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An Integral Tool for the Diagnostic Evaluation of Non–Territorial Offices

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Abstract

Nowadays, many organizations have innovative workplaces with desk-sharing and desk-rotation. The main objectives are 1) to improve organizational performance by better communication, and 2) cost reduction by the more efficient use of accommo-dation and other facilities. Although some research has been conducted into the use and experience of new offices, there is a need for sound data about the overall effects on organizational performance and user needs. Commissioned by the government, the Center for People and Buildings in Delft has developed an instrument for an ex ante or ex post evaluation of non-territorial offices. The tool has been based on an extensive literature review and is being tested in a number of case studies. The tool can be used to indicate problems in the present situation, to evaluate the effects of design interventions, and in support of decisions to change the physical working environment.

The problem: Conflicting views and lack of data

Worldwide, there is an ongoing trend towards non-traditional work settings and loca-tions, such as shared assigned offices, non-territorial offices, hotelling, office swapping, and home-based telework (Duffy, 1996; Lang et al, 1998; Van der Voordt, 2003). In non-territorial offices, employees are encouraged to work in a variety of work locations and settings throughout the building, based on their work tasks. These offices are organized around rapid developments in ICT (fast computers; laptops; mobile phones; intranet; internet; digital filing systems), organizational changes (less hierarchical; more open

and dynamic; employee autonomy; teamwork; the shift away from "nine to five"), economic factors (competition; need for cost reduction; globalisation), and social trends (part-time work; force of less commuting; integration of work and private life). Organizations are introducing the new offices with a view to improving overall organizational performance. Expectations are high. Openness and transparency will support easy communication and the rapid exchange of knowledge and skills, with a consequent increase in labour productivity. Beautiful architecture, ergonomically sound furniture and modern technology will compensate for the loss of a personal desk, so that workplace innovation will not reduce labour satisfaction. Desk-sharing will reduce facility costs by tens of percent. Keywords are effectiveness and efficiency. But there are also dissenting voices. People do not like open-plan offices that do not afford privacy. The distractions involve a loss of productivity, while the excessive stimulation means that people can become fatigued or overburdened. People are not machines but creatures of habit that like to work in the same place. The need to change place all the time is highly disturbing. With the long run-lines and difficulty in locating documents, central and digital archiving results in a loss of time. Technically, it is not a problem for everything to be in digital form, but a printout is preferred above reading long texts on screen. Some employees are unable to cope with the pace of change. So what's true? Do organizational goals and values go hand in hand with user needs and preferences, functionally and psychologically? If not, what are the risks of implementing non-territorial concepts? How do we overcome people's resistance towards giving up their own personal desk and working in an open environment?

## Towards an integral and standardised evaluation toolkit

In order to answer these questions and so as to support complex decision-making processes, reliable and valid research data are needed. Although there is a bulk of studies on workplace design, most studies focus on the difference between traditional offices and open plan offices (e.g., Hedge, 1982; Brill et al., 1984, 2001; Sundstrøm, 1986; Block & Stokes, 1989; Brennan et al., 2002; Ilozor et al, 2002). Studies with a focus on non-territorial offices recline primarily upon questionnaires measuring user experience, and don't pay much attention to the actual use of space, operating results, and future value (e.g., Vos & Dewulf, 1997; Becker, 1991, 1994, 1995). Questionnaires are different across case studies, so benchmarking is difficult or impossible at all. Models such as the Balanced Score Card (Kaplan & Norton, 2001) include a variety of strategic factors, but are less operational with respect to the *physical* environment. As a consequence, both from a methodological point of view and with respect to the managerial lessons learned, there is a need for improved measurement tools and additional information. For these reasons, the Center for People and Buildings and the Faculty of Architecture of the Delft University of Technology have started a project to develop an integral tool with a wide scope. FMWEB – the State government's network for Facility Management – endorsed this initiative as it had a need for such an instrument. During the initial phase the Ministry of Education, Culture and Science turned out to be looking for a straightforward method to monitor the functionality of work environments. A plan was jointly drawn up for the development of two instruments: 1) A *work environment thermometer* for a straightforward quick scan of the activities and level of satisfaction with the facilities in the office,

at home and en route; 2) A *work environment diagnostic instrument (WEDI)* for a broader, deeper and more rigorous scientific measurement. The term "diagnostic" is used to distinguish an extensive evaluation from an "indicative" or "investigative" POE (Preiser, Rabinowitz & White, 1988). The WEDI tool is being developed with financial support from InAxis, the Public Administration Innovation Centre. This paper discusses the structure and scope of this diagnostic tool, illustrated by preliminary research data from a number of case studies.

Modular structure of WEDI

The WEDI tool provides protocols for interviews with key persons, questionnaires to ask employees about their experiences, observation methods to list the actual use of the environment and a framework to check the overall costs and benefits. All methods are clustered into a modular framework. Three introductory modules (0.1–0.3) guide the user in choosing the scope of the evaluations, the objectives, research methods and prerequisites with respect to time and money, leading to an evaluation study that suits the conditions of the organization. The point of departure of the evaluation is the preliminary objectives set for the work environment, e.g., "better communication and collaboration," "improving labour productivity," "easier attraction and retention of employees and clients," or "reduction of the facility costs." The next three modules collect data on the new and old situation with respect to the organization (A1), working processes (A2), and facilities (A3), in order to assess the suitability of the accommodation for the organization and its

Figure 1. The modules of the diagnostic tool.
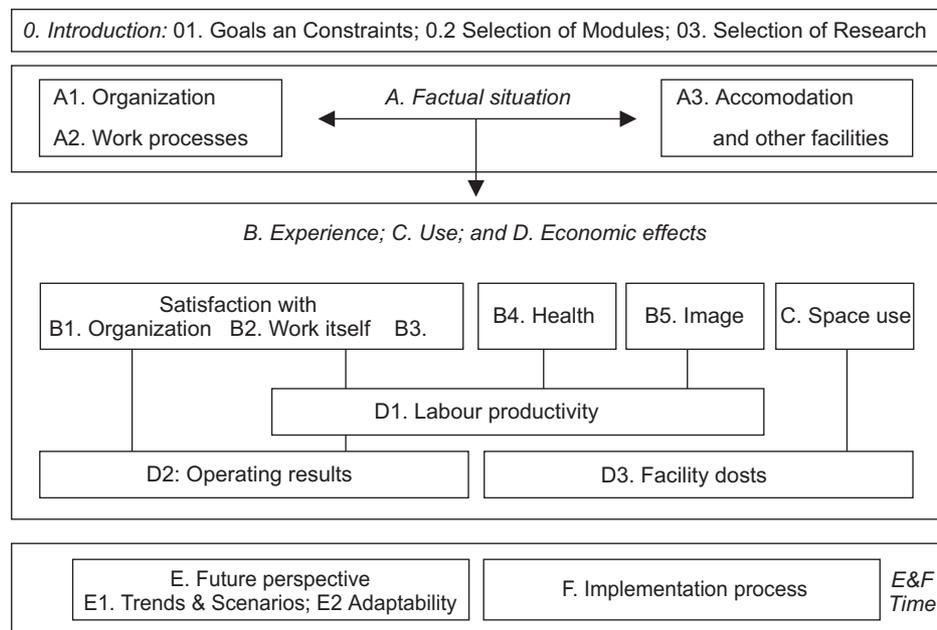
working processes. Six modules have been set up in order to measure the way in which the work environment is experienced (B1–B5), and actually used (C). In addition there are three modules for measuring economic effects: labour productivity (D1), the operating results (D2) and the facility costs (D3), and two modules for measuring the future value, i.e., future developments (E1) and flexibility (E2). The final module (F) deals with the implementation process. A process evaluation is important for determining the extent to which the use and experience of the accommodation have been influenced by the method of implementation. The modular structure increases the accessibility and makes it possible to apply a selection in line with the reason for the diagnosis.

Structure of the individual modules

Each module consists of instructions for use accompanied by a little theory, a brief discussion of the relevance, a description of possible measurement methods and questionnaires for oral and written interviews. The labour productivity module, for example, starts with a brief analysis of what precisely labour productivity means, what physical environmental variables exert a particular influence on it and how labour productivity may be measured. Since this is particularly awkward in knowledge organizations the focus is on perceived labour productivity, i.e., productivity as experienced by the management and employees. The interview protocol starts with an open question: How do you consider that the accommodation and other facilities contribute towards labour productivity? Positively or negatively? Why? Questions are then asked about the assumed effect of a number of environmental factors, including job-rotation, the flex-factor, i.e., the number of

Table 1. Propositions concerning labour productivity drawn from the written questionnaire.

To what extend do you agree with the following propositions?

	strongly disagree	disagree	neutral	agree	strongly agree
When I get to the office I can always find a workplace	☐	☐	☐	☐	☐
I can generally find a workplace I like	☐	☐	☐	☐	☐
When I change place I adjust the furniture	☐	☐	☐	☐	☐
An innovative office fits well with our work processes	☐	☐	☐	☐	☐
The layout of the building has an inspirational effect	☐	☐	☐	☐	☐
There is more exchange of knowlegde and experience than before	☐	☐	☐	☐	☐
I feel more responsible than before	☐	☐	☐	☐	☐
Our work environment boosts my productivity	☐	☐	☐	☐	☐
Our office encourages high-quality work	☐	☐	☐	☐	☐

workspaces per employee, the transparency of the environment, and network facilities, etc. The questionnaire for the employees includes such questions as: How well does the work environment support work requiring concentration and communication with colleagues and external parties? How well does your work environment support office work, telephoning, formal and informal consultation and filing? To what extent do you agree with the following propositions?

Aim and target group

The instrument is primarily being developed for the State government. Its accommodation policy is aimed at the implementation of innovative workplace concepts in order to improve the standard of service to the public, increase labour productivity and make the public service an attractive employer where people stay. Equally, WEDI is a handy tool for regional and local government and the private sector. The instrument is designed for the collection of data in order to support organization-based accommodation, i.e., an optimal fit between housing, ICT and other facilities, changes in the organization and new methods of working in the interests of maximum organizational effectiveness. Although equally suitable for the screening of traditional accommodation, the instrument has in particular been developed in response to the advent of office innovation, which has seen quantum-leap improvements in office organization, office activities and/or the office environment. The data from the diagnosis may be used at three policy levels: strategic, by way of substantiation for accommodation policy and policy changes; tactical, by way of substantiation for interventions consistent with the strategic plan; and operational, in the form of concrete interventions in the daily use and management of the work environment. This makes the instrument relevant for various actors: the board of directors, the management, the staff, the works council, and support services such as FM, IT and HRM. Systematic data collection in a number of projects makes it possible to establish the similarities and differences between projects as regards concepts and effects, thereby

Table 2. Possible objectives of a work environment diagnosis.

- Ex ante measurement to substantiate the choice of office concept
- Ditto to substantiate the schedule of requirements
- Evaluating whether the accommodation objectives have been attained
- Determining unintended side-effects, both positive and negative
- Providing insight into the relationships between accommodation and other facilities as a means, and improved performance, greater job satisfaction and cost reduction, etc., as an end
- Legitimisation for the continuation, amendment or adaptation of the accommodation policy
- Providing a basis for improvement plans and development of a future vision
- Monitoring development within organizations and at macro level
- Providing a basis for theory-building and instrument development in order to support complex decision-making processes
- Providing input for a database, as frame of reference and for benchmarking

providing a firm foundation for theory-building on the relationships between organizational characteristics, the characteristics of work processes and the most appropriate accommodation.

When measurements are taken over extended periods it is also possible to determine the long-term effects. Data from successful projects (i.e., best practices) can serve as a source of inspiration for new projects. Knowledge of less effective concepts (i.e., worst cases) can be used in order to prevent failures in the future. In this way the data obtained with the diagnostic instrument contribute towards more efficient and effective decision-making (Table 2).

The instrument is capable of being deployed at various points: at random moments, upon a zero or ex ante measurement prior to an intervention in the accommodation and upon an ex post measurement, e.g., several months after a new office concept has been taken into use (i.e., initial effect measurement) and 9–12 months after occupation (i.e., second effect measurement).

Development and testing in case studies

Whether the WEDI tool works and yields reliable and valid data at reasonable cost in terms of time, money and research capacity can only be determined by applying it, for which reason draft versions of WEDI were tested in three cases. The instrument is to be used again in autumn 2004 in a case study of the Government Buildings Agency in The Hague. The work-environment diagnostic instrument will be available at the end of 2004 in the form of a book with associated software. The data from the case studies will be included in a digital database in accordance with the standard format. In order to keep the diagnostic instrument and database up to date, consideration is being given to setting up a research network. Membership would confer the right to use the instrument and to access the database, thereby guaranteeing both quality and continuity.

Figure 2. Research sites of the case studies.

Chamber of Commerce
Response = 67%; *N* = 130

Spatial Planning
Response = 62%; *N* = 69

Revenue Service
Response = 48%; *N* = 88

Methodological lessons learned

The operating result, future value and facility costs have not so far been taken into consideration in the test cases. Generally speaking the draft versions of the other modules turned out to work well. The questionnaires and interview protocols only needed to be supplemented or tightened here and there. There did however consistently prove to be a tension between what organizations want to know and the means they were prepared to make available for that purpose. The choice of a modular structure makes it possible for organizations to set priorities and to use only selected elements of the diagnostic instrument. Depending on the need it is also possible to use the modules on either a full-scale or selective basis: users of the instrument can themselves add or delete questions, thereby enabling organizations to deploy their resources as effectively as possible. One disadvantage is that this limits the ability to compare one case with another, as the respective variables may differ. This limits the potential for benchmarking and for the use of data from case studies for further theory-building. A distinction is therefore drawn within WEDI between a *core package*, which would preferably be used automatically by each organization, and an additional *optional package*, to be applied as required, depending on the reason for and objective of the evaluation. The core package consists of an orientation interview with the management in order to determine the required breadth and depth of the diagnosis, three to five interviews with key individuals in order to obtain certain factual data and a general impression of the use and perceptions, the examination of certain documents and a written survey among the employees on the basis of a list of key questions plus a selection of questions drawn from all the modules.

Empirical findings

The cross case analysis is still in progress. Up until now the findings have shown that, if expressed as a mark out of ten, the users assign an average score of 6.7 to new work environments, i.e., more than adequate but not especially well. Individual opinions vary considerably. Positively rated aspects are generally the communication with colleagues, the design and quality of the layout, the openness and the ability to make a choice out of various locations. Frequently cited minuses are excessive noise levels, problems with the interior climate and ICT, the lack of privacy (especially acoustically: hearing and being heard) and the distractions and consequent difficulty of concentrating (Figure 3). People miss the presence of indoor plants and works of art, the social cohesion between the teams and the lack of a permanent place of their own.

The level of satisfaction with the concept is related to the nature of the work. An above-average proportion of people whose work involves frequent concentration would prefer to return to a traditional office concept (ANOVA $F(2.190) = 6.9$, $p < .01$). They also tend to rate the facilities less favourably (Pearson correlation $r = -.26^{**}$).

Personal characteristics also turn out to affect the rating. Preliminary results show that women have somewhat less difficulty than men with respect to sharing workplaces, the reduced ability to express status, and the lack of space for personal attributes. Men by contrast have less difficulty with the lack of auditive privacy. Employees aged over 50 are the least satisfied with the sharing of workplaces, changing place, and the openness. Older employees are also less positive about the extent to which the environment sup-

Figure 3. Satisfaction/dissatisfaction with a number of issues.
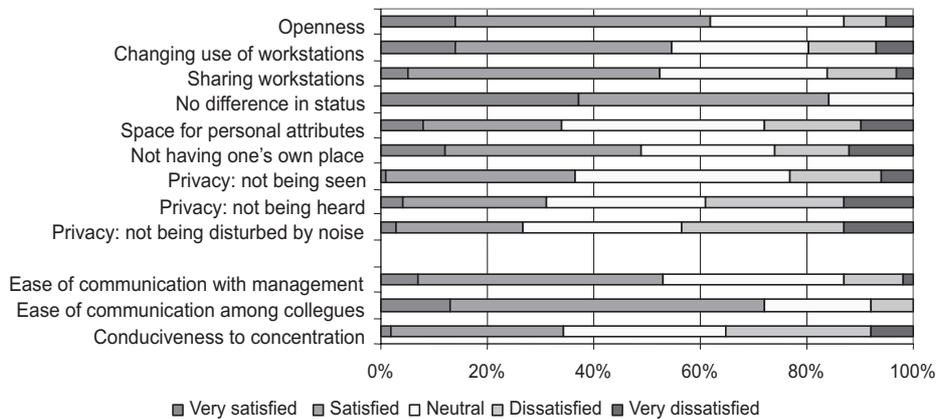
ports their productivity. They indicate relatively often that they rate the traditional situation more positively and would prefer to return to it. This is possibly explained by the fact that older employees have sometimes worked for decades along traditional lines and find it less easy to switch to new methods of working. Another explanation is that older people generally tire more easily and so tend to be more disturbed by the wide range of stimuli in an open work environment.

The average occupancy ratio of 50% remains fairly low (Figure 4), thus reducing the need to change place frequently. Practice shows that people often continue to work in the

Figure 4. Occupancy levels in one of the cases (maximum and average).
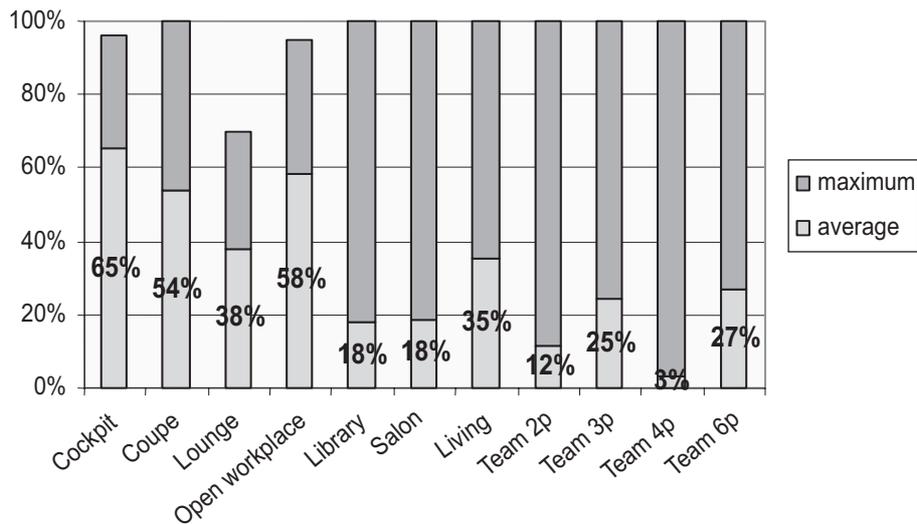
same place out of habit and do not change place, even when this would be desirable for work purposes.

Conclusion

In the long run, many of the frequently asked questions may be answered with the aid of the data collected with the instrument. The present data suggest that working in an innovative office environment has fewer psychological drawbacks then theory would suggest. Only 20% of employees state that they are genuinely dissatisfied at not having their own particular place. So non-territoriality is not a big problem in itself. But the lack of visual and auditive privacy is a source of dissatisfaction among almost 40%. Loss of concentration and distraction in an open work environment was also a well-known phenomenon in the open-plan offices of the 1970s. The thinking behind a combi-office was that this drawback could be eliminated by the provision of special concentration areas and that people will change place when their work requires. But changing place is what employees do not do quite easily. Management must face the question of what to do if staff dislike the concept or do not use it as intended. Must the concept be adjusted to the user, with the risk that it will in due course revert to the traditional cellular office with more or less fixed workplaces? Or must people adapt or be forced to use the concept as intended, for example by reducing the number of workplaces to the point at which people are obliged to change place? The longer-term effects of working in a flexible environment (for example on health, well-being and labour productivity) are not known at this point. It therefore remains a major challenge to find the kind of solutions to ensure that the work environment broadly meets organizational objectives, such as effectiveness and efficiency, while at the same time optimally meeting the psychological needs of human beings.

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