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This is a working paper. I would be delighted if you have comments, critique, ideas and references to share. Please send to birger.sevaldson@aho.no

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Holistic and dynamic concepts in design: What design brings to systems thinking.

Birger Sevaldson

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Introduction

In art and design we find some long living central elements that are found in one or the other form in most if not all works of art or design. Amongst those concepts we find e.g., working with the creation of wholes, generating harmonic (or disharmonic) compositions and synthesising ideas (content). These elements have been known and developed for a long period of time and may be seen as core concepts in art as well as design.

This working paper suggests that some of these core concepts should be central in developing the field of systemic design. Potentially the skills and competences that are at the core of design involve in creating wholes. These wholes are sometimes self-referential but more relevant to our discussion they might be in interrelation with an environment. These art and design practices demonstrate something very unique. Potentially they demonstrate how to compose create plan and bring to life system components, actors, and bring it together into holistic gestalts. While all other systemic approaches are dominantly descriptive Systemic design is dominantly generative and creative. Its main role is therefore to shape, design and compose artefacts within systems, as systems and in systemic contexts. The artefacts at stake are material or immaterial, objects or relations, items or processes, politics or social contexts.

This text is a true working paper, a work in progress. It is less well validated and has fewer references and is more polemic than the final version will have. The theme this WP touches upon is to my knowledge not addressed before and it is a complex thematic that is impossible to fully develop within the framework of the WP. This WP is very disharmonic because some issue have been developed further and others shorter. These will only be commented very briefly and listed.

Current state

Earlier attempts to integrate systems thinking in design have largely failed to become part of the normal mainstream profession and design education. Explanations for this failure could be that systems approaches are alien to designerly ways, or the systems approaches have been too inflexible and dogmatic and the seamless integration into designing has failed.

But there might be other additional reasons that so far have been largely overlooked. I will argue that design over time has developed a series of concepts in dealing with complex issues and to generate holistic resolutions. Some of these ideas and concepts are so basic and embedded in the designerly “DNA” that this might explain why they have not been looked at closer in this discussion.

Also in design there has been and still is a movement away from its roots, the arts and craft. Design wants to become more scientific and in this effort the traditional association to the arts is seen upon as misleading. A long stream of external concepts models and ideas are discussed as relevant to design. Sociology, ethnography, statistics, even natural sciences are imported into design as solutions to make design more scientific. Also we see an interest into other practice based fields. Amongst these we find concepts especially from medicine, e.g. Evidence Based Design¹ and Problem Based Learning have made their way into design, both are problematic because of their misfit to designerly ways and because they replace already existing and partly better concepts and traditions from within design as I will argue. EBD has specific problems in the definition of the term evidence. It becomes principally problematic when basing creative and generative work, mostly for situations that have certain uniqueness about them, on the idea of evidence that is dependent on reliable repetition. PBL appears as bleak and primitive compared with the studio based pedagogic practices developed in art and design schools since the Bauhaus and before.

This mistake is caused because of the superficial need for design to move away from the arts and to become more “scientific”. This need I argue is fake and is truly not about being more scientific but being more commercial. The redressing of design as a science gives design a appearance with great authority and it gives customers the faulty impression that there is a lower risk.

The move away from the root competencies in arts and crafts has unfortunate consequences and is not a necessary move when becoming more “scientific”. In contrary design research should look into the resources from arts and craft and analyse them to make them more explicit and learn from them.

The contradiction between arts and science are constructed and have their root in an old dichotomy between those fields. In the design discourse the arts are often dismissed as being intuitive, creative and based on metaphors etc. But intuition, creativity and metaphors are all part of science. This dichotomy between art and science is relatively new and should not be taken for given. There is no logic in moving away from art will make design more scientific. John Maeda who has a PhD from MIT and an art education puts it this way:

Art and science. To those who practice neither, they seem like polar opposites, one data-driven, the other driven by emotion. One dominated by technical introverts, the other by expressive eccentrics. For those of us involved in either field today (and many of us have a hand in both), we know that the similarities between how artists and scientists work far outweigh their stereotypical differences. Both are dedicated to asking the big questions placed before us: “What is true? Why does it matter? How can we move society forward?” Both search deeply, and often wanderingly, for these answers. We know that the scientist’s laboratory and the artist’s studio are two of the last places reserved for open-ended inquiry, for failure to be a welcome part of the process, for

¹ EBD has recently been strongly supported on the DRS phd list.

learning to occur by a continuous feedback loop between thinking and doing.
(Maeda, 2013)

This discussion is old and it is discouraging to observe how the artificial dichotomy between art and design and science pops up over and over again. But I will turn my back to this and look forward to see how concepts from art and design can be integrated especially from the perspective of systemic design.

Systemic approaches have faced resistance when they were introduced to the fields of design not only because they misfit but also because they had to compete with already embedded and integrated approaches and concepts, the core concepts of art and design briefly mentioned. When systems thinking was introduced earlier the designer actually was implicitly asked to forget the training in those skills and concepts. Those skills and intuitions were to be replaced with hard mathematical modelling and simulations. Or at best the terminology was alien and systems thinking in design was most often technical and theory oriented and presented textually rather than demonstrated and developed through good practice. Systems thinking was conceived as prescriptions to design. It was mostly a one way relationship. The few exceptions were standing out, e.g. Rittel's work. Though even those exceptions were all textual and theory oriented even when describing practice. There was an obvious lack of research by design that could develop new insights and systemic design practices. Systems thinking in design became very normative and fixed and failed to be inspiring and innovative in meeting the field of design. The trench wars in the systems field did not help either. No wonder designers turned their back to the field of systems thinking.

Meanwhile the global development created an increased pressure on design. Ever more complex challenges and difficult relations emerged in design practices. Globalization and the need for sustainability, the de- and eventual re-industrialization of the west and the rise of the east and south Americas as well as Africa, and the gigantic re-distribution of global wealth totally changed the profession of the designer within a few decades. Design needs to revisit the sciences of complexity and systems thinking in particular. But this time we might approach it on a more equal base. Design needs to change, at the same time design has some of the central answers to the difficult questions and challenges we are confronted with.

The radical potential of systemic design is that it might rethink the relation between systems thinking and design. If done properly and deep enough the fixed relation between systems thinking and design might be shaken and destabilized and we will start to look for new answers in the amalgam of the two fields. We should create new ways of relating design and systems thinking. This does not mean that we as designers should read up on systems theories first. Maybe the worst thing a young designer can do is to start with reading up on particular systems orthodoxies and learning specific systems models. Actually when we start with systems thinking we always start with designing. This might be provoking for many cyberneticians or systems dynamics people but this paper will argue that there is more important work ahead first if we want to avoid stranding in the same ditches as before. What we need to do first of all is to re-understanding the design field and its heritage and potential, revisiting the mentioned designerly core concepts. Understanding the original ideas and concepts of art and design in regards to systemic design will potentially also develop both further. I propose that these designerly concepts to deal with complexity and create holistic solutions are the

core of what design brings to systems thinking.

Making design explicit

While design has had an inherent and rather tacit way of dealing with complexity and synthesis, that at its best demonstrates ability to solve very complex and systemic problematiques it has never before made these crafts and skills explicit. On the other side most systems thinking comes from fields remote to design and the systems models that became dominating where not at all design oriented.

There are obvious exceptions on the individual level. People like Alexander, Banathy, Rittel and Ackoff where closely tied to design and designing. Their approaches are still very valuable and are the ones most relevant to systemic design today. But their contributions were expressed in texts and there is little contribution to the development of a systemic practice in design. Though they might emphasize skills and mind sets they fail to demonstrate and show how to in a designerly way internalize these aspects and make systemic design skill sets tacit. All of them ignore the “old” design skills and competences, amongst them the concepts of composition, orchestration, choreography, the idea of Gestalt² and ultimately the idea of the Gesamtkunstwerk.

In resent debates in design research this ability to design has been regarded as less important compared to the effort to move design closer to scientific research. If this shift comes at the cost of the mentioned central ability it will be catastrophic on several levels. First this designerly ability is truly the hallmark of design work and it is a genuinely specific activity that is particular to designers. We might find seemingly similar activities in other neighbouring fields like art and engineering, but none of them have the complete and versatile version as found in design. There is a danger that abandoning this root competence will destroy design. The core competence of composing holistic solutions will erode and we will see lesser solutions. Even as we speak discussing beauty, elegance and aesthetics in the context of systems thinking seems problematic.³

Holistic designs and the issue of harmony.

One of the central features of the designer is the ability to create harmonic wholes. Confronted with many demands, briefs, complexities the designer aims at generating one holistic response that solves some or many of the contradictory inputs in the shape of a more or less aesthetically beautiful and elegant form. The notion of harmony and balance (or disharmony and misbalance) is not taken as given but is constantly challenged. Harmony is a parameter rather than a goal. In many cases disharmony is preferred. There are many ways of composing a whole, the less harmonic ways will often tell more complex stories. The notion of harmony is also not congruent with the notion of the whole. Despite that harmony is a way of expressing an ideal type of holistic solution.

² Though Gestalt psychology has a systemic root.

³ When talking about beauty, elegance etc these are seen as neutral parameters. It could as well be ugliness or un-elegant as a conscious choice or cultural expression.

Gestalt Psychology

The "hidden" relation between design and systems surfaces when we look at Gestalt theory.

No wonder Gestalt psychology has long had a very strong position in visual arts and design. It is so to say the psychological theory that resonates the most with designers. E.g. Rudolf Arnheim has connected Gestalt psychology directly to creativity. (Arnheim, 1974) Already the Bauhaus was in close contact with the early Gestalt psychologists and adopted the theories. (Behrens, 1998)

On the other hand there are many links between Gestalt psychology and the systems world. Gestalt psychology is not directly related to systems thinking and is normally not counted as part of systems thinking but it is a predecessor of systems thinking. Kurt Lewin is both Gestalt theorist and systems thinker (Ramage & Shipp, 2009)

The famous statement, "The Whole is more (greater) than the sum of its parts" is often credited to systems thinking. But in fact it comes from Gestalt Psychology and is the central thesis. But it was originally a bit different:

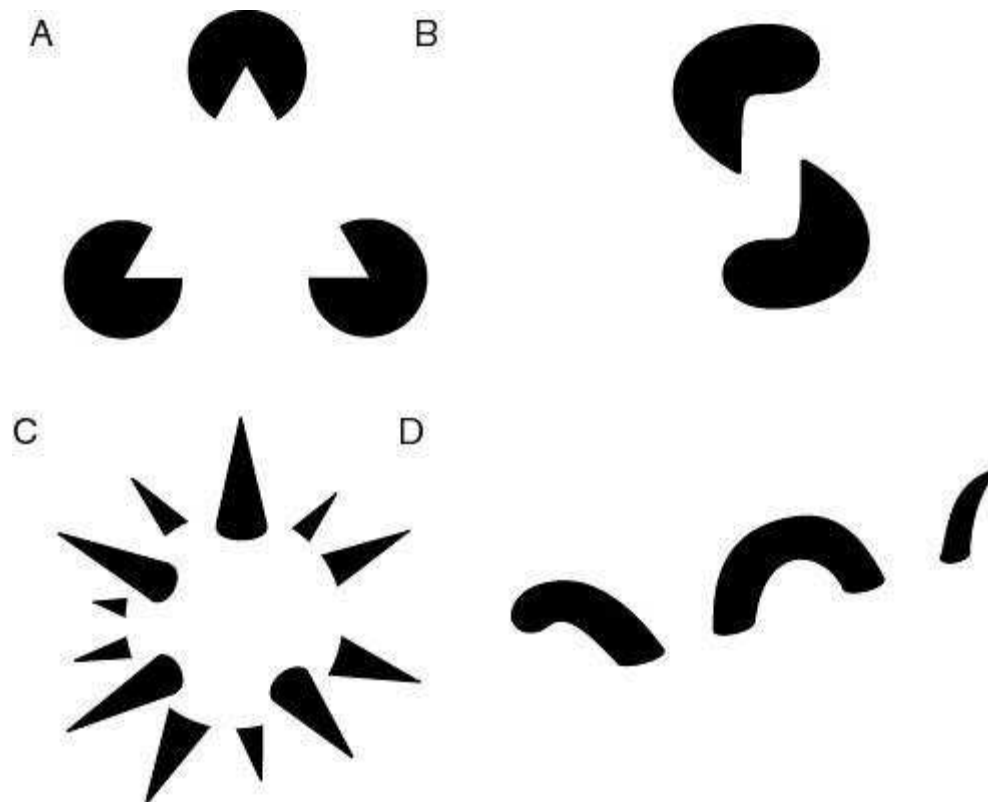
"The whole is other than the sum of its parts" (Kurt Koffka)⁴

Kurt Koffka was precise that the whole was not more but different. It is not an addition but the whole has a different existence. This central statement proven in Gestalt psychology has been expanded to systems thinking but there it is mostly referred to as "the whole is more than the sum of its parts" and it is most often discussed in connection with and reference to emergence and synergy. So in systems thinking, following its "hard" traditions it was totally detached from its original roots in the theory of perception. Unfortunately when this slogan was migrating into the systems world it got changed and lost its real edge. The original form of the statement points to a qualitative difference rather than a quantitative.

To investigate the relation between systems thinking and design, Gestalt Psychology provides several gates for connecting and cross referring. In this discussion it seems most useful to return to the original version of the core statement from Gestalt Psychology and turn the discussion towards the qualitative issues.

Gestalt refers to sensing as an active process where missing parts are added in perception creating wholes.

⁴ Kurt Koffka was central in the creation of Gestalt Psychology and was responsible of creating a coherent theory of Gestalt. He was propagating a holistic view on psychology.



The images demonstrate how perception creates wholes out of *patterns that actually don't provide any real information about the whole indicated and created by perception.* (Wikimedia commons)

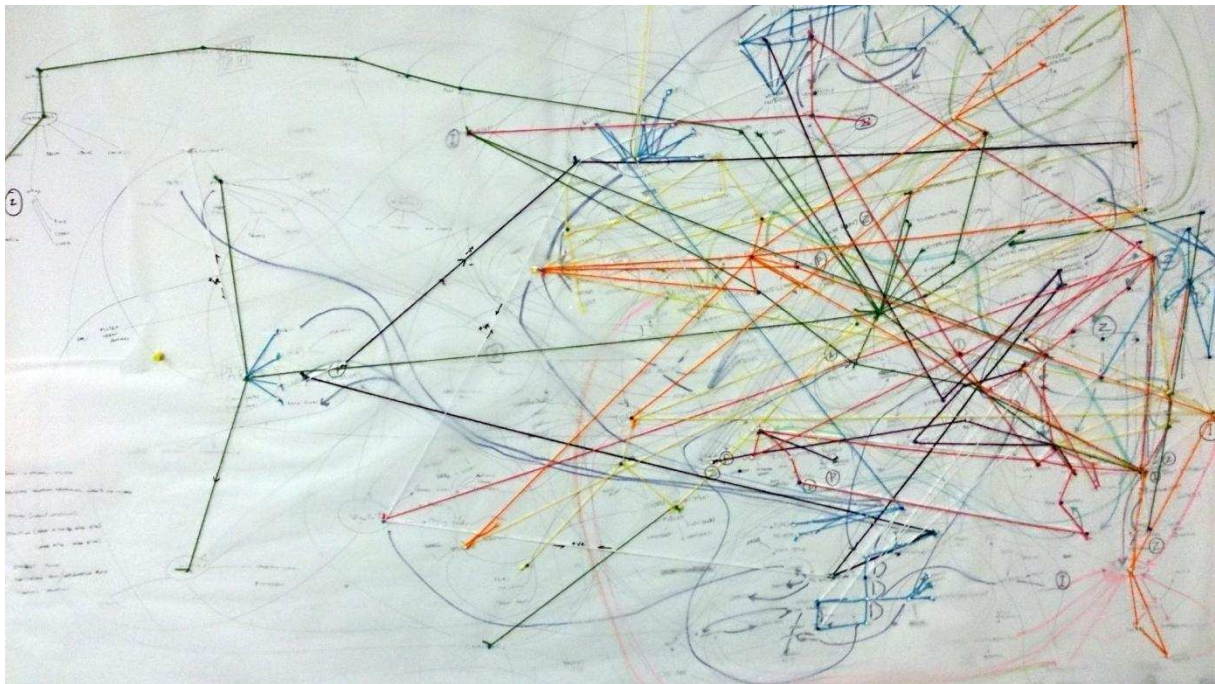
Central in Gestalt Psychology is the idea of the whole. Related to perception this means that it does not make sense to look at the singular fractions of perception but that we need to look at perception as a holistic and active / creative process. The purpose and functionality of perception is indeed to generate wholes.

Christian von Ehrenfels explains: A melody is composed of singular notes. The same notes can form many different melodies. But if you do a transition of the melody to another key, the notes would be different but the melody is the same.⁵ So the melody generates a recognizable whole across all possible versions of intonations and tonality.

Regarding our main discussion on relating systems thinking and design this proposes a radically different possibility than the abstract, hard and sometimes quantitative systems models and analyses that have been predominant in large parts of systems thinking. Even in the softer parts of systems the perception and analyses of systems remains quite abstract. All system modeling is geared towards the understanding of interplay between many components, to generate a holistic understanding out of the attempt to understand myriads of fragments. It is truly possible to train an increased capacity to keep control of great numbers of entities and their relations. This we have demonstrated through Gigamapping. The process of designing plays a central role in the active internalization of big amounts of data. But in the end while developing the extensive Gigamaps another perspective emerges. This perspective is not about understanding each and every single

⁵ Christian von Ehrenfels, *Über Gestaltqualitäten (On the Qualities of Form)*, 1890

components and myriads of interactions. During the mapping process sensitivity towards a different realization emerges, the creation of the Gestalt of the system.



The complexity of a gigamap might reach beyond our ability to keep the overview but can take a different role as Gestalt. It indicates the main structures layers diversity, connection on the cost of fractional information. In this case the entities are toned down and a pattern of relations is emphasized. Another issue is that the creators of the map will have a much greater insight and detailed knowledge than a random viewer. This insight is especially developed through the processes of visual thinking when creating the map. (Chalmers School of Architecture 2015, Photo: Author)

Especially in Gigamapping we reach the limits of the number of elements we can handle. We manage by zooming in and out constantly and by cross scalar thinking. But most often it is the overall feel of the system that is the most valuable result from Gigamapping. This means the Gestalt of the system.

Through this jump we seamlessly are drifting into a generative mode. Sensing is generative. When sensing becomes central in the interpretation of complex systems there is no longer any divide between sensing, thinking and designing.

Rudolf Arnheim is providing a platform for this jump through his theories on "Visual Thinking". His central argument is that there is no real divide between perception and thinking. This provides yet another connection between Gestalt and systems thinking

Now that we have established some substantial channels and connection between systems and design we have a back drop to discuss more specific concepts from art and design in relation to systems practice. Amongst these that will be discussed further in the future are Composition, Choreography, Orchestration and the notion of the Gesamtkunstwerk. In the framework of this working paper we will only touch upon them briefly.

Composition

in art, writing and music, space and time

Composition in design can be understood as a special way of synthesis of shape. In art composition rests in its own object and creates its own logic. It addresses spatial organization in painting and sculpture and notions of balance imbalance contrast etc are central. Music composition is concerned with the whole of a piece of music. It is addressing temporal issues, rhythms tonalities dynamics etc.

In design all these parameters may be at play. For product design similar to painting and sculpture, for service design and interactions in addition similar to those in music. Actually interaction design and service design bring all those aspects together.

But in addition there are other parameters to be taken into consideration: ergonomics, function, pleasure, experience, sustainability, technology markets, politics, social systems, etc etc.

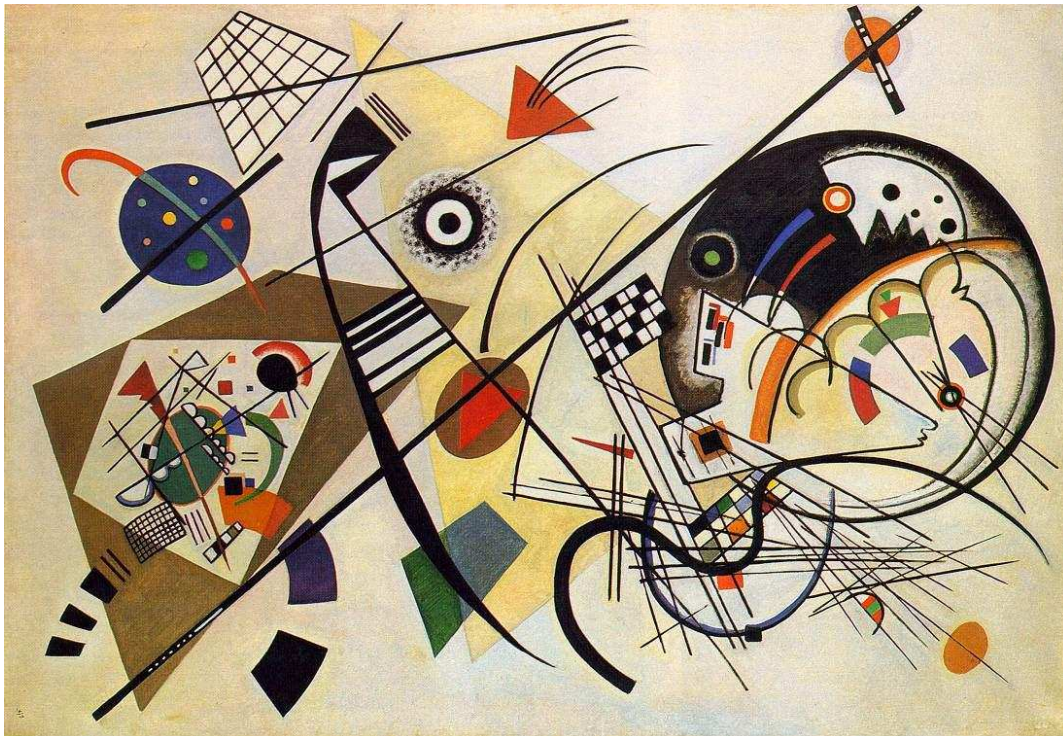
Composition:

In visual arts: arrangement and placement of visual components

If we look into texts on compositionality and composition systems the relation to systems thinking is obvious.

Compositionality refers to the evident ability of humans to represent entities as hierarchies of parts, with these parts themselves being meaningful entities, and being reusable in a near-infinite assortment of meaningful combinations. Compositionality is generally considered to be fundamental to language (Chomsky [7], [8]), but many believe, as do we, that it is fundamental to all of cognition. Objects and scenes, for example, decompose naturally into a hierarchy of meaningful and generic parts. Furthermore, compositions help us to identify parts unambiguously: It is often the case that components can not be correctly interpreted in the absence of the contextual constraints imposed by their incorporation into a larger whole, i.e. a composition. Indeed, such compositions are sometimes called “higher-level constraints.”

From Composition Systems Stuart Geman, Daniel F. Potter, Zhiyi Chi, Division of Applied Mathematics, Brown University



Wassily Kandinsky 1923 (Public Domain)

Balance and imbalance

Relating categorically different entities

Objects primitives and freeform

Composed figures

Fields and boundaries

Colours

Creating tension but generating a sense of a holistic resolution



Paolo Ucello The Battle of San Romano 1432. Graphic analyses by Birger Sevaldson 2004

The notion of past and future (time) in art

The notion of movement

Choreography

The concept of choreography, arranging actions over time, has made its way into service design through the notion of Service choreography. Service choreographies are not executed: they are *enacted*

<http://www.youtube.com/watch?v=lrr06TfrYxl>

This indicates a designerly way of ordering and playing out services. It involves a deep realization that a central material in service design is time. Timing, rhythms, repetitions, etc are central. While it is obvious that service design is systemic, (independent from the realization of the service designers) it is equally obvious that systemic design must involve choreography.

Orchestration

While choreography is about the enactment of players elements and processes over time orchestration is about making many players interact and correlate according to a higher level instruction or holistic perspective.

Orchestration is a term used in computing. It describes the automated arrangement, coordination, and management of complex computer systems, [middleware](#), and services (Wikip)

Orchestration and choreography are also terms used in the context of cloud computing. As so often when IT uses terminology stolen from the field of design and art the original human and creative closeness of those terms is lost. In Systemic Design it would be useful to re-examine both terms.

Gesamtkunstwerk

Total work of art, ideal work of art, universal artwork, synthesis of the arts, comprehensive artwork, all-embracing art form, or total artwork.

Gesamtkunstwerk is a work of art that makes use of all or many art forms or strives to do so. The term is a German word which has come to be accepted in English as a term in aesthetics.

- Wagner sought to unify all works of art in the theatre
- Essay “Art and Revolution”
- He was part of the 1848 revolutions in particular the Dresden revolution. So he played a liberal role. But he also wrote the notorious “Das Judentum in der Musik”.

Wagner presented an idea of the Gesamtkunstwerk that was literally boxed in on the stage, presented to a passive audience looking at it from the outside. The Gesamtkunstwerk did not engage with the outside.

The Gesamtkunstwerk combined musical composition and orchestration, spatial composition, theatrical orchestration and choreography into one holistic performance.

But the roots of the holistic art work is older.

- Already the architects in the Renaissance did not see a division between their different tasks. Being it structure, interior, exterior, landscape, sculpting, painting or engineering.
- e.g. Michelangelo



Süleymaniye Mosque 1558, Architect: Mimar Sinan (photo: www.egitimkutuphanesi.com)

The building complexes surrounding most imperial mosques in Istanbul are called Külliye. The term is deriving from the Arabic word "kull" meaning the whole.

The Külliye constitutes the holistic complex and multilayered cultural societal organization and a political contract between the empire and the people.



San Lorenzo de El Escorial. Architect Juan Bautista de Toledo, Work started in 1559 (Photo: Wikimedia Commons)

El Escorial is a Royal Palace, Government functions, Monastery, Library, School, Cathedral.

The combination of political and religious functions is a politic statement on the unity of the royal palace with the roman catholic church of Spain. So this is not only purely practical functional organisation design but also symbolic / political functions

El Escorial is a powerful statement in the Counter Reformation and an expression of the melancholy side of Spain, and the strictness of the Counter Reformation.

Both these examples demonstrate a concept of the Gesamtkunstwerk that is politically connected to society and that has multiple practical and symbolic functions.

The idea of the Gesamtkunstwerk developed further though art nouveau.

Important names were Josef Hoffmann and Otto Wagner, Victor Horta and Paul Hankar, Charles Rennie Mackintosh, Antoni Gaudí, Eliel Saarinen and Henry van de Velde. But the Idea of the Gesamtkunstwerk was rather limited and maybe reduced to style rather than the multiple meanings and connectedness we see in the former examples.

With the Bauhaus a more complete vision returned and it became more political and societal connected. The Bauhaus looked at a new type of merged disciplinarity in the Gesamtkunstwerk

This disciplinarity goes beyond the interdisciplinarity we talk of today.

It is a natural and necessary interdependence rather than a planned collaboration.

The lack of depth in the interpretation of the Gesamtkunstwerk in particular and holistic design in general developed into the degeneration of the ideal.

Achieving a formal holistic design became in some cases a straight jacket. A total composition needs to be static. It is a closed work of art in contrast to the richness of juxtaposition e.g. like in a home.

Here it is the collection in a context that create in-between relations that tell rich and complex stories. Lack of compositional unity creates potential open ended and rich spaces. You can add and subtract things.



National Bank of Norway, Built 1986. Architects: Lund & Slaatto A/S (Photo Wikimedia Commons)

On the other hand an open framework of structural and material guidelines can add to the individual freedom. This is an argument for a less strictly composed conception of the Gesamtkunstwerk, one that is not based on the perfect interrelation but on a more dynamic and open ended one.



Oia, Santorini (Photo: Wikimedia Commons, Simm)

César Manrique's role in the creation of the building regulations of Lanzarote could also be seen as a more modern type of holistic and systemic intervention and the creation of a Gesamtkunstwerk on a mega scale. It is equally open ended as Oia but influences at a bigger scale and has had big influence on avoiding the destructive consequences from mass tourism, preserving local identity and pride.

The building regulations regulate the building height, use of materials and color scheme.

These seemingly simple regulating interventions have a major systemic impact on the society.

Bringing the special designerly approach that is demonstrated in the concept of the Gesamtkunstwerk into our times with increasingly complex challenges is both promising and challenging.

We need to go beyond styles, formalism and composition.

We need to go the cumbersome road where we utilize large numbers of real life parameters (quantitative as well as qualitative). Unfortunately (or fortunately?) it is not easy or even possible to quantify these parameters and automate the generation of designs. Therefore we need to turn to designerly ways of approaching designing holistic solutions in very complex contexts. This implies looking and the Gestalt of complexities rather than total measurements.

I suggest the same abilities of balancing, negotiation and composition that are required in the Gesamtkunstwerk are at the core when we design for complexity today.

Approaching the concept of Gesamtkunstwerk again in a new way could clarify the merging of disciplines, the crossing of scales and the approaches to negotiations.

The new Gesamtkunstwerk is less concerned about composition than synthesis.
Less about form than interplay of actors and forces.
Less about complete design than open design.
Less about the art piece itself than involving with context.

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