

A network diagram with nodes and lines is visible in the background, primarily on the right side of the image. The nodes are represented by circles of varying sizes, and they are connected by thin, light blue lines. The overall structure is a complex web of interconnected points, suggesting a network or a system of relationships. The nodes are distributed across the right half of the image, with some clusters and some isolated points.

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## Safety Case Variation using Goal Structuring Notation

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Christian Parra-John & Steve Wallace

# Introduction

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- **The Challenge**

- KiwiRail must contribute to achieving SFAIRP safety outcomes on the CRL project
- KiwiRail must also prepare itself to operate, maintain and provide access & train control to CRL in conjunction with the rest of the Auckland Metro Network
- KiwiRail will need to submit a Safety Case Variation (SCV) to NZTA (Waka Kotahi) and have them approve it before KiwiRail can act as the Network Access Provider or Rail Operator within CRL.

- **The Approach**

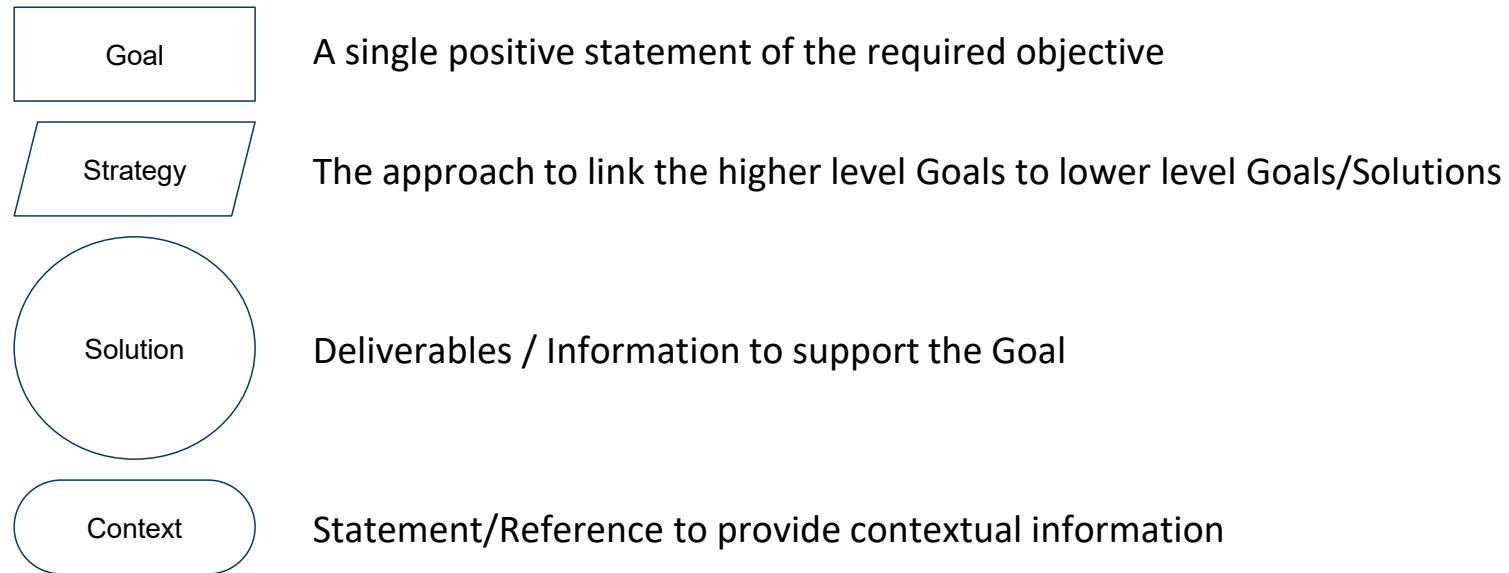
- GSN was adopted to understand, agree & coordinate what evidence generated through the organisational change programme will be required for the SCV application

- **This Presentation**

- Will provide an overview of what GSN is
- Provide an overview on how GSN was implemented on CRL by KiwiRail to support the SCV and highlight some of the benefits achieved

# What is GSN?

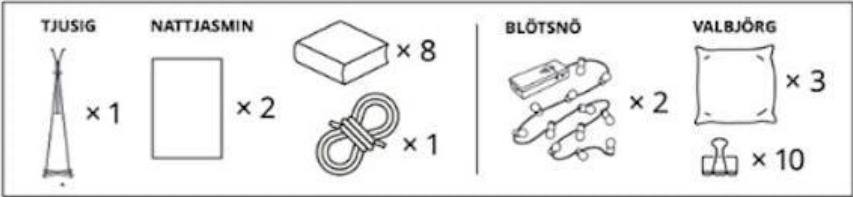
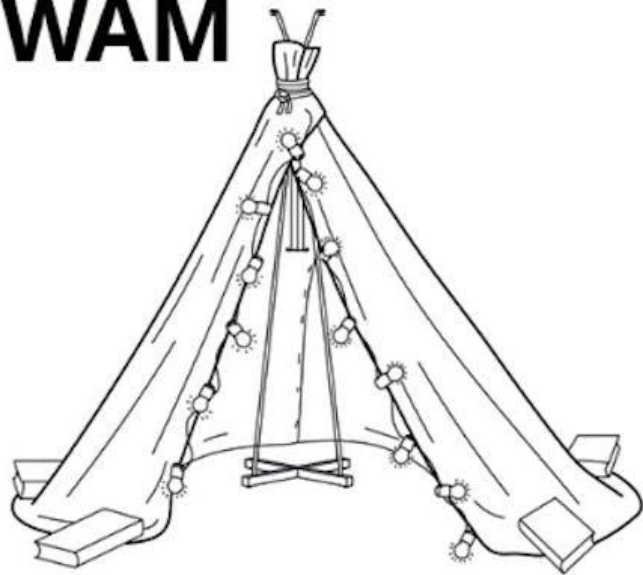
- A graphical notation used to create, communicate, and evaluate structured arguments, especially assurance cases.
- It visually maps the logical relationships between:



- Makes complex reasoning explicit, traceable, and understandable

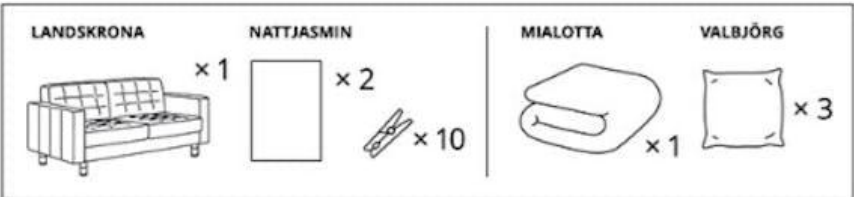
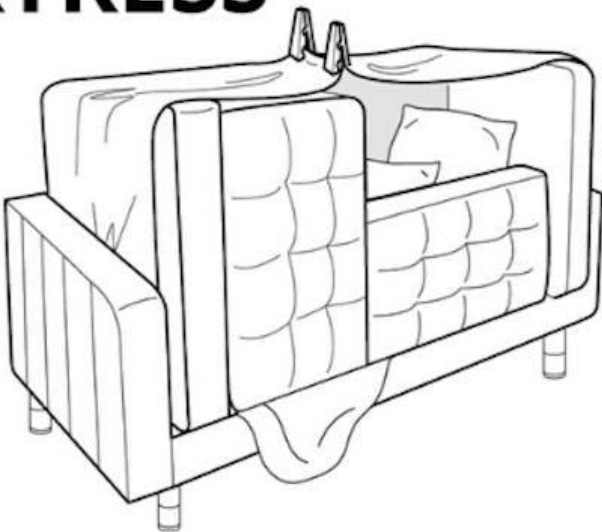
# What is GSN?

## WIGWÅM



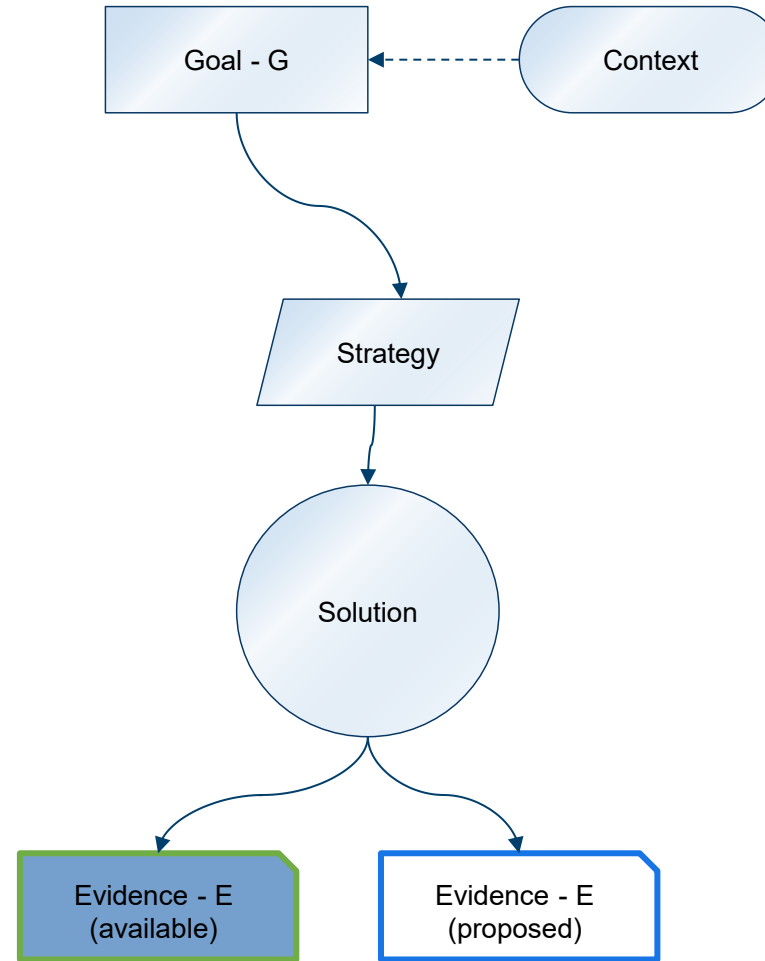
Make sure that the structure is safe. Do not leave children unattended.  
The suggested examples are not official IKEA user guides for IKEA products.  
If you can't find the products referred to in the instructions, use similar ones.

## FÖRTRESS



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# How was GSN used on CRL





# How was GSN used on CRL

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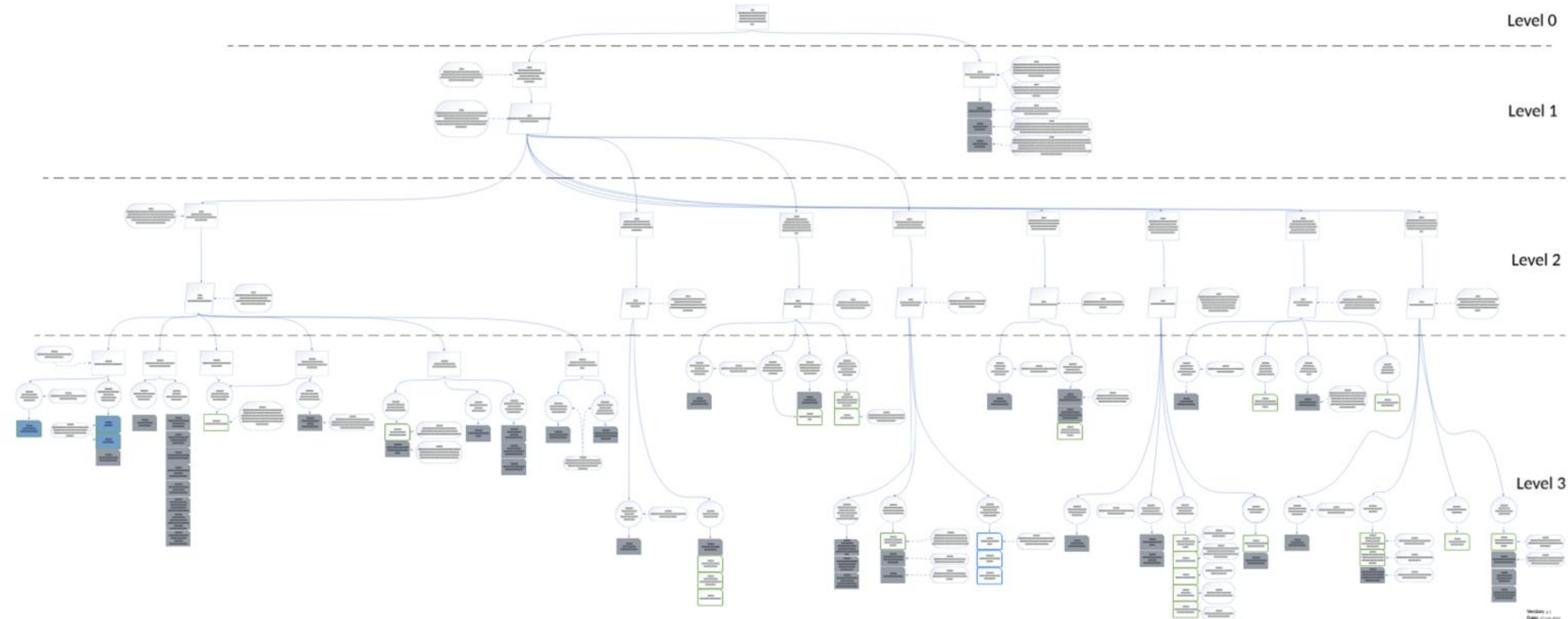
- **Development & Stakeholder Communication**

- Used as a workshop tool to build a consensus view of what needed to be considered in the argument
- Used to agree size and shape internally with senior leadership and delivering workstream leaders
- Used to communicate and agree the size and shape of the variation with parties like CRLL and LKA
- Regular rail regulator engagement to avoid surprises or misaligned expectations
- It was iterated regularly and became more stable as time progressed
- Understanding and partitioning of delivery risk

- **Evidence Gathering**

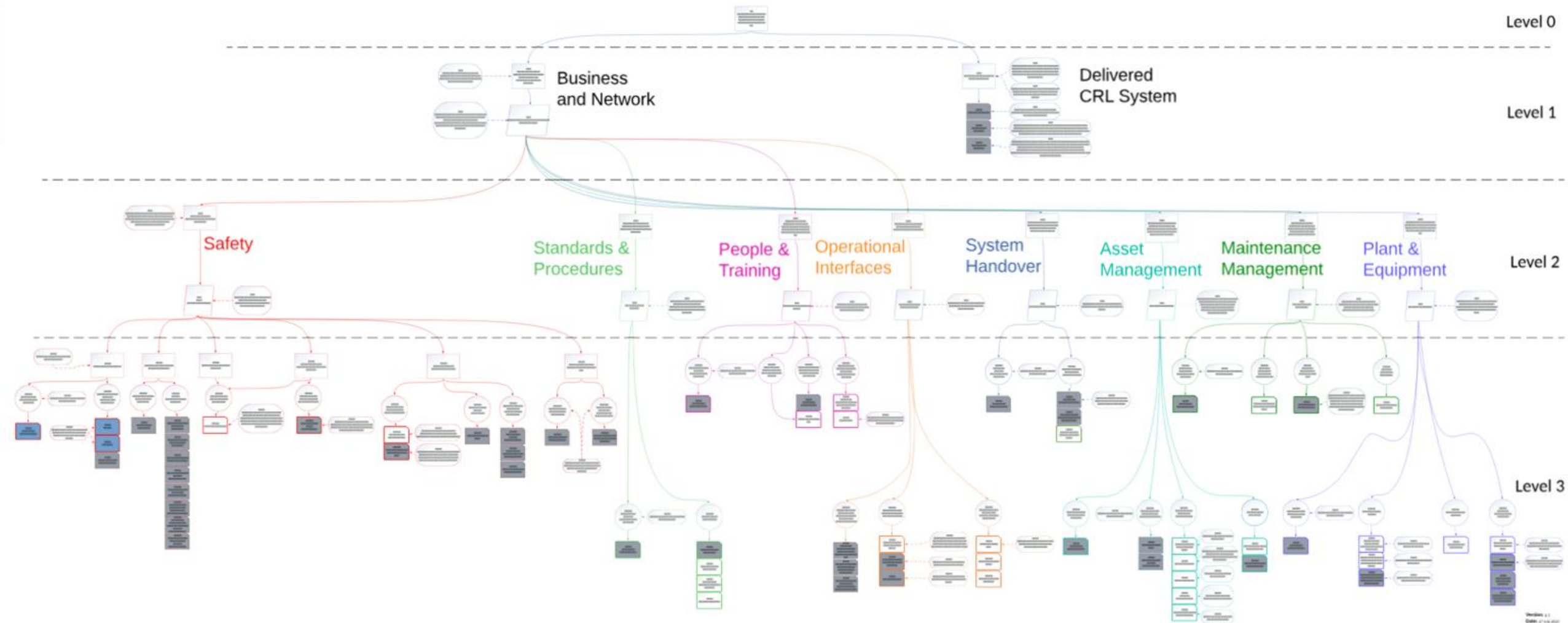
- Used to track the progress of the evidence by colouring each item depending on its status
- Identified gaps in narrative and from that the evidence that would be required to support it

# What did it look like?

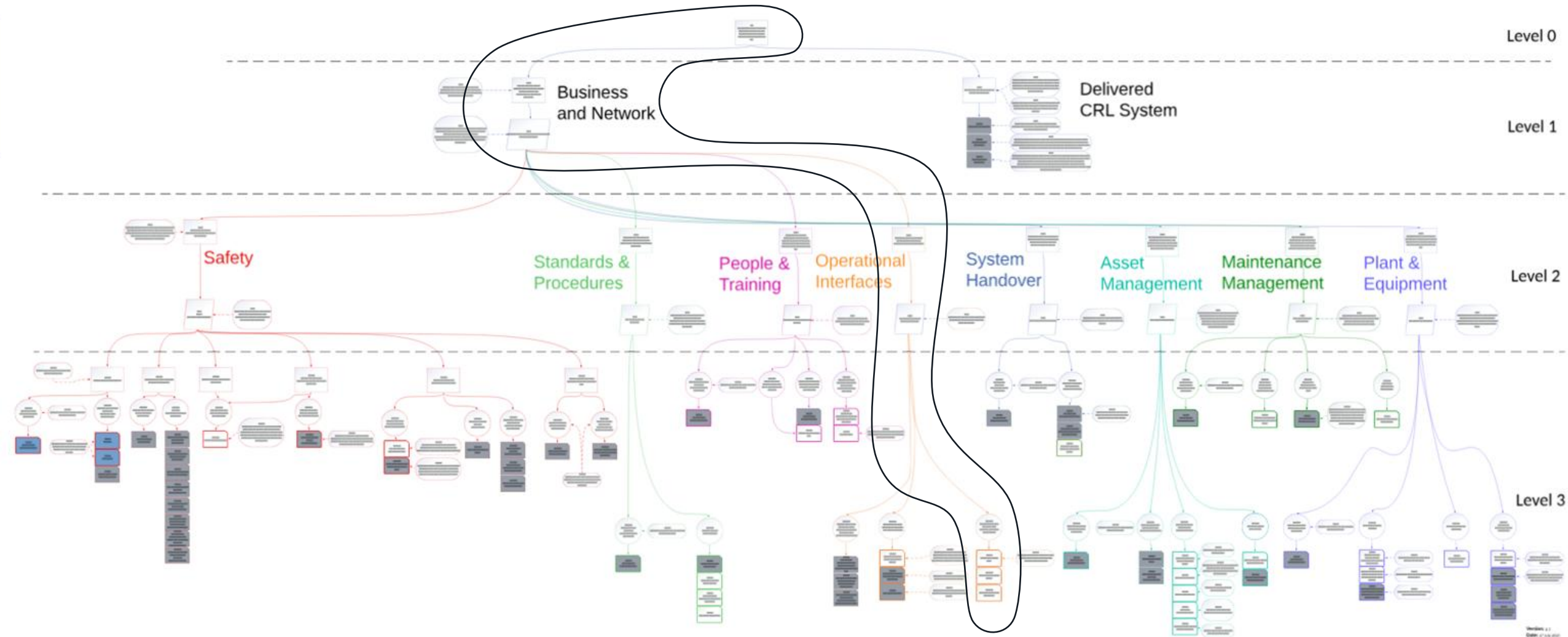




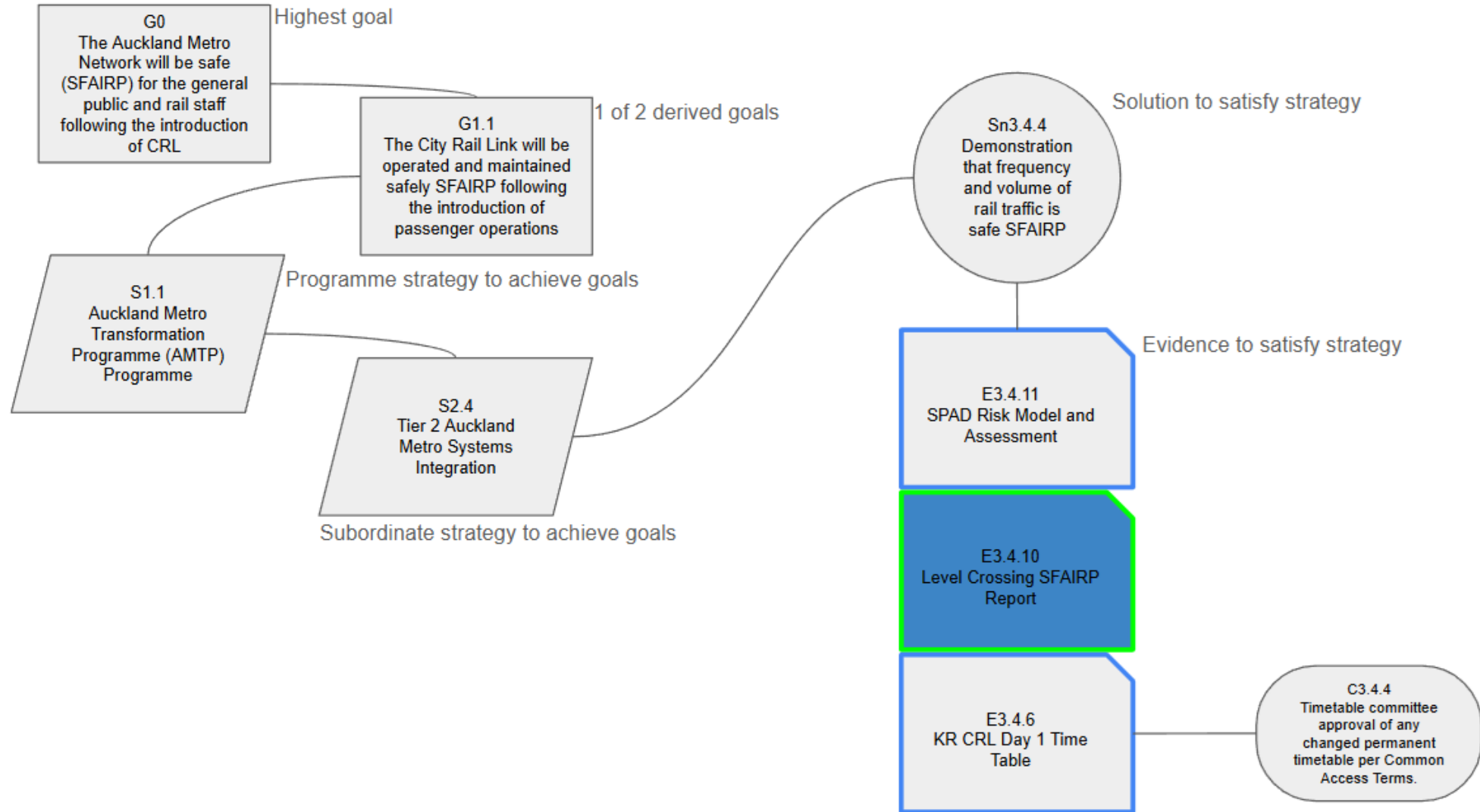
# What did it look like?



# What did it look like?



# What did it look like?



# Benefits of using GSN on CRL

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- **Shared Understanding of Context**
  - Made reasoning and assumptions explicit
  - Explained the entire argument from top to bottom, alongside the required body of evidence
  - Enabled key stakeholder appreciation of outputs delivered outside of their own area
  - Helped both technical and non-technical stakeholders understand assurance cases
  - Enabled early discovery of gaps within the safety argument so they can be addressed
- **Stakeholder Engagement & Agreement**
  - Supported alignment with regulator from day one
  - Became the touchstone document for every engagement on the safety argument
  - Facilitated the transfer of safety risk control items from Link Alliance (LKA) to KiwiRail (KR)
  - Supported the identification of gaps in safety argument for aspects that span inter-organisational responsibility
- **Usability**
  - Easy to use and understand - almost zero learning curve
  - Easy to change

# Summary

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- GSN is a well proven approach to describe the complete scope of a (safety) argument
- Enabled effective definition, collaboration and evolution of the SCV
- Reduced the risk of misalignment of expectations
- The value of using GSN outweighed the effort of developing & managing it
- The power is in its simplicity

However...

- Care must be given on managing the GSN's complexity
- Scrutiny is required to stop it from becoming a self-fulfilling prophecy

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## Questions and Comments

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