Integrated Design Principles for Lab Projects

Canadian Biosafety Symposium 2018

September 13, 2018
Presentation Objective

The objective of this presentation is to put forward an integrated design approach and specific strategies which can be used by laboratory project delivery teams in order to ensure alignment around critical lab design principles.
Abstract

• Broad and diverse set of stakeholders and decision makers.
• Approach and specific strategies which can be used by laboratory delivery project teams in order to bring alignment around laboratory design principles.
• Formal and informal interaction that can be used.
• Roles and responsibilities which need to be filled.
• Principles and Rules of Engagement that can be deployed on all sizes of projects.
• Specific examples from laboratory projects which are currently being delivered by our practice.
• Best practices and industry tools associated with decision management.
• Project delivery models and construction phase communication techniques which will ensure alignment between project stakeholders and increase the likelihood of meeting project targets.
Communication is everyone’s panacea for everything.

Tom Peters
Stakeholders and Decision Makers

- General Public
- Authorities Having Jurisdiction
- Occupational Health & Safety (OHS)
- Institutional / Private Client Management Teams
- Project Team
- Funding / Grant Organizations
- Community Liaison Groups
- Regulatory Bodies
- Biosafety Representatives
- Scientific / Administrative Groups
- Facility Management Groups
- Occupational Health & Safety (OHS)
Stakeholders and Decision Makers
## Project Consultant Team Complexity

<table>
<thead>
<tr>
<th>Item</th>
<th>Service</th>
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</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Structural Consulting Engineering Services</td>
<td>1.15</td>
<td>Interior Design Consulting Services –</td>
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<tr>
<td>1.2</td>
<td>Mechanical Consulting Engineering Services</td>
<td>1.16</td>
<td>Laboratory Design Consulting Services</td>
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<td>1.3</td>
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<td>Landscape Architect Consulting Services</td>
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<td>Lighting Design Consulting Services</td>
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<td>1.5</td>
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<td>Planning Consulting Services</td>
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<td>1.8</td>
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<td>Building Security and Communications Systems Consulting Services</td>
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<td>1.9</td>
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<td>Traffic Consulting Services</td>
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<td>1.10</td>
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<td>Vertical Transportation Consulting Services</td>
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<td>1.11</td>
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<td>1.12</td>
<td>Heritage Conservation Consulting Services</td>
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<td>Furniture, Fixtures and Equipment (FF&amp;E) Selection, Procurement, and Installation Coordination</td>
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<td>1.13</td>
<td>Archaeological Consulting Services</td>
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<td>Graphic Design and Signage</td>
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<td>1.14</td>
<td>Hardware Consulting Services –</td>
<td>1.28</td>
<td>Tenant Improvement Design Services</td>
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Oh. And a few more....

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<tr>
<td>1.33</td>
<td>Coordination of <em>Client's</em> Equipment</td>
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<tr>
<td>1.34</td>
<td>Value Engineering Services</td>
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<td>1.35</td>
<td>Life Cycle Cost Analysis Services</td>
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<tr>
<td>1.36</td>
<td>Energy Modelling Services –</td>
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<td>1.37</td>
<td>Climate Change Analysis</td>
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<td>1.38</td>
<td>Enhanced Sustainable Design</td>
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<td>1.39</td>
<td>Sustainable Design Certification</td>
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<tr>
<td>1.40</td>
<td>Commissioning</td>
</tr>
<tr>
<td>1.41</td>
<td>Multiple Language Services</td>
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</tbody>
</table>
Approach & Specific Strategies

Specific strategies which can be used by laboratory delivery project teams in order to bring alignment around laboratory design principles.

- Meetings / Workshops
  - (Consider Separate Meeting Streams for Management, Consultant, Technical, and Biosafety/Facility Management)
- Steering Committee Sessions, IDP Sessions, & User Group / Science Stakeholder Sessions
- Site Reviews / Assessments
- Reports
- Emails
- Drawing Packages & Specifications
1. Identify the problem
2. Establish decision criteria
3. Weigh decision criteria
4. Generate alternatives
5. Evaluate the alternatives
6. Choose the best alternatives
7. Implement the decision
8. Evaluate the decision
Approach & Specific Strategies

STAKEHOLDERS: ALIGNMENT/FOCUS

“STAKEHOLDERS” AS “ALIGNMENT OF INTERESTS AS COMMUNITIES”

- STUDENTS
  - Undergraduate
  - Graduate
  - Societies

- ADMIN
  - Executive
  - Research
  - Education

- FACULTIES
  - Science (Biology, Chemistry, Physics)
  - Engineering and Applied Sciences

- PRIVATE INDUSTRY

MUN COMMUNITY

RESEARCH COMMUNITY

- FACILITIES MGMT.
  - Utilities
  - CEP
  - Maintenance

- C&C

SAFETY

OPERATIONAL COMMUNITY

- PIPPY PARK

- CITY OF ST. JOHN’S

- METRO BUS

- LOCAL COMMUNITY

- PROVINCE OF NL

REGIONAL COMMUNITY
Approach & Specific Strategies

“WORK STREAM SESSIONS: CHARRETTES”
Approach & Specific Strategies

- **NOTES:**
  - Schedule based on tradition design-bid-build without sequential bid or fast track delivery.
  - 5 month SD/DDB Phase include 3 week client review period.
  - 40 month Construction Schedule based on past experience. Actual construction schedule will vary depending on contractor strategies with respect to sequential tending considerations (i.e., foundation, etc.) if opening for winter session 2019 required.
LOOK AHEAD SCHEDULE - SAMPLE
### Approach & Specific Strategies

<table>
<thead>
<tr>
<th>Communication Element / Event / Goal</th>
<th>Stakeholders Involved</th>
<th>Frequency</th>
<th>Tools &amp; Techniques</th>
<th>Outcome &amp; Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Start Up Meeting</strong></td>
<td>PWGSC, ANDC, Consultants, User Reps.</td>
<td>Time</td>
<td>Integrated and in person, Electronic minutes, WBS, Schedule, RACI</td>
<td>Scope, schedule, and communication alignment between team members</td>
</tr>
<tr>
<td><strong>Updated Functional Program</strong></td>
<td>All</td>
<td>Time</td>
<td>Digital files, non data sheets, system design criteria, etc. - as per RFP</td>
<td>Coordinated approach to functional and technical project requirements</td>
</tr>
<tr>
<td><strong>Bi-Weekly Project Management Meetings &amp; Risk Assessment Sessions</strong></td>
<td>PWGSC, ANDC, Consultant PMs</td>
<td>Biweekly</td>
<td>In person, or via Webex &amp; Teleconference</td>
<td>Tracked decisions, Schedule monitoring</td>
</tr>
<tr>
<td><strong>Community Consultation Sessions in Cambridge Bay</strong></td>
<td>PWGSC, ANDC, Consultants, User Reps, Community Reps.</td>
<td>Up to 11 times, as per RFP</td>
<td>Integrated and in person, Graphic and digital media presentations, Electronic minutes</td>
<td>Community dialogue and understanding</td>
</tr>
<tr>
<td><strong>Consultant Coordination Meetings</strong></td>
<td>Consultants</td>
<td>Biweekly</td>
<td>In person, or via Webex &amp; Teleconference</td>
<td>Tracked decisions, Schedule monitoring</td>
</tr>
<tr>
<td><strong>Team Integration Tools</strong></td>
<td>All</td>
<td>Continual</td>
<td>Secure FTP server for secure file and document transfers, Use of PWGSC Buzios site ensures staff and clients work from most recent published records, In Office Video Conference Facilities: supporting both ISDN and IP and up to four simultaneous parties, WebEX: Web-based worldwide meetings &amp; conferencing, Smart Phones: Staff are in touch with clients and each other worldwide via Smart Phone services</td>
<td></td>
</tr>
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</tr>
</thead>
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<td><strong>User Group Sessions</strong></td>
<td>PWGSC, ANDC, Consultants, User Representatives</td>
<td>At key intervals during design phase</td>
<td>In person, or via Webex &amp; Teleconference</td>
<td>Tracked decisions, Data and process input into design</td>
</tr>
<tr>
<td><strong>Cost Management Sessions</strong></td>
<td>PWGSC, ANDC, Consultant PMs, Consultant Team</td>
<td>At key intervals during design phase, as required</td>
<td>In person, or via Webex &amp; Teleconference</td>
<td>Tracked decisions, Updated Cost Plans and bid targets</td>
</tr>
<tr>
<td><strong>Special Presentations</strong></td>
<td>Team members, as required</td>
<td>As per Project Workplan and RFP</td>
<td>In person, and via Webex &amp; Teleconference, Graphic and digital presentations, Electronic minutes</td>
<td>Team dialogue and understanding</td>
</tr>
<tr>
<td><strong>Major Milestone Submissions</strong></td>
<td>All</td>
<td>As per Project Workplan and RFP</td>
<td>In person, and via Webex &amp; Teleconference, Graphic and digital presentations, Electronic minutes</td>
<td>Team dialogue and understanding</td>
</tr>
<tr>
<td><strong>QA / QC Comment Tracking Documentation</strong></td>
<td>PWGSC, ANDC, Consultants, User Representatives</td>
<td>As per Project Workplan and RFP</td>
<td>Digital Comment Tracking Documents</td>
<td>Clear QA/QC input tracking, and follow up</td>
</tr>
<tr>
<td><strong>Site Review Meetings</strong></td>
<td>PWGSC, ANDC, Consultant Reps, Resident Site Reps.</td>
<td>At key intervals during design phase, as required</td>
<td>In person, and via Webex &amp; Teleconference</td>
<td>Tracked decisions, and dialogue</td>
</tr>
<tr>
<td><strong>Contract Administration Data Flow</strong></td>
<td>PWGSC, ANDC, Consultant Representatives, Resident Site Reps.</td>
<td>Online Contract Administration Software permits staff and clients to access our data worldwide.</td>
<td>Clear and concise changes documentation</td>
<td></td>
</tr>
</tbody>
</table>

*This framework provides a sample of the communication strategy and will be expanded in the Phase 2 Submission. It will be reviewed at the project start up meeting and further refined to reflect PWGSC requirements.*
Roles

Decision Makers
Conceptual Thinkers
Critical Calculators
Synthesizers
Measurers
Quality Assurance / Quality Control
Peer Review
Constructors
### Approach & Specific Strategies

Often, projects focused on assessment of alternatives will involve two or more of these documents.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Feasibility Assessment</td>
</tr>
<tr>
<td>Building Condition Analysis</td>
</tr>
<tr>
<td>Fundraising Document</td>
</tr>
<tr>
<td>Master Plan</td>
</tr>
<tr>
<td>Life Cycle Cost Analysis</td>
</tr>
<tr>
<td>Risk Analysis Report</td>
</tr>
<tr>
<td>Functional Programming Report</td>
</tr>
<tr>
<td>Phasing Implementation Plan</td>
</tr>
<tr>
<td>Options Analysis Report</td>
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</tbody>
</table>
Protocol Mapping
Early Design Phase

• Meeting Minutes
• Decision Logs
• Site Evaluations (Environmental)
• Functional Programs
• Regulatory Analysis
• Outline Specifications
• Relationship Diagrams
• Commissioning Process Plans
• Cost Estimates

Late Design Phase / Construction

• Detailed Drawing Review
• Construction Specifications
• Full Building Schematics
• As Built Documentation
• Record Drawings
• Commissioning Reports
• Measurement & Verification Studies
Requirements & Planning For:

Material Handling
Waste Stream Management
Sample Storage
Sample Flows
Media Preparation
Glasswash Procedures
Security & Biosecurity
Safety & Biosafety

Centralized or Decentralized?
**SOME TECH - ENGINEERED SYSTEMS**
- Heating and Cooling Equipment
- Lighting Equipment

**LOW TECH - PASSIVE SYSTEMS**
- If you need energy, maximize what is available; wind and sunlight
- Building Orientation

**NO TECH - LOAD AVOIDANCE**
- Minimize Mechanical Engineering
- Minimize Electrical Engineering
Construction Phase Communication Considerations

Project delivery models and construction phase communication techniques which will ensure alignment between project stakeholders and increase the likelihood of meeting project targets.

- Don’t Forget About the End Users!
- Contractor and Consultant Look-Ahead Schedules
- Shop Drawing Scheduling
- Regular Site Walk Throughs
- Move Management / Decanting for Complex Projects
- Laboratory Equipment Initialization & Validation (Site Acceptance Testing)
- Commissioning & Re-Commissioning
- Operations & Maintenance Manuals
Construction Phase Communication Considerations

Project delivery models and construction phase communication techniques which will ensure alignment between project stakeholders and increase the likelihood of meeting project targets.

- Don’t forget about the end users
- Contractor and Consultant Look-Ahead Schedules
- Shop Drawing Schedules
- Regular Site Walk Throughs
- Move Management / Decanting for Complex Projects
- Commissioning & Re-Commissioning

Onware
Prolog
Sharepoint
Others….Etc…
Construction Phase Communication Considerations

What Project Delivery System?
- Construction Management at Risk (CMR) also known as CM/GC
- Design-Bid-Build (DBB)
- Design-Build (DB)

What Procurement Method?
- Best Value (BVS)
- Low Bid
- Negotiated
- Qualifications-Based
- Sole Source (or Direct Select)

What Contract Format?
- Cost Plus Fee
- Guaranteed Maximum Price (GMP)
- Lump Sum (or Fixed Fee)
- Target Price
- Unit Price
Construction Phase Communication Considerations
Construction Phase Communication Considerations

Efficient project delivery methods such as Integrated Project Delivery – IPD for major new construction, and Job Order Contracting – JOC for renovation, repair, sustainability, and minor new construction, among others, are proven and have been practiced effectively for decades.

Both construction delivery methods drive collaboration and transparency (the two keys to productivity improvement), leverage well defined best management practices and processes, and have supporting technology is readily available.
Construction Phase Communication Considerations

Extended Collaboration Model for Design, Construction & Operations
BIM Level 3 Benefits Are Realized throughout the Building Lifecycle
Communication Planning is Key. Consider Separate Meeting Streams for Management, Consultant, Technical/Biosafety/FM

Early and Continued Involvement of Senior Decision Makers

Work Backwards from Regulatory Requirements to Ensure Compliance

Adoption of Low Tech and High Tech Solutions in Project Delivery

Exploration of Alternative Construction Delivery Models
The simple act of paying positive attention to people has a great deal to do with productivity.

Tom Peters
Thank You

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