

“Mega Project Management”

workshop held at

Indian Institute of Management, Calcutta

during June 26th-30th, 2023.

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Topics to be covered

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1. Mega Projects- are the **projects** with **budgets** generally **exceeding \$1billion** (say **Rs. 8000 Cr.** in International Market).

Mega projects are important **contributors** to numerous **sectors**, including **health care, defense, mining, telecommunications, transport, energy and water infrastructure, sporting events, science and manufacturing.**

They **represent** a significant proportion of many **nations' economic activity** and very **deeply** affect **productivity, social cohesion, and the environment.**

Yet, **Mega projects** have proved **difficult** to deliver on **time** and on **budget**; one **estimate** suggests about **90%** of them end up **over budget.**

03 Prominent examples are the **Sydney Opera House** in Australia, which was **10 Yrs.** late and a staggering **1,400%** over **budget**, the **"Big Dig"** central **artillery/tunnel Project** in Boston Massachusetts (original estimate **\$2.6 billion**, **actual cost \$ 14.8 billion**) and **Scottish Parliament Building** in Scotland (Built in 1999-2004) that ended up with a 1,600% cost overrun.

Organizations responsible for producing **megaprojects** face a **"Performance Paradox"**. Despite the growth in their **number and opportunities** to benefit from **learning, megaprojects** continue to have **poor performance records**.

Their **success** is measured against their original **time, cost, quality**, and **safety objectives** as well as their **expected revenue predictions** and **most of them** are **unsuccessful**.

2. Definitions

TRADITIONAL PROJECTS

Standard practices can be used for:

- Design
- Funding
- Contracting

Static interactions

High level of similarity to prior projects creates certainty



MEGA PROJECTS

Standard practices are not used for :

- Design
- Funding
- Contracting

Dynamic interactions

High level of uncertainty regarding objectives and/or implementation

3. Why are mega projects so difficult to manage?

The **reasons** for difficulty in managing **mega projects** include **technical challenges**, **changes in design** and **operational requirements**, increase in **costs**, **disputes over responsibility** and new **regulation**.

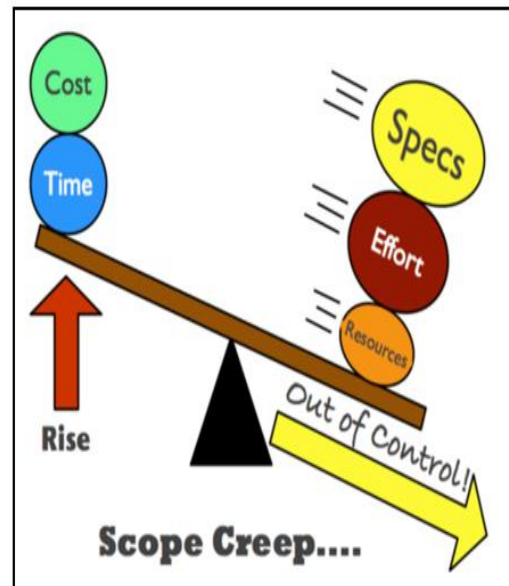
Complexity in **mega projects** usually increases with **project scale**, and **complexity** can give rise to **uncertainty** and inability to **foresee** the difficulties, **changing conditions**, and **unanticipated opportunities** that will be **encountered** once the project is **underway**.

One **way** to manage the **uncertainties** is to introduce **changes and new ideas** throughout the **course of the project**.

Project Managers expect they can **plan** for all the **variables** in a **complex project** in advance, but they **can't**. Nobody is that **smart** or has that as clear **vision** as a crystal **ball**.

Conclusions:- Strong **leadership** with the clear and logical **vision** as well as the use of **performance indicators** are essential to support the **new behaviour** required for the **successful outcomes** of **mega projects**.

4. Causes of Complexity in Mega Projects



- Inexperience
- Technical challenges
- Non-technical challenges
- Multiple funding sources
- Multiple external parties
- Environmental constraints
- Political issues
- Public relations challenges

5. Reasons for failure of Big Projects

Big projects generally **fail** at a rate well **over half**, by some **estimates**.

Study after study has shown, **big projects** frequently deliver **disappointing returns** - by some estimates, in fact, **well over half the time**.

And the **damage** big projects take for delivering **disappointing returns** is not just **financial**. These failures **demoralize employees**, who have **laboured diligently** to complete their **share of the work**.

Traditional Big project planning carries three serious risk :-

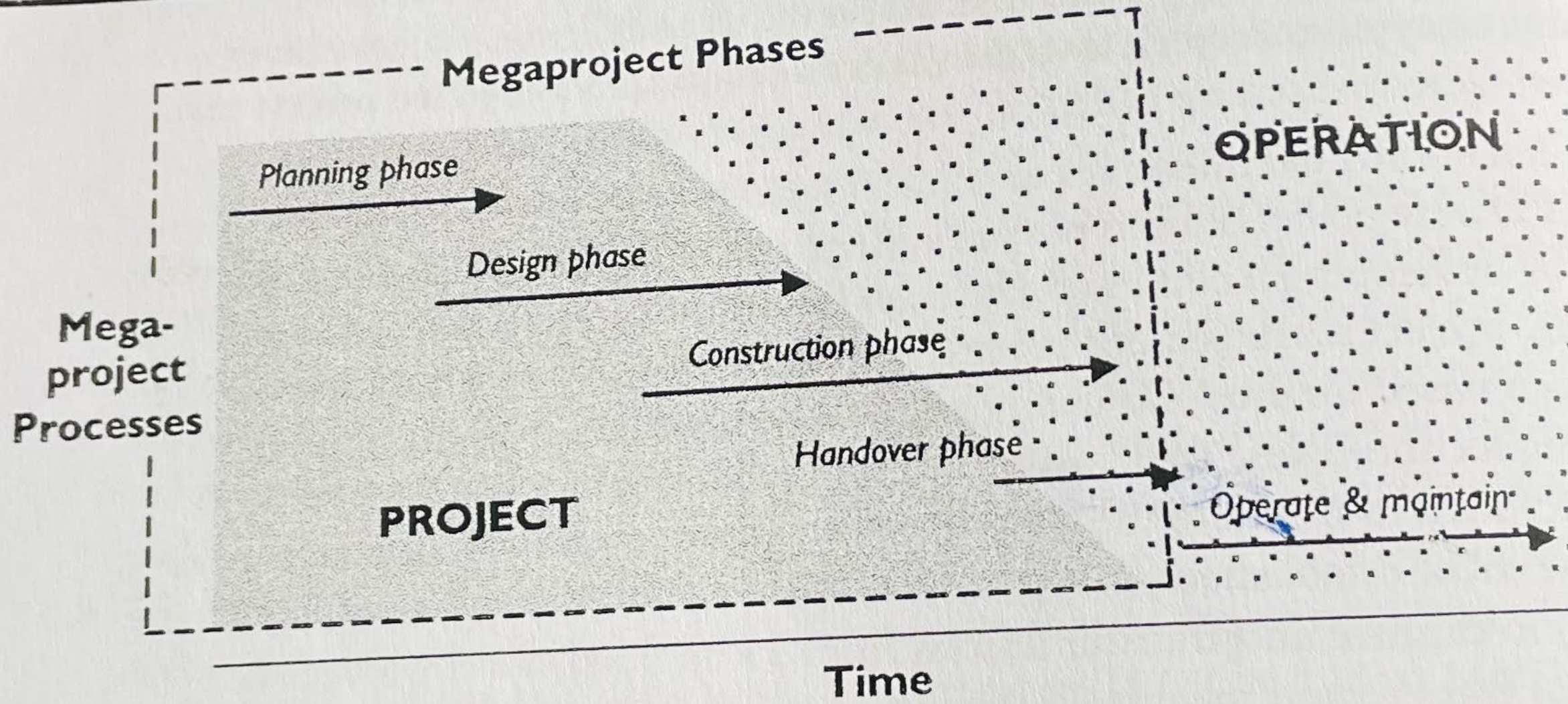
White spaces: **Project** Planners leave **gaps** in the project plan by failing to **anticipate** all the project's **required activities** and **work streams**.

Executions: **Project team** members fail to carry out **designated activities** properly.

Integration: **Team members** execute all tasks **free from defects**- on time and within **budget**- but don't **join closely** all the project pieces together at the end.

In the **end**, the **Big project** doesn't **deliver** the **intended results**.

FIGURE 5. Transition from Project to Operations



6. Five Innovation Rules for Managing Large, Complex & High Risk Projects

The following **05 simple rules** can help **improve** the performance of **big, complex projects**.

These **05 rules** encourage **innovation** to deal with **uncertainty** and to confer the **flexibility** to change- while maintain the **stability** required to **deliver projects efficiently**.

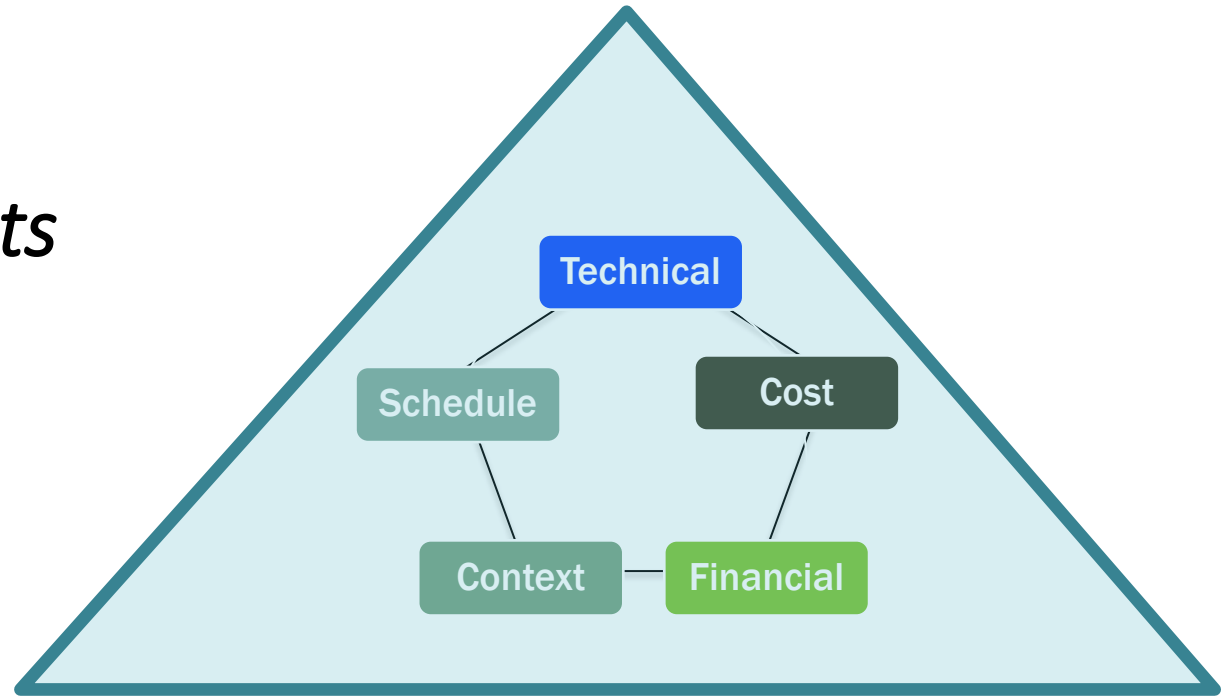
S. No.	Rule	Purpose	
1.	Assess what's worked before	Learning from other project sectors and research organizations. Capturing own prior experience.	<p>It has been found that the use of fixed price contracts to transfer risks to suppliers, create adverse relationships with contractors and worse- freezing designs at an early stage of the project, limit innovation.</p> <p>Endeavouring to learn from these accumulated lessons, the planners created a new delivery model based not on rigid fixed price contracts but on a collaborative, innovative, & flexible process.</p> <p>Our own prior experience in projects will also help in managing large projects.</p>

Sno.	Rule	Purpose	
2.	<p>Organize for the unforeseen</p>	<p>Flexibility and adaptability. Changing behaviours & Risk-sharing.</p>	<p>Flexible contracts are required to deal with unexpected & rapidly changing circumstances by using cost plus or cost reimbursable contracts, for example, the client and contractor enter into a relational agreement where there are incentives to build trust, form a collaborative culture and share risks and opportunities.</p> <p>The client encourages contractor to reveal problems, recover costs, achieve agreed upon profit margins, exploit innovative possibilities & build solutions.</p> <p>Another key to managing megaprojects is staffing project teams with innovative thinkers -and encouraging teams to remain flexible.</p> <p>After all, a megaproject comprises numerous smaller projects, each executed by a project team. When organized and incentivized effectively, people with different knowledge and skills can adapt and respond flexibly to rapidly changing conditions, unforeseen problems, and emergent opportunities. These teams treat existing knowledge and skills as bases from which to modify old routines and build new ones.</p>

S.No.	Rule	Purpose	
3.	Rehearse first.	<ul style="list-style-type: none"> Exploring options Prototyping , proving and improving. Identifying and reducing uncertainty. 	<p>The risks of cost and time over runs associated with the adoption of new technology and practices are minimized by reliance on established technologies & practices.</p> <p>Where new technologies and practices were introduced, they were first tested and proven in off site trials, dry runs, and other operational environments such as smaller airport terminals.</p> <p>Project leaders to identify with a pre-emptive risk mitigation plan, enabling contractors to work more rapidly on-site.</p>
4.	Calibrate and apportion risks appropriately.	Managing innovative components of the project differently from standardized and predictable aspects.	<p>A megaproject contains a large proportion of predictable, standardized, and repetitive tasks that have been performed many times on previous projects- as well as novel and innovative procedures being applied for the first time.</p> <p>This combination requires a balancing act, and the concept of "targeted flexibility" provides a solution to it. The idea is to break down a megaproject into distinct projects, structures, and processes, each of which addresses a different piece of the uncertainty.</p>
5.	Harness innovation from start to finish.	Formalizing structures and processes for guiding, shaping, creating and using innovations.	<p>Formulating a coherent statement about innovation can help project leaders plan, coordinate, and communicate with research partners and other collaborators from start to finish.</p> <p>For Innovation Strategy, a formal process can be created for encouraging members of the project supply chain to submit ideas for innovation. For this, a small team can be created for the express purpose of identifying, evaluating, and developing new ideas- ideas developed internally or originating with members of the project supply chain.</p> <p>Innovation Management System can be developed to manage, track, and report on the progress of ideas.</p>

7. Project Management – 5 Dimensional

- *Project Management*
- *Strategies for Complex Projects* found 5 dimensions of complexity:
 - *Technical*
 - *Cost*
 - *Schedule*
 - *Context*
 - *Financing*

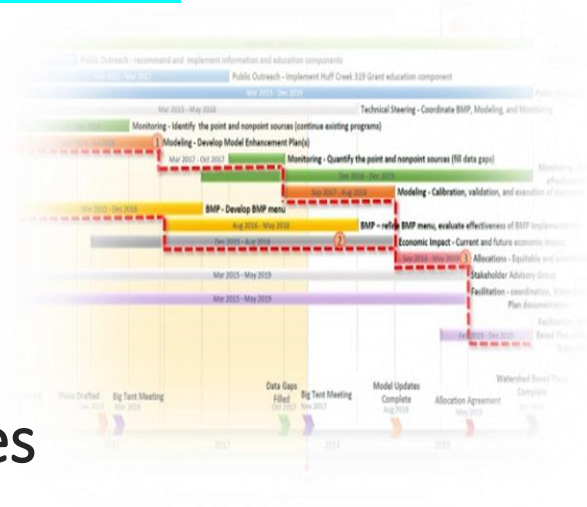


**5 Dimensional
Project Management**

Dimensional Factors

Schedule Factors

- Time
- Schedule risk
- Prescribed milestones
- Availability of resources
- Notice to proceed
- Statutory time limits – advertise, award, notice to proceed, etc.



Technical Factors

- Design
- Scope of work
- Aesthetic requirements
- Quality
- Need for integrated delivery



Context Dimension Factors

- Political/procurement constraints
- Environmental issues
- Public perception
- Right-of-way acquisition
- Sustainability
- Owner preferences/biases
- Utilities



Cost Dimension vs. Financing Dimension

Cost Factors

- Estimates
- Scope of work
- Quantities
- Right of way (ROW) acquisition
- Requirements needing funding



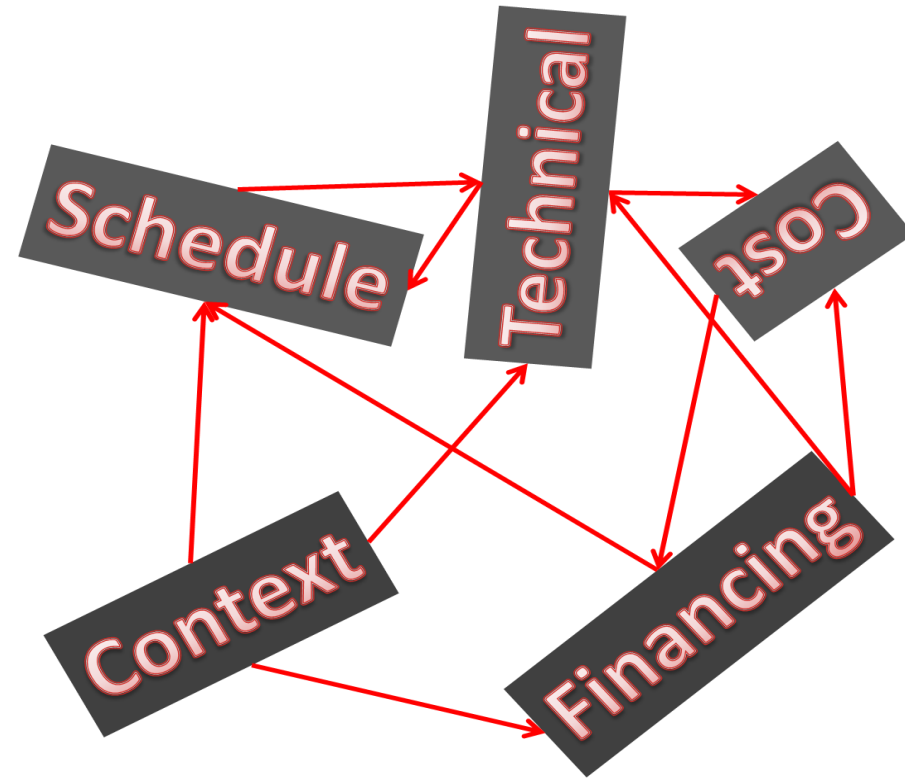
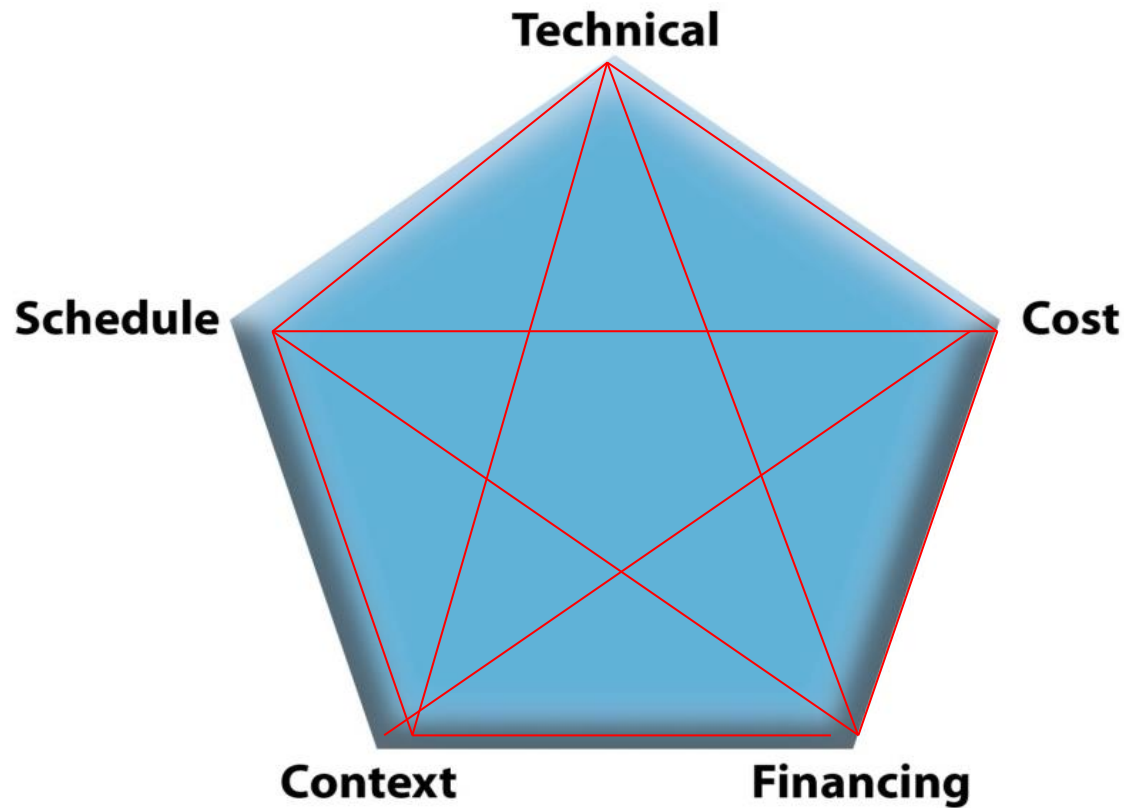
Financing Factors

- Source of funds
- Schedule of fund availability
- Cash flow
- Public Private Partnerships



5 Dimensional Project Management Interactions

Theoretical Model



Actual Model



8. Public Private Partnership Contract (PPP)

Anatomy of a PPP Contract

- **Public- Private Partnerships (PPPs)** - envisage **long term agreements** between the **government** and a **private sector** entity, whereby the **private entity delivers** and **funds** public services using a **capital asset**, sharing the **associated risks**.
- **Public- Private Partnerships (PPPs)** combine the **resources of government** with those of **private agents** (business or non-for-profit bodies) in order to **deliver societal goals**.
- The forms taken by **public-private partnerships** include **contracting-out** of services, the **business management** of **public utilities**, and the design of **hybrid organizations** for risk sharing and co-production between **government and private agents**.
- **PPPs** give rise to series of **ideological** and **managerial** choices. These concern the relationship between **private actors** and the **state**, the extent to which businesses and **not-for-profits** should substitute for **government**, and the cost and benefits of different public-private solutions.
- **Public- Private Partnerships (PPPs)** - in a generic sense to refer to the ways in which **government** and **private** actors work together in pursuit of **societal goals**.
- **PPPs** can deliver public services regarding **infrastructure projects** like **airports, roads and social assets** like **hospitals, schools etc.**
- **Contracts** dealing with **PPPs** for **infrastructure projects** can be very **comprehensive**

- **PPPs** generally consist of **5 parts** dealing with the **essential and basic** of the **project** and its **contractual implications**
- **Part I** -covers **Definitions and Interpretations** of the commonly used **words** in the **contract**
- **Part II** -covers the **scope of the concession**, Concession Fee, the range of activities covered by the Concession, **Condition Precedents, Government Support**, Representations and **Warranties etc.**
- **Part III** -deals with **Development** and **Operations** along with important **contractual provisions** pertaining to preparation of **master plan, construction, opening of the facility, maintenance, management of the facility, monitoring of operations** etc.
- **Part IV** -deals with **financial provisions** like **imposition of charges** and **user fees, insurance** during the concession, **accounts and audit** etc.
- **Part V** -covers **Force Majeure (Uncontrolled** events such as **external & internal)** and **termination** along with **consequences of Force Majeure, default of obligations** and its **consequences, transfer of facility** etc.

9. EPC CONTRACTS

- **Engineering, Procurement and Construction contract**, also known as **EPC contract** is a **contract** which is popular in the **construction industry**, more particularly in **big projects** like **bridges, stadiums, airport, etc.**
- The **contract** is in the nature of a **turn-key project** where the contractor **designs the project, procures the logistics, and constructs the assigned work.**

The typical scope of an EPC Contract would include the following things:-

- **Engineering** – preparation of **engineering designs, plans and technical specifications of equipment, preparation of performance standard maintenance and training manuals.**
- **Procurement** – provision of **equipment, procurement** from third parties, **delivery** to the site, provision of **spare parts;**
- **Construction** – **construction, erection and completion** of the work, **rectification of defects.**

The **contractor** may either **execute the whole project** himself, or through **sub- contractors.**

EPC contract gives much **leverage** to the **project owner** in terms of **single point contract and responsibility, payment of a fixed lump sum amount, minimum legal risks and obligation** and known **time-period** for construction which in turn increases the **bankability of the project.**

Scope:-

- This is the **fundamental clause** on which the **success** of the **whole contract depends**.
- Any kind of **ambiguity** (understanding in more than one way) or **uncertainty** in the clauses might lead to **conflicts** and **confusion** in the future.
- The **clause** should be **drafted** with **utmost precision**, having **clarity** and **delineate** (in detail) the scope of the work.
- In terms of **content**, the **clause** should define what works are **expressly covered** under the **agreement**, what works are **expressly excluded**, what works are **dependent** or **responsibility of the third party**.
- If, it is **not possible** to describe the work to be **executed in details**, such work might be described in details in the schedule **annexed to the agreement**.

Having **clarity** regarding the **scope** will also help in formulating the **pricing, rights** and **liabilities** of the **parties** in a better way to suit the nature of the **contract**.



INDIAN INSTITUTE OF MANAGEMENT CALCUTTA
Management Development Programme on
Megaproject Management
June 26 - 30, 2023
Venue: IIM Calcutta



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Madhu Arora, Ashutosh Mishra, Abel Nischal Peters, Sivaji Chatterjee
Standing 1st Row (L to R) : Avishek Maji, Hemant Kumar, Arnol Barkade, Ashi Kapoor, Soumen Mallick, Sanjeev Kumar Sharma, Papun Kumar Pradhan, Balakrishna M D,
A Sathyanarayan Raju, Sanjay Darbari, Taranjeet Singh
Standing 2nd Row (L to R) : Alind Shekhar, Mahima Ranjan Mukhopadhyay, Piyush Pandey, Hirakjyoti Sarma, Ranjan Das, Pankaj Kumar Ray, Kankan Goswami, Ram Prasad Sahu,
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THANKS