# AI-Powered Facultative Reinsurance Decision Support System

## Title

**AI-Powered Facultative Reinsurance Decision Support System 2025**

## Introduction

* 1. Background  
     Reinsurance is often referred to as the “insurance of insurance companies.” It enables insurers to transfer part of their risks to reinsurers, reducing exposure to large or unusual losses.

Within reinsurance, two main types exist:

* **Treaty Reinsurance** – automatic cover for portfolios of risks.
* **Facultative Reinsurance** – case-by-case cover for very large, unusual, or complex risks.

Facultative reinsurance requires underwriters to carefully analyze unique submissions, which may include financial statements, engineering reports, loss histories, and catastrophe models. The process is currently slow, heavily manual, and experience-driven, leading to delays and inconsistencies.

An AI-powered decision support system can transform facultative underwriting by quickly extracting data, analyzing risks, and providing consistent, data-driven recommendations.

### Problem Description

Facultative underwriting currently relies on manual document review and judgment-based decision-making. Underwriters spend days or even weeks analyzing large submissions, which leads to:

* Delays in responding to cedants and brokers.
* Inconsistent risk assessments due to reliance on individual experience.
* Missed opportunities if competitors respond faster.
* Potential mispricing of risks, exposing the reinsurer to large losses.

Automation and AI can significantly reduce these challenges by enhancing speed, accuracy, and portfolio optimization.

### Objectives

#### Main Objectives

1. Automate extraction and organization of facultative submission data.
2. Enhance underwriting efficiency and consistency.
3. Improve risk selection and pricing accuracy.
4. Optimize portfolio concentration and exposure limits.
5. Strengthen competitiveness through faster decision-making.
6. Preserve underwriting expertise and institutional knowledge.

## Stakeholders

* **Facultative Underwriters**: Direct users of the system for risk analysis and pricing.
* **Portfolio Managers**: Monitor overall exposure, diversification, and portfolio impact.
* **Senior Reinsurance Managers**: Oversee profitability, strategy, and competitive positioning.
* **Cedants & Brokers**: Benefit from quicker turnaround times and clearer feedback.
* **Regulators & Rating Agencies**: Gain from improved transparency, compliance, and data accuracy.

## Current State

Facultative analysis is performed manually by underwriters, requiring extensive review of documents and data. The process is slow, inconsistent, and resource intensive.

## Desired State

The goal is an **AI-powered facultative reinsurance platform** that:

* Ingest submissions directly from emails and repositories.
* Extracts and structures risk details automatically.
* Analyzes risks, loss histories, catastrophe exposures, and financials.
* Suggests pricing, share recommendations, and terms.
* Assesses impact on the reinsurer’s overall portfolio in real-time.
* Provides explainable, consistent, and transparent outputs.

## Constraints and Assumptions

**Constraints**

* Integration with existing systems (e.g., SICS, portfolio tools).
* Data quality and format inconsistency in facultative submissions.
* Change management and resistance from underwriters.
* Data security and regulatory compliance requirements.

**Assumptions**

* Submissions will primarily arrive via cedant/broker emails with attachments.
* AI models can be trained on historical facultative data for improved accuracy.
* System will provide recommendations, but human underwriters remain the final decision-makers.

## Scope

The solution will cover facultative submissions across all classes of business, starting with high-value and complex risks (e.g., power plants, airlines, large factories).

Key functionalities include:

* Automated email and document handling.
* Risk data extraction and summarization.
* AI-based analysis for pricing, share recommendations, and portfolio impact.
* Market insights and competitor trend tracking.
* Automated decline/acceptance letters and portfolio dashboards.

## Input Data

* Facultative submission documents (financials, engineering assessments, loss histories).
* Cedant and broker communications (emails and attachments).
* Catastrophe exposure models and external datasets.
* Historical facultative deals (pricing, share accepted, outcomes).
* Portfolio data from internal reinsurance systems.

## Step-by-Step Procedure

#### Document Handling

* 1. AI bot scans email inbox for facultative submissions.
  2. Saves attachments and emails into predefined folders.

#### Data Extraction & Organization

* 1. AI extracts key risk details (insured, cedant, peril, geography, sums insured, loss history).
  2. Structures extracted data into a working sheet (Appendix 1).

#### Risk Assessment

* 1. AI applies catastrophe models to estimate exposure.
  2. Evaluates claims experience, ESG factors, and climate risks.
  3. Identifies possible maximum loss (PML).

#### Pricing & Share Recommendation

* 1. AI calculates premium rates and fair pricing based on past cases.
  2. Suggests share acceptance % based on portfolio appetite and concentration.

#### Portfolio & Market Considerations

* 1. System simulates impact of proposed deal on overall portfolio.
  2. Provides market insights, competitor behavior, and negotiation factors.

#### Decision Support Output

* 1. Generates a structured facultative working sheet (Appendix 1).
  2. Creates acceptance/decline recommendations.
  3. Submits output to underwriter dashboard for review.

## Potential Solutions

* **Robotic Process Automation (RPA)**: For email/document intake and data handling.
* **Natural Language Processing (NLP)**: To extract structured information from unstructured facultative documents.
* **Machine Learning Models**: For pricing, risk scoring, and share acceptance predictions.
* **Portfolio Optimization Algorithms**: To balance diversification and exposure.
* **Integration with Cat Models**: To assess natural catastrophe exposures.
* **Dashboards & Visualization Tools**: For portfolio monitoring and decision tracking.

## Conclusion

The proposed AI-powered facultative reinsurance platform will:

* Reduce underwriting turnaround time from days/weeks to hours.
* Improve accuracy and consistency in facultative decision-making.
* Optimize portfolio management by balancing concentration and diversification.
* Enhance customer service by providing faster broker/cedant feedback.
* Strengthen competitive advantage in the facultative reinsurance market.

Ultimately, this system lays the foundation for **end-to-end underwriting automation**, complementing claims automation initiatives and positioning the reinsurer for future growth and resilience.