

Contents

01 Background: Aim and approach

02 Investigation of different organisational configurations

- An Organisational framework
- Simulations of three C2 configurations
- Summary Evidence and propositions
- Requirements for modelling for 21st century missions

03 Agility and implications for capability acquisition

04 Way Ahead and an Experimental campaign



01

Background: Aim and approach



01 Contractual

- **Agency:** Office of the Secretary of Defense, Office of Networks and Information Integration (NII).
- **Program:** Research and Development for the Command and Control Research Programme (CCRP).
- **Aim:** To investigate the implementation of Edge Organisations.

01 Overall aim is to be able to test the thesis

- *“Edge Organizations allow their operating units to exert more decisive influence than other organizational forms over a wider range of adversarial organizations within many types of operational contexts”.*

... hence ...

- We need to be able to model competitions/engagements between different kinds of organisations in a variety of contexts.

... so ...

- We have identified a set of attributes that will enable us to characterise different types of organisation, their composition, form, behaviour and motivation, and the environments they operate within.

... but ...

- Our current models simulate attritional conflicts between ‘traditional’ military forces.

... so ...

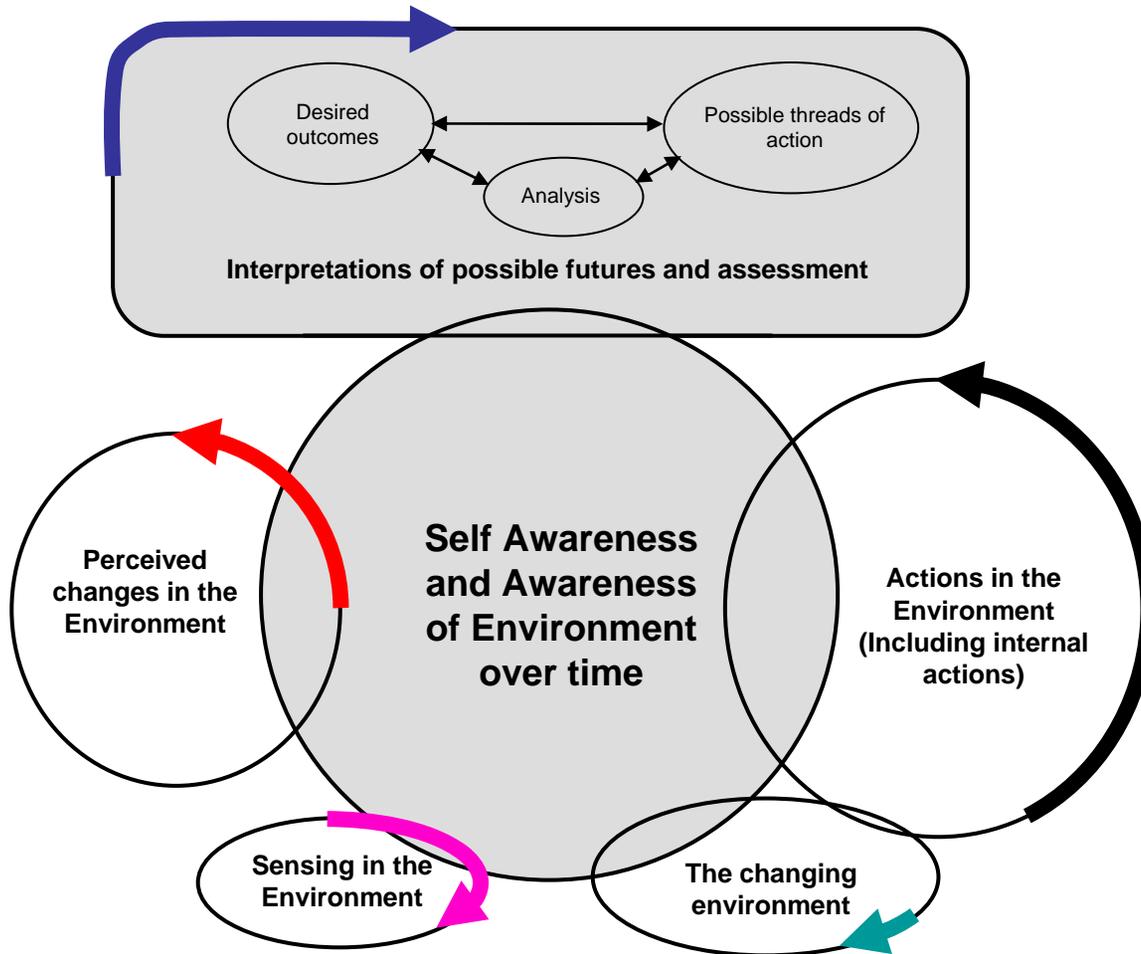
- We have undertaken a proof of concept study to test the thesis on a small sub-set of the attribute space and to help us identify the characteristics of a full experimental campaign.

02

Investigation of different organisational configurations



02 An organisation in its environment



- It is not a loop – it is cross-referential and nested.
- All activities simultaneous.
- All activities have different rhythms
- Awareness is the key function.
- Assessment assumes model of self

02 Characterisation of the framework

- Attributes of the operational environment
 - Difficult to influence (e.g. Terrain, rates of change, familiarity and predictability)
 - Amenable to influence (e.g. Boundaries, value-systems)
- Organisational attributes and building blocks
 - Capability components (e.g. equipments, doctrine, personnel)
- Command and control attributes
 - Levers (e.g. Success measures, intent, feedback mechanisms)

02 Characterisation of the framework

Attributes of operational environment

| |
|--|
| Organization's own values and concerns about impact of its actions |
| Organization's perception of how others assess impact of its actions |
| Physical environment |
| Rates of Change |
| Target Specification |
| Terrain |
| Complexity of the Environment |
| Prior models of others' behaviour modes, patterns |
| Boundaries (legal, tactical and operational) |
| Environmental resources |
| Predictability |

Fixed

Organisation attributes and building blocks

| |
|--|
| Infrastructures and support (including logistics and interactions) |
| Personnel |
| Training |
| Doctrine (expression of) |
| Doctrine (use of) |
| Equipments |

Fixed

Structural and cognitive attributes

| |
|--|
| Identity and sense of self |
| Generation, maintenance and dissemination of purpose |
| Groupings of operating units |
| Decision-making [Delegation of decision rights] |
| Sense making [Shared awareness of non-self] |
| Sense making [Perception of environment and changes] |
| Status monitoring and decision-making [Shared Awareness of self, including status and setting resource priorities] |
| Synergy [Shared awareness of self and own operation with respect to others] |
| Success measures |

02 Structural and cognitive attributes in a military context

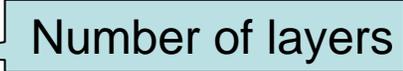
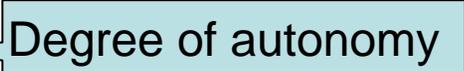
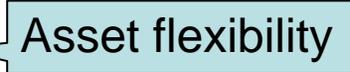
- Ownership and responsibility (e.g. Force ORBAT structure)
- Authority for actions (e.g. Command freedoms and decision rights)
- Re-assign-ability at run-time (e.g. re-allocation of support units)
- Internal information sharing (e.g. own force status reporting structures)
- Planning horizons and forward projection (e.g. cyclic vs continuous)
- Logistics C2 structures (e.g. demand-led or supply-determined)
- ISTAR architectures (e.g. distribution and processing of sensor-derived info)

02 Focus for the independent variables

- Ownership and responsibility (e.g. Force ORBAT structure)
- Authority for actions (e.g. Command freedoms and decision rights)
- Re-assign-ability at run-time (e.g. re-allocation of support units)
- Internal information sharing (e.g. own force status reporting structures)
- Planning horizons and forward projection (e.g. cyclic vs continuous)
- Logistics C2 structures (e.g. demand-led or supply-determined)
- ISTAR architectures (e.g. distribution and processing of sensor-derived info)

02 Parameters to define different C2 configurations

Independent variables relate only to:

- Ownership and responsibility
 - (e.g. Force ORBAT structure) 
- Authority for actions
 - (e.g. Command freedoms and decision rights) 
- Re-assign-ability at run-time
 - (e.g. re-allocation of support units) 

02 Simulations to investigate three different C2 configurations

| | | Ownership and responsibility (No. of Layers) | Authority for actions | Re-assign-ability at run-time |
|------------------|--------------------|---|-----------------------|---|
| C2 configuration | Top down hierarchy | 4 | Low | None |
| | Intermediate | 3 | Medium | Long range artillery |
| | “Edgy” | 2 | High | Long range artillery, Manoeuvre Units, Attack Helicopters |

02 Scope of proof of concept simulations

- *“Edge Organizations allow their operating units to exert more decisive influence than other organizational forms over a wider range of adversarial organizations within many types of operational contexts”.*

two

just one

without a
comparison

02 ...and so...

| | Operational Environment | Building Blocks | C2 Configurations |
|------------------|------------------------------------|------------------------------------|--|
| Simulation run 1 | Fixed and constant across the runs | Fixed and constant across the runs | Attacking force: Top down Defending force: Intermediate |
| Simulation run 2 | Fixed and constant across the runs | Fixed and constant across the runs | Attacking force: Intermediate Defending force: Intermediate |
| Simulation run 3 | Fixed and constant across the runs | Fixed and constant across the runs | Attacking force: Edgy Defending force: Intermediate |

02 Findings from proof of concept simulations

- In the advance-to-contact phase:
 - Edge configuration allows forces to achieve greater operational tempo than the top-down directed forces (including early initiative to strike with well-placed and organisationally flexible indirect-fire assets and AH).
- In the in-contact phase:
 - Edge configuration results in more losses (both personnel and vehicles) than the other two configurations (variance of losses is also larger).
- Across all phases:
 - Number of local decisions (Edge-like behaviour) is greater for defensive force than attacking force while both are in Intermediate configuration.
 - There are cross-over points in tempo and loss trajectories indicating periods (relating to phase-changes) in the operation when it would be advantageous for the force to adopt one of the other two configurations. This helps to define feed-back mechanisms for agility.

02 Propositions

- Forces should be able to adopt different configurations:
 - At different phases of the conflict.
 - For different environmental conditions.
 - To match specific attributes of the organisation's building blocks.
- Edge-like organisations are more suited to collective actions that are responsive in nature and have a distributed general purpose rather than a specific directive, for example:
 - Defensive postures and holding ground
 - Potentially also delay and blocking missions
 - Rendering a situation safe or regaining normality or stability
 - General advance and movement actions
 - ISTAR tasks (in particular search and surveillance)
 - Supply and general sustainment operations.

02 Requirements for modelling 21st century missions

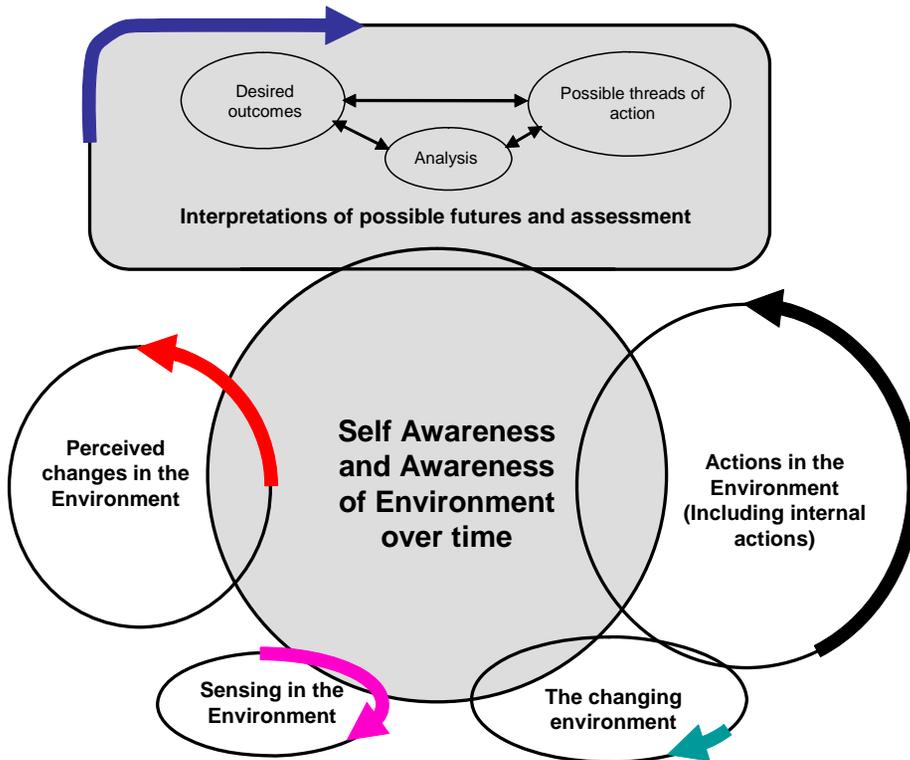
- New organisational modelling concepts are required that address:
 - Novel mechanisms and different types of feed-back information for establishing and re-adjusting means and ways of sensing, measuring, analysing and assessing own force status, disorder and fitness for current purpose.
 - Novel mechanisms to establish self-synchronisation in particular ways to define and re-adjust boundary conditions at execution time based on both external and internal feedback and changes in measures of effectiveness as the operation is on-going.
- New modelling techniques that are not event-driven and which are able to simulate non-combat operations are required to fully investigate the advantages and internal arrangements of edge and agile organisations. Simulations need not only to be able to represent activities and interactivity but also be able to represent and drive changes in relationships and interdependencies.

03

Agility and implications for capability acquisition



03 Agility within the framework

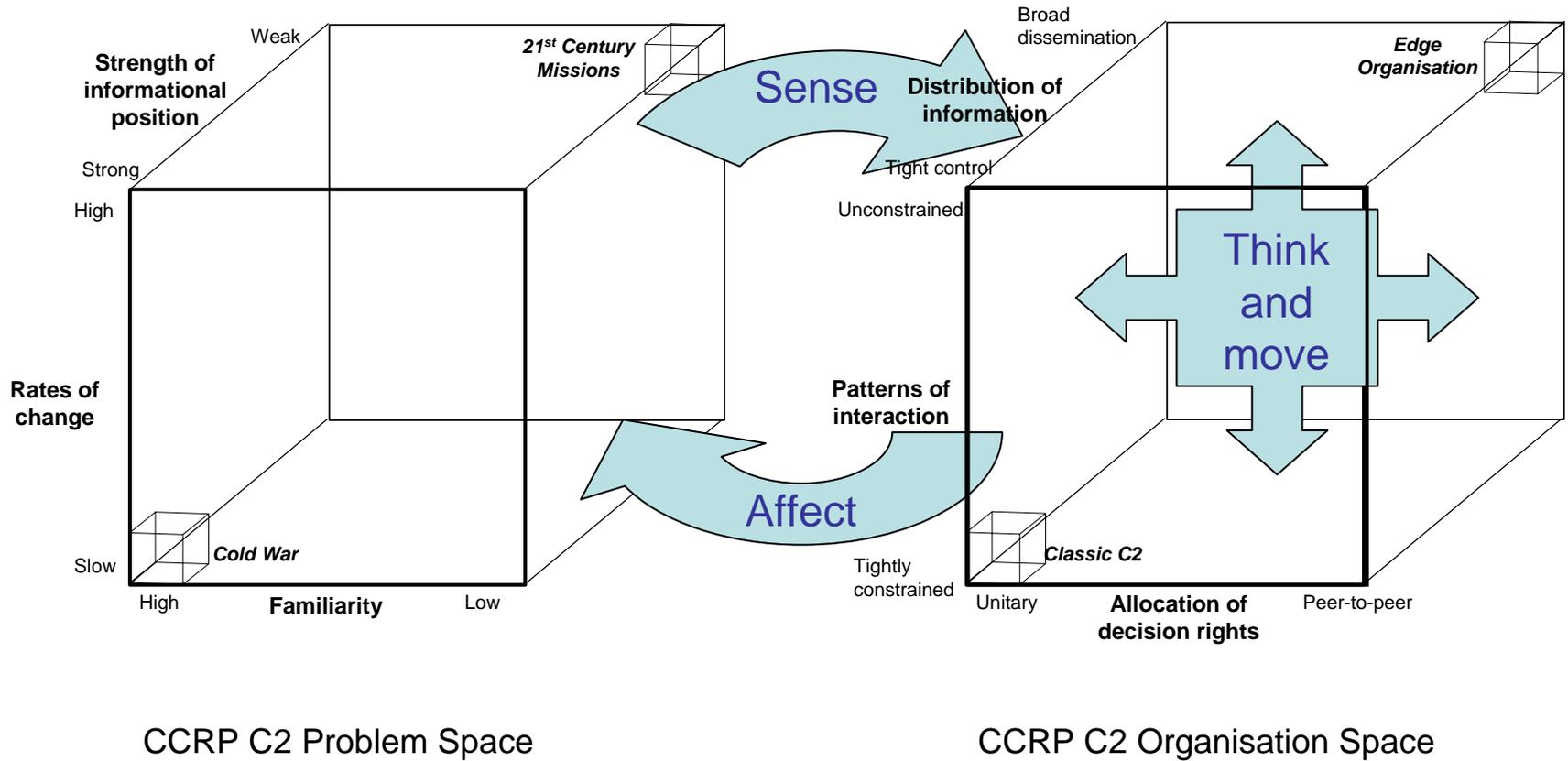


Behaviour of the framework

- Ability to adopt different internal configurations and behaviours, to reflect:
 - The environment
 - The internal components
 - The phase of the conflict
 - The organisation's intent
- This requires:
 - Identification of indicators
 - The ability to sense the environment
 - The ability to sense self
 - Predict the future
 - The ability to understand the motivation of other actors in the environment
 - The ability to affect the environment

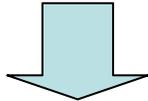
03 An Agile Organisation

Agile Organisation



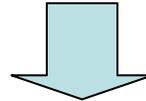
03 The three views on Agility

Operational View of Agility



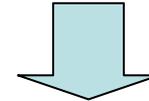
The ability to change between courses of action (to achieve **ENDS**) in a dynamic and changing environment

Organisational View of Agility



The ability to combine the organisational building blocks into new and innovative combinations (**MEANS**) – (e.g. bricolage).

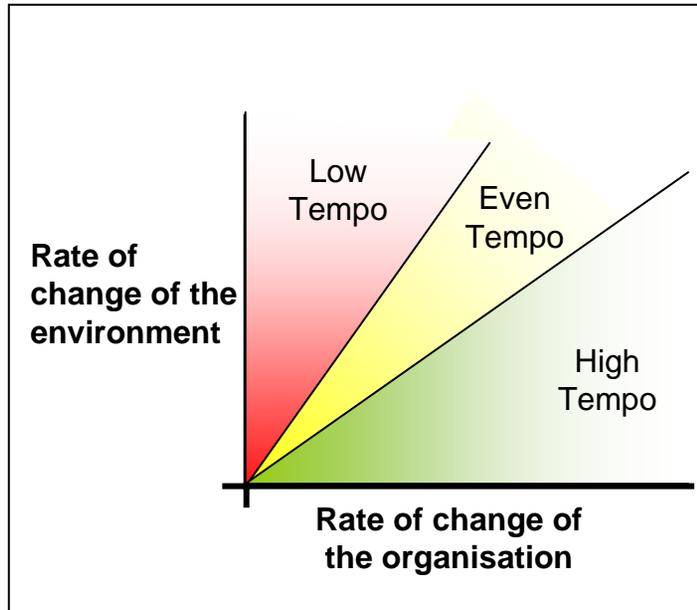
Command View of Agility



The ability and will (**WAYS**) to utilise the combinations and building blocks to follow the desired course of action.

Operational View = f (Organisational View, Command View)

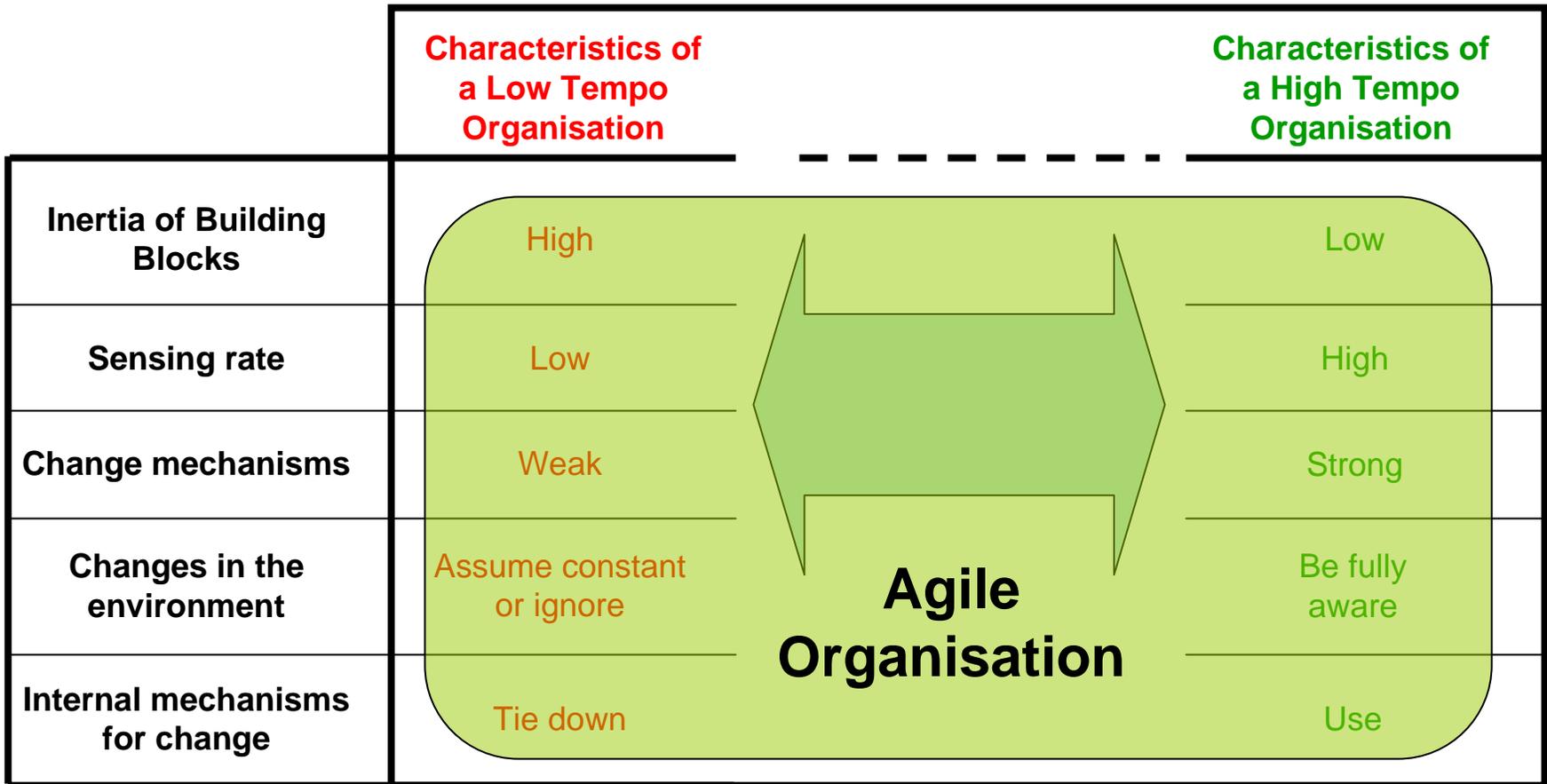
03 Tempo



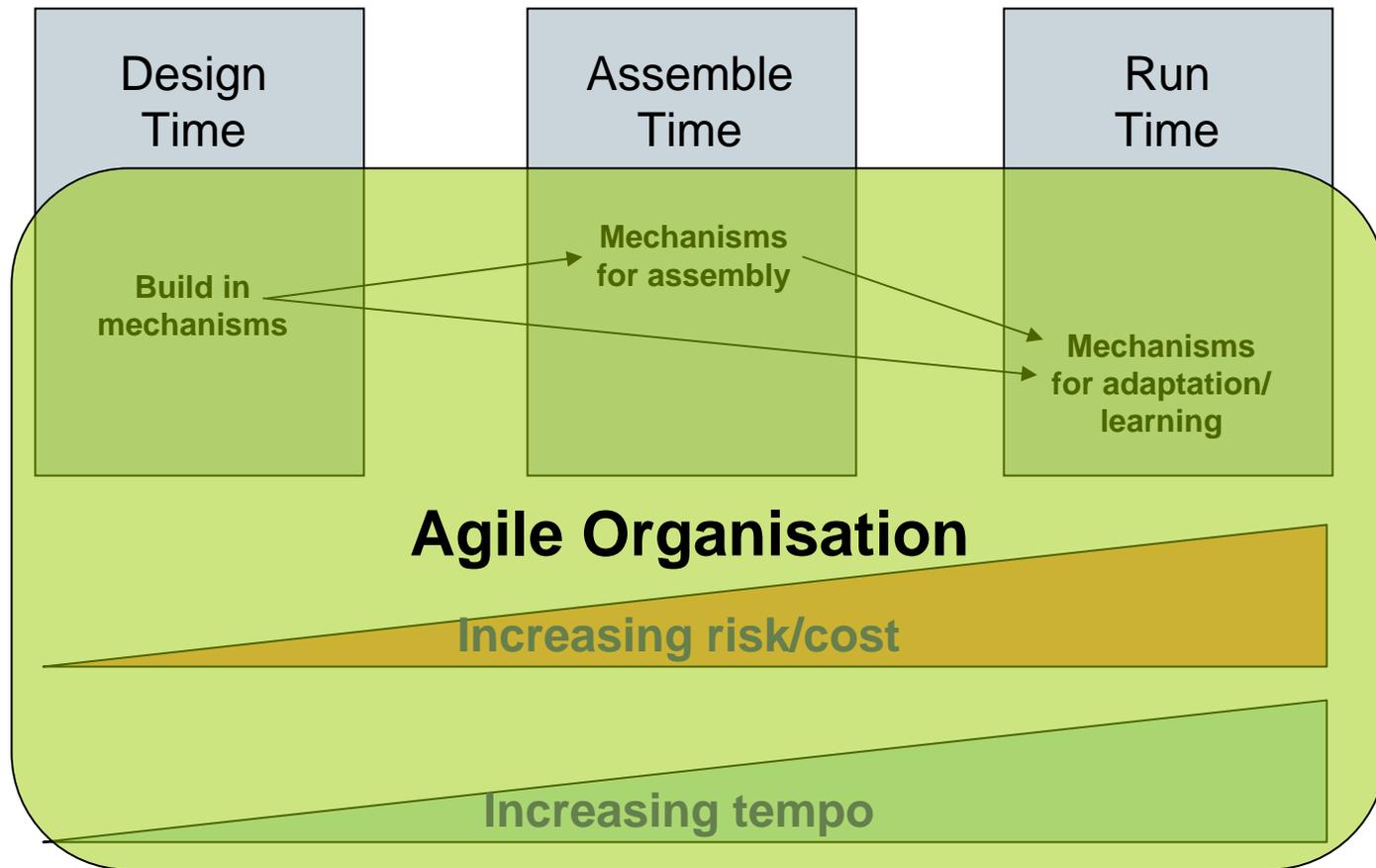
- Low Tempo – organisation is static for long periods then makes dramatic step change.
- Even Tempo – organisation changes in synchronisation with the environment.
- High Tempo – suitable for very volatile environments where the organisation will have to be able to react to very large discontinuities in the environment.

03 The Characteristics of organisations

Note: All characteristics are relative to the environment



03 Mechanisms for change



03 Agile Mechanisms

- An Agile Organisation:
 - Has all the characteristics of high, even and low tempo organisations.
 - Has Assemble and Run time mechanisms to enable it to change the characteristics
 - Is able to exercise these mechanisms at different times and in distinct components

04

Way Ahead and an Experimental Campaign



Summary

- We have presented three sets of attributes that can be used to characterise organisations.
- We used them to simulate different C2 configurations instantiated in one particular environment.
- Extended the results of the simulations into propositions about the suitability of different C2 configuration.
- These have allowed us to propose new modelling requirements .
- Started to define the characteristics of an Agile Organisation.

04 Thesis for the proof of concept study

- *“Edge Organizations allow their operating units to exert more decisive influence than other organizational forms over a wider range of adversarial organizations within many types of operational contexts”.*

04 Thesis for an experimental campaign

- *“**Agile** Organizations allow their operating units to exert more decisive influence than ~~other~~ **fixed** organizational forms over a wider range of adversarial organizations within many types of operational contexts, because they are able to adapt their organisational form and behaviour to best match the adversarial context”.*

Adapt at run time

Many

with comparisons



Questions

QinetiQ

The Global Defence and Security Experts