

# **The Future Factory**

## **- A concept designed by women and young people**

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### **Abstract**

In focus in this paper is the Future Factory, a research project involving women, young people and other stakeholders in workplace design and development. Drawing on the idea of 'good work', efficient as well as attractive factories and interactive methods, the vision of the project is to both develop methods for such processes as well as to design a Future Factory on a conceptual level together with the participants. These participants include young people and women, as they are not attracted by factory work and face problems when working in industry. Management and union representatives are other stakeholders included in the project. In this paper we present the background of the project as well as the interactive methods used. These include future work-shops as well as the use of personas and scenarios to stimulate engagement of the participants. We also present some of the results, both in terms of the methods used and the participants' views on 'good work'. The results are that the methods used did stimulate active participation, that they facilitated the focus and discussions on different problem situations. As a result of future workshops, it can also be concluded that young peoples' view on industrial work can be described in terms of a utopian as well as a dystopian vision. Both groups of participants indicate that 'good work' should include possibilities of learning and development, tasks that are challenging and stimulating as well as autonomy. Furthermore, work should be carried out in teams, manufacturing facilities are important for the workplace culture and should contribute to healthy and attractive factories. Based on these results, it can be concluded that there are possibilities of developing methods that contribute to sustainable and attractive work places for both women and men.

### **INTRODUCTION**

In focus in this paper is the Future Factory, a new and perhaps somewhat different research project, aiming at developing a vision of future industrial work together with stakeholders that normally are not included in organization and production development and design. Inspired by Volvo's famous "Your Concept Car", a project in which women exclusively were involved in the design of a conceptual car, we designed a research project involving women, young people and other stakeholders.

This project draws on the idea of 'good work', which is based on a field of research with profound historical origins; e.g. Thorsrud and Emery's (1969) socio-technical school. One example of how their ideas got a foothold in Sweden is the concept of 'good work' formulated by the Metal workers union in 1985 (Metall, 1985), in which nine criteria were presented; 1) job security, 2) a fair share of the production earnings, 3) co-determination in the company, 4) a work organization for cooperation, 5) professional know-how in all work, 6) training – a part of work, 7) working hours based on social demands, 8) equality at the work place, and 9) a working environment without risk to health and safety.

Drawing on the concept of 'good work', our vision is to develop methods that enable the

integration of goals of both efficient and attractive factories. The idea of the efficient and productive factory is not new. It is a tradition based on Taylor's (1913/1972) ideas of short-term cycles of work that can be performed by un-skilled workers. Since then, the guiding star of industrial production has been to fight low productivity. At present, such efforts are often labelled Lean Production. What differentiates the current industrial context from that of the time of Taylor, however, is for example that there are now increasing demands of continuously developing new products and of redesigning the production systems (Bellgran & Säfström, 2006). There are also flexibility demands; to offer flexible and changing services as well as adaptation to customer's needs. Additionally, in contrast to Taylor's ideas, this development means that there is a need for highly qualified and skilled workers. Companies must provide possibilities for learning, skills development, innovation, entrepreneurship, and creativity, even though it is still the logic of efficiency that often rules (Svensson, Brulin & Ellström, 2002).

These tendencies point at the importance and possibilities of integrating goals of increased productivity with goals of improved working environment. Organization concepts described in the rich flora of international management literature, point at such possibilities, provided that

they are implemented in the right way. There are for example hopes that modern organization concepts including a high degree of learning and skills development will create working conditions that counteract stress and work related ill-health. Terms like sustainable and healthy organizations are frequently used in the debate. However, in Sweden, until today, work environment issues have been motivated by legislations and regulations.

One obvious sign of the need for a new type of organization and production development is the fact that industry does not attract young people, in spite of higher wages than in many other sectors. Young people in Sweden seem to value other factors than high wages; e.g. social networks and activities that provide authenticity and satisfaction (Ziebertz & Kay, 2005; Furth, 1999; Lindgren, 2005). This is something we will explore further by inviting young people to be part of the design of a future factory.

In this project, in addition to the youth perspective we also draw on the gender perspective. Sweden is well-known for its efforts to create gender equality. Historically, however, the agenda has concerned the upgrading of so called women's work and focus was not so much on creation of equal working conditions (Hirdman, 1988) In Sweden, women work to the same extent as men, but the percentage of women working in industry is still low, about 20% (Statistics Sweden, 2007). Additionally, women in Swedish industry are more often than men victims of serious work place accidents (AFA, 2007). This has been an argument to prevent women from working in industry; i.e. that the work is too heavy for women. However, the largest problem faced by women in industry is not that the physical working environment, the machines and tools are not designed for them; it rather concerns the work place culture. The culture of work places in industry tends to be characterized by male bonding; identification with male work colleagues and exclusion of others, i.e. women, office personnel and management (Collinson, 1992; Roper, 1996; Kanter, 1993). Also, 'women's work' in industry is often more monotonous than that of men; women are often bound to a machine (Abrahamsson, 2002; Baude, 1992). However, the largest problem is the gendered division of labour, meaning that there is a need to overcome gender segregated work organizations and that gender perspectives need to be used as a tool in organizational change processes (Abrahamsson, 2000).

The project presented in this paper draws on theory and ideas found within human work science, organization and gender studies as well as modern production development. Based on our understanding, this means that work place design concerns not only the development of the physical work environment and the production system, but

also social and cultural aspects like gender identity, work identity, and work place culture (Abrahamsson & Johansson, 2006). Based on these perspectives, in this project we include women and young people as well as other stakeholders such as union and management representatives in the design of a future factory. This means that there is a need for a research approach that is based on participation of and collaboration between participants and researchers; i.e. interactive methods. Aiming at investigating what methods that are useful in this project, in this paper we will present this research approach as well as the way the methods have been used and tested. In the end of the paper, we describe and discuss some of the preliminary results of the project together with its future challenges.

## RESEARCH APPROACH

In this section we both describe and discuss the approach and the methods, *how* we have used them as well as their benefits and pitfalls. The future factory project is based on an interactive research approach, which means that we invite stakeholders to participate within the different phases of the project. The project is divided into four partly parallel phases; 1) knowledge review, 2) pre-study, 3) design work, and 4) analysis and discussion. In the initial phase we have conducted field studies including interviews and observations, as well as a study of extant research on gender and workplace design. In the second phase we have until now completed a mapping of women's and youth's preferences based on workshops with youths, trade unions and management representatives. This means that we have invited the participants to define the current situation and discuss problems. During the third phase, we plan to bring together a team of women designers, architects, engineers, production technicians and organization experts in the design of the future factory concept. The final and fourth phase includes the analysis and the discussion of the result with the different stakeholders.

Participatory design spans over a wide field of theories, practices, analyses, and actions with the goal of working directly with the users and other stakeholders in the process (Muller & Kuhn, 1993). Participatory design is an approach that attempts to actively involve the end users in a change process to ensure that the end result better meets their needs (Bødker et al, 2000). The approach is used in product- and interaction design, as well as in urban design, architecture, and planning as a way of creating environments that are more responsive and appropriate to people's cultural, emotional, and practical needs. In the Scandinavian tradition of the

1960s and 70s, the objective was user empowerment and democratization with inspiration from Action research and Socio-technical Design (Bødker et al, 2000). Participation of researchers in companies concerning reorganization of labour and work place design has taken place in Sweden and is described in extant research, e.g. Volvo's plant in Uddevalla, where researchers took an active part in the design of the production system (Sandberg, 2007) and in food manufacturing industry (Steen & Ullmark, 1982) as well as UTOPIA, work place design for graphic workers (Ehn, 1988; 1993). In participatory design present, potential and/or future end-users are invited to cooperation with researchers during a change process.

As its name implies, the approach necessitates active participation of the stakeholders in the research work. Our ambition is to carry out research together with participants and thereby create new knowledge about industrial contexts. Participation engages people in examining their own knowledge, understandings, skills and values, as well as the ways they interpret themselves and their actions (Kemmis & McTaggart, 2000). This is described as a process by which each individual in a group tries to get a handle on the ways his or her knowledge shapes his or her sense of identity and how that knowledge frames and constrains his or her action.

Within the field of participatory design, the metaphor of games has been used as a way to constitute participation (Brandt, 2006). The *Persona* and *Scenario* techniques are two approaches that aim at understanding and organizing participation in a systematic way, but still by ways that might be considered as games. The techniques can be applied in a Future workshop to stimulate and engage the participation further.

### **Future Workshop**

*Future workshop* is a well-known technique that aims at sharing experiences, knowledge and purposes between different stakeholders in a group session (Brandt, 2006). A workshop includes a group of people that have gathered to discuss an issue or a problem, but a future workshop also aims at developing a future vision (Drewes Nielsen, 2006). Distinguishing is the synergy that occurs between the participants as in sharing of ideas and discussions, as the participants stimulate each other to reach further (Bruseberg & McDonough-Philp, 2002).

The technique is good for exploration of a subject/an issue or a problem, the gathered information is qualitative and includes ideas, views and motives for action rather than figures and facts (Bruseberg & McDonough-Philp, 2002). The Future workshop approach is divided into three different phases (Drewes Nielsen, 2006; Brandt,

2006) with a complementary initial phase, suggested by Ehn and Sjögren (1991) ; 0) the preparation phase 1) the critique phase, 2) the Utopia phase, and 3) the implementation phase. The preparation phase consists of an initial mapping of the situation, as in observations, focus group and/or interviews. The first phase follows a traditional pattern during which the participants give short statement about the current practice, for instance a work place. The statement are then grouped and placed in order of precedence. During the second phase the participants create future scenarios about their wanted future (work) situations. The third and final phase is to return to the present situation and try to implement the visions and ideas from the second phase into the current practice. Each phase ends with discussion and reflection of the shared knowledge.

In the project we have carried out one future workshop with trade union representatives and another one with young persons. In the first one we performed the first and second phase; critique phase and utopia phase. The objective was to understand the present problem situations, as the participants experienced it. Since the project does not deal with one particular work place, the implementation phase was not part of the workshop.

The second workshop was a future workshop with young people. This activity was inspired by Future workshops but the focus was on the utopia phase; the creation of future visions. Young people of course have no professional knowledge or experience of industrial work, but they do have important understandings of young peoples' expectations and values. We sought after their perspectives on future work life in an industrial context. The scenery was 15- 20 years into the future. We wanted them to describe their work situation given that they were working in an ideal manufacturing industry. After an initial discussion the adolescents (18 years of age) wrote individual narrative scenarios about their ideas on the future work.

### **Persona**

Persona is a qualitative method that is useful especially during the critique phase in order to stimulate discussion and reflection of the current situation.

Cooper (1999) introduces the term *persona* for what he describes as a fictitious description of users; a technique to describe and communicate users to others. The aim is to overcome difficulties in communicating needs and problems and to increase the understanding of the same. The persona method is a tool to achieve a mutual understanding of the people that the result is intended for instead of individual perspectives among a development team (Nielsen, 2004). In the

project we used field data such as interviews, observation and secondary data as input to create three personas; archetypes of problem situations in an industrial context. Others use terms like profiles (Miles & Huberman, 1994), user-archetypes (Mikkelsen & Lee, 2000) to describe similar procedures as the persona method.

The basis of a persona is field data but each persona has a name and personal details that are fictitious; i.e. analytical constructions to support the understanding of the situation or the problem that the persona is developed from. Each persona is defined with a name, age and a picture (Cooper, 1999). Additional information can be personal information, work environment, attitude and motivation to work and some supplementary personal details that makes each persona memorable and unique. A persona should also be defined by personal and practical goals and by the relation to the system that is to be developed as well (Nielsen, 2004).

Our intent is to use the personas to stimulate engagement in the activities with different stakeholders. From our understanding people that participate in industrial development today are not aware of all of the perspectives of different stakeholders and we see the method as one way to increase the understanding of the same. One of the main advantages of using the persona technique is the creation of a mutual understanding of the problem situation (Nielsen, 2004). Other benefits are stimulated discussions and engagement in the development team (Brandt, 2006). In our project we conducted interviews and observations, as well as used secondary data like statistics to get an initial understanding of the problem situation. After analysing the field data we identified aspects that we wanted to explore further together with the participants. The aspects, or the problem situations, were presented as personas.

One problem of the method is that it is not that well-known and therefore may cause problems; people that are used to work with numbers and figures are hard to persuade of the benefits with the method (Nielsen, 2004).

We noticed similar obstacles in the future workshop with union representatives; the participants felt that they already were aware of the problem situation and thus claimed that the personas did not stimulate the discussion. The observational protocols show that the discussion focused on the presented personas and hence the problem situations. As we see it, thus, the personas did indeed stimulate the discussion and helped the participants to focus on particular situations. One problem might be that the focus is only on the presented situations and therefore some important issues might be missed if the pre-study is not meticulous enough.

A continuation of the method is to use scenarios, sometimes described as bringing a static character to life (Nielsen, 2004).

## Scenarios

The scenario-technique is used in many fields including human factors and ergonomics. A scenario describes particular interpretation of a use situation, but is still deliberately incomplete in order to open up for negotiation and change (Carroll, 2000). The term scenario is used in connection to development processes; with focus on change in work and workflow, for development of websites, with focus on wanted future situations, and with focus on end-users for design work (Carroll, 2000). Scenarios can also be useful in formulating a strategy; it can be used in policy development, conflict resolution, group learning, and rehearsing management decision (Rajalahti & van der Heijden, 2006). Scenarios can be written (Carroll, 2000) or acted, or film sequences that are explored during for instance a future workshop session (Brandt, 2006). The reason for using methods like scenarios is that qualitative data organised into incidents or stories, have a concrete, vivid, meaningful flavour that often proves more to a reader, another researcher, a policymaker, a practitioner, than pages of summarized numbers does (Miles & Huberman, 1994). There is also the view that scenario construction can restructure the current situation in order to provide for new insights (Schön, 1995). They can also be useful to support planning and decision-making by describing future conditions in which the organization may have to operate (Rajalahti & van der Heijden, 2006).

In the future workshop with young people the objective was, as mentioned above, to create future scenarios. Our intent is to use the scenarios as input for the continuous work in the project. In the next section we describe some of the results from using the methods that the activities in the project have provided so far.

## RESULTS

Our field study resulted in three personas that each represents an identified problem situation in an industrial context. Here is one example from the project; Anna is the persona of a young woman that has difficulties in coping with her heavy and stressful work situation:

*Anna is 22 years old and she has been working at the factory X for 1, 5 year. Anna is working in a team of 13 people in which the average age is 26 years old. She works at a motor assembly line; each work moment is 3 minutes and 40 seconds long. During that time Anna is supposed to perform the assignments that her station is assigned to. If she, or someone else in her team, does not accomplish the task in time, a bell signals and the line*

stops. During the work the line moves forward, this means that Anna, who is quite short, have difficulties in reaching since no stationary help equipment can be used. The tools are quite heavy too; Anna still has problems with some of them. Usually the team divides the work so Anna does not have to do the heavy assignments; some of the guys are nice enough to take on the hard parts. "Once you have a family or get a bit older you are either transferred to another work place or simply quit", says Anna, she does not know anyone that has stayed after they turned 35. The work is too stressful and heavy, for Anna this is simply a way of earning money, not something she intends to do for the rest of her life. "I would like to travel and experience things, not get work injuries before I turn 30", say Anna.

The description of Anna is based on field studies, but some of the information is fictitious in order to stimulate engagement in the character. When Anna is presented "she" also has a picture to make her memorable and increase the engagement in the person. When Anna was presented in a workshop the discussion dealt with her work situation and means to improve it. The method provided possibilities to gain access to 'tacit' knowledge and to involve all of the participants that came from different organizations and had different background.

The result from the future scenarios written by young people is thought-provoking and can be divided into utopian and dystopian visions. Most of the adolescents' scenarios were examples of a utopian vision; future industrial work was described as evolving, including variation, integration of work tasks and cooperation. It also included aesthetic values as well as environmental and ergonomic issues. The dystopian vision, on the other hand, described future industrial work as monotonous, filthy and not self-realising. The future vision was for some a result of contamination and human's abuse of nature. These are aspects that have to be taken into consideration when designing the future industrial vision.

Results from the two work-shops is that 'good work' should include continual learning and development, tasks that are challenging, stimulating and somewhat difficult as well as autonomy in work and decentralized planning. Work should be performed mainly in teams; work colleagues are the most important aspect of good work both for current workers and potential future young workers. Other important factors are that manufacturing facilities are significant for the work place culture; the work environment should contribute to good work climate and good health. Intentionally or not, the premises reflect how the employer regards his or hers employees and the work they do. Furthermore, continuous improvement is a term used in modern management concepts mostly regarding technical rationality. In our activities the participants felt that it could also be an incentive for employees to find their own solutions for

continuous development towards both effective and attractive factories.

## IMPLICATIONS AND FURTHER WORKPLACE DISCUSSIONS

Based on these results, the next stage of our research project will be to put together a team of women; engineers, architects, designers, managers and other types of categories working within the manufacturing industry. Using the above mentioned methods as well as other methods inspired by participatory design and interactive research, the up-coming work of the team will be to design an attractive, health promoting and efficient concept of the Future factory.

The final phase in the project will be to summarize the results and experiences from the previous phases and come to conclusions. These will be presented and discussed with the stakeholders that have been involved in the participatory work as well as to the research community. This project is somewhat different from traditional research projects and our intention is therefore to discuss the objective with as many stakeholders as possible.

So far, it can be concluded that important challenges of this project are found in gendered division of labour and segregation between women and men. In this pursuit, there is a risk that focusing women will reproduce gendered conceptions of 'women's' and 'men's' work. On the other hand, there are possibilities of developing methods that challenge such conceptions and contribute to sustainable and attractive work places for both women and men.

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