Continuous Change and Added Complexity – A Real Threat to Safety?

Dr. Wayne Martin, BAvMan, MAvMgmt, MBus, PhD, FRAeS
University of Southern Queensland

CRICOS QLD00244B NSW 02225M TEQSA:PRF12081

Change and Complexity

Every time there is a change to rules or procedures in aviation it adds a layer of complexity for the operators.

Some of this complexity is temporary – some is permanent.

Complexity

‘Infusion pumps are devices that control the flow of medication or other product into a patient through an intravenous (IV) line.

An infusion pump manufactured by Alaris Products and used in many hospitals had a “key bounce” problem such that pressing a button once would sometimes register that keypress twice. For example, pressing 4.8 might result in “44.8” being entered, which represents a 10-time overdose.

In August, 2006, the manufacturer was ordered by the US Food and Drug Administration (FDA) to send a letter to every hospital still using their device. The letter alerted hospitals to the problem and offered these solutions:

(1) provide instructions for nurses to use a proper stance
(2) listen to the number of keypress beeps
(3) verify the screen display
(4) obtain an independent double check
(5) look at the IV tubing to verify the correct flow rate; and
(6) a warning label should be placed on each device.

A simpler and more effective solution might have been to fix the mechanical key bounce problem.

(Holden, 2009)

Who Moved My Cheese?

Drivers of Change

International Bodies

Regulators

Manufacturers

Air Traffic Service Providers

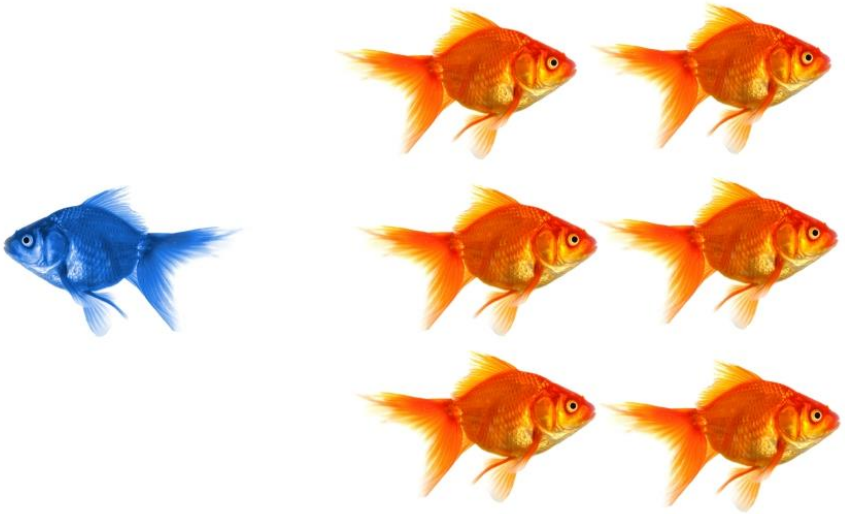
Airport Companies

Engineering

Company/Flight Operations Management

Safety Departments

Resistance to Change (RTC)

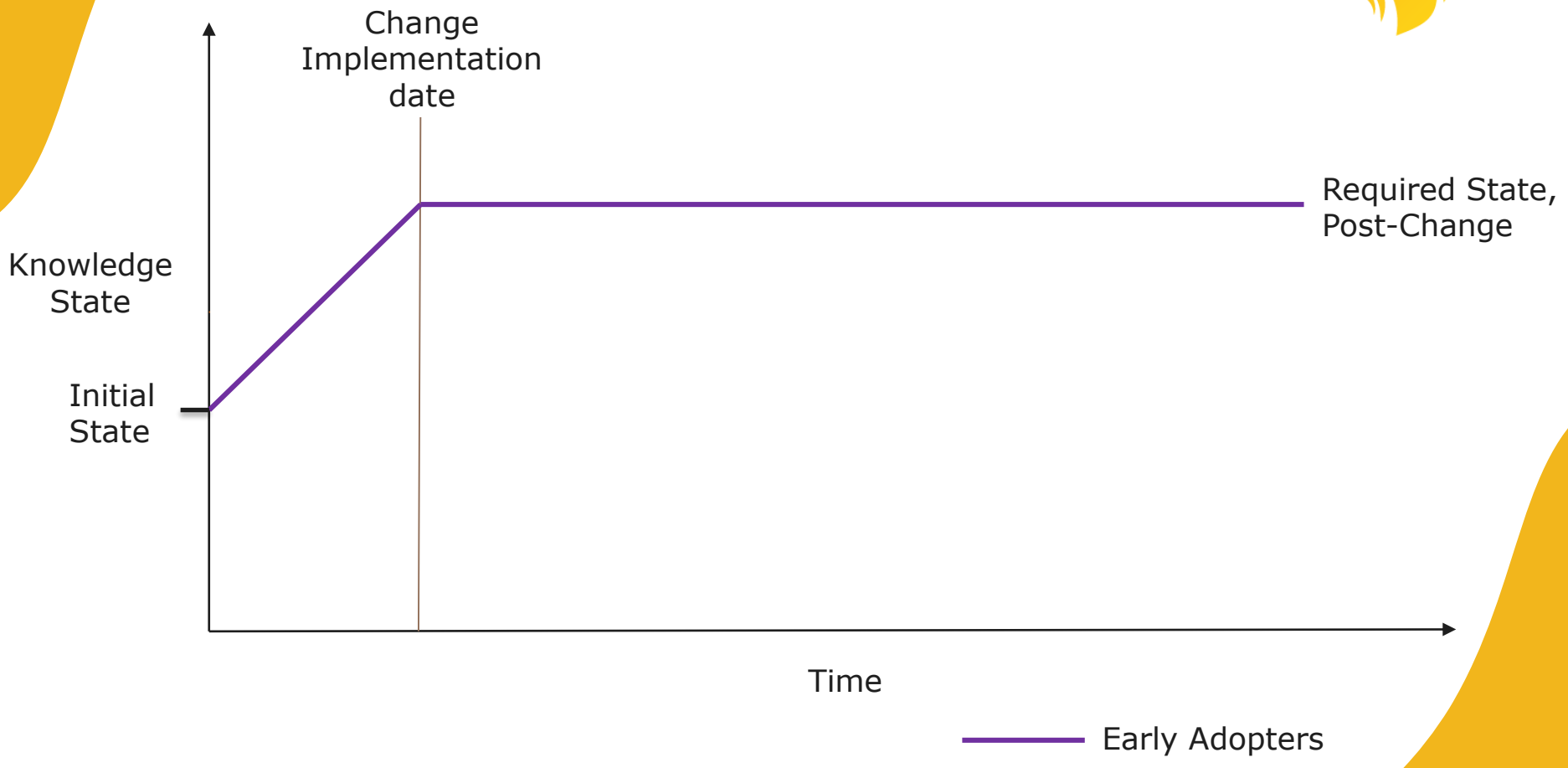


- Well established phenomenon

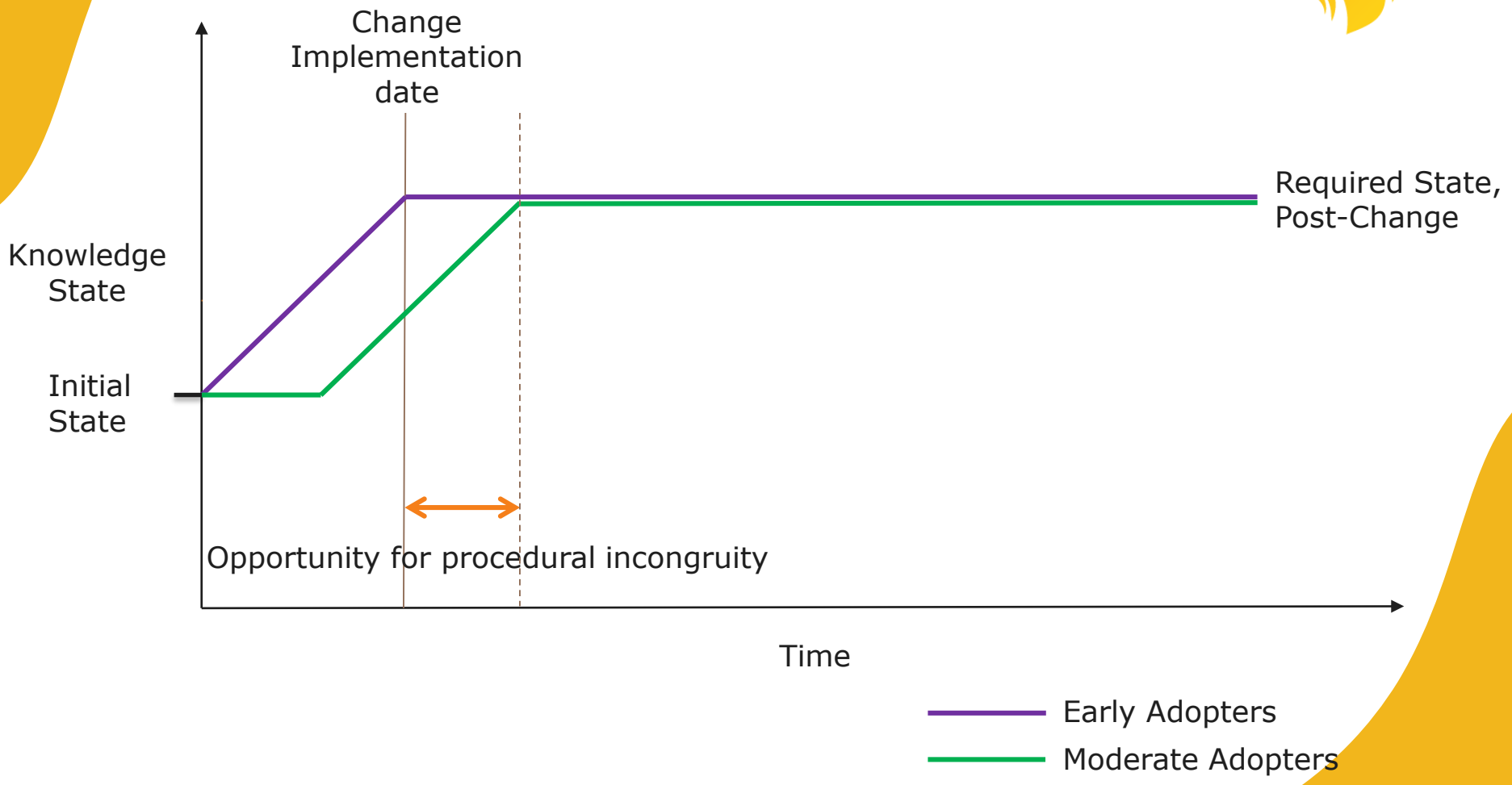
- Varies widely

Reasons for Resistance

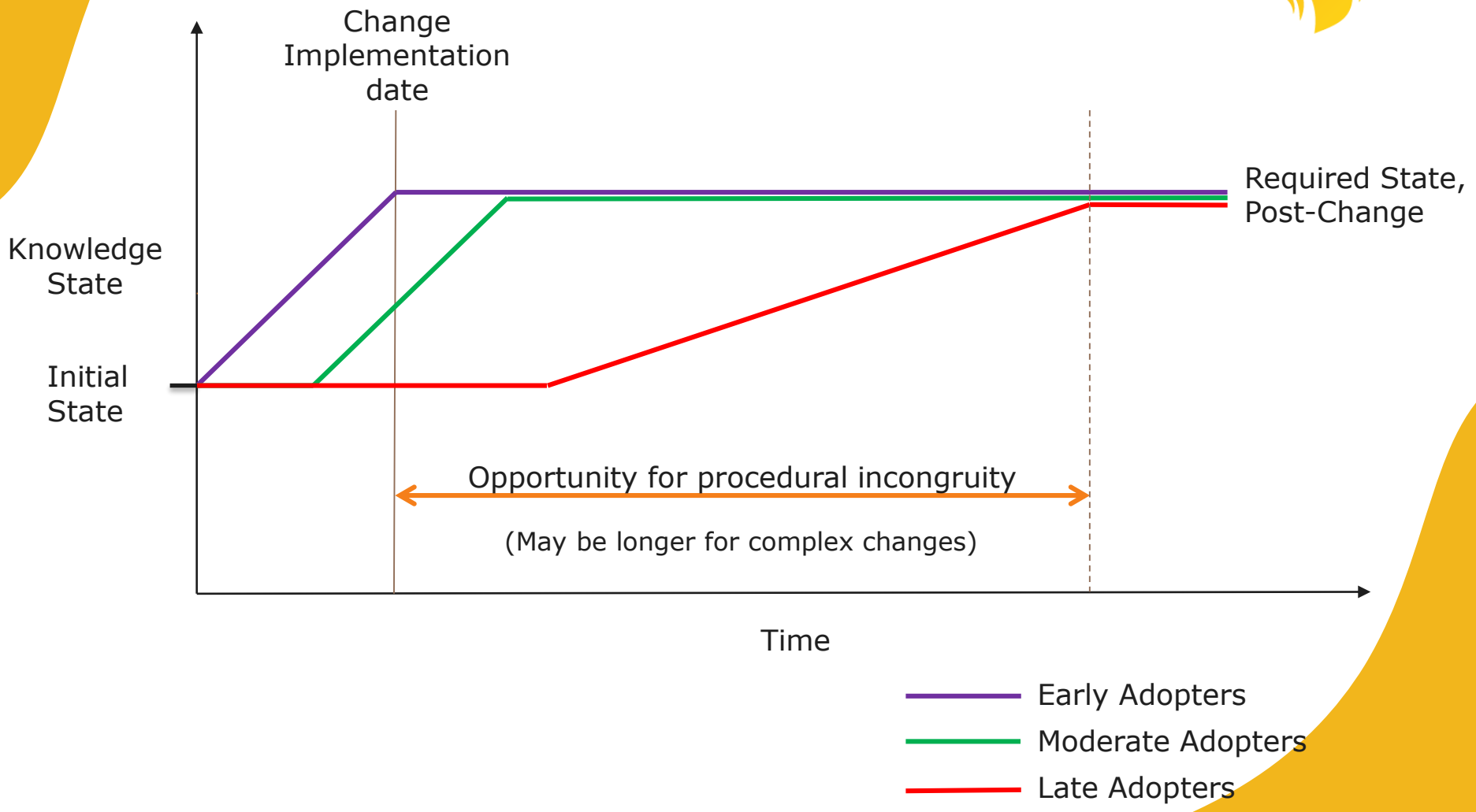
Incongruous Change Adoption



Incongruous Change Adoption



Incongruous Change Adoption



Threat and Error Management

Relies on two main tools:

1. An established framework of procedures and routines which creates both an individual and team mental model of what should happen.

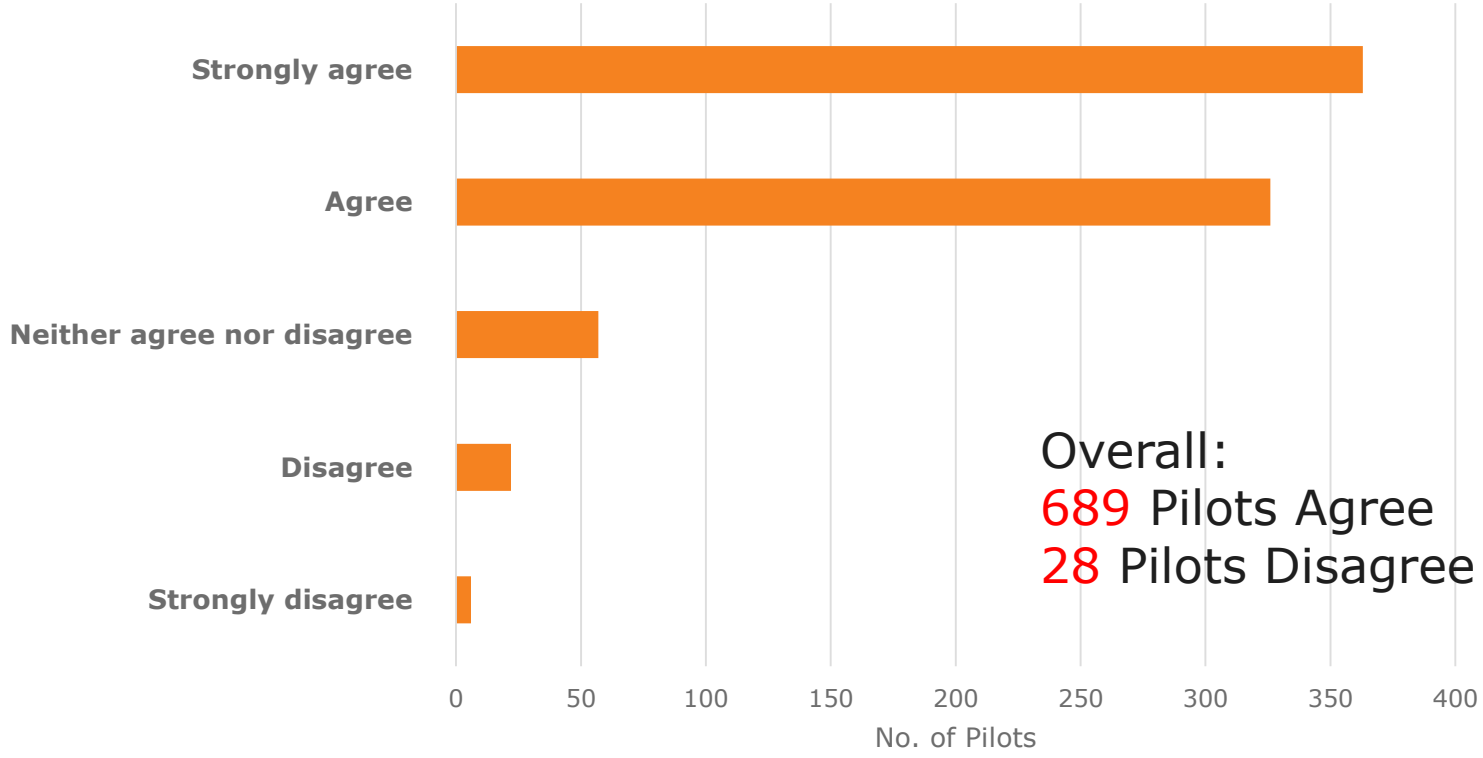
2. Individual and Team Resilience, utilising CRM skills to detect, mitigate and manage unexpected issues.

Aviation Change and Complexity Survey

- Online survey conducted in July/August 2015
- 15 Multi-choice questions plus an opportunity for open comment
- Disseminated to Pilot Associations for mail-out to members
- 776 Survey Responses
  - 125 Long Haul
  - 651 Short Haul

Aviation Change and Complexity Survey

Aviation procedures and regulations involved in flying the aircraft from point A to point B have become more complex over the past five years

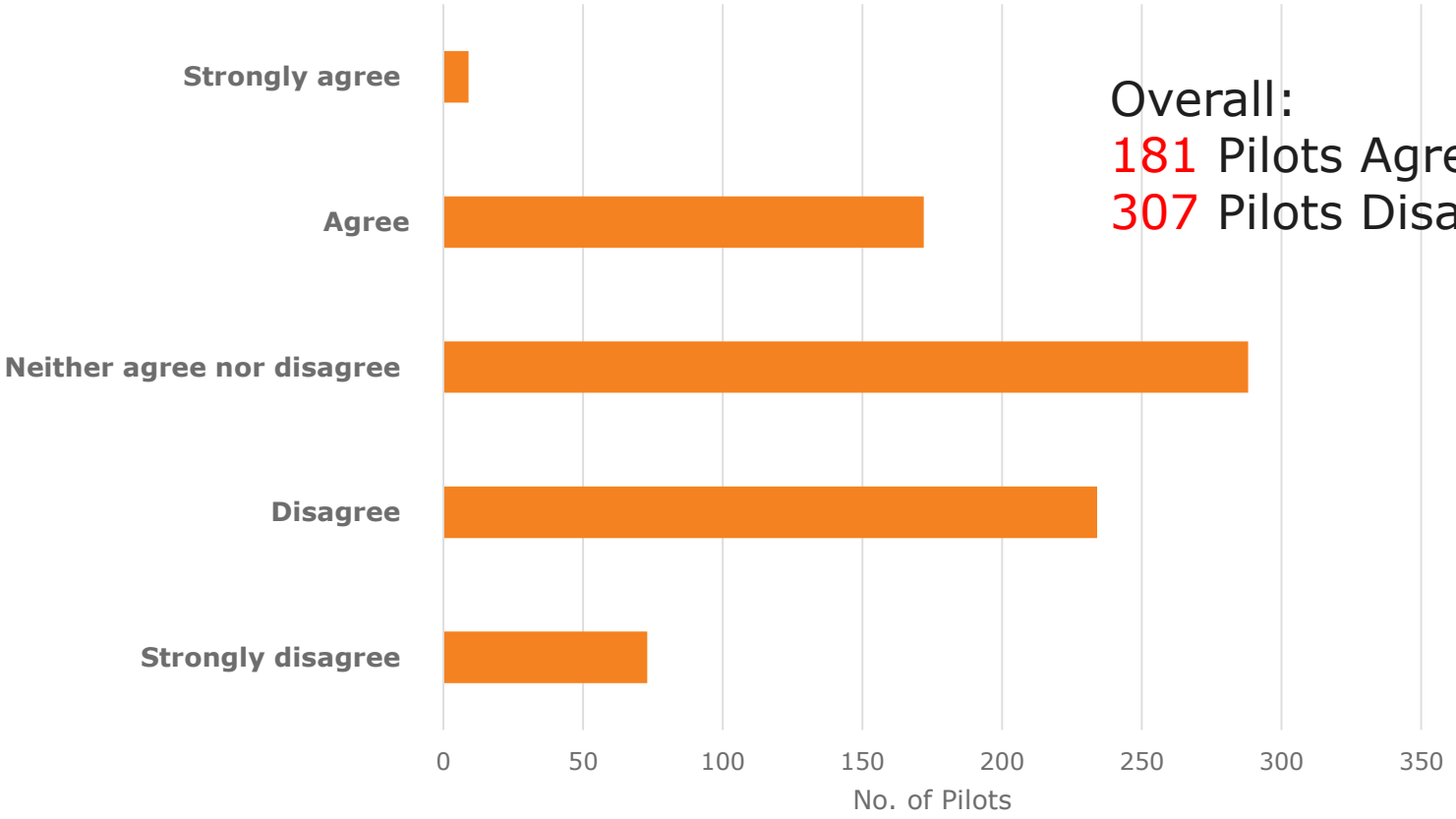


Overall:
689 Pilots Agree
28 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

The evolution of aviation procedures and regulations in recent years has improved aviation safety

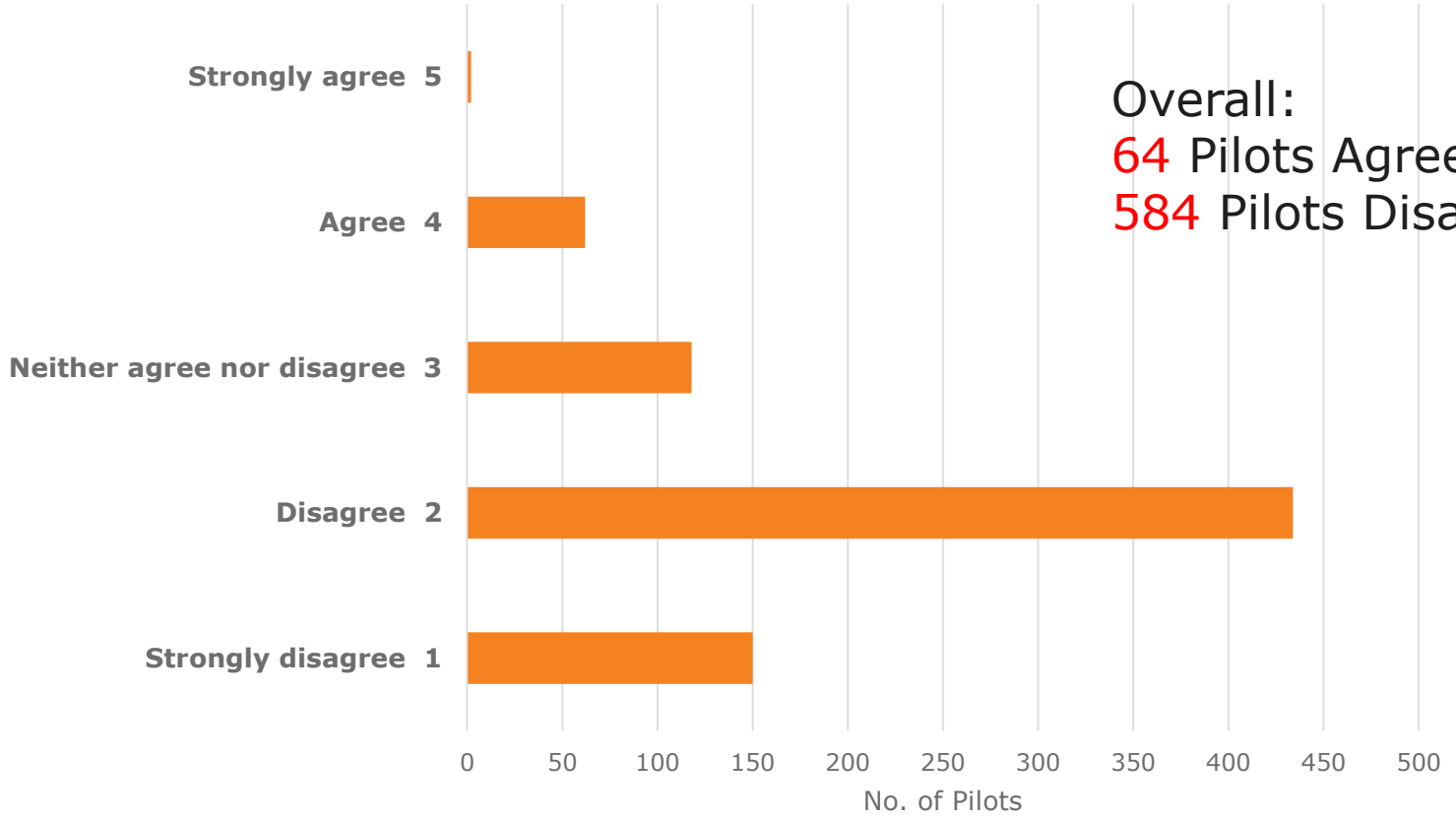


Overall:
181 Pilots Agree
307 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

Understand the rationale behind a new or revised aviation procedure or regulation

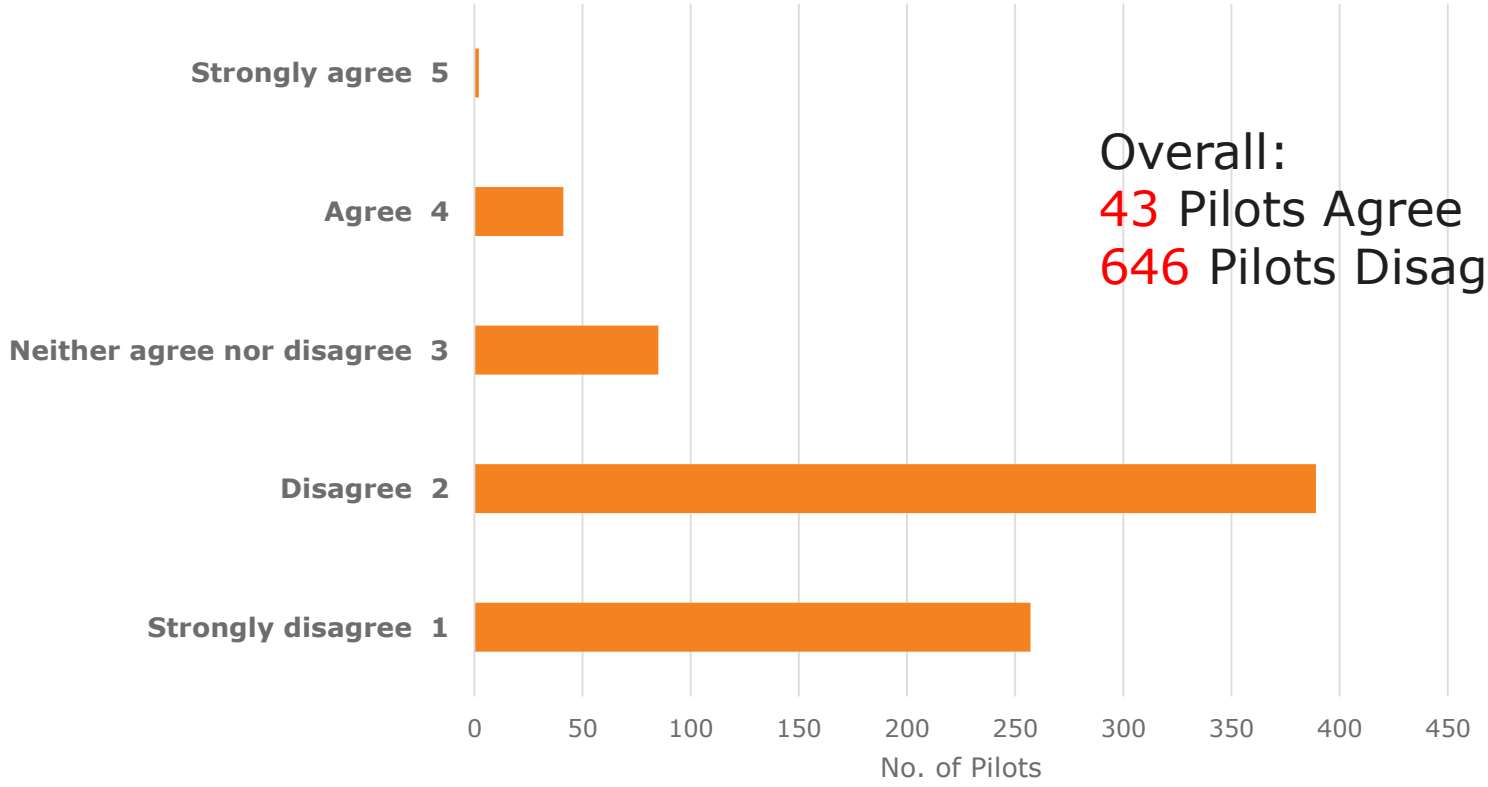


Overall:
64 Pilots Agree
584 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

It is easy to locate specific information and reference material with respect to aviation procedures and regulation changes

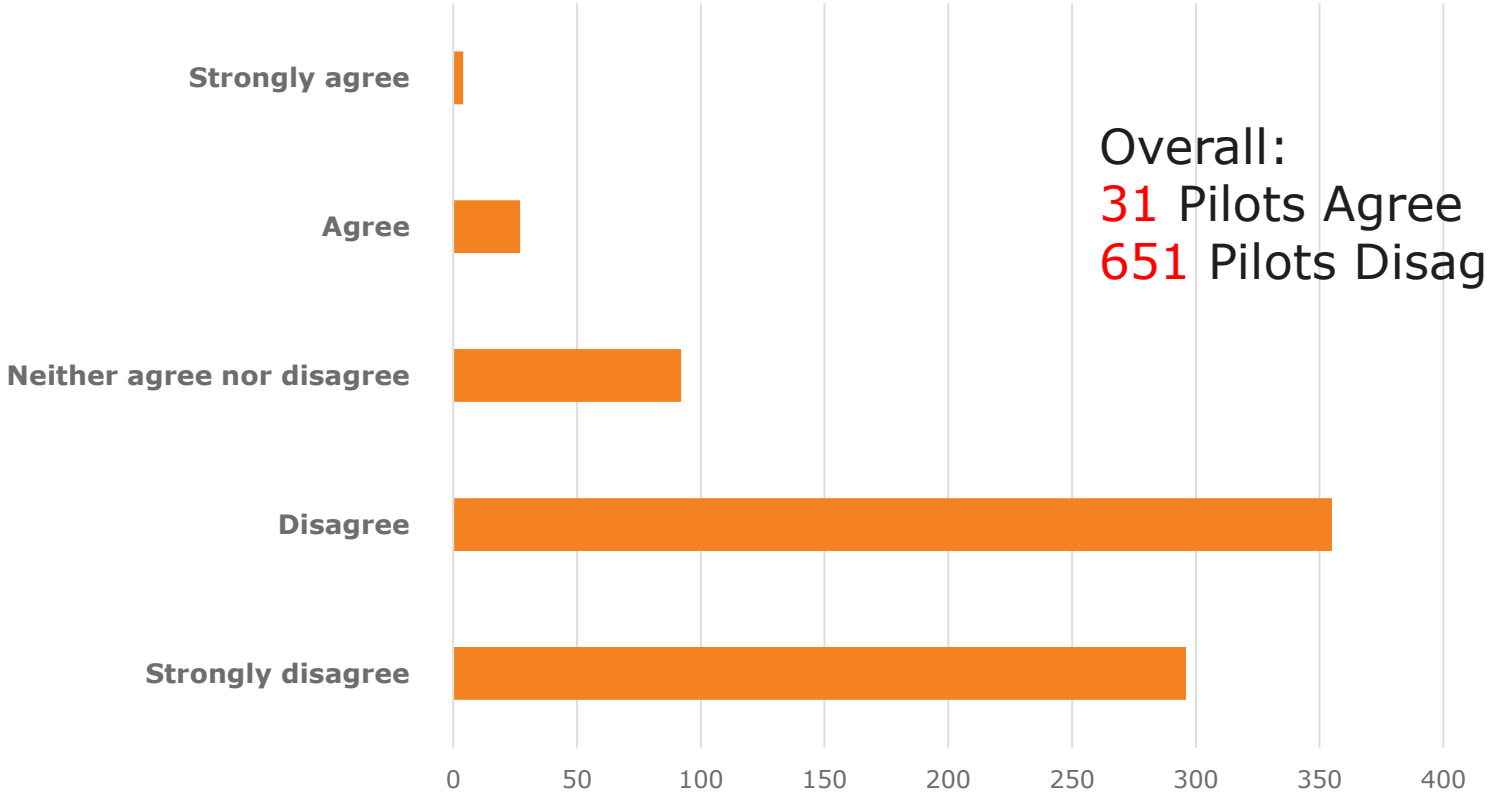


Overall:
43 Pilots Agree
646 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

New or revised aviation procedures and regulations are written in a way that is easily understood so that their interpretation is consistent between crew members

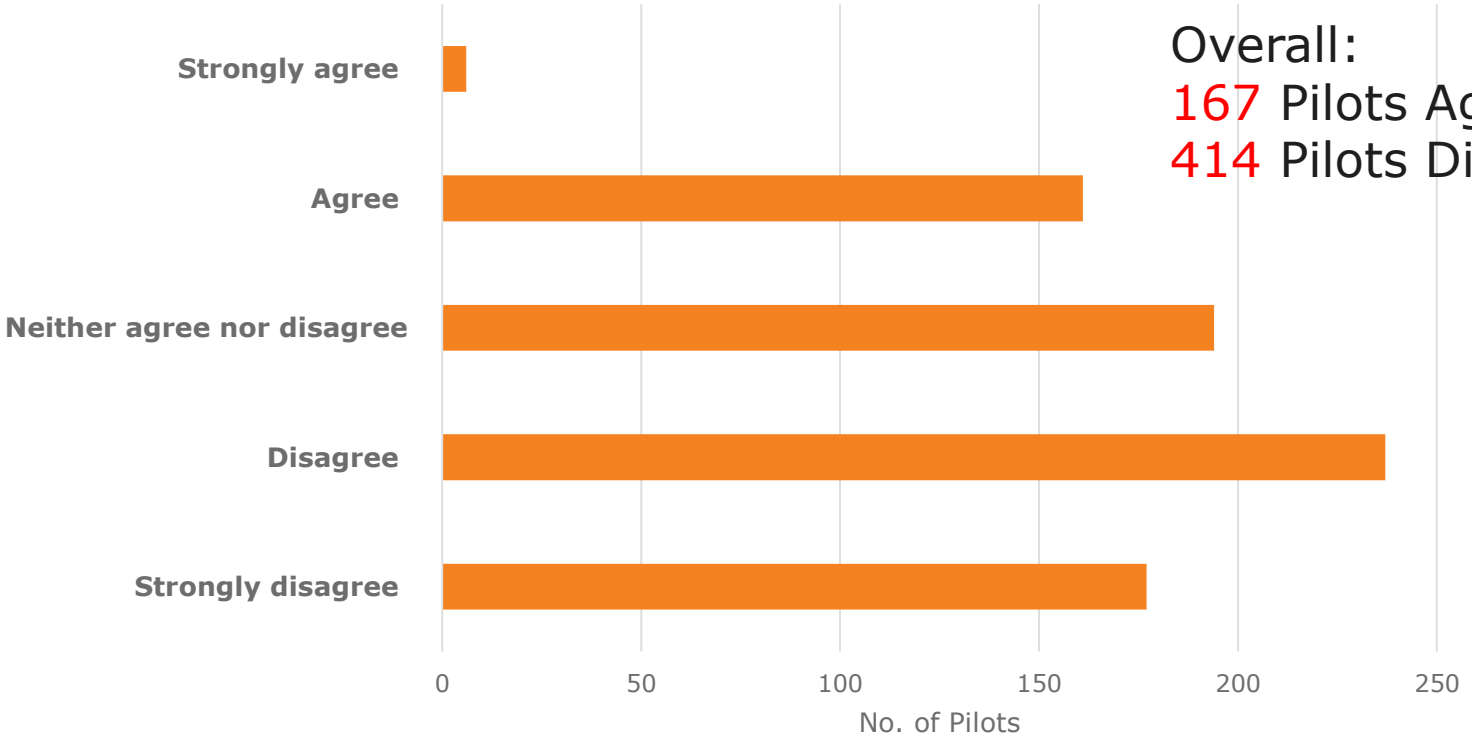


Overall:
31 Pilots Agree
651 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

External distractions during flight safety critical tasks (such as during take-off performance calculations) are minimal due to well trained and disciplined support agencies

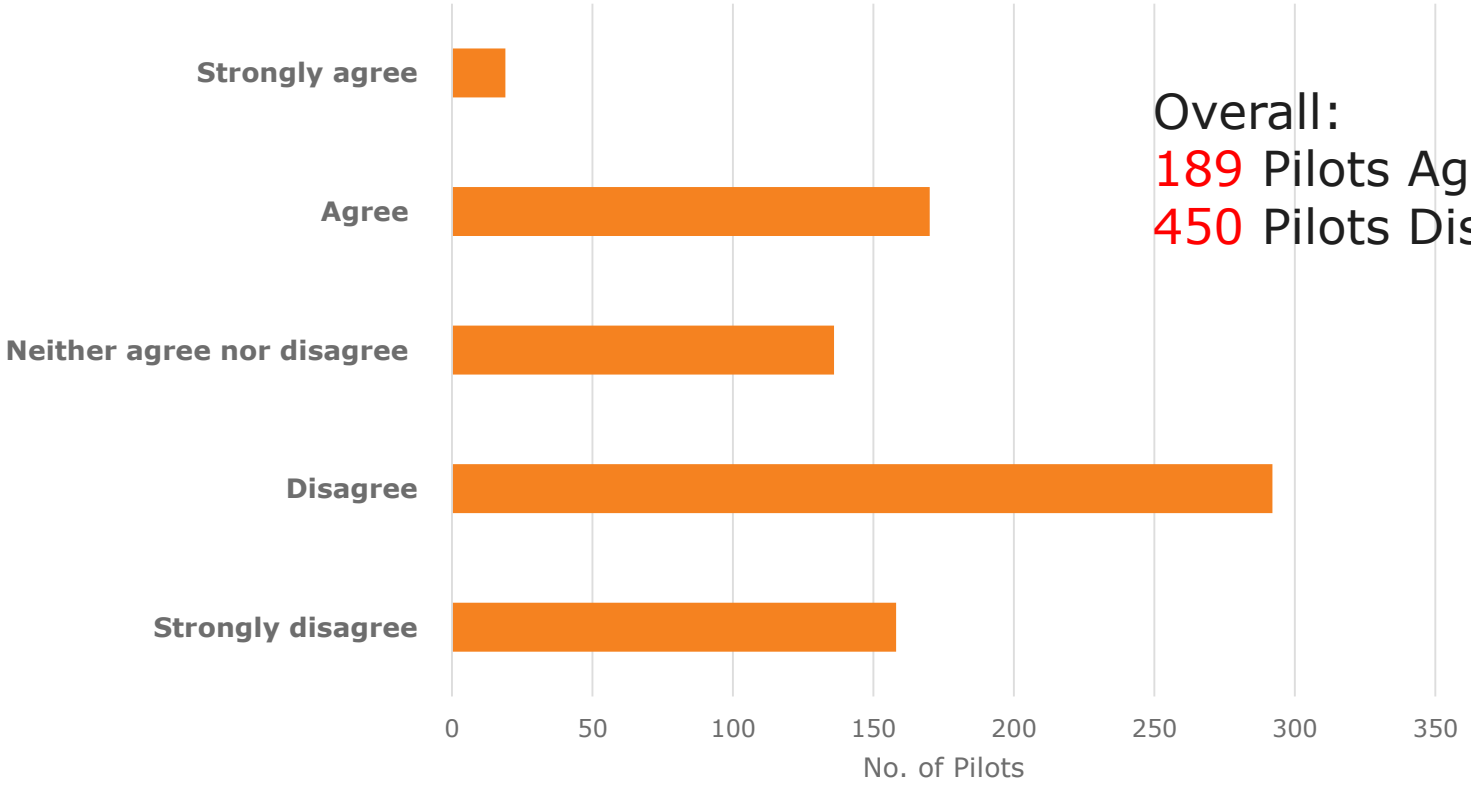


Overall:
167 Pilots Agree
414 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

Pilots have sufficient time during their pre-flight duties to mentally prepare for the flight ahead without any distractions

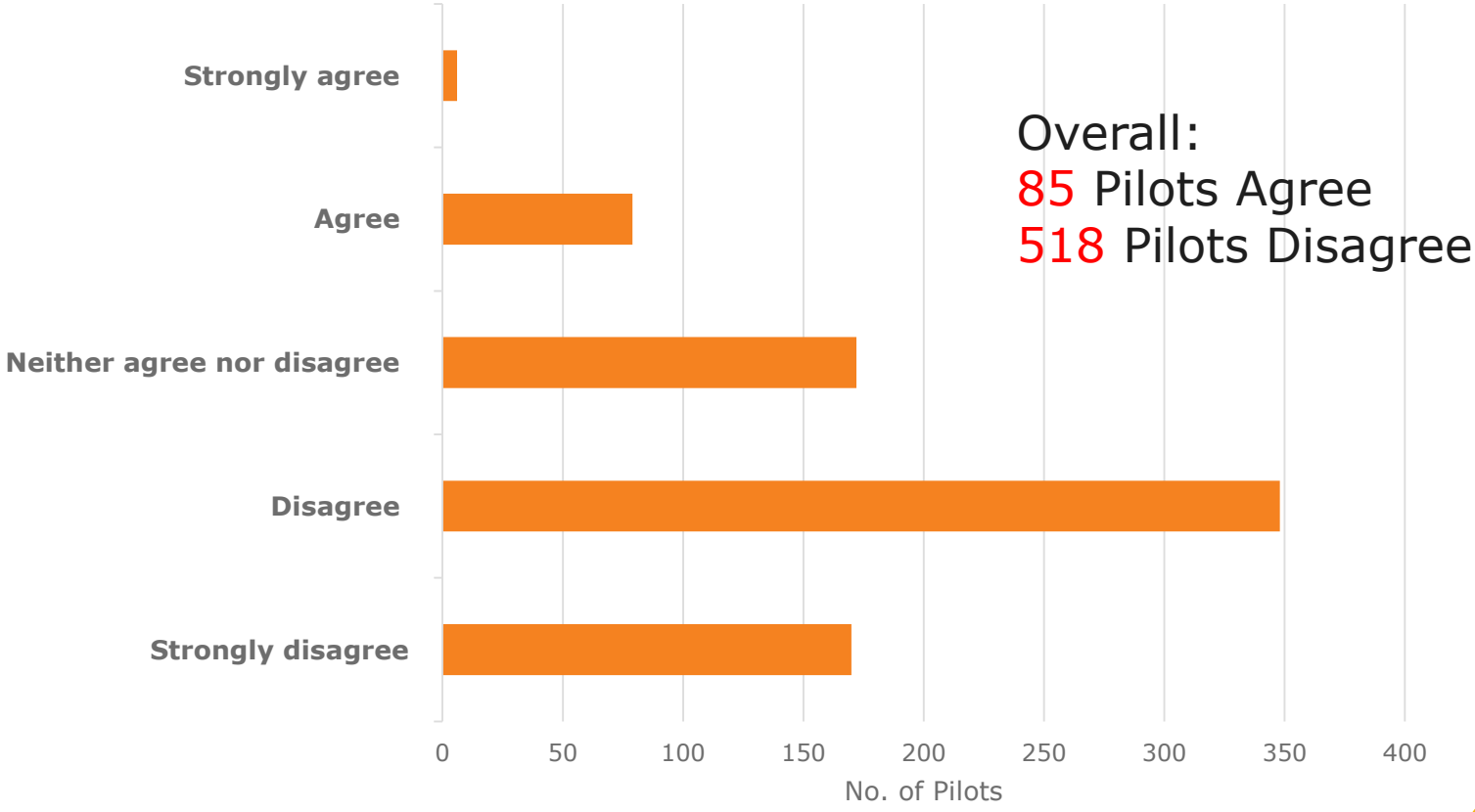


Overall:
189 Pilots Agree
450 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

Changes or revisions to regulations are clearly communicated and adequately distributed

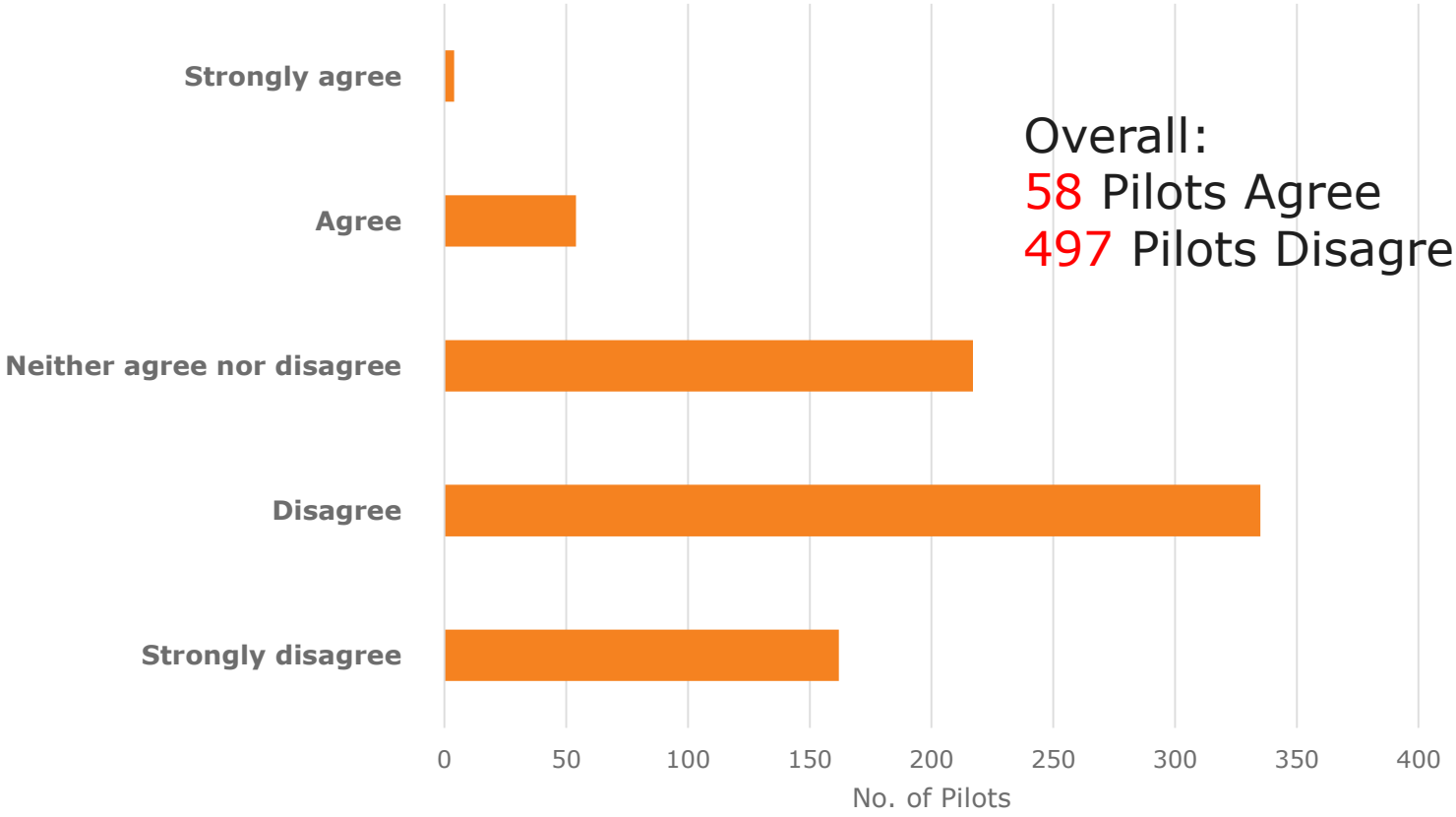


Overall:
85 Pilots Agree
518 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

Aviation procedures and regulations are risk managed appropriately, prior to implementation

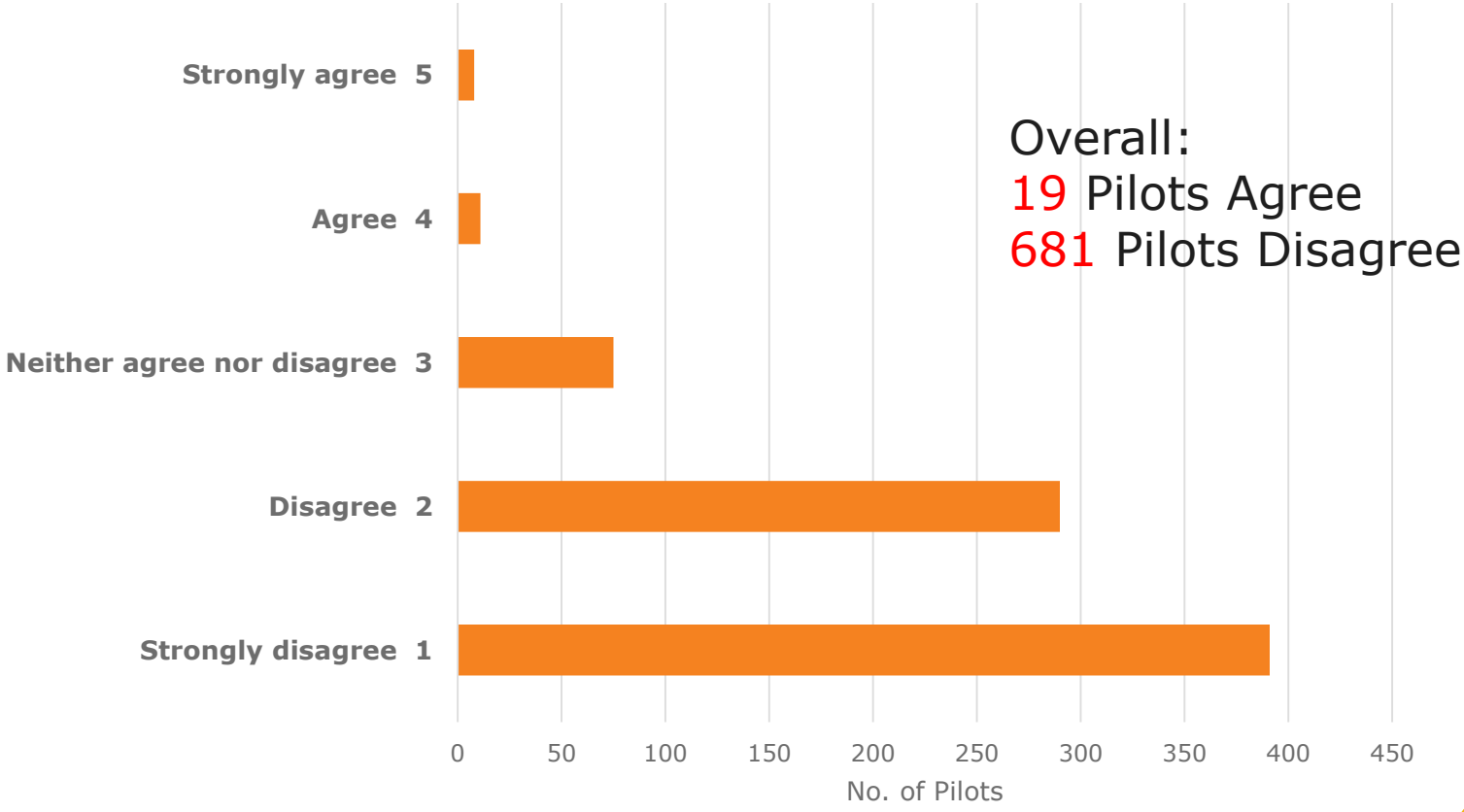


Overall:
58 Pilots Agree
497 Pilots Disagree

Highly significant $p<0.01$

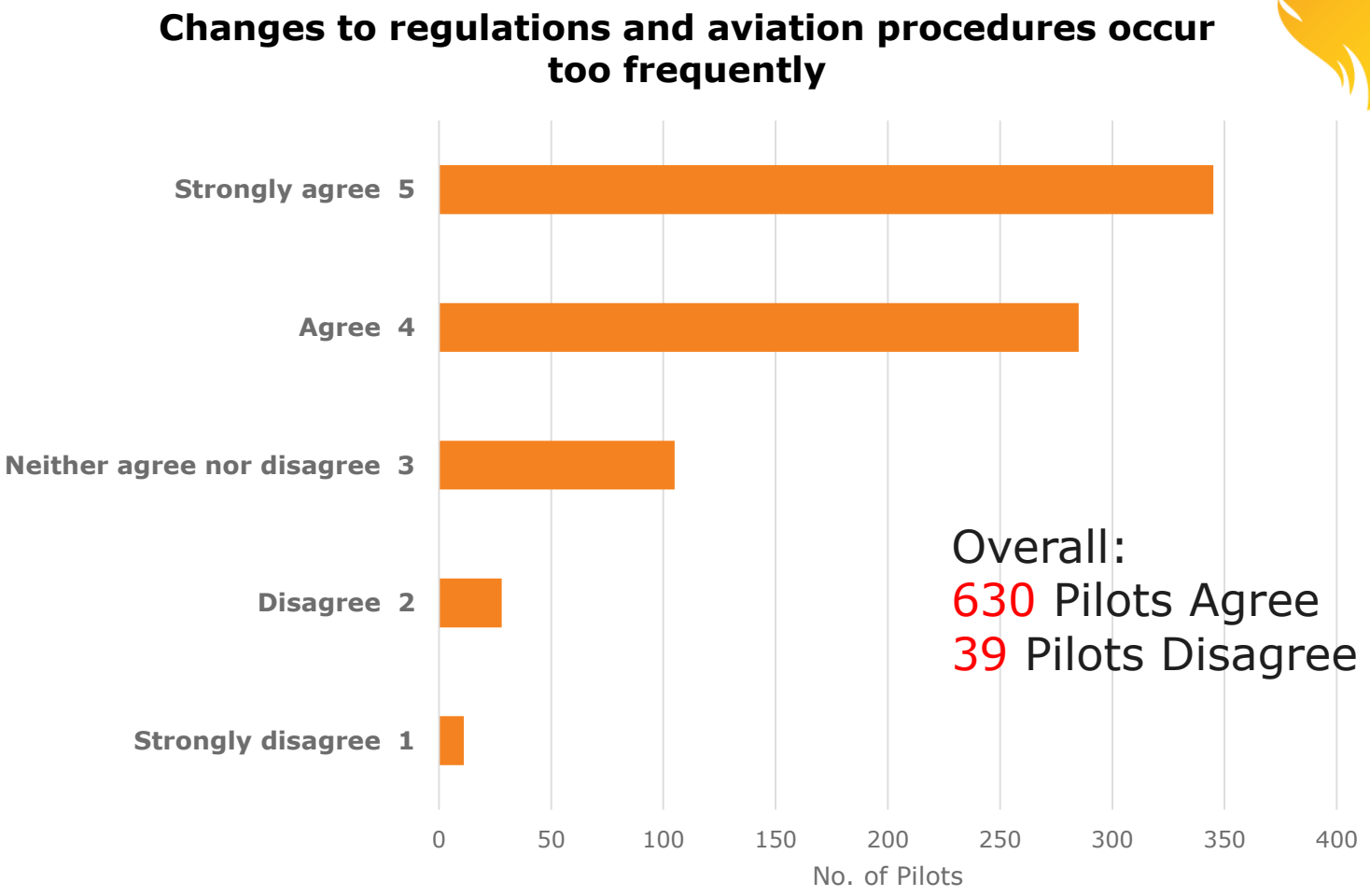
Aviation Change and Complexity Survey

Regulations and procedures introduced in recent years have simplified the job



Highly significant $p<0.01$

Aviation Change and Complexity Survey



Overall:
630 Pilots Agree
39 Pilots Disagree

Highly significant $p<0.01$

Aviation Change and Complexity Survey

UNIVERSITY OF SOUTHERN QUEENSLAND AUSTRALIA

Typical Comments From Optional Open Comments Question (n=218)

'On a company level, procedures and policies are added and changed so frequently that the risk of misinterpretation of information may affect the safety of the operation….'

'Most changes are made in good faith with safety in mind, however if there are too many changes, pilots will revert to what they have done in the past…'

'I regularly see unnecessary layers of artificial complexity consume a large portion of Pilot's mental capacity and blind or distract them from the simplest tasks on a day to day basis where a simple and pragmatic approach would suffice....'

'The multiple changes in Reg's, compliance, SOP's and a constant production of operational notices have made my job as a Captain just unbelievably difficult…'

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Questions?