

# Engineering project management

One curriculum: the integrated planning and quality management system (IPQMS)

Lecturer

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一般的な立場で、 実行者の立場で

特に、アラスカパイプラインの経験をもとに

## 2.1 brief overview

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- ❑ Studies of costly overruns and failures clearly pointed to the need for a new approach to project planning and management.
- ❑ The basic problem is that **different groups are normally involved with: 複数の組織が含まれる**
- ❑ project identification and formation
- ❑ feasibility analysis and appraisal
- ❑ design, including preparation of drawings, specifications and establishing personnel needs
- ❑ traditional project management, which includes activation, implementation, supervision and control through completion
- ❑ Problem is...
- ❑ **No coordination between and among groups.**

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- The need for more effective coordination and control of the various tasks throughout the project life. **といいつつもこれといった対策は書いていない。情報と意識の共通化が重要**
  - The principal need to focus of the integrated project cycle.
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# Divided into 4 phases

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- ❑ Planning, appraisal(見積もり、評価) and design
- ❑ Selection, approval and activation
- ❑ Operation, control and handover
- ❑ Evaluation(評価、一般的), and refinement
- ❑ Figure2.1 illustrates the relationship among the phases of the project cycle, the tasks within each phases, and the overall dependence on central policy issues. ギソソでいえば、輸出をどうするか、など

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- Each project does pass through a cycle consisting of a sequence of phases, and the last phase should produce new project ideas and approaches. Thus the project cycle is self-renewing as shown in Fig.2.1.
  - 評価などを行うと次のアイデアが生まれる。  
(最近、特に評価が強調)
  - これも、立場による。(生涯に一度の経験となる人、組織には?)
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## 2.2 phase1: planning, appraisal, and design

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- (1) Identification and formation of a project
  - (2) Feasibility analysis and appraisal(見積もり、評価)
  - (3) Design of the project
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# Identification and formation of a project

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- ❑ Project may be identified by political parties or governmental officials: **a project may be political.**
- ❑ International agencies have their own procedures for identifying projects. **世銀**
- ❑ After a project has been identified, its parameters must be identified. This is a part of the formation task.
- ❑ 政治的な側面・組織は組織の論理、個人は個人の論理（最後は人を動かすものは何か？）

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- The formation of a project involves:
  - The **objectives**
  - Expected **results**
  - An estimate of **various resources** required to achieve them.
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- 余計なことですが、研究(卒論、修士論文、博士論文など)も同じ
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# Feasibility analysis and appraisal

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- If decision makers find them desirable.  
(直観的によいと考えた場合: 重要)
- **Feasibility analysis** is the process of determining if the project can be implemented.
- Appraisal is the evaluation of the ability of the project to succeed.
- Appraisal 見積もり、プロジェクト成否の評価
- The findings at this point will be useful during the other phases of the project, particularly phase 3.

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- ❑ Determining the feasibility of the project depends on the accuracy of the information received. 情報
  - ❑ Some projects may require a pilot study as part of the feasibility process. 試験(施工、施行)(情報量による: 油田試掘)
  - ❑ A comparative study determines whether the resources will be best used in the project or in some other form. 代替案との比較検討: 例: 石灰岩
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- Many agencies have developed rigid procedures to be followed when their funds are required. (金融)機関は厳しい審査
  - UNDP (国連開発計画) for industrial projects: market analysis- including national trends in production, foreign trade, consumption, and consumer prices, and estimated sales.
  - Added: impact on the social and cultural life, the environmental and ecological impact of the project.
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Studies : technical, economical,  
~~commercial, financial,~~  
administrative/managerial, and  
organizational aspects

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- Additional political, social, environmental, and cultural factors also may be included.
  - 一般の意味とはやや異なる。プロジェクトに関することに特化して述べてある。
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# Economic studies

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- ❑ Related to economic F/S are commercial (market) studies.
  - ❑ These studies examine the market demand for the output of the project, consider the costs of production, and look at all aspects of the project to determine if it is viable.
  - ❑ 市場調査を行い製品の需要調査など、要は資金回収できるか？ Micro or macro
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# Financial studies 財務-主として完成まで- 大胆に言うと、あとは 回収が主: 立場

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- Financial studies determine how much capital is required to complete the project. (いくらかかるか?)
- These studies focus on whether the project can sustain its financial obligations, have adequate working capital(流動資産(使える金)), and generate enough funds(財源) to ensure adequate cash flow to keep the project operational.

# Administrative/managerial studies

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- Administrative/managerial studies determines the adequacy of personnel to control and direct the project.
  - Many regions and countries suffer from a lack of management and administrative capacity to direct projects.
  - 貧しい国ほど、いない。高給の外国人
  - 危惧: あるレベル以下の国には、プロジェクトの考えからは、永久にプロジェクトは成り立たない？
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## Once the F/S have been completed

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- A meaningful appraisal of the project is possible. (合理的な見積もり評価が可能となる)
  - Policy and decision makers and lending institutions may carry out (*put*) the appraisal. (見積もり(承認)を検討する)
  - Potential lending institutions may undertake their appraisal with a healthy skepticism toward all phases of the project. (改善: 銀行にも技術者が要)
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# Design of the project

## 図面を描くだけではない

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- Design establishes the basic programs, allocates responsibilities(責任分担), determines activities and resources and sets down in operational form the areas of priority and functions to be carried out.
  - The design task also includes the preparation of blue prints and specifications for construction, facilities, and equipment.
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## 2.3 Phase2: selection, approval and activation

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This phase of the project has two major tasks.

(1) Selection and approval 承認

(2) activation

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# Selection 選定(順位付け)

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- ❑ Selection takes place after the project has been accepted by policy makers and funding organizations. (承認の中で)
  - ❑ The project has been well organized.
  - ❑ The selection of one project over another is made on the basis of several criteria.
  - ❑ If a project fulfils a major need or contributes to national or sector goals and is politically desirable, it may be selected. (国、セクター、政治)
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- Project selection requires negotiations to obtain formal approval from national authorities, funding agencies, and other contributors.
  - 選定されるには協議をして国家組織、金融機関、その他の認可
  - 大規模ほど大変
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# Activation 開始

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- ❑ Activation of the program involves the coordination and allocation of resources to make the project operational. (資源配置: 契約会社、人材)
- ❑ The activation task must ensure that planning for all the phases is undertaken so that delays in vital inputs do not occur.
- ❑ At this point, the actual work of the project is about to start.

## 2.4 phase 3: operation, control, and handover

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- This phase has three sets of tasks:
  - (1) Implementation 遂行・実施
  - (2) Supervision 監督
  - (3) Completion and handover 完成・引渡し

どこまでを、完了と考えるかも決めておく必要：  
施設完成時？一定期間操業？30年？50年？

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# Implementation

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- ❑ Implementation involves the allocation of tasks to groups within the project organization. 仕事の仕分け(分担)、組織が多数の場合、特に重要(空白(重要なのに誰もやらない)を避ける)
- ❑ At this point, a final review of the project design and timetable is undertaken.
- ❑ Decisions about the procurement of equipment, resources and manpower also need to be made 購入・人材の決定
- ❑ The responsibility for implementation rests with the project manager. PMの責任

# Supervision and control

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- Appropriate procedures must be activated to provide feedback to both the policy makers and the project manager. (Project Management Body of Knowledge---CPM: 学部で松川先生)
- Specific management tools, such as the critical path methods (CPM), program review and evaluation techniques (PERT), and other forms of net work analysis are particularly useful.



- In addition to providing internal control, those funding the project maintain an independent monitoring and control system. PM独自の合理的評価システム、内部談合のみでは混乱(判断基準が統一されない)、合理的説明accountability
- The project manager must meet control criteria established by either the government or another controlling agency, or perhaps by the funding institution.
- 種々の制約を合理的にこなす、かつ、独自性

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- They must take into account the changing patterns that occur during the life of the project.
  - In many cases, the overall project design will need to be reviewed.
  - 種々の条件が変わった場合も、できるだけ同一判断基準で変更(工程や分担)
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# Completion 完成

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- ❑ Project completion prepares the project for phasing out and handover to another form of administration. 撤退と引渡し
  - ❑ Completion consists of scaling down and dismantling the project organization. 人材の再就職もある。うまくしないと暴動
  - ❑ Personnel, assets and other facilities, (取り壊し、撤退)
  - ❑ Completion may take place over a considerable period.
  - ❑ Completion report should be prepared for various authorities.
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- ❑ The actual handover of the project's operation involves finalization of contracts, termination of loan facilities, and so on. 契約やローンの清算
  - ❑ It also includes the transfer of the project's activity and the resources to the new administration.
  - ❑ 下手すると、操業方法が伝達されない。人材が既に再就職(もう、契約の義務もない。日本だと「まあまあ」が通用するが、普通は通用しない。)

## 2.5 phase 4: evaluation and refinement

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- The final phase of the project is the evaluation and refinement of policy and planning factors.
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# Evaluation and follow-up

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- ❑ Actual benefits may not become apparent until the project has been operating for some time.
- ❑ However, it is necessary to consider evaluation as an ongoing process integrated with each phase of IPQMS.
- ❑ For example, evaluation procedures must be designed to analyze and propose solutions to problems that may arise during the tasks of activation, implementation, supervision and control. 評価は、問題の解析と解決を提案するようになっていくべきだ。

- Evaluation of a project can take several forms.
  - Those who are funding the project will undertake a thorough investigation of its financial aspects, including an effectiveness study of goal attainment. 財務と目的達成
  - The studies should consider its influence on the political, social, cultural and environmental factors. 政治・社会・文化への影響
  - In most cases, the project is evaluated as a whole. 総合的-評価の観点が重要-個人・組織で相違
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- ❑ International agencies, such as the world bank or UN have their own procedures. 世銀については別紙
  - ❑ Related to the evaluation, is the need for follow-up.
  - ❑ If the project is successful, guidelines can be set down for the project to be repeated in another setting. 本当は失敗例が役立つ。



# Refinement

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- ❑ Policy makers and managers will need to refine their procedures in the light of each completed project. 手順の改善
- ❑ Experiences and lessons should be the basis on which planning and policy tasks are reviewed. 計画と政策の見直し
- ❑ Refinement of these procedures is an important contribution that the project can make to future development programs.

## 2.6 Feasibility studies

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- ❑ In most cases, the project must satisfy economic and social needs.
  - ❑ The most important task in the planning phase is the determination if the feasibility of implementation. 計画では可能かどうか判断
  - ❑ FS require a preliminary design which is developed from the formulation task 案出作業.
  - ❑ Formulation defines the parameters of the project and estimate the various resources.
  - ❑ One or more preliminary designs 複数の初期設計
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# FS must cover 6 important study areas

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- (1) technical, including manpower and technical requirements
  - (2) Economic justification, such as the cost and benefits
  - (3) Administrative and managerial, including external linkages and internal organization
  - (4) Environmental, including present baseline data and impact on those data
  - (5) Social and political, including demographic data and social needs
  - (6) Financial for funding needs/sources
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# Context of 5 interrelated questions in FS

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- Is the present project responsive to urgent present or anticipated social and economic needs? 緊急性
  - Will the project as planned adequately serve or fulfill the intended purposes without detrimental to the environment? 環境
  - Will the benefits of the project of both society and the economy be justified by the cost? 費用便益
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- ❑ Should various technical alternatives be studied to optimize or maximize cost effectiveness of the project without sacrificing the quality or function of the project? 代替技術をキチンと検討したか？
  - ❑ Do the feasibility studies provide sufficient baseline criteria and measures to establish a checklist for subsequent project implementation, control and evaluation? FSはOKか？

# FS and appraisal (FSと見積もり(評価)) : several other crucial functions

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- First, by examining project goals and by questioning all assumptions, they provide a framework to reformulate the preliminary design into the most appropriate design. 最適なものへ
  - Second, FS and appraisal help guide the implementation of the project.
  - Finally, FS includes criteria and baseline measures to evaluate the project.
  - In fact, the significance of FS is setting up guidelines and checklists for subsequent tasks in IPQMS!
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# In summary

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- ❑ Poor project planning results in many problems.
  - ❑ Costly budget overruns
  - ❑ Structural collapses
  
  - ❑ The six types of FS are summarized in matrix form in Table.2.1.
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# Concept

## Table 2.1 F/S Checklist –Technical-

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- A. Site Data: Geology and soil conditions, drainage characteristics, climate conditions, water supply, power and transportation
  - B: Choice of available technologies: equipment and machinery, manufacturing process, spare parts
  - FSのcheck listは、実施中もほぼ同じcheckである。
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- C. Design: layout, engineering requirement, construction materials
  - D: Manpower: professional, technician, labor
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- ❑ Is there an adequate choice of available technologies for alternative design purposes considering physical layout, engineering design, and availability of raw materials?
  - ❑ Do the alternative designs meet relevant building codes?
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# -Economic-

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- ☐ A. Demand: domestic, export
  - ☐ B. Supply: domestic, import
  - ☐ C. Marketing program
  - ☐ D. Employment Impact
  - ☐ E. Raw material needs: domestic, import
  - ☐ F. Cost-benefits
  - ☐ 途上国政府と海外企業では意見が違うのが当然、一旦決まったら、態度を変えない！？
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# -Administrative/Managerial-

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- A. Internal organization: structure (命令系統の明確化), authority, lines of communication, flexibility
  - B. External linkages: government support, government regulations
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- ❑ C. Personnel: needs/ capabilities, position descriptions, local vs. foreign, policies
  - ❑ D. Management: management of project, control techniques, scheduling
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# -Environmental-

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- ❑ A. Physical/chemical: water, land, air, noise
  - ❑ B. Ecological: species and population, habitats and communities, ecosystems
  - ❑ C. Esthetic: land, air, water, biota, man-made objects
  - ❑ D. Social: individual well-being, social interactions, community well-being
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# -Social/Political-

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- A. Social impact: culture and life style, demography(人口学),
  - B. Political impact: equity, social justice, political organization
  - C. Community resistance: 嫉妬含む
  - D. Institutional resistance: legal constraints, stability of political support
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# -Financial-

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- ☐ A. Project design and implementation
  - ☐ B. Cash flow studies, profitability:  
external , domestic
  - ☐ C. Source of funding
  - ☐ D. Adequacy of funds
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