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MARKET RESEARCH: A PRIMER FOR ENTREPRENEURS

The development of a new venture is an iterative process. Each iteration starts with an initial version of the venture's (extended) business model.¹ The venture then gathers new information, assimilates and analyzes it. Based on what it learned, it revises its business model and proceeds to the next iteration. Market research comprises multiple "test and learn" information loops that propel the new venture forward.

As the venture evolves, it uses what it learned from market research to modify different aspects of its business model – its product or service, target customers, revenue model (e.g., pricing), go-to-market strategy, competition, etc. Market research includes *primary* and *secondary* research. Primary research is customized research conducted by interacting with other people, testing product prototypes in use or collecting data first hand. Secondary research is research which is based on data and analyses that were developed or compiled by others. Both are useful and important, and they are complementary, although different commentators have expressed different views on their value and use.

In addition to market research, a new venture's information loops often include product and technology research. This research is specific to the technology which enables the venture's product or service, is often technical in nature, and is best addressed within the context of the underlying science or engineering disciplines. However, product research also involves customer research which is at the core of market research.

This note addresses the market research performed between the point at which the venture defines its *initial* business model and the point at which it achieves meaningful *traction* (also known as "product/market fit"). This is a period of high uncertainty and turbulence, and its focus should be on discovering new insights, improving the venture's business model, and engaging in information gathering and experimentation to both increase the venture's upside

¹ The extended business model comprises the venture's core business model (value creation model, profit model and the logic of the business), augmented by its business network and external factors (e.g., competition, regulation, technology). See, H. Mendelson, "Business Models: A Primer," Graduate School of Business, Stanford University, 2011. This note does not focus on the scope and definition of business models, and therefore simply uses the generic term "business model" broadly. Nor does it focus on changes in the composition of the venture team, which may sometimes be called for along with business model changes.

Haim Mendelson prepared this note as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Preliminary draft – please send comments to Mendelson.Haim@gsb.stanford.edu. Copyright © 2011 by Haim Mendelson.

(identifying new opportunities for success) and reduce its downside risk. The venture aims to assimilate new information quickly and at low cost so it can find its way from the initial business model to a viable business model – without running out of cash. This calls for judiciously optimizing the use of primary and secondary research by balancing the value of the information acquired against the time and cost of acquisition.

In what follows, this note first outlines the market research process. It then provides an overview of secondary research, showing how it may be applied to market sizing. The following sections consider different ways of conducting primary research: interviewing experts and other industry participants, conducting exploratory customer research, interviewing customers for problem identification and solution evaluation, managing focus groups and using surveys and A/B tests. The note ends with brief concluding remarks.

Research Process

Because the development of a new venture comprises multiple “test and learn” information loops, market research should be designed dynamically rather than rigidly follow a preset plan. It’s best to start with an overarching research plan and revise it as the research progresses, along with the revisions of the venture’s business model. Each “test and learn” loop starts with a business model which is to be tested and analyzed, and a set of research questions or hypotheses that define the goals of the upcoming information loop, i.e., what are we trying to test and learn now? While the research questions define what the venture is *trying* to learn next, it may end up learning less – or more. The venture should design its information loops so it can capture more information than just what’s needed to answer the research questions it identified. It should seek and stand ready to assimilate and harvest new insights as they emerge.² At the end of each information loop, the venture takes stock of what it learned, revises its business model and research plan, and designs the information loop that follows.

Focus and simplicity are key to successful market research.³ While the venture should stand ready to harvest any new serendipity insights, it should plan for one or few priority areas per information loop, depending on its resources and time constraints. Simpler and faster information loops work better than heavy information loops that are loaded with multiple objectives: the latter are slower and their results are harder to interpret.

Any “test and learn” loop may involve primary or secondary research, depending on the goals of the upcoming information loop and the available resources. Some commentators argue that the only market research that matters involves direct end-user feedback. While those are indeed crucially important, I believe the judicious use of expert interviews and secondary research can greatly speed up the development of a venture’s business model. Although secondary research was not customized to the specific questions the venture needs to answer, it can be cost-effective and useful. Secondary research has the advantage that it has already been collected, often by experts – the venture’s main task is to find, assimilate and interpret it. Its disadvantage is that it

² This is sometimes called “Information Awareness.” See H. Mendelson and J. Ziegler, *Survival of the Smartest*, Wiley, 1999, and the research papers cited therein.

³ Mendelson and Ziegler, *Op. Cit.*

was not collected by nor specifically for the venture, and as a result its relevance is limited and sometimes questionable. It often has little to say about how customers will use the venture's product, how partners will structure deals with it, or any other particular aspect of the venture. Therefore, the tradeoff between time, cost and customization should drive the balance between primary and secondary research. In some cases, expert interviews provide the best solution on this tradeoff curve. And, when the venture resorts to secondary research, it should keep its limitations in mind and actively engage in a vigorous primary research program as a core element of its research plan. In some areas, such as online consumer offerings, primary research can be fast and sufficiently inexpensive that it can drive the answers to most research questions: demand can be estimated by measuring the response to a paid search campaign that links to a "Coming Soon" landing page, and business model hypotheses can be directly tested using an A/B testing procedure as discussed later in this note.

Initiating the Market Research Plan

New venture development does not follow a fixed sequence of "test and learn" loops, as those depend on the particular way the venture came to life, on the nature of the problems it attempts to address, and on what it learned in earlier information loops. Even the first step in the market research process varies depending on the initial impetus that stimulated the venture's formation. In many cases, the initial impetus is a perceived customer problem. Then, the venture may engage in exploratory customer research early on to determine whether there's a real problem, what its scope is, how acute it is, and how it may be solved. When Japanese entrepreneur Kuniyoshi Konishi set out to disrupt the expensive (3,000-5,000 yen) and time consuming (a full hour) hair salon market in Japan, his first question was: "Would customers be interested in a no-frills barbershop where they could get a haircut in ten minutes at a cost of 1,000 yen (About \$10)?" His first step was to perform primary customer research, starting with exploratory research and concluding with a telephone market survey that found 36% of respondents clearly supporting the concept.⁴ Based on the survey findings, he engineered a haircut process that met these cost and time objectives and started the QB ("Quick Barber") House barbershop chain that grew from one hair salon at year-end 2006 to about five hundred outlets in 2011.⁵

In other cases, the impetus for the formation of the new venture is new emerging technology. In that case, the first step may be to estimate the potential values of solutions that take advantage of the new technology. This calls for secondary research focused on sizing potential markets. For example, in 1994 Jeff Bezos founded Amazon.com to capitalize on the phenomenal growth of Internet technology. Bezos recalled:

Web usage, as measured in number of bytes flying across the Internet in Web format, was growing at 2,300% a year, and things just rarely grow that fast. So I set about trying to find a business plan that might make sense in the context of that growth, and I made a list of 20 different products looking for the first best product to sell online.⁶

⁴ Another 34% liked the idea in modified form.

⁵ H. Mendelson, "Business Models: A Primer," *Op. Cit.*

⁶ Jeff Bezos interview on Motley Fool Radio, January 25, 1999.

After researching the twenty retail categories, Bezos selected books. He explained the findings of his market research:

Books are incredibly unusual in one respect, and that is that there are more items in the book category than there are items in any other category by far. There are more than 3 million different titles available and active in print worldwide. Music is the number two category, and there are about 300,000 active music CDs. When you have this huge number of titles, a couple of things start to happen. First of all, you can use computers to sort, search and organize. Second, you can create a super-valuable customer proposition that can only be done online, and that is selection... Online, you can have this vast catalog of millions of titles, whereas in the physical world, the largest physical superstores are only about 175,000 titles, and there are only three that big.⁷

In yet other cases, the impetus for new venture formation is regulatory change. Then, researching the interplay between market structure and regulatory rules is a natural early step. For example, when the Securities and Exchange Commission (SEC) published in 1996 new rules for handling equity trades, it introduced an obscure concept called "Electronic Communication Network" (ECN). An ECN was a system that accepted orders for trading stocks, displayed them to the rest of the market, and could execute them electronically. If it satisfied certain regulatory conditions, the ECN would receive SEC approval without the heavy regulatory burden and overhead of a stock exchange. The new SEC rules created opportunities for the development of such ECNs, allowing trades to move away from established trading venues to the lower-cost, highly-automated ECNs. The technology for electronic trading already existed, and the most crucial information gap was determining what regulators would actually allow an ECN to do under a regulatory regime that had never existed before. As a result, regulatory research was the first priority; customer and technology research came second. Gerald Putnam, then owner of a small Chicago brokerage, recognized the ECN opportunity as he was reading about the new SEC rules in 1996. After studying the regulatory issues, lining up technology partners and testing early prototypes, he launched in 1997 a new ECN called Archipelago. In 2005, the New York Stock Exchange merged with Archipelago in a \$9 billion transaction.

Research Plan and Evolving Information Loops

Conceptually, the decision on what research to conduct in the upcoming information loop is made by examining the current state of the business model, identifying the knowledge gaps that need to be resolved, prioritizing them based on their importance to the viability of the venture, and evaluating the "bang for the buck," measured by value per dollar spent or value per week, for alternative information loops. The venture can then determine what experiment or data gathering effort will be most cost- and time-effective.

At the early stages of development, information and insight are typically more important than revenue or profit per se – the latter become increasingly important as the venture scales up. The

⁷ Jeff Bezos speech at the Commonwealth Club, July 27, 1998. More details are in H. Mendelson, *Amazon.com: Customer-Centricity in the Cloud*, Graduate School of Business, Stanford University, 2008.

reason is that early on, the venture is experimenting on a limited scale, so any revenues it stands to collect at present will likely be dwarfed by the revenues it will collect once it scales up. It will be foolhardy, for example, to invest in a large sales-force before the team understands what its product is and who its target customers are. Early on, the importance of revenue as a source of cash usually pales by comparison to revenue as a source of market information. If the venture is short on cash, collecting revenues is of course helpful. But the primary value of revenue should come from testing and validating the venture's business model: revenues support the hypothesis that its product or service is creating real value that real customers are willing to pay for with their hard-earned money.

The choice of an information loop often hinges on time considerations – how much time it will take to close the knowledge gap vs. how much it will slow the venture down if it doesn't. For example, quick market sizing estimates based on secondary research may eliminate certain customer and solution types from further consideration and allow the venture to focus its primary research on more promising problems, solutions and customer segments. Thus, conducting appropriate secondary research early on saves the venture time and allows it to focus on the most crucial information gaps.

The research process evolves from the exploration of broad questions (such as, identifying what customers are looking for) through the testing of specific hypotheses (e.g., what is the effect of a price change on revenue?) to the validation of the business model or its key elements. That evolution is not linear. For example, the results of a test may take the venture back to the exploration of customer needs. Through the process, it is often necessary to assimilate a large amount of information about a market that the team may not know much about while leaving multiple options open for the future. This requires a deliberate, well thought out research plan – which will be modified as the venture continues to learn.

One sequence of market research activities is shown in **Exhibit 1**.⁸ Secondary research comes first because it can be gathered relatively quickly while creating a basic knowledge platform on which the venture can build the rest of its research plan. Expert interviews come early on because they allow the venture to gain a deeper understanding of the industry and its problems, and they help identify what information the venture will need later on. Expert perspective is often key for grounding both the venture's business model and its research plan in the reality of the industry. And, once the venture has made some progress in its research, it should plan to return to its experts for a reevaluation of its findings and the associated business model.

Customer research is usually at the core of market research, starting with exploratory research to identify basic issues and needs. It may then move on to interviews where the customer evaluates the solution, using a simple prototype whenever possible. Only then is the venture ready to conduct more structured survey research to test specific hypotheses and validate key elements of its business model. **Exhibit 1** shows one possible pattern of iteration; many others are possible as well. For example, some ventures have the ability to engage in parallel market research

⁸ See A. Sieger and R. Chess, *A Note on Market Research*, Stanford Graduate School of Business E-165, June 2004, for another approach to sequencing market research activities.

efforts. This may involve parallel prototyping,⁹ whereby the venture engages in parallel development efforts, or employing different types of market research (e.g., focus groups, surveys and customer interviews) in parallel in the same information loop.

Throughout the research process, it is important to plan for flexibility and multiple iterations. For example, if the venture is planning to conduct twenty customer interviews, it should think about each interview as an opportunity to learn how to conduct the next interview or modify its research plan altogether: what it gleans from an interview may direct it to a new source, or may result in the reformulation of the interview questions to build on new insights.¹⁰ In summary, the venture should have an overall vision and research plan which will be continuously modified based on what it learns as it goes along.

CONDUCTING SECONDARY RESEARCH

Secondary research is research which is based on data and analyses that were developed or compiled by others. Secondary research may be documented in market research reports compiled by market research and consulting firms, firm and industry research reports compiled by brokerage analysts and investment firms, public company filings with the U.S. Securities and Exchange Commission and parallel regulatory agencies in other countries, investor presentations and marketing literature from firms in the industry, white papers, company websites, data and reports compiled or filed by government agencies, articles from news, trade and academic journals, and reports compiled by industry organizations.

If everything in your life starts with an online search query, your secondary market research should be no exception. Otherwise, a good starting point is your library, which will typically have both high-level and detailed industry information. A librarian may help with the use of library resources and will typically be able to direct you to relevant government and other common data. Identify the public companies that play an important role in the industry and review their regulatory filings and analyst reports. Review competitors' websites in detail. Find out which market research firms cover the industry. Identify relevant keywords and search news and industry sources that are available in closed databases in your library as well as on the Internet. Remember that when you start, your objective is to gain a high-level understanding of the industry and some aggregate estimates rather than to cover all fronts (as you start, you don't even know what these fronts will be). Most of the decisions you will make early on will not be sensitive to small differences in market size, cost structure and other parameters. Rather, you are seeking to gain a general understanding of market structure, customer demand and the like, as well as the order of magnitude of relevant market parameters. Make sure you limit your time investment accordingly.

⁹ See, E. Dahan and H. Mendelson, "An Extreme-Value Model of Concept Testing," *Management Science*, Vol. 47, No. 1, 2001, pp. 102-116.

¹⁰ This should be done with care, however, as changing the questions makes it more difficult to compare the answers of different customers. Such revisions in mid-stream are unadvisable in survey research but are often called for during qualitative exploratory research.

The U.S. Government compiles and assembles data on a variety of economic topics and industries. Its online “reference shelf” is at [http://www.usa.gov/Topics/Reference Shelf/Data.shtml](http://www.usa.gov/Topics/Reference%20Shelf/Data.shtml). The U.S. Government also assembles data about foreign markets at <http://Export.gov/mrktresearch/>.¹¹ These data include country commercial guides which analyze different countries’ business environments, industry overviews, Best Market reports identifying top country markets by industry, and other industry and regional reports. The United Nations (<http://data.un.org>), the Organisation for Economic Cooperation and Development (OECD at <http://www.oecd.org>) and multiple industry associations have a wealth of data as well. In addition, some universities maintain industry and country portals and guides. For example, the Stanford Graduate School of Business has a collection of industry, company and country guides (<http://www.gsb.stanford.edu/jacksonlibrary/research/>), and Michigan State University’s GlobalEDGE (<http://globaledge.msu.edu/>) links to a wealth of information about business activities around the world.

Since secondary data has already been compiled for you, so you can assimilate large amounts of information quickly and at low cost. Make sure you realize this advantage by using it properly: early on, extract the key pieces of information you need such as market size and growth trends, industry structure, value chain structure, and overall cost structure. You may be able to drill down beyond that, but the data may be old, aggregated or refer to a different market segment from the one(s) you want to focus on. You need to understand the key structural elements of the industry before you start interviewing experts, customers and other industry participants. Because the research was not prepared for your own purposes, you are likely to be left with large, unfilled information gaps. However, secondary research may simply not be available to answer many of your questions, and even if it is available, it may take you too much time to hunt it down. The gaps between what you can find and what you want to know will help you identify what to ask experts and others. They may be able to answer your questions, direct you to a source you could never find on your own, or help you recast your questions so they are amenable to productive research.

Early on in the venture development process, you will need to estimate the sizes and growth rates of your potential markets and market segments. This will help you sort out which market segments show more promise than others and will give you (and potential investors) a sense of the potential return on investment in your new venture.¹² This process, which typically uses secondary research, is considered next.

Market Sizing

A key driver of the return on investment in a new venture is market size. Much of the cost structure of a new venture, from R&D expense to software development and physical facilities, is fixed. If the market is not large enough, the venture may not be able to reach its break-even point (with the variable profit contribution covering the venture’s fixed costs), which implies that it cannot be economically viable. Reaching the break-even point is of course only a first step –

¹¹ Access to the data requires registration at Export.gov.

¹² Recall the analysis performed by Jeff Bezos prior to deciding to concentrate on the book category.

the larger the market, the larger the potential returns. Thus, market sizing will help you determine how large the opportunity is, how likely you are to break even, what the scale of your R&D expense should be, and what are appropriate salesforce size and go-to-market strategies.

Market size is measured by annual revenues. These revenues are driven by other drivers of scale – for example, number of users, usage frequency, and revenue per use. While it is important to identify these drivers, the ultimate market size should be stated in annual revenue terms. When specifying these revenues, it is important to also specify what market segment(s) they are based on, e.g., by geography, demographics, and other customer characteristics.

The first measure of market size is the Total Addressable Market (TAM) – the annual revenue you would generate if you acquired every potential customer in the absence of direct competition (these customers form the addressable market for your product or service). TAM corresponds only to the customer segment(s) that would be served by your product or service – not to some high-level market size estimates provided by a research firm. For example, if your company sells luxury apparel online, your market is limited to high-end apparel and to online sales (and the market will probably be limited to the U.S. as you start).

At a high level, there are two ways to estimate TAM: top-down and bottom-up. The *top-down* approach starts from a broad market size estimate, typically sourced from a research firm or an industry participant, and then narrows it down to your target market segment(s) (say starting from apparel, then limiting it to high-end apparel and to online sales). Sometimes, you will start with high-level demand drivers (e.g., overall spending in a category) and adjust them for factors that drive or inhibit demand (e.g., number of rainy days for umbrellas). Pharmaceutical companies may use the number of people afflicted with a particular disease to estimate the TAM for a new drug. In the early years of DVD-by-mail subscription service Netflix (before it started streaming video), the company could estimate its TAM by multiplying annual U.S. home video entertainment revenues in the relevant year by the percentage that could be derived from DVD rentals by mail (i.e., excluding outright DVD sales, in-store rentals, VHS rentals, etc.) that were initiated over the Internet (thus requiring an Internet connection, which was far from universal at the time).

The bottom-up approach builds the TAM figure up by plugging the data into your revenue model, segment by segment. For Netflix in the late nineties, this approach could start with the revenue formula

$$(1) \text{ Annual Revenue} = \text{Number of Subscribers} \times \text{Average Monthly ARPU} \times 12,$$

and with a segmentation of U.S. households, say by geographical area. While this segmentation may not be necessary to estimate the overall TAM, Netflix's ultimate penetration depends on the time it takes to ship a DVD to the customer by mail, which depends on the customer's distance from Netflix's distribution center. When Netflix launched, it had one distribution center in Los Gatos, serving the San Francisco Bay Area; in later years it launched distribution centers throughout the U.S. and its penetration grew accordingly. The ARPU (Average Revenue per User) can be calculated by multiplying out the monthly subscription under each plan by the percentage of subscribers who would opt for the plan. The TAM may now be estimated by

adding up the results of (1) across the different geographic segments. If you now want to add video streaming, you may treat it as another segment, using equation (1) with the number of people who subscribe to video streaming, and the ARPU of the average streaming subscription.

Needless to say, TAM estimates are often based on some soft assumptions. This problem may be mitigated by comparing the TAM estimates derived using the top-down and bottom-up approaches,¹³ or by using ranges based on pessimistic and optimistic estimates for a TAM driver. In spite of the potential complexity of estimating TAM, you should keep your analysis as simple and as transparent as possible.

The TAM calculation assumes that anybody who could use the product or service would. The Served Addressable Market (SAM) limits the market size to actually served customers, and is obtained by multiplying the TAM by the penetration rate of the product or service. Penetration rates are less than 100% because of the time and difficulty of adopting new products and services as well as distribution barriers and imperfect marketing. In the case of DVD-by-mail, penetration rates may reach up to a quarter of TV households in an area with a local distribution center (which assures delivery in one or two days), and will be significantly lower if there is no local distribution center.

The most relevant market size is of course based on the actual market that will be served by the venture, taking into account the fact that some customers will be served by competitors. Your Share Of Market (SOM) is your annual revenue, estimated as the product of SAM by your market share. In the case of Netflix, the key question here is what will be the market share of competitors such as Blockbuster when it provides a DVD-by-mail service. It is often difficult to estimate the market share of a new venture, which is why the TAM or SAM are convenient starting points from which you may derive your annual revenue as a function of your market share.

Finally, it is also important to identify key market trends rather than just estimate the market size at a single point in time: a small market experiencing double-digit growth is often worth more to a startup than a large but stagnant market. This has to do partly with the compounding effect of a growing market and partly with the fact that it is often harder for a startup to dislodge entrenched incumbents in a stable market than to capture a new segment of a growing market.

CONDUCTING PRIMARY RESEARCH

As already discussed, there is only so much you can get from secondary data. To answer questions that are specific to your new venture, you need to step up your efforts and conduct primary research. Direct observation, interviews, industry events, focus groups, surveys, and a variety of forms of field research are sources of primary research. Primary research has the advantage that it is tailored to answer *your* questions, but its cost and time requirements are substantial. In addition, the information assimilated from primary research is often ambiguous,

¹³ If the two approaches lead to substantially different results, you need to drill down, figure out the source of the discrepancy, and reconcile the two estimates.

full of contradictions, and open to multiple interpretations. However, primary research will provide you valuable knowledge and insights that cannot be obtained from secondary research.

Primary data may come from direct interactions with potential customers, end users, experts, suppliers, distributors, partners, and competitors. It can be exploratory, used to discover preliminary insights and a broad understanding of the market, or it may be used to test specific hypotheses (e.g., can you acquire 1,000 customers a day by spending \$100 on search marketing?) or to validate various aspects of your business model. Exploratory primary data are largely gathered by talking to people. These conversations become particularly powerful and concrete when they are accompanied by a prototype.¹⁴ Compared to a discussion of what your venture could do in the abstract, a prototype elicits direct, meaningful and credible feedback.

Experts and Other Industry Participants

While the most important target for gathering primary research is prospective customers, you can gain useful knowledge by talking to other industry participants, including trade show participants, suppliers and industry experts. A discussion with a potential business partner may result in multiple insights, both in terms of the viability of the partnership (direct) and in terms of the structure of the industry, what customers are looking for, and other industry insights (indirect). You may also learn about the industry and potential competitors and sometimes identify partners and leads by talking to suppliers.

You may gain valuable market research at low cost by participating in trade shows and industry meetings. Many industries have annual (and sometimes more frequent) shows where multiple companies showcase their products. They are held at large meeting venues and are attended by vendors, buyers, distributors and other industry participants. You can learn about industry “buzz,” what products are in demand, what buyers are looking for and what sellers are “pushing” by attending a relevant trade show. You may find and casually interview business customers, distributors and potential partners (as well as potential competitors) at a trade show.

Expert interviews

In many cases, a good early step is to conduct an interview with an industry expert, who may show you the lay of the land and help you see the forest for the trees. An expert interview may short-cut the long process of learning what’s feasible, how the industry works, who are the key players, how customers are segmented, and what seemingly promising approaches have been tried before but failed.

Experts include executives, entrepreneurs who have worked in the industry, research analysts, consultants, university professors, and government or industry association officials. Retired executives are often particularly helpful: they have some free time, they don’t have an axe to grind, they have a broad and rich perspective on the industry, and they enjoy recounting their

¹⁴ See A. Han and H. Mendelson, *Prototyping: A Quick Introduction*, Stanford Graduate School of Business, E-414, 2011.

experiences. Alumni are often willing to help students, and friends and teachers can help you identify experts they know and may introduce you to them.

Industry experts may help you stir your venture both early on and throughout its development. As discussed above, they can help you define your initial business model and stay away from known pitfalls. As you continue to evolve your business model, they can give you insight to help determine your next steps and feedback about your plans. They can critique all aspects of your business model, help shape your research plan, identify contacts such as lead customers and potential partners, give you referrals and help you find and interpret relevant research.

To prepare for an expert interview, make sure you review secondary sources regarding the industry in advance. Bring to the meeting a concise description of your venture and your business model. Prepare a list of both high level areas you want to cover and specific questions you have. When you introduce your venture, avoid sales pitches and grandiose statements (“we aim to disrupt the toy industry”); be brief and concrete. In some cases, the expert will guide the discussion once he or she knows what your venture is about; the expert may actually start interviewing you. That’s OK as long as you are well-prepared, keep taking detailed notes, tick off the areas the expert covered so you can ask about what’s left, and stick to the point.

In most cases, you will be leading the interview. Start with high-level overview areas and then proceed to your detailed questions. Make sure you ask “Who else do you think might be helpful?” close to the end of the interview. Different experts often have different perspectives on the industry, and some may be self-centered. Hence, it is a good idea to interview a number of industry experts if you have access to them. Finding the right experts can dramatically accelerate your learning cycles as well as help you create an effective research plan.

It goes without saying that you should treat industry experts with care. Make sure you recognize their contributions, respect their time, and thank them for their help. Industry experts who helped you early on will often be interested in hearing back about your progress, and you should get back to them as a matter of both courtesy and self-interest. Depending on their contributions and status, industry experts may become advisors or board members in your company.

CUSTOMER RESEARCH

Ethnography

Exploratory customer research attempts to discover insights from interactions with customers or end-users. The *empathy* stage employed at the beginning of the human-centered design process¹⁵ is an example of exploratory customer research. It involves observation of end-users and their behavior in the context of their lives, interaction with them through both scheduled and short encounters, and immersion in their experiences. Your objective is to arrive at a deep understanding of the problems they face and gain insights into their feelings and preferences. Empathy is a special case of a broader class of exploratory research techniques known as

¹⁵ *Bootcamp Bootlag*, Stanford d.school, 2010.

ethnographic research, which originated in the discipline of anthropology. Ethnographic research studies people's behavior in their "native" environments – where they live, work, shop, and play. The researcher immerses himself or herself within the environment and work/social context of the subjects, establishes rapport with them, and engages them through participation, observation and conversation to yield insights about their underlying needs, beliefs, attitudes and values.

A coherent ethnographic approach to market research has been developed and successfully deployed by the Stanford d.school, and is covered elsewhere.

Customer interviews

Customer interviews are important sources of information that could dramatically affect the path your venture will take. It takes time to line customers up as well as interview them. Therefore, it's important to do your homework in advance. Develop an interview plan that will guide you through each interview and try to cover the key issues without being rigid about the structure of the interview. Keep the interview as simple as possible, and focus on key issues. When you recruit subjects, you may want to subtly mention the benefits of the interview to them: they may have an opportunity to learn about new market developments, review their own business or activities vis-à-vis competitors or best-practice benchmarks, and they may be able to influence the development of your product or service in a way that's beneficial to them. As an added benefit, you may offer to review a summary of your findings with them.

There are two different types of customer interviews: (i) an early, exploratory interview which is used to identify a customer's problems; and (ii) an interview used to evaluate potential solutions, often using a simple prototype. The two interview types have distinctly different goals. Problem identification interviews should be kept as "pure" as possible, since any discussion of a solution colors and biases the customer's perception of his or her problems and needs. However, the evaluation interviews should include a reevaluation of the underlying problem, as the evaluation of a solution may lead to the identification of new customer needs.

Problem Identification

A good way to learn about customer needs is to interview them. Interviews are usually conducted one-on-one, ideally with another person coming along to take notes. The interview gives you an opportunity to get in-depth information from a prospective customer, to learn how he or she performs relevant tasks, and to probe for underlying needs or problems that call for solutions. Interviews may be scheduled or unscheduled. Unscheduled interviews are essentially short, ad-hoc encounters with consumers where they shop, eat, etc. Interviews are useful but imperfect sources of information. Customers may try to "look good" during the interview, which could affect their responses. They may simply not remember or not be able to articulate their exact experiences, the process they go through, or even their preferences among alternative features or courses of action.¹⁶

¹⁶ Ethnographic and "empathy" research are well-suited to address these issues.

The first step in the interview process is to identify prospective customers to interview based on your target market segment. Interviewees may be end-users, key decision-makers in the buying process, or support personnel. In many business situations, the end-user, the buying customer, and the decision maker are not the same person. There is often a complex relationship between the different players who influence the buying decision, and each is driven by different drivers and incentives. Consider, for example, the case of a medical device. In some cases, the end user (the patient) may not pay for the device – the insurance company, or Medicare, might be the payer. In others, the patient pays a fraction of the price of the device. In yet others, the patient makes a fixed copayment. Each of these possibilities influences the choices made by the patient. In fact, in many cases the patient's physician is the one who effectively makes the choice, and in others it is the insurance company. You should map the various people and entities that participate in or influence the decision process and clearly understand their roles and how they interrelate to one another. You should interview representatives from each of these stakeholder groups as "customers" so you their motives and needs are properly reflected in your analysis.

The number of interviews you conduct depends on the nature of the market and on the resources available to you. It is commonly assumed that about 10-20 interviews should be sufficient to identify the vast majority of customer needs.¹⁷ In business-to-business markets, 5-10 customers are often sufficient. Unlike survey research, which calls for a statistically representative sample, problem identification interviews are best conducted with early adopters with a further view to spanning multiple use cases ranging from non-users to lead-users.¹⁸

It's a good idea to let customers know in advance the objectives of the interview so they can prepare, lightly, in advance. "Lightly" is a key word here, as excessive preparation and "canned" responses negatively affect the veracity of the interview. There are exceptions, as when the interview has to go into technical issues and details that are hard to remember without preparation. These, however, should be avoided to the extent possible.

In contrast, you should be thoroughly prepared for each interview. You should be grateful for the opportunity to talk to them and make every minute of observation and interaction count. Make sure you know what information you are trying to gather in the interview, but be flexible – you don't want to miss any serendipity. Order the interview questions from easiest to harder (but still easy!) questions and from casual to more structured and detailed so the interview flows naturally. Prepare some alternative high-level paths for the interview.

When you schedule the interview, set clear expectations on the amount of time required (often half an hour) and the purpose of the interview. Face to face interviews are best, as they instill a sense of intimacy, allow you to read body language, and let the interviewees use hand gestures or drawings to illustrate their points. If face to face interviews are not feasible for all the customers you interview, try to schedule the face to face interviews (which tend to be richer) first and telephone interviews later. Use phone or email (depending on the interviewee's preference) for a quick and focused follow-up to a face to face interview if needed.

¹⁷ A. Griffin and J. Hauser, "The Voice of the Customer," *Marketing Science*, Vol. 12, No. 1, Winter 1993, pp. 1-27.

¹⁸ Mendelson and Ziegler, *Op. Cit.*

During the interview, make sure you cover the key areas you prepared, but ask open-ended questions that don't suggest there is a "right" answer and don't cut off an open-ended conversation. Questions with yes or no answers turn the interviewee off and give you less information – an explicit structure is more useful in surveys than in customer interviews. Let the customer tell you stories and frequently ask "why?" so you can better understand his or her underlying needs. Be an active listener – let the customer drive the answers and much of the discussion. Keep your questions short, don't suggest answers, and don't argue.

Don't "sell" your concept – your objective is to learn. Focus on the customer's underlying activities and tasks rather than on the features of the product or service you have in mind. It's a bad idea to start "selling" a solution when you are trying to identify key problems. The key question on your mind at this point should be what is the customer's main pain point and what outcome she would like to achieve, not what products or product features she would pay for.

While the interview is casual and partly driven by the customer, your objective is to cover at least the following areas:

1. What are the customer's key problems in the domain you are looking at?
2. How do they currently perform the tasks you are looking at? What is the process they go through? What choices do they make? Why?
3. What do they like about it? Why? What don't they like about it? Why? What are their most pressing pain points?

Try to schedule a follow-up interview to review the needs you identified, their priorities, and to obtain further information. Keep in mind that you will want to interview the same prospective customers again once you have some solution prototypes to show them.

Following the interview, quickly organize and interpret your notes and analyze them to identify what you have learned from the interview.

Solution (Prototype) Evaluation

A prototype enables you to iterate on the design of your business model and in particular – your product or service. A key objective of rapid prototyping is to allow you to receive quick feedback from end-users based on simple and easy-to-construct models and before you make major investments in further design (not to speak of manufacturing and distribution). A prototype may be as simple as a drawing, demo or mockup or as elaborate as a concept car.¹⁹ It enables end-users to visualize what the product or service you provide may look like. Early on, you should try to generate multiple prototypes with some extreme and unique attributes. Many of them may elicit negative reactions, but some may result in unique features that allow your product or service to stand out. Extreme designs elicit strong reactions that enable you to come up with highly differentiated products or services: your objective is to shoot for the best rather than revert to the mean.

¹⁹ A. Han and H. Mendelson, *Prototyping: A Quick Introduction*, Stanford Graduate School of Business, E-414, 2011.

Try to interview some of the same people you talked to early on, as well as some new end-users to bring in a fresh perspective. Make sure you understand their basic “demographic” and use characteristics. Bring the prototype with you and show them how it may be used. Watch their reactions and take down the questions they are asking. Some of the questions you may want to get answers to when you evaluate a prototype are listed in **Exhibit 2**. Although the interview questions in **Exhibit 2** are purposeful and structured, the idea is to obtain the answers in a casual fashion, allowing the end-user to use the prototype to illustrate her points and, whenever possible, watching it in actual use. It is important to identify whether the solution is compelling (your objective) or nice-to-have, and (in the latter case), what it would take to make it compelling. Note that the questions are designed not only to evaluate the prototype, but to identify new use cases as well. Make sure you document your results shortly after the interview.

In later stages of the research process, the focus shifts from exploration to the testing of specific hypotheses, which requires larger sample sizes and often a more quantitative approach. At this point, you will have well-formulated hypotheses that can be tested more rigorously.

Focus Groups

A focus group is a deliberate, moderated discussion of a specific topic with about 4-10 participants (often prospective customers). Focus groups are designed to capitalize on interaction and communications among the members of the group. The assumption underlying focus group research is that the information and insights produced by the group are richer, more complete, and more revealing than what you can learn from a series of individual interviews.²⁰ However, a professional focus group may be expensive for a startup, as you are expected to pay a professional moderator and sometimes the participants for their time.

Focus groups are efficient in aggregating large amounts of information and feedback quickly, and they sometimes uncover hidden issues that would not surface easily in individual interviews.²¹ In some cases, focus groups are used to explore open issues, surface customer problems, and identify basic needs (exploratory research). In others, they may be used to test or validate specific hypotheses (e.g., examine customer reactions to a prototype) using a small sample size and a more qualitative approach to testing. Because the participants in a focus group do not form a representative sample, the outcomes are often biased, and even if they are not, the results are not statistically significant unless multiple groups are used. Further, research suggests that “an hour of interviewing is an hour of interviewing independently of whether it comes from a one-on-one interview or a focus group,” so focus groups use customer time inefficiently.²² Furthermore, group dynamics and peer pressure may lead the group astray, and the skills of the

²⁰ D. W. Stewart, P. N. Shamdasani and D. W. Rook, *Focus Groups: Theory and Practice*, Sage Publishing, Applied Social Research Methods Series, Volume 20, 2007.

²¹ *Ibid.*

²² A. Griffin and J. Hauser, “The Voice of the Customer,” *Marketing Science*, Vol. 12, No. 1 (Winter 1993), pp. 1-27; E. F. Fern, “The Use of Focus Groups for Idea Generation: The Effect of Group Size, Acquaintanceship, and Moderator on Response Quantity and Quality,” *Journal of Marketing Research*, Vol. 19 (February 1982), pp. 1-13.

moderator affect the performance of the group. When people report issues in a group setting, what the group may think often affects what they say, which creates another source of bias. However, focus groups can still lead to the rejection of a key hypothesis and to the identification of important issues that the startup must address. Sometimes, the findings from focus groups serve as a bridge between qualitative exploration and quantitative survey research.

Survey Research

Surveys involve the systematic collection of primary data through a questionnaire that is administered to a sample of respondents. Surveys may be conducted face to face, by mail, by phone, by email, through a website, or through a combination of these channels. Surveys may be used to test or validate specific hypotheses, to study customer characteristics or to understand the structure of demand and the effects of implementing alternative product features. To properly interpret the responses, it is important to understand the characteristics of the respondents. In particular, if the sample of respondents is not representative of the overall target population, the survey results will be biased.

Putting together a survey is a multi-step process. First, you need to determine the purpose of the survey: what information are you seeking? How would you translate your information needs into concrete data items that you will gather in the survey? The next step is to determine your survey channels, which will shape the overall form of your survey instrument. **Exhibit 3** compares a number of survey channels based on five criteria: cost per contact, speed, richness of interaction, anonymity, and the risk of potential bias. Face to face and telephone surveys are flexible and interactive, but they do not provide anonymity to the respondent. Professional telephone surveys are typically supported by special CATI (Computer Assisted Telephone Interviewing) software that helps the interviewer dial the numbers and record the results. Face to face interactions are rich and they allow the use of visual aids and the close observation of respondent reaction, but they are also the most costly.²³ Internet-based channels are inexpensive and fast (major advantages for a startup), allowing in some cases anonymity and the analysis of large samples at low cost. Another important advantage is that a service such as SurveyMonkey makes it easy to construct, administer and analyze Internet-based surveys for free or at low cost. Mail-based surveys can reach a controllable and wide sample at low to moderate cost while allowing for anonymity and reduced biases, but they take a long time to administer. The choice of a survey channel is also related to the sample characteristics you are seeking – demographics, industries, job functions, etc. For example, young consumers are unlikely to respond to a mail survey.

Your next step is to draft the actual questionnaire. You need to choose the structure of each question (multiple-choice, fill-in a number, open-ended, etc.), to word it, to make sure the question is clear and serves your information needs, and to design the format of the response. You then integrate your questions into a questionnaire including an introduction, survey instructions, and possibly multiple sections into which you will fit and sort your questions.

²³ These are sometimes aided by CAPI (Computer Assisted Personal Interviewing) software on the interviewer's laptop.

At this point, you have a draft of the survey that you should review critically, along with colleagues who are seeing it for the first time. This is essentially a prototype of your survey that should be treated like any other prototype. Administer it to a number of lay people, solicit their feedback, estimate the amount of time it takes to respond and revise the survey based on your findings. If possible, it's a good idea to validate your survey instrument more systematically using a small subsample before you administer it to your entire sample.

The quality of survey results is determined by the survey instrument, by the way the survey is administered, and by the survey sample. The survey aims to generalize from the sample of respondents to the entire universe of people you want to study (also called the "population" – in most cases, potential customers). Therefore, the best sample would be representative of the entire population. However, perfecting the survey takes time, effort and money, which you should trade off against the quality and reliability of the research.

The lowest-cost samples are *convenience samples* selected based on availability. A convenience sample may be a sample of fellow students, a sample of people willing to be interviewed at a shopping mall, a sample of people responding to a web survey, etc. By definition, these samples are attractive based on time and cost considerations, but are not representative of the larger population, and are therefore subject to biases. For example, a survey of shoppers at Saks Fifth Avenue is likely to include more affluent females than the overall population.

A more representative sample may be obtained, when feasible, by first identifying the relevant population or universe (e.g., members of a given customer segment) and then randomly selecting survey respondents from that larger universe. In telephone surveys, for example, it is common to use random digit dialing, where the first few (location-based) digits of the phone number are selected based on desirable sample characteristics, and the rest are dialed at random (an added advantage is that unlisted numbers are included in the sample).

Each survey is subject to different types of error, which are summarized in **Exhibit 4**. *Sampling error* is due to the fact that you are generalizing from a smaller sample to the entire population: it reflects the statistical (chance) fluctuations of the responses among the respondents, and it can be reduced by increasing the sample size. Its effect is quantified by the standard error of the estimate (SEE), which is equal in a simple random sample to the sample standard deviation divided by the square root of the sample size. As you increase your sample size, the sampling error decreases (albeit more slowly than linearly), and for a large enough sample size, you may achieve statistically significant results. However, as in the rest of your market research, you should balance the time and cost of conducting the survey against the precision of the results. You may end up making a deliberate decision to select a smaller sample than is needed for a scientific study, and this may be your best choice as long as you understand the limitations of the results. In fact, even a larger sample size may not reduce non-sampling errors (**Exhibit 4**) that could give rise to more serious problems than sampling error.

Systematic or non-sampling errors (**Exhibit 4**) bias the responses because of the design of your survey instrument and its administration, regardless of sample size. Some non-sampling errors are *measurement errors* (**Exhibit 4**), which reflect differences between the survey responses and the true underlying data. One factor which may lead to systematic measurement errors is social

acceptability: survey respondents are less likely to give answers that present them in a socially unfavorable light. For example, in a survey of music listening, respondents are less likely to admit that they downloaded music illegally. The wording and structure of questions on a survey may also unduly bias the responses. Consider, for example, two survey instruments with multiple-choice questions about customer satisfaction. One survey instrument has three options: satisfied, dissatisfied, or very dissatisfied. The other has four: very satisfied, satisfied, dissatisfied, and very dissatisfied. By giving the respondent one response option to express satisfaction and two options to express dissatisfaction, the first survey instrument is more likely to elicit less than satisfied responses. In addition to the wording of questions, the way questions are ordered and the interviewer's conduct (in a telephone or face to face survey) may also affect the way respondents answer the questions.

Other non-sampling errors are due to *non-response and selection biases* (Exhibit 4), which occur because the survey respondents may over-represent some segments of the relevant population and under-represent others. A non-response bias occurs when the people who decline to respond are different in relevant characteristics from those who agree. It is less of a problem when the response rate is high, i.e., most of the people in the sample complete the survey. The problem can be reduced through the choice of survey channel (e.g., face to face interviews may have higher response rates), by following up with non-respondents (e.g., calling them back), or by trying to sort out differences between respondents characteristics and overall sample characteristics.

Selection biases occur when population segments with certain relevant characteristics are systematically over-represented in the sample. A well-known example of a selection bias comes from the 1948 U.S. presidential election, when the election-day issue of the *Chicago Tribune* headlined "Dewey Defeats Truman," reporting the victory of the Republican candidate based on a pre-election telephone survey (of course, Truman won the election). Since telephone technology was relatively new in 1948, phone owners tended to be richer members of the community with stable addresses, which were disproportionately Republican.²⁴ Another source of selection bias is self-selection bias, which can happen whenever participants select whether to participate in the survey (as in an open web-based survey). For example, it goes without saying that an opinion survey of U.S. health care reform administered to the listeners of Rush Limbaugh's talk show would reach different conclusions than a similar survey administered to Randi Rhodes' listeners.²⁵

In a study of life events and satisfaction,²⁶ the University of Wisconsin-Madison gathered data about the characteristics of a sample of divorced individuals. The data were gathered by a phone survey which was followed up by a mailing for non-respondents. The reported data were compared to the data in the respondents' divorce certificates and other State data. This enabled the researcher to estimate, using the underlying data, the different sources on non-sampling

²⁴ B. Friedenson, "Dewey Defeats Truman and Cancer Statistics," *Journal of the National Cancer Institute*, 2009, p. 1157. Perhaps more important was the practice of quota sampling, which gave interviewers discretion to choose subjects they liked within certain numerical quotas.

²⁵ The former is a "conservative" talk show host, and the latter, a "progressive."

²⁶ K. Olson, "Survey Participation, Nonresponse Bias, Measurement Error Bias, and Total Bias," *Public Opinion Quarterly*, Vol. 70, No. 5, 2006, pp. 737-758.

errors in **Exhibit 4**. The variables studied included the length of the marriage, given by the difference between the divorce date and the marriage date in months; the number of months between the divorce and the survey date; and the number of times the respondent had been married before the last divorce.

Overall, the interviewers managed to contact 80.3% of the total sample, but 9.4% of the people contacted were not interviewed (primarily because they refused the interview), resulting in a response rate of 71% (**Exhibit 5**). **Exhibit 6** presents the means and standard errors of the estimates (SEE) for the underlying data (based on State records) vis-à-vis the survey results. The sample is segregated into five groups: the full sample, those contacted, those not contacted, contacts that were not interviewed, and those interviewed. The average length of marriage for the full sample was 130.29 months, compared with 134.17 months for the respondents and 133.92 in the survey results. The small difference between 133.92 (survey) and 134.17 (mean underlying value for the same respondents) reflects measurement error. Among those contacted, there was no difference in the average length of the marriage between the people interviewed and those not interviewed, but there was a difference of about 3% between the average length of marriage for respondents (134.17) vs. the full sample (130.29), reflecting a selection and non-response error. Regarding the number of months since divorce, the selection and non-response errors were small, but the measurement error (55.74 in the survey vs. 50.44 in the underlying records) was 10.5%. Turning to the number of previous marriages, the measurement error was small (1.21 in the survey vs. 1.20 in the underlying records) but there was a larger selection and non-response error as those interviewed had fewer marriages on average (1.20) than non-respondents (1.27).

Few early-stage startups engage in large-sample survey research, with the exception of online ventures that have the ability to reach a large online audience at relatively low cost. A special form of such market research that enables online ventures to test and compare alternative offerings with moderate to large sample sizes is A/B testing, which is discussed next.

A/B Testing

An *A/B test* is a controlled experiment which is used to compare the performance of competing prototypes. In its simplest form, you build two prototypes, "A" and "B," which you test in parallel using statistically similar (ideally, identical) customer samples. You then compare the responses to "A" and "B" on one or more performance measures of interest.²⁷

For example, a credit card company may test whether in a new mail-in credit card offer, the color of the envelope affects the response rate to the offer. The company creates two customer samples with the same characteristics and designs two credit card offers that are identical except that in "A," the envelope is white, and in "B," the envelope is blue. It mails the offer to the two customer samples, waits for an appropriate period of time, and then compares the response rates of the "A" and "B" offers. In more complex applications, the company may compare multiple colors or mix different offer characteristics (e.g., different customers may receive envelopes with different colors as well as different interest rates and different annual fees). The latter is an

²⁷ In some cases, one of the "prototypes" being compared is the current system.

example of *multivariate testing*, where the test compares the effects of multiple variables (rather than just one – the color of the envelope – in a simple A/B test) across the test samples.

A/B testing is commonly used to test alternative website designs. To compare two website designs, “A” and “B,” you may split the incoming traffic between them, measure their performance characteristics (revenue, conversion rate, etc.) and select the one that performs better. Services such as Google’s Website Optimizer (<http://www.google.com/websiteoptimizer>, with training videos at <http://www.google.com/websiteoptimizer/tutorials.html>) and Optimizely (<http://www.optimizely.com/>; the homepage has an introductory video and enables you to get started quickly) enable you to quickly experiment with website variations, to perform the test and to track the results.

CONCLUDING REMARKS

Alan Kay, founding principal of the Xerox Palo Alto Research Center (PARC) and the inventor of the first personal computer with a graphical user interface, famously said “the best way to predict the future is to invent it.” As a corollary, Kay did not believe in market research. He said:

The goal-orientated approach that the management books advocate is to find a need and fill it. We don’t get many new ideas out of that because if you ask most people what they want, they want just what they have now, 10 percent faster, 10 percent cheaper, with 10 percent more features. It’s kind of a boring way to predict the future. But if we look at the big hitters in the 20th century, like the Xerox machine, like the personal computer, like the pocket calculator, all of these things did something else. They weren’t contaminations of existing things. They weren’t finding a need and filling it. They created a need that only they could fill. Their presence on the scene caused a need to be felt, and almost paradoxically the company was there to create the need and fill the need.²⁸

Indeed, Xerox PARC, launched in the 1960s to lead the transformation of Xerox from a copier company to an “Architecture of Information” company, was managed internally to invent the future. And in the 1970s, its scientists did invent the future, including portable personal computers with a graphical user interface; the Ethernet network standard; object-oriented programming; the first word processor with a graphical user interface, called Bravo; and more.

None of these major inventions was commercialized in a meaningful way by Xerox. Years later, Apple developed the Macintosh based on what Steve Jobs and his team saw when they visited Xerox PARC; Bob Matcalfe left Xerox PARC to start 3Com, a company that sold Ethernet-based networking products; multiple vendors developed commercial object-oriented programming software; and Charles Simonyi and most of the Bravo team left Xerox PARC for Microsoft, where they developed Microsoft Word.

²⁸ Alan Kay, Remarks at the 20th Stanford Computer Forum, 1989.

From an inventor's perspective, this may not be a problem. As Kay put it,

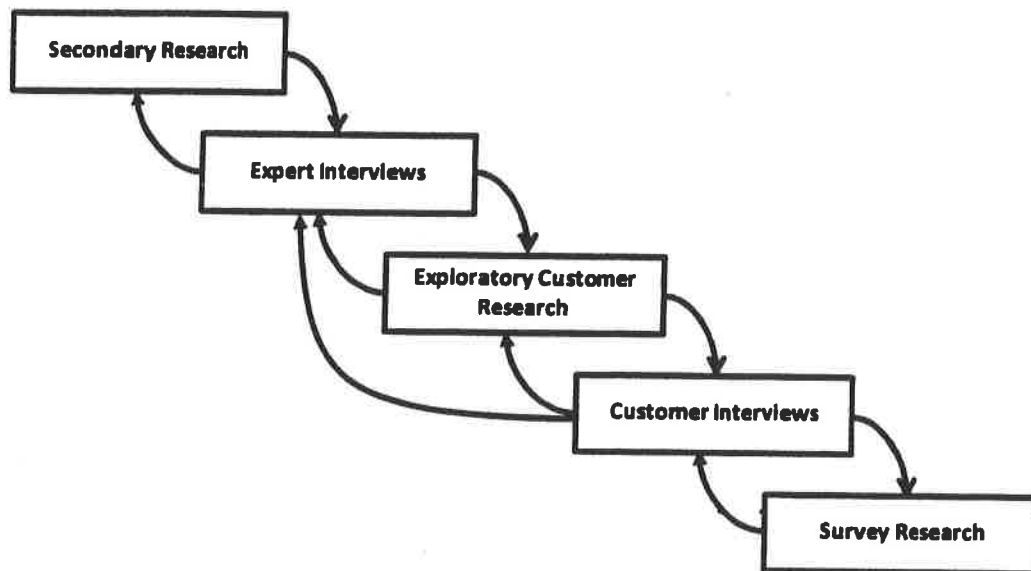
... it takes a very long time – about 10 to 20 years – to get a technology out of the research lab and into everyday life. It's very difficult to get brand new ideas out in less than a decade; in the case of the transistor, it took almost 25 years. No matter what you do, it may take several companies, several different groups of people, several different areas of venture capital funding and more before you get something back. As far as predicting the future, that makes it really nice, because it means that a lot of the future that we're going to have to contend with is sitting in someone's research lab right now. And, by simply going around and looking in the right places you can get a tremendous idea of the kind of things that are going to happen.²⁹

This does present a problem, however, from an entrepreneur's point of view. For one, a guaranteed profit contribution of a hundred million dollars discounted over twenty years at 30% a year is worth a little over half a million dollars.³⁰ And, while society would benefit from the invention regardless of who ultimately commercializes it, most entrepreneurs prefer that their own ventures will see the fruits of their inventions. Unlike invention, which can start and end at the lab and be driven by the genius of a research team, successful commercialization hinges on interactions outside the lab, iterative development and market research.

The approach I advocate to commercialization is based on incremental learning from customers and others, and by itself, it's unlikely to generate breakthrough scientific inventions. However, once the fundamental scientific breakthrough has been made, I believe an effective way to turn it into a viable venture is through the iterative market research process outlined in this note. This approach does not compete with the "big science" approach to innovation. To the contrary, the ability to commercialize science creates the resources, and the incentives, that fuel scientific breakthroughs. Most real customers won't pay for big science per se. They will pay for small and big improvements in their personal and professional lives, and a good way to identify those improvements is to go through a loop of "test and learn" cycles with them. Had Xerox been more engaged in such a process, it might have reaped more of the benefits of its breakthrough inventions.

²⁹ *Ibid.*

³⁰ Needless to say, a \$100 million profit cannot be guaranteed for almost any invention, and venture capitalists commonly use a 50% discount, which makes the value of the invention about \$30,000.

Exhibit 1: A Schematic Research Plan.**Exhibit 2: Customer Interview Questions to Consider When Evaluating a Solution (Prototype).**

1. Would you use this product or service? When? How?
2. What do you like about it? Why?
 - (i). Is it compelling or nice-to-have?
 - (ii). What would make it compelling?
3. What don't you like about it? Why?
4. What tasks can it help you perform? How?
 - (i). How do you currently perform that task?
 - (ii). What do you like about the way you do it today?
 - (iii). What don't you like about the way you do it today?
 - (iv). Does our product or service help? How?
 - (v). Can it do a better job for you? How?
 - (vi). If not, what's missing?
 - (vii). If yes, do you need all the features I showed you today?
 - a) Which features are most useful? Why?
 - b) Which features could you do without?
 - c) Which additional features do you wish it had?
5. What other tasks could you imagine performing with our product or service? (For each, go through (i) – (vii)).

Exhibit 3: Comparison of Alternative Survey Research Channels.

Channel	Cost/Contact	Speed	Richness	Anonymity	Potential Bias
Face to Face	Very High	Slow	Very high	No	High
Telephone	Moderate	Slow	High	No	Moderate-high
Mail	Low-moderate	Very Slow	Low	Possible	Low
Web survey	Low	Fast	Moderate	Possible	High
email	Low	Fast	Low-Moderate	Possible	Low-moderate

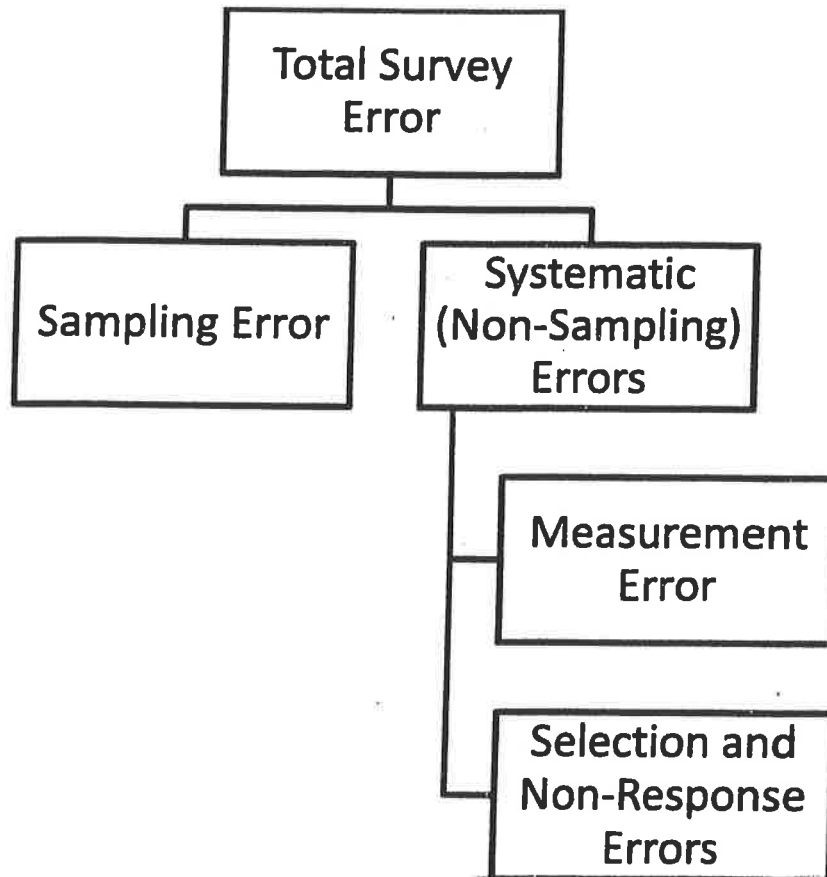
Exhibit 4: Error Classification in Survey Research.

Exhibit 5: Sample Statistics for University of Wisconsin-Madison Divorce Study.³¹

	N	%
Interviews	523	71.0%
Not ncontacted	145	19.7%
Contacted, not interviewed	<u>69</u>	<u>9.4%</u>
Total	737	100.0%

N is the number of people in each group.

Exhibit 6: Means and Standard Errors for the Underlying Record Values of Different Subsamples in the University of Wisconsin-Madison Divorce Study³² vs. Survey Results.
 Subsamples include the full sample population, people contacted, not contacted, contacted but not interviewed, and those interviewed.

	N	Length of Marriage (Months)		Months Since Divorce		Number of Previous Marriages	
		Mean	SEE	Mean	SEE	Mean	SEE
Underlying Record Value							
Full Sample	737	130.29	3.57	49.75	0.9	1.22	0.02
Contacted	592	134.17	4.08	50	1	1.20	0.02
Not Contacted	145	114.46	7.09	48.74	2.07	1.27	0.04
Contacted, Not Interviewed	69	134.17	13.16	46.68	2.96	1.28	0.07
Interviewed	523	134.17	4.29	50.44	1.06	1.20	0.02
Survey Results	429-520	133.92	4.79	55.74	1.62	1.21	0.02

N is the number of people in each group. SEE is the standard error of each estimate.

³¹ Olson, *Op. Cit.*

³² *Ibid.*