Telling a Compelling Technology Story

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The Small Business Innovation Research Program

The Small Business Innovation Research (SBIR) program is the largest source of early-stage technology financing in the United States. Annually, the program provides over $2 billion to small, high-tech companies (fewer than 500 employees). Nationally, more than 70% of all awards go to companies with fewer than 10 employees.

Although the SBIR program represents a tremendous opportunity, creating a competitive proposal in response to an SBIR or STTR solicitation is an arduous task—and it's definitely NOT for everyone. The proposal-development process requires a series of steps to ensure that organization properly prepare themselves to write and then produce a fully compliant and highly competitive proposal. Many organizations fail in their attempts to secure funding from the SBIR program because they are unable to effectively tell the story of their technology innovation.

The Technology Story as a Means to Creating a Compelling Proposal

One useful tool for testing ideas and preparing to tell a story is the *Technology Story*. The technology story process that we use with clients and teach in workshops represents a proven approach for developing a compelling and competitive story. The story developed can be presented to others to solicit feedback and to introduce the SBIR proposal. The development of the technology story is part of the homework we have our clients do to get ready to write the actual proposal.

The technology story serves as a means of jumpstarting the proposal-preparation process. The technology story allows you to pre-qualify ideas for SBIR proposals and other government programs—both among your own staff and with outside reviewers and government personnel. The input received from these reviews can be incorporated into the story before the material is integrated into the final proposal.

Remember that the proposal you present to the government is a sales document, and as such it must tell a compelling story that will attract and hold the attention of the reviewer. The proposal in most cases is your one and only opportunity to present your case for funding. You do not get a chance to respond to questions that might be raised in the mind of an evaluator as he or she reads your proposal. Therefore, it is imperative that the proposal tell the story in the most compelling manner possible.

The technology story process and the template we use helps to get the proposal story organized. It is a key step in producing the most competitive proposal possible. Please note that while we focus on the preparation of government SBIR proposals here, the technology story process is applicable for any situation in which your goal is to present your technology in a compelling way—such as in your business plan.

Elements of the Technology Story

The technology story is a short (about three- to five-page) summary of the proposed technology. The technology story allows you to test your ideas on others before committing to a full proposal. The key parts of the technology story are described below.

1. **Setting the Stage** – In this part of the technology story your goal is to get the audience immediately interested in the problem or opportunity you are addressing and in your innovative technology—i.e., to set the stage for the proposition you will make concerning your technology. You do this by describing the problem or opportunity that you will address in terms of the need, the current state of the art (and its shortcomings), and remaining technology challenges.

First, describe the problem or opportunity in terms of its importance to society, the world, or the target audience. Many technologists ascribe to the theory that if you build something new, it is by virtue of its newness, better. In fact, unless the new technology addresses a need that is recognized, it is unlikely to find a market.

Second, you must describe the current means by which the need is being met. In other words, you must describe the state of the art. In addition, it is important that your story describe why the state-of-the-art approach is insufficient to fully meet the need. This gap between the need and the state of the art is the target for the new technology innovation you hope to offer. We often hear from our clients that there is nothing like what they offer on the market today. That is, there is no state-of-the-art. This is never true. Even if the idea is very innovative it will improve on the way things are done today. That is the state-of-the-art however antiquated it may seem compared to your innovative idea.

Third, the technology challenges that have prevented others from overcoming the technology gap must be explained. These technology challenges form the justification for funding the research and development of your innovative solution.

Try to come up with compelling statements that will get the readers' attention and will quickly cause your proposal to stand out among the many other proposals vying for funding. Some of the questions that should be answered in this section are listed below:

- What is the problem/opportunity being addressed, and how big is it? Why is it important? (Quantify whenever possible.)
- Who cares about it? Why? Who will pay for it? How do you know?
- What does the problem cost? Or what does it cost us to NOT capitalize upon this opportunity?
- Why is it still a problem? (Why haven't smart people already solved it if it is important?)
- What is the key technical nut that has to be cracked?
- What is deficient in the current state of the art and the current R&D that is focused on solving the technical problem?

- Why are **you** able to solve the technical problem(s) when everyone else has failed?
- What special capabilities does your team bring to this problem?

2. **The Theme –** In the second part of the technology story you describe the concept of your solution and how you will prove its feasibility. Notice that we did not start our technology story with a description of the innovative solution. Many technologists lead with the technology description because it is, after all, their greatest interest. Unfortunately, the readers have no reason to be interested in your solution until they understand the need and problem the technology will address. That is, the stage has not been set by the first part of the technology story.

In the theme portion of the technology story you state what your solution involves, how it works, and what you will do with any research money awarded. You may want to start by writing a sentence beginning with: "In Phase I **we will attempt to prove that** ..." This approach forces you to think in research terms. That is, conducting an effort that proves something rather than simply building something. (By the way, for software developers who read this developing and testing software is not research. Rather, the prototype software you create is used to test the feasibility of solving some problem better than what is currently available.) You should talk about how you will use previous experience or existing technologies to great advantage using the current effort to advance the state of the art.

Many times there are several problems that must be proven before a new technology is ready for market. The important element at this early stage is the single most critical element that will make or break the feasibility of the concept.

It is also critical that you think in measurable terms about what will constitute success in your research and development. By quantifying your goals you can clearly establish that you succeeded in achieving your feasibility criteria.

Some questions that should be addressed in this section are:

- What is the overall goal of the new technology being proposed?
- What is the Phase I goal that will prove conceptual feasibility?
- Why is this goal critical to proving feasibility of your solution?
- How will you know you have proven your hypothesis? In other words, how will you **measure** your success?

3. **The Vision –** In the third part of the technology story your goal is to create a vision of the future for the reader with your solution in it. In many ways, this is the most exciting part of the story. In this section you get to envision the future with your solution in it.

The vision should predict what Phase II of your R&D will look like, but should also present a longer-term view of what impact the solution might have when successfully commercialized and adapted to other applications. Many organizations struggle with this section because it tends to move from the laboratory research and development arena to the commercial business world.

Questions that should be addressed in this section are:

- If you are able to prove the feasibility of your concept in Phase I, where does the R&D go from there?
- Who will benefit by the final product? (You should quantify the benefit if possible.)
- Who might use it?
- How will it be used?
- How broadly might it be applied if you are successful with this specific application? This is essentially a quantification of the market.

Technology Story Template and Examples

Here is a guide and some brief examples that show how these components are used to tell the technology story. The examples have been shortened to abstract length (about three paragraphs) for convenience in presenting them here. Each section of the actual technology story will be more detailed and should include references to further increase the credibility of your arguments. As stated earlier, a full white paper should be three to five pages in length.

- **Set the stage – Problem**
  - A. Get the audience interested at the outset
  - B. Identify the importance of the problem – the need
  - C. Summarize the state of the art
  - D. Describe the technical challenges to solving the problem
- **State the theme – Solution**
  - E. Describe the concept of your solution
  - F. Present what you will attempt to prove in Phase I
- **Create a Vision**
  - G. Discuss how Phase I success will set up Phase II
  - H. Discuss the overall plan for Phase II
  - I. Envision the world with your solution in it ("Phase III")

Sample 1 – Hypoglycemia Testing for Infants

(A) Hypoglycemia represents a dangerous acute condition for neonates and for diabetics of all ages. (B) For neonates, careful monitoring of plasma glucose concentrations in at-risk newborns over the first few hours of life has become standard medical practice throughout the nation to guard against hypoglycemia. (C) However, today's state-of-the-art techniques for accurately detecting hypoglycemia do not adequately address the needs of neonates or of their care providers. (D) In fact, manufacturers are careful to publish the testing ranges for which their systems have been "validated"--which do not include the key hypoglycemic ranges (e.g., 10- to 50-mg/dL)--and some *specifically warn care providers in writing that the systems are not to be used for neonate testing.* **That testing range remains as a major challenge.**

(E) The overall goal of this multi-phase SBIR project is to develop a specialized, economical, hand-held glucose-sensor technology that will overcome the limitations of current glucose tests for neonates. We expect to primarily address the 10- to 50-mg/dL range, with a secondary goal of addressing the entire relevant neonate range (perhaps 10 to 90 mg/dL). (F) Our approach for Phase I will be to investigate the feasibility of combining a novel electrochemical sensor technology with a new generation of a proprietary, prototype hand-held point-of-care monitor that has already been developed by our firm. Our progress to date in this arena will make it possible to prove feasibility within the limited scope of Phase I.

(G) A successful Phase I will lead to (H) a Phase II prototype-development program designed to validate our approach through initial clinical trials and to prepare for follow-on Phase III development, FDA approvals, and ultimate commercialization. (I) The resulting product would serve a significant neonate population in the U.S. (4 million annual births) and a larger international market. Moreover, the technical success achieved would likely lead directly to production of an improved point-of-care glucose-monitoring product for all Type I diabetics who require extremely accurate, reliable, low-cost home-testing capabilities for aggressive diabetic monitoring.

Sample 2 – Labeling to Detect Fruit Ripeness

(A) The US pear industry is struggling to market an increasing harvest of winter pears—(B) one that will soon exceed 20 million bushels. (C) Agricultural specialists have long recognized that the biggest obstacle to selling winter pears is the fact that the consumers are generally ignorant of the requirements to ripen fruit and are often disappointed with their experience with pears. There are similar problems with other produce, such as melons. Essentially nothing has been done to improve this situation in the consumer arena, (D) as no one has devised an effective method of educating consumers on the spot or otherwise making it possible for them to solve this problem as they shop.

(E) Given that most fruit is now labeled, we propose to develop a non-toxic, chemically active label that progressively changes color as fruit ripens. As currently envisioned, the label will respond to the increasing flux of the plant hormone, ethylene, as the fruit approaches the climacteric, marking the on-set of ripening. The consumer will be able to quickly tell whether the fruit is near-ripe, ripe, or over-ripe.

(I) This approach is applicable to a wide range of different fruits, but, (F) for the proof-of-concept work in Phase I, we propose to use d'Anjou winter pears. Phase I tasks will be focused upon demonstrating the feasibility of designing and producing safe, low-cost labels that will provide the target performance.

(G) Phase I success will set the stage for (H) Phase II optimization/prototype demonstration with a range of pear cultivars as the next step toward Phase III commercialization. (I) This label will benefit consumers, who will have a visual indication of the edibility of the fruit; growers, who will benefit from a larger demand; and retailers, who will benefit from less handling, bruising and wastage of the fruit.

The success that is anticipated with pears under this project could then be applied to other produce, such as melons, nectarines, plums and papayas. The potential worldwide market could reach many billions of units/year.

Sample 3 – Anti-Malaria Drugs

(A) **A child dies of malaria every 12 seconds.** (B) Hundreds of millions of all ages are infected annually. If carried out aggressively, new initiatives for preventing and treating malaria could reduce the suffering of millions--and could also eliminate the threat of renewed outbreaks in temperate regions (*including the United States*). (C) Unfortunately, scientists cannot yet identify drugs that are unique to a stage of growth of a particular microbe (i.e., the stage at which it is most vulnerable)—which is what is needed to treat malaria. (D) Next-generation technology that has greater sensitivity and higher-throughput capacities is required to support the drug-discovery advances needed to address this major medical challenge.

(E) ADC proposes to develop and apply its innovative, highly sensitive electrochemical sensor-array technology for high-throughput screening for drugs to treat human malarias. (F) The two Phase I goals are to prove the feasibility of 1) developing new sensors/sensor arrays in a microtiter-plate format for direct, quantitative measurement of malarial gene expression in multiple samples; and 2) demonstrating the utility of the sensor arrays for high-throughput screening for drugs to treat human malarias. Substantial Phase I work will address the need for high sensitivity, innovative plate and instrument design, and performance evaluation to establish system feasibility—(I) with a focus on malaria as a model that illustrates the power and sensitivity of this new tool for drug discovery relevant to a number of important diseases.

(I) When scientists can identify drugs that are unique to a stage of growth of a particular microbe, drugs can then be targeted to specific growth stages. (G) Success in this Phase I project will lead to (H) a larger Phase II effort designed to produce prototype technology to support initial clinical demonstrations of the technology's effectiveness. (I) Follow-on Phase III success will provide essential new tools for efficient, economical, high-throughput screening to make this process of drug discovery much more rapid and cost-effective. The potential market is a segment representing tens of millions annually within a drug-discovery market that totals some $5 billion.

Sample 4 – Adhesives for Ceramic Armor

(A) Since the use of armor in battle was first envisioned, its added weight has been a major problem: (B) the trade-off issues involving protection vs. performance for aircraft, ground vehicles, and individual soldiers are significant. (A) A top priority for today's U.S. Army continues to be the need to identify and develop a next-generation method of producing and applying lightweight, high-performance armor to its aircraft and ground vehicles. (C) Although currently available advanced ceramics, such as SiC, are ideal materials for these lightweight armor applications, ceramics must be adhered to or encapsulated within metals (e.g., titanium) to protect their brittle nature. (D) Our current ability to protect these ceramics in armor applications is not adequate; the needed high-performance adhesives do not exist. An improved adhesive for joining ceramics to low-density, lightweight metals would represent a major technical advance. Such an adhesive could tolerate the substantial differences in thermal expansion coefficients between the two types of materials that must remain bonded when subjected to the most severe combat conditions.

(F) For Phase I, we propose to demonstrate the feasibility of improving the sheer lap strength of the currently used bonding technology (5,000 psi) by at least 50% (to at least 7,500 psi)—*thus exceeding the Army's target specifications for the next-generation technology.* (E) We will verify the failure mode(s) of the currently utilized technology and will work to design an adhesive system that overcomes those deficiencies. Proper surface preparation and priming will be investigated to optimize bond strength, and an ambient-cure system will be pursued to accommodate field repair. With decades of experience in developing custom products for use in effectively joining dissimilar materials and the R&D team's 100 years of cumulative experience we are well-positioned to carry out this work successfully.

(G) Phase I success will set the stage for a larger (H) Phase II prototyping and field demonstration/validation effort that will establish the potential for this new technology in a range of key applications. The company is a well-established manufacturing and marketing firm with the capabilities needed to provide this product to the Army immediately upon completion of the SBIR projects. (I) The 9/11 attacks have graphically demonstrated the need for both military and civilian protective measures that go far beyond those previously envisioned. Effective and cost-efficient light armor systems are clearly a necessity for both military and non-military applications. The proposed new product represents a state-of-the-art advance in high-performance adhesive technology. Success in this effort will result in armor that can be used by the Army and throughout the U.S. military, as well as on civilian aircraft and vehicles, and any stationary structures.

Sample 5 – Laser Diode Cooling

(A) Laser diodes are extremely important throughout the DOD for applications such as communications, laser radar, target designation, spectroscopy, and directly fired weapons. (B) In the past two to three years the maximum power levels of reliable mass-manufactured laser diodes have increased dramatically. Unfortunately, the technology for cooling these laser diodes has not kept up. The newer laser diodes produce more than ten times as much power—and waste heat—from a unit having the same size footprint. These higher power densities surpass the ability of current cooling systems to remove the waste heat fast enough. (C) Traditional laser diode cooling has been based on electronics heat sink cooling technology—with minor adaptations and improvements. External refrigeration units are now being used as a stop-gap measure to provide cooling. They are large, heavy, expensive, and power-hungry.
(D) Next-generation cooling technologies would address this significant cooling problem and

would allow the DOD to further advance laser diode capabilities in terms of maximum power, reliability, and wavelength stability—and to also expand the use of the technology.

(E) The primary goal of the research proposed here is to identify and validate (via modeling) candidate solutions that represent the next generation of laser diode cooling technology for multiple DOD uses. We expect that technology to be self-contained and to allow for the complete elimination of the large refrigeration units that must now be used. Our R&D team has more than five decades of collective experience in the type of cooling technologies that will be examined.

(F) In Phase I we will characterize and model the cooling needs of pumped laser diodes to maintain stabilization, and we will evaluate available cooling options using innovative modeling techniques to determine the feasibility, practicality, and applicability of each technique individually or in combination for both short- and longer-duty cycles and identify one or more candidates for prototyping and DOD validation in Phase II.

(G) Phase I success in demonstrating the theoretical practicality of producing the desired self-contained cooling systems will lead to a follow-on Phase I Option and Phase II project focused on system prototyping and demonstration. (H) In Phase II, we will utilize our micro-fab capabilities and our substantial mechanical design skills to build test fixtures, physical models, and then a fully working prototype. (I) Diode pumped solid-state (DPSS) lasers will be replacing gas lasers for higher-powered DOD and industrial operations. In the low- to medium-powered DPSS units, the laser diode cooling system is sometimes a more-expensive component than are the laser diodes themselves. In these units, the cooling system can also be larger and can consume more power than the complete laser, controls, and power supply combined. A breakthrough in the cooling technology for laser diodes could open up new markets for these DPSS systems as they become smaller, cheaper, and require less maintenance. Opto and Laser Europe has estimated the 2005 laser diode market to be nearly $9 billion.

The SBIR Guys

Randy Dipner and Mark Henry are the SBIR Guys. Randy Dipner has assisted in the development of hundreds of winning SBIR proposals. He built his own company using SBIR funding and has participated in SBIR proposal reviews for several different federal agencies. Mark Henry is nationally recognized as the Vince Lombardi of the SBIR program. He led Bend Research to over 175 SBIR wins in the 80's and 90's and has subsequently contributed to hundreds of winning SBIR proposals across every SBIR-awarding agency.

The SBIR Guys deliver training programs ranging from one or two hours to two days in length to audiences across the country. The SBIR Guys bring their extensive, first-hand knowledge of the program coupled with an upbeat presentation style has engendered rave reviews from every audience.

The SBIR Guys also provide direct support to small businesses in the development of competitive SBIR proposals using their proven methodology involving guided background research, development of a technology story to test the SBIR proposal story, production of key pre-proposal data to ensure consistency of content and scope of the proposal, and editorial and content review support of the actual proposal.

Please contact the SBIR Guys if you have any questions.

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