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### IIIa

#### **The Importance of the Organization in the Design and Construction Process of Large Projects**

Importance de l'organisation dans les phases d'étude et d'exécution de grands aménagements

Die Bedeutung der Organisation in der Planung und Ausführung von grossen Bauvorhaben

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#### **SUMMARY**

This paper gives an overall view on the nature of the organization of the design and construction process in large projects. The way to organize this process differs from country to country. The partners in the process form the organization. As the partners enter the organization at different points of time, close cooperation between them is necessary in order to arrive at the best solution within the desired time, cost and quality for a project. The method of selecting the different partners is of special interest; why do we select the construction partners in a different way from all the other partners?

#### **RESUME**

Ce rapport présente une vue d'ensemble de l'organisation dans les phases d'étude et d'exécution de grands aménagements. L'organisation varie d'un pays à l'autre, mais elle dépend essentiellement des différents partenaires qui en font partie. Ces partenaires entrent dans l'organisation à différents moments: une collaboration étroite est donc nécessaire pour atteindre l'objectif dans le délai, le budget et le niveau de qualité fixés. La méthode de choix de différents partenaires est d'une importance primordiale; la question est posée de savoir pourquoi le choix de l'entrepreneur n'est pas fait selon les mêmes critères que le choix des autres partenaires.

#### **ZUSAMMENFASSUNG**

Die Probleme der Organisation des Entwurfs- und Ausführungsprozesses bei grossen Bauvorhaben werden bearbeitet. Der Charakter einer Organisation für ein grosses Bauvorhaben ändert von Land zu Land, es sind die verschiedenen Partner, die die Organisation letztlich ausmachen. Der Zeitpunkt des Eintrittes eines Partners in eine Organisation prägt den Ablauf der Arbeiten, die Kooperationsfähigkeit der einzelnen Partner ist von entscheidender Bedeutung für das Resultat der Arbeiten. Die Methode der Wahl der Partner rückt deshalb in den Vordergrund, warum wählen wir eigentlich die ausführenden Unternehmer anders aus als die projektierenden Ingenieure?



## 1. INTRODUCTION

Time and again it is necessary to convince the partners in the building process of the importance of good organization. A good organization will help to achieve: short design and construction periods, simple and manageable programmes, feasible quality of construction, minimum loss in time and cost when changes in the design or construction have to be made, good cooperation between the partners, safe and human working conditions.

## 2. PARTNERS IN THE BUILDING PROCESS

One of the most important question is: "How to improve cooperation between the different partners in the building process?" There are some specific groups of partners, the representatives of

- the owner or the client (government, cooperate, private)
- the consultants (architect, engineers)
- the contractor (one or more in joint ventures)
- the subcontractors (nominated or not nominated by owner)
- the suppliers (nominated or not nominated by owner)
- the people

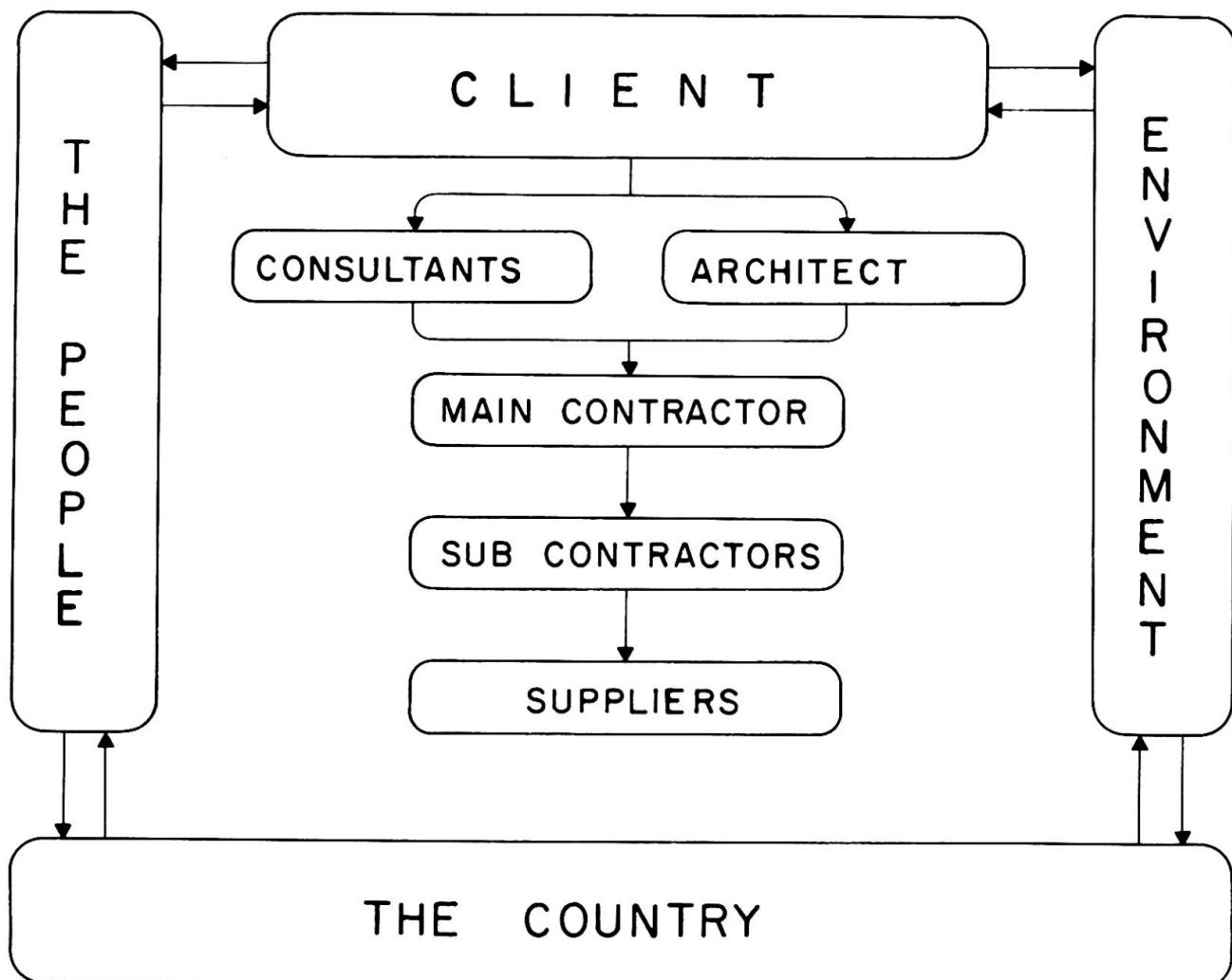


Figure 1: "Partners" in the building process

We have to consider the fact, that a project has to meet finally the objectives, the needs of "the people", the people who wish to have more influence on what will be built at which location, the people who have to live in or have to learn to live with these buildings, the people who have to pay directly or indirectly the cost of buildings etc. When organizing design and construction of a large project, one has to recognise and consider the different attitudes of the partners in the building process. In each case we have to decide, when and in what way each partner will be involved as we proceed with design and construction. In large project on a international level, we will find different points of view between continents and countries; the social structure of the country in which the project should be realized has to be respected.

A special problem arises, when the environment of bordering countries is influenced by large projects (e.g. nuclear power stations located close to the border, upstream industries which pollute a main river). The organization has to involve the necessary partners on the respective political level.

### 3. ENGAGING THE BUILDING PROCESS PARTNERS

How far should a design be prepared by the project organization, before new partners will be integrated in the building process? We know that the client chooses an architect or an engineer as a consultant early in the process. Only in the later phases the main contractor, the subcontractors and the suppliers are selected. The method and the point of time to enlist these partners will influence the organization and is of great importance for the programme in the following phases.

To have these partners active in the building process as early as possible will prove time-saving and advantageous to improve cooperation in early stage. To apply similar selection criteria in the choice for partners in the field of execution as are applied to select consultants, would possibly bring better results, the decisive factor in construction is not only the lowest bid, but also reliability, know how, experience, cost-consciousness. Through an early contribution of the know how of these construction partners to the design of a building, it will be possible to come to the most satisfactory solution.

### 4. ORGANIZING THE BUILDING PROCESS

If the construction partners are chosen early in the design phase, the design of the building and the preparation of the execution can be carried out at the same time and the experiences of the contractors can be brought into the design. When we analyze planning procedures applied in the building process, we realize that only those methods can effectively be used, which will be accepted by all partners. To keep track of the immense amount of informations and to operate a well adapted communication-system is the final objective in planning design and construction in large projects.

For large building projects we will introduce the following levels in the planning process:

- the overall plan (all partners together)
- the master plan (each partner on his own)
- the work programme (each partner on his own)
- the working schedule (each partner on his own)



## 5. THE OVERALL PLAN

To enable the project-team to take the right decisions at the right time, this team should have an overview of the whole project. The members of this team should know which partner has to do what kind of activity at which moment; and as a partner we define the representatives of the client, the architect, engineer and consultant, as well as the contractors and the suppliers. To develop an "overall plan", the project team has to know: the requirements, the technological dependences between main activities, the economical relations between these main activities, the budget.

It is essential that the project team achieves full agreement between all partners, the overall plan will then be used as a general guide line. All future decisions have to be deduced from this overall plan which contains a certain number of milestones, in which different activities of several partners meet and may influence each other. When a deviation to the overall plan develops, the consequences can be made visible, the necessary corrections can be enforced. To make such an overall plan, it will be necessary to take the following steps:

- analyse owner's requirements
- confer between partners
- make a first draft of the plan
- test this draft against the ideas of the different partners
- make the final draft of the plan
- settle the overall plan after consideration by all partners and have it signed.

## 6. THE MASTER PLAN

Each partner's activities have to be coordinated along the accepted overall plan. That means that each of the partners has to work out his own plan, in which all his activities will be integrated. We call this plan the master plan. Therefore, we have one overall plan and as many master plans as partners. Each master plan is made after analysing every subactivity to be executed, they have to meet the milestones of the overall plan. The master plans have some kind of flexibility, they are also interlocked into the overall plan.

## 7. THE WORK PLAN

The different subactivities within the master plan can be grouped into adequate work-programmes which are actionorientated. In such workprogrammes we consider different standards, type of labour, equipment and material. We would like to know in what time, with how many men and with what kind of equipment and material we have to handle what type of work with what sort of technique. The workprogramme will be used for construction, but also in the design-phase for design-decisions, design-calculations, cost-calculations etc. Workprogrammes will not be flexible, they fix for the next period the necessary steps to be taken. The programme must be clear to all people who have to work with it.

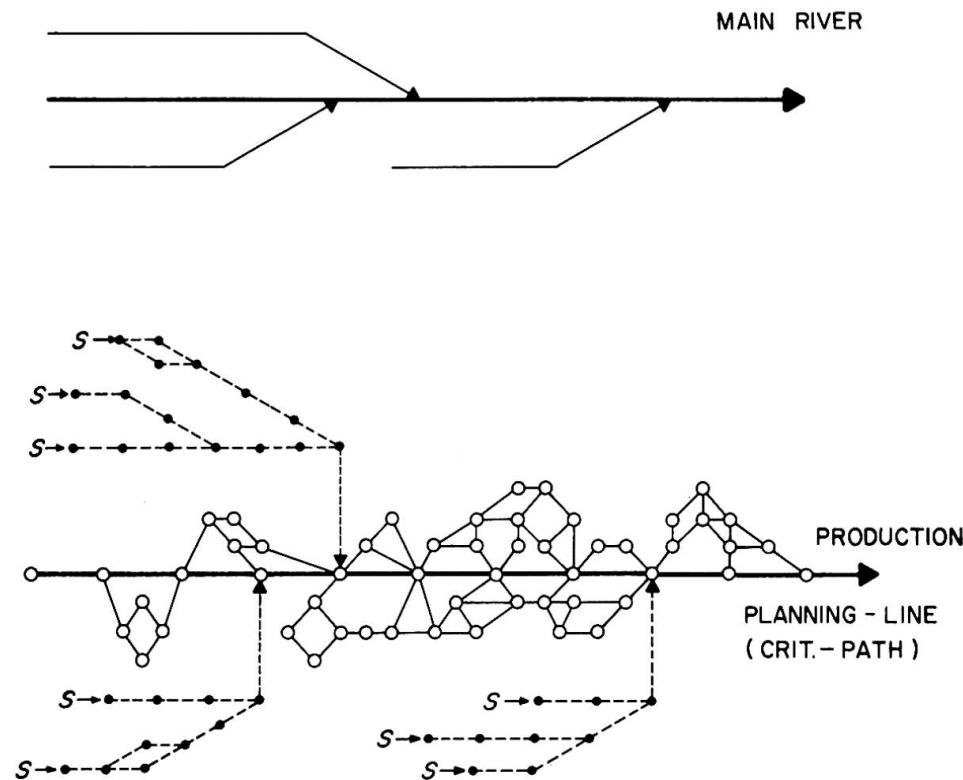


Figure 3: Principle of "logic diagram"

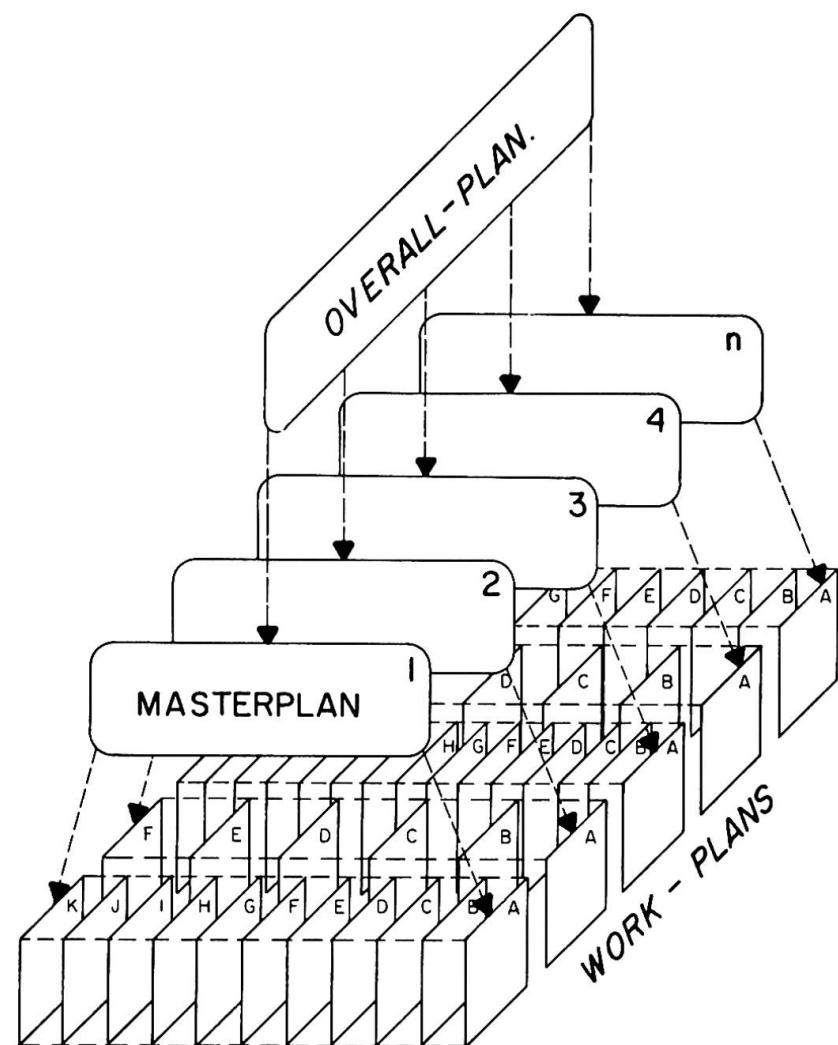


Figure 2: planning-levels



## 8. THE WORKING SCHEDULE

In the last level of planning we find the working schedules in which the instructions for the different tasks are given. Tasks must be performed within fixed periods and the instructions must therefore be clear to men working on site, at drawing-boards etc.

## 9. THE LOGIC-DIAGRAM

It becomes more and more important to plan not only the sequence of the activities of the building process, but the preparatory actions for each activity, or at least for the main activities, as well. This means that parallel to the real workprogramme activities, preparatory activities must also be analysed. When we compare the workprogramme with a river, in which the critical path is considered as the main stream, we can imagine that this main stream must be fed at vital places by a lot of secondary rivers. The rivers stand for activities to be completed before the main activity in the work plan can be started. Questions like these will help to define preparatory activities: What kind of things must be present? What materials must have been supplied? What kind of drawings do we need? What equipment is necessary to execute this activity and how do we get this equipment to the building site?

These preparatory activities can be analysed and shown in the "logic-diagram". The logic-diagram helps to identify the most important tasks in the buildings-process.

## 10. CONCLUSION

Organizing design and construction of large projects is a complex task. Time, cost and quality of the realized building depend directly on the quality of the organization, the selected partners form the organization. Good cooperation and communication are decisive aspects of the organization, the early selection of the construction partners helps to coordinate design with the preparation of the execution.