

BBSE3009 Project Management and Engineering Economics

<http://www.mech.hku.hk/bse/bbse3009/>



# Project management at production and construction stages



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Building design is a team work.



# Building and Construction

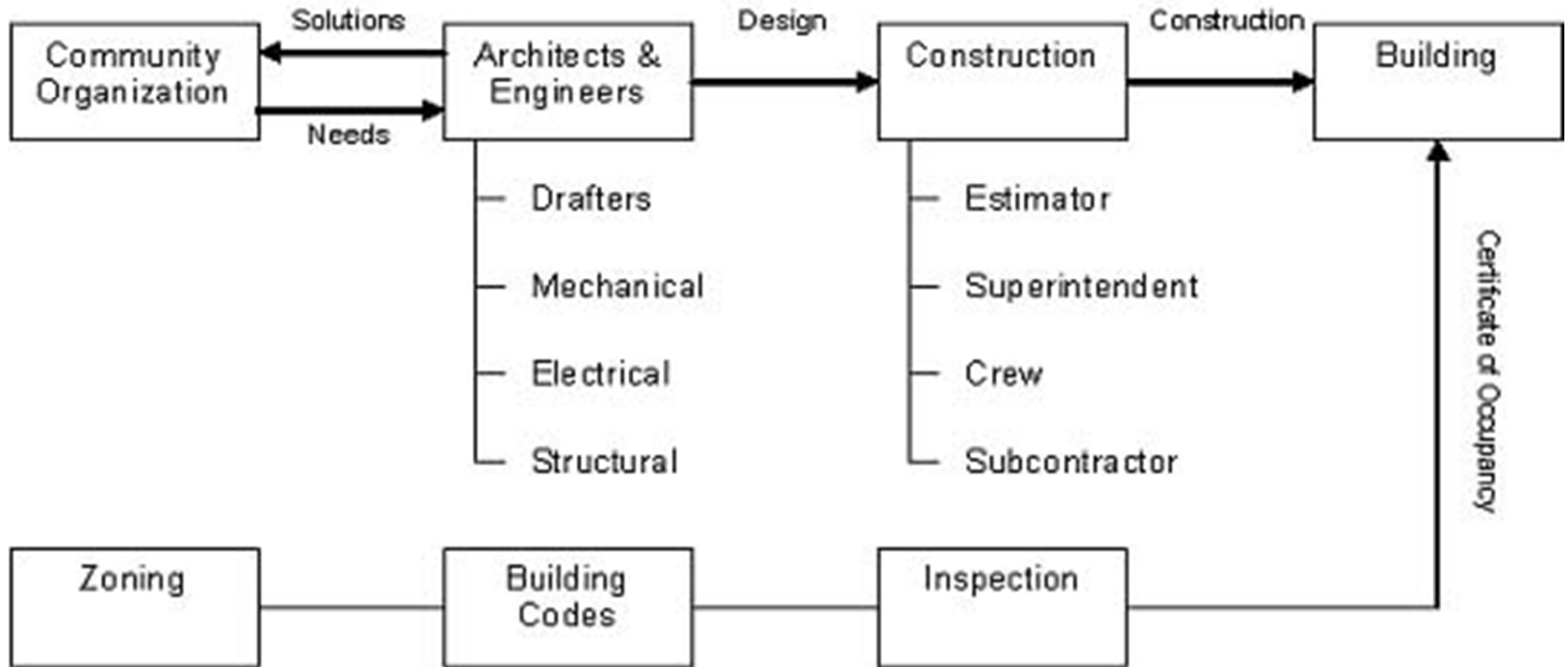


- Video: The Six Professionals in the Construction Value Chain (6:28), [http://youtu.be/ch15\\_z-gkWg](http://youtu.be/ch15_z-gkWg)



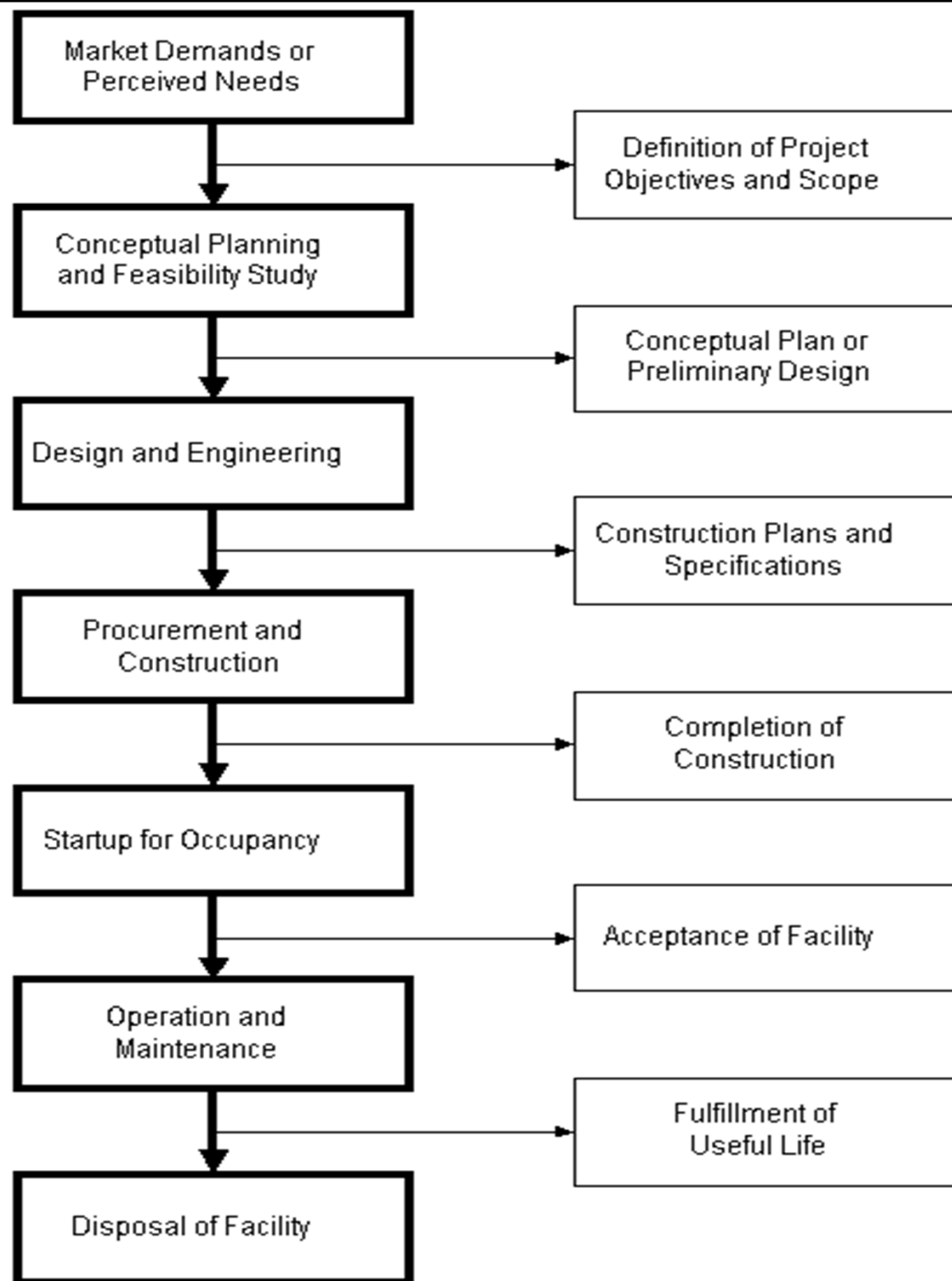
- Architect
- Civil and Structural Engineer
- Mechanical & Electrical (Bldg. Services) Engineer
- Project Manager
- Quantity Surveyor (QS)
- Facility Manager

# The Design and Construction Team



(See also: Organisation of Parties to Construction,

<http://www.kctang.com.hk/qswiki/Organisation%20of%20Parties%20to%20Construction>)



The project life cycle of a constructed facility (the owners' perspective)

# Building and Construction



- Selection of professional services
  - Financial Planning Consultants
  - Architectural and Engineering Firms
  - Design/Construct Firms
  - Professional Construction Managers (CM's)
  - Operation and Maintenance (O&M) Managers
  - Facilities Management (FM)



# Building and Construction



- Construction contractors

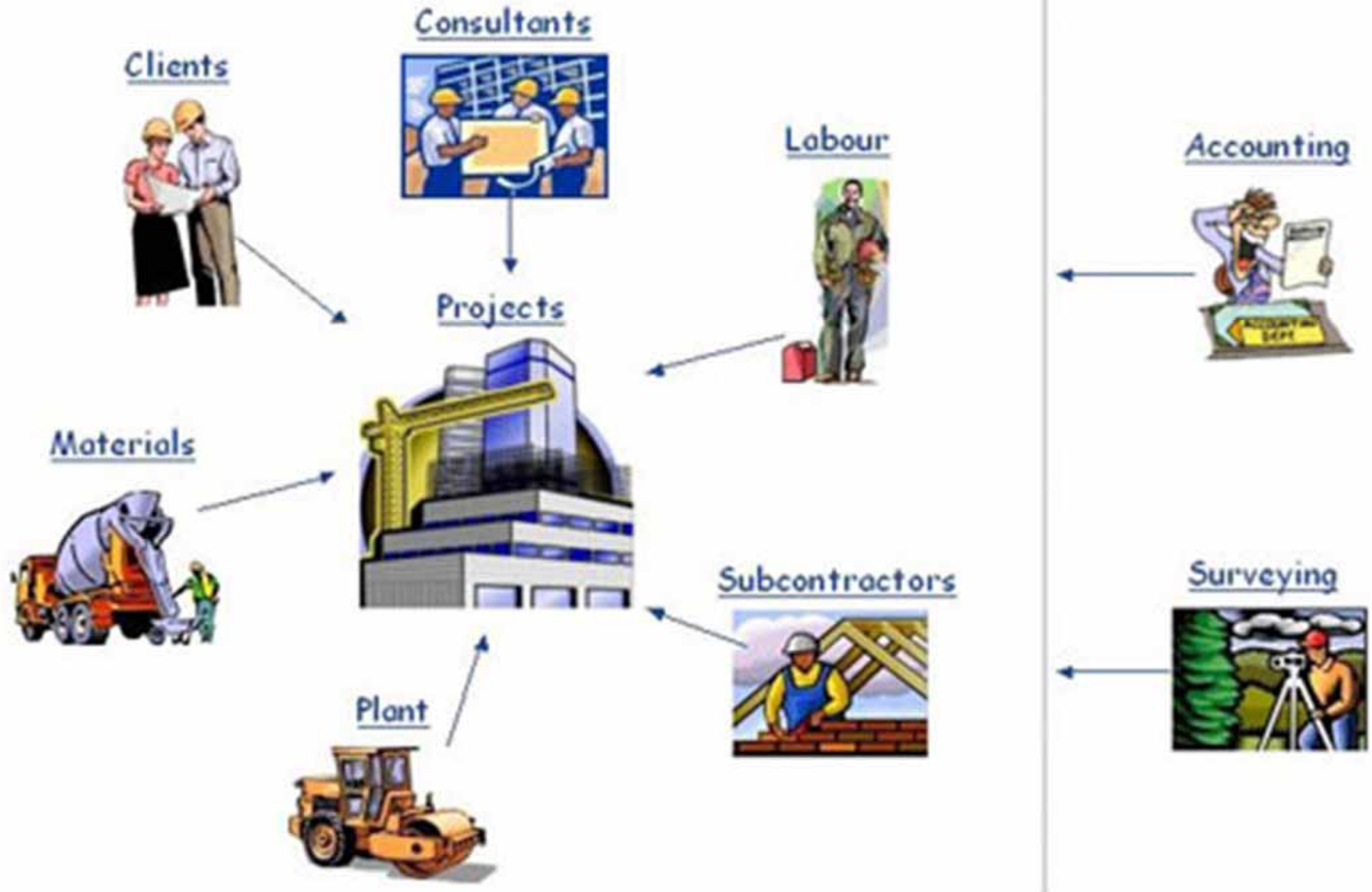
- General Contractors (Builders)
- Specialty Contractors (Sub-contractors)
- Material and Equipment Suppliers



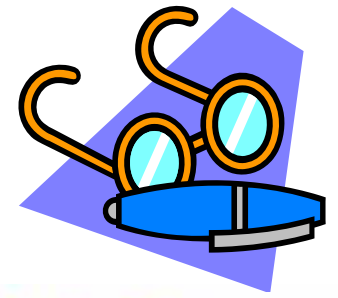
- Legal and regulatory requirements:
  - Legal responsibilities
  - Mitigation of conflicts
  - Government regulations (building codes)



# Construction project management



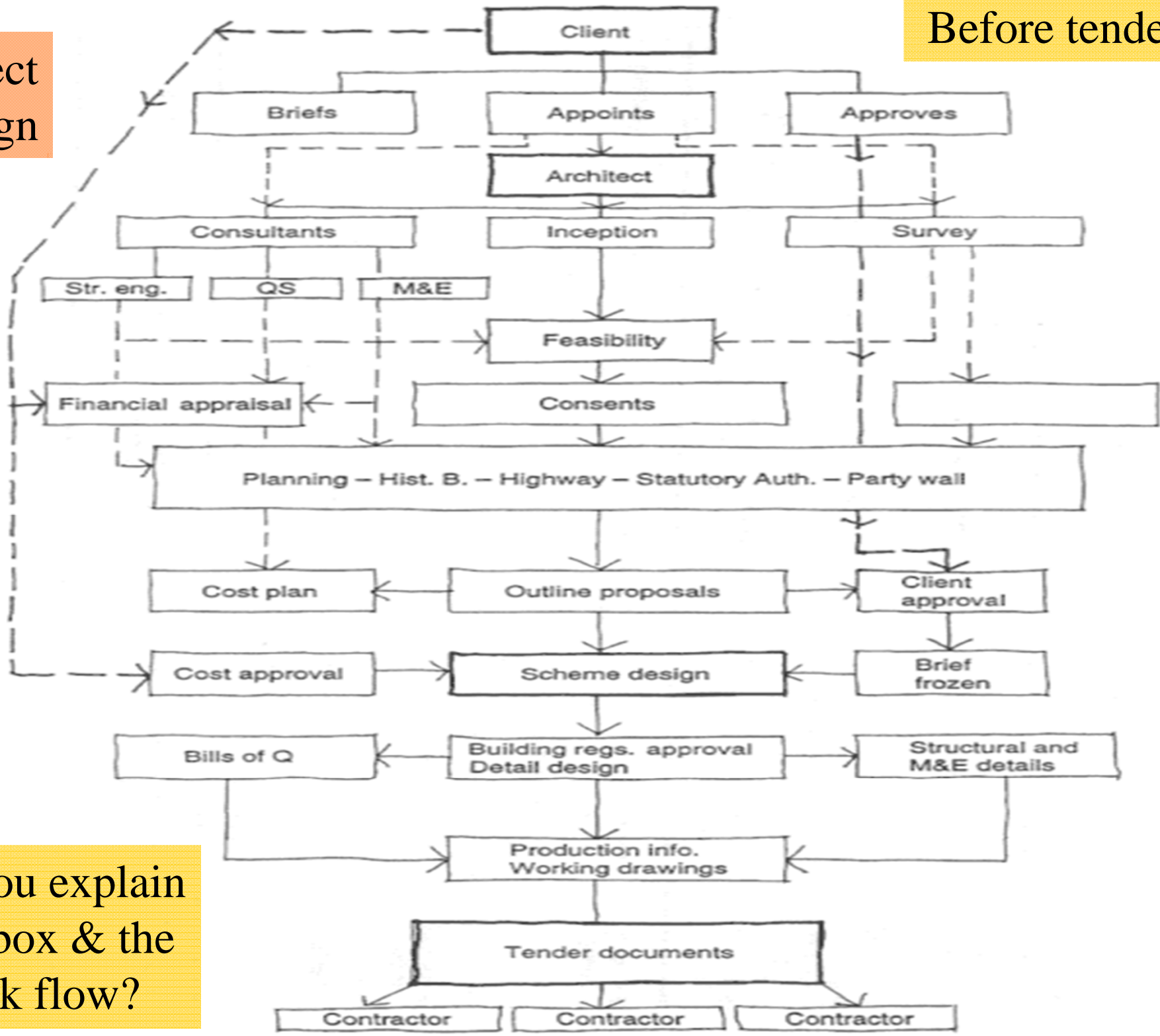
# Project Plan



- Project design (see flow chart diagram)
  - Pre-tender stages
  - How the idea comes out & develop into design
  - Major outcome: tender documents
- Project construction (see flow chart diagram)
  - Post-tender stages
  - Contract administration
  - Site operation, completion & payments

Before tendering

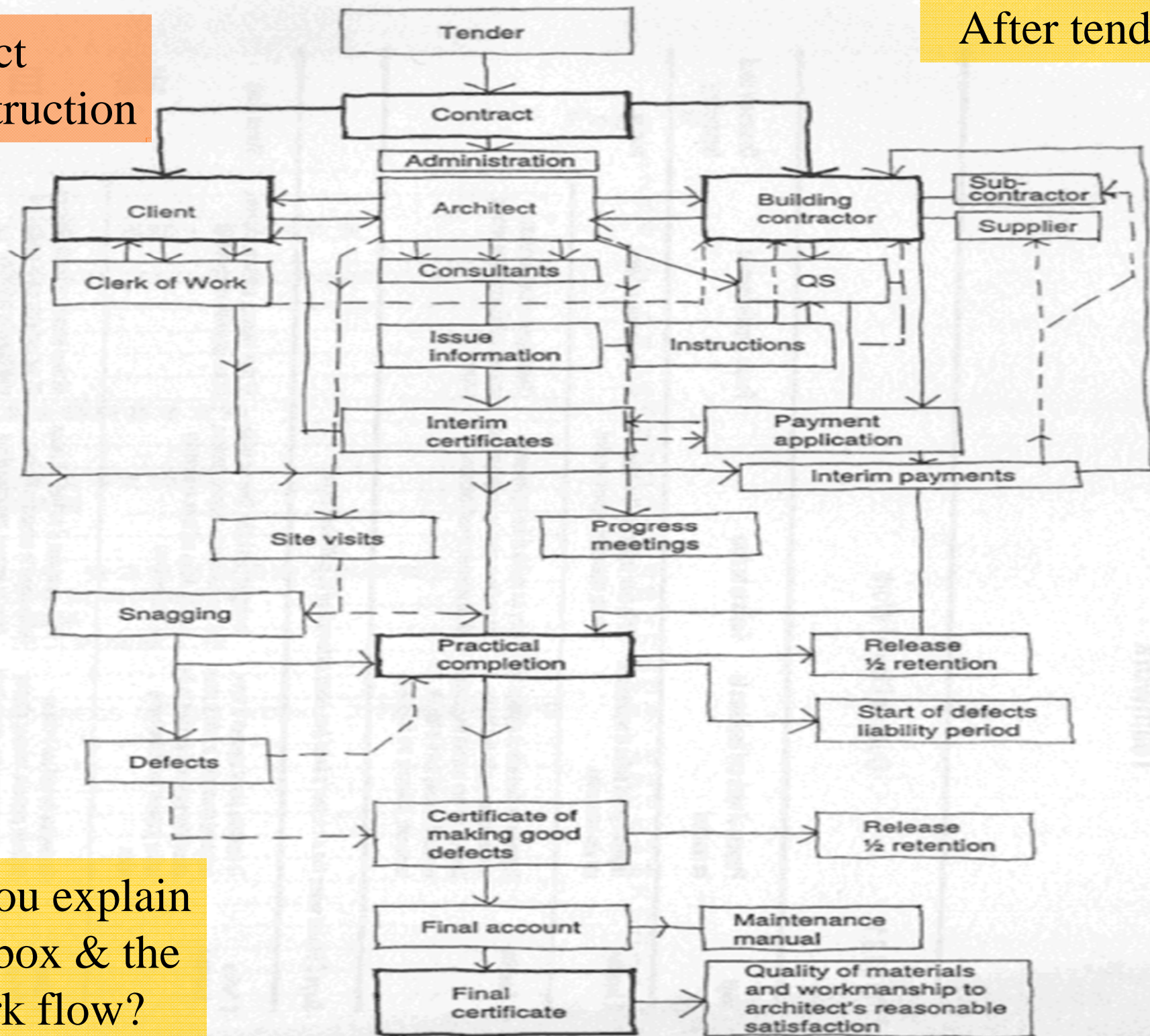
Project Design



Can you explain each box & the work flow?

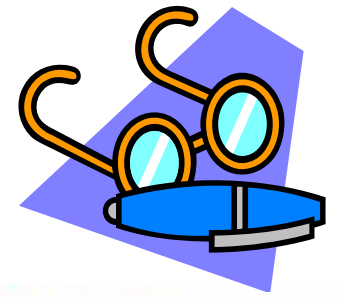
# Project Construction

After tendering



Can you explain each box & the work flow?

# Project Plan



- Outline Plan of Work 2007 (from RIBA)\*

- A. Appraisal
- B. Design brief
- C. Concept
- D. Design development
- E. Technical design
- F. Production information
- G. Tender documentation
- H. Tender action

Preparation

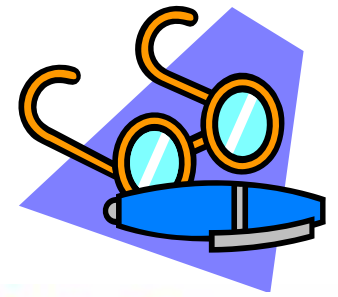
Design

Pre-construction

(\* RIBA = Royal Institute of British Architects;

File: [www.mech.hku.hk/bse/bbse3008/ribaoutline.pdf](http://www.mech.hku.hk/bse/bbse3008/ribaoutline.pdf))

# Project Plan



- Outline Plan of Work 2007 (cont'd)

- J. Mobilisation
- K. Construction to practical completion
- L. Post practical completion

Construction

Use

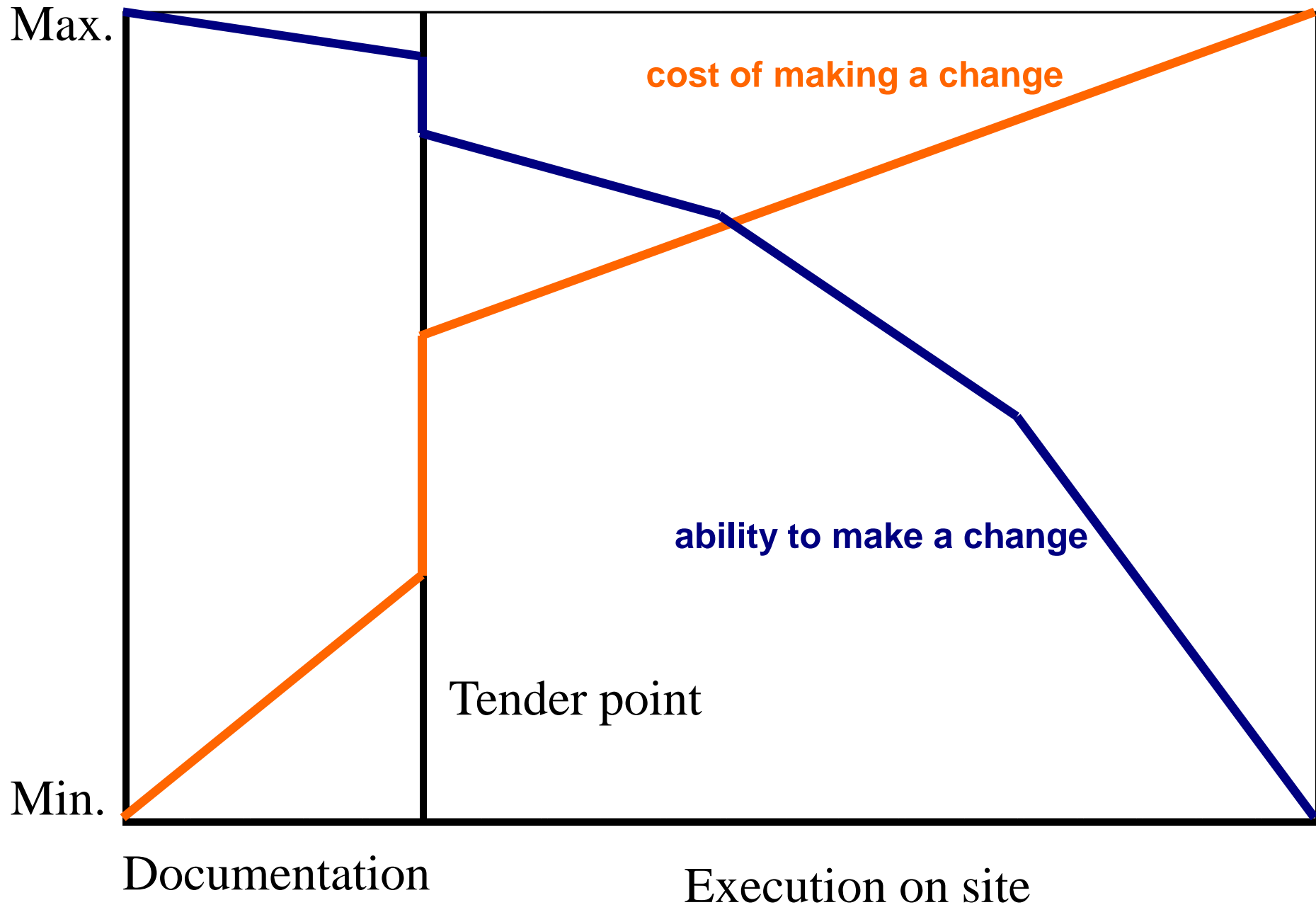
- The Outline Plan of Work organises the process of managing, and designing building projects and administering building contracts into a number of key Work Stages
  - Description of key tasks
  - Various procurement methods (e.g. open tender, design & build, management contract)



# Building Contract

- Contract (= offer and acceptance)
  - An agreement between 2 or more parties/persons to do or not to do some act or acts, their intention being to create a legal relationship which is enforceable by law
- Typical templates of construction contracts:
  - Standard Form of Building Contract
  - Sub-contracts (e.g. w/ sub-contractors/suppliers)
- Express terms and implied terms; liability and breach of contract

# Managing changes and risks in building contract







# Building Contract

- Contract documents:

Contract document	Definition	Clarification
Instructions to tenderers	Rules of play	for tender phase
Conditions of contract		for construction phase
Production drawings	Description of work	graphical
Specification		written
Quantities		numerical
Schedule of work		list

- HK Standard Form Contract (Main Contract)

- Between the Client and the main contractor
- 36 nos. clauses (see contents for the 1997 version)
- Latest version: 2005

# Hong Kong Standard Form of Building Contract (1997 version)

## CONTENT 目錄

Clause No. 條款	Page 頁
1. MAIN CONTRACTOR'S OBLIGATIONS 建造商的義務 .....	1
2. ARCHITECT'S INSTRUCTIONS 建築師的指示 .....	2
3. CONTRACT DOCUMENTS 合約文件 .....	6
4. STATUTORY OBLIGATIONS, NOTICES, FEES AND CHARGES 法定義務、通知、費用與收費 .....	9
5. LEVELS AND SETTING OUT OF THE WORKS 平水與開線 .....	11
6. MATERIALS, GOODS AND WORKMANSHIP TO CONFORM TO DESCRIPTION, TESTING AND INSPECTION 材料、貨物及手工須符合說明、測試及檢驗 .....	12
7. ROYALTIES AND PATENT RIGHTS 版權與專利權 .....	13
8. FOREMAN-IN-CHARGE 地盆總管 .....	14
9. ACCESS FOR ARCHITECT TO THE WORKS 建築師有權進入地盆 .....	14
10. CLERK OF WORKS 工程監督 .....	15
11. VARIATIONS, PROVISIONAL AND PRIME COST SUMS 改動、預算金額與基本定額 .....	16
12. CONTRACT BILLS 合約數量單 .....	21
13. CONTRACT SUM 合約金額 .....	22
14. MATERIALS AND GOODS, UNFIXED OR OFF-SITE 未安裝或存放地盆外之物料 .....	22
15. PRACTICAL COMPLETION AND DEFECTS LIABILITY 實質完工與保固 .....	23
16. SECTIONAL COMPLETION 分段完成 .....	25
17. ASSIGNMENT OR SUB-LETTING 轉讓或分判 .....	27
18. INJURY TO PERSONS AND PROPERTY AND EMPLOYER'S INDEMNITY 受傷與財物損毀及保障業主 .....	28
19. INSURANCE AGAINST INJURY TO PERSONS AND PROPERTY 傷亡與財物損毀保險 .....	29
20. INSURANCE OF THE WORKS AGAINST FIRE, ETC 為工程投購火險等 .....	32
21. POSSESSION, COMPLETION AND POSTPONEMENT 接收地盆、完工與擱置工程 .....	40
22. DAMAGES FOR NON-COMPLETION 過期賠款 .....	41
23. EXTENSION OF TIME 展期 .....	42
24. LOSS AND EXPENSE CAUSED BY DISTURBANCE OF REGULAR PROGRESS OF THE WORKS 工程進度受到干擾做成之損失和額外開支 .....	44
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27. NOMINATED SUB-CONTRACTORS 指定承判商 .....	55
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29. ARTISTS AND TRADESMEN 美術家與技工 .....	68
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34. ANTIQUITIES 古物 .....	81
35. ARBITRATION 仲裁 .....	82
36. FLUCTUATION IN WAGE RATES 工人日薪波動 .....	85



# Building Contract

- Clauses most relevant to our present study:
  - 2. Architect's Instructions
  - 10. Clerk of Works
  - 11. Variations, Provisional and Prime Cost Sums
  - 15. Practical Completion and Defects Liability
  - 23. Extension of Time
  - 24. Loss and Expense
  - 30. Certificates and Payments
  - 36. Fluctuation in Wage Rates



# Contractor Organisation



- Organisation of building services contractors (see examples in the figures)
  - Usually acting as sub-contractors
  - On site and off site personnel
  - Technical and non-technical staff, e.g.
    - Project manager
    - Project engineer
    - Supervisor, foreman
    - Operatives

\* If you have taken summer training, please draw up the organisation chart of your training company.

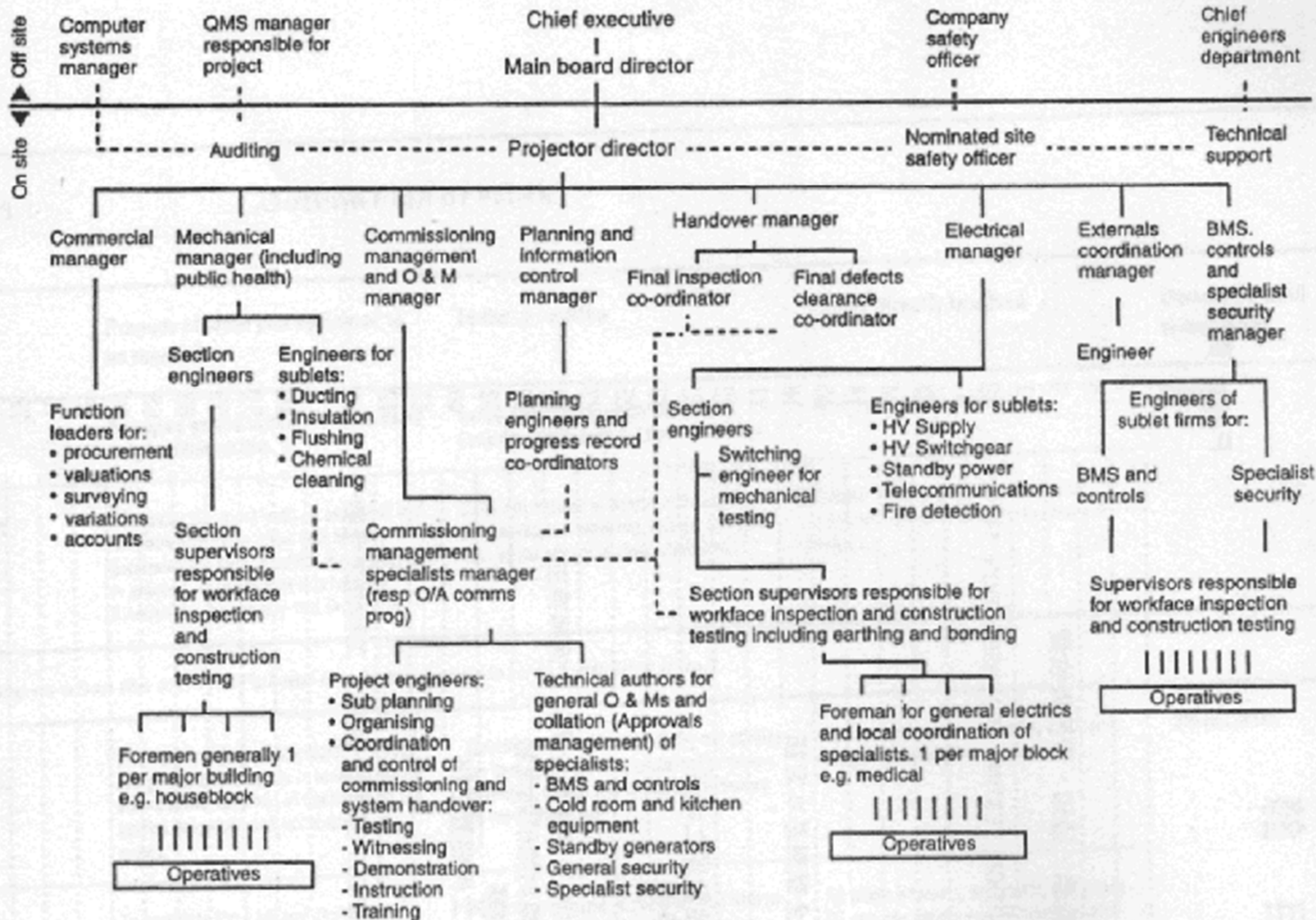


Figure 3.2 Building services contractor – organogram for a new prison.

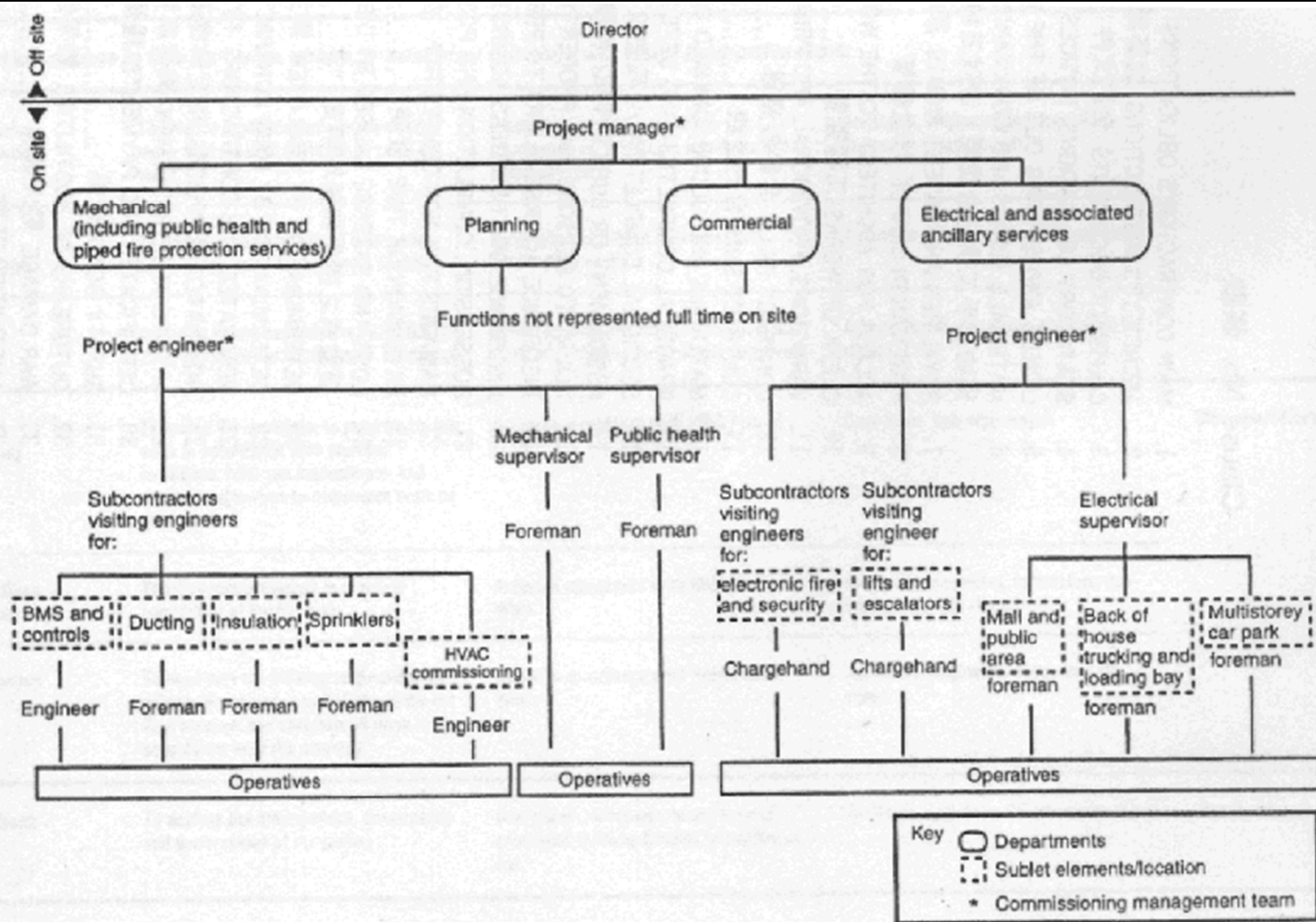
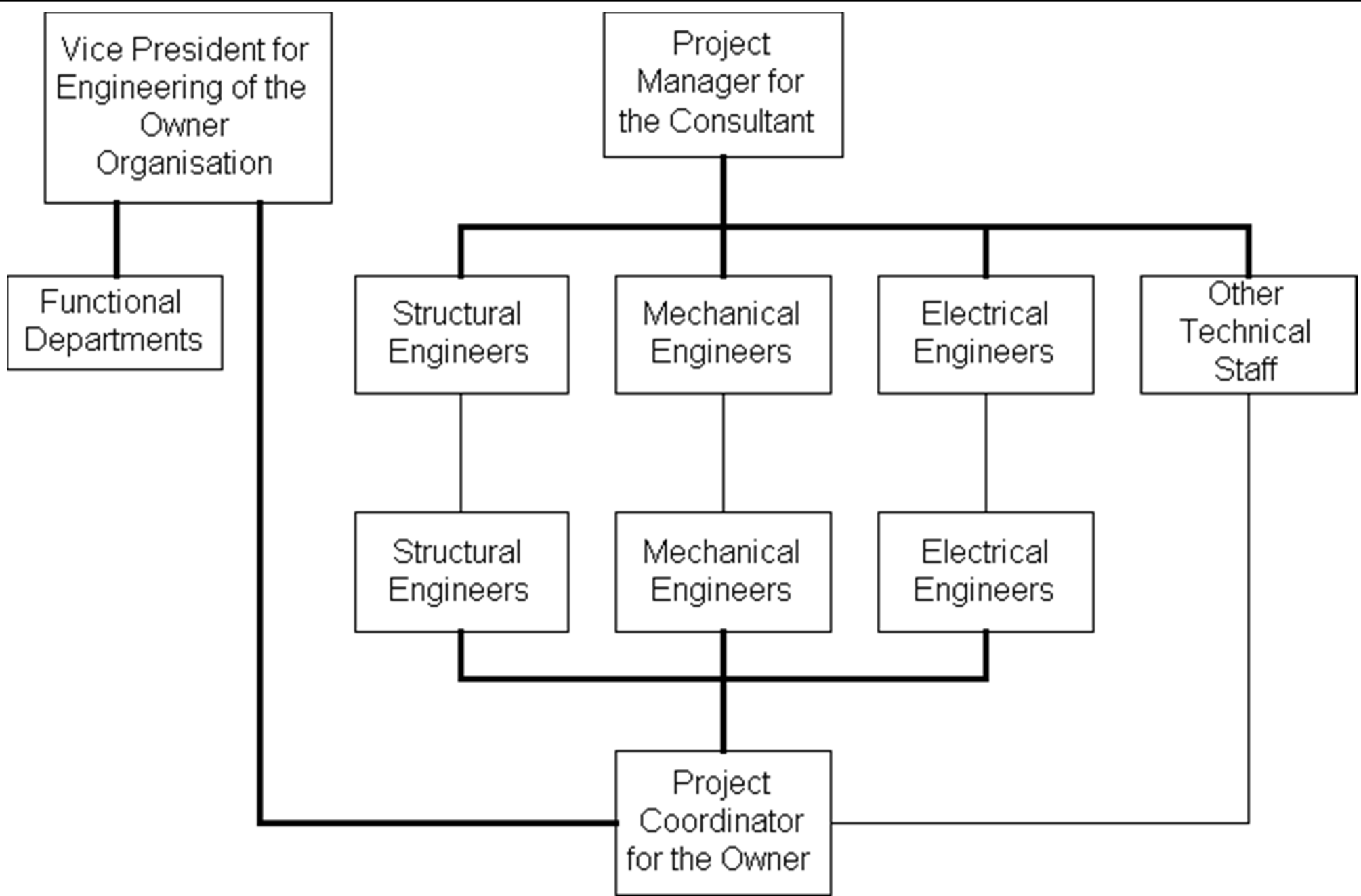
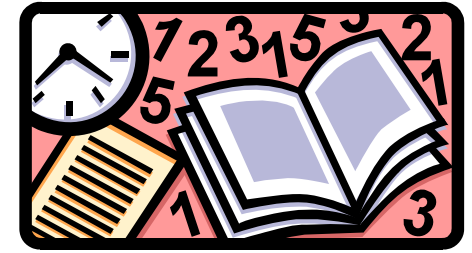


Figure 3.3 Building services contractor – organogram for a shopping centre.



**Coordination between owner and consultant in construction management**



# Further Reading

- Organisation of Parties to Construction,
  - <http://www.kctang.com.hk/qswiki/Organisation%20of%20Parties%20to%20Construction>
- RIBA Outline Plan of Work 2007,
  - [www.mech.hku.hk/bse/bbse3008/ribaoutline.pdf](http://www.mech.hku.hk/bse/bbse3008/ribaoutline.pdf)
- Contracts/Contracting,
  - [www.trp.dundee.ac.uk/research/glossary/contract.html](http://www.trp.dundee.ac.uk/research/glossary/contract.html)
- Contract documents,
  - [www.designingbuildings.co.uk/wiki/Contract\\_documents](http://www.designingbuildings.co.uk/wiki/Contract_documents)