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System Management: Optimization of a Satellite Project

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Leftfahrttechnik Raumfahrt technik v.14 no. 3, March 1968, p. 75-77

Abstract. In order to improve the efficiency of the development of a project, a project optimization group with specialized personnel from the fields of technology, finance, time-planning and organization should be incorporated into the organization of the project program. This group judges the course of the project between the project management and the other specialized groups, evaluates possible variations, submits optimization proposals to the project management and directs these proposals when rejected to the business management.

Introduction

In order to carry out a satellite project in such a way that a superior performance is achieved and time and costs are optimized, not only outstanding project management is required but also a continuous project evaluation.

Even the best project management can only supervise and improve itself to a certain extent, as it undoubtedly has the opinion that it already is doing the best possible job. The character of a project group with the attribute of an absolute guidance authority, in relation to the specialist groups carrying out the task, does not permit in theory or practice any reflux of the great experience available in the specialized groups and thereby no improvement in approaching the solution to a problem (Fig. 1). An additional unit is required, namely the "project optimization group".

In comparison with the auditor, which is limited to the examination and evaluation of finished activities, the emphasis in the case of the project optimization group is on the additional evaluation of program variations and on the suggestion of alternate approaches to the business management. Through the constructive exercise of influence, the creative competition which hitherto has been inactive in the program is now mobilized and the work is promoted under psychologically favorable conditions.

NAS-5-14826

CSFC, 1968

By TECHTRAN CORP, GLEN BUR

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FACILITY FORM 802

N 69-36191

(ACCESSION NUMBER)

(THRU)

8  
(PAGES)

(CODE)

CR-105638  
(NASA CR OR TMX OR AD NUMBER)

34  
(CATEGORY)

The project optimization group, operates outside the group link (project group-technical group) and should have the following essential characteristics:

- (1) It must put the business management in the position to judge accurately the realization of the management objective;
- (2) It must be flexible to adjust itself to the varying financial and technical scales of a project, or to the number of projects existing at any given time;
- (3) It should be able to adapt itself to the intrinsically varying organizational procedures.

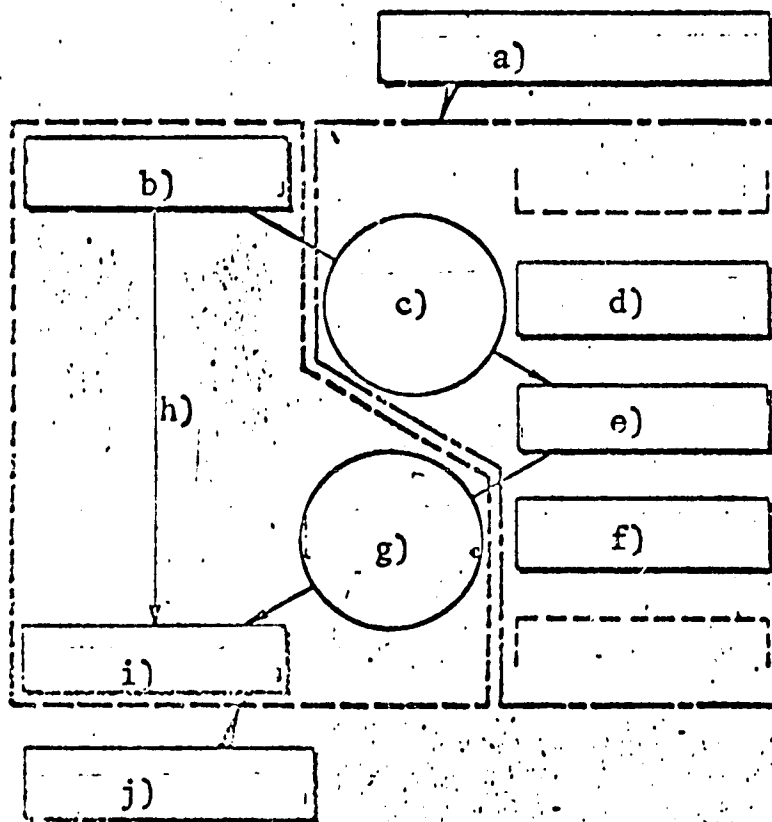


Figure 1. Independent operation of the project group vs. controlled operation of the technical group.

Key: a) Operation of the technical group controlled by the project group; b) Project group assigns specific subcontract; c) control by project group; d) Technical group I; e) Technical group carries out specific contract; f) Technical group II; g) No control by technical group; h) Progress of the project; i) Project group accepts completed subcontract; j) Independent operation of the project group.

### Objectives of a Project Optimization

A project optimization is necessary in both governmental and industrial organizations, the objectives in both cases being similar:

- (a) examination of the data for the project guidelines and activities (specification, surveillance, coordination, information);
- (b) evaluation of the program deviation and determination of the causes for the deviation;
- (c) exploration of possible improvement proposals from contractor or subcontractors;
- (d) evaluation of deviations and suggestion of alternate approaches;
- (e) surveillance of existing recommendations, guidelines and accepted alternate approaches.

The next objectives are functions not related to specific project phases but to all disciplines of a project:

- (f) technology
- (g) finance
- (h) time-planning
- (i) organization.

The interdependence of the individual project disciplines is usually so complex that only an extensive and consistent comparative evaluation will lead to profitable recommendations.

The criticism to the effective realization of the objectives of a project group is thus not limited only to the system level of the project, but extends to the subsystem level as well as to the component level.

### Range of Activity of a Project Optimization Group

The range of activity of the project optimization group is defined by the relation of the project group to the individual internal and external points of contact (Fig.2).

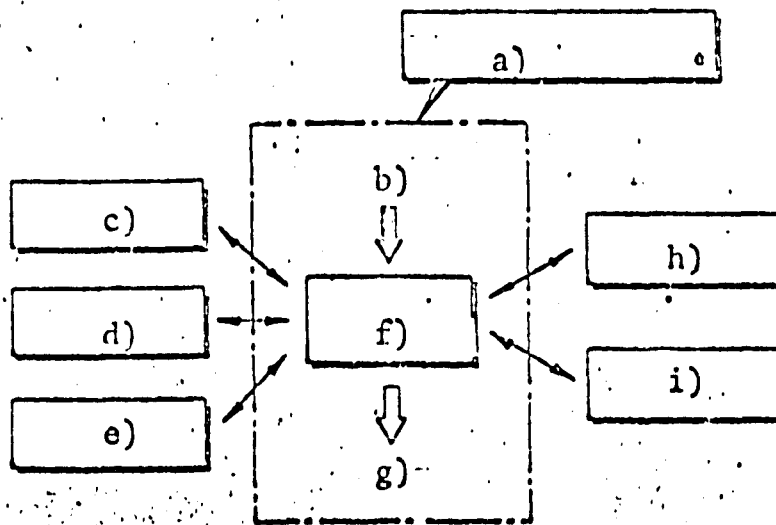


Figure 2. Field of activity of the project optimization group.

Key: a) Field of activity of the project optimization group; b) Completed activities; c) Scientists; d) Contractors; e) Discharge agency; f) Satellite project group; g) Planned activities; h) Business management; i) Technical groups.

The internal points of contact are the business management and the technical divisions. Externally, the activity of the optimization group extends to the scientist, the industrial contractors and the launching organization.

In order to guarantee a strict project examination, the functioning area of the points of contact must be unambiguously defined. The most effective way is to subdivide the project optimization in analogy to the project activity levels. Only for compelling reasons should a subsequent level of activity be included in the examination. (Fig. 3)

The project optimization covers both the immediate tasks of the project group as well as the planned activities. A special emphasis should thus be given to a comparative evaluation of the planned activities on the basis of previous recommendations and their successful execution.

The existence of an optimization group and the recognition of its recommendations by the project group must in the future be contractually grounded

under all circumstances. By a division of the competence between the project group and the external points of contact since up to now it is evident that the project group has had difficulties in successfully following the guidelines and recommendations from advisers on the corresponding level of activity.

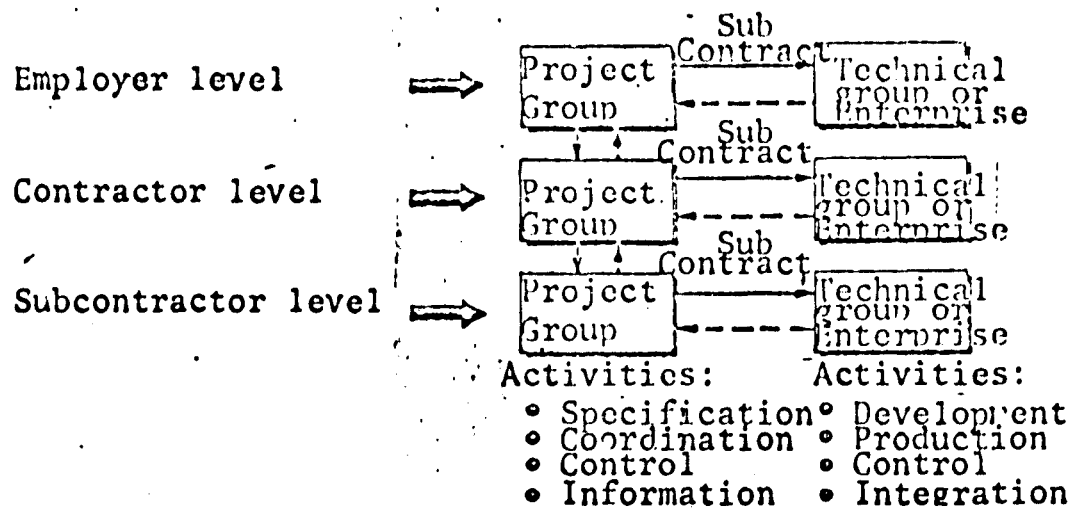


Figure 3. Presentation of tasks of the project group or technical group and their coordination with the various activity levels.

### Sections of the Optimization Group

In the case of large enterprises (development oriented) with several parallel projects, the optimization group will very quickly be recognized as a permanent institution by its effective influence on the course of the projects. In a production oriented enterprise with only minor project participation there are different control setups.

For development oriented projects, an efficient and adaptable composition of a new project optimization group could be as follows:

It is absolutely required that the members of the optimization group have wide experience in a special field, but if possible they should have in addition an "interphase" understanding. However, individuals who substantially meet this requirement can be provided only by the individual technical divisions. It must be recognized in the future that with project optimization we are concerned with a genuine additional work participation of the specialized group

in each project, which must be accounted from the beginning since only then the internal work flow will not be seriously affected by the detachment of technical personnel in an enterprise.

The members of the optimization group should be responsible and experienced technical personnel not engaged in a subcontract of the project, and should be available for the work of optimization during the entire course of the project.

The individual disciplines should be manned as follows:

- (a) technology, by personnel from the technical divisions;
- (b) finance, by personnel from the auditing office;
- (c) time-planning, by personnel from the central planning;
- (d) organization, by management assistants.

The chairman of the optimization group is the spokesman, final authority in staff position and directly subordinate to the business management. Only then it can be ensured that the recommendations worked out by the optimization group, in case of non-acceptance by the project group, will reach the business management immediately for decision (arbitration case) (Fig. 4).

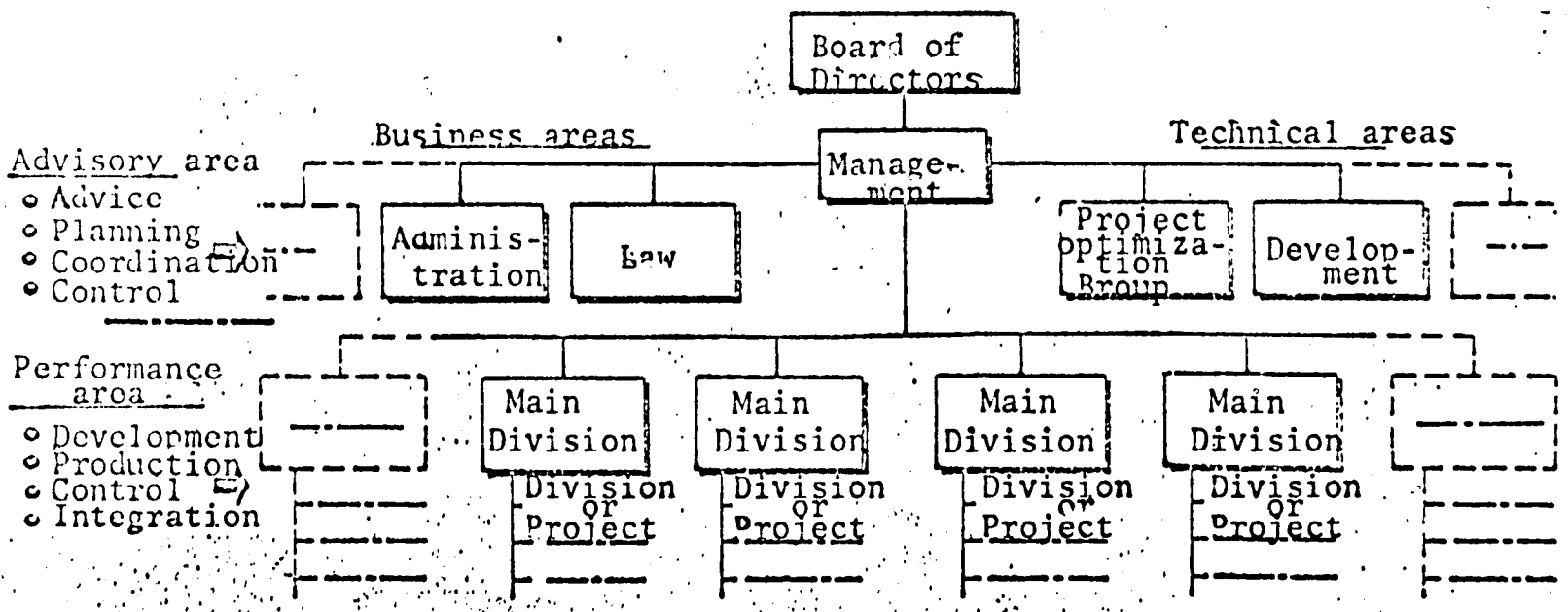


Figure 4. Incorporation of the project optimization group in the organization chart of a progressive enterprise.

The percentage quota of a discipline within the optimization group as well as the number of group members is determined by the technical structure and the financial magnitude of the project in question.

#### Phases of the Optimization Work in a Satellite Project

The development of the program of a satellite project is in theory characterized by the sequence of the program phases for the different satellite models, i.e. the individual program phase starts only when the preceding phase has been completely terminated to the satisfaction of all participating authorities.

However, the certainty of carrying out a program successfully is not economically feasible in practice due to the great expenditure of time and money. Therefore, in an economically rational execution of a project, certain program phases overlap at the start of the project, such as the beginning of production of the flying model and the qualification test of the prototype.

The individual focal points of a program optimization are specified by the development of the program; and they comprise

- (1) the feasibility optimization,
- (2) the design optimization,
- (3) the production optimization,
- (4) the prototype qualification
- (5) the flying model acceptance

The observance of these optimization phases which are established from the beginning of the project, permits a clear effective examination compatible with the program. The business management thereby obtains a timely double check. It will also become natural for the systems engineers to think, for example, how the best technical product is to be delivered or how to work profitably in the .



case of a fixed price contract, and hence the enterprise image can be improved, especially under strong competitive conditions.

### Conclusion

The improvement in technical performance desired in all enterprises should not only make its appearance in the form of a creative competition between the advisory sphere and the performance sphere, but also between the project groups and the technical groups. This continuous constructive supplementation necessarily leads to a continuous improvement of program efficiency. Hence, the educational factor for the project group and the technical group obtained through the continuous fluctuation of experience, should not be overlooked.

Hitherto the improvement of a project discipline could generally (if only partially and without the need of alternate proposals) be attained by a so-called auditor. The project optimization group is undoubtedly a unit more effective and more compatible with the mentality and dynamics of modern enterprises to achieve this improvement.