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Spatial implications of trends in higher education and scientific research

Management builds for the future (1)

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New ways of learning and working

Processes of learning and working are constantly changing. Traditional education in the form of lectures is being replaced by problem-based learning in small groups. Studying at home via the Internet is becoming more popular. Learning tools are becoming more and more available in digital form. Although the virtual university is still a long way away, developments are taking place rapidly. Nevertheless everyone seems to be agreed that face to face contacts will be essential in the future to good education and research. Other trends that can be observed are the strengthening of relations with private firms and industry, the emergence of new target groups (the elderly, post-academic education, in-company training) and the globalisation of education and research. Far-reaching interdisciplinary cooperation requires adequate spaces for team work and spatial conditions that encourage openness and communication.

Low occupancy loads and absence due to leave, sickness, training, part time working, employment elsewhere in the building or teleworking demands a reappraisal of the use and allocation of space. Although large scale experiments are still needed, certainly with respect to technological research, in laboratories a shift is noticeable from fewer experiments to more computer simulations and miniaturisation of research apparatus. Expensive apparatus and limited financial resources demand careful consideration about 'sharing' research facilities. This does not only exert extra demands on space and apparatus but also requires good management. The stricter legal requirements applied to property from the viewpoints of welfare, health and the environment equally have important consequences in spatial and construction terms. Efficient use of space, the encouragement of communication, being flexible in the approach to the future and a 'healthy' working environment are important objectives in the development of new design concepts.

New learning and working environments

The transformation of rather static education buildings, which date back decades, into a dynamic and flexible learning and working environment with a positive image is an important challenge to the Delft University of Technology Real Estate Department. By means of two pilot projects in the Civil Engineering and Mechanical Engineering/Marine Technology faculties the Real Estate Department is demonstrating how it wishes to design in conjunction with the users. As an illustration we give a brief description of the Civil Engineering pilot project. The original situation is characterised by a double corridor system with long passages, sanitary facilities in the central area and mainly one and two person rooms along the outer walls. Due to the fact that the walls are not transparent the appearance of the whole is tranquil but boring. The perceptual quality of the built environment is poor. The spatial layout does not encourage contact. Following consultations with facility management, the lecturers of the Structural Mechanics and Materials Science departments and other daily users, the sixth floor of the building has been designated by Real Estate Management for a pilot study. The pilot area covers 2000 square metres of gross floor space. In both departments the emphasis is more on research than on education (no education groups, mainly individual supervision). For that reason, in the redesign many one and two person rooms have once again been included for work demanding a high level of concentration. Since virtually everyone here works full time no shared workspaces were provided with the exception of those for student assistants. The renewal is concentrated on the improvement of mutual communication, a more flexible design, improved perceptual qualities and a more conscious experiencing of the spaces. The rooms are smaller to the benefit of the central area, which has been enlarged. In this central area students of both departments are supervised by fellow students. A waiting room and a meeting room for the students are situated here as well as a consultation room. Permanent cupboards for the central archives have

been built around the renewed sanitary facilities. Glass partitions ensure openness (communication), opaque glass at eye level ensures some privacy. The central position of the new concrete technology microlab heightens the representativity and renders the techniques visible to everyone. This laboratory is a shining example of the trend towards the integration of modern (micro) labs in an office environment. It has characteristics of both a 'territorial lab' (a fixed group of users) and a 'sharing lab' (used also by external colleagues with whom collaboration is taking place). Because of the necessary incorporation in an education building and intensive use by the staff it is not possible to opt for more intensive shared use such as, for example, in a hotellab (intended for the temporary hiring of expensive laboratory space and apparatus) or a full-service lab (idem including the use of specialised personnel). The collaboration between the original 'blood groups' finds its spatial expression in the centralisation of the secretariats and the lecturers' rooms. The flexible partition system means that any modifications are relatively easy to carry out. There are many possibilities for laying out exhibitions in the zones between the columns and the corridor walls. The meeting room at the head of the plan area is supplied with ultramodern presentation techniques.

Management of change

The process of realisation was intensively guided from the beginning by members of the Real Estate and Project Management department of the Faculty of Architecture and at a later stage by the architect Timmy Thio. Discussions were held with the users in workshops about methods of working and learning, both at present and in the future. These did not in the first instance lead to a renewed programme of requirements or a radically different design. Enthusiasm was stimulated by showing the users a number of innovative office projects. At the same time it became clear that concepts such as group offices and shared work spaces are not (yet) attractive. The physical removal of the uninspiring corridor structures, a greater openness, a more attractive environment and more effective

and more efficient use of space appeared to be the most important motives on the part of the users for tolerating the inconvenience of the considerable rebuilding process. It has become clear from the process that sometimes considerable resistance must be overcome. People are so preoccupied with their day-to-day tasks that thinking about the future does not even occur to them. At the same time people are not always aware of all the changes taking place and the possibilities of maximising these with a renewed accommodation. The following lessons can be drawn from the experiences gained in this project:

- Organise a start-up meeting to inform those concerned and to come to agreements about the objectives and approach of the process and the results envisaged.
- Make sure there are enthusiastic 'leaders of the project' among both management and users.
- Ensure there is a decisive project organisation with clear tasks and powers on behalf of the parties involved and a clear coordination between the central level (Real Estate Management, faculty management) and lower levels (heads of work areas, day-to-day users).
- Make sure there is a balance between policy-oriented guidance from the management ('top-down') and the development at the grass roots of users' ideas ('bottom-up').
- The number of workshops should reflect a balance between the need for information and discussion, efficient time management and rapid throughput.
- Alternate workshops with individual interviews and meetings of the project team intended for more detailed discussions and decision making.
- Involve the architect in the process at the appropriate time as soon as work processes and trends are clear and the desired work space concepts begin to take shape.
- Ensure the project is clearly completed. Draw up clear agreements about any temporary accommodation and the use and management of the new accommodation. Make sure that there is proper training so that users are able to cope with the new accommodation adequately.

Information and communication is essential
The chances of success with a renewed work-

ing environment stand or fall by the way in which communication is achieved with all those involved. It is essential that any constraints are immediately made clear (square metre norms, budgets, limitations of the existing load bearing structure, stairs and lifts, problems of incorporation into the existing architecture, sustainable building). Another point that must be given adequate attention is the adaptation of the new accommodation to existing and future patterns of activities. Accepted research methods such as written questionnaires, interviews, occupancy measurements and workshops are important tools in this respect. Feedback of the results to the users must be timed properly. Small assignments such as 'Imagine your daughter is going to study here. Indicate the three most important changes she will experience during the time of her study' can help to free people from familiar concepts of accommodation. Discussions using visual material about new concepts and excursions also appear to work well.

Evaluation

The pilot demonstrates that much can be done with the existing buildings at the Delft University of Technology. Within the pilot area the number of work spaces has increased by 30%. The arrival of the microlab has strengthened the interaction between experimental and numerical research. The transparency and the spacious central area appear to be favourable conditions for better communication and more intensive co-operation. The attractive appearance heightens the whole experience and makes visible the fact that the group is paramount. The central position of the secretariats heightens the recognizability for the visitor. The flexible partition system leaves the possibility open to adapt the layout in the long term without any demolition having to be carried out. Definitive conclusions are only possible, however, after careful evaluation. About half a year after the new accommodation has been taken up the employees of the Real Estate and Project Management department will interview the users about their experiences with the new working environment and compare the results with the so-called zero measurement at the start of the pilot. Additional attention will be paid in particular to communication (within the group, within the faculty, rela-

tionship with the concrete lab Stevin 2) and the success of the spaces used for work requiring a high degree of concentration, to the use and appreciation of the central area as well as the microlab, the central archives, the informal meeting spaces, the shared work spaces for student assistants, the meeting rooms and the multimedia facilities. Furthermore specific attention will be paid to the functioning of the flexible and transparent partitions and experiences with internal climate (temperature, ventilation, acoustics).

(1) Note

This article is based on a study into and participation in a pilot project at the Civil Technology department, a comparable pilot study at the Mechanical Engineering department and a partial study into (university) laboratories. See for more information:

- Voordt, D.J.M. van der, et al (1999) *Universitair vastgoed: de leer- en werkomgeving*, Delftse Universitaire Pers, Delft. [University Real Estate: learning- and working environment].
- Aalders, J.A.M., A.M. Fabry de Jonge & D.J.M. van der Voordt (1999), *Universitair vastgoed: laboratoria*, Delftse Universitaire Pers, Delft. [University Real Estate: laboratory].