



2026 Student Research Case Study Challenge

Case Study Description

Actuaries in Space: The Pricing Frontier

January 16, 2026

Overview

It is the year 2175. Space travel is an established industry, and trading among planets is common. You are a member of the actuarial team at Galaxy General Insurance Company, one of the leading insurance companies across the interstellar expanse. Cosmic Quarry Mining Corporation has issued a request for proposals (RFP) to provide space mining insurance coverage for their expanding operation. Galaxy General Insurance Company has experience developing similar lines of insurance in other circumstances. A successful response to this RFP, highlighting the unique actuarial approach of Galaxy General Insurance Company, could establish your company as a leader in interstellar commercial insurance.

Currently, the Cosmic Quarry Mining Corporation's operations span three solar systems: Helionis Cluster, Bayesia System, and Oryn Delta. Each solar system has distinct resources and potential challenges. The RFP requests development of products with insurance coverage in four hazard areas: equipment failure, cargo loss, workers' compensation, and business interruption.

Galaxy General Insurance Company's management is led by a multi-person team which includes the Chief Actuary, Max Variance, as well as several other of the Company's management executives (some of whom are not actuarially trained) such as the chiefs of compliance, operations, marketing, and various other staff.

Your actuarial team at Galaxy General Insurance Company is provided with [Project Objectives](#), [Project Data](#) (including more details about the various entities in [Online Encyclopedia Entries](#)) and [Project Report Deliverable](#) to help your Team create a report to Galaxy General Insurance Company's management on your Team's recommendations for products related to this RFP. Management will evaluate your Team's Report using the [Project Report Evaluation Criteria](#), subject to the [Submission Requirements](#).

Project Objectives

Management requires your actuarial team's recommendations for products include details and rationale based on your Team's actuarial modeling and the following.

1. Your Team's actuarial modeling for each of the four hazard area coverages should provide short- and long-term ranges for aggregate:
 - a. costs,
 - b. returns, and
 - c. net revenue.
2. The estimated ranges in (1) above should at least include important statistics, such as:
 - a. expected values,
 - b. variances, and
 - c. tail behaviors for a variety of risks.

3. Your Team's recommended product design features (e.g., benefit structure, coverage triggers, exclusions) should address:
 - a. The distinct resources and potential challenges of each solar system, and
 - b. Possible adaptations to address scalability of the recommended products to address changes impacting risks and hazards in the future.

Project Data

Experience Data (Historical Claims)

From the experience of similar lines of insurance in other circumstances sold by the Galaxy General Insurance Company, as the Company's actuarial team, your Team has access to four claims datasets. These datasets are from the four hazards area coverages:

- Equipment Failure
- Cargo Loss
- Workers' Compensation
- Business Interruption

The data elements are described in the accompanying Data Dictionary.

New Business Data (Prospective Exposure)

The Cosmic Quarry Mining Corporation's RFP includes data describing the corporation's mining operations span the Helionis Cluster, Bayesia System and Orynn Delta solar systems. These data represent the exposure basis for pricing new policies and include:

1. Technical and operational details for the new assets (e.g., equipment features, maintenance standards, safety protocols), as well as payrolls, staff experience level, contract types, etc.
2. Anticipated environmental and production conditions—solar activity levels, asteroid belt density, and material extraction profiles.
3. Financial and macroeconomic assumptions for pricing, including:
 - a. Yield rate curves for discounting expected losses.
 - b. Inflation rates reflecting interplanetary cost trends.
 - c. Forecasted productivity indices relevant to exposure growth.

Supplementary References and Data

In addition, the interstellar interconnected information network, accessible via computer aided devices using artificial intelligence, contains the following Online Encyclopedia Entries:

- The History of Interstellar Mining beginning in the late-21st century until the present time of 2175
- The Galaxy General Insurance Company — Galactic Property and Casualty Insurance for the New Era of Mining
- The Cosmic Quarry Mining Corporation, outlining its history, corporate structure, financial information, and environmental issues
- Solar Systems Descriptions

All data and supplementary references files are available on the [2026 SOA Research Institute Student Research Case Study Challenge webpage](#), URL: <https://www.soa.org/research/opportunities/2026-student-research-case-study-challenge/>.

Project Report Deliverable

Galaxy General Insurance Company's management requires that your team of actuaries deliver a report on recommended products, informed by your analysis, including incorporation of any external secondary research, which addresses all the following items:

1. Executive Summary

- a. Recommended products to be added to Galaxy General Insurance Company's portfolio related to each of the four hazard area coverages using the information related to Cosmic Quarry Mining Corporation's RFP included in the [Project Data](#) section. Include commentary about:
 - i) How your Team's Recommendations reflect the [Project Objectives](#) section above, and for each of the products, your Team's Recommendation for that product's inclusion (or not) in Galaxy General Insurance Company's portfolio, including a compelling rationale;
 - ii) Design features included so that each recommended product can be tailored for the distinct resources and potential challenges of each solar system;
 - iii) The adaptability and scalability of each recommended product to address changes impacting risks and hazards in the future; and
 - iv) Optionally, at your Team's discretion: other environmental, social and governance (ESG) features and considerations.
- b. To assist the marketing and sales teams, how the Cosmic Quarry Mining Corporation might integrate these recommended products or lack of products into their enterprise risk management (ERM) framework related to the four hazard areas spanning the three solar systems.

2. Product Design

- a. Benefit structures
- b. Coverage triggers
- c. Exclusions
- d. Optionally, at your Team's discretion, other important features

3. Summary of Pricing and Capital Modeling

- a. Aggregate loss distributions for each hazard coverage
- b. Stress testing for extreme scenarios (e.g., 1-in-100 year events)
- c. Optionally, at your Team's discretion: Dependency-based methods for events affecting more than one solar system at the same time

4. Risk Assessment

- a. Risk identification by hazard area coverage for each solar system
- b. Correlated risk scenarios (e.g., solar storms hitting multiple solar systems simultaneously)
- c. Scenario testing (best-, moderate- and worst-case scenarios, where best is smooth operations with attritional claims and worst is a catastrophic correlated event)
- d. Threat table ranking top threats
- e. Narrative of risk differences among solar systems
- f. Optionally, at your Team's discretion: Discussion of other environmental, social and governance (ESG) features and considerations

5. Assumptions

- a. In the body of your Team's Report, a list of key assumptions that have the most significant impact on pricing, capital modeling, and risk assessment, including a description of your rationale for choosing each key assumption
- b. A list of other assumptions whose impact is less significant, optionally, at your Team's discretion, the list may be included in an appendix with a summary of the material included in that appendix in the body of your Team's Report.

6. Data and Data Limitations

- a. Identify all data sources used in addition to the data provided in the [Project Data](#) section.
- b. Identify any data limitations and the impact of any such limitations on your Team's Recommendations.
- c. A clear statement, of how, if at all, your Team used Artificial Intelligence (AI) or Large Language Modeling (LLM) tools creatively and responsibly (e.g., validating the outputs, challenging and modifying the information gained).¹

Project Report Evaluation Criteria

Galaxy General Insurance Company's management will evaluate the report submitted by your team of actuaries using the following criteria:

1. Appropriateness for the audience of the organization, form, clarity, and cohesiveness of your Team's Report. The audience consists of busy, high-level executives in Management who represent a wide variety of disciplines. While many Management individuals are technically minded, some Management individuals are not quantitative specialists.
2. Clarity, conciseness and completeness of responses included in your Team's Report, and, whether the responses cover all of items listed in the [Project Report Deliverable](#) section.
3. Understandability of explanations to the technically minded Management individuals of any detailed actuarial analysis. Your Team's actuarial analysis should apply the concepts of probability, probability distributions, and time value of money (with explanations of any formulas, models, and other aspects of the analysis).
4. Creative and strategic aspects of your Team's Recommendations.
5. Evidence of external secondary research, including a bibliography showing a list of all sources cited throughout your Team's Report.
6. Clear consideration of the data provided in the [Project Data](#) section in your Team's analysis and recommendations, including documentation of data limitations.
7. Documentation of all assumptions.
8. Adherence to all items discussed in the [Submission Requirements](#) section and its subsections.

Submission Requirements

Your student team's submission must contain a written report that meets all the criteria outlined under the subsection below titled [Written Report Criteria](#), and your student team must comply with all the criteria outlined under the subsections [Registration](#) and [When and Where to Submit Your Project Report Deliverable](#). For further information, please refer to the [2026 Student Research Case Study Challenge Official Rules](#), URL: <https://www.soa.org/research/opportunities/2025-student-research-case-study-challenge/>

Written Report Criteria

The report by the actuarial team of Galaxy General Insurance Company should be addressed to Galaxy General Insurance Company's management. Your Team's Report format must meet all the following criteria. Failure to meet any of criteria 1 through 3 will result in automatic rejection. Failure to meet any of criteria 4 through 10 may, at Management's discretion, lead to rejection.

1. Your Team's Report should consist of either a single Microsoft Word (docx or doc) or Adobe (pdf) document, without macros, not password protected and smaller than 25 MB (note: the submission form is designed not to accept files larger than 25 MB).

¹ Any use of artificial intelligence (AI) tools or software during the creation of a Team's Entry must comply with all applicable laws and regulations. Additionally, use of any AI tools must be disclosed in writing and documented responsibly and appropriately. No portion of the submission may materially rely on content generated by AI or similar automated tools, except as disclosed or for performing non-substantive, mechanical, or editorial functions (such as spelling, grammar, or formatting corrections). A Team is responsible for the quality, originality, and integrity of the Team's Entry and for ensuring any AI-generated output, citations, and references have been validated and disclosed in writing. AI tools shall not be listed as an author, and the Team will disclose in writing and include proper citations for all sources (including AI) and contributors included the Team's Entry.

2. Your Team's Report must be written in English.
3. On the top page of your Team's Report (the cover page, if your Team's Report has a cover page, or the first report page if your Team's Report does not have a cover page), provide the following information:
 - Team name
 - University affiliation, and
 - Each student team member's name.
 Do not include any email information or phone numbers.²
4. Your Team's Report should be readable and formatted to professional standards.
5. The filename of your Team's Report must be your Team's name and a brief description of the content for quick identification (for example: "Team Name Report.docx" or "Team Name Report.pdf").
6. For material addressing an item in the section [Project Report Deliverable](#) to be considered during judging, it must appear in the body of your Team's Report.
7. All elements of your Team's Report that are not original must be referenced in a bibliography with full citations. This applies to all written material, tables, graphs, charts, images, and data (other than data from the [Project Data](#) section).
8. Your Team's Report and its supporting calculations must be the original work of your Team specifically for this Actuaries in Space: The Pricing Frontier Case Study. Previously prepared or published work cannot be repurposed or submitted.
9. Any generative Artificial Intelligence (AI) tools used in developing a submission must be acknowledged and documented responsibly and appropriately. If you use AI tools, you are accountable for the originality and integrity of the content of your external secondary research and analysis and for ensuring that any AI-generated output, citations, or references have been validated.
10. The body of your Team's Report's length cannot exceed 10 pages with 1-inch (2.5-cm) margins and a 12-point font size. If the body of your Team's Report exceeds 10 pages, Management will evaluate your Team's Report based on only the first 10 pages. Reports with narrower margins or smaller font sizes will be downgraded during judging. The following items will not count toward the 10-page limit:
 - Cover page, if using (cover page is optional)
 - Table of contents, if using (table of contents is optional)
 - Bibliography containing cited sources
 - Appendix or appendices, if any. However, information in appendices should be supplemental with the intent of providing additional detail to support the information already discussed in the body of your Team's Report. Generally, we expect this additional information may be useful for the technically minded Management individuals. Material in the appendices will not be considered in fulfillment of the items listed in the [Project Report Deliverable](#) section. Consequently, it is good practice to provide summarizing sentences in the body of your Team's Report about each of the appendices. Appendix or appendices may contain:
 - i) Supporting formulas, calculations, or data,
 - ii) Further elaboration or amplification on any item in the body of your Team's Report,
 - iii) Program code in any programming language, or
 - iv) Direct citations of external secondary research.
 Supporting analysis contained in an appendix or appendices, if any, which is not included in the primary file containing your Team's Report is limited to three additional files. Each file, if any, must be submitted only in either Microsoft Word without macros (.docx or .doc), Microsoft Excel without macros (.xlsx or .xls), or Adobe (.pdf) formats. Other formats will not be considered. The maximum size of each supporting file, if any, is 25 MB.

² Winning reports will be posted on the Society of Actuaries Research Institute website. For privacy reasons, the Society of Actuaries Research Institute does not recommend showing email addresses or phone numbers on or in your Team's Report.

Registration

All student teams are asked to register no later than the Thursday of the week prior to the submission deadline. If your student team wishes to submit an entry, please complete the online [Registration to Submit Form](#), URL: <https://soa.wufoo.com/forms/z1eojtcg0du2rem/>, by Thursday, March 5, 2026.

When and Where to Submit Your Project Report Deliverable

Complete the [online submission form](#) at URL: <https://soa.wufoo.com/forms/zworvny1s0mck9/>, including attaching your Team's Report and supporting analysis files, if any. Submissions must be received by 3:00 p.m. U.S. Daylight Time on March 13, 2026; late submissions will not be accepted. Please include the names and email addresses of all student team members and your faculty advisor, as well as your university affiliation. Your student team's name and student names should be written as you would like them to appear on your certificate of participation. Please ensure the email addresses you enter are correct because they will be used for communicating advancement during judging and providing certificates of participation or completion after judging. The online submission form will accept up to four (4) files, each with a maximum size of 25,000 KB (25 MB). Submissions with one or more files that exceed the maximum size will not be accepted. Note that the online submission form may not be available until March 12, 2026.

Soon after submission, the first student team member identified on the form will receive email confirmation of the submission. If the first student team member does not receive an email confirmation of your submission form within 15 minutes after clicking the "Submit" button, either the first student team member's email address was incorrect or your submission was not accepted. Please resubmit after double-checking all email addresses and file sizes.

If submission fails a second time, please email your student team's submission to research@soa.org, copy all student team members and your faculty advisor, and include in the body of your email the names and email addresses of all student team members and your faculty advisor. The maximum size of email that SOA can accept is 50,000 KB (50 MB). Please do not submit via email unless your submission via the form has failed twice.

Questions or Comments

Please direct any questions or clarifications on the rules to the SOA Research Institute via email at research@soa.org. So that all participating students have access to the same information, the SOA Research Institute will not respond to questions about the content of the case study or data.

Society of Actuaries Research Institute
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