Project Portfolio Management

- Organizations have limited resources to devote to projects
  - Like an investment portfolio, resources should be assigned to projects that promise the greatest "return" or benefit
  - Less important projects should not siphon resources away from more important projects
Project Portfolio and Strategy

- Common Problems in Project Portfolios
  - No link between business strategy and project selection
  - Poor quality portfolio (weak, mediocre projects)
  - Lack of focus (weak projects get resources; best projects starved for resources)
  - Project trivialization (projects selection based on “low hanging fruit” – modifications, extensions, updates; nothing breakthrough or innovative)
Project Portfolio Management

- Project proposals are assessed for costs, risks, benefits, and contributions to objectives
- Decisions are made to authorize some projects, retain some on the “back burner,” and dispose of others
- Scarce resources are allocated effectively to insure that priority projects get adequate funding and support
- Projects are "balanced" in terms of high vs. low risk, large vs. small size, long-term vs. short term focus, etc.
- Projects are continually tracked, compared, and managed collectively
Process for Selection and Management of Projects

Figure 17-1
The management of projects.
Process for Selection and Management of Projects

**Strategic management: focus the organization.**
- Top management articulates organization vision and mission, defines objectives and initiatives, decides on budget, allocates resources to business units.

**Portfolio management: select the right projects.**
- Business unit managers develop goals, strategies, and initiatives consistent with corporate objectives and initiatives. These become criteria for selecting projects.

**Gating methodology: nurture or get rid of projects.**
- Managers assess performance of projects: important, struggling projects are allocated more resources; poorly performing projects are put on hold or cancelled.

**Project management: manage the projects right.**
- Projects are managed using principles and practices of project management.
Projects Review Board

Project Review Board (aka Portfolio Management Team, Project Governance Board, Project Steering Committee, Project Council)

- Responsible for project selection and portfolio management

- Membership includes
  - portfolio manager (PRB chairperson)
  - chief financial officer (CFO)
  - chief risk manager (CRO)
  - chief human resource officer (CHRO)
  - project management office (PMO) director
  - chief technical officer (CTO) (from IT, engineering, or product development)

- For research and engineering projects PRB includes group of technically competent "peer reviewers"
Framework for Project Selection, and Portfolio Management

Phase I

Pre-screening stage: to “pass”

- Projects must be justified in terms of either organizational survival or growth.
  - Survival projects: necessary for health and viability of the organization
  - Growth projects: offer organization opportunity for prosperity and expansion
- Projects might require:
  - feasibility study
  - champion and sponsor
  - *documented* expected benefits
- Sometimes, simple checklist is employed to rate each proposal as excellent, good, poor, etc.
Framework for Project Selection, and Portfolio Management

Phase I (cont’d)

Proposal analysis stage

- Employ a combination of quantitative and qualitative models and scoring methods.
- Rate the proposal using diverse criteria, e.g.,
  - link to strategic objectives
  - financial value
  - compliance to constraints
- Proposal must exceed minimum cutoff value or score

Proposal screening stage

- Assess and eliminate projects that do not meet requirements for expected benefits, risk, or other specific criteria.
Framework for Project Selection, and Portfolio Management

Phase I restricts the pool of projects entering Phase II to those that are the *right* projects.

**Phase II**

**Portfolio selection stage**

- Review proposed projects and existing projects together
  - Compare projects in terms of analysis scores or current performance
  - Rank-order projects

- Rank-ordering: to ensure that resources and funding are allocated to higher-priority projects.
Framework for Project Selection, and Portfolio Management

Phase II (cont’d)

Portfolio adjustment stage
- Decide which projects to accelerate, delay, or cancel
  - to satisfy changing objectives, opportunities (new strategies develop, new RFP’s or proposals arrive), and resources,

Gating process: evaluate current projects
- Reassess projects underway for expected benefits, performance, and costs
- Terminate projects in trouble and not meeting minimal requirements
- Pool remainder with new projects, rank-order, and reconsider which projects for portfolio (i.e., perform screening and selection stages).
Framework for Project Selection, and Portfolio Management

- Selection process: analogous to a **funnel** and a **filter**:
  - funnel takes in project ideas, proposals, and concepts
  - filter precludes all but the best from proceeding.

- Goal: design the process so funnel takes in lots of ideas; filter screens poor projects yet allows constant flow of quality projects

(a) Constrained flow of projects typical of many companies  
(b) Improved flow of projects

Financial models

- **ECV (expected commercial value)**
  - Estimates commercial worth of a project. Often used to justify project at initiation stage.
  - Weakness: Probabilities and costs are all estimated (informed guesses?)

\[
ECV = [(NPV) P_L - L] P_D - D
\]

\[
NPV = \text{Net present value for future stream of earnings}
\]

\[
L = \text{Launch cost}
\]

\[
D = \text{Development cost}
\]

\[
P_D = \text{Probability of technical success}
\]

\[
L = \text{Cost of launch}
\]

\[
P_L = \text{Probability of commercial success given technical success}
\]
Methods for Project Analysis

Financial models (cont’d)

- B/C ratio (benefit/cost analysis)
  - Simple measure of return vs. required resources.
  - Weakness: requires accurate estimates of all relevant costs and benefits, including "hidden" or external ones;
  - all the numbers are estimates.

- Examples

\[
B/C = \frac{\text{Estimated revenues} \times \text{probability of success}}{\text{Estimated cost}}
\]

\[
B/C = \frac{\text{Worth of benefits}}{\text{Capital recovery cost} + (\text{Operating cost} + \text{Maintenance cost})}
\]
Methods for Project Analysis

Scoring Models

- Use a list of criteria with weightings.
- Rating Criteria examples
  - Strategic Fit
  - Strategic Leverage
  - Probability of Commercial Success
  - Probability of Technical Success
- Rate each Criteria, $i$, with score $R_i$
  - $i=1$, poor
  - $i=4$, below average
  - $i=7$, good
  - $i=10$, excellent
- $w_i$: weighting of criterion $i$, $\sum w_i=1.0$
- Score$_{\text{project}}=\sum w_iR_i$
- Example:
## Weighted Scoring Model

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Expected Rating</th>
<th>Weight</th>
<th>Weighted Expected Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-range outlook</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Product</td>
<td>0.8</td>
<td>0.2</td>
<td></td>
<td></td>
<td>3.8</td>
<td>3.8</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>2. Market</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.0</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td><strong>Meets objectives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. ECV</td>
<td>0.8</td>
<td>0.2</td>
<td></td>
<td></td>
<td>3.8</td>
<td>3.8</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>2. ROI</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td>3.0</td>
<td>3.0</td>
<td>6</td>
<td>18.0</td>
</tr>
<tr>
<td>3. Image</td>
<td>0.6</td>
<td>0.4</td>
<td></td>
<td></td>
<td>2.6</td>
<td>2.6</td>
<td>4</td>
<td>10.4</td>
</tr>
<tr>
<td><strong>Fits strategy</strong></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Phase 1</td>
<td>0.8</td>
<td>0.2</td>
<td></td>
<td></td>
<td>3.8</td>
<td>3.8</td>
<td>10</td>
<td>38</td>
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<tr>
<td>Phase 2</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
<td>1.0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Phase 3</td>
<td>0.6</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
<td>3.4</td>
<td>3.4</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td><strong>Goal contribution</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal A</td>
<td>0.2</td>
<td>0.8</td>
<td></td>
<td></td>
<td>3.2</td>
<td>3.2</td>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td>Goal B</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td>4.0</td>
<td>4.0</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Goal C</td>
<td>0.2</td>
<td>0.2</td>
<td>0.6</td>
<td></td>
<td>1.6</td>
<td>1.6</td>
<td>4</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>Risk level acceptability</strong></td>
<td>0.7</td>
<td>0.3</td>
<td></td>
<td></td>
<td>3.7</td>
<td>3.7</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td><strong>Competitive advantage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.9</td>
<td>0.1</td>
<td></td>
<td></td>
<td>3.9</td>
<td>3.9</td>
<td>8</td>
<td>31.2</td>
</tr>
<tr>
<td><strong>Compatibility with other systems</strong></td>
<td>0.2</td>
<td>0.7</td>
<td>0.1</td>
<td></td>
<td>3.1</td>
<td>3.1</td>
<td>8</td>
<td>24.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>336.8/400</td>
</tr>
</tbody>
</table>
Methods for Project Analysis

Scoring Models

- **Usage**
  - Gates: e.g., average score of 5 required for “go” decision on a project
  - Prioritization: rank “go” projects, both proposed and active, according to scores

- **Scoring Models Weaknesses**
  - Imaginary precision in score
  - Halo effect of new projects
Methods for Comparing and Selecting Projects

Project Selection Approaches aim at

- Maximizing the value or utility of the portfolio
- Achieving balance in the portfolio
- Fitting the portfolio with organization objectives and strategic initiatives.
Methods for Comparing and Selecting Projects

Value or Utility of the Portfolio

- Single-criterion methods
  - ECV, B/C, NPV, etc.

- Multiple-criteria methods
  - Example, next slide
Methods for Comparing and Selecting Projects

Multiple criteria, combination of quantitative and subjective (numbers in parentheses are rankings; last column is average rankings)

<table>
<thead>
<tr>
<th>Project.</th>
<th>Strategic Fit</th>
<th>Reward (ECV)</th>
<th>Risk</th>
<th>Ranking Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Metis</td>
<td>4 (1)</td>
<td>2.3 (7)</td>
<td>3 (3)</td>
<td>3.67 (5)</td>
</tr>
<tr>
<td>Project Adrastea</td>
<td>0 (5)</td>
<td>3.5 (4)</td>
<td>4 (4)</td>
<td>4.33 (7)</td>
</tr>
<tr>
<td>Project Thebe</td>
<td>2 (3)</td>
<td>3.1 (5)</td>
<td>4 (4)</td>
<td>4.0 (6)</td>
</tr>
<tr>
<td>Project 10</td>
<td>3 (2)</td>
<td>2.6 (6)</td>
<td>2 (2)</td>
<td>3.33 (4)</td>
</tr>
<tr>
<td>Project Europa</td>
<td>1 (4)</td>
<td>6.4 (1)</td>
<td>4 (4)</td>
<td>3.0 (3)</td>
</tr>
<tr>
<td>Project Ganymede</td>
<td>3 (2)</td>
<td>4.6 (3)</td>
<td>3 (3)</td>
<td>2.67 (2)</td>
</tr>
<tr>
<td>Project Callisto</td>
<td>4 (1)</td>
<td>5.3 (2)</td>
<td>2 (2)</td>
<td>1.67 (1)</td>
</tr>
</tbody>
</table>
Methods for Comparing and Selecting Projects

- Weaknesses of all value or utility maximization approaches
  - Ignore resource requirements and “bang for buck.” Big projects tend to score higher than little ones, hence resource-heavy projects tend to get higher priority.
  - Imaginary precision
  - No explicit link between selection method and business strategy
  - Ignores balance in project-mix
Methods for Comparing and Selecting Projects

**Balance of Projects**

- Balance between, e.g.,
  - High-risk and low-risk
  - High-return vs. low-return

- Balance displayed on a “bubble diagram”
  - Example, next slides
Bubble sizes represent project sizes.
Bubble shapes span potential risks and rewards. Projects below threshold line are dropped.
Methods for Comparing and Selecting Projects

**Strategic Fit**

- Management decides relevant ways to divide up projects
  - These become “buckets.”
- Management decides on desired spending (resource allocation) to each bucket
- Projects are categorized into buckets, then prioritized within each bucket
  - Priority criteria can be different for each bucket.
- Projects in each bucket are tallied to compare actual spending to desired spending
- If actual spending > desired spending, projects with low priority are killed or put on hold
Methods for Comparing and Selecting Projects

**Strategic Fit**

- Bucket categories, e.g.,
  - Strategic goals
    - Defending product base, expanding base, …
  - Product lines
    - A, B, C, …
  - Project types
    - NPD, maintenance, process improvement, R&D
  - Geography
    - NA, SA, Europe, Asia, …
### Strategic Fit

**Example**

- Values on table are $M.

<table>
<thead>
<tr>
<th>Process Improvement</th>
<th>Upgrade</th>
<th>NPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target: $12.2 M</td>
<td>Target: $9.8 M</td>
<td>Target: $20.5 M</td>
</tr>
<tr>
<td>G 2.1</td>
<td>B 2.9</td>
<td>F  6.8</td>
</tr>
<tr>
<td>A 3.4</td>
<td>E 6.4</td>
<td>C  2.9</td>
</tr>
<tr>
<td>D 1.9</td>
<td>I 2.4</td>
<td>J  5.8</td>
</tr>
<tr>
<td>H 0.5</td>
<td></td>
<td>K  4.2</td>
</tr>
<tr>
<td>L 1.3</td>
<td>Excess = 1.9</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td></td>
<td>19.7</td>
</tr>
</tbody>
</table>

- Second bucket exceeds target; projects I will be killed, scaled back, or put on hold.
- Assumes projects rank ordered by ECV, scoring, or other method
- Drawback of approach: time-consuming; requires forced choices
Methods for Comparing and Selecting Projects

Cost-Benefit Grids

- Rate each project's financial benefits as high, medium, or low.
- Rate its cost as high, medium, or low.
- The outcome is displayed on a three-by-three grid.
- Example, next slide, shows the ratings for 12 projects.
- Rating team should be able to justify why it rated one project high and another medium or low.
Repeat process for other benefits; e.g., technical, intangible, business, strategy fit, etc.

Example, next slide.
<table>
<thead>
<tr>
<th>Grid A</th>
<th>Grid B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Low** Med. High
Financial benefits

<table>
<thead>
<tr>
<th>Grid C</th>
<th>Grid D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Low** Med. High
Intangible benefits

<p>| | |</p>
<table>
<thead>
<tr>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Low** Med. High
Technical benefits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Low** Med. High
Fit with business strategy
Methods for Comparing and Selecting Projects

Cost-Effectiveness Analysis

- "Effectiveness:
  - degree to which a project is expected to fulfill project requirements (value, utility, efficiency, and performance)

- Involves consideration of multiple factors
  - Rate factors subjectively (based on quantitative analysis and advice of technical experts)
    - Weigh the ratings
    - Sum them up

- Example
## Cost-Effectiveness Analysis

Table 17-4  Cost-Effectiveness Data Analysis.

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>W (WEIGHT %)</th>
<th>PROJECT A</th>
<th>PROJECT B</th>
<th>PROJECT C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>WE</td>
<td>E</td>
</tr>
<tr>
<td>Speed</td>
<td>10</td>
<td>95</td>
<td>9.5</td>
<td>80</td>
</tr>
<tr>
<td>Range</td>
<td>15</td>
<td>70</td>
<td>10.5</td>
<td>80</td>
</tr>
<tr>
<td>Efficiency</td>
<td>20</td>
<td>75</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Comfort</td>
<td>15</td>
<td>70</td>
<td>10.5</td>
<td>85</td>
</tr>
<tr>
<td>Capacity</td>
<td>20</td>
<td>70</td>
<td>14</td>
<td>90</td>
</tr>
<tr>
<td>Loaded mass</td>
<td>15</td>
<td>90</td>
<td>13.5</td>
<td>60</td>
</tr>
<tr>
<td>Maintainability</td>
<td>5</td>
<td>75</td>
<td>3.75</td>
<td>85</td>
</tr>
<tr>
<td>Total WE</td>
<td></td>
<td>76.75</td>
<td></td>
<td>79</td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td>$1.9B</td>
<td></td>
<td>$2.0B</td>
</tr>
</tbody>
</table>
Projects in blue area are automatically rejected.
Projects below line j-A-n-C (“efficient frontier”) are rejected too.
**Periodically Review and Assess Projects During Gating Process**

New Product development project example:
Review project at each gate (G1...G6)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
<td>G4</td>
<td>G5</td>
<td>G6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project initiation</td>
<td>Strategy definition</td>
<td>Scope definition</td>
<td>Definition phase planning</td>
<td>Final estimates</td>
<td>Project lock-down</td>
<td>Detailed plans complete</td>
<td>Validation</td>
<td>System certification</td>
<td>First application</td>
<td>Controlled rollout</td>
<td>General availability</td>
</tr>
</tbody>
</table>

- **G1**: Project initiation
- **G2**: Strategy definition
- **G3**: Scope definition
- **G4**: Definition phase planning
- **G5**: Final estimates
- **G6**: Project lock-down
- **G7**: Detailed plans complete
- **G8**: Validation
- **G9**: System certification
- **G10**: First application
- **G11**: Controlled rollout
- **G12**: General availability

Review project at each gate (G1...G6)
Integrate Portfolio Management with Gating Process

1. Gating Process

- Set up process that:
  - Requires serious market and technical analysis at front-end of process
  - Requires at each gate pre-defined deliverables and information necessary to make go/kill decisions
  - Employs criteria that senior management has set to evaluate each project: strategic fit, feasibility, market attractiveness, competitive advantage, etc.
Integrate Portfolio Management with Gating Process

2. Resource capacity analysis

- Quantify all projects’ demand for resources versus resource availability
- Ask: are available resources sufficient for current projects?
- If no, must reduce project goals or acquire more resources
Integrate Portfolio Management with Gating Process

3. Integrate Portfolio Management with Gating Process

- Stage-and-Gate process addresses individual projects at life-cycle stages
- Portfolio management process addresses (compares) all projects at same time
- Must integrate the Gating and Portfolio processes
Function of PMO in Portfolio Management

- Assist Project Review Board (PRB) (or Project Governance Board or Steering Committee)
  - Provide overview information about project portfolio
  - Assist with portfolio decisions: project prioritization, approval, cancellation

- Specific Responsibilities
  - Gate requirements/deliverables
  - Ensure project has met requirements for each gate

- Resource Allocation
  - Track resource allocation for all projects vs. requirements for current projects
  - Provide status reports showing relative performance for all projects (use bubble charts, “dashboard” reports, etc.)