

The Hospital Planning Process

Seminar
Indian Institute of Health Management Research
Jaipur, March 15, 2008
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Project Stages New Construction or Expansion

- Strategic Planning
- Definition
- Design
- Construction
- Commissioning
- Operation

Programme for the Seminar

- Strategic Planning
 - External Environment
 - Internal Environment
- Project Definition
 - Master Program
 - Master Plan
 - Functional and Space Program

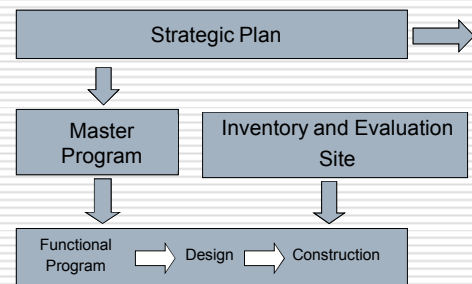
Programme for the Seminar

- Design
 - Procurement methods
 - Stages
- Construction
 - Approaches
 - Stages
- Operation
 - Building commissioning
 - Operational commissioning

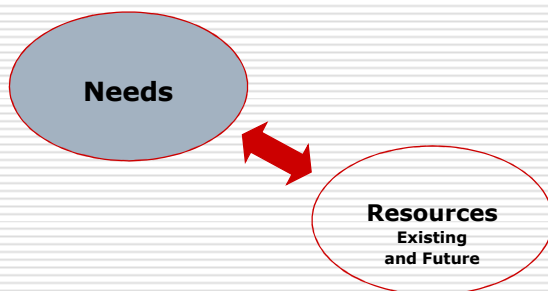
Basic Philosophy

- ❑ **Reflection** before **action**
- ❑ **Analysis** before **synthesis**
- ❑ **Diagnostic** before **treatment**
- ❑ **Programming** before **planning & design**
- ❑ Treat the disease, not the symptoms
- ❑ Define and understand the problems before developing solutions

Planning Process New Institution



Needs vs Resources



Strategic Planning

"The process by which the guiding members of an organization envision its future and develop the necessary procedures to achieve that future"

*"It helps an organization **create** its future"*

Goodstein, Nolan and Pfeiffer

Strategic Planning

□ Assess the external environment

(Events over which you have no control)

- Demographics
- Epidemiology
- Social and political trends
- Healthcare delivery trends
- Markets and potential customers
- Competitors
- Market share
- Regulatory constraints

Strategic Planning

□ Assess the internal environment

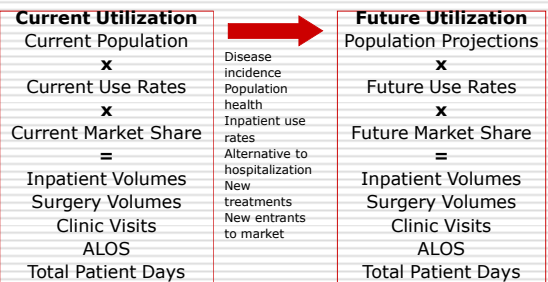
(Events over which you have complete or partial control)

- Strengths and weaknesses
- Organizational structure
- Workloads and utilization
- Current resources
 - Financial
 - Human

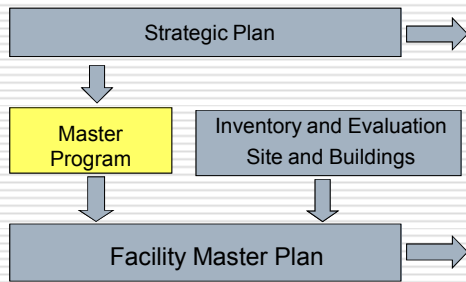
Strategic Planning - Outcome

- Vision, mission and objectives
- Future scope of services
- Workloads and utilization objectives
- Financial feasibility

Framework to Forecast Needs



Planning Process Existing Institution



Master Program

- Definition
- Goals
- Contents
- Prerequisites
- Caveats
- Process

Definitions

- Program:** Specification of what should be included in the plan.
- Master Program:** Summary description of functional components to be included in the plan along with planning criteria and major organizational concepts.
- Plan:** A written description accompanied or not by graphics describing a future state that is desirable.
- Facility Master Plan:** Definition of all physical resources necessary to achieve the stated role of the institution

Master Program Definition

- Preliminary functional program that defines the project components and their areas based on workloads and general operating principles and systems, and provides an overall definition of the total project
- An assessment by department of the implications of the hospital's strategic plan on the departmental scope of services, workload and facility requirements: major room elements and departmental area

Master Program • Goals

- Translate the clinical program into functional and space needs;
- Provide a rational basis for developing a master plan for an existing institution or an architectural concept for a new building.
- Provide to the institution, funding organizations, design professionals and other stakeholders a document describing and quantifying the physical resources the institution requires to carry out its role.

Master Program Content – Summaries

- Clinical programs
- Operational systems
 - Pharmacy
 - Material handling
 - Food
 - Linen
 - Sterile supplies
 - IT
- Workloads
- Number of beds distributed by categories
- Summary of all major rooms (operating rooms, imaging, etc.)

Master Program Component Programs

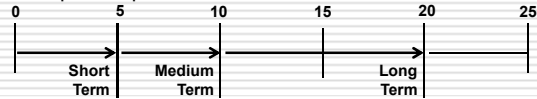
- Overview and assumptions
- Scope of Services;
- Major Policies and Procedures
- Workloads
- Staffing
- Inter-departmental relationships
- Gross Area
- Major sectors
 - Inpatients Units
 - Ambulatory Care
 - Diagnostic and Therapeutic Services
 - Administrative Services
 - Support Services
 - Patient and Public Services
 - Staff Services

Master Program • Space Needs

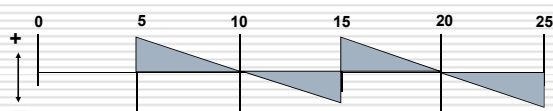
- Future space needs ensue from:
 - Changes in programs and services:
 - Existing ones that expand, contract or are abandoned
 - New ones
 - Correction of functional and physical deficiencies
- Needs should be distributed over different planning horizons: 5-10-20 years

Master Program • Space Needs

Anticipated Space Needs



Component Areas



Master Program • Prerequisites

- Strategic plan defining clinical services and workloads
- Organizational structure with appropriate authority to settle issues unresolved at the users level
- Internal or external programming expertise
- Efficient communication links between participants

Master Program • Caveats

- Recognize the goals pursued by the master program and its level of precision: the Master Program is not a detailed functional program
- Take into consideration time lapses between master program, master plan, functional program and project design and construction

Master Program • Caveats

- Avoid useless discussions on details that will be resolved at the functional program stage
- Use projected workloads, staffing and equipment, and generally accepted standards to determine future space requirements

Master Program • Process

- Structured users' participation:
 - To develop a more complete and well documented program
 - To get the users to "buy in" the program and the subsequent plan
 - To avoid communication problems
- Participation through questionnaires and interviews

Master Program • Process

- Users' Contribution:
 - Historical workloads
 - Operational policies and procedures
 - Factors that will impact workloads (and not the projected workloads themselves)
 - Evaluation of different design criteria and factors that will impact space (but not the space requirements themselves)

Master Program • Outcome

- Recapitulation of the Strategic Plan
 - Demographic and epidemiological data
 - Current and projected scope of services
 - Projected workloads
 - Number of beds
- For each department/service:
 - Services offered
 - Current and projected workloads
 - Major rooms or other appropriate space determinant
 - Current and projected gross area

Space List Summary

1. INPATIENT UNITS		348,027	32333
	#		
	Beds		
1.1 Medical/Surgical Units	504	192612	17894
1.2 Obstetrical Unit	30	22770	2115
1.3 Neonatal Intensive Care Unit	20	5115	475
1.4 Paediatric Unit	48	11137	1035
1.5 Intermediate Care Units	48	22103	2053
1.6 Intensive Care Units	96	57567	5348
1.7 Coronary Care Unit	32	18693	1737
1.8 Palliative Care Unit	8	4560	424
1.9 VIP Unit	14	13470	1251
	800		

Space List Summary

2. AMBULATORY CARE		Total Components	Gross Area	110174	10235
		Beds/Stretchers			
2.1	General Medical Clinics		12210	1134	
2.2	General Surgical Clinics		15,945	1481	
2.3	Specialty Clinics		15,930	1480	
2.4	Medical/Surgical Day Care	24 MDC	18,383	1708	
2.5	Emergency	16 Observ.	17,004	1580	
2.6	Dialysis Service	12 Treatment	7,335	681	
2.7	Oncology Centre	20 Treatment	6,405	595	
2.8	Specimen Collection		2,828	263	
2.9	Pre-Operative Assessment Unit		1,834	170	
2.10	Executive Health Check-Up		8,685	807	
2.11	In-Vitro Fertilization Centre		3,615	336	
		Total	109		

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Space List Summary

3. DIAGNOSTIC AND TREATMENT SERVICES		Total Gross Area	170,921	15879
3.1	Surgical Suite		47,584	4421
3.2	Diagnostic Imaging		31,504	2927
3.3	Clinical Labs		26,156	2430
3.4	Pharmacy		7,621	708
3.5	Morgue and Autopsy		2,795	260
3.6	Physiotherapy		5,656	525
3.7	Occupational Therapy		1,778	165
3.8	Audiology and Speech Therapy		4,077	379
3.9	Electrodiagnostic Services		5,032	467
3.10	Respiratory Therapy		3,038	282
3.11	Cardiac Catheterization Lab		9,663	898
3.12	Social Work		819	76
3.13	Endoscopy and Cystoscopy Suite		6,825	634

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Space List Summary

4. ADMINISTRATIVE SERVICES		Total Components	Gross Area	37691	3502
4.1	Administration		14924	1388	
4.2	Admitting/Registration		4,172	388	
4.3	Educational Services		9,974	927	
4.4	Health Records		4,953	460	
4.5	Employees' Health Service		1,162	108	
4.6	Information Systems		2,506	233	

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Space List Summary

5. SUPPORT SERVICES		Total Components	Gross Area	88175	8192
5.1	Central Stores and Distribution		22241	2066	
5.2	Central Sterilization Service		10506	976	
5.3	Dietary Service for Patients		10506	976	
5.4	Dietary Service for Staff		21600	2007	
5.5	Laundry and Linen Service		13125	1219	
5.6	Housekeeping		805	75	
5.7	Engineering and Maintenance		7488	696	
5.8	Security		1904	177	

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Space List Summary

6. STAFF and PUBLIC SERVICES	Total Components Gross Area	58221	5409
6.1 Medical Staff Services		6994	650
6.2 Hospital Staff Services		16440	1527
6.3 Public and Patients Services		34788	3232

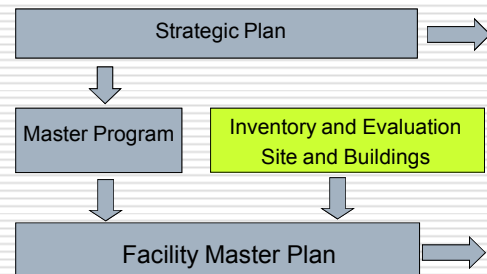
Space List Summary

Total Components Gross Area		813209	75550
Main Circulations, Exit Stairs, Elevators Cores, etc.	15%	121981	11332
Electrical and Mechanical Systems	10%	93519	8688
Total Building Gross Area		1028710	95570

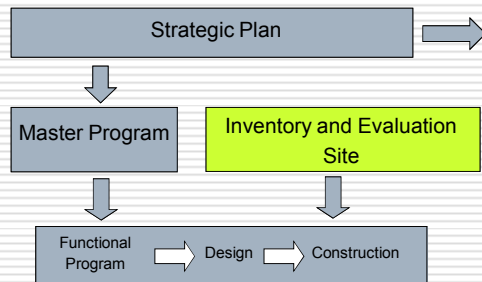
Other Plans

- **Manpower plan**
 - A description of the implications of the hospital's future directions for staff (medical and allied health) recruitment, training and replacement
- **Financial plan**
 - A plan for securing the necessary funding for capital investment and operation

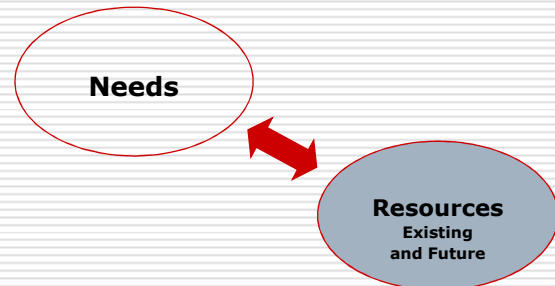
Inventory and Evaluation Existing Institution



Inventory and Evaluation New Institution



Needs vs Resources



Physical and Functional Evaluation

- Land
- Buildings

Inventory and Evaluation Goals

- Get a clear and well documented picture of the physical resources the institution has at its disposal to fulfill its role
- Identify the functional and physical deficiencies that will need to be corrected or palliated by the master plan
- Identify constraints imposed by the buildings and the site on future development

Inventory and Evaluation Process

- Inventory done first
- Physical evaluation by team of architects and engineers early in the process, assisted by staff responsible for planning and maintenance, using pre-determined forms

Inventory of Buildings and Site

- Collect all available plans for buildings and site
- Examine to see if they are complete and up to date
- Survey site, buildings or parts of buildings as required
- Assign rooms to specific functional components
- Tally site information and functional components areas

Site Data to be Collected Existing or New Site

- Survey
- Zoning
- Easements/Rights of way
- Access points
- Topography
- Drainage
- Soil
- Vegetation
- Services and utilities
- Transportation

Evaluation Site

- Area
- Zoning, easements and other legal constraints
- Accessibility
- Topography
- Soil characteristics
- Vegetation
- Services
- Parking and public transport
- Environmental quality
- Expansion potential

Location



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Site Plan



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Dates of Construction

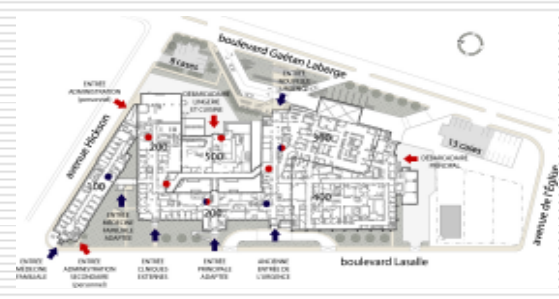


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Site Access and Entry Points



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Buildings Physical Evaluation

- Architecture
 - Envelope
 - Interior finishes
 - Fixed equipment
 - Means of conveyance
 - Codes

Physical Evaluation • Buildings

- Structure
 - Foundations
 - Vertical and horizontal elements
 - Bearing capacity
 - Codes

Physical Evaluation • Buildings

- Mechanical Systems
 - Heating
 - Ventilation
 - Air conditioning
 - Plumbing
 - Other services
 - Codes

Physical Evaluation • Buildings

- Electrical Systems
 - Power supply and distribution
 - Emergency power
 - Lighting
 - Communications
 - Fire alarm
 - Codes

Functional Evaluation

- Done during the master programming stage
- For each functional component:
 - Areas of individual rooms and of whole component
 - Functional relationships with other components
 - Component layout
 - Flexibility/adaptability
 - Environmental quality
 - Expansion potential

Documentation

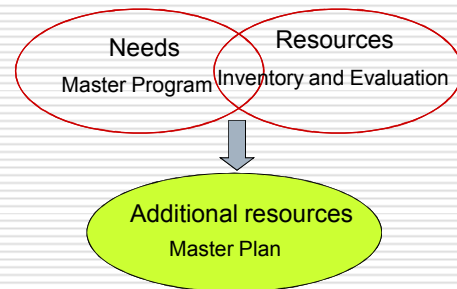
- Tabulation of areas (see Master Program)
- Diagram of functional relationships, existing and desirable
- Summary tables for physical evaluation to identify at a glance where major deficiencies are
- Description of functional and physical deficiencies according to divisions listed previously

Graphic Documentation

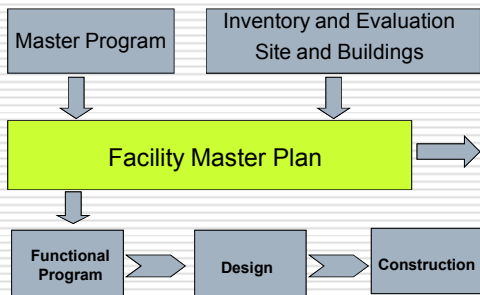
	Architecture	Structure	Mechanical	Electrical
Memorial Wing	Envelope	Foundations	Heating	Power Supply & Dist
East Wing	Int. Finishes	Vent. & Horiz. Elean.	Ventilation	Emergency Power
South Wing	Equip. & Furniture	Bearing Capacity	Air Conditioning	Lighting
North Wing	Conveyance	Codes	Plumbing	Communications
West Wing	Codes	Codes	Other Services	Fire Alarm
Central Wing	Codes	Codes	Codes	Codes

○ Good ◐ Minor Deficiencies ● General Deficiencies ● Major Deficiencies

Master Plan Role



Master Plan Existing Institution

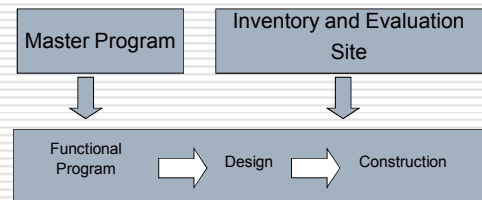


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Master Plan New Institution



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Master Plan

- What is a master plan and what should it consist of?
- When should it be undertaken?
- What should the process be? Who should participate?
- Why should an institution have a master plan? Why is it important?

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Master Plan - Role

- To chart the course the institution should follow for its rejuvenation and expansion and, in some cases, for its total replacement on its own site
- It is akin to an urban plan that defines major axes of circulation and land uses, i.e. a general arrangement of functions and components

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Master Plan • Phases

- ❑ The Master Plan reflects the needs expressed in the Master Program
- ❑ As the Master Program, it usually comprises several phases to deal with the short-, medium- and long-term needs
- ❑ Usually, a first phase should involve new construction to initiate the “musical chair” process and avoid multiple “decanting”

Master Plan Goals

- ❑ Respond to institutional priorities and future needs
- ❑ Regroup services/components according to their functional affinities
- ❑ May call for the demolition of obsolete buildings or wings
- ❑ Correct functional and physical deficiencies
- ❑ Improve site accessibility and meet parking requirements

Guiding Principles • General

- ❑ Add to the most recent wing or building
- ❑ Don't surround an old building
- ❑ Don't adjoin an existing building too closely
- ❑ Beware of the floor-to-floor height
- ❑ Start a new wing that can become the nucleus of a total or partial replacement
- ❑ Concentrate expansion in one area; don't build “lumps and bumps”

Guiding Principles Internal

- ❑ Develop major horizontal spines and vertical transportation cores that can serve future expansion
- ❑ Put services/components most likely to expand at the periphery
- ❑ Provide “soft space” next to component likely to expand
- ❑ Give services/components shapes appropriate to their functions
- ❑ Locate like spaces together

Guiding Principles Site

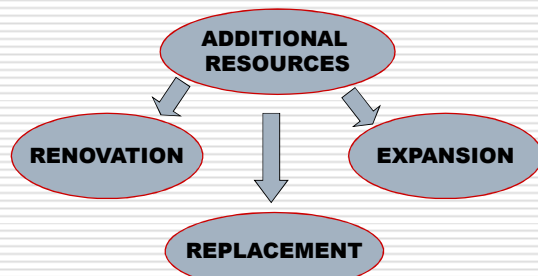
- Provide parking to meet current and future requirements
- Plan for future access points
- Locate expansion in an area that has expansion potential
- Respect and take advantage of topography
- Preserve vegetation
- Take orientation into consideration

A Fine Balance



To renovate or to replace?

Options



Master Plan Options

- Leave component where it is and expand in adjacent space?
- Move component to another location within the hospital?
- Locate component in new construction?

Master Plan Criteria

- Keep space at the same service level or downgrade space to lower service requirements
- Leave highly serviced space in place and expand into adjacent area
- Move lower-serviced components out of the hospital to make way for other services expansion

Master Plan Caveats

- Beware of:
 - Corridor widths
 - Structural bays
 - Load-bearing walls
 - Floor-to-floor height
 - Elevators capacity
 - HVAC capacity
 - Type of construction
 - Codes

Master Plan Caveats

- Beware of:
 - Mechanical/plumbing shafts
 - Electrical/communication panels
 - Floor load-bearing capacity
 - Special services, e.g. medical gases
 - Door widths
 - Wall and ceiling construction (fire and acoustical rating)
 - Access during demolition and construction
 - Disruption of on-going operation

Master Plan Process

- Familiarisation with all previous reports, particularly the Master Program
- Familiarisation with the existing physical plant
- Development of various options
- Presentation to and evaluation by a Steering Committee

Master Plan Process

- ❑ Refinement of selected option(s)
- ❑ Presentation to and evaluation by Steering Committee
- ❑ Refinement of final solution
- ❑ Final presentation
- ❑ Documentation

Master Plan Importance

- ❑ Identifies the most pressing problems
- ❑ Establishes a framework for future development-related decisions
- ❑ Confirms site and building development potential
- ❑ Identifies new development potential
- ❑ Establishes financial and physical guidelines

Master Plan Importance

- ❑ Can be used to resist pressures from staff to undertake "ad hoc" projects
- ❑ Improves staff morale
- ❑ Sends a message of renewal and excellence to the local population
- ❑ Provides a promotional document for fund raising

Solution Ground Floor



Existing Building



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Solution Second Floor

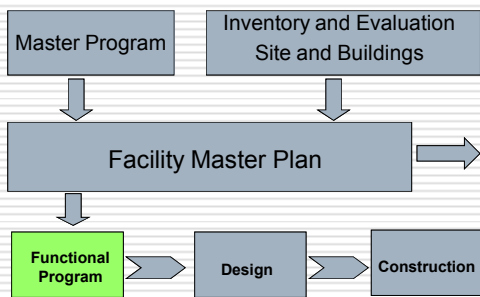


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Functional Program



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Programming

"A process leading to the statement of an architectural problem and the requirements to be met in offering a solution" Webster

"Programming = problem seeking"

"Design = problem solving"

"Programming = analysis"

"Design = synthesis" William Pena

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Functional Program Definition

- Written document that describes the services offered, defines policies and procedures that will be implemented, and identifies all the resources necessary to deliver the services.
- A document that describes the functions, operations, activity, staffing, room and space requirements of each department or service in a building
- It must contain all the information necessary to build and operate the facility

Functional Program Uses

- **For design professionals**, it provides all the information necessary to design the building
- **For the administration**, it defines the project objectives and scope
- **For the staff**, it identifies policies and procedures to be implemented

Functional Program Uses

- **For financial planners**, it defines human resources and operating cost.
- **For the cost consultants**, it provides all the information necessary to prepare realistic cost estimates
- **For funding agencies**, it establishes the capital resources necessary to bring the project to fruition

Functional Program Communication Tool

- Goals of the project
- Operational requirements
- Functions that will take place in the spaces
- Description of the facility
 - Operational policies and procedures
 - Workloads
 - Staffing patterns
 - Intradepartmental and interdepartmental relationships
 - Traffic flows
 - Methods for ensuring flexibility and expandability
 - Statement of building requirements

Functional Program Process

- Identify a Steering Committee
- Establish project parameters
- Determine departmental user groups
- Document department/service role and program
 - Philosophy
 - Policies
 - Systems
 - Procedures

Functional Program Process

- Analyze current and historical activities
- Project future activity
- Document existing staffing
- Project future staffing
- Document design considerations
- List all room required with net area and occupancy

Functional Program Contents

- Scope of the project
- Clinical activity
- Bed distribution
- Staffing summary
- Space summary
 - Net and gross areas
 - Total building area
- Functional relationships
- Technology
- Operational policies
 - Patient transport
 - Movement of supplies
 - Movement of samples, records and medication
 - Collection and disposal of waste
 - Information systems
 - Security
 - Communication

Functional Program Contents for each Department/Service

- Component programs
 - Basic hypotheses
 - Services offered
 - Policies and procedures
 - Workload
 - Staffing
 - Functional relationships
 - Design criteria
 - List of rooms with areas
 - Functional diagram

Functional Program Primary Space Determinants

- Operating rooms: surgical procedures
- Day surgery: outpatient procedures
- Radiology: diagnostic procedures
- Pharmacy: prescriptions
- Physiotherapy: attendances by treatment modality
- Occupational therapy: visits by treatment modality
- Obstetrics: number of births
- Laundry: daily pounds of linen
- Dietary: number of meals
- Emergency: visits by type
- Administrative services: staff

Data Sheets Definition

- Detailed description of every room in the building with all its architectural and engineering requirements, and with a list of equipment and furniture
- Architectural characteristics such as finishes, doors, hardware, etc.
- Mechanical and electrical requirements regarding HVAC, medical gases, plumbing, lighting, outlets, etc.
- Information technology and telecommunication requirements
- Fixed and mobile equipment
- Furniture
- Diagrammatic layout

Data Sheets Types

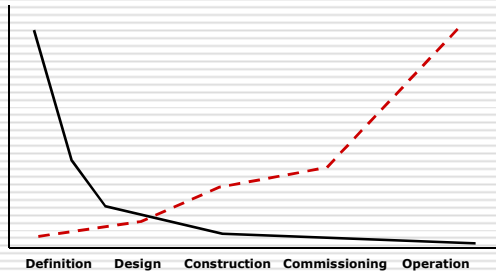
- Generic**
 - Done at the functional programming stage
 - Include generic performance requirements
 - Don't include specific materials, finishes, etc.
- Specific**
 - Done at the final design stage
 - Include specific requirements for all room elements

Data Sheets Definition

- See example from MediCity

[Room Data Sheet Sample.doc](#)

Programming Ability to Control Capital Cost versus Engaged Expenditures

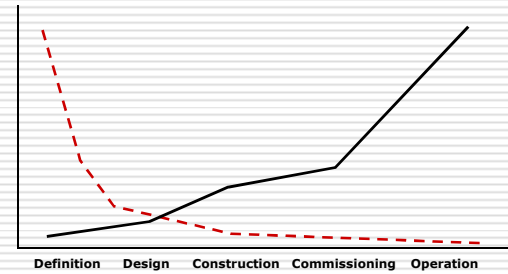


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Programming Usual Effort versus Required Effort

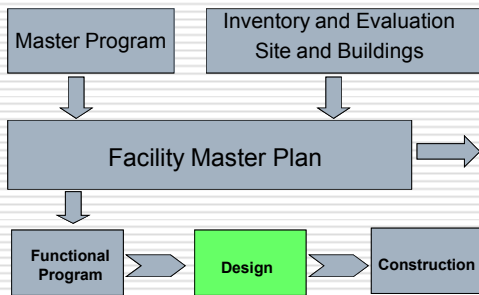


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Master Plan Existing Institution



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Project Delivery Approaches

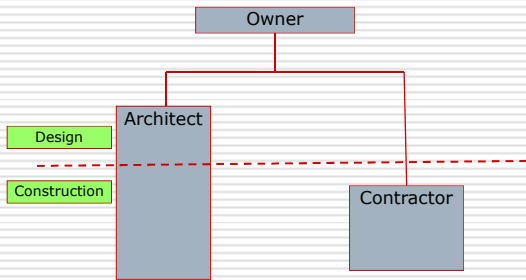
- Traditional approach: design-tender-build
- Construction management
- Design/build
- Public-private partnership

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Traditional Approach

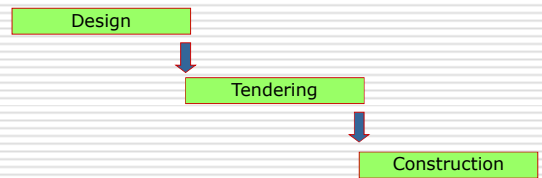


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Traditional Approach



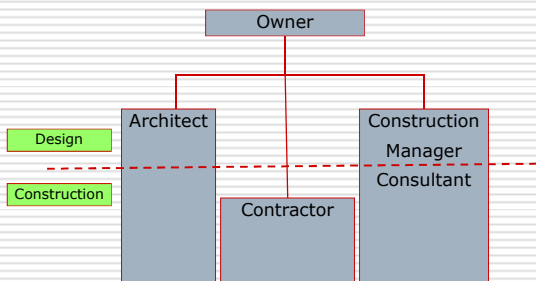
- Sequential process
- Known price before construction begins
- Longer construction period
- Architect supervises construction

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Construction Management Construction Manager as Consultant

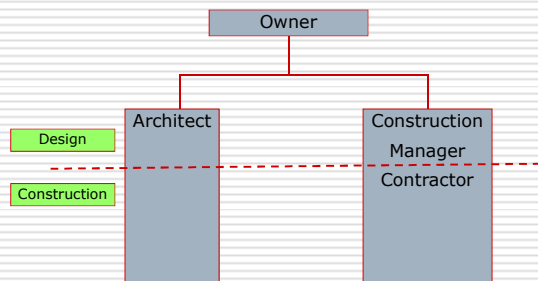


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Construction Management Construction Manager as Contractor

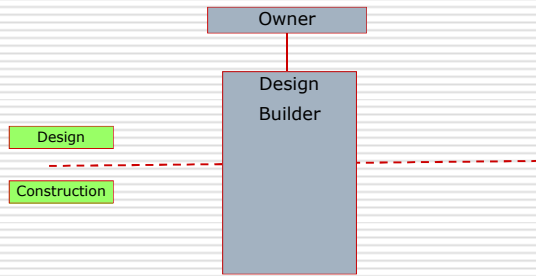


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Design/Build Single Provider

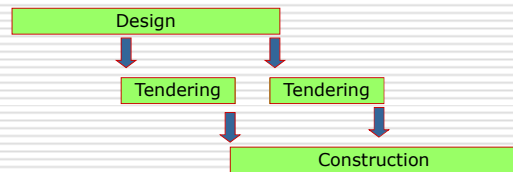


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Design/Build Single Provider



- Overlaps as per CM
- Known price before construction begins if GMP
- Shortest construction period
- Limited owner's involvement

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Public Private Partnership P3/PFI/BOOT

- Very popular in England and Australia for construction of new hospitals
- Starting in Canada
- Single entity responsible for financing, design, construction and operation of non clinical services
- P3 partners own and operate the facility for 30 to 35 years before transfer to the client

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Keys to Success for PFI Projects UK Government

- The project has clear boundaries and measurable capital output performance;**
- There is scope for innovation in design which enables the service provider to design away risks and bring new ideas to the way the service is provided;**
- The project has a substantial operating content;**
- There is scope for the service provider to find alternative uses for the asset provided;**
- Any surplus assets intrinsic to the project are included in the package; and,**
- The risks transferred to the private sector are commercial in nature and controllable."**

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P3 for Hospital Projects in India

- ❑ Experience already in India for infrastructure construction
- ❑ Will the government remain a provider?
- ❑ For private hospitals, P3 are not applicable

Design

- ❑ Block Schematics
- ❑ Preliminary design
- ❑ Final design
- ❑ Contract documents
 - Working drawings
 - Specifications

Block Schematics

- ❑ Based on the Master Program
- ❑ Developed by architects, engineers and other consultants
- ❑ Schematic drawings showing all components
- ❑ Site plan
- ❑ Outline specifications
- ❑ Validation of preliminary cost estimates

Block Schematics

- ❑ See example from MediCity

[..\..\ARCOP Office\India\Design\IIMSHT
Block Plans 7.8 01APR05 2.pdf](#)

Feasibility Study Preliminary Report

- General project description
- Master program
- Block schematics drawings
- Outline specifications
- Preliminary cost estimates
- Schedule and delivery method

Preliminary Design

- Internal layout of all departments with all partitions, doors and circulations patterns within department
- Check for all code regulations
- Preliminary sections through building and elevations

Preliminary Design Example

[6.L1 1.5a ICU Type 1.pdf](#)

Final Design

- Dimensioned drawings
- Final code verification
- Final sections and elevations
- Final choice of materials
- Final selection of fixed medical equipment
- Specific data sheets

Final Design Example

[A-106 Lvl 1.dwg](#)

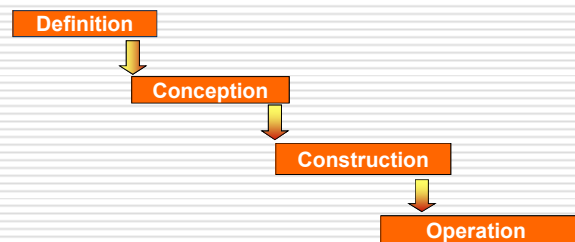
Contract Documents

- ❑ Complete set of drawings and specifications good for construction
- ❑ May be assembled in packages for a fast-track process

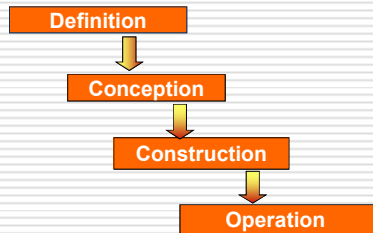
Construction

- ❑ Tendering
- ❑ Contract award
- ❑ Site supervision

Traditional Approach



Fast-track Process

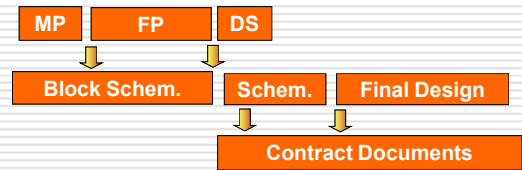


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Overlaps Programming/Design

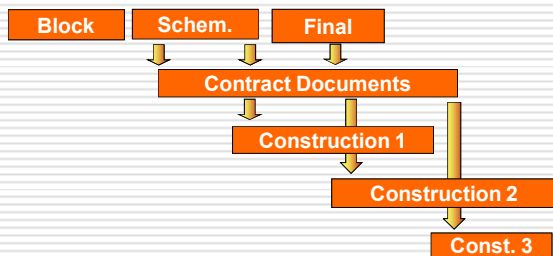


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Overlaps Design/Construction

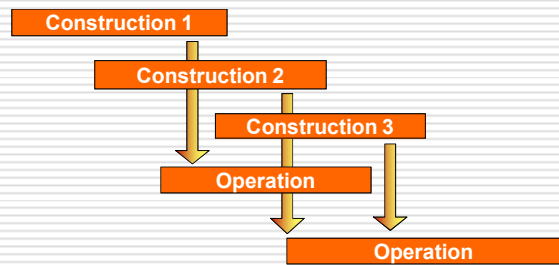


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Overlaps Construction/Operation



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Operation

- Building commissioning
 - Mechanical and electrical systems
 - Other systems
 - Medical equipment
 - Mobile equipment
 - Supplies

Operation

- Operational commissioning
 - Medical staff recruitment
 - Allied health and other staff recruitment and training
 - Managerial organization

Thank you for your attention

- Questions?