

Jan Åke Granath

LicArch. PhD

Assoc. Professor

Chalmers University of Technology

School of Architecture

Division for Industrial Architecture and Planning

Director

AoT Arkitektur och Teknik AB

Göteborg

Paper for The International Seminar on

Industrial Buildings

Unrevealed Potentials

Report '92

Vienna, 10th-12th of June 1992.

Jan Åke Granath
LicArch. PhD

Design Process: Combining Social and Lean Principles

Designing systems of production that develop those who work in them while they also produce better products more efficiently is a task that requires the development of new knowledge, methods and languages. Most important, however, is a new attitude. We must discard sectors of our traditional knowledge, ideas that permeate our assessments of what is well-suited to its purpose in our society. Unless we develop new frames of reference, no innovative production system based on other assumptions than the traditional ones will ever be able to get a foothold, since it will be evaluated using traditional measuring sticks in the traditional fashion.

The limits of the acceptable vary, both between cultures and over time. Today, we consider it acceptable to wear young people out at repetitive jobs that offer no opportunity for learning or self-realization. We say this practice is necessary due to the pressure of foreign competition, high costs and the time it takes to manufacture a product that the Japanese can produce in less time. We cannot afford any other system of production, we say. To reach beyond our own conceptions and design production systems that are better suited for young well educated generations to work in, is a difficult task full of frustration and mistakes.

I will share some of my own experience from this kind of design work with you. In two recent design project I took part in, the design of a final assembly plant for Volvo in Uddevalla and the redesign of the Torslanda plant, the problem was not defined in regular terms for this kind of design work. The design work was characterized by the following:

1. The design problem has not been "set" or formulated in terms that might serve as a program for architectural work.
2. The problem has been formulated as a number of goals concerning qualities in the future production system; that is to say, not even the technical/ technological or organizational features of the system have been decided, other than with respect to the qualities the solution should possess.

The vision that the management and unions in Uddevalla could agree on was: *"a holistic approach to an efficient workplace with human qualities for the manufacture of quality products" and "technology, process information and environment aspects shall be well integrated in the complete factory"*.

The means we used to deal with this situation I will describe as a process of *Learning through Collective Design and Reflection*.

By *collective design* I mean a design process where designers from different disciplines develop a *joint conception of the problem at hand* and create new knowledge together and a new common repertoire of solutions and examples within the group.

Collective reflection is a concept of my own invention. It takes its point of departure in Donald Schön's concept of *reflective behaviour* and expand it above the individual level. I will also use Schön's terms *reflection-in-action* and *reflection-on-action* in the following text.

So, what are the characteristics of a design process that makes mutual learning possible? What are the *organization, methods and tools* that are appropriate for such a process? In my own praxis I have found some factors that I find crucial. Those factors are:

1. *Integration*. An *integration* of different branches of knowledge in the design work. That is, integration not only of various actors in the building process, but of all the actors who work in a wide variety of separate design activities.
2. *Language*. To carry out design work in the form of a *dialogue* between actors who neither share a common language nor traditionally share the same praxis is very difficult. What you need is a common *language* between the actors.
3. *Reflection*. You need to find methods that encourage a *reflective approach* to design work and give rise to solutions that are based on *reflection on the conventional wisdom*.
4. *The expert role*. Finding methods that make use of each actor's *expert knowledge without creating a mystique of expertise*.

Integration

The *integration of knowledge* in design work is an old idea in Sweden. Integration between union representatives and management and between experts and users has been advocated by many researchers both within architecture and other disciplines.

In the above mentioned projects the actors were not invited entirely as union and company representatives and not even entirely as users of the production system, but foremost based on different "expert" knowledge. There were assembly-workers,

production engineers, experts on logistics, builders and building engineers, organization experts, architects, economists, social scientists, pedagogues etc. All these took, from time to time, active part in the design work.

Language

The Uddevalla project gave us numerous examples of the importance of finding means of communication between actors of different professional backgrounds. In a post-project seminar, the leading production engineer stated that Uddevalla was the first project in which the ideas of a human-oriented production system had been communicated effectively to all actors, regardless of background. He went on to credit us academic architects with having helped make this possible. What exactly had we architects contributed to this essentially production technical project that could make such a difference?

We architects introduced media and languages into the process that were easy for all the actors to grasp. When we illustrated prospective work stations in the form of cardboard models, perspective drawings and coloured pictures, everyone could see for themselves what was being proposed. These media also made it possible, in Schön's terms: to impose new order and new patterns on the reality the models represented. The model responded immediately, in a way everyone could understand and discuss in a reflective "conversation". The members of the group who gathered around the model came from different backgrounds, and so their reflections on the responses the model gave differed. The common language of the model allowed all to reflect in the jointly experienced situation. Engineers could use economists' or assembly workers' *reflection-in-action* as a point of departure for their own reflections. Through *collective reflection* in the design situation they were able to generate *new knowledge* that differed from their previous personal and established knowledge.

A reflective behaviour

The meeting between these different actors created new common knowledge. None of them took part in the process with the conception that they entirely knew how to deal with it, and if they did, they very soon realized that other participants had a lot of experience and knowledge that they earlier had overseen. They went into the process with only the formulated vision as a measure stick for problem solving. They had a reflective approach to the design work. As I see it a collective reflective approach to design is characterized by an active conversation with the design object and between the participants. From this follows a mutual learning and increase of self esteem and responsibility for solutions taken.

The role of experts.

I believe there is a need for an expert role that is different from the traditional. The expert should not see the design process as a win/lose game, nor should he protect himself from criticism or the client from "bad news". The expert should instead be open, reflecting and create a climate for mutual learning with the co-designers, including the client. The American work scientist, and good friend of mine, Hy Kornbluh have called this kind of expert role "an enabler of learning".

The result of the design process

As the design work went on in Uddevalla, the participants came to the conclusion that, what we sometimes call a socio-technical approach to designing the production system, would best fit the vision of a production system that had both economic, humanistic and productive qualities.

One of those who first formulated the socio-technical approach, Eric Trist at Tavistock Institute in London, put emphasize on *good work*, which he defines as work that presents the individual with a *challenge*, that affords opportunities for *continual learning*, that lets the individual use his *judgement* and make *decisions*, that earns the worker *esteem and respect*, that is somehow *related to its surroundings* and that inspires *hope for the future*. Unlike scientific management the socio-technical approach does not advocate any specific technical or organizational solutions. What is important are the qualities of the production system and that you use both technological and organizational solutions to reach your goals.

The design group in Uddevalla arrived at a solution for their production system that they regarded to have qualities very close to this. They did this through a collective reflecting way of working and they learned something through the whole design-process. In every instant of the process they had new problems to face that none had given them ready-made solutions to.

As I see it, a socio-technical conception of production gives the *production process* characteristics similar to those of the design process I have described here. Socio-technically inspired production systems utilize human beings' capacity to reflect in the situation as well as the skills they have acquired through theoretical studies and/or practical experience. Both design work and production involve learning and a process whereby prior conceptions are questioned and refined.

Turning now to consider the most salient alternative to socio-technical solutions, namely, "lean production", we find that it, too, is of general applicability and not specific to any one technical or organizational solution. Lean production aims to achieve effective utilization of resources in all phases of production. As practiced in Japan, it is also reflected in quality consciousness on all levels - in the nation, the company and the individual. In concrete terms, it comprehends product design, the organization of work, economy of material and intellectual resources, and a search for

culturally appropriate social and economic structures for the company's relations with its employees and with society at large. What the solutions have in common is generally high levels of productivity and quality.

In my opinion, Volvo's investment in socio-technical production represents an effort to arrive at specifically Swedish solutions that permit efficient production of automobiles of high quality in Sweden. In this sense the Uddevalla concept is a "lean" solution that in addition to its Japanese version is conscious of not using up human resources. It is my belief that the experiences gained in the Uddevalla factory and other socio-technical experiments in Swedish industry will guide industrial production in knowledge-oriented societies of the future. Perhaps we in Sweden will not be the ones to develop these ideas further, but I would not rule out the possibility that Japanese industry, in response to trends toward increasingly "westernized" values among their youth, which include a greater emphasis on the value of the individual, may find them of interest. I know, as a matter of fact, that this is already the case.

In forward-looking discussions, researchers and production engineers have described "the Swedish model" as the next step after "lean production" under the apt designation of *reflective production*.

Reflective production will differ from the current *lean concept* through its extensive use of human intellect and ability of problem solving in actual production. This will be a resource that, through continuous learning in the production situation, will increase throughout time and contribute to higher quality, more profit and less wearing out of human resources.

I believe however that a reflective and integrated design-process is the best way to design such reflective production system.

References:

Ellegård, Kajsa. 1989. Akrobatik i tidens väv: En dokumentation av projekteringen av Volvos bilfabrik i Uddevalla. *Choros* 1989:2. Göteborg: Kulturgeografiska institutionen, Göteborgs universitet.

Granath, Jan Åke. 1991. *Architecture, technology and Human Factors: Design in a Socio-Technical Context*. Doctoral thesis. Göteborg: Chalmers University of Technology.

Henriksson, Lars. 1991. Japanska undret är en mardröm (The Japanese miracle is a nightmare). *Göteborgs-Posten*, October 21.

Holusha, John. 1989. No Utopia, but to Workers It's a Job. *New York Times*, January 29.

Johannessen, Kjell, Rolf, Bertil. 1989. *Om tyst kunskap: Två artiklar*. Didaktisk forskning i Uppsala nr 7. Uppsala: Centrum för didaktik, Uppsala universitet.

Johnson, Robert E., Mansour, Yasser. 1988. *Aspects of Rules and language in Design Decisions*. Ann Arbor, Mich.: College of Architecture and Urban Planning, The University of Michigan.

Kornbluh, Hy. 1989. *Participatory Workplace Design: Toward a Redefinition of Professionalism in Industrial Architecture and Engineering*. Paper for the conference Industrial Architecture and Engineering Design: When People Matter. A Nordic International CIB-UIA Symposium in Sweden August-September 1989. Ann Arbor, MI: Labor Studies Center, University of Michigan.

Rowe, Peter, G. 1987. *Design Thinking*. Cambridge, Mass.: The MIT Press.

Sandholm, Lennart. 1981. *Japanese QC Circles: A Remedy for West's Quality Problems?* The Union of Japanese Scientists and Engineers (JUSE).

Schön, Donald A. 1983. *The Reflective Practitioner: How Professionals Think in Action*. New York, N Y: Basic Books Inc.

Simon, Herbert. 1981. *The Science of the Artificial*. 2nd ed. Cambridge, Mass: The MIT Press.

Wallin, Leif. Tisell. Johan. 1991. Företagsfilosofin japanernas styrka (Corporate philosophy, Japanese "secret"). *Göteborgs-Posten*, September 15.

INTEGRATION OF KNOWLEDGE

A COMMON LANGUAGE

REFLECTION

THE EXPERT ROLE