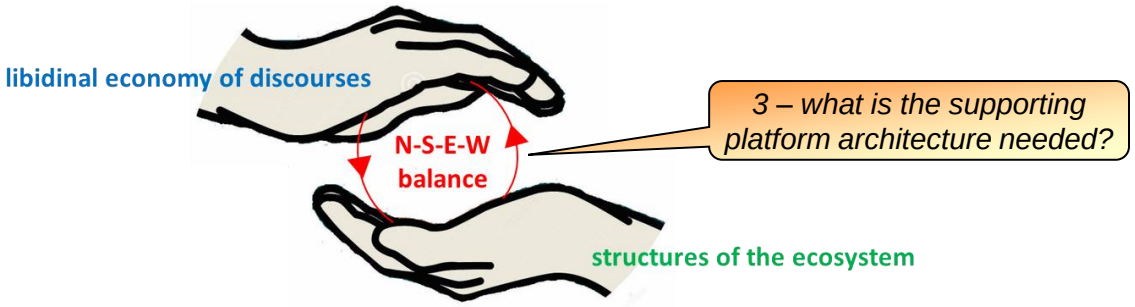
Pathways across the 3rd epoch domain

3 – consulting to an edge role on the need for a supporting platform architecture

Philip Boxer BSc MBA PhD

November 5th 2019



What changes are needed for an organisation to be able to become effects-driven?

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Learning from the military needing to take power-to-the-edge

			← 1st asymmetry →		← 2nd asymmetry →		← 3rd asymmetry →	
The Enterprise Economy	**USA's DOTMLPF**	**UK's Lines of Development**	**The 'WHAT' (blue team)**	**The 'HOW' (white team)**		**The 'WHO-for-WHOM' (red team)**		**WHY (black team)**
			1: Equipment	**2: Fielded equipment**	**3: Operational Capabilities**	**4: Composite Capabilities**	**5: Synchronisation events**	**6: Decisive moments within contexts-of-use**
Doctrine & Operational Concepts	Doctrine	Concepts & Doctrine		Technique	Tactics & Procedures	Concept of Use (CONUSE), Concept of Employment (CONEMP)	Concept of Operations (CONOPS)	Defence Operations lessons learned
Facilities, Infrastructure & Logistics	Facilities	Logistics	Spares provision Deep maintenance Supply chain	Front Line Maintenance	Equipment Availability (in-field replacement/ repair)	Forward supply within fixed constraints	Forward supply within flexible constraints	
		Infrastructure	Special storage, maintenance, training facilities	Deployed support facilities	Facility Management			
Leadership & Education	Leadership	-	Staff-centric			Mission-centric	Self-synchronised	Anticipated Effects
Materiel & Technology	Materiel	Equipment	Equipment Acquisition	Availability for deployment	Deployed and operationally available	SoS inter-operationally ready	SoS dynamically responsive	
Edge Organization	Organisation	Organisation	Supply-chain organisation	Deployment organisation	Force Component organisation	Force Element organisation	Organisation of synchronisation of agility	organisation of threats/decisive moments
Force composition & collective learning	Training	Training	Training Facilities Documentation	Operator and Maintainer training	Task training	Collective training	Collective training Mission rehearsal	
Situational Understanding	-	Information	About how things are designed	About how things are working	About how things are being used	About combined uses of things	About situations of use	About domains of relevance/contexts-of-use/potential effects
Personnel & Culture	Personnel	Personnel	Service personnel	Operators, maintainers trained to use and maintain equipment	Operators trained to carry out tasks in accordance with Tactics, Tasks & Procedures	Operators having received collective training able to support operational tasks	Operators able to monitor and adjust activities to suit dynamic operations	

To be effects-based, it is necessary to start from situational understanding

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Balancing the development wheel

Sustaining power-to-the-edge across all 8 lines of development

Leadership and Education
The ability to lead creatively and effectively within the chosen domain of relevant differences.

Materiel and Technology
The equipment, tools and methods needed to be effective within the chosen domain of relevant differences.

Facilities, Infrastructure & Logistics
The facilities, infrastructure and logistics providing the platform that supports an organisation in doing its work.

Edge Organisation
The particular orchestration and synchronization of capabilities needed to generate the desired effects within a client situation.

Doctrine and Operational Concepts
The principles and framework governing the approach to generating effects for clients within a domain of relevant differences.

Mission Alignment
The people with the appropriate know-how and ability to work together collaboratively in support of a given edge organisation.

Personnel and Shared Culture
The people with the socialization, background and mutual knowledge and trust to be able to work together.

Situational Understanding
The way a domain of relevant differences is defined and its data is fused and interpreted to provide a composite picture and understanding of what is going on in the particular situation.*

Hierarchically/ vertically driven

Horizontally/ edge- driven

To be effects-based, it is necessary to start from situational understanding

* A key issue here is not only 'dark data' i.e. data that is accessible, but not currently included within the current definition of the domain of relevant differences (see Hand, D., J., Dark Data - why what you don't know matters. 2020: Princeton University Press.), but also traces of behaviors that are not yet accessible as data – the kind of traces that require 'feet-on-the-ground' and a forensic attention to wigo.

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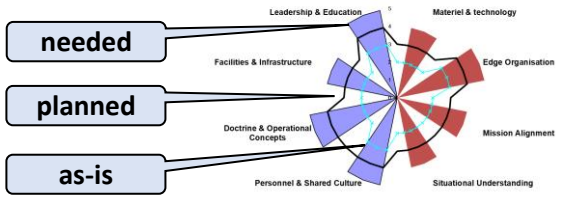
Assessing capability gaps across all eight spokes of the wheel



		hierarchically/vertically-driven				*horizontally/edge-driven*			
		D	F	L	M	O	T	S	F
		Doctrine & Operational Co	**Facilities, Infrastructure & Logistics**	**Leadership & Education**	**Materiel & Technology**	**Edge Organisation**	**Mission Alignment**	**Situational Understanding**	**Personnel & Shared Culture**
synchronization	5	how operational capabilities can be used to generate effects for clients	allocated facilities etc available within defined but flexible constraints	foundations, experience, leadership ability & creative delegation in pursuit of organisational goals	current adapted tools and methods able to be aligned to different types of use dynamically	able to dynamically synchronise work of operational capabilities to creating needed effects	mission rehearsal	understanding about how what-is-there is put together in the particular context-of-use	people with availability, readiness and understanding etc and the mutual trust
orchestration	4	the techniques, procedures and processes for using operational capabilities	allocated facilities etc available within defined fixed constraints	foundations, experience & ability to lead etc that enables delivery of organisational goals	current adapted tools and methods able to be aligned to different types of use	able to orchestrate multiple equipment needing to collaborate	collective learning	understanding about the patterns in how what-is-there is being used	people available & ready etc with the appropriate understanding of each other
customization	3	the techniques, procedures and processes for using sets of equipment	allocated facilities and infrastructure with an appropriate level of maintained availability	foundations & experience etc with ability to lead	adapted tools and methods kept current for generic use	able to customise fielding of equipment to client's situation	task training	information about how what-is-there is being used	people available & ready with the appropriate socialisation
activity chain	2	the techniques, procedures and processes for using equipment	facilities and infrastructure allocated to parts of the organisation	educational foundations with vocational experience	tools and methods adapted for use within the organisation	able to field available equipment	training in operation & maintenance	data about how what-is-there works	people available and ready to be deployed
production	1	supply-side knowledge of what it is possible to do	centrally provided facilities and infrastructure	basic educational foundations	general tools and methods	equipment available for supply	training facilities & documentation	data about inputs to what-is-there	people available

To be effects-based, it is necessary to start from situational understanding

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What constrains the forms of situational understanding that are possible?

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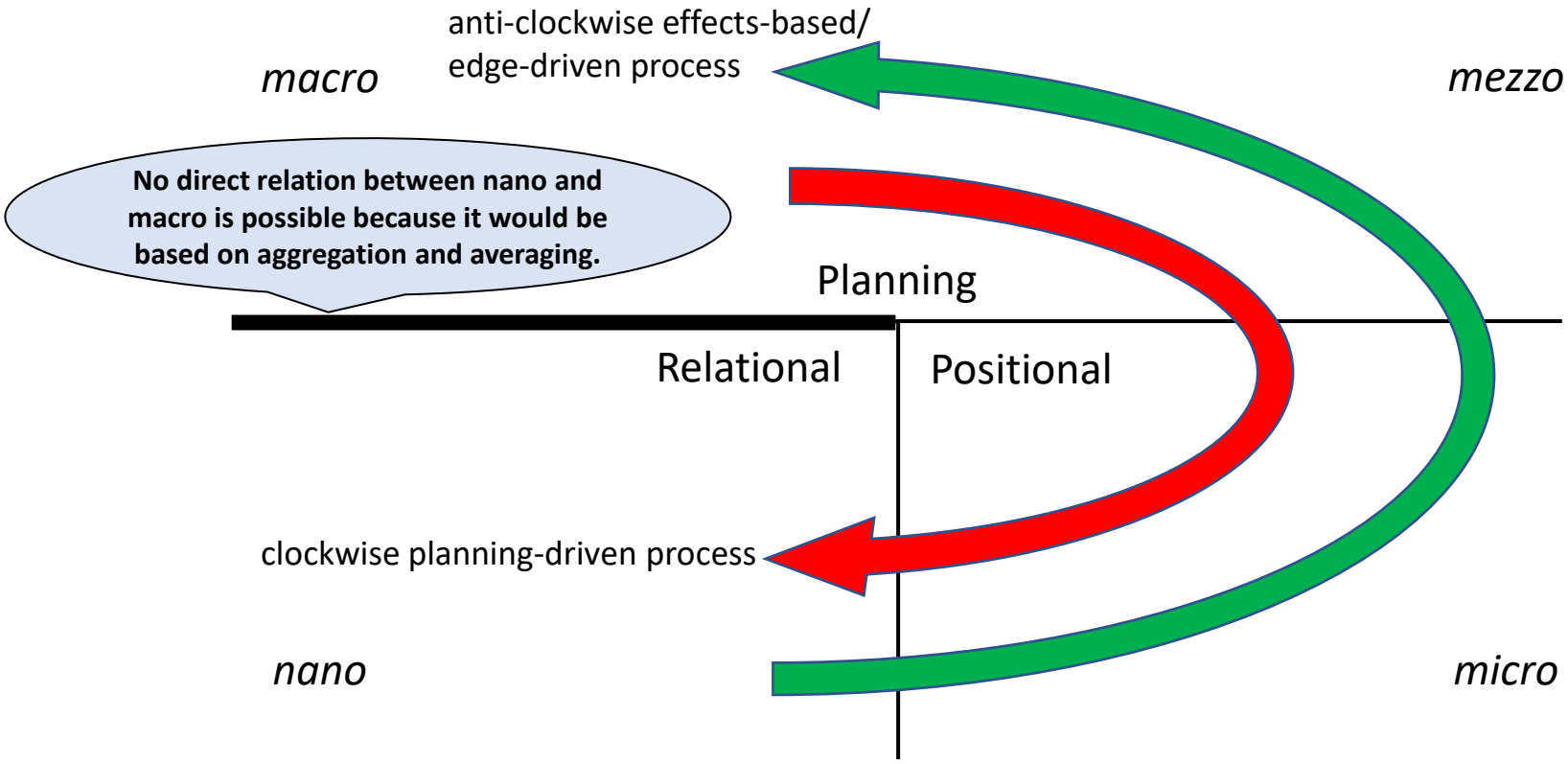
Making the shift to horizontal dominance a

necessary shift when demand-tempo exceeds integration tempo

- To be adaptive within an ecosystem, anti-clockwise processes have to be dominant, albeit constrained by clockwise processes
- When demand tempo exceeds integration tempo, maladaptation* arises when clockwise processes continue to be dominant

* polarisation, dogmatism & stalemate



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What's difficult about anti-clockwise processes

*The sense that can be made depends on the 'ontic scaffolding'**

* See Lane, David A., and Robert R. Maxfield. 2005. 'Ontological uncertainty and innovation', Journal of Evolutionary Economics, 15: 3-50.

- correspondence-truth uncertainty
  - = uncertainty over whether well-defined propositions are true or not in their correspondence to 'fact'
  - = potential for Type I errors of execution**;

Taken-for-granted processes of alignment and orchestration minimise truth uncertainty in situation

- semantic uncertainty
  - = uncertainty about what a proposition means
  - = potential for Type II errors of planning/alignment**;

Formation of component protocols and orchestration constraints minimise semantic uncertainty arising from the way alignment and orchestration processes are engaged in.

- ontological uncertainty
  - = uncertainty about what kinds of entities inhabit the actor's world, what kinds of interactions these entities can have, and how entities and interaction modes can change as a result of these interactions.
  - = potential for Type III errors of intent**.

'Ontic scaffolding' affect what forms of ontological uncertainty emerge…

… and the learning needed to balance clockwise and anti-clockwise processes will raise challenges for the existing ontic scaffolding

** See Boxer, P.J. 2017. 'Working with defences against innovation: the forensic challenge', *Organizational and Social Dynamics*, 17: 89-110.

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The 'ontic scaffolding' determines what can be understood as being relevant…

layer 7: embodied experiencing
(clients' being in relation to experienced effects)

Relation to client's value deficit

layer 6: Context-of-use
(the client's context-of-use in relation to which effects are experienced

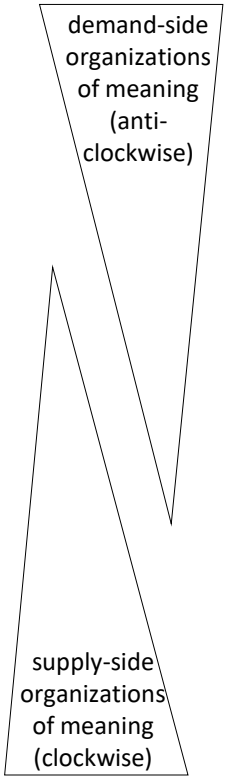
layer 5: Pragmatic Interactions
(the way *the client's* demand-side situation is engaged with)

layer 4: Discursive Interactions
(shared supply-side understanding of organizational processes)

layer 3: Semantic Interactions
(shared understanding of object-referenced meaning)

layer 2: Syntactic Interactions
(syntax – the way distinctions can be put in relation to each other)

layer 1: Granularity of Ontic distinctions
(lexis – distinctions that are made)



*Relation of domain of relevant differences to wiRgo**

layer 0: traces
(direct and indirect traces left by behaviors but not yet named)

*what is Really going on

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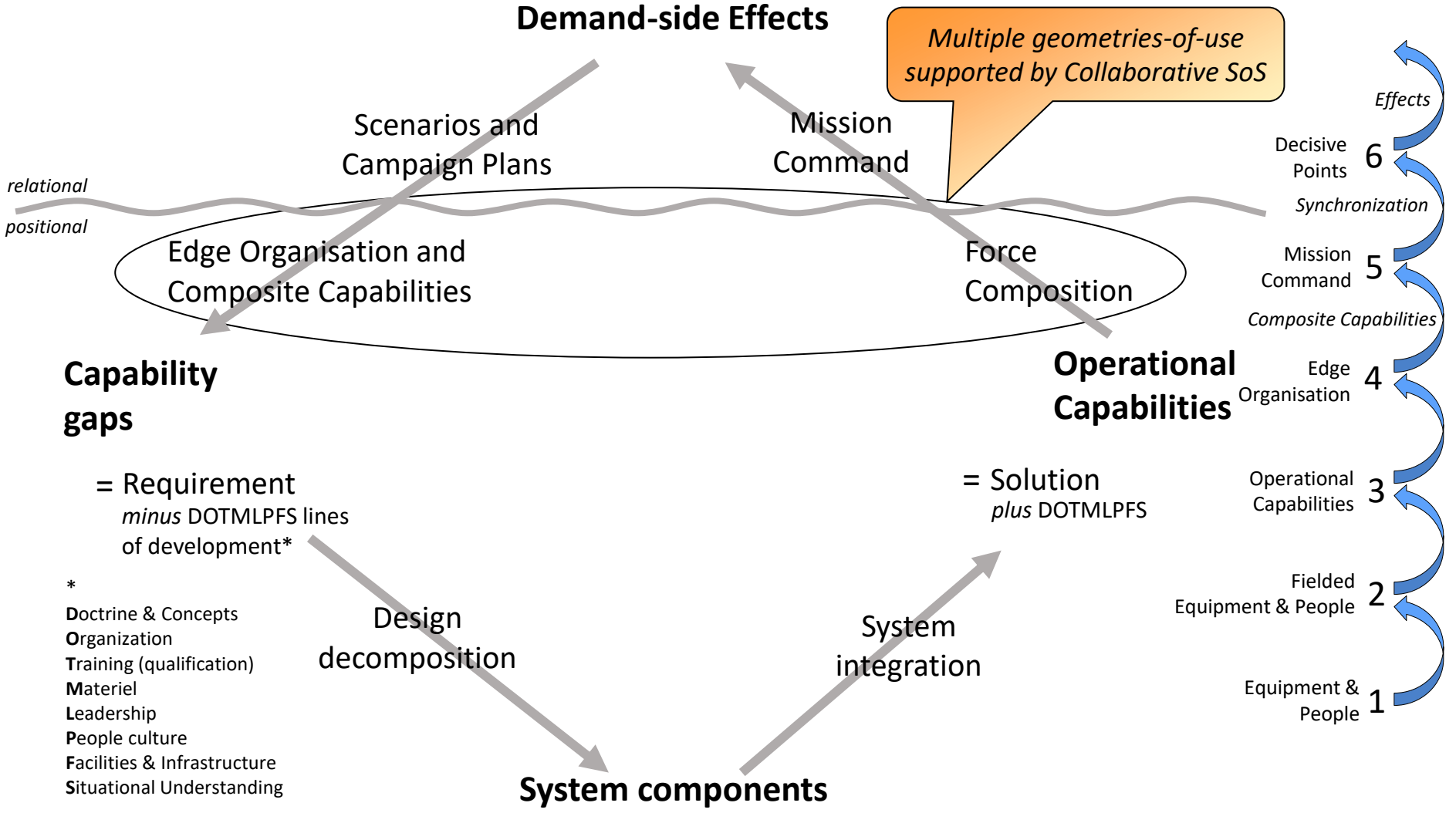
… is challenged as the double 'V' is worked in pursuit of intended effects …



Boxer, P.J. (2007) *Managing the SoS Value Cycle*, January 2007, http://www.asymmetricdesign.com/archives/85

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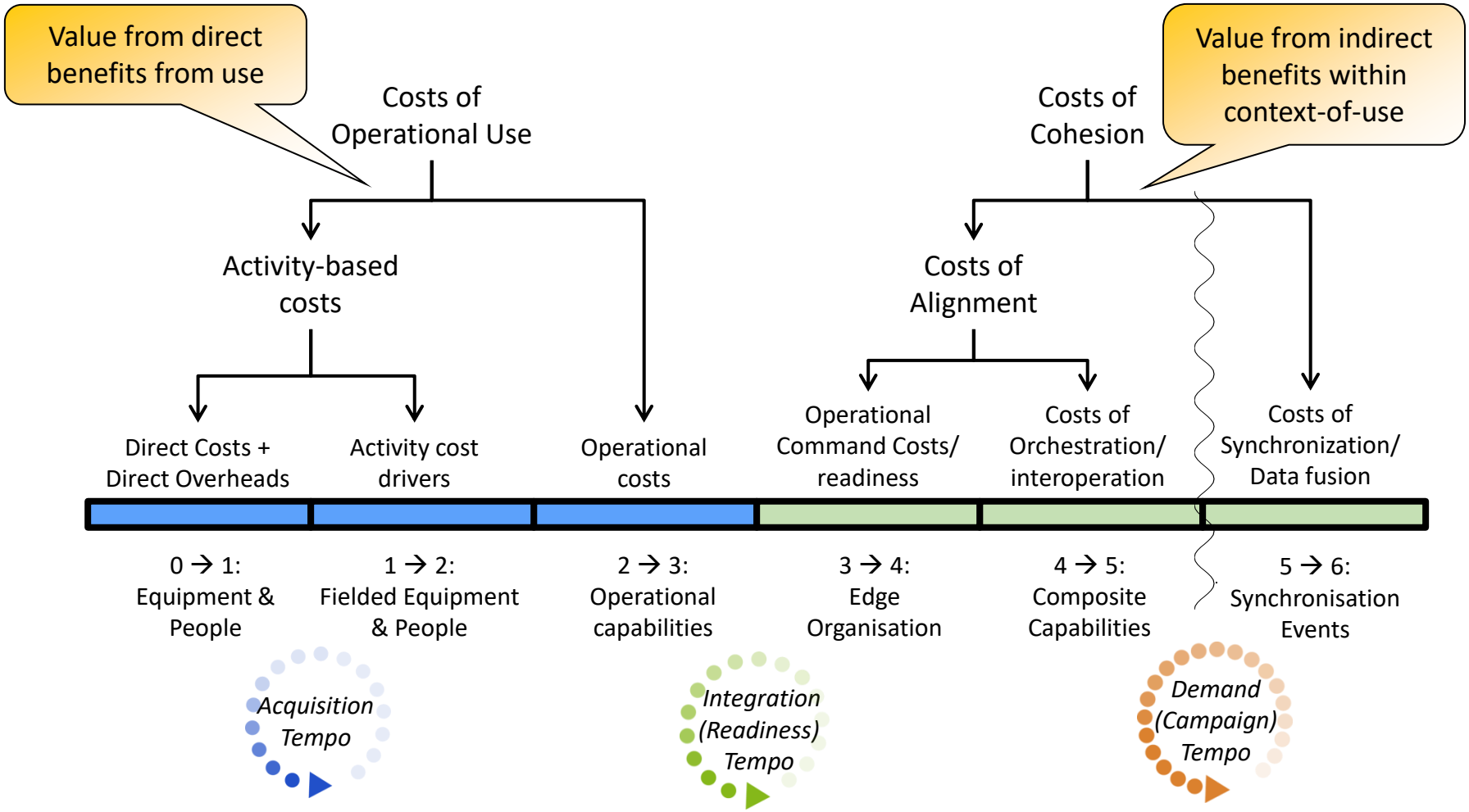
… and must account for value from direct *and* indirect benefits

i.e. the costs of demand-side cohesion as well as operational costs



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Examples of Indirect Benefit from which value may be captured:

the indirect benefit is in the support given to the networked collaborations

	Orthotics Clinics	e-Government	UAS	iPhone
Supplier	Orthotics supplier	IT Department	Thales	Apple
Platform	Orthotics clinic	Research engine	UAS	iPhone+Cloud
Direct Customers	Clinicians, Orthotics Manufacturers etc	Departmental & Agency users	Royal Artillery	Service Providers, App developers etc
Collaboration supported by Platform	Between clinicians' episodes of care	Between Departments and external Agencies	Between Force Elements and Mission Command	Between users and their apps
Multi-sided Client Situation	The patient managing their diabetic condition	The citizen with a question	Interdicting fleeting targets	The phone user arranging to meet a blind date
Indirect Benefit from which to capture value	Costs to the patient and insurer of failing to manage their condition	Costs to the citizen and Government of responding mistakenly	Costs of aligning more expensive capabilities by other means	Costs to the user of having to use less direct methods of organizing
Demand tempo for the Supplier	Month-by-month	Week-by-week	Hour-by-hour	Minute-by-minute

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The ability to work the double ‘V’ also depends on the pragmatic and granular adequacy of the supporting systems…

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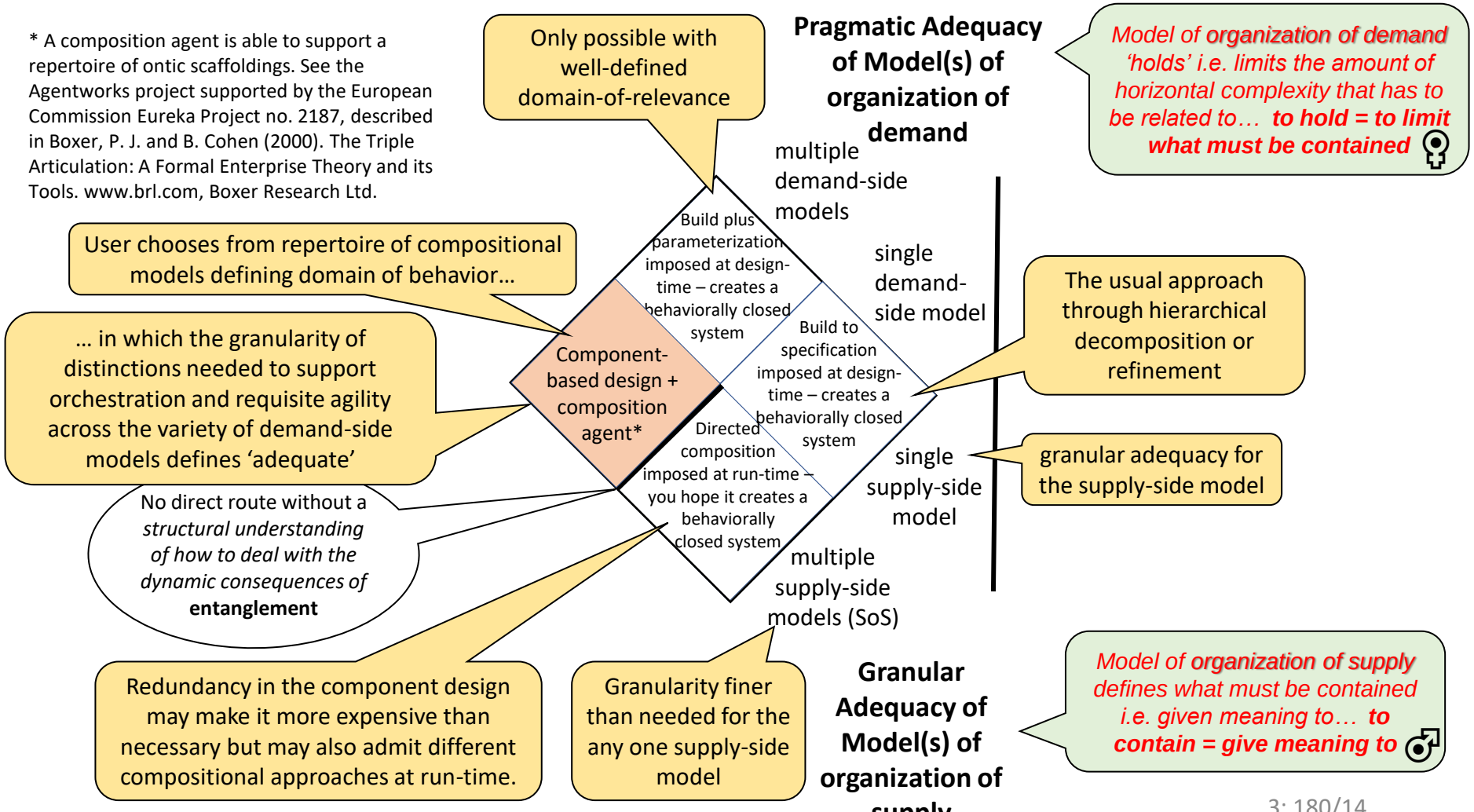
‘Adequacy’ is defined by the variety of compositional approaches that can be supported

* A composition agent is able to support a repertoire of ontic scaffoldings. See the Agentworks project supported by the European Commission Eureka Project no. 2187, described in Boxer, P. J. and B. Cohen (2000). The Triple Articulation: A Formal Enterprise Theory and its Tools. www.brl.com, Boxer Research Ltd.



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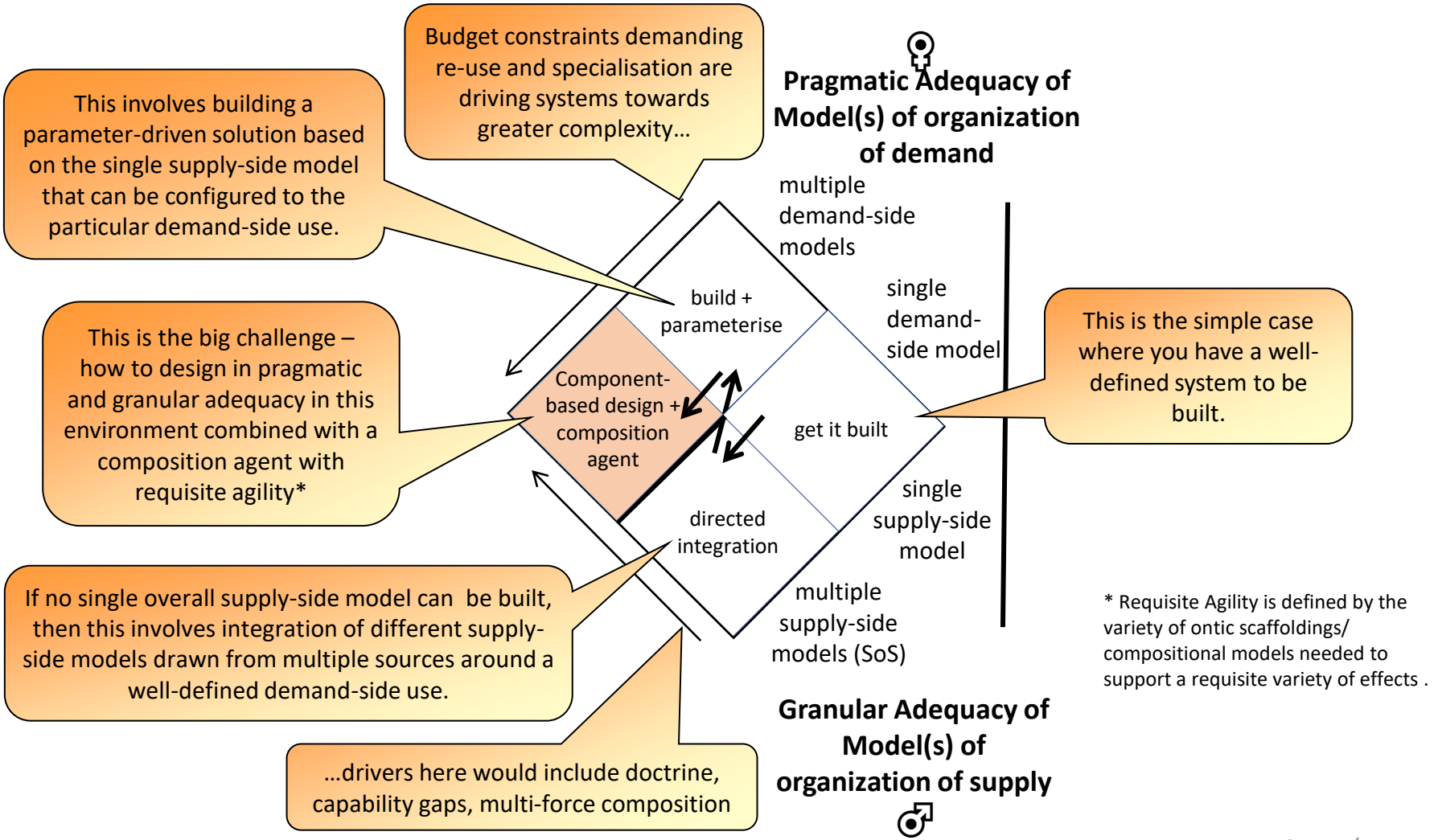
A different kind of design approach is used in each case…



* Requisite Agility is defined by the variety of ontic scaffoldings/ compositional models needed to support a requisite variety of effects .

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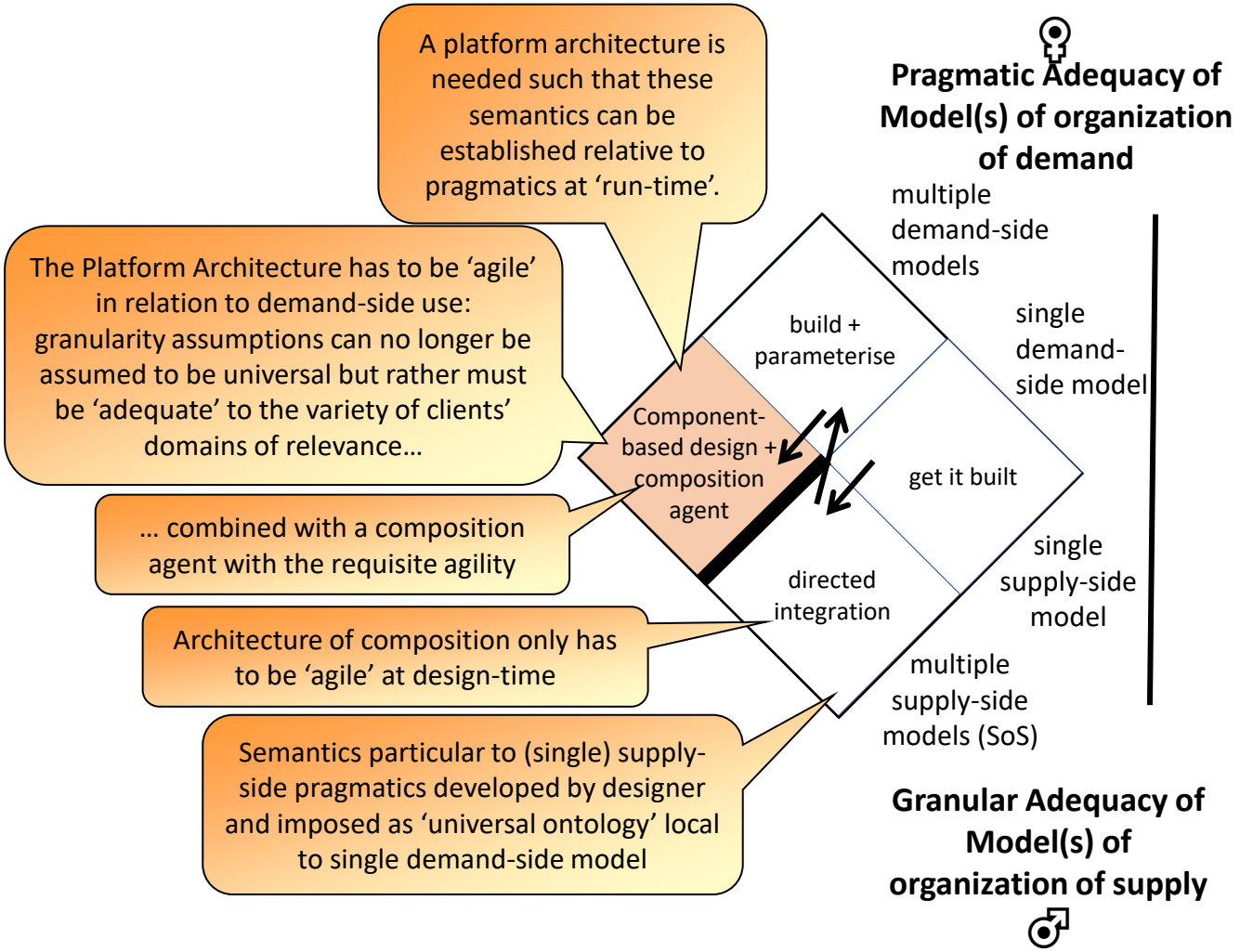
… driving platform architecture design…

needing to develop adequate pragmatics and supporting semantics with adequately fine-grained ontic assumptions



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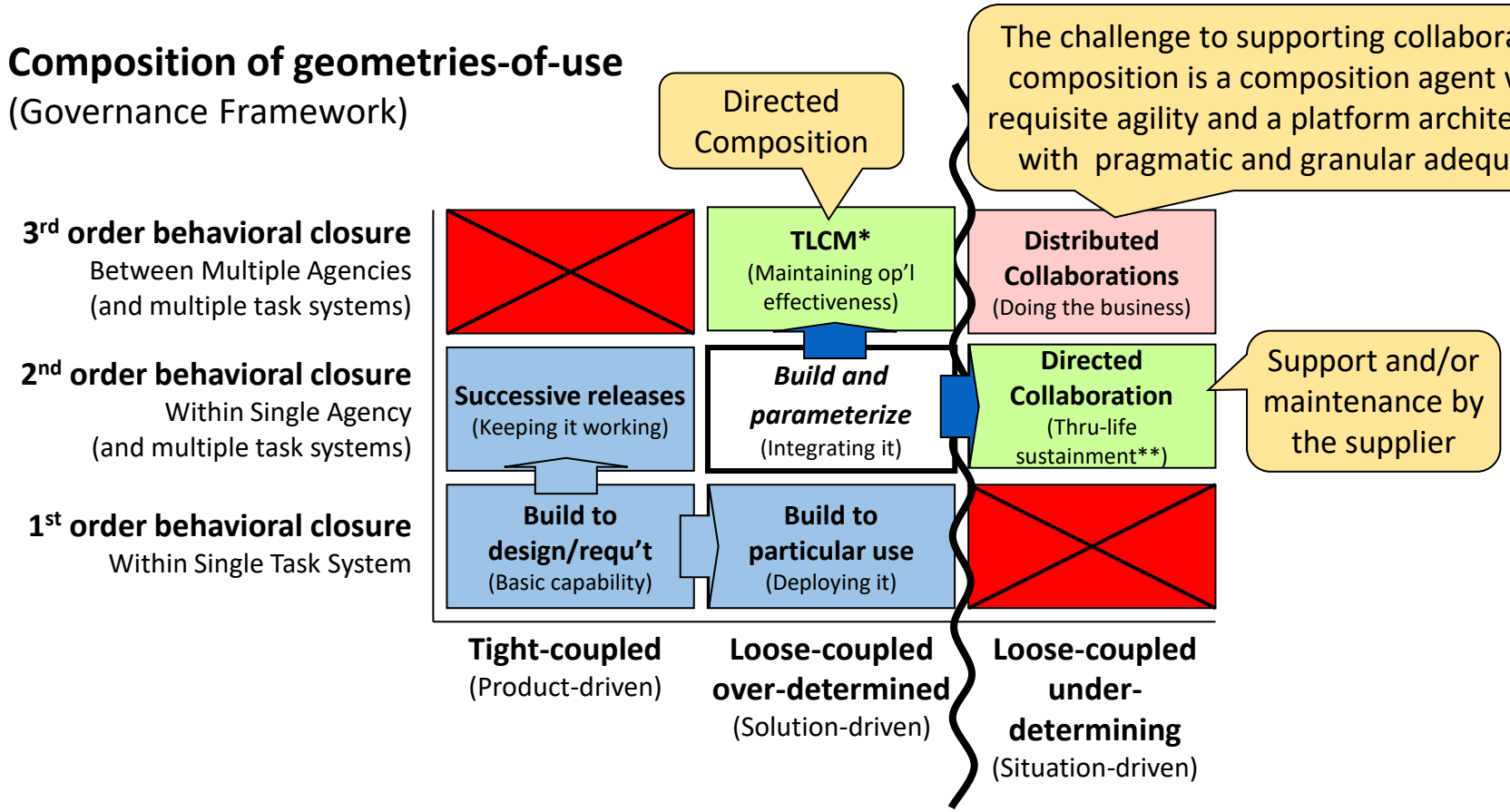
… which reflects the double challenge faced by the organization

the double challenges this time facing the supporting architectures



* TLCM = Through-Life Capability Management

** Sustainment = support and/or maintenance

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The architectural challenge that therefore arises from being effects-based

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Four kinds of approach to System-of-Systems Architecture

* participant = participant in a collaboration using a system-of-systems

Effects-based/edge-driven: No central management authority and no centrally agreed upon purpose

No

Yes

Many participants, none dominant*

Component systems of networked collaboration select interact at **run-time**

Virtual: Large-scale behavior emerges—and may be desirable—but this type of SoS must rely upon *relatively invisible mechanisms* to maintain it.

No

Yes

Supporting multi-sidedness of demands

Component systems retain independent **design-time** ownership, objectives, funding, development and sustainment approaches

Collaborative: The *central participants collectively* provide some means of enforcing and maintaining (run-time) standards.

*Relatively few dominant participants**

One participant has dominance*

No

Yes

One participant given dominance*

Directed: the integrated system-of-systems is built and managed to fulfill the *specific centrally managed purposes* of its owners

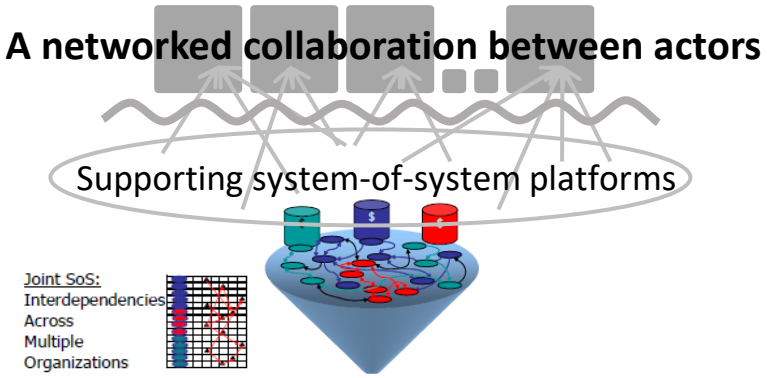
Acknowledged: changes in the (component) systems are *based on (design-time) collaboration* between the SoS and the (component) system(s)

Source of definitions: Systems Engineering Guide for Systems of Systems, OSD, Version 1.0 August 2008. Brackets added.

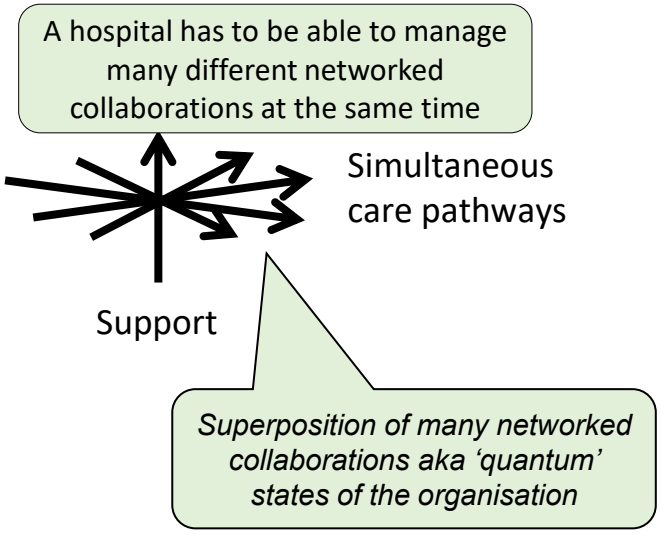
The collaborative and virtual approaches

in which horizontal dominance means responding to clients one-by-one, each networked collaboration defining a 'quantum' state of the organization

- The nature of a networked collaboration will be determined by the way its actors understand what the client wants *aka* the relation to the client's value deficit.
- The networked actors can be spread across multiple organizations within an ecosystem.
- The actors participating in the networked collaboration will define how they want their collaboration to be supported by the platform.
- For this to be possible, the supporting platform has to be able to support multiple simultaneous networked collaborations *aka* 'superposed' networks.



Source: Fig 2-1 on the Management Challenge: Systems Engineering Guide for Systems of Systems, OSD, Version 1.0 August 2008.



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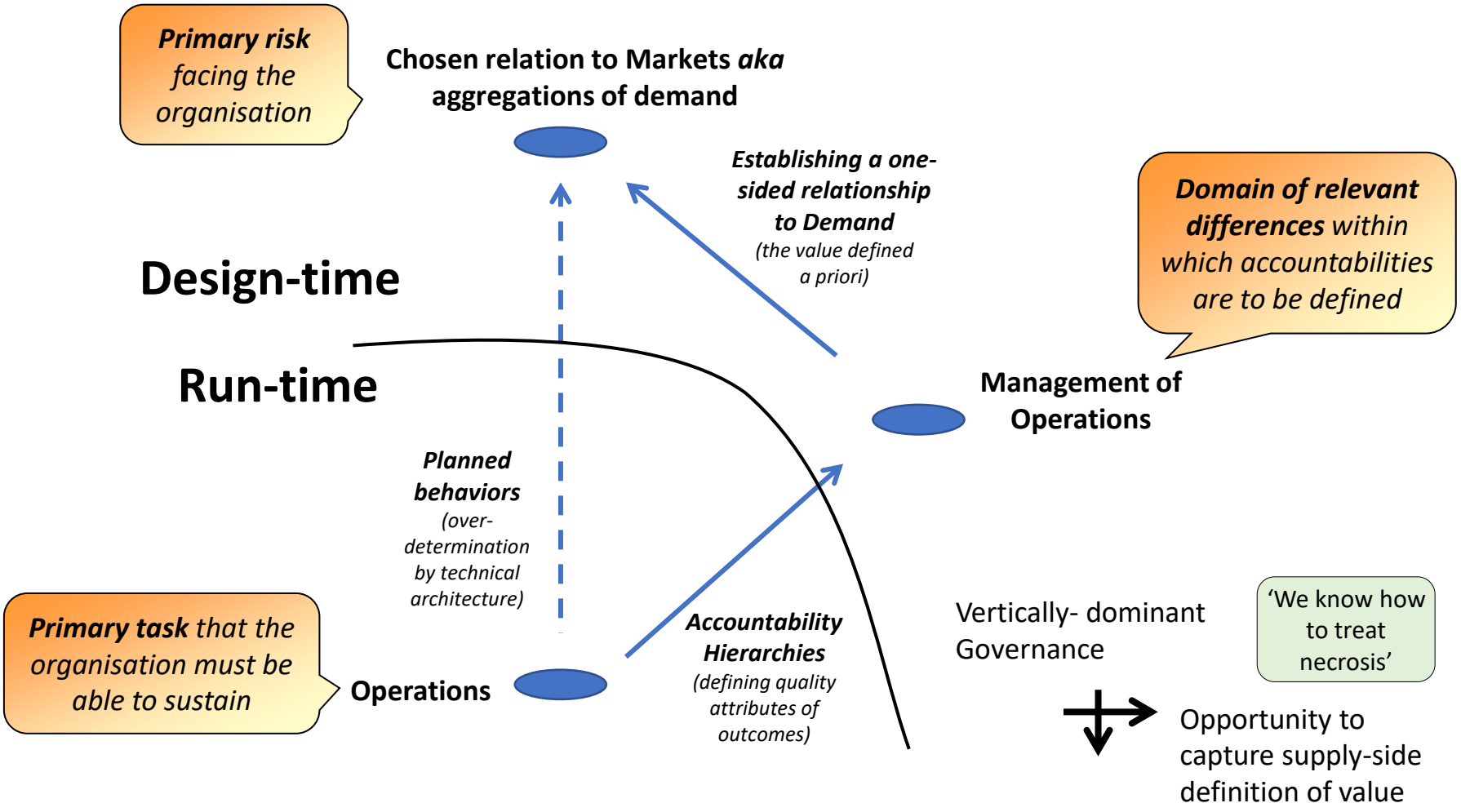
‘Classical’ vertically accountable organization:

design-time conversations over-determine run-time conversations



See Boxer, P. J. (2014a). "Leading Organisations Without Boundaries: 'Quantum' Organisation and the Work of Making Meaning." Organizational and Social Dynamics **14**(1): 130-153.

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‘Quantum’ organization*:

supporting concurrent networked collaborations

* See Boxer, P. J. (2014a). "Leading Organisations Without Boundaries: 'Quantum' Organisation and the Work of Making Meaning." Organizational and Social Dynamics **14**(1): 130-153.

Primary risks *facing the organisation*

Relation to Demand-in-its-context
(describes the variety of indirect demands)

Cohesion of the response to multi-sided Demands
(the value defined ‘live’ in the situation)

Design is going on at run-time, while demands are being responded to one-by-one

Modularity of behaviors
(under-determination by technical architecture)

Domains of relevance *within which accountabilities are to be defined*

Management of Operations *and* Alignment
(organizes the alignment processes)

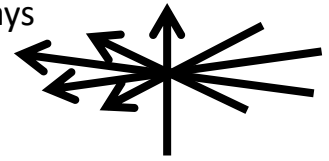
Primary tasks *that the organisation must be able to sustain*

Accountability Hierarchies
(defining quality attributes of outcomes)

Operations
(the multi-sidedness which the supporting platforms are capable of supporting at a given tempo)

‘We enable our patients to manage their diabetes’

Simultaneous care pathways



Support

Each networked collaboration has to be able to collapse out a different care pathway

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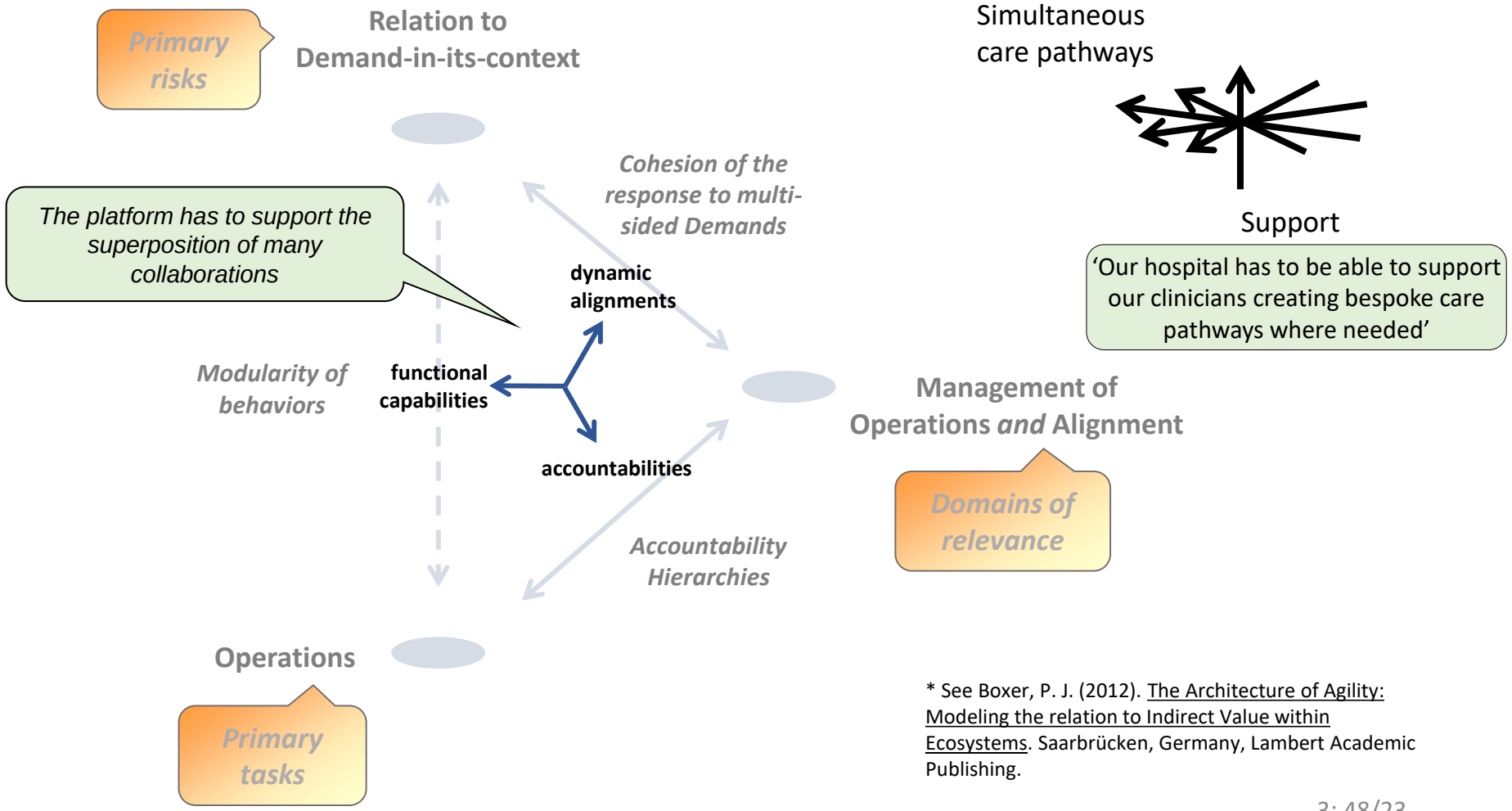
Quantum organisation requires an agile platform* able to respond to multi-sided demands:

the platform has to be able to support superposition



* See Boxer, P. J. (2012). The Architecture of Agility: Modeling the relation to Indirect Value within Ecosystems. Saarbrücken, Germany, Lambert Academic Publishing.

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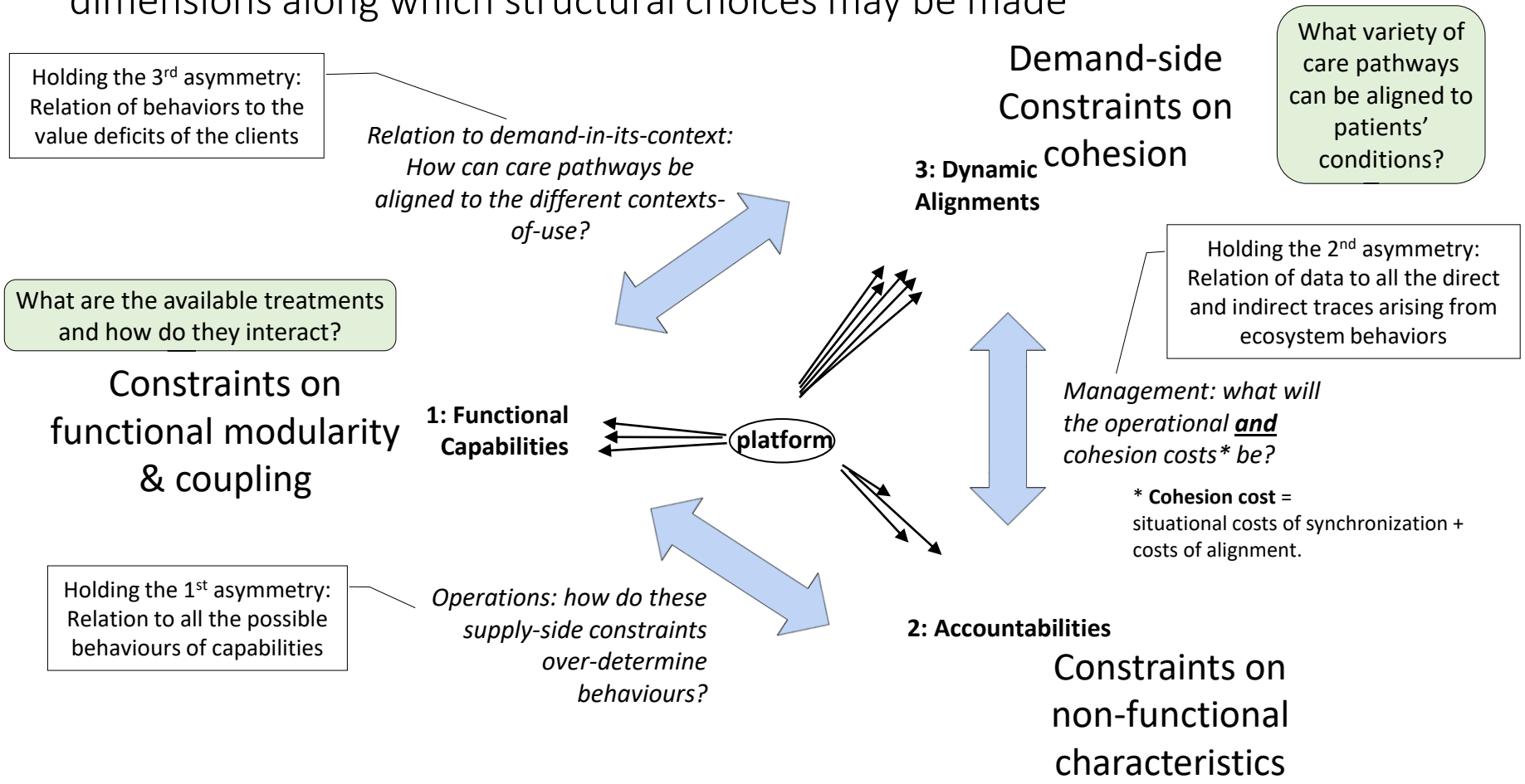
The architectural challenge is that such a platform has to be triply-articulated:

the articulation along three axes of under-determination *aka* independent dimensions along which structural choices may be made



Boxer, P. J. (2012). The Architecture of Agility: Modeling the relation to Indirect Value within Ecosystems. Saarbrücken, Germany, Lambert Academic Publishing.

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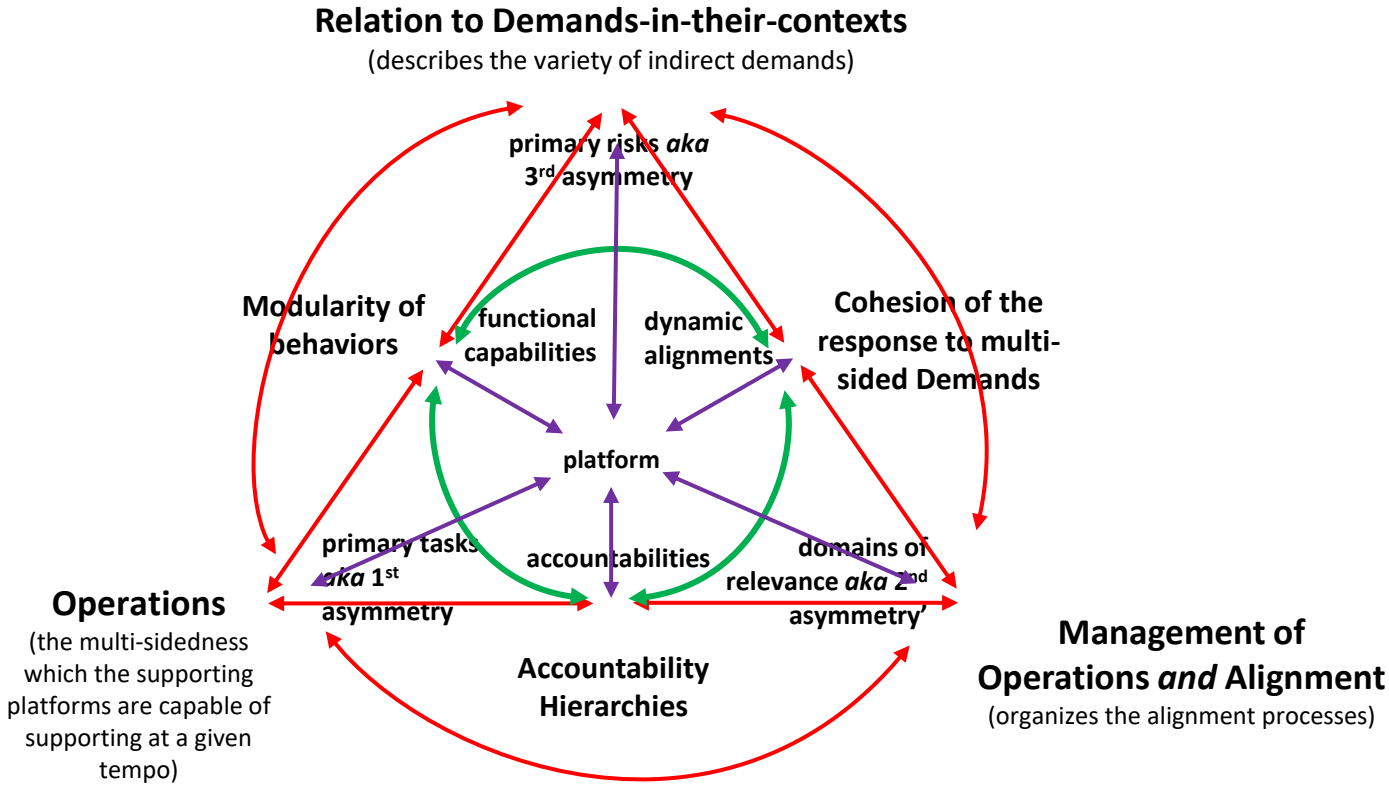
The platform architecture supports the organisation's behaviours



△ An organisation's behaviours being **used** by a citizen

▽ A platform architecture supporting the organisation's behaviours

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This means that investments by the organisation must attach value to changes in both operational cost *and* cohesion cost

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Responding to the multi-sidedness of demand at the edges

- Capturing indirect value at demand tempo
  - Suppliers have to consider their relationship to indirect forms of demand, and the organizational processes by which their own products and services can be aligned with those of others to support multi-sided demands.
- Defining the economics at the level of the ecosystem
  - The value lies in reducing the costs that fall ultimately on the indirect customer of aligning suppliers' products and services to multi-sided demands.
- Developing the platform architectures capable of capturing indirect value
  - The architectures have to have 'requisite agility' in the sense that they can support a sufficient variety of forms of multi-sided demand.

The clinic has to understand the variety of clinical collaborations needed in responding to the variety of conditions they are meeting

It becomes critical to analyze the cost to the patient of their condition over its life, and what are its drivers

The agility of the platform is defined by the variety of care pathways that it can support. This requires both granular and pragmatic adequacy and a composition agent with requisite agility.

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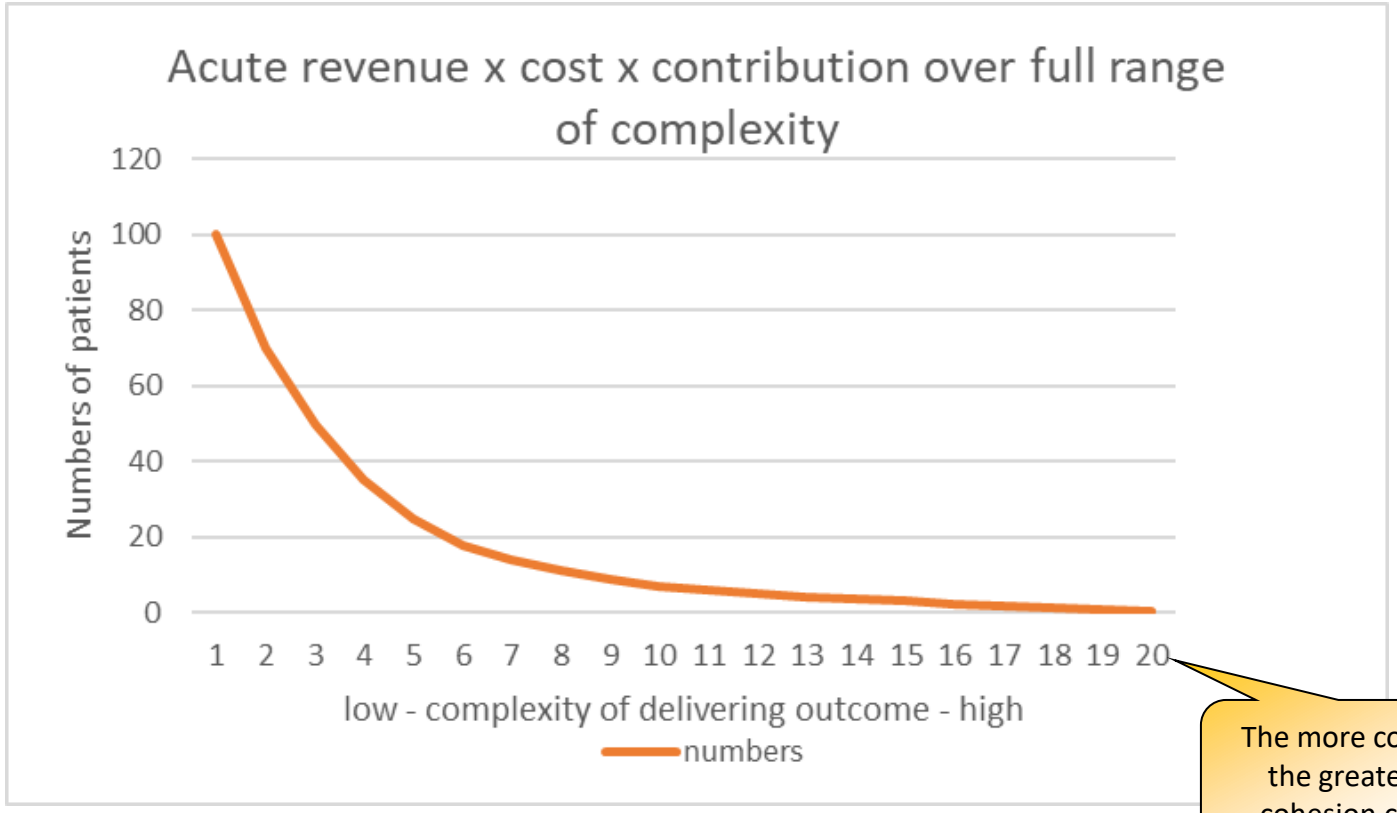
The acute system is dealing with these patient numbers…



The more complex, the greater the cohesion costs…

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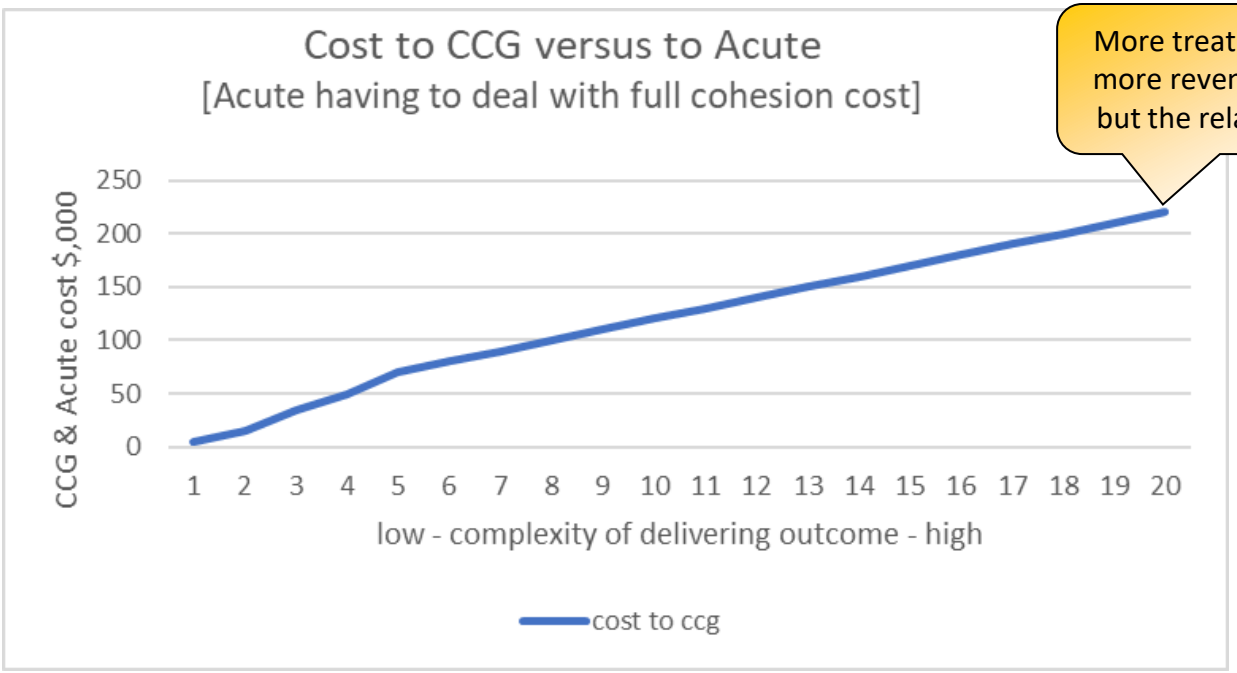
… for which it gets paid by the CCG* for the operational cost of the treatment…

* Care Commissioning Group, funded by the State



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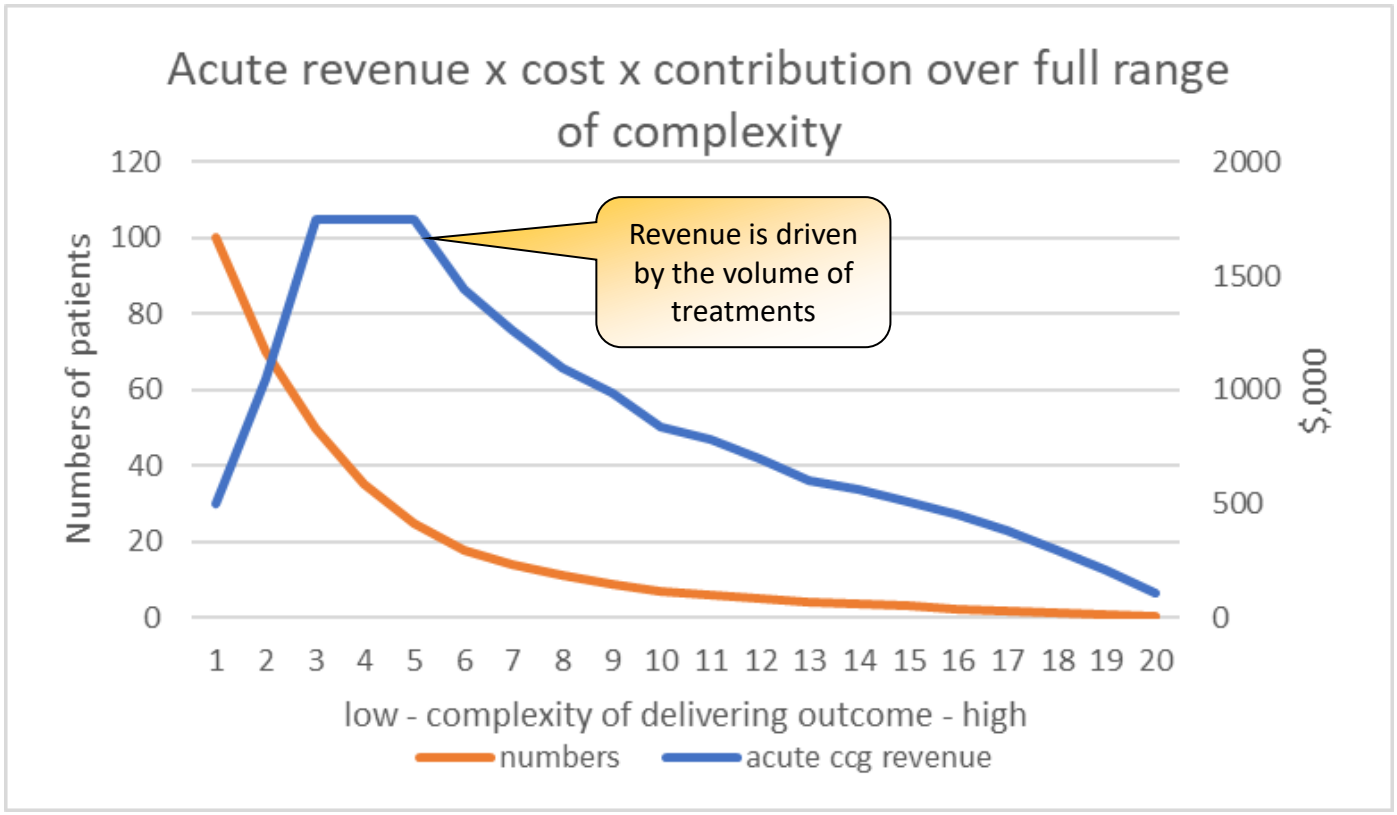
… providing this profile of revenue for the acute system.



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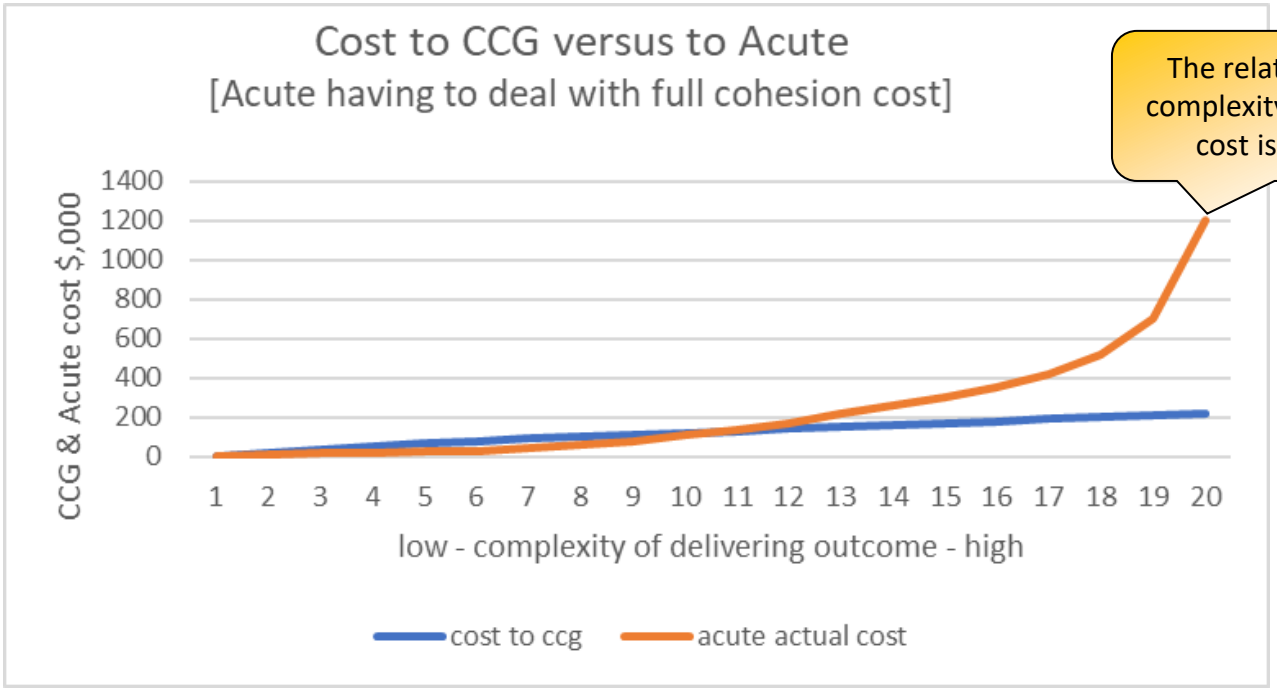
But the acute system has to deal with the costs of aligning treatments to the patient (cohesion costs) that increase non-linearly…



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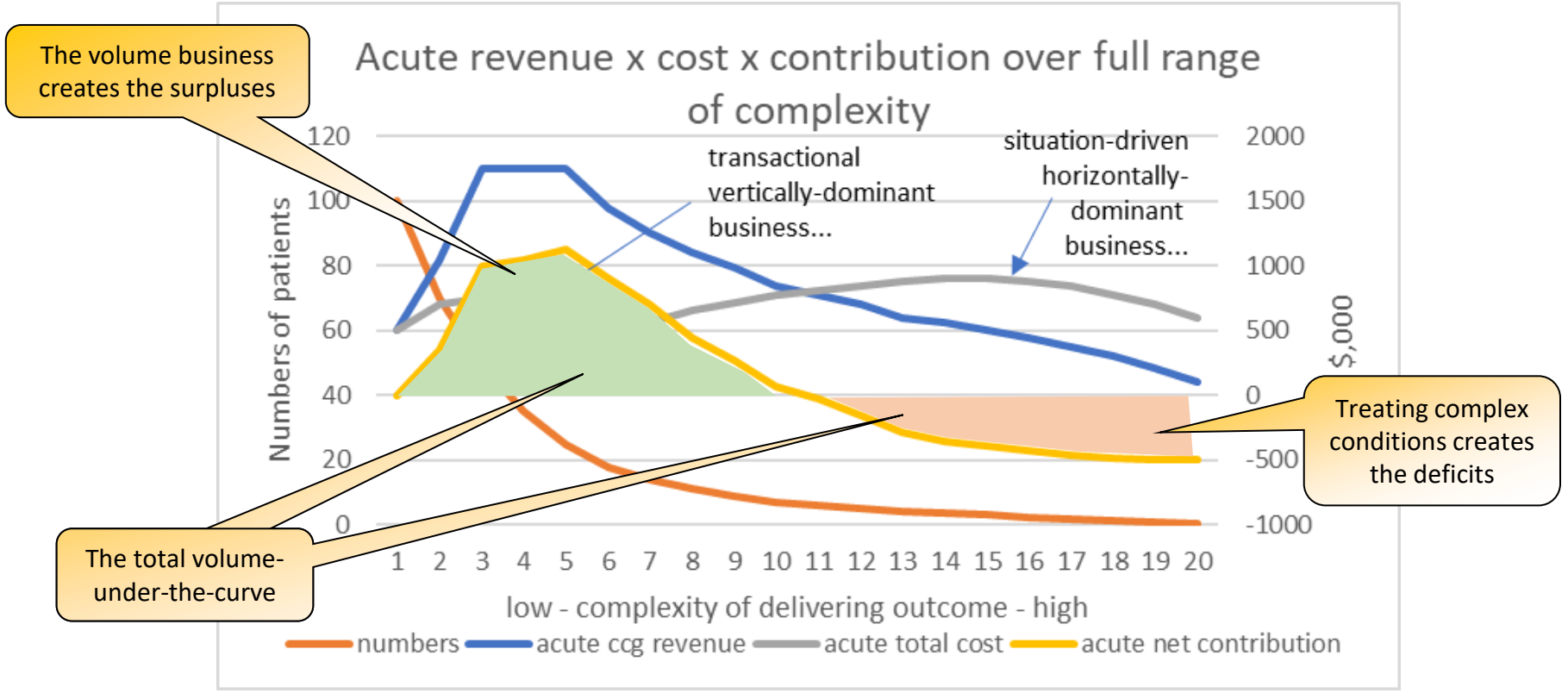
… which means that the acute system is really running two kinds of business

- The volume business has to cross-subsidise the treatment of complex conditions



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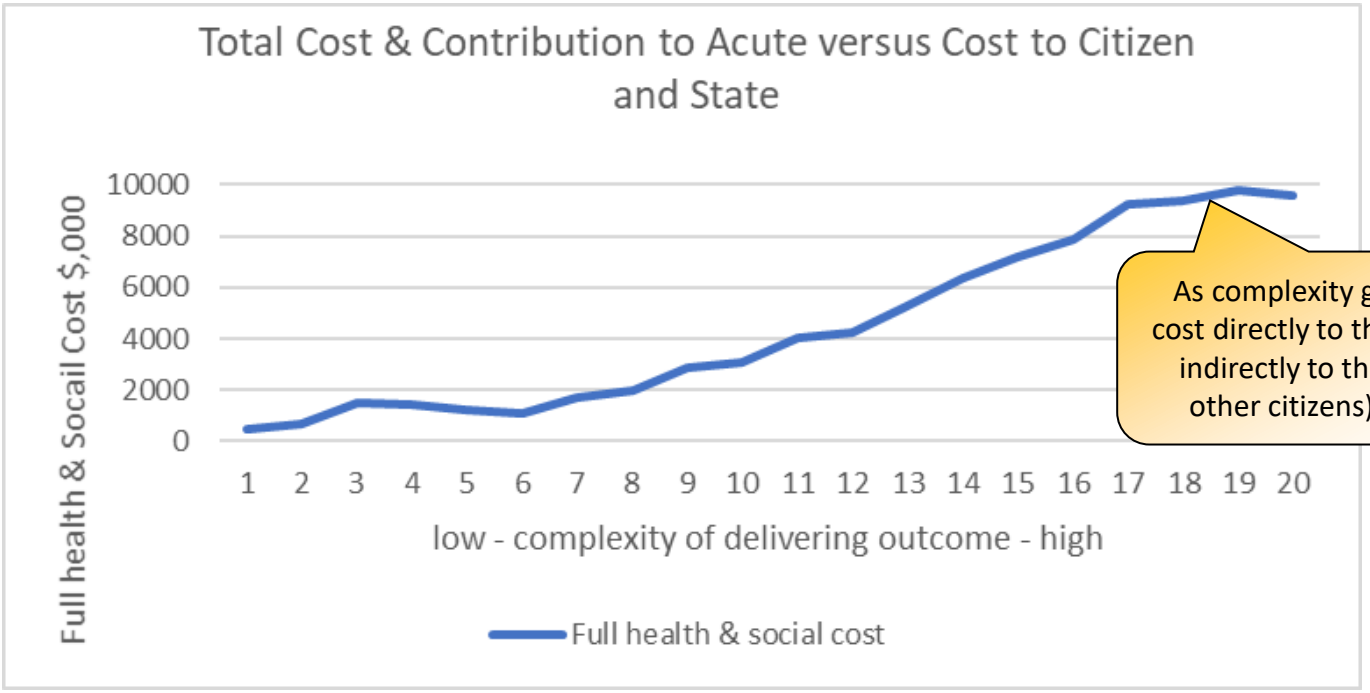
Consider the full cost to the citizen (and indirectly to the State) over the full range of complexity (of both primary and social care)…



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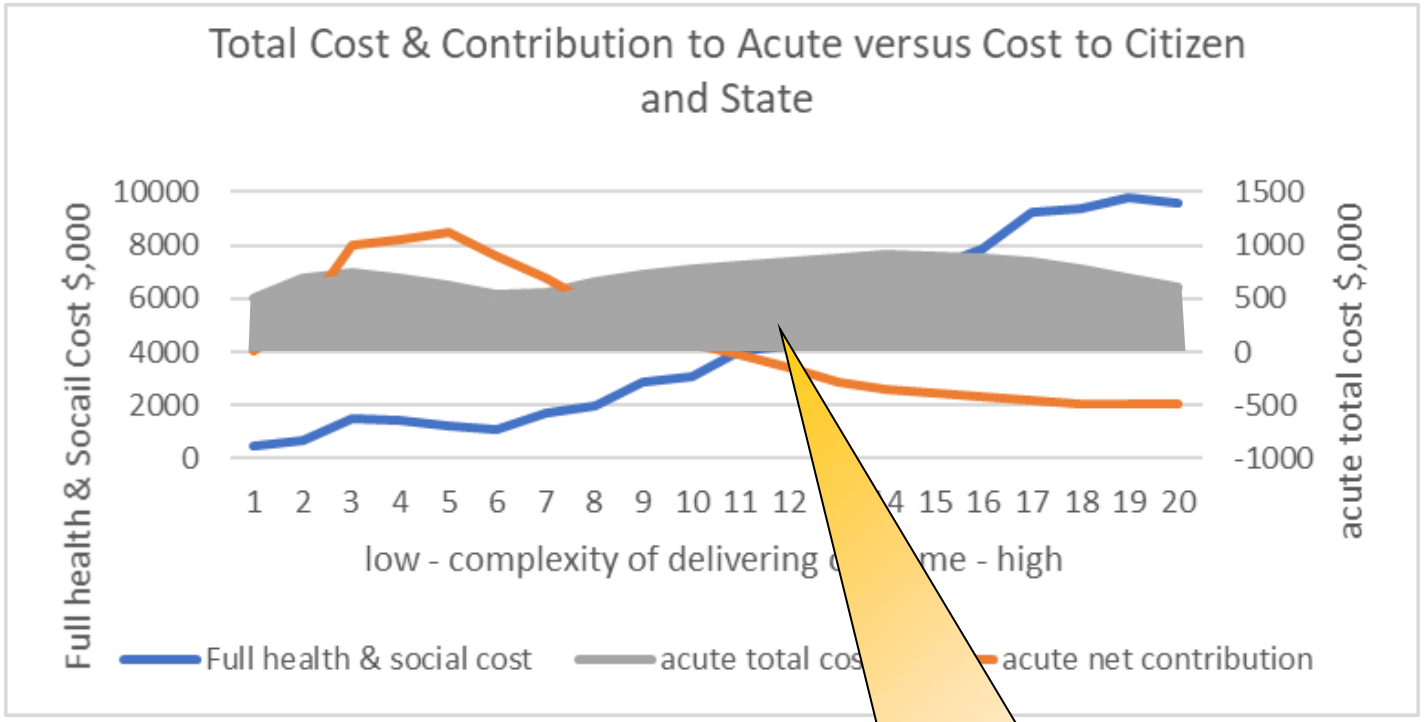
… then the CCG's funding does not incentivize the acute system to address the complexity



… instead what the CCG should be doing is incentivising the acute system to manage the volume under the curve

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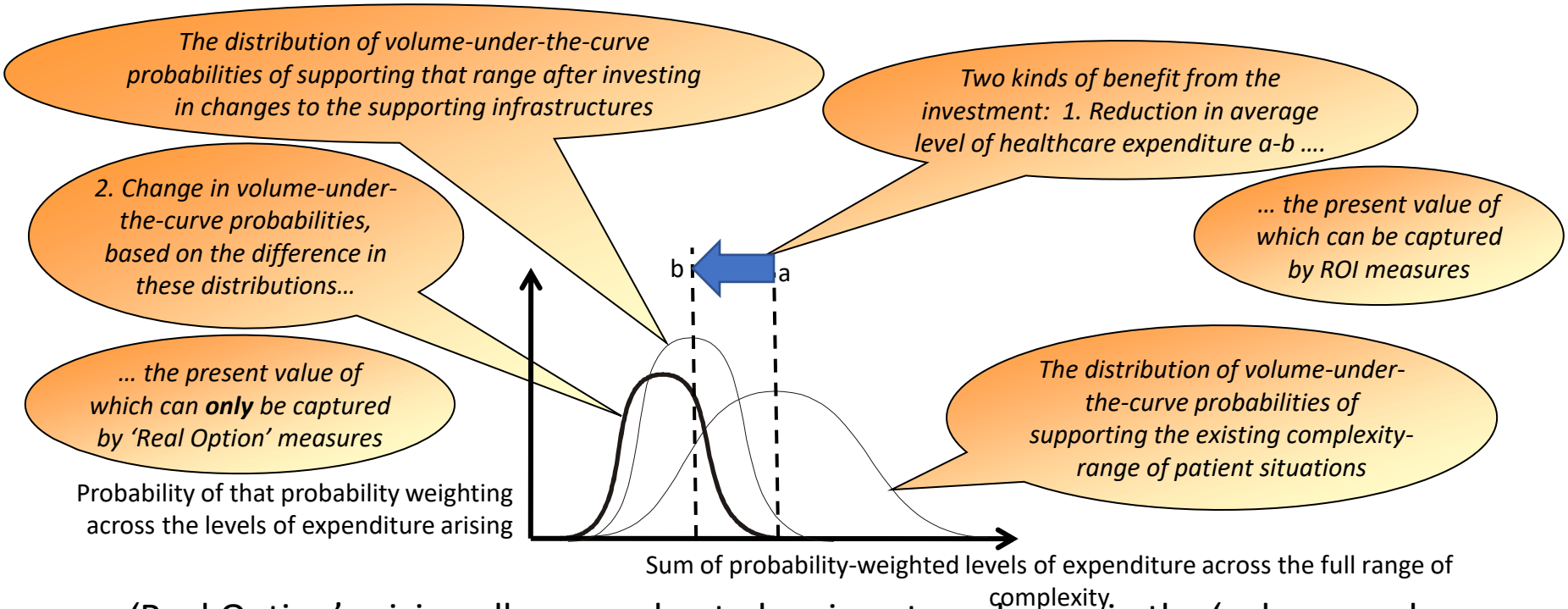
‘Real Option’ Pricing changes the focus by valuing changes in the ‘volume under the curve’



- ‘Real Option’ pricing allows a value to be given to a change in the ‘volume under the curve’…
  - Given that cohesion cost increases with increases in complexity,
  - The value of an investment must include its impact on both operational cost and on cohesion cost

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The structures of governance need to manage complexity in a different way…

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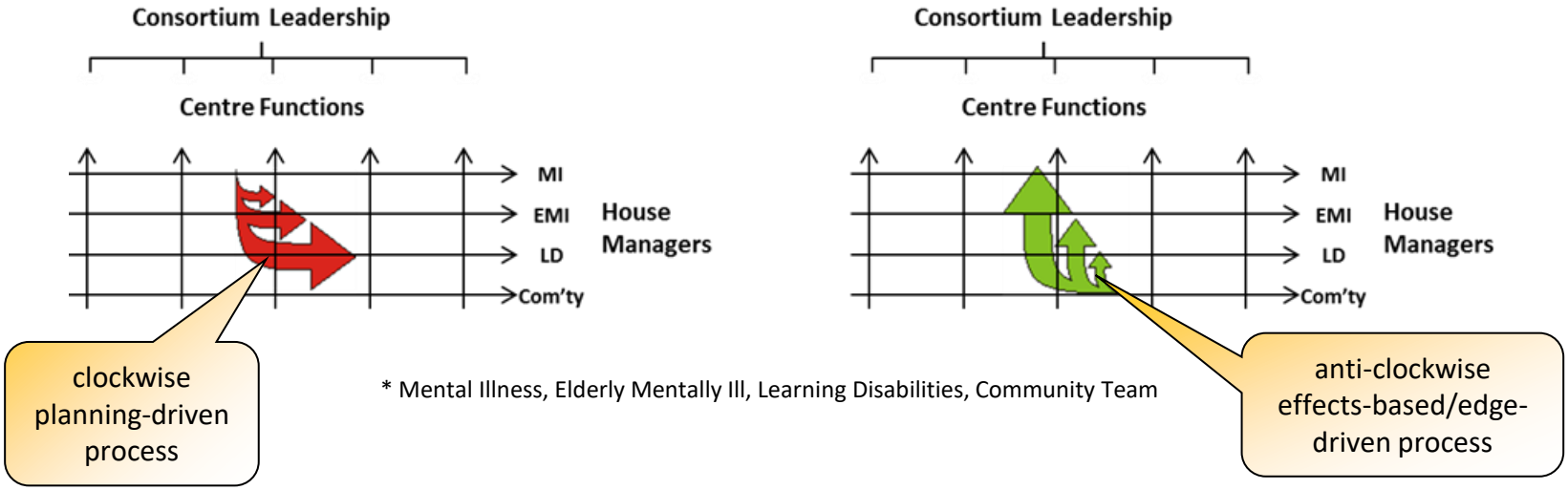
Creating cohesion at demand tempo

Being effects-driven demands horizontally dominant forms of Governance

- This means being able to capture economies of alignment,
  - moving from being *determined* by vertical controls to *working within vertical constraints*
- This in turn means holding the tension between capturing economies of scale/scope and economies of alignment

clockwise planning-driven process



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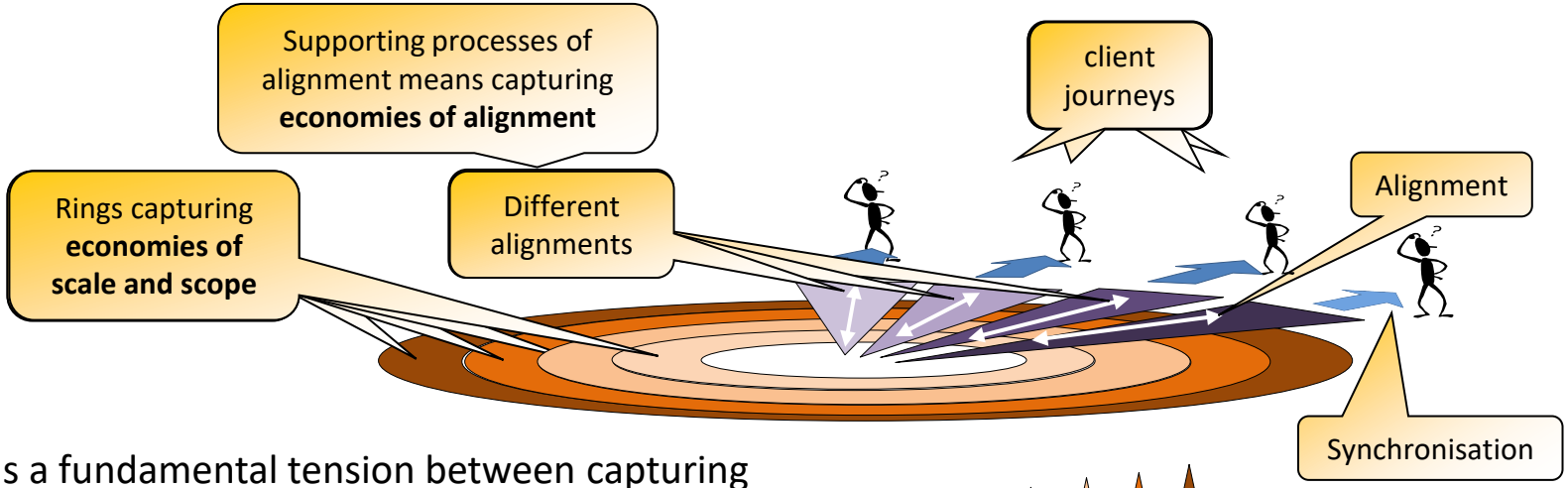
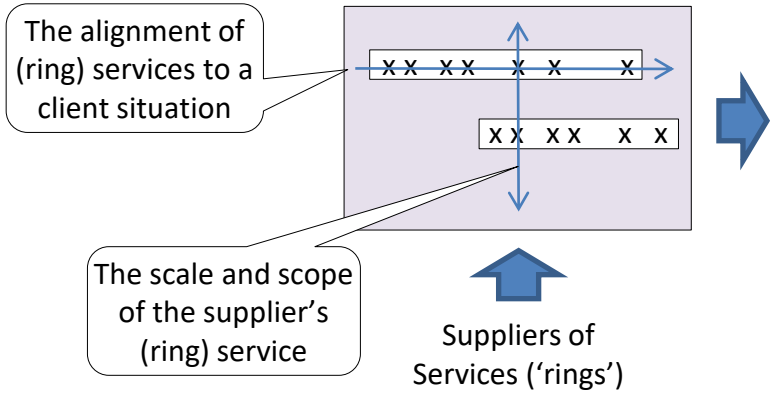
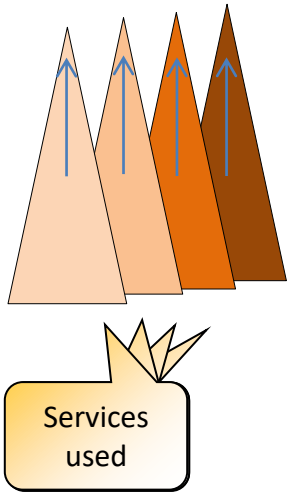
Holding the vertical x horizontal tension in terms of 'wedges' and 'rings'…



- There is a fundamental tension between capturing economies of scale/scope and economies of alignment in creating cohesion



Alignment to client journeys ('wedges')



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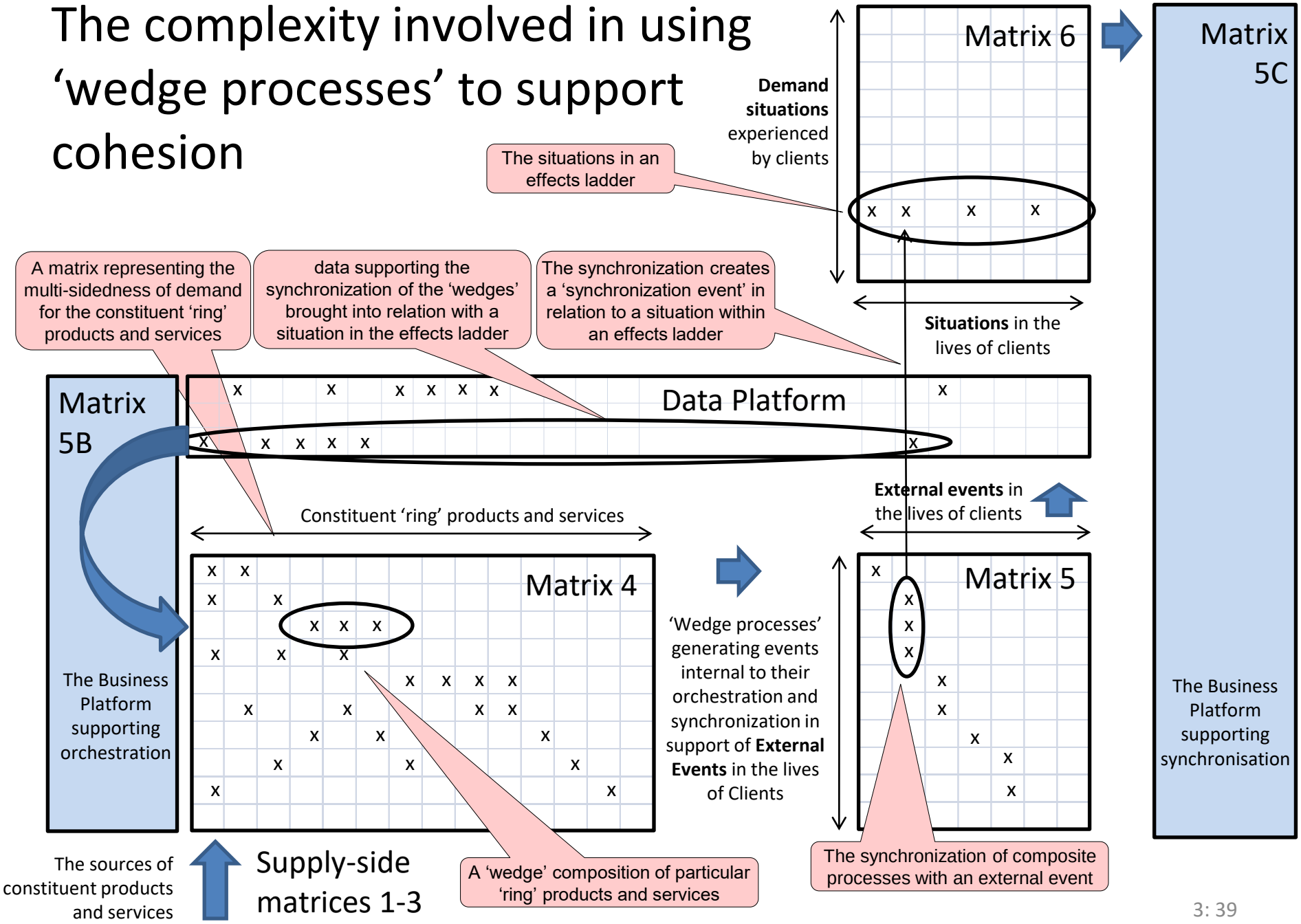
The complexity involved in using 'wedge processes' to support cohesion



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v3

An example of stratifying complexity:

building a viewer experience around film

5→6 **Synchronisation events**: There are numbers of different ways in which the story elements can be experienced at run-time, depending on what effects the director is trying to achieve for a viewer….

4→5 **Composite capabilities**: These scenes have to be synchronised into the story elements that support the viewer experience as a whole.

3→4 **Edge organisation**: Given the actual exposed footage organised into rushes, the scenes have to be constructed from them in a way that anticipates the viewer experience as a whole.

2→3 **Operational capabilities**: The 'rushes' – the concatenation of footage organised in relation to temporal sequences of the experience.

1→2 **Fielded equipment & people**: The combination of visual breakdown elements into a 'shootable' sequences, given resource constraints.

0→1 **Equipment & People**: The basic resource categories that have to be put together for each visual breakdown element of the viewer experience.

This is how the elements of the story, experienced as moments, combine into a whole experience…

This is how the scenes are synchronised to form story elements that create moments within the viewer experience as a whole.

'Wedge process', balancing constraints of economies of scale/scope imposed by producer with directors alignment of material to create singular value in relation to the intended audience(s)

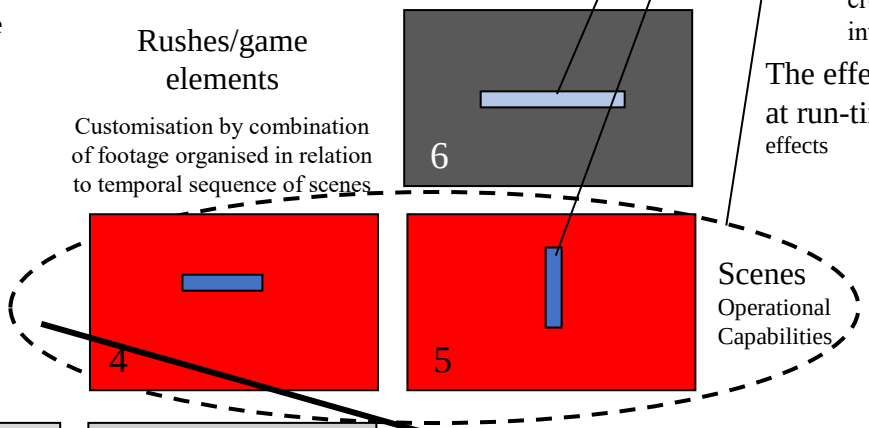
Story Elements
Decisive Points
Moments in the whole experience

The effects of the viewer experience at run-time on its audience(s)
effects

Rushes/game elements

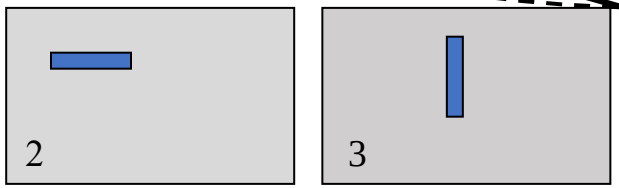
Customisation by combination of footage organised in relation to temporal sequence of scenes

The storyboard is a rough organisation of the visual breakdown elements to how the scenes were originally supposed to build together into a story..



Scenes
Operational Capabilities

Shooting at locations
supply chain management

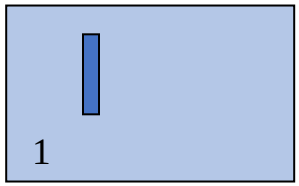


Footage
Outcomes

Director worries about how the whole thing can be cut together at run-time to create its effects on its audience(s)

Producer worries about efficiency/cost of supply-side logic to create game elements

Resource Categories
e.g. cast members, stunts, FX, props etc



These are the director's decisions about locations for how the story is to be staged

Visual Breakdown elements
events

The efficiency/cost is driven by how these rushes/game elements are organised in relation to the underlying repertoire of resources available to the producer.

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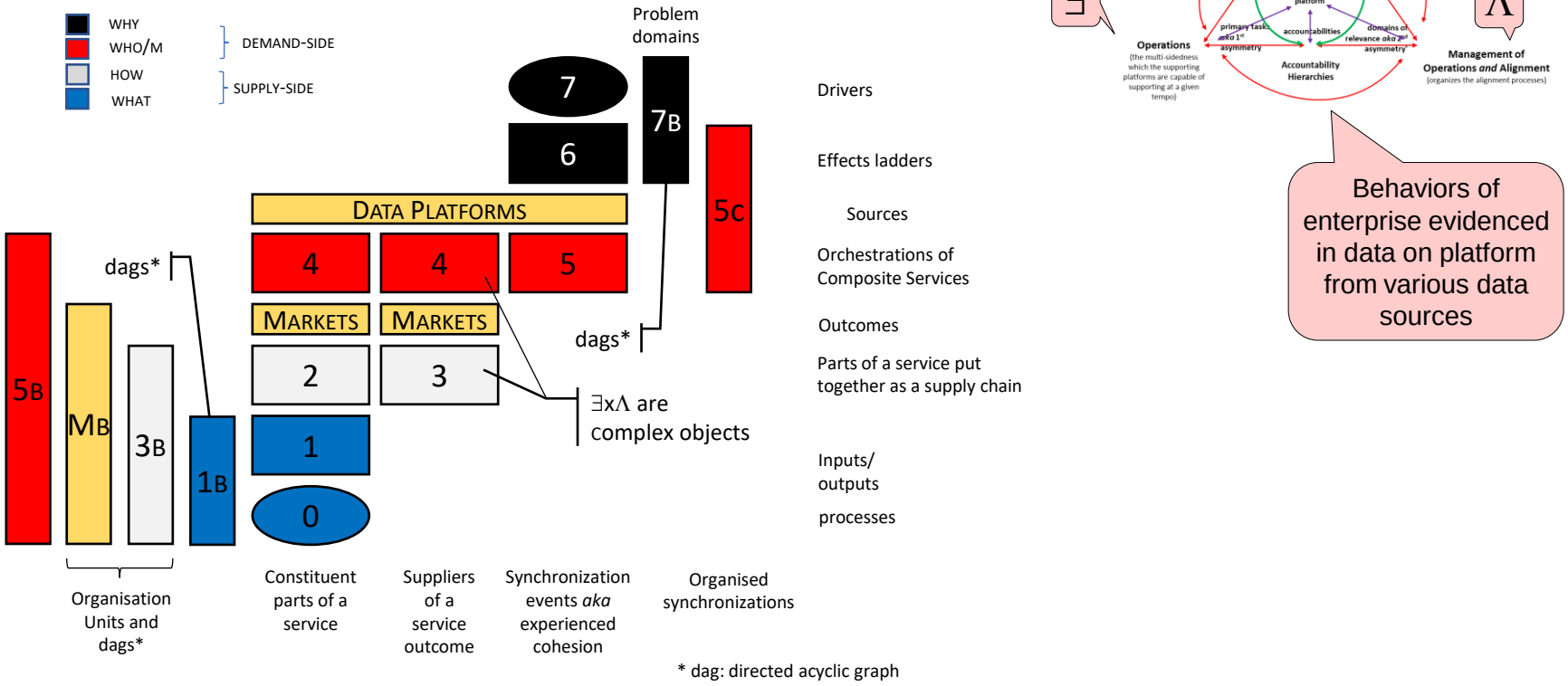
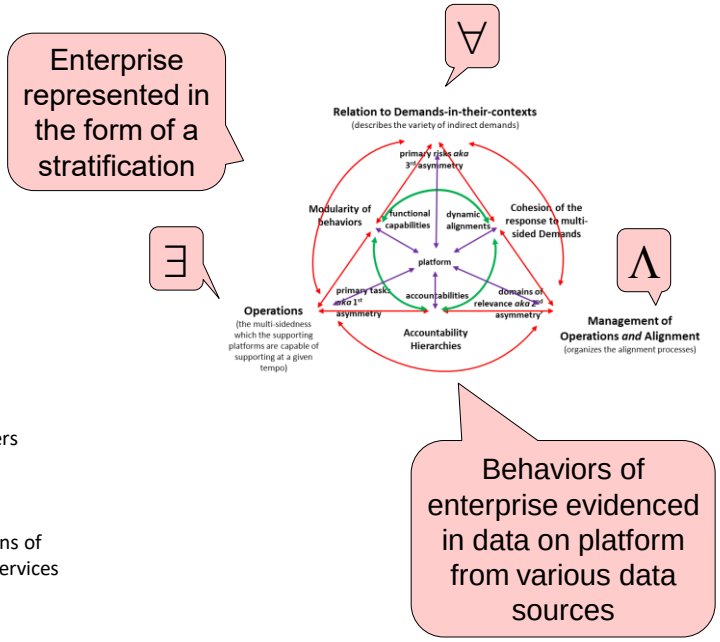
The relation of stratified ecosystem to data platform





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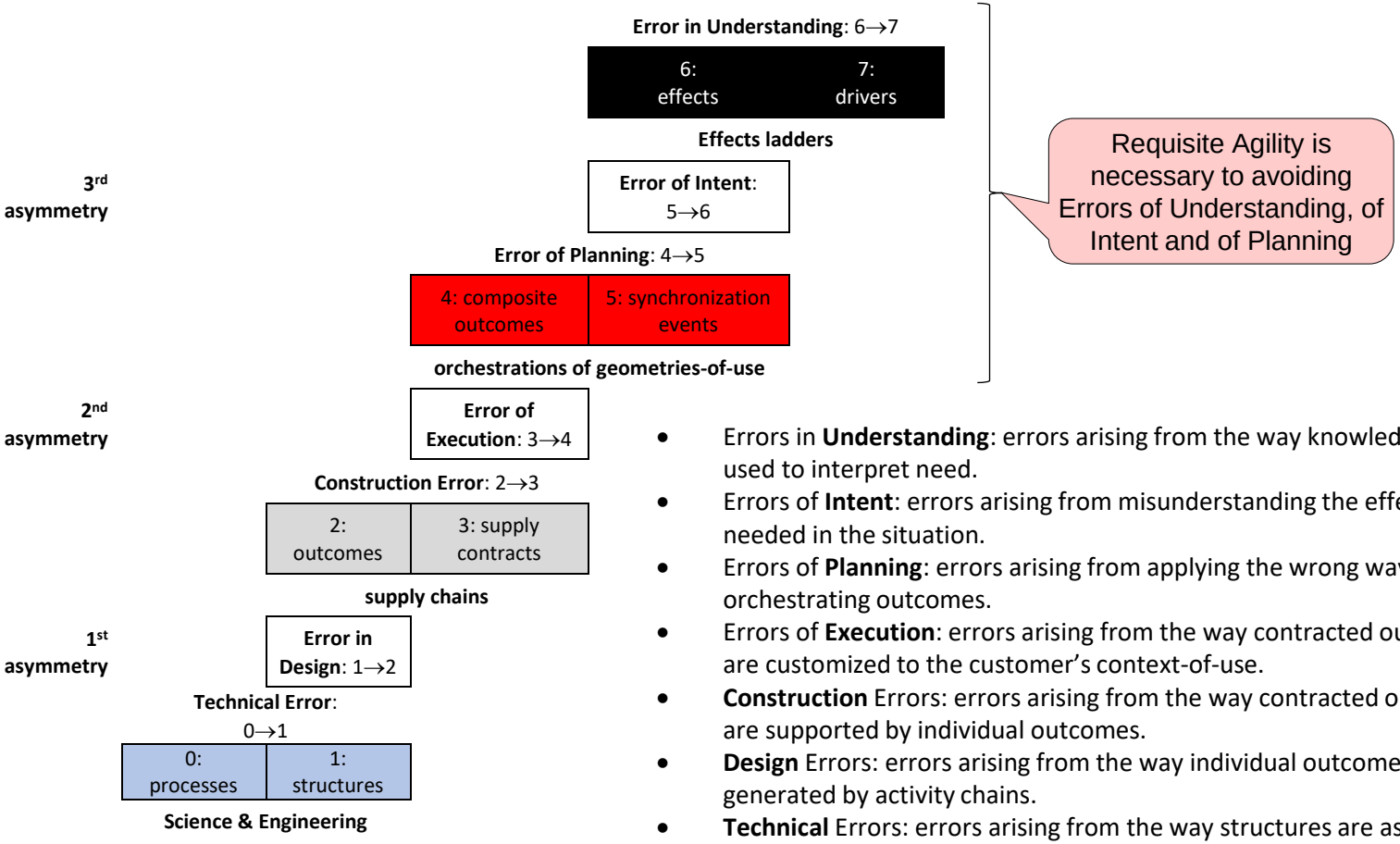
Errors arising from misalignment between the layers of a stratification



- Errors in **Understanding**: errors arising from the way knowledge is used to interpret need.
- Errors of **Intent**: errors arising from misunderstanding the effects needed in the situation.
- Errors of **Planning**: errors arising from applying the wrong way of orchestrating outcomes.
- Errors of **Execution**: errors arising from the way contracted outcomes are customized to the customer's context-of-use.
- **Construction** Errors: errors arising from the way contracted outcomes are supported by individual outcomes.
- **Design** Errors: errors arising from the way individual outcomes are generated by activity chains.
- **Technical** Errors: errors arising from the way structures are assumed to determine processes.

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Placing ‘wedge processes’ within the context of the larger ecosystem

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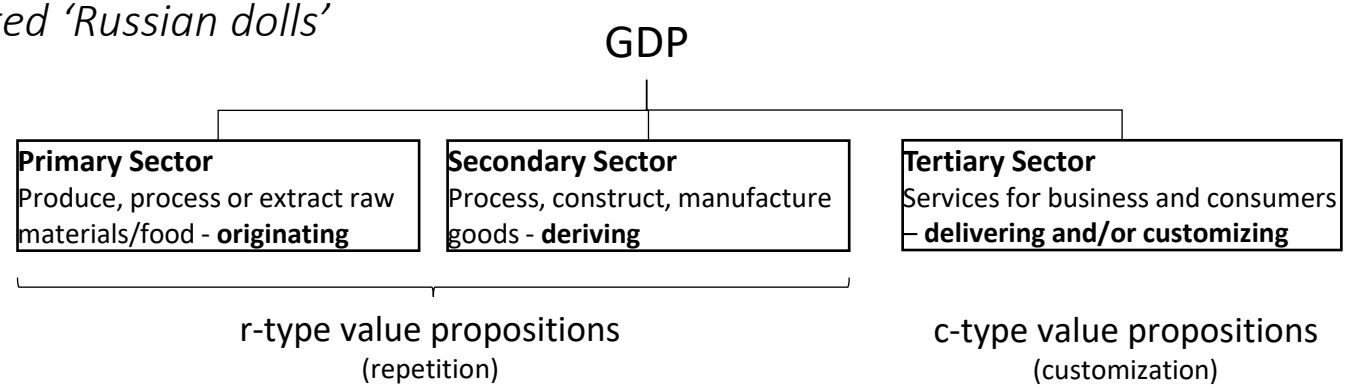
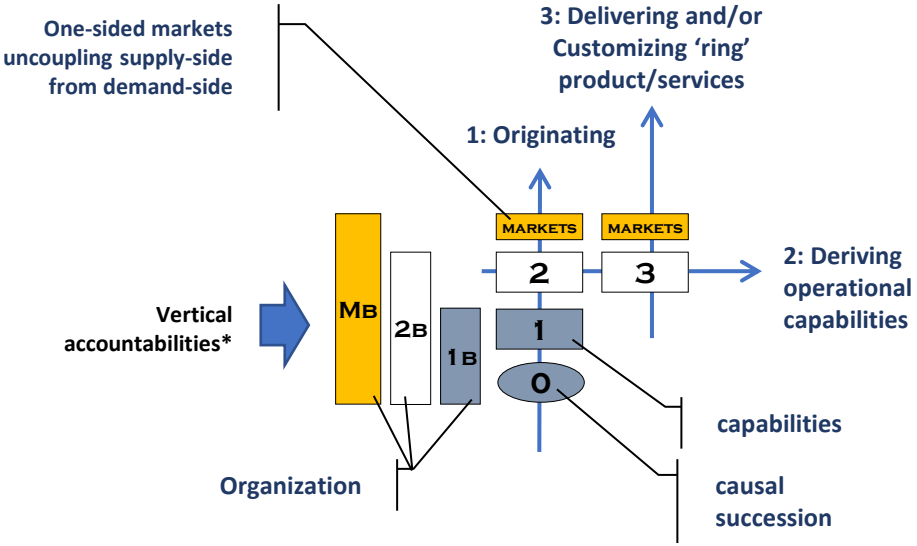
The Sectors describe layers of complexity that are stratified within an ecosystem

like nested 'Russian dolls'





* See netchains for more on 'organization' across the different supply-side strata: Lazzarini, S. G., F. R. Chaddad and M. L. Cook (2001). "Integrating supply chain and network analysis: the study of netchains." Journal of Chain and Network Science **1**(1): 7-22.

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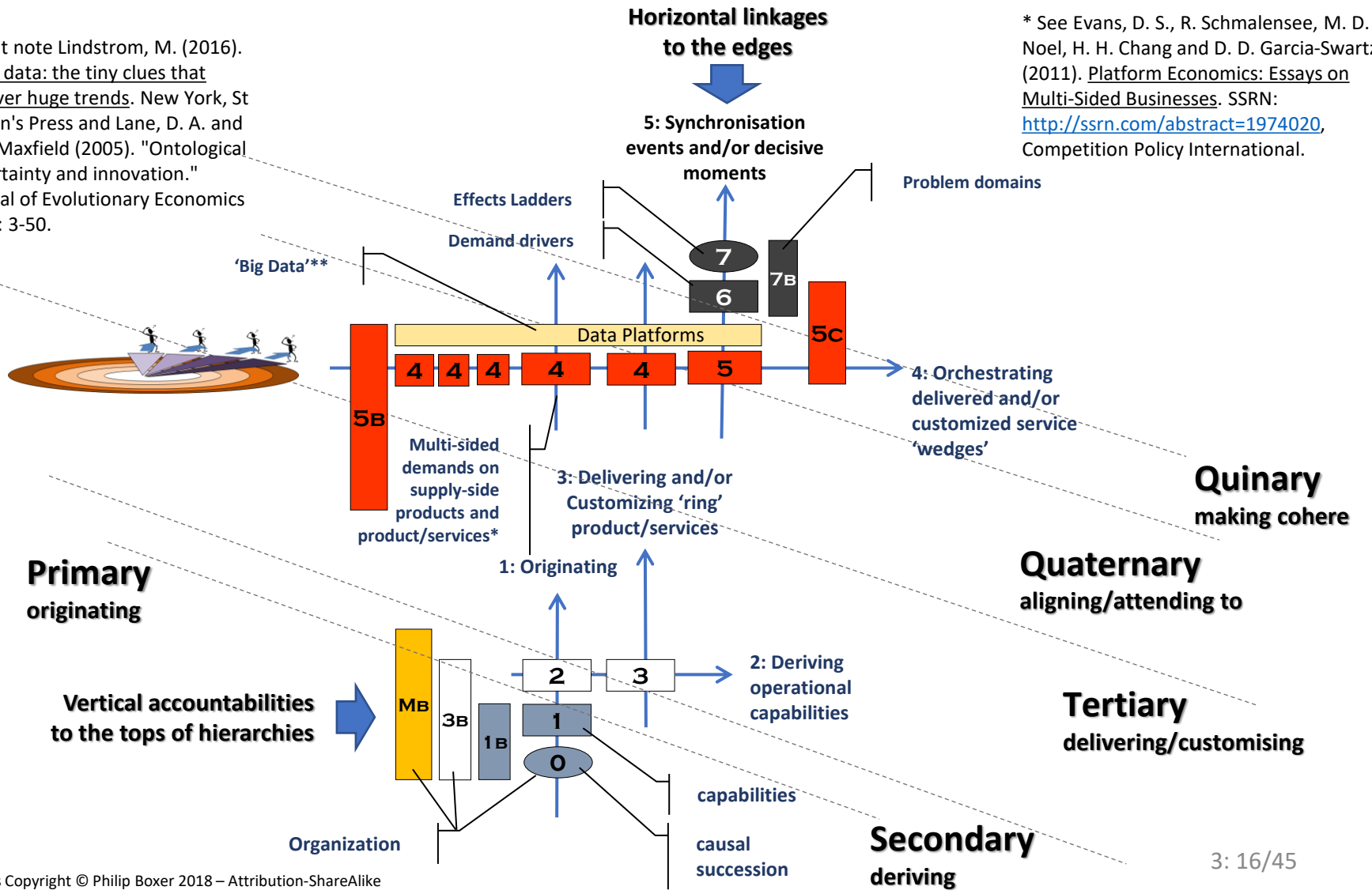
Creating cohesion at demand tempo means capturing value across the whole ecosystem…

** But note Lindstrom, M. (2016). Small data: the tiny clues that uncover huge trends. New York, St Martin's Press and Lane, D. A. and R. R. Maxfield (2005). "Ontological uncertainty and innovation." Journal of Evolutionary Economics 15(1): 3-50.

* See Evans, D. S., R. Schmalensee, M. D. Noel, H. H. Chang and D. D. Garcia-Swartz (2011). Platform Economics: Essays on Multi-Sided Businesses. SSRN: http://ssrn.com/abstract=1974020, Competition Policy International.



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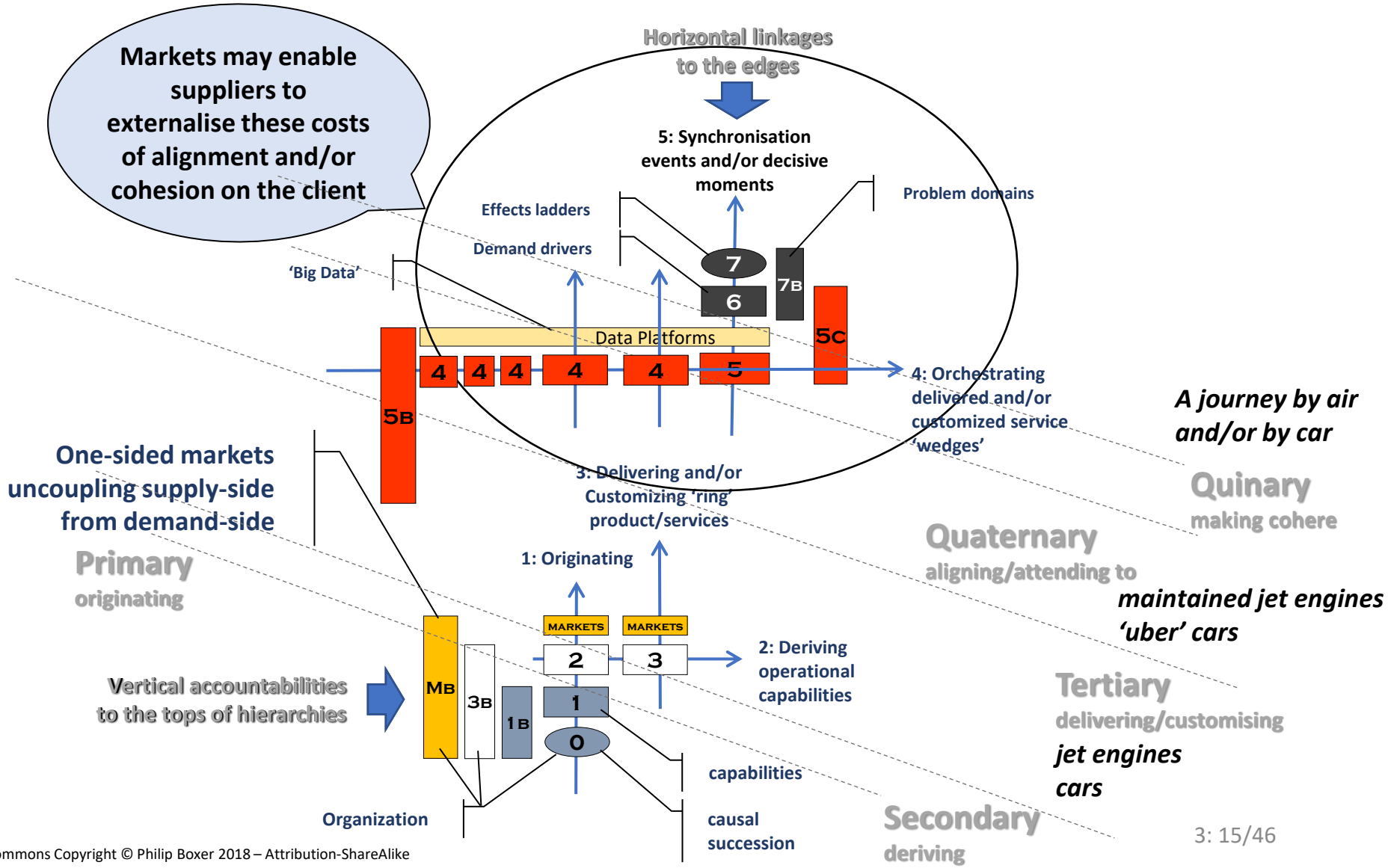
… which is not possible if the costs of alignment and/or cohesion are externalized on the client



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Mental Health Care Quality Execution

how cohesion is not created around the mental health care of individuals

Fragmented across different silos

These effects ladders are different for each individual client

5: Synchronisation events

Advocates, Individuals and Families

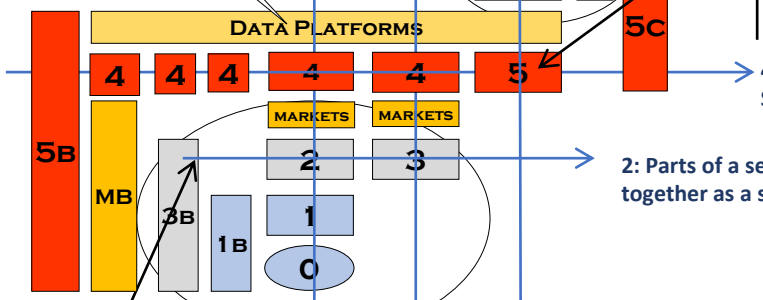
Demand-side Regulation: NAO and Public Accounts Committee ultimately examine how things have actually been done…

NHS/Foundation Trusts are ultimately suppliers of services that are economically viable…

3: Suppliers of Services

… but the more complex the demand the more critical alignment & cohesion is and the more difficult it becomes

Horizontal linkages



4: Orchestrations of Composite Services ('wedge process')

2: Parts of a service put together as a supply chain

Vertical accountabilities

1: Constituent parts of a service

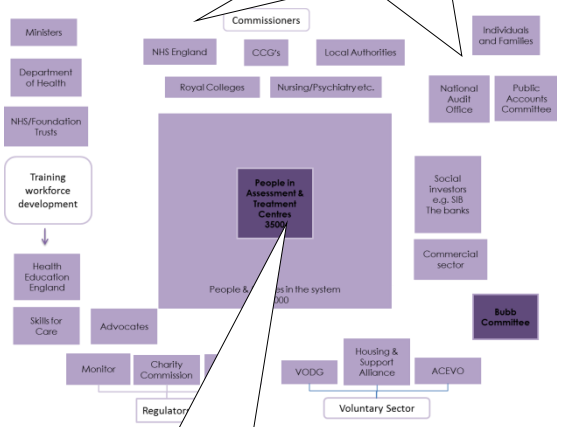
VBODG, H&SA and ACEVO all have a concern with the way this is done in practice

Royal Colleges, Nursing/Psychiatry etc are ultimately concerned with the practice of the underlying services and how they may be used

Health Education England and Skills for Care are likely to be limited to a supply-side focus

Ministers and the Department of Health should be concerned with the dynamics of this whole system. In practice they act more like a supply-side regulator subject to intense lobbying…

… creating a 'market' for all these organisations



The provision of mental health care structured around 'oubliettes'…

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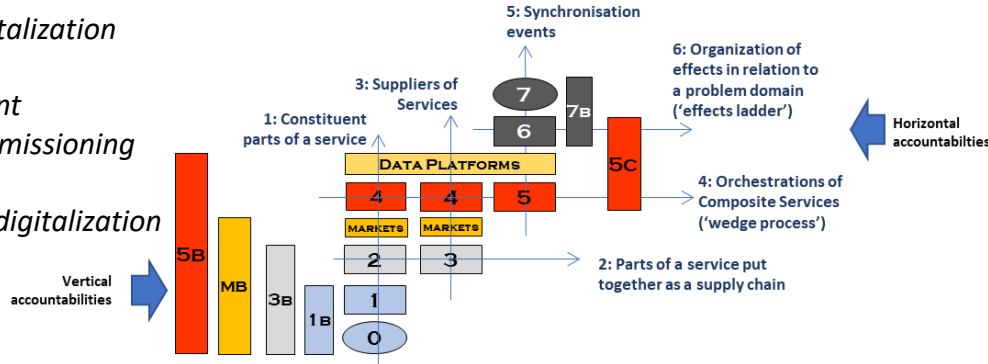
Case examples$_1$

An ecosystem is defined in relation to a chosen variety of *value deficits**

An ecosystem is defined in relation to *value deficits*



Each value deficit 'brings forth' a different ecosystem…

1. The Avenues Group – *providing intensive social care*
4. BAE Systems – *changing demands on Surface Warfare capabilities*
8. NATO AWACS – *adaptation to changing mission demands*
9. British Telecomm – *opportunities for retail businesses from digitalization*
10. NHS Purchasing and Supplies – *under-use of orthotic care*
11. Raytheon Systems – *changed approach to weapons procurement*
12. Waltham Forest Specialist Housing – *changed approach to commissioning*
13. BTR Control Systems Group – *capturing value downstream*
14. Computer Management Group – *opportunities from impact of digitalization*
15. ICI Chemicals and Melinar – *capturing value downstream*

Method development

2. The Health Foundation – *diffusion of 'back-office' innovations:* Distinguishing pilot, pathfinder & roll-out
3. King's Fund - *learning from 'avoidable deaths':* Distinguishing Safety I from Safety II
5. Swiss Federal Chancellery – *evaluating investment in information systems*: Real Option Valuation
6. Thales UK – *through-life management of capabilities:* The value stairs for Through-life capabilities
7. Joint Fire Sciences, USA – *overcoming fragmentation of supporting models:* Stratification modeling
16. The eXtreme Science and Engineering Discover Environment – *cross-platform collaboration:* Dynamic alignment of strata
17. Defence Science and Technology Laboratory – *the impact of mission thread variability:* The need for Real Option analysis

* A *value deficit* being a *gap* that remains unsatisfied, characteristic of a *situation* as experienced by a *client*

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Case Examples$_2$

	Project	Direct Customers	Multi-sided platform	Indirect customers	Problem and/or Potential Indirect Value
Quantifying Indirect Value	4: MoD surface capability	MoD acquisition	C4ISTAR platform	Mission Commanders	40% saving on operational costs, 15% from reduced variation
	5: Swiss eGovernment	Federal Chancellery	Search engine platform	Respondents to citizens	80% saving, 50% from reduced variation
	6: Uninhabited Aerial Systems	Royal Artillery	UAS platform	Mission Commanders	40% saving, 30% from reduced variation
Identifying Risks	9: BT customer service	Area management	Customer services platform	Phone user	70% of errors from failures to align properly
	17: Network-Enabled Capability	MoD acquisition	Capability systems of systems	Mission Commanders	Unable to assess impact of mission thread variability
	8: AWACS	NATO acquisition	Mission systems of systems	Mission commanders	Architecture restricting adaptation to new types of mission
Mitigating risks	7: Wildland Fire	Federal Agencies	Collaboration support	Fire fighters	Needed focus on variation in forms of collaboration
	16: XSEDE	Supercomputing centers	Research systems of systems	Research collaborations	Needed focus on variation in forms of collaboration
	10: NHS Orthotics	Healthcare Trusts	Clinician support platform	Patients	Managing treatment through-life means $1 now = $4 saved

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Determining pragmatic and granular adequacy in relation to an anticipated variety of effects

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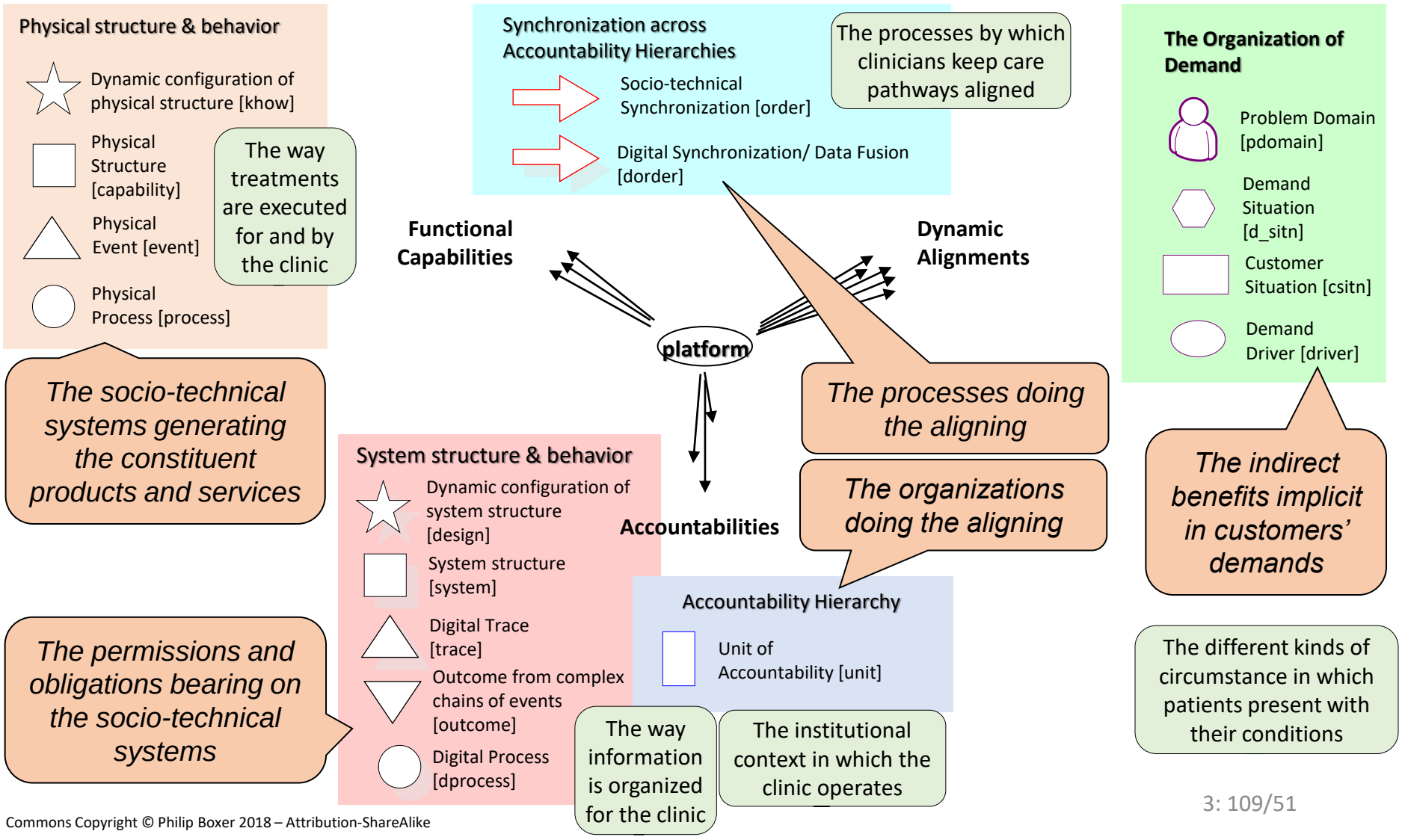
Triply-articulated modeling:
modeling of the relationships between three types of model



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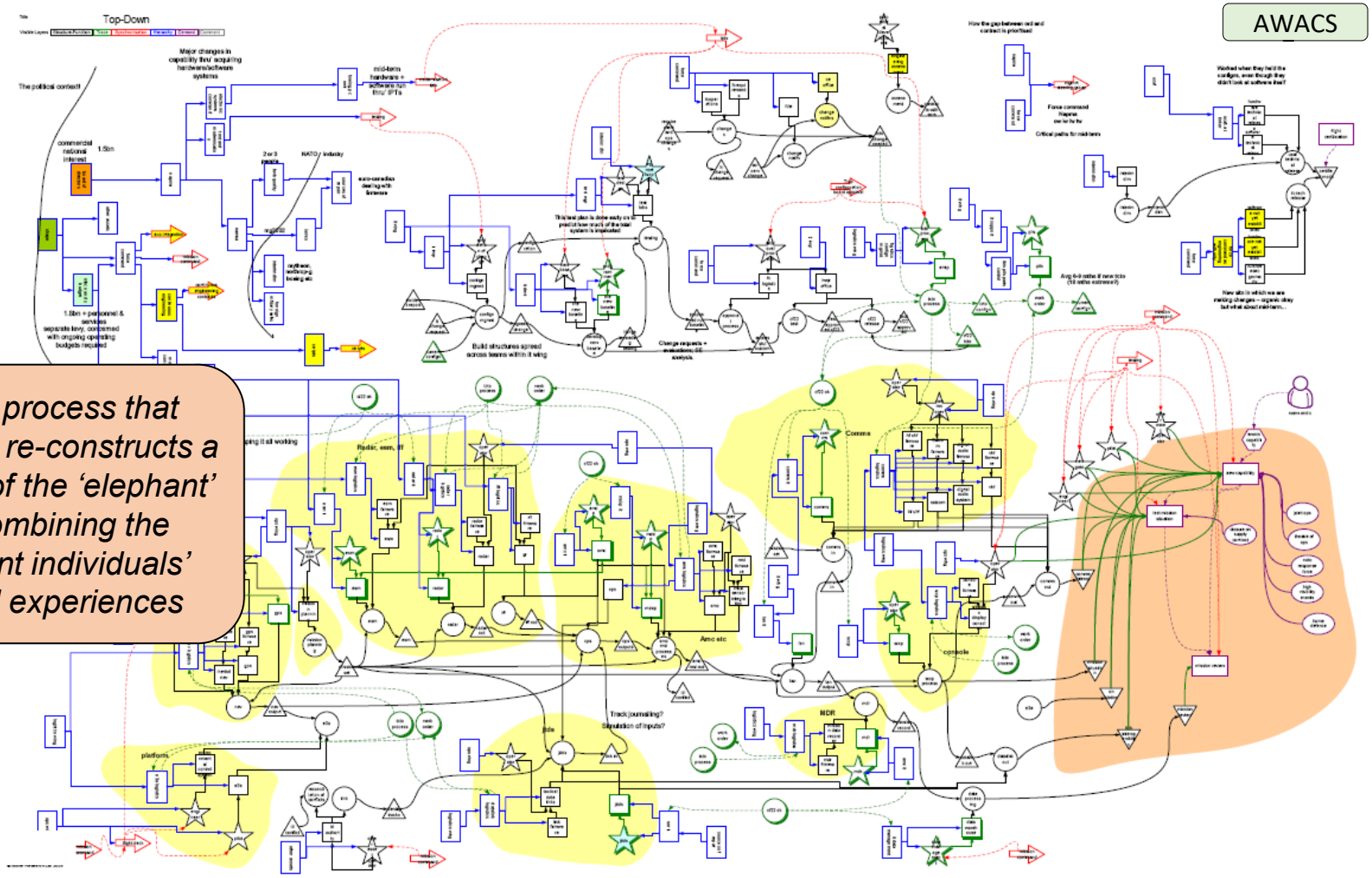
Eliciting relational knowledge:

these models emerged from multiple actors within the ecosystem



It is a process that carefully re-constructs a picture of the 'elephant' by combining the different individuals' partial experiences

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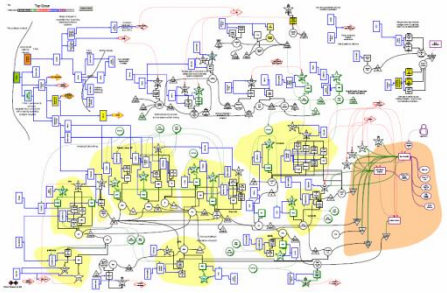
Structural Analysis of Gaps:

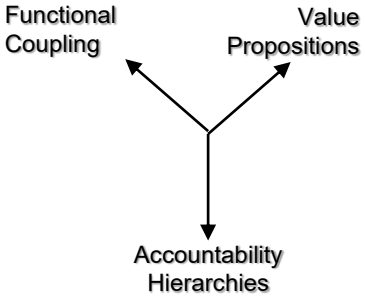
identifying structural gaps (granular and pragmatic inadequacies) that create risks to dynamic alignment

Ecosystem alignment to Multi-sided Demands

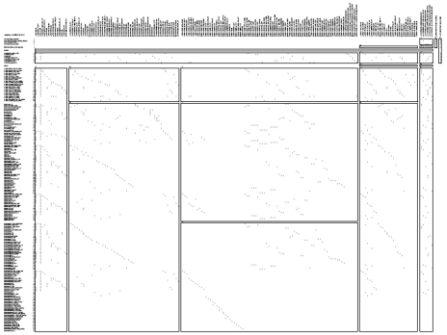


AWACS

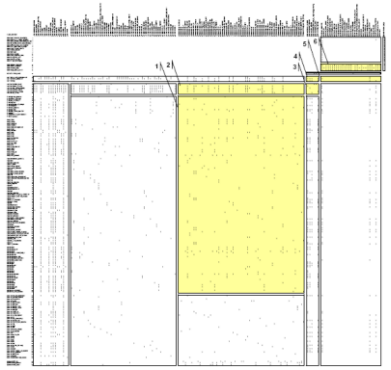
Distinguishing the different kinds of path



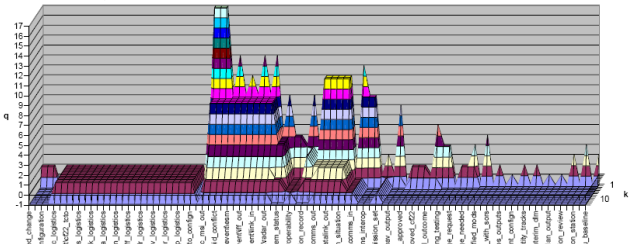
Defining alignment processes across strata



Analysis of Modularity within strata



Identifying Structural Gaps *aka* inadequacies within the different strata



Mitigation Strategies to enable spanning of multiple types of mission

Source: Anderson, Boxer & Browsword (2006) *An Examination of a Structural Modeling Risk Probe Technique*, Special Report, Software Engineering Institute, Carnegie Mellon University, CMU/SEI-2006-SR-017.

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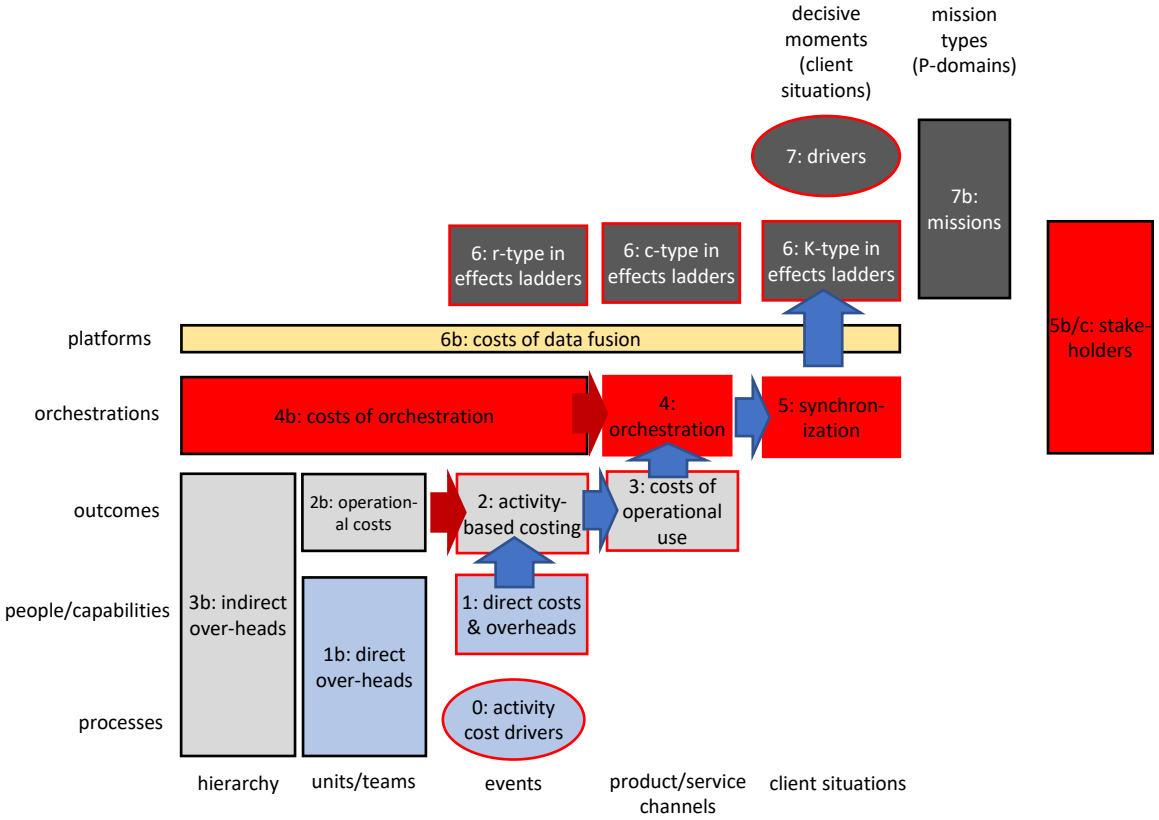
Operational and Cohesion Costs

Identifying cohesion costs associated with overcoming structural gaps



Activity Cost Drivers (0->1)	1. Equipment & people costs/hour: what is the total activity-based costing of using the capability?
Direct Costs & Overheads (1b->2)	2. Fielded costs: what is the unit cost of use?
Activity-based costs/coordination (2b->3)	3. Operational costs: what is the unit cost of use of operational units?
Costs of Operational Readiness (3b->4)	4. Edge Organization Logistics and Training costs: what are the logistics and training costs of bringing the force element to readiness?
Costs of Orchestration/interoperation (4b->5)	5. Composite Capability costs: what are the costs of the orchestration platform and the incremental costs of orchestrating?
Costs of Synchronisation (5b->6)	6. Synchronization/comms capability: what are the csots of the (outcome) synchronization capability and the incremental costs of communication?
Costs of data fusion (6b->6)	6. Data fusion/situational awareness: what are the platform costs and the incremental costs of fusing this data?

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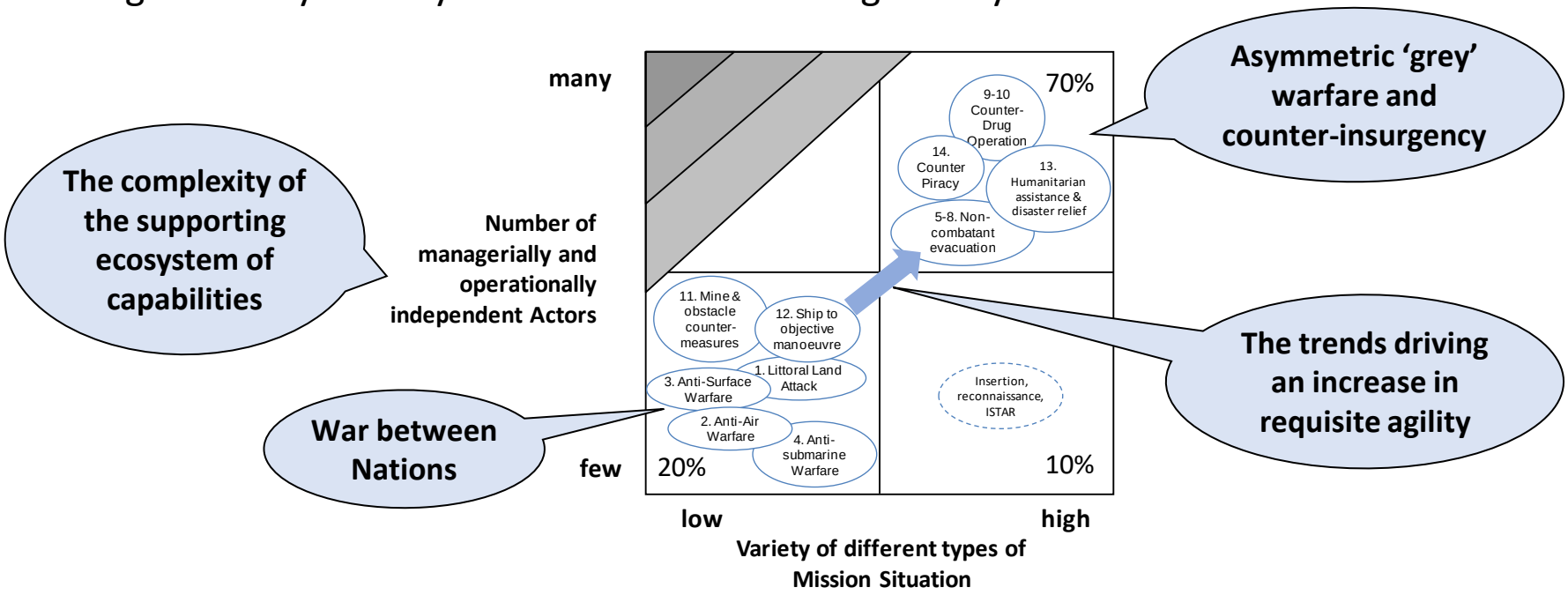
The variety of demands driving requisite agility

Another example from the military world

- The focus on capability acquisition was on the most extreme threats bottom-left.
- The larger proportion of operational time (70%) was spent in the top-right quadrant.
- The trend across the whole range of mission situations is towards the pursuit of greater asymmetry and therefore increasing variety of demands.



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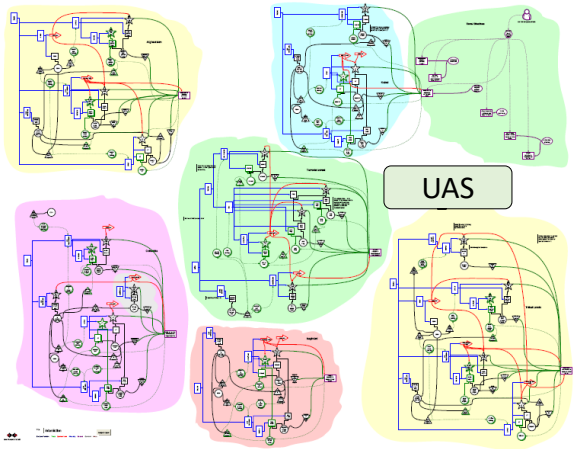
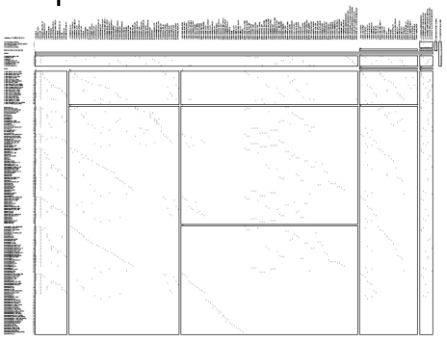
Using Monte Carlo simulation:

The impact of variation in Indirect Demand on Cohesion Costs

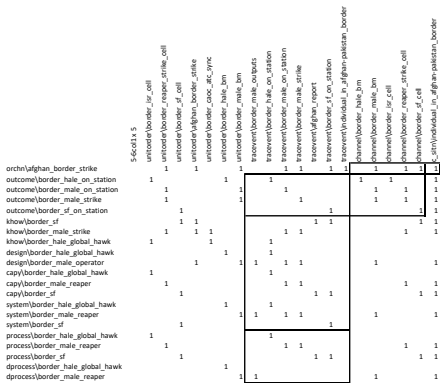
Ecosystem alignment to Multi-sided Demands



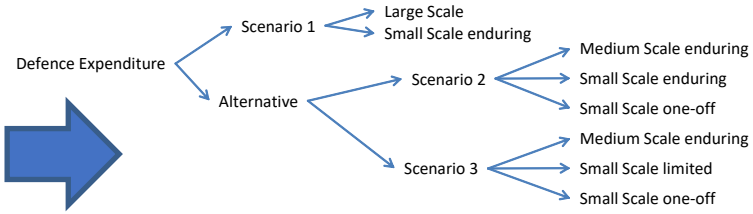
Defining alignment processes across strata



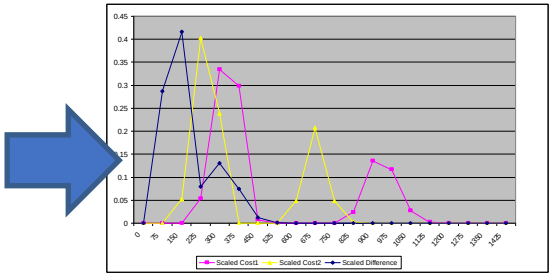
Costing Cohesion of Value Propositions



Monte Carlo Simulation of impact of Variations in Multi-sided Demands on range of cohesion costs



Real Option Valuation of impact of investment on range of cohesion costs



Increased Agility by Reducing Cohesion Costs across variety of types of mission

Boxer, P.J. (2009) *What Price Agility? Managing Through-Life Purchaser-Provider Relationships on the Basis of the Ability to Price Agility*, Special Report, Software Engineering Institute, Carnegie Mellon University, CMU/SEI-2009-SR-031.

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Implications for supporting cohesion:

doing more with the same resources by increasing utility both directly and indirectly

- Responding to multi-sided demands at demand tempo means dynamically aligning many value propositions to many different local environments. This means
  - Managing entangled dialogues-at-the-edge
    - Dynamic alignment entangles design-time and run-time conversations, changing the supplier's unit of analysis from one-sided markets to the multi-sided contexts with which the supplier is interacting.
    - There has to be dialogue within each local environment through which *local coherence* can align pathways.
    - Each dialogue must be able to *collapse out* a singular local pathway that need not be correlated with pathways demanded in other local environments.

  - Supporting superposition of networked collaborations
    - Platforms have to be engineered that are agile enough to support dynamic alignment to the variety of local environments encountered.
    - This variety of simultaneous pathways supported at demand tempo are a *superposed* set of states.
    - Engineering such platforms involves identifying risks to agility and quantifying the value of increases in agility.

The Quantum Metaphor helps us to understand the challenge these environments present to Structures of Governance

Shifting the focus to managing cohesion cost across the variety of indirect demands leads to 30-50% reductions in total operating costs

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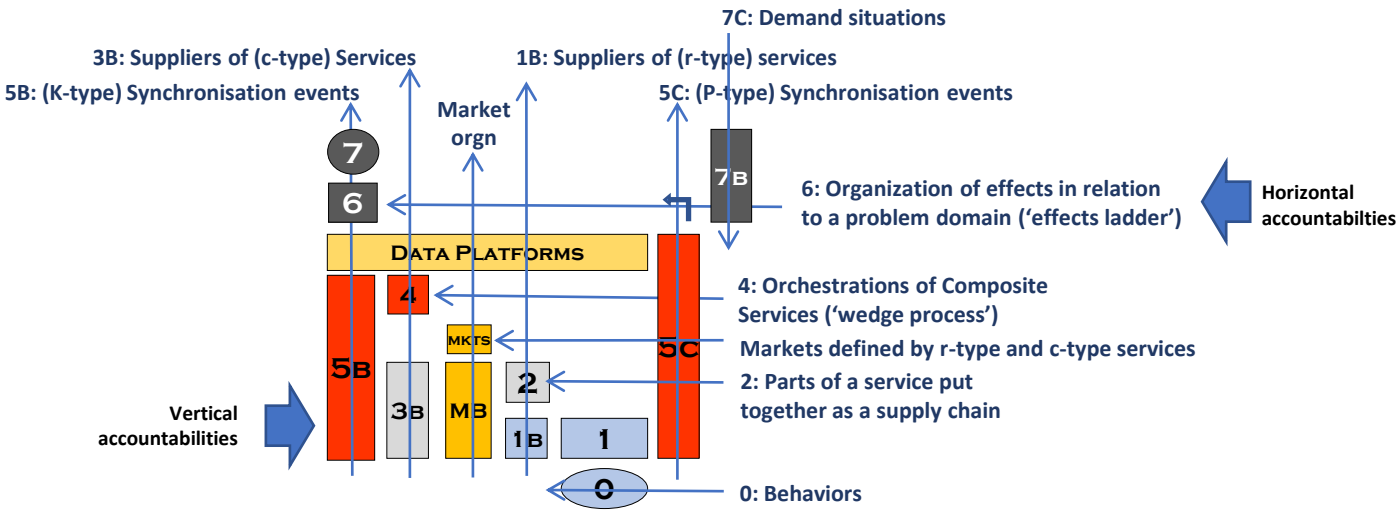
End

Observer's 'reading' of the 'use' of an enterprise within an ecosystem



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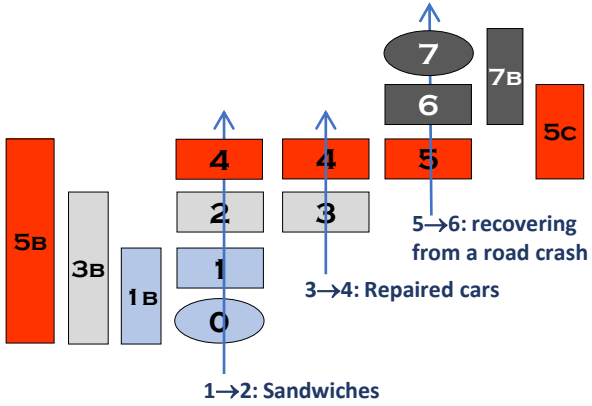
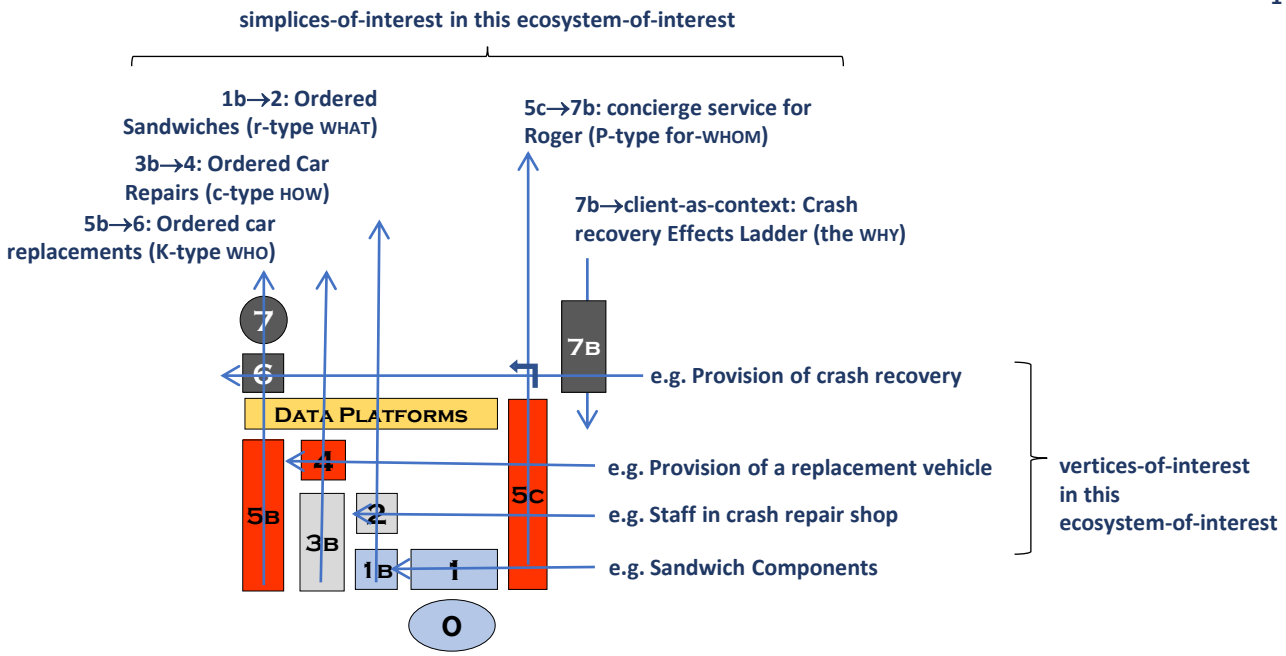
Observer's 'reading' of the 'use' of an enterprise within an ecosystem





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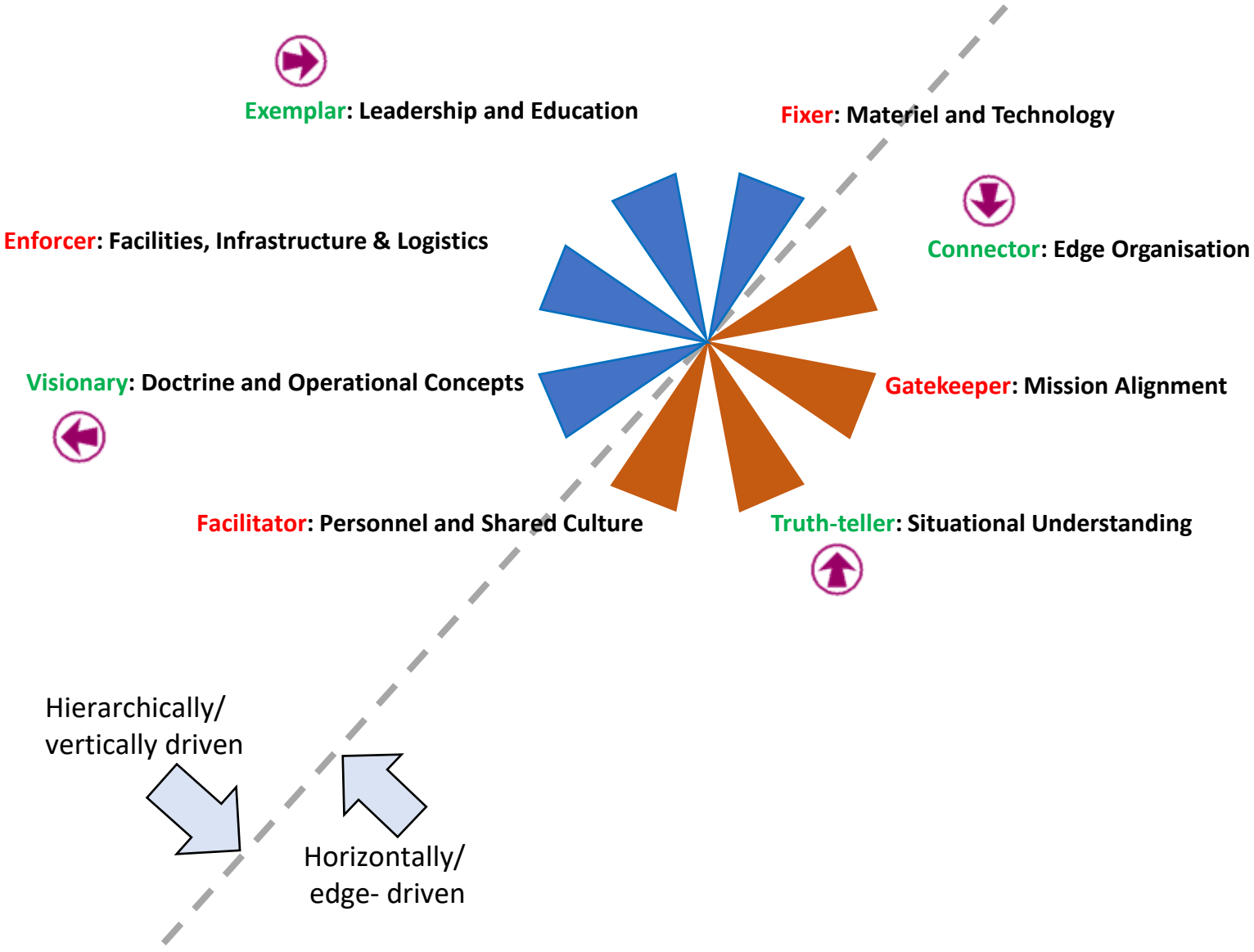

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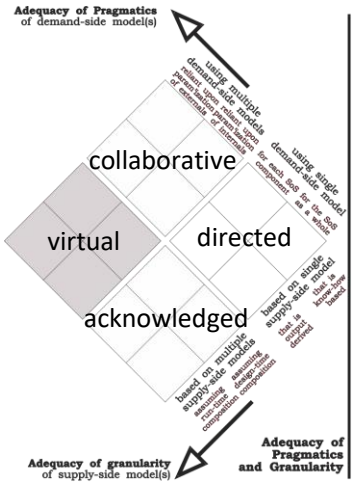
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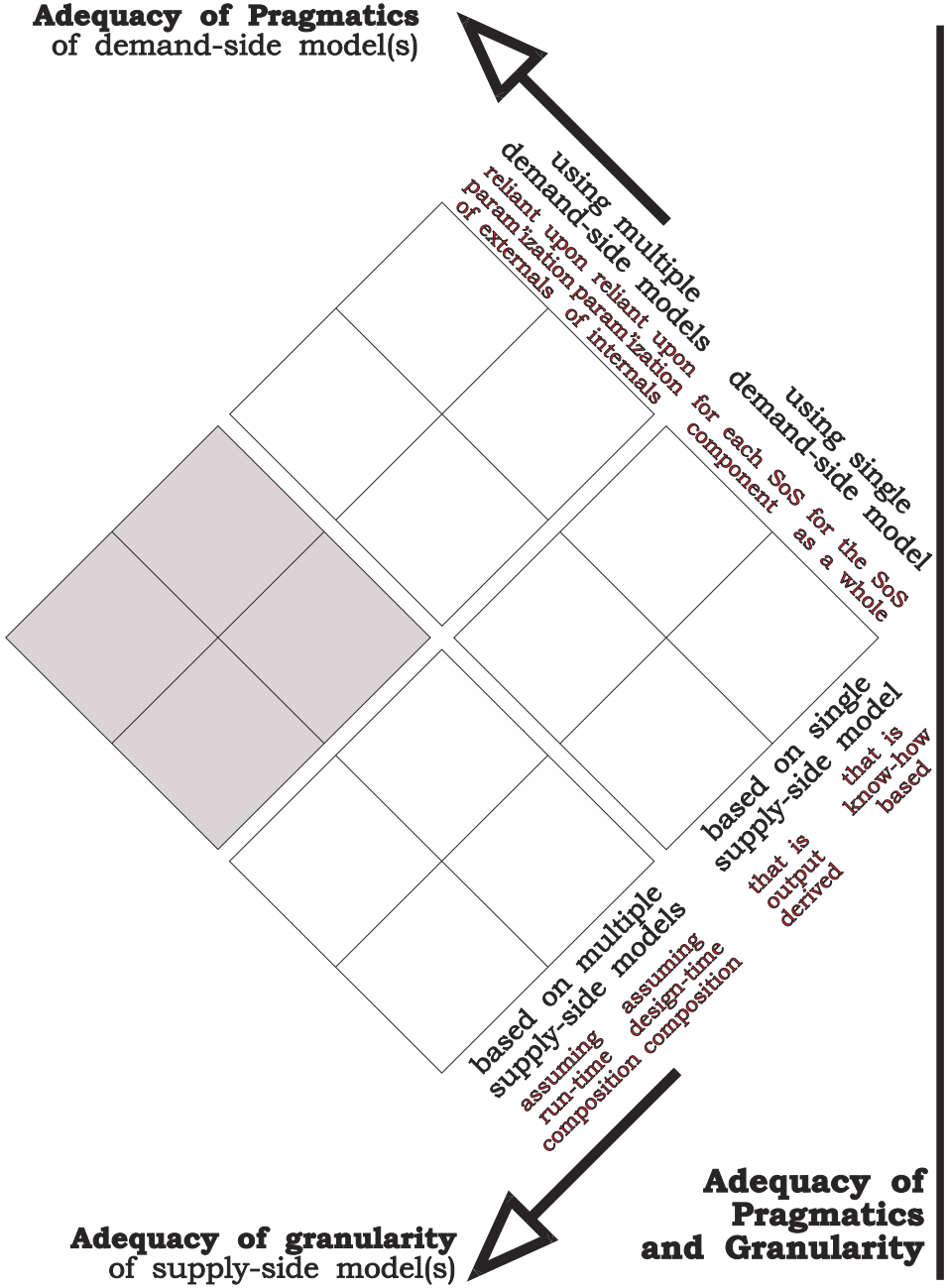
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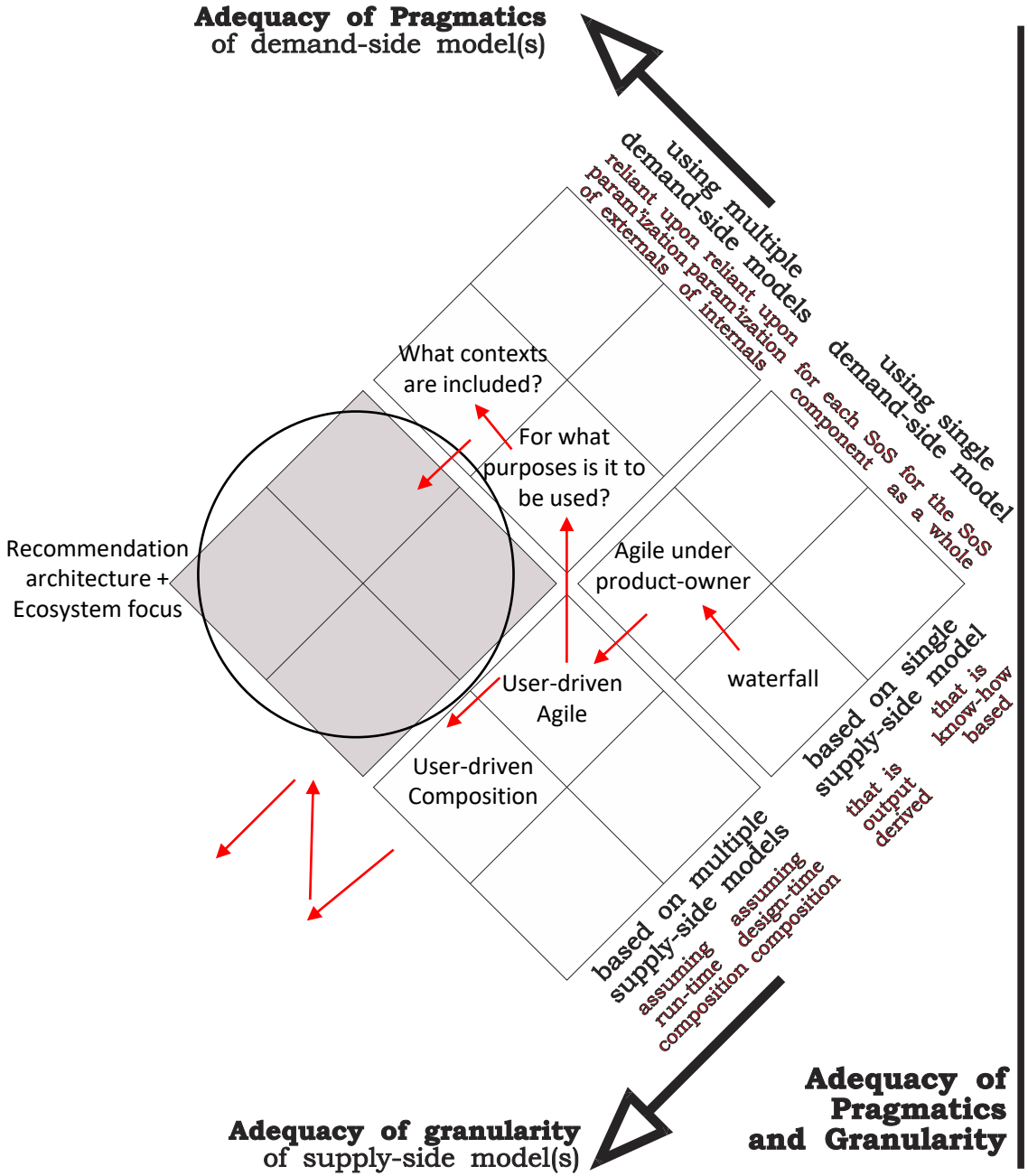

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