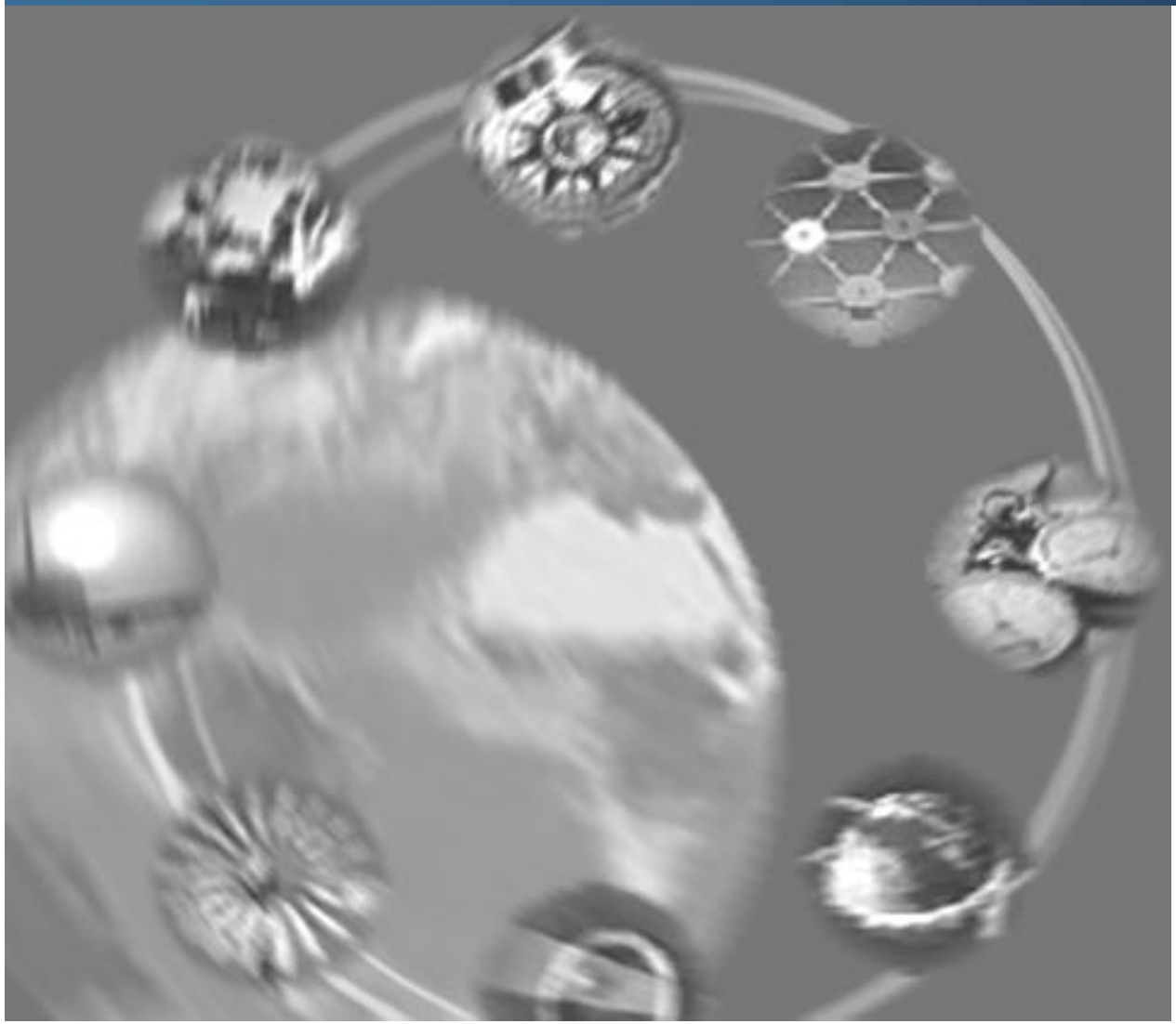
Ten Key Elements

401.649 Cost Planning for Construction Projects

April 22nd, 2009



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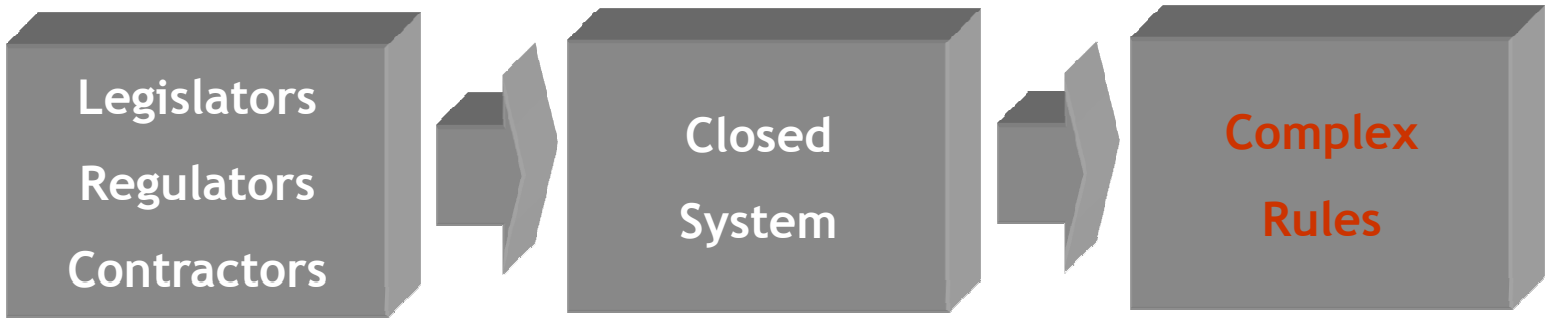
Open to Technological Change

- Technological change
  - A fundamental element of future infrastructure procurement strategy

- Open System vs. Closed System

- In a Closed System



- Lack of institutional memory to see the importance of evolution in technology and methods
- Comfortable to build procurement methods
- Technology and Methods are frozen
- The closed system has led to increasingly detailed efforts for reform of acquisition system
- Constrain continued innovation

- In an Open System
  - Open System: An environment in which some or all the variables cannot be controlled, predicted, or managed.

- Deft strategy today is very likely to be poor strategy tomorrow
  - Steady technological improvement is important !!
- Change: 11th key element (?)
- Change vs. Continuity

- The open system confirms that new technology and methods can move around the world,

  from project to project

  from industry to industry

  from application to application

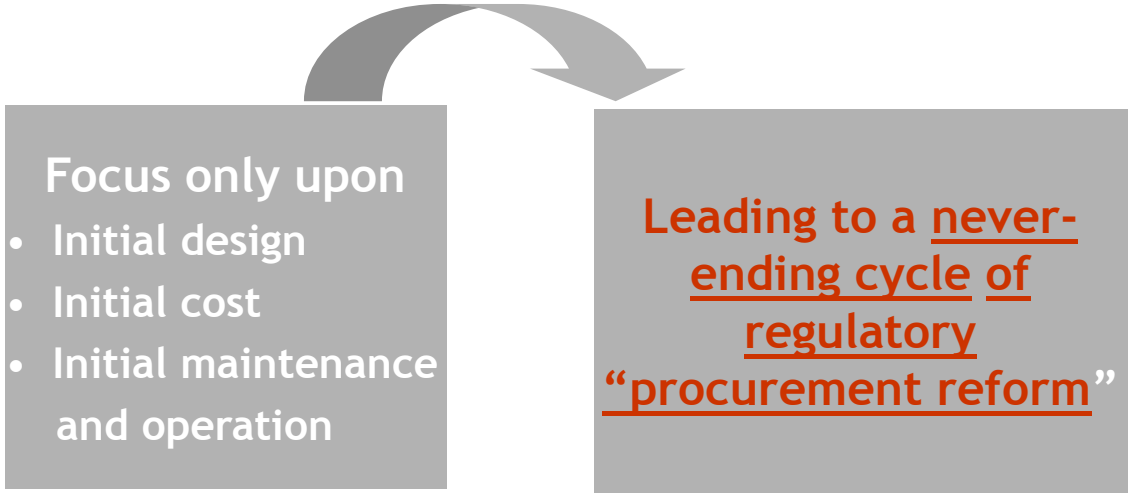
Case Project:

Highway 407, Toronto

Sound Financial Analysis Over the Project Life Cycle

- Life cycle discounted cash flow analyses should form the analytical core of strategic efforts to improve portfolios of infrastructure facilities and services.

- Currently, LCC are not treated as core value in the procurement of infrastructure facilities

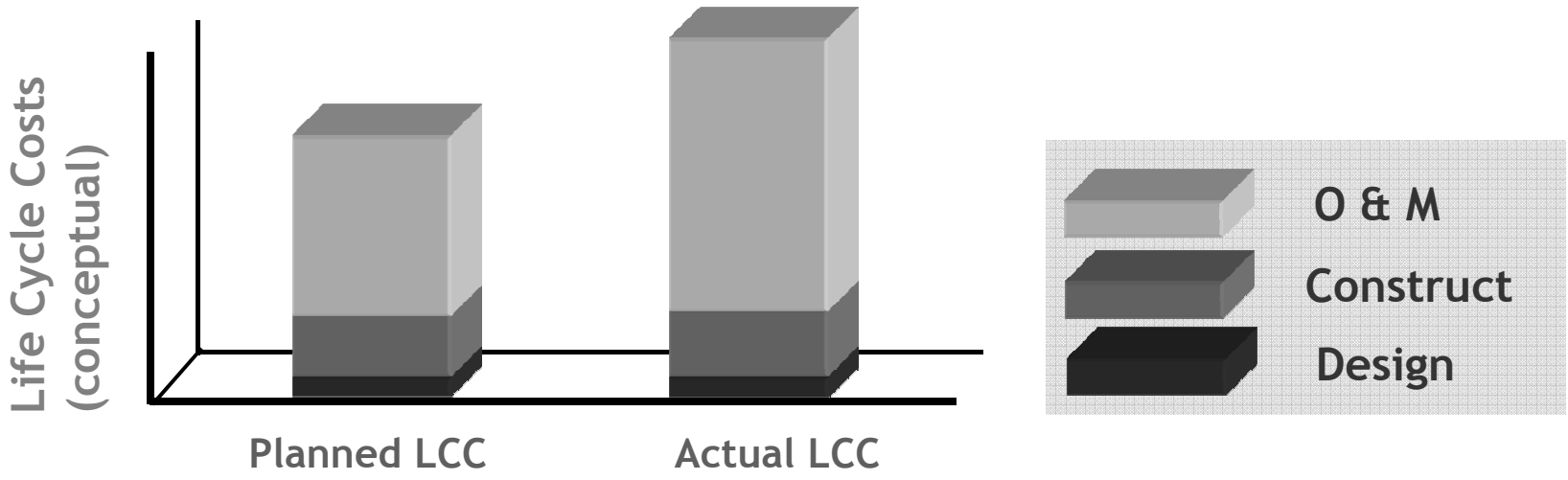


- Planned initial cost (design and construction):
  → 10-15% of LCC

- Actual initial cost → 5% of LCC

  Because most facilities remain in service far longer than planned.

- So initial design and construction ought to be aimed at long term operations, maintenance, and finance.



- The cause of overruns
  - The avarice of bidders competing to perform the work
  - Incompetent contractors (both design and construction)
  - The contracting officers administrating these programs
  - The “environmentalists”
  - Quadrant IV processes themselves are the cause of such overruns

- Segmented process (independent design, construction etc.) → “out of control” on the cost side
- Changes in project definition are decided after initial design and construction → Discrepancy between estimates and actual costs
- Regulatory agencies insist upon the submission of complete plans and specifications prior to final regulatory consideration
- Multiple interfaces between stakeholders lead to overrun initial cost →cost overrun is covered by user fees

- Solution
  - Think carefully about project definition and scope before contracts are signed
  - Prepare detailed discounted cash flow analysis of capital costs, financing costs, operating expenses, and operating revenues over the life of the service agreement

Chapter Case:
The Franklin Water Treatment Plant

Alternative analysis in project delivery and finance

- Project delivery and project finance are variables, rather than fixed constants.

- Efforts to use any project delivery method other than DBB
  - “Public-private partnerships”
  - “Alternative delivery mechanisms”
  - “Innovative finance”

- The current public cash flow shortfall and the inexorable development of technology are leading this change in infrastructure strategy.

- What is really a continuum of project delivery alternatives ?
  - Replacing DBB in quadrant IV with another single delivery method (x)

    →More than one method is appropriate, depending on the project, and the relative abilities of government, the private sector, and the public to fund it.

  - All of public infrastructure can be “privatized” (x)

    → “Open System”

- Reject a exclusively preferred procurement approach (DBB or BOT)
- This new discipline builds on Gordon's work on alternative project delivery strategies.

→Elimination of inappropriate project delivery and finance strategies, not the identification of a "correct" one

- The tools that construction and project managers can apply in meeting society's needs for sustainable infrastructure facilities and services.

Chapter Case:
The JFK Int'l Airport

The Emergence of Infrastructure Portfolio Management

- Infrastructure Portfolio
  - Use alternative project finance and delivery methods across collections of infrastructure projects
  - Strategic opportunities to affect the timing, quality, and cost of facilities performance.
  - Introduce different sources of revenue and capital, improved methods of design, construction, and operation
  - The term “portfolio” : the collection of infrastructure projects held or controlled by a government.

- Modeling the portfolio
  - Find alternative combinations of project delivery specific cash flows
  - “Bottoms up” analysis of project delivery and finance options for the portfolio
  - Attract both public support and private sector capital investment
  - Provide high quality infrastructure services at reasonable initial and long term costs
  - Must be flexible, yet simple

- New formulation (modeling the portfolio)

Capital Sources (Capital Rationing Limits for each source by year)

Source 1 | Source 2 | Source 3 | Source 4

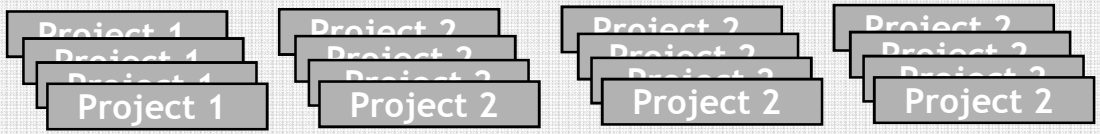
Adjustable Restraint

The List of Desirable Infrastructure Projects

Project 1 | Project 2 | Project 3 | Project 4

The Variables : Alternative Means of Delivery
(Source, Amount, Timing of Capital varies with method)

DBB
DB
DBO
BOT



Strategic Planning Goals

1. Evaluate A Range of Project Delivery/Finance Configurations Against Expected Capital Constraints
2. Evaluate the Impact of Adjustments in Capital Source, Project Delivery Methods
3. Maximize the Number of Desirable Project Delivered
4. Present Alternative Viable Configurations (Order of Delivery, Star/Finish Dates, Means of Delivery)

Chapter case:
The Dulles Greenway and the Indianapolis Wastewater Treatment Project

Next Assignment: Bidding for the Confederation Bridge

The Confederation Bridge joins the provinces of Prince Edward Island and New Brunswick, Canada and forms part of the Trans Canada Highway-making travel to and from the mainland fast and simple. A close 30 minutes from the Nova Scotia/New Brunswick border, the engineering marvel is open year-round 24 hours a day and takes a little over 10 minutes to cross.

중간고사: 4/49

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Civil and Environmental Engineering

Infrastructure Development Systems IDS-97-T-010

Research Assistant Om P. Agarwal prepared this case under the supervision of Professor John B. Miller as the basis for class discussion, and not to illustrate either effective or ineffective handling of infrastructure development related issues. Data presented in the case has been altered to preserve confidentiality.

Confederation Bridge
over the
Northumberland Strait

INTRODUCTION

Prince Edward Island (PEI), with a population of 129,765 (June 1991) and an area of 5660.38 sq kms, lies off the east coast of Canada, being separated from Nova Scotia and New Brunswick by the Northumberland Strait. It is one of the four Atlantic Provinces of Canada and measures 224 kms from tip to tip with a width ranging from 6 to 64 kms. (See map at Annexure 1)

PRINCIPAL ECONOMIC FEATURES OF PRINCE EDWARD ISLAND

A
dominat ing
The pro my.
Million i 924

P
than 30 ore
There ar on.
acres devoted to agriculture, 381,000 are under crops. 000

Fishing and aquaculture is of major importance contributing in excess of C$ 210 Million annually. The lobster fishery accounts for about two thirds to three quarters of the annual fishing income. There are approximately 5,300 fishermen and another 2,500 persons are employed in the fish processing industry.

A large part of the island's manufacturing sector is involved in the processing of agricultural and fisheries products. Specialized manufacturing industries have also been established for producing such goods as diagnostic medical kits, optical frames and steel and aluminum cookware.

Reference: 테미스
등장인물: 성수, 도희, 영웅, 교수

Term Project

Proposal 기한: 2009. 5.6

한국 공공발주공사케이스 개발

MS Word , 부록

입찰안내서

참여업체 제안서

영업담당 심층인터뷰

가명, 소설

Ten Key Elements

수업 교재 (책자) 발간