Project Management  In the world of geospatial
Instructor

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  Michael Baker International, Inc.
  Jackson, Mississippi
  - 23-Years with Michael Baker
  - 20-Years of Project Management
  - 15-Years of Operations Management
  - Masters Certificate in Project Management from University of Pittsburgh’s Katz School of Business
Project Management: Course Syllabus

• Basics
• Project Management Plan (PMP)
• Preparing the Scope of Work (SOW)
• Work Breakdown Structure (WBS)
• Scheduling
• Communication
• Financial Management
• Contracts & Agreements
PMs (Existing or Future) are Encouraged to Take an Accredited Course (PM Centers USA, PMI, Universities)
BASICS
Project

- A temporary endeavor undertaken to create a unique product, service or result.

Project Management

- The application of knowledge, skills, tools and techniques to dedicated activities to meet the project requirements.
- Centralized management of a group of related activities in a coordinated manor to obtain benefits and control.
Project Manager Role

• Organize, Coordinate and Direct
• Lead the Project Team to Success
• Communicate Well-Defined Requirements
• **Resolve Conflicts** Between Stakeholders
Project Manager is **NOT** Necessarily…

- The Most Intelligent
- The Most Technically Competent

Project Manager *is*…

- Good Communicator
- Organized
- Results Oriented
- Politically Savvy
- Cost Conscious
Benefits of Structured Project Management

Organizational Planning
• Identification of Time Limits
• Measurement of Actuals vs. Plan
• Early Identification of Problems
• Optimization of Time, Cost and Resources
• Improved Estimating for Future
• Improved Project Performance
• Compilation of Historical Metrics

Stakeholder Welfare
• Client Satisfaction
• Knowing When Objectives Will be Exceeded
• Enhanced Decision Making
• Reduction of Risk/Delay
• Team Building & Unified Agendas
• Improved Morale of PMs
Project Management Knowledge Areas

- Integration Management
- Cost Management
- Communications Management
- Scope Management
- Quality Management
- Risk Management
- Time Management
- Human Resource Management
- Procurement Management
Project Management: Simplified

- Schedule
- Financials
- Communication
PMP
Project Management Plan
Project Management Plan (PMP)

- Collection of Pertinent Information Required to Successfully Manage a Project.
- Living “Document”
- Primary Objectives:
  - Facilitates a Standard Process for Planning the Successful Outcome
  - One-Stop Reference Tool for the Project Manager and Staff
  - Critical Resource for the NEXT Project Manager
Project Management Plan (PMP)

1. Project Purpose
2. SOW & Contract
3. Critical Assumptions & Constraints
4. Project Team & Stakeholders
5. Communications Plan
6. Project Procurement & Subcontracting
7. Project Schedule
8. Project Budget & Invoicing
9. Quality Management Plan
10. Risk Management Plan
11. Change Management Plan
12. Health, Safety & Environment (HS&E)
13. Closeout Plan
Scope Of Work
Scope of Work

- A Narrative Description, **IN DETAIL**, of the Products or Services to Be Supplied by the Project Including…
  - Business Need and/or Strategic Goals;
  - Product, Service, or Result Description;
  - Functional, Physical, and Other Characteristics;
  - Specifications and Requirements To Be Met;
  - General Acceptance Criteria;
  - Constraints and Quality Requirements;
  - Target Milestones, Schedule, and Budget
SOW Problem Avoidance

- Use the **SMART** Approach to SOW Development

- **SPECIFIC**
- **MEASURABLE**
- **ACHIEVABLE**
- **REALISTIC**
- **TIMELY**
Details Matter

• Thoroughly Vet the SOW with the Client or Sub
• Don’t be the Only Line of Defense
• The Goal of a Review Committee is to Disqualify You
## SOW Language Do’s & Don’ts

<table>
<thead>
<tr>
<th>Don’t Use</th>
<th>Do Use</th>
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<tbody>
<tr>
<td>At all times</td>
<td>Once per…</td>
</tr>
<tr>
<td>Insure; Ensure; Assure</td>
<td>Reasonable effort will be made…</td>
</tr>
<tr>
<td>Periodically</td>
<td>Once per…</td>
</tr>
<tr>
<td>Supervise; Inspect*</td>
<td>Observe; Report; Monitor</td>
</tr>
<tr>
<td>Certify*; Warrant; Guarantee</td>
<td>Engineering judgement based on..</td>
</tr>
<tr>
<td>Attend All Meetings</td>
<td>PM will attend * meetings</td>
</tr>
<tr>
<td>Provided in a Timely Fashion</td>
<td>Provided by *; Provided within *</td>
</tr>
<tr>
<td>Prepare a Minimum of…</td>
<td>Will prepare * …</td>
</tr>
</tbody>
</table>

* Certain Terms May Be Required By Contract
WBS
Work Breakdown Structure
Work Breakdown Structure (WBS)

- Hierarchical Decomposition
- Deliverable-Oriented
- Organizes and Defines
- Includes:
  - Management-Oriented Deliverables
  - Product/Production-Oriented Deliverables
WBS Levels

- Subdivide Work Into Manageable Tasks
- “Work Package” is the Lowest Measurable Level
- WBS Promotes:
  - Estimating
  - Scheduling
  - Monitoring
  - Predecessor / Successor Relationships
  - Stakeholder Understanding
WBS Diagram vs. List

- Custom Vendor Selection
  - Agenda for Visits
  - Evaluation Criteria
  - Team Prep.
  - Visit Schedule
  - After Action Report

- Vendor Reference Checks
  - Reference Format
  - Vendor Reference Request
  - Reference Evaluation Forms
WBS Diagram vs. List

- Lists are innately **Temporary**
- Easy to overlook items on a list
- Lists can be cumbersome
- Lists don’t facilitate Work Package hierarchy (relational)
- Lists are created by 1 person
- WBS is a group effort
- WBS fosters stakeholder buy-in/comprehension
WBS Exercise

• Develop a WBS for the Koko Trail Backpack LiDAR Scanning Project
Time Management

- Project Life Cycle
Project Life Cycle

- Effort vs. Duration
Activity Sequencing

- Leverage the WBS

- **Predecessor** – any Activity(ies) or Task(s) that MUST be Completed Before Starting the Next Activity or Task.

- **Successor** – any Activity(ies) or Task(s) that are Dependent on the Completion of the Present Activity or Task.
Types of Schedule

• Gantt Charts
  • 1:1 Comparison to WBS
  • Easy to Update
  • Good Communication Tool

• Milestone Charts
  • High-Level Summary
  • Useful for Stakeholder Presentations

• Network Diagrams
  • Shows Relationships/Dependencies
  • Enables “What-If” Analysis
Network Analysis Terminology

- **Milestone** – Point in Time to Measure Progress
- **Early Start (ES)** – Earliest Time an Activity Can Start
- **Early Finish (EF)** – Earliest Time an Activity Can End
- **Late Start (LS)** – the Latest Time an Activity Can Start
- **Late Finish (LF)** – the Latest Time an Activity Can Finish
- **Float (F)** – Time an Activity Can be Delayed Without Impacting Schedule
- **Critical Path** – Longest, Direct Path Thru the Network (Zero Float)
Determining Critical Path

- Critical Path – Longest, Direct Path Thru the Network (Zero Float)
Start Float: Forward Path

Start Float: Forward Path

Start

End

ES = Early Start
EF = Early Finish
LS = Late Start
LF = Late Finish

Task

Start

End

ES = Early Start
EF = Early Finish
LS = Late Start
LF = Late Finish
Finish Float: Backward Path

Start

A

D

F

G

H

C

End

Task

ES = Early Start
EF = Early Finish
LS = Late Start
LF = Late Finish

4d 4 4 13
4 4 13 17
13 17 19
19 26

4 8d 9d 12
4 12 13
13 17
17 26

12 4d 16
12 22 26
22 26

7d 19 26
19 26

0 4 4 13 17 19 26
0 3 4 12 16 22 26
0 3 4 12 16 22 26
0 4 4 13 17 19 26
**Total Float**

- **Float = Late Start – Early Start**

![Diagram showing project network with task labels and float calculations]
Network Diagram Exercise
COMMUNICATION
Communication Management

- Processes Required to Ensure Timely and Appropriate Generation, Collection, Dissemination, Storage, Retrieval, and Ultimate Disposition of the Project Information
  - How
  - When
  - In What Form
  - To Whom
Methodology Considerations

- Immediacy of the Need
- Complexity of Information
- Audience
- Project Duration
- Availability of Technology
- Familiarity With the Technology
Project Team Expectations

• Four Legs of the Project Organization
  • Authority: Power Granted
  • Responsibility: Obligation Incurred
  • Accountability: Answerable
  • Reliability: Dependable

When RESPONSIBILITY is Assigned, AUTHORITY is Required;
When AUTHORITY is Granted, ACCOUNTABILITY is Required;
When ACCOUNTABILITY Exists, RELIABILITY is Required.
RACIs Matrix

- **R**esponsible
- **A**ccountable
- **C**onsulted
- **I**nformed
- **S**upport

### RACIs Matrix Exercise

- Develop a RACIs Matrix for the Koko Trail LiDAR Project
# MAPPS Winter Conference 2020

## Project Management

### RACIs Matrix

#### Exercise

<table>
<thead>
<tr>
<th>Personnel</th>
<th>A</th>
<th>A/R</th>
<th>R</th>
<th>I</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>LiDAR Ops Mgr</td>
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<td>TBD</td>
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<td>TBD</td>
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<td>TBD</td>
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<tr>
<td>Field Ops Mgr</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
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<td>TBD</td>
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<tr>
<td>Survey Ops Mgr</td>
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<tr>
<td>Tech. Serv. Mgr</td>
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<td>Municipal/Civil</td>
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</table>

### Decisions / Activities

<table>
<thead>
<tr>
<th>Contract</th>
<th>Receive Project Award</th>
<th>Execute Contract</th>
<th>Execute Subconsultant Agreement</th>
<th>Submit Authorization to Proceed</th>
<th>Execute Project</th>
<th>Invoicing/Cost Transfers</th>
<th>Project Closeout</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>LiDAR Collection</th>
<th>Logistics</th>
<th>Equipment Installation/Testing</th>
<th>Establish GPS Ground Control</th>
<th>Safety Training</th>
<th>LiDAR Scanning</th>
<th>GPS Base-Station Setup/Processing</th>
<th>Data Shipment</th>
<th>Equipment De-Mobilization</th>
<th>LAS Processing</th>
<th>Constrain LiDAR to Ground Control</th>
<th>Planimetric Feature Extraction</th>
<th>Surface Modeling (DTM/DEM/Breaklines)</th>
<th>Planar/Spherical Imagery</th>
<th>Web/GIS Viewer</th>
<th>QA/QC and Deliverables</th>
</tr>
</thead>
</table>

### Notes

* To be consulted as necessary after opportunity review

** To be consulted if determined to be other than a strictly Geospatial opportunity

*** Project Personnel may be the same as Staff listed elsewhere in the Matrix
FINANCIALS
Funding Basics

- Gross Revenue (GR)
- Other Direct Costs (ODC)
- Subcontractors (Sub)
- Net Revenue (NR = GR-ODC-Sub)
- Direct Labor (DL)
- Overhead (OH)
- Fringe/Benefits (FR)
- Contribution Profit (CP = NR-DL-FR)
- Project Factor (NR ÷ DL)
Cost Estimating Approach

- Top-Down
  - Useful “First-Cut” or Rough Order of Magnitude (ROM)
- Bottom-Up
  - Detailed. Correlates to the WBS

Cost Estimating Methods

- Similar Projects
- Knowledge
- Calculated Risks
- Best Estimates (SWAG)
Financial Administration

• Cost / Schedule Control
  • Assessment of the Baseline
  • Tracking Requirements
  • Managing Change

• Performance Measurement
  • Actual vs. Planned (Variance)
  • Percent Complete
  • Trend Analysis

The Question is NOT “Is There a Variance?”
The Question is “What is the Projection the Variance Indicates?”
Project Performance

• Key Components
  • Approved Cost Budget (ACB)
  • Forecast Cost Budget (FCB)
  • Inception To Date (ITD)
  • Period To Date (PTD)
  • Year To Date (YTD)
  • Percent Complete (%Comp)
    • Physical, Budgeted, Scheduled
**Project Management Report**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Agreement</th>
<th>Type</th>
<th>Cost</th>
<th>Budget</th>
<th>Cost</th>
<th>Budget</th>
<th>Cost</th>
<th>Budget</th>
<th>Cost</th>
<th>Budget</th>
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<table>
<thead>
<tr>
<th>Tasks</th>
<th>Work</th>
<th>Start Date</th>
<th>End Date</th>
<th>Status</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1.1-Labor</td>
<td>Task 1</td>
<td>01/01/20</td>
<td>12/31/20</td>
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<tr>
<td></td>
<td>Task 2</td>
<td>01/01/20</td>
<td>12/31/20</td>
<td>Approved</td>
<td></td>
</tr>
</tbody>
</table>

| PM Report Exercise |

* Real Project, but Values have been modified for this exercise
## Project Management Report

**Prev. FCB Reduction in Effort**

**Prev. FCB Increase in Effort**

**FCB Adjustments Created More Profit**

**Over budget**

**Little PM effort considering FCB %Comp**

**Client Hasn’t Paid**

**PM Report Exercise**

---

* Real Project, but Values have been modified for this exercise
Financial Administration

• Activities & Frequency

* Actual activity frequency will be dictated by your company’s guidelines and client/contract requirement(s)
CONTRACT & AGREEMENT
Contract

• A Legal Agreement Between Two or More Parties or Persons that Creates an Obligation to do or not to do a Particular Activity.

• Contract Has 2 Aspects:
  • **Document** – Written or Oral Manifestation of an Agreement Between Parties
  • **Relationship** – Commitment that Forms Between Parties Entering the Agreement.
Types of Contracts

- Firm Fixed Price (FFP) / Lump Sum (LS)
  - Useful for a Specific, Well-Defined Deliverable
  - High Risk/Reward for Seller

- Cost, Plus Fixed Fee (Cost+)
  - Used for Projects Comprising Variable Quantities and
    the Seller’s “Best Effort” Estimate
  - Long-Period, High-Capital Projects

- Time & Materials (T&M)
  - Hybrid Approach Used for Projects With Greater
    Risk/Uncertainty
Contract Type vs. Risk

Seller Risk

Cost+  T&M  LS

Buyer Risk

Reward

HIGH  LOW

LOW  HIGH
Primary Types of Agreements

- Non-Disclosure Agreement (NDA)
- Teaming Agreement (TA)
- Blanket Purchase Agreement (BPA)
- Master Services Agreement (MSA)
- Subcontractor Agreement (SA)
- Memorandum of Understanding (MOU)
Terms & Conditions (T&C)

- **Term** – an Enforceable Promise that Addresses a Specific Subject
- **Condition** – a Phrase that Either Activates or Suspends a Term

- **Don’t be the Only Line of Defense**
  - Officers can be Personally Liable

Call the Attorney!
Breach

- Failure, Without Legal Excuse, to Perform any Promise, in Whole or Part, of the Contract
- Remedies: (Red Flags During Legal Review)

- Compensatory Damages
- Liquidated Damages
- Non-Punitive Damages
- Specific Performance
- Performance Bond
- Other Actions
Risk Management Strategies

- **Avoidance**
  - Change the Project Management Plan to Eliminate Risk

- **Transference**
  - Shift the Consequences of Risk to a 3rd Party
    - Subcontracts, Insurance, Bonds, Warranties

- **Mitigation**
  - Reduce the Risk to an Acceptable Probability or Consequence
    - Detailed SOW, Work OT, Extend Due Dates

- **Acceptance**
  - Active / Passive – Contingency Plans vs. No Action
Contracts/Agreement Workflow
Discussion and Questions

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