Competitive Project Unit (CPU)
Tanta University

Tools for Project Management: LFM and GANTT Charts

By
Mohamed Labib Salem, PhD
Prof. of Immunology, Faculty of Science
Director, Competitive Project Unit (CPU)
mohamed.labib@science.tanta.edu.eg
Tel. 017 427 2624
“Give a man a fish and he will eat for a day. Teach a man to fish and he will eat for a lifetime” - Chinese Proverb
The Management Workflow

1. Set Goals
2. Formulate Action Plan
3. Set Milestones
4. Frame it in Workflow
5. Breakdown into To-Do Lists
6. Act on To-Do List
7. Evaluate Progress
The Basic Project Management Process

“Who fails to plan, plans to fail”
Results based management: for systematic planning, implementation, monitoring, and evaluation of projects.

Is expressed by LFM chart (Logical Framework Matrix)

Time-based management

Is expressed by GANTT chart
LFM is a “Summary” of the Project

- **WHY**: The project is carried out (development objective, immediate objectives)
- **WHAT**: The project is supposed to produce (outputs)
- **HOW**: The project is going to achieve the outputs (activities)
- **HOW**: The success of the project can be measured (indicators)
- **WHERE**: The data can be found (means of verification)
- **WHICH**: External factors influence the project (assumptions)
<table>
<thead>
<tr>
<th>Activity description</th>
<th>Performance Indicators</th>
<th>Means of Verification</th>
<th>Risks and Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal (Overall Objective)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs (Results)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Means</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LFM: Components

Vertical Logic

• Identifies what the project intends to do and achieve
• Clarifies the causal relationship
• Specifies important assumptions and risks

Horizontal Logic

• Identifies the source and means by which indicators will be verified
• Specifies indicators to measure progress

Aims measured by indicators through information collected and presented in specified means of verification
An Example of the Logic Model

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>Outcomes or Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Members</td>
<td>Drive to state park</td>
<td>Family members learn about each other;</td>
</tr>
<tr>
<td>Budget</td>
<td>Set up camp</td>
<td>family bonds; family has a good time</td>
</tr>
<tr>
<td>Car</td>
<td>Cook, play, talk, laugh, hike</td>
<td></td>
</tr>
<tr>
<td>Camping Equipment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Everyday example of the logic model: A family camping trip
Features of LFM

• Results oriented- not activity driven
• Logically sets objectives and their causal relationships
• Shows whether objectives have been achieved: Indicators.
• Describes external factors that influence the project’s success: assumptions and risks
Measures to verify to what extant the results are achieved.

Specify how the achievement of an objective can be verified or demonstrated.

Provide a basis for Monitoring and Evaluation.

Quantitative and Qualitative.
Source and means by which indicators will be verified

- field verification
- Benchmarking
- project documents
- Publications
Wider and specific objectives

**Wider objective:**
- Expected result of the project expressed in terms of consequences
- Longer term impact of the project
  - To which wider objective will the project contribute?

**Specific objective:**
- Expected result of the project expressed in terms of results which will contribute to the achievement of the overall objective
- Initial impact, short term, of the project
  - Which specific objectives should be achieved to contribute to the wider objective?

**The LFM should answer:**
- Does the LFM provide a good and concise overview of the project?
- Is this overview consistent with the previous sections?
- Are the Wider objective and specific objective(s) logically connected?
- Are the project specific objectives clear, measurable and realistic?
Activities & inputs

- Activities = Actions taken or work performed through which means/inputs are mobilised to produce specific outputs
  - Which activities should be carried out, and in what order, to produce the expected outcomes/outputs?

- Inputs = financial and human resources, equipment and infrastructure used for the implementation of the project

The LFM should answer:

- Are all activities needed to achieve concrete outcomes and outputs?
- Are all elements coherent and feasible?
- Is the overall working method (HOW to do things) logical and clear?
Outputs and outcomes

- Outputs = the products, capital goods and services which result from a project – tangible

- Outcome = the likely or achieved short-term and medium-term effects of project's outputs – intangible

The LFM should answer:

- Are the outcomes/outputs going to lead to the planned specific objectives?
- Are all outcomes and outputs quantified?
- Are there concrete dates/deadlines quoted?
Assumptions and Risks

• Assumptions are factors that are necessary for the success of the project, but are not under the direct influence of the project.

• Risks are factors that can jeopardize the success of the project.

• Assumptions and Risks should be relevant and probable.

• Do not include risks if not important.
Assumptions = Desired situation
if an assumption is formulated in a negative way it becomes a risk

Risks = External factors outside the control of the project, but which are critical for the achievement of its objective

Assumptions and risks analysis = elaboration of hypotheses about factors or risks which could affect the progress or success of the project

The assumptions and risks analysis allows to identify, or to give the means to identify, the risks that could be faced and to take the necessary measure as early as possible

Guiding questions:
- What are the assumptions required for the achievement of the project?
- What are the risks which should be taken into account?
- What are the possible measures to limit or prevent these risks?
- Have these measures been translated in project activities whenever possible?
Assumptions = Desired situation
if an assumption is formulated in a negative way it becomes a risk

Risks = External factors outside the control of the project, but which are critical for the achievement of its objective

Assumptions and risks analysis = elaboration of hypotheses about factors or risks which could affect the progress or success of the project

The assumptions and risks analysis allows to identify, or to give the means to identify, the risks that could be faced and to take the necessary measure as early as possible

Guiding questions:
  - What are the assumptions required for the achievement of the project?
  - What are the risks which should be taken into account?
  - What are the possible measures to limit or prevent these risks?
  - Have these measures been translated in project activities whenever possible?
LFM: Dissemination

- People directly participating in the project
- Other teaching, academic staff, students
- Other faculties
- Other universities
- Regional/National authorities
- Neighbouring countries
### Activity description

<table>
<thead>
<tr>
<th>Goal (Overall Objectives)</th>
<th>Purpose (Project Objectives)</th>
<th>Outputs (Results)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Contribute to the achievement of Sustainable Development in the area of Lake Manzala</td>
<td>- Improve water quality in Lake Manzala</td>
<td>- Good water quality - Better fish productivity - Conservation of existing habitats</td>
<td>- Baseline study to detect type of contaminants and level of water pollution - Track sources of Pollution - Introduction of appropriate remediation techniques (e.g. Bioremediation) - Better Law enforcement - Develop more protected areas - Capacity building for local governance - Public participation</td>
</tr>
</tbody>
</table>

### Indicators

<table>
<thead>
<tr>
<th>Goal (Overall Objectives)</th>
<th>Purpose (Project Objectives)</th>
<th>Outputs (Results)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Water quality - Fish productivity - Quantity and quality of reed swamps, salt marshes, and sandy areas</td>
<td>- Water quality - fish productivity</td>
<td>- Water quality - fish productivity</td>
<td>- penalties - trained personnel - public hearings - protected areas</td>
</tr>
</tbody>
</table>

### Means of Verification

<table>
<thead>
<tr>
<th>Goal (Overall Objectives)</th>
<th>Purpose (Project Objectives)</th>
<th>Outputs (Results)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Regular monitoring of fish productivity</td>
<td>- Regular monitoring of quantity and quality of reed swamps, salt marshes, and sandy areas</td>
<td>- Regular monitoring of water quality - Regular reporting</td>
<td>- Regular monitoring of ongoing activities and compatibility with the project timeplan - Regular reporting -- budget</td>
</tr>
</tbody>
</table>

### Assumptions

<table>
<thead>
<tr>
<th>Goal (Overall Objectives)</th>
<th>Purpose (Project Objectives)</th>
<th>Outputs (Results)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Political will</td>
<td>- Public participation</td>
<td>- Strong law enforcement - Continues capacity building</td>
<td></td>
</tr>
</tbody>
</table>
### Goal (Overall Objective)
This research aims to develop appropriate remediation methods for contaminated sites in Egypt to clean up the groundwater from contaminants. A special emphasis will be given to ……

### Project Objectives
- It is expected to predict how far the contaminant has migrated from its source and the spatial and temporal distribution of both aqueous and solid phase concentrations.
- It is also expected to predict how much contaminant was absorbed by soil particles……..

### Outputs (Results)
- Stochastic analysis of contaminant flow & transport;
- Temporal and spatial distributions of the contaminant conc.
- Develop appropriate remediation methods for contaminated sites in Egypt.
- The amount of contaminated absorbed by soil particles & the time needed for these contaminant to release to groundwater again after the aquifer is remediated.

### Activities
1. Collect data about contaminated sites.
2. Take water and soil boreholes.
3. Investigate the collected water and soil samples in the lab.
4. Verify experimental results against numerical model …
5. Input results of experiments to another numerical model that accounts for macroscopic scale problems (e.g. field sites).
6. Carry out numerical simulations of the site to predict temporal and spatial distribution of contaminant.
7. Suggest appropriate remediation programs to cleanup the site.
8. Write up results and publish them in international conferences and journals.

### Means
1. An assistant to help in…..
2. Contractor to collect soil boreholes …. 
3. Laboratory to investigate contaminated soil and water samples …. 
4. Printer and two computers (one for me and another one for the assistant) to carry out the numerical modeling.

### Risks and Assumptions
- We need data about contaminated sites in Egypt from ministry of environment, ministry of irrigation and water resources, and ministry of petroleum. The traditional routine in governmental offices may delay the collection of these data.
- The main condition which is outside our control is the collection of the data from governmental offices. In Egypt, people always try to hide data even if they are not going to use it. This may happen even if the project is going to suggest solutions for scientific problems they already have.
Project Management

Time Based Management (GANTT Chart)
“Once you have mastered time, you will understand how true it is that most people overestimate what they can accomplish in a year – and underestimate what they can achieve in a decade!” - Anthony Robbins

“The only reason for time is so that everything doesn't happen at once” - Albert Einstein
What, when and where

- Starting date and deadline for each outcome
- Location of each activity
Evolution of GANTT Chart

- known after Henry Gantt (1861–1919).
- Henry Laurence Gantt was a mechanical engineer, management consultant and industry advisor.
- He developed Gantt charts in the second decade of the 20th century (1910–1915) as a visual tool to show scheduled and actual progress of projects.
- Accepted as a common-place project management tool today, it was quite a radical concept and an innovation of world-wide importance in the 1920s.
- Organizing for Work is an early book written by Henry L. Gantt and published the same year he died (1919).
Gantt Chart

- Is a graphical representation of the duration of tasks against the progression of time.
- Is a useful tool for planning and scheduling projects.
- Is helpful when monitoring a project's progress.
- Lays out the order in which the tasks need to be carried out.
- Show dependencies between tasks
GANTT Chart

• Lets you see immediately what should have been achieved at any point in time.
• Lets you see how remedial action may bring the project back on course.
• Illustrates the start and finish dates of the terminal elements and summary elements of a project.
• Terminal elements and summary elements comprise the Work Breakdown Structure (WBS) of the project.
Basic GANTT Chart

• Early Gantt chart users showed progress using a simple "fill in the bar" method to show how much of the project was complete.
<table>
<thead>
<tr>
<th>Project Tasks</th>
<th>1918</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J</td>
</tr>
<tr>
<td>Project &quot;XYZ&quot;</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>J</td>
</tr>
<tr>
<td></td>
<td>J</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
<tr>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Prototype</td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td></td>
</tr>
</tbody>
</table>
Basic Gantt Chart

<table>
<thead>
<tr>
<th>Project Tasks</th>
<th>1918</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J</td>
</tr>
<tr>
<td>Project &quot;XYZ&quot;</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Prototype Production</td>
<td></td>
</tr>
</tbody>
</table>
A modern Gantt chart is a matrix constructed with:

• **A horizontal axis** representing the total time span of the project, broken down into increments (days, weeks, or months).

• **A vertical axis** representing the tasks that make up the project.

• **A graph area** which contains horizontal bars for each task connecting the period start and period ending symbols.
The GANTT Chart has 4 variants

- **Milestones:** important events (checkpoints or interim goals) for a project.

- **Resources:** for team projects, it often helps to have an additional column containing numbers or initials which identify who on the team is responsible for the task.

- **Status:** the project's progress, the chart is updated by filling in the task's bar to a length proportional to the amount of work that has been finished.

- **Dependencies:** an essential concept that some activities are dependent on other activities being completed first.
GANTT Chart

• Gantt charts only represent part of the \textit{triple constraints} (cost, time and scope) of projects, because they focus primarily on schedule management.

• Some tasks can be done concurrently while others cannot be done until their predecessor task is complete.
Calculating Time in GANTT Chart

• In GANTT chart, each task has three time estimates: the Optimistic time estimate \((O)\), the most likely or Normal time estimate \((N)\), and the Pessimistic time estimate \((P)\).

• The expected time \(T_E\) is computed using the formula \((O + 4N + P) \div 6\).
### Typical GANTT Chart

<table>
<thead>
<tr>
<th>Task</th>
<th>Artist</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstorm</td>
<td>Amy, Kevin</td>
<td>13 19</td>
<td></td>
</tr>
<tr>
<td>Copywriting</td>
<td>Amy</td>
<td>21 28</td>
<td></td>
</tr>
<tr>
<td>Proofread</td>
<td>Kevin</td>
<td>21 28</td>
<td></td>
</tr>
<tr>
<td>Slides</td>
<td>Craig</td>
<td>14 19</td>
<td></td>
</tr>
<tr>
<td>Video Presentation</td>
<td>Matt</td>
<td>14 19</td>
<td></td>
</tr>
<tr>
<td>Editing</td>
<td>Kathy</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Audio</td>
<td>Jeff</td>
<td>15 20</td>
<td></td>
</tr>
<tr>
<td>Animation</td>
<td>Matt</td>
<td>21 28</td>
<td></td>
</tr>
<tr>
<td>Final Editing</td>
<td>Matt</td>
<td>7 17</td>
<td></td>
</tr>
<tr>
<td>Preliminary Presentation</td>
<td>Kevin</td>
<td>7 17</td>
<td></td>
</tr>
<tr>
<td>Implement Changes</td>
<td>to be determined</td>
<td>7 17</td>
<td></td>
</tr>
<tr>
<td>Final Presentation</td>
<td>Kevin</td>
<td>21 2</td>
<td></td>
</tr>
<tr>
<td>Task Description</td>
<td>Months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 Development of Methodology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Workshop on user needs</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 Draft of methodology</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 Evaluation of methodology</td>
<td>6-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2 Specification of Integrated System</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Inventory of resources in selected regions</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 Review of existing facilities</td>
<td>4-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3 Specify technical developments required</td>
<td>6-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4 Impact analysis of different scenarios</td>
<td>8-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 Prepare detailed business plans</td>
<td>13-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3 Feasibility Studies for each region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review existing practices</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review technologies (state of the art)</td>
<td>4-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity analysis of scenarios</td>
<td>6-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report on most suitable options</td>
<td>8-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4 Project Management and Coordination</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissemination of information: Workshops</td>
<td>16-18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Milestones and Deliverables**
- Guideline for methodology
- Interim Reports
- Business Plans for four regions
- Public Workshop on results
- Final Report
Thank You

Dr. Mohamed Salem