MASA X TUASC Hackathon 2024: R-Defining the Future
Problem Statement and Guidelines

This programming competition is a one-month competition which consists of a **one-day online workshop**, **Preliminary Round** and **Grand Finals**.

The Preliminary Round will involve researching and programming as part of the Hackathon challenge. The **top 8 teams** will be eligible to proceed to the Grand Finals where follow-up assignments are given.

Participants will be required to discuss and prepare a live presentation within a time limit. The **top 3 teams** will be selected **as the winners** and awarded with the cash prizes.

Important Event Timeline

*All the event time is based on the time zone in Malaysia (GMT+8)

No.	Event	Date	Time
1	One Day Online Workshop	27th April 2024	1:00 p.m. - 6:30 p.m.
2	Submission Deadline for Preliminary Round	12th May 2024	12:00 p.m.
3	Announcement of Finalist Teams for Grand Finals	24th May 2024	6:00 p.m.
4	Grand Finals	1st June 2024	8:30 a.m. - 6:15 p.m.

Background of the Challenge

It is the second quarter of 2024. You are a consulting actuary engaged by Great Insurance, a multinational general insurer headquartered in Malaysia, to examine the feasibility of extending its existing reinsurance treaty structure for Malaysia's business to cover the general insurance business of a foreign branch that the company will acquire in a neighbouring country, the Eastern Republic. The Eastern Republic has a similar economy, population size, climate, and insurance regulation as Malaysia.

The soon-to-be-acquired entity in Eastern Republic has been relying on an intra-group reinsurance arrangement with its Head Office to manage its insurance exposure, but the arrangement will be commuted upon the sales of the company by the end of 2024. Details in relation to the existing reinsurance arrangement have not been made available to you, except for some information on past facultative reinsurance cessions to external reinsurers.

The entity underwrites general insurance business in only two lines of business, i.e. Property and Motor. It commands a sizable share of Property business particularly in the industrial segment and is looking to grow its personal Motor business aggressively in the coming years through its internet channel. The entity is targeting a 10% and 20% p.a. growth on its Property and Motor portfolios respectively over the next few years.

Preliminary Round

For the preliminary round, you are required to examine the existing reinsurance arrangement of Great Insurance or whatever alternative structure that may be deemed appropriate for the entity's Property portfolio only. You were also informed that insurance entities in Eastern Republic are governed by a relatively simple local capital requirement as compared to Malaysia, based on the following formula:

$$Capital\ Adequacy\ Ratio\ (CAR) = \frac{Admittable\ Asset}{0.8 \times Net\ Written\ Premium\ Over\ Past\ 12\ Months}$$

The minimum regulatory threshold is 120%.

For this exercise, you may assume that:

1. Underwriting Profit after Tax = Net Written Premium – Net Claim Incurred – Net Commission – Management Expense – Tax.
2. All premiums written to-date are fully earned and all claims incurred to-date are fully developed.
3. Gross Commission = 20% x Gross Written Premium for Property class.
4. Management Expense = 15% x Gross Written Premium for Property class.
5. Tax rate is 24% of Underwriting Profit Before Tax.
6. Where relevant, the required rate of return on shareholders' capital is 12%.
7. To simulate past years' or future years' CAR, Admittable Assets as at each year-end positions would be affected only by the Underwriting Profit after Tax of the current underwriting year.
8. For this round only, Motor portfolio would not incur any capital requirement. Admittable Asset would not be affected by the profit or loss arising from the Motor portfolio.

Guidelines and Instructions

You may consider the following steps for this exercise:

1. Perform an analysis on the gross claim experience before any reinsurance for a better understanding of the portfolio. This may include a review of the portfolio's loss ratio, premium mix by segments or claim trends etc. Your analysis may be performed on an underwriting year basis or accident year basis, wherever appropriate.

2. Apply the Great Insurance Malaysia's current reinsurance arrangement to the entity's past five years' claim experience to examine if the existing arrangement is appropriate.

3. Propose whatever changes or alternative structure deemed necessary for the entity, with the general objectives of maximising long-term returns, minimising short-term volatilities in underwriting profits and maintaining a CAR above the regulatory threshold.

For this round, you are provided with the following information:

1. Breakdown of gross and facultative written premium by sum insured band, type of occupancy type and hazard level for past 5 years (2019-2023) for Property business.

2. Listing of claims for the past 5 years (2019-2023) for Property business.

3. Existing reinsurance structure of Great Insurance Malaysia.

4. Admittable Asset of the entity as at 31 December 2023 is $500,000,000 Eastern Dollar (ED).

5. You may also assume that the impending acquisition will have no impact on the entity's insurance operation, capital structure and adequacy.

Judging Criteria

Each submission shall be graded based on the following criteria each on a **scale of 1 (Poor) to 5 (Excellent)**.

Criteria	Description	Weight
Basic Reinsurance Knowledge	Understanding of basic reinsurance concepts including the purpose and quantitative workings of different reinsurance arrangements.	10%
Portfolio Review	Exploratory data analysis using MS Excel and R for better understanding of each portfolio's past underwriting performance and how reinsurance may be applied given the specific characteristics of the portfolio.	20%
Reinsurance Modelling	Appropriateness and robustness of reinsurance models developed in MS Excel or R, which may range from a deterministic scenario testing approach to the more sophisticated stochastic techniques.	25%
Business Proposal	Quality and practicability of business proposal based on the results of portfolio review and reinsurance model above.	20%
Programming	Overall quality, accuracy, and readability of coding in R or MS Excel.	15%
Communication	Quality of deliverables and/or speaker's presentation.	10%
Total		100%

Submission Details

1. You are required to submit your works with the title **"TeamName_Hackathon2024"** to us by filling up a **Google Form** via this link https://forms.gle/b9p51p89UwQnifRf6, attached with your **proposal** and **R-code** before the deadline, **12th May 2024, 12:00 p.m.** to submit your answer.

2. Late submissions will not be accepted, any late submissions will not be entertained.

3. Only **one** submission per team.

4. Only the **team leader** is required to submit on behalf of the team.

5. The proposal should be converted to a PDF file and renamed as **"TeamName_Business Proposal"**. Please submit the R-code as (.**RMD) file**.

Rules & Regulations

1. The Executive Summary and Business Proposal must be in the format of:
   a. Font   : **Times New Roman**
   b. Font Size   : **12**
   c. Line Spacing : **1.15**
   d. Margin   : **Normal**

2. The business proposal content and appendix must not exceed **10 pages,** not including cover page and references.

3. The proposal should be in an appropriate format, including introduction, analysis, methodology, findings, recommendation, and conclusion, while completing all the assignments in **Guidelines and Instructions**

4. Calculations, output of codes, and explanation of the codes, graphs, etc must be included in the appendix.

5. References must follow the **7th Edition APA referencing style**.

6. In-text citations are not required.

7. The team's name and team members must remain unchanged throughout the competition.

8. Plagiarism of any form is strictly forbidden. Any teams found doing so will be disqualified.

9. The question should not be shared with others during the competition.

10. **At least one** member from each team must attend the **Workshop**.

11. **All finalist team members** are required to be **present** in **Grand Finals**. Withdrawal of any member is permissible if a valid reason is provided.

12. The Preliminary Round is a two-stage judging process:

    a. <u>**Stage 1:**</u>

        i. Judges will undergo an evaluation process based on the **Executive Summary**.

        ii. Only the top 30 groups that pass this evaluation will proceed to **Stage 2**.

    b. <u>**Stage 2:**</u>

        i. Submissions that advance to Stage 2 will undergo an in-depth review on **Business Proposal**. Judges will assess the technical quality, innovation, and potential impact of each submission.

        ii. The top 8 finalists will be selected based on their performance in **Stage 2**.