Project Management in the Design and Construction Industry

Design & Construction Institute of Nova Scotia

February 4, 2011
Game Plan

• Project Management 201
  – Consultant’s Perspective
• Contractor’s Perspective
• Break
  – Networking, Health, Crackberries
• Project Manager’s Perspective
• Panel Discussion, Qs and As
Game Plan

• Project Management defined
• Project Management in the Consultant’s Practice
• Project Management in the Construction Co.
• Project Management in the Design and Construction Sector
• Why?
• BUT!
What?

• the discipline of planning, organizing, securing and managing resources to bring about the successful completion of specific project goals and objectives  Wikipedia

• specialized management technique to plan and control projects  Business – The Ultimate Resource
The process of guiding a project from its beginning through its performance to its closure
What?

1. Approach to management of work within the constraints of time, cost, and performance requirements.
2. Body of knowledge concerned with principles, techniques, and tools used in planning, control, monitoring, and review of projects.

BusinessDictionary.com
What?

• *project*, not process or program
• clear goals and objectives
• plan
  – resources
  – schedule
  – budget
  – monitor, control
• quality, performance
What?

• “Cradle to grave”
  – Originating the project
  – Organizing, planning, preparing
  – Executing
  – Closing out the project
Project Phases

1. Wild enthusiasm
2. Disillusionment
3. Confusion
4. Panic
5. Search for the guilty
6. Punishment of the innocent
7. Promotion of non-participants
“Effective management of the project is an essential element of good professional practice.”
PM in Consultant’s Practice

- the person in an architect’s office who directs and administers an architectural project
  - selecting and managing people, including in-house staff and outside consultants
  - ensuring continuous and effective communications
  - delegating tasks appropriately
  - arranging and managing meetings
  - controlling and managing design changes
  - managing time effectively
  - scheduling, estimating, project control

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PM in Consultant’s Practice

- Proposal / Contract
- Clear Scope of Services - objective
  - Phases
- Fees
- Milestones / Schedule
- Resources – in- and out-of-house
- Quality
- Risk

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summarizes or more complex scheduling arrangements.

This chart has limited potential because it can only indicate the end date — not the start date — of activities. Moreover, it does not show relationships between activities.

Diagram A: Milestones in the Bid Process

<table>
<thead>
<tr>
<th>Task</th>
<th>Milestone Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue text to newspapers</td>
<td>February 1, 2009</td>
</tr>
<tr>
<td>Distribute documents to bid depositories</td>
<td>February 4, 2009</td>
</tr>
<tr>
<td>Publish advertisements for bidders</td>
<td>February 5, 6, and 8, 2009</td>
</tr>
<tr>
<td>Issue final addenda</td>
<td>March 4, 2009</td>
</tr>
<tr>
<td><strong>Bid closing</strong></td>
<td><strong>March 11, 2009</strong></td>
</tr>
<tr>
<td>Analyze bids</td>
<td>March 12, 2009</td>
</tr>
<tr>
<td>Report to building committee</td>
<td>March 15, 2009</td>
</tr>
<tr>
<td>Notice of award of contract</td>
<td>March 17, 2009</td>
</tr>
<tr>
<td>Prepare and distribute CCDC 2 and contract documents</td>
<td>March 26, 2009</td>
</tr>
<tr>
<td><strong>Start-up meeting</strong></td>
<td><strong>April 19, 2009</strong></td>
</tr>
</tbody>
</table>

Gantt Diagram

Unlike a milestone chart, a Gantt diagram (a type of bar chart) lists all the required activities together with horizontal lines for each activity to indicate the beginning and end of each task, and so on.

Credit: Canadian Handbook of Practice for Architects
Illustration A-5: Critical Path Diagram
a = most optimistic time, i.e., the shortest time for completion (best case scenario)
b = most pessimistic time, i.e., the longest time for completion (worst case scenario)
m = most likely time, i.e., the time that the work would most likely be completed based on its execution several times under randomly varying conditions

Diagram C: The PERT Network

$T_e = \text{earliest estimated completion time}$
$T_1 = \text{latest estimated completion time}$
$S = \text{slack time}$

Task D  Install anchors and sill plates

$T_e = 9 \text{ days}$
$T_1 = 9 \text{ days}$
$S = 0 \text{ days}$
Diagram B: Partial Gantt Chart or Bar Chart

<table>
<thead>
<tr>
<th>Task Name</th>
<th>1999</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Oct. 29</td>
</tr>
<tr>
<td>Place concrete forms</td>
<td></td>
</tr>
<tr>
<td>Place reinforcement bar</td>
<td></td>
</tr>
<tr>
<td>Pour slab</td>
<td></td>
</tr>
<tr>
<td>Pour concrete walls</td>
<td></td>
</tr>
<tr>
<td>Wreck concrete forms</td>
<td></td>
</tr>
<tr>
<td>Cap foundation</td>
<td></td>
</tr>
<tr>
<td>Install sill plates</td>
<td></td>
</tr>
<tr>
<td>Install floor joists</td>
<td></td>
</tr>
<tr>
<td>Install sub-flooring</td>
<td></td>
</tr>
<tr>
<td>Insulate foundation</td>
<td></td>
</tr>
<tr>
<td>Waterproof foundation</td>
<td></td>
</tr>
<tr>
<td>Backfill foundation</td>
<td></td>
</tr>
<tr>
<td><strong>House framing</strong></td>
<td></td>
</tr>
<tr>
<td>Construct walls/posts/beans</td>
<td></td>
</tr>
<tr>
<td>Construct roof</td>
<td></td>
</tr>
<tr>
<td>Construct stairways</td>
<td></td>
</tr>
</tbody>
</table>

Credit: Canadian Handbook of Practice for Architects
Task Duration - example

DETAILED TASK CHECKLIST

Work Breakdown Structure and Calculation of Fees
Project: New Commercial/Retail Building

Subproject 5 - Construction Documents P.1

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Subtask</th>
<th>Work Package</th>
<th>Individual effort</th>
<th>Hours</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Admin.</td>
<td>review/update prod'n sched.</td>
<td>arch't</td>
<td>review/update</td>
<td>4</td>
<td>BW</td>
</tr>
<tr>
<td></td>
<td>update project brief</td>
<td></td>
<td></td>
<td>2</td>
<td>BW</td>
</tr>
<tr>
<td></td>
<td>update directory</td>
<td></td>
<td></td>
<td>1</td>
<td>EV</td>
</tr>
<tr>
<td></td>
<td>coordinate</td>
<td>coordinate</td>
<td>team</td>
<td>2</td>
<td>BW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>EV</td>
</tr>
<tr>
<td>Constr'n Documents</td>
<td>working drawings</td>
<td>index/format</td>
<td>meet consultants</td>
<td>2</td>
<td>EV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>meet spec writer</td>
<td>1</td>
<td>LP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAD layers</td>
<td>set out, convey team</td>
<td>2</td>
<td>VT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>scales</td>
<td></td>
<td>1</td>
<td>EV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sheet content</td>
<td></td>
<td>3</td>
<td>EV</td>
</tr>
<tr>
<td></td>
<td>Drawings</td>
<td>code review</td>
<td></td>
<td>8.5</td>
<td>BW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>site plan</td>
<td></td>
<td>5</td>
<td>BW</td>
</tr>
</tbody>
</table>
XYZ PROJECT

KEY PLAN

4 (RK)

SITE PLAN
9 5 (JS) 3 (RK) 2 (JS) check

A-1

SITE DETAILS
6 (RK)

(2)

A-2

3 BW (Review)

3 BW (Review)

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STRATEGIES 4 IMPACT
Professional Service Firm
2.0 Scope of Professional Services

This proposal is organized in two phases. Throughout the delivery of professional services described below Watkinson will report to and liaise with Client.

2.1 Adapting New Contracts for the City

2.1.1 Research, Analysis and Strategy

- review current current City contracts in detail
- review contracts used for building construction and design services by Region and other Municipality as a context for adapting the New contracts for the City, given that from time to time the City undertakes projects jointly with each
  - prepare a written comparison between the current City contracts to CCDC 2-2008 as amended by the New supplementary conditions AND OAA Document 600-2008 as amended by the relevant New supplementary conditions
  - where contract requirements appear to be similar, comment on the potential for adapting or adapting new contract wording
  - where requirements appear to differ materially, comment on adapting/adapting new wording or maintaining/adapting current City wording
  - identify "gaps" where either the City contracts or the New contracts are silent, and comment on possible approaches to address the gaps
- review findings with Client and City Solicitor
  - review comments and develop potential strategy for addressing similarities, differences, gaps
  - develop strategy for consultation with City procurement, risk management, works
  - develop strategy for consultation with outside legal counsel as well as insurance and surety advisors
  - discuss strategy for potential liaison with industry through the Ontario General Contractors Association, the Ontario Association of Architects, Consulting Engineers of Ontario, and the Association of Registered Interior Designers of Ontario

2.1.2 Consultation

- implement the strategies for
PM - Contractor

• Managing the construction process
• PM, Site Superintendent, trades
• Construction Contract
• Schedule
• Costs
• Changes
• Consultant/Owner

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NOT

Construction Management
“Project Management”

• “Cradle to Grave”
  – Feasibility
  – Charter
  – Plan
  – Assemble Teams
  – ‘Conduct’
  – Monitor execution
  – Closeout
  – Hand-over
Why?

Asset
Why?

• Owner concerns w/ “conventional” models
  – Cost
    • $$$
    • Not getting ‘best value for money’
    • Overruns
  – Schedule
    • Looking for faster delivery
    • Overruns and delays
  – Quality
Why?

• Owner concerns w/ “conventional” models
  – Lack of innovation
  – Performance
    • End-users and service delivery
  – Maintenance
  – Sustainable design
  – Operation
  – Maintenance
  – LCC
  – Adversarial
Why?

• Complexity
• Procurement and “procurement policies”
• “single point responsibility”
  – One stop shopping
• In-house PM resources
  – Insufficient
  – Downsizing
  – Outsourcing to refocus
  – Expertise?
Why?

- Industry concerns
  - Procurement
  - Not following industry practices
  - Professional fees inadequate
  - Little opportunity to innovate
  - Unreasonable, unrealistic risk transfer
  - Adversarial
  - Not profitable enough
    - Little opportunity for reward
Design Bid Build

Owner

Contractor

Designer
Design Bid Build

- Owner
- Designer
- Contractor
Increasingly Adversarial

Owner

Contractor

Designer

RFP’s and Contracts “From Hell”

“Induced” Adversarial Relationship
Design Bid Build

Owner

Contractor
Design Build

Owner

Design Builder
Design Build

Owner

Design Builder

Designer
“The 2 Silos”

Design
Construction
“Commissioning”

Facilities Management
Maintenance
Energy Performance
Operations
Finance
Service and Ops

- Design/Construction + Asset Management
- Operations
Design Bid Build

Owner

Designer

Contractor
RISK
Ceramic rods used as solar screen
Lowest 10 rows of ceramic rods providing solar shading had to be removed because of NYC human orangutans!
Hubbert Curve

- Proven reserves: $250 \times 10^9$ bbls
- Cumulative production: $90 \times 10^9$ bbls
- Future discoveries: $910 \times 10^9$ bbls

Production ($10^9$ bbls/yr) vs. Year (1850 to 2200)
So, TRANSFER what risks???

- Schedule
- Budget
- Finance
- Own Consultant liabilities
- Accuracy of site info.
- Users e.g. changes
- Changes in law, codes
- “Fitness for purpose”
- Maintenance

- Subsoils
- Environmental
- Operational
- Innovation
- Energy Performance and Energy Costs
- LCC and performance
- ...
<table>
<thead>
<tr>
<th>#</th>
<th>Description of Risk</th>
<th>Probability</th>
<th>Impact</th>
<th>Risk Factor</th>
<th>&quot;owner&quot;</th>
<th>Response</th>
<th>Status</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Interference issues S,M and E</td>
<td>3</td>
<td>6</td>
<td>18</td>
<td>architect</td>
<td>reduce/mitigate</td>
<td></td>
<td>BW - implement interference &amp; coordination review; O/T; communicate to client re 4 day delay in bid call</td>
</tr>
<tr>
<td>A2</td>
<td>Hardware Finish Selection may be limited</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>architect</td>
<td>mitigate</td>
<td></td>
<td>BW - advise client, check availability before contractor tenders for supply- ensure consistent finishes</td>
</tr>
<tr>
<td>A3</td>
<td>Spec'd Acoustic Tile Ceilings not available in time</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>architect</td>
<td>mitigate</td>
<td></td>
<td>BW advise client, ID produce comparative incl hygiene, sound and $$$</td>
</tr>
<tr>
<td>A4</td>
<td>Committee of Adjustment negative decision</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>mitigate and approved</td>
<td>transfer to legal</td>
<td></td>
<td>BW coord w/legal counsel, ask owner contact local councillors, facilitate NIMBY meeting; shadow drawings noise and traffic report</td>
</tr>
</tbody>
</table>

**Probability**

1 = low, 10% or less
3 = moderate, 20-50%
5 = high, greater than 50%

**Impact**

1 = negligible
2 = small - inconvenience
4 = medium - but doesn't cause failure of project
8 = very big, likely to cause failure of project
Risk / Reward
Project Alliance

Project Cost and OH guaranteed
Profit and Corp OH at risk (pain)
Potential Gain if improve on “targets”
Performance Contracting

- **Design Fee**
- **Metric (e.g. Annual Cost of Energy)**
- **Base Fee**
- **Maximum Incentive**
- **Target**
- **Maximum Penalty**
- Beat the target
- Miss the target
UNDERSTANDING PUBLIC PRIVATE PARTNERSHIPS IN CANADA
Public Private Partnerships (P3s, AFP)

Diagram:
- Advisors
- Public Owner
- Consortium
- Contractor
- F/M
- Equipment/IT
- Operators
- Designers
- Energy
Integrated Project Delivery

Project Facilitator

Project = Shared Goal

Shared Risk and Reward
IPD – Greater Design Investment

- Impact of decisions
- Potential
- Cost of changes
- Usual

Project life cycle to commissioning
IPD = Collaboration

Project is the Common, Shared Goal
Open Information Sharing
Shared Risk and Reward
Value-Based Decision-making
Project Management – Why?

• One-stop shopping
• Cradle to Grave
• Risk
  – Greater certainty
• Accountability
• Optimum project outcome
• PM in the Future??
Project Management – BUT!

- Qualifications
  - Resources
- Scope of service
- Operating philosophy/style/realities
  - “turf”
  - industry practices
  - communication
- Accountability
- Realistic owner expectations