

Strategic Physical Planning for the Renewal and Reuse of Industrial Facilities

by Ulf Ranhagen



Ulf Ranhagen
Technical University of
Luleå and VBB arkitekter
Stockholm, Sweden

This article illuminates a field in which the author works both as a planner and as a researcher: strategic physical planning for the renewal and reuse of industrial facilities. After reviewing the thought processes underlying the planning of industrial buildings and areas during the twentieth century, he discusses how the term "strategic planning" can be interpreted for use in practical planning situations. The argument is exemplified by current planning cases.

Theme WORKSPACE DESIGN

THE PHYSICAL PLANNING OF INDUSTRIAL facilities during the initial expansion of Industrialism, from the middle of the nineteenth century to the beginning of the twentieth, had as its primary goal the provision of space for expanding "genius industries" and the other businesses that formed the basis for the emerging welfare society. A simple building often grew into a confusing conglomeration of buildings as limited access to buildable land at least in inner locations determined the location of additions.

Not until the beginning of the twentieth century, when the negative effects of an irra-

tional physical framework on the production environment became apparent, was the importance of comprehensive planning for industrial facilities appreciated. Also behind the new awareness lay a new factory ideal for which Fredrick Taylor's ideas provided an important source of inspiration. Though his theses dealt primarily with the management, division, organization, and execution of labor, he also had ideas about the design of factories, which he thought should be as well organized and rational as machines. Henry Ford was an important advocate of Taylor's factory design theories.

Brunnström (1990) describes in greater detail the influence of these ideas on the planning and design of industries in Sweden between

1900 and 1930. She emphasizes the importance of the role played by "Industribyrån" (the Bureau of Industry), which designed several industrial complexes at the beginning of the century. They also introduced the so-called "development plan", which showed how an entire factory facility could expand in the short and long term. T. A. Bergen, leader of Industribyrån, developed the concept in a series of articles published in 1915, asserting that

the effectiveness of a factory depends in large part on the buildings themselves and on the relationship between them, and a problem in their construction or arrangement detected later usually is of such a nature that correcting the problem is economically impossible ...

These plans are the first documented examples of strategic physical planning for industries in Sweden. Between 1910 and 1920, Industribyrån received commissions for over twenty development plans. The plans were to be used to create the proper conditions for the rational management of the companies, while concern for the work environment was conspicuously absent. Some of the plans were preliminary studies for new building projects.

The approach to architecture and urban planning represented by Functionalism included a strong awareness of the importance of having a comprehensive vision for the design of industrial plants. KFAI, with its principle architect, Eskil Sundahl, became the leading office in both the planning and architectural design of such facilities. Kooperativa förbundet's (KF) light bulb factory (the Luma-fabriken) in Stockholm was a successful exponent of the office's philosophy of industrial building. The following quotation from the journal *Arkitektur* in 1930 reflects the consciousness about the importance of planning which functionalists applied to industrial projects:

Theoretical calculations can in general only be used in tackling details ... Only with an intuitive composition, which is both analysis

and synthesis at once, can one sift through the material at hand and crystallize a clear and simple solution – a general plan for the entire facility. Without such a general plan, the business of the industry will sooner or later find itself in a state of chaos.

At Chalmers University of Technology in the beginning of the 1930s, Professor Melchior Wernstedt formulated a number of "general requirements for the building of industries". Among them were that

each building and facility must have the ability to expand without excessive changes or disturbance to production

and that

the natural development in an industry is from raw material to finished product, and this development may in no way be disrupted by the unsuitable disposition of an area or by poorly studied or improperly placed transportation routes – this applies within each factory building, between buildings, and in the facility as a whole.

While these quotations reflect an insight into the importance of a comprehensive perspective, they are accompanied by no more thoroughly worked plans for the development of industrial facilities. The plan is still primarily a map – that is, a static site plan with areas set aside for expansion.

During the 1940s, industrial planning developed primarily in conjunction with the relocation of some major corporations from inner city sites to virgin land on the urban periphery. An example is LM Ericsson's expansion in Midsommarkransen¹ and Åkerlund and Rausing's (later Tetra-Pak and Tetra-Laval) in Lund². For the expansion of Scania Vabis in Södertälje in the mid '40s, architects Ahrbom and Zimdal, together with the board of directors, established a so-called *master plan*. When the architects Erik and Thore Ahlsén planned Konfektkions AB S:t Erik, Slitman, in Sala, the work environment took on a more central role than it had in other projects from

the '40s. The board of directors, executives, and laborers participated in the planning. The factory is broken up with carefully planted courtyards. The goal was

to base everything on the dimensions of man and the ability of the individuals visually to grasp their collective task from a broad perspective ...³

That intention is apparent in the facility's overall layout as well as in its detailing.

Industrial expansion continued during the '50s and '60s, and the overcrowding of central urban locations brought on a move to suburban sites with good road and railway connections. With the growing scale of facilities, now incorporating several large buildings, areas for loading and unloading, traffic routes, and supply systems, comprehensive physical planning took on increasing importance. As developments in production technology progressed, the industrial building came to be seen as merely a

shell to enclose a rational production process, a view that profoundly influenced the planning and design of industrial facilities. In the '60s the SLP method was introduced through the American Rickard Muther's book *Systematic Layout Planning*, in which the term "general planning" was used to mean the overall planning of industrial facilities. The method flatly concentrates on the requirements of production, founded on the belief that through analyses of product mix, production technology, the flow of materials and other such matters, one can linearly determine the space requirements of various functions and the demands on proximity between them.

The interplay between studies of production systems, the work environment, buildings, and landscape which progressive industrial architects

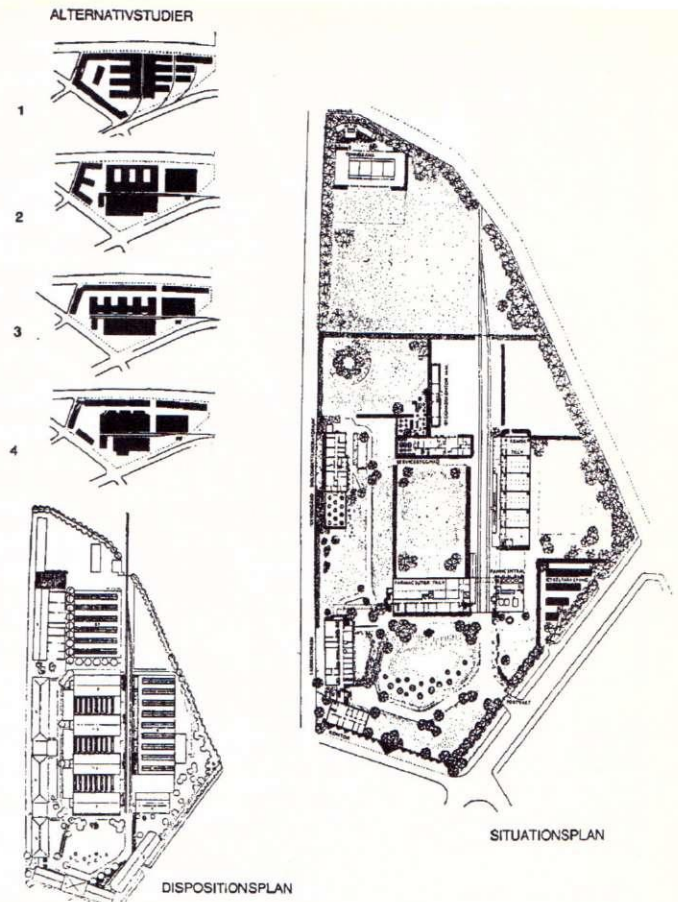


Figure 1. Master plan, site plan, and alternatives for Pharmacia's facility in Boländerna, Uppsala (1950-1).

had advocated since the beginning of the 1930s was not always fully recognized by corporate leaders, or by production and building supervisors, and resulted in many industrial buildings of an enormous scale which were difficult to comprehend and had a characteristically barren environment. More developed forms of physical and strategic planning were still rare but may be found among leading companies in various businesses. One example is Pharmacia's layout plan of 1950-1 for its move from an old facility on Lövholmen in Stockholm to Boländerna in Uppsala. The plan includes studies of several alternative ways of organizing the site for the building and the traffic and supply systems. The importance of placing a heavily invested media system in such a way as to maximize flexibility in the future motivated a

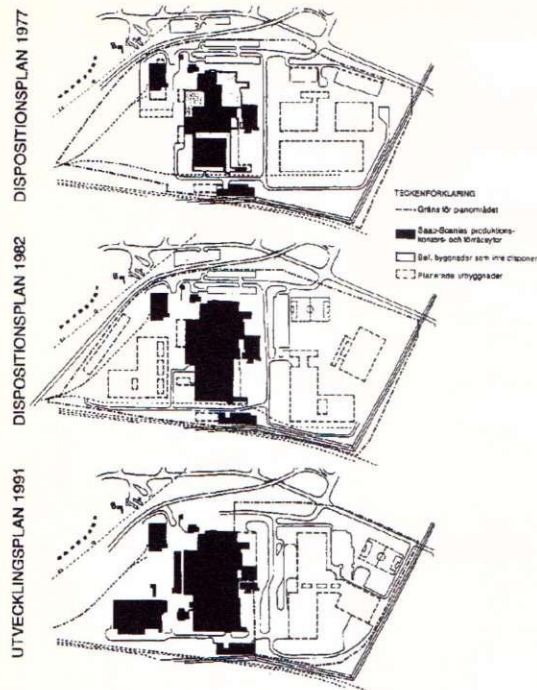


Figure 2. VBB architects' rolling master plan for Scania in Falun (1977, 1982, and 1991) has provided a long-term framework for the development of the facility from the old ASJ workshop to today's axle production for Scania's truck program.

foresighted planning. The company has maintained a continual strategic planning, as in connection with major expansions in Boländerna in the mid and late '80s⁴.

One example of planning from the beginning of the 1960s, Volvo's Torslanda plant, was planned as an interplay between physical structure and production, with consideration for the conditions of the landscape, and with the possibility of doubling the size of the facility in the future. It later became apparent that the plant probably expanded too much and, together with the lagging renewal of work organization and the work environment, this has inspired a great deal of criticism. The general plan for AB Tetrapak's (i.e. Åkerlund and Rausing's) industrial facility in Lund is from the same time but shows significant concern for allowing the business to grow in many small steps.

During the '70s and '80s, planning for expansion continued to dominate, though people

began to recognize the value of older industrial buildings as a resource for modern industrial production. Evidence that these two factors can be reconciled is Scania's plant in Falun. A rolling master plan⁵ has been followed since 1977 with a view to utilizing an existing industrial building, parts of which date back to the 1890s, while complementing it with minor additions. The handling of goods has successively been concentrated to one side of the facility, leaving the other free for landscaping, dining rooms, offices, lounges, and light production such as assembly.

Increasing concern for the work environment and organizational issues over the past few decades has led to the emergence of new concepts for production, building, and planning. Volvo's factories in Kalmar and Uddevalla are the most recognized examples of a more free building design. Critics thought that the Kalmar plant's geometric form, built up of a series of hexagons, would limit the factory's ability to expand. Now automobile production has been shut down and the problem is instead that of finding businesses interested in establishing in the area.

Another new plan form was the block plan, which was used to create either a first class environment and a flexible basic unit (a thoroughly studied basic building) which could be repeated over a large area. Internal flexibility could be combined with the possibility of expanding by adding completely new units to the pattern of blocks. Perhaps the clearest example of this principle is the 1975 layout plan for Fläktfabriken (later ABB Fläkt) in the Ljungarum area outside Jönköping. Only part of the plan, however, has been fully realized. The dramatic rationalization and floor area effectivization which began to preoccupy companies from the mid '80s brought with it a new direction in planning toward concentration at the same time that businesses were decentralizing. One aspect of the process of concentration was the restructuring from functional workshops to product workshops. Part of the remaining

production from the Junebro facility in central Jönköping was moved out to Ljungarum, which expanded the plant, though less than the original plans called for.

The area per employee was reduced by about 30% while production capacity increased threefold between 1985 and 1993. In relative terms, then, the company achieved almost a fivefold increase in floor area efficiency in the facility as a whole. The vacated Junebro factory was sold to the city and has been remodeled into a school, another functional change which has motivated new strategies for the central areas of the city.

The preceding historical review shows that, since the time of Industribyrå's development plans, progressive representatives of industry together with architects have shared a planning methodology that focuses primarily on area growth and building expansion. Meanwhile, consolidation and utilization of existing buildings and areas have played an increasingly central role in industry. Planning situations have also become more complex, increasing the demands for strategic planning.

Discussion of the Concept of Strategic Planning

The term "strategic planning" has been more exhaustively examined in fields such as organizational theory and economic planning than in physical planning. Strategic and long-range planning began to be employed in earnest by western industrial companies first in the 1960s. Until then, planning was rigid and hierarchical, dominated by linear thinking and blind faith in prognoses and trend predictions. By the 1970s there were several studies which indicated the failure of this planning system, discounting it with claims that

strategic planning is seldom necessary. Most organizations survive successfully by considering various environmental changes to be independent of one another

(Rehman, 1975)

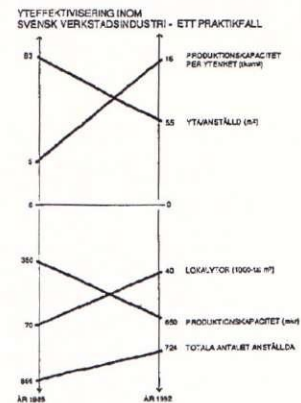
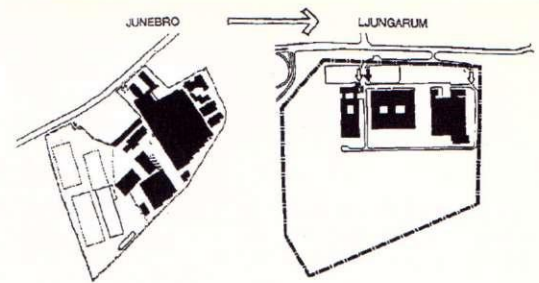
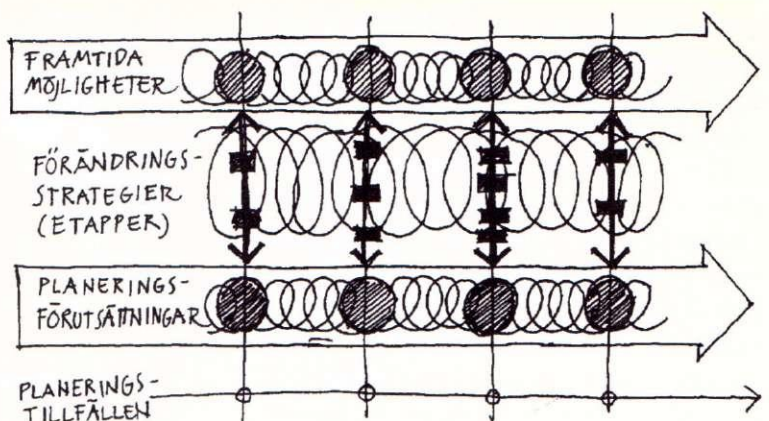


Figure 3. The development of certain key figures for ABB Fläkt's plant in Jönköping before and after the completion of the 1985 master plan. The key figures are taken from the company's own calculations, according to interviews during 1992-3.

Later, in *The Rise and Fall of Strategic Planning* (1994), Henry Mintzberg took formalized planning to task for believing it could with analytical methods predict the future. He questioned the very concept of strategic planning, saying that strategies could not be developed analytically, but must to a great extent arise from intuitive and creative processes. The business of planning for companies should include a proper blend of analytical and creative approaches.

Mintzberg introduced the term "emergent strategy": decisions and actions made without a conscious attempt at coordination over time may nevertheless converge into a consistent strategy, a "realized strategy". He contrasts this gradually emerging type of strategy with the consciously formed "intended" or "deliberate strategy". As a rule, effective strategies combine

Figure 4. Modern strategic planning is carried out continually, with the regular revision of planning conditions, strategies for change, and future development possibilities (from Ranhagen, Ulf *Handbook on Property Management. Strategic Physical Planning (1994)*).



both kinds in a way that reflects the prevailing conditions and the need to anticipate future developments while maintaining the capability of reacting to unpredictable changes.

Even if the contributions of Mintzberg and other organizational theoreticians are not directly applicable to the world of physical planning, many lessons may be learned and many parallels drawn from the problems encountered by strategic business planners. Among architects and planners it is a virtual truism that it is impossible to derive strategies and proposals for change solely based on the thorough, linear analysis of a planning situation.

Against this background, I feel that it would be too drastic to follow Mintzberg literally in discounting the concept of strategic planning. I do think that a new interpretation of the concept could provide fertile ground for developing planning instruments which can give guidance in complex planning situations.

I would define the strategic physical planning of industrial facilities as planning which aims beyond what is required by acute problems, but which nonetheless can provide guidance in acute situations. Such planning seeks to improve a company's ability to meet changes which are today partially or even entirely unknown, but it *also* supports the everyday, concrete work of developing the business. *With the properly prepared strategic planning of a property, one should be able to improve one's ability to deal with more*

or less unseen developmental trends without disregarding the adjustments and changes required on a daily basis.

To arrive at strategies which can be successfully realized, stilted and formal planning routines must be replaced by dynamic planning characterized by

- Intensive interaction between analysis and synthesis. Analyses of developments in the surrounding world and of existing resources in the form of buildings, land, and businesses provide the basis for a creative process which generates proposals for various imaginable scenarios, visions, development trends, and strategies for change. General strategies should be broad enough to allow for courses of action, unforeseen at the time of planning, which arise during the actual process of change (compare to Mintzberg's "emergent strategies");
- Oscillation between various planning scales, from regional to community, neighborhood, site, and even down to details, to allow the quick, two-directional analysis of the consequences of various measures – impossible with the unidirectional "top-down" planning of hierarchically organized companies;
- Continual collaboration between the actors involved, including property owners, authorities, effected companies, public interest representatives, consultants, etc.

Strategic Planning for Business Consolidation and Reuse: a Current Example

Overall industrial planning in the past, as we have seen in the historical review above, focused primarily on growth, as in the large scale expansion of land areas, facilities, and buildings. Not until recent years did goal-oriented planning for area effectivization and business consolidation become common.

As part of its T50 Program, the ABB company is successively effectivizing its use of space, consistently refitting functional workshops into product workshops, combining and decentralizing operations, and other measures. As a result, they have needed to consolidate, regroup or shut down the activities in some buildings, while subdividing and reusing other buildings and areas for new purposes. ABB Fastighet (Property) conducts continual strategic property planning in order to be able to offer the various ABB companies land and buildings in good locations, at the same time it rents or sells real estate to outside companies.

The metamorphosis of the Mimer quarter in Västerås is a current example of the strategic planning of an industrial property for which decentralizing and space effectivization requires industry and community planning to be woven together into an integrated planning process. Since the 1910s, the Mimer quarter has been a characteristic feature of downtown Västerås. The area includes a few buildings of significance for the nation's industrial and building history from the hand of the legendary architect Erik Hahr. The front side of the quarter, facing the city center and its sky scraper, is still occupied primarily by offices for ABB's various companies. However, the extensive effectivization and decentralization of the recent years has been moving the industrial operations out to, among other sites, the Finnslätten area.

How does one redevelop a land and building resource of this magnitude (about 10 ha of land and over 100,000 m² of floor space) in a medium-sized Swedish town? The Mimer quarter

is neighbor to an area twice its size (Outokumpu Copper) that is also being planned for new business, which does not make matters easier.

ABB Fastighet examined the area's development potential at the beginning of 1994 through parallel commissions to different architecture firms. After evaluating the firms' proposals, the planning process has progressed based on the main idea of allowing the industrial area, which has previously been a closed enclave in the city, to open up and be woven together with downtown Västerås. Several different scenarios and visions of this theme have been explored, as have a series of different ways of successively renewing the area at a faster or slower pace. The city's more intricate network of streets is permitted to continue into the industrial area. Three new entrances are added to the one that alone serves the area today. In this way the area is incorporated into, and becomes a part of, the city. Of the existing building stock, the substantial buildings ringing the area and an interior building perpendicular to them are to be preserved primarily for offices, light production, and possibly even small scale retail. It has been proposed that some of the larger old, partially run-down buildings, formerly foundries and the like, be torn down to make room for apartment blocks immediately adjacent to the work places. Other factory buildings can be reused for cultural or leisure purposes.

A project organization, including a steering committee and a project group, has been formed with representatives of the local government, ABB Fastighet, and an external consultant, the architectural firm VBB arkitekter. The project organization is developing a master plan for the area in which the views of the community are coupled with those of the company. But parallel to this master planning, buildings and the surrounding grounds are being successively remodeled in order to improve conditions for the companies in the area. The process of opening up the area to its surroundings, for example, has already begun. In the corner between Karlsgatan and Stora

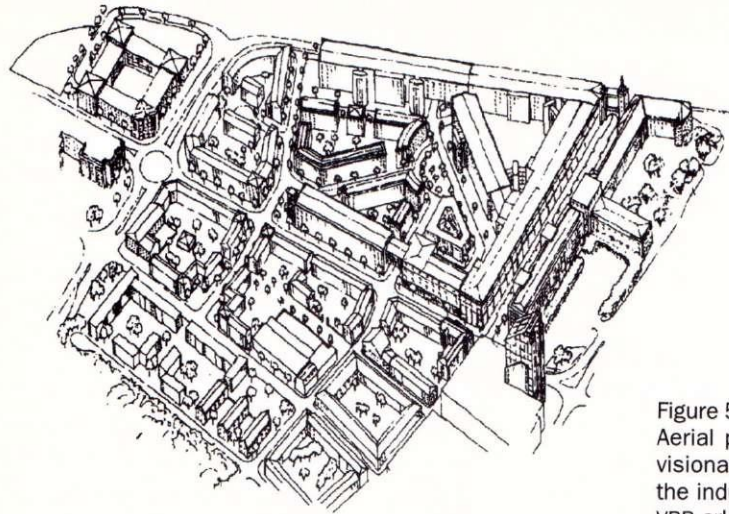


Figure 5. The Mimer quarter in Västerås. Aerial perspective showing a long-term visionary proposal for weaving together the industrial area and the city. VBB arkitekter, 1995.

gatan, a diagonal axis breaks through the ring buildings. These measures increase the contact between the city and the interior of the Mimer quarter with its existing offices and planned ground floor market hall.

Dealing simultaneously with strategic planning issues and the realization of practical changes demands a quick and smooth exchange of information between all parties involved. It stimulates everyone to make an active commitment and contributes to the establishment of a dynamic planning situation.

Strategic Planning for Expansion and Renewal

Unfortunately, the reality of industry is not so simple that one can focus on only the dominating trend. It is still necessary to work in parallel with both concentration and expansion since different operations even within the same industrial facility can find themselves in different market conditions. For example, the pharmaceutical and forest products industries are today (1995) dramatically expanding production capacity to meet the increases in demand expected in the future while other businesses, such as various types of support companies, are consolidating their production into smaller areas.

Astra Hässle in Mölndal is a research company that is expanding so fast they have had to come up with new concepts for organizing their land and building areas. The expansion is motivated by the need to develop a new original drug to complement the thus far so successful Lossec from 1988. As in the above case of ABB, Astra Hässle commissioned two firms to work in parallel to address the problem of more than doubling the floor area (from about 38,000 m² to 88,000 m²) on a relatively limited site. The important criteria for evaluating the proposals were the proximity between collaborating functions, flexibility, the integration of new and old, and provisions for “organic growth” and for informal meeting points.

The winning proposal, by Gert Wingårdh, as based on a central communication and supply axis along which new buildings are built between existing buildings. This scheme meant that the floor area could be doubled without increasing the distances between functions. The architect characterized the solution by saying that the facility “implodes instead of exploding”⁶. But the site is so cramped that a neighboring property to the north had to be acquired, and a Scandic Hotell will have to be destroyed, to make room around an office building during its construction, to allow that building to face

north for climatic reasons, and to provide it with good connections to the traffic system.

The rapid expansion at Astra Hässle has meant that the strategic physical planning for the future has largely coincided with the realization of additions, a situation significantly different from that of the engineering industry. For the long run, the question arises whether the facility can continue to grow without overly exploiting the site and thus spoiling the qualities so far won in the form of proximity between functions. Another issue is whether research can in the future evolve to allow productivity and production capacity to increase within the existing or even diminished areas, thus allowing the business to grow without a major physical expansion.

Strategic Property Planning for Cost-Effectiveness

During the eighty years since Bergen introduced the so-called development plan, progressive companies have in one form or another carried out general or master planning of their facilities. It is also interesting to note how planning forms have developed to not only deal with plain expansion, but even restructuring and concentration, as well as combinations of all of these trends. However, not all large and complex companies, and even fewer small and medium-sized businesses, have adopted this type of planning. One reason could be the difficulty in clearly defining the economic effects of master planning in advance in the manner of, for example, programs for reducing operation times and the amount of capital tied up in production.

More and more production and property executives have nonetheless begun to recognize the advantages of instituting a well thought-out strategic plan for their area and building stock. Continual strategic planning has been shown to be important for cost-effectiveness in the following ways:

- it facilitates the coordination of several different projects in time and space;
- it prevents or reduces conflicts between different kinds of land and building use,

traffic systems, supply systems, buildings, landscape, etc.

- it hastens the development of new business ideas and operations for areas and buildings which have been emptied of their original contents, thus helping to increase the value of those properties;
- it encourages the cross-departmental collaboration within a company, but also between a company, the local government, and other authorities.

In addition to these positive effects, I might add that vigorous strategic planning is often a necessary, if not sufficient, condition for the creation of quality architecture and a good work environment, and for energy conservation. Several of the examples discussed in the article testify to this.

More R&D work is necessary for clarifying the roll of strategic planning in creating smoothly functioning, environmentally sensitive, and energy-saving industrial facilities and urban areas. Various kinds of planning instruments need to be further developed in practice and through research and development work. "Helicopter perspective" or "split vision" can metaphorically represent the holistic thinking which is sought in opposition to the tunnel vision or "key hole planning" that has been so common in Swedish business in the past.

Notes

1. Thure Wennerholm, article in *Byggmästaren* 1941:26.
2. Nils Ahrbom and Helge Zimdal, article in *Byggmästaren* 1942:1.
3. Thure Wennerholm, article in *Byggmästaren* 1941:26.
4. In 1985, VBB arkitekter developed a layout plan for Boländerna under the leadership of Ulf Ranhagen and Per Lagheim.
5. The planning of Scania in Falun is documented in *Ranhagen, Ulf, Förnyelse av industriell arbetsmiljö* BFR T2:1980, and in Per Lagheim and Ulf Ranhagen, *Strategisk fysisk planering av industri-anläggningar*, VBB arkitekter, 1993.
6. Formulated by Gert Wingårdh at a presentation of the planning of Hässle at a seminar arranged by "Forum för arbetets betydelse" nov. 1995.

Ulf Ranhagen, professor in industrial planning at the Technical University of Luleå and chief architect at VBB arkitekter, Stockholm, Sweden.

Bibliography

- ABB Fastighet, VBB arkitekter, *Strategiska planer för fastigheter i Bollnäs, Gävle, Häggvik, Västberga och Västerås (Ku. Mimer)*. Planning reports 1992.
- Arbetskyddsnämnden, VBB arkitekter, LuTh, *Att arbeta i projekt – om planering inför större förändringar. Verktyg och metoder. Sågverks-, Trä-, Massa-, Pappersindustri*. Educational materials 1995.
- Brunnström, Lisa, *Den rationella fabriken – om funktionalismens rötter*. Dokuma Umeå 1990.
- Byggnadsstyrelsen, VBB arkitekter, *Underlag för fördjupning av översiktsplaner för Norra och Södra Djurgården*. Planning report 1994.
- FORTV, Ranhagen, Ulf, *Handbok fastighetsförvaltning. Strategisk fastighetsplanering*. Stockholm 1995.
- FORTV; VBB arkitekter, *Strategisk fastighetsplan för F7 Sätenäs*. Planning report 1995.
- Försvarsmakten, VBB arkitekter, *Plan för MAL-verksamheten. Berga örlogsskolor*. Planning report.
- Lagheim, Per, Ranhagen, Ulf, *Strategisk fysisk planering av industrianläggningar. Etapp 1 och 2*. VBB arkitekter, BFR. Research report 1989 och 1993.
- Lagheim, Per, Ranhagen, Ulf, *Återanvändning av institutionsområden. Projektbeskrivning och program för fortsatt FoU*. VBB arkitekter, BFR. Research report 1993.
- LEG, VBB arkitekter, *Rahmenplan Industrigebiet Premnitz. Rahmenplan Industrigebiet Döberitz*. Planning reports 1993 och 1994.
- Marabou, VBB arkitekter, *Förstudier och strategiska planer för anläggningarna i Upplands Väsby, Sundbyberg, Malmö och Slagelse*. Planning report 1982–1991.
- Mintzberg, Henry, *The Rise and Fall of Strategic Planning. Reconciling Roles for Planning, Plans, Planners*. The Free Press. New York 1991.
- Paulsson, Thomas, *Den glömda staden. Om stadsbyggandet i Stockholm under 1900-talets första decennier*. Stockholmia förlag. Stockholm 1994.
- Ranhagen, Ulf, "Strategisk planering – företagens 'time-manager'. Att samordna byggande och personalpolitik" i *Bakom arbetets fasader*. SNS:förlag 1990.
- Ranhagen, Ulf, "Strategisk planering för effektivare mark- och lokalutnyttjande" i *Lantmäteriidskriften* 2:91.
- Saab Automobile, VBB arkitekter, *Strategiska planer för industriområden i Trollhättan, Nyköping och Göteborg*. Planning reports 1985–1992.
- Scania Trucks and Buses, VBB arkitekter, *Strategiska planer för industriområden i Södertälje, Falun, Katrineholm, Sibbhult, Zwolle och Meppel*. Planning reports 1974–1991.
- Senge, Peter M., *Den femte disciplinen. Den lärande organisationens konst*. Nerenius & Santérus förlag 1995.
- Wingårdh, Gert, "Astra Hässle" i *Arkitektur* 2:1995.