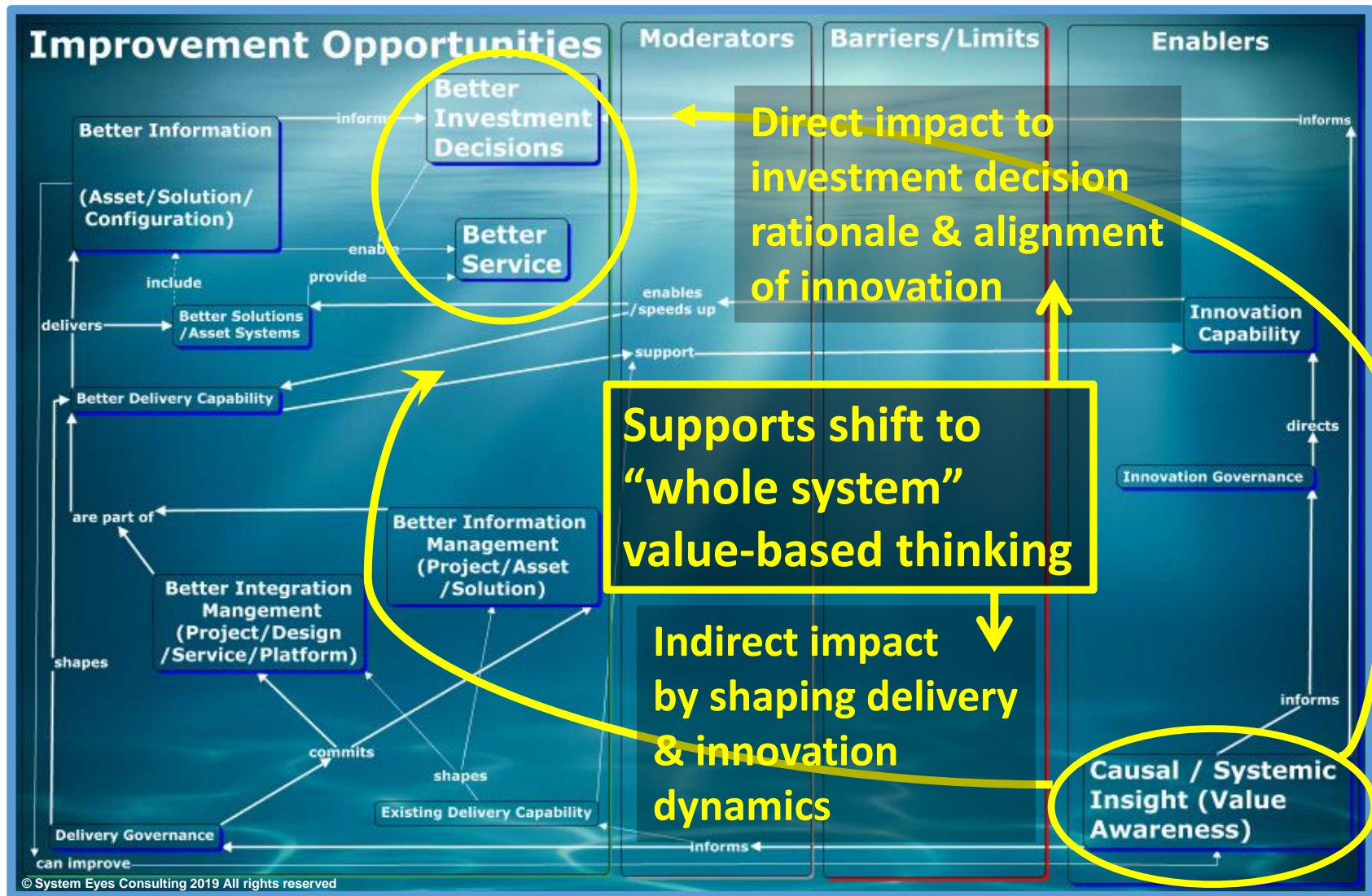
Industry *Agnostic* Solution Approaches

Casual insight can be assisted with:

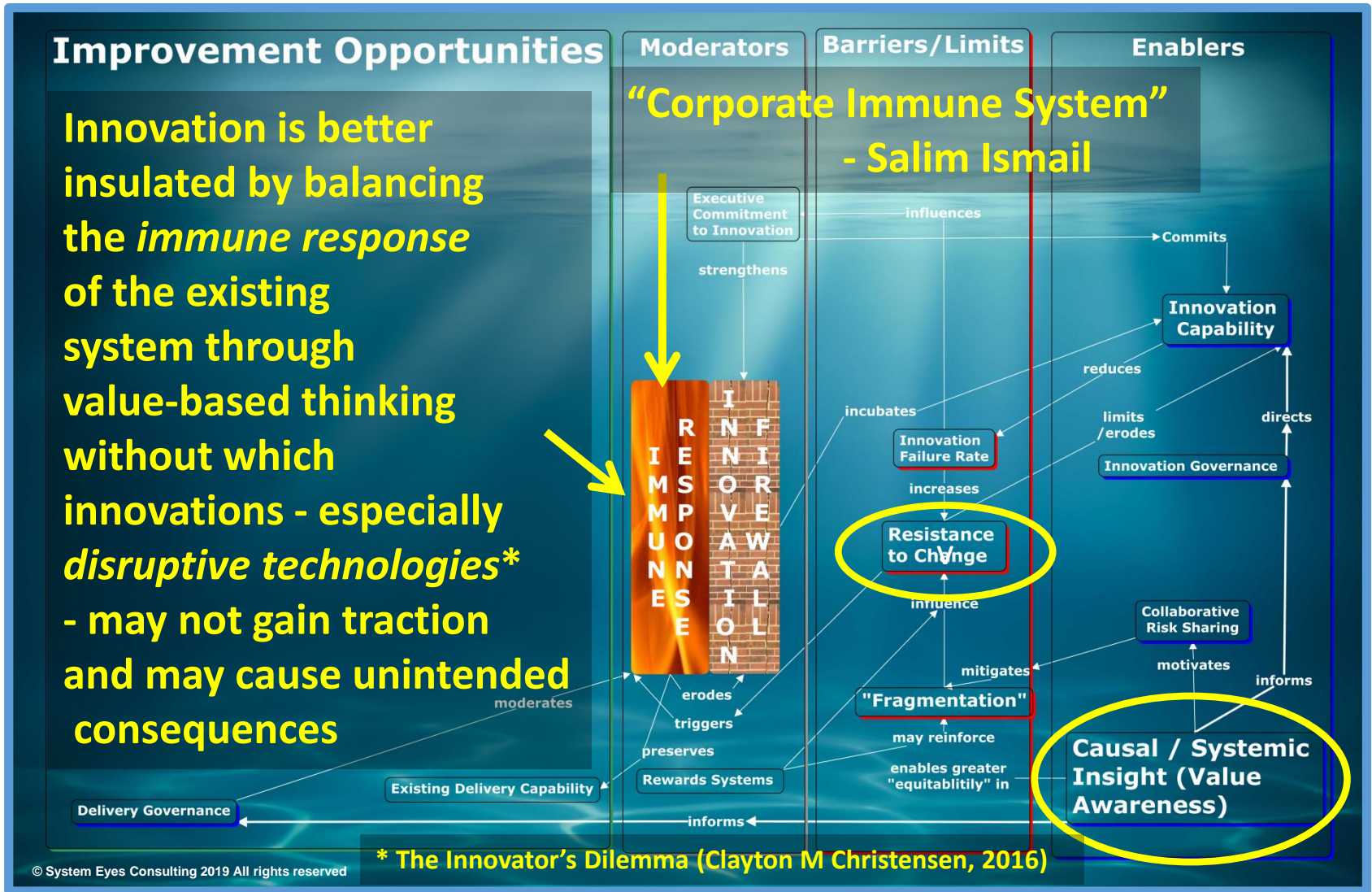
- Simulation capability to assist comprehension of relationships
- Ability to capture feedback loops and behavior over time
- Ability to engage stakeholders in creation & use of simulation
- Adaptability (for continued relevance)

The chosen approach addresses the above utilizing System Dynamics non-linear dynamic modeling overlaid with highly configurable user interfaces

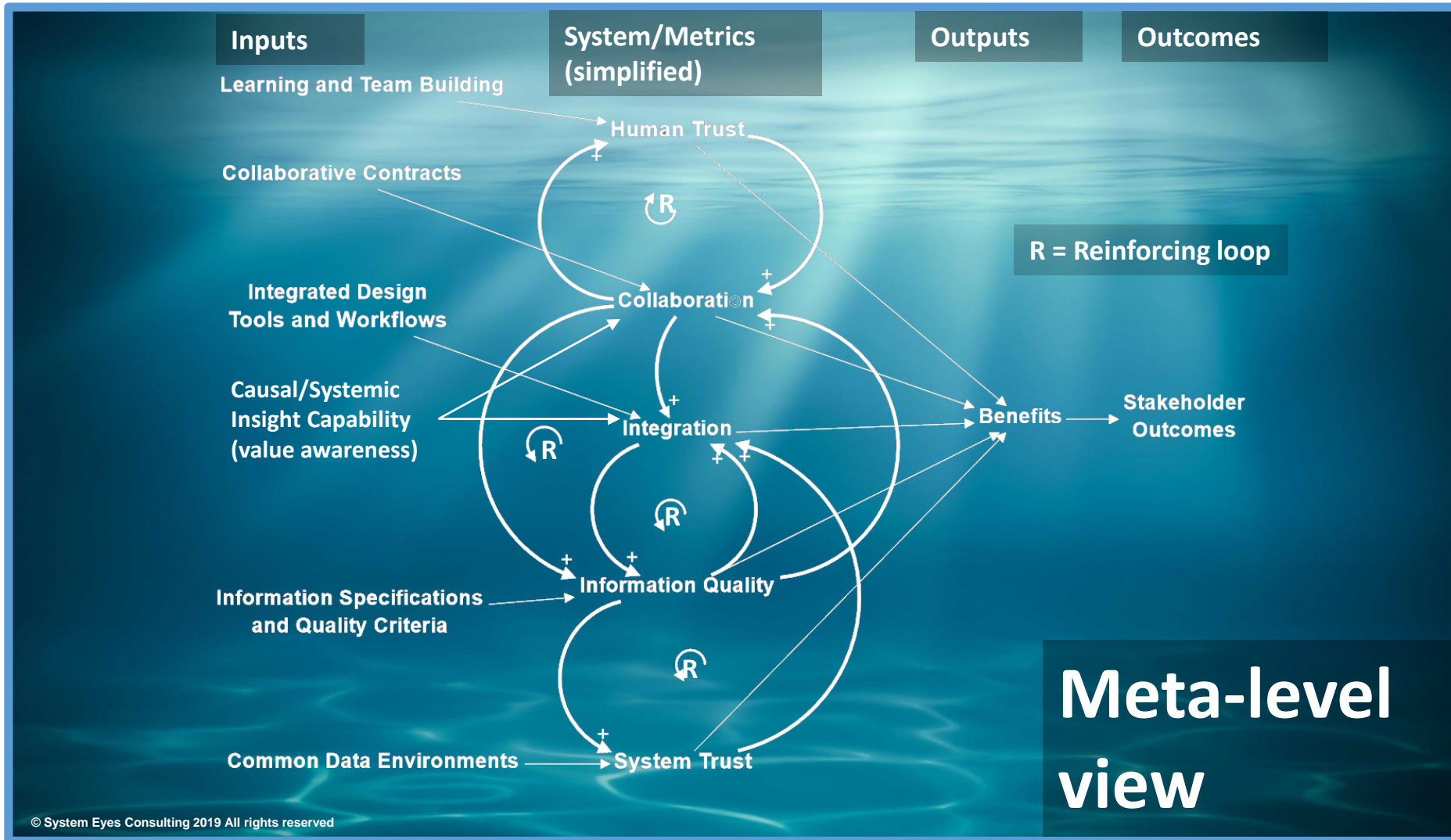
Impact of Causal Insight Within Solution Scope



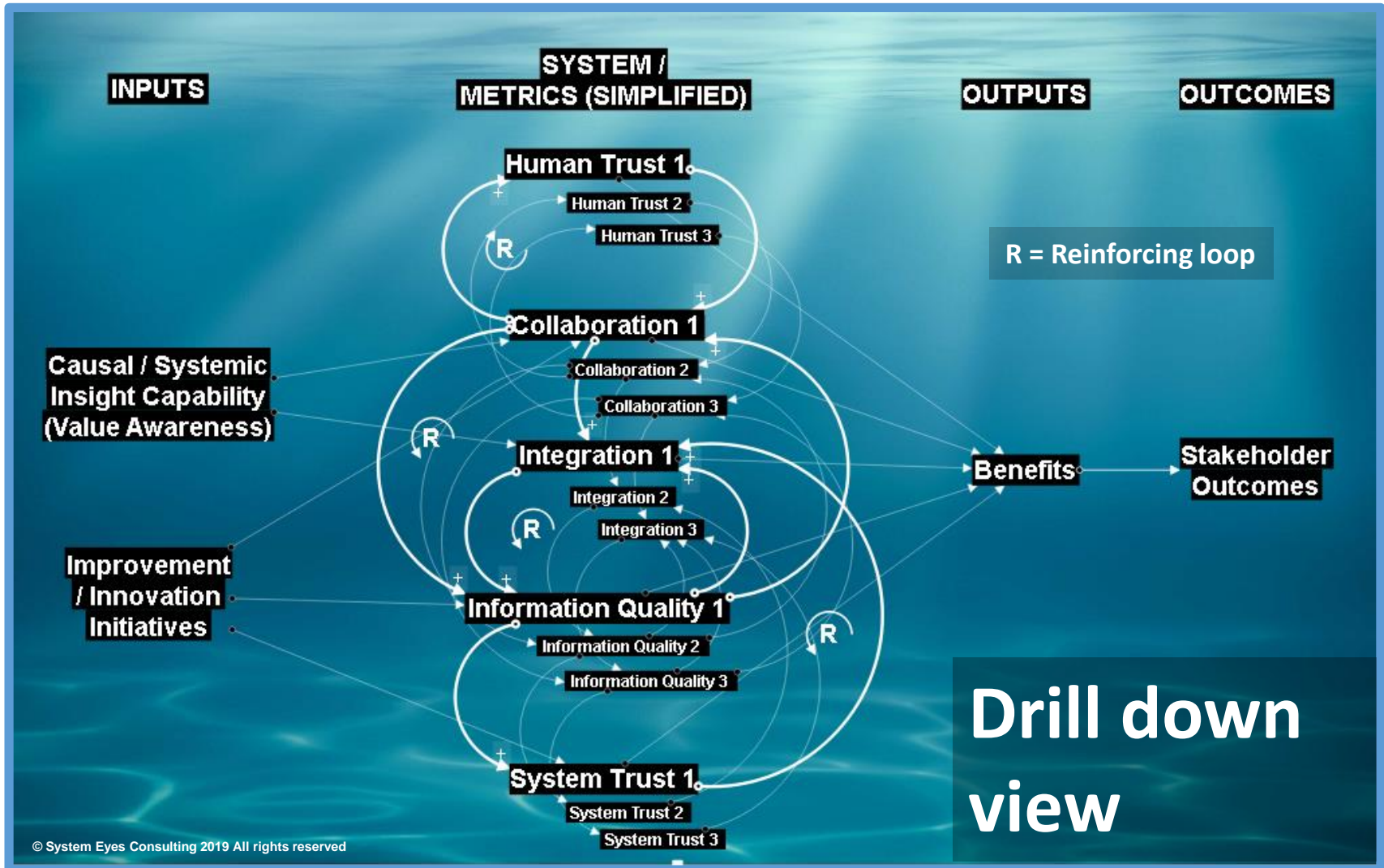
Impact of Causal Insight Within Solution Scope



Pre-Configuration Systemic Modeling



Pre-Configuration Systemic Modeling



“What if...?” Scenario and Sensitivity Analysis

A series of modeling steps leads to configuration of scenario and sensitivity analysis dashboards addressing a wide range of “what-if...?” questions regarding value and risk



Web link to demonstration available upon request

“What if...?” Scenario and Sensitivity Analysis

Value and risk related questions can include:

- What if we choose not to lead?
 - What if we wait until wider industry maturity levels increases?
 - What if we wait until our local or internal maturity level increases through other initiatives?
- How can we factor in uncertainty and confidence levels?
- How can we model “pain-share gain-share” equitable distributions between stakeholders in relation to risk ownership and investments?

“What if...?” Scenario and Sensitivity Analysis

Value and risk related questions can include :

- What if a success indicator deviates from projections? As a result of:
 - delivery performance variance
 - inaccuracy of projections / relationships we model
 - impact of risk events (actual or scenario)
 - other improvement initiatives (actual or scenario)

“What if...?” Scenario and Sensitivity Analysis

Value and risk related questions can include :

- What if we change the start and duration of the improvement implementation?
- What if we compromise implementation efficacy (e.g. schedule compression) or over-estimate impact?
- What if implementation costs vary?
- Etc.

Lessons from the selected approach:

“The map is not the territory” - Alfred Korzybski

- Applies to any modeling exercise
- However, the System Dynamics modeling approach utilized builds from first principles and can help provide transparency to biases and assumptions
- The System Dynamics modeling approach is most beneficial if accompanied by stakeholder training / support in systems thinking

Lessons from the selected approach:

“Everything should be made as simple as possible but no simpler”

– Albert Einstein

- Granularity can be selectively increased where it is beneficial to do so
- A balance must be struck. With additional granularity the following can result:
 - increased time/cost
 - can reduce stakeholder comprehension
 - can limit model adaptability

Lessons from the selected approach:

- Systems thinking is completely generic and can compliment other frameworks and modeling approaches
- Data management can be as simple or complex as required (e.g. Excel is supported)
- The causal approach to value insight is very tolerant of poor or incomplete data for achieving causal insight.
 - Expert opinions can be easily captured
 - Assumptions can be flagged for future data infill

Lessons from the selected approach:

- System Dynamics modeling helps identify critical relationships as a focus for:
 - performance and risk management
 - prioritizing further analysis / data capture / data cleansing
- Enables stakeholders to explore a wide range of risk scenarios
 - can model the causal impact of multiple risk possibilities (although risk probabilities are not predicted through this modeling)

Resources / Links

Integrated Project Delivery resources:

<https://ipda.ca>

<https://buildingsmartcanada.ca/>

<https://www.canbim.com/>

2018 Presentation discussing construction industry trends with Canadian case studies:

[Extending the Enterprise to Close the Performance Gap in the Built Environment](https://www.pemac.org/sites/pemac.org/files/Extending_the_Enterprise_to_Close_the_Performance_Gap_in_the_Built_Environment)

(https://www.pemac.org/sites/pemac.org/files/Extending_the_Enterprise_to_Close_the_Performance_Gap_in_the_Built_Environment-Slides.pdf)



Questions?

seb@systemeyes.consulting

LinkedIn