Situational Architecturing

An integrated governance pattern for sensemaking architecture.

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– a DYA whitepaper by Sogeti –

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Abstract—This whitepaper describes part of our vision we call Sensemaking Architecture. A vision that is based on our understanding as experienced enterprise architects about sensing and perception, managing complexity, applying ethical thinking. In this paper we add to this vision a way to translate the purpose of an organisation to a way of working for enterprise architects that honours the challenges of a complex and changing environment. Inspired by psychology, industrial design, sociology, and systems theory, we introduce a model with three levels.

On the first level we are making sense. What purpose does this organisation have, and what sub-systems are there? We give some perspectives to help find these subsystems.

On the second level, for each sub-system we change situationally. What purpose does this sub-system have, and what changes are needed? We present a way of identifying the situation and give a pattern to help govern and guide changes. This comprises a situational architecture approach based on combining architectural method fragments.

On the third level we change via a structured way of working, using best-practices, specialised working-regimes and standard methods, suited to the circumstances of the change.

Contents

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I. Sensemaking and Situational architecturing

The environments we work in are becoming increasingly complicated, sometimes even complex. To ensure giving the best advice to an organisation and be the best advise-facilitators, architects will have to get smarter. As architects, we will have to improve our way of working; we must adapt our professional products to the exponentially increasing external variety. We must be able to deal with this variety without falling into the reductionistic trap, without killing the much-needed internal business variety. But how? It is time to take our sensemaking duty seriously and develop our situational awareness.

In this paper, we discuss how architects can deal with complexity by switching between approaches according to the type of situation.

A. About this whitepaper

This whitepaper expresses a vision that is not validated by a large number of case descriptions or other relevant scientific methods. However, it makes use of some accepted approaches and theories from other fields, such as psychology, industrial design, sociology, and systems theory. In the coming years, we intend to deepen this vision based on our empirical experiences, gratefully using your feedback.

We start with a brief explanation of our two origins of the sensemaking architecture vision.

Next, we dive deeper, elaborating sensemaking, facilitating change situationally, and working in a structured manner, in three subsequent chapters. This is the main body of this paper. We finish the paper with a short summary of the foundations that guide our understanding, a discussion and references.

B. Our two origins: Multi dynamic architecture and Multi modal governance

In previous years the authors of this paper were driving two separate developments: multi dynamic architecture and multi modal governance. We inspired and helped each other. For a while we saw the two developments as overlapping, but both potentially valuable to develop separately. Today we see them as complementary and combine them, becoming the situational vision of sensemaking architecture.

The origin of the first concept, multi dynamic architecture (Eusterbrock and van Steenbergen, 2016; van Steenbergen et al., 2016a,b) started with the recognition that we need different architecture approaches for different organisations. Extending that vision, we recognised that within organisations there are collaborating environments, multi-disciplinary teams, ad-hoc and institutionalized, even sub-organisations. All of which serve different purposes, have different needs for adaptivity, have different levels of complexity (see page 9 for an example). These differences should be reflected in different architecture styles and architectures that guide the development of the particular sub-system. Based on systems theory, attributes were identified to enable the selection of a fitting architecture style.

Summarised: the multi dynamic architecture concept focusses on enabling different dynamics of the organisation by supporting sub-systems with different architecture styles.

The origin of the second concept, multi modal governance (Nouwens and Opperman, 2017; de Mik et al., 2019) started with the need to clarify Gartner's proposed bimodal strategy. The authors saw their respective organisations struggle with questions on how to organise their change initiatives. How to support any change with sound and practical methods for project management and architecture? They saw a need for a holistic, more adaptive, more dynamic way to organise the changing information and IT landscape. This was the basis for the introduction of working regimes and the related project and architecture styles.

Summarised: the multi modal governance concept focuses on enabling different ways of working for executing change initiatives with different architecture styles.

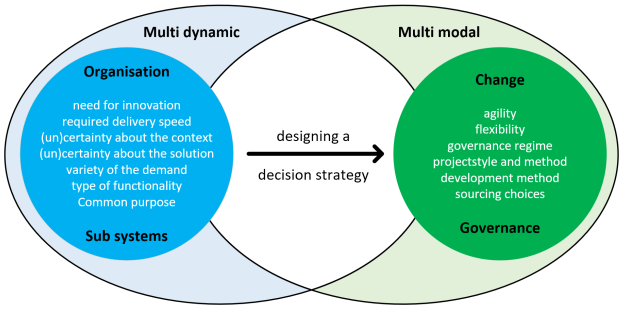

Figure 1: our two overlapping origins

The combination of these two concepts forms a set of decision-making strategies that allow for a way of working that is aware of the local situation in its ever-increasing complex environment. An architecture style is applied for each identified or recognised sub-system, reducing the complexity of the whole to complicated parts and dependencies. In both approaches, changes are contained within a sub-system. For each change initiative an architecture guides the governance regime of the change organisation.

C. Introducing a situational context for architecturing

How can we as architects increase our ability to grasp the complexity of organisations without falling into a reductionistic trap? How can we deliver our value by facilitating decision making? How can we deliver the much-needed coherence, the concinnity as referred by Hoogervorst and Dietz? (Hoogervorst, 2009, 2017; Dietz et al., 2013). Hence, how can we guide our organisation to a skilful and harmonious arrangement of the different sub-systems?

Based on a selection of theoretical inspirations (as detailed in chapter VIII) for situational awareness, we conclude that at least we need to

- be a highly socially skilled actor;
- be able to observe and perceive;
- be able to interpret, prioritise, value and remember the resulting information;
- make use of a developed mental model (domain knowledge);
- focus on connections instead of the elements;
- have a goal, a purpose.

Based on this situational awareness, we then should differentiate our way of working.

A sensemaking architecture way of working creates this understanding. Understanding how the organisation exists, survives, and thrives in its environment. We assess the situation; we identify and differentiate the several sub-systems. With this understanding we start to build a model per sub-system and the interdependencies between these sub-systems.

As stated by many, architecturing needs to deliver performance and value by facilitating good decision making (van den Berg et al., 2019). The architectures we deliver must enable us to create a sustainable flexibility. We state that the way to do so, is to differentiate between contexts and sub-systems and adjust both content and way of working to the needs of a situation.

We do recognise the critique that not every organisation is the same size and that in smaller organisations distinct sub-systems cannot be identified. The same holds for organisations that are not concurrently executing many change initiatives. However, for any architect in any size of organisation it is good to be sensitive and aware of the organisation's context and to be able to adapt your style of architecture. Be smart about the amount of architecture time and effort you put into supporting a project.

1) **On the first level we are making sense.**
   Take guiding principles from enterprise governance and many external sources, open your senses, feel the culture and interpret narratives. Design an enterprise architecture. The applicable methods in this complex environment are based on systems thinking, characterised by being mostly qualitative, unprecise and based on narratives. This enterprise architecture is a very high-level model depicting the sub-systems of the enterprise with their purposes, their interrelations and relations to the enterprise ecosystem. Plus, the enterprise architecture principles, guiding the overall development of the enterprise.
   For each sub-system we can describe why they exist (their purpose) and how their development should be governed, as well as prescribe what should be architectured to develop their purpose.
   From this first level we initiate multiple concurrent sub-system architectures, which brings us to the second level environment.
2) **On the second level we change situationally.**
   For each sub-system take the guiding principles of the sub-system governance and design a sub-system architecture. The methods in this (now reduced to a) complicated environment, are based on practices that have a good track record to solve a known problem. Each change initiative within each sub-system potentially has a different way of working, specifically for the situation. From the sub-system architecture, for each change initiative we can describe why a change exists and how the change should be managed (working regime), as well as prescribe what the change should consist of.
   From the second level we initiate multiple concurrent changes[1], which brings us to the third level environment.
3) **On the third level we work in a structured manner.**
   Taking the guidance from sub-system architecture we design the change, resulting in a functional design document describing the change. A specific change architecture is designed that will guide the solution design or solution procurement process. The change is executed, showing what to do and with what tools. The deliverables are handed over to the operational management, explaining how to change the way of working and how to instruct the people executing the business processes.

All of this will be done concurrently. There will be many changes being designed, many architectures being derived, many styles of working being applied etc. In several sub-systems. All at the same time.

[1] We use the more generic term change instead of project. This is to emphasise that it can be managed in any form. For example, as a prince-II project, any agile variation or DevOps . The situation of the sub-system will prescribe the way of working.

In the next three chapters, we will explain each of the three levels of our proposed model and try to give guidance on how to govern your way of working.

Each level can be regarded from two perspectives and three different languages.

- The subjective perspective, about explaining why we are and exist, mostly using a teleological[2] language, expressing goals and purposes in relation to humans. In short: **why?**
- The objective perspective, about the construction of things, using an ontological[3] language, expressing how things and phenomenon are. In short: **what?** There is no way to easily bridge these two perspectives. You will have to use your imagination to design a solution. What to do, to solve my questions and goals?
- For bridging the two perspectives we use a functional language. In short: **What does it do for whom?**

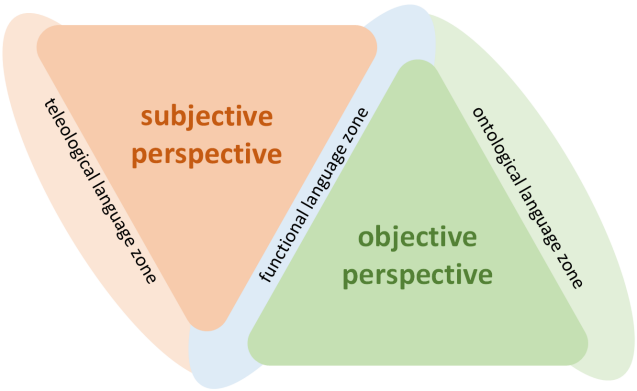

Figure 2: two perspectives, three languages

[2]**Teleology** (a combination of τέλος, ***télos***, end, aim, goal, and λόγος, ***logos***, explanation, reason) is a reason or explanation for something as a function of its end, purpose, or goal, as opposed to as a function of its cause.

[3]**Ontology** (a combination of ὄν, ***on***; ὄντος, ***ontos***, being, or 'that which is' and λόγος, ***logos***, explanation, reason) is the study of being, that encompasses a representation, formal naming, and definition of the categories, properties, and relations between the concepts, data, etcetera.

II. Level 1 - Sensemaking

On the first level we are making sense. The two perspectives we label as

- Enterprise Sensemaking (subjective)
- Enteprise Architecturing (objective)

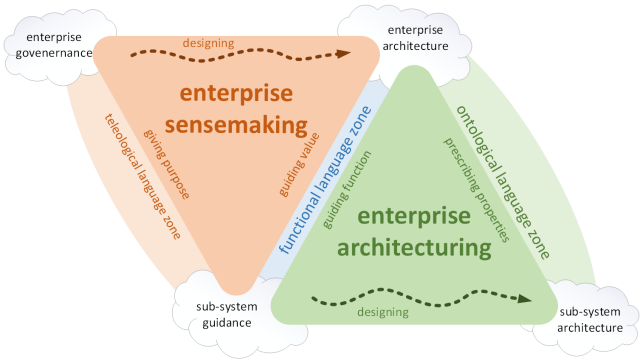

Figure 3: Level 1 - Enterprise Sensemaking and Enterprise Architecturing

To read the figure, think like this:

On the corners of the model there are the things we as architects create. Depending on the perspective, some of these are as concrete as deliverables in the form of a model or formal description. Some are as soft as an awareness of an emotional state.

In between these states there are interactions, influencing forces or coordinated processes. For instance:

- an sub-system architecture can be derived from an enterprise architecture. This is done within the zone of an ontological language, describing what should exist on the enterprise level, and what should exist on the sub-system level;
- a sub-system guidance is guided by the enterprise architecture description and awareness. Sometimes this is focussing on value for stakeholders (subjective), sometimes this is guiding functions for stakeholders (objective);
- The process to get from a sub-system guidance to a sub-system architecture is less structured. The starting point is a functional description. This needs a creative, probably iterative, design process.

these three together we call Enterprise Architecturing.

For each of the levels we will be presenting the two perspectives and labels.

A. Enterprise Sensemaking (ES)

First order of business in this sensemaking phase is literally opening senses. Forget about business for now. See, listen, smell, taste, and touch. Listen to stories, talk to many stakeholders. Feel the culture, have lunch and drink lots of coffee together. Find out why this organisation exists, why people feel connected to its mission and purpose, why the organisation is in its current state and why it should change. Discuss your perceptions, gradually building your interpretation, ordering and prioritising your interpretations, placing them in context of the organisation. Enrichening your interpretations with your personal mental models and visa-versa.

Organisations are social, complex and viable systems. Hence, in a changing environment, organisations need to evolve or risk becoming irrelevant and obsolete. They change form, function, outputs, intention and sometimes their purpose too. The required form of resilience is related to the needed amount of evolvability, that is related to the amount of change of the environment. For more information on resilience see our whitepaper Design for Chaos (Botjes et al., 2021).

Every organisation consists of several sub-systems, each with their own focus and therefore their own change dynamic, need for speed, quality levels, available resources, culture, and governance. The finding, recognising and acknowledging of sub-systems is done by looking for their purpose, which positively contributes to the organisation's mission and strategy. Examples of purposes are: making and keeping public space attractive, safe, efficient and liveable for citizens and organisations (purpose of a spatial planning sub-system in a municipality), ensuring responsible and effective use of data throughout the organisation (purpose of a data sub-system) or ensuring strategy achievement (purpose of a management sub-system).

Our vision on situational architecturing described in this paper is strongly based on the concept of (sub)systems. It is important to realize that, as sub-systems are identified by their purpose, there is no a priori relation between organisation sub-systems and the organisational units of an organisation. Sub-systems are functional decompositions based on purpose. Hierarchies of organisation units are constructional decompositions mainly for attaining control.

With a situational awareness (see our description referring to Endsley at page 18) at least on the Comprehension level, we have an initial understanding of a purpose. Next thing is to store (remember) this interpretation, make the models explicit and try to project and model a future state. Going to the situational awareness level Projection. Be aware of the iterative nature of this approach. Don't be afraid to go back, open your senses again and re-interpret your perceptions.

In the next section we will delve deeper into how to recognise sub-systems and design an Enterprise Architecture.

1) Recognizing sub-systems

Sub-systems are not necessarily the same as an organisation unit, business capability or business function. There is no defined method for recognising, identifying and designing sub-systems. The context is complex, the results are fluid and constantly in motion. *"The path will be created by every step"*.

However, we found several perspectives that help us as enterprise architects to cluster and identify elements that have a common purpose. Iteratively we start to recognise a coherent set of sub-systems.

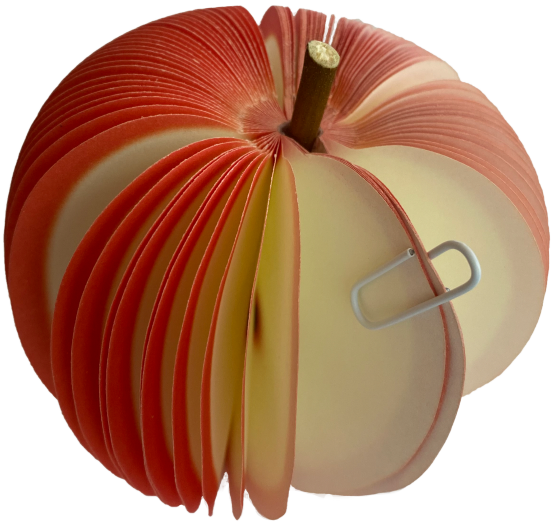

Figure 4: recognising an emerging 3D shape by using many flat perspectives.

a) Recognising sub-systems by looking at the dimensions of purpose

As proposed by van Ingen et al. (2021), the dimensions of purpose are significance, aspiration, direction, unification, and motivation. Using their descriptions, we see the following recommendations:

- Find some clustering of stakeholders. Make use of an existing vision statement, find out what they want to be. Make use of a goals description, finding out what they want to do. Then look for the needs and problems they try to solve.
- Find coherence (if any) in all current and proposed actions. It is potentially valuable for clustering input to recognise sub-systems, because these can be directly translated to changes in the next level.
- Shared understanding and shared meaning are created by employees. We are very hesitant to re-use a current business-unit structure to identify sub-systems. But some inspiration could be found in the strategic documents of the different departments. How do they describe their departmental purpose to their employees?
- Some inspiration can be found in various forms of communication. Are people motivated by a vision, or is there money to be made by employees in an incentive programme? Are there examples of advertisements? What texts are used in recruitment?

Together these give an idea of shared purposes. Are there some clusters to be found where the purposes differ? These are potential enterprise sub-systems.

b) Recognising sub-systems by looking at the change dynamics: the Adaptive Cycle of Resilience.

An indication of an enterprise sub-system is the state of change of a group of business functions on the lemniscate of the Adaptive Cycle of Resilience (ACoR) as described by Takács and Abcouwer (2020).

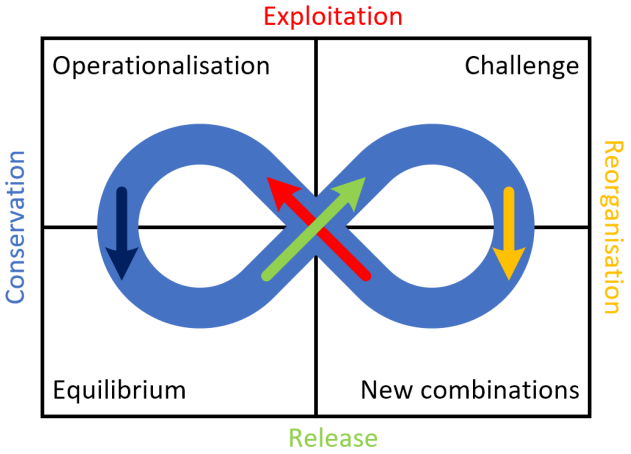

Figure 5: Adaptive Cycle of Resilience (ACoR) (Takács and Abcouwer, 2020)

The position of a business function in one of the ACoR quadrants is a strong clustering indication for being part of a sub-system. Intuitively it is very hard to have a sub-system that would be in a state of challenge and at the same time being in the equilibrium state. It is hard to imagine that a sub-system is at the one hand looking for new ways of doing business, looking for new strategic opportunities, challenging everything in its way, etcetera. And on the other hand is making money, everybody knows what they are doing and things flow smoothly. We dare to say that such a combination, a single sub-system in multiple states, is probably unlikely.

c) Recognising sub-systems by looking at the business function model.

What are the business functions that are part of this sub-system? A business function is a combination of operations and business capabilities that implementation-independently contribute to the mission of an organisation. They are more stable than the organisational structure and probably comparable between organisations in the same sector. Typically, a business function model can be provided for by a sector reference architecture. The contributions to the mission can be an inspiration for recognising a purpose.

Being part of a layer of business functions (primary, supporting, generic) can strengthen a purpose description. However, be careful, a sub-system may include all three layers of business functions.

d) Recognising sub-systems by looking at the Viable System Model.

The Viable System Model by Beer (1972) is an organisation construction model consisting of functional

About the holistic view of an enterprise. In this paper we propose a number of perspectives to find clues to recognise different sub-systems with a goal of governing them interdependently and situationally. The question is if we can have a whole view of the enterprise when we have acknowledged a number of sub-systems? For this we use and refer to the story about the blind men and an elephant and the reflections by Luke Craven. There is no objective elephant that is commonly discovered by the blind men. We struggle with complexity in our attempt to make sense of our perceptions, coloured by our own experiences. We should appreciate and make use of the different perspectives, even if they might not result in something others call an elephant. Embrace our limitations of sensemaking, accept multiple and partial understandings of the complex whole. *"…it is about creating a space in which we can sit with multiple, potentially incompatible perspectives, make connections between them because of and despite their differences, and have conversations about what we can do with them that we might collectively value."* (Craven, 2021).

sub-systems, each with a distinct purpose. Beer introduces his model in "Brain of the firm" in 1972. Originally derived from the architecture of the brain and nervous system, elaborated in several following publications. The model is recursive and consists of six classes of sub-systems. Together the sub-systems are able to handle the enormous variety from the environment and the internal variety. It thus honours the law of requisite variety.

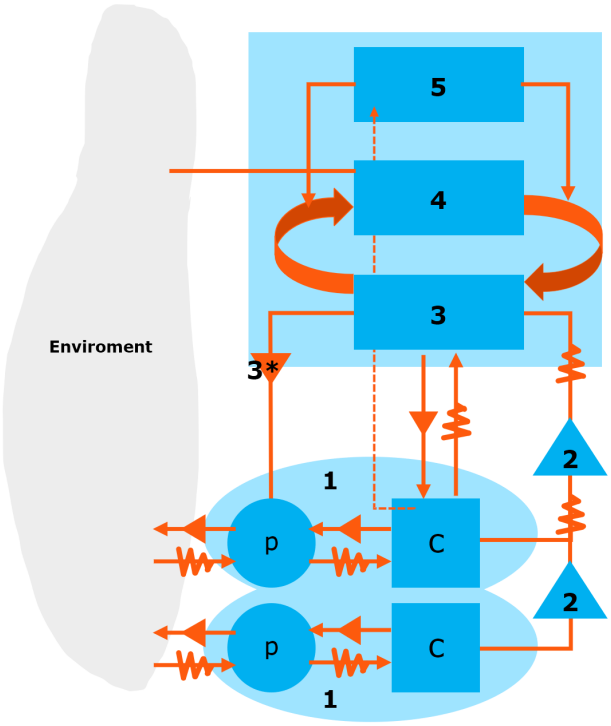

Figure 6: The Viable System Model (VSM)

Summarised, the model can be described as:

- **The Environment.** Parts of anything beyond the boundaries of the system, delivering and supplying goods or services and information.
- **System 1 – production.** This is where the primary business activities happen. Where products or services are delivered or retrieved to and from the environment. Usually there are several instances of System 1. In itself System 1 is a Viable system, as it is recursive.
- **System 2 – coordination.** In this system the information flows between systems 1 and between 1 and 3 is coordinated.
- **System 3 – management.** Representing the control, giving orders and providing resources to Systems 1. Within this system there are the support functions of management. Focus on the here and now.
- **System 3* – audit.** A non-continuous function that validates the compliancy of the Systems 1.
- **System 4 – vision.** Focussing on outside and the future, this function has direct contact with the environment, proposing the new direction of management.
- **System 5 – ethos.** Responsible for overall policies and keeping a balance between System 3 and System 4.

The recursive nature of Systems 1, and its viability as a sub-system makes Systems 1 potential candidates for the class of sub-systems we are looking for. Systems 2, 3, 3*, 4 and 5 are no potential candidates, as they separately are not viable systems and are not recursive.

e) Recognising sub-systems by looking at the capabilities by Ross et all.

In their 2019 book Designed for Digital, Ross et al. describe five capabilities that organisations "must develop to succeed at digital".

1) Shared insights
2) Operational backbone
3) Digital platform
4) Accountability framework
5) External developer platform

The identification of these five capabilities is an indication for a sub-system. Some sub-systems could focus on delivering some of these capabilities for their own sub-systems. Others, for instance the operational backbone, could focus on delivering to other sub-systems. Each having their own architecture regime.

Example: Sub-systems of a municipality.
A municipal organisation has various sub-systems that differ in culture, strategic focus, management, risk of failure, continuity requirements, quality requirements, changeability, development method, development speed, and/or innovative character:

- The spatial planning sub-system aims to make and keep public space attractive, safe, efficient and liveable for citizens and organisations. This subsystem mainly works on a project basis in close collaboration with contractors and other partners.
- The social domain sub-system aims to provide social support to society. This sub-system works with very privacy-sensitive information and has to do with national legislation on social support, youth care and the participation of citizens and companies. Chain partners such as the UWV, care offices and the Social Insurance Bank play an essential role.
- The client interaction sub-system focuses on direct interaction with citizens and organisations through various channels. Customer experience is what matters here.
- The data sub-system aims to ensure that everyone within and outside the municipality has access to the data they need and are entitled to. This sub-system is spread throughout the organisation taking care of data quality, data collection, data distribution, data privacy and all other aspects related to safe data use.
- The operational management sub-system is concerned with supporting the internal organisation in areas such as financial administration, P&O and IT. This is mostly about reliability and efficiency.

Sub-systems of a municipality need not coincide with organisational units or business functions.

2) Prescribing sub-system guiding

Guiding changes with a situational way of working is done by a multi-disciplinary team with a helicopter point of view, and an oversight on the broader connections within the organisation sub-system, to the other sub-systems and to the outside of the organisation. In our view this is not a management responsibility a priori given to managers, as they are responsible for managing the current operations, the running part of the business. Guiding is a different responsibility, the changing part of the organisation. It is not impossible for a manager to have both responsibilities; however, the distinctive nature of the responsibilities may also create the need for different personalities and leadership styles.

In this whitepaper we use the term Guiders for the people that execute the guiding responsibility.

The Guiders advise on which working regimes to apply to which sub-system. The different working regimes that can be distinguished are discussed at the next level, the situational level.

Architects assisting the Guiders are typically enterprise architects. The architects advise on goals, scope, organisation, and boundaries. They advise the guiders on how to situationally govern their changes and how to manage ad hoc change requests. The enterprise architecture prescriptions are to be translated into a functional language, relating the proposed roadmaps to purpose and meaning (from an ontological to a teleological language model).

Architects assisting the Guiders work in an overviewing role. These architects' mindset is: "Together, ensure business value" and "Discovering principles".

B. Enterprise Architecturing (EA)

The next step after sensemaking, recognising and identifying the various sub-systems within the organisation, is to develop and evolve the enterprise architecture description. It must slowly become a prescriptive tool that shows what the different sub-systems are, what their components are, their interdependencies, what architecture principles guide their evolution etc.

Enterprise Architecturing is developing and evolving an enterprise architecture and using it to support enterprise-wide organisational decision-making. In our first level this means to prescribe for each sub-system what its governance regime should look like and what architecture principles are dominant in guiding that specific sub-system. Referring back to the Adaptive Cycle of Resilience (ACoR on page 7), what is their current state and their ambition?

As argued for by Proper and Lankhorst (2014, par 3.4) the enterprise architecture should prescribe and enable a balance between the two aspects of an organisation: the operational capability and the transformational capability.

The enterprise architecture should prescribe what architecture method fragments will be used to develop, maintain and apply the architectures for each sub-system. Hence, this interpretation of enterprise architecture includes a form of architecture management.

We discuss these activities in more detail in the next three sections.

1) Prescribing what a sub-system is and what change is needed.

Architects work with product or epic owners, programme and project leaders of a sub-system. Advising and explaining to them the chosen working regime they are in, their preferred way of working, their mindset and their deliverables.

The resulting architectures at this level are characterised as limiting design freedom, not an overall enterprise design. Enterprise architectures should be about explaining and constraining, not constructing. *"[Enterprise transformations red.] as primarily being an intervention in the natural evolution of the enterprise, resulting in a*

changed course of its evolution towards a presumably more desirable direction." (Proper and Lankhorst, 2014, par 3.3).
In this context, proposing changes is certainly not exclusive to the architects and their long-term roadmaps. Any ad hoc suggested changes are to be analysed, put in context and given appropriate articulation and consideration. These requests are a valuable source of demand. It's these bottom-up changes that may prove even more valuable. Architects work with (sub-system) business leaders (and their Guiders) to support decision making about a portfolio of proposed changes and provide insights about opportunities, risks, portfolio cohesion, and provide a long-term vision to ensure the delivery of business value to the sub-system. They create high level architectures, continuously delivering and maintaining roadmaps and future-state architectures.

2) Prescribing an architecture method by combining method fragments

In his blog, Chris Lockhart discusses the endless debate about what framework is better or why we need a new framework that supplants all others. He pleads for the application of what he calls frankenframeworks. "We need to do more of more value and do it more quickly. I submit one way to achieve that is to put aside the endless soul-searching over frameworks. Pick one. Pick ten. Pick two and smoosh them together. Keep them and reuse them. But above all, use what works for the problem you have regardless of what the experts say." (Lockhart, 2012)

Thinking in terms of sub-systems enables us to apply architectural approaches that better fit the situation. This implies that we define more than one architectural approach and that these different approaches are applied simultaneously, but in different sub-systems. To make this a feasible way of working, we turn to the discipline of situational method engineering (Brinkkemper, 1996).

Brinkkemper (1996) introduces method engineering as a research framework for information systems development methods and defines method engineering as: "method engineering is the engineering discipline to design, construct and adapt methods, techniques and tools for the development of information systems". A method is defined by Brinkkemper as "an approach to perform a systems development project, based on a specific way of thinking, consisting of directions and rules, structured in a systematic way in development activities with corresponding development products" (Brinkkemper, 1996, p.275-276). Though meant for information systems development, we believe that method engineering can also be applied to methods of working under architecture.

A special form of method engineering is situational method engineering. Situational method engineering is about tailoring a method to a specific situation, based on reusable method fragments. These reusable method fragments are stored in a so-called method base, a repository of method fragments.

If we translate situational method engineering to architecturing, we are talking about architecture method fragments that can be used to assemble an architectural approach suited to a specific context, or sub-system. An architecture method fragment is a part of working under architecture that can be regarded as a building block that, together with other building blocks, shapes working under architecture. In his publication Bengsch et al. (2019) broadly classifies architecture method fragments into governance (for instance architecture board, governing by principles, governing by rules), method (for instance PSA workshops, RCDA[4], backlog prioritization), process (for instance PSA approval process, advisory process), reference model (for instance SOLL application landscape, architecture principles) or tool (for instance repository, ArchiMate, causal loops). In each of these classes different choices will be made depending on the nature of the sub-system concerned.

[4] https://www.cginederland.nl/nl/artikelen/rcda-risk-and-cost-driven-architecture

III. Level 2 - Situational

On the second level we are changing situationally. The two perspectives we label as

- Sub-system Guiding (subjective)
- Sub-system Architecturing (objective)

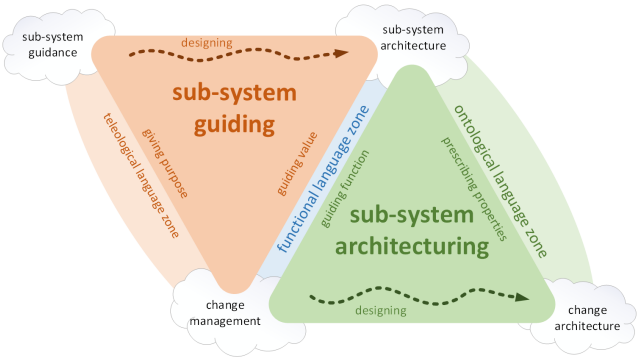

Figure 7: Level 2 - Sub-system Guiding and Sub-system Architecture

A. Sub-system Guiding (SG)

Sub-system guiding is executed by the Guiders. Although the guiders guide within the context of one sub-system, they are very much aware of the interdependencies of their sub-system with other sub-systems. This is described by customised views on the enterprise architecture, focussing on purpose and meaning of the sub-system.

Not all change activities that are guided, are necessarily executed in the form of a project or programme. It can also be a continuously working department or a temporary committee. What unites them is a goal to change something. However, we do associate project style names with the working regimes, especially because there seems to be so much confusion about the terminology when it comes to describing a project style.

1) Decoding and articulating change initiatives

Within a sub-system there will be multiple concurrent changes in various stages of development. Initially a change request is probably a bit vague. There is some need, some idea, maybe the goals of the proposed change are known, often not. These initiatives can be made by anybody within the enterprise, including the Guiders running multiple-year roadmaps. By allowing anybody to suggest an improvement, the enterprise makes use of the large variety and creativity of all stakeholders.

It is up to the Guiders to articulate this change initiative and develop its description in such a way that there can be a rational decision to allocate resources and start changing. This process involves many of the roles in the organisation, such as business analysts, demand managers, product owners, account managers etc.

To choose an appropriate way of working two aspects of the circumstances of the change request are investigated: the amount of certainty of the context of the change request and the amount of certainty of the proposed solution or product. The sub-system governance provides guidance for answering the first dimension. The second dimension is to be found in the change initiative, the change request or project briefing.

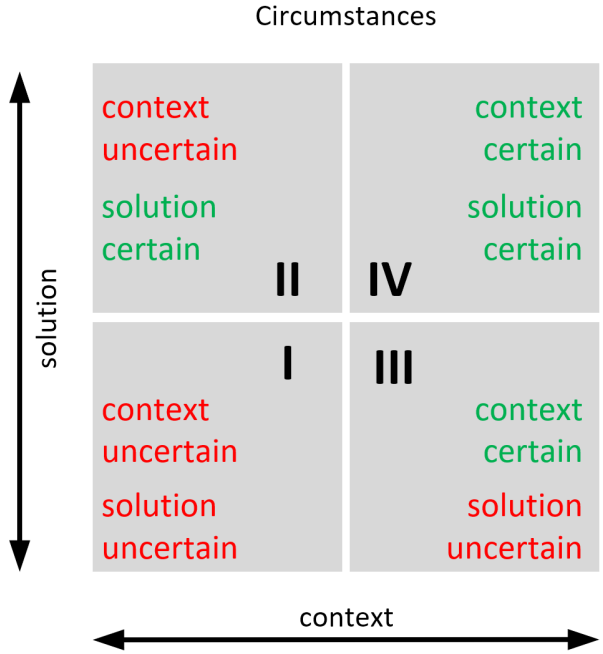

Figure 8: Identifying four types of circumstances, based on certainty and uncertainty of context and solution (Nouwens and Opperman, 2017)

The following questions are to be answered:

1) The amount of certainty or uncertainty about the context of the change request.
   - With what degree of certainty do we know what is requested or expected?
   - With what degree of certainty do the stakeholders truly know their needs and functional requirements?
   - With what degree of certainty do we know how the proposed solution will fit in the current situation of the organisation? Does it fit in the current business processes?
2) The amount of certainty or uncertainty about the proposed solution or product.
   - With what degree of certainty do we know the solution? Is it an existing ready-made, maybe commercially available and supported product?
   - With what degree of certainty are we able to support and maintain the solution?
   - With what degree of certainty do we know the requested is a product? Are there clear requirements, is there a complete solution design? Are we ready to start building? Or are we ready to send out an RFI and find a supplier?

The combination of these two aspects leads to four classifications of the circumstances of a change request. These four classifications give guidance to determine a way of governing the proposed innovation or change. See Figure 8.

It is tempting to combine the 2x2 circumstances matrix with the Cynefin model and there are definitely some relations. Quadrant IV is the simplest (obvious), best-practices can be applied. Quadrant II and III can be complicated, sometimes there are some good practices. Our working regime approach of quadrant I (act-sense), even resembles the approach of cynefin (act-sens-respond). However, the primary cause of the differentiation of the matrix is different. We investigate (un)certainty, the Cynefin model investigates complexity. Secondly, our goal is identifying a working regime of a change initiative, the Cynefin model helps to make sense of people's behaviour (Snowden and Boone, 2007).

Recognising circumstance I: Change context uncertain, proposed solution uncertain.

It's not clear what we need or want, there is uncertainty about the change request, the problem we want to solve. How will the solution fit in the current organisation and processes, what value will it deliver? We don't know.

The solution itself is also unknown. We have no readily available product.

The Guiders goal should be to get at least more clarity about one of these two uncertain factors, the solution or the change context.

The Guiders approach should be experimental. Take a best guess with an existing product or develop a mock-up or quick-and-dirty solution. Try it and learn how your stakeholders are able to solve their problems or can support their business processes.

The label given to the **working regime** related to this circumstance is: *Pioneers*.

Recognising circumstance II: Change context uncertain, proposed solution certain.

In this situation it is (more) clear what solution we need. Maybe even a product or supplier is known. What is uncertain is how the product will fit in our organisation, how it will prove its value supporting the processes of our organisation. Do we need to change our processes? Do we need different people with different competences?

The Guiders goal is to seek feedback on the way the product; the solution is embedded in our processes and organisation.

The Guiders approach should be incremental, start small and grow.

The label given to the **working regime** related to this circumstance is: *Settlers*.

Recognising circumstance III: Change context certain, proposed solution uncertain.

In this situation we know more about what we need, there is certainty about the context. The business context where the business solution is supposed to deliver its value is (mostly) known and described. The requirements of the unknown solutions are (mostly) clear. But the solution itself is unknown or unavailable.

The Guiders goal is to create or to procure a product.

The Guiders approach should be executing a sourcing strategy. Is there a ready-made product or service available? Is the supported business process essential, maybe unique and distinctive for our organisation? The sourcing strategy has multiple outcomes: to buy or to build.

The label given to the **working regime** related to this circumstance is: *Town builders*.

Recognising circumstance IV: Change context certain, proposed solution certain.

In this situation we know what we need and want, and we know how it fits in our organisation. The requirements and processes are known. We know what the desired results are and what value it will result in. The solution or services are known. Maybe there is an existing supplier available.

The Guiders goal is to deliver business value as soon as possible. To deliver a solution efficiently.

The Guiders approach should be a predictable, stable delivery or maintenance process. Within budget, within time. Predictable, auditable, efficient results.

The label given to the working regime related to this circumstance is: *Town runners*.

These four classifications give the basis to identify and differentiate four change working regimes that we will describe in the next section.

2) Guiding four different working regimes for the identified circumstances

As described in the previous section, we identify four working regimes: Pioneers, Settlers, Town builders and Town runners. For each of these we will explain how they are related to the four circumstances, what their typical scope and velocity ought to be, how the level of governance ought to be (strict or loose), some remarks about variety, something about the types of workers and finally our label for a project-style.

Guiding a Pioneers working regime

The Pioneers working regime is **related to Circumstance I**: Change context uncertain, proposed solution uncertain.

The aim of this regime is innovating and experimentation, finding both a solution and the intended change. This can be the processes, the IT means, organisation, governance etcetera. Starting top-down from the sub-system strategic goals or bottom up, research and test innovative ideas.

The scope should be limited and **the velocity** should be high. There is a need for getting an indication about the feasibility of ideas as soon as possible. Fail fast, fail cheap, fail often and learn!

The level of governance is low. Variety should be high, creativity stimulated. From an architecture point of view there are very little to no requirements. If there are any requirements at all they should be there to facilitate innovation. Possibly existing frameworks or platforms are used, but only if they facilitate speed or increase the chance of success, not to restrict the solution and guide it to a solution that can be maintained by the current IT department.

The execution is done by a small multi-disciplinary (ad hoc) team.

When we speak of a **project style**, we call it a *"proof-of-concept project"*.

Guiding a Settlers working regime

The Settlers working regime is **related to Circumstance II**: Change context uncertain, proposed solution certain.

The aim of this regime is determining if and how an existing solution or product can be implemented into our sub-system.

The scope should initially be small, but it will grow. Looking at the business function model there is no obvious relation, it can be applied to any of the layers, primary to tertiary.

The velocity is based on the absorption power of the people in the organisation.

The lead time depends on the size of the organisation, ranging from weeks until several months.

The level of governance is higher than average, focussing on controlling risk when the impact of the implementation increases. Variety should increase in time. As the impact grows, variety will follow, stressing and preparing the solution for a full implementation. The architects help guide the step-by-step implementation: infrastructure and application changes are strictly managed; process changes are iterative and explorative.

The execution is done by a multi-disciplinary team, dominantly consisting of business roles such as product-owners, functional managers and key-users. When we speak of a **project style**, we call it a *"pilot project"*.

Guiding a Town builder work regime

The Town builder work regime is **related to Circumstance III**: Change context certain, proposed solution uncertain.

The aim of this regime is the development or procurement (sourcing) of an unknown solution. Previously tested ideas will be converted to a reliable solution, a product or service that can be implemented. Looking at the business function model we find inspiration on the layers for our sourcing strategy. Solutions directly related to primary business functions can be, after careful deliberation, developed internally. A secondary business function is an indication for a sector-generic solution. Tertiary business functions are highly generic, for them one should only look for standard products or services. Nowadays typically cloud or SaaS based.

The lead time is strongly dependant on the chosen sourcing strategy. A simple procurement process can be quick. But when a European public procurement procedure is required, the minimum will be 6 – 9 months. Developing (designing and programming) a solution takes time, several months at least, but multiple years is no exception.

The governance is relatively strict. Variety will start high and be dampened more and more as product options converge. Guidelines given will be focused on creating or procuring a solution in an existing business context. Describing requirements will be one of the deliverables, especially regarding process and information integration.

The execution will be done by a multi-disciplinary team consisting of several roles such as architects, product specialist, designers and developers, functional and technical managers, contract and procurement managers.

When we speak of a **project style**, we call it a *"procurement project"* or *"development project"*.

Guiding a Town runner working regime

The Town runner working regime is **related to Circumstance IV**: Change context certain, proposed solution certain.

The aim of this regime is to implement, operate, maintain and optimise a known combination of the business context and solution. These maintenance activities are predominantly executed by a line organisation. Typically, this is predictable, managed, budgeted work that can be part of a multi-year roadmap, part of the operational strategy of a department.

Looking at the business function model we will typically find the solutions in the secondary and tertiary layers.

The lead-time is long and activities have a continuous character. Within this working regime there is a stream of small changes and fixes that will be handled in incident, problem and change (IPC) processes. Therefore, the amount of work can highly vary.

The way of working is strictly managed according to strongly governed maintenance and change procedures within formal architectural constraints. The focus is on predictable and efficient results. Making errors leads to disruptions of continuity, down time and loss of business value. Integrations into the business ecosystem are to be optimised, taking into account the complete chain of business processes, including from (external) partners outside the business scope. Variety can be seen as a mitigatable risk.

The execution is done by a maintenance department, part of the line organisation.

Especially in this working regime the activities are mostly not organised within projects. However, when change requests grow, the number of stakeholders and impact increases, a classical project way of working is still advised. There is no need for an agile approach as up front it is known what is required and to be delivered.

When we speak of a **project style**, we call it a *"maintenance, replacement or optimisation project"*.

3) Guiding a portfolio of concurrent working regimes

Presumably there are many concurrent changes happening in your organisation sub-system. Thus, there are multiple, concurrent change activities based on any of the four working regimes.

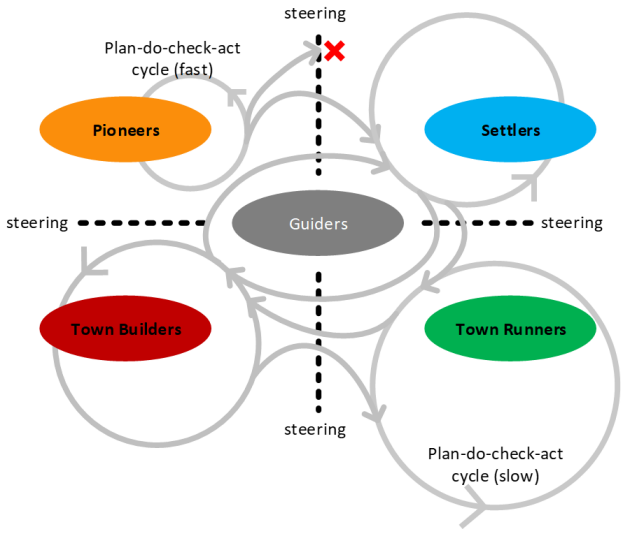

Figure 9: Guiding regimes (Nouwens and Opperman, 2017)

Just like the structured project management method Prince-II, the "managing a stage boundary" process is a point in time in which steering committees are highly involved. In our way of working, the Guiders are supposed to be very alert when change teams finish their work. Figure 9 illustrates the Guiders (the team executing the change governance) steering a change initiative, changing the way of working to the four working regimes. Each time a change, working in one of the regimes, steps out its cycle, it reports back to the Guiders.

We have seen in some organisations that the composition of a project team, including the steering committee, remained the same while the goal of the project stage completely changed. In our vision, for instance the change from a project with a procurement goal to a project with an implementation goal, needs a different way of working and different specialist and managing roles. In our terms a completely different working regime.

It is tempting to see the working regimes as part of a production chain from testing an idea, developing, piloting and maintaining. However, this is not intended as such. Working regimes can be recommended in any order. The Guiders evaluate and help to advise on the appropriate way of working for the next phase.

And remember, stopping after a working regime has delivered its results, is always a real option.

B. Sub-system Architecturing (SA)

Architects create an architecture for a sub-system, they prescribe what to do for that particular sub-system. The traditional way to do this is to create and communicate some models, and to create and get commitment for a set of architecture principles that help to support future decision-making. In this context this is not so different, except for the situational adaptation to the purpose and goals of the sub-system (e.g. level of architectural detail, choice of representation formats (viewpoints), implementation of architectural processes).

1) Defining sub-system architectures

Architects work with the sub-systems Guiders and change management (epic owners, programme or project leaders). Advising and explaining what it is and what it does. What they are changing and how the proposed changes contribute to the purpose of the sub-system, contributing value to the overall enterprise. What to change is based on an impact analysis by experts. Based on current-state and future-state models. The deliverables of a change are based on the delta between the two models.

As usual, several viewpoints will be prescribing the views that are presented to the stakeholders. For some stakeholders, an advisable way of recording and communicating these models is based on the Archimate standard. Others will prefer to see the architecture models translated to a less precise format such as in a Powerpoint presentation. In this level 2, the regular rules of the road for architects will be applicable.

The architecture principles will be much more suited to the particular sub-system and needed change, as they translate part of the purpose and apply it in context. The level of governance (strict or loose) given by the Guiders will also be reflected in the style and tone of voice in the principles. They can be anything between specific rules prescribing how to do things and strategic principles setting an effect to be achieved rather than the way how to achieve it (Eusterbrock and van Steenbergen, 2016).

2) Prescribing an architecture method by combining method fragments

When architects support a particular working regime, they should work structured. To be relevant and effective, they should adapt their way of working in the context of the working regime.

Prescribing way of working for architects supporting a Pioneers working regime

This Pioneers working regime is **related to Circumstance I**: Change context uncertain, proposed solution uncertain. For architects supporting the project style *"proof-of-concept project"*.

Architects work in a creative role. Their mindset is: "Together, looking for business value" and "Discovering principles". They work cooperatively and provide existing architecture products to support and inspire innovation. No clear boundaries and rules are given, out-of-the-box solutions are needed. When finalising this working regime, the architect can apply any new insights to the architecture baseline of the sub-system. Existing future-state architectures and roadmaps may be realigned after well-informed decision making.

Relevant architecture method fragments are patterns, architecture principles, the bridge, scenarios, value sketches, causal loop diagrams.

Prescribing way of working for architects supporting a Settlers working regime

This working regime is **related to Circumstance II**: Change context uncertain, proposed solution certain. For architects supporting the project style *"pilot project"*.

Architects work in a developing and evaluating role. Their mindset is: "Realise and evaluate business value" and "Applying principles". They work to integrate an existing product into a business context with a goal to deliver improved or new services. Their focus is on the environment, not the product itself.

Existing boundaries and rules are applied, the business environment (services, processes and information) will be guided to adapt to the new product. When finalising this working regime, the architect will have to apply the new situation to the current state architecture description.

Relevant architecture method fragments are architecture principles, advising projects, domain models, stakeholder concerns.

Prescribing way of working for architects supporting a Town builder work regime

This working regime Town builder is **related to Circumstance III**: Change context certain, proposed solution uncertain. For architects supporting the project style *"procurement project"* or *"development project"*.

Architects work in a creating and support role. Their mindset is: "Realise products to deliver business value" and "Define principles and rules". They work as specialists and deliver input about the circumstances (current state architecture) and the requirements that describe the product that will be sourced or built. The architect supports major decision making by delivering a Project Start Architecture (PSA) or Sourcing Start Architecture (SSA), a variant of the PSA in the context of a sourcing project (Nouwens, 2015), and will apply sourcing strategies, advise on sourcing and the product boundaries. Special attention is needed to prevent overlap with other developments or current products and services. The circumstances are known, as are the goals of the future product.

There are two variations:

1) In the case of building, architects can be specialists in supporting software development, probably in an agile context. Working together with product owner to develop the product back log and prioritise the user stories for the upcoming sprints. Frameworks like SAFe[5] and methods like RCDA[6] can be applied.
2) In the case of sourcing, architects can be specialists in procurement procedures, especially when EU procurement laws are to be applied. They will be able to advise on what EU procurement procedure (open, restricted, competitive dialogue, negotiated procedure) to follow, based on the amount of needed (design-)interaction during the procurement procedure (Nouwens, 2015).
   Existing goal-architectures or roadmaps are not modified, they are partly realised by the results of this working regime.

Relevant architecture method fragments are architectural principles, architectural rules, current state architecture, reference architecture, project start architecture, sourcing start architecture, RCDA, SAFe, stakeholder viewpoints.

Prescribing way of working for architects supporting a Town runner working regime

This working regime Town runner is **related to Circumstance IV**: Change context certain, proposed solution certain. For architects supporting the project style *"maintenance, replacement or optimisation project"*.

Architects work in a controlling and improvement role. Their mindset is: "Ensure business value, continuity and compliance" and "Enforce principles and rules". They work as a steward to prevent unintended or too risky changes to the current-state architecture. Strict boundaries and rules are applied. Their focus is on optimisation of the current business services while ensuring and maintaining compliance. The architect knows about the current state of things and can provide impact analyses of suggested changes. Existing current-state architectures will be unchanged.

Relevant architecture method fragments are architecture rules, approve change request, review change against architecture, current state architecture.

[5] https://www.scaledagileframework.com
[6] https://www.cginederland.nl/nl/artikelen/rcda-risk-and-cost-driven-architecture

IV. Level 3 - Structured

On the third level we are working in a structured manner. As described in the previous chapter we propose four situational working regimes: Pioneers, Settlers, Town builders and Town runners.

The two perspectives we label as

- Change Designing (subjective)
- Change Architecturing (objective)

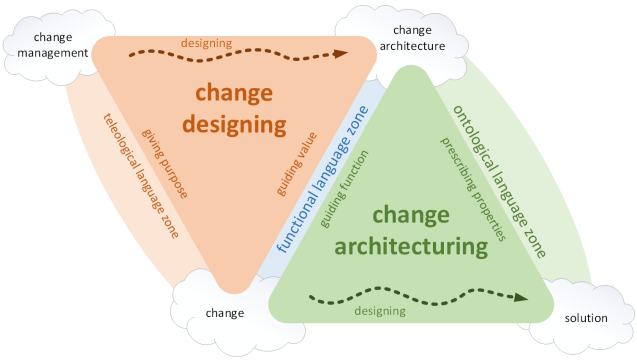

Figure 10: Level 3 - Change Designing and Change Architecturing

Level 3 is not elaborated further. As the context and environment is, in Cynefin terms, clear, we can allow ourselves to work in a structured manner. It's make or buy; taking the guidance from project management styles we design the change, guiding it with a change architecture. Or we support the procurement of a system that implements the required change.

To relate to the changing of the operation, an extension of a fourth level is added. At this level the change team (project or some other way of organising the change) designs and delivers or procures the solution within the constraints of the change architecture. The change deliverables such as working instructions, training etcetera, are handed over to the operational management.

On the fourth level we are realising and implementing. The two perspectives we label as

- Solution Designing (make) or Procuring (buy) (subjective)
- Solution Implementing (objective)

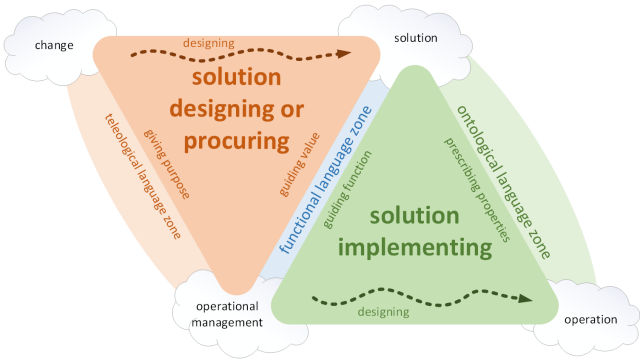

Figure 11: Level 4 - Solution Designing or Procuring and Solution Implementing

The change is implemented. Finally, the organisation will start to see the value of the change. For the best-practices we refer to the plethora of management books, project management training and general education on management.

V. Summary

We strive to make the complex manageable by separating levels of governance and architecture which allows us to better separate the complex from the complicated and simple. By doing so we are able to restrict the complex to the top level, the sensemaking level.

1) **On the first level we are making sense.**
   What purpose has this organisation and what sub-systems are there?
   From the first level we initiate multiple concurrent second levels.
2) **On the second level we change situational.**
   What purpose has this sub-system and what changes are needed?
   From the second level we initiate multiple concurrent third levels.
3) **On the third level we change structured**
   What goals are there for this change, and what solutions are to be delivered?
   From the third level we initiate multiple concurrent building and implementations activities.
   and we deliver structured
   Design or procure a solution, implement the changes. Manage and operate.

All of this will be done concurrently. There will be many governance scenarios and changes being designed, many architectures being derived, many situational styles of working being applied etc. In several sub-systems. All at the same time.

VI. Discussion

But... are sensemaking architecturing and situational architectures different from the existing way of working? How do they compare to “regular” enterprise architecture and domain architectures?

First of all, sensemaking architecturing differs from regular enterprise architecture in the way we look at the context. Not discussed in this chapter, but in sensemaking architecture we take into account much more aspects such as the ethical and human-centric (van Steenbergen et al., 2019, 2020). We see an enterprise as a complex adaptive system, designed, managed, and executed by human actors. Complex humans, and not cogs and wheels like in a mechanical clockwork. A proven plan and defined path do not exist. The path will be created by every step. In this whitepaper this wide view is reflected in the way we approach the level of sensemaking and the work regimes, based on a multidisciplinary way of working by people.

Secondly, a sub-system of an enterprise is identified with several perspectives, a holistic approach recognising the limited ability to analyse a complex adaptive system. Multiple sub-systems potentially overlapping. A domain architecture is often defined a priori. Sometimes it is seen as an architecture for a business domain such as HR or sales. Sometimes it is seen as a geographical related subset of the organisation. Most of all, it is often dangerously reductionistic! We recognize that architectural approaches do not always coincide with business domain boundaries.

Thirdly, when applying TOGAF[7] in a recursive way, as described in their own method, it is still the Architecture Development Method (ADM) that is used when creating both the higher-level architecture and the lower recursions. And it does so in a very procedural, almost mechanistic way. A situational architecture regime can have method fragments that are specifically adapted to the context, the current situation.

Situational Architecture products work together as systems. Interdependent, influencing each other, influencing and influenced by architectures outside of the current scope of interest.

Lastly, the concurrency of the different levels is hard to visualise. Remember: each level instantiates multiple and concurrent activities on next levels. Each instance is temporary.

VII. Conclusion

To make sense of what is happening, sensemaking, is an essential contribution of enterprise architecture. Architectural views, for instance, have been used to enable decision-makers to make sense of new developments in the context of their organisation. They help them envision possible impacts of various choices and see the connection between these choices. Architecture has been doing this for decades. However, current times ask for new ways of doing so. We must up our game.

We can start with realising that our organisations are no longer really their own boss but are part of an ecosystem with many interdependencies between network organisations. This increases a new level of unpredictability and complexity that requires a situational approach to architecture. We can deal with this complexity by thinking in terms of sub-systems, architectural method fragments and working regimes. Sub-system thinking enables us to turn a complex context into a complicated context. And architects know how to deal with complicated contexts. It enables us to choose the right approach for the right situation working down to the right working regime for the right change context. Adding the level of sensemaking to our repertoire keeps us relevant.

Let’s up our game.

[7] https://www.opengroup.org/togaf

VIII. Theoretical background and inspiration

For the curious reader we provide the theoretical backgrounds that we used. These backgrounds are from the fields of psychology, chaos theory, sensemaking, situational awareness, systems theory.

Enterprises, systems, and sub-systems

We use the label **enterprise** as an overall term to identify a company, **organisation**, business or a governmental institution. Social entities of human endeavour, organised complexities, non-deterministic, with a certain purpose (Hoogervorst, 2017, chapter 2).

"Modern science is characterized by its ever-increasing specialization, necessitated by the enormous amount of data, the complexity of techniques and of theoretical structures within every field." Is the first sentence of the chapter about General Systems Theory by Ludwig von Bertalanffy. This timeless introduction is written in 1968 and is the basis for a dominant way of conceptualising our world.

Common definitions based on General Systems Theory are:

- A **system** is a set of interdependent resources of people, information, and/or technology that must interact with each other and their environment in support of a common purpose.
- An **environment** is the context within which a system exists. It includes everything that may affect a system and may be affected by a system at any given time.
- Systems are composed of **sub-systems** and any system is embedded in a larger system. Sub-systems of a system interact in order to attain their own purposes and the purposes of the system in which they are embedded.
- **POSIWID**, A term by Stafford Beer referring to The Purpose Of a System Is What It Does[8]. What binds the components of the system is its common purpose.

Based on these definitions, the terms system and sub-system are interchangeable.

Sensemaking and situational awareness

Our first inspiration is taken from the field of psychology. In 2006, the psychologist Gary Klein[9] describes the concept of sensemaking from several perspectives. From a psychology perspective, sensemaking is a "motivated, continuous effort to understand connections (which can be among people, places, and events) in order to anticipate their trajectories and act effectively." (Klein et al., 2006; Klein et al., 2006). From a naturalistic decision-making perspective[10], Klein elaborates sense-making through several functions such as looking backwards trying to anticipate the future, to anticipate future difficulties, and to notice problems and realise concerns. He also argues that sensemaking is a social activity. Interestingly, Klein relates (fig 12) sensemaking to situational assessment and situational awareness.

		Phase	
		Process	***Outcome***
Objective	***Tactical (short-term)***	situational assessment	situation awareness
	Strategic (long-term)	sensemaking	understanding
	Scientific (longer-term)	analysis	prediction

Figure 12: A table attributed to Klein, found on wikipedia.

Our second inspiration refers to cognition and Situational Awareness. Mica R. Endsley is an industrial design engineer and a former Chief Scientist of the US Air Force[11]. In her paper "Theoretical underpinnings of situational awareness: A critical review" (Endsley, 2000), she shares her theoretical foundations and several models on cognitive processes. According to Endsley (1988), the formal definition of Situational Awareness is "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future". Endsley (2016) describes three separate levels of situational awareness:

- **Situational Awareness level 1: perception of the elements in the environment** — includes two steps. The first is sensing, the receiving of physical stimulation by the sensory receptors (sight, sound, smell, taste, touch). The second is perception, being the interpretation of this sensory data. Without a basic mental model, the person is not able to perceive the signals.
- **Situational Awareness level 2: comprehension of the current situation** — takes the multiple sources of information (interpreted sensory data). The information is sorted, given a priority and a value and then remembered. Finally, it is integrated with the context. A highly developed mental model (domain knowledge) plus an explicit goal is required to reach level 2.
- **Situational Awareness level 3: projection of future status** — takes more than just skills. Without a goal a person is not able to holistically and correctly comprehend the current situation and is not able to project future status, and subsequently decide on any interventions.

Endsley writes *"Situation awareness drives decision making and performance"* (Endsley, 2016), creating a nuance that a good awareness, even a good decision, will drive, but not guarantee, good performance. During execution things can still go wrong.

The third inspiration we use is based on the works of Dave Snowden[12], the Welsh consultant and researcher in the field of complexity science. In 2005 he writes a plea for a new simplicity in decision making, by a "Multi-ontology sense making". In this paper Snowden describes, based on his extensive experience and case studies, a Social Complexity domain that has five distinct categories of complexity. Referring back to Gary Klein's naturalistic decision theory, *"decisions are a first-fit*

[8] https://en.wikipedia.org/wiki/The_purpose_of_a_system_is_what_it_does
[9] https://en.wikipedia.org/wiki/Gary_A._Klein
[10] https://en.wikipedia.org/wiki/Naturalistic_decision-making
[11] https://en.wikipedia.org/wiki/Mica_Endsley
[12] https://en.wikipedia.org/wiki/Dave_Snowden

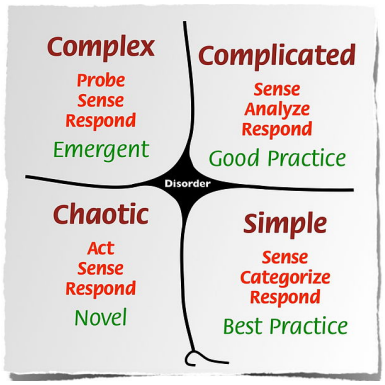

Figure 13: The phenomenological Cynefin framework . How people perceive and make sense of their environment in order to make decisions. (Snowden, 2011 via Wikimedia Commons)

pattern-matching with past experience or extrapolated possible experience", Snowden explains and coins the term "Contextual Complexity". He argues that humans have the ability to operate in all quadrants of the model, concluding that "Multi-ontology sense making then reflects the need to adopt different diagnostic techniques, different intervention devices and different forms of measurement depending on the ontological state. This is contrasted with any single-ontology form of sense making whether based on order, complexity or chaos." (Snowden, 2005).

Recent research exploring a conceptual model about organisational purpose, our fourth inspiration, defines organisational purpose as ***"an organization's reason for being characterized by significance, aspiration, direction, unification, and motivation."*** (van Ingen et al., 2021). They elaborate their definition with:

- Significance – the degree to which the organization has a substantial positive contribution to or impact on the lives or work of people, whether within the organization or in the external environment outside the organization, such as local or global society.
- Aspiration – the hope or ambition of achieving the fulfillment of human needs in the future (i.e., significance), strongly desired yet difficult or maybe impossible to achieve, that one must continually strive for.
- Direction – the path or course to fulfilling the significant and aspirational aspects of purpose, thereby guiding decision-making, promoting goal orientation, and providing order and coherence of actions.
- Unification – the connecting or binding of people to the organization and its purpose, through shared understanding of the significant, aspirational, and directional aspects of purpose, thereby fostering belongingness, relatedness, and connectedness at the emotional level, and collaboration (inside the organization) and cooperation (outside the organization).
- Motivation – the energization of voluntary activities or behaviors either done for their inherent interest (i.e., need fulfillment) or done for the reason of fulfilling the organization's significant, aspirational, directional and unification aspects of purpose (van Ingen et al., 2021).

Finally, more from a practitioner's perspective, the Finnish researcher Jarkko Nurmi[13] describes a dualist approach in his 2021 dissertation called "Enterprise Architecture in Public Sector Ecosystems; A Systems Perspective" (Nurmi, 2021). He argues that we need two different approaches: infrastructure or systems architectures (complicated) can be fully modelled using structural decomposition techniques. Business architectures (complex) are always modelled incompletely and should be modelled functionally.

To summarise the interwoven inspirations:

- To be able to make sense from a situation is a highly social activity, connecting to multiple stakeholders and their concerns (Klein).
- One must be able to receive and perceive many signals (Endsley, Klein). Make use of developed mental models (Endsley), experience (Klein) and understand connections (Klein) to create a situational awareness.
- An advanced level of sensemaking that facilitates decision making, needs interpreted, prioritised, and remembered information, integrated in a context. This requires a common goal and personal mastery of the process (Endsley).
- Multiple forms of complexity require multiple diagnostic techniques and approaches (Snowden, Nurmi). An explicit goal being a precondition for the ability to project a future status (Klein, Endsley) that enables decision making (Klein).

We use these inspirations and theories from psychology, industrial design, and the social complexity domain, for further understanding and elaborating sensemaking architecture.
In this paper we extended our vision with a way of working that honours the challenges of a complex and changing environment: situational architecting.

[13] https://www.researchgate.net/profile/Jarkko-Nurmi

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