Managing Risk on Federal Projects

The GSA Perspective: Learning from our Legacy

Prof. Spiro N. Pollalis
Harvard University

2020 Project Delivery Symposium
Santiago Calatrava
“if I were a painter...”
A Building Project has Stakeholders

Individuals or organizations actively involved
- Client
- Final user
- Project team
- Suppliers

or have an interest in the development
- Citizens
- Government
- Politicians
- Competitors
Project Management

The ART and TECHNIQUE to plan, organize, manage and control the RESOURCES needed to achieve a predefined set of OBJECTIVES of a PROJECT.

Prof. S.N. Pollalis, March 10, 2020
Project:
  • Leeds to a unique product, with characteristics defined, up to a point, as the project progresses
  • A team is assigned for the duration of the project
  • Temporary, with a Start and an End

Art:
  • A methodology is not enough. Human factor...

Technique:
  • Tools and processes
• Resources
  • People
  • Physical resources
  • Time
  • Money

• Objectives
  • Safety
  • Quality
  • Cost
  • Planning
  • Others
Objectives

• The first and most relevant question to ask to properly manage a project is the definition and understanding of the OBJECTIVES and the PHILOSOPHY of the CLIENT

• Who is actually the client and the “non evident” objectives must be considered
Project Areas

PMI Functions

• Scope
• Quality
• Cost
• Schedule
• Team
• Integration
• Communication
• Risk assessment
• Purchasing
Project Management

• Project delivery; organization
• Clarify and structure responsibilities
• Communication/information transfer
Additional tasks

• Management of design
• Site Acquisition
• Demolition
• Image/public relations
• etc...
Tools

- Gantt diagram

<table>
<thead>
<tr>
<th>Project</th>
<th>Time in Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>A—Do preliminary market analysis</td>
<td>2-3</td>
</tr>
<tr>
<td>B—Develop preliminary product designs</td>
<td>4-6</td>
</tr>
<tr>
<td>C—Do preliminary manufacturing study</td>
<td>7-10</td>
</tr>
<tr>
<td>D—Evaluate &amp; select best product design</td>
<td>11-12</td>
</tr>
<tr>
<td>E—Develop detailed marketing plans</td>
<td>13</td>
</tr>
<tr>
<td>F—Design manufacturing process</td>
<td>14-15</td>
</tr>
<tr>
<td>G—Develop detailed product design</td>
<td>16</td>
</tr>
<tr>
<td>H—Build and test prototype</td>
<td></td>
</tr>
<tr>
<td>I—Finalize product design</td>
<td></td>
</tr>
<tr>
<td>J—Order components</td>
<td></td>
</tr>
<tr>
<td>K—Order production equipment</td>
<td></td>
</tr>
<tr>
<td>L—Install production equipment</td>
<td></td>
</tr>
</tbody>
</table>

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Tools

Software tools

• They may save a lot of work. They may even be essential.
• They are TOOLS. They do not think.
• They are TOOS. They are not objective.
• Their internal logic is not always applicable to the problem (resources)
• Not everyone can understand their output
• Common sense is essential to use them

GIGO; GARBAGE IN  GARBAGE OUT
The client is most important

• Implication
• Clarity of objectives. Compromises
• Clear responsibility assignments
• Capacity and will to make decisions
• Capacity and will to have the decisions implemented

THE CLIENT IS THE ONLY SINGLE FACTOR ESSENTIAL FOR SUCCESS
The project manager

• Takes care of the team!
• Gets enough resources
• Looks for intelligent hard-working people
• Knows the team: competences, preferences
• Motivates
• Asks for top performance. Does not ask for the impossible
• Corrects errors
• Shares the success. Assumes the errors
The project manager

- Sets clear objectives and guidelines
- Shares information
- Gives freedom. Supervises progress. Helps
- Teaches. Educates
- Involves the members of the team in the meetings with the client, suppliers, contractors, users, etc.
- Promotes group feeling
- Avoids internal competition. Promotes cooperation
The project manager

- Documents: meeting minutes, reports, agreements, etc.
- Does not assume that everyone will fulfill his compromises. Supervises, verifies
- Checks the facts. Checks again
- Pays attention to relationships among people
The project manager

- Pays attention to delivery dates: supplies, permits, licences, etc.
- Keeps contingencies: budget, schedule...
- Analyzes the consequences of the problems
- Understands the state of mind of the client
- Impact of changes in the organization of the client
- Expectations of key participants
The project manager

- When problems appear...
  - Tries to keep calm. Does not lose objectivity. The situation could be worse...
  - Tries to find solutions from the very beginning. Avoids the temptation to start looking for culprits.
  - Goes to the client with the problem clearly defined and, if possible, with a solution.
  - Does not blame the client (at least not from the beginning)
  - It pays to be brave
  - Perseverance
Key Point

- The Key Point is to develop TRUST
- Other issues are ABSOLUTELY IRRELEVANT if there is no trust
- The client always DOUBTS
Traditional Project Delivery

OWNER

A/E DESIGN
architect, engineers, etc.

CONSTRUCTOR

SUBCONTRACTORS
Traditional Project Delivery

OWNER

A/E DESIGN
architect, engineers, etc.

CONSTRUCTION MANAGER

CONSTRUCTOR

SUBCONTRACTORS
Traditional Project Delivery

OWNER

DESIGN PROFESSIONAL SERVICES
(arquitects, engineers)

CONSTRUCTORS

SUBCONTRACTORS

CONSTRUCTION MANAGER

SUPPLIERS

SUBCONTRACTORS

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Organizational Diagrams of Delivery Methods

**Design / Build**
- Owner
- D/B GC
  - SU
  - B
  - S
  - A/E

**The traditional method**
- Owner
- A/E
- GC
  - SU
  - B
  - S

**Construction Management**
- Owner
- A/E
- CM
- GC
- GC
- GC
Contractual arrangements

<table>
<thead>
<tr>
<th>Owner</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnkey</td>
<td>Initiation</td>
</tr>
<tr>
<td>Design / Build</td>
<td>Program</td>
</tr>
<tr>
<td>Bridging</td>
<td>Design concept</td>
</tr>
<tr>
<td>Traditional</td>
<td>Construction docs</td>
</tr>
</tbody>
</table>

Time $ contract
Delivery Methods observed in projects

Prime contract

Design / Build

Program $ Construction

Traditional

Program CDs $ Construction

Multiple contracts

Construction Management

Program CDs $ Construction

$ Construction

$ Construction

$ Construction

Project A

Project B

Project C

Project D

$ Contract

Define requirements
Owner’s control over changes
Enforce contract
Risk of conflict

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Lump-sum Contract

Price is fixed at $10,300

- **a**: if final cost is $9,500, contractor profit is $800 (8.42%)
- **b**: if final cost is $10,000, (as expected) contractor profit is $300 (3%)
- **c**: if final cost is $10,500, contractor loss is $200 (-1.9%)

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After J. Macomber, 1989

Prof. S.N. Yokellis, March 19, 2020
Time and Materials Contract

Price = cost plus 5%

Final Cost

$9,500
$10,000
$10,500
$11,025

Final Price

$9,975
$10,000
$10,500
$11,025

a = if final cost is $9,500, contractor profit is $475 (5%)
b = if final cost is $10,000, contractor profit is $500 (5%)
c = if final cost is $10,500, contractor profit is $525 (5%)
Guaranteed Maximum Price

Price = cost of work plus fixed fee of $500 with a maximum price of $10,500

- $10,500
- $10,000
- $9,500

a = if final cost is $9,500, contractor profit is $500 (5.26%)
b = if final cost is $10,000, contractor profit is $500 (5%)
c = if final cost is $10,500, contractor profit is $0 (0%)
Owner’s risks under contractual arrangements

- Financing and operation risks
- Design-related risks
- Construction coordination risks

<table>
<thead>
<tr>
<th></th>
<th>Design / Build</th>
<th>Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime contract</td>
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<td></td>
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<tr>
<td>Multiple contracts</td>
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</table>

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Cruzcampo Pavilion (Seville 1992)
Athens Olympic Stadium

ATHOC

GSS

Architects of JV

Contracting JV

Designers engineers of SubCo’s

Sub-Contractors

BUNG AG

Santiago Calatrava SA

Engineering Consultants of JV

Project Delivery

an AIA Knowledge Community

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Bilbao
Guggenheim
Museum
Spangler Student Center, Harvard Business School
Petronas Towers

Client
KLCC (holding) Sdn. Bhd.

Project Management
Lehrer McGovern (Schlather)

Construction (foundation)
Bachy soletanche
First nationwide engineers

Facade
Limited partnership of Harmon and local companies

Construction Tower 1
Hazama Corporation and Mitsubishi Corporation
J.A. Jones Construction Company
MMC Engineering and Construction Company

Construction Tower 2
Samsung Engineering and Construction
Kuk Dong Engineering and Construction

Architect
Architectural Division KLCC

Cesar Pelli

Associate Architect
RSP

Structural engineer
Thorton Tomasetti Engineers

Design Architect
Adamson Associates

Mckinsey & Company
Sendai ikesendai
HMA
Kirkgaard
KTA tenaga
Larson Engineering

Motioneering
OVE ARUP
Pernas otis elevators
Rowan Williams
Davies & Irwin
Taylor Devices

STI

HO HUP
Flack + Kurtz
HMA
Kirkgaard
KTA tenaga
Larson Engineering

Motioneering
OVE ARUP
Pernas otis elevators
Rowan Williams
Davies & Irwin
Taylor Devices

STI
US 84 Mississippi River Bridge; Natchez-Vidalia Bridge
GSA Cases

• Federal Construction
  • Site Acquisition
• Renovations
  • Occupied Buildings
  • Sole Sourcing (rare)
• Build to Suit
San Francisco FB
SSA NATIONAL SUPPORT CENTER

<table>
<thead>
<tr>
<th>Role</th>
<th>Company/Location</th>
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</thead>
<tbody>
<tr>
<td>General Contractor:</td>
<td>Hensel Phelps Construction Company – Chantilly, Virginia</td>
</tr>
<tr>
<td>Design Architect:</td>
<td>Skidmore, Owings &amp; Merrill (SOM) – Chicago, Illinois</td>
</tr>
<tr>
<td>Architect of Record:</td>
<td>Corgan Associates, Inc. – Dallas, TX</td>
</tr>
<tr>
<td>Geotechnical Engineer:</td>
<td>GeoConcepts Engineering, Inc. – Ashburn, Virginia</td>
</tr>
<tr>
<td>Civil/Landscape:</td>
<td>Timmons Group – Richmond, Virginia</td>
</tr>
<tr>
<td>Structural:</td>
<td>Thornton Tomasetti, Inc. – Washington, DC</td>
</tr>
<tr>
<td>MEP:</td>
<td>KTA Group Inc. – Herndon, Virginia</td>
</tr>
<tr>
<td>Mechanical:</td>
<td>Southland Industries – Dulles, Virginia</td>
</tr>
<tr>
<td>Electrical:</td>
<td>M.C. Dean – Dulles, Virginia</td>
</tr>
<tr>
<td>Fire Protection / Life Safety:</td>
<td>Rolf Jensen &amp; Associates, Inc. – Fairfax, Virginia</td>
</tr>
</tbody>
</table>
ERIE CH COMPLEX, ERIE, PA

KSB&A- Overall Lead Firm

<table>
<thead>
<tr>
<th>Lead Role</th>
<th>DPK&amp;A</th>
<th>KSB&amp;A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of Design</td>
<td>30% Design</td>
<td>100% Design</td>
</tr>
<tr>
<td>Construction Phase</td>
<td>DPK&amp;A and KSB&amp;A</td>
<td></td>
</tr>
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</table>

MEP Engineer
H.F. Lenz Company

Structural
Keast & Hood Co.
James N. V. Wilson, P.E.

Geotech/Environmental
GAI Consultants

Cost Estimating
Emanuel B. Gold

Surveyor
Hill Engineering, Inc.

Landscape Arch.
Laquera Bonci Assoc.

Acoustical
The Sextant Group

Court Consultant
Meyer Associates

Abatement
Greenmoor, Inc.
Calisons
Brayman Constr.

Excavation/Excavating
E. E. Austin & Sons
MASONRY/RECTOR
Franco

STRUCT/MEC
Althor Steel

Millwork/Doors
Sterling Contracting

Roofing
Alex Roofing

Dock Equip.
Weber Company
CURTAINWALL
Schindler Glass

DRIWALL/ACOUSTIC
Easley & Rivers, Inc.

DETENTION EQUIP
G.S. Company Glass

PNEUMATIC TUBE
Colombo ELEVATORS

MEP/FIRE PROT
Wm. T. Speader Co.
ELECTRICAL
Keystone Electric Co.
50 UNP, San Francisco, CA

Phase 1: 50% DDs
May-July 2010 --> GAP between phases: 0-50% DDs

Client & Tenant
GSA

AE
HKS, Inc.

CMa
VANIR

CMc
HDCC

CXa
AECOM

Subcontractors
ARG

Subcontractors
multiple

AE
HKS, Inc.

CMa
JACOBS

CMc
HDCC

CXa
AECOM

Subcontractors
NYA WSP & Flack+Kurtz

Subcontractors
multiple

Subcontractors
multiple

Phase 2: 50-100% DDs
90% CDs
100% BDs

Prof. S.N. Pollalis, March 10, 2020