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White Paper 1

Deciding Which Projects to Fund: Using Value Focused Thinking in Pharmaceutical Decision Making

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Many important problems faced by decision makers involve multiple conflicting objectives. When faced with truly difficult decisions involving high stakes, risky and conflicting objectives, this transparent approach will help to guide decision makers toward better, more defensible choices.

Question: What do the following have in common?

- New drug candidates in a pharmaceutical company
- IT projects within a medical devices company
- Bioterrorism threats ¹
- Military base closure candidates ²
- New technology efforts for radioactive waste remediation ³

Answer: First, the organizations facing the task of prioritizing in each situation need to achieve **more than one key objective**. Because there are multiple, sometimes conflicting objectives, there is not one magic metric such as number of lives lost, number of projects completed, or NPV (Net Present Value) that adequately communicates the value (or harm) of a project.

Second, these are actual examples of choices that have been successfully prioritized for decision makers using the same multiple objective approach – **Value Focused Thinking (VFT)**.

What is Value Focused Thinking?

“Value Focused Thinking ... consists of two activities: First deciding what you want and then figuring out how to get it.”

Ralph L. Keeney ⁶

There are other methods for prioritizing projects with multiple conflicting objectives as described in Multiple Attribute Decision Making: Methods and Applications.⁴ However, we have found the VFT methodology to be superior and its superiority is supported by many articles in peer-reviewed journals that compare multiple objective methods.⁵

Many quite experienced decision makers, faced with the task of prioritizing projects or assets for the purpose of funding, cutting, or otherwise allocating resources, move directly to the alternatives at hand and start working on which project is the least or the most value-adding to the organization.

VFT Activities	VFT Benefits
Discussions with Decision Makers	Uncovers Hidden Values
Value / Objectives Hierarchy	Improves Communications
Strategy Generation	Evaluates Alternatives
Identification of Value Gaps	Facilitates Involvement
Creation / Filtering to Produce Better Alternatives	Uncovers Decision Opportunities
Means-Objectives Network	

Table 1. Value Focused Thinking Activities and Benefits.

Ralph Keeney, however, says to first look at the values of the organization. Keeney affirms that "Values are what we care about ... [they] should be the driving force for our decision making ... [and] the basis for the time and effort we spend thinking about decisions."

The VFT method, shown in Figure 1, does just that. The emphasis is on uncovering and discussing the fundamental values of the company, and then structuring the objectives that support those values.

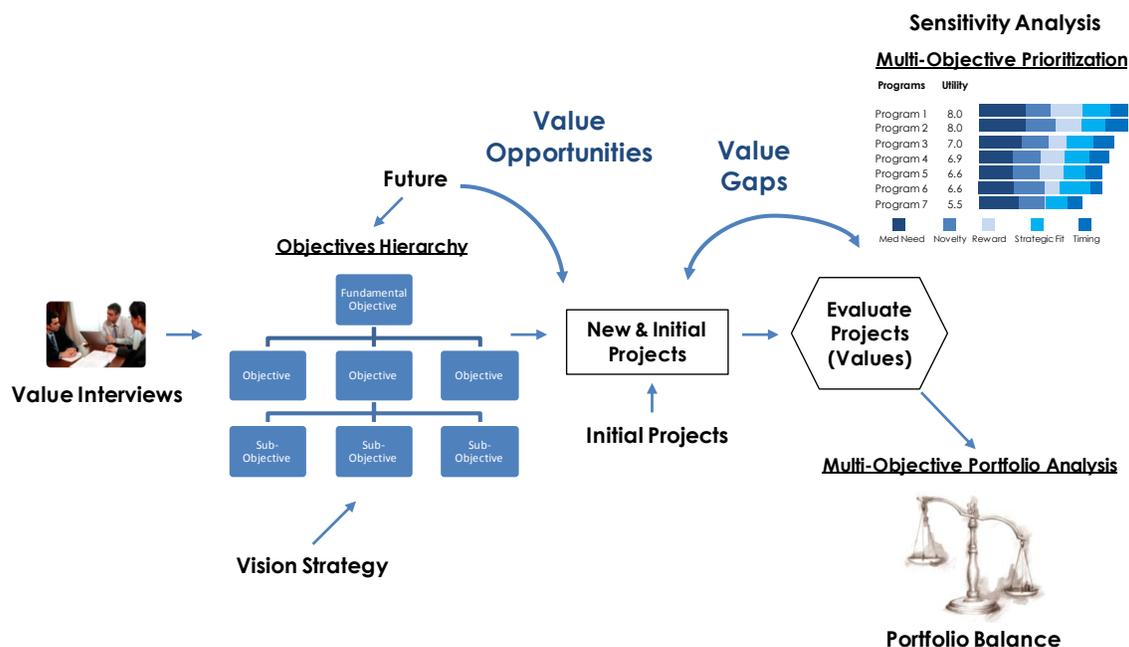


Figure 1. Value Focused Thinking.

Once the company develops a structured view of their own objectives, projects or assets can be compared against these objectives to reveal value gaps. New projects or hybrid projects are often developed that help eliminate the value gaps. The final analysis is one of transparency and relevancy, bringing needed clarity to the decision maker.

Case Study: Prioritization of Lead Compounds

The management team was trying to prioritize their lead compounds, all in stages prior to acceptance into development. They knew they had to

focus on a few compounds but were unable to agree upon the prioritization. KROMITE proposed using a multiple objective approach for the prioritization. Frustrated, they agreed to try the approach.

Figure 2 shows the steps taken by the team, facilitated by the analyst to build a suitable model for the prioritization. The small decision team immediately focused on defining the values, then objectives, of the therapeutic area (Oncology). The analysts then helped the team arrange the objectives into a suitable hierarchy, with the top level being the key objectives that were relevant for this decision (see Figure 3).



Figure 2. Workflow for Aligning Measures and Objectives.

With the objectives identified, the work of finding metrics that would align with these objectives began. The functional experts (oncologists, biologists, and marketing experts) assisted in developing measures that aligned best with the objectives. Keeney and Raiffa developed a mathematically sound and defensible method for combining the performance scores into one overall number.⁷

The **Value number** communicates the value of the program to the organization. For example, if the objective was to fill an apparent project launch gap in 2018, a measure should be developed that takes this objective into account; for example, "Launch Date" (Figure 3).

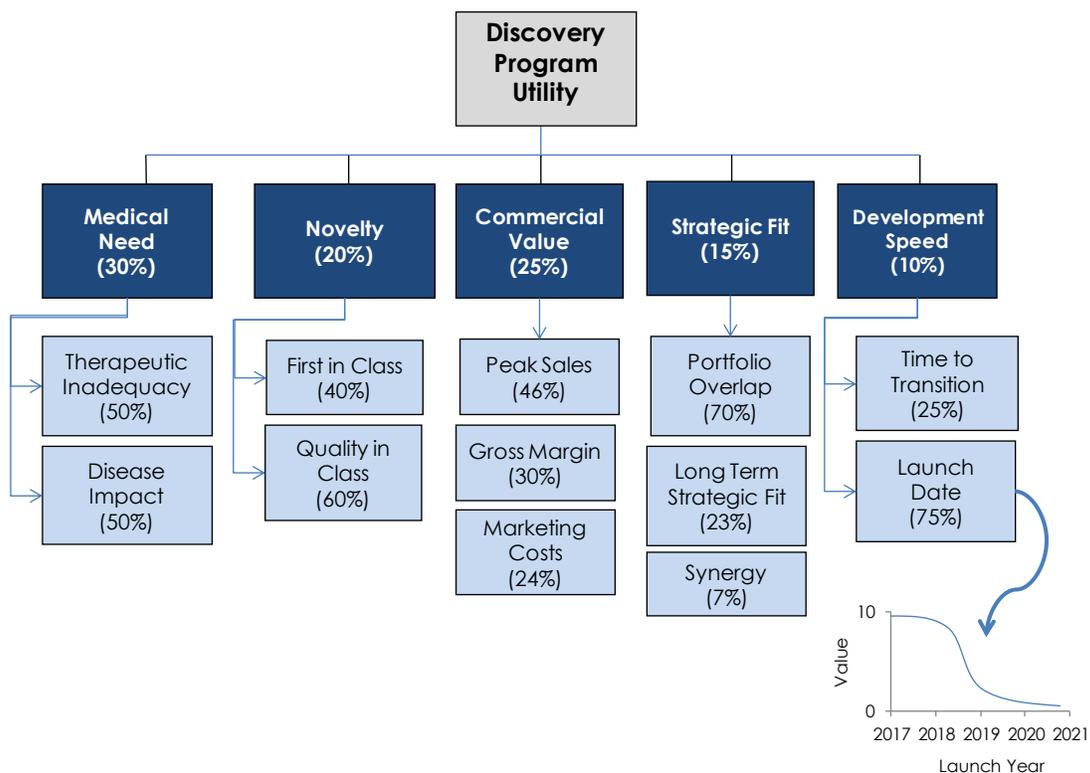


Figure 3. An Objectives Hierarchy. The figure shows the Key Objective, and two levels of supporting objectives including the respective weights for each objective and sub-objective (percentages in parentheses; note each level must total to 100%), as well as one example of a value measure.

Metrics are meaningless unless they are tied not only to a key objective, but also reflect the value added to the company. There may be a certain level of achievement in a metric that adds a disproportionate amount of value. Using the same example and Figure 3, the earlier launches are of course of greater value. However, launching at or before

2018 would add significantly more value than launching a year later and was reflected in the return function.

The curve shows a distinct value increase (on the vertical axis) for any launch date before or equal to 2018 (horizontal axis). Exploring this reflection of value to the company is called “**developing a Value Function**”.

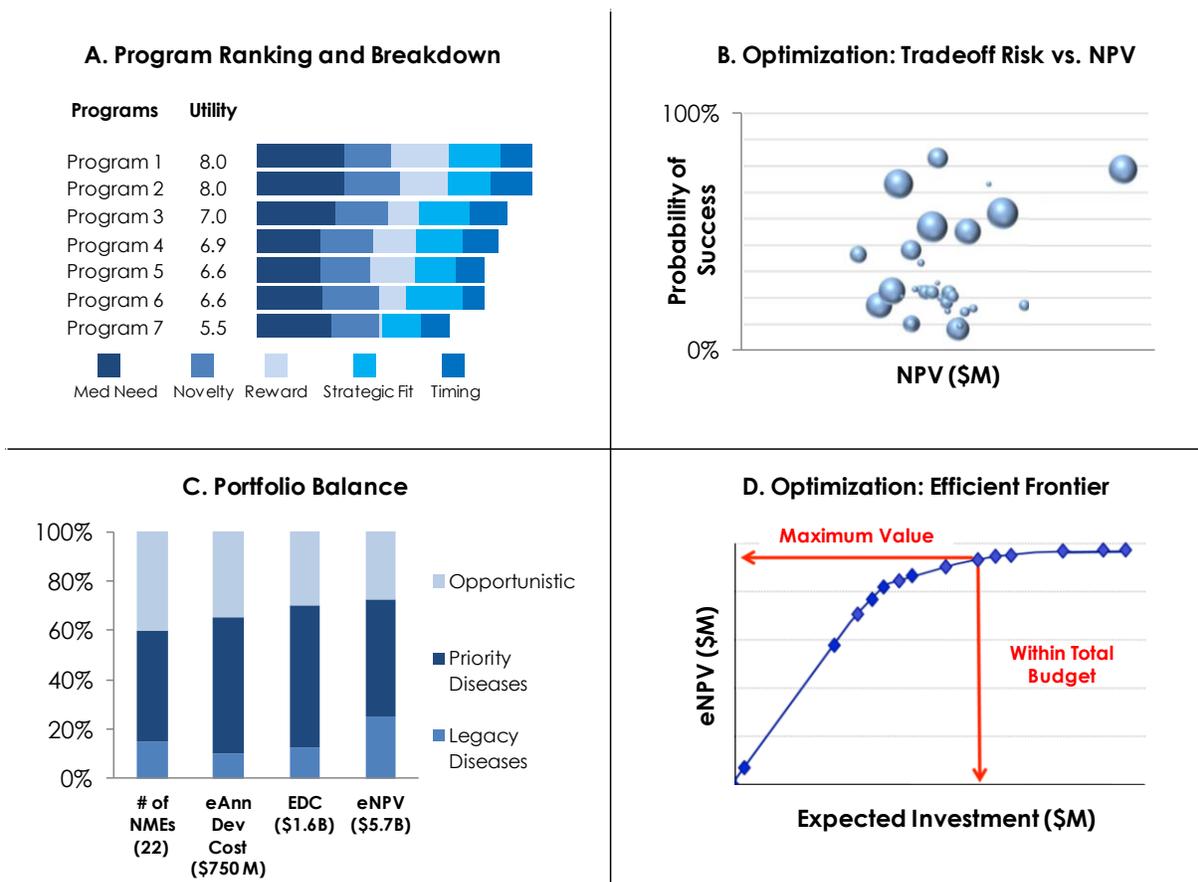


Figure 4. Reexamining the Discovery Portfolio Using a Multiple Objective Perspective. A. Program Ranking based on the objectives previously described, along with the value functions and weights described. B. Size of bubbles indicates cost. C. Shows the contribution of three types of products (those within Legacy Diseases, those within Priority Diseases, and those outside of these two categories defined as Opportunistic); numbers in parentheses at X Axis are the totals for the current Portfolio; D. Efficient Frontier shows the best portfolio (greatest eNPV) at each potential level of investment.

Now, with objectives in place, aligned metrics developed, and value functions

agreed upon, the programs can be consistently assessed against a set of

metrics that are aligned with objectives and values of the organization. A transparent analysis, giving clarity to the decision makers regarding the strengths, weaknesses, and relative value added by each project was now possible. Tough discussions took place.

The analysis revealed the real strength of two competing programs, 1 and 2. Although Program 7 was thought to be an excellent program due to its focus on unmet medical need, it was dominated by nearly every program in every other objective. Program 4 originally was assessed to have much lower value. The team modified the program to allow for an earlier launch in an alternate disease with just as much commercial potential, increasing its value to the organization significantly (Figure 4A)

Total Multiple Objective Value can be traded off against the **Probability of Technical Success (POS)**. Those with low value (left side of chart) and low POS (lower half of chart) should be closely examined for continuation (Figure 4B).

One of the key objectives was Novelty. The measure associated with this objective categorized each Program into First in Class, Best in Class, or neither (minimal differentiation). In Figure 4C, one can assess Portfolio Balance using number of new molecular entities (# of NMEs), short term spend (expected one year development cost; eAnn Dev Cost), long term spend (expected development

cost; EDC), and overall expected NPV (eNPV).

Portfolio Optimization is a term that basically means getting the most value out of your portfolio for a given amount of research and development spending. Often, using only prioritization of projects can lead to less than optimal results for the overall portfolio – especially if the budget is strictly adhered to. Expertise in optimization helps eliminate the less-than-optimal results by using every dollar of your annual budget to produce as much overall value as possible. As seen in Figure 4D, an optimal value portfolio can be calculated for any budget level. From the multiple objective perspective, this means optimally aligning with all of the objectives while still meeting all of the company's resource or strategic constraints.

All of this modeling and interaction with company experts and management has enabled us to look at the Drug Discovery programs in a new light. Clarity for the decision makers has been increased. The decision making body now is confident the valuation results have captured the key areas of concern, have captured them consistently, and have given more influence to the areas of most concern.

We will end the same way we began this discussion, with a question: **What decision problems or prioritization issues exist in your company that should involve multiple objectives?**

Abbreviations

- EDC = expected development cost
- ENPV = expected NPV, a probability-weighted average of all possible NPV outcomes
- NME = new molecular entity
- NPV = net present value, a sum of discounted cash flows over a defined time horizon using an agreed upon discount rate.
- POS = probability of technical success

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About KROMITE

KROMITE is a leading strategic advisory firm that specializes in the application of decision science to help clients make strategic decisions, manage risk, and create value. KROMITE was founded in 2003 to provide independent and unbiased support for tough decisions in the life science industry.

Our team, headquartered in New Jersey and located throughout North America and Europe, possesses unparalleled expertise in scenarios analysis and decision making. From years of working for pharmaceutical, biotech, medical device and agricultural companies, our team commands intimate knowledge of tools, terminologies, organizational roles & responsibilities, R&D processes, common deal term structures, and organizational decision making processes, which allows our clients to rely on us as a partner and external expert.

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About the Author

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Jack was a Senior Partner at KROMITE for 5 years and is now Principal. Jack is a retired US Army Lieutenant Colonel with experience in R&D portfolio management, decision analysis, modeling and simulation, technology selection, and strategy development. Jack was head of Portfolio Management for Bristol-Myers Squibb and, more recently, head of Portfolio Management for J&J Pharma Services, where he coordinated the portfolio management efforts across multiple R&D and marketing operating companies. He received his Ph.D. in Economic Decision Analysis from Georgia Institute of Technology and Masters in Industrial Engineering from Lehigh University. Jack is a board member and Fellow of the Society of Decision Professionals, a member of the Decisions Analysis Society, and a 20-year member of the Institute for Operations Research and the Management Sciences (INFORMS).



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