Survival of the fitting An essay on Sensemaking Architecture

Marlies van Steenbergen Hans Nouwens Ton Eusterbrock Edzo Botjes







Survival of the Fitting An essay on Sensemaking Architecture

Preface

The essay you are about to read is one of the most significant publications of the year, given the unpredictable and uncertain future we face. As we confront a multitude of complex crises, some refer to this period as 'the decade of disaster'. However, I prefer the more optimistic term 'The Roaring 2020s', where accelerated change is the only constant and unprecedented opportunities abound for those who can ride the waves of change.

In times when nothing stays the same, having a clear vision and a steadfast course is essential to govern technological experiments and guide organizations in the right direction. To meet these challenges, nothing less than a twin-transformation is required, where organizations must transform towards a digital economy and a sustainable economy simultaneously. At the core of this twin-transformation is the process of sensemaking, which results in a clear narrative about the value an organization provides in the emerging digital and sustainable society. Making sense of the fundamental changes taking place in the world, providing clarity of the role your organization plays, and helping your people understand how they can make a difference are all urgently needed.

This essay offers much-needed help. First, it increases our understanding of what matters now and answers the "Why" question. Second, it provides practical advice about the "What" and the "How," building on the foundation of DYA, the approach to creating and continuously developing Dynamic Architectures.

Therefore, if you're an architect who desires to increase the resilience, adaptivity, and creativity of your people and your organization, I highly recommend reading this essay carefully and taking the advice of Marlies, Hans, and Ton to heart. Believe me when I say that they have been right before!

Michiel Boreel Global Chief Technology Officer of Sogeti

Contents

÷	Introduction	6
2	Sensemaking Architecture	11
3	Flow-oriented	19
4	Human-centered	31
5	Value-sensitive	43
6	Situational	51
7	Conclusion	59

1 Introduction



1. Introduction

One of the hallmarks of DYA has always been our power to incorporate new insights and experiences from practice and science. We have been doing that for over 20 years. We shared our insights in books, professional journals and lately a series of white papers.

After all these years the core of DYA still stands. The DYA model depicting architecture services as a process that supports and guides, and is fed by the processes of strategic dialogue and development, is still valid. Granted, the distinction between working under architecture and working without architecture is not as sharp as depicted in the model, but the underlying thought that full compliance with the architecture is not always possible, or even desirable, still stands.

DYA always considered not only the architectural deliverables, but also the architectural processes and the persons involved in these processes. Depending on the purpose of the architectural practice, we argued, organizations must identify and develop the necessary products, processes and persons. This simple model can also be recognized in this essay. We will be talking about how the goals for the architecture practice are changing. We will be talking about new deliverables that are needed, as well as new requirements on existing deliverables. We will be talking about persons, however, shifting our attention somewhat from the architect to the persons impacted by the architecture. We will talk about process, but again extending our discussion to the processes enabled by the architecture. And finally, we will talk about an agenda for the professional field to bring the architecture practice to a much-needed next level.

In this essay we will repeatedly refer to the Sensemaking Architecture whitepaper series. In this series the following whitepapers appeared:

- 1. Architecture in this new world we live in
- 2. Value sensitive architecture
- 3. Design for Chaos
- 4. Situational Architecturing

Each of these papers discusses a topic that is relevant to the concept of Sensemaking Architecture. We will not repeat the contents of these whitepapers in this essay. Instead, we will refer to them at suitable points in the text.

The increasing impact of digitalization on individuals as well as society at large, the increasing availability of technology to everyone, the increasing and continuously shifting interdependencies between organizations and individuals within existing and new ecosystems, all these factors together need to be addressed by organizations. Because they impact the way we do business. But they cannot be addressed if we keep doing the same things. with the same aims, and with the same underlying assumptions. If we keep doing what we always did, nothing will change. And things must change, also in the way we approach enterprise architecture. This essay is about integrating the why of this change, with the what and how. It represents a new phase in DYA, called Sensemaking Architecture.

We translate the sensemaking in Sensemaking Architecture in three ways:

 Sensemaking as in making sense of the world, noticing what is happening outside and inside the organization, understanding and interpreting events and trends, and recognizing if and how these events and trends are relevant for the organization.

- Sensemaking as in providing sense to the organization in terms of purpose and place in the world.
- Sensemaking as in helping the organization to take sensible actions, actions that lead to realization of the organization strategy.

The aim of this essay is to look towards the future: what directions do we see in which the field should develop, or maybe even reinvent itself. It should be read as a call to action, rather than a recipe of what to do. We will touch upon several issues, give some directions on how to address these issues and put some themes on the agenda to be elaborated by the architecture community. Most of all, this essay aims to provide architects with various perspectives on the world they work in. If need be, challenging some of our classic assumptions along the way.

2 Sensemaking Architecture



2. Sensemaking Architecture

In 2001 the first DYA book appeared in Dutch, the English translation appeared in 2005. This was the start of a process of reflecting on how to make enterprise architecture effective in everchanging circumstances. And of translating these reflections in hands-on practices and tools for practitioners. A process that has been continuing up until the present day. And because all developments in DYA are born from changing needs, this process will probably keep continuing for as long as the world keeps changing. Since this first book, several more books on architecture followed, as well as numerous white papers and publications in professional journals.

2.1 Reinventing the field

Looking back upon these twenty odd years. we dare say that again and again we managed to pinpoint the next steps that were needed to keep enterprise architecture relevant. We introduced and operationalized several topics that nowadays are so evident that we tend to forget that once they were not. Our first book carried the message that it was not sufficient for architects to focus on architectural deliverables such as architecture principles or (at that time mainly) architectural models, but that more attention was needed for the architectural processes. Besides, being agile 'avant la lettre', in that first book we already introduced the basic DYA principle

of 'just enough, just in time' architecture. We also argued that a one-size-fits-all approach was not feasible. In our second book, published in 2004, we translated our insights into our DYA Maturity Matrix, an instrument to assess and improve the architectural practice. In that book we also argued that the architect is just one of the players in the field of working under architecture, and that other roles such as business management and development also need to enter the field. Other topics that we addressed and introduced over the years, were: how to move from 'providing insight' to 'realizing impact': the relation between the effectiveness of architectural practices and organizational culture: the

changes in soft skills needed; the move from organization perspective to ecosystem perspective; the need for multi-dynamic architecture; the need to distinguish between principle-based and rule-based architecture; and the important relation between architecture and ethics.

2.2 The four pillars of Sensemaking Architecture

And again, there is a need for recalibrating the profession of enterprise architecture. In our whitepaper 'Architecture in this new world we live in', we introduce the concept of Sensemaking Architecture. Sensemaking Architecture is the next step in DYA. It is necessitated by the technological and societal changes we currently experience. To effectively deal with these changes, we need to drastically adjust our way of working. We need other concepts, other perspectives and other topics than what we are accustomed to. In the whitepaper we argue that this new Sensemaking Architecture approach rests on four pillars: we need it to be humancentered, flow-oriented, value-sensitive, and situational. Pillars resting on a strong scientific foundation.



- Human-centered, because in an increasingly complex world, the attitude, interactions and capabilities of people are essential.
- Flow-oriented, because architecture is not about static descriptions but about the dynamics of doing business.
- Value-sensitive, because the values of all stakeholders, direct and indirect, including future society, must be respected.
- Situational, because to create flexibility, architecture must be able to differentiate between different contexts and subsystems and adjust both content and way of working to the needs of the situation.

The operationalization of these four themes takes time. After all, we are reinventing the field. We need to make the four themes actionable. Making these themes actionable should dominate the innovation agenda of the enterprise architecture professional field for the coming time. To support such an agenda and the further development of these themes, we will discuss each of the four pillars in turn in separate chapters.

The themes of human-centered, floworiented, value-sensitive and situational architecture are big themes. There are no easy answers. We are in the middle of what might turn out to be a paradigm shift. One thing is clear though: we will not find any answers unless we take an interdisciplinary approach. In this essay we hope to plant some seeds from which such an interdisciplinary approach can grow. We do this by bringing a diversity of perspectives and concepts into the discussion, from disciplines such as philosophy, organization science, psychology, social science, complexity theory, systems theory and information technology, as well as ideas from modern critical thinkers. Some of these ideas were incorporated in our DYA Sensemaking Architecture whitepaper series. Others have come up in literature from other disciplines and in discussions with inspiring enterprise architects. We are not under the illusion that the collection of ideas in this essay is complete, but we do hope it provides inspiration and direction for others to add to and further build upon.

2.3 Applying different lenses

One way in which to look at an organization from various perspectives, is to explicitly use multiple metaphors. In his 2006 book Images of Organization, Gareth Morgan describes various metaphors people apply to organizations such as organizations as machines, as organisms, as psychic prisons. Metaphors

make us look at organizations with a specific frame in mind. This can make you see things you wouldn't otherwise notice. Each metaphor looks at an organization with a different lens. However, the real value of metaphors is not in the extent to which they fit a particular organization. The real value of metaphors comes to light in the phenomena that do not fit the metaphor. Because from the friction between metaphor and reality, new insights may emerge. Using multiple metaphors provides richness in visions. Applying different metaphors, may also prevent you from (unconsciously) getting stuck in one specific perspective. An organization may in parts be like a machine, it is not a machine. Morgan: "...the ultimate challenge is not to be seduced by the power or attractiveness of a single metaphor – old or new – so much as to develop an ability to integrate the contributions of different points of view." (Morgan, 2006, p.xii).

Sometimes a metaphor is translated into concepts that become part of professional management literature. When this happens, the concepts become a truth in themselves and the metaphorical background disappears from view. An example are concepts such as structure, inputs, outputs, organizational design and efficiency. These concepts have become such a part of organizational thinking that no one seems to challenge them anymore. But they are all concepts that arise from the machine metaphor. But the machine metaphor is not the only correct lens to apply to organizations. And other metaphors lead to other concepts. So, it is short-sighted to take the machine concepts as the one and only truth. Elevating concepts such as efficiency to the status of universal truth is dangerous. The lesson to be learned from this is that we must beware not to fixate on one metaphor and make that metaphor the (sometimes implicit) leading principle. As this example shows, metaphors are not merely lenses with which we view organizations, they also play an active role in shaping reality.

The strength of metaphorical thinking lies not in choosing the best metaphor, but in switching between metaphors to generate deeper understanding of what is going on in organizations. The list of metaphors is not meant to be exhaustive. Any metaphor that leads to better understanding is valuable. In his 2006 updated edition of the book *Images of Organization* Gareth Morgan describes eight metaphors as different perspectives on organizations. These eight metaphors lead to different theories of organization and management. Each has its own strengths and limitations.

The eight metaphors described in the book, are:

- Organizations as machines
 Views an organization as a
 collection of cogs and wheels,
 a mechanical device, focusing
 on efficiency, reliability, and
 repeatable output. Recognizable
 from bureaucracy, much used in
 classical scientific management.
- Organizations as organisms
 Views an organization as a living
 organism that adapts to its
 environment in order to survive.
 Using ecosystem thinking, open
 systems, and organizational life
 cycles.
- Organizations as brains
 Views an organization as a
 collective intelligence, where each
 part contributes to the overall
 decision-making process. Focusing
 on information processing,
 organizational learning, and self organization. For example, using

the Viable Systems Model, managing variety.

- Organizations as cultures
 Views an organization as a cultural entity, where values, beliefs, and norms shape the way it functions.
 Organizational culture as influenced by the societal, national and cultural context. Creating a social reality, based on shared values and norms.
- Organizations as political systems
 Views an organization as a political
 system, where power and interests
 shape decision-making. Focusing
 on interests, conflicts, and control.
 Parallels with governance patterns
 such as democracy and autocracy.
- Organizations as psychic prisons
 Views an organization as a
 psychological system, where
 unconscious dynamics shape
 behavior and decision-making.
 The risk of group thinking, being
 trapped in favored ways of
 thinking. Discipline, obedience,
 and duty based on (misguided by
 experiences) personality. Typical
 a preoccupation on productivity.
 Seen in family businesses.
- Organizations as flux and transformation

Views an organization as a dynamic entity that is constantly changing

and adapting. Focussing on logics of change, complexity, and causal feedback loops. Acknowledging emergence and chaos theory, where small interventions may result in large effects.

• Organizations as instruments of domination

Views an organization as an instrument to impose the will of a group of individuals on others. The bureaucratic processes as social domination or exploitation, institutionalized class divisions in the workplace. Employees as human resources, human capital, labor as a commodity. Multinationals as world powers.

We will return to metaphors at various points in this essay.

2.4 Survival of the fitting

The title of this essay is 'Survival of the fitting'. This is not a spelling mistake. According to Gareth Morgan, survival of the fitting argues that evolution is not about single organisms (survival of the fittest), but about organisms and their environment (Morgan, 2006). It refers to viewing evolution in terms of patterns evolving, instead of the separate elements within the pattern. When we apply this metaphor to organizations, we may ask whether organizations can survive in the long run if they place themselves at the centre, stick to a strong identity and draw fixed boundaries around themselves. Would they not have a better chance of surviving if they work with their environment, and focus on connection instead of identity? Egocentrism versus systemic wisdom. Survival of the fitting is about the effectiveness of collaboration and emerging patterns in the socio-political-technological-organizational landscape (Morgan, 2016).

This metaphor of survival of the fitting instead of survival of the fittest aligns very much with the four pillars of Sensemaking Architecture. It broadens our perspective and helps us to step outside our own organizational bubble. Organization and environment are elements of the same interconnected pattern. The danger of egocentrism, of drawing basically arbitrary boundaries around the organization, is that organizations may willingly destroy the 'environment' that they are part of and depend on. An example of survival of the fittest versus survival of the fitting is the debate about the future of agriculture in the Netherlands. The emergence of megafarms is an exponent of survival of the fittest: farms have had to become increasingly large to survive low prices. However, an unintended consequence is a decrease in biodiversity. Small-scale biological farmers, on the other hand, chose a different approach. They try to work with nature, cannot compete with low prices, but instead compete on quality.

In the remainder of this essay, we will be looking for how to achieve survival of the fitting.

Margherita Pagani (2013) provides a classification into three organization designs that illustrate various types of organization evolution.

The first one, the tightly vertically integrated model, is the classic value chain model. It is based on centralization. The driving force is to achieve control over the entire chain. In times of unpredictability and more power with the customer, this model is destined for disaster. The second model that Pagani describes is the loosely coupled coalition model. This model is not about a centrally controlled singular value chain, but about the emergence of a value network with various kinds of partnerships between the different parties in the network. In practice, there are power differences between the parties, but even the more powerful parties are still dependent on others.

The final model discussed by Pagani is the multisided platform. A multisided platform company brings together two or more distinct groups of participants (the sides) that need each other in some way. To facilitate this, the company builds an infrastructure (the platform) that creates value for the participants by reducing distribution, transaction, and search costs of interaction. The business model of the multisided platform company is based on earning money from the facilitation of the participants and/ or the collection and selling of data generated by using the platform. Interestingly, the multisided platform has turned out to be a return to centralizing power. Not power over what value is created and offered. but power over who gets access to

who in the creation and consumption of value.

We might conclude that the tightly vertically integrated model and the multisided platform company are both examples of survival of the fittest, while the loosely coupled coalition model is closer to survival of the fitting.

The focus of enterprise architecture is, as the name suggests, the enterprise or organization. By enterprise or organization, we mean a purposefully designed system with some form of overall governance. A system is defined as a set of interdependent resources of people, information. and/or technoloav that must interact with each other and their environment in support of a common purpose. The common purpose is what binds the components of the system. Enterprise architecture provides guidance on how to "organize" the elements of the system (organization), given the system's purpose. The elements that the definition speaks of, are people, information and technology, which interact. So, the subject of analysis of architecture is the organization as a system. But enterprise architects cannot restrict their attention to the organization. As the defini-

tion of a system shows, enterprise

architecture must also take the environment into account. The definition shows that a system does not function in splendid isolation but is part of an ecosystem.

When we discuss the four pillars of Sensemaking Architecture, we will be moving among three perspectives: the ecosystem, the organization, and the individual. On occasion, we may also take society at large into account. So, starting from the organization we will move up and down to the ecosystem and the individual. In the elaboration of the four Sensemaking Architecture pillars we will see that the three perspectives are strongly interrelated and cannot be separated from each other.



3. Flow-oriented

Sensemaking Architecture is flow-oriented because it is not about static descriptions but about the dynamics of doing business.

For quite some time now, it is a common and obvious understanding that most organizations cannot afford to ignore what is happening in the outside world. Organizations can only flourish if they realize that they are an actor in an ecosystem that consists of other organizations and individuals. Except for a very few, very powerful players, the old idea that the organization decides what products and services to offer its customers is no longer valid. For most of us, interaction with the environment, shaping and being shaped by our ecosystem is reality.

In public life, governments can to a certain extent dominate the value chain of public services. However, in this case too, if governments do not invest in collaboration with other parties and listen to other parties, this may lead to long waiting lists, services not being rendered properly and great dissatisfaction from the public. We have seen this happening in care, in education, and in transportation. However, if we look at any architectural deliverables being produced today, we only see static descriptions of the organization. Granted, we may see different versions projected on a timeline, but nevertheless static descriptions. And if you take a close look at any of such architectural models, you cannot but conclude that the interesting stuff happens in the 'empty space' of the model, in that which is not depicted.

An architecture that is flow-oriented supports an organization in making sense of the external, the internal and the interactional dynamics. It helps answering questions such as: what do we need to be able to respond adequately and timely to what's happening in the world? What type of language will help us generate the insights we need? What are the key competences that will make us flourish in an unpredictable, dynamic world? What organization principles will help us, or hinder us? A flow-oriented architecture is geared to dynamics. Firstly, it has means to visualize dynamics. When we visualize dynamics, we may be better equipped to adequately handle various types of dynamics. Secondly, it recognizes that within the organization different dynamics exist. Thirdly, a flow-oriented architecture also knows that flow cannot always be designed. And fourthly, it recognizes that flow also has to do with autonomy: to what extent are individuals, both employees and customers, enabled to determine the flow of what they are doing, or to deviate from the pre-designed flow?

3.1 Visualization of dynamics

For the past twenty years and more, architects have been drawing models. Models about various aspects of the organization, such as business capabilities, processes, data, IT systems, or infrastructure. And models of various moments in time, such as the current situation, the situation in two years, or the long-term situation. But all these models are static models. As is the default modelling language many of us use, ArchiMate. At best we make static pictures in time that show connections between parts. But these models do not show the dynamics of an organization in its environment. They do not show dynamic patterns. They do not show feedback loops.

In systems theory, the feedback loops are an important concept. They stand for the fact that events can strengthen or weaken other events, which in turn can strengthen or weaken the original events, in mutual causality. Feedback loops can be distinguished into positive and negative feedback loops. In cases of positive feedback loops, a change in one direction leads to more increases in the same direction. This continuously enlarges an effect, where more leads to more and less leads to less. In cases of negative feedback loops an increase in one direction leads to a change in the opposite direction. This often oscillates and gradually dampens an effect. Whereas like in a thermostat. a negative feedback loop moves towards a target state, a positive feedback loop leads to change. In case of desirable change, we are dealing with a virtuous circle. In the case of undesirable change, we are dealing with a vicious circle.

We need to visualize feedback loops to see patterns rather than simplified linear causal relations. This allows us to address patterns of multiple effects and multiple relations instead of limiting ourselves to overly simplistic root causes. Feedback loops can be visualized by causal loop diagrams. Causal loop diagrams present an entirely different view of the organization than the common architectural models. They stimulate other types of intervention. They should become an essential part of the standard professional backpack of architects.

In figure 1, there are two feedback loops. The left is a positive feedback loop. Together right a negative feedback loop. Together they work as a balancing system. More rabbits leads to an increasing birth rate, resulting in more animals. But more animals leads to an increased rabbit death rate (for instance due to diseases, or less available food), which leads to less animals and so on. Together a (temporary) equilibrium emerges with just the amount of animals in the population that the resources can support. How can we model a population of foxes living together with the rabbits? And how about a rabbit food supply? Are we able to quantify the relations? Things will get complicated very soon, even with this simplified example.

In our whitepaper "Architecture in this new world we live in" we use a causal loop diagram to illustrate the need for Sensemaking Architecture. Figure 2 shows how external factors such as the increasing importance of ecosystems, the seemingly unlimited possibilities of technology, and societal moral awareness, both positively and negatively influence an organizations capability to deliver value, be adaptive and act responsibly. It shows us that



Figure 1, a qualitive causal loop diagram



Figure 2, a qualitative causal loop diagram communicating our vision on Sensemaking Architecture.

organizations need a skilled workforce and leadership and that acting ethically contributes to building such a workforce. It also shows that Sensemaking Architecture is directed to making the business adaptive in order to remain able to deliver value.

Figure 2 is a very high-level diagram showing what Sensemaking Architecture is all about. But this type of causal loop diagrams can be made at any level and in any detail to gain insight in how events and actions may impact each other. Using such diagrams is a first step towards a more flow-oriented architecture. Causal loop diagrams provide a view of organizations that can be used for sensemaking. It makes us talk about, sometimes hidden, connections. Instead of thinking about problems mechanistically and trying to manipulate linear "causes" and "effects", causal loop diagrams make us focus on recognizing and changing patterns. Morgan too uses causal loops. He provides the following questions managers should ask themselves in order to manage complexity (Morgan, 2006, p.272):

- What are the significant loops defining a system?
- Are there principal subsystems or nests of loops that hang together? What are the key connections? What are the key patterns?
- Can we use this understanding to go beyond surface appearance and superficial problems to identify the generative forces that are producing those problems?
- Given our understanding of system dynamics, where is the best place to intervene?
- Can we find manageable initiatives that will change the generative pattern, for example, by adding or removing positive or negative feedback loops?
- How can we learn to "nudge" key aspects of such systems to create "new contexts", through our equivalent of the butterfly effect?

These are the types of questions enterprise architects must assist management in. Causal loop diagrams can help to do so.

Visualizations such as causal loop diagrams show how events and actions are linked

and how they may strengthen or weaken each other. However, the speed at which this happens is not shown. The effect of polluting the soil with poison takes far longer than the effect of an influencer making derogatory remarks about a new product. Parts of the loop can be much more dominant, possibly alternating in time. We should take the speed of change and dominance into account when thinking about suitable interventions. We use causal loop diagrams as qualitative, not as quantitative diagrams, to communicate relations and influences.

3.2 Different dynamics: the efficiency trap

Flow can be regarded in various ways. If we are looking for efficiency, we aim for an uninterrupted flow from input to output, with as little delay as possible. We do not want disturbances and we want the process to be executed as smoothly and with as little effort as possible. This can be achieved with a large degree of automation. And when the flow becomes too complicated to automate in a classic manner, we may try to have an AI algorithm do the necessary complicated, or even complex, decision making. However, efficiency is not the one and only value to strive for. In some cases, for instance when we are dealing with people, we ought to put caution, empathy and human responsibility before efficiency. And this is where digitalization may go wrong. May go wrong, not necessarily goes wrong. But the risk that something may go wrong is in some cases not acceptable. And in these cases, flow should not be regarded from a merely efficient perspective, fed by a machine metaphor.

When we regard an organization as a machine or factory, it makes sense to speak in terms of structure, process models and efficiency. These are concepts that are commonplace in organizations. However, we may ask ourselves whether regarding and designing an organization as a factory is suitable in situations where fast adaptation to changing circumstances is important. Factories are not made for such situations, and we might do well to look for other metaphors for inspiration. For instance, what Morgan calls the flux and transformation metaphor. It may be the case that for organizations that want to flourish in dynamic and unpredictable circumstances, efficiency is not the ultimate goal. We call this risk of automatically putting efficiency on top of the list, the efficiency trap.

Another metaphor that comes to mind when thinking about flow, is of course the flow of water. The Greek philosopher Heraclitus is supposed to have written panta rhei (πάντα ῥεῖ), everything flows. In Roman culture, the general principle omnia mutantur (everything changes), is commonly used. The Buddhist Anicca and the Hindu Anitya say "Nothing stays, everything constantly changes". All refer to the same metaphor and philosophy. You can never step into the same river twice. Every time the river is different. and so are you. Be humble about it¹. Applied to the context of enterprise architecture, the metaphor suggests that everything in the organization flows. There are people flowing in and out with different ideas and experiences, projects are constantly changing the used tools, information constantly flows through the organization, even simple resources such as money flows. As an architect you should be humble and not try to stop or change this flow too much. It is not about you. An organization is not an architect-centric (think TOGAF crop circles) universe. Just like in a river, you are part of the flow, we are standing in the river too. Create a distant point to which the water naturally wants to flow. Add your pebbles in your flowing river to steer it gently.

^{1.} https://en.wikipedia.org/wiki/Heraclitus#Panta_rhei; https://www.no-regime.com/ru-nl/wiki/Anicca; https://en.wikipedia.org/wiki/Three_marks_of_existence

The DYA way of working is comparable to subtly changing the flow. Identifying where the organization wants to flow to, helping the organization by recognizing their own purpose and goals. We should try to find our place in the flow where we as architects can make an impact with small interventions such as supporting decision making, creating guiding principles and applying these in the context of projects or changes.

3.3 Emergence or design?

Chaos theory teaches us that order emerges, rather than that it can be imposed upon an organization top-down from a predefined grand design. This implies that it is more fruitful to try and generate a context where appropriate order can emerge, than to try and impose order. Chaotic systems tend to evolve towards "attractor states". Change is about breaking the power of established attractors by creating conditions in which new contexts can emerge that give rise to new attractors. New contexts can be created by generating new understandings of a situation, or by engaging in new actions. This can be done by small, incremental changes. In complex systems, as opposed to linear systems, small incremental changes can produce large quantum effects.

How can organizations flourish in dynamic ecosystems that keep disrupting their order and structure? In our whitepaper "Design for chaos" we discuss various types of resilience of organizations and the characteristics that go with these types. Resilient organizations are able to recuperate from unexpected disruptions. The whitepaper also discusses what can be done to become an antifragile organization. An antifragile organization is an organization that emerges from an unexpected disruption better than it was before.

Figure 3 shows four types of resilient behavior. Engineering and Systems resilience are achieved by reducing the impact of variety from outside. Complex Adaptive Systems and Anti-fragile systems resilience are achieved by increasing the ability of the organization to absorb more variety from outside by increasing the variety within the organization itself. These are fundamentally different approaches, asking for different techniques.



Fig. 3. The EAAL Framework (adapted from Botjes et al., 2021)

In the past, architects were focused on reducing variety by formulating architectures based on rules, modularity, loose coupling and enforcing uniformity and standards. In situations of fast and unpredictable change we need to focus on increasing variety to be able to deal with the dynamics of reality. This asks for other means, such as introducing diversity, room for experimentation and self-organization. The challenge for today's architects is to be able to work in both contexts and to use different approaches in these contexts. We will return to this theme when discussing the situational pillar.

Humanity has always tried to impose order on life, but whatever we try, we always run into limitations. As Frank Meester illustrates in his book on inconsequentialism, whether we try to order our desk or devise a calendar. in the end we are always stuck with a "rest" category: the one thing on your desk that you stuff in the back of a drawer because there is no place for it, or the leap seconds we need to keep our calendar in tune with reality (Meester, 2021). This does not mean that there is no sense in imposing order on what we are doing. After all, we can live very well with our calendar, even though we need leap seconds and leap years to make it work. It does mean, however, that we must consider that our order has its limitations and that we should not try to fit in what doesn't fit

3.4 Own your flow

If people are not allowed to determine or change the flow of their work, organizations are not capable of acting on unexpected events. Whether these events represent threats or opportunities, or just make sense given a specific situation. Changing the flow can be hard, it carries a huge responsibility. If you change the flow, and things go wrong, you are to blame. If you follow the flow, even if you have doubts about the correctness of its direction, you cannot formally be blamed, can you? If people do not feel they can act upon their own knowledge and intuition, even though formally they are allowed to do so, they will not. We will return to this theme in the chapter on human-centered architecture.

One of the dangers of the efficiency trap, as mentioned above, is that we try to automate matters that should not be automated. This tendency is growing with the rise of AI. In discussions about decision-making within government organizations, a distinction is made between the so-called vertical perspective and the horizontal perspective (van Driel & van Steenbergen, 2021). In the vertical perspective on decision-making, citizens are subject to government, authorities, employers, or other forms of hierarchical powers. These are expressed in regulations, rules, and procedures. But to ensure correct decision-making, underlying processes are also needed to develop new information and knowledge and to gain experience. These processes play in the background and are less structured, collaborative processes in which various types of stakeholders are involved. This is the horizontal perspective. This horizontal

perspective is a necessary, but less visible, part of government decision-making (Council for Public Administration, 2011). To achieve a well-balanced, fair, and considered decision-making process it is important that the vertical and horizontal way of decision-making are iteratively applied. Within the vertical perspective there is, once the decision-rules have been established, no room for discussion or negotiation. That makes this type of decision-making suitable for automation. The flow is fixed and not alterable. But, as we have seen above, sometimes discussion and negotiation are necessary to arrive at the right decision. This is the case in situations where the right decision cannot be expressed in predefined rules, but at the best in principles that are open to interpretation. It is very important to distinguish when to use the vertical perspective and when the horizontal, and to know how to combine the two in an integrated flow. Especially, as the instinctive tendency may be to automate the entire process, eliminating opportunities for horizontal reflection. This goes beyond ensuring that impactful AI results are checked by a human. This is about deliberately designing interruptions into the automated decision process.

An often-heard phrase in the context of AI, is the so-called 'human in the loop', meaning that final decisionmaking must always be done by a human. However, 'human in the loop' seems to carry the association of an automated decision process, executed by an AI algorithm, in which the human plays a subordinate part. We propose to discard this phrase and start talking about 'AI in the human loop': a decision-making process executed by humans in which AI has a supportive role.

Another form of responsible governance is the technique of Deep Democracy. In this way of decision-making, the oftenopposite view or opinion of a minority is used to improve the quality of the decision. Deep Democracy keeps the rational arguments in sight but does not ignore the undercurrent of the whole community that has to live with the consequences of the decision.

Both the vertical and horizontal way of decision-making, and the Deep Democracy techniques are examples of existing dialectical decision-making strategies, a reasoned argumentation and discourse that uses different and opposite points of view to come to a common truth or understanding. Dialectical decision-making strategies are not part of the standard repertoire of architects. Especially enterprise architects, who are supposed to be experts in supporting strategic decision-making, should be aware of this technique.

Bringing it all together

To achieve a flow-oriented architecture, the following actions should be taken:

- Add causal loop diagrams to the repertoire of architectural models.
- Start taking the concept of complex adaptive systems as theoretical foundation for organization design.
- Incorporate other metaphors than solely the machine metaphor in the architecture process.
- Make use of existing rich dialectical decision-making strategies.



4. Human-centered

Sensemaking Architecture is human-centered because in an increasingly complex world, the attitude, interactions, and capabilities of people are essential.

At some time during the last few years, a discussion emerged about whether Sensemaking Architecture is humancentered or human-centric. We started out calling it human-centered, but after about a year we realized that somewhere along the way, without any conscious decision, the term had changed into human-centric. So, we started a brief discussion about the difference between the two. It soon became clear that it is hard to find a sharp, widely accepted definition of this difference. Often, they seem to be used interchangeably. As we did unwittingly. However, reading between the lines, a distinction of sorts seemed to emerge. Human-centered appears to have a connotation of "reasoning from the human perspective". Human-centric tends more to "putting the human at the centre".

An example is an academic paper about Industry 5.0 with human-centric in its title, that discusses how in Industry 5.0 robots know about humans and use this knowledge to optimally support humans. Interestingly, searching for human-centric produced a lot of papers about technology. The search for human-centered revealed mainly papers dealing with human-centered design, discussing how design can be better done from the human usage perspective. Is this a hard distinction? No. And probably the difference in term has as much to do with discipline tradition as with a conscious choice. But even so, it makes for an interesting issue: is Sensemaking Architecture about reasoning from a human perspective or is it about putting the human in the middle? We decided to return to our original term: humancentered. A human-centered architecture is an architecture that enables humans to flourish.

Reasoning from the human perspective within architecture, can be done from the employee perspective and from the customer perspective. As depicted in the causal loop of Sensemaking Architecture in figure 2, a skilled workforce is essential

for an organization to deliver value. In times of scarcity, it is a challenge to retain employees. Employees must be willing to invest in the organization and to keep investing. They will only do so when sufficiently motivated. But a skilled workforce is no use if customers are not willing to engage with the organization. They will only do so if the services and interaction mode of the organization matches their needs and preferences. Traditionally, enterprise architects have been excluded from decision making about human resource themes. But leaving the role of the individual out of the architectural thinking and deliverables cannot but lead to failure. Because in the end it is the individual. both within the organization and within the ecosystem, alone as well as with others, who acts or allows things to happen. How can we architecture the organization in such a manner as to enable and motivate employees to make the organization flourish in and with the ecosystem?

4.1 The quality of employee motivation

In dynamic times, when boundaries around organizations become increasingly blurred, it is a good idea to muster as much mental power as possible. Organizations need to address complex or even wicked problems. And they cannot do so in isolation any longer. Finding adequate responses to ecosystem problems requires an open mind and a willingness to look at an issue from multiple perspectives. The organization that can tap into a great variety of perspectives has a far bigger chance of being effective. This requires employees from various disciplines that are motivated to share knowledge and work together to solve problems. And to open themselves to other perspectives.

Employees that are autonomously motivated are happier and lead to better performance for the organization. This is a steady outcome of studies from the last four decades or so, based on the Self-Determination Theory (SDT) by Deci and Ryan (Deci et al., 2017). From the field of psychology, SDT is a well-known theory on motivation. It has been developed and elaborated over the last four decades, with many empirical studies applying the theory to various domains, including organizations and the workplace. SDT claims that autonomous motivation leads to psychological wellbeing, organizational trust and commitment and job satisfaction, as well as better organization performance. The theory distinguishes various types of motivation on a continuous autonomy scale, ranging

from fully autonomous to fully controlled.

- Intrinsic motivation is fully autonomous, it is a motivation that stems from feeling intrinsic satisfaction from executing the activities one performs.
- Extrinsic motivation is to a larger or smaller extent controlled from outside.

The least autonomous form of extrinsic motivation is external regulation. This type of motivation is based on punishments or rewards. You perform a task because, if you don't, you might lose your iob. The most autonomous extrinsic motivation is integrated regulation. i.e. motivation generated by the fact that you feel that what the organization requires vou to do is an integral part of who you are, is self-determined, even though it is required by someone else. This kind of motivation is felt when you perform some task because you value what the task stands for. Not because it is interesting in itself, but the task is close to who you are. In between are introjected regulation and identified regulation. Introjected *regulation* means a person has accepted an external regulation but has not really made it their own. You comply with external regulation, for instance, in order to increase your self-esteem, to make you feel worthy. In the case of *identified* regulation, people choose to comply with

the regulation because it is congruent with their personal goals and identities. They perform a task because they understand the importance of the task. The better extrinsic, regulated motivation is internalized, the more autonomous it becomes.

Underlying SDT is the theory that all humans have three basic psychological needs:

- a need for autonomy,
- a need for relatedness and
- a need for competence.

Satisfaction of these basic needs fosters autonomous motivation. When people experience satisfaction of the needs for relatedness and competence with respect to a behavior, they may internalize its value and regulation. But the degree of satisfaction of the need for autonomy is what distinguishes whether identification or integration, rather than just introjection, will occur.

To retain a workforce it is important to cater to your employees' psychological needs. This means providing a climate that supports employees in applying and developing their competences, providing them with tasks that are challenging enough, but not too much, and giving them opportunities to learn. It also means
providing them with a workplace that gives them a feeling of belonging, an organization that they are proud to be part of, a story they can relate to. And most of all, it means building an autonomy-supportive organization that supports employees in their autonomy.

4.1.1 Competence building

Competence development is not only important for employee satisfaction. It is also in the interest of the organization. An organization that wants to be able to adequately deal with unpredictable events, not only in a responsive manner but also in a shaping manner, needs a skilled workforce. In the end, it is down to individuals to make the right choices and perform the actions that lead to beneficial results.

There is a role for architects to not only think about goals, processes, information, data and infrastructure, but to include the impact of all these aspects on employees.

In the original DYA framework, the organization column is one of the columns that represent the topics of architecture. However, in practice organization management often explicitly excludes the organizational structure from the scope of the architects work package. But how can we define an architecture if we do not take the human element into account? Any architecture presupposes certain competences to be present. But an architecture can also stimulate the development of certain competences and contribute to the satisfaction of employees' need to develop themselves. An example is the integration of AI algorithms in the business processes of the organization. As studies show, it is one thing to train a machine-learning algorithm to predict recidivism, fraud, or payment difficulties. But what is a professional supposed to do with the results of the algorithm? And if Al is doing the routine work, how are novice professionals to acquire the necessary basic competences to validate the results, as well as build the knowledge to address the more complex cases? An enterprise architecture that does not take these aspects into account, is not complete and may have unintended, unexpected and unpleasant effects.

Employees have to act in increasingly complex and dynamic environments. To be able to do so, it is important that they do not only acquire the necessary knowledge to do their job, but they also need the necessary skills. The cybernetic law of Requisite Variety states: a controller can only control something to the extent that it has sufficient internal variety to represent it. In organizational terms: the collection of employees that work in an increasingly complex environment, must have sufficient variation and skills to sensibly respond to what is happening around them and to be able to improve what they are doing. They need skills such as dealing with uncertainty, ethical reflection, problem solving and systemic thinking. The organization needs variation in its set-up, such as diversity of culture, experience, level of education, and vision.

4.1.2 Relatedness

Everyone has a certain need to feel connected to others. Like competence development, this is something that architects may not have a direct say in, but that they may stimulate by their architectural choices as well as address in strategic dialogues they participate in. The question to be answered is how the architecture may stimulate connectedness among employees. For instance, by making it easy for employees to accidently encounter each other, either physically or virtually. Or to encourage and facilitate knowledge exchange and provide collaboration spaces.

4.1.3 Autonomy

A frequently heard statement is that

architects and their architectures should limit the design space. The motivation behind this is that architects must ensure consistency between various designs. We might consider supplementing this thought with another statement: architects must concern themselves with how the right set of affordances can manifest itself. Affordance theory, originally from the field of ecological psychology, provides another lens to look at IT- enabled change. Affordances are "perceivable action possibilities of an object or situation" (Van den Hoven, 2017).

The Teleology-Affordance-Ontology trio, depicted in Figure 4, is an essential theoretical concept for architects. It explains the relation and difference between affordance and function.



Figure 4, affordance and function (Nouwens, 2022)

Teleology is the study of the purpose of an object or artefact. The reason something exists, the cause of its existence as experienced by the subject. A subjective perspective, commonly known as "why something is". Ontology is the study of objects or artefacts by its properties. What parts it is made of, independent of a user. The thing exists independently. An objective perspective, commonly known as "what something is". Function is what an artefact, for instance a digital application, should do for a user. It is a designed relation between the artefact to be created and the intended user. Affordance is about the perceived relation between an existing artefact and its user: what opportunities does the artefact offer an individual in a specific context to achieve their goals (Anderson & Robey, 2017).

When starting from a purpose, the relation of the subject with a designed artefact is called a function. When starting from the object, the perceived usability of the object by the subject is called the affordance.

When designing a function for a subject, we as architects should also consider possible affordances, including the unintentional, possibly harmful, sideeffects. A bench is designed to enjoy a lovely day in the park. The intended function is to sit on it. Some people use it as a bed, their perceived affordance is to sleep on it.

In a next iteration of the bench design, some designers moved the arm rests to the middle. This prevents the bench to be used as a bed.

> An urban-design strategy exists, called Hostile architecture, that purposefully uses elements of the built environment to guide or restrict behavior². This is an example of consciously limiting the number of affordances.

We might say that thinking in terms of affordances is human-centered instead of artefact-centered. Whether someone "actualizes" the affordances offered, depends on various factors, such as abilities and preferences of the individual, features of the system, and the relationship of perceived affordances to current goals.

This turning around of the purpose of architecture. from restrictions to affordances, still allows us to achieve consistency. But it makes us think in terms of what we facilitate instead of what we deny. Thinking in functions and the affordances they provide, helps to build an autonomy-supportive architecture. An automated straight through process provides not many affordances concerning changing the process. A user interface enabling an employee to select what task to perform next, affords the employee to make different prioritization decisions, to choose different task divisions and to reorder process steps. An integration architecture that precludes exchange of data with the environment provides less affordances regarding collaboration than an open integration architecture.

If deviating from the flow becomes a necessary part of an employee's work process, employees will need some encouragement. Especially, as most employees have been trained for decades not to deviate from the prescribed processes. Technology, processes, and climate must conspire to offer the employee the right affordances.

4.2 Engaging customers

Increasingly, customers expect from organizations services that are well-tuned to their needs and preferences. For some time, organizations have been trying to cater for the needs of their (potential) customers by offering different channels of communication, such as social media, chatbots, interactive forms, phone, email and many more, as well as any combination between them. In the end however, it is not about the channel. Customers expect a meaningful interaction.

In thinking about how to design interaction with the customer, it helps to think in terms of affordances. Organizations tend to design interaction inside-out (functions): what do we want the customer to do? How can we make the customers find the right product or information as quickly as possible? Organizations should design interaction outside-in (affordances): What do our customers need to achieve their goals? What functions and options does the interaction design offer the customer? How accessible are these options to different types of customers? How transparent is our design in terms of the consequences of customer actions?

In the open-data community there is a strong drive to publish data that is meant to be publicly available. With workshops and hackathons, involving customers and developers, this community tries to find problems for their available solution. Governments create laws to force themselves to publish data about many of their processes, involved politicians, current research, projects and expenses, and various statistics about the government and the country they govern. All with the intention to enforce transparency. With the Teleology-Affordance-Ontology trio in mind, the open-data is a given thing, the ontological "what". The intention, citizens asking for transparency is the teleological "why". But what are the perceived affordances? What functions

(applications, websites, offerings) can we make to connect the why and the what? And do the citizens indeed perceive this as something they can use, their affordance? And are there any unwanted affordances? Can there be something like too much transparency? In principle, everybody sees the potential value for the open-data to be used. However, after many workshops and hackathons, very few real problems for citizens are being solved.

Involving customers in the development of solutions, using the wisdom of the crowd. allows for new ideas. new viewpoints. new application of existing solutions. But. as we cannot cater for every individual customer, we will have to somehow profile categories of users and design for those categories. In this approach lies the potential un-ethical challenge of selecting representative and inclusive categories. These are examples of amplifying the variety (involving customers) and attenuating variety (categorizing). Because variety must be balanced to be able to create a sustained interaction, most interactions have their amplifying or attenuating counterpart. It takes some creativity to find them.

An interesting study was done by Utrecht University of Applied Sciences. Public transport users were asked to use various online prototypes of an advisory robot. The robot gave them advice on the most suitable public transport subscription. based on attributes such as travel pattern and walking distance to the nearest station. The experiments indicated that if customers are stimulated to play what-if scenarios with the data they enter, for instance increasing the maximum walking distance, they have more confidence in the ultimate advice. Also, if the robot not only shows the best option, but also all other possible subscriptions, confidence in the final choice increases. Again, this is a matter of designing the right functions to allow affordances. Finding a balance between advice from the system and control for the customer³.

Even though many organizations explicitly express "customer first" as a basic principle, there is still a whole world to explore for architects to help the organization truly practice this principle. Customer first implies thinking about how to be loyal as organization to the customer, instead of expecting the customer to be loyal to the organization.

Bringing it all together

To achieve a human-centered architecture, the following actions should be taken:

- Include the individual in the architectural thinking and modelling, thinking in terms of affordances rather than limitations, designing functions for an autonomy-supportive organization.
- Support employees in their desire for relatedness and competence development, providing a stimulating space for interdisciplinary encounters and interaction.
- Involve more stakeholders in the architectural design process.
- Learn to amplify variety instead of only trying to attenuate it.
 Attenuating is a common approach in IT, leading to potential noninclusive solutions. Amplifying is less obvious but potentially very powerful.

3. https://www.hu.nl/onderzoek/projecten/publieke-dienstverlening-in-digitale-transitie

5 Value-sensitive



5. Value-sensitive

Sensemaking Architecture is value-sensitive because the values of all stakeholders, direct and indirect, including future society, must be respected.

Over the past few years, the discussion about the impact of digitalization on both individuals and society at large has been growing. Awareness is increasing that the impact can be huge, both in a positive and negative sense. Especially in relation to the application of artificial intelligence (AI). Although the topic of our 2018 DYA seminar was "Ethics and Architecture" and we published our white paper on value sensitive architecture in 2019, it has been primarily in the past year or so, that we see a huge increase in attention to the ethics of digitalization. Ethics workgroups are emerging in the IT community, publications on the ethics of digitalization are numerous and there is an increasing number of conferences on responsible AI and ethics.

The conversation about digital ethics differs in nature, depending on whether it takes place at the level of a specific application or at the level of society. At the level of society, it is important that the right public debate is being held: what kind of society do we want to be, who is going to decide about our lives on what basis, under what circumstances are young people going to grow up and develop their personalities, what priorities will be set. At the level of specific applications, it is important that the parties involved, take responsibility for the impact the use of their application may have on people, the affordances. And that individual values are taken into account during design, and the application does not lead to exclusion of individuals. At both levels digitalization can have huge beneficial effects as well as huge negative effects. That is why ethical questions and dilemmas emerge that should not be ignored. Instead, we have to learn to deal with these ethical questions and dilemmas. At both levels.

5.1 Digitalization and society

The Scientific Council for Government Policy (Dutch: Wetenschappelijke Raad voor het Regeringsbeleid, WRR) is an independent think tank of the Government of the Netherlands. The WRR calls AI a system technology, and not without reason. The increasing penetration of AI in all parts of our lives has huge consequences, both positive and negative. These consequences manifest themselves on individual, organizational, ecosystem and societal level. When deciding on how to employ AI in the organization, all these levels must be considered.

Discussing the impact of digitalization on society at large may easily lead to a sense of helplessness. It may be difficult to imagine how an individual can influence what happens at this level. What use is worrying about what happens with our data, when big tech already knows everything about us. What choice do I have not to use WhatsApp if everyone else is using it? It is no use trying to stand in the way of progress, is it? If I won't do it, someone else will.

But we are more powerful than we may think. In a webinar, the Harvard professor Shoshana Zuboff explained: when during the industrial revolution workers were brutally exploited, they managed to organize themselves into unions and enforce better circumstances. We can do that again.

But, is there a need to organize ourselves? What is the problem, actually? Shoshana Zuboff thinks that there definitely is a problem. She sketches how, over time, our lives are becoming increasingly commoditized, i.e. tradeable (Zuboff, 2015). Various aspects of our lives have become commodities. substances or products that can be traded, bought or sold. Thus, our lives have become commoditized as jobs or work being executed in return for money. This is poignantly illustrated by the term "human resources". Our environment has become commodifized as real estate that can be sold and bought. Our debts, owing someone because they did something for us, have become commoditized as money. And now we are in the process of our reality becoming commoditized as behavior. By collecting huge amounts of data about individuals and analyzing this data in real-time, the big tech companies are increasingly able to predict our behavior. And this is valuable knowledge for marketing purposes as well as political purposes. If we can predict what people will do, we can intervene in many ways and turn that behavior to our advantage. This has impact on individuals, but also on society at large. It impacts the personal identity development of young people, our personal autonomy, our democracy and our public values like solidarity and trust. The crucial difference between what Zuboff calls surveillance capitalism

and classic market capitalism is the realtime nature of the data collection and analysis. This allows real-time personalized intervention, manipulating us without us being aware of it.

Individually, our influence on societal level may be limited, but as an enterprise architecture community we may have more impact. As Henriëtta Joosten argues for in her book (Joosten, 2019). As a discipline we can work on a code of conduct, for instance. We can integrate ethical thinking in our training modules. We can write about it in our professional journals. And, very importantly, we can join forces with other IS disciplines and take a common stand against surveillance capitalism. The EU initiatives on responsible AI are helpful in this respect.

5.2 Digitalization at organization and application level

Awareness is emerging that professionals commissioning, governing, designing, developing, implementing and using digital applications, especially dataanalytics based applications, have a responsibility concerning the impact of these applications. At this level we can apply the value sensitive design approach or any variation thereof, as discussed in our white paper "Value-sensitive architecture". Though application design and development are not part of the enterprise architecture processes, the formulation of guidelines concerning responsible application development can be put on the agenda by enterprise architecture.

Professionals get access to an increasing number of supportive digital tools. The oncologist is supported in the diagnoses by an algorithm that analyzes photos of tumors. The credit assessor is supported by an algorithm that calculates the risk of payment difficulties. These tools can be very useful. There are situations where the algorithm beats the human. For instance, in chess, But also in making sales forecasts, where a machine learning algorithm fast surpassed the forecasting abilities of experienced salespersons (Bohanec et al., 2017). These studies show also that the combination of human and machine beats both. Human – computer chess teams beat both grandmasters and top chess computers, even though the human is not a grandmaster. Salespersons using an algorithm, but adding their own experience to the outcome, produce better forecasts than the algorithm alone. If collaboration is the way to go, we

have to think about what is needed to generate this collaboration. We can only do that by applying systems thinking, and taking algorithm, interaction, context, human abilities, and values into account. For instance, studies show that professionals using a digital tool in the presence of a client, may feel that it impacts negatively on their professional reputation. Also, a digital tool may negatively impact a professional's sense of autonomy.

At organizational level, we see an increasing need for organizations to take an ethical stance. Organizations can no longer pollute the earth without questions being asked. Organizations can no longer ignore occurrences of sexual harassment within their organization. Organizations are asked questions about their sustainability. della, the company changed its mission to "to empower every person and every organization on the planet to achieve more". This change of mission also led to a change in culture to a culture of collaboration and inclusiveness. It also made the company more open to collaborating with other companies instead of fighting them. Another example is Flitsmeister, that provides an app, signaling speed control devices to car drivers. They also collect data from each drive, which they aggregate to insights about traffic flows. At some point in time, they decided not to collect data from the first and last kilometer of the drive. Their motivation was that if they do not collect this data. they cannot be tempted or forced by government to use it for identifying a person's home or frequented places.

An example of an organization that redefined itself in terms of their mission statement is Microsoft. At the time of Steve Ballmer, the key driver of Microsoft was "we will conquer the world". This led to a culture of competition and strive between departments. With the new CEO, Satya NaOrganizations try to make their moral stance tangible by introducing ethical codes and/or forming an ethical committee. Enterprise architects can connect to this by translating the ethical code into architectural principles. Ethical awareness can also be increased by including ethical considerations in the motivation or rationale part of architectural principles. Ethical considerations can change the choices we make in the enterprise architecture. For instance, about the way the architecture handles customer data, the way it employs different communication channels, the extent to which it assumes self-reliance from customers, the purposes data analytics are put to, the extent to which it contributes to the United Nations Sustainable Development Goals.

One might ask the question whether architects have the competence to assess the ethical aspects of their architecture. After all, most architects did not receive an education in ethics. In our opinion. ethical awareness and acting can be developed. We might compare it with the discipline of architecture. Developers are no architects, but they can develop an architectural awareness and act upon that. When they are in doubt, they should ask architects for help. The same goes for ethical awareness. Architects, and indeed all employees, can develop a basic ethical awareness and act upon that. When in doubt, they should ask the ethical committee for help. For instance, as we argue in our AG Connect paper 'I am an architect, not an ethicist', architects may question the desirability of architectural choices by: translating these choices to impact on individual or public values; assessing the choices against ethical

norms; assessing the choices against potential impact in other contexts; and investigating alternatives to the proposed choices (Van Steenbergen et al., 2019). If value tensions are encountered, the architects may ask themselves: what are the potential consequences of different choices, what is the right thing to do in terms of norms and values, and who would be the right person to make a decision?

5.3 Value conceptualization

The term value can be used in various respects, which are important to distinguish to prevent confusion. First. there is the distinction between human value and economic value. Economic value is attached to a product or service and is ultimately expressed in monetary terms. Human value is not attached to a specific artefact, but is related to how we feel about matters in general, to what in our opinion would be a desirable state of the world. Human values are guiding principles that transcend specific situations. The economic value a person attaches to an object will be partly determined by their human values. Human values are held by individuals, but values can also be shared within groups of people. In the latter case we might speak for instance of organizational values or public values. A specific type of

human values are moral values. Moral values are about how we think we should relate ourselves to other people. Examples are solidarity, responsibility, distributive justice, and care. Examples of human values that are not moral values are professionalism, efficiency and reputation.

How can values be translated into architecture? In Spiekermann (2015) various examples are given of conceptualizations of values in terms that can be implemented in systems. For instance, trust or consent. We can use such conceptualizations to develop value architecture principles, value design patterns and value system development guidelines.

Spiekermann (2015) distinguishes five forms of evidence that may build trust:

- Evidence of frame. Examples are quality seals, certification, and reputation systems.
- Evidence of context. Examples are publicly stated guarantees, warranties, explanations-forconfidence and regulator support.
- Evidence of identity. For instance, by having a strong brand.
- Evidence of file. By being favorably

referred to in reputation systems or social media.

 System evidence. For instance, by providing standardized forms of interaction, dependability, or transparency.

Likewise, consent can be subdivided into:

- Informing the data subject. This includes both clearly indicating what data processing will take place and ensuring that the user truly understands this.
- Obtaining consent from data subject. This involves ensuring real voluntariness, avoiding disclosures because of user faults, and enable easy retraction of consent.

In this manner Spiekermann gives numerous examples of value operationalizations that may function as a base for value-sensitive design.

Friedman & Hendry (2019) discuss how various design methods and techniques can be adjusted to take values into account. For instance, prototypes and mock-ups can be used to generate a discussion of the impact of a design on the moral values of various stakeholders by spotlighting certain aspects. In a similar vein, other instruments can be made more value-sensitive. For instance, a Business Model Canvas that is extended with a field for moral impact, persona descriptions that include human values of the persona, or value user stories that address impact on human values.

An example of an existing instrument made more value-sensitive is the Sustainable Business Model Canvas that CASE provides on their website (https://www.case-ka.eu/index. html%3Fp=2174.html). This extension of the original Business Model Canvas has two additional areas: eco-social costs and eco-social benefits. In a similar vein, classical stakeholder analysis can be extended into inclusive stakeholder analysis, with explicit attention to the concerns and values. of less obvious stakeholders, such as individuals who do not use an application. but are nevertheless affected by it. For instance, persons who will or cannot use an application.

Bringing it all together

To achieve a value-sensitive architecture, the following actions should be taken:

- Ask the four impact questions with every new architecture initiative and apply a value-sensitive design approach to architecture.
 - Translating architectural choices to impact on individual or public values,
 - assessing the choices against ethical norms,
 - assessing the choices against potential impact in other contexts, and
 - investigating alternatives to the proposed choices.
- Intensify the professional debate on digital ethics.
- Formulate value-sensitive architecture principles and guidelines.

6 Situational



6. Situational

Sensemaking Architecture is situational because to create flexibility, architecture must be able to differentiate between different contexts and subsystems and adjust both content and way of working to the needs of the situation.

From the very start, DYA has been arguing that there is no one size fits all approach to architecture. For architecture to be effective, it has to align with the decision-making processes and development methods of the organization. However, implicitly we were talking about organizations. We were appealing to architects to adjust their way of working to their organization. This appears to be not enough. It is not only a matter of differentiating between organizations, but also within one single organization, as we argue in our whitepaper "Situational architecturing". This occurs at two levels: at one level we can distinguish subsystems that require different architecture regimes in terms of architectural models and processes (multi-dynamic architecture). At another level we can distinguish change initiatives that require different ways of governing, what we call working regimes (multi-modal governance).

It is not enough to differentiate between different contexts and adjust our way of working accordingly, it is also necessary to make different contexts work together. This entails crossing boundaries.

6.1 Subsystems and architecture regimes

Multi-dynamic architecture originates from the realization that organizations consist of different subsystems that have different characteristics that require different architectural approaches. As we discussed before, a subsystem 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. The common purpose is what binds the elements of the system. To fulfil this purpose now and in the future, systems need to keep updating themselves. The dynamics-of-change characteristic of a system is possibly the most important factor in deciding what

architecture approach (architecture regime) is suitable for a system. Subsystems are not designed; they exist and must be discovered. Discovery of subsystems is done by looking for purposes that bind individuals in the organization. Purposes can be primary, supportive or governing. Examples of purposes are customer journey excellence, on-time delivery, timely and to-the-point information access, employee satisfaction, innovation, etcetera.

The idea of differentiation within organizations is not new. Most proposals (for instance Gartner's bimodal IT), however, have two shortcomings: they are often strongly IT focused and they often distinquish between only two modes. Enterprise architecture is not about IT but about all aspects of the organization and the world is not bipolar. That's why we broadened the idea of differentiation to subsystems consisting of an interdependent collection of people, information and technology (instead of only IT). Next to that, we distinguish more than two different categories of subsystems. This may seem unnecessary complex, but, as we argue in our AG Connect paper 'the world is not bipolar', dividing the world in two, leads to far greater complexity. Because it forces a choice between A and B. If you are not A, you must be B. But if you are a

bit of both, or you are neither, there is a big problem (van Steenbergen et al., 2016).

Frank Meester argues that, however hard we may try, we will never arrive at the 100% consistent story (Meester, 2021). Nevertheless, we can get guite far with our attempts to structuring. Far enough to make it work. As long as we don't mind being stuck with a "rest" category. The same goes for enterprise architecture. We can get far with our principles and models, as long as we do not try to achieve completeness and full consistency. Relating this to the bimodal idea, it is unavoidable that some cases will fit in neither category. With only two categories this is a problem. With a flexible number of categories, the problem is far less. Another consequence of having only two categories, is that the categories might enter into a competition, or that one category might be more favorable than the other. This may lead to all sorts of destructive patterns.

So, how many subsystems do we want to distinguish? This may differ from organization to organization, there is no fixed number, neither a fixed typology. Instead, the identification of different subsystems is motivated by the need to apply different, what we call architecture regimes. An architecture regime consists of an architecture governance approach; an architecture framework; an implementation methodology; types of architectural deliverables; an architecture repository; and a set of best practices. Different architecture regimes make different choices for each of these socalled architecture method fragments, suitable for the subsystem they are applied to.

Subsystems require different architecture regimes: because they have different change rhythms; because of the variability they exhibit: because a different delivery method they employ; because their different types of governance; because of different reliability requirements of systems and processes; because of different amount and classifications of data they work with; or because of different positions in the ecosystem they have. Subsystems with high demands of reliability, change under different circumstances and therefore will probably need another manner of architecture governance, than subsystems with less need for reliability but great variability. The financial subsystem of a retail organization may want to be very stable and predictable, and any unforeseen event may be tackled by a simple exception procedure. In a customer digital services subsystem,

the handling of unforeseen events is not an exception but should be integrated in the core way of working.

If architects take a differentiated reality into account, they can better help business and IT managers to make the right choices.

Municipality example

A municipal organization has various subsystems 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 subsystem aims to make and keep public space attractive, safe, efficient, and livable for citizens and organizations. This subsystem mainly works on a project basis in close collaboration with contractors and other partners.
- The social domain subsystem aims to provide social support to society. This subsystem 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 subsystem* focuses on direct interaction with citizens and organizations through various channels. Customer experience is what matters here.
- The data subsystem aims to ensure that everyone within and outside the municipality has access to the data they need and are entitled to. This subsystem is spread throughout the organization taking care of data quality, data collection, data distribution, data privacy and all other aspects related to safe data use.
- The operational management subsystem is concerned with supporting the internal organization in areas such as financial administration, human resources and IT. This is mostly about reliability and efficiency.

Subsystems of a municipality need not coincide with organizational units or business functions.

Understanding and realizing that an organization consists of subsystems, consciously designed or not, helps

architects perform their task effectively. The following guidelines may support an architect in thinking in terms of subsystems:

- Determine which subsystems exist in your own organization. Where are the essential differences between focus and associated quality requirements within the organization?
- Define per subsystem what content and approach best suits the definition and maintenance of the architectural frameworks for the subsystem.
- Develop architecture frameworks for subsystems in a way that is recognizable to the organization. Involve owners of the relevant business processes. Among other things, this concerns business activity, strategic focus, management, market position, risk of failure, continuity requirements, quality requirements, variability, development method, development speed and innovative character. The result is controlled differentiation instead of a bookcase full of architecture deviations.
- Implement a process for maintaining and continuously evaluating and adapting the architecture frameworks. Important here are the facilities for measuring and adjusting the effect of the architectural frameworks.

In our white paper "Situational Architecturing" we relate subsystems and architecture regimes to change circumstances and working regimes.

Dynamic architecture is a means of amplifving variety, necessary in complex adaptive systems. Recognizing subsystems and developing different architecture regimes accordingly is a complex task. It may even seem a daunting task. However, if we want to be able to deal with the complexity of today's world, we must fully engage in this task. Besides, if an architect recognizes and acknowledges the existence of subsystems and includes them in the formulation of the architectural frameworks and in the application of those frameworks, the world becomes simpler. The organization is then not forced into an ill-fitting straitjacket. Processing the differences between subsystems in the architecture creates room for differentiation in IT, without falling into old-new contradictions that are constantly lurking in bipolar views.

6.2 Crossing boundaries

Because of increasing complexity, solving today's problems requires an interdisciplinary approach. Complex problems cannot be solved within just one discipline. They require a variety of perspectives (metaphors), problem solving skills and knowledge, working together. However, to solve problems together, employees need some sort of common ground to understand each other. Boundaries must be crossed.

The term boundary crossing refers to professionals "entering onto territory in which we are unfamiliar and, to some significant extent therefore unqualified" (Suchman, 1993, p.25). These boundaries are the sociocultural differences that give rise to discontinuities in interaction and action (Akkerman & Bakker, 2011), Boundary crossers are a special breed of people. They build bridges between worlds. However, by crossing boundaries their position may become ambiguous: to which world do they belong? Does a project architect belong to the project or to the architectural team? Boundary crossers require special boundary crossing competences.

Boundary crossing can be supported by boundary objects. Boundary objects are artefacts that are used by more than one practice, with each practice putting its own, different, interpretation on the artefact. An artefact that at the same time also possesses some common ground between these practices. The DYA instrument Project Start Architecture (PSA) is an example of a boundary object. It is drafted by project architects at the start of a project, and includes architectural directions for the project. The PSA is functioning as guideline to the project and at the same time as a governance instrument to the architects.

Boundary crossing is about ongoing, two-sides actions and interactions between contexts (Akkerman & Bakker, 2011). Boundary crossing is not the same as transfer, which often is about onetime and one-sided transitions. for instance a person moving from a learning context (school) to application in practice (work). In contrast to transfer, boundary crossing values differences. It deals with how to overcome discontinuities in actions or interactions that emerge from sociocultural difference, rather than overcoming or avoiding the difference itself. Its aim is not to fuse intersecting worlds or to dissolve boundaries, nor to achieve more homogeneity, but to establish continuity in a situation of sociocultural difference.

Enterprise architects need to be boundary crossers. At the same time, they must help the organization to facilitate boundary crossing, both within the organization and as part of an ecosystem.

Bringing it all together

To achieve a situational architecture, the following actions should be taken:

- Think in subsystems, architecture regimes and working regimes.
- Do not create subsystems in your organization, but recognize existing ones. Explicate them by describing their purposes, mission statements, vision and values.
- Develop the competences to become effective boundary crossers.





The world has become increasingly complex from an organizational point of view. Organizations must move from survival of the fittest to survival of the fitting, which requires more collaboration and less control. It also requires organizations to rethink their responsibility and place in the world: it is not only about making maximum profit. And it requires organizations to embrace diversity and build-in the necessary variety to deal with unpredictable dynamics.

Sensemaking Architecture is about making sense of the world, noticing, understanding and interpreting what is happening outside and inside the organization. It is also about helping the organization to define and realize its purpose and place in the world. And it is about helping the organization take the right actions.

Making sense of the world requires architects to broaden their view from organization to ecosystem as well as to the individual person, to visualize dynamics, to iteratively apply different metaphors, and to cross boundaries between contexts with the aid of boundary objects. Helping the organization realize its purpose and place in the world requires architects to think deeply about the (moral) impact of their architectural choices and advice to management. To explicitly take human and public values into account, and to architect in terms of affordances instead of limitations. Helping the organization take the right actions involves taking a situational approach by distinguishing subsystems and architecture regimes.

The architecture community must step up to the plate and take its responsibility. This requires reinventing the architecture discipline, taking leave of some habits, but mainly acquiring new "habits". To realize such a transformation. the field must acquire new competences (knowledge, skills, attitude). In this essay we sketch a number of developments that in our eyes enable such a transformation. We hope this stimulates architects to look at the world and their own tasks in a new light. We also hope that it stimulates the architecture field to invest in the building of new truths, new instruments, new methods and new competences. To this end, we want to conclude this essay with an agenda for the architecture community.

We see three themes to be further developed.

 First and importantly, we suggest that the reflections and concepts discussed in this essay are further developed into a deep and holistic vision on enterprise architecture. Part of this vision must be the new role of enterprise architecture in achieving survival of the fitting. Further elaboration of systemic wisdom and how it differs from the traditional egocentric view will lead to new fundamental truths about what enterprise architecture stands for. Among others, truths about the moral obligations of enterprise architecture, such as the duty to architect for inclusive affordances discussed in this essay. Or the commitment to diversity, to respecting human values.

- Second, we suggest that this vision is elaborated in a systemic approach to enterprise architecture. This approach will include the application of causal loop models: how and when do we use them, where do they fit in the enterprise architecture process. It will also include how to simultaneously apply different metaphors when designing architecture. It will include how to iterate between the perspectives of individual, organization, ecosystem and society. More new techniques, methods and examples are needed.
- Third, we suggest that the field rethinks the skills that are needed and starts thinking about how to build these skills. What competences do you need to become a boundary crosser, crossing the boundary between enter-

prise architecture and theoretical fields such as ethics, sociology and systems theory, as well as other professional practices inside and outside the organization. We also need the skills to become the facilitator and enabler of complex decision-making with impact on any level in the organization.

We think that Sensemaking Architecture is an exciting direction that will bring enterprise architecture to a new level and help architects bring both value and values to the organization.

DYA principles

Twenty-odd years ago the first DYA book was published. In this book, 10 DYA principles were formulated:

- 1. Architecture is strategic if IT is strategic.
- 2. Architecture must facilitate speed of change.
- 3. Communication between business and IT management is crucial.
- 4. Business objectives govern the development of architecture.
- 5. The level of architecture will be continually raised if architecture is aligned to important business changes.
- 6. Architecture must be developed "just enough, just in time".
- 7. Working under architecture is supported by a theoretical and working model.
- 8. Transparent relations must be defined.
- 9. Several development strategies are distinguished.
- 10. Architectural principles and processes must be an integral part of the organization.

In our view, the core of these principles is still valid, but their nuances have changed. Reformulated they become:

- 1. Architecture has strategic value.
- 2. Architecture enables and serves organization agility and adaptivity with diversity and variety.
- 3. Architecture enables and serves complex decision-making.
- 4. Architect in terms of affordances, taking a purpose-oriented approach.
- 5. Architecture is about moving stones in a river, taking a flow-oriented approach.
- 6. Just enough and just in time architecture.
- 7. Working under architecture is supported by complex adaptive systems theory.
- 8. Architect with an ecosystem perspective, respecting societal and moral values.
- 9. Allow for situational differences in rhythm and needs.
- 10. Survival of the fitting is central.

Research agenda

The sensemaking research agenda for architecture:

- 1. Develop a holistic vision on:
 - survival of the fitting,
 - architecting for affordances,
 - responsible enterprise architecture, incorporating a moral value perspective.
- 2. Elaborate a holistic approach for:
 - iterating between metaphors,
 - applying causal loop models,
 - applying the multiple views of society, ecosystem, organization and individual.
- 3. Build skills to:
 - become a boundary crosser (into fields such as ethics, sociology, systems theory, as well as into professional practices inside and outside the organization),
 - become a facilitator and enabler of multi-level decision-making.

Addressing these three themes are conditional to preparing the architecture field for delivering true value to the organization and beyond.

Acknowledgements

We would like to thank everybody for their inspiring conversations that all contributed to the contents of this essay. Especially: Michal Kleinhans for the inspiring discussions about what it means to be an effective and flourishing architecture practice. And Anton Opperman, who stood at the base of multi-modal governance and working regimes.

Also, we would like to thank the Research Group Digital Ethics from HU University of Applied Sciences, Utrecht, for the discussions we had, and research projects we did on the impact of digital innovations on the personal values of affected parties. And foremost, Sogeti Netherlands for allowing us to develop our architecture profession by creating this essay.

References

Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of educational research*, 81(2), 132-169. https://doi.org/10.3102/0034654311404435

Anderson, C., & Robey, D. (2017). Affordance potency: Explaining the actualization of technology affordances. *Information and Organization*, 27(2), 100–115. https://doi.org/10.1016/j.infoandorg.2017.03.002

Bohanec, M., Borštnar, M. K., & Robnik-Šikonja, M. (2017). Explaining machine learning models in sales predictions. *Expert Systems with Applications*, 71, 416–428. https://doi.org/10.1016/j.eswa.2016.11.010

Botjes, E., van den Berg, M., van Gils, B., & Mulder, H. (2021). Attributes relevant to antifragile organizations. *2021 IEEE 23rd Conference on Business Informatics (CBI)*, *01*, 62–71. https://doi.org/10.1109/CBI52690.2021.00017

Council for Public Administration (ROB) (2011). Horizontaal met verticaal verbinden. De reactie op de reacties van vertrouwen op democratie. Redactie: Rien Fraanje Henriëtte Loogman, Den Haag, september 2011, page 8.

https://www.raadopenbaarbestuur.nl/binaries/raad-openbaar-bestuur/documenten/ publicaties/2010/02/17/vertrouwen-op-democratie/Horizontaal_met_verticaal_ verbinden_Reactiebundel_bij_Vertrouwen_op_democratie_201109.pdf

Deci, E., Olafsen, A., & Ryan, R. (2017). Self-Determination Theory in Work Organizations: The State of a Science. *Annual Review of Organizational Psychology and Organizational Behavior, 4.* https://doi.org/10.1146/annurev-orgpsych-032516-113108

Driel, P. van & van Steenbergen, M. (2021). *Overheid doe een stap terug met AI.* AG Connect, November 2021, 66-68 https://www.agconnect.nl/artikel/overheid-doe-een-stap-terug-met-ai

Friedman, B. and Hendry, D. G. (2019). Value sensitive design: Shaping technology

with moral imagination. MIT Press, Cambridge, Massachusetts, USA. DOI: https://dx.doi.org/10.7551/mitpress/7585.001.0001

Hoven, J. van den (2017). Ethics for the Digital Age: *Where Are the Moral Specs?* (pp. 65–76). https://doi.org/10.1007/978-3-319-55735-9_6

Joosten, H. (2019). De publieke sfeer in de 21e eeuw. *Hannah Arendt als gids voor professionals*. ISVW Uitgevers. https://www.researchgate.net/publication/337632321_ De_publieke_sfeer_in_de_21e_eeuw_Hannah_Arendt_als_gids_voor_professionals

Meester, F. (2021). *Waarom we de wereld niet rond kunnen krijgen: Pleidooi voor inconsequentie*. Utrecht: Ten Have. ISBN: 9789025909147

Morgan, G. (2006). *Images of Organization* (updated edn). Thousand Oaks, CA and London: Sage. ISBN: 9781412939799

Morgan, G. (2016). Commentary: Beyond Morgan's eight metaphors. *Human relations, 69(4)*, 1029-1042. https://doi.org/10.1177/0018726715624497

Nouwens, H. (2022). Researching Sensemaking and Situational Architecting – A First Step Towards a Guide for Sensemaking, Situational Architecturing, Designing, and Changing Enterprises. *Proceedings of the 21st CIAO! Doctoral Consortium, and Enterprise Engineering Working Conference Forum 2021 Co-Located with 11th Enterprise Engineering Working Conference (EEWC 2021)*, http://ceur-ws.org/ Vol-3115/. http://ceur-ws.org/Vol-3115/paper6.pdf

Pagani, M. (2013). Digital business strategy and value creation: Framing the dynamic cycle of control points. *Mis Quarterly*, 617-632. https://doi.org/10.25300/ MISQ/2013/37.2.13

Spiekermann, S. (2015). *Ethical IT innovation: A valuebased system design approach*. CRC Press, Boca Raton, Florida, USA. DOI: https://dx.doi.org/10.1201/b19060

Relevant publications

DYA Books

Wagter, R., van den Berg, M., Luijpers, J., van Steenbergen, M. (2001) DYA: Snelheid en samenhang in business- en ICT-Architectuur. Tutein Nolthenius. ISBN: 9789072194626. http://www.worldcat.org/oclc/67159574

van den Berg, M., van Steenbergen, M. (2004), DYA : stap voor stap naar professionele enterprise-architectuur. TenHagenStam Uitgevers. ISBN: 9789044011210. http://www.worldcat.org/oclc/66640929

van den Berg, M., van Steenbergen, M., Wagter, R., & Luijpers, J. (2005). Dynamic Enterprise Architecture: How to Make It Work. Wiley. http://www.worldcat.org/oclc/834776896

van den Berg, M., & van Steenbergen, M. (2006). Building an enterprise architecture practice. Springer Netherlands. ISBN: 9781402056055. https://doi.org/10.1007/978-1-4020-5606-2

Smits, D. (2006). DYA Governance - Succes met IT Governance. Eenvoud in de praktijk. ICT-Books. ISBN: 9789075414110. https://www.ict-books.com/topics/dya-governance-hardcover-nl-info

van den Berg, M., van Steenbergen, M. and Jumelet, D. (2006). DYA topics: rendement uit enterprise-architectuur. Academic Service. ISBN: 9789012117777. http://www.worldcat.org/oclc/150419408

Deckers, R., Steeghs, R. (2010). DYA software: architectuuraanpak voor bedrijfskritische applicaties. Kleine Uil, SogetiBooks. ISBN: 9789075414318. http://www.worldcat.org/oclc/743012260

Jumelet, D. (2011). DYA infrastructuur, architectuur voor de fundering van de IT. Sogeti. ISBN: 9789012124614 Van Steenbergen, M. (2015). DYA van inzicht naar impact, de architectuur voorbij. Sogeti. ISBN: 9789075414660.

https://www.ict-books.com/topics/dya-van-inzicht-naar-impact-softcover-nl-info

DYA Whitepapers

Steenbergen, M. van, Eusterbrock, T., Nouwens, H., Botjes, E. A., Scholtens, W., & Atsma, L. (2019). Architecture in this new world we live in – a DYA Whitepaper by Sogeti. Sogeti Nederland. https://labs.sogeti.com/wp-content/uploads/2019/12/ Architecture-in-this-new-world-we-live-in-a-DYAwhite-paper-by-Sogeti-version-20191223-v2.pdf

Steenbergen, M. van, Eusterbrock, T., Nouwens, H., Botjes, E. A., Atsma, L., & Draaisma, M. (2020). Value sensitive architecture – a DYA Whitepaper by Sogeti. Sogeti Nederland. https://labs.sogeti.com/wp-content/uploads/2020/09/Value-sensitivearchitecture-20200902-v2.pdf

Botjes, E. A., Eusterbrock, T., Nouwens, H., & Steenbergen, M. van (2021). Design for Chaos – A DYA white paper by Sogeti Nederland. https://labs.sogeti.com/wp-content/uploads/2021/11/Design-for-Chaos-a-DYA-white-paper-by-Sogeti-version-20211008-v1.pdf

Nouwens, H., Steenbergen, M. van, Opperman, A., Botjes, E. A., & Eusterbrock, T. (2022). Situational Architecturing—An integrated governance pattern for sensemaking architecture. Zenodo. https://doi.org/10.5281/zenodo.6424942

Eusterbrock, T., & Steenbergen, M. van (2016). DYA - Principle-based approach in Enterprise Architecture practice; finding the sweet spot. Sogeti Nederland. https://labs.sogeti.com/wp-content/uploads/2022/10/Principle-based-approachin-Enterprise-Architecture-practice-a-DYA-whitepaper.pdf

Publications in professional outlets

Steenbergen, M. van, Eusterbrock, T. & Bouman, J. (2016). De wereld is niet eenvormig of bipolair. AG Connect, May 2016. https://www.agconnect.nl/artikel/de-wereld-is-niet-eenvormig-of-bipolair

Nouwens, H., & Opperman, A. (2017). Whitepaper multimodale governance aanpak met hora. SURF. https://www.surf.nl/whitepaper-multimodale-governance-aanpak-met-hora

Steenbergen, M. van, Helderman, A., & Eusterbrock, T. (2019). Ik ben architect, geen ethicus. AG Connect, February 2019. https://www.agconnect.nl/artikel/ik-ben-architect-geen-ethicus

Mik, T. de, Nouwens, H., & Opperman, A. (2019). whitepaper—Werken onder architectuur in een multi-modal omgeving. SURF. https://www.surf.nl/whitepaper-werken-onder-architectuur-in-een-multimodal-omgeving

Nouwens, H., & Opperman, A. (2021). Sturen op veranderen in dynamische en (on)zekere tijden. AG Connect, August 2021.

https://www.agconnect.nl/artikel/sturen-op-veranderen-dynamische-enonzekere-tijden

Driel, P. van & Steenbergen, M. van (2021). Overheid doe een stap terug met Al. AG Connect, November 2021 https://www.aqconnect.nl/artikel/overheid-doe-een-stap-terug-met-ai

Steenbergen, M. van, Kleinhans M. (2022) Zo kom je tot een effectief architectuurteam. AG Connect, January 2022 https://www.agconnect.nl/artikel/zo-kom-je-tot-een-effectief-architectuurteam
Colofon

Digitale uitgever Sogeti Nederland B.V., Postbus 76, 4130 EB Vianen, T 088 660 66 00 Illustraties Richard Wouters, Axioma Communicatie Art direction en ontwerp Mirjam Herrebrugh, Axioma Communicatie Drukwerkbegeleiding Axioma Communicatie. Voor deze uitgave is FSC-papier gebruikt.

2023 Sogeti Nederland B.V., Vianen





CC BY-SA includes the following elements: BY ⊕ – Credit must be given to the creator SA ⑨ – Adaptations must be shared under the same terms

Sensemaking Architecture is an exciting direction that will bring enterprise architecture to a new level and help architects bring both value and values to an organization.

