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Allopoietic design – Designing of the not-thing

Tore Gulden

In this article, I explore allopoietic systemic design as a perspective and process.

Allopoietic systems are understood as systems that produce something other than the systems themselves. Hence, an orientation of allopoietic design is then not on the making of the thing but on what the thing produces. The produced systems could be quarrels, engagement, teaming up, deceptive behaviour, cooperation, and, hence, activation in general and the history of these praxes. The emphasis of the allopoietic design perspective is thus on the elicitation of praxes (behaviour and thinking) and the subsequent feelings elicited.

The allopoietic view involves parting with the "meaninglessness of physical properties" (Krippendorff, 2007) and products and services, and instead studying them as *interfaces* (Krippendorff, 2007) and thus platforms for communication dynamics. By extension also proceeds the understanding of *the user* or *the users* (Krippendorff, 2007) that has inspired the development of misleading emphatic design methods inspired from algorithms, such as a *persona.*

Service design functioning is analysed in relation to play and game dynamics and progression (control) and emergence (autonomous) structure platforms, and I discuss how the notion of service design should be replaced with the notion of the *framing of progression and emergence interfaces*.

Keywords: systemic design, service design, game dynamics, play, allopoietic design, progression interfaces, emergence interfaces, and framing

Design in light of game and play theory and systems of play

Bateson described play not as "the name of an act or action; [rather] it is the name of a frame for action" (cited in: Nachmanovitch, 2009, p. 1). Hence, he emphasised the practice of seeking an understanding of the phenomenon of play as process, behaviour, and communication. That is, the term play itself does not give insight. Bateson's phrasing of *what play is not* exemplifies the method of cybernetic explanation, which implies looking to the other end of a phenomenon to understand the phenomenon itself (Bateson, 2000/1972). As an example, Bateson (2000/1972) studied *play* by exploring *not-play* and further examined these dimensions from the perspective of *playfight* and *fight*. By this study he found that these two ends of *playfight* and *fight,* produce almost identical behaviour, thus the difference in play and not-play lies in the communication.

Bateson's (2000/1972) notion of the frame describes an emerging factor or context for play to happen. Goffman, later building on this idea, described games as "framing" (1986) that serves as a boundary or membrane that allows or elicits "world building activities" (Goffman, 1961, p. 21) and uplifts these activities from daily life situations. Hence, a frame may be described as a specific context by the rules and/or by the physical and augmented environments that elicit play. For example, in basketball, a player must conform to the rules about not kicking the ball, the position of the basket, the bounce of the ball, which is limited by material characteristics and air pressure, and the organisation of the players, which limits passing opportunities. All restraints "make clues, i.e., and thus sources of information" (Bateson, 1972/2000, p. 400) or "a difference which makes a difference" (1972/2000, p. 318), "which will guide [the player´s] selection" (Bateson, 1972/2000, p. 400). Framing then serves to activate by *enabling constraints* (Bunnell, 2015).

The concept of framing and enabling constraints that a game consists of is equivalent to what the design of a service or product (*interfaces)* comprise. A service for example functions as a frame that will continuously inspire and demand specific behaviours by enabling constraints. A frame exists as a temporary shared environment for the participants (Linderoth, 2012); hence, when the play or other behaviour elicited by the frame ends, the frame ceases to exist. That is, designed frames, such as services and interfaces, only exist when they activate. The systems perspective explains how services and *interfaces* are not fixed or stable, but temporary. Matter then, is no longer the massive element of understanding of design. Rather the emphasis is on the elicitation of behaviour, or how matter serves as framing. In this research, design is therefore understood as framing. The sub-functioning's of a frame are defined as enabling constraints.

Praxis

Bateson (1972/2000) argued that there is much to learn from studying the details of recursive systems by examining the network of sequences or circuits of which they consist. Sequences or recursive "networks of closed circuits" of communications that are connected with cognition and behaviour are referred to by Bateson as *praxis* (1972/2000, p. 318). Bateson exemplified such praxis by describing the network of closed circuits in the action of cutting down a tree as follows: difference in tree, difference in retina, difference in brain, difference in muscles, difference in movement of axe, and difference in tree (1972/2000, p. 318). The continuance of these circuits is praxis, which influences the structure, and the structure influences the praxis. In playing a computer game, praxis may be exemplified as follows: difference in picture, difference in retina, difference in brain, difference in muscles/fingers, and difference in picture. In this example, the functioning of the system can partly be described through the players' drive to create a difference in the picture produced by game mechanics, which, combined with praxis, produces feelings. Praxis therefore consists of the systems of communication and their continuance or change due to the behaviour and cognition connected to or associated with the communication system.

Allopoietic processes and systemic design

The behaviour and activation generated by the frame and its enabling constraints are described as allopoietic functioning; that is, the design produces something more or other than itself (Ashby, 1956/1963).

The relations, behaviour, circuits of praxes, cognition, and feelings that are produced by the frame are understood as systems. Systems can be seen as communications or relations that happen between things that influence both behaviour and structures (Meadows, 1999; Meadows & Wright, 2015). Systems theory recognises contexts for design and interventions as exceedingly complex and emphasises that systems dynamics progress by or are dependent on structures.

Both complexity and systems are difficult to describe and understand because they have the "disturbing traits of a mess, of the inextricable, or disorder, of ambiguity of uncertainty" (Morin, 2008, p. 5). The difficulty in understanding these disturbing traits may have to do with the typical characteristics of systems: they are

Figure 1. The players, field, ball, goal, spectators, rules, materialization of rules as lines, referees, and weather comprise the structure in football.

Picture 1. Lofotmuseet

intangible, and they are always intertwined with the structure from which they emerge. To understand complex networks, systems theorists have suggested diverse approaches to studying systems, some of which will be described in this article. One such approach is the separate study of systems and structures to identify systems and their functions (See e.g., Luhmann & Gilgen, 2012; Maturana & Guiloff, 1980; Varela et al., 1974). The structure is then considered the context or frame that makes a functioning system possible, and everything that the system utilises is what defines the structure (Luhmann, 2012, p. 70). An example is play in football. Analysing football by Luhmann's description of systems and structures, the players, field, goal, and ball are parts of the active existing structure (Figure 1). Thus, everything in the field that the systems do not utilise (e.g., earthworms, billboards, and power poles) is not part of the structure. Because they do not provide information that influences the systems' functioning or behaviour, they do not exist in relation to the system's influence.

In game research, a game is often understood as a system in that it consists of elements that depend on each other to function (Salen & Zimmerman, 2004). In this research, however, a game and any other structure that elicits behaviour are understood as frames, and what it produces is understood as systems. The designed structure is the game, and, together with the rules, makes the enabling constraints. Accordingly, the play and communications, and thus relations (Bateson, 2010) within a team's praxes, are understood as systems (Figure 2a., orange, turquoise, and green area). The orange area (see Figure 2a) illustrates one team's social interaction systems. These systems consist of communications and relations and are based on the existence and history of communication, the organisation of the structure (placing of the ball, players, speed, etc.), and the existence and history of praxes (behaviour and thinking). The experience and recurrent communication systems based on the history of praxes may explain the playing style or culture. The opposing team produces a similar communication system with similar mechanics; however, its function differs (Figure 2a, turquoise area). When the two systems interact during a match, a new, common system is produced (Figure 2a, green area); the character and complexity of this system differ from the history of the praxes and play systems of each team and the several subsystems that emerge during the game. Communications, interactions, and praxes (i.e., behaviours, systems, and closed networks of circuits), which I call *systems of play,* emerge from the frame of the football game. All communications during play serve to produce information simultaneously in the common system. These interactions may involve moves, behaviour, interactions, observations, multiple layers of expectations, exchanges, expectations, double expectations (i.e., I expect that you expect of me) (Gulden, 2018, p. 109), and so forth, all of which produce information that makes a difference; that is, it becomes information because it is observed, considered, and acted upon.
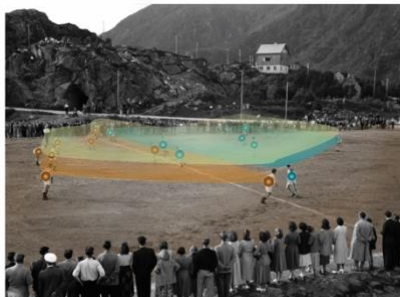

Figure 2a. All systems function simultaneously. Communications by passing, trickery, running, and reading facial expressions or body movements are all part of all the systems enabled by the constraints of the structure.
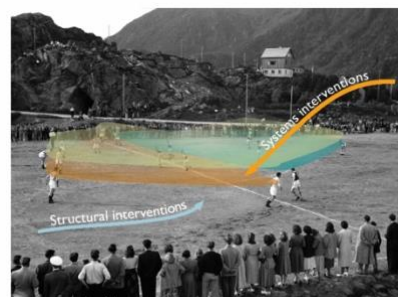

Figure 2b. Interventions on structural and systemic levels

The above analysis illustrates how a structure can function as a frame with enabling constraints that elicit systems. The division between structure and systems also shows the very different types of interventions possible

in football (Figure 2b). The analysis also shows how one can approach a context or situation through structural and/or systemic interventions in design.

Allopoietic design

Structural and/or systemic interventions involve considering the allopoietic functioning of a game, service, or product, and thus the systems in which the elicited system of play is generated by the design and how they operate, create, or influence. For example, by analysing the game Monopoly to determine the allopoietic facet of the design process, the dimensions of designing the board, pieces, aesthetics, or framing are considered. However, the emphasis would be oriented towards the consideration of the creation of potentials for quarrels, deception, competition, teaming up, circularity of praxis, and autopoietic functioning—that is, systems that create their own systems (Maturana, 1991), feedback loops, self-strengthening feedback loops, and so forth. Each of these factors is elicited by framing and game dynamic functions that serve as enabling constraints, such as rules, alterations by chance, and special abilities.

Structural and systemic interventions are natural to perform from both systemic and game dynamics perspective. A problem in design, however, is that the history of praxes within the practice have emphasised on structural interventions. The systems based on communication, flow, behaviour, thinking, feelings, etc., are either not considered in the design process or handled as things. When these systems are handled as things in the design process, they are utilised with the trust that the term itself offers insight. As Bateson noted (1972/2000, p. 275), psychologists commonly speak as if the abstractions of relationships ("dependency," "hostility," "love," etc.) are real things that are to be described or "expressed" by messages. This is epistemology backwards: in truth, the messages constitute the relationship, and words like "dependency" are verbally coded descriptions of patterns immanent in the combination of exchanged messages. As has already been mentioned, there are no "things" in the mind-not even "dependency." (Bateson, 1972/2000, p. 275)

Summative and systemic analysis

A structural perspective in design can be exemplified by a summative evaluation of the 11 players on a football team and their different abilities; that is, the players are viewed as entities, and the sum of these entities is viewed as team characteristics (Figure 3a). The systemic analysis of the same players would underline the evaluation of how the players understand and act within the communication dynamics at play (Figure 3b) but would also include the individual qualities. Understanding players as *networks of praxes and dynamics*, and not things, represents a perspective that is well known by, for example, football coaches in their efforts to build a culture or team. Most coaches recognise that it is not the quality of the entities, or players, that makes a good team. Having the best players with reference to physical abilities does not ensure the players' quality as team contributors; however, additional understanding and communication abilities within the dynamics of a game do. That is, to understand, change, or design for quality in football, it is of some help to address the individual skills apart (structure) but more important to understand individual skills as part of play (structure and systems), and even more central to understanding the collective functioning and intervening in these dynamics elicited during play (systems).

Figure 3a. Example of a positivistic understanding of team skills by evaluating the individual skills in a team. The sum of these are understood as the team skill.
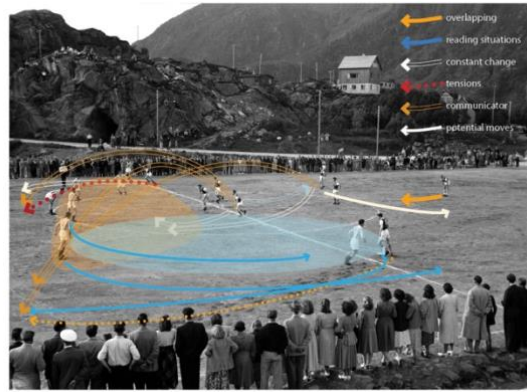

Figure 3b. The cybernetic understanding of team skills builds om two principles. First, one cannot understand dynamics apart from a functioning system, that is, the individual and collective skills are observable when the actual play happens. Secondly, it is the relations and praxes and dynamics between the players and the emergent allopoietic and autopoietic systems functioning that describes team qualities or skills, not the qualities of the entities alone.

Team performance is thus influenced by the dynamics and individual skills, and the dynamics describe how systems make "more than the sum of parts" (Bertalanffy et al., 2015, p. 57) by communication, which suggests that dynamics produces something that the entities alone cannot.

Personas

Personas is a method developed to understand users as part of a design process. The method represents the "paradigm of simplification" (Morin, 2008, p. 3) and can generally be described as a summative reductionist structure-oriented method of describing many people as one entity. Cooper (2012) stated that a "typical persona description should be a synthesis of the most important details observed during research, relevant to this persona" (Cooper et al., 2012, p. 102), and that "the goal is to find a single persona from the set whose needs and goals can be completely and happily satisfied by a single" (Cooper et al., 2012, p. 104) design. The descriptions of personas referred to as narratives in the literature are based on observation, interviews, and research and are used as origins for design processes and interventions. Hence, humans are translated into something that is part of a structure. From systems perspectives, knowledge in understanding behaviour and thinking and, for example, communication dynamics and double bind (paradoxical communication), praxis, feelings, flow, motivation, feedback loops, and engagement as insights for design demonstrate the shortcomings of the persona method in design. The process of writing a persona produces descriptions of often limited, existing, and non-existing social structures by categories, such as income, personality, age, and social standing, without attempting to understand the complexity they consist of and the context in which they exist. These analyses and targeting classifications created by the persona method made to design for specific needs and marketing segments function as fixed descriptions and insights. This is in contrast to the meaning of a persona described by Carl Jung (as cited in: Shelburne, 1988, p. 32) which is possibly the origin of the use of notion in design theory. Carl Jung used the notion of *persona* to describe the "relationship of the individual to society" (Horneland, 2021; Shelburne, 1988, p. 32). He further emphasised how "attempting to adapt to the demands of society we tend to identify ourselves with the consequent roles that we must play to fit smoothly into the social order" (Shelburne, 1988, p. 32). It is this group praxis that Jung called persona. The word persona means mask and describes the person that we pretend to be to adapt to specific systems or societal collective psyches (Cited in: Shelburne, 1988, p. 32). Jung's description is thus counter to Cooper's, as Jung discussed what people pretend to be, whereas Cooper highlighted what people are. In contrast to how design theory understands personas, Jung suggested that by describing a persona, one learns about the collective psyche and the collective unconscious in contrast to the individual psyche. He emphasised personas as a phenomenon, which in this article is understood as systems—the relations and dynamics in the now—rather than considering personas as stable social constructions. Understanding

personas as Jung did could potentially produce interesting insight for designers in that it would contain processes of understanding and designing for how people pretend to be, and of the collective psyche, they desire to be part of, and hence descriptions of, the dynamics that elicit such pretending. However, the method aims at describing existent phenomena without methods to do so and conveys the hazard of establishing stable social predigest and xenophobic understandings, for which Jung has also been criticized (Shelburne, 1988). Similarly, personas in design methodology are created with the confidence that terms or words (the personas)—or what Bateson calls abstractions, such as *young* or *active*—are fixed constructions and that they also contain and convey embedded insights about the phenomenon itself and about being in the now within such categories, as if the words exist as real things. The data derived from the persona analysis are often understood as systems, although they are not, because of the lack of attempts or methods to understand dynamics such as relations and communication, and changes in dynamics do not yield learning about systems. Interesting insights are produced from the comparison of the persona approach to Krippendorf's reformulation of THE user as *stakeholder networks,* which is further developed in this research and described as *networks of praxes and dynamics.* The function of *networks of praxes and dynamics* suggests seeking understanding about the systems, their influence, communication dynamics, relations, etc. as descriptions of thinking, acting, and functioning in and with contexts. Accordingly, the designers seek to describe humans as entities with *personas* (such as the summative description of eleven individual skills on a football team as a team quality), while seeking to understand and describe *networks of praxes and dynamics* leads to the documentation of the dynamics that constitute human praxes, thinking, communications, and reactions (like descriptions of interaction systems of play in football).

The perspective of THE product and personas thus represents an epistemology that can be described as a mechanistic or first-order cybernetic because the focus is on understanding dynamics as structures and systems as closed systems, such as a thermostat and an oven that act on one constant, which is room temperature. This is opposed to open systems or second-order cybernetics, such as systems of play in football, which involve systems that sustain and create systems, and short-lived complex systems that change and observe other systems of play, all of which alter the organisation of the structure, consequently influencing the systems. A mechanistic understanding of the game*play* of Monopoly can be exemplified by a player who arrives at a position on the board; a certain amount has to be paid, and whether it is paid or not paid, as if nothing happens, no interaction systems are elicited. The mechanistic system, such as a persona, can thus be described without what it produces.

Hence, it is essential, when describing open complex systems, often short lived, to examine the dynamics, such as communication and engagement (McWhinney, 2005, p. 24), and the frame that elicits them. For example, describing a football team as an individual skill does not inform us about what they can do in collective praxes, and to understand praxes, it is not sufficient to describe them without the context in which they emerge. Identical movements of waiving of an arm, for example, can mean hello or help, depending on the context. Hence, to understand behaviour, it is beneficial to examine the frame and dynamics.

Describing the frame and the elicited dynamics will thus produce insights into how the dynamics function and why they emerge. For example, regardless of background or education (e.g., a classified group), a person exposed to paradoxical communication or double bind situations (Bateson, 1972/2000), such as in physical education when the teacher divides the class into teams (e.g., the classmates welcome you with words but communicate disappointment in other types of messages), will experience the situation hurtful. Approaching this situation with traditional classification methods for design, such as personas, one would establish groups of the prioritized as one persona and non-favoured children as another and subsequently design for each group or their combination. From a systems perspective and allopoietic design perspective, however, the logical action would be to seek understanding about the dynamics and alter the system that creates such groups. Accordingly, by understanding and aiming at changing the functioning and dynamics of systems and structures and their organisation, the designer is freed from creating and targeting unnecessary, superficial, or non-existent groups in society. Instead, it is of interest to leverage or intervene in the functioning of systems and praxes (Meadows, 1999).

Hence, even though the functionality of dividing structures and systems is presented to understand systems and their intertwined functioning with structures as a praxis in design processes, one cannot understand systems without recognising their intertwined functioning and dependence on structures or frames. That is, one cannot intervene in either of the two and harvest the expected results because they coexist. The problem of exploring the dynamics of such coexistence is analogous to Bateson's problem of dividing nature and mind. He stated that his study of the Atmel people in New Guinea was "an attempt at synthesis, a study of the ways in which data can be fitted together, and the fitting together of data is what I mean by 'explanation'" (Bateson, 1958/1936, p. 281).

Personas and systems goals

Cooper et al. suggested (2012, p. 104) that when working with personas, one should seek to describe the goals of the persona. Systems theory suggests looking into different phenomena, such as feedback loops, flow, and information, to understand a systems goal. This implies that a system goal is different from the sum of individual goals. When designing to, for example, change systems or comply to systems and phenomena, it is useful to understand the goals of the systems. However, this is not an easy task. The technique of negative explanation from cybernetics and Bateson may be useful to detect and describe systems goals. This would involve describing the malfunction of the system studied to define its goal. For example, in a football series, the individual goal of children might be to get friends, become famous, or feel the team spirit and happiness by mastery. However, a malfunction in the children's football series might be that the system damages the very structure on which it depends to exist when children are injured during play, so that the scheme cannot continue. The negative explanation then exemplifies how the system goal could be phrased as *assisting* or *recovering*—that is, being able to have enough players and teams meeting up so that the series can continue. The point is that the examination of the system goal suggests very different functioning than the sum of individual. Therefore, considering systems goals contributes to a deeper understanding of the frame examined, the design process, and how the design will perform.

Services

Service designers devote quite some effort to understanding people's needs and goals and apply user-oriented methodology, such as co-design, to understanding contexts in which a sum of individual goals, functioning, or personas are intended to function. Service design is therefore typically described as what is between a provider and user and the interaction (Penin, 2018), act, activity, a continuous result or state[1], such as in product service systems (PSS) (Morelli, 2006), an experience, or offerings (Clatworthy et al., 2014), or a perspective on business with different offerings than goods (Yu & Sangiorgi, 2018). However, the user is considered a sum of entities by persona descriptions. Hence, there is potential in service design to understand users as *networks of praxes and dynamics*, not as entities and the sum of entities. In practice and research, service design is often considered a product itself; however, the effects of design are also emphasised (see, for example, Designing the invisible: Penin, 2018). Although the research on service design describes the designs as interaction and the process as the design of the invisible (Penin, 2018), there is potential to emphasise that service designs function as framing and hence elicit praxes (behaviour and thinking).

Often, service design is understood as an interface that ensures that people do what is intended, such as a purchase or recordkeeping. The possible praxes in most services are limited and often controlled. Challenging this perspective of the service design process may contribute to the awareness of other potentials for praxis and ethics. I explored this potential by analysing the design processes and the interaction, behaviour, and thinking that services elicit in relation to play and game dynamics and the progression and emergence structure platforms offered by Juul (2011).

In progression structure games, the player is allowed to be creative and can do a lot of things; however, he/she does not perform any task that the designer has already thought of. For example, Super Mario is a progression structure game, whereas a banking service is a progression structure service. Games that allow the player to engage in ways that the designer did not think of or intend (e.g., trickery or associated games created based on basketball) are known as emergence structure games (Juul, 2011). These games allow or motivate by enabling constraints, which imply partial control and non-control, and thus creativity and the altering of structures, game, and play. In emergence structure platforms, structure elicits the emergence of many systems that, if recognised, may produce unique and unexpected contexts and situations that provide new understandings that will be acted upon. Hence, the behaviour and thinking of the player, a person, or play are somewhat free and may instigate actions outside the frame that produced the behaviour and consequently alter the frame itself. One example of such a change of frame because of emergent play is *futsal* (Berdejo-del-Fresno & Medicine, 2014) which occurred

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[1] An example of such a product service system could be that one can purchase a length of grass always being within a certain range on a football. Hence all stadiums do not need all lawing equipment since a service provides this for many football fields (Penin, L. (2018). *An Introduction to Service Design: Designing the Invisible*. Bloomsbury Publishing. https://books.google.no/books?id=pqFiDwAAQBAJ ibid).

due to a lack of areas for full-size fields in Brazil and Uruguay. Hence, emergence structure platforms produce change not only for the systems elicited but also for the frame, game, or service itself.

The progression structure platform represents a philosophy of controlling the player, design, research process, or activated people or animals. The understanding and steps of action within the service originate from the previous moves and what is experienced by these moves. Progression structure is a leading concept within service design epistemology. The progression structure method implies a description of how different users will interact within the service, a situation similar to how the method of personas is described to seek understanding (see, for example, Nielsen, 2019, p. 83).

Accordingly, I suggest that the notion of service, in service design, should be substituted with the notion of *progression and emergence interfaces*. This allows for different discussions and understandings of what a service can be or how it may function. Similarly, the design of interfaces in general can be seen as a *progression and emergence framing processes.* In progression design processes, one must stick to the recipe and not change the process, while in emergence design processes, the alteration of the process itself may be one of the outcomes of the activity.

Creation of the not-thing

This study originates in systems thinking and the method of the negative explanation of design. I have introduced a way to identify systems and structures isolated and integrated and, by extension, provided a model to describe separate and intertwined systems and structures. This can provide dynamic descriptions that make analyses by negative explanation possible.

I have examined design as the making of the not-things, and the living as not-things. The designing of the not-things concerns the creation of allopoietic functioning and design understood as *framing*, which produces something other than itself that serves for systems, behaviours, praxis, thinking, feelings, etc. to emerge by *enabling constraints*. Understanding the living as not-things involves recognising that the living, and especially humans, act, and react on the basis of that they exemplify, and orient themselves within *networks of praxes and dynamics*.

Hence, within this perspective, describing and classifying people by personas of fixed things, such as young, educated, manager, or interested in coffee, as if the words represent dynamics, does not provide insight. Therefore, I suggest not using the method of personas.

A negative explanation is further suggested as a perspective to understand what a system goal is that can be performed by describing the malfunctioning of a system functioning. The other end of the contrasting understandings of these descriptions may offer insights into how one can describe a system goal. The analysis thus recommends not describing systems goals as the sum of individual goals as described in a persona. Instead, the method of understanding systems and praxis, and by extension the elicitation of praxes in combination with understanding users as *networks of praxes and dynamics,* is suggested.

Accordingly, the exploration of design as not-things and people as *networks of praxes and dynamics* yield insights for the design and research processes in it involves examining games, services, and products as not the action of creating a thing as an isolated entity or closed mechanistic system. This will yield insights into the design and research processes that lead to understanding and creating the *not-thing*, the now, and praxes, as well as the experiences and feelings elicited by praxes.

Service design is then examined in relation to progression and emergence structure platforms and play and games theory. The analysis suggests that the history of praxis within service design practice is to handle a service as a fixed thing and not a frame that elicits behaviour and thinking. Further, a malfunctioning service lacks control behaviour; thus, the system goal of services is to control. The perspective of play and game theory used to analyse this understanding suggests that a malfunctioning of services may also be the lack of the quality of people who, by the activation of the service, are able to influence and create, for example, new situations, experiences, and challenges because of the service. Hence, emergence is recommended as a quality. Therefore, I suggest that the notion of service design should be replaced with the notion of framing *progression and emergence interfaces*.

When humans encounter a design, the networks of praxes and dynamics are influenced. Hence, the design serves as an interface and thus platform and utiliser for communication in that it creates, alters, strengthens, or weakens systems, thinking and behaviours. Understanding design as an *interface* and users as *networks of praxes and dynamics* implies a new way of learning as a dimension and phase in design. These involve identifying and understanding people's praxes. Understanding praxes involves learning about circuits of action and thinking, which determines the next circuits of action, thinking, and networks of praxes; together, these comprise the system dynamics in the meeting with other systems.

Allopoietic design, then, is the framing on the basis of understanding players and users as networks of dynamics and praxes, a perspective that will yield insights into the design and research processes and understanding and creating the *not-thing* and hence the praxes and the now. The design processes then involve the consideration of the other end of things (play and not play, for example), and thus the dynamics of variable situations that can be elicited by the particular *interfaces* (context, service, game, or thing). Allopoietic design therefore contributes to the understanding of social interaction systems, relations, and experiences as facets of design, and it introduces thinking about systems, dynamics, motivation, and engagement as dimensions of design.

These findings from this study illustrate how the combination of systems, games, play theory, and design practice skills serves as a platform for research and learning. The combination of theory offers a perspective that may generate insights about possible thoughts and behaviours that designs elicit and how thoughts and behaviours influence action, the designs, and design processes themselves.

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