

# TOWARDS AN INTEGRATED FACILITY MANAGEMENT SYSTEM FOR MANAGEMENT AND USE OF GOVERNMENT BUILDINGS

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**ABSTRACT.** The Government Building Agency in the Netherlands is developing an integrated facility management system for two of its departments. Applications are already developed to support a number of day-to-day facility management activities on an operational level. Research is now being carried out to develop a management control system to better plan and control housing and material resources.

## 1. Introduction

The management of organisations takes place on different levels with different planning horizons. In designing structures for adequate information supply and information exchange, one must be aware of the different information needs that exist between the management levels and their decision processes. This paper focuses on the relationships between planning, control, operating and information supply in a facility management organisation. A case study concerning the development of an integrated facility management system by the Government Building Agency (GBA) in the Netherlands will be discussed.

Commercial facility management systems that can be bought off the shelf nowadays only support the operational management level, where day-to-day facility management activities are being carried out (Joudah 1992). These facility management systems usually consist of large databases where amounts, types and location of facilities are stored. Research is now being carried out at the GBA to extend the functionality of such a 'standard' system to the tactical-strategic management level. For this purpose a management control system is being developed that monitors a set of well-defined indicators (the critical success factors), which are aggregated from the operational data stored, and predicts the housing consequences of policy measures that are proposed on the higher, strategic management level.

This paper will focus on the research that is undertaken to develop the management control part, on top of the existing FM system. Section 1 gives a brief overview of the tasks of the Government Building Agency and developments in the public sector that are changing patterns of work and housing conditions. Section 2 explains the strategic goals of a facility management system that integrates the information supply of both the GBA and its clients. In Section 3, the general approach of the research to extend the functionality of the existing FM system to a tactical management level is described. In Section 4, some preliminary results are presented. A proposal

for a facility management control system is discussed in Section 5 and some conclusions are formulated in Section 6.

## 2. The Government Building Agency

The Government Building Agency (GBA) is responsible for the provision of work space to 160,000 people in the service of the central government in the Netherlands. The stock consists of some 4,000 buildings with a gross floor area of six million square metres and an estimated replacement value of ten billion U.S. dollars. Integration of housing and facilities information is needed for a better control of housing costs and to meet the higher requirements which constantly changing organisations pose on their buildings.

In the past, the GBA has focused mainly on building and technology. According to this approach, a building was largely seen as an end in itself: a technological product which had to be designed, constructed and maintained. The organisation using a building came in second place. Since the publication of the first Housing Policy Plan in 1988, this strategy has changed. A building is no longer looked upon solely as a technological accomplishment, but primarily as a means to support the primary production process of a public organisation. The focus in the management of real estate has shifted since then from the supply side (the building stock) to the demand side (the users of the buildings) (De Jonge 1990). Real estate decisions are now aimed at creating a work environment that improves the organisational performance outcome and job satisfaction in general (see also McLennan 1992; Drucker 1991; Becker et al. 1991). From the point of view of the GBA, more investments in housing can be made if they contribute to the overall results of the organisation.

### 2.1. FACILITIES AND HOUSING COSTS

While the management of real estate and the provision of housing is the primary function of the GBA, it also forms part of the facility process of a public organisation, a customer of the GBA. Facility management involves planning, providing and maintaining appropriate physical spaces, support and services for an organisation. Its main goal is to support the primary functions of a single organisation in a flexible, effective and efficient manner. The GBA takes part in this process by providing adequate housing.

The annual costs of providing people with facilities to operate in office environments are about NLG 23,000 per work unit (Figure 1). The costs for housing represent some 10% of the total costs of a public organisation: about NLG 12,000 per work unit yearly. The GBA pays about 40% of the facility costs of an organisation. These consist of capital costs, costs of furniture and fixed assets, energy, maintenance and part of the cleaning. Many other facility functions, however, which are not performed by the GBA and are not paid for by it either, are strongly affected by characteristics of the building. Examples of these functions are cleaning, security, communication, data services, postal service, space, inventory accounting etc.

Although facilities costs and housing costs are relatively small compared to the total costs of an organisation, the importance of facility and housing management should not only be stressed from the point of view of the direct costs related to it. The importance lies in the effects that efficient operation of facilities has on the primary process and the disturbance of it when facilities are not efficiently operated. These costs, however, are difficult to calculate.

Obviously, the management of public real estate and the facility process is a complex matter in which the GBA and its clients have shared responsibilities. Cooperation is vital, not only to provide an efficient, integrated operation of facilities, but also in order to respond to important

developments that are now taking place in the public sector. These developments have major consequences for the quality of government buildings.

cost of:	minimum	maximum	average	percentage
1 capital	4900	7700	6500	32.5 %
2 energy	400	1200	825	4.1 %
3 maintenance	500	1040	800	4.0 %
4 cleaning	420	560	500	2.5 %
5 security	750	1100	950	4.8 %
6 catering	1300	2150	1500	7.5 %
7 management	1800	3500	2600	13.0 %
8 reproduction + postal service	800	3000	1900	9.5 %
9 stationery	500	1250	800	4.0 %
10 fittings	400	1400	950	4.8 %
11 communications	400	1400	900	4.5 %
12 data service	1000	2500	1750	8.8 %
<b>Total</b>	<b>13170</b>	<b>26800</b>	<b>19975</b>	<b>100 %</b>
<b>Total including 18.5 % Tax</b>	<b>15606</b>	<b>31758</b>	<b>23670</b>	

Figure 1. Annual costs per work unit in NGL  
Source: NEFMA survey of office buildings, 1989

## 2.2. DEVELOPMENTS IN THE PUBLIC SECTOR

The Dutch government wants a smaller but more effective public apparatus. This means a re-evaluation of tasks in the primary production process, but it also entails a more effective operation of secondary, supporting functions. During the eighties, several austerity measures were put into effect and are still in progress. These operations are meant to reduce expenses by decreasing the number of civil servants. The measures have a direct impact on the way facility management units and the GBA are working.

The facility management units in the public sector must respond to developments such as concentration on primary tasks (management by objectives, contracting out), a growing rate of churn in an organisation which requires a flexible, quick-witted organisation, teamwork and project structures, better qualified personnel and a deconcentration of responsibilities from staff to line management. These developments suggest that GBA and FM units have to operate under uncertain circumstances. Their main task is therefore to create deliberate flexibility in the facility management and housing process. For example, at stock level a mix of rented and owned space is used (see De Jonge 1991), at building level office systems to reduce space costs and improve flexibility are used (see Wassenaar 1990), and at service level short-term contracts where conditions might be altered are advocated.

In the first Housing Policy Plan (1988), the GBA was called upon to reduce housing costs by 10% per employee between 1988 and 1992. To realise this reduction in housing costs, the GBA has implemented two strategies. First, the effectiveness of the use of public housing was improved by better matching the available accommodation in the real estate stock with the housing

demands of an organisation. For this purpose an active portfolio management is carried out (see Boender 1992). Secondly, spatial costs and quality standards were tightened up and these standards were enforced on new and, if possible, on existing housing. The actual space per work unit is still well above the spatial standards set for the public sector.

Housing costs and facilities costs in general still show a tendency to rise, however. This is caused by a growing numbers of part-time employees, who all have a right to their own work unit, facilities needed for telecommunication, and requirements for public housing which stem from general public policy on environment, indoor climate, accessibility of buildings for the handicapped. To find solutions for the growing tension between housing supply and housing demand and to reduce the housing costs per work unit, the GBA must have accurate, well-structured information about the total housing costs, irrespective of whether these costs are paid for by the GBA or its client, the technical and functional quality of the real estate stock, and existing and prospective housing situations. Unfortunately only costs which are paid for by the GBA are reasonably well known. Data of other housing and facility activities, performed and paid for by her clients, is hardly available or otherwise difficult to compare.

### **3. An Integrated Facility Management System**

To meet the need for more integrated information on housing (demand) and housing-related facilities and to better support the primary functions of its clients, the GBA is developing a CAD-based facility management system, together with a Dutch software house. The FM system consists of a central relational database and 'loose-fit' modules for specific applications. An Intergraph system (Workstation) was chosen for graphic representations, which can be linked to several relational databases; e.g. Oracle and Informix. The FM system runs under UNIX and MS-DOS and operates on a client-server base (Figure 2). This means that data (alphanumeric and graphic) are stored separately from specific FM applications, where the actual data processing and calculation takes place. In this way several users can consult facility management data at the same time through different applications ('multi-user environment'). At this moment modules of the system are used by facility management units of the Department of Social Affairs and the Department of Housing, Physical Planning and Environment (VROM). The goals of the FM system for the GBA and its clients are threefold:

#### *1. Task control at the operational level*

Task control in facility management assures that specific tasks are carried out effectively and efficiently. The FM system supports and integrates the day-to-day activities of the FM units. Applications have already been developed for space planning and optimization, inventory management, drafting coordination, move coordination, call handling and reservations. Although many FM systems are already available to deal with the above-mentioned tasks, integration of these processes is very often problematic.

#### *2. Management control at the tactical level*

Management control concerns the implementation of strategies which are used to attain strategic business goals. Management control does not involve the detailed operating decisions and activities that are the focus of task control; it is the means by which management assures that the organisation carries out its strategies effectively and efficiently (Anthony and Young 1984). Management control in facility management is needed to link facility management to the basic goals of an organisation. These goals are decided upon by top management on a strategic planning level. Facility management and computer-aided facility management should support management control activities by supporting the implementation of business strategies, and

deriving management information from different facility management processes, in order to better plan the required facilities for the organisation.

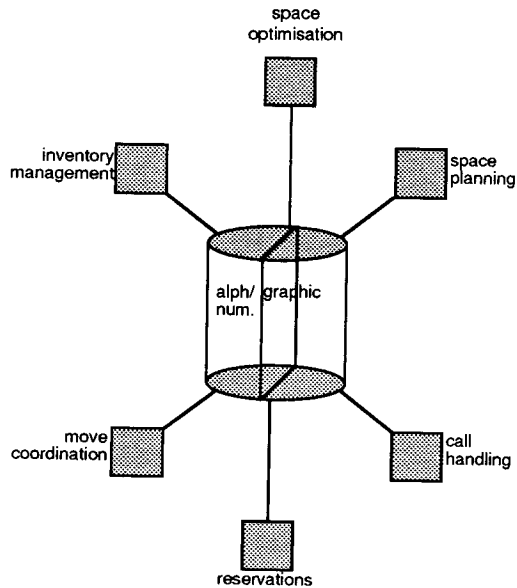


Figure 2. Model of the facility management system

### 3. Information exchange

By developing an FM system, the GBA wants to establish a uniform and structured information exchange between the facility management process of its clients and the public housing process. The information exchanged will probably concern housing costs, maintenance, housing standards, housing demands and housing analyses on the sectoral, urban and building levels. These goals indicate that the FM system can play an important role on different managerial levels in the FM organisation and that the system will help in linking facility management to the overall goals of the organisation. Moreover the system can be used as an instrument to exchange housing (related) information between the GBA and its clients. The facility information supply in an organisation is depicted in Figure 3.

### 4. Approach

When a facility management concept is introduced in an organisation, often little attention is given to linking FM to the primary goals and activities of an organisation. Usually facility management only draws the attention of top management when it does *not* meet the needs of the organisation (people start complaining). Housing and material resources are still not generally regarded as strategic means of production for an organisation, which need as much careful planning and control as human and capital resources do. Existing FM systems reflect this attitude towards facility management. They are primarily used for the support and integration of day-to-day activities on an operational level; e.g. cleaning, moving, inventory management, security etc. Management reports for the top level are not generated on a regular basis.

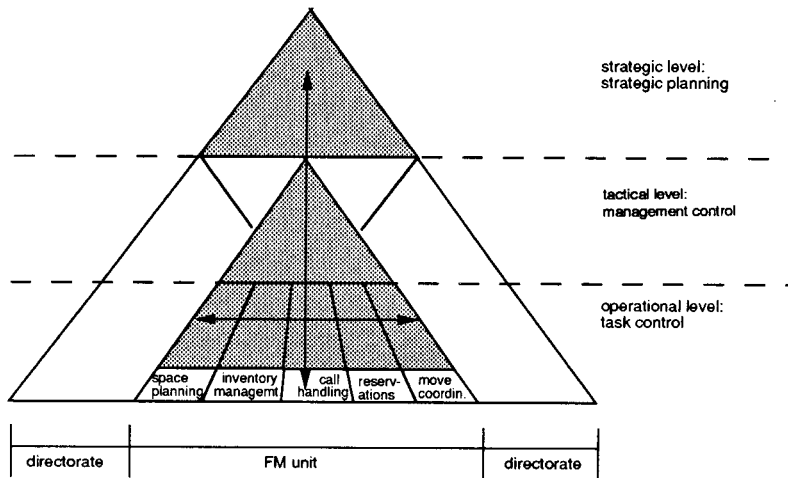


Figure 3. Facility management information supply in the organisation pyramid

When the GBA and the Department of Housing, Physical Planning and Environment (VROM) started to develop an FM system, they decided that this system should also offer tools to exercise some sort of management control over the facility management process. Research was needed to answer two questions: (i) to what extent are housing and facilities important for the primary activities of a public administrative organisation?, and (ii) what is the facility information need on a tactical and strategic management level?

#### 4.1. RESEARCH STAGES

The research for the development of a facility management control system is conducted in three stages. The research is now at the beginning of the second stage. The three stages are:

##### 1. *Describing the as-is situation*

Information and organisation analysis of the way facilities are being managed at present in central public organisations. During the last quarter of 1991 and the first quarter of 1992, a series of interviews was held with directors of FM units of six departments and with line managers of the FM unit of the Department of VROM. These are the future users of the FM system. The interviews were held to get an impression of the way facilities are managed in a public administrative environment. Moreover, we tried to define the global information needs of facility managers and their staff and the problems they are dealing with in daily practice. The results of the interviews, the data flow diagrams and the procedure charts that were drawn up are used to define the functionality of a facility management control system.

##### 2. *Describing the to-be situation*

Development of a management model and an information model for a desired situation. These models form the basis for a facility management control (sub)system that will enable the user to derive management information from daily facility management processes and to forecast financial, housing and material consequences of housing plans, retrenchment strategies and reorganisation plans. These plans are made on a strategic level.

### 3. *Drawing up an implementation plan for a facility management control system*

The implementation plan will comprise the order in which automated tools have to be implemented, the necessary alterations of the FM system, which is now primarily used for task control (operational activities), and the organisational consequences of a management control system.

## 5. Management Control in Current Facility Management Processes: Preliminary Results

### 5.1. THE MANAGEMENT CONTROL PROCESS

The management control process takes place in the context of an organisation that has goals and that has decided on broad strategies for achieving these goals (Anthony and Young 1984). There are five main steps in a formal management control process (Figure 4). In the standardisation step, requirements to which the products of an organisation have to conform are derived from strategic business goals. These requirements are stated in the form of cost and quality standards. Then, in the programming step, decisions are made with respect to the major programmes the organisation plans to undertake during a coming period. These programmes are usually stated in the form of long-range and mid-term plans. Next, in budget formulation and allocation step, a budget which is a plan expressed in quantitative, usually monetary, terms covering a specific period of time (Anthony and Young 1984) is formulated and allocated to programmes for execution.

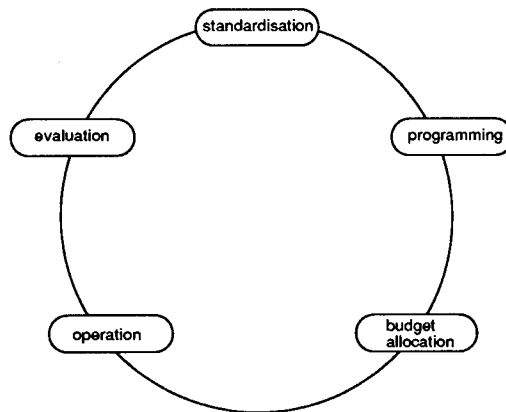


Figure 4. The management control cycle

During the period of programme execution, records are kept of resources actually consumed and outputs actually achieved. This is the step of operating and measurement. Finally, in the reporting and evaluation step, accounting information is summarised, checked against cost and quality standards and reported to top management on tactical and strategic levels (directors and secretary-general of a Department).

### 5.2. PROBLEM ANALYSIS

The following major problems exist in the facility management processes which have been

studied. These problems may obstruct adequate management control in the facility management process.

#### *Weak management control*

The five steps of the management control process are already filled in and applied in the public housing process of the GBA and form a closed loop of planning and control. This cycle, however, is almost nonexistent in current facility management processes. Most directors of FM units who were interviewed do not have their own policy plan, nor do they use clearly defined standards to compare actual outputs and inputs of the facility management process to planned outputs and inputs. None of the FM units studies policy plans of other directorates (their clients) to make detailed quantitative and qualitative plans of the facilities which must be provided with housing services. Reporting to top management does not occur frequently or in a structured way. Developments in personnel growth and decrease are only taken into account in a limited sense. On the other hand, the directorates, clients of the FM units, do not specify their housing and facility needs in a structured way; for example, in the form of short-term housing plans. So it is very hard for an FM unit to foresee how many housing mutations can be expected in one year's time as a result of moves, projects or internal reorganisations. Obviously, most of the FM units do not have the power to 'force' their clients to make plans in which housing and facility needs are specified. One facility manager told us he was given a week's notice to move 500 employees.

#### *The relationship between the primary production process and the facility management process is indistinct*

FM units can be classified as service centres. Their output contributes to the work of other business units (directorates). Only a few of the questioned facility managers, however, could give a fairly good description of the primary process and the overall goals of their department. In most cases FM units only react to complaints and faults. They have little idea of how to give better support to their organisation, since they do not know exactly how good their level of support is at the moment. Perhaps this problem is caused by the nature of the primary process, which is rather 'vague' in public organisations. Their function is threefold: policy-making, legislation and realising income transfers (subsidies). Especially the output of the first two process functions is hardly quantifiable. Further research into this matter has yet to be done.

#### *Low cost consciousness*

There are insufficient incentives for the facility manager to work in a cost-conscious way. An important goal of the budget accounting system which is being used in public organisations is to pose limits on the expenses incurred by directorates. The relationship between expenses (called budgets) and the non-monetary output of the facility management process (in the form of housing, support and services for the organisation) is often not clear. Budgets of an FM unit are in most cases based on the expenses of the previous year. Usually a budgeting technique called 'input budgeting' is used to calculate a budget. This budgeting technique only measures the expenses incurred, but does not measure the monetary or non-monetary value of the (FM) unit's output.

#### *Facility management information is scattered*

Facility management information is usually scattered among several automated and hand-operated information systems. Separate applications exist to manage inventory, telephone and data network, support space planning etc. Integrated FM systems are not used yet. None of the departments visited exchanged information in a structured way between FM applications and the personnel information system or the budget accounting system. Cost classifications and registrations of employees in these systems are not sufficiently tuned to one another. It also



became clear that in some cases deconcentration of responsibilities from staff to line management hampered the information supply for facility management. Deconcentration in these cases has taken the form of a delegation of tasks, without an obligation to report frequently to the top level. The consequence is that information, e.g. about acquisitions of material supplies, repairs and maintenance, can only be obtained from the client himself or from the contractor. Information gathering in this way is very costly and time-consuming.

*GBA's housing plans are not detailed enough to develop a strategic facility plan*

The GBA produces housing plans on various managerial levels. On the strategic level, it generates the Housing Policy Plan (1988), in which housing goals and strategies for attaining these goals are stated for the next four years. On the tactical level, it generates housing analyses to design planning strategies on the sectoral (per department), regional and urban level. These strategies are worked out to meet future housing demands. Existing housing situations are compared to functional and technical criteria or standards, derived from strategic housing goals. Then several housing alternatives can be proposed which will improve the existing situation (see Boender 1992). The translation to tactical housing plans on a more pragmatic operational level is not yet conducted by the GBA. That would involve identifying the consequences, for example, of a specific housing plan for the number of workplaces, space costs, the nature of information technology and the equipment needed, possible types of space layout and of space planning, possible security regimes etc. GBA can help facility managers of public FM units to make their own strategic facility plans, which would enable them to make more informed choices.

## 6. Proposal for a Facility Management Control System

A management control system as part of an integrated facility management system should contain an accounting system which provides historical information. That is information on what has happened and what the costs were. In addition, the facility management control system should provide two types of information that are not found in the accounting system (Figure 5): (i) estimates of what will happen in the future, called forecasts, and (ii) estimates of what should happen, called standards or budgets.

### 6.1. ACCOUNTS

Accounts are devices for collecting data about what has happened (historical data) and what is planned to happen (future data). The interviews with facility managers have given an impression of the sort of accounting information needed. Much of this information will be provided by the applications for space planning, inventory management, move coordination and call handling, which form the task control part of the FM system at this moment. First, *process measurements* such as turnover data (acquisitions per product group), expenditure data (energy, water), cycle time (complaint and fault handling, post), churn rate of an organisation, and the use of equipment are required. In addition, *product measurements* such as faults, occupation rates, types of space layout and space layout losses are needed. Then, there is a need for *cost information*: personnel costs of FM employees, material costs, contract costs, facility and housing costs per workplace, per employee, and *client information* such as complaints and employee satisfaction. *Standards* are required to compare process and production measurements, involving spatial standards, cost standards, average workplace costs and checklists for maintenance, cleaning etc. Finally, there is a need for *planning information* for stock management and contract management, and *product and contractor information*. Cost information, standards, planning information and product and contractor information is not yet provided by the FM system of VROM.

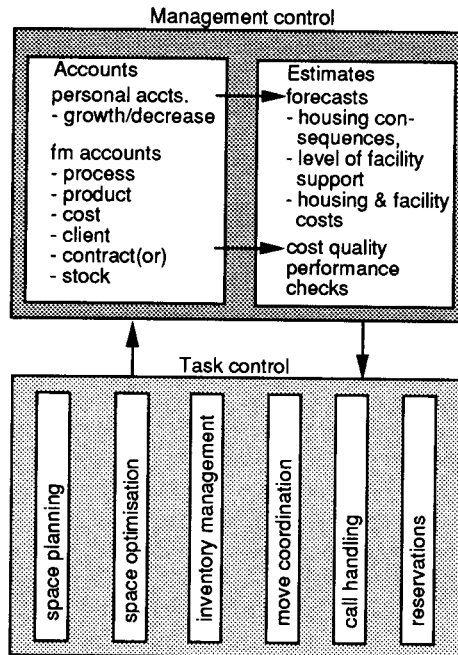


Figure 5. Proposed model for a facility management system, comprising a task and management control part

## 6.2. ESTIMATES

In order to perform the estimation function well, the facility management control system should be linked to the personnel system of the organisation. In this way, forecasts can be made of housing consequences and the desired level of facility support, based on future personnel strengths. Also housing and facility costs should be calculated, based on both the characteristics of the building and the organisation. Moreover, an FM control system should be built around a financial structure, to which process and production information can be related. For this purpose the facility cost classification structure probably has to be tuned with two other cost classification systems used in public organisations: the official budget accounting system of a department and the housing cost classification of the GBA. The latter is needed to establish an adequate information exchange on housing and facility costs between the GBA and its clients. Last but not least, the GBA can help set up a sound planning and control cycle for facility management by working out housing plans and housing analyses per department on the operational working level of the facility manager. Good cooperation is vital.

## 7. Conclusions

Facility management must be linked to the primary activities of the organisation. Otherwise an FM unit runs the risk of becoming a department with no other mission than to solve complaints and faults. The positive effects of adequate housing and facility supply will only be noticed by the organisation if an FM unit is able to work in a pro-active rather than a reactive way. This means that planning and control instruments have to be developed that can help the facility manager make more informed decisions that affect the organisation's ability to attain its basic goals.

However, more research still has to be done on the relationship between the primary process and facility management.

The GBA can offer instruments for standardisation, programming, operating and evaluation, as far as it concerns the management of housing. In cooperation with its clients, the GBA can extend its own management control system for housing to comprise other housing-related facilities as well. An integrated FM system, consisting of a task and management control part, is an opportunity for a facility manager to be ahead of developments now taking place in the public sector. These developments have major consequences for the way public organisations are being managed, housed and serviced.

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