34th Annual INCOSE international symposium

hybrid event

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A System Dynamics Model of Organizational Resilience

Outline

- Introduction
- System Dynamics Model
- Findings
- Discussion
- Key Takeaways

Introduction

Resilience is often expressed as behaviour over time

Adversity and recovery

System Dynamics modelling is ideal for resilience

Differential calculus for behaviour over time

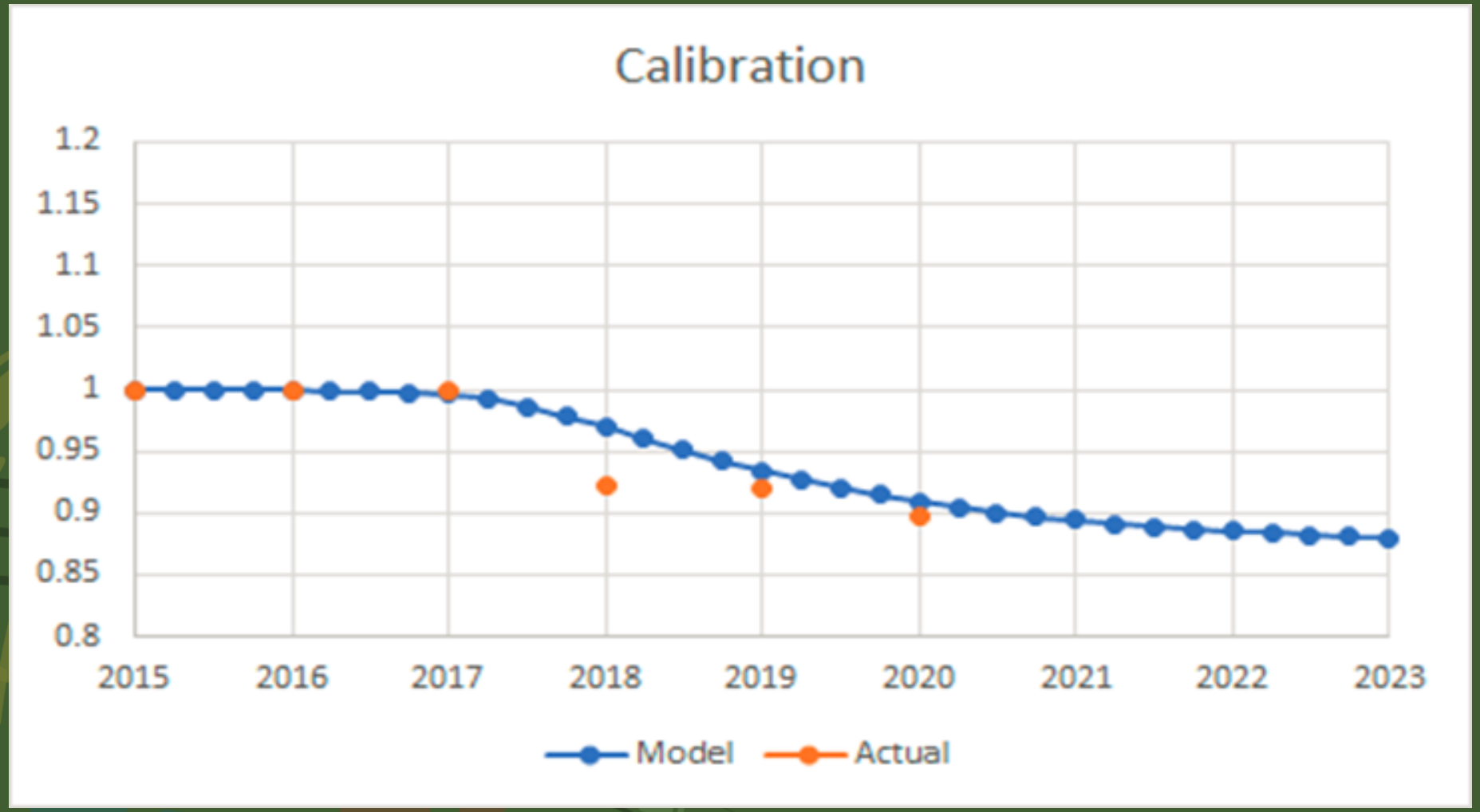
Organizational Resilience Case Study

Scandals, reputation damage, recruiting, retention

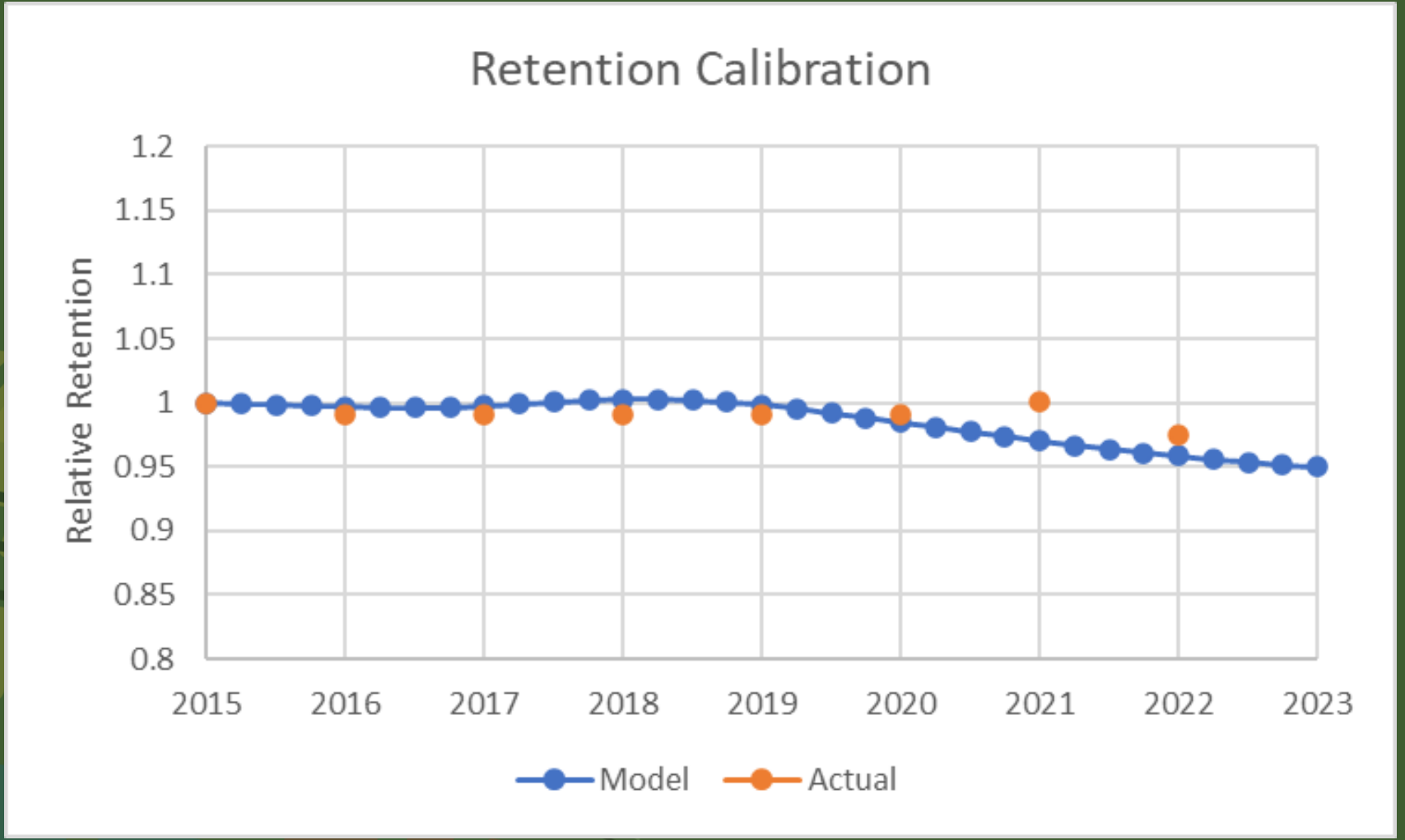
Policies to restore the organization's reputation

Culture change

Behaviour Over Time (Recruiting)



Behaviour Over Time (Retention)



Policies and Programs

- Leader Commitment to Change
- Changing Organizational Practices
- Influencing Policies
- Middle Manager Professional Development
- Promoting Community
- Strengthening Employee Skills

Policies and Programs

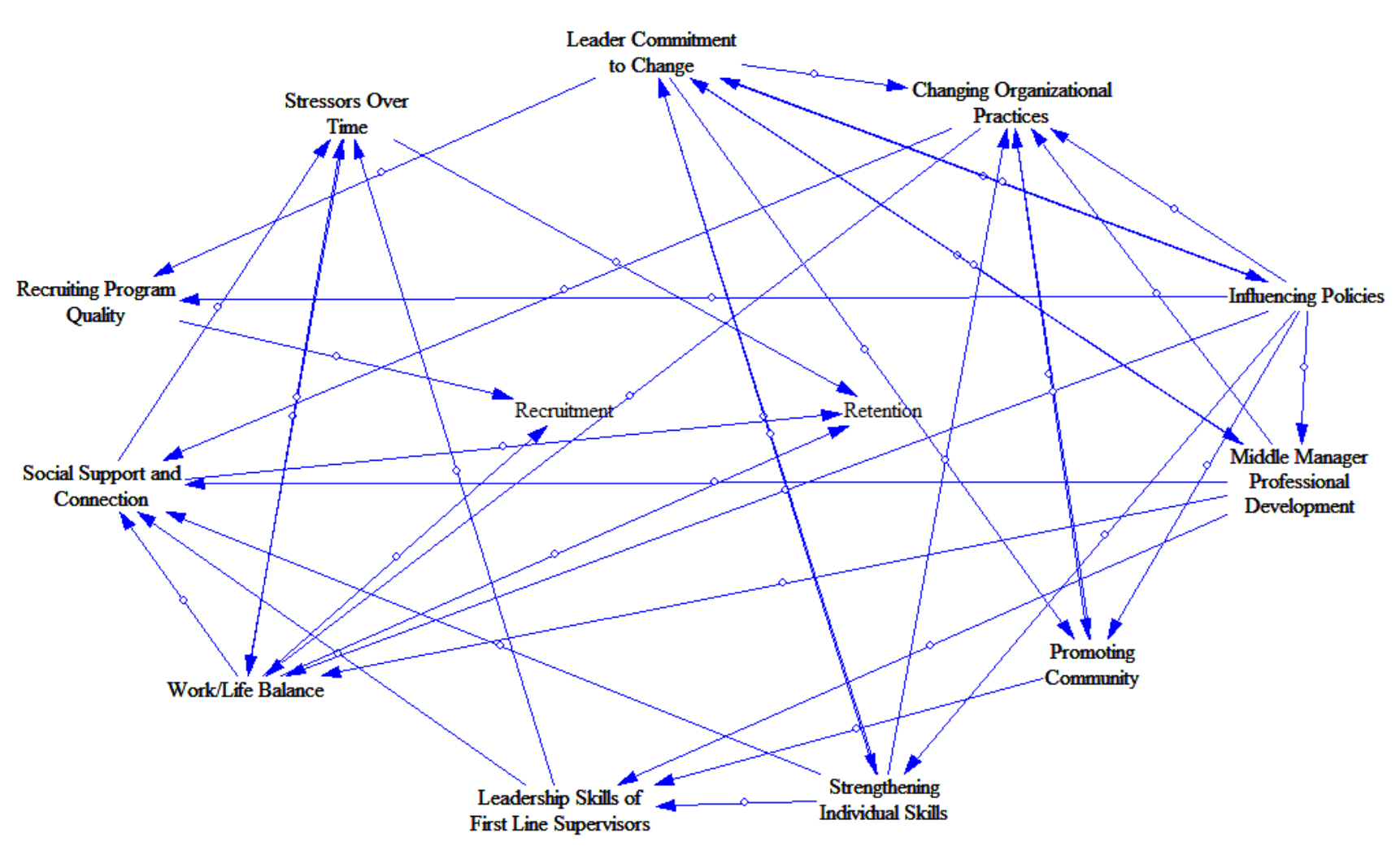
- Leadership Skills of First-Line Supervisors
- Work/Life Balance
- Social Support and Connection
- Recruiting Program Quality
- Stressors Over Time

Causal Structure Matrix

Policies	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Leader Commitment to Change	0	1	1	1	1	1	0	0	0	1	0	0	0
2. Changing Organizational Practices	0	0	0	0	1	0	0	1	1	0	0	0	0
3. Influencing Policies	1	1	0	1	1	1	0	1	0	1	0	0	0
4. Middle Manager Professional Development	1	1	0	0	0	0	1	1	1	0	0	0	0
5. Promoting Community	0	1	0	0	0	1	0	0	0	0	0	0	0
6. Strengthening Individual Skills	1	1	0	0	0	0	1	0	1	0	0	0	0
7. Leadership Skills of First-Line Supervisors	0	0	0	0	0	0	0	0	1	0	-1	0	1
8. Work/Life Balance	0	0	0	0	0	0	0	0	1	0	-1	1	1
9. Social Support and Connection	0	0	0	0	0	0	0	0	0	0	-1	0	1
10. Recruiting Program Quality	0	0	0	0	0	0	0	0	1	0	0	1	0
11. Stressors Over Time	0	0	0	0	0	0	0	-1	0	0	0	0	-1
12. Recruitment	0	0	0	0	0	0	0	0	0	0	0	0	0
13. Retention	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 3. System Dynamics Causal Structure Matrix

Causal Network Diagram



Mathematical Model

$$Q_i(t) = \int_0^t Ci(t)\ dx + Q_i(0)$$

$$C_i(t) = (M_i(t) - Q_i(t - dt)) / Y_i(t)$$

$$M_i(t) = MIN\ (1, G_i(t) \prod_{j=1}^{11} Rji)$$

$$P_j(t) = Q_i(t) / Q_i(0)$$

Projected Behaviour Over Time (Recruiting)

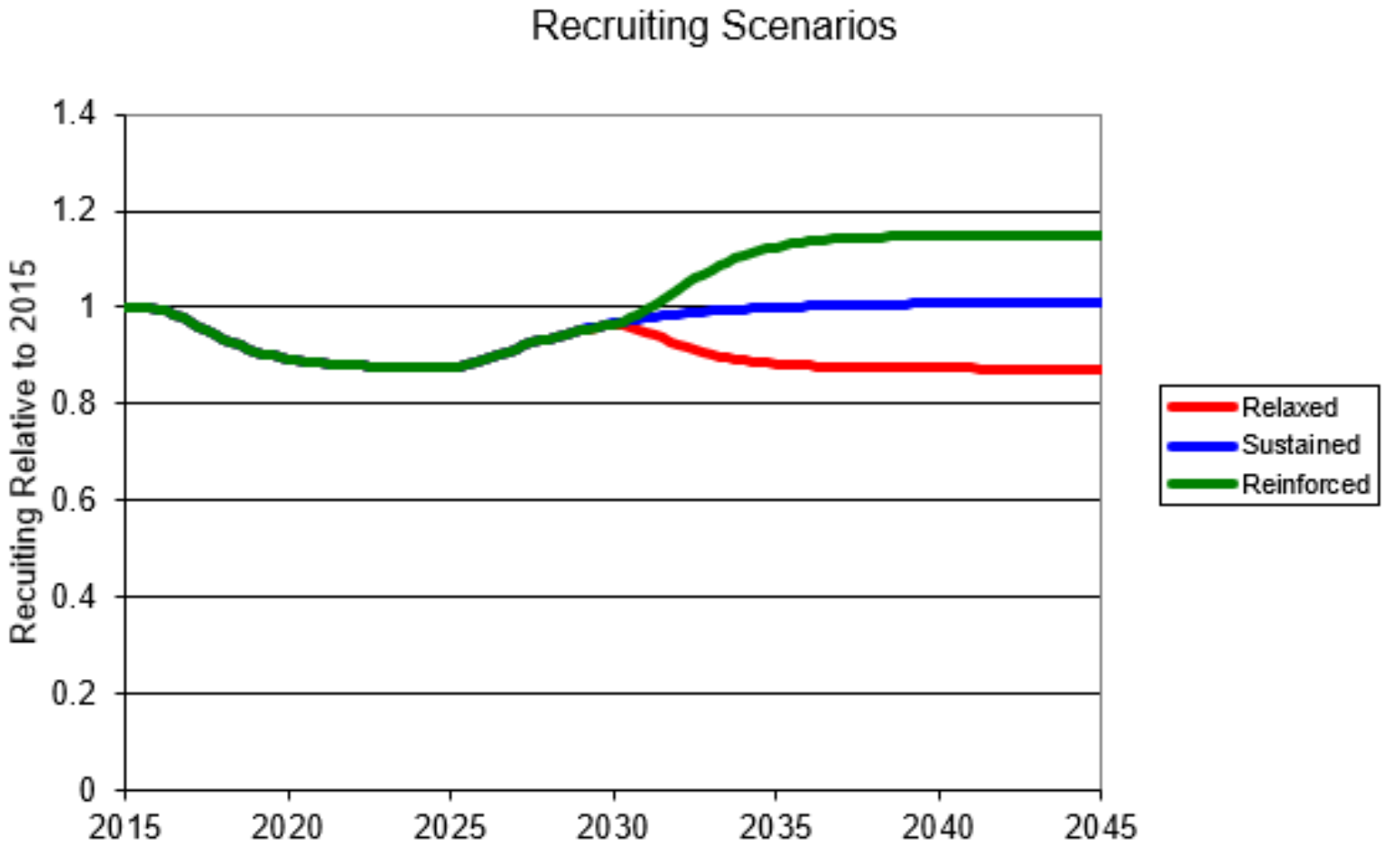


Figure 5: Results of the simulation for recruiting

Projected Behaviour Over Time (Retention)

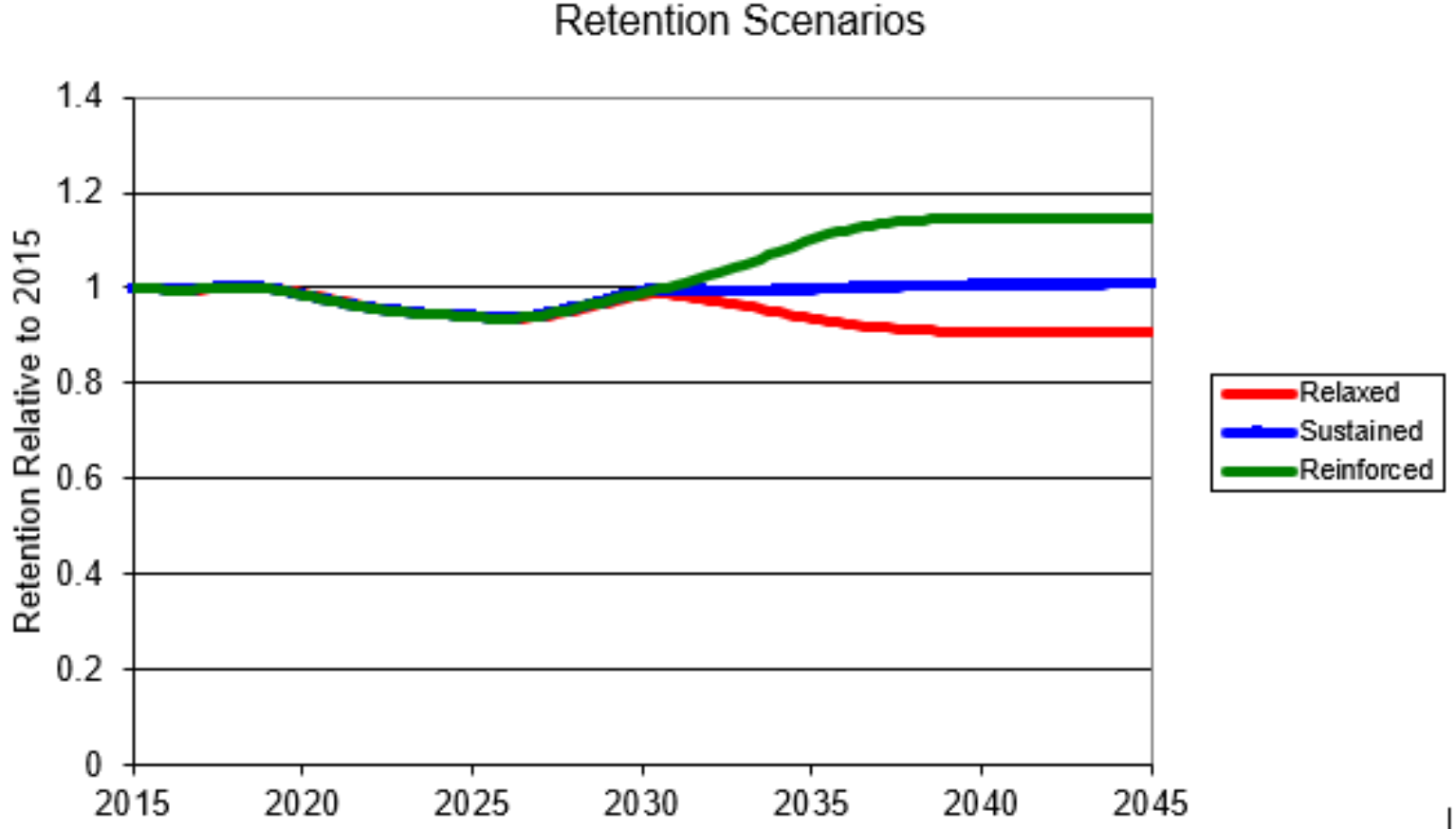


Figure 6: Results of the simulation for retention

Discussion

- System Dynamics Modelling
  - *Strengths*
    - *Behaviour over time*
    - *Causal relationships*
    - *Quantitative and qualitative*
  - *Limitations*
    - *Assumptions*
    - *Oversimplification*
    - *Unforeseen events*

Discussion

- Organizational Change and Cultural Transformation
  - *Could face resistance*
    - *Ingrained norms*
    - *Conflicting priorities*
    - *Unintended consequences*
  - *Sustained effort and patience*

Discussion

- Validation
  - *Crucial for model accuracy*
  - *Recognize inherent uncertainty*
  - *Maintain critical mindset*
  - *Incorporate diverse evidence and expertise*
  - *Robust risk management*
  - *Continuous refinement*

Discussion

- Model Value and Future Projections
  - *Despite challenges SD model is valuable for*
    - *Projecting future scenarios*
    - *Supporting decision making*

Three Key Takeaways

- Leadership and Organizational Resilience
  - *Leaders must commit to culture change*
  - *Culture change takes sustained and patient effort*
  - *Takes time to alter deeply ingrained beliefs*

Three Key Takeaways

- System Dynamics Modeling
  - *Effective for studying resilience*
  - *Mixes quantitative and qualitative*
  - *Suitable for concepts like leadership*
  - *Handles delays and inertia*

Three Key Takeaways

- Recruiting and Retention Impact
  - *Policies implemented in 2023*
  - *Worse before better*
  - *Expect to see improvement in 2026*
  - *Return to 2015 levels in 2030*
  - *Project long-term future scenarios after 2030*

You can contact me at any time at ivan.taylor@incose.net

Thank you for listening
Questions and Comments?

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