



International Congress of Applied Psychology

Florence, Italy

24 July 2026

Dr Tony Bannister-Tyrrell, PhD



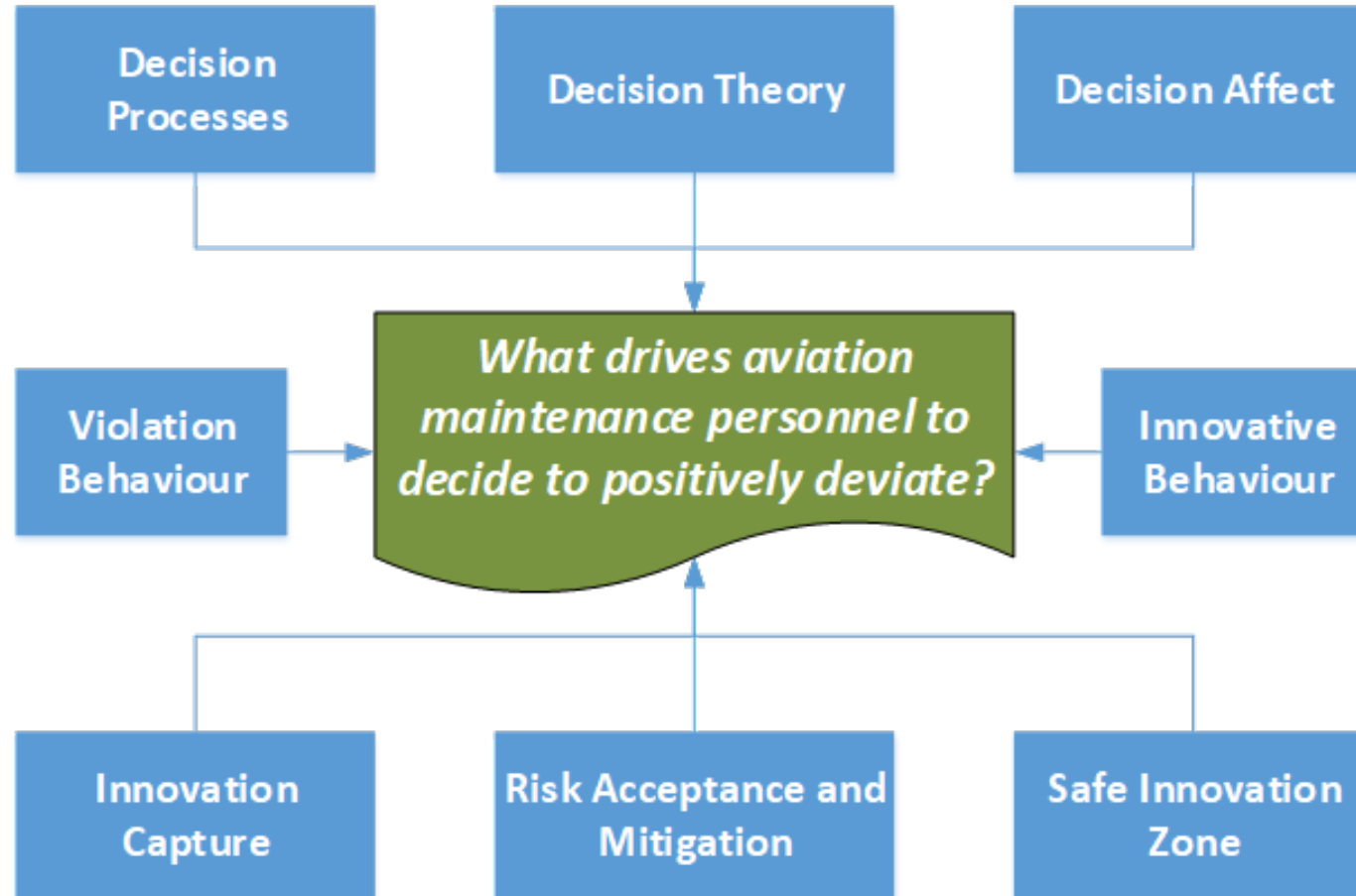
Innovative
Utility

Positive deviance: Analysis from a time-lapse study of aviation maintenance decision making

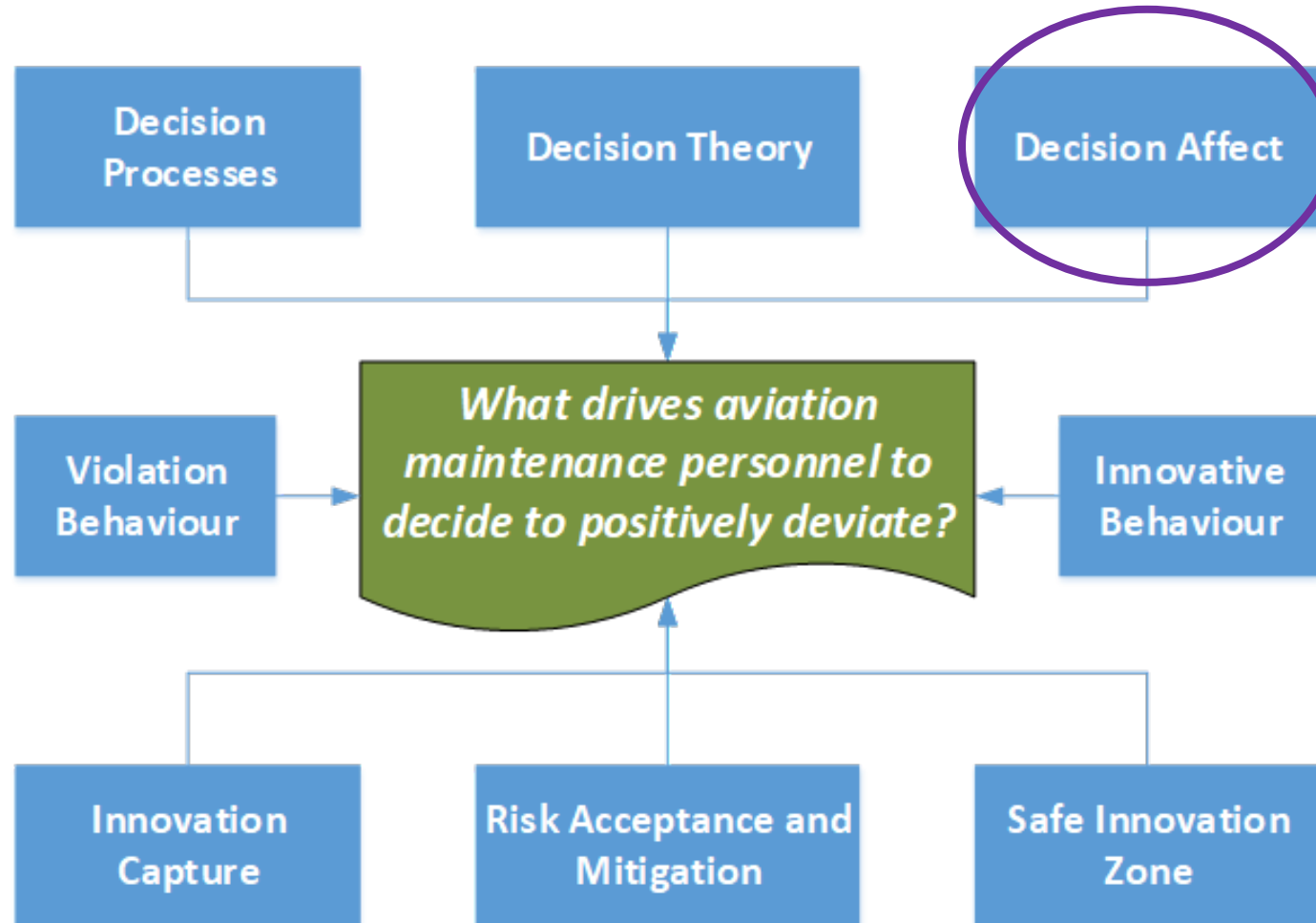
Capturing, Codifying, and Controlling innovative violations by applying new thinking to the drivers of positive deviance behaviour



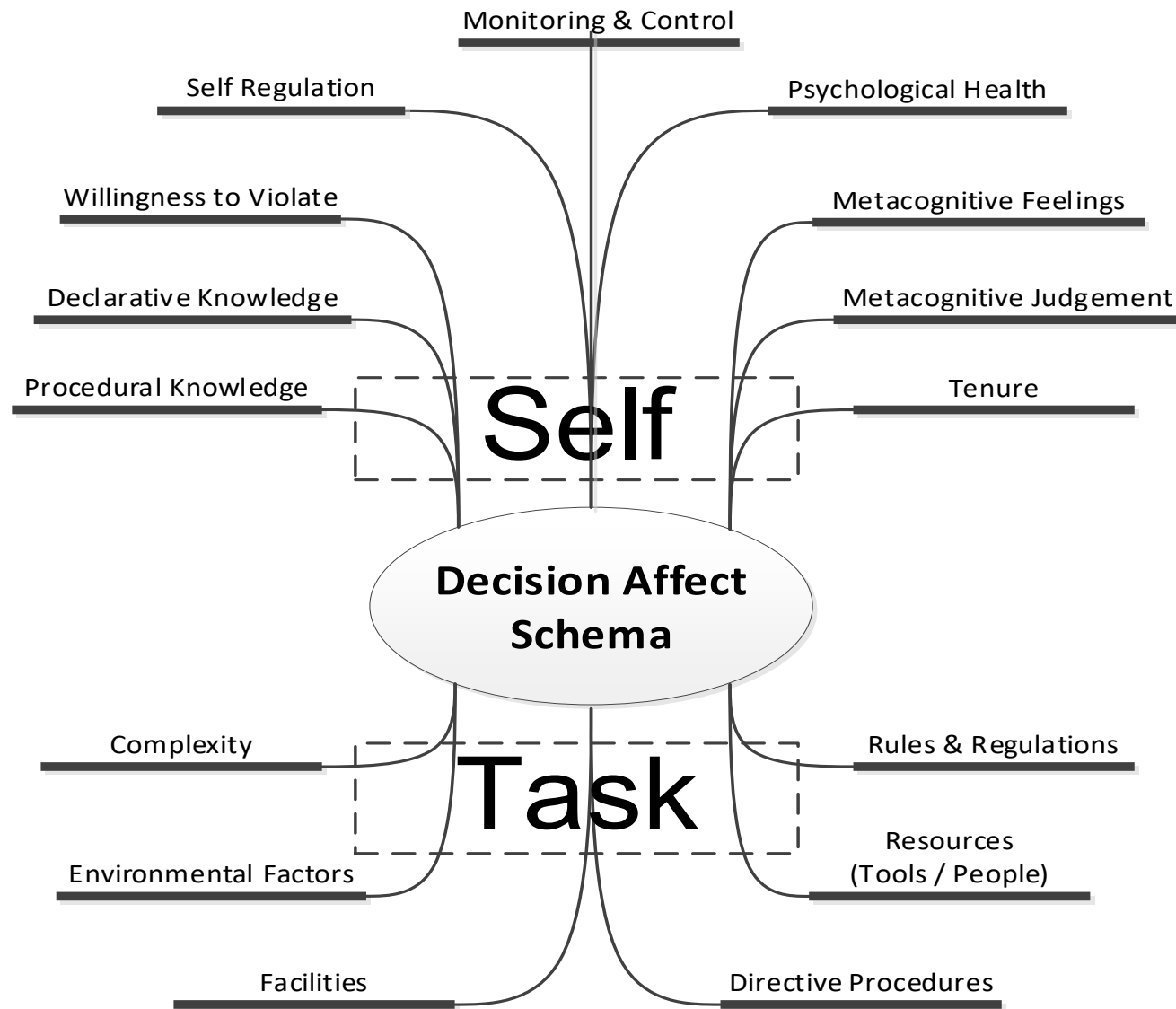
It started with a question



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Decision Affect Schema (DAS)



The DAS formed the basis of the Maintenance Innovation Survey, where 4 survey items were developed for each of the 15 DAS elements.



Overview of PhD research

Quantitative instruments

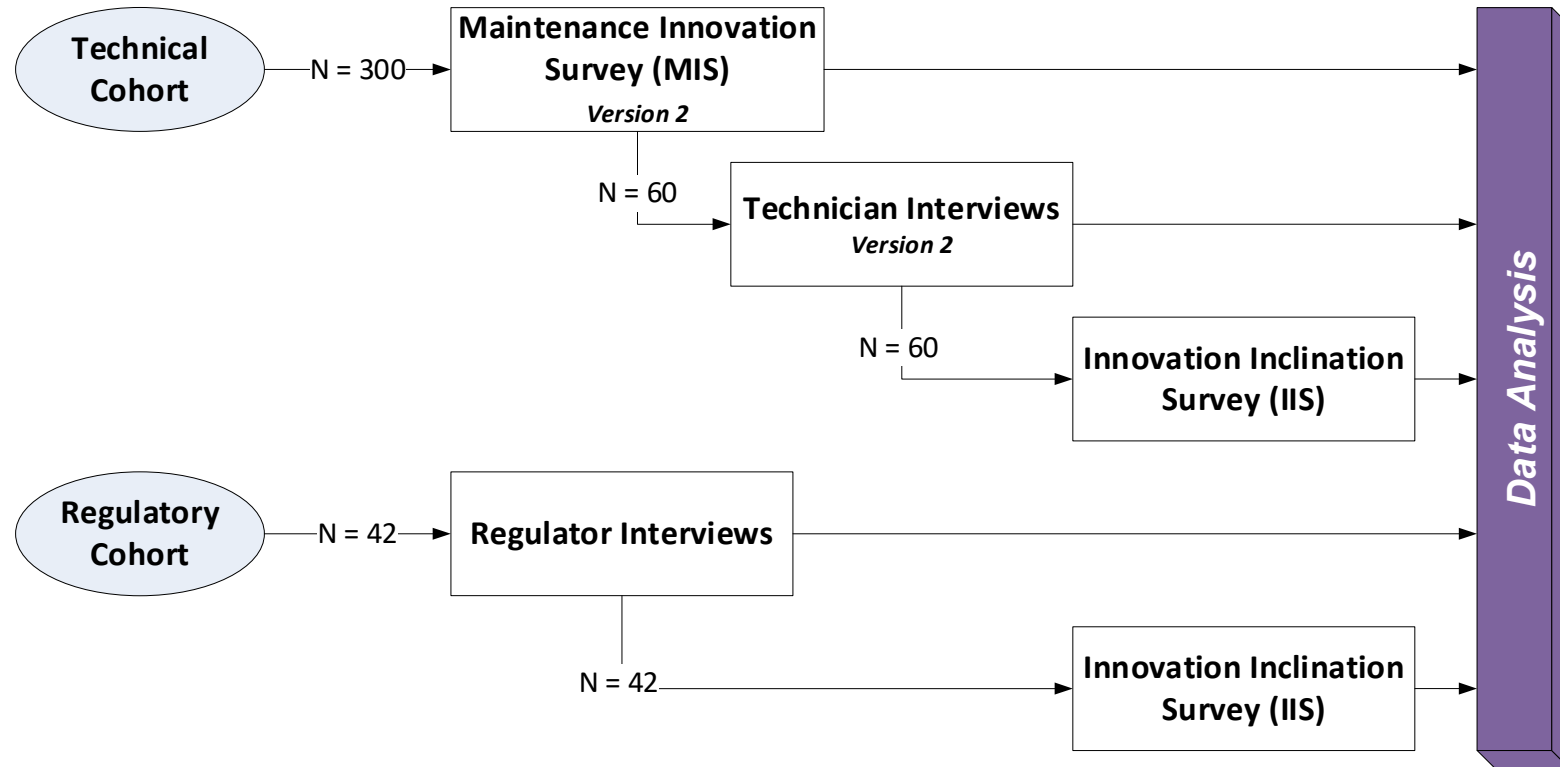
- Maintenance Innovation Survey
- Innovation Inclination Survey

Qualitative instruments:

- Technical Maintenance Cohort interviews
- Regulatory and Safety Management Cohort interviews

Data collected between 2016–2017

Conducted as a cross-sectional activity involving Australian aircraft maintainers, aviation regulators, and aviation safety personnel



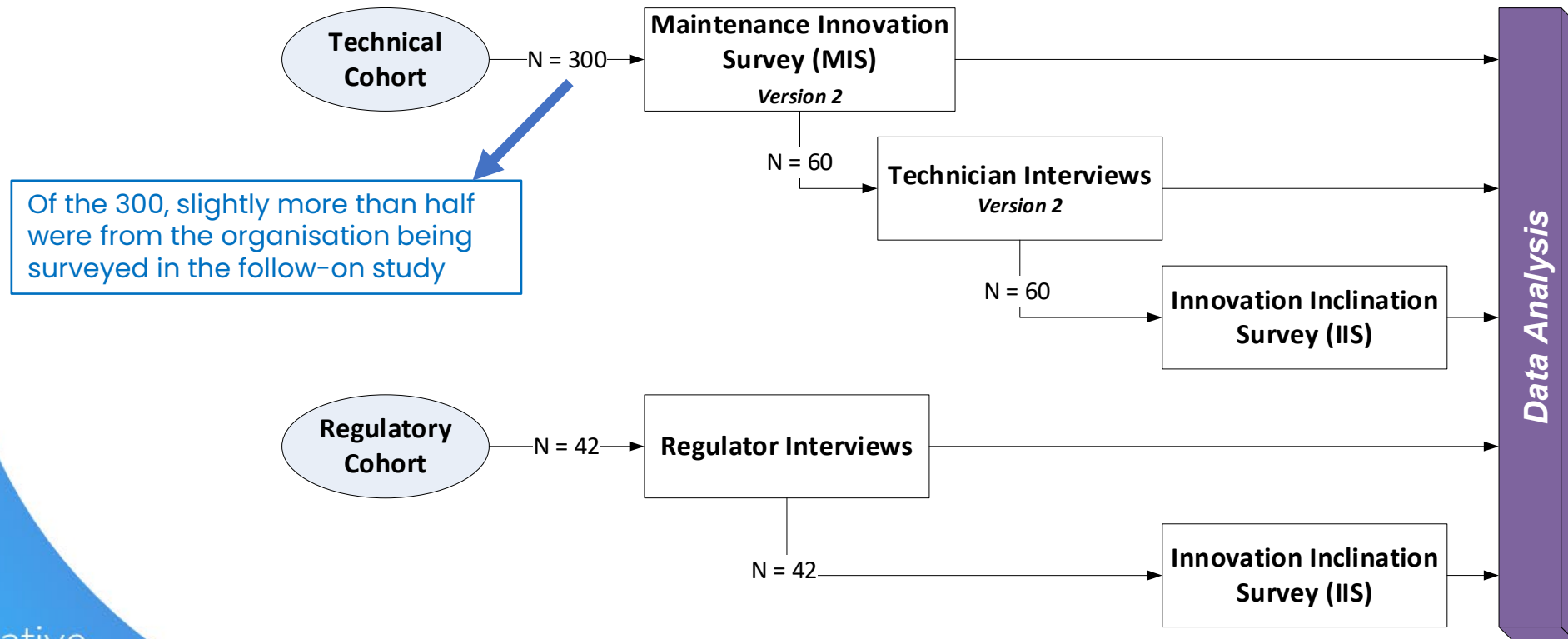
Overview of PhD research

Quantitative instruments

- Maintenance Innovation Survey
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Qualitative instruments:

- Technical Maintenance Cohort interviews
- Regulatory and Safety Management Cohort interviews



Genesis of the follow-on study (2025)

Operating environment changes:

- Operational imperatives had significantly changed
- Operational tempo remained high

Regulatory environment changes:

- A fundamental change from a technical airworthiness regulatory framework
- Implementation of EASA aligned methodology

Aircraft are 8 years older:

- Increased maintenance impost
- 4 aircraft types were involved
- All were in operational service at the time of the original PhD research
- All were past their anticipated mid-life point



Conduct of follow-up research

Follow-up research question: *Do attitudes towards innovative maintenance change in response to organisational and/or operational changes?*

Research instrument: *Maintenance Innovation Survey (from initial research activity)*

Participant engagement: *112 participants
data collected in November 2025*

Observation snapshots: *Efficacy of maintenance publications
Compliance
Willingness to innovate*



Aviation maintenance practices
Validation through outcomes-based research

Maintenance Innovation Survey

Ethics notification:

The information collected from survey responses will only be used as a collective data set and will not be used to identify individual respondents.

Age (last birthday):

Gender:

N/A

Date completing survey:

Trade:

Mechanical

Avionics

Structures

Other

Aviation industry experience: (including training):

<5yrs

5-10yrs

11-20yrs

>20yrs

On-type tenure (on current airframe):

<2yrs

2-5yrs

6-10yrs

>10yrs

Are you a Maintenance Supervisor or LAME

Yes

No

How many years have you been a Maintenance Supervisor or LAME?

What is your highest level qualification?

Trade Certificate

Craft Certificate

Certificate II

Certificate III

Certificate IV

Diploma

Bachelor's Degree

Graduate Cert

Master's Degree

☒ Using the scale between 'Strongly disagree' and 'Strongly agree' indicate your response towards each statement by placing a tick the applicable box

Strongly disagree

Strongly agree

1.

All technical training required for my current role has been provided and undertaken.

Strongly disagree

Strongly agree

2.

Maintenance procedures and instructions are accurately described in the approved technical manuals.

Strongly disagree

Strongly agree

3.

When situations change I choose to adjust my actions to ensure the maintenance task is completed on-time.

Strongly disagree

Strongly agree

4.

There are always better ways of doing a task than that described in the maintenance publications.



Innovative
Utility

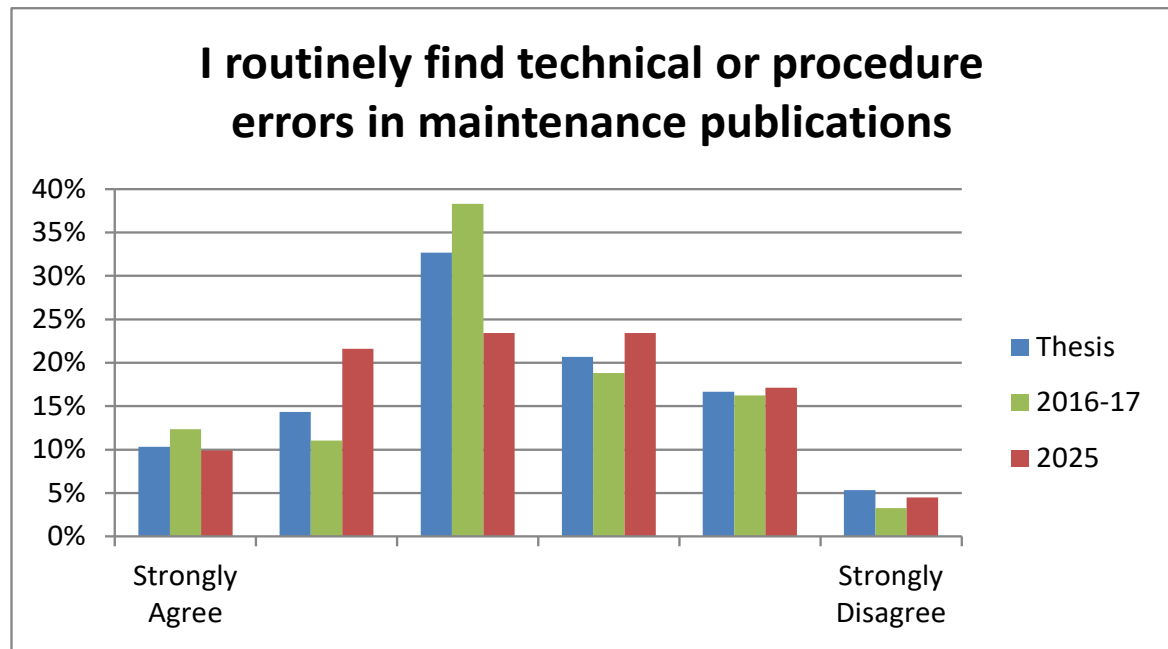
Observation 1

Efficacy of maintenance publications

- Comprised:**
- M41:** I routinely find technical and procedure errors in maintenance publications*
 - M49:** Within the past 6 months I have chosen to complete a maintenance activity when the maintenance publication was unavailable*
 - M56:** I routinely refer to an informal source to conduct maintenance activities*

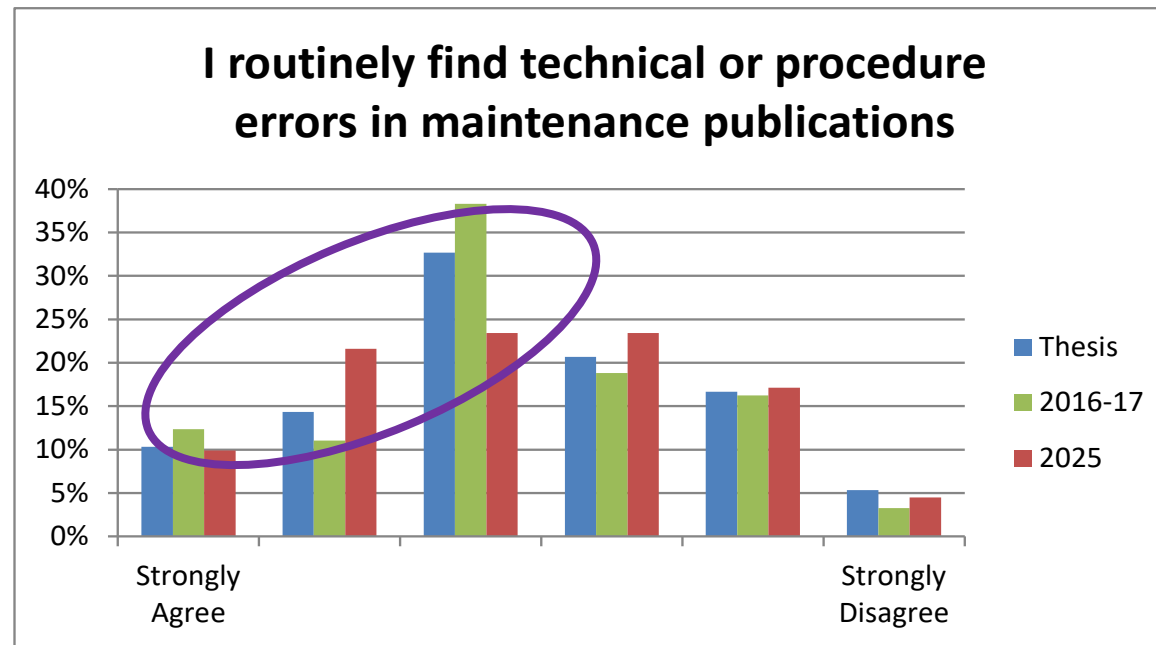


Efficacy of maintenance publications



Efficacy of maintenance publications

M41: *I routinely find technical and procedure errors in maintenance publications*



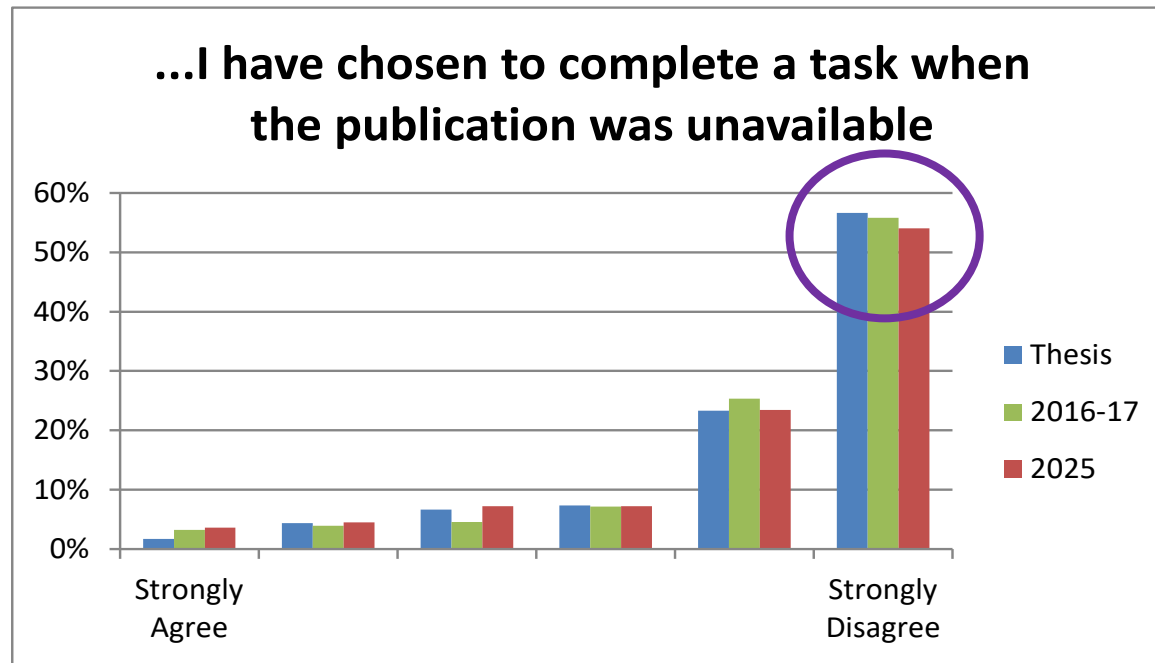
There are some changes between the 2016-17 and 2025 data



Efficacy of maintenance publications

M41: *I routinely find technical and procedure errors in maintenance publications*

M49: *Within the past 6 months I have chosen to complete a maintenance activity when the maintenance publication was unavailable*



A slight decrease in Strongly Disagree

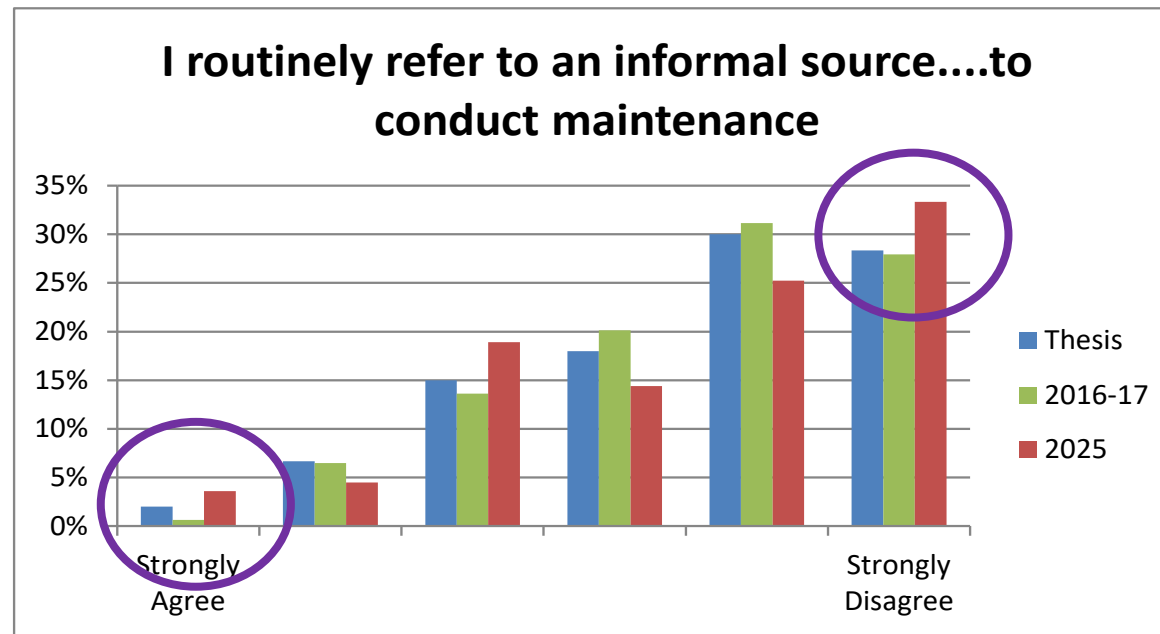


Efficacy of maintenance publications

M41: *I routinely find technical and procedure errors in maintenance publications*

M49: *Within the past 6 months I have chosen to complete a maintenance activity when the maintenance publication was unavailable*

M56: *I routinely refer to an informal source (personal notebook or aide memoire) to conduct maintenance activities*



Increases in both Strongly Agree and Strongly Disagree

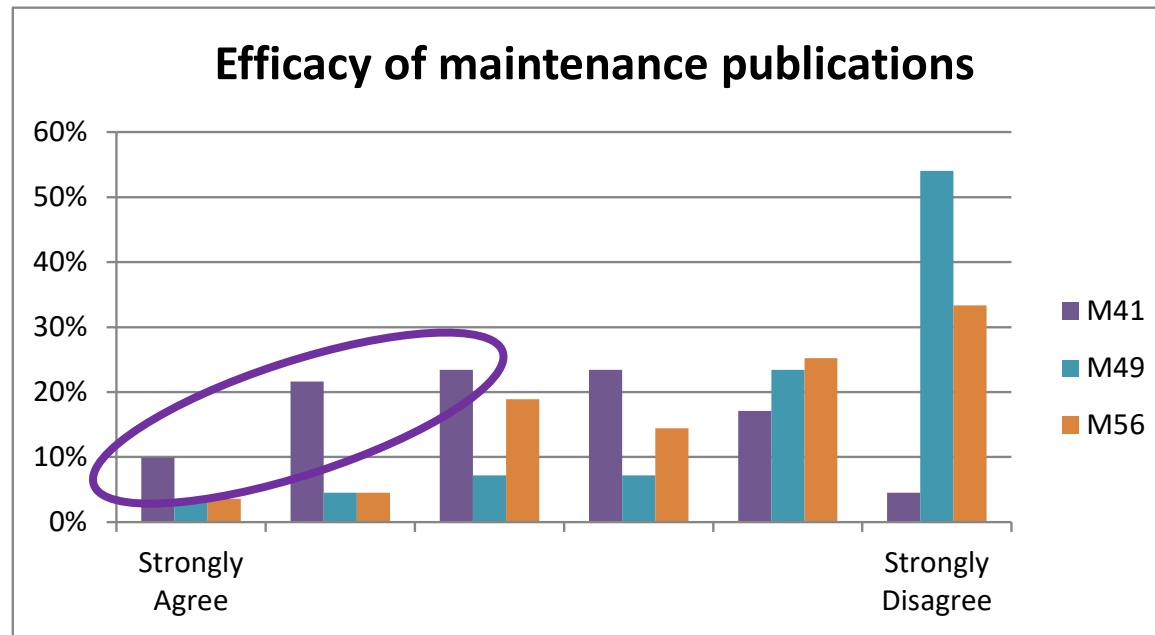


Efficacy of maintenance publications

M41: *I routinely find technical and procedure errors in maintenance publications*

M49: *Within the past 6 months I have chosen to complete a maintenance activity when the maintenance publication was unavailable*

M56: *I routinely refer to an informal source (personal notebook or aide memoire) to conduct maintenance activities*



53% indicated a positive response to routinely finding technical and procedure errors in maintenance publications.

It is therefore not surprising that maintenance personnel are using other means for task completion.



Observation 2

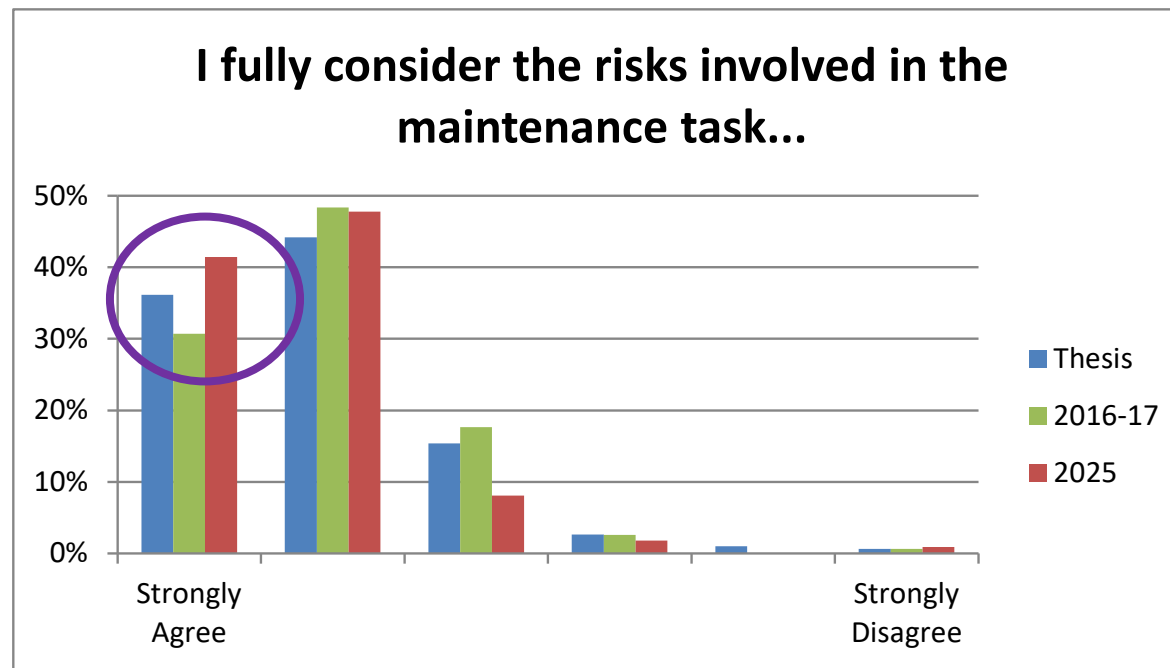
Compliance

- Comprised:**
- M13:** I fully consider the risks involved in the maintenance task prior to commencing the task*
 - M18:** Adherence to rules and regulations is a key message from the organisation's management*
 - M38:** I feel it can be problematic to apply innovation to aviation maintenance tasks*
 - M53:** I strictly adhere to the maintenance publications*



Compliance

M13: *I fully consider the risks involved in the maintenance task prior to commencing the task*



Stronger results than the 2016-17 data



Compliance

M13: I fully consider the risks involved in the maintenance task prior to commencing the task

M18: *Adherence to rules and regulations is a key message from the organisation's management*



Similar results between 2016-17 and 2025 data

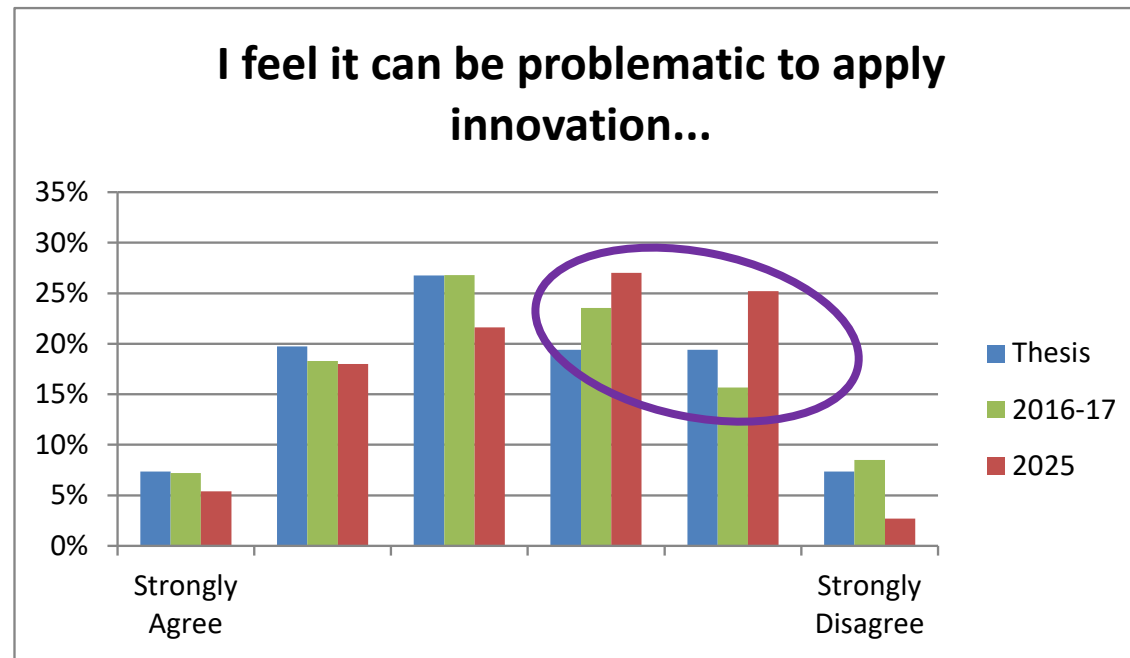


Compliance

M13: I fully consider the risks involved in the maintenance task prior to commencing the task

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M38: *I feel it can be problematic to apply innovation to aviation maintenance tasks*



Demonstrates a leaning towards innovation in the 2025 data



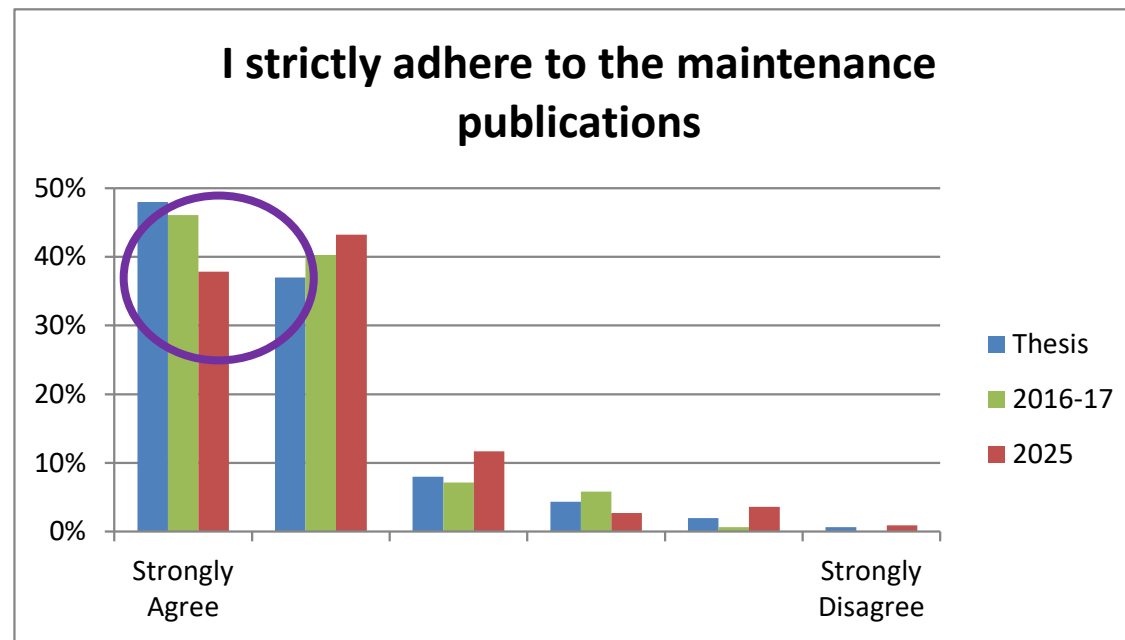
Compliance

M13: I fully consider the risks involved in the maintenance task prior to commencing the task

M18: Adherence to rules and regulations is a key message from the organisation's management

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M53: *I strictly adhere to the maintenance publications*



Less than 40% Strongly Agreed to strict compliance with the maintenance publications



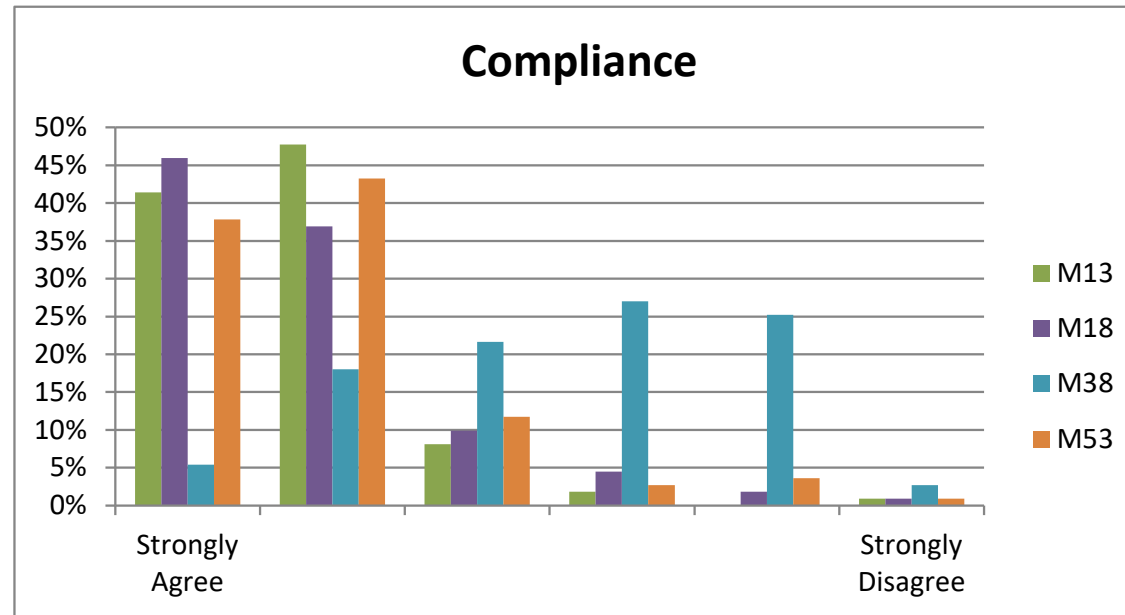
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Aviation maintenance is built upon a compliance framework.
Whilst results are generally positive, there are significant data points for those that disagree.



Observation 3

Willingness to innovate

Comprised:

M4: *There are always better ways of doing a task than that described in the maintenance publications*

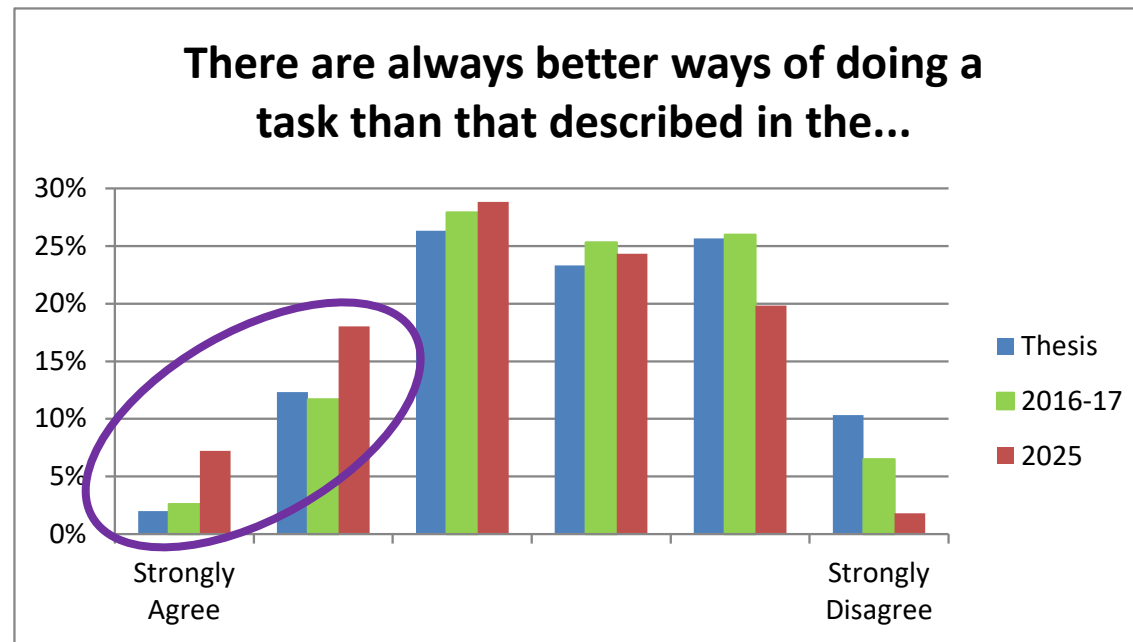
M9: *My supervisor or manager encourages me to look for better ways to do maintenance tasks than those described in the maintenance publications*

M21: *I feel that the organisation I work for values innovation*



Willingness to innovate

M4: *There are always better ways of doing a task than that described in the maintenance publications*



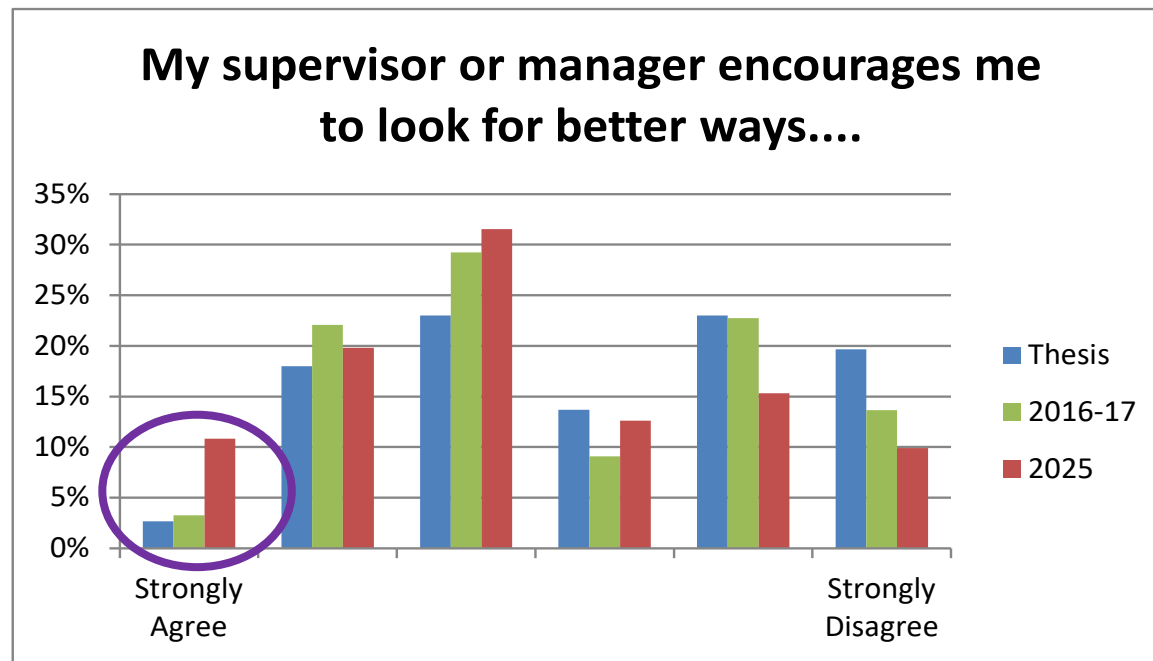
Significantly more positive responses than the 2016-17 data



Willingness to innovate

M4: There are always better ways of doing a task than that described in the maintenance publications

M9: *My supervisor or manager encourages me to look for better ways to do maintenance tasks than that described in the maintenance publications*



A significantly increased response than the 2016-17 data

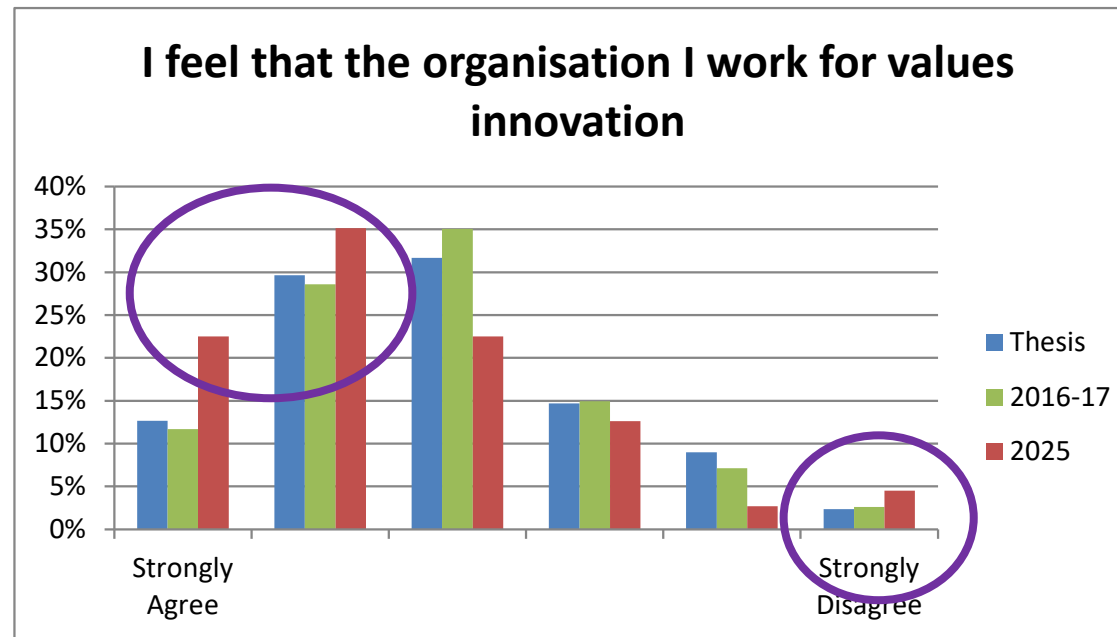


Willingness to innovate

M4: There are always better ways of doing a task than that described in the maintenance publications

M9: My supervisor or manager encourages me to look for better ways to do maintenance tasks than that described in the maintenance publications

M21: *I feel that the organisation I work for values innovation*



Increased Strongly Agree responses and an increase in Strongly Disagree responses

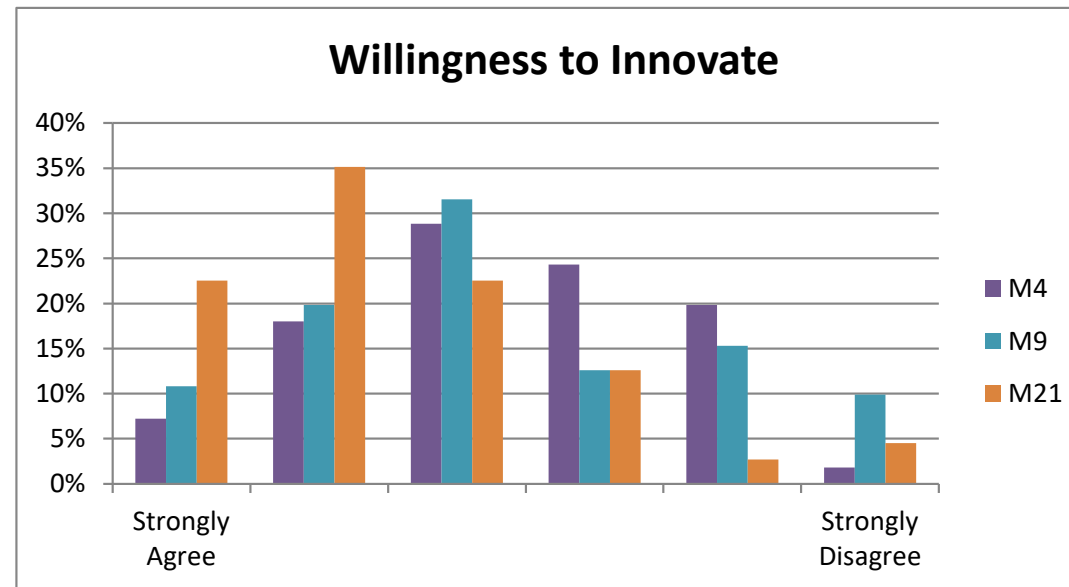


Willingness to innovate

M4: There are always better ways of doing a task than that described in the maintenance publications

M9: My supervisor or manager encourages me to look for better ways to do maintenance tasks than that described in the maintenance publications

M21: I feel that the organisation I work for values innovation



The key here is to understand where an innovation crosses the line to becomes a violation

- 54% responded positively to doing a task in a better way than that described in the maintenance publication
- 62% responded positively that their supervisor encouraged them to look for better ways to do maintenance
- 80% responded positively that the organisation they work for values innovation



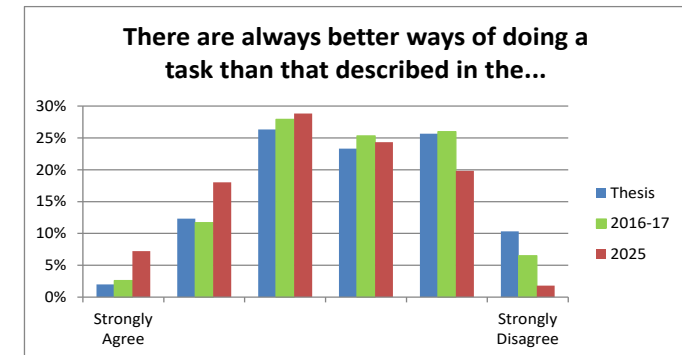
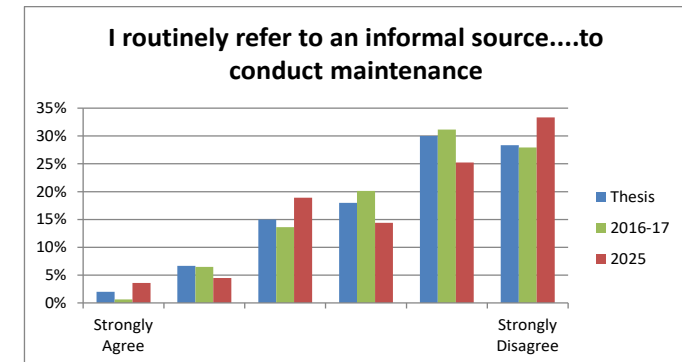
Answering the research question

Do attitudes towards innovative maintenance change in response to organisational and/or operational changes?

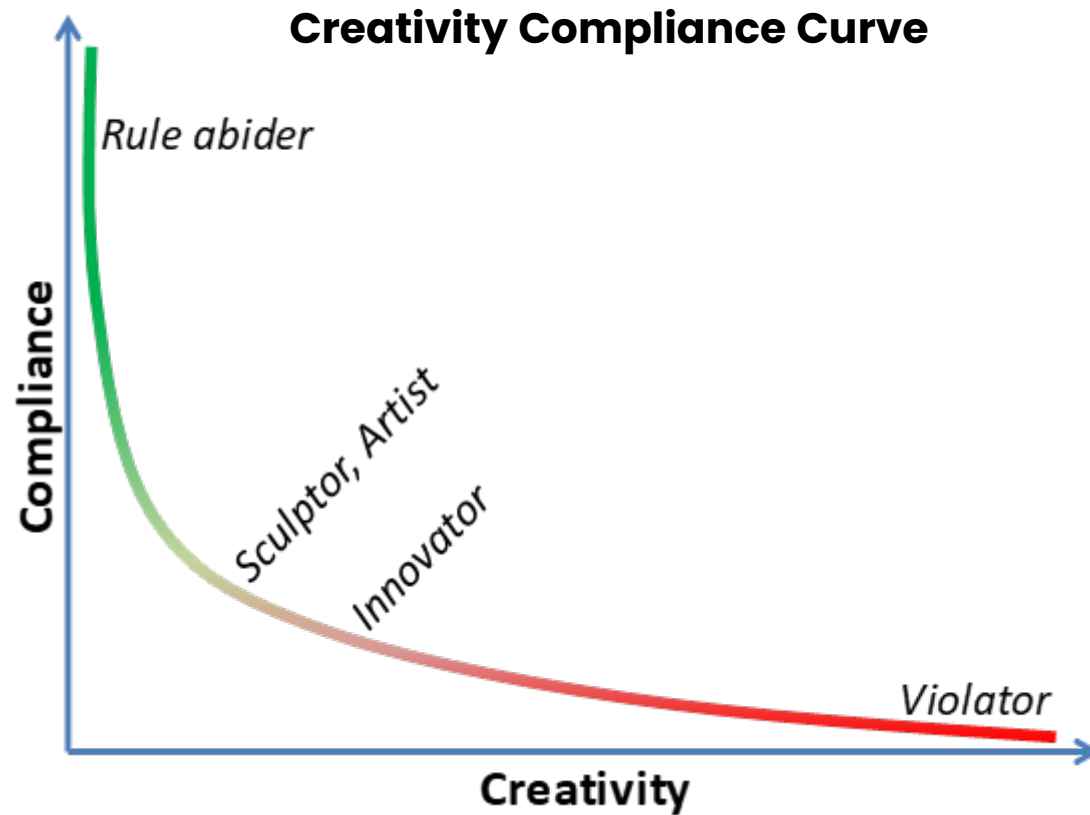
The follow-up research activity suggests that aviation maintenance personnel continue to preference innovative approaches to maintenance. The data would further suggest that positive deviance behaviours continue to exist and that therefore, the potential exists for uncontrolled positive deviance behaviours to transition into violation outcomes.

Therefore:

- *Violations go unrecorded and unreported*
- *Maintenance certifications are incomplete, inaccurate or potentially/wilfully fraudulent*
- *Risk decisions are made by individuals who may not have sufficient competency or authority to make such decisions*
- *Publication and procedure errors aren't corrected – they are simply ignored*
- *Deviant behaviours become organisational norms*
- *Traceability of procedure deviance is non-existent*



Implications for organisational psychology



The conceptualised **Creativity Compliance Curve** provides a prediction of where an innovator would be positioned within a 'rule abider – violator' continuum.

This concept of thinking as a creative endeavour was previously espoused by Sir Frederic Bartlett (Bartlett, 1958¹) in his chapter on the artist's thinking. Bartlett describes the artist as not always conforming to the norms, but rather adapting and manipulating the conventions and rules to fit the ideas and actions towards an outcome that best serves.

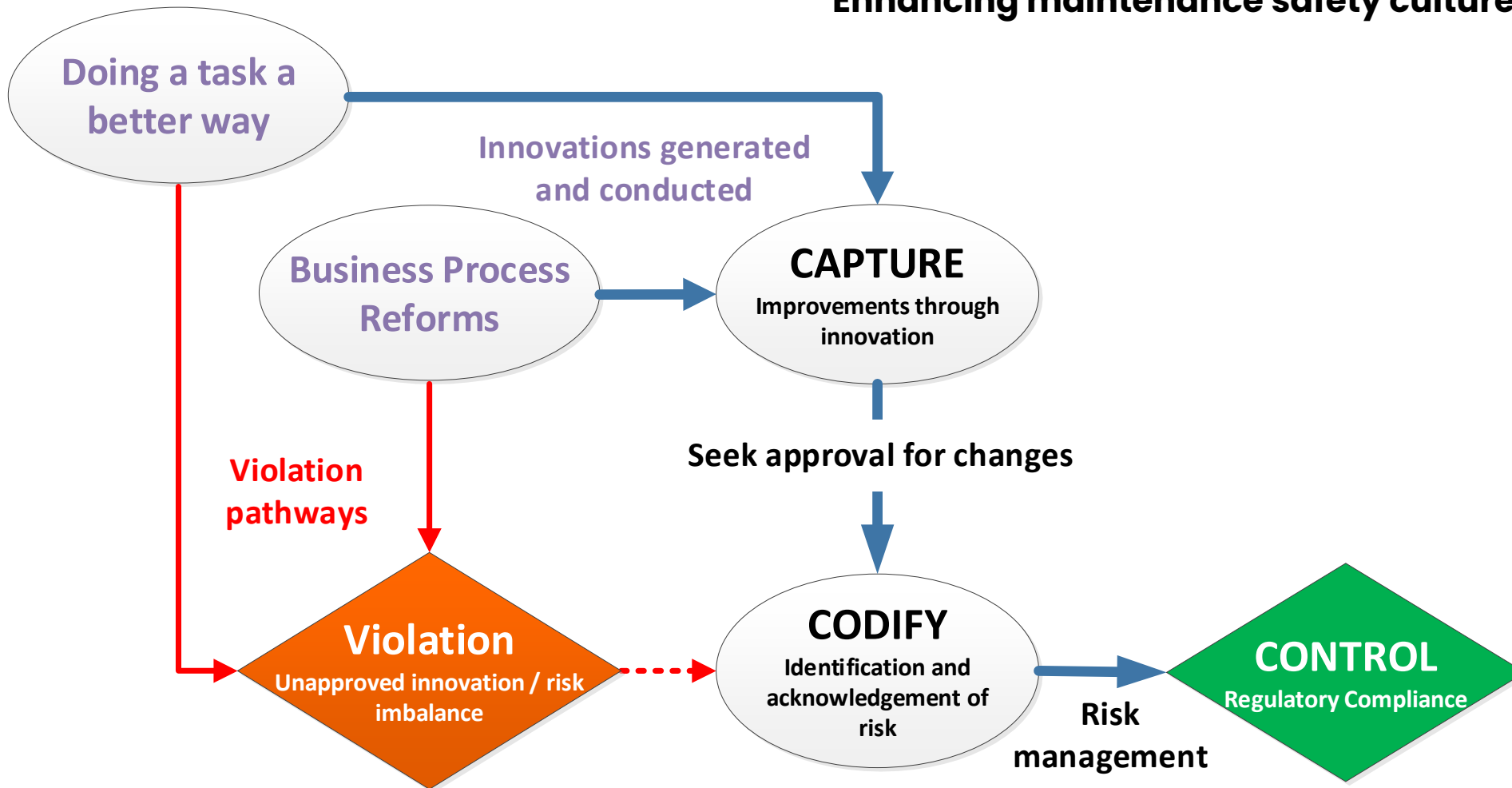
This model, derived from analysed results from the PhD data—and in reference to Bartlett (1958)—depicts the delineation between compliance and creativity.

Arbitrarily positioning the 'innovator' along the continuum identifies the need for an effective barrier that prevents positive deviance decisions (to benefit from creative and innovative behaviours) from becoming violations.

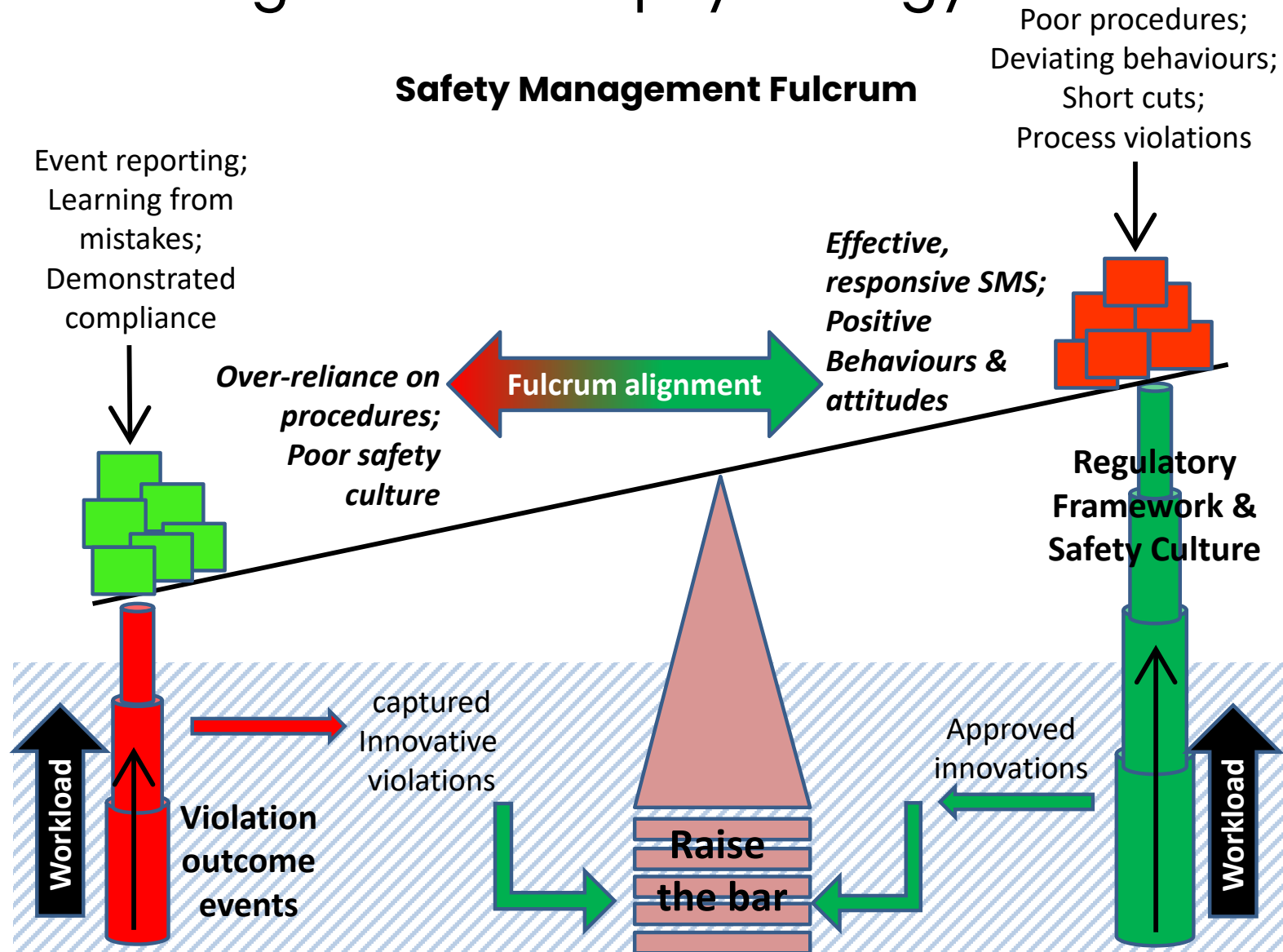
¹ Bartlett, F. (1958). *Thinking: An experimental and social study*. Woking, London: Allen and Unwin

Implications for organisational psychology

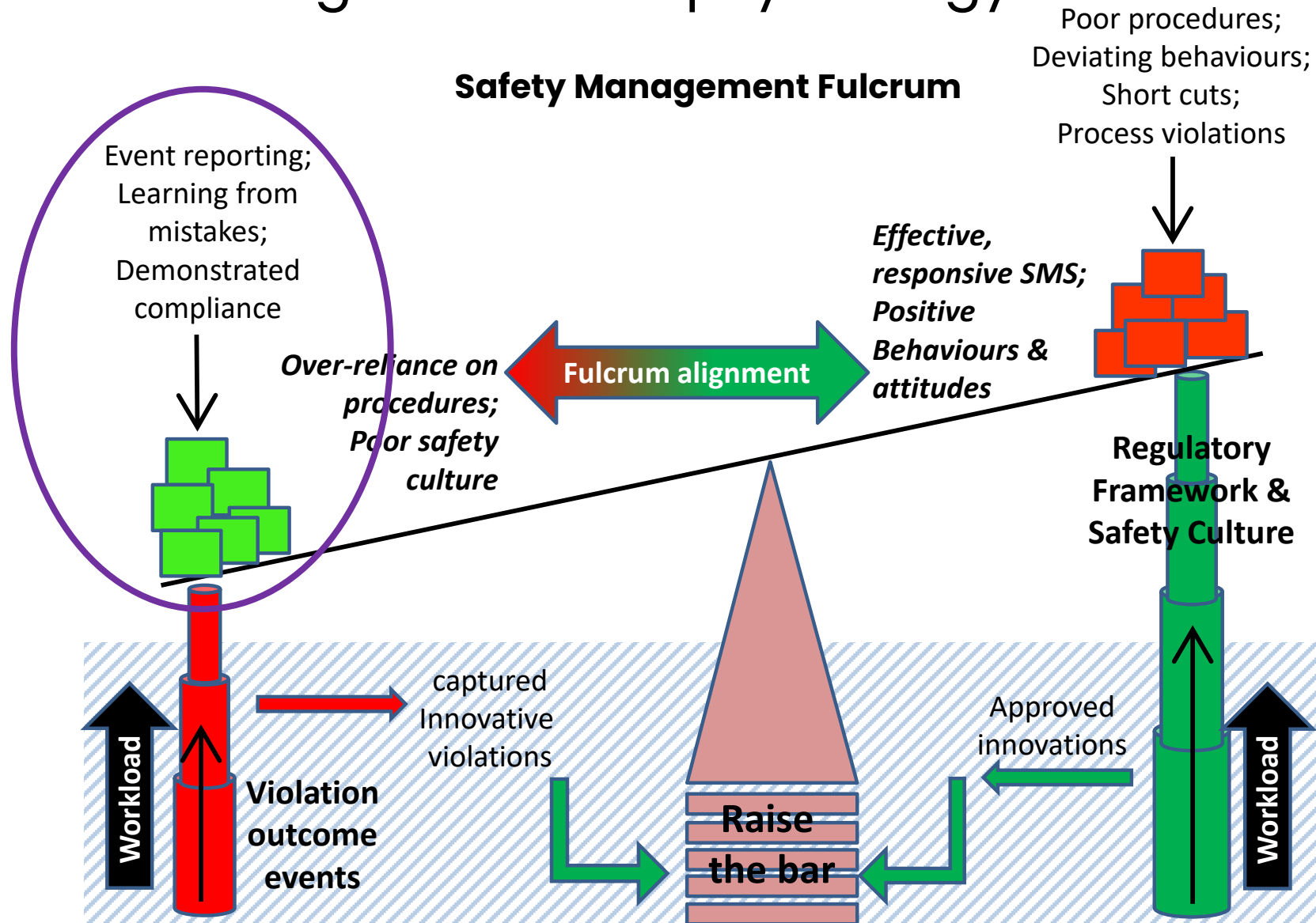
Enhancing maintenance safety culture



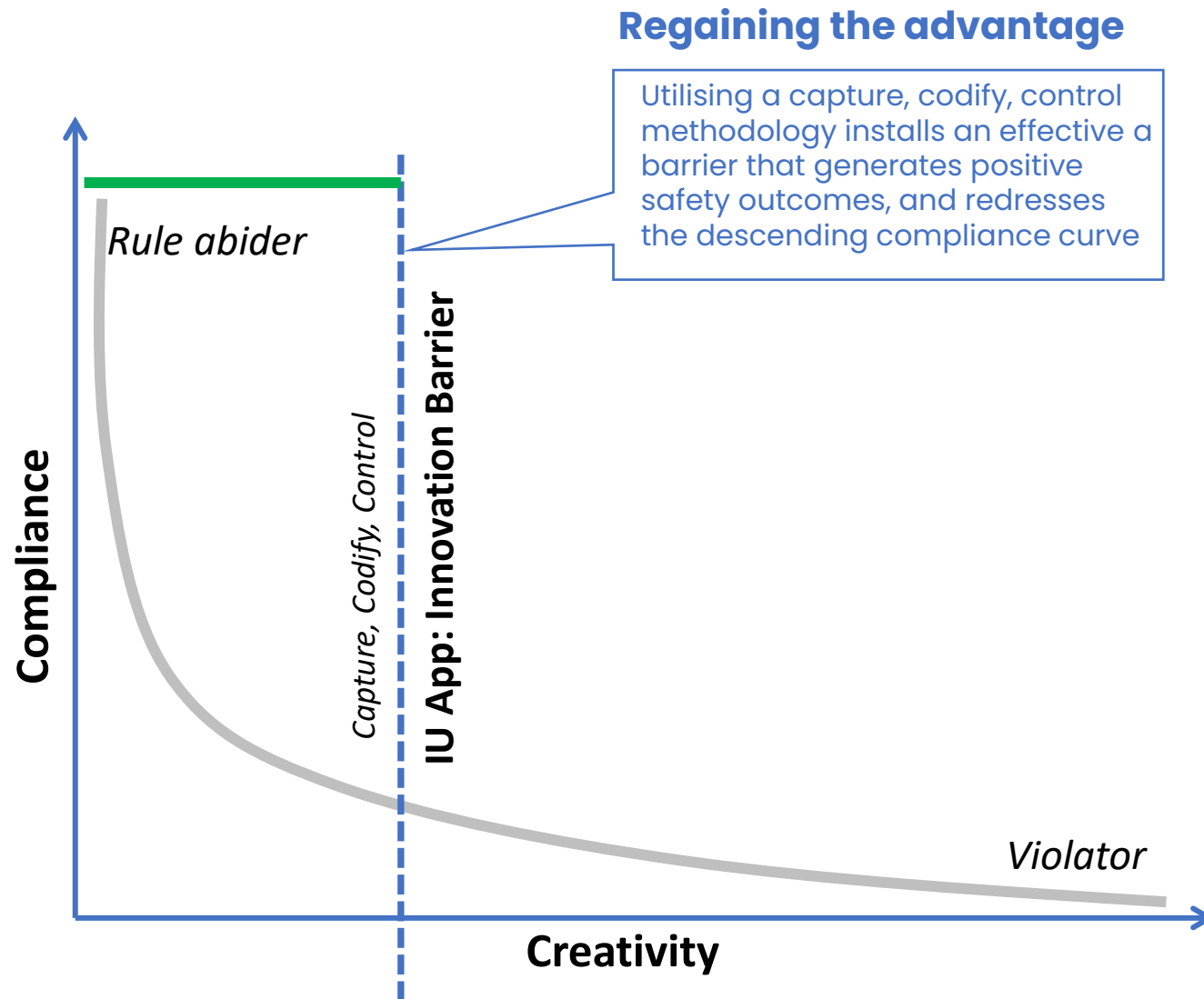
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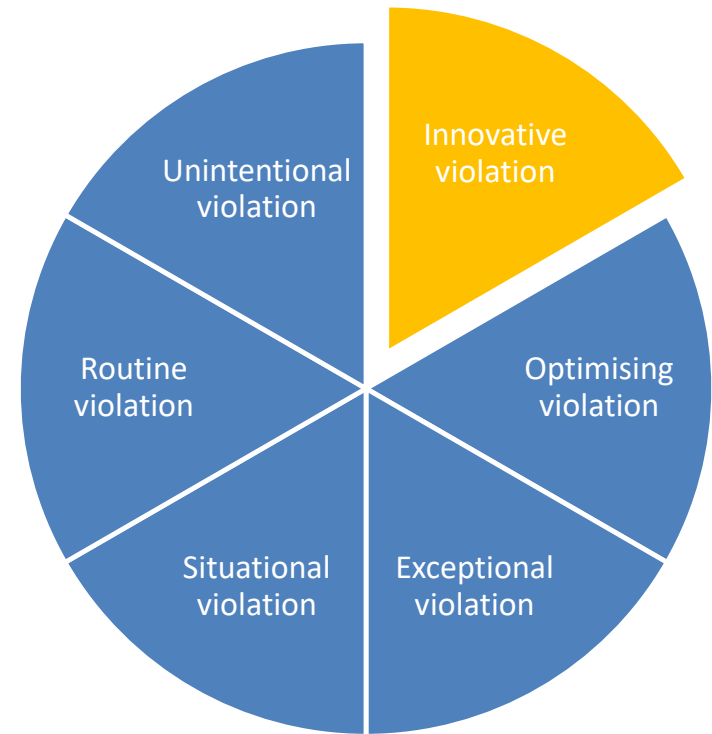


Implications for organisational psychology

There is a better way

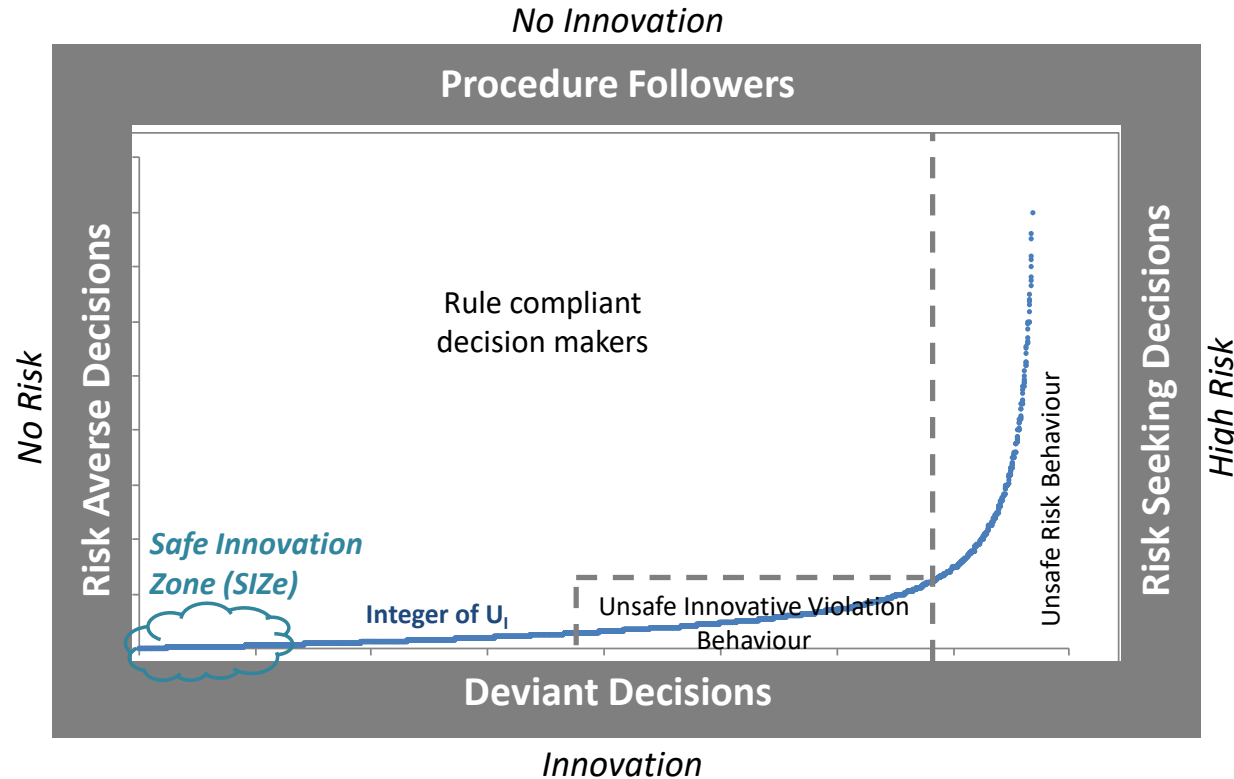
Embedding a structured approach to positive deviance behaviours can:

- Deliver proven organisational safety enhancements
 - Improve workplace culture
 - Empower maintenance workforce decision making
 - Strengthen compliance behaviour
 - Enhance system criticality outcomes



Implications for organisational psychology

Safe Innovation Zone



The Safe Innovation Zone (SIZE) is given structure and purpose through application of the Utility of Innovation (U_i) equation.

Defining the level of acceptable innovation is achieved by assigning bounded U_i values.



Implications for organisational psychology

Utility of Innovation (U_I)

$$U_I = \frac{S_C R_B}{I_A}$$

Where:

S_C = System Criticality

R_B = Risk Behaviour

I_A = Innovative Attitude

This equation is applicable to multiple domains and can be adapted for specific systems, behaviours and attitudes.



Conclusion

Data from the follow-on study suggests maintainer attitudes towards innovative maintenance continue to preference innovation as opposed to strict compliance with the maintenance procedures.

The follow-up research activity suggests that aviation maintenance personnel continue to preference innovative approaches to maintenance.

The data would further suggest that positive deviance behaviours continue to exist and that therefore, the potential exists for uncontrolled positive deviance behaviours to transition into violation outcomes.

This is evident by:

- *54% of respondents positively agreeing to 'doing a task in a better way than that described in the maintenance publication'*
- *62% of respondents positively agreeing that 'their supervisor encourages them to look for better ways to do maintenance',*
- *80% of respondents positively agreeing that 'the organisation they work for values innovation', and*
- *Less than 40% of respondents Strongly Agreed to 'strict compliance with the maintenance publications'*



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As organisation psychologists, our challenge is to identify positive deviance behaviours to ensure that the benefits of such behaviours are captured, codified, and controlled to maximise the innovative benefit.

Get in Contact



Tony Bannister-Tyrrell

tony@iuoutcomes.com

+61 (0)455 278 622

Beth Boustead

beth@iuoutcomes.com



Company direct:

admin@iuoutcomes.com

Via the website:

www.iuoutcomes.com

Link to Tony's thesis:

Uncertain outcomes: Traversing the breach between innovation and violation in aviation maintenance

<https://nova.newcastle.edu.au/vital/access/manager/Repository/uon:37484>



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