



# EVALUATION GUIDELINES FOR GLOBAL ISSUES PROBLEM SOLVING

AS ADOPTED JUNE 2018

## PURPOSE OF EVALUATION

The primary purpose of Global Issues Problem Solving (GIPS) evaluation is to provide coaches and participants with feedback that allows them to develop and improve their problem solving skills. Global Issues Problem Solving is performance-based, and evaluation is an authentic assessment of the team's/individual's booklet. Because there is no single "right" answer, FPSPI employs a variety of strategies to review student work, using specific criteria to evaluate performance in each Step of the process. Skill improvement remains the most important aspect of evaluation; however, since GIPS also involves competition and competition scoring must be impartial, a secondary purpose of evaluation is to provide a fair, consistent, and reliable method for comparing teams/individuals in a Global Issues Problem Solving competition.

## ATTITUDE

It is essential that evaluators maintain a positive attitude throughout the evaluation process. The central purpose of FPSPI is to assist students in acquiring better thinking, communication, and problem solving skills. Evaluation is always done with this thought in mind. **The better evaluators offer constructive feedback and make students want to improve their problem solving skills.** Regardless of the quality of the student effort, effective feedback praises students for what they did well and encourages them to use their improved skills to tackle the next problem. **Negative feedback may discourage a team and keep them from improving, defeating the purpose of the program.**

It is important for evaluators not to extend their personal expectations and skill level into that of the booklets represented in an evaluation sample. Evaluators should not confuse the sophistication of the task with that of the students but consider the age/division of the participants and the level of competition (practice or competition) in constructing positive feedback. Once an exceptional booklet is noted, it may be easy to expect the same quality from all booklets. Evaluators should remember the completion of a GIPS booklet is, by itself, a major accomplishment – possibly more demanding than anything else the students have completed as part of their educational experience. Students' work will delight, frustrate, and eventually reward the demanding task of the evaluator.

**The ability to provide positive and constructive feedback consistently  
is the goal to which all evaluators must aspire.**

## FEEDBACK

Feedback helps students understand the strengths and weaknesses of their booklet and motivates them to improve their skills. Feedback is ***the most important aspect of the evaluation*** and is given for each Step of the GIPS booklet. Feedback enables students to focus their learning process and allows the coach to adapt problem solving instruction to meet the needs of the students.

Comments, both general in nature and specific to a single response, are written on the score sheet.

Using a strategy devised by Edward de Bono (1974) improves the quality of feedback. Edward de Bono suggests that attention be given to the following four areas when responding to students about their problem solving: praise, clarification, criticism, and amplification.

**Praise:** Evaluator acknowledgments of effort, creativity, and major strengths

- Reinforces positive aspects of performance
- Rewards the team/individual for facing a problem and developing a Solution idea
- Reminds the team/individual, even if the score is not high, they did some things right and encourages them to improve
- Establishes a good working relationship between the evaluator and problem solvers



**Clarification:** Evaluator comments asking students to clarify ideas

- Points out statements that may be confusing or unclear and offers suggestions for improvement
- Encourages students to improve the clarity and elaboration of their work
- Promotes the development of effective communication skills

**Criticism (Ideas for Improvement):** Evaluator suggestions for areas needing improvement

- Helps teams/individuals build their skills through specific, constructive comments
- Gives teams/individuals examples of ways to use their ideas, research, or the problem solving process more effectively
- Encourages teams/individuals to learn from their work to become better problem solvers

**Amplification:** Evaluator comments that help students expand their ideas, push their thinking even further, and improve the quality of their problem solving

- Points out gaps in information or logic
- Identifies other ideas that might have been considered
- Prompts students to consider the possible consequences of their ideas
- Lists positive, constructive ideas for improvement

See **STRATEGIES FOR EFFECTIVE FEEDBACK** (page 40) for examples and ideas for feedback.



## PREPARATION

**Knowledge is Necessary!** Before evaluating booklets for any topic, evaluators should have knowledge of the topic. The students put tremendous effort into their work and deserve to have their work reviewed by conscientious evaluators. They can really lose respect for evaluators and the problem solving process - no matter how valid the feedback is - if a basic understanding of the material is not obvious. Reading the topic chapter in *Readings, Research, and Resources*, along with several articles from the provided suggested readings, is a necessary minimum to gain topic awareness for evaluation.

Reading, discussing, or contemplating the ideas presented in the Future Scene and in the topic evaluation notes help bring a high level of consistency to FPSPI evaluation. When possible, scanning through the set of booklets is also helpful in getting a sense of student responses and their sophistication.

## SCORE SHEET COMPONENTS

**Identification:** An evaluator fills in or verifies the identification portion of the score sheet before evaluating. This includes the competitor code, evaluator code, division, and competition round.

**Scoring:** An evaluator uses the descriptors on the score sheet for each criterion to determine the numerical score. Several elements of the score sheet are determined by scales (discussed below). Others, such as Clarity and Adequacy, are rubric based. To correctly use a rubric, begin with the middle scores and determine if the work meets the explanation of that score. If it does, move up to the next highest score on the rubric, read the description, and determine if the work meets that explanation. (If it does not, go back down and assign the appropriate score.) If the work meets the higher descriptor, move to the next higher score and read that explanation. If that descriptor does not fit, assign the lower score. If the highest descriptor fits, you must assign that score. If the middle descriptor does not fit, the process is the same as you move in the opposite direction and keep moving down until the explanation fits your opinion of the work.

**Feedback:** An evaluator uses the space provided for both general and specific feedback.

## TYPES OF SCALES

GIPS evaluation criteria are grouped into four categories of scales:

- **Frequency scales:** Points awarded based on a count of responses that meet specific criteria
- **Rating scales:** Points awarded based on the degree or extent to which a team/individual meets a descriptor
- **Weighted scales:** Bonus points awarded for fluent or relevant responses, which are indicative of high-quality thought and found infrequently.
- **Composite scales:** Points awarded based on a combined total of points earned on individual elements.



## TYPES OF EVALUATION CRITERIA

GIPS evaluation criteria measure student skills in the following three categories:

- **Content:** These criteria measure the *quality of the content* in students' work. Content-oriented criteria evaluate the *merit of the ideas*.
- **Structure:** Structure-oriented criteria assess how effectively students fit their work into a prescribed format, measuring a student's mechanics in completing their booklet.
- **Process:** These criteria judge how well students use the problem solving process.

**Note:** Types of scales and evaluation criteria are labeled throughout the *Guidelines* for easy reference.



## THE FUTURE SCENE

Student work must relate to the Future Scene, a hypothetical “what-if” scenario based on current information projected 20-30 years into the future. In cases where research can be found that contradicts the Future Scene, the team/individual is still required to problem solve within the boundaries of the given situation. The Future Scene operates as the “reality” within which participant work must take place. Early in the competitive season, Future Scenes are open-ended and allow students to develop and enhance their skills. Future Scenes become more difficult as the FPS season progresses.

There are two ways that Future Scenes are utilized during the FPSPI season. Practice Problem #1 and Practice Problem #2 are non-competitive. These Future Scenes are often examined by students over time, with instruction and guidance from their coach. For these problems, emphasis is placed on learning the problem solving process, and thus, evaluators often provide extensive feedback to promote effective use of the process. The Qualifying Problem, Affiliate Final/Bowl and the International Conference are competitive, and thus less emphasis is placed on teaching the process and more on the application of the process. For competitive Global Issues Problem Solving competitions, students do not see the Future Scene in advance. Rather they receive the Future Scene in a proctored setting limiting access to resources and time. In these situations, evaluators reward students for responding directly to the Future Scene, recognizing teams/individuals that **use their creativity to respond spontaneously to a situation. This furthers FPSPI’s educational goal of preparing students to respond to real-world Challenges.**



**Note about Examples:**

- The examples used in this document are based on the 2014 International Conference Future Scene, SPACE (found at the end of this document). Familiarizing yourself with this Future Scene before reviewing these *Guidelines* will improve the effectiveness of examples.
- Step 1 examples represent Junior Division responses, Step 2 and 3 represent Senior Division responses, and Step 4 Middle Division responses.
- Gray text boxes such as this one indicate examples throughout this document.



# STEP 1

## Identify Challenges

**Objective:** To identify 16 (8 for individuals) challenges related to the Future Scene

Fluency .....	1	2	3	4	5	6	7	8	9	10
Flexibility.....	1	2	3	4	5	6	7	8	9	10
Clarity .....	1	2	3	4	5	6	7	8	9	10
Originality .....	3 x ____ = ____									

**Content:** A Challenge is an issue, concern, or problem that *may* need attention or consideration (points of importance). A Challenge is a logical cause or effect of the situations in the Future Scene that may have a chance of occurring. Flexibility in thinking is demonstrated by exploring Challenges from different perspectives or categories.



**Structure:** Well-written Challenges follow these guidelines:

1. Challenges are written in statement form. (Questions are inappropriate for this Step.)
2. Challenges are stated in terms of *possibility*, using non-absolute terms such as may, might, could, etc. (Absolute terms that indicate that “x **will** be a challenge” deny an important element of projecting into the future. It is impossible to know what will or will not occur in the future. We can only make educated guesses as to possible occurrences based on an investigation of the resources. Using “will” instead of “may” affects the clarity score.)
3. A clearly written Challenge has logical cause-effect reasoning and demonstrates what the Challenge is, why it is a Challenge, and how it logically relates to the Future Scene.

**Types of Challenges****Yes****Perhaps****Why****Solution****Duplicate**

**FLUENCY** measures the *quantity* of **Yes** Challenge *ideas*.

**Scoring:** (1-10 team; 1-10 individual) The numerical score is based on the number of **Yes** Challenges awarded. Each Challenge is individually read and classified in one of the following ways:

**Yes** – The Challenge has a possibility of existing or occurring if the Future Scene were to occur.

- The cause/effect relationship should be clearly evident.
- Challenges that merely restate a problem stated in the Future Scene are not awarded a **Yes**.
- A **Yes** may be awarded for Challenges written at different levels of expertise, as shown in the examples. The focus is on the *ideas*, not the sophistication of the *writing*.

- *People on Titania may not be able to communicate with Earth.*
  - Cause/effect relationship implied
- *Since Titania is the farthest settlement from Earth, People on Titania may not be able to regularly communicate with Earth due to technical problems.*
  - Explained what the challenge was and why it was a challenge
- *Since Titania is the farthest settlement from Earth, people on Titania may not be able to communicate with friends and family on Earth due to technical problems causing them psychological and emotional stress.*
  - More insightful information added
- *Humans can suffer emotionally, psychologically, and physically from long separations from loved ones. Since Titania is the farthest settlement from Earth, people on Titania may not be able to communicate with friends and family on Earth causing them psychological and emotional stress which could lead to poor job performance.*
  - Relevant research added

**Perhaps** – The Challenge is ambiguous; true intent cannot be determined.

- *People might not be able to communicate.*
  - Unclear intent of the challenge idea
- *People might get sick on Titania.*
  - Statement does not identify a challenge.

**Why** – The Challenge does not have a clear connection to the Future Scene situation or merely restates a fact from the Future Scene.

- *Thousands of people live semi-permanently on the station.*
  - Does not tell what the challenge is or why it is a challenge. Requires the evaluator to infer their intent.



**Solution** – A response that suggests **how** to solve a Challenge of the Future Scene is a Solution rather than a Challenge. Identifying issues that might result from a Solution to the Future Scene is not the same as identifying actual Challenges in the Future Scene. Citing Challenges resulting from a Solution without defining the Challenge or indicating why it is a Challenge causing the Future Scene or resulting from it is an elaboration of **how** to implement the Solution.

- *People on Titania could SKYPE or Face Time to Earth every week.*
  - Proposes a solution rather than identifying a challenge

**Duplicate** – Any Challenge too contextually similar to another accepted Challenge cannot receive additional credit. *Evaluators should not confuse duplicate ideas with duplicate categories as it is acceptable for students to list several different ideas in the same category.*

### Reminders for Awarding the Fluency Score

- Read each challenge statement and mark as **Y** – yes, **P** – perhaps, **W** – why, **S** – solution, or **D** – duplicate in the appropriate column on the score sheet.
- After evaluating each of the challenges, count the number of Yes challenges, indicate the number in the last row of the Yes column, and circle the fluency score based on the scale provided on the score sheet.
- Record the fluency score in the Step 1 score box. *Frequency; Content and Process*

**FLEXIBILITY** measures the *variety* of viewpoints taken in the **Yes** Challenge ideas.

**Scoring:** (1-10 team; 1-8 individual) – The numerical score is based on the number of categories addressed in the Challenges scored as **Yes**. A more varied approach to the Future Scene allows for a more complete picture of the whole situation. Evaluators take each of the following areas into consideration in scoring booklets for flexibility:

- Evaluators categorize the **Yes** Challenge responses, using the categories listed on the score sheet.
- Some Challenges can be categorized in more than one way. Evaluators are encouraged to assign a category that has not yet been awarded.



### Reminders for Awarding the Flexibility Score

- Award flexibility points based on the number of unique categories identified.
- Count the number of different categories.
- Determine the numerical score (up to 10 for teams, 8 for individuals).
- Record the flexibility score in the Step 1 score box. *Frequency; Process*

**CLARITY** measures the *quality* of the writing and the cause-effect reasoning in the Challenges.

**Scoring:** (1-10) – A Challenge with a clear and thorough description of the concern and logical cause-effect thinking demonstrates good clarity; a clearly written Challenge shows effective communication skills. Students who consistently state what the Challenge is, why it is a Challenge, how it logically relates to the Future Scene, and the logical causes/consequences of the Challenge should receive a high Clarity score.

If “may” or “might” (statements of possibility) are not used, it is an issue of clarity, not of fluency.

- *The Oberon Corporation is planning to send 600 people to live on Titania to mine Helium-3. People living on Titania might not be able to get help from Earth if there is an emergency resulting in death, injury, or irreparable damage to equipment.*
  - “Expertly” written challenge with high clarity

### Cause-effect reasoning considered as an element of Clarity in challenges.

Cause and effect is the relationship between two things when one thing makes something else happen. A challenge embodies cause-effect reasoning when looking at causes whose effects can be seen in the Future Scene or looking at the Future Scene details as causes and determining what effects may occur. There may be multiple causes for a single effect and multiple effects from a single cause.

Many signal words/phrases indicate cause-effect relationships. You will probably see all of these in written challenges at one time or another!

Accordingly	Consequently	If...then	Therefore
As a result	Due to So that	Nevertheless	Thus
Because	For this reason	Since	



Understanding the causes and effects of situations is essential in learning the basic ways the world works. Part of the clarity score is evaluating whether the cause-effect reasoning used in the challenges is logical.

A “reciprocal” cause-effect relationship is a chain. A cause leads to an effect, which then goes on to cause another effect, and so on. Most challenges with high clarity have at least two links on the chain. Challenges with many links may become confusing, leading to lower clarity. A cause-effect relationship that takes a “big leap” is probably missing parts of the chain and is also lower in clarity. **Example:** Because people are under stress, they may all kill each other.

### Reminders for Awarding the Clarity Score

- Use the descriptors to evaluate the writing and the cause-effect thinking.
- Deduct a point for the repeated use of “will” rather than “may” or “might.”
- Consider the clarity of the challenges as a whole. Determine the numerical score.
- Record the clarity score in the Step 1 score box. *Rating; Structure*

**ORIGINALITY** rewards **Yes** Challenge ideas that are especially insightful, highly creative, and/or unique.

**Scoring:** (3x) – An original Challenge is a response that is found infrequently among responses at that age/grade level and considered of high quality (insightful, indicative of breakthrough thinking)

### Reminders for Awarding the Originality Score

- Mark **Original** (a check mark or O) in the O column for each **Yes** challenge judged original.
- Enter the total number of originals on the score sheet and multiply by 3. *Weighted; Content*

## REVIEW STEP 1 SCORES

**Fluency:** The score awarded is identified by applying the total number of Yes Challenge ideas to the scale as indicated on the score sheet.

**Flexibility:** The unique number of categories utilized in Yes Challenges (up to 10) determines the score.

**Clarity:** Considering the quality of student work as applied to the rubric descriptors provided, the score is decided.

**Originality:** Add any Yes Challenges marked as unique and multiply the total number by 3 for the bonus points added to the Step 1 scores.



Step 1 Scoring Guidelines										Team score sheet					
Fluency - A Yes challenge is a logical cause or effect of the situations in the Future Scene. Score	Fluency is determined by totaling the number of Yes challenges and using the following scale:														
	Number of Yes challenges:		1	2	3	4	5-6	7-8	9-10	11-12	13-14	15-16			
	Number of points awarded =		1	2	3	4	5	6	7	8	9	10			
Flexibility - Measures the number of different categories in Yes challenges. Score	Flexibility is determined by totaling the number of different categories identified.														
	Number of distinct categories:		1	2	3	4	5	6	7	8	9	10			
	Number of points awarded =		1	2	3	4	5	6	7	8	9	10			
Clarity - Tells what the concern is, why it is a concern, and relates it to the Future Scene. Score	Hard to determine what challenge is; cause-effect reasoning may be absent or incorrect. 1 2 3			Most convey basic idea; lacks detail; cause-effect reasoning is vague or takes leaps. 4 5 6			Clear explanations; some detail; most cause-effect relationships make sense. 7 8			Well written; clear descriptions with detail; logical cause-effect relationships. 9 10					
Originality - Three bonus points may be awarded to any Yes challenge that shows unique creativity or insight into the future scene.															
Step 1 Scores	Fluency (1-10)			Flexibility (1-10)			Clarity (1-10)			Originality (x3)			Total		

Step 1 Scoring Guidelines												Individual/MAGIC score sheet				
<b>Fluency</b> - A Yes challenge is a logical cause or effect of the situations in the Future Scene <b>Score</b>	Fluency - Award points for each Yes challenge.															
	Number of Yes challenges:		1	2	3	4	5	6	7	8						
	Number of points awarded:		3	4	5	6	7	8	9	10						
<b>Flexibility</b> - Number of unique categories in Yes challenges <b>Score</b>	Flexibility - Award 1 point for each different category used in a Yes challenge.															
	Number of categories used:		1	2	3	4	5	6	7	8						
<b>Clarity</b> - Clearly tells what & why challenges are a concern <b>Score</b>	Below average clarity			Average clarity			Good clarity			Excellent clarity						
	1	2	3	4	5	6	7	8	9	10						
<b>Originality</b> - Three bonus points may be awarded to any Yes challenge that shows extraordinary creativity or insight																
<b>Step 1 Scores</b>		<b>Fluency (3-10)</b>			<b>Flexibility (1-8)</b>			<b>Clarity (1-10)</b>			<b>Originality (x3)</b>			<b>Total</b>		

The total Step 1 score is determined by adding together all points earned for the four components of Step 1. Please note that even if no Challenges were accepted, student effort is recognized with the appropriate minimum scores. Please note: Only steps that contain no student work are scored zero



## STEP 2

# Select an Underlying Problem

**Objective:** To identify and state an important part of the Future Scene to address

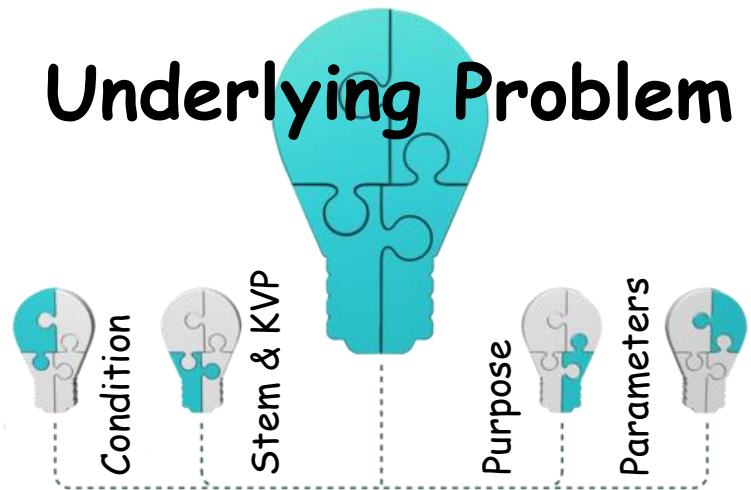
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**Content:** An Underlying Problem identifies a goal based on addressing one or more Challenges within the Future Scene. An excellent Underlying Problem has a narrowed focus, addresses a **significant** issue from the Future Scene through the Key Verb Phrase, and identifies a positive outcome (Purpose) of accomplishing the KVP.

**Structure:** A well-structured Underlying Problem is one that includes four required elements:

1. Condition Phrase
2. Stem + Key Verb Phrase
3. Purpose
4. Future Scene Parameters

## Underlying Problem



**CONDITION PHRASE (CP)** – The Condition Phrase is a lead-in fact or logical extension from the Future Scene or research related to the Future Scene that is the basis for the issue chosen for the Key Verb Phrase. The Condition Phrase may explicitly or implicitly refer to one Challenge or a group of Challenges but is not itself a Challenge.

**Scoring:** (0, 1, or 2 points)

- **2 points:** The Condition Phrase relates to the Key Verb Phrase and uses accurate information from the Future Scene and/or from research related to the Future Scene.
- **1 point:** The Condition Phrase does not use accurate information from the Future Scene or research, or it does not relate to the Key Verb Phrase.
- **0 points:** The Condition Phrase is missing.

*Due to the fact that Oberon may hold a monopoly on Helium-3 collection in space, possibly causing an uneven distribution of fusion energy on Earth,*

**STEM + KEY VERB PHRASE (KVP)** – Together, the Stem (“How might we” or “In what ways might we”) and the Key Verb Phrase, a single action verb or verb phrase with its object, indicate the primary action goal that addresses an issue from the Future Scene. All Solution ideas in Step 3 must address the action goal of the Key Verb Phrase.

*...how might we diversify access to Helium-3 collecting*

**Scoring:** (0, 1, 2, or 3 points)

- **3 points:** The Key Verb Phrase is present and contains a single action verb or verb phrase.
- **2 points:** The Key Verb Phrase is present but has two objects or two modifiers.
- **1 point:** The Key Verb Phrase is present but has two verbs or verb phrases.
- **0 points:** The Key Verb Phrase is missing.

**PURPOSE (P)** – The Purpose specifies an optimal direction or outcome of the Key Verb Phrase. The Purpose should be singular and give further information about a desired result that should flow from accomplishing the action goal, and it is not a repetition of the Condition Phrase or Key Verb Phrase. The Purpose usually begins with “so,” “so that,” or “in order to.”

*...so that citizens of all countries have access to clean fusion energy in 2063 and beyond?*

**Scoring:** (0, 1, 2, or 3 points)

- **3 points:** The Purpose is present and has a single focus with a logical relationship to the Key Verb Phrase.
- **2 points:** The Purpose is present but does not have a clear relationship to the Key Verb Phrase.
- **1 point:** More than one Purpose is present, or it repeats the KVP or CP.
- **0 points:** The Purpose is missing.

**FUTURE SCENE PARAMETERS (FSP)** – The Future Scene parameters place the Underlying Problem within the confines of the Future Scene. These parameters include the topic (major focus of Future Scene), place (geographic location), and time (date from Future Scene, reasonably related dates, or logical time phrases).

Topic – *space*  
Place – *space, deep space, Titania, Earth's moon, Oberon Corporation's reach*  
Time – *2063; late 21<sup>st</sup> century*

**Scoring:** (0, 1 or 2 points)

- **2 points:** All 3 parameters of topic, place, and time are present.
- **1 point:** Two of the three parameters are present.
- **0 points:** Only one or none of the parameters are present.

*Due to the fact that Oberon may hold a monopoly on Helium-3 collection in space, possibly causing an uneven distribution of fusion energy on Earth, how might we diversify access to Helium-3 collection on Titania so that citizens of all countries on Earth have access to clean fusion energy in 2063 and beyond? (parameters underlined)*

**FOCUS** looks at the *scope* of the Underlying Problem and whether it is too broad or too narrow.

**Scoring:** (1-10)

- The issue identified in the Underlying Problem should be a smaller part of the entire Future Scene; it should narrow the Future Scene without trivializing any part of it.
- The issue must be derived from a Challenge or cluster of Challenges generated in Step 1. If this is not the case, the Underlying Problem scores between 1 and 3, based on the quality of its focus.
- A higher score is awarded to an Underlying Problem that identifies a clear and manageable concern of the Future Scene. A lower score is given if the Challenge identified is too broad or too narrow.
- If there is a multiple Key Verb Phrase or a multiple Purpose, the UP will score low in Focus.

**Reminders for Awarding the Focus Score**

- Use the descriptors to evaluate the focus of the Underlying Problem.
- Determine the numerical score.
- Record the Focus score in the Step 2 score box. *Rating; Process*

**ADEQUACY** assesses the *significance and merit* of the Underlying Problem and its impact on the Future Scene.

**Scoring:** (1-10)

- The Underlying Problem should identify a major, important issue in the Future Scene, rather than a Future Scene fact, a non-Challenge, the whole Future Scene, or something outside the Future Scene.
- The Underlying Problem should be of major importance in relation to other Challenges affecting the Future Scene. Future Scenes commonly identify a specific mission, charge, or area of concern.
- If there is a multiple KVP or Purpose, only the first one is considered when scoring Adequacy.

**Reminders for Awarding the Adequacy Score**


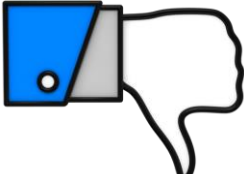
- Use the descriptors to evaluate the Adequacy of the Underlying Problem.
- Review the Future Scene specific *Evaluation Notes* Rubric to consider applicability to Future Scene Charge.
- Determine the numerical score.
- Indicate the Adequacy score in the Step 2 score box. *Rating; Content*




## Common Evaluation Issues for Underlying Problems

The Underlying Problem is the most important Step in problem solving because the quality of all subsequent Steps relies on an important and well-stated Underlying Problem. Many aspects must be considered in evaluating this Step in problem solving. Below are common concerns when scoring an Underlying Problem that does not successfully execute the proper Underlying Problem format.

Scoring UPs with KVP and/or Purpose concerns	
<b>KVP</b> multiple verbs or verb phrases OR multiple objects of the verb	<p><b><u>Notes on multiple verbs/verb phrases and multiple objects:</u></b></p> <ul style="list-style-type: none"> <li>A KVP should contain a single verb or verb phrase with a single object.</li> <li>Words <i>and</i>, <i>or</i>, and <i>while</i> in the Key Verb Phrase increase the chance of a multiple verb or multiple objects.</li> <li>The Focus score will be reduced, and evaluators will use only the first verb/verb phrase or object when scoring for Adequacy.</li> <li>To be scored as Relevant in Step 3, Solution ideas must address everything mentioned in the KVP.</li> </ul> <p><b><u>Examples of multiple verbs/verb phrases:</u></b></p> <ul style="list-style-type: none"> <li><i>...how might we increase space expansion and decrease safety issues ...</i></li> </ul> <p><b><u>Examples of multiple objects of the verb:</u></b></p> <ul style="list-style-type: none"> <li><i>...how might we reduce the risk caused by space junk and asteroids...</i></li> <li><i>...how might we improve competition and fairness...</i></li> <li><i>...how might we provide communication and counseling...</i></li> </ul>
<b>KVP</b> absolute verbs	<p><b><u>Notes on absolute verbs:</u></b></p> <ul style="list-style-type: none"> <li>In general, absolute verbs such as stop, prevent, eliminate, etc. may unnecessarily narrow the focus, thus reducing the points awarded.</li> <li>An absolute verb <i>may</i> be appropriate, depending on the intent defined. The context of the Future Scene will help the evaluator determine if the absolute verb is appropriate or causes the focus to be too narrow.</li> <li>The use of an absolute verb should have no impact on the Adequacy score, which is about the importance of the issue selected.</li> </ul> <p><b><u>Example using an absolute KVP:</u></b>  <i>Since Oberon Corporation plans on taking the water for those people living at Titania's Midsummer Station from the interior water ice mantle, how might we prevent natural toxins from contaminating the drinking water so that the inhabitants of Midsummer Station have a safe drinking water supply?</i></p>
<b>KVP &amp; Purpose</b> restatements of the Future Scene	<p><b><u>Notes on restatements:</u></b></p> <ul style="list-style-type: none"> <li>A restatement is a KVP and Purpose that addresses the entire Future Scene in a very general way and is a critical error in the creative problem solving process. The KVP should narrow the Future Scene to one area of concern.</li> <li>Words from the Future Scene charge can be used in the UP, but if the charge is very broad the resulting Key Verb Phrase could be a restatement.</li> <li>Restatements are given a score of 1 for Focus and a score of 1 for Adequacy. Scores <b><u>may</u></b> also be lower in Step 6 (Impact), and in Overall (Creative Strength).</li> </ul> <p><b><u>Examples of restatements:</u></b></p> <ul style="list-style-type: none"> <li><i>...how might we overcome (or develop remedies for, or decrease, or solve) the Challenges created by the Oberon Corporation in Space in 2063 so that it will work better?</i></li> <li><i>...how might we reduce the problems resulting from Oberon's space mining in 2063 so that Oberon's space expansion will be more successful?</i></li> </ul>

Scoring UPs with KVP and/or Purpose concerns	
<b>KVP &amp; Purpose</b>  broadens or goes beyond the facts stated in the Future Scene	<p><b>Notes on broadenings:</b></p> <ul style="list-style-type: none"> <li>A UP that broadens the charge of the Future Scene is one that takes a tangent to the Future Scene and applies it to their UP. This is usually a completely different line of action sometimes related to research.</li> <li>A score of 1 is given for Focus and for Adequacy when broadening occurs.</li> <li>If the parameters are not included in the UP or are changed, the Future Scene parameters of topic, place, and time are used when scoring Step 3.</li> </ul> <p><b>Example of broadening:</b></p> <ul style="list-style-type: none"> <li><i>...how might we involve more governments in Oberon's space exploration so that people don't lose their jobs back on earth?</i></li> </ul> 
<b>KVP &amp; Purpose</b>  unrelated to the Future Scene	<p><b>Notes on unrelated Underlying Problems:</b></p> <ul style="list-style-type: none"> <li>An unrelated UP ignores the facts of the Future Scene, perhaps concentrating on some aspect of research of the topic.</li> <li>A score of 1 is given for Focus and a score of 1 is given for Adequacy.</li> <li>The Future Scene parameters of topic, place, and time are used when scoring Step 3, causing scores to be lower in Step 6 (Impact), and <b>possibly</b> in Overall (Creative Strength).</li> </ul> <p><b>Example of unrelated Underlying Problem:</b></p> <ul style="list-style-type: none"> <li><i>...how might we educate the public about space so that there are more jobs for teachers?</i></li> </ul>
<b>Purpose</b>  with multiple verbs, verb phrases OR multiple objects	<p><b>Notes on Purposes with multiple elements:</b></p> <ul style="list-style-type: none"> <li>A score of 1 is given for Purpose.</li> <li>The UP will score lower in Focus.</li> <li>Evaluators will refer only to the first verb/verb phrase or object when scoring Adequacy.</li> <li>Solution ideas must support both verbs or objects.</li> </ul> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li><i>... so that the people of Earth will be able to receive the benefits of the corporation's space expansion and receive fair pricing of fusion energy...</i></li> </ul> 

Scoring UPs with KVP and/or Purpose concerns	
<b>Purpose</b> missing	<p><b><u>Notes on UPs without a Purpose:</u></b></p> <ul style="list-style-type: none"> <li>A score of 0 is given for Purpose and scores of 1-3 are given for Focus and Adequacy.</li> <li>The implications for scoring the subsequent Steps, particularly Step 3 Solutions, are determined by the round of competition.</li> </ul> <p><b><u>Non-Competitive Rounds</u></b></p> <ul style="list-style-type: none"> <li>Evaluators will provide feedback that explains the usefulness of the Purpose to focus the Underlying Problem, helping students to understand the connection between a Purpose and the Key Verb Phrase in the UP.</li> <li>Evaluators will impose a Purpose that seems logical to the Future Scene and the KVP.</li> <li>Evaluators, in their feedback, will state that they will NOT impose a Purpose for the upcoming competitive rounds.</li> </ul> <p><b><u>Competitive Rounds</u></b></p> <ul style="list-style-type: none"> <li>Evaluators will provide feedback that explains the importance of a Purpose in defining the goals of the Key Verb Phrase.</li> <li>Evaluators do not complete the UP by imposing a Purpose in competitive rounds of FPS evaluation.</li> </ul>
<b>KVP &amp; Purpose</b> are the same	<p><b><u>Note on KVPs and Purposes that are the same:</u></b></p> <ul style="list-style-type: none"> <li>A score of 1 is given for Purpose and scores of 1-3 are given for Focus and Adequacy.</li> <li>The implications for scoring the subsequent Steps, particularly Step 3 Solutions, are determined by the round of competition.</li> </ul> <p><b><u>Non-Competitive Rounds</u></b></p> <ul style="list-style-type: none"> <li>Evaluators will provide feedback that explains the usefulness of the Purpose to help focus the Underlying Problem, helping students to understand the difference between a Purpose and the Key Verb Phrase in the UP.</li> <li>Evaluators will impose a new Purpose that seems logical to the Future Scene and the KVP.</li> <li>Evaluators, in their feedback, will state that they will NOT impose a Purpose for the upcoming competitive rounds</li> </ul> <p><b><u>Competitive Rounds</u></b></p> <ul style="list-style-type: none"> <li>Evaluators will provide feedback that explains the importance of a Purpose in defining the goals of the Key Verb Phrase.</li> <li>Evaluators do not impose a new Purpose in competitive rounds of FPS.</li> </ul> 

**REVIEW STEP 2 SCORES**

**Completeness:** Each element of the Underlying Problem present (Condition Phrase, Stem & KVP, Purpose, and Parameters) earns points.

**Focus:** The scope of the Underlying Problem is considered for points.

**Adequacy:** Points are awarded based on the importance of the Underlying Problem.

<b>Step 2 Scoring Guidelines</b>							
<b>Condition Phrase</b>	Not present	Inaccurate information or unrelated to KVP	Present, accurate, and related to Future Scene				
<b>Score</b>	0	1	2				
<b>Stem and KVP</b>	Key Verb Phrase not present	Present but multiple verb phrases	Present but multiple objects or modifiers	Present and contains a single active verb phrase			
<b>Score</b>	0	1	2	3			
<b>Purpose (P)</b>	Not present	Present but more than one or repeats KVP	Present but no clear relationship to KVP	Present and singular with logical relation to KVP			
<b>Score</b>	0	1	2	3			
<b>Future Scene Parameters</b>	0 or 1 Parameter present	2 Parameters present	Topic, place, and time present				
<b>Score</b>	0	1	2				
<b>Focus of Underlying Problem</b>	Restates, broadens, or ignores FS	Too broad or too narrow KVP with stated purpose; UP not clearly worded; multiple KVP or purpose	UP contains a good KVP, the goal or purpose is evident and addresses Future Scene charge	Excellent KVP that ties directly into a well defined, clearly written purpose and addresses Future Scene charge			
<b>Score</b>	1 2 3	4 5 6	7 8	9 10			
<b>Adequacy/Importance of Underlying Problem</b>	Restates, broadens, or ignores FS	Identifies minor issue from the Future Scene	Identifies an appropriate issue from the Future Scene	Identifies a major, important issue from the Future Scene			
<b>Score</b>	1 2 3	4 5 6	7 8	9 10			
<b>Step 2 Scores</b>	<b>Condition (0-2)</b>	<b>Stem/KVP (0-3)</b>	<b>Purpose (0-3)</b>	<b>FSP (0-2)</b>	<b>Focus (1-10)</b>	<b>Adequacy (1-10)</b>	<b>Total</b>

The total Step 2 score is determined by adding together all points earned for the three components of Step 2. Please note that while the absence of elements can lead to a zero in the Completeness categories, the lowest available score for Focus and Adequacy is 1. There are no scoring differences between the Team, and Individual/MAGIC score sheets.

**STEP 3****Produce Solution Ideas**

**Objective:** To identify 16 (8 for individuals) varied and unique solution ideas addressing the Underlying Problem

Fluency .....1 2 3 4 5 6 7 8 9 10  
 Elaboration.....1 2 3 4 5 6 7 8 9 10  
 Flexibility .....1 2 3 4 5 6 7 8 9 10  
 Originality .....3 x \_\_\_\_ = \_\_\_\_

**Content:** A Solution idea, if **Relevant**, addresses the Key Verb Phrase and supports the Purpose, either explicitly or implicitly. It does not contradict the Future Scene parameters of topic, place, and time or Future Scene charge. Flexibility in thinking is demonstrated by suggesting ideas from different perspectives or categories.

**Structure:** Well-written, elaborated Solution ideas follow this guideline: Solution ideas should be written in statement form as definite proposals, using the word “will” rather than “may” or “might.” (no points are deducted for failure to write in statement form, but, evaluators should remind students of the preferred format in the comment section rather than feedback line)

**FLUENCY** measures the *quantity* of **Relevant** Solution *ideas*.

**Scoring:** (1-10 team; 3-10 individual) The numerical score is based on the number of **Relevant** Solution ideas awarded. Each Solution idea is individually read and classified in one of the following ways:

**Types of  
Solutions**  
**Relevant**  
**Perhaps**  
**Why**  
**Duplicate**

**Relevant** – The Solution idea addresses, or has a relationship to, the Key Verb Phrase and it is clear or easily inferred that it supports the Purpose. In addition, it does not contradict the Future Scene parameters (Topic, Place, and Time) or the Future Scene Charge.

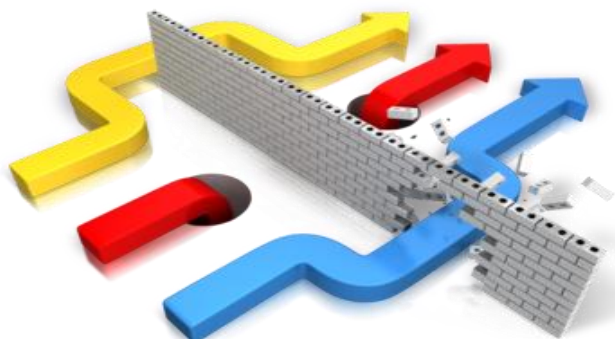
- A Solution idea does not have to solve the Underlying Problem completely, but it must show a relationship to the UP.
- The Condition Phrase, Key Verb Phrase, and/or Purpose do not have to be repeated for a Solution to be **Relevant**.
- The connection to the Purpose does not have to be explicitly stated, as long as the Purpose would clearly be impacted by the Solution idea.
- A **Relevant** Solution does not have to work perfectly, be humane, be cost effective, be tried and true, or be new. These aspects are judged in Step 6 - Action Plan.
- Imaginative inventions are fun, but inventions don't necessarily happen just because someone says it will. Sometimes inventions are “magical thinking” or in opposition to the laws of nature. Some level of explanation about how the invention will work may be needed to award a **Relevant**.
- A Solution idea should not be denied a **Relevant** because the word “will” was not used. A comment in the feedback section about using “will” is sufficient.
- A **Relevant** Solution idea does not have to be elaborated. The focus of fluency is on the *ideas*, not the sophistication or elaboration of the *writing*.

**Perhaps** – The Solution idea does not have a clear connection to the Key Verb Phrase and Purpose of the Underlying Problem. More information may have helped to make the connection.

**Why** – The Solution idea is unrelated to the Underlying Problem, OR the statement does not describe a Solution Idea, OR the idea is unclear.

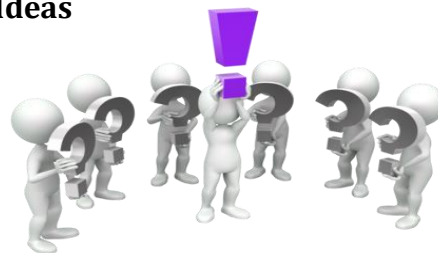
**Duplicate** – A Solution idea too contextually similar to another idea previously scored as **Relevant** is considered a duplicate idea.

Evaluators should not confuse duplicate ideas with duplicate categories – it is acceptable for students to list several different ideas in the same category.



### Common Evaluation Issues for Fluency: Relevance of Solution Ideas

Step 3 is intricately related to the Underlying Problem. Often a misstep in Step 2 has specific ramifications for how to proceed with scoring Solutions. Below are notes on scoring Solution ideas when an Underlying Problem was incomplete or did not effectively apply the proper format.



Scoring Solution Ideas for UPs with KVP and/or Purpose Concerns	
<b>KVP</b> multiple verbs or verb phrases OR multiple objects of the verb	<b>Scoring Solution Ideas when UP has multiples in KVP:</b> <ul style="list-style-type: none"> <li>Although only the first verb phrase is considered when scoring for Adequacy, each Solution must <i>address</i> (have a relationship to, not completely solve) both of the verbs in order to score as <b>Relevant</b>.</li> </ul>
<b>KVP</b> absolute verbs	<b>Scoring Solution Ideas for absolute KVPs:</b> <ul style="list-style-type: none"> <li>The use of an absolute verb does not make it ineligible for <b>Relevancy</b> points. Each Solution idea must be examined to determine if it addresses the KVP and supports the Purpose.</li> </ul>
<b>KVP &amp; Purpose</b> broadens or goes beyond the facts stated in the Future Scene	<b>Scoring Solution Ideas for broadened UPs:</b> <ul style="list-style-type: none"> <li>Although the Solutions are responding to a UP that broadens the directive/charge, the Solutions will score as <b>Relevant</b> as there is a relationship to the UP, so long as they do not contradict the Future Scene and its charge.</li> <li>If the parameters were not included in the UP, or were changed, the Future Scene parameters of topic, place, and time are used for scoring Step 3.</li> </ul>
<b>KVP &amp; Purpose</b> unrelated to the Future Scene	<b>Scoring Solution Ideas for UPs unrelated to the Future Scene:</b> <ul style="list-style-type: none"> <li>The Future Scene parameters of topic, time, and place are considered when determining the <b>Relevance</b> of each Solution idea.</li> </ul>
<b>Purpose</b> with multiple verbs, verb phrases OR multiple objects	<b>Scoring Solution Ideas when UP has multiples in Purpose:</b> <ul style="list-style-type: none"> <li>Although only the first verb phrase is considered when scoring for Adequacy, each Solution must <i>support</i> both of the verb ideas in order to score as <b>Relevant</b>. This still does not mean that an explicit description of the relationship is required, but the relationship must be obvious or easily inferred.</li> </ul>



Scoring Solution Ideas for UPs with KVP and/or Purpose Concerns	
<b>Purpose</b> missing	<p><b><u>Scoring Solution Ideas when there is no Purpose in the UP:</u></b></p> <ul style="list-style-type: none"> <li>In Non-Competitive Rounds, it is a good idea to provide feedback that emphasizes the connection of the Solution idea to the imposed Purpose.</li> <li>In Competitive Rounds, evaluators should include an example of a possible Purpose that might be consistent with some of their Solution ideas.</li> </ul> <p><b><u>Non-Competitive Rounds:</u></b></p> <ul style="list-style-type: none"> <li>Evaluators provide feedback that emphasizes the connection of Solution ideas to the Purpose.</li> <li>The Purpose imposed in Step 2 is used to determine whether or not a Solution is <b>Relevant</b>. Once again, this does not mean that an explicit description of the relationship is required, but the relationship must be obvious or easily inferred.</li> </ul> <p><b><u>Competitive Rounds:</u></b></p> <ul style="list-style-type: none"> <li>In a booklet where the UP lacks a Purpose, Solutions will solve/address only one goal, the Key Verb Phrase.</li> <li>Without a Purpose to be supported, Solutions are likely ineligible for the designation of <b>Relevant</b>.</li> </ul>
<b>KVP &amp; Purpose</b> are the same	<p><b><u>Scoring Solution Ideas when the KVP and Purpose are the same:</u></b></p> <ul style="list-style-type: none"> <li>In Non-Competitive Rounds, it is a good idea to provide feedback that emphasizes the connection of the Solution idea to the imposed Purpose.</li> <li>In Competitive Rounds, evaluators should include an example of a possible Purpose that might be consistent with some of their Solution ideas.</li> </ul> <p><b><u>Non-Competitive Rounds:</u></b></p> <ul style="list-style-type: none"> <li>Evaluators provide feedback that emphasizes the connection of Solution ideas to the new Purpose.</li> <li>The new Purpose imposed in Step 2 is used to determine whether or not a Solution is <b>Relevant</b>. Once again, this does not mean that an explicit description of the relationship is required, but the relationship must be obvious or easily inferred.</li> </ul> <p><b><u>Competitive Rounds:</u></b></p> <ul style="list-style-type: none"> <li>In a booklet where the UP's Purpose repeats the KVP, Solutions will likely solve/address only one goal, as the Key Verb Phrase and Purpose are the same. To meet the definition of a Purpose (p.11), it must not be a repetition of the Condition Phrase or the Key Verb Phrase.</li> </ul>

### Reminders for Awarding the Fluency Score

- Each solution idea is read and marked as **R** – Relevant, **P** – Perhaps, **W** – Why, or **D** – Duplicate in the appropriate column on the score sheet.
- After evaluating each of the solution ideas, count the number of Relevant solutions, indicate the number in the last row of the Relevant column, and circle the fluency score based on the scale provided on the score sheet.
- Indicate the fluency score in the Step 3 score box. *Frequency; Content and Process*

**ELABORATION** measures the number of **Relevant** Solution ideas that contain at least three significant areas of detail.

**Scoring:** (1–10 team; 3–10 individual) – An elaborated Solution idea is any **Relevant** Solution idea that includes significant details for at least three of the *who, what, how, why, when, and where* elements.

- Solution ideas elaborated by simply adding on the Key Verb Phrase and/or Purpose are not considered for elaboration credit more than three times in a booklet.
- *When and where* may be counted toward elaboration only if they are of a substantive nature. ('In the year 2063 in Singapore.' is not substantive.)
- Evaluators should provide feedback that contains specific suggestions on ways to elaborate Solution ideas.

#### Elements of Elaboration

Here is an example of an elaborate (perhaps *over* elaborate, for the sake of illustration) solution idea utilizing who, what, how, why, and a substantive where and when:

Who: *The United Nations*

What: *will initiate a new policy*

How: *encouraging every nation to buy a stake in Oberon Corp. and eventually buy them out*

Why: *in order to diversify access to Helium-3 collection.*

Where: *This worldwide owned company will give each nation equal shares of the Helium-3*

When: *and will begin immediately.*



**FLEXIBILITY** measures the diversity of thought in the *variety* of viewpoints taken in **Relevant** Solution ideas.

**Scoring:** (1–10 team; 1–8 individual) – The numerical score is based on the number of categories used in writing the Solutions scored as **Relevant**. Evaluators take each of the following areas into consideration in scoring booklets for flexibility:

- Evaluators categorize the **Relevant** Solution ideas, using the categories listed on the score sheet.
- Some Solutions can be categorized in more than one way; so evaluators are encouraged to assign a category that has not yet been awarded.

#### Reminders for Awarding the Elaboration Score

- An “E” or a check mark is recorded in the Elaboration column next to each **Relevant** solution that qualifies as elaborated.
- If no credit is awarded for Elaboration, the space is left blank.
- Count the number of solution ideas marked as elaborated.
- Determine the numerical score according to the scale on the score sheet.
- Indicate the Elaboration score in the Step 3 score box. *Frequency; Structure*

**Reminders for Awarding the Flexibility Score**

- Award flexibility points based on the number of unique categories identified.
- Count the number of different categories.
- Determine the numerical score (up to 10 for teams, 8 for individuals).
- Record the flexibility score in the Step 3 score box. *Frequency; Process*

**ORIGINALITY** rewards **Relevant** Solution ideas that are especially insightful, highly creative, and/or unique. Original ideas may often include futuristic elements.



**Scoring:** (3x) – An original Solution is a response that is found infrequently among responses at that age/grade level and considered of high quality (insightful, indicative of breakthrough thinking). Wildly futuristic ideas are not always original.

**Reminders for Awarding the Originality Score**

- Mark **Original** (a check mark or “O”) in the “O” column for each **Relevant** solution judged original.
- Enter the total number of originals on the score sheet and multiply by 3. *Weighted; Content*

**REVIEW STEP 3 SCORES**

**Fluency:** The score awarded is identified by applying the total number of **Relevant** Solution ideas to the scale as indicated on the score sheet.

**Elaboration:** The score awarded is determined by applying the total number of **Elaborated Relevant** Solution ideas to the scale as indicated on the score sheet.

**Flexibility:** The unique number of categories utilized in **Relevant** Solutions ideas (up to 10) determines the score.

**Originality:** Add any **Relevant** Solution ideas marked as unique, and multiply the total number by 3 for the bonus points added to the Step 3 scores.

Step 3 Scoring Guidelines		Team score sheet										
<b>Fluency</b> - A relevant solution idea addresses the KVP and supports the purpose Score	Fluency is determined by totaling the number of relevant solution ideas and using the following scale:											
	Number of relevant solution ideas:	1	2	3	4	5-6	7-8	9-10	11-12	13-14	15-16	
	Number of points awarded:	1	2	3	4	5	6	7	8	9	10	
<b>Elaboration</b> - Any relevant solution idea that includes at least 3 who, what, why, how, where and when elements Score	Elaboration is determined by totaling the number of elaborated solutions in relevant solution ideas:											
	Number of elaborated solution ideas:	1	2	3	4	5-6	7-8	9-10	11-12	13-14	15-16	
	Number of points awarded =	1	2	3	4	5	6	7	8	9	10	
<b>Flexibility</b> - Measures the number of different categories in relevant solution ideas Score	Flexibility is determined by totaling the number of different categories identified.											
	Number of categories:	1	2	3	4	5	6	7	8	9	10	
	Number of points awarded =	1	2	3	4	5	6	7	8	9	10	
<b>Originality</b> - Three bonus points may be awarded to any relevant solution idea that shows unique creativity or insight												
Step 3 Scores		Fluency (1-10)	Elaboration (1-10)	Flexibility (1-8)	Originality (x3)	Total						

Step 3 Scoring Guidelines		Individual/MAGIC score sheet							
Fluency - A relevant solution idea addresses the KVP and supports the purpose Score	Fluency - Award points for each relevant solution idea.								
	Number of Relevant: 12		3	4	5	6	7	8	
	Number of points awarded: 34		5	6	7	8	9	10	
Elaboration - Description of who, what, why, and how (3) Score	Elaboration - Award points for each elaborated relevant solution.								
	Number of Elaborates: 12		3	4	5	6	7	8	
	Number of points awarded: 34		5	6	7	8	9	10	
Flexibility - Number of unique categories in relevant solutions Score	Flexibility - Award 1 point for each different category used in a relevant solution idea.								
	Number of categories: 12		3	4	5	6	7	8	
Originality - Three bonus points may be awarded to any relevant solution idea that shows extraordinary creativity or insight									
Step 3 Scores	Fluency (3-10)	Elaboration (3-10)	Flexibility (1-8)	Originality (±3)	Total				

The total Step 3 score is determined by adding together all points earned for the four components of Step 3. Please note that even if no Solutions were accepted, student effort is recognized with the appropriate minimum scores. Please note: Only steps that contain no student work are scored zero.



## STEP 4

## Generate and Select Criteria

**Objective:** To determine 5 criteria that measure how well the solution idea accomplishes the Underlying Problem

Correctly Written .....1 2 3 4 5  
 Relevance..... 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

**Content:** Criteria are the standards by which Solution ideas are judged. The Solution idea that best meets all of the criteria is considered the “best Solution” and becomes the basis for the Action Plan; therefore, criteria should address aspects of the Solution ideas that will be very important in determining which one will best accomplish the goals of the Underlying Problem.

**Structure:** A correctly written Criterion is one that meets four required guidelines:

1. Focuses on a single standard
2. Demonstrates a measure of degree using a superlative
3. Indicates the desired outcome
4. Recognizable as a question

**CORRECTLY WRITTEN** is a matter of structure. Each criterion must focus on a single standard, demonstrate a measure of degree, indicate the desired outcome, and be recognizable as a question. At this point, the evaluator is not deciding the value of the criterion but assessing only the structure.

**Scoring:** (0-5; each of the five criteria is awarded 0 or 1 point)

- Each criterion must deal with a single standard. The words “and” and “or” in a criterion often indicate multiple standards and should be avoided.



- Adding the KVP or Purpose to a criterion with words like “when” and “while” is usually a time constraint and not a multiple standard.
- Adding a phrase with the words “so that” or “in order to” along with a superlative often results in a multiple standard. In that case, award 0 for correctly written.
- Each criterion must include a superlative (best, longest, easiest, fewest, most, greatest, etc.), allowing the Solution ideas to be ranked in Step 5.
  - Comparative words do not rate as “Correctly Written.” (These include better, longer, easier, fewer, more, greater, etc.)
- Each criterion must be stated so that the desired outcome is indicated.

- Which solution will be the safest for passengers?
  - Indicates a desirable direction
- Which solution will be the least safe for passengers?
  - Does not indicate a desirable direction

- Criteria should be recognizable as a question. With or without the question mark, we would read it/see it clearly as a question to weigh our Solutions.

- safest for passengers
  - Does not meet the question requirement for Correctly Written

#### Reminders for Awarding the Correctly Written Score

- If a criterion meets all four structural requirements, award 1 point for Correctly Written. Indicate this with a check mark in CW column of the score sheet.
- If all four requirements are not met, a point for Correctly Written is not given.
- Verify the number of Correctly Written criteria in the top rectangle for Step 4.
- Record that number in the Steps 4-5 score box. *Frequency; Structure*

**RELEVANCE** assesses the specificity of the criteria content. Criteria that are generic and can be applied to a wide variety of topics and situations score lower in points. Criteria that are specific to relevant research, Underlying Problem, and Future Scene for this topic score more points.

**Scoring:** (0-15; each of the five criteria is awarded 0-3 points)

- All criteria are scored for **Relevance**, *even if* they were not correctly written.
- For criteria with multiple standards (thus not correctly written), use only the first standard to determine relevance.
- Each criterion is scored from 0-3 points
  - 0 points – (NR or D) Not Relevant or Duplicate
  - 1 point – (G) Generic
  - 2 points – (M) Modified
  - 3 points – (A) Advanced



Scoring Criteria Relevance – Notes and Examples	
<p><b>Sample Underlying Problem for Criteria Relevance Examples:</b>          Because Oberon Corporation holds large amounts of economic and political power as the solar system's largest supplier of "extra-Earth" minerals and Helium-3, in what ways might we increase the variety of companies involved in the space program so that it will lessen Earth's dependency on the dominating Oberon Corporation on Earth in the year 2063 and beyond?</p>	
<p><b>Not Relevant</b>          0 points – (NR)</p>	<p><b>Notes on Not Relevant Criteria:</b>          A criterion that has no relevance to evaluating Solutions for this Underlying Problem.</p> <p><b>Examples of NR Criteria:</b></p> <ul style="list-style-type: none"> <li>• Which Solution will (WSW) most convince people to vacation in space?</li> <li>• WSW improve communication the most?</li> </ul>
<p><b>Duplicate</b>          0 points – (D)</p>	<p><b>Notes on Duplicate Criteria:</b>          A criterion that duplicates one of the other criteria being used.</p> <ul style="list-style-type: none"> <li>• The criterion may not use the exact wording but will essentially be evaluating Solutions based on the same concept.</li> </ul> <p><b>Examples of Duplicate Criteria:</b>          (For demonstration Purposes, these examples are duplicates of the <b>Not Relevant</b> examples.)</p> <ul style="list-style-type: none"> <li>• Which Solution will result in the most people wanting to be space vacationers?</li> <li>• WSW best enhance contact between Earth and Titania?</li> </ul>
<p><b>Generic</b>          1 point – (G)</p>	<p><b>Notes on Generic Criteria:</b>          A criterion that could be applied to nearly any Underlying Problem or Future Scene</p> <ul style="list-style-type: none"> <li>• Generic criteria with Future Scene parameters added (topic, place, time) are still rated <b>Generic</b>.</li> </ul> <p><b>Examples of Generic Criteria:</b></p> <ul style="list-style-type: none"> <li>• WSW <u>last the longest</u>?</li> <li>• WSW <u>people accept the most</u> on the topic of space?             <ul style="list-style-type: none"> <li>○ Topic parameter added is still generic</li> </ul> </li> <li>• Which Solution will be the <u>safest</u> in 2063?             <ul style="list-style-type: none"> <li>○ Time parameter added is still generic</li> </ul> </li> </ul>
<p><b>Modified</b>          2 points – (M)</p>	<p><b>Notes on Modified Criteria:</b>          A criterion with a core idea that is generic, but with significant details from the Future Scene added</p> <ul style="list-style-type: none"> <li>• These details may include stakeholders from the Future Scene; details from the Condition Phrase, Key Verb Phrase, or Purpose if used as a time constraint; or other key details from the Future Scene.</li> <li>• Future Scene parameters alone (topic, place, time) are not enough to score as <b>Modified</b>.</li> </ul> <p><b>Examples of Modified Criteria:</b></p> <ul style="list-style-type: none"> <li>• Which Solution will be the safest <u>for Oberon Corporations workers in space</u>?</li> <li>• WSW be the most accepted by the <u>governments of Earth using Fusion energy</u>?</li> <li>• WSW be the quickest to implement <u>for Oberon's competitors</u>?</li> <li>• WSW be the easiest to implement <u>for companies working in space</u>?</li> </ul>

Scoring Criteria Relevance – Notes and Examples	
<b>Advanced</b> <b>3 points – (A)</b>	<p><b>UP Based</b></p> <p><b><u>Notes on Advanced Criteria Based on the UP:</u></b>  A criterion that uses the concept from the Key Verb Phrase or the concept from the Purpose.</p> <ul style="list-style-type: none"> <li>Both KVP and Purpose can be used to create criteria.</li> </ul> <p><b><u>Examples of UP Based Advanced Criteria:</u></b></p> <ul style="list-style-type: none"> <li><i>Which Solution will best increase the variety of companies involved in the space program?</i> <ul style="list-style-type: none"> <li>Based on KVP</li> </ul> </li> <li><i>Which Solution will most effectively lessen the Earth's dependency on the dominating Oberon Corporation?</i> <ul style="list-style-type: none"> <li>Based on Purpose</li> </ul> </li> </ul>
	<p><b>Topic Research / Future Scene Based</b></p> <p><b><u>Notes on Advanced Criteria Based on topic research and/or specific to Future Scene:</u></b>  A criterion that uses concepts from the background research on the topic for this particular Future Scene or is specific to an element of the Future Scene that is not generic</p> <ul style="list-style-type: none"> <li>A criterion based on relevant research <i>may</i> have modifying information from the Future Scene, but it is <i>not</i> required; however, <u>the criterion must first be relevant!</u></li> <li>Adding the KVP or Purpose to a generic criterion idea is a modification, not making it specific.</li> </ul> <p><b><u>Examples of research and/or Future Scene Based Advanced Criteria:</u></b></p> <ul style="list-style-type: none"> <li><i>Which Solution will best comply with <u>international business laws that govern the harvesting of materials from space</u>?</i> <ul style="list-style-type: none"> <li>Space law was part of the research on the topic of space.</li> </ul> </li> <li><i>WSW be most effective in dealing with the dangers of living in space?</i></li> <li><i>WSW best avoid conflicts between governments competing in space?</i></li> </ul>
	<p><b>Justified with Future Scene facts</b></p> <p><b><u>Notes on Advanced Criteria Justified with Future Scene Facts:</u></b>  A criterion that is generic but is justified with <i>specific facts</i> from the Future Scene that relate closely to its importance.</p> <p><b><u>Examples of Advanced Criteria Justified with Future Scene Facts:</u></b></p> <ul style="list-style-type: none"> <li><i><u>Since unmanned shipments of Helium-3 will be sent from Midsummer Station to Earth only twice per decade</u>, which Solution will best assure the safe delivery of the Helium-3?</i></li> <li><i><u>Since the need for cost-effective clean energy is ever increasing</u>, which Solution will be the most sustainable?</i></li> <li><i><u>Because the trade of fuel and minerals from space is international and therefore involving diverse populations and varying locations</u>, which Solution will be the easiest to implement?</i></li> </ul>



**Reminders for Awarding the Relevance Score**

- Indicate **NR** for Not Relevant, **D** for Duplicate, **G** for Generic, **M** for Modified, or **A** for Advanced.
- Record the corresponding point values (0 for Not Relevant or Duplicate, 1 for Generic, 2 for Modified, or 3 for Advanced).
- Verify the total at the bottom of the column.
- Verify the sum of the points for Relevancy.
- Indicate that number in the Steps 4-5 score box. *Composite; Content*

**Common Evaluation Issues for Criteria**

Criteria are more complex than it might seem at first and a variety of mistakes may occur. See the table below for examples of student work, and the appropriate scores for such work.

**Criteria Scoring Concerns with Examples****Sample Underlying Problem for Scoring Examples:**

Since the trip to Uranus' moon will take Oberon Corporation's employee-settlers a long time, how might we reduce potential hazards they may encounter in their trip so that the people of Earth will be able to receive the benefits of the corporation's space expansion?

<b>No superlative</b>	<i>Which Solution will not cost as much in 2063?</i> <ul style="list-style-type: none"> <li>• Correctly Written – 0 (no superlative)</li> <li>• Relevance – 1 Generic (Cost is a generic concept.)</li> </ul>
<b>Not related to the Underlying Problem</b>	<i>Which Solution will be safest for the people using Helium-3 on earth?</i> <ul style="list-style-type: none"> <li>• Correctly written – 1</li> <li>• Relevance – 0 Not Relevant <i>This criterion is not relevant to this UP.</i></li> </ul>
<b>Meaning difficult to discern</b>	<i>Which Solution will be the most valuable?</i> <ul style="list-style-type: none"> <li>• At first this appears to be a typical generic criterion; however, the intent to be considered when ranking the ideas is not obvious.</li> <li>• Correctly Written – 1</li> <li>• Relevance <ul style="list-style-type: none"> <li>○ 1 Generic OR</li> <li>○ 0 for Not Relevant</li> </ul> </li> </ul>
<b>Multiple subjects</b>	<i>Which Solution will the companies and workers find most acceptable?</i> <ul style="list-style-type: none"> <li>• Correctly Written – 0 (more than one subject)</li> <li>• Relevance – 2 Modified (Using the first of the subjects which is modified with Future Scene stakeholders.)</li> </ul>
<b>Multiple criteria with two superlatives</b>	<i>Which Solution will benefit the space employees the most so they can be the safest?</i> <ul style="list-style-type: none"> <li>• With two superlatives, score only the first for relevance</li> <li>• Correctly Written – 0 (two superlatives)</li> <li>• Relevance – 2 Modified (The first superlative is modified by key stakeholders.)</li> </ul>

Criteria Scoring Concerns with Examples	
<b>Justification is not a Future Scene fact</b>	<p><i>Since the scientists at Port Earth Station don't get along, which Solution will be the most acceptable to them?</i></p> <ul style="list-style-type: none"> <li>• If the justification does not include facts from the Future Scene, ignore it in scoring. The Future Scene does not state that the scientists on the Port Earth Station don't get along, so this is an assumption.</li> <li>• Correctly Written – 1</li> <li>• Relevance – 1 Generic (Without justification, the remaining criterion is generic.)</li> </ul>
<b>Justification does not have a logical relationship to the criterion</b>	<p><i>Because inhabitants of Midsummer Station survive due to Titania's interior water ice mantle, which Solution will be the most humane?</i></p> <ul style="list-style-type: none"> <li>• If the justification is not logically related to the criterion, the justification is ignored in scoring. Surviving on the water ice mantle would not be inhumane, so the Future Scene fact does not justify the criterion. This Future Scene fact is not a logical reason to consider humaneness.</li> <li>• Correctly Written – 1</li> <li>• Relevance – 1 Generic (Without the justification, the remaining criterion is generic.)</li> </ul> <p><i>Because Oberon Corporation's human footprint will continue to expand toward the edges of our solar system, which Solution will be the safest?</i></p> <ul style="list-style-type: none"> <li>• If the justification is not logically related to the criterion, the justification is ignored in scoring. The justification does not show a connection between an enlarged human footprint and safety.</li> <li>• Correctly Written – 1</li> <li>• Relevance – 2 Modified (Without the justification, the criterion is modified.)</li> </ul>

### **REVIEW STEP 4 SCORES**

**Correctly Written:** Each Correctly Written criterion is awarded 1 point.

**Relevance:** All criteria, even those that were not Correctly Written, are examined for their Relevance. Each criterion may earn up to 3 points depending on the quality of the work.

The total Step 4 score is determined by adding together all points earned for the two components of Step 4. Steps 4 and 5 share a scoring section and are combined as displayed on the score sheet. There are no scoring differences between the Team, and Individual/MAGIC score sheets.





## STEP 5

# Apply Criteria to Solution Ideas

**Objective:** To develop an evaluation matrix (grid) that uses the criteria from Step 4 to rank 8 solution ideas (5 for individuals) to determine the best solution

Correctly Used .....1 2 3 4 5

**Content:** Students select 8 of their most intriguing Solution ideas (5 for individuals) to enter into the evaluation matrix (grid). The matrix is used to rank the Solution ideas, considering one criterion at a time. The Solution idea with the highest overall ranking is the best Solution that will be used for the Step 6 Action Plan.

**Structure:** An accurate grid follows these guidelines:

1. Considering one criterion at a time, each of the Solution ideas are ranked against all others using that criterion. The ranking is repeated for each of the criteria.
2. In each column, Solution ideas are ranked from 1 (low) to 8 (high) or to the highest number that equals the number of Solutions ideas in the grid (5 for individuals).
3. Each number is used once in each column. (Exception: If two ideas rank equally in satisfying a criterion, half points that are mid-way between the two ranks may be used. For example, two ideas that are equal and would have been ranked 5 and 6 may each be ranked 5.5.)

Step 3 Solution	Solution Idea	Criteria					Total
		1	2	3	4	5	
# 13	Space suits	6	4	6	7	5	28
# 5	multiple companies	3	3	3	6	4	19
# 9	Space X	1	8	4	4	3	20
# 10	UN money	7	5	5	5	1	23
# 15	Helium-3 scans	4	2	7	2	2	17
# 1	Private transport	2	1	1	1	8	13
# 7	new budget	5	6	2	3	7	23
# 8	Mars rover	8	7	8	8	6	37

4. The rankings for a single criterion may be weighted if it is especially important. In this case, each rank must show the weight; if double weighting is used the ranks would range from 2 to 16 (2 to 10 for individuals).
5. The ranks are added across the rows and the totals entered into the final column of the matrix.
6. The Solution idea with the highest points must be used as the basis for the Step 6 Action Plan.
7. If there is a tie for the highest points, students must choose to use only one. Breaking ties may be done in several ways. The method used for making the choice may be shown on the grid, but this is *not required*.

**CORRECTLY USED** measures the accuracy in completion of the evaluation matrix (grid).

**Scoring:** (1–5 points)

- 5 points are awarded for a perfect grid.
  - Add the totals of the final column. If the total is 180 for 8 Solution ideas in the grid (75 for 5 Solution ideas in the grid), it is most likely that the grid has been completed correctly.
- 1 point is deducted for these mistakes:
  - Numbering in the wrong direction for the entire grid
  - Each instance of using a number more than once in a column (except for half points).
  - Each instance of incorrect addition across a row.
- 1 point only is awarded for obvious grid manipulation, such as each row containing the same numbers across which ignores the problem solving process.
- 1 point only is awarded if the Solution idea that scored the highest is not used as the main focus of the Step 6 Action Plan. This includes cases in which the highest-ranking idea and another idea of lower rank are combined in the Action Plan with equal weight. (Other related ideas may be used as support, as long as they are not the primary focus of the Action Plan.)



One error = 4 points  
Two errors = 3 points  
Three errors = 2 points  
Four or more errors = 1 point

#### Reminders for Awarding the Correctly Used Score

- Determine the number of points to award for Correctly Used.
- Record the points in the Correctly Used section of the score sheet.
- Indicate that number in the Steps 4-5 score box. *Composite; Structure*

### REVIEW STEP 5 SCORES

**Correctly Used:** Up to 5 points are awarded for the appropriate use of the matrix (grid) in the ranking of Solution ideas to Criteria.

Steps 4-5 Scoring Guidelines	
Correctly Written (CW) The structure of each criterion	One point is awarded for each correctly written criterion. A correctly written criterion <b>MUST</b> fulfill all four: a superlative - 'st' word, focus on a single standard, indicate a desired direction, and be recognizable as a question.
Score	Number of correctly written criteria = 0 1 2 3 4 5
Relevance to the UP	Total Relevancy Points from the table below
Score	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Correctly Used	Grid has 3 or more errors; top solution not used in Step 6
Score	1 2
	Grid contains 2 errors
	3
	Grid contains 1 error
	4
	Grid contains no errors
	5
Step 4-5 Scores	
	Correctly Written (0-5)      Relevance (0-15)      Correctly Used (1-5)      Total Points

Steps 4 and 5 share a scoring section and are combined as displayed on the score sheet. There are no scoring differences between the Team, and Individual/MAGIC score sheets.



## STEP 6

# Develop an Action Plan

**Objective:** To develop an Action Plan based on the highest scoring solution idea explaining and demonstrating its relevance and importance to the UP and the Future Scene

Relevance .....	1	2	3	4	5					
Effectiveness .....	1	2	3	4	5					
Criteria in Development of Action Plan.....	1	2	3	4	5					
Impact .....	1	2	3	4	5					
Humaneness .....	1	2	3	4	5					
Development of Action Plan.....	1	2	3	4	5	6	7	8	9	10

**Content:** An Action Plan is a *proposal* for solving the Underlying Problem. The Action Plan should **explain in detail** *who, what, how, why, where, and when* of the Solution idea. Developing an Action Plan involves moving from creative ideas into action; a new idea is incomplete until it is a workable plan. The Action Plan demonstrates how it addresses the area of concern of the Underlying Problem and how it impacts the Future Scene.

**Structure:** Action Plans vary widely in their structure, but include some or all of these elements:

1. The Action Plan **MUST** focus primarily on the best Solution as identified by using the evaluation matrix (grid) in Step 5.
2. The Action Plan may first introduce the basic idea, similar to what was written about it in Step 3 – Solution Ideas.
3. The Action Plan may include one or more of the other Solution ideas, as long as they are purely supportive and not a main focus.
4. Many additional facets may be added to the idea at this point, with the goal of showing a complete plan and strategies for implementation of the best Solution.
5. The Action Plan *may* describe timelines and tasks, details on how the Solution will operate, potential obstacles and how to overcome them, how the plan will address the Underlying Problem, how/why it will have a positive impact on the Future Scene, etc.



**RELEVANCE** measures the extent to which the Action Plan addresses the Key Verb Phrase and the Purpose. Relevance asks whether the Action Plan addresses the Underlying Problem, a *process* issue.

**Scoring:** (1-5) – The score is determined by comparing the Action Plan to the goals of the Key Verb Phrase and Purpose in the Underlying Problem and then evaluating the extent of the relationship.

### Reminders for Awarding the Relevance Score

- Use the descriptors to evaluate the relationship of the Action Plan to the UP.
- Record the Relevance score in the Step 6 score box. *Rating; Process*



**EFFECTIVENESS** measures the potential ability of the Action Plan to successfully solve the Key Verb Phrase and fulfill the Purpose. Effectiveness asks whether the Action Plan successfully solves the Underlying Problem, a *content* issue.

**Scoring:** (1-5) – The score is determined by comparing the Action Plan to the goals of the Key Verb Phrase and Purpose in the Underlying Problem and then evaluating the extent to which the plan solves the Underlying Problem.

#### Reminders for Awarding the Effectiveness Score

- Use the descriptors to evaluate the extent to which the Action Plan successfully solves the UP.
- Record the Effectiveness score in the Step 6 score box. *Rating; Content*

#### CRITERIA IN DEVELOPMENT OF ACTION PLAN

measures the degree to which criteria are addressed in the Action Plan.

**Scoring:** (1-5) The score is determined by the successful integration of the criteria into their description to create a stronger action plan. Please note that these descriptors do not quantify the number of criteria involved, but rather depend on the degree to which the students tie Steps 4 and 5 into their Action Plan. Essentially, “How well do they explain the thinking that went into their choice of Action Plan and what part did their criteria play in that thought?”



#### Reminders for Awarding the Criteria in Development of Action Plan Score

- Use the descriptors to evaluate the extent to which the criteria are addressed in the Action Plan
- Record the Criteria in Action Plan score in the Step 6 score box. *Rating; Content*

**IMPACT** measures the strength of the impact the Action Plan will have on the Future Scene.

**Scoring:** (1-5) – Action Plans scoring high in impact will make the Future Scene situation better for most of the stakeholders and create a positive effect for the future. If the Underlying Problem scored low in Adequacy, the Impact score will most likely also be low.

#### Reminders for Awarding the Impact Score

- Use the descriptors to evaluate the strength of the Action Plan’s impact on the Future Scene.
- Record the Impact score in the Step 6 score box. *Rating; Content*

**HUMANENESS** measures the productive, positive potential of the Action Plan as opposed to its destructive, negative potential.

**Scoring:** (1-5) – The evaluator should consider the practical consequences of implementing the Action Plan when scoring this section. The humaneness of an Action Plan is scored *independently* of Relevance, Effectiveness, and Impact. An Action Plan may score well in Humaneness while scoring poorly in other Step 6 criteria.

#### Reminders for Awarding the Humaneness Score

- Use the descriptors to evaluate whether the potential of the Action Plan is destructive for the Future Scene, neutral, or productive and positive.
- Record the Humaneness score in the Step 6 score box. *Rating; Content*

**DEVELOPMENT OF ACTION PLAN** measures the extent to which a complete strategy for implementing the Action Plan is described.

**Scoring:** (1-10) – An Action Plan that scores high in this area would fully describe the action to be taken and outline the Steps necessary to complete the plan. The idea is to paint a complete picture of the plan.

- A well-developed Action Plan is fully explained and elaborated.
- The Action Plan may explain obstacles that must be overcome to achieve its goal.
- It may also explain *why* and *how* the plan has a positive impact on the Future Scene.
- An Action Plan that simply restates the Solution idea from Step 3 would score on the low end of this scale.



#### Reminders for Awarding the Development of Action Plan Score

- Use the descriptors to evaluate the development of the Action Plan.
- Record the Development of Action Plan score in the Step 6 score box. *Rating; Content*

#### Common Evaluation Issues for an Action Plan

Action Plans are often wildly creative and can distract from how appropriately they solve the Underlying Problem. Several aspects of the Action Plan score are contingent on scores awarded earlier in the problem solving process. Below are several common concerns to keep in mind.

Action Plan Concerns	
<b>Two plans are presented</b>	<p><b>Description</b></p> <ul style="list-style-type: none"> <li>• If an Action Plan has combined two or more <u>unrelated</u> Solution ideas, the result is essentially presenting two separate plans. (Ideas from other Solutions are allowed if they support the best Solution.)</li> </ul> <p><b>Scoring:</b></p> <ul style="list-style-type: none"> <li>• Score only the first Solution for Relevance, Effectiveness, Impact, and Humaneness.</li> </ul>

Action Plan Concerns	
<b>Action Plan unrelated to the UP</b>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>It is possible for an Action Plan to be unrelated to the UP.</li> </ul> <p><b>Scoring:</b></p> <ul style="list-style-type: none"> <li>A score of one (1) is awarded for Relevance and Effectiveness.</li> </ul>
<b>Action Plan unrelated to Future Scene</b>	<p><b>Description:</b></p> <ul style="list-style-type: none"> <li>It is possible for an Action Plan to be completely unrelated to the Future Scene.</li> </ul> <p><b>Scoring:</b></p> <ul style="list-style-type: none"> <li>A score of one (1) is awarded for Impact.</li> </ul>
<b>If UP has no Purpose: Competitive Rounds</b>	<p><b>Relevance:</b></p> <ul style="list-style-type: none"> <li>Score a 1 or 2 – Action Plan has some relation to UP.</li> </ul> <p><b>Effectiveness:</b></p> <ul style="list-style-type: none"> <li>Score a 1 or 2 – Action Plan solves some aspects of the UP.</li> </ul> <p><b>Note:</b> Evaluators should provide feedback that emphasizes the connection of the Action Plan to the Purpose of the Underlying Problem.</p>
<b>Key Verb Phrase and Purpose are the same</b>	<p><b>Relevance:</b></p> <ul style="list-style-type: none"> <li>Score a 1 or 2 – Action Plan has some relation to UP.</li> </ul> <p><b>Effectiveness:</b></p> <ul style="list-style-type: none"> <li>Score a 1 or 2 – Action Plan solves some aspects of the UP.</li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>In non-competitive rounds, evaluators should provide feedback that emphasizes the connection of the Action Plan to the imposed Purpose of the Underlying Problem.</li> <li>In competitive rounds, evaluators should include an example of a possible Purpose that might be consistent with their Action Plan.</li> </ul>

### **REVIEW STEP 6 SCORES**

**Relevance:** Up to 5 points are awarded based on how well the Action Plan addresses the Underlying Problem.

**Effectiveness:** Considering how successfully the Action Plan solves the Underlying Problem, up to 5 points are awarded.

**Criteria in Development of Action Plan:** The degree to which Criteria are integrated into the Action Plan determines the score of up to 5 points.

**Impact:** The strength of the effect that the Action Plan will have on the Future Scene is examined to determine the score of up to 5 points.

**Humaneness:** Unrelated to the UP, the potential positive influence of the Action Plan on the Future Scene is considered, and up to 5 points awarded.

**Development of Action Plan:** The extent to which the Solution is elaborated into an Action Plan determines the awarding of up to 10 points.

## EVALUATION GUIDELINES FOR GLOBAL ISSUES PROBLEM SOLVING

Step 6 Scoring Guidelines							
<b>Relevance</b> - Measures the plan's relationship to the Underlying Problem <b>Score</b>	Action Plan does not address the UP	Action Plan has some relation to the UP; another solution might be better	Action Plan does a good job of addressing the UP	Action Plan has an excellent relationship to the UP			
	1	2 3	4	5			
<b>Effectiveness</b> - Measures the potential ability of the Action Plan to successfully solve the UP <b>Score</b>	Action Plan does little to solve the UP	Action Plan solves some aspects of UP	Action Plan adequately solves UP	Action Plan completely solves UP			
	1	2 3	4	5			
<b>Criteria in Development of Action Plan</b> - the degree to which criteria are addressed in Action Plan <b>Score</b>	Action Plan does not address the criteria	Action Plan's connection to criteria is minimal or unclear	Action Plan makes some valid connections to criteria	Action Plan addresses criteria in a convincing manner			
	1	2 3	4	5			
<b>Impact</b> - Measures the positive effect of the Action Plan on the Future Scene <b>Score</b>	Action Plan has no effect; UP scored low in adequacy	Effect on the Future Scene is not strong; UP low in adequacy	Action Plan has effect on Future Scene; UP of average adequacy	Plan has strong impact on Future Scene; UP high in adequacy			
	1	2 3	4	5			
<b>Humaneness</b> - Measures the productive, positive potential of the Action Plan <b>Score</b>	Negative or destructive Action Plan	Action Plan is neutral - neither positive nor negative	Constructive potential evident	Action Plan is positive and constructive			
	1 2	3	4	5			
<b>Development of Action Plan</b> - The degree to which the team explains its plan <b>Score</b>	Minimal description of plan; rewrite of Step 3 solution idea	Plan provides some elaboration; more support of ideas needed	Plan explains the who, what, why, and how in detail	Plan structured and well elaborated detailing more than the basic W-W-W-H elements			
	1 2 3	4 5 6	7 8	9 10			
<b>Step 6 Scores</b>	Relevance (1-5)	Effectiveness (1-5)	Criteria (1-5)	Impact (1-5)	Humaneness (1-5)	Dev. Action Plan (1-10)	Total

The Step 6 total score is determined by adding together all points awarded for each of the 6 components as indicated on the score sheet. There are no scoring differences between the Team, and Individual/MAGIC score sheets.



## OVERALL

**Objective:** To combine research, creativity, and futuristic thinking to effectively work from a Future Scene to a focused Action Plan using the creative problem solving process

Research Applied.....1 2 3 4 5 6 7 8 9 10  
Creative Strength.....1 2 3 4 5 6 7 8 9 10  
Futuristic Thinking.....1 2 3 4 5 6 7 8 9 10

**RESEARCH APPLIED** measures the application of research throughout the booklet.

**Scoring:** (1-10) - Each Step of the process is examined for connection to the research available on the topic, as well as knowledge of issues and trends in general as related to the Future Scene. Vocabulary terms, concepts, facts, and incidents from the research are all indications of research applied. Evaluators are encouraged to keep brief notations of research used throughout the booklet to reference when awarding research points.

### Reminders for Awarding the Research Applied Score

- Review the booklet and notes made while evaluating for evidence of research applied.
- Use the descriptors to evaluate the extent to which knowledge of research is evident.
- Record the Research Applied score in the Overall score box. *Rating; Content*

**CREATIVE STRENGTH** measures the creative, productive thinking in evidence throughout the booklet. Skillful use of the problem solving process is an indicator of creative thinking. Thus high scores on the creativity scales of Fluency, Flexibility, Elaboration, and Originality are also signs of creative strength.

**Scoring:** (1-10) - Evaluators should review each Step for innovative or unconventional thinking and for ideas indicating fresh insights and perceptions. Responses showing creativity are those requiring intellectual energy to make mental leaps beyond obvious or commonplace responses.



### Reminders for Awarding the Creative Strength Score

- Review the written booklet for evidence of creative strength in ideas, in the use of the problem solving process, and in scores on the creativity scales.
- Use the descriptors to evaluate the strength of creativity shown.
- Record the Creative Strength score in the Overall score box. *Rating; Content*



**FUTURISTIC THINKING** measures the students' ability to address the time frame of the Future Scene and to extrapolate relevant trends and technologies from their research as they identify futuristic Challenges and create workable, futuristic Solutions and ideas.

**Scoring:** (1-10) Evaluators should reward thinking that shows evidence of futuristic trends or technologies. Each Step should show an understanding of how it could impact future society.

### Reminders for Awarding the Futuristic Thinking Score

- Review the written booklet for evidence of futuristic thinking.
- Use the descriptors to evaluate the extent to which futuristic concepts are present throughout the booklet.
- Record the Futuristic Thinking score in the Overall score box. *Rating; Content*

## REVIEW OVERALL SCORES

**Research Applied:** A score of up to 10 points is awarded for the extent of Research Applied throughout the booklet.

**Creative Strength:** Award up to 10 points for the Creative Strength demonstrated throughout the entire booklet.

**Futuristic Thinking:** The display of Futuristic thinking from the entire booklet is considered for awarding up to 10 points.

Overall Scoring Guidelines				
<b>Research Applied</b> Relevant terms and ideas Score	Minimal evidence of research terms, concepts, issues, trends 1 2 3	Average evidence of research terms, concepts, trends for age group 4 5 6	Noticeable evidence of research terms, concepts, trends 7 8	Evidence of research and thorough knowledge of topic readily apparent 9 10
<b>Creative Strength</b> Original, productive, thinking Score	Minimal evidence of creative thinking 1 2 3	Some attempt at creative thinking evident in parts of booklet 4 5 6	Innovative thinking, insightful ideas; parts of booklet go beyond the ordinary 7 8	Strong display of inventive, ingenious ideas throughout the booklet 9 10
<b>Futuristic Thinking</b> Relevant trends and technologies projected into the future Score	Minimal evidence of futuristic trends or technologies 1 2 3	Average futuristic ideas for age group 4 5 6	Futuristic concepts present throughout booklet 7 8	Excellent futuristic concepts that indicate how ideas impact future society 9 10
<b>Overall Scores</b>	<b>Research Applied (1-10)</b>	<b>Creative Strength (1-10)</b>	<b>Futuristic Thinking (1-10)</b>	<b>Total</b>

The Overall score is determined by adding together the points awarded for each of the three components as indicated on the score sheet. There are no scoring differences between the Team, and Individual/MAGIC score sheets.



## FINALIZING SCORES

**Minimum scores:** Students that attempt work on a particular section of the booklet must typically receive the designated minimum score for each criterion in that section. Only steps that contain no student work are scored zero (0). **Exceptions to this rule occur in the following areas: Structure in Step 2, Originality in Steps 1 and 3, Correctly Written in Step 4, and Relevance in Step 4.**

**Comments for each Step:** The primary intent of the evaluation system is the improvement of problem solving skills. Upon completing the evaluation of each Step, an evaluator should write specific comments to promote improvement. Although limited space allows only brief observations, the comments are extremely important. This is the evaluator's chance to encourage the students and give them pointers to improve their problem solving skills. Initially, students look at the score to determine how they performed on a booklet; however, they read the evaluator comments on the score sheet for the true determination of their performance. The evaluator's insights make the final impression. (See Feedback in Evaluation for more ideas.)



**Ranking:** A ranking system is an effective way to compare booklets in a scoring sample. Using such a system, each evaluator scores an equal number of booklets and then ranks each booklet according to the total points each booklet receives. Booklets are ranked from 1 (best) to the number of booklets scored. The evaluator should review the booklets before ranking to ensure that the quality of the work matches the ranks. Ranking booklets reduces scoring differences between tough and lenient evaluators. It also creates a "common language" for comparing booklets from different samples and for moving booklets on to the next round of evaluation.

### Reminders for Finalizing the Total Booklet Score

- Review to be sure that comments have been written for each Step. (See Feedback in Evaluation page 2).
- Total each Step and double-check the math for accuracy.
- Check that all of the scores have been accurately transferred into the total score boxes for each Step.
- Add the totals from each Step and record the total for the booklet in the Total Score box at the end of the score sheet, double-checking the math for accuracy.
- After scoring all of the booklets in the set, determine and record the Rank for each booklet.

### THANK YOU!



Evaluation is a highly rewarding experience. Evaluators expend considerable mental energy during a day of evaluation; however, they are always re-energized and inspired by the ideas of creative students. The kind and constructive scoring and feedback of evaluators make the FPSPI mission possible. We are extremely proud and humbled by our evaluators, whose knowledge and willingness to pass their expertise on to participants is seemingly limitless. Please take great pride in knowing that your evaluation makes a significant contribution to FPSPI and to the hundreds of thousands of students who participate.



## References for Evaluators

### CATEGORY LIST

Use these categories in evaluating Fluency in Step 1 Challenges and Step 3 Solution ideas.

- |                        |                           |
|------------------------|---------------------------|
| 1. Arts & Aesthetics   | 10. Government & Politics |
| 2. Basic Needs         | 11. Law & Justice         |
| 3. Business & Commerce | 12. Miscellaneous         |
| 4. Communication       | 13. Physical Health       |
| 5. Defense             | 14. Psychological Health  |
| 6. Economics           | 15. Recreation            |
| 7. Education           | 16. Social Relationships  |
| 8. Environment         | 17. Technology            |
| 9. Ethics & Religion   | 18. Transportation        |

### INTERNATIONAL CONFERENCE PHILOSOPHY OF EVALUATION

The International Conference (IC) winners are those teams/individuals that exhibit the best creative problem solving skills in response to the IC Future Scene. More specifically, evaluators look for top-quality work in three areas:

1. Use of the problem solving process
2. Applying relevant research to a specific Future Scene
3. Spontaneous response to specifics of the IC Future Scene

#### Applying Research to the Future Scene

Future Scenes revolve around an imaginary, yet realistic, futuristic scenario. The imagined and futuristic elements of the Future Scene allow FPSPI to use its own creativity in producing the scenarios. Global Issues Problem Solving intends for students to build upon the creative elements of the Future Scene and showcase their own creativity.

Future Scenes concentrate on only a portion of the topic. Not all of the student's research and information is applicable to the Future Scene, and the students must utilize appropriate information relevant to their work in the GIPS booklet.

An example of this is the topic of drugs used for an Affiliate Final/Bowl. Instead of describing traditional addictions and the effects of drugs on society, the Future Scene detailed a virtual reality program with drug-like effects. Using the virtual reality program as the basis of the Future Scene required students to use only their background knowledge on the effects of drugs rather than their knowledge of drugs as a whole.

Early in the competitive season, Future Scenes are open-ended and allow students to develop and enhance their skills. In an effort to help evaluators distinguish teams/individuals who memorize from those who think, Future Scenes often apply to only a portion of the research available. Therefore, it is up to the students to analyze the Future Scene and determine what portion of their research is relevant and what is not. The best teams/individuals then apply relevant research to the specifics of the Future Scene.



### Spontaneous Response to the Future Scene

For competitive Global Issues Problem Solving competitions such as Qualifying or Affiliate Final/Bowl or the International Conference, students do not see the Future Scene in advance. In these situations, evaluators reward students for responding directly to the Future Scene, recognizing teams/individuals that **use their creativity to respond spontaneously to a situation. This furthers FPSPI's educational goal of preparing students to respond to real-world Challenges.**

For clarification, consider a team/individual preparing for a competitive situation. The students spend time researching the topic and developing ideas that might be relevant to the Future Scene; however, they do not see the Future Scene until the two-hour competition begins. The students must analyze the contents to determine what part of their research and information on the topic applies to the Future Scene and what does not. Research skills are important, and FPSPI strives to take students to the next level, asking them to apply their knowledge to a specific, focused situation.

The ability to be prepared and informed, and thus respond to an unknown situation is at the core of the mission of FPSPI. Unfortunately, participants sometimes rely too much on their preparation and do not use their creativity to respond directly to the Future Scene. The result may be a booklet that is "flat," does not pertain to the Future Scene, or seems prepared in advance (pre-packaged or "canned").

#### **FPSPI Mission:**

To develop the ability of young people globally to design and achieve positive futures through problem solving using critical and creative

When evaluators encounter multiple GIPS booklets (Team, MAGIC, and/or Individual) that have the same Key Verb Phrase and/or Purpose in the Underlying Problem, it becomes obvious that a canned response has been planned and practiced. FPSPI creates Future Scenes for the Affiliate Final/Bowl and the International Conference with these thoughts in mind. The Future Scenes emphasize preparation, but also contain elements that promote creativity.

**Evaluators should reward students for their creative, spontaneous responses to the Future Scene.** Students should not be rewarded for writing canned booklets – booklets prepared in advance and composed mostly of ideas not specific to the Future Scene. By evaluating with these thoughts in mind, evaluators enhance the educational experience for all students who learn it takes more than just good research and pre-planning on critical Steps to score well in competitive circumstances.

### Indications of Preparation versus Pre-Packaging

Consider the differences as presented below for student work that is well prepared versus that which is determined in advance of receiving the unique Future Scene. Very experienced teams use their preparation to jumpstart brainstorming and understanding of the Future Scene. It can be difficult to distinguish between preparation and pre-packaging.

	Being Prepared & Spontaneous	Being Pre-packaged
<b>Step 1</b>	<ul style="list-style-type: none"> <li>For practice, brainstorming likely Challenge outcomes of current research trends</li> </ul>	<ul style="list-style-type: none"> <li>Having prepared ahead of time Challenges from research without consideration for the reality of the Future Scene</li> </ul>
<b>Step 2</b>	<ul style="list-style-type: none"> <li>For practice, writing multiple Underlying Problems related to Challenges encountered in the research</li> <li>In competition, developing a UP based on the Future Scene charge and details</li> </ul>	<ul style="list-style-type: none"> <li>Having completely prepared an Underlying Problem and “force-fitting” or adapting it to the Future Scene</li> <li>Possibly working with multiple teams and individuals so that all are planning to use the same UP idea</li> </ul>
<b>Step 3</b>	<ul style="list-style-type: none"> <li>For practice, brainstorming ahead of time multiple Solution ideas for the practice UPs; brainstorming details for some of the Solution ideas</li> <li>In competition, adapting known ideas and generating new and unusual ideas</li> </ul>	<ul style="list-style-type: none"> <li>Having prepared ahead of time multiple Solution ideas to the one selected UP</li> <li>Preparing ideas that can easily be applied to any Future Scene on the same topic</li> <li>Each team member prepared to write very specific ideas</li> </ul>
<b>Step 4</b>	<ul style="list-style-type: none"> <li>For practice, generating criteria to multiple practice UPs, especially those using issues from the research</li> <li>In competition, generating criteria to fit the UP and the Future Scene situation</li> </ul>	<ul style="list-style-type: none"> <li>Planning criteria to fit a pre-selected Underlying Problem and Solution idea</li> <li>Criteria lack a relationship to the Future Scene specifics</li> </ul>
<b>Step 6</b>	<ul style="list-style-type: none"> <li>In competition, using criteria to determine the best Solution idea for the Action Plan</li> <li>Generating and writing an Action Plan based on research</li> </ul>	<ul style="list-style-type: none"> <li>Pre-selecting, planning, and practicing the Action Plan before the competition</li> <li>Ignoring criteria to begin writing the Action Plan before Steps 1-5 are complete</li> </ul>
<b>Research</b>	<ul style="list-style-type: none"> <li>Applying research to areas specific to the Future Scene</li> </ul>	<ul style="list-style-type: none"> <li>Loosely tying general ideas from research to the Future Scene</li> </ul>

## STRATEGIES FOR EFFECTIVE FEEDBACK

Despite the quality of its content, feedback is useless unless it has a positive impact on students and coaches. The following are strategies evaluators can use to make their point while keeping students proud of their effort and excited about future work.

### Feedback Sandwich



By starting and ending with positive comments, a slice of criticism is more easily swallowed when it is sandwiched between two thick slices of praise. The key to the technique is to provide *legitimate* praise. A comment such as, “Fun Solutions to read!” does not relate to the specific effort. A comment such as, “Show how your ideas relate to the Future Scene” relates to the rubric and gives students a jumping off point for improving their skills in upcoming competitions. When these two comments are combined there is clear praise of students’ efforts and an indication of how to improve in the future. The feedback sandwich is too much for individual Challenges and Solutions, but it is great for summarizing each Step. Remember, a positive start and finish motivates students for the next writing.

### Thoughtful Word Choice

Just as a student’s word choice impacts how effectively their efforts are communicated, your word choice impacts how well students will receive and respond to your feedback.

- Substitute “when” or “and” for the word “but.” Explain to students, “You have some terrific ideas *when* you relate them to the topic and your Purpose.” This comment is far more positive than “You have some terrific ideas, *but* you don’t relate them to the topic.”
- Use a question to encourage students to rethink an idea. Asking “What in your research suggests this will happen?” puts the responsibility of explanation back on the student and encourages thought on their part. Writing a comment telling students that their reasoning is faulty doesn’t help them improve and can be hurtful.



### Limited Criticism

People can only respond to a certain amount of criticism, even if it is in the form of a feedback sandwich. Consequently, students who may need improvement in several areas may only be capable of digesting a few suggestions for improvement; therefore, evaluators should determine the areas that need the most improvement and focus feedback on those areas. If a student improves in one major area (for example, improving the clarity of their ideas), many of the smaller problems in the booklet may be eliminated as well.

### Score Sheet Descriptors

Identify the descriptors from the rubrics that contributed to your score. This helps students follow your train of thought in determining their score. Following the rubric improves consistency among evaluators and ensures that the message students receive about their work and how to improve it, clearly corresponds to their efforts.

AVOID Criticism	USE Praise, Clarification, Improvement Ideas, Amplification
Poorly written	<ul style="list-style-type: none"> <li>• I was not sure what you meant.</li> <li>• Show how this fits into the Future Scene.</li> <li>• Add details to let us know more about how this will work.</li> </ul>
Trivial issue	<ul style="list-style-type: none"> <li>• This issue is related to the FS. Focusing on ... or ... would have more impact on the situation.</li> </ul>
Disorganized Action Plan	<ul style="list-style-type: none"> <li>• Consider writing your Action Plan as an instruction manual for someone else to implement your ideas.</li> <li>• Try giving a Step-by-Step plan.</li> <li>• Tell us what needs to happen first, then next, etc.</li> </ul>
Impossible	<ul style="list-style-type: none"> <li>• How would this work?</li> </ul>
Incomplete UP	<ul style="list-style-type: none"> <li>• Try assigning a team member to remember each part of the UP</li> </ul>
Wrong information	<ul style="list-style-type: none"> <li>• Be sure to reference information in the FS accurately.</li> </ul>



### **Proper Perspective**

FPS participants can easily convince evaluators that they are sophisticated and advanced thinkers; therefore, evaluators may have elevated expectations and be highly critical of weaker booklets. Remember that even the weakest booklet required a great amount of thought, creativity, and effort to complete, and was done by a student. Evaluator feedback must take into account the age/division of writers. A positive attitude from the evaluator encourages growth and development from students performing at all skill levels.

### **Evaluator Expectations**

None of the suggested techniques for providing effective feedback should be misinterpreted as saying that you should set low expectations. In fact, the opposite is true. FPS students will continually amaze you with their breadth of knowledge, creativity, and insight. Furthermore, high expectations often produce better results. Evaluators should set their expectations high and remember that students with limited life experience and great potential for growth can write sophisticated FPS booklets. Set your expectations realistically high, offer feedback in a positive manner, and encourage students to reach their full potential.

**Future Problem Solving  
Junior Division****2014 International Conference  
Space**

*"Sixty years ago I looked up at that star," my great-grandfather points toward a point of light through the station window. "Scientists laughed at me when I said I'd send a probe there. But look at what we have achieved, William! Sixty years from now, the probe we launched today will send back the first images of the star system, Alpha Centauri." He sighs quietly, "I wish I could be alive to see the results."*

While CEO of our family business, the Oberon Corporation, my great-grandfather paid for the development of the Herschel 1 probe. Herschel 1 launched today from our moon and is headed for the Alpha Centauri System four light years away. The probe contains a transmitter, an imaging device, and fusion generators for power. It will take over sixty years before we can be sure it has arrived.

At 100 years old, my great-grandfather has seen more scientific and social progress in his life than almost any other living person. When he was born in 1963, a national tragedy gave way to fears that the new president wouldn't continue to support the U.S. space program - but that didn't happen. The wonderful achievements of that decade are often referred to as "the golden age of space exploration." By the start of the 21<sup>st</sup> century, creative entrepreneurs like my great-grandfather were taking control from governments as the corporate space age took shape.

The space elevator brought my great-grandfather and me 62,000 miles up to Port Earth Station. From there we could watch the launch and enjoy just one example of the achievements of entrepreneurs like my great-grandfather. Port Earth Station is effectively an orbiting city - a "new star," as my great-grandfather likes to say. Some 3,500 scientists, engineers, and marketing-specialists live semi-permanently on the station - and most of them are employees of Oberon Corporation. Even with rival mineral mining concerns on the Moon and Mars, our corporation remains the solar system's largest supplier of "extra-Earth" minerals and Helium-3, the main fuel in fusion power generators - and we intend to keep it that way.

Our next venture will be the biggest and best achievement of Oberon Corporation. On the Uranian moon of Titania, 1.7 billion miles away, we are planning for our newest settlement: Midsummer Station. It will be the farthest human settlement from Earth, with a planned population of 600 people who will be able to survive on the moon because of Titania's interior water ice mantle. Three Helium-3 collectors in the atmosphere of Uranus will supply Midsummer Station with all the fuel needed to run its fusion reactors and power its mining facilities. Twice-per-decade, unmanned shipments of Helium-3 will be sent from Midsummer Station to Earth. This will provide a nearly inexhaustible supply of fuel for Earth's own fusion reactors. Because of these shipments, clean energy will course through the power relays of Earth and the human footprint will continue expanding toward the edges of our solar system and beyond. All of this, the very future of space exploration, has been made possible by my great-grandfather and the entrepreneurial skill he showed decades ago.

And what is the cost for this endless supply of clean energy? As the first to mine the abundance of Helium-3 on Titania, we have almost complete control over the price. Cost will not stand in the way of my great-grandfather's vision. And what if governments try to tax our profits or regulate our corporation? Well, mining Helium-3 is expensive and regulation tends to make it more expensive - so expensive that if governments do regulate us, they may hurt their own chances of enjoying the benefits of fusion energy. I'd say we have a pretty sound business model. *FPSers, use the six-Step problem solving process to address the implications of Oberon Corporation's space expansion in the late 21<sup>st</sup> century and beyond.*

**Future Problem Solving  
Middle/Senior/ Adult Division****2014 International Conference  
Space**

*"Sixty years ago I looked up at that star," my great-grandfather gestured toward a single point of light among thousands through the station window, "and they laughed at me when I said I'd send a probe there. But look at what our efforts have wrought, William! Some sixty years from now, the probe we launched today will send back the first images of Alpha Centauri, another star system..."* He trailed off wistfully, the regret in his voice both palpable and understandable.

While CEO of our family business, Oberon Corporation, my great-grandfather funded the development of the Herschel 1 probe. Launched today from Earth's moon bound for the Alpha Centauri System four light years away, the probe contains a transmitter, a state-of-the-art imaging device, and two fusion generators to power its ion glide drive. Even traveling at speeds just under 10% the speed of light, it will still take sixty years to get there with an additional four years before final confirmation of its arrival is possible.

At 100, he's seen more scientific and social progress in his life than practically any human ever - excepting fellow centenarians, of course. When he was born in 1963, a national tragedy gave way to fears that a new president wouldn't continue to support the U.S. space program - but those fears weren't realized. The notable achievements of that decade are often referred to as the golden age of space exploration with "great leaps for mankind" and routine trips into orbit considered "slipping the bonds of Earth." By the dawn of the 21<sup>st</sup> century, entrepreneurs like my great-grandfather were taking the reins away from governments and launching the corporate space age.

The space elevator that brought my great-grandfather and me 62,000 miles up to Port Earth Station this past week so that we could watch the launch is but one of the achievements of entrepreneurs like my great-grandfather. Port Earth Station is effectively an orbiting city - "a new star," as my great-grandfather likes to say. Some 3,500 scientists, engineers, and marketing-specialists live semi-permanently on the station - and most of them are employees of Oberon Corporation. Even with rival mineral mining concerns on the moon and Mars, Oberon Corporation remains by far the solar system's largest supplier of "extra-Earth" minerals and Helium-3, the primary fuel in fusion power generators - and we intend to keep it that way.

"Our next venture will be the crown jewel of Oberon Corporation - a new settlement we'll call Midsummer Station. We plan to build this on the Uranian moon of Titania, 1.7 billion miles away. It will be the most distant human settlement from Earth, with a planned population of roughly 600 people. Water supplies will be obtained by drilling down to Titania's water ice mantle. Three Helium-3 collectors deployed in the atmosphere of Uranus will supply Midsummer Station with all the fuel needed to run its fusion reactors and power its mining facilities. The twice-per-decade arrival of unmanned shipments of Helium-3 from the station to Earth will provide a nearly inexhaustible supply of fuel for Earth's own budding fusion reactors. A practically unlimited supply of clean energy will course through the power relays of Earth and the human footprint will continue expanding toward the fringes of our solar system and beyond. All of this, the very future of space exploration, has been made possible by my great-grandfather and the entrepreneurial skill he showed decades ago.

And what price for all this plenty - the inexhaustible supply of clean energy? As the first to mine the abundance of Helium-3 on Titania, the price will be what we say it is. And what of governments trying to tax our profits or trying to regulate Oberon Corporation? Well, mining Helium-3 is expensive and regulation tends to make it more expensive - so expensive that those governments might not get to enjoy the benefits of fusion energy as long as their taxes and regulations remain in place.

FPSers, use the six-step problem-solving process to address the implications of Oberon Corporation's space expansion in the late 21<sup>st</sup> century and beyond.