A Framework for Portfolio Management

Daniel Saaty
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A Brief Introduction

Daniel Saaty
- CTO, Decision Lens

Background
- Founder, Decision Lens
  - Enterprise Resource Optimization Company
  - Founded 2005
  - 80+ clients – Fed, State & Local, Commercial

- Areas of Decision Making
  - Strategic Planning
  - Product Portfolio Management
  - Capital Planning and Budgeting
About Decision Lens

Decision Lens provides a powerful resource allocation solution based on a proven decision-support methodology.

- A software solution and an advanced process for collaborative decision-making and resource allocation based on the proven scientifically based methodology, Analytic Hierarchy Process (AHP) and a set of proprietary core algorithms.

- A technique for quickly collecting and synthesizing qualitative and quantitative information from multiple data sources and stakeholders for trade-off, prioritization and/or resource allocation decisions.

- An approach to quantifying and making explicit the subjectivity that is part of all decision-making in order to use experience and judgment more effectively.

- A system of record for strategic decisions and a method to continuously enhance the resource allocation process.

Dr. Thomas Saaty
Father of AHP

- PhD Mathematics Yale
- Professor U of Pitt
- Professor Wharton
- US State Dept
- MIT at The Pentagon
- Office of Naval Research

- Interesting Fact
  (Shortest PhD Thesis In Yale History- 21 page math theorem)
## Our Customers

### Commercial
- Johnson & Johnson
- KRAFT
- Pfizer
- GlaxoSmithKline
- Shell
- Boeing
- Boeing

### State & Local
- PENNDOT
- Amtrak
- Phoenix Sky Harbor International Airport
- Penn State
- SFMTA

### Federal
- U.S. Army
- U.S. Air Force
- U.S. Department of Agriculture
- FAA
- U.S. Department of Homeland Security
For most everyone, these are challenging times and the pressure is on to accelerate the pace of innovation and drive growth.
## A Long Term Trend

<table>
<thead>
<tr>
<th>Development Project Type</th>
<th>1990</th>
<th>2004</th>
<th>% Change from 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>New to world, new to market – innovations</td>
<td>20.4%</td>
<td>11.5%</td>
<td>43.7% decrease</td>
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<tr>
<td>New product lines to the company</td>
<td>38.8</td>
<td>27.1</td>
<td>30.1% decrease</td>
</tr>
<tr>
<td>Additions to existing product line in company</td>
<td>20.4</td>
<td>24.7</td>
<td>20.8% increase</td>
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<tr>
<td>Improvements &amp; modifications to existing company products</td>
<td>20.4</td>
<td>36.7</td>
<td>80.1% increase</td>
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<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
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Source: APQC Benchmark Study
Shift Happens

**Example: Portfolio Lifecycle**

- Projected Revenue
- Actual Revenue
- Middle of P&L Squeeze
- Max Resource Flexibility
- Net Income
What’s Putting the “NO” in InNOvation

**Strategic Plan Goals**

- Pipeline Neglect
- Need for Speed (limited due diligence)
- Resource Burn on Close In
- Sub-Optimal Performance
- Increasingly Risky Environment
- Short Term Focus
- Budget Cuts
- Amplifying Feedback

$ Gap
Changing the Game

STRATEGIC PLAN GOALS

Managed Risks

Pipeline Investment

Portfolio of Options

Selective Strategic Investment

Balance of Short –Long Term

Acceptable Mix of Performance

Resource Efficiency

Return on Investment

Managed Risks

Pipeline Investment

Portfolio of Options

Selective Strategic Investment

Balance of Short –Long Term

Acceptable Mix of Performance

Resource Efficiency

Return on Investment
Key Question:

Where are you and which way are you moving?
Closing the Innovation Gap

When portfolio diversification is needed

- It all starts with strategy…
- Determine strategic allocation targets
- Take inventory of the organization’s activities
- Categorize the work within the strategies
- Stop and redeploy off strategy efforts resources
- Start multiple, small, milestone based initiatives
  - (take an options approach, stage gating)
- Continue to back the winners and manage portfolio balance and reassess strategic environment
How Do We Get There from Here?

- Measure current actual allocation against next time horizon target allocation.
- Next time horizon target time increment depends on program cycle times.
- Populate the pipeline with ideas and activities that can support the shifting priorities as current programs close.
- This requires rapid idea screening and lean resource deployment in early phases.

Scenario Planned Portfolio Evolution
High Level Process Overview

- Portfolio Governance Framework
- Project Prioritization
- Resource Capacity Assessment
- Optimize the Portfolio

Environment

- Effective
- Responsive
- Productive

$ Value Creation $
Funding Hierarchies

- Determine the project funding and approval processes and supporting organizational structures that facilitate them.

- Classify the types of projects in the organization:
  - New Product/Service Development
  - Cost Improvement
  - Strategic Infrastructure
  - Etc.

- Document the funding hierarchy and align it with the Portfolio Management Team and Sponsors (e.g., Executive Leadership Team):
  - If one doesn’t exist, create it!
An Example Hierarchy (as you’ll find it)

- CEO
  - CFO
    - VP R&D
      - Product Line 1
        1. New Product
        2. Quality Improvement
      - Product Line 2
      - Product Line 3
        10. New Product
      - Product Line 4
        13. Process Improvement
    - VP Americas
      3. Line Extension
      7. New Product
      11. Line Extension
    - VP Europe
      4. Geographic Expansion
      5. Line Extension
      8. Geographic Expansion
      12. Geographic Expansion
      9. New Product
    - CIO
      6. Website
      15. Enterprise System
  - Infrastructure
    - Funding
      - Project 1
      - Project 2
      - Project 7
      - Project 9
      - Project 10
      - Project 13
      - Project 3
      - Project 5
      - Project 6
      - Project 11
      - Project 4
      - Project 8
      - Project 12
      - Project 14
      - Project 15
An Example Hierarchy (as you’ll find it)

- **CEO**
  - **CFO**
    - **VP R&D**
      - 1. New Product
      - 2. Quality Improvement
    - **VP Americas**
      - 3. Line Extension
      - 4. Geographic Expansion
      - 7. New Product
      - 8. Geographic Expansion
      - 11. Line Extension
      - 12. Geographic Expansion
      - 14. Supply Chain Cost
    - **VP Europe**
      - 4. Geographic Expansion
      - 5. Line Extension
      - 6. Website
      - 9. New Product
    - **CIO**
      - 10. New Product
      - 11. Line Extension
      - 12. Geographic Expansion
      - 14. Supply Chain Cost
      - 15. Enterprise System
    - **Product Line 1**
      - 1. New Product
      - 2. Quality Improvement
      - Project 1
      - Project 2
      - Project 7
      - Project 9
      - Project 10
      - Project 13
    - **Product Line 2**
    - **Product Line 3**
    - **Product Line 4**
    - **Infrastructure**
      - 13. Process Improvement
      - Project 3
      - Project 5
      - Project 6
      - Project 11
    - **Funding**
      - 10. New Product
      - 11. Line Extension
      - 13. Process Improvement

**Watch for Disconnects**
Decision Rights

R.A.P.I.D.

- **Recommend** – Responsible for making proposals, gather input and providing data
- **Agree** – Has veto power, yes or no over recommendations and courses of action
- **Perform** – Responsible for executing on agreed recommendations
- **Input** – These people are consulted on various aspects of the decision/activity
- **Decide** – This person/group is ultimately accountable for taking a decision and the decision outcome
Create the Top Down Portfolio Framework

- Analyze the funding hierarchy and create the portfolio framework, may be multi-leveled
  - Examples
    - Base versus Innovation, or New versus Existing
    - Innovation Horizon 1, Horizon 2, Horizon 3
    - Probability of Market and Technical Success (4 Box)
    - Business Unit A, Business Unit B, Business Unit C
    - Cost Improvement, Quality Improvement, etc.

- Create a cascading portfolio structure that allows comparison of “like versus like” projects
  - It is not critical that structure is exact, it is important that classification of projects to buckets in the structure is done consistently
Some Common Models for Portfolios

- **Growth –Share Matrix**
  - Dogs (low-low), Cash Cows (low-high), Stars (high-high-high), Problem Child (high-low)

- **Business Assessment Array**
  - Industry Attractiveness versus Business Competitive Strength

- **Business Profile Matrix**
  - Competitive Position v. Stage of Industry Maturity

- **Most Interesting are Custom Models**
  - Management determined matrix of criteria
  - These are easily assessed using AHP
Important Questions

- How do we determine the buckets?
  - P&L Structure
  - Product Lines / Tech Platforms
  - Business Units
  - etc.

- How much information is needed to support the assessments of the strategic buckets?
  - Depends...

- Amount of background requested seems to vary amongst participants, for instance
  - Data Driven types
  - Synthesis/Intuitive types

- A couple of thoughts on this however
  - Blink, by Malcolm Gladwell
  - Wisdom of Crowds, by James Surowiecki
Key Concept in Top Down-Bottom Up Portfolio Models

- Don’t compare apples versus oranges

- Compare how to split the land between size of the orchard, and the size of the grove
Using AHP, pairwise comparisons can accurately determine the relative size of these shapes to a common attribute, in this case “area”.

The algorithm can accurately determine the allocation of “area” units to each shape as a fraction of the total shape defined area.
We may be more used to this view…

Fraction of Total Area

- Triangle: 0.05
- Circle: 0.47
- Rectangle: 0.24
- Diamond: 0.15
- Square: 0.10

DECISION LENS
The benefit of foresight.
This same principle can easily be used to allocate on a different basis… Dollars!
Determine a Portfolio Structure

- Innovation Bucket 1
- Innovation Bucket 2
- Innovation Bucket 3
- Innovation Bucket 4

- Base Bucket 1
- Base Bucket 2
- Base Bucket 3

- Level 1

- Level 2

- Level 3?

Overall Level 3

Breakouts: Investment Bucket 4, Investment Bucket 3, Investment Bucket 2, Investment Bucket 1
Bottom Up Model

- Develop models to rate and compare similar projects against each other because their criteria may differ in type and/or weight
  - Cannot effectively compare
    - Cost savings against New Product Development in the same model
    - Infrastructure against Research & Development in the same model

- The Top Down model allows a strategic level discussion about the appropriate level of activity between different “buckets” in the hierarchy

- The Bottom Up model evaluates the attractiveness or importance of the alternatives within each individual “bucket” of the hierarchy
Determine the Bottom-Up Model Criteria

- **Customer**
  - Need
  - Benefit
  - Interest

- **Strategy**
  - Fit
  - Leverage
  - Synergy

- **Technical**
  - Competency
  - Lifecycle
  - IP

- **Market**
  - Sales
  - Profitability
  - Growth
  - Competition

- **Other…**
  - Risks
  - Time to Market
  - Environmental

Rate/Compare Alternatives (Projects/Programs)
How we address the challenge

A solution for **quickly synthesizing** qualitative and quantitative information from **multiple stakeholders** to gain buy-in and assess the relative value of opportunities.
Determine Project Cost Model

What is the basis for resource comparisons?

- Single Budget (often R&D) as Proxy? FTE’s only?
- Rolled up Commercialization Costs (Cost to Launch)?
  - R&D Budget
  - CapEx Budget
  - Marketing Entry Costs
  - Etc.

Once established, allocate out the available funding to the portfolio structure (ring fence the resources) and assess project resource demands to enable balance and optimization.
Resource Allocation

Identify the **best bang-for-the-buck** projects to deliver the greatest value to your organization.
Sample Decision Structure

(Top Down)
Model 1
Strategic Allocation
Target Setting

(Bottom Up)
Model 2
Projects Prioritized by Bucket

Innovation Bucket 1
45%
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5
- Priority 6
- Priority 7
- Priority 8
- Priority 9

Innovation Bucket 2
15%
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5
- Priority 6
- Priority 7
- Priority 8
- Priority 9

Innovation Bucket 3
30%
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5
- Priority 6
- Priority 7
- Priority 8
- Priority 9

Innovation Bucket 4
10%
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5
- Priority 6
- Priority 7
- Priority 8
- Priority 9

Strategic Bucket Allocations

Resource Capacity Band
- Green: Approve & Resource
- Yellow: Consider Trade-Offs Across Buckets
- Red: Stop/Shelve

Approve & Resource
Consider Trade-Offs Across Buckets
Stop/Shelve
Establishing a Return on Investment (ROI)

<table>
<thead>
<tr>
<th></th>
<th><strong>REVENUE BASED RANKING</strong></th>
<th><strong>COST/BENEFIT OPTIMIZATION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Valuation</strong></td>
<td>Peak year revenue forecast</td>
<td>Multi-criteria “value” score</td>
</tr>
<tr>
<td><strong>Cost Basis</strong></td>
<td>Expense plus FTE dollars</td>
<td>Expense plus FTE dollars</td>
</tr>
<tr>
<td><strong>Resource Allocation</strong></td>
<td>Largest to smallest value until out of money (salami slice)</td>
<td>Cost/Benefit value optimization</td>
</tr>
<tr>
<td><strong>Expected Financial Value of Portfolio</strong></td>
<td>Peak year revenue forecast of selected projects subject to uncertainty and attrition assumptions for 100,000 trials</td>
<td>Peak year revenue forecast of selected projects subject to uncertainty and attrition assumptions for 100,000 trials</td>
</tr>
<tr>
<td><strong>Alignment to Objectives</strong></td>
<td>Cumulative percent criteria score achieved across chosen projects per criteria</td>
<td>Cumulative percent criteria score achieved across chosen projects per criteria</td>
</tr>
<tr>
<td><strong>Risk adjusted projected peak year sales</strong></td>
<td>$89MM</td>
<td>$106MM</td>
</tr>
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</table>
The multi-criteria decision analysis method provides greater expected return 80% of the time, and, when it provides greater returns, those returns are 20% larger.
Why? Comparing the 2 Scenarios…

Because all the other indicators combined better describe the likelihood of financial success than the biased financial calculation alone!

The Financial dimension is the only one that is better in the financially based portfolio selection.

% Difference of scores on key dimensions of the cost/benefit vs. financial metric selected portfolios
Benefits

This approach reconciles the shortcomings with purely top down or bottom up methods

- Top Down Disadvantage: Artificially splitting resources without an eye on the opportunities
- Bottom Up Disadvantage: Failure to drive strategic alignment and protect high risk-high return, longer term bets

Top Down-Bottom Up Approach

- Provides strategic targets to isolate resources and “protect” strategic bets, while also showing what could be left on the table in order to pursue them
- In other words, it frames very important trade-off decisions
Let’s look at an example model using this approach
Allocation Summary

Target Allocation: Total $3.6MM
- $720.00, 20%
- $1,800.00, 50%
- $1,080.00, 30%

Requested Allocation: Total $5.4MM
- $930.00, 17%
- $1,015.00, 19%
- $3,443.00, 64%

Funded Allocation: Total $3.1MM
- $410.00, 13%
- $1,015.00, 33%
- $1,693.00, 54%
Value Returned on Investment

- Project Y
- Project X
Pareto Analysis

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<tr>
<th>Budget Level</th>
<th>Strategic Portfolio Value</th>
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<tbody>
<tr>
<td>$1,800</td>
<td>0.7034</td>
</tr>
<tr>
<td>$2,160</td>
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<tr>
<td>$2,520</td>
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<td>$3,240</td>
<td>0.8738</td>
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<td>$3,600</td>
<td><strong>0.9005</strong></td>
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<td>$3,960</td>
<td>0.9009</td>
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<tr>
<td>$4,320</td>
<td>0.9308</td>
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<tr>
<td>$4,680</td>
<td>0.9553</td>
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<td>$5,040</td>
<td>0.9553</td>
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<tr>
<td>$5,400</td>
<td>0.9553</td>
</tr>
</tbody>
</table>
## Pareto Table

### Target Budget Level

<table>
<thead>
<tr>
<th>Project</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
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<th>Scenario 6</th>
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<th>Scenario 9</th>
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<td>Project Y</td>
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### Strategic Portfolio Value

<table>
<thead>
<tr>
<th>Budget Level Scenario</th>
<th>$1,000</th>
<th>$2,160</th>
<th>$2,520</th>
<th>$2,880</th>
<th>$3,240</th>
<th>$3,600</th>
<th>$3,960</th>
<th>$4,320</th>
<th>$4,680</th>
<th>$5,040</th>
<th>$5,400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Portfolio Value</td>
<td>0.7034</td>
<td>0.7654</td>
<td>0.7967</td>
<td>0.8241</td>
<td>0.8738</td>
<td>0.9006</td>
<td>0.9053</td>
<td>0.9533</td>
<td>0.9953</td>
<td>0.9953</td>
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</tr>
</tbody>
</table>
Technical Risk vs. Strategic Value
(Bubble = Cost)

$1725 Combined Spending Shortfall

$530 Combined Spend

Big Innovation Core Renovation Margin Improvement Unfunded

$530 Combined Spend

$1725 Combined Spending Shortfall

Project Y

Project X

Legend:
- Big Innovation
- Core Renovation
- Margin Improvement
- Unfunded
These projects gain their value from a mix of Geographic OR Financial impact.
A Theoretical Foundation

Using AHP, pairwise comparisons can accurately determine the relative size of these shapes to a common attribute, in this case “area”.

The algorithm can accurately determine the allocation of “area” units to each shape as a fraction of the total shape defined area.
We may be more used to this view...
This same principle can easily be used to allocate on a different basis… Dollars!