A psychosocial approach to understanding pilot and controller acceptance of change in ATM, based on three CDA case studies

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Overview

- Background
- Concepts behind the method
- Some key results
- Broader findings
- Summary & next steps

Background

Provenance

- Research undertaken by:

  Transport Studies Group

  University of Westminster

- With funding and technical expertise from:

  EUROCONTROL Experimental Centre

  Prospective Studies Unit

82 interviews: 20-50 minutes

Manchester	NATS bmibaby BA CitiExpress Thomas Cook	07-09 MAR 2005	31 interviews (+10)
Bucharest	ROMATSA TAROM	21-24 MAR 2006	24 interviews
Stockholm-Arlanda	Luftfartsverket SAS	15-17 NOV 2006	27 interviews

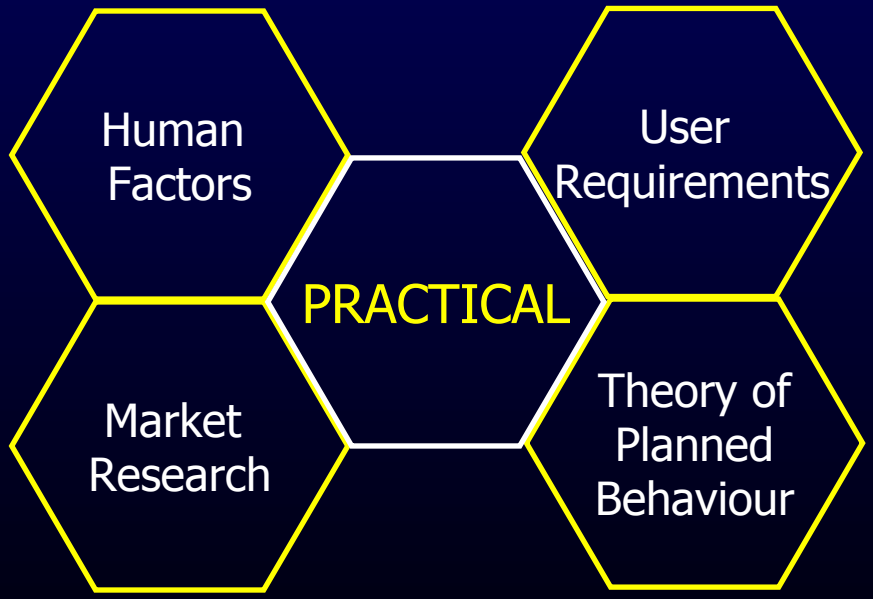
The three CDA trials

Manchester	Vectored	2200 - 0600	CDA assumed as standard
Bucharest	STAR	All times	CDA by pilot request
Stockholm-Arlanda	P-RNAV STAR + A-CDA / 'Green Approaches'	Low traffic	CDA on ATC offer

Concepts behind the method

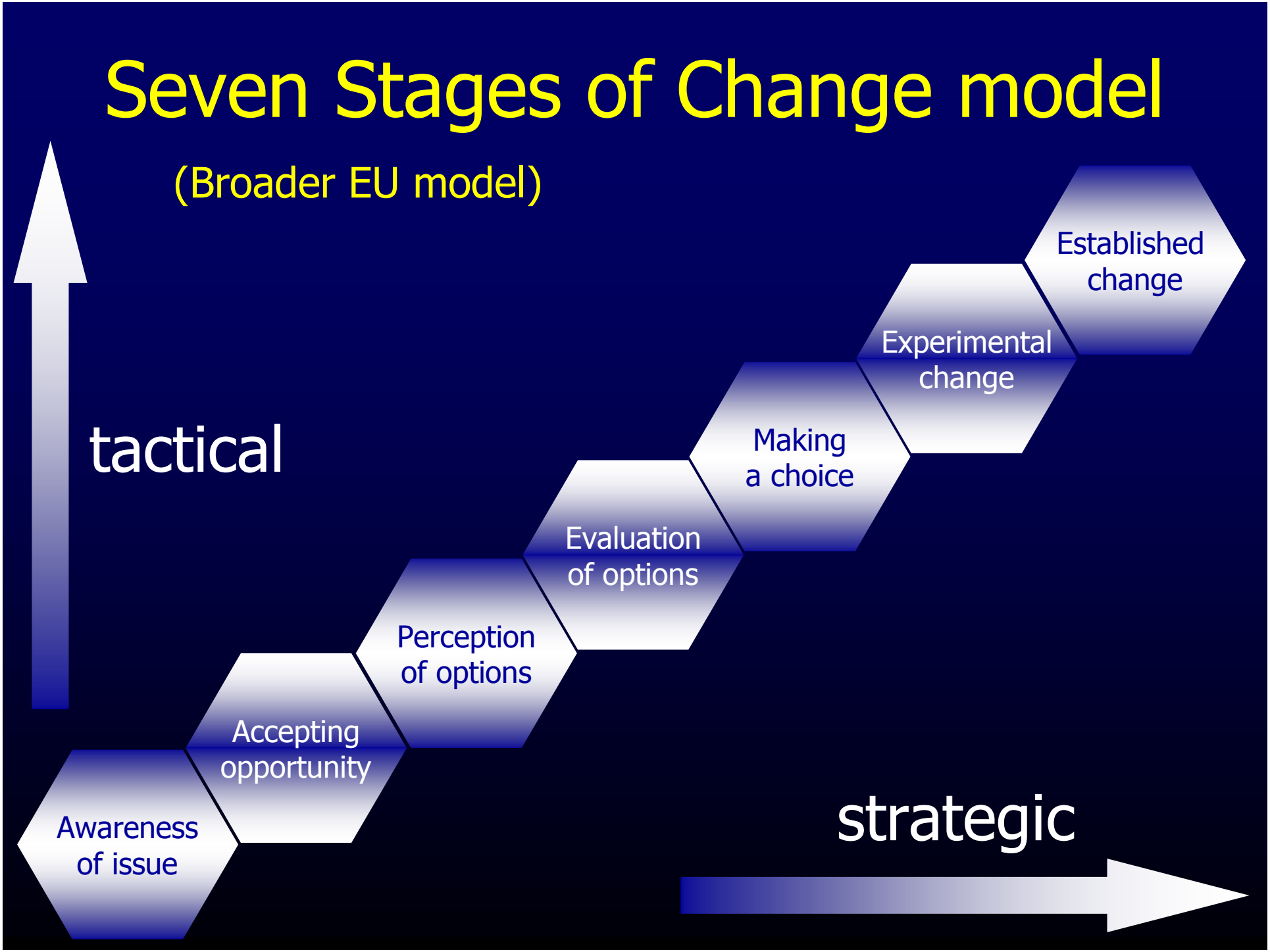
To better understand the process of change in ATM

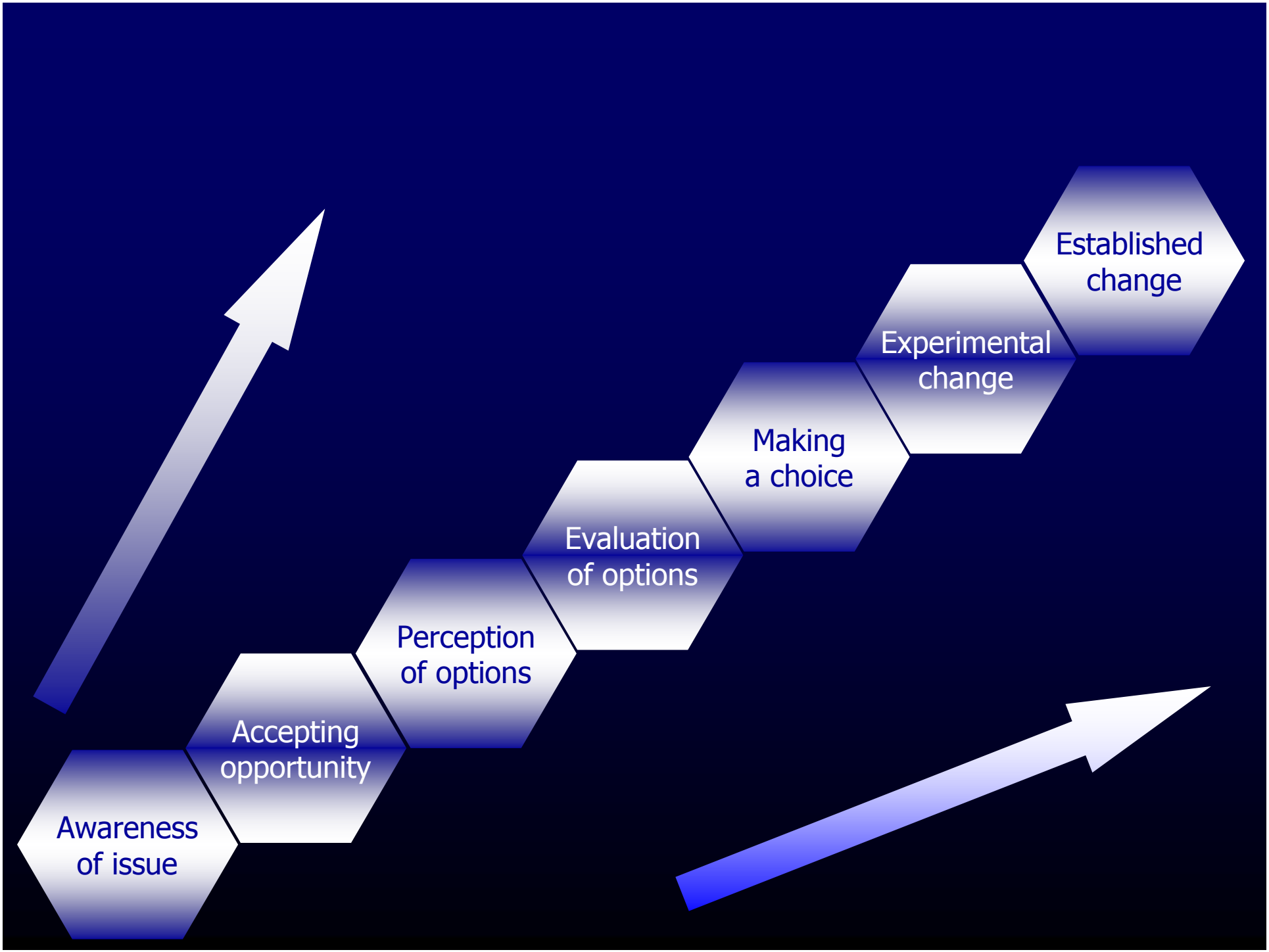
- Pressures driving change (industrial, societal)
- How change is introduced
- Barriers to successful change
- Factors which promote successful change



Tools for mapping acceptance of change

- 'Halo effect' (1920) *'to colour judgements by general feeling'*
  - field of psychology; appraisal / attribute intercorrelations
- Theory of Reasoned Action (late 1960s)
  - actual behavioural control
- Theory of Planned Behaviour (1980s)
  - mostly in health sector
  - predicting deliberated behaviour: context of perceived control
- Seven Stages of Change
  - sustainable travel behaviour, urban campaign assessment
  - recently in ATM: key similarities & differences (autonomy)
- Library of generic reference questions
  - mapped onto specific sets for different types of ATM change


Seven Stages of Change model
(Broader EU model)
tactical
strategic
Awareness of issue
Accepting opportunity
Perception of options
Evaluation of options
Making a choice
Experimental change
Established change


Awareness of issue
Accepting opportunity
Perception of options
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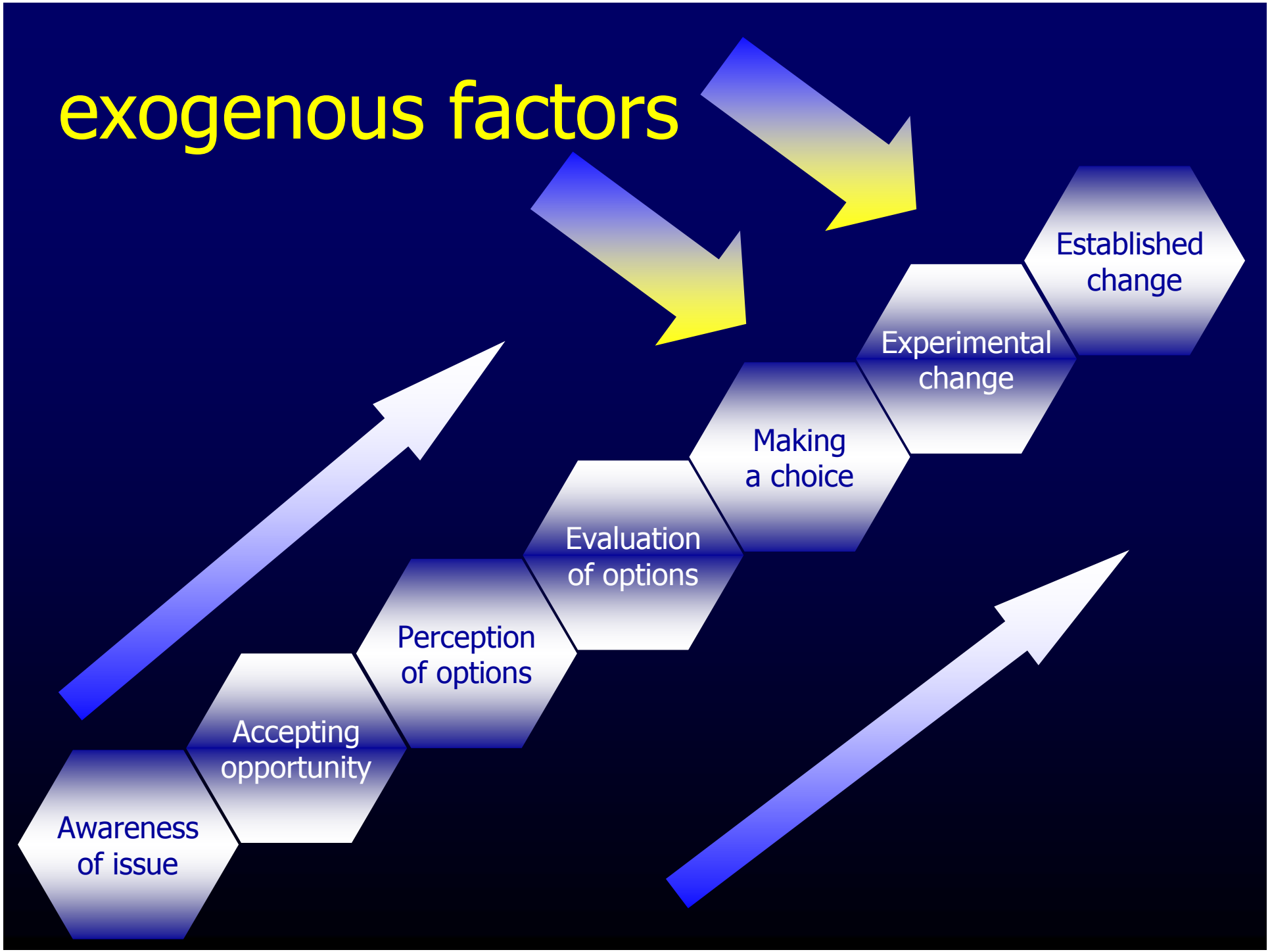

exogenous factors
Awareness of issue
Accepting opportunity
Perception of options
Evaluation of options
Making a choice
Experimental change
Established change

Seven Stages: some key variables

Variable	Example question	Measure of
V_1	'Achieving CDAs at [airport] is not my responsibility'	acceptance of responsibility
V_2	'Achieving CDAs at [airport] is a serious contribution to positive change'	option evaluation (generic measure)
V_3	'I would recommend the way we do it at [airport], to a similar airport'	net 'buy-in' (proxy measure)

Likert (summated) attitudinal scale

A psychosocial context

- Perceived societal and system benefits
  - relationship between two, blurred boundary?
  - trade-offs, e.g. flexibility v. noise abatement?
  - how correlated with behavioural change?

'Public' benefit of CDAs demonstrated
a larger halo effect and
behavioural correlation, with pilots

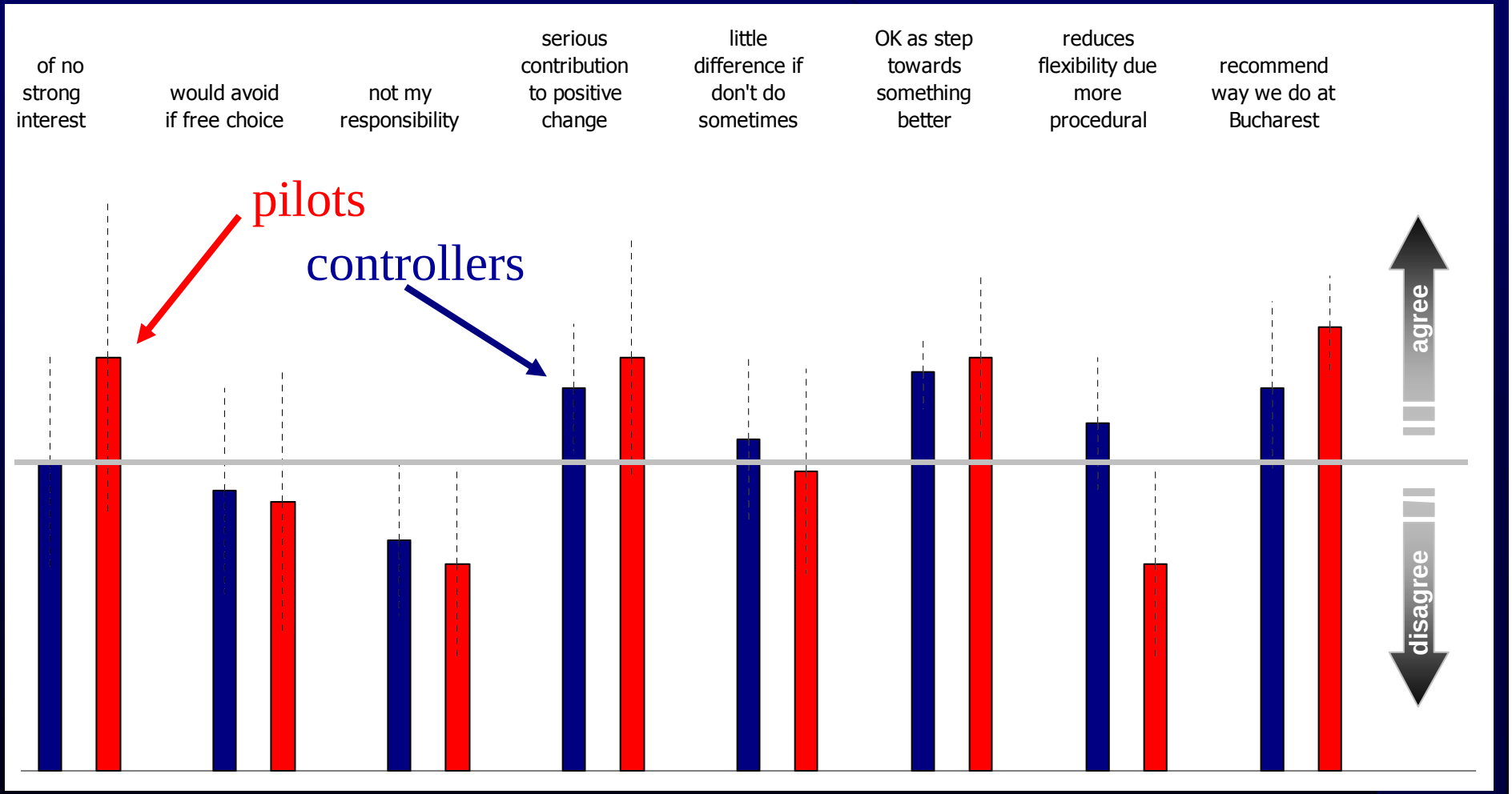
A principle components approach

- A better description of the perceived benefits and disbenefits?
  - with respect to 'society' and 'system' (as described by 9 key variables)

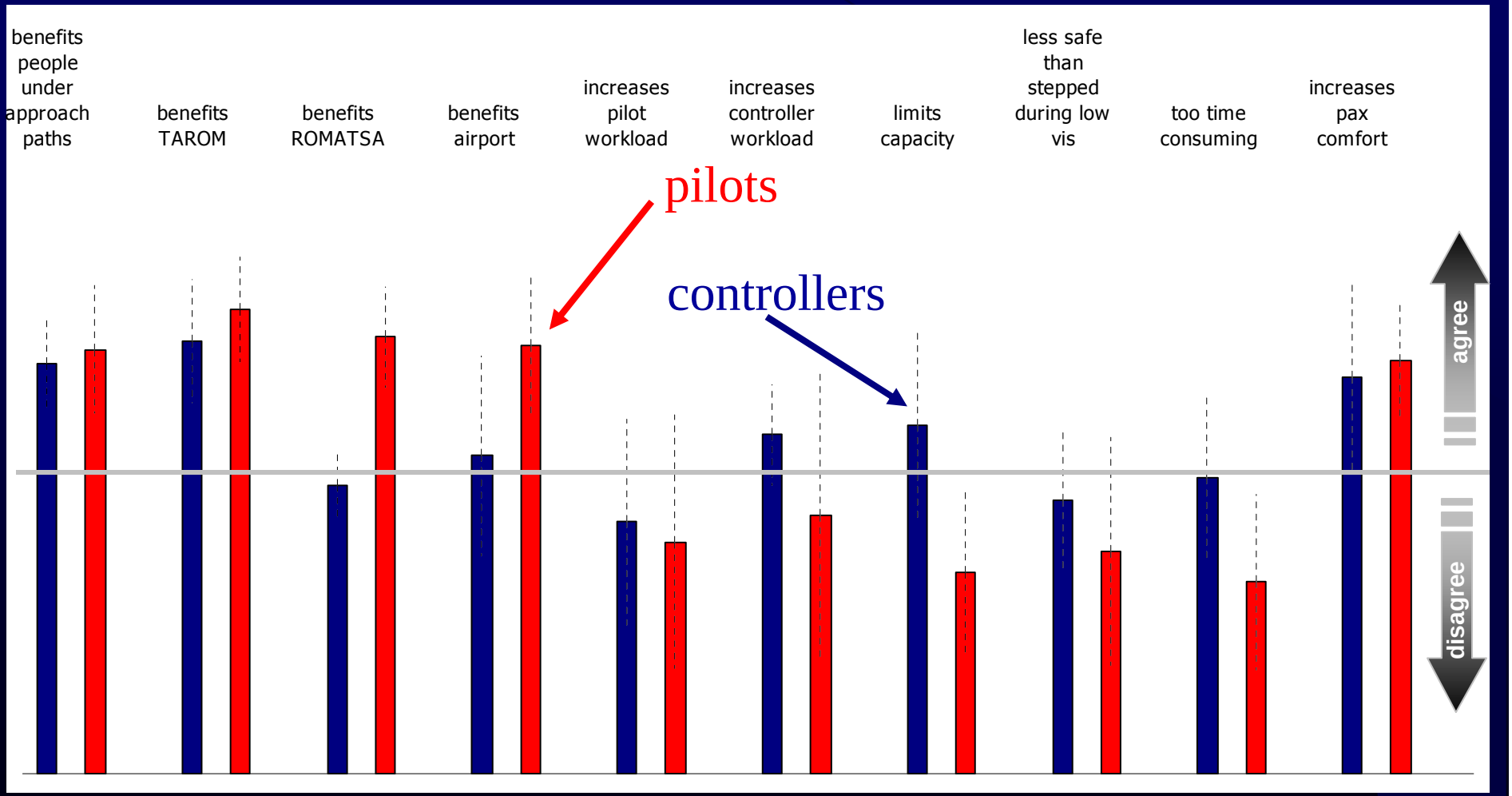
2 components were produced from these 9 variables, pretty cleanly loaded (aggregate, unconstrained)

Some key results

Attitudes to CDAs



Benefits of CDAs



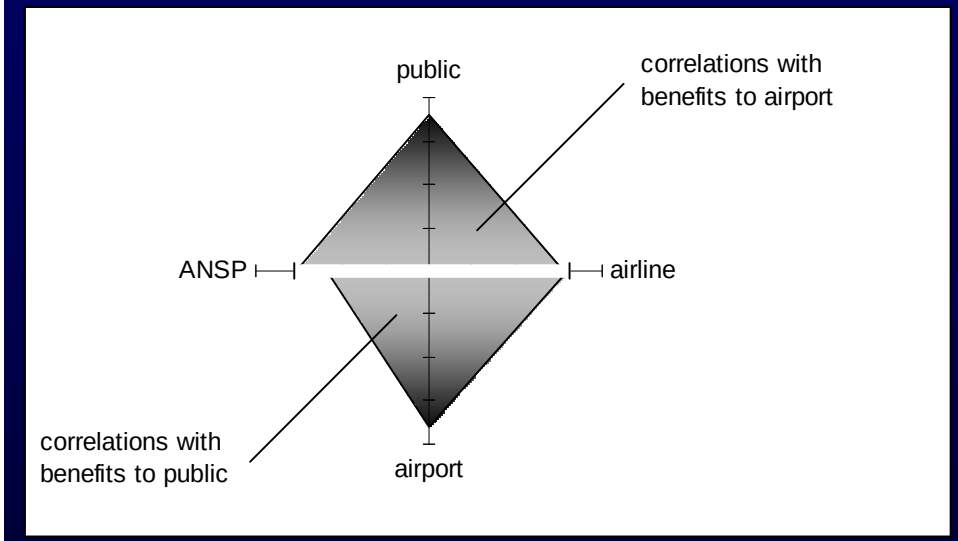
Principle components analysis

- Unconstrained, disaggregate; for controllers:
  - solutions produced more components than for pilots
  - correlations weakened by perceived workload
- Components* were logical 'predictors' of V_1 … V_3
  - suggestive that perceived benefit drives change
  - some components were better 'predictors' than 1° variables
  - pilot benefit components were best 'predictors'
  - ${}^{b}C_{P,1}$ best of all at capturing 'net perceived benefit'
  - ${}^{b}C_{P,1}$ even captured concern about noise complaints (!)
- Correlation matrices
  - logical and very clean: suggested some interesting halo effects, differentiated by pilot / controller …

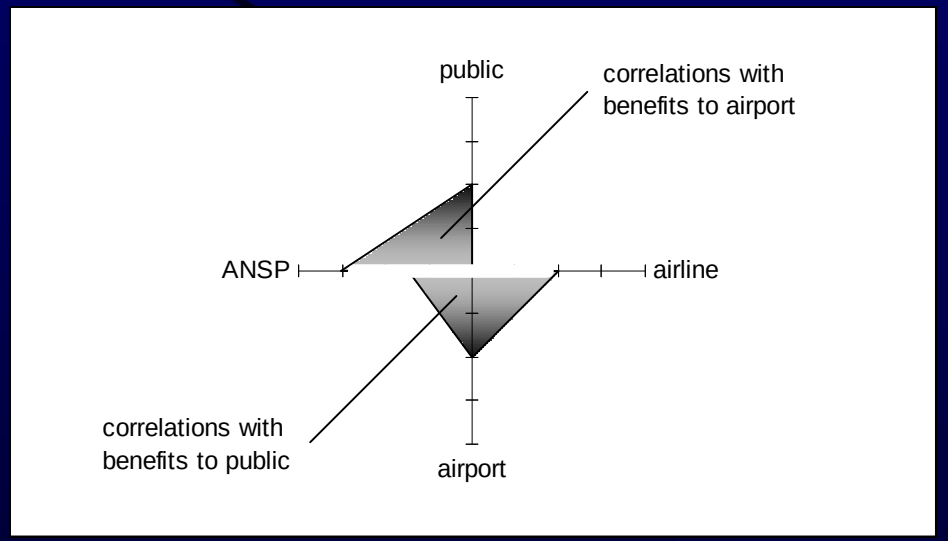
* as dummy variables

Halo effects

'Airport' and 'public' benefit correlations



Pilots
(Figure 2)



Controllers
(Figure 4)

Broader findings

Some examples of broader findings

- Full briefing of participants
  - avoid tactical / RT 'discussions' on what is already agreed
- Move stakeholders forward at same time: buy-in through agreed objectives
  - but don't set (early) goals too high
- Need good inter-sector comms & to clearly ID traffic in scope
  - CDA & stepped/vectored traffic = difficult mix
- Make sure participants understand limitations (of ATC & aircraft)
  - e.g. pilot complaints when broken-off / dropped by APP, think have priority
- Maintain a continued dialogue, with flight-by-flight correlation potential
  - but outside a blame culture
- Keep everything as simple as possible
  - but try to get the technology right to avoid a poor start, difficult to shake off

Summary & next steps

For ATM change implementers

- Perceived benefit drives behaviour, especially when conforms with existing values
  - see also Bolic & Hansen (2005)
- Look for positive and negative halo effects in target sub-groups:
  - reinforce the dominant benefit(s) perceived
  - off-set the dominant disbenefit(s) perceived
- Study output will be a set of practical guidelines
  - to help understanding & facilitation of change
- How ATM views society - & *vice versa* !
- Any suggestions for a pilot workload case study?

Thank you