OHIO
Roadmap to Future
Jobs & Prosperity
Mapping Your
STEM
Commercialization
and Business Plan

Believe in OHIO Program

STEM Commercialization Plan &
STEM Business Plan Competition

Standards for
Plan Preparation, Competition Rules
including Judging and Student Awards
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What is Believe in Ohio? An invitation for Ohio high school students to participate

Believe in Ohio (Bio) is a student entrepreneurship program to develop Ohio’s next generation of STEM innovators. High school students compete to earn awards and scholarships to Ohio colleges and universities through participation in STEM Commercialization or STEM Business Plan Competitions.

Believe in Ohio is a free program developed by The Ohio Academy of Science and Entrepreneurial Engagement Ohio with support from the Ohio General Assembly and Ohio Department of Higher Education.

Believe in Ohio prepares Ohio high school students for the future by: 1) Introducing them to Ohio’s Innovation Economy, 2) Inspiring them to pursue their STEM education and careers in Ohio, and 3) Encouraging them to become one of the innovators and entrepreneurs Ohio needs to help develop the new products, services and jobs of the future.

While the Believe in Ohio program includes local high school and regional STEM Plan competitions and other activities, the centerpiece of the program is a Statewide Student STEM Commercialization Plan & STEM Business Plan Competition to compete for hundreds of thousands of dollars in awards and scholarships to Ohio’s colleges and universities. We invite all Ohio high school students to participate!

Why is this program important?

Our nation’s prosperity is the result of generations of innovators and entrepreneurs who developed the products, services, businesses and industries that have made the United States economy the largest in the world.

Today, however, our state and nation are being challenged on an unprecedented basis to maintain their historic prosperity. We are living in an Innovation Age in which technology advancements and global competition point to a future where continuous innovation will cause every product, service, and aspect of life to be transformed and reinvented during the lifetimes of today’s students.

While many challenges lie ahead, so too will be the opportunities, but only if today’s students rise to the occasion to become our country’s next generation of innovators and entrepreneurs who create the new jobs and prosperity of the future. The purpose of the Believe in Ohio program is to:

• Open students’ eyes to what they will experience in the future and learn how to prepare for it.
• Inspire students’ interest in STEM where many of the jobs and careers of the future will be.
• Plant in students the seed of entrepreneurship and help students develop the problem solving, critical thinking, collaboration and the other 21st Century skills they will need to be successful in the future.
• Introduce students to Ohio’s Innovation Economy and inspire them to pursue their STEM and entrepreneurial education and careers in Ohio.
• Recognize and award Ohio’s high school students with awards and scholarships to Ohio colleges and universities through participation in Believe in Ohio STEM Commercialization Plan and STEM Business Plan Competitions.
Who may participate in Believe in Ohio competitions... individuals and teams?

BiO students may work as individuals or in teams of up to three (3) members to compete for awards and scholarships. Each school year students may submit only one plan, unless the student is required to do a plan for two different classes, e.g., one commercialization, one business.

Generally, students in a STEM class will develop a STEM Commercialization Plan, while students in a business, economics, marketing or entrepreneurship class will develop a STEM Business Plan competition.

How will competitions work?

STEM Plan competitions at the High School Level:

Teachers are granted the flexibility to have their students develop their STEM Plans based on what works for them and their classroom schedule. Teachers may have their students do their plans during the Fall Semester or Spring Semester, or over the course of the entire school year. Similarly, teachers may have their students develop plans on a compressed timeframe (e.g. over a 4-6 week period) or spread their students’ work over the course of the full school year, or anything in between.

Local high school competitions will be run by teachers who will apply the BIO standards, rules, and grading/judging rubrics. Local judges will be recruited by the participating teachers. (Teachers should review the recommendations about how to conduct their local competitions as noted on the Believe in Ohio website at www.BelieveinOhio.org, and in the Competition Standards, Rules and Instructional Booklet.)

Depending on the number of student plans completed within each school, BiO will provide from $300 to $2,500 in funding for awards. The maximum award that may be paid for any awardee plan is $500. The minimum award that may be awarded to any individual student recipient is $100. Awards should be given to those student plans that have the highest scores in their local high school competitions, as long as each plan earns an average judged score of at least 24 points.

STEM Plan competitions at the Regional Level:

All local high school plans with an average judged score of 36 points or greater may compete in a Regional competition. If this number is less than 20% of all local high school plans, then additional plans up to 20% may compete in a Regional competition, provided that all plans submitted must have received an average judged score of 24 or greater.

During the 2020-2021 school year, there will be two Regional competitions, one in December 2020, and one at the end of the 2020-2021 school year. Plans that qualified for a Regional competition during the 2019-2020 school year will be entered into the Regional competition in December 2020. Plans that qualify for a Regional competition during the 2020-2021 school year may be entered into a Regional Competition in either December 2020 or at the end of the 2020-2021 school year.

Plans qualified to compete must be electronically submitted to The Ohio Academy of Science office within 30 days after competition of local judging, but no later than the deadlines that will be posted on the BiO website. (Teachers will find additional information about how BiO’s regional competition will work at www.BelieveinOhio.org, and in the Competition Standards, Rules and Instructional Booklet.) A total of one hundred highest scoring regionally judged plans from both the December 2020 and the end of school year regional competition, with representation from each state region, will each receive a $1,000 scholarship to any Ohio college, university, or post-high school training program. These plans will also be entered into the BiO State Competition.

STEM Plan competition at the State Level:

A third level of competition will be held at the state level by The Ohio Academy of Science with Academy judges applying the same rules and grading rubrics as used at the local high school and regional competition levels. The first annual statewide competition will take place during June 2021. (Teachers will find additional information about how BiO’s state competition will work at www.BelieveinOhio.org, and in the Competition Standards, Rules and Instructional Booklet.) The State competition will offer hundreds of thousands of dollars in scholarships to any Ohio colleges, universities, or post-high school training program.

How the process will work for local plan competition awardees to receive their awards:

Step 1: Participating teachers must complete the Competition Cash Award Grant Application, that states the teacher(s) intention to participate and the estimated amount of student competition award dollars to be received.

Step 2: After all local grading and judging is completed, teachers must mail a copy of the cover page from all of their student plans to the Academy office to document how many total plans their students have completed. BiO will use this information to determine the actual amount of funding for competition awards at the high school. (The Academy office will advise the date when such copies are due.) The following must be marked on each submitted plan cover page: 1) The grade given to each plan by their teacher, and 2) For all plans that have been judged, the average judged score given by the competition judges.

Step 3: Teachers, after consulting with their STEM Advocate, will determine how the actual total amount of competition award funding will be awarded to their highest scoring student plans, keeping in mind that the maximum award to any awarded plan is $500, and that the minimum award that may be given to any individual student recipient is $100.

Step 4: Teachers provide their student award information to the Academy office, and in return, will receive from the office student award certificates to be printed by the teachers that shows student awardees the amount of their cash award.

Step 5: Student awardees will then be instructed to complete an online form with appropriate contact information. They will then receive a check for the amount of their award directly from the Academy office.
IMPORTANT UNDERSTANDINGS

Originality, attribution, and plagiarism: It is not required that student participants make scientific breakthroughs or develop products or services that are previously unheard of. Indeed, most students will likely evolve an existing product or service or idea for use in some new or different application. What students must understand, however, is that they must properly document and show attribution for ideas of others primarily by citing the sources of ideas or background statements within the text and listing the sources cited at the end of the report.

Here is an excerpt from an actual student plan showing in-text and 1:1 concordance with full references.

With the introduction of soft robotics, however, researchers can more closely mimic the qualities of the naturally occurring soft and adaptive biological systems and structures found in any number of organisms, including humans (Majidi, 2014). Soft robotics now enables researchers to create continuously distributed actuators in a manipulator, such as the continuous curvature found in nature as elephant trunks or octopus tentacles (Lipson, 2014).


Codes of ethics: Many businesses and engineering societies have codes of ethics that should be considered and followed. For example, search Google for ASME code of ethics of engineers. See also this link to On Being a Scientist that may be downloaded free from the National Academy of Science.

Special circumstances: At all levels (local school, regional and State) of participation and competition, research plans and certain special protocols must be approved in advance if any experimentation, student research or engineering design projects involve one or more of the following: 1) Human subjects, 2) Non-human vertebrate animals including observation projects, 3) Potentially hazardous biological agents, including microorganisms, recombinant DNA technologies, or human or animal flesh tissues, blood or body fluids, 4) Controlled substances and alcohol and tobacco, and 5) Hazardous substances or devices including certain chemicals, equipment, firearms, radioactive substances and radiation.

In these situations, search “International rules for pre-college science research” for forms and procedures to apply. These rules require adherence to special student research protocols and supervision, including prior approval of student research and engineering design projects by local scientific review committees (SRCs), or, in the case of human subjects, institutional review boards (IRBs). Local schools must appoint and manage these committees.

Depending upon the project(s) committee members of SRCs must have sufficient professional expertise by way of education and experience to review both human subjects and non-human vertebrate projects. IRB board members must have appropriate psychologist or social science backgrounds.

Patent, intellectual property and publication understandings: Once a student(s) submits a plan for grading/judging, they are making a public disclosure of their ideas, concepts, research, etc. and therefore they retain no proprietary interest in those ideas, concepts, research or results, etc. unless they have made an appropriate patent or intellectual property filing to protect their interests prior to submitting their plan for review. Students/parents interested in protecting their intellectual property rights should consult an attorney for advice.

Notwithstanding the above, it should be clearly understood by all Believe in Ohio participants that all teachers, mentors, judges, and any other people in any way connected with the Believe in Ohio program, The Ohio Academy of Science, Entrepreneurial Engagement Ohio, the Ohio Department of Higher Education, or any other person involved with the Believe in Ohio program in any capacity are under no duty whatsoever to maintain the confidentiality of any concepts, ideas, or research included in any plan submitted for review and judging. Additionally, the student acknowledges that any plan that they submit may be published or publicized, in whole or in part, along with their name by the Believe in Ohio Program, The Ohio Academy of Science and related organizations, particularly if their plan is chosen as an awardee in the Believe in Ohio plan competitions.

Click here to review Patent and Intellectual Property videos and discussion.

Prototypes, Models, Drawings or Sketches: Prototypes or models and their testing are expected within reason in that both time & cost may prohibit their full development. At a minimum, however, well-labeled, scaled and described engineering drawings or 3-D sketches are required. Use a CAD program or Google SketchUp available free at https://www.sketchup.com/

Apps: Students proposing “apps” must describe the functions in detail. Validation of an idea for an app idea means that students must provide a schematic or flow chart with symbols portraying how the user will navigate the app as well as all the features envisioned. Snippets of source code or working prototype even with limited functionality will enhance a plan and should be included to demonstrate a student’s computer science general knowledge and skills.

Carryover Projects not permitted: Although ideas may be spin-offs of previous work, Believe in Ohio competitions do not permit carryover projects. New ideas must be generated in subsequent years. Students must discuss briefly the previous idea if the new idea is related to a previous project.
We believe in you. We believe in Ohio……

“Ohio has a long tradition of innovation. Thomas Edison and Orville and Wilber Wright changed the way we live and travel. Neil Armstrong and John Glenn showed us what was beyond the clouds and dared us to dream. Ohio is the birthplace of great innovators and courageous trailblazers. We’re calling on you to step forward and join this legacy. Combine your passion for science and technology with a spirit of entrepreneurship to be part of Ohio’s future. We believe in you. We believe in Ohio. And we hope you will Choose Ohio First.”

STEM Plan competition recommendations for teachers:

• The teacher should first grade each student plan using the applicable standardized grading rubric, and assign each plan a score of 0-40. If a student receives a teacher grade of 19 or less, the plan should be excluded from judging to avoid wasting volunteer judge time by asking them to judge clearly substandard plans.

• All plans with a teacher grade of 20 or higher should be judged locally by at least two judges (ideally three judges) who apply BiO’s standardized judging rubric. Only plans that receive an average judged score of at least 24 points will be eligible to receive a local high school award.

• Judges must use the BiO STEM Commercialization Plan judging rubric if the student plan is a STEM Commercialization Plan, and the STEM Business Plan judging rubric if it is a STEM Business Plan.

• While the students’ teacher of record must grade each plan applying the standardized grading rubric, the teacher of record should not also be a competition judge.

• Judges may include other teachers or members of the local STEM professional and business community.

• It is recommended that judges judging a STEM Commercialization Plan ideally should have a science, technology, engineering or mathematics background.

• It is recommended that judges judging a STEM Business Plan should ideally have a business background and at least a fundamental knowledge of STEM.

• Given that judges are volunteers and that we do not want to overload them or else they may not volunteer again, we recommend that each judge be given no more than 6-8 plans to judge.

What is a STEM Commercialization Plan?

The primary emphasis is on a scientific, engineering or mathematical proof of concept.

A STEM Commercialization Plan is a written document that describes how a new and/or an existing STEM concept, prototype, process, idea or technology (or a combination of multiple STEM concepts, processes, ideas or technologies) may be applied, or further developed to provide a solution to a marketplace or societal problem, need or opportunity. It will likely be the cross fertilization and application of concepts and research from the many new and evolving STEM disciplines where most new products, services and other market opportunities (and jobs) will develop.

A STEM Commercialization Plan essentially provides a written “science & technology proof of concept” to support an innovative product or service concept or idea. A STEM Commercialization Plan includes both a persuasive science and technology assessment and plan and a discussion of the concept’s likely commercial feasibility and viability.

What is a STEM Business Plan?

The primary emphasis is on a business and financial proof of concept.

A STEM Business Plan is a written document that describes how to apply a new or existing technology to create a new product or service or enhance an existing product or service with new features or capabilities that can be successfully developed into a real-world business opportunity and “taken to market.” Thus, a STEM Business Plan provides a written “business & financial proof of concept” to support an innovative product or service that may be taken to market.

STEM Business Plans will be judged by business people with an understanding of STEM fields, as opposed to STEM academics, researchers and practitioners. As such, judges will be most interested in the quality of the student’s plans for taking their product to market, and secondarily, although importantly, in the student’s assessment of the viability of the science and technology supporting the product or service idea.
How to Navigate the Believe in Ohio STEM Commercialization Plan and STEM Business Plan Instructional Roadmap

Your Innovation Journey Will Reach 12 Mileposts Along the Way.

MILEPOST “0” - GET READY FOR YOUR JOURNEY

STEP 1 – Determine if you will develop a STEM Commercialization Plan or a STEM Business Plan. The answer depends mainly on the subjects taught by your sponsoring teacher. Generally, complete a STEM Commercialization Plan if your supervising teacher teaches science, technology, engineering, mathematics or career technical subjects. Complete a STEM Business Plan if your teacher teaches business, economics, marketing or entrepreneurship.

STEP 2 – Read all the program materials and thoroughly explore the Believe in Ohio website to get a big picture understanding of what you are being asked to do. www.BelieveinOhio.org

STEP 3 – Use the “Roadmap to Ohio’s Future Jobs & Prosperity” as a brainstorming tool to help develop your plan. The Milepost 1-8 poster can be found on page 8 & 9 of the STEM Plan Instruction Booklet.

- Use your Milepost 1-8 poster as a brainstorming tool by using a 1 ½ x 2 inch Post-it® Note (or a trimmed down 3” x 3” Post-it® Note) to post your thoughts and findings to the Roadmap. Consider taping or hanging it on a wall so that you can reference it frequently. As you research and discuss your plan ideas with others, you will find that your ideas will evolve and you will likely make many course corrections, often called pivots.
- Continually keep revising your Post-it® notes until you are satisfied that your Plan idea is commercializable.
- Throughout your Innovation Journey if you come upon a term that you don’t know or understand, stop for a minute to determine the meaning and determine how it may relate to your journey.

NOTE: Believe in Ohio’s “Road Map” is based loosely on the “Lean Canvas Business Model” developed by Ash Maurya (https://bmtoolbox.net/tools/lean-canvas/) that was adapted from the “Business Model Canvas” (http://www.businessmodelgeneration.com/canvas/bmc) by Alexander Osterwalder & Yves Pigneur and is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported License.

NOW, SET OUT ON YOUR JOURNEY

Milepost 1 – Problem Statement – Pain Point – Market Opportunity

Whether developing a STEM Commercialization Plan or a STEM Business Plan, often the hardest part about getting started is coming up with an idea for a Plan. The first step is to put your imagination to work. In brainstorming an idea, remember that innovation and entrepreneurship are about challenging the status quo and transforming or developing new products, services, and solutions to meet the changing needs, wants, and problems of society. Start by looking around you at needs that are not being fulfilled, problems that remain unsolved, and things that do not work. Then think about how technology developments have made possible or could make possible products, services, and solutions that simply were not possible before.

If you are a STEM student doing a STEM Commercialization Plan, think about how a new and/or an existing STEM technology concept (or a combination of multiple new or existing STEM technology concepts) may be applied, or further developed to create a commercializable technology concept that might be applied to fill a marketplace need or solve a societal problem.

If you are business student doing a STEM Business Plan, think about how a new or existing technology can be applied to create a new product or service or enhance an existing product or service with new features or capabilities that can be successfully developed into a real world business opportunity and be “taken to market.”

In a few words note on one or more Post-it notes, the Problem(s), “Pain Points” or Market Opportunities that the plan will address. At all Mileposts you should focus generally on three or fewer problems, needs or opportunities.

Milepost 2 – What is your Proposed Solution?

At Milepost 2, use Post-it notes to describe briefly your proposed solutions to the problem(s) and need(s) identified at Milepost 1.
Milepost 3 – What Stem Concepts and Principles Underlie Your Proposed Solution?

The accelerating pace of technological change is the catalyst behind most of the innovation that will cause virtually every product, service, and aspect of life to be continuously transformed and reinvented during your lifetime. In that context, use your Post-it® notes at Milepost 3 to indicate the key science and technology concept(s) and advances that you plan to apply to address the problems and solutions you previously identified at Mileposts 1 and 2.

Milepost 4 – Who Are Your Target Customers and Intended users?

You can’t have a useful and economically sustainable product, service and market opportunity unless someone other than you actually will buy and use what you are planning to develop. At Milepost 4, note who you believe to be your target customer(s). While you are thinking about your targeted customers, consider the size of the market opportunity they represent. Would millions likely see value in or purchase your idea, or only a small group of people? Keep in mind the difference between who your customer might be and who the ultimate user will be. For example, if your idea is intended to be used by young children, the children will be the intended user while their parents will be the intended customer. At Milepost 4 note both your expected target customer(s) and intended user(s).

Milepost 5 – Who Are Your Competitors?

At Milepost 5, note who you expect your competitors will be. When considering the potential feasibility of a new idea, product, or service, you must know and understand your competitors. Both are important because you need to know what your idea, product, or service will be competing against and because we learn from competitors.

Milepost 6 – What is the Customer Value Proposition and Competitive Advantage?

At Milepost 6, describe what you believe is the customer value proposition and competitive advantage your plan offers. Stated another way, unless your target customer perceives value in your idea, it won’t go far. In the real world you would do research to try to answer this question. Describe what you see as the “competitive advantage” your proposed solution has over other potential solutions to the problem/pain point/market opportunity that your plan addresses. Generally, some form of cost advantage or differentiated features or benefits gives your problem solution a competitive advantage.

Milepost 7 – What Revenue Streams Do You Expect?

At Milepost 7 note what revenue sources and potential size of those revenue streams that your venture would anticipate receiving. Now that you have noted the customers and competitors and what customer value proposition or competitive advantages your solution offers, identify what revenue streams you expect such as: product sales through middleman wholesalers or direct to customers, fees for services performed, subscription fees, usage fees, advertising revenues, lease income, license fees, franchise fees, etc.

Milepost 8 – What Startup and Operating Costs Do You Expect to Incur?

At Milepost 8, consider what kind of startup and operating costs you would expect to incur. These costs will be determined in part based on all the matters you considered at Mileposts 1 -7. To what extent will you incur costs for ongoing research and development or for the development of potential prototypes and testing? Will you manufacture a product yourself, or outsource production? What staff will be needed to bring your plan idea(s) to fruition? You will find that all of the issues discussed earlier at Mileposts 1 -7 and at this Milepost 8 trade off against one another.

Stop! – Traffic Light – In Your Opinion Does Your Solution and Plan Make Commercial Sense?

- If NOT - Then start again at Milepost 1 and repeat until you are satisfied that your solution makes commercial sense.
- If YES – Write your Plan by following through on Mileposts 9 -11.

Challenge your plan to determine if it makes commercial sense. Why? It makes no sense to invest time, energy and resources to pursue an idea that a pragmatic assessment concludes won’t fly. Better to go in another direction.

Talk to any business incubator or accelerator and they will tell you that it is rare, if ever, that someone’s first idea is the one that they move forward with. Instead, what happens is that the entrepreneur or innovator takes to heart what they learned from their research and discussions with others and decides to make course corrections, or pivots. It is not uncommon for a new idea to pivot 5-6 or more times before it is ready to advance.
Milepost 9 – Summarize the STEM Concepts and Principles Underlying Your Solutions
(500 words of fewer based on Milepost 3)

If your idea is based largely on existing or developed science that has not previously been applied in the way you propose, discuss how that science provides a feasible basis for your product, service or other concept idea. Also discuss what additional scientific research or development may be required to bring your concept or idea to completion.

Milepost 10 – Summarize in Writing your Commercialization Assessment of Your Plan
(Based on your findings at Mileposts 1-2 and 4–8)

Summarize your conclusions as to the commercial feasibility of your Plan. Include a discussion of the following:

- The problem, pain point or market opportunity you seek to address.
- Your proposed solution.
- Who your target customer(s) are?
- Who your intended users are, and how they may be different from your customers?
- Who your competitors are and on what basis you expect to compete with them?
- What your customer value proposition is and what competitive advantage your solution offers.
- What principal revenue streams you foresee generating?
- What significant startup and operating costs you expect the development of your venture will require.
- Your overall assessment of the commercial feasibility of your Plan.

Milepost 11A – If yours is a STEM Commercialization Plan, Develop A Science and Technology Proof of Concept

This section provides an assessment of the science and technology concepts and principles underlying your proposed idea and provides a proof of concept for the feasibility of the idea. Your discussion should include:

- Your review and assessment of the scientific literature related to your idea. What does the scientific community already know that is relevant to your idea? You do not need to summarize every paper in the field.
- Your statement of a single, clear and compelling (1) testable hypothesis or (2) engineering design.
- An inquiry or design-based discussion rather than simply a summary of knowledge. Your writing should include a discussion of prototypes and models that you create (including computer and mathematical models) with strong data analyses. Discuss additional research, design or analyses that should be done.

- Data tables, graphs, charts, sketches, engineering drawings or photos of prototypes or models, and cited references.
- A description of your findings with relevant, references cited within the text that you will include in a list of cited references at the end of your Plan. There must be a 1:1 concordance between in-text citations and references.

Milepost 11B - If yours is a STEM Business Plan, Develop a Business and Financial Proof of Concept

The purpose of this section is to provide an assessment of the business and financial feasibility of your proposed business venture, which effectively provides a proof of concept for your idea. Your discussion should include:

- Your proposed marketing, sales and pricing strategies to bring your new product, service or concept idea to market.
- How you will operationally develop and make your product, service or other concept idea into a tangible commercial venture.
- The most significant risks and uncertainties you expect to face in bringing your new product, service or other concept idea to market.
- A discussion about the amount and type of investment you believe will be required to bring your new product, service or concept idea to market.
- A three-year financial projection that confirms the financial feasibility of bringing your new product, service or concept idea to market on a sustainable basis. Access the financial template at: http://believeinohio.org/resources/

- A description of your findings with relevant, references cited within the text that you will include in a list of cited references at the end of your Plan. There must be a 1:1 concordance between in-text citations and references.

Milepost 12 – Prepare an Executive Summary and Elevator Pitch of your Entire Plan

An Executive Summary 250 words or fewer provides a concise summary of your plan. The Executive Summary must be written in a manner that a person, who may not be familiar with the topic, can understand your plan’s important points. An Elevator Pitch is a three or fewer sentence summary of the entire plan.
Student Step by Step Instructions for Determining the Commercial Feasibility of Their Plan Idea and Developing the Plan Itself

The following step-by-step instructions for developing a STEM Commercialization or STEM Business Plan were compiled from BiO’s Ohio Roadmap to Future Jobs & Prosperity and related instructions. Students should use these Instructions as a “Check List” to ensure that the plan that they develop is complete. Students are also encouraged to make use of the STEM Plan Templates in Microsoft Word & Excel for both Commercialization and Business Plans at: http://believeinohio.org/resources/

STEP 1 – Roadmap Milepost “0” - Determine if you will develop a STEM Commercialization or STEM Business Plan:
The answer depends mainly on the subjects taught by your sponsoring teacher. Generally, students will develop a STEM Commercialization Plan if their teacher teaches a STEM subject, while students will develop a STEM Business Plan if their teacher teaches business, economics, marketing or entrepreneurship.

STEP 2 – Develop an idea for your Plan by applying Roadmap Mileposts 1, 2 and 3:
Whether you will be doing a STEM Commercialization Plan or a STEM Business Plan, oftentimes, the hardest part about getting started is coming up with an idea for your Plan.

The first step is to put your imagination to work. In coming up with an idea, remember that innovation and entrepreneurship are about challenging the status quo and transforming or developing new products, services, and solutions to meet the changing needs and wants and problems of society. Start by looking around you at needs that aren’t being fulfilled, problems that remain unsolved, and things that don’t work. Then think about how technology developments have made possible or could make possible products and services and solutions that simply weren’t possible before. Your responses to Mileposts 1, 2 and 3 must work together if there is to be a workable solution:

Milepost 1 - Describe the Problem (aka “Pain Point”) or Market Opportunity that your idea is intended to address.

Milepost 2 – Describe your proposed solution to the problem, pain point or market opportunity noted at Milepost 1.

Milepost 3 - Technological change is the catalyst behind most of the innovation that will cause virtually every product, service, and aspect of life to be continuously reinvented. Describe the key STEM concept(s) & developments that you will apply to address the problems and solutions identified at Mileposts 1 and 2. Consider the following:

- Not every idea needs to “change the world” – smaller or simpler ideas are also important and are usually much easier to implement and prototype.
- Not every idea needs to be a “breakthrough, original idea”. Ideas that improve on the existing are important too.
- Because someone somewhere else in the world is already doing something similar does not disqualify your idea. Instead, work to improve on the existing product or solution.
- This competition is about STEM advances being the basis for new or improved products and services. While the application of STEM may be large or small, it should be the catalyst for the student’s idea.

STEP 3 – Determine if your plan idea is commercializable by applying Roadmap Mileposts 4 – 8:
It makes no sense to invest time and energy and resources in developing an idea that a pragmatic assessment tells you is not commercializable or won’t fly. By applying Roadmap Mileposts 4 – 8, one can evaluate the feasibility of an idea.

Milepost 4 – Describe who your target customers and users are (they may be different people). Determine if your idea would be of value to both of them.

Milepost 5 – Discuss who your competitors are or might be and determine what you can learn from them.

Milepost 6 – Describe the Customer Value Proposition and Competitive Advantage your proposed solution has over other potential solutions to the problem/pain point/market opportunity that your plan addresses. Generally, some form of cost advantage or differentiated features or benefits may give your problem solution a competitive advantage.

September 2019
Milepost 7 – Discuss what revenue streams you expect? Having determined your customers and competitors and what customer value proposition or competitive advantages your solution offers, identify what revenue streams you expect such as: product sales through middleman wholesalers or direct to customers, fees for services performed, subscription fees, usage fees, advertising revenues, lease income, license fees, franchise fees, etc.

Milepost 8 – What startup and operating cost do you expect to incur? Consider what startup and operating costs you would expect to incur. To what extent will you incur costs for research and development or for the development of prototypes and testing? Will you manufacture a product yourself, or outsource production? What staff will be needed to bring your plan idea(s) to fruition?

STEP 4: At the Roadmap Stoplight, consider what you learned in Steps 2 & 3, reassess your plan idea:
Based on your assessment, make needed changes and “Pivot”. Repeat the process as many times as needed until you are satisfied that you plan makes commercial sense.

STEP 5 – Working through Mileposts 9 – 12, write your plan:
Work through Mileposts 9, 10, 11 and 12 and follow Believe in Ohio’s plan preparation instructions that tell you how to assemble the different parts of your plan into a single cohesive and understandable plan document.

First, provide a short summary (couple of sentences) that describes your Problem Statement/Pain Point/Market Opportunity (Milestone 1) and your proposed solution (Milestone 2). (This will be Part 3 of your written plan also to be discussed on pages 13 & 14.)

Milepost 9 – Summarize the STEM concepts & principles underlying your solution (This will be Part 4 of your Plan.)
In this Part 4, summarize and explain the application of each of the key STEM concepts included in and underlying your solution to your plan problem and demonstrate to the reader that you have a reasonable working knowledge of the key STEM concepts. Also, discuss why you believe this science provides a feasible basis on which to base your plan.

Part 4, is titled “Summary of the STEM Concepts & Principles Underlying Your Plan Solution”. It can be no longer than 500 words (which is about one page in length). (Part 4 of your Plan should be based on your discussions at Milestones 3 & 9.)

Milepost 10 – Summarize in writing your commercialization assessment of your plan (This will be Part 5 of your Plan.)
In this section, summarize your conclusions as to the commercial feasibility of your plan. In doing so, discuss each of the individual topics addressed in Mileposts 1-2 and 4-8, then report on your overall assessment of commercial feasibility.

Milepost 11 A – If yours is a STEM Commercialization Plan, develop a science and technology proof of concept
This section, which will be Part 6 of your Plan Document, is similar to a research paper. It should provide an in-depth assessment of the STEM concepts underlying your plan and provide a proof of concept for the feasibility of your proposal. It should include five elements:
1. A review and assessment of the scientific literature.
2. A discussion of your findings with relevant cited references provided.
3. A statement of a single, clear and compelling (1) testable hypothesis, or (2) engineering design.
4. An inquiry or design-based discussion of the STEM concepts relative to your idea, rather than simply summarizing current knowledge.
5. Data tables, graphs, charts, cited references, etc. to properly support your science & technology proof of concept.

Milepost 11 B – If yours is a STEM Business Plan, develop a business and financial proof of concept:
This section, which will be Part 6 of your Plan Document provides an assessment of the business and financial feasibility of your planned business venture which equates to a proof of concept for your idea. It should include five elements:
1. A discussion about your marketing, sales and pricing strategies to bring your product or service to market.
2. A discussion about your operational plan to bring your product or service to market.
3. A discussion about the significant risks and uncertainties you expect to face.
4. A discussion about the amount and type of investment you will need to get your venture started.
5. A summary three-year financial projection that confirms the financial feasibility of bringing your venture to market.

Milepost 12 – Prepare an Executive Summary and Elevator Pitch of your entire plan: (This will be Part 2 of your Plan.) An Executive Summary of 250 words or fewer provides a concise summary of your plan and its most important points. It must be written in a manner that a person who is not familiar with your topic can understand what your plan is about.

An Elevator Pitch is a three or fewer sentence summary of your entire plan. You Elevator Pitch & Executive Summary should be written last, after you have completed all the other parts of your plan.

STEP 6: Review your plan carefully before turning it into your teacher:
You may have the best idea in the world, however if it is not professionally presented it may go unnoticed. Carefully review your plan for good grammar, correct spellings, proper punctuation and its overall professional appearance.
Student Instructions for Writing and Formatting Their STEM Plan

Point #1 – Overall instructions for writing your plan report:

- Your report must be typed. Clear and concise writing is expected.
- Write and re-write your plan until you have what you believe to be a professional presentation of your ideas. Review your plan carefully before you turn it in to your teacher.
- Avoid using personal pronouns in your report (e.g. I, you, he, she, we, they, etc.)
- Do not use cute report titles. The title must reflect the contents of your plan report.
- Use good grammar and punctuation. Spell correctly. Proofread carefully.

Point #2 – Plan formatting instructions:

- Use a text font size no less than 10-point nor greater than 12-point (Prefer 12-point size).
- You may use smaller font sizes in tables or on charts, graphs, sketches or engineering drawings provided they are legible.
- Consider all illustrations such as photos, sketches, graphs, etc. as numbered figures: Figure 1, Figure 2, Figure 3, etc. with legends and captions for each. Data tables should be identified as Table 1, Table 2, etc. and titled.
- Your plan must have 1-inch margins on top, bottom and sides. Not larger, nor smaller.
- Use an easily readable typeface. We suggest using: Times New Roman, Century Schoolbook, Arial, Calibri or Myriad Pro.
- The report may be typed single-spaced, or up to 1.5 spaced. Optionally, you may indent the first lines of paragraphs.
- Your report may not exceed 12 pages in length (including your cover page & any tables, charts, drawings, financial schedules, etc.)
- Type all pages flush left. Do not justify paragraphs (i.e. stretch type to left & right margins)
- Starting from page 2 until the end of your report, you should type continuously (that is, do not start each Part on a separate page). Section headings (Parts) need not be numbered.

Point #3 - Page numbering instructions:

- The first page of the report is the Cover Sheet. Although it is page 1, it should not be numbered.
- The second thru the twelfth page should be sequentially numbered 2-12.

Point #4 - Instructions to ensure your plan includes all required parts:

A complete STEM Plan will have 8 parts as noted below (plus supporting attachments)

- **Part 1** is the cover sheet. It should only include the following information and no more/no less:
  - Line 1 – Plan author’s name(s)
  - Line 2 – Grade level of the plan author(s)
  - Lines 3 & 4 – The title of your plan report in *italics*
  - Line 5 – The plan judging category (either a STEM Commercialization or STEM Business Plan)
  - Line 6 – Leave blank
  - Lines 7-9 – Your Elevator Pitch of no more than three sentences (you may use additional lines if necessary)

- **Part 2** is the Executive Summary which should include 250 words or fewer (250 words is generally about half a page) (This is Milepost 12 on the Roadmap)
  - This part should always be written last. It should include key information from all the other parts of the plan in a concise summary. It should be written in a manner that a person, who may not be familiar with the topic, can understand your plan’s important points.

- **Part 3** provides a short (couple of sentences) summary of the Problem Statement/ Pain Point/ Market Opportunity from Milepost 1 and the Proposed Solution from Milepost 2.

- **Part 4** is a Summary of the STEM Concepts & Principles Underlying Your Solution that is based upon your discussions at Mileposts 3 and 9. In 500 words or less, it should summarize, then explain the application of the key STEM concepts underlying the solution and demonstrate to the reader that the plan's author has a reasonable working knowledge of the key STEM concepts.
Part 5 includes the assessment of the commercial feasibility of the plan idea and proposed solution as discussed at Milepost 10. Your assessment should include an individual summary discussion about each of the Mileposts 1 and 2 and 4-8 and conclude with the overall assessment of the plan’s commercial feasibility. This should be a key part of your plan and will likely be 1-2 pages length.

Part 6 should be the core of the STEM Plan whether it be a Commercialization Plan or a Business Plan. As such, it will likely need to be several pages in length to adequately cover all the information required in the listed discussion points at Milepost 11 A (for a Commercialization Plan) or at Milepost 11 B (for a Business Plan).
   o For a Commercialization Plan (11 A), it is essentially a “Science & Technology Proof of Concept” that includes a statement of a single, clear and compelling (1) testable hypothesis or (2) engineering design.
   o For a Business Plan (11 B), it is essentially a “Business & Financial Proof of Concept” that is justified by market analysis and includes a three-year Excel financial projection spreadsheet.

Part 7 - Acknowledgements – This should identify those who helped the student and what they did.

Part 8 – References Cited – See Point 8 that follows for a full discussion about how references should be properly cited.

Point #5 – Instructions for electronically submitting a STEM plan to Believe in Ohio:
• If and when you are requested to submit your completed Plan to the Academy office in Columbus, submit all the pages of your plan, up to the maximum 12 pages for in a single electronic Adobe PDF file.
  o This rule also applies when sending a STEM Business Plan where at least one of its pages (the Financial Projection Schedule) will be in an Excel/spreadsheet file format. This may require scanning all 12 plan pages into one PDF document.
• To allow Believe in Ohio to know which plan is which, the name of the plan’s author must be included in the PDF file name as follows: LastnameFirstname.pdf For example: SmithCarol.pdf
  o If the plan was developed by a team, the file name should include the name of one of the plan authors, followed by the word team. For example: JonesSallyTeam.pdf
• If and when you are requested to submit your Plan to the Academy office, you will be instructed how to do so at that time.

Point #6 – Prototypes, Models, Drawings or Sketches:
• Prototypes or models and their testing are expected within reason in that both and cost may prohibit their full development.
• At a minimum however, well-labeled, scaled and described engineering or other drawings or 3-D sketches are required.
• You may use a CAD program or Google SketchUp which is available for free at http://www.sketchup.com

Point #7 – Apps:
• Students proposing “apps” must describe the functions in detail.
• Validation of an idea for an app idea means that students must provide a schematic or flow chart with symbols portraying how the user will navigate the app as well as all features envisioned.
• Snippets of source code or working prototypes even with limited functionality will enhance a plan and should be included to demonstrate a student’s computer science general knowledge and skills.

Point #8 – Instructions for properly citing references:
• Best practice for writing a scientific research paper, such as a STEM Commercialization Plan, requires that references be cited with the text and that there be a 1:1 concordance between in-text citations and the list of cited references at the end of the plan. The safest way to avoid plagiarism is to cite all references within the text.
• While best practice for citing references within a business plan is less specific and may not take the form of in-text citations, students must document and show attribution for the ideas of others within their business plans.
• Make sure you cite references in text like these examples: Smith (1993) or (Smith 1993).
• List cited references from the text alphabetically by last name at the end of the plan.
• Complete citation information only for literature or sources actually cited within your plan.
• Web references must cite accessed date and fully retrievable URL.
• Please do not use footnotes in the body of your plan.
• Do not use the term “Bibliography” to refer to a list of cited references. They are two different things.
• Please note an excerpt from an actual student plan that is included on page 4 in the STEM Plan Instruction Booklet that illustrates how in-text citations and 1:1 concordance with full references should be written.
# STEM COMMERCIALIZATION PLAN JUDGING CRITERIA

<table>
<thead>
<tr>
<th>POINTS</th>
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# STEM BUSINESS PLAN JUDGING CRITERIA

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