

## The development of Siri and the SRI Venture Creation Process

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### Introduction

Siri is an SRI spinoff company that created a speech enabled “personal assistant” for smartphones. Siri was bought by Apple in 2010, two years after its initial launch in January 2008, at a remarkable price. In October 2011 Siri (Apple chose to keep the name Siri) was announced as a key element of the iPhone 4S<sup>1</sup>. In the time since the launch of the iPhone 4S, Siri has become a product phenomenon. In November, Eric Schmidt, Chairman of the Board of Google, testified to the U.S. Senate Judiciary Committee that Siri was potentially a major threat to Google<sup>2</sup>. Siri has appeared extensively in the media as a new consumer phenomenon, including coverage in the *New York Times*<sup>3</sup>, CNN<sup>4</sup>, NPR<sup>5</sup>, Dilbert<sup>6</sup>, Jon Stewart<sup>7</sup>, and hundreds of thousands of YouTube videos. It’s even been the major part of an episode of the sitcom “Big Bang Theory” on CBS, with Raj falling in love with Siri<sup>8</sup>.

Using speech instead of keyboards to communicate with computers is an old dream, but it took more than thirty years to achieve the robustness and performance needed to make speech systems practical for consumers. Developing software for limited vocabulary spoken language recognition was the first step, and we are all familiar with the call center applications. However, developing software to enable computers to respond reliably to a broad range of spoken input is much more challenging, and requires not just speech recognition, but also understanding of natural language, context, and reasoning: the domain of artificial intelligence research. Speech and artificial intelligence have been the subject of enormous research investment, most notably by the Department of Defense, anxious to increase the performance of personnel dealing with complex systems. SRI, the former Stanford Research Institute, has been at the forefront of this research, and has pioneered many of the practical solutions now reaching the market. The worldwide leader in speech recognition systems, Nuance, began as an SRI spinoff in 1995 and IPOed in June 2000<sup>9</sup> and was eventually acquired by Scansoft in 2005, another public company, that changed its name to Nuance after the merger.

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<sup>1</sup> "iPhone 4S - Ask Siri to help you get things done". Apple. 2011-10-05

<sup>2</sup> Eric Schmidt (2011-11-07). "Google's Eric Schmidt: Apple's Siri could pose 'threat'". London: Telegraph. 2011-11-23.

<sup>3</sup> "iPhone 4S Gets More Power, a Better Camera and Siri". NYTimes.com. 2011-10-04

<sup>4</sup> "Apple introduces Siri, Web freaks out a little". CNN. 2011-10-04

<sup>5</sup> "Winarsky Talks About Siri". NPR. 2011-10-18

<sup>6</sup> Siri comic strip. Dilbert, by Scott Adams. 2011-12-16

<sup>7</sup> "Jon Stewart Argues With Siri Over Foxconn". The Daily Show with Jon Stewart. 2012-01-17

<sup>8</sup> "The Big Bang Theory Video – Dinner With Siri". CBS.com. 2012-01-26

<sup>9</sup> "Nuance Communications IPO Soars". The Street. 2000-04-13.

This case history describes the creation of Siri as a revolutionary consumer software product based on SRI speech and artificial intelligence technology. This case is of particular interest because it illustrates how innovations go from concept to the market within a large organization that has effective internal management processes. Part I describes the Siri product and how it evolved. Part II describes the corporate process at SRI for selecting and nurturing commercial innovations. In part III we offer some views on lessons learned from this successful effort regarding the fostering of industrial innovation.

### **Part I: How Siri became a successful product**

What was the disruptive market opportunity that the Siri team identified?

Simply the disconnect between the promise of smartphones and the limitations of their usability. People wanted to perform all sorts of tasks with their smartphone, but were frustrated by the repeated keyboard clicking needed to get any task accomplished, such as trying to find out the weather. As a result, although smartphones had more computational power than the original PCs, their popular applications were limited to simple functions like ringtones and short messages. In fact, market research found that each time users needed to click through a screen on their smartphone, 25% of them abandoned that application or purchase intent. Having to click through multiple stages and screens to perform and execute tasks was just too annoying for most people.

The idea behind Siri was simple: allow people to buy tickets, make reservations, get the weather, and find a movie, with their smartphone without multiple clicks. Originally, the idea that the application had to be voice activated rather than just using text input was debated within the team, but soon that became the approach -- and is probably a key to Siri's success.

Here's how Siri works.

First, a spoken (or typed) utterance is converted into text by a commercial speech recognition engine. Next, the words in the text must be analyzed to determine the intent the user is trying to express in the utterance. This requires the system to represent concepts that humans talk about, and to associate groups of words with those concepts, the subfield of artificial intelligence known as natural language understanding.

In the current state of natural language understanding, it is unrealistic to expect the computer to understand everything a user might possibly say. Therefore, all current natural language systems focus on one or a few "vertical domains" in which the users can expect reasonable understanding of their utterances. Outside of those domains, the system's understanding is limited. Siri focused on vertical market domains of travel and entertainment, thereby circumscribing the kinds of general requests it could be expected to understand.

As a further focus, Siri is designed to handle user utterances that are requests for web-oriented services. The third step in Siri's operation is therefore interpreting the utterance in the context of one or more web services, inputting the correct information into the web service, and combining the results into an

answer for the consumer. For example, if a user asks for “hotels” that are “available tomorrow”, “in San Francisco”, “top rated”, “romantic”, etc., Siri needs to access and consolidate the results from websites that handle hotel reservations, such as hotels.com and have extensive written reviews, such as Yelp. As a result, Siri enables a smartphone to act as a (limited) personal assistant, allowing the user to buy tickets, make dinner reservations, or check the weather with no clicks at all. Unlocking the promise of smartphones using invisible technology is the key task of Siri.

The ability to complete such a product involved a great deal of prior technology and application creativity. SRI was uniquely positioned for that because of its extensive work on speech recognition and artificial intelligence. But most important, the ability to actually build a new company was only possible because of the special institutional structure of SRI.

### **What Were The Market Trends That Positioned Siri for Success?**

The concept of a virtual personal assistant product is not new, starting perhaps with the promise of artificial intelligence. John McCarthy coined the term “artificial intelligence” in 1956<sup>10</sup>; he defined it as “the science and engineering of making intelligent machines.”<sup>11</sup> The founders of the science of AI were, in hindsight, much too optimistic about the future of the new field: Herbert Simon predicted that “machines will be capable, within twenty years, of doing any work a man can do” and Marvin Minsky agreed, writing that “within a generation ... the problem of creating 'artificial intelligence' will substantially be solved”.<sup>12</sup> AI systems did not realize this promise, and for many years were brittle and unreliable. The promise of systems that could perform as a human always seemed to be “twenty years away”. The result was that initiatives that involved AI were almost always greeted by skepticism in the commercial community. So why was Siri able to overcome this skepticism? The answer was in Siri’s realization that five market trends were occurring that would finally allow Siri to put a virtual personal assistant in the hands of millions of consumers:

1. Smartphones were emerging with the computing power, storage capacity, and bandwidth to perform application functions with low latency. The first Apple iPhone appeared on January 9, 2007, just 6 months before the venture Siri was created at SRI. The Siri team designed their initial system for the iPhone 3G, which was launched in January 2008, but were forced to change their design to support the iPhone 3S because the iPhone 3G’s processing power caused unacceptable delays between the query and the response, given the Siri interface design. Low latency was a key driver of user satisfaction.
2. Speech recognition – that is, automatically translating the spoken utterance to text – had reached a high level of accuracy at reasonable cost, allowing Siri to assume that this part of the problem had been solved. The two leading companies that provided this technology were Nuance (an SRI spinoff) and Vlingo (which was recently purchased by Nuance).

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<sup>10</sup> Although there is some controversy on this point (see Crevier (1993, p. 50)), McCarthy states unequivocally “I came up with the term” in a client interview. (Skillings 2006)

<sup>11</sup> McCarthy, John (November 12, 2007). “What Is Artificial Intelligence?”

<sup>12</sup> Herbert Simon quote: Simon 1965, p. 96 quoted in Crevier 1993, p. 109; Marvin Minsky quote: Minsky 1967, p. 2 quoted in Crevier 1993, p. 109.

3. Natural language understanding that automatically understands the intent of the utterance had improved substantially over the years, attaining acceptable accuracy if the domain of queries or statements were sufficiently constrained. Under the leadership and innovations of Adam Cheyer and Didier Guzzoni, new approaches were developed that vastly simplified the development of Siri in this regard.
4. Web applications had become ubiquitous for a broad array of functions, such as making hotel reservations or buying a movie ticket, or asking for the status of a flight. And importantly, web sites were developing APIs (Application Programming Interfaces) that enabled other applications to call upon the web service. This was critically important to Siri, since the long and tedious process of developing an interface to each web service would have been prohibitive.
5. Cloud services became available that provided servers to perform the complex speech and natural language processing that were required. Cloud services were also connected to the web services, enabling the query to be executed and the responses fed back to the iPhone with low latency. Cloud services allowed Siri to avoid the burden of purchasing its own server farms, enabling it to scale up or down according to the number of users at a given time.

### **Siri becomes a business venture within SRI**

What we have described is the final product, but getting there was very much a process of trial and error driven by a combined team of technologist, marketer and equally important, a very talented business management team nurtured within SRI.

While the concept of a virtual personal assistant and the underlying technology is decades old, the beginnings of the SRI business concept that became Siri began with the *Vanguard* Initiative. *Vanguard* was an SRI business development effort started in 2002 by Norman Winarsky and Bill Mark based on the premise that the mobile phone would become a dominant computing platform, and that the primary user interface to that platform would have to be spoken language (because the mobile form factor dictates a small keypad that is difficult for most people to use for significant input). They used the name *Vanguard* because SRI has been on the vanguard of the revolutions in computing. They believed that the next great revolution would be the “mobile phone as computer” and wanted to be a leader in that revolution as well. Their original hope was to work with a major wireless carrier or consumer electronics company to realize their vision, and to license the technology to them. They didn’t expect to create a venture at that time. *Vanguard* defined several pilot applications to be used to prove the viability of the concepts for corporate customers.

In parallel, in 2003 SRI won and took the lead on the *CALO* (Cognitive Assistant that Learns and Organizes) project, a large DARPA-sponsored research effort that pushed the boundaries of personal assistance, particularly in the use of machine learning technology. This program was funded at over \$150 million and had over 23 subcontractors, including most of the centers of artificial intelligence research in the country. The approach to personal assistance explored in *CALO* was a major inspiration for Siri. *CALO* itself was partly inspired by the movie *MASH*, in which one of the main characters, Radar O’Reilly, was a great assistant to Colonel Potter, and always knew what the Colonel wanted before the Colonel knew what the Colonel wanted.

We now fast forward to 2006, when Adam Cheyer, an SRI technical program director who had played a major role in both *Vanguard* and *CALO*, and prior to that had led several SRI initiatives relating to delegated agent technologies, asked to lead an internally funded project to create a lightweight platform for intelligent assistance for web services. Drawing on *Vanguard*, *CALO*, and earlier SRI work over a decade earlier on intelligent agents, Adam and his team, including his Ph.D. student Didier Guzzoni, created a software platform called *Active* that became the core technology of Siri. Adam's initial *Active* project was funded internally by SRI's Information and Computing Sciences division. Approval was local (Artificial Intelligence Center Director Ray Perrault and Bill Mark), based on a brief presentation.

*Vanguard*, *CALO*, and related projects continued to be the source of both commercial license and venture concepts. In 2007, SRI proposed a commercial licensing program to Motorola that involved smartphone personal assistance functions (with no server backend). The project had an excellent champion within Motorola: Dag Kittlaus, who was head of the X Products Group, responsible for creating Motorola's iconic new products that would be the next generation beyond the Razr. SRI worked to create the program with Motorola, but was unable to launch a significant development effort. In addition, Motorola was struggling in the mobile phone market, with no products beyond the Razr that provided breakthrough differentiation from the lookalike products being introduced by competitors. Shortly after, X Products was dismantled and reintegrated into the main Motorola handset business.

Dag Kittlaus was dismayed by this turn of events, and asked Norman Winarsky if he might become an Executive in Residence (EIR) at SRI, and help lead the creation of a new venture. Dag left Motorola, sold his home in Chicago, and moved his family to Silicon Valley.

At this point, in 2007, an initial team of Dag Kittlaus, Norman Winarsky, Bill Mark, and Adam Cheyer began working together as a Venture Team in frequent team meetings intended to advance the venture concept following the **SRI Innovation Process** described in Part II below. Two of the most critical ingredients for Siri's success came from the team: Dag Kittlaus's business, marketing and leadership skills and Adam Cheyer's technical insight and skill in developing world-leading solutions combined to create a *practical* virtual personal assistant product.

The venture team's most critical task was defining the final product's value proposition. The team's ideas began to crystallize at a two day offsite at Half Moon Bay, where Dag, Adam Cheyer, Tom Gruber, Norman Winarsky, Bill Mark, and Didier Guzzoni focused on market needs, business model, and competition. The decision was made that Siri would be a "natural language do engine" not a search engine, that it would be a virtual personal assistant, and provide answers, not links. No clicks. It would allow natural language queries, and understand the query, the context, and also develop a model of the smartphone user. It would surprise and delight the user with its knowledge of the user, and with its assistant actions. For example, consider the query, "get me a hotel reservation in San Francisco for tomorrow night for a hotel that is top rated and has a pool and a fitness center." With that query, Siri would bring up a list of top rated hotels with a pool and a fitness center. Confirming one item on the list

would enable the consumer to make a hotel reservation. At that offsite, the team decided it would work to develop a “do engine” that had these goals and constraints:

- Queries would be enabled for natural language speech or text for goal based requests, and be limited initially to the travel and entertainment domain – with tens to hundreds of web services.
- Responses would be designed that surprised and delighted the user (e.g., your flight is late, would you like me to find a hotel?)
- A large fraction of queries would be enabled for daily use, even if no revenue would be generated, so as to increase the number of users, and make people familiar with the new application. This was the primary goal initially – not revenue generation.
- The system would be designed to encourage an ever-broadening user base. For example, Siri would enable another person to get a meeting confirmation-- if he or she became a Siri user

Daily iteration to refine this value proposition and initial product continued for months. The business model became clear. Siri would enable transactions with hotels, airlines, movies, and all the web services for which it became a front end. Money would be made by being paid a percentage of the revenues enabled by Siri.

The biggest technical hurdle was inferring the user’s intent from a natural language utterance. Natural language is a rich medium of expression that relies on understanding of context to resolve the incompleteness and ambiguity that gives it its power. The technical problem is to represent and apply the required contextual knowledge in an efficient and scalable software framework. The good news was that the technology was in hand because *Active* specifically addressed this hurdle through a knowledge representation and reasoning approach that became the basis for a patent<sup>13</sup>.

Another anticipated hurdle, common to all natural language systems, was dealing gracefully with user utterances that the system is not prepared to handle. People have an array of techniques for dealing with this situation, acquired and practiced over a lifetime. These techniques rely on knowledge of the world and knowledge of other people that is extremely difficult to represent in software. Software systems instead rely on stock answers and non-natural-language user interface responses to guide the interaction. This hurdle was not addressed in the initial *Active* approach, but it became a major focus of Siri.

The value proposition also had outstanding cost advantages. Since Siri only needed to access web services through an API, it did not need to scour the web. It only needed to access the web services themselves. In addition, if a query was given to Siri, the likely worst case scenario would be that Siri could not answer the query, but would recognize that it was likely out of domain, and would provide the query to a search engine, like Google or Bing. So a worst case scenario for Siri would be the best case scenario for a search engine. Interestingly, today this is becoming a major benefit of Siri to Apple. Consumers are using their mobile phones to ask Siri to search for information in almost any domain, because they know that Siri will hand off the query to a search engine. That is, people would rather speak their query to Siri than type their query to a search engine.

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<sup>13</sup> Adam Cheyer, Didier Guzzoni, “Method and Apparatus for Building an Intelligent Automated Assistant”, Publication number: US 2007/0100790 A1

### Launching the venture: External funding

When the SRI team first decided to seek outside investment for a spin-out in 2008, a small number of venture capitalists familiar with SRI and who regularly participated in venture reviews, were approached for advice on strategy and plans. These people were highly supportive because they recognized both Siri's strengths and weaknesses. However, they raised major issues regarding funding the venture.

- Dag Kittlaus came from Motorola, and had never been a CEO. Most VCs don't want to hire CEOs who have come from big companies. They often just "don't get" the lean startup environment. To Dag's credit, he had demonstrated entrepreneurial talent, in that he had helped create Telenor's Mobile Internet Portal which launched dozens of innovative mobile applications.
- The venture was attacking a world-class hard artificial intelligence problem, which had been attacked before without success. "Why now" and "why can **you** do it" was a frequent refrain.
- Mobile was still a small market and the iPhone and smartphone market was even smaller. A few VCs were willing to fund if the application switched to PCs rather than hand sets.
- It is well known that asking people to change their behavior (in this case "talking to their phone") is extremely difficult and very risky. Why would the application gain users?
- Siri's greatest strength was that it could be a natural language interface to many web services. But Siri didn't have one "killer app" that people could identify Siri with and use.

After three weeks of such discussions with VCs, a process was launched for raising the capital needed to get started as an independent company. Dag Kittlaus, Adam Cheyer, Tom Gruber, and Norman Winarsky went to the top VCs in Silicon Valley, and addressed their concerns as best they could. In the end, concerns can only be mitigated, never removed completely. Siri was going to be a risky investment, but could produce great rewards. It would clearly impact the wireless industry with its disruptive technology.

Shawn Carolan of Menlo Ventures responded with a term sheet first. Gary Morgenthaler was equally convinced, and agreed to the Menlo term sheet. The terms for an A round were: \$8.5 million invested, with a \$10 million pre-money value – sufficient for an 18 month runway. Beyond the good financial terms, Siri now had two very experienced and collaborative venture capitalists as lead investors. The board then was comprised of Gary Morgenthaler, Shawn Carolan, Norman Winarsky, and Dag Kittlaus who served as CEO.

The Siri product development took 18 months rather than the initial plan of 12 months because of the need to commercially harden the technology and to conclude contractual arrangements for web services.

Siri grew over the next 18 months from 3 founders to 22 people, including 15 engineers. Run rate began to reach about \$350,000 per month. The first and most important smartphone platform for Siri was the Apple iPhone, which had only recently been launched. But Dag also began to open discussions with wireless carriers about Siri capability. Verizon Wireless began discussions immediately, but the Siri board was highly skeptical of any contractual agreements with Verizon, or any wireless carrier. Wireless

carriers have a reputation for long and difficult negotiations, with onerous deal terms, and with very little hope of closing a deal. Also, during the negotiations, it would be highly distracting from the principal focus of launching on the iPhone. Even so, the board agreed to allow Dag the latitude he asked for to pursue the Verizon contact.

To everyone's surprise, Dag reached an agreement with Verizon over a period of a month or two for a deal worth over \$20 million that would lead to an opportunity for Siri to be on the home screen of every Verizon smartphone. In addition, the operating system would have been Android. Later though, when Siri was launching on the iPhone, Dag continued to hear from Verizon that there would have to be some reduced expectations on whether Siri would be on the home screen of many of their phones. They stated that certain agreements with handset manufacturers would relegate Siri to a less visible position in many of the phones. Also at that point, Verizon had not begun to market Siri, though it was required in the contract.

Since the A round funding would run out soon, the team launched a B round. Many VCs were interested, but the valuation would be very high due to the high profile of the venture. The contract with Verizon helped increase the value of Siri for the expected B round – which was a \$50 million pre-money value, with \$15 million invested. Horizons Ventures took the lead, with Solina Chau as their champion and Frank Meehan as their board member. This round closed in December, 2009.

At this point, competition was beginning to be intense. Google queries had begun to have some “answer engine” like ingredients. For example, one could now ask Google for “status United flight 973” and actually get status, rather than a set of links. The Siri relationship with Vlingo and Nuance was a good one, but rumors surfaced that independently, both Nuance and Vlingo were building their own Siri competitors. These rumors turned out to be true. Nuance later came out with “Dragon! Go<sup>14</sup>” and Vlingo introduced its own “assistant”<sup>15</sup>.

From around November of 2009 to February 2010 the company ran a small beta of a few hundred people to gain user data and to tune the user interface.

At this point it was a race to launch as quickly as possible, and finally Siri was launched as a free application in the Apple App Store in February 2010.

The company had prepared for the launch of the Siri application with embargoed demonstrations and reviews by top bloggers from TechCrunch, Scoble, and many others. It was a great success. Siri was being downloaded at the rate of over 1 a second, and by the first weekend, it had been downloaded by 200,000 users. In addition, it was in the top 50 of all Apple Apps, and was the top LifeStyle App. Revenue, in contrast, was almost non-existent – a few thousand dollars.

The same week after the launch, Dag received a phone call: “Hi, This is Steve Jobs.” At first Dag thought it was a joke, and hung up. Then the phone rang again, “really, it's Steve Jobs”. They talked for a while,

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<sup>14</sup> <http://www.nuance.com/products/dragon-go-in-action/index.htm>

<sup>15</sup> <http://www.vlingo.com/>



with Steve congratulating Dag on Siri's capability. He invited Dag, Adam, and Tom to his house. Dag called the board of Siri immediately, and discussed what to say about Siri. The board was not anxious to sell, since the value was almost certainly going to increase substantially. However, Dag was instructed to learn about Steve's interests, and postpone any further discussion.

At his house, Steve congratulated the team, and discussed Siri's capability. He understood immediately the value of the AI part of the engine, and agreed to talk again in a few weeks. Steve also understood the nature of the technology and the certainty that errors, such as in recognition of the natural language, would always occur – but he was not discouraged. This was remarkable, because virtually all the other Apple products were designed “for perfection.”

Over the next few weeks, Steve opened discussions with Dag about a purchase price for Siri, with multiple calls per week. Dag and the board spoke often, with the board uniformly against an early sale. Siri had yet to reach its potential. Finally, Steve made an offer that was a sufficient return on investment that it was becoming difficult for any VC or team member to turn down. From SRI's point of view, its share would amount to the second largest financial event in the history of SRI, second only to Nuance in value realized.

At this point most of the board still believed that Siri could become a billion dollar company and should continue independently. But many considerations led to the sale: the IRR for the VCs was excellent, and their partners all encouraged the sale; the team members had fallen in love with the idea of going to Apple and working for Steve Jobs, helping create a world-wide impact. The board knew that Apple had the resources to attempt to attract the entire team, if it chose to. And patent wars were not a major threat to a company like Apple. Furthermore, the risk of continuing independently was great, since it was clear that once Siri proved to be successful, Google, Microsoft, Nuance, even Apple, and many other competitors might make the “make vs. buy” decision in favor of “make”. Beyond that, Siri's business model was unproven. Revenue from the initial launch were small because users were requesting free services rather than revenue generating ones.

The board of Siri eventually agreed to the sale, but it required that the negotiations be completed within the next two weeks because in two weeks, the company would have to deliver the Siri software to Verizon, as part of the contract. The agreement with Verizon was, therefore, remarkably valuable but its *real* future value dropped every time the team spoke to them because Verizon's intentions were unclear.

Steve did not want that delivery to occur, because it was a Siri version that would run on Android phones. But if Siri failed to deliver, the contract would be terminated while still negotiating with Apple. The Board said that losing Verizon would have substantially reduced the value of the company, and also put it in a poorer negotiating position. Steve understood the argument, and agreed to close the deal within 2 weeks. And close it did at 9:30 AM on April, 11, 2010. The Verizon delivery had been due at 10 AM.

## Part II. The SRI Innovation Process

Contrary to popular belief, few great innovations are born on short notice and without extensive iteration. Furthermore, few great commercial innovations come from individuals working on their own. Concepts may come from loners, but it generally takes multiple talents and a collaborative environment to develop valuable products and Siri is an excellent example of how this happens in a big organization.

In the course of reviewing the development of Siri over a number of years in Part I, reference was made to the unique SRI process for managing the emergence of valuable commercial innovations. This section reviews this process because the methodology applies to any organized methodology for managing innovations in corporate organizations of significant size. As you will see, the distinguishing features are: the opportunity provided to innovators to test their ideas among knowledgeable folks; the ability to receive support in the iterative process always needed to bring new concepts to fruition; and the balanced oversight required to promote a spirit of creativity while limiting the financial risks associated with hasty decisions that can kill good concepts at their most critical stage: while they are being refined to meet real world needs.

While it is easy to set high barriers for deciding which innovation concepts deserve commercial funding, the important element in a successful organization is to set the balance between risk avoidance, potential reward and the setting of realistic objectives. The SRI innovation management process is designed to avoid the pitfalls of being either overly prudent or overly risk seeking. The wise management of this balance is the key to success.

The lists below are comprehensive and it is obvious that good answers cannot be given to many of them in the early stages of a project. However, the need to think about all the issues is important in guiding the formulation of venture ideas toward commercial objectives.

### The Venture Criteria

SRI only creates ventures when they meet a set of very challenging criteria:

- Important opportunity: A large, rapidly growing market opportunity with the potential for >\$1 billion market cap – often a disruptive market opportunity
- A great core Innovation Team
- A compelling *quantitative* Value Proposition
- Differentiated product or service to successfully address the market opportunity
- Sustainable competitive barriers
- Disruptive technology, not incremental improvements (i.e., a “Golden Nugget”)
- An effective positioning strategy for introducing the product into the marketplace
- Key elements of risk identified and minimized
- Sufficient funds with an exit strategy identified

As a result, SRI only creates 2 – 4 ventures a year, though it has over 2200 staff members, over 1000 researchers, and works on over 2000 projects a year. But the resulting ventures are of high quality: over the last 17 years, SRI has created over 50 ventures, 4 of which IPOed, with a total market

capitalization of over \$20 billion. These include leading companies like Nuance and Intuitive Surgical. SRI also had many successful private company exits, most recently and most notably, Siri.

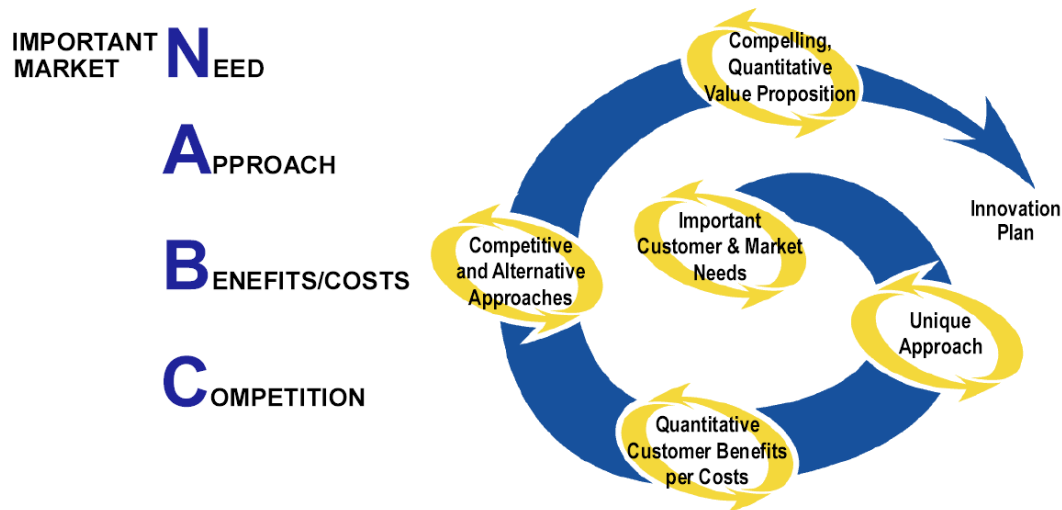
The reasons that SRI sets such a high standard are threefold: (1) Expectation of success must be very high to justify the dedication of personnel otherwise committed to generating contract revenues; (2) Top-tier venture capitalists will only invest in ventures that meet these criteria; and (3) Because SRI invests some of its most valuable intellectual property in its ventures, spinning out a company is only one of the ways to monetize innovations. If SRI chooses not to launch a venture, it has many other ways to monetize the opportunity, such as by licensing for royalty or equity in an established company, or simply by using the technology to win new contracts.

The SRI Innovation Process is composed of two separate but complementary fundamental processes: [The NABC Process](#), and the [Venture Creation Process](#).

### The NABC Process

SRI teaches [NABC process](#) to its staff, and also gives workshops on this process around the world. For an in-depth description, see Curt Carlson and Bill Wilmot’s book, *Innovation, The Five Disciplines for Creating What Customers Want*<sup>16</sup>, which explains and illustrates the NABC approach.

In the graphic on the NABC process,(Figure 1) we see a blue spiral, starting at “Important Customer and Market Needs”, and continuing to Approach, Benefits per Cost, Competition, and continuing to Value Proposition. The bolded characters indicate why the process is called NABC.



A Value Proposition is defined by SRI as the combination of elements of NABC. The blue spiral in the graphic is meant to indicate continued iteration by the team on the ingredients of NABC, constantly

<sup>16</sup> “Innovation: The Five Disciplines for Creating What Customers Want”. Curtis R. Carlson, William W. Wilmot. Random House, 2006.

building and improving the value proposition. The spiral grows in size, intending to indicate increased value.

Around each component N, A, B, C of the spiral are yellow arrows. These arrows also indicate iteration on that component. That is, the teams who are working on creating a venture are constantly iterating on the customer need, the technical and business approach, the quantitative benefits, and the competition.

This process is completely aligned with the goal of creating a venture presentation which would be understood and valued by potential investors, particularly by top-tier silicon valley venture capitalists.

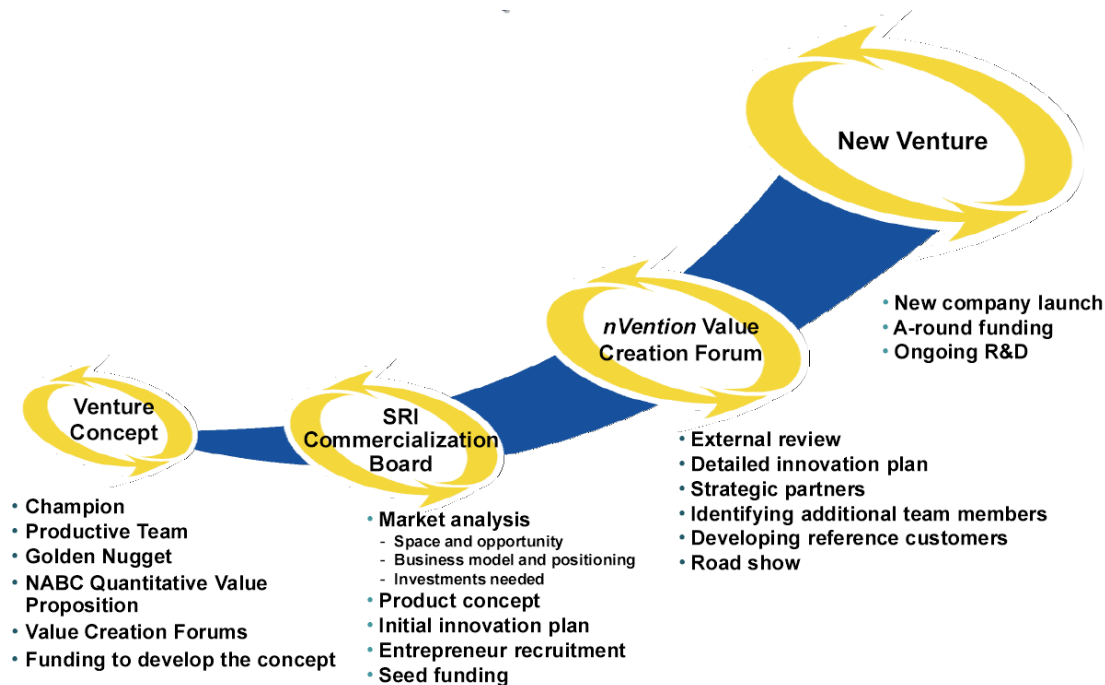
It's useful to note that the NABC process is in contrast to many incubation or value creation processes. For example, the stage-gate process<sup>17</sup> is often used by enterprises around the world. In this process, a venture or product concept passes through various stages of corporate acceptance and funding based on milestones set at the beginning of each stage. SRI believes that the stage-gate process for venture creation is flawed for two reasons: first, it assumes a linear flow from discovery to scoping, business case, development, testing and validation, and launch; second, it requires a filtering process to occur at each gate. In contrast, the SRI NABC approach first assumes that innovation is non-linear, requiring *constant iteration* of each element of NABC; and second of the 50 ventures that SRI has created over the last 18 years, virtually none of them started with the value proposition that ultimately led to venture investment and success. These successful ventures only arose because the management of the SRI process made possible the convergence of a successful result by constant iteration and rethinking based on creative iterations among team members and members of the internal review committees. In other words, virtually all of SRI's ventures would have been filtered out at the early stages of a stage-gate process.

#### *Step 1 of The Venture Creation Process: Developing the Venture Concept*

In the graphic on the SRI Venture Creation Process (Figure 2), we see a blue swoosh, starting from Venture Concept, and continuing to SRI Commercialization Board, the nVenture Forum, and ending at New Venture. Each of these elements are circled by yellow arrows, indicating iteration of that element. This process usually lasts between 6 and 12 months.

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<sup>17</sup> Cooper, Robert G. (1986) *Winning at New Products*, Addison-Wesley



Members of the **SRI Ventures Group** help drive the process, often assuming the role of coach or business development champion of the initiative, and helping lead or participating in all the Stakeholder Meetings, as well as all Commercialization Board meetings. They are also responsible for helping identify the venture capitalists, setting the SRI terms, and negotiating the contract.

The first element of the process is a Venture Concept. It's important that we start with a venture concept, not with a technology. This approach is in contrast, for example, to what is commonly called technology-transfer<sup>18</sup> – where teams attempt to develop a venture starting from a technology. SRI believes that the technology-transfer approach is deeply flawed, because ventures are fundamentally businesses, and must enter the market to serve customer needs. Technology will often be valuable in creating the solution, but starting from a solution and asking what the business opportunity often misses the major market opportunities. If you think of an analogy of driving a car, and technology is behind you and the market opportunity is ahead of you – tech transfer is like driving the car by looking in the rear-view mirror.

Many universities and laboratories around the world don't understand this dual focus on market and golden nugget – with emphasis on market. Instead, they look at their technologies, and attempt to identify ways to monetize those technologies. Ventures or licenses that are launched to solve a technology problem alone are depending on some other company or customer to discover how to use the technology, and for it to “catch on”.

<sup>18</sup> [http://www.autm.net/Mission\\_and\\_Goals/6124.htm](http://www.autm.net/Mission_and_Goals/6124.htm)

In contrast, almost all SRI's ventures are the result of a team that conceives of a disruptive market opportunity with a disruptive technology or market solution: the yin and yang of a startup. A disruptive market opportunity is one in which a new product or service is introduced that has not existed before. Often the market didn't exist before either, or if it did, the product is profoundly superior. Existing market players that are the incumbents are unable to respond with their own products in time to prevent the venture from achieving market success.

A disruptive golden nugget solution is one which enables the new product. If it is a technology solution, it needs to provide the venture a sustainable competitive differentiation, not only by patents, but by the nature of the technological advance. Identifying this type of technological breakthrough is always difficult. Think of technology solutions on a scale, from "already done" to impossible. The slice of opportunity between "already done" and impossible is very small, and difficult to identify. It also changes over time, as technologists around the world invent new solutions, and new competitors enter the market.

Ideas for SRI ventures come from the network of internal or external entrepreneurs, venture capitalists, university students and faculty, and individuals from innovative companies, or individuals within SRI's Ventures Group – in other words, venture concepts come from almost any source. These individuals who conceive of ventures and wish to push them forward are champions for the concept, and help articulate the vision, develop and iterate the value proposition and business plan, motivate and recruit the team, and launch the venture. How do these champions identify the "yin and yang" of market disruptions and golden nugget solutions?

Many market disruptions are created by some primary factors or "triggers" such as government regulations, health issues or new technologies. Some examples include: Sarbanes Oxley created such a burden on companies that new software was necessary to follow the regulations; the AIDS virus created an industry of anti-viral drugs; the aging population in the U.S. and around the world creates industry opportunities to assist the aging and help them stay independent; the development of the internet, the world-wide-web, and the cloud led to the creation of many current industries including Google, Facebook, Zynga, Amazon, and more.

To identify major market opportunities means staying constantly aware of the greatest needs, problems and opportunities that have not yet been addressed. Important market problems don't go away. If entrepreneurs fail to solve an important problem, it'll still be there. In other words, they get more than one shot at the goal. The people who try to solve major market problems use everyone they can reach to come up with ideas, but also to develop strategies and vision, iterating on those strategies and vision every step of the way.

The act of identifying a major disruptive market opportunity and a disruptive golden nugget is the act of creating an inspirational bridge. This aha moment of inspiration is very rare, which is one reason why it's so difficult to create an SRI venture. At SRI, about 2000 new projects per year are created; of those 2000 potential products and inventions, only a few are deemed worth starting a venture around because they have a big market opportunity associated with them. This is because the recognition of yin and yang,

opportunity and solution, is a creative act. They are no set formulas. It involves great people who are smart, well-informed, and original thinkers. They are usually “in the flow” of great market and technology ideas.

Being “in the flow” means that the social and human network is a critical foundation for a startup. One needs to build that culture which is open to information, new ideas and where entrepreneurs constantly interact with other entrepreneurs, venture capitalists and business leaders.

### *Step 2 of The Venture Creation Process: The Commercialization Board*

The SRI’s Commercialization Board’s primary responsibility is to advise on the use of SRI funds set aside specifically to seed commercialization activities from within the community of SRI innovators. The Board members include SRI executives experienced in the successful creation of ventures: Norman Winarsky (chair), Curt Carlson (CEO), Stephen Ciesinski (VP of International Business), Tom Furst (CFO), Richard Abramson (VP Legal and Business Affairs), Bill Mark (VP of Information Computing Sciences), Walter Moos (VP of Biosciences), Eric Pearson (VP of Physical Sciences), and Alice Resnick (VP of Marketing and Communications). The Commercialization Board is chartered to be the “last mile of commercialization”, and so the funds are largely dedicated to business use, rather than technology development. For that reason, funding is often modest, ranging from \$200,000 to \$400,000, and usually lasting between 6 and 12 months.

In the Venture Creation Process graphic, the Commercialization Board is circled by yellow arrows, indicating iteration. Unlike the staged-gate process mentioned above, the Commercialization Board expects both strengths and weaknesses in an NABC format presentation. The use of the Commercialization Board funding is primarily to strengthen the weaknesses. The Board will expect a venture concept to be presented every month or two, where the NABC components are iterated and improved. As a result, champions who present in this forum are encouraged to describe their value proposition clearly articulating both strengths and weaknesses, rather than giving a “selling pitch”. Often venture concept presentations make clear, through the NABC process, that it is not in fact a venture that will meet the SRI criteria. In those cases, the concepts are almost always highly applicable to licensing and royalty revenue potential.

To understand the role of the Commercialization Board, let’s go back to the Siri experience. In June of 2007, Dag Kittlaus, Adam Cheyer, Norman Winarsky, and Bill Mark created a value proposition for a Siri-like venture and presented it to the Commercialization Board for approval to recruit an Executive-in-Residence. The initial presentations to the Commercialization Board of the first concepts of Siri were rough and didn’t well articulate the value proposition. At that first presentation, the Commercialization Board was torn with a difficult decision. Most of the board had difficulty with the same issues we described above – the lack of experience of Dag, why now, what is the business model, will people talk to the phone, and more. The Board was split in its decision: a few were supportive, several abstained, and one was a definite “no”. In the end, the Board agreed to initial funding, but also agreed that this funding would be contingent on continued development and improvement of the value proposition at each subsequent CB meeting; that the team work daily with the Ventures Group on developing and

iterating the Value Proposition; and that the team develop a “bring it to life” demonstration. To Dag’s huge credit, he accepted these terms, quit his job at Motorola, and moved his house and family from Chicago to Silicon Valley.

The actual total funding applied to the Commercialization Board activity over the next 6 months was \$215,000, which included costs for the EIR, for engineering costs to develop the demo, and for the team to meet and iterate on the value proposition. It is a tenet of the Commercialization Board that its role is to fund the business opportunity, and not to advance the technology. If the technology needs significant investment, the CB funding would be too small and time too short relative to what’s been invested in the past (usually millions of dollars).

Listed below is the **Checklist** that the Commercialization Board asks each proposed venture to review before presenting:

### **Customer Need**

1. Does the opportunity satisfy an important customer and market need?
2. Does the team have a deep knowledge of the market opportunity? Have they talked with potential customers?

### **Last Mile of Commercialization**

3. Is the opportunity for the “last mile” of commercialization at SRI: launching a funded venture, licensing to a customer, or selling a product in 6 – 18 months?
4. Is there no longer a need for continued contract R&D funding?
5. Is the opportunity high value (\$MMs) with high potential return on Commercialization Board investment (5X – 100X in 2 – 5 years)?

### **Champions and Teams**

6. Does the opportunity have business and technical Champions, dedicating their passion, time, and energy to it?
7. Does the opportunity have a stakeholder team, iterating frequently (at least weekly) and rapidly, led by the Champion, and including a member of the Ventures Group?
8. Is there a need to recruit external Champions and Team Members

### **Value Creation**

9. Does the team have an Elevator Pitch, Value Proposition (NABC), and before commercialization, a Fundable Business Plan?
10. Is there a disruptive market opportunity enabled by a disruptive technology or market solution? Is there a “golden nugget” or sustainable competitive differentiation?

### **Organizational Alignment**



11. Is the opportunity presented and supported by the Champion(s) and Team?
12. Are the presentations to the CB supported by the Division VP(s) and by the Ventures team?

**Beyond the checklist, the Commercialization Board provides Guidelines for developing venture presentations:**

Venture Presentations should include:

**Team**

- Founders and management (identify both business and technical champions)
- Outline experience of team members
- Board of Directors/Advisors
- Which additional team members are required (what skills are missing in the management team)

**High Level Vision Statement**

- What does this venture intend to accomplish, and what is its position in the market? (Ex. from Google: “To organize the world’s information and make it universally accessible and useful.”)

**Overview**

- Overview for your value proposition (NABC) in a single slide the “Elevator Pitch”. Explain as concisely as possible the potential value in your proposed business.

**What is the important customer and market NEED?**

- Identify and profile your target customer(s)
- Describe the customer’s specific need or pain point(s) you plan to address.
- Outline how the customer addresses the pain today. Quantify how severe, how often, how costly, relative importance, etc.
- Describe the size of the market that shares this pain.
- Why now? Set–up the historical evolution of your product category. Define recent trends that make a new solution possible.

**What is the differentiated APPROACH for addressing this need?**

- *Product / Service*
  - Describe the product or service.
  - Illustrate use cases – describe a “day in the life” of a customer using your product to solve their pain or need. Demonstrate how and why users will be compelled to use it frequently, if not every day. Quantify the improvement. Better to be a “painkiller” than a “vitamin.” Bring these scenarios to life as best you can, using pictures, demos, videos, etc.

- Outline in detail which features are essential for your minimum viable product (version 1 beta) release, including any key implementation principles.
  - Show the longer-term vision and larger product development roadmap including any additional features you plan to add in future versions.
- *Technology*
    - Outline high level technology architecture
    - Provide a “bring it to life” demonstration or prototype
    - Engineering milestones to alpha, beta, and release
    - Identify possible risk areas
    - Identify technology “Golden nuggets.” How does your approach help create a solution that is differentiated from others.
- *Business Model*
    - How will you make money?
    - Calculate the TAM (top down), and SAM (bottom up)
    - Which revenue streams will you go after?
    - What business models do industry leaders currently use?
    - How do you fit in the larger industry ecosystem?
- *Go-to-Market Strategy*
    - What sales and distribution channels will you leverage to get to customers?
    - Which partners?
    - Who are some likely first customers and why?
    - How do you acquire customers?
    - How will you eventually become the leading company in your industry? What will the company look like at that stage?
- *Intellectual Property*
    - Identify relevant patents, software, and other IP you plan to leverage.
- *Risks in your approach*
    - What has to work in order to make the product successful?
    - What changes in the industry can prevent you from succeeding?

**What are the BENEFITS per costs to the customer that result from this approach?**

- Identify and quantify the benefits to your customer (These should align with the aforementioned needs/pain points stated). Specifically, tie back to the “day in the life.” Show, if possible, these benefits are disruptive rather than incremental.
- Identify and quantify what are the costs for using the product. What should the customer change in the way they do things now in order to use the product? Is that a behavioral change?

### **How are those benefits per cost superior to the COMPETITION and the alternatives?**

- Identify your competitors today, and who they might be in the future. Describe not only direct competitors, but also indirect ones (e.g. Caltrain’s competitors are not only other mass transit operators, but also bicycles)
- Explain what will be your initial competitive differentiation / “golden nugget” / “unfair advantage” - and how it can be sustained over time.
- Use meaningful comparisons. Feature charts and matrices can be helpful, but better is to SHOW where the competition fails and you can excel by bringing it to life. Use pictures, screenshots, or videos to relate the experience. Quantify as much as possible.
- Illustrate the day in the life of the user using the competitor’s products and how your product improves the consumers’ lives.
- Your “Golden Nuggets” do not necessarily have to be technology.

### **Financials**

- Draft a rough P&L forecast (Three year projection, quarterly) with estimated cash burn, incl. staffing, and maximum cash out, capital expenditures needs. When do you become consistently cash flow positive?
- What will it take, and how long to reach your first \$10 million in revenue?
- What is your financing plan?

### **Investment Needed**

- How much money are you asking for from the CB?
  - From now until the next CB meeting, milestones expected to be achieved (time, money)
  - Estimate CB money to reach outside funding (time, money), and to license/venture
- What will the money be used for?
  - Set clear milestones to meet
- How is your fund raising plan aligned with your product development and marketing plans (make sure you have no funding gaps)

### **Summary**

- Summarize the main points
- Outline the critical points that the investor/audience needs to believe/agree with to go forward
  - 5 common risks to make sure have been addressed:
    - Team – Can they do it, have they done it before? Can they lead, hire, execute?

- Market – will the “dogs eat the dog food?” If you make this product, will people actually buy it?
- Technology – can you accomplish what you are demonstrating? Will it scale, is it robust?
- Manufacturing risk – can you deliver at the price and performance you are projecting?
- Financial risk – can you do it within the budget you have

### **Part III. Concluding thoughts: Lessons learned to help create the next Siri**

- Focus resources to understand long term technology and business trends that can profoundly change the industrial world. There are organizations that pride themselves on being technology followers. The guys who bring up the rear die sooner rather than later. The corporate world is full of corporate zombies who might survive but don’t grow or build value because their management teams were too risk-averse.
- Nothing happens as fast as people think, but then reacting is too late—competitors will have taken the high ground. Creative minds should have the freedom to explore opportunities—false starts are part of the process and innovators should not be penalized for such events. Nothing ventured nothing gained.
- Big ideas may only succeed when enabling technologies emerge. This means that organizations must strive to keep an open environment for learning and assimilating ideas and technologies from anywhere in the world. The idea of “not invented here” negativity is long gone – it is a path to failure.
- The more important and far reaching a new product idea , the more important it is to make sure that the best minds are dedicated to its realization. Management must be actively involved—world changing ideas don’t see fruition without management being partners with the innovators. Sooner rather later, management will be faced with a financial decision regarding such concepts. Only the most engaged and educated management team can make wise decisions.