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Environmental Control and Information Design: Development of the *Flow* Concept by Knud Lönberg-Holm in Collaboration with Ladislav Sutnar

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Abstract

Sweet's Catalogue of Building Construction, by architect Knud Lönberg-Holm and graphic designer Ladislav Sutnar, is well known as a pioneering work in information design. However, what is less known but essential in understanding Lönberg-Holm's work was his theoretical work in relation to environmental control. The purpose of this study is to explore the relationship between Lönberg-Holm's activities from the 1930s onwards by dealing with both his theoretical work in collaboration with his colleague Theodore Larson and his catalogue design practices in collaboration with Sutnar. For this purpose, this study focuses on the use of the term 'flow'.

During a design research project focused on environmental control, the 'production cycle' and 'production index' were developed as a means of transforming and combining 'environmental forth' into usable forms. In these studies, the term 'flow' was used in relation to various things, including energy, production, and information. However, the term first played a fully active role in relation to catalogue design when Lönberg-Holm joined Sweet's Catalog Service.

The 'mental flow pattern' representing the purpose transition of the user, the 'information flow pattern' representing the logical structure of information, and 'the visual flow pattern' representing the visual structure were all formulated by Sutnar, and design goals were determined for the establishment of balance in each. Since then, the content of the flow has been expanded and its role has been further enhanced to align 'function' and 'form'.

In Lönberg-Holm's final book, *Development Index*, the goal of productivity improvement via the production cycle was neutralized, while a harmonious system involving nature, human beings and culture was emphasized.

Although Lönberg-Holm contributed little to the environmental movement, his unique design concept focusing on the flow of information is still worth considering in terms of the harmony between nature, humans and culture that he espoused.

Keywords: *Knud Lönberg-Holm; Ladislav Sutnar; Information Design; Environmental Control*

Introduction

Buckminster Fuller (1895–1983), in his essay 'The Age of Astro-Architecture', stated that his long-time friend, the fellow architect Knud Lönberg-Holm (1895–1972), had talked with him about 'ultimately invisible architecture' in 1929, and Fuller honoured him as a forerunner in this regard:

The really greatest architect in history would be the one who finally developed the capability to give humanity completely effective environmental control without any visual structure and machinery.¹

Among the works of Lönberg-Holm,² the best known is his design of a catalogue of architectural products for Sweet's Catalog Service, developed in close collaboration with graphic designer Ladislav Sutnar, an immigrant from Czechoslovakia.³ However, Fuller's essay suggests that it is necessary to pay attention not only to his role in the design of this catalogue, but also to the fact that he explored a methodology for total environmental control.

Another reason why his concept of environmental control should be noted is that it was possibly conceived against the background of American environmentalism in the 1930s. According to S. Strum, this environmentalism, 'which was suggested by the resource and productivity auditing of the 1930s, distinguished itself from conservationism by contemplating the confluence and interaction of industrial, technological, and ecological systems and their life cycles'.⁴ Fuller's 'World Energy Map' published in *Fortune* magazine early in 1940 was a product of such environmental research. In addition to Fuller, others who related to this 'environmentalism' included engineer Howard Scott (1890–1970), who promoted a unique economic system based on energy theory, critic and historian Lewis Mumford (1895–1990), economist Thorstein Veblen (1857–1929), and Nobel Prize-winning scientist Frederick Soddy (1877–1956), who later turned his academic attention to economics. Among them, Soddy's energy-economics stood out, as he identified solar energy as a source of social wealth, arguing that life always relies on the continuous flow of energy, and thus wealth has the character of flow, quoting from *Unto This Last* by John Ruskin (1819–1900). Lönberg-Holm's concept of environmental control was formed within this background of environmentalism, and he published several articles and books outlining his design theory.

So, what relationship was there between the development of the concept of environmental control and the pioneering work of the catalogue design? This study explores this relationship, focusing on the term 'flow' because it was frequently used in both tasks in referring to a wide range of elements including information, energy, production, the production process, transportation, communication, the design process, eye movement, and sequencing in relation to catalogue design.

1. From time zoning to design for environmental control

Lönberg-Holm migrated to the United States in 1923. After teaching at the Michigan State University School of Architecture for one year, going through working as an architect, he joined the research department of F.W. Dodge Corporation in 1929 as a researcher and was placed in charge of editing the technical news department of *Architectural Record* magazine from 1931. From 1936 onwards, he was exclusively assigned to the research department of Sweet's Catalog Service, a sister company of F. W. Dodge Corporation, where he was engaged in catalogue research and production.

During this time, he was a member of Structural Study Associates (SSA), founded in 1932 by Fuller, and Congrès International d'Architecture Moderne (CIAM). In an issue of the magazine *Shelter* published by SSA in 1932, he contributed an article titled 'Monuments and Instruments' that criticized the winner of the competition to design the Soviet pavilion.⁵ He analysed the general nature of the award-winning works of one American and two Soviet architects and found that both the communist and capitalist architecture tended to 'mass-weight-dead load-permanence-immobility-impressiveness-monumentality'. As opposed to these 'Isms' he placed 'Industrial Communism' and defined its fundamental nature as 'performance, mobility, flexibility, physical decentralization, diffusion of economic activity, and the elimination of waste

in terms of time, labour and materials'. 'Industrial Communism' was a term that Fuller had proposed to represent an industrial society in which workers were freed from monotonous work by mechanization, and thus able to engage in more creative activities. SSA was an organization linked to the technocracy movement, of which Scott was one of the representatives, and, like Scott, was influenced by the concept of a 'Soviet of Technicians' proposed by Veblen.

Lönberg-Holm, like Fuller, was concerned by the loose connection between architecture and contemporary technological industry, as well as the huge time lag. However, unlike Fuller, who pursued architectural innovation through 'dymaxion', coined as the term for symbolizing his technological thought, Lönberg-Holm sought the transformation of the production process in architecture and design, rather than the construction itself. The first concept he proposed was 'time zoning'. This was an idea initially conceived as a means of preventing the spread of blighted areas following reflection on the causes of the generation of slums. According to Lönberg-Holm, 'space-time zoning is more effective than current space zoning', and 'it is necessary to eliminate obsolescence quickly'. His reasoning was as follows:

Change and obsolescence are inherent factors of industrial progression. Obsolescence, with the possible exception of that caused by crowding and physical deterioration, is an index of human progress. The problem is therefore not to find ways of reducing or avoiding potential obsolescence (staticizing (sic) rate of change), but to harmonize the growth process through effective liquidation of obsolete conditions by moving or scrapping obsolete equipment.⁶

Behind this promotion of the liquidation of obsolete conditions was the unemployment of the Great Depression era, when architects had very few opportunities to design new works. Following discussions with colleague Theodore Larson (1948–1973), who specialized in prefabrication, this idea developed into a proposal for a 'production cycle' that included design activities in the cycle that began with research and ended with elimination (or liquidation). This production cycle consisted of six phases: research, design, fabrication, distribution, use, and liquidation. They argued that to facilitate the realization of new and productive designs, 'liquidation' of old technology and forms was essential.⁷

Based on the idea of this production cycle, between 1936 and 1938, Lönberg-Holm, together with Larson, researched the building industry and formed an 'environmental control' design theory.⁸ As a result of their studies, they regarded design as environmental control aimed at improving human life, arguing that the purpose of environmental control was 'the increase of life for the human organism – the elimination of waste in metabolism', and that 'this is expressed in an increasing surplus of human energy which is released from drudgery and destructive forces of an uncontrolled environment and becomes available for the promotion of human culture'. Clearly, the aim of the abovementioned 'Industrial Communism' is reflected in this passage. According to Lönberg-Holm and Larson, the object of environmental control was 'the environmental forces', which at first were roughly divided into two categories: 'human activities – biological and social forces' and 'matter – solids, liquids, gases, electromagnetism, and radiation'. Later they were divided into three categories: 'physical' (e.g., the geosphere, atmosphere, and atomic sphere), 'biological' (e.g., bacteria, plants, animals, and man), and 'socio-economic' (e.g., products, organizations, and concepts). These forces were also referred to as 'variable and changeable forms of energy representing factors that are involved in all phases and all fields of production', and they concluded that 'industrially, the problem is the most effective transformation of such forces into flow patterns (productive forms) that will best conform to the continually changing requirements of use'.⁹

A further development of this idea was the ‘production index’, which was embodied as a tool that applied not only to the building industry but also to the entire range of industrial activity. In 1940, Lönberg-Holm and Larson published a booklet titled ‘Planning for Productivity’, which included a production index that was designed to ‘correlate various environmental forces and various phases in the cycle of production’.¹⁰ The production index consisted of six categories, ‘production fields, control forms, man, animals, matter, and the cosmos’, in addition to the production cycle. They explained that this index was a product of ‘the effort to envisage essential relationships and thereby to develop a check list of all items of information...’, and that ‘it became possible to abstract the terms of reference which are applicable in any branch of production, technical, industrial, or cultural’.¹¹ However, because the booklet was published just before Nazi Germany’s invasion of the Netherlands, it had little impact.

2. Development of catalogue design and variety in the concept of *flow*

In 1936, when Lönberg-Holm wrote ‘Design for Environmental Control’, he was transferred from the editorial section of *Architectural Record* magazine to Sweet’s Catalog Service, a division of F. W. Dodge Corporation. The catalogue comprised 5,423 pages presenting products from more than 1,100 vendors, and 14,500 copies were printed in 1938.¹²

Therefore, a system enabling the efficient use of vast amounts of information was urgently needed. After his transfer, Lönberg-Holm immediately began research on basic standards that could be applied to the content and format of the catalogue.

A report titled *Catalog Design Standards*, dated June 1936, was the first outcome of this research. The report defined the objective of catalogue design as ‘the control of the catalogue’s function for precision in use’, and stated that ‘such control achieves the elimination of waste in terms of human and mechanical energy. Waste is eliminated through specialization, standardization, and integration.’ It described the design of catalogues using the term ‘flow’ as follows:

The catalog user’s point of departure is a specific need. He approaches the catalog in search of specific information. His attitude, or mental flow pattern, is expressed in the questions: “WHAT? WHERE? HOW?” The objective of catalog design is the control of such information through design flow patterns which will facilitate the desired mental flow patterns. The criterion is to maximize the efficiency in catalog use.¹³

In this way, the ‘flow’ concept plays a vital role in the functional analysis that is presented in the report. Lönberg-Holm saw the user’s cognitive behaviour as ‘mental flow’, and the design of the information in the catalogue as a means of facilitating desirable mental flow patterns. The relationship between the two was suggested by demonstrating the correlation between the locus of eye movement and the logical order of information, citing an experiment using a device to measure eye movement.

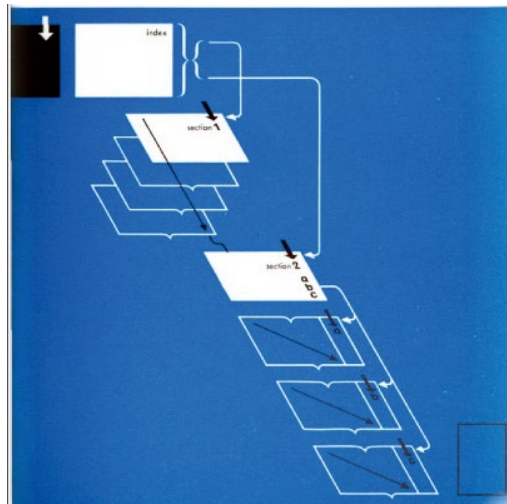


Figure 1. An example of the use of visual flow patterns in catalogue design.

Catalogue design based on the flow concept was introduced in 1941, when Sutnar was hired by Sweet's Catalog Service as an art director. Lönberg-Holm was exploring the control of information flow, and identified the three elements he considered essential to good catalogue design: the cover, the index, and the visual unit.¹⁴ Sutnar provided the 'visual flow' that enabled the user's eye to access the desired information by navigating from the cover through the index to the visual unit (Figure 1). In 1943, Sutnar published a booklet titled 'Control of Visual Flow' in which he summarized the main principle underlying the process:

Good design implies control of visual flow. Such control may be accomplished by simplification and coordination of design factors for the most efficient and continuous transmission of information.¹⁵

Sutnar provided examples of design patterns that 'lead the reader's eye into the desired path for greater speed and efficiency in reading', referring to signs and signals on the road that 'regulate traffic for greater speed and safety in driving'.

In 1947, Lönberg-Holm and Sutnar co-authored *Designing Information*, which was published as three articles in *Interiors* magazine and attempted to enhance the process of catalogue design by providing a more general visual design principle. The function of a visual pattern combining visual elements is summarized in the two concepts of 'visual selectivity' and 'visual continuity'. While 'visual selectivity' is promoted by emphasizing, indicating, separating and combining information by controlling blank space, colour, line, shape, and texture, 'visual continuity' is realized as a harmonized pattern in various media such as booklets, books, posters, and exhibits. Therefore, 'visual continuity' can be regarded as an extended version of 'visual flow'.¹⁶

Later, the concept of 'flow' was revisited in the final book co-authored by Sutnar and Lönberg-Holm, *Catalog Design Progress: Advancing Standards in Visual Communication*. In this book, a new slogan, 'Form, Flow, Function' was introduced, and thus the term 'flow' was included as a key principle alongside the fundamental design concepts of 'form' and 'function'. Moreover, the flow pattern was expanded so that it could include other elements as follows:

The flow pattern of any sequence adopts its form, reflecting function, and its variety of forms may be observed not only in information flow, but in man (the nervous, digestive, reproductive systems), in industry (production flow), and elsewhere.¹⁷

By way of background to the expansion of the flow theory, it is noted that it overlaps with the time when information theory and cybernetics first appeared.

3. Towards a correlation among the cosmos, humans and culture through the flow of information

As described above, Lönberg-Holm and Sutnar had consistently put forward a design theory of information with ‘flow’ as the key concept, along with the practice of catalogue design.

In 1953, Lönberg-Holm and Larson published *Development Index*, based on *Planning for Productivity*, which was ‘a proposed pattern for organizing and facilitating the flow of information needed by man in furthering his own development’.¹⁸ Comparing the two publications, it is clear that the central idea of the production index had been ‘revised and reformed’. The explanation of the production cycle that was part of the production index in *Planning for Productivity* was nuanced in the following way:

In order to achieve rhythmic and balanced continuity in development, it is necessary to continuously erase the old one with the appearance of the new one. Such continuity requires close coordination of the research and elimination stages of the development cycle. These definitions of development do not imply that the old thing is deliberately destroyed simply because it is old by something new just because of the novelty or the change as “fashion”. It has never been possible to create. It should be used clearly and continuously, as long as the old ones follow the needs. The purpose of the new forms and patterns is to serve the emerging needs of humans who cannot cope properly with the existing forms and patterns.¹⁹

As for the index in *Development Index*, the seven categories that had been proposed in *Planning for Productivity* were grouped into three categories: ‘cosmos’, ‘man’, and ‘culture’. These changes suggest that the social and economic conditions underlying the initial idea of environmental control put forward by Lönberg-Holm had changed. In the Depression era of the 1930s, there was an urgent need to address both unemployment and productivity. Thus, the production cycle and the production index were developed for this purpose. After the Second World War, the context in which the production index was used changed, and as a result the focus was no longer on ‘productivity’, but on ‘development’. The three main categories were defined as ‘the environmental resources which man has available for development purposes’, and the relationships among them were explained as follows:

Each category is a distinct system.... Yet all three must be considered as having an essential unity. Culture cannot exist without man, and man clearly is a part of the cosmic system; culture grows out of man just as man has grown from the cosmos²⁰ (see Figure 2).

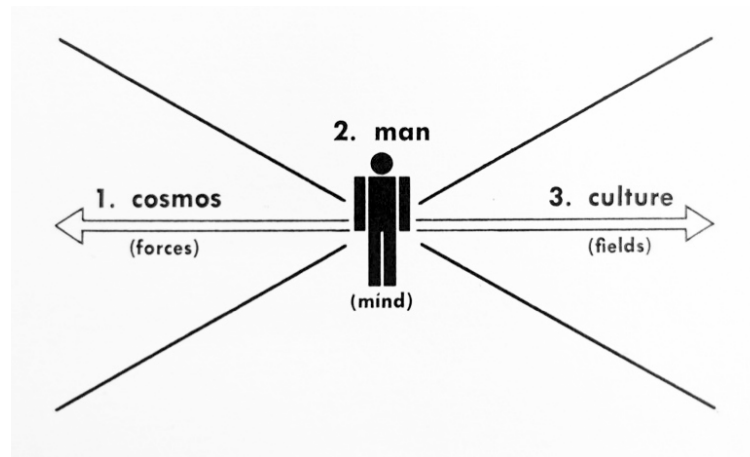


Figure 2. A diagram in *Development Index* showing the relationships among the cosmos, man, and culture.

In summary, in *Development Index*, the importance of the production cycle was reduced, and instead a harmonious system involving nature, human beings and culture was emphasized. The booklet was sent to several stakeholders, including Sigfried Giedion (1888–1968), who wrote the following comment on the human-centric diagrams in *Development Index*:

I am also so glad that the emphasis [sic] is now given to the flow of information on need and that the poor man is placed not just between the cycle of production but between cosmos and culture. Maybe we are coming much closer by this kind of hierarchy of values.²¹

Conclusion

The notion of a ‘flow of information’ has long existed in the domain of information design for catalogues and in theoretical work related to design for environmental control, which developed from an idea of time zoning into the *Development Index*. The gap between architecture and industrial technology was the main problem in Lönberg-Holm’s eyes, and enhanced catalogue design was seen as a way to overcome this problem. The production cycle and indexes, which were conceived as thought tools for exploring environmental research, were also based on the concept of ‘flow of information’.

The expansion of the meaning of the term ‘flow’ to include various applications reflects the dynamic relationships among various elements of life. Initially, ‘flow’ was used to refer to fluidity, mobility, in reaction to unchanged, monumentality. Later, it was also applied to visual design and was embodied as an aesthetic construction principle that largely characterized Sutnar’s design work.

Unlike Buckminster Fuller, who was one of the most prominent architects in the rise of environmentalism that started in the 1960s, Lönberg-Holm barely contributed to the environmental movement. However, his unique design philosophy is still worth looking at because of its emphasis on the importance of harmony between nature, human beings and culture.

Acknowledgements

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Notes

1. B. Fuller, 'The Age of Astro-Architecture,' *Saturday Review*, July 13, 1968, p. 42.
2. The overall scope of Lönberg-Holm's work has recently come to light through an exhibition held from 6 May until 1 August 2014 at the Ubu Gallery in New York and a book published in 2018 titled 'Knud Lönberg-Holm: The Invisible Architect'. S. Sturm, *The Ideal of Total Environmental Control: Knud Lönberg-Holm, Buckminster Fuller, and the SSA*, Routledge, 2018.
3. The two men's collaborative work is discussed in the following articles: S. Heller, and P. Makovsky, 'Historical Critique: Sutnar & Lönberg-Holm', *Critique*, Summer, 1999, pp. 38-47; P. Makovsky, 'The space of information: Collaboration between Theodore Larson, Knud Lönberg-Holm, and Ladislav Sutnar at Sweet's Catalog Service, in *Ladislav Sutnar-Prague-New York-Design in Action*, Museum of Decorative Arts in Prague & Argo Publishers, 2003, pp. 338-48.
4. S. Sturm, *The Ideal of Total Environmental Control*, p. 127.
5. K. Lönberg-Holm, 'Monuments and Instruments' *Shelter*, May 1932, p. 5.
6. K. Lönberg-Holm, 'The time-zoning as a preventive of blighted areas' *Record and Guide* June 24, 1932, p. 6.
7. Mary van Kleeck, Mary L. Fleddéus, *On economic planning: Papers delivered at the regional study conference of the international industrial relations institute (IRI)*, New York, November 23-27 1934, 1935, pp. 254-256.
8. K. Lönberg-Holm and C. T. Larson, Design for environmental control, *The Architectural Records*, August 1936, pp. 157-159.
9. K. Lönberg-Holm and C. T. Larson, Industrialization of housing, *Technical America*, March 1938, p. 10.
10. K. Lönberg-Holm and C. T. Larson, *Planning for productivity*, International Industrial Relations Institute, 1940.
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13. K. Lönberg-Holm, *Catalog design standards*, June, 1936, n.p.
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15. L. Sutnar, 'Controlled visual flow,' *design and paper*, 1943, n.p.
16. K. Lönberg-Holm and L. Sutnar, 'Designing information,' *Interiors*, February, March, April, 1947.
17. K. Lönberg-Holm and L. Sutnar, *Catalog design progress: advancing standards in visual communication*, Sweet's catalog service, 1950, n.p.

18. K. Lönberg-Holm and C. T. Larson, *Development index*, University of Michigan, 1953. n.p.
19. K. Lönberg-Holm and C. T. Larson, *Development index*.
20. K. Lönberg-Holm and C. T. Larson, *Development index*.
21. Letter S. Giedion to K. Lönberg-Holm, and T. Larson, March 18, 1953, C. Theodore Larson Papers, Bentley Historical Library, University of Michigan.

Author Biography

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Hisayasu Ihara is a Professor at the Faculty of Design, Kyushu University, Japan. His research field is the history of information graphics in the 20th century, including isotype, and the development of international graphical symbols in the 1960s. He co-authored *Isotype: Design and Contexts 1925-1971* (London: Hyphen Press, 2013). His most recent research project, conducted with a typeface designer and a psychologist, focuses on legibility and readability tests for the design of Japanese universal fonts.