

## **User Testing Instructions:**

This SBIR output report offers the same information in two formats. The bottom of each page is labeled with the Option number and Page number.

### ***OPTION 1 - pages 1 through 11***

- Displays the TTPT questions along with user responses.

### ***OPTION 2 - pages 12 through 20***

- Does not display the TTPT questions, and instead only provides user responses.

Please review both options before responding to the SBIR output report questions in the TTPT evaluation survey.

**Expanded Keyboard  
SBIR Commercialization Plan Output Report  
Responses from TTPT Parts 1 & 2**

This document contains components commonly required in Phase II SBIR proposal commercialization plans. The content you entered into the TTPT will populate relevant proposal sections, however some sections will need elaboration or additional content that is beyond the scope of the TTPT.

The blue boxes represent the major sections commonly required in Phase II SBIR proposals. Each of these major sections includes the SBIR requirements, relevant TTPT questions, and your TTPT responses.

## SBIR Proposal Requirement 1: Research and Development Plan

Content for this section was drawn from the information you input into the TTPT regarding your plans for prototype development and testing. You may have included details about activities that have already occurred, as well as plans for the future. Therefore, some of this information may be more applicable to the Phase I results section of your proposal.

**SBIR R&D Plan Instructions: Include a detailed description of the Phase II research and development plan. The plan should indicate not only what will be done, but also how the research and development will be carried out. The adequacy of the work plan (and schedule) will be considered. Phase II research and development should address the technical objectives cited in the prior section of the proposal. The methods planned to achieve each objective or task should be discussed in detail. The applicant should provide sufficient detail to indicate how the research objectives will be investigated.**

### **Technical Objectives and Engineering Implementation Plan**

***TTPT Part 2- Q3: What technical objectives do you intend to achieve through your development activity?*** 1) Design and produce a functioning case; 2) Establish electronic interface to allow for communication between the expanded keyboard's buttons and a TI calculator.

***TTPT Part 2- Q5: Describe the details that are included in your engineering implementation plan.*** It includes CAD drawings that will be used to communicate technical specs with our hardware and software engineering teams. It also details the electrical wiring diagram being used to create the prototype. Specific roles and responsibilities are described and laid on a timeline.

### **Development Activity- Product Engineering and Testing- Alpha Prototype**

***TTPT Part 2- Q21: Describe the steps or tasks involved in creating the alpha prototype.*** Early questions that guided the prototype development effort included the following: What should be the device's size, shape, and color? What material should be used? What should be the size of each key and distance between keys? Should the device include a moisture guard and how should it be cleaned? What will be the device's power source? ***When will this activity occur?*** 01/20/2016

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**TTPT Part 2- Q22: Describe the testing that will be performed to ensure the alpha prototype functions as desired.** Testing of the alpha prototype included bench-testing within our development shop. We also provided the alpha prototype to focus group participants to gauge their reaction to its form and function. **When will this activity occur?** 01/30/2016

**Development Activity- Product Specifications**

**TTPT Part 2- Q20: Describe how you have or will develop product specifications.** We held an initial consumer panel, followed by two consumer focus groups on the Expanded Keyboard to define product specifications. The groups were comprised of a cross section of potential users from the primary target market. Included were high school and college students lacking the fine motor control skills necessary to operate the current scientific calculators, teachers, teaching assistants, and occupational therapists. Specifications resulting from the groups were derived from the participants' descriptions of their current status and satisfaction with existing alternatives, and their conceptualization of the ideal Expanded Keyboard product. **When will this activity occur?** 03/21/2016

**Development Activity- Product Engineering and Testing- Beta Prototype**

**TTPT Part 2- Q23: Describe the steps or tasks involved in creating the beta prototype.** Following the alpha focus groups, product specifications were refined. As a result, we sought manufacturers who could deliver production-quality components, including the full case and all calculator keys. At the same time, refinements to the electronics were performed by a sub-contractor, who ensured that the necessary connections would be made between the Expanded Keyboard case/keys, and the original TI calculator. **When will this activity occur?** 03/21/2016

**TTPT Part 2- Q24: Describe the testing (i.e. user testing and/or field testing) that will be performed to ensure the beta prototype functions as desired.** Beta focus groups were conducted with a sample of the same participants from the alpha groups. These individuals reacted to the improved form and function of the prototype device, and were overwhelmingly positive about the beta version. **When will this activity occur?** 09/19/2016

**Development Activity- Technology Transfer Office**

**TTPT Part 2- Q15: Describe your current or planned interactions with your University's Technology Transfer Office.** We have received a waiver from our Technology Transfer Office, which allows us to proceed with this project without additional disclosure requirement.

**TTPT Part 2- Q16: Moving forward, describe the role that the Technology Transfer Office will play in the project.** The TTO may assist us in locating an appropriate manufacturer. **When will these activities begin?** 10/20/2016

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**Development Activity- Regulations and Reimbursement**

**TTPT Part 2- Q19: If applicable, describe how you will address regulatory standards and reimbursement requirements for your prototype.** The expanded keyboard will not be subject to regulatory standards. As it will be purchased with private pay, reimbursement requirements are not a concern. **When will this activity occur?** No date given

**SBIR Proposal Requirement 2**

**Commercialization Plan: (i) Project Value, Expected Outcomes, and Impact**

**SBIR Q1. State the product, process or service to be developed in Phase III.**

**TTPT Part 1- Q1: Name of project?** Expanded Keyboard.

**SBIR Q2. Describe, in layperson's terms, the proposed project and its key technology objectives.**

**TTPT Part 1- Q2: What are you creating/developing?** We are creating/ developing an expanded keyboard that makes it easier for kids who have difficulty with fine motor control to use a graphing calculator.

**SBIR Q3. Clarify the need addressed, specifying weaknesses in the current approaches to meet this need.**

**TTPT Part 1- Q3: As described by end users, what problem does your product solve or what unmet need does it fulfill?** The problem is some children lack the fine motor control skills needed to successfully operate a Texas Instruments graphing or scientific calculator.

**TTPT Part 1- Q10: How does the target customer currently meet the need that your product will address?** The target customer currently meets the need that this product will address with alternatives, such as computer programs offering graphing capabilities.

**TTPT Part 1- Q11: Why is your product superior to existing alternatives?** The Expanded Keyboard will be superior because it offers access to the same calculator being used by a student's peers. Features include enlarged key size, reducing an individual's need for fine motor control, tilt adjustable cover to improve display visibility, lightweight design with physical dimensions similar to a laptop, and battery powered operation.

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**SBIR Q4. Specify the potential societal, educational, and/ or scientific benefits of this work.**

*TTPT Part 1- Q4: How does the product solve the problem/fulfill the unmet need?* The product solves the problem/ fulfills the unmet need by providing an enlarged, lightweight, independently powered replica of the keyboard face of these calculators.

**SBIR Q5. Explain the non-commercial impacts to the overall significance of the project.**

\*Beyond the scope of the TTPT. Enter your response here.

**SBIR Q6. Explain how the SBIR project integrates with the overall business plan of the company.**

\*Beyond the scope of the TTPT. Enter your response here.

### Commercialization Plan: (ii) Company Information

**SBIR Q7. Outline focused objectives/ core competences; specialization area(s); products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization.**

\*Beyond the scope of the TTPT. Enter your response here.

**SBIR Q8. Provide short description of the origins of the company.**

\*Beyond the scope of the TTPT. Enter your response here.

**SBIR Q9. Indicate your vision for the future, how you will grow/ maintain a sustainable business entity, and how you will meet critical management functions as your company evolves from a small technology R&D business to a successful commercial entity.**

\*Beyond the scope of the TTPT. Enter your response here.

**Expanded Keyboard  
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**Commercialization Plan: (iii) Customer and Competition**

**SBIR Q10. Describe the market and/or market segments you are targeting and provide a brief profile of the potential customer. Provide information on the size of the market.**

**TTPT Part 1- Q7: Who will use your product?** The product will be used by students who lack the fine motor control skills necessary to operate a standard scientific calculator, but wish to take courses in chemistry and mathematics.

**TTPT Part 1- Q9: Who will pay for the product?** The product will be paid for by a caregiver, friend or relative.

**TTPT Part 2- Q8: Describe and quantify the size of the target market.** The total potential market for the Expanded Keyboard, including both students and professionals, is projected to be over 1 million people who have fine motor control limitations.

**TTPT Part 2- Q9: Describe the geographic area where the target market is located.** At this time, we are focused on serving the domestic US market. However, there is potential for use of the Expanded Keyboard in other countries.

**TTPT Part 2- Q10: In what setting will the target market use the product?** For children, the Expanded Keyboard will primarily be used in schools and in the home, while completing homework. Professionals will use the Expanded Keyboard in the workplace.

**TTPT Part 2- Q11: Describe growth trends regarding the size of the market.** Over the past decade, the percentage of students with disabilities in regular classrooms has increased by nearly 20 percentage points. The IDEA has prompted further inclusion of students with disabilities in regular classrooms, thereby increasing the number of students who would be required to have access to a graphing/scientific calculator.

**TTPT Part 2- Q12: Describe anticipated changes to the rate of demand over time.** It is expected that by increasing access to certain course subjects requiring the use of graphic/ scientific calculators, the number of people with fine motor control limitations who will be able to enter professional fields requiring the use of a graphing and/ or scientific calculator will expand as well.

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**SBIR Q11. Tell what significant advantages your innovation will bring to the market, e.g. better performance, lower cost, faster, more efficient or effective, new capability.**

**TTPT Part 1- Q11: Why is your product superior to existing alternatives?** The Expanded Keyboard is superior to alternatives because it offers access to the same calculator being used by a student's peers. Features include enlarged key size, reducing an individual's need for fine motor control, tilt adjustable cover to improve display visibility, lightweight design with physical dimensions similar to a laptop, and battery powered operation.

**SBIR Q12. Explain the hurdles you will have to overcome in order to gain market/ customer acceptance of your innovation.**

**TTPT Part 1- Q12: What problems might you encounter in creating, testing, transferring, and selling your product?** During development, we may encounter problems while enabling the interface to control the calculator's functions. When selling the product, there may be limited acceptance from teachers and school boards when students require this technology to complete tests.

**TTPT Part 1- Q13: How will you overcome these problems?** We will overcome these problems by working closely with the calculator's manufacturer to ensure we can achieve seamless functionality. We will also work with teachers and school administrators to address their concerns regarding use of the technology for tests.

**SBIR Q13. Give an overview of the current competitive landscape and any potential competitors over the next several years.**

**TTPT Part 2- Q13: Describe the competitive landscape in more detail.** There are no fully accessible scientific/ graphing calculators currently on the market. Computer programs can perform similar functions. However, they are less portable than a stand-alone calculator and may not be allowed for exams.

**TTPT Part 2- Q14: Describe the barriers to entry that prevent new entrants or current competitors from copying your solution.** We are striving to create an exclusive agreement with Texas Instruments, the manufacturer of the TI calculator lines. This agreement would position the Expanded Keyboard as the only TI-endorsed product for this purpose.

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Commercialization Plan: (iv) Production and Marketing

**SBIR Q14. Describe how the production of your product/ service will occur (e.g. in-house manufacturing, contract manufacturing).**

*TTPT Part 1- Q6: Who will be responsible for manufacturing, selling and servicing your product when it is in the market?* All manufacturing, selling, and servicing will be performed by external parties.

*TTPT Part 3- Q3: Describe how the production of your product will occur, including discussion of in-house capabilities and/or those provided by a partner or subcontractor.* NA

*TTPT Part 3- Q7: Describe your plans for full-scale launch of the product.* NA

**SBIR Q15. Briefly describe your marketing and sales strategy.**

*TTPT Part 3- Q5: Briefly describe your marketing and sales strategy.* NA

*TTPT Part 2- Q8: Describe your plans for distributing your product.* NA

**SBIR Q16. Outline milestones, target dates, analyses of market size, and estimated market share after first year sales and after five years.**

\*Beyond the scope of the TTPT. Enter your response here.

**SBIR Q17. Explain your plan to obtain market share.**

\*Beyond the scope of the TTPT. Enter your response here.

**Expanded Keyboard  
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**SBIR Q18. Describe any strategic alliance, partnerships, or licensing agreements you have in place to market and sell your product.**

***TTPT Part 2- Q7: Describe any strategic alliance, partnerships, or licensing agreements you have in place to develop, produce, market, or sell your product.*** We are engaged with Texas Instruments, the manufacturer of calculator models TI-73, TI-83 Plus, and TI-89. They are providing technical support to ensure a good fit between their products and this accessible add-on. We are seeking a partner who can manufacture, sell, and service the device.

***TTPT Part 2- Q15: Describe your current or planned interactions with your University's Technology Transfer Office.*** We have received a waiver from our Technology Transfer Office, which allows us to proceed with this project without additional disclosure requirements.

***TTPT Part 2- Q16: Moving forward, describe the role the the Technology Transfer Office will play in the project.*** The TTO may assist us in locating an appropriate manufacturer.

**Commercialization Plan: (v) Intellectual Property**

**SBIR Q19. Provide patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage.**

***TTPT Part 2- Q17: Describe the terms of existing non-disclosure agreements (NDA) or partnership agreements that are in place or forthcoming.*** We presently have a NDA in place with Texas Instruments.

***TTPT Part 2- Q18: If needed, describe how you are going to protect any intellectual property that results from your innovation.*** At this time, there is no need for additional intellectual property protection.

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**Commercialization Plan: (vi) Financing**

**SBIR Q20. Describe the necessary financing you will require, and when it will be required, as well as your plans to raise the requisite financing to launch your innovation into Phase III and begin the revenue stream.**

***TTPT Part 2- Q25: Describe the necessary financing you require to complete this project's research and development effort. When will funds be required, how much is needed, and how will it be obtained?***

This project is being funded through a federal grant, which has already been awarded. The grant includes funds for personnel, technology purchases, testing facilities, and participant stipends.

***TTPT Part 2- Q26: Are the required resources available and/or already secured and allocated?*** Yes, we have secured resources for development and transfer activities from our Center and our University.

***TTPT Part 3- Q4: Describe the necessary financing you require to produce the produce and begin generating revenue. When will funds be required, how much is needed, and how will it be obtained?***

NA

**Commercialization Plan: (vii) Revenue Stream**

**SBIR Q21. Explain how you plan to generate a revenue stream for your company should this project be a success. Examples of revenue stream generation include, but are not limited to, manufacture and direct sales, sales through value-added resellers or other distributors, joint venture, licensing, service.**

\*Beyond the scope of the TTPT. Enter your response here.

**SBIR Q22. Describe how your staffing will change to meet your revenue expectations.**

\*Beyond the scope of the TTPT. Enter your response here.

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Responses from TTPT Parts 1 & 2

Commercialization Plan: (vii) Assistance and Mentoring

**SBIR Q23. Plans for securing needed technical or business assistance through mentoring, partnering, or through arrangements with state assistance programs, SBDC's, Federally-funded research laboratories, Manufacturing Extension Partnership centers, or other assistance providers.**

***TTPT Part 2- Q7: Describe any strategic alliance, partnerships, or licensing agreements you have in place to develop, produce, market, or sell your product.*** We are engaged with Texas Instruments, the manufacturer of calculator models TI-73, TI-83 Plus, and TI-89. They are providing technical support to ensure a good fit between their products and this accessible add-on. We are seeking a partner who can manufacture, sell, and service the device.

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### SBIR Proposal Requirement 1: Research and Development Plan

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**SBIR R&D Plan Instructions: Include a detailed description of the Phase II research and development plan. The plan should indicate not only what will be done, but also how the research and development will be carried out. The adequacy of the work plan (and schedule) will be considered. Phase II research and development should address the technical objectives cited in the prior section of the proposal. The methods planned to achieve each objective or task should be discussed in detail. The applicant should provide sufficient detail to indicate how the research objectives will be investigated.**

***Technical Objectives and Engineering Implementation Plan***

***Technical objectives:*** 1) Design and produce a functioning case; 2) Establish electronic interface to allow for communication between the expanded keyboard's buttons and a TI calculator.

***Engineering implementation plan:*** It includes CAD drawings that will be used to communicate technical specs with our hardware and software engineering teams. It also details the electrical wiring diagram being used to create the prototype. Specific roles and responsibilities are described and laid on a timeline.

***Development Activity- Product Engineering and Testing- Alpha Prototype***

Early questions that guided the prototype development effort included the following: What should be the device's size, shape, and color? What material should be used? What should be the size of each key and distance between keys? Should the device include a moisture guard and how should it be cleaned? What will be the device's power source? ***This activity will occur:*** 01/20/2016

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Testing of the alpha prototype included bench-testing within our development shop. We also provided the alpha prototype to focus group participants to gauge their reaction to its form and function. ***This activity will occur: 01/30/2016***

***Development Activity- Product Specifications***

We held an initial consumer panel, followed by two consumer focus groups on the Expanded Keyboard to define product specifications. The groups were comprised of a cross section of potential users from the primary target market. Included were high school and college students lacking the fine motor control skills necessary to operate the current scientific calculators, teachers, teaching assistants, and occupational therapists. Specifications resulting from the groups were derived from the participants' descriptions of their current status and satisfaction with existing alternatives, and their conceptualization of the ideal Expanded Keyboard product. ***This activity will occur: 03/21/2016***

***Development Activity- Product Engineering and Testing- Beta Prototype***

Following the alpha focus groups, product specifications were refined. As a result, we sought manufacturers who could deliver production-quality components, including the full case and all calculator keys. At the same time, refinements to the electronics were performed by a sub-contractor, who ensured that the necessary connections would be made between the Expanded Keyboard case/keys, and the original TI calculator. ***This activity will occur: 03/21/2016***

Beta focus groups were conducted with a sample of the same participants from the alpha groups. These individuals reacted to the improved form and function of the prototype device, and were overwhelmingly positive about the beta version. ***This activity will occur: 09/19/2016***

***Development Activity- Technology Transfer Office***

We have received a waiver from our Technology Transfer Office, which allows us to proceed with this project without additional disclosure requirement.

The TTO may assist us in locating an appropriate manufacturer. ***This activity will occur: 10/20/2016***

***Development Activity- Regulations and Reimbursement***

The expanded keyboard will not be subject to regulatory standards. As it will be purchased with private pay, reimbursement requirements are not a concern. ***This activity will occur: No date given***

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**SBIR Proposal Requirement 2**

**Commercialization Plan: (i) Project Value, Expected Outcomes, and Impact**

**SBIR Q1. State the product, process or service to be developed in Phase III.**

Expanded Keyboard.

**SBIR Q2. Describe, in layperson's terms, the proposed project and its key technology objectives.**

We are creating/ developing an expanded keyboard that makes it easier for kids who have difficulty with fine motor control to use a graphing calculator.

**SBIR Q3. Clarify the need addressed, specifying weaknesses in the current approaches to meet this need.**

The problem is some children lack the fine motor control skills needed to successfully operate a Texas Instruments graphing or scientific calculator.

The target customer currently meets the need that this product will address with alternatives, such as computer programs offering graphing capabilities.

The Expanded Keyboard will be superior because it offers access to the same calculator being used by a student's peers. Features include enlarged key size, reducing an individual's need for fine motor control, tilt adjustable cover to improve display visibility, lightweight design with physical dimensions similar to a laptop, and battery powered operation.

**SBIR Q4. Specify the potential societal, educational, and/ or scientific benefits of this work.**

The product solves the problem/ fulfills the unmet need by providing an enlarged, lightweight, independently powered replica of the keyboard face of these calculators.

**SBIR Q5. Explain the non-commercial impacts to the overall significance of the project.**

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**SBIR Q6. Explain how the SBIR project integrates with the overall business plan of the company.**

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**Commercialization Plan: (ii) Company Information**

**SBIR Q7. Outline focused objectives/ core competences; specialization area(s); products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization.**

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**SBIR Q8. Provide short description of the origins of the company.**

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**SBIR Q9. Indicate your vision for the future, how you will grow/ maintain a sustainable business entity, and how you will meet critical management functions as your company evolves from a small technology R&D business to a successful commercial entity.**

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**Commercialization Plan: (iii) Customer and Competition**

**SBIR Q10. Describe the market and/or market segments you are targeting and provide a brief profile of the potential customer. Provide information on the size of the market.**

The product will be used by students who lack the fine motor control skills necessary to operate a standard scientific calculator, but wish to take courses in chemistry and mathematics.

The product will be paid for by a caregiver, friend or relative.

The total potential market for the Expanded Keyboard, including both students and professionals, is projected to be over 1 million people who have fine motor control limitations.

At this time, we are focused on serving the domestic US market. However, there is potential for use of the Expanded Keyboard in other countries.

For children, the Expanded Keyboard will primarily be used in schools and in the home, while completing homework. Professionals will use the Expanded Keyboard in the workplace.

Over the past decade, the percentage of students with disabilities in regular classrooms has increased by nearly 20 percentage points. The IDEA has prompted further inclusion of students with disabilities in regular classrooms, thereby increasing the number of students who would be required to have access to a graphing/scientific calculator.

It is expected that by increasing access to certain course subjects requiring the use of graphic/ scientific calculators, the number of people with fine motor control limitations who will be able to enter professional fields requiring the use of a graphing and/ or scientific calculator will expand as well.

**SBIR Q11. Tell what significant advantages your innovation will bring to the market, e.g. better performance, lower cost, faster, more efficient or effective, new capability.**

The Expanded Keyboard is superior to alternatives because it offers access to the same calculator being used by a student's peers. Features include enlarged key size, reducing an individual's need for fine motor control, tilt adjustable cover to improve display visibility, lightweight design with physical dimensions similar to a laptop, and battery powered operation.

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**SBIR Q12. Explain the hurdles you will have to overcome in order to gain market/ customer acceptance of your innovation.**

During development, we may encounter problems while enabling the interface to control the calculator's functions. When selling the product, there may be limited acceptance from teachers and school boards when students require this technology to complete tests.

We will overcome these problems by working closely with the calculator's manufacturer to ensure we can achieve seamless functionality. We will also work with teachers and school administrators to address their concerns regarding use of the technology for tests.

**SBIR Q13. Give an overview of the current competitive landscape and any potential competitors over the next several years.**

There are no fully accessible scientific/ graphing calculators currently on the market. Computer programs can perform similar functions. However, they are less portable than a stand-alone calculator and may not be allowed for exams.

We are striving to create an exclusive agreement with Texas Instruments, the manufacturer of the TI calculator lines. This agreement would position the Expanded Keyboard as the only TI-endorsed product for this purpose.

## Commercialization Plan: (iv) Production and Marketing

**SBIR Q14. Describe how the production of your product/ service will occur (e.g. in-house manufacturing, contract manufacturing).**

All manufacturing, selling, and servicing will be performed by external parties.

**SBIR Q15. Briefly describe your marketing and sales strategy.**

\*No response entered into TTPT.

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**SBIR Q16. Outline milestones, target dates, analyses of market size, and estimated market share after first year sales and after five years.**

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**SBIR Q18. Describe any strategic alliance, partnerships, or licensing agreements you have in place to market and sell your product.**

We are engaged with Texas Instruments, the manufacturer of calculator models TI-73, TI-83 Plus, and TI-89. They are providing technical support to ensure a good fit between their products and this accessible add-on. We are seeking a partner who can manufacture, sell, and service the device.

We have received a waiver from our Technology Transfer Office, which allows us to proceed with this project without additional disclosure requirements.

The TTO may assist us in locating an appropriate manufacturer.

**Commercialization Plan: (v) Intellectual Property**

**SBIR Q19. Provide patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage.**

We presently have a NDA in place with Texas Instruments.

At this time, there is no need for additional intellectual property protection.

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**Commercialization Plan: (vi) Financing**

**SBIR Q20. Describe the necessary financing you will require, and when it will be required, as well as your plans to raise the requisite financing to launch your innovation into Phase III and begin the revenue stream.**

This project is being funded through a federal grant, which has already been awarded. The grant includes funds for personnel, technology purchases, testing facilities, and participant stipends.

We have secured resources for development and transfer activities from our Center and our University.

**Commercialization Plan: (vii) Revenue Stream**

**SBIR Q21. Explain how you plan to generate a revenue stream for your company should this project be a success. Examples of revenue stream generation include, but are not limited to, manufacture and direct sales, sales through value-added resellers or other distributors, joint venture, licensing, service.**

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**SBIR Q22. Describe how your staffing will change to meet your revenue expectations.**

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**Commercialization Plan: (vii) Assistance and Mentoring**

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