

Customer Focused Technology Planning[®]: An Overview*

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Introduction

Customer Focused Technology Planning[®] (CFTP[®]) is a planning framework designed to help firms focus their technology investments in areas that will have a significant impact on their markets, their operations, and their shareholders. The concepts behind CFTP[®] were developed over the last thirty years in consulting assignments with several dozen corporations around the world. It has been successfully adapted to many types of companies, large and small, high and low tech, emerging and mature. Industries using the framework have included oil exploration and refining, food processing, consumer products, aerospace, chemicals and materials, pharmaceuticals, medical products, pulp and paper, computers and electronics, power distribution and telecommunications. This paper provides a brief introduction to the logic behind CFTP[®] and the steps in a typical CFTP[®] program.

Overview

CFTP[®] is based on the model of innovation developed by Don Marquis at MIT over 40 years ago: innovation occurs when needs are coupled to technologies that address those needs and the resulting new process, product and service ideas are developed in a responsible way that balances the risks and rewards of doing something new.

CFTP[®] starts with the collection of information on:

- Your goals and capabilities
- Your customers' current and emerging or 'unarticulated' needs
- The technologies potentially available to you and others to satisfy those needs, and
- The capabilities and intentions of your current and potential competitors.

Given the complexity and diversity of information, we find it useful to follow a relatively structured approach to integrate this information. A structured approach helps identify holes in what you know, provides a record of your assumptions, and focuses information gathering efforts. Perhaps most important, it provides managers a tool for linking the different parts of the technology investment puzzle into maps that can be used to track the logic of alternative investment options.

However, collecting data and preparing maps is not planning – planning is thinking not data manipulation. The key to good planning is the use of informed judgment based on your experiences and the best available information on the needs, options, and competitive implications of alternative investments. The process of collecting and integrating the data through the CFTP[®] process helps refresh managers' minds about the factors affecting the investment decision, and provides a useful tool for assessing investment options – but these are only tools. Its success comes from giving managers a new *way of thinking* about technology, not merely teaching them a new planning technique. People make decisions – not models.

This paper was developed as a companion piece for executive programs on product and technology roadmapping and strategy; see www.jaypaap.com for upcoming courses that expand on the framework outlined in this paper.

The Dynamics of Innovation

Perhaps the most comprehensive assessment of the nature and dynamics of innovation was undertaken by Don Marquis at MIT in the 1960s as part of a long term government sponsored study and published by the National Science Foundation (Marquis and Meyers, *Successful Industrial Innovation*, 1969). The basic concept is amazingly simple: innovation occurs when there is a matching of a new or emerging need with an existing or emerging technology, and industrial firms select and develop the best ideas using a staged process that balances risks and unknowns. Figure 1 is adapted from the Marquis innovation model.

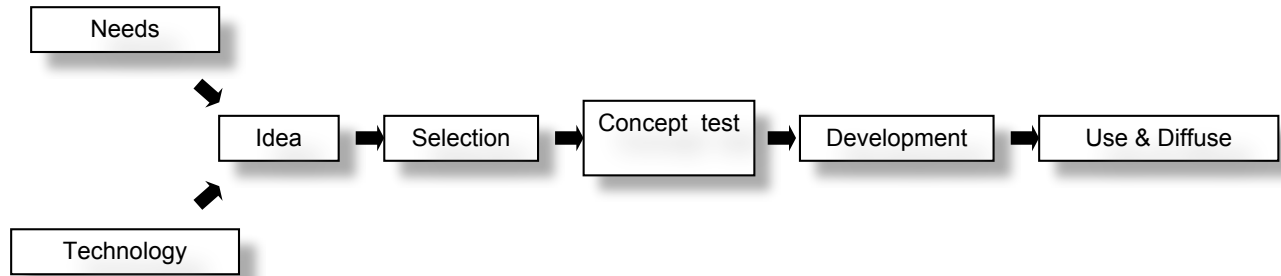


Figure 1. Marquis model of innovation

The latter part of this model has been popularized by Bob Cooper and his colleagues in the form of the Stage Gate[®] project management system which starts with the idea stage (often the selected idea) and leaves the “fuzzy front end” that precedes it to others. The CFTP[®] process was developed in the mid 1970s primarily to focus on the ‘fuzzy front end’ and draws on experience and research dealing with both innovation and organizational decision making to provide a team based approach for linking needs and technology in a structured way.

An important aspect of the CFTP[®] process is the recognition that technologies and needs are dynamic, each having a life cycle that requires firms to understand where they are on the relevant technology or need ‘s-curve’ and to anticipate shifts to new technologies or needs as the technologies and primary need drivers mature. This basic interplay between evolving needs and evolving technologies is illustrated in Figure 2. It also shows two important planning concepts: ‘need leverage’ (which reflects the relative maturity of the need) and ‘technology productivity’ (which reflects the relative maturity of the technology.)

Technology Maturity and Productivity

A technology only has value to the extent that it can make a change that is valued by either an internal customer (in the case of a process technology) or an external customer (for a product or service). The extent to which a technology is able to make a change in the performance of a process, product or service is referred to as ‘technology maturity’, and follows a classic ‘s-curve’ pattern. When a technology is first introduced it is often difficult to use and the skill and support to change a performance characteristic of interest requires a lot of effort. With experience and continued effort, the technology matures relative to that performance driver, and it becomes easier to make changes. During this growth stage the technology is often the source of significant competitive advantage. At some point it reaches its limit in terms of being able to make further meaningful changes in the performance driver, and we consider it to be mature.

Implications for planning. It is critical to understand the relative maturity of a technology relative to the primary drivers in your operations or target markets so that new technologies can be acquired to continue providing performance enhancements demanded by your operations or customers.

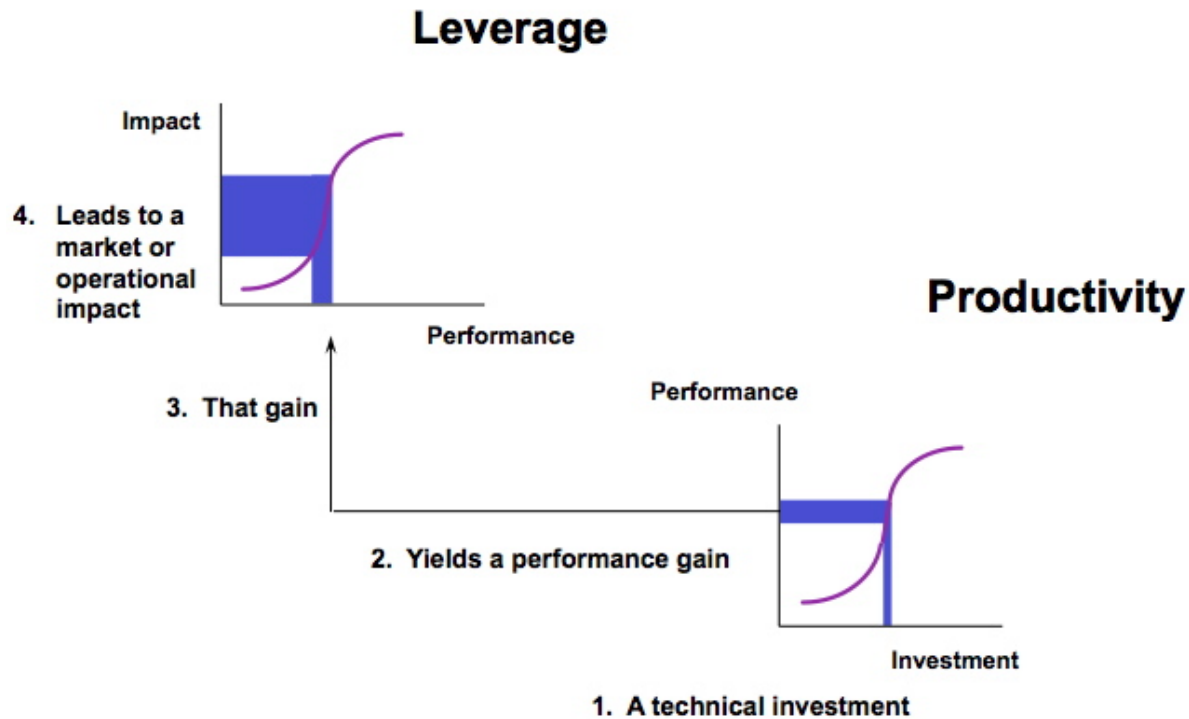


Figure 2. Dynamic interplay between needs and technology

Need Maturity and Leverage

Similarly, a specific performance dimension is a meaningful driver of technology investments only when performance improvements lead to a significant impact for the firm making the investments. These might include hard measures such as increased sales and lower costs, or ‘softer’ measures such as better customer satisfaction, knowledge of a new technology’s capabilities, or positioning to exploit a new market. The extent to which a change in a performance characteristic of a process, product or service has an impact that benefits the firm is referred to as ‘need maturity’, and also follows a classic ‘s-curve’ pattern.

When an improved capability is first introduced it is often difficult to recognize or leverage the benefits either because of ignorance or the lack of the appropriate infrastructure or skills to fully use it. With experience and continued effort, the perceived value (and resulting impact) of making changes in the performance feature increases, or matures. During this growth stage the ability to satisfy this need or driver better than others is often the source of significant competitive advantage. At some point it reaches its limit in terms of being able to make a meaningful impact on your operations’ or your customers behavior, and we consider it to be mature.

Implications for planning. It is critical to understand the relative maturity, or leverage, of the different performance characteristics that customers use to assess the value of a product or service, and recognize that these change over time. The dominant drivers of today will reach a point where further enhancements have no impact and new drivers will emerge (often from unarticulated needs of which customers are not aware). This often requires refocusing technology investments into new areas where improvements will have an impact, even when there are still advances to be made in the old driver. It sometimes means acquiring or developing a new technology that is better suited to improving the new performance drivers.

The CFTP® Process

The underlying purpose of CFTP® is to provide managers a tool to help them make more informed decisions, and to do so as effectively and efficiently as possible. Specifically, it addresses the question:

Which technology investments will provide the competencies needed to provide, maintain, or improve product or service characteristics that are sufficiently valued by customers to establish a competitive advantage and promote your business objectives?

It involves four basic steps:

- Develop market profiles - ***who are your customers and why are they important?***
- Create a ‘landscape map’ of technology–market interactions in selected product-market segments:
 - What product or service characteristics affect purchase/usage decisions – ***what do your customers value and why?***
 - How can technology be used to improve these characteristics – ***what is the role of technology?***
 - Profile the competition – ***can you gain an advantage?***
 - How mature are the needs, and technologies – ***where is there leverage?***
- Identify technology investment opportunities - ***what can we do?***
- Select projects and set priorities based on the business and technology strategies - ***what should we do?***

The output of the CFTP® process is a ‘landscape map’ of the factors needed to understand the link between customers’ needs and technology investment options. Figure 3 is a generic CFTP® map, the logic of which will emerge as you step through the process in the sections that follow.

The CFTP® Map helps firms integrate the diverse sources of information needed to decide where to invest to get the greatest return from their technology dollar. It helps managers understand the dynamic environment in which needs constantly evolve and technologies mature and are replaced by newer ones. It helps firms anticipate shifts in market needs and technological capabilities that alter the current competitive environment, and increase the probability that they will avoid surprises..

CFTP® is an inherently flexible framework, with few rigid requirements for what the forms will look like and how they are to be filled out. One of its strengths is in its ability to adapt its planning frameworks to closely fit with a group's needs, objectives, resources, and information base; and current planning processes.

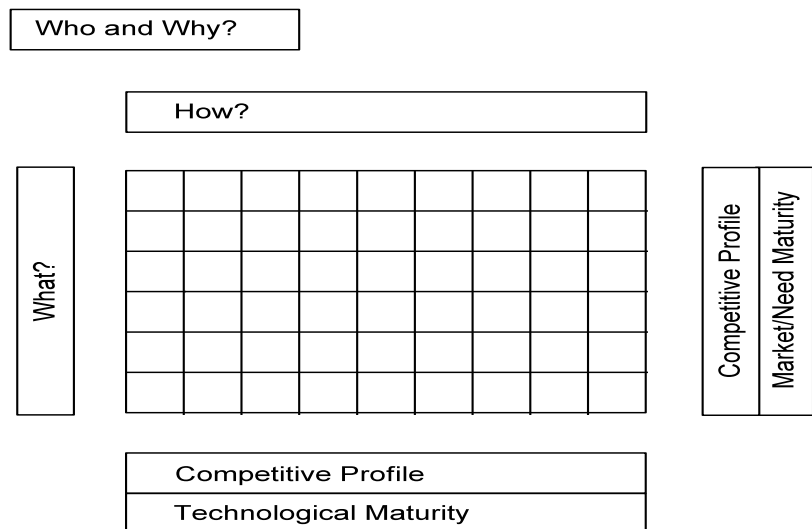


Figure 3. Generic CFTP® Map

Planning for the Planning

Before launching the CFTP® planning process there are a number of questions to be resolved:

- What are the objectives? Is the primary purpose to stimulate ideas for new processes, products or services that will help improve your competitive position? Set priorities? Provide the technology input into business plans? Promote cross-functional cooperation and team building? It is important that the specific objectives are understood before the process begins, and communicated to those involved.
- When do you hold formal planning exercises? It is common to plan annually, either just before or in parallel with the annual strategic and operating planning efforts. But don't just plan because a year has passed, technological progress doesn't follow the calendar. If there have been few changes in the forces affecting technology investments over the year, don't waste people's time in a major planning exercise. A simple update of the previous year's work may be sufficient. Similarly, do not hesitate to call for a special planning effort if external or internal conditions change significantly, there are technical or competitive surprises, or you are uncomfortable with the relevance of last effort's results.
- Who conducts the planning and what are their roles? Among the constituencies typically active in the actual planning are the staff of formal planning groups or consultants (as facilitators, advisors, and sources of tools and analyses, not as decision makers); and cross-functional teams. In most cases it is important to involve teams representing constituencies within the firm that have access to the technological, competitive, and market information needed to conduct the planning. Their interaction not only leads to better planning results, but also enhances cross-functional cooperation and mutual learning. However, the key is finding people with knowledge about the markets and technologies to be used, not simply pulling people from a Marketing or R&D department.
- What other constituencies should be involved? Identify the major stakeholders inside and outside the organization. Their concerns and biases can be important in positioning the results of the planning, and they are often excellent sources of information and guidance.
- What help do you provide the planners? They need clear direction; access to technical, market and competitive data and intelligence; analytic frameworks; training; a facilitator; incentives, and so forth. Assess the team's needs, and plan for the support up front, before planning starts.

Ideas versus Information

For purposes of this overview we are assuming that the planning objectives have been set and teams formed for each of the major business areas of the firm. The teams' purpose is not to share ideas, but to share information so they can jointly develop ideas. This is a critical distinction. When different individuals are asked to come to a joint planning meeting with ideas for new products or services, they tend to be closed to other individual's ideas and resist constructive criticism of their own. Too often joint planning becomes sequential monologues with the resulting decisions more a function of pre-existing power bases than the needs of the firm.

It is better to encourage individuals to come to the initial sessions with information alone, and to withhold deciding what they think should be done until the team can share information, agree on the underlying forces affecting their product or business area, and then jointly develop ideas as a team.

Product/Market Mapping

The first step for each team is to understand who the customers are and why satisfying them is important to the firm. The Product/Market Profile (Figure 4) is used to organize the information needed to answer these questions. Profiles are often developed at a high level by those organizing the planning to identify where they need teams. More importantly, it is completed by each team to provide an overview of the areas in which the firm might compete. There rarely is time, or need, to assess every product-market area of operation. This initial step helps the teams identify which current or potential areas are worth their spending time doing planning.

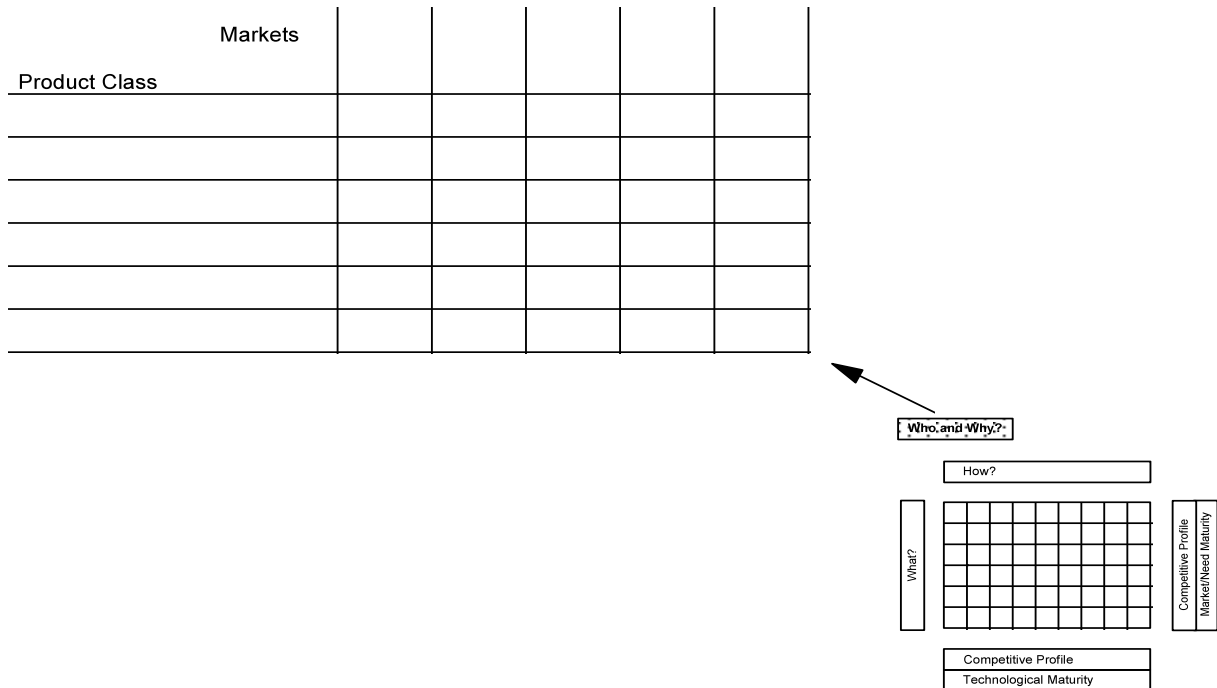


Figure 4. Generic Product Market Map

Guidelines for Completing Product/Market Profiles

- Use product classes, not products. Product class refers to a broad range of related products or services used to address a customer need. Product class does not necessarily deal with products per se, they may be services, advice, solutions, or prototypes – anything you provide to your customer. “Disposable liquid containment vessels” is an example of a product class. “Paper cups” is a product in that class for the fast food market. “Bag in box” is a product for the industrial fats market. By using product classes it often helps think beyond what is currently offered, and can help make connections with technology based solutions in other industries with similar needs to satisfy.
- Base market segments on decision patterns – not the structure of the marketing or sales departments, or characteristics of the product or service. The critical question is whether customers in a given market segment approach the purchase or use decision from the same perspective.

- Develop comprehensive assessments of high interest segments:
 - Company objectives - image, ROI, share, growth, harvest, etc.
 - Market characteristics - size, growth, profits, image, synergy, etc.
 - Competition - share, capabilities, intentions, etc.
- Assess non-participating segments for opportunities for technical or market extensions.
- Use available data and selectively augment based on sensitivity analysis.
- Select high interest/payoff clusters for detailed assessment to save time and cost.

This last item merits especial attention. Sensitivity analysis is important in order to avoid information overload: *planning should stimulate thinking, not overwhelm it*. It usually is best to do an initial analysis using only the data you have, being careful about indicating where the data is weak or you are using best guesses. After the first analysis, examine the assumptions used to support your decisions. If a variation in the assumption would lead to a different decision, the decision is *sensitive* to that data and you should take the time to validate it. Most assumptions do not affect the outcome, and by focusing only on those that do, significant time and effort can be saved.

You may need to eventually gather the data to validate the other assumptions, in order to prepare a development plan or implement your decisions. Care should be taken to conceptually separate information needed to make a decision from that needed to implement a decision. At this stage of the process, conserve resources by focusing only on details needed to support a decision. This keeps you from wasting time gathering detailed information on concepts you decide not to pursue.

Chart Detail and Adaptation

You will note that the product/market chart is very simplistic, as are all of the generic CFTP® charts. The objective is to provide a rough framework and allow each team to adapt the chart to their needs, the types of information they have, and the purpose of the planning effort. This not only increases ownership and relevance of the resulting maps, it saves time that might otherwise be spent filling out irrelevant sections of standardized forms.

Segment Focus

The next step is to analyze a particular segment of your business: a specific product class (or related classes) in a particular market (or related markets) that is of interest because of its current or potential importance to the firm. Typically, a team will select from 4 to 7 segments for further examination. The remaining analyses are done for each of the segments selected and are designed to help understand the market, technical, and competitive dynamics in each area.

Performance Characteristics

In each selected segment, first assess the characteristics that drive the decision to use your product or service. These are simply the factors used by your customer in choosing you over a competitor, or choosing not to use yours or anyone else's product. The customer could be an internal group to which you transfer a material, technology, component, or finished product; or it could be the final customer. Performance characteristics should also include factors important to interested third parties who influence the customers' buying decision, such as their purchasing department, regulators, or advocacy groups.

To fully understand what drives the purchase or use decision, it is often necessary to consider not only product characteristics such as functionality, price, system compatibility, etc; but also other factors such as your technical image, field support for your products, your ability to influence the specification, etc. A generic Performance Characteristics profile is shown in Figure 5.

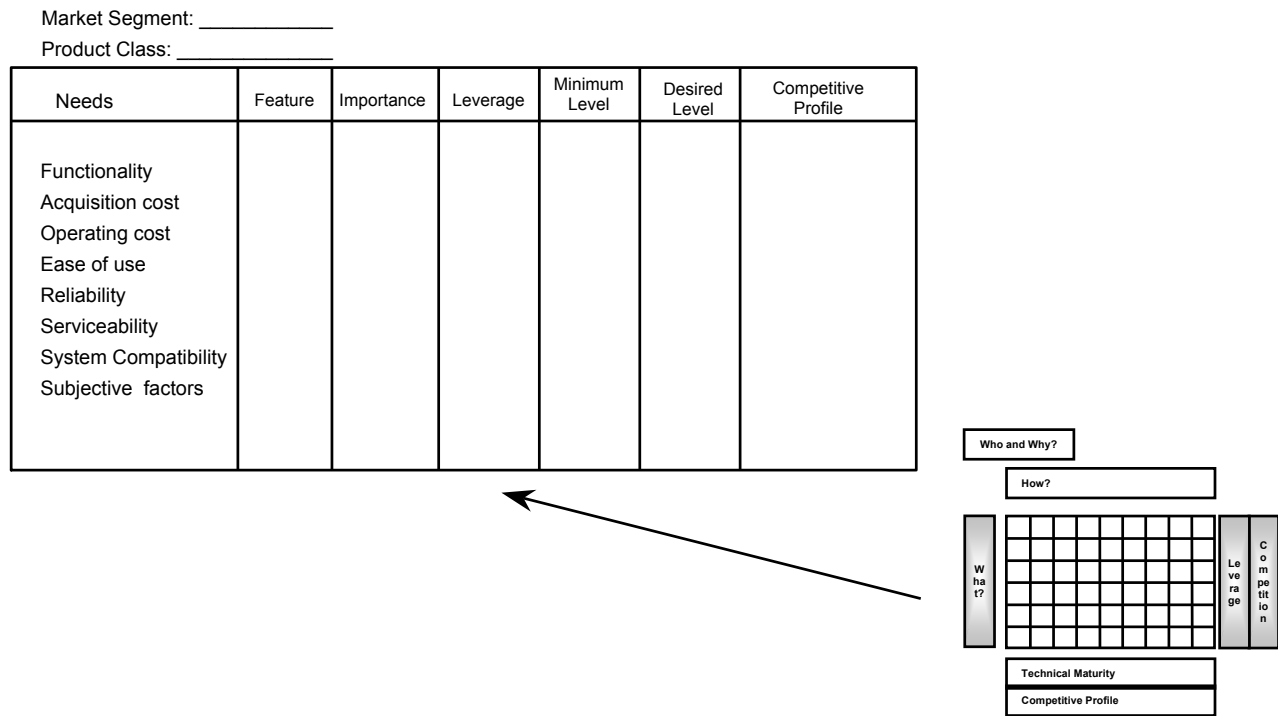


Figure 5. Generic Performance Characteristic Profile

Guidelines for Assessing Performance Characteristics

- Think broadly when defining *customer*; consider users, buyers, decision influencers, etc.
- List decision factors used by customers using categories on the sample chart as a starting point. This starts with understanding the features they now desire, thinking backward to the needs these are addressing, and then identifying additional features that may also meet those needs. Needs change very slowly, features are a function of available technology designed to meet those needs.
- Rank and/or rate the past, present and future importance of the features and or needs.
- Determine whether an improvement in the performance characteristic will increase the use of your product or service - its *leverage*. This is a function of need maturity and the extent to which the underlying need being addressed drives decisions.
- Determine the minimum level of the performance that needs to be offered in order for your to be taken seriously in the market.
- Determine the desired level, that is the point beyond which there will be no significant interest for improvement, because further change is not perceivable, cannot be used, or becomes less important than making improvements in another need or driver.
- Compare competitors on each characteristic - determine “best in class” through benchmarking.

Leverage. Perhaps the most important consideration in this analysis deals with the concept of leverage. Leverage is related to, but different from importance. Importance is an absolute rating or ranking of all features or characteristics. The absence of an important feature will always influence the purchase or use decision. However, at a certain level of performance, most characteristics reach a point where further improvement is no longer desired or valued. The characteristic is still important, but making further improvements will have little impact on customer choice., i.e., it no longer has *leverage*. At that point, less important needs emerge to drive the purchase decision.

Thus, in some contract bids, the technology capabilities are important, but don't discriminate between winners and losers. If everyone that is considered can meet the spec, what is left are lower order considerations such as price, service, or reputation. These may not be as *important* as technical competence, but they can have more *leverage* in a particular setting.

Investments in technology need to be focused on high leverage items, not simply on high importance items. This makes the planning process challenging since leverage is more changeable than importance. In general, every time you or your competition provides greater value on a dimension, you decrease the impact or leverage of future improvements.

Customer Needs

This all sounds easy, and is, assuming you know what drives your customers' decision-making process. This is one of the major challenges of a technical group, particularly if you are isolated from the customer as is often the case. The following are some techniques to determine customer needs:

- Customers themselves are probably the best source of information on their needs. Don't limit your inquiry to just your best customers, they are already generally satisfied. Instead, concentrate on your critical customers and your competitors customers. Also look at potential customers. Specifically:
 - Conduct customer visits. Be sure to plan this activity with the same rigor as other parts of a product or technology development project. Before the visit, prepare and know what you need to know and how and who will collect it. On the visit talk, listen, and observe. After the visit conduct a debriefing of all those involved to ensure that critical information is not lost.
 - Involve customers in planning, design and/or development.
 - Identify 'lead users' – sophisticated users who have adapted your product or service to their needs.
 - Conduct market research using your own sales force, marketing department, outside consultants, commercial databases and on-line services, etc.
 - Conduct problem research; i.e., look at their current operations and assess whether there are ways you could help them do what they do now but do so better, *faster, or cheaper*.
 - For consumer products, leverage insights from ethnographers who monitor social forces on behavior.
 - Monitoring of web activity by potential customers or competitors can uncover needs.
- Develop industry trend assessments - find past patterns, leading firms or industries, inter-dependencies, etc. As Mark Twain once stated: "*History doesn't repeat itself, but it does rhyme.*"
- Analyze competitive products, and monitor their advertising and public statements to identify needs they appear to be addressing. They may not be right, but if they are different they might provide useful insights.

Market research and problem research. These are not the same. Both rely on understanding customer preferences from the customers themselves, but differ in terms of the extent to which the customers directly provide that information. For adaptation of existing products or services, your customer can often accurately tell you exactly what they value and why. In such cases, traditional *market research* using questionnaires, interviews, and focus groups, often provides all the information you need.

However, it is a greater challenge when you are considering innovative products or anticipating future or “unarticulated” customer needs. Rarely can your customers indicate their preferences for the features of non-existent products or the use of a new technology. *Problem research* is an approach that has proven useful in such cases. Simply put, based on current customer’s activities and forecasts of available technology, assess whether there are ways to help your customer do what they now do, but do so faster, better, or cheaper. This is usually accomplished by observing the customers while they use the existing products or services. Often it is possible and desirable to place product development team members into a customer operation so that they can carry on the related tasks themselves. Sales forces can also be useful in helping develop a comprehensive model of what your customers now do so that you can develop ideas for how they may accomplish the same results with different tools or processes.

Technology Impact

The next step for each team is to identify the technology options available to provide, maintain, or improve important and leveragable characteristics. Figure 6 shows the generic chart that can be used to capture information on Technology Impact.

Market Segment: _____

Product Class: _____

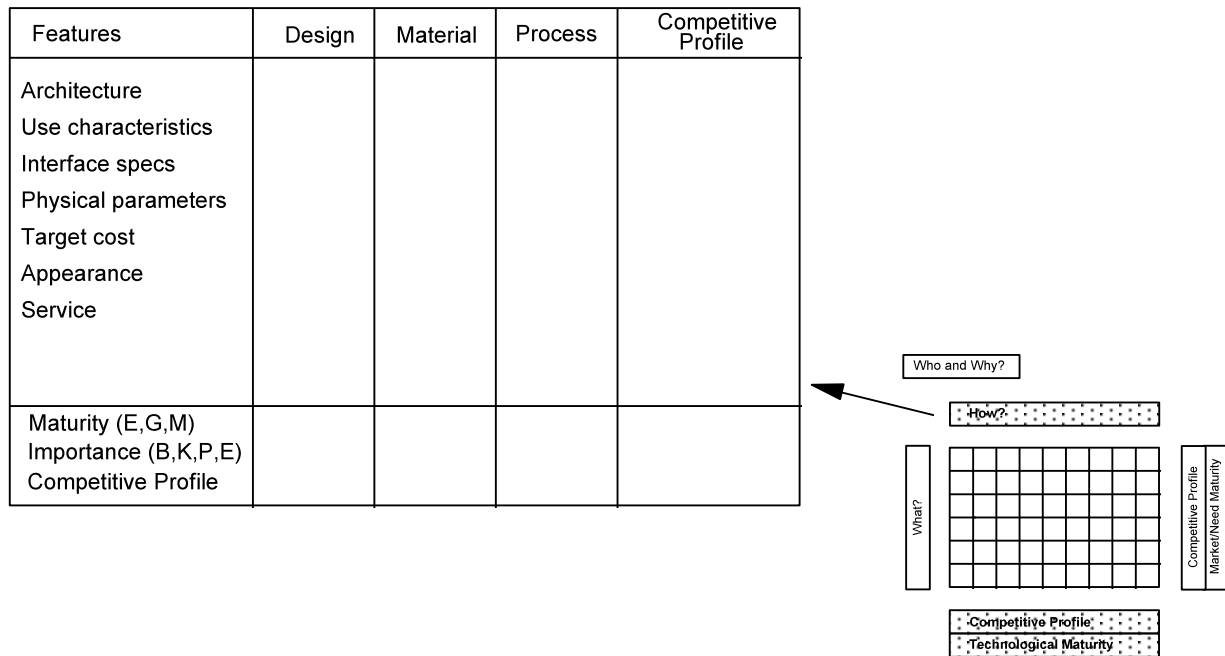


Figure 6. Generic Technology Impact Profile

Guidelines for Assessing Technology Impact

- Identify technologies that do or might affect important leverage characteristics.
- Rank or rate the potential for the technology to maintain or improve characteristics of importance.
- Estimate relative maturity and anticipate potential for obsolescence or substitution.
- Determine the competitive impact of technology:
 - Base - necessary and available to all
 - Key - source of competitive advantage
 - Pacing - technology expected to be future key
 - Exploratory - early stage with unclear potential
- Use benchmarking to compare competitors and identify “best in class”, investment level, experience, strengths, etc.

The importance of understanding technology maturity cannot be underestimated. The types of management challenges you face change significantly depending on whether technology is in its emerging, growing, or maturing stage. An important task of the CFTP® teams is to understand the relative maturity of their most important technologies and to develop forecasts of substitute technologies.

Although it is possible to construct s-curves for the technologies being looked at, it usually is not worth the effort. It is more important that the team develop a *sense* of how mature the technology is, and to then explore the management implications. (Reference Figure 7).

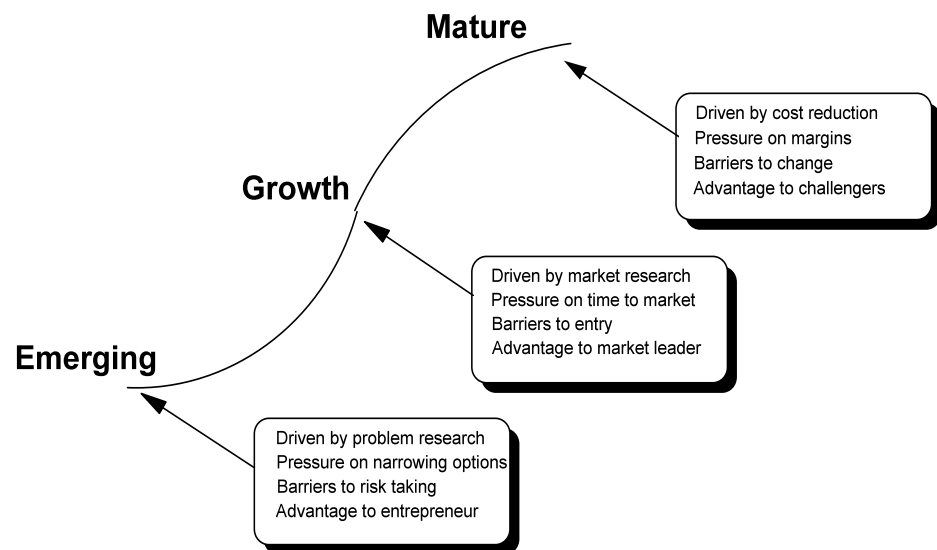


Figure 7. Management implications of technology maturity

Resistance to new technology is common, and often it is necessary to get an outside perspective to ensure that those with vested interests in the old technology do not ignore its becoming mature. However, such resistance is not always bad. Great breakthroughs can happen in seemingly mature technologies when its supporters are confronted with a competing technology. Resistance can lead to a burst of creativity and energy that pushes the old technology well past what observers regarded as its natural limits. Critics can also help assess the true value of a new technology by identifying serious shortcomings not recognized by its supporters. Resistance should not be eliminated, it should be managed.

The relative maturity of the technology is only part of the technology intelligence needed. Where is the competition relative to you? What new technologies are out there that are attempting to replace the current technology base? When the technology matures will there be new technology take its place? Or will technology become less important as competitors' capabilities equalize? Failure to anticipate these forces can lead to serious mistakes. Figure 8 graphically illustrates the key technology intelligence questions.

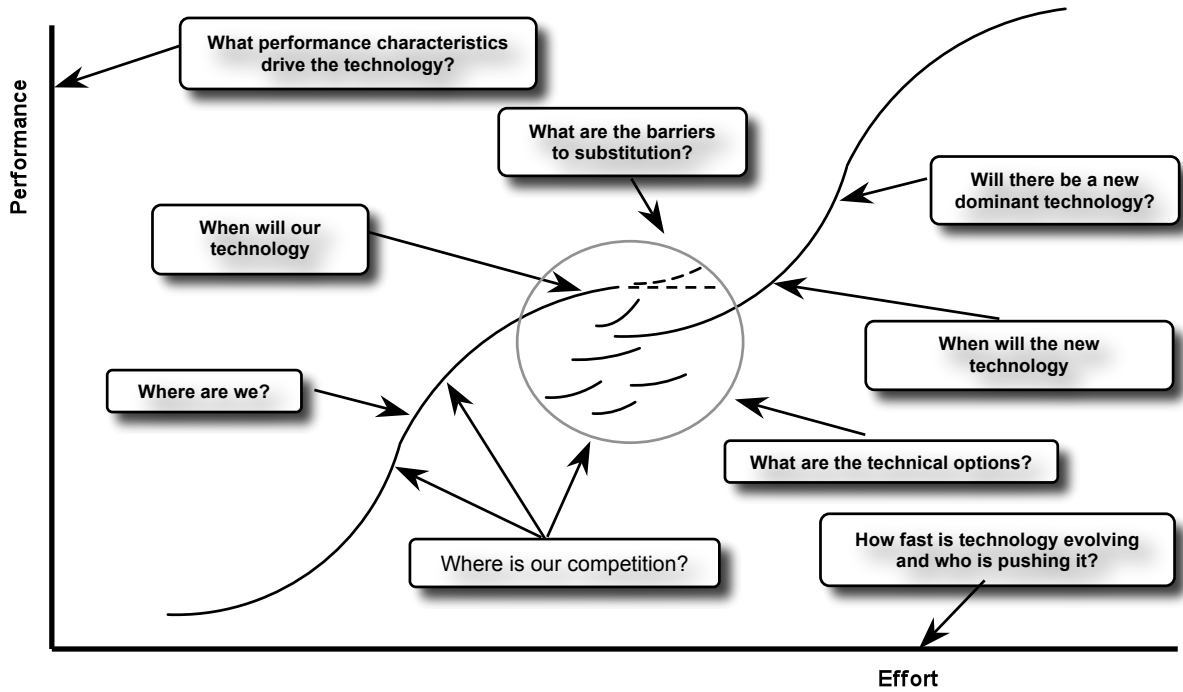


Figure 8. Key technology Intelligence Questions

This information needs to be gathered from a number of different sources. Figure 9 identifies several techniques for tracking technology. They are organized in terms of their Character (personal versus impersonal) and their Proximity (directly from the developer versus indirectly from another source). No one technique is right for all situations; each has its advantages as well as disadvantages. Firms need to consider them all, being sensitive to the purpose of the intelligence gathering, and the time and resources available.

The impersonal techniques are probably the most commonly used since the information is relatively easy and inexpensive to collect. However, such information cannot be tailored to specific needs, and is often not current.

		<i>Proximity</i>	
		Direct	Indirect
<i>Character</i>	Personal	Personal networks Sponsored research Visits Trade Shows Venture capitalists Universities Entrepreneurial firms ...	Gatekeepers Consultants Editors Expert panels Suppliers/vendors Analysts Retired executives ...
	Impersonal	Patents Patent citations Literature searches Reverse engineering Marketing material Annual reports, 10Ks W W Web ...	Industry surveys Trade journals Associations Government records UN reports Local newspapers Buyers guides ...

Figure 9. Techniques for gathering Technology Intelligence

Probably the most reliable and timely way to gather technical intelligence is with the personal techniques. However, these can be time consuming, particularly if you don't have trained staff, and must be handled carefully to avoid accusations of industrial espionage and exposure of the true interest of the inquiring firm. For these reasons, professional information consultants are often commissioned to do the intelligence gathering. These and other indirect sources can also be useful in filtering out extraneous information, although some firms prefer to gather the information themselves to avoid losing details filtered out by experts.

Adding Detail

Gather and assess new information by exception, not as a matter of course. As mentioned earlier, begin with what you know and organize it at fairly general levels. At various points of the planning process it will become clear that additional information or another level of detail is needed to fully understand either what is driving the business or what options you have for enhancing your position. Whenever necessary, develop supporting maps that break down important dimensions into smaller levels of analysis. (Figure 10)

Thus, the initial analysis may compare major technical options such as the use of a UNIX platform as opposed to a Sun or HP workstation. Once you decide that HP appears the best choice, you may want to break the HP option into the various configurations of processor, peripherals, and so forth. Expand each cell or cluster of cells to provide the detail needed to clarify options and support decisions.

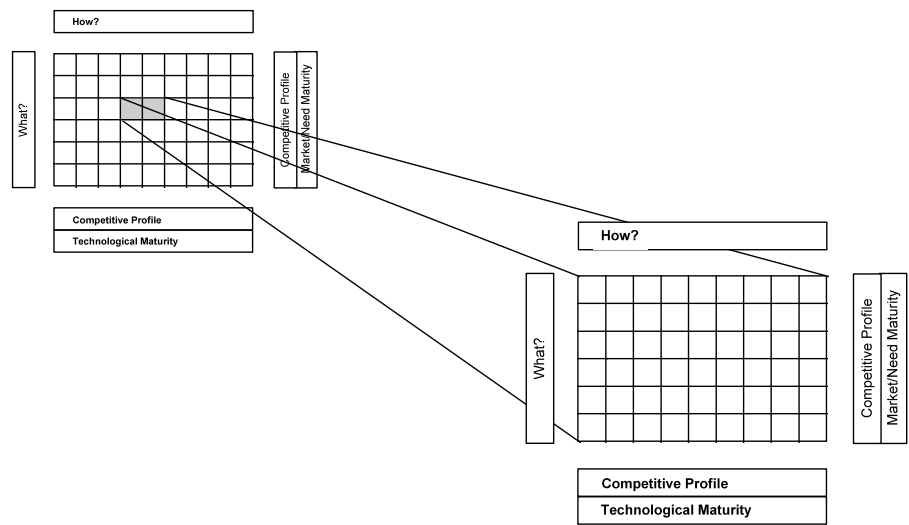


Figure 10. Provide detail as needed

You may want to add new charts or sections of charts to incorporate variables that will help the team collect and assess information needed to address such items as design characteristics, quality standards, product specification, core technologies, or selling and marketing points. Keep in mind, the charts are tools to help organize your thinking. If information is important for the decisions being considered, incorporate it. If not, leave it out.

Checking Interactions

The various performance characteristics and technologies affecting your business do not act in isolation from each other. It is important to check whether investments designed to improve selected characteristics will have a negative impact on other characteristics. (Ref. Figure 11)

Seek out changes that have positive interactions, providing benefits along multiple dimensions. An apparently modest project may provide a multitude of modest enhancements and greater total benefit than a major enhancement that has little impact elsewhere.

Make sure that any detrimental impact is flagged and considered in the “cost” of the improvement. Pay particular attention to previously satisfied needs or optimal processes, these are often overlooked when focusing on highly leveragable items. A negative impact does not preclude going forward, but you may want to modify your approach to minimize the downside effects.

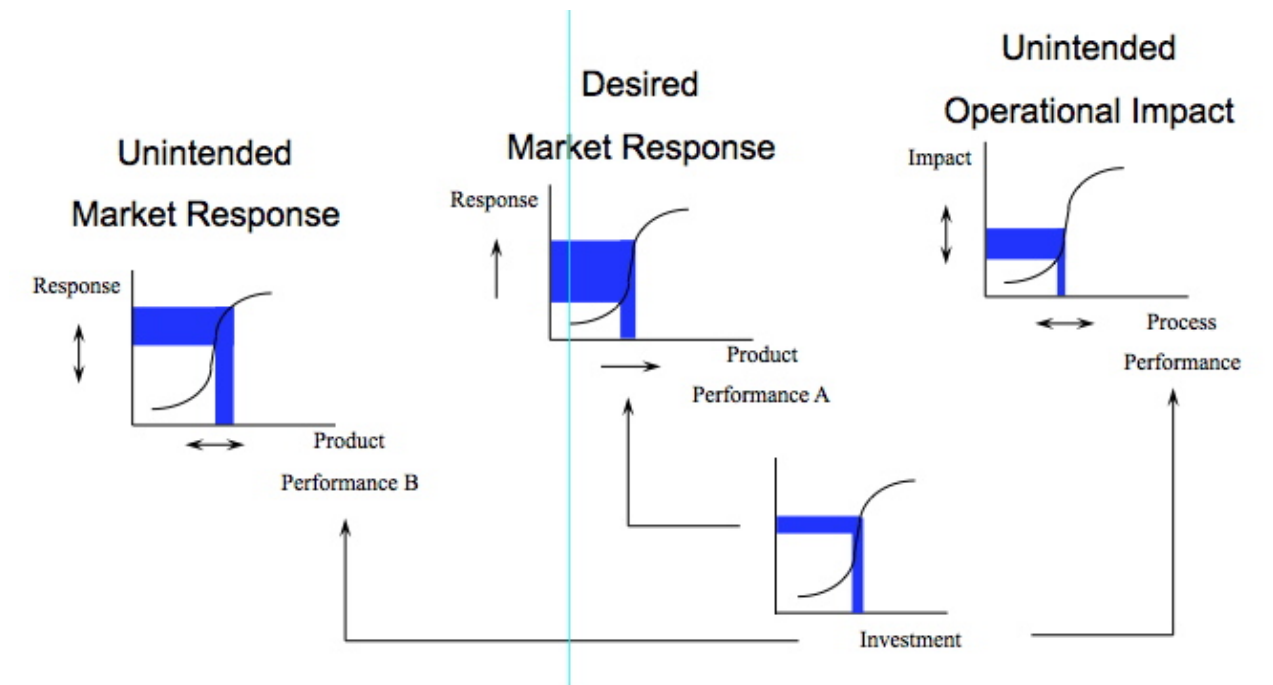


Figure 11. Test for Possible Interactions

Communicating Results

At this point in the process there may be four or five teams, each of whom have assessed six or more segments, resulting in several dozen separate analyses. The amount of information to be used to make investment decisions can be overwhelming, particularly to those to whom you might be presenting your conclusions. It is important to capture the key dynamics and relationships in a format that helps the teams quickly, yet thoroughly, identify options and work through the rationale, options, and likely competitive impact of each. Figure 12 provides an example of a completed CFTP[®] Landscape Roadmap. Attachment 1 contains additional information on the interpretation of the CFTP[®] map.

While the map contains a lot of information, it represents but a fraction of the analyses a team is likely to have done. The detail is kept as back-up to allow the team to focus on the major relationships and dynamics needed to understand why a particular investment makes sense. In the map below, for example, the team might point out that their company (CI), has a real problem with its flavor (competitively it is number 3), which is the most important characteristic, improvements in which will have a moderate impact in the marketplace (leverage). Two technologies have a big impact on flavor, fats and flavorings. In the first it has moderate capability compared to others, but in flavors, it is definitely weak. It can be argued that to improve their market position (now at 10% share), they will need to develop or acquire flavoring technology and launch projects to enhance the flavor of their products.

Market: Consumer
 Product Class: Convenience desserts

Performance Characteristic	Importance	Industry Leverage	Ingredient Technologies				Process Technologies		Competitors	
			Sweeteners	Fats and substitutes	Shelf life enhancers	Flavorings	Formulation	Mixing	++	--
Flavor	1	M	+	++	+	++	+	+		
Appearance	2	L	+	+	++	0	++	+		
Fat Content	3	H	0	++	0	0	0	0		
Texture/ Mouthfeel	4	H	+	++	+	++	+	+		
Price	5	M	0	+	+	+	++	++		
Calories	6	L	++	+	0	0	0	0		
Competitor Profile		Constar Inc.	●	⊙	⊙	○	○	⊙	10% share	
		A	⊙	●	●	●	⊙	●	30% share	
		B	⊙	⊙	●	●	●	⊙	40% share	
Relative Maturity			G	E	G	G	M	G		

Figure 12. Representative CFTP[®] Landscape Roadmap

Planning Begins

It is at this point that systematic data gathering hands off to insight and informed judgment. Using the landscape roadmaps as tools and mental crutches (there is a lot of information to keep straight), the planners identify potential development projects. We find it useful to think of four types of generic investment opportunities covering investments in product enhancements, current technology upgrades, new products or businesses, and new technical capabilities. Each team identifies several projects, together with the reasons why the project makes sense, the risks of doing and not doing it, the costs, alternatives, impact on the competitive environment, etc. Teams often make recommendations about other things as well, such as the need for additional information, or access to new technologies.

The end result of this phase of the CFTP[®] process is a landscape map of the competitive, market, and technological environment and the identification of a large number of investment opportunities. The next phase requires that managers assess the options and decide which to pursue, based on their business, market, and technology strategies, and the available internal and external resources. The outputs are technology and product route roadmaps which are used to communicate, coordinate and guide implementation efforts. These activities build on the CFTP[®] landscape mapping effort, but the emphasis goes from data gathering and reflection to the use of informed judgment to make decisions about the makeup of the technology portfolio.

Summary

CFTP[®] does not tell you in what products or technologies to invest, nor does it identify options for you and tell you how to weigh them. It merely structures and focuses the information needed to stimulate innovative ideas, clarifies the impact of technology investments on your customers and on your business, and helps you effectively and efficiently make technology investment decisions that benefit both.

Attachment 1 – Sample Charts Needs Assessment

Market Segment: Consumer

Product Class: Convenience deserts

Needs	Features	Importance	Industry Leverage	Leverage Minimum *	Leverage Limit *	Competitive Profile	
Provides pleasure	Flavor	1	M	50	65	<div style="display: flex; justify-content: space-between; align-items: center;"> ++ B A CI – </div>	
	Appearance	2	L	75	80		B A CI
	Mouth feel	4	H	45	85		B CI A
Minimizes guilt	Fat content	3	H	< 6g fat	0g fat	<div style="display: flex; justify-content: space-between; align-items: center;"> A B/CI A B/CI </div>	
	Calories	6	L	< 150	0		A/B/CI
Fits the budget	Price	5	M	< \$2.00	\$.80	B A CI	
Convenient	Easy open	7	L	65	70	<div style="display: flex; justify-content: space-between; align-items: center;"> B CI A B A CI </div>	
	Stores easily	8	L	45	65		B A CI

* Note: Leverage uses either actual numbers or subjective values. In example, subjective values represent consumer panel scores reported on a 1-100 scale.

Technology Impact

Market Segment: Consumer

Product Class: Convenience deserts

Features	Sweeteners	Fats & Substitutes	Shelf life enhancers	Flavorings	Formulation	Mixing	...
Flavor	+	++	+	++	+	+	
Appearance	+	+	++	O	++	+	
Fat content	O	++	O	O	O	O	
Texture/Mouth feel	+	++	+	++	+	+	
Price	O	+	+	+	++	++	
Calories	++	+	O	O	O	O	
Maturity (E,G,M)	G	E	G	G	M	G	
Importance (B,K,P,E)	B	K	B	K	B	B	
Competitive Profile	CI A/B	A B/CI	A/B CI	A/B CI	B A CI	A B/CI	

Final Working Landscape Map

Market: Consumer
 Product Class: Convenience desserts

Performance Characteristic	Importance	Industry Leverage	Ingredient Technologies				Process Technologies		Competitors	
			Sweeteners	Fats and substitutes	Shelf life enhancers	Flavorings	Formulation	Mixing	++	--
Flavor	1	M	+	++	+	++	+	+		
Appearance	2	L	+	+	++	o	++	+		
Fat Content	3	H	o	++	o	o	o	o		
Texture/ Mouthfeel	4	H	+	++	+	++	+	+		
Price	5	M	o	+	+	+	++	++		
Calories	6	L	++	+	o	o	o	o		
Competitor Profile		Constar Inc.	●	⊙	⊙	○	○	⊙	10% share	
		A	⊙	●	●	●	⊙	●	30% share	
		B	⊙	⊙	●	●	●	⊙	40% share	
Relative Maturity			G	E	G	G	M	G		

- Importance: Rank order, **1** is most important
- Industry Leverage: **H** = high
M = medium
L = low (refers to customer reaction to performance improvements)
- Technology Impact: **++** = technology influences greatly (positive or negative)
+ = moderate impact
o = low impact
- Competitors: **1** = best
2 = second best
3 = third best (ties indicate equal performance)
- Competitive profile: **●** = strong capability/high investment
⊙ = moderate capability/investment
○ = low capability/investment
- Relative maturity **E** = Emerging technology
G = Growing technology
M = Mature technology

*** See next page for additional explanation of the form ***

Performance Characteristic	Importance	Industry Leverage	Ingredient Technologies				Process Technologies		Competitors	
			Sweeteners	Fats and substitutes	Shelf life enhancers	Flavorings	Formulation	Mixing	++	--
Flavor	1	M	+	++	+	++	+	+	B A CI	
Appearance	2	L	+	+	++	0	++	+	B A CI	
Fat Content	3	H	0	++	0	0	0	0	A B CI	
Texture/ Mouthfeel	4	H	+	++	+	++	+	+	B CI A	
Price	5	M	0	+	+	+	++	++	B A CI	
Calories	6	L	++	+	0	0	0	0	A B CI	
Competitor Profile		Constar Inc.	●	⊙	⊙	○	○	⊙	10% share	
		A	⊙	●	●	●	⊙	●	30% share	
		B	⊙	⊙	●	●	●	⊙	40% share	
Relative Maturity			G	E	G	G	M	G		

1. The **Performance Characteristics** refer to the factors that are important in influencing the purchase or use decision.
2. The **Importance** refers to the absolute importance of the characteristic in the purchase or use decision. Higher importance items generally must be fairly well satisfied before lower importance items influence the buying or use decision.
3. The **Industry Leverage** refers to the market impact of an improvement in a characteristic, its maturity. High leverage means your customers will have a strong and positive reaction to improvements. Low means they really don't care about improvements – *even if it is an important characteristic*. Note, just because industry leverage is low (totally satisfactory is available somewhere) does not mean there may not be room for you to improve.
4. The **Technologies** refer to the current and potential technologies that are used in this business area.
5. The **Technology Impact** refers to the extent to which a technology affects the performance level of a characteristic.
6. The **Competitive Performance Profile** refers to the extent to which each competitor, including yourself, is providing the customers what they want.
7. The **Market Share** refers to your success in the marketplace; in an open market it should reflect the relative performance of your product or service.
8. The **Relative Maturity** of the technology refers to the approximate location of the technology on its *S-Curve* and indicates the ease with which an investment in technology can be translated into a meaningful level of improvement in your product or service.
9. The **Competitive Technology Profile** refers to the strength in the technology by each competitor, including yourself.

Items 1, 2, 3, 6, and 7 are typically provided by a marketing group, market research, customer contact, assessment of purchase/use patterns, etc.

Items 4, 5, 8, and 9 are typically provided by an engineering or R&D group, reverse engineering, competitive intelligence, technology forecasts, etc.

Example – Appearance: Appearance is the second most important characteristic, but its leverage is low indicating that everyone is generally well satisfied with the appearance of existing products. There is difference among companies however, B has the best appearance, A next best, and CI the worst. The two technical areas that have the greatest impact on appearance are shelf life enhancers (their use can degrade appearance) and formulation (that is the key to good appearance). If CI were to decide to improve appearance it has a major technology weakness to overcome; its formulation technology is weak compared to its two main competitors. This is surprising since it is a relatively mature technical area, but this also means that the technology might be available from the outside. CI's low market share may be due in part to their weakness in appearance.

Attachment 2

Constar, Inc. (CI) Case

The Constar, Inc. Case was selected to demonstrate the logic of the CFTP® approach. While it may not directly relate to your particular industry, it addresses questions that are common to all technology planning efforts, using technologies and products that are relatively easy to understand, regardless of your background. Completing the case should help you better understand the CFTP® process and how the CFTP® Map can help you make difficult technology investment decisions.

Constar Case

Constar Inc (CI) has been working on a new artificial sweetener, Sweetall, that will provide better cost and taste attributes. Company A is rumored to be test marketing a new fat substitute with better taste, mouthfeel, and cost. Company X has approached CI with a new technology that allows you to change additives without having to stop the process line and purge and clean the system; productivity and cost impact could be great for the company acquiring this technology.

As you work through the questions at the end of the case reflect on how this *way of thinking* about technology could be used to address the technology planning challenges you face.

Situation:

- CI is a major food processing firm with a wide range of consumer and institutional food products.
- Last year they launched a new soft frozen desert aimed at the growing nutritionally aware segment of the market.
- Unfortunately, despite the fact that initial field tests showed strong customer acceptance, the product has had difficulty achieving a significant market share.
- A market research study was just completed indicating the importance and desire for improvement in each of six major characteristics of their product. The results are summarized in the attached Customer Needs Matrix.
- A technology audit was conducted in which the key technologies needed to improve or support each characteristic were identified. The results are summarized in the attached Technology Impact Matrix.
- A competitive study was commissioned that provided information on how their product and technology compared to other participants in the industry. The two working matrices were updated to reflect the relative strength of each firm.
- You are a member of a planning team responsible for reviewing the data and making recommendations on where to focus development efforts to improve the product.
- The information from each of the analyses have been summarized on the CFTP® Map in Attachment 1, which includes a guide to its interpretation.

The Questions:

1. Relying solely on the information on these pages, identify as many projects as possible that you might want to consider. (e.g., improve texture to make product smoother.)
2. Select the three or four projects that you would consider as the highest priority, and explain why.
3. What additional information about your competitors, technology, or the market would be useful?

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