TODUS ADVISORS Bowtie Risk Visualization Project Overview

Goal:
The goal of this project is to give graduate students a realistic setting to apply data visualization, storytelling, and data science to a real-world risk problem and receive feedback from an industry partner in this field.

The primary deliverable is an interactive Bowtie diagram built using React Flow + ELK (for auto layout) that clearly communicates risk to non-experts.

This project is not about building a full product. It's about showing strong ideas for interactive design, clear storytelling, and making complex risk simple.

Project Deliverables:
Your assignment is to build a light-weight MVP with the following features:

- **Bowtie Diagram Construction**: Build an incremental Bowtie structure that shows: Threats → Prevention Barriers →Hazard → Top Event → Mitigation Barriers →Consequences.
- **Expand/Hide Barriers Feature:**
  User story: As a risk analyst, I can expand/collapse barriers so I can focus on the spine or zoom into controls.
- **Interactive Features (Pick >=2) :** Hover tooltips, click-details side panel, "scenario toggle" that flips a barrier to failed and highlight downstream path.
- **Save Diagram Feature:**
  User story: As a risk analyst, I can save the diagram with structure, layout, and metadate to revisit/edit later.
- **Export to PDF Feature:**
  User story: As stakeholder, I can export a clean PDF for reports for senior management.
- **Storytelling:** Engaging narrative explaining how your diagram tells the story and explains complex Bowtie risk to a non-expert.
- **Optional for Extra Credit:** Integrate the diagram with GitHub and Streamlit by creating a repository containing mermaid source, documentation and interactive elements.

Use of GenAI: You are encouraged to use GenAI tools for scaffolding, idea generation, or symbol conversion.

Technology & Constraints:

- Required: ReactFlow (MIT open-source) plus elkjs for layered left-right auto-layout.
- Allowed: Any React libraries for UI (modals, side panels), basic state management, and simple export (PNG/SVG) tooling.
- Optional: A read-only Streamlit viewer that loads a saved JSON; not required for editing.
- Symbols: Students will create their own generic symbols (don't use proprietary symbols)

Academic Rubric:

The project will have two components (Team and Individual):

- **Story & Clarity** (30%) – can a non-expert understand the story and follow the Bowtie narrative? How well does the diagram go with the story?
- **Interactivity of the diagram** (25%) – required interactions work and add insight.
- **Layout & readability** (20%) – De-clutter. Use ELK config to avoid clutter/overlaps.
- **Pre-attentive Attributes** (15%) – polish design, labeling, legend, use of color.
- **Individual Reflection Report** (10%) – A one page reflection discussing lessons learned about visual storytelling with Bowtie and to communicate complex risk concepts to diverse audiences.
- **Optional credit** (up to 5%) – integration with GitHub and Streamlit.

Presentation:

At the end of the project, each team will present to the industry partner. The presentation will include:

- A short narrative explaining how the diagram tells the risk story and how your project illustrates the insights.
- Explanation of the design choices, execution challenges and recommendations.

Ownership:

•Students retain ownership of the code and design ideas they produce and may showcase work in portfolios or future projects.

• The company may later adopt some of the ideas, but there is no expectation they must.

Industry Partner Role:

This educational project uses real-world case provided by Todus Advisors, a RiskTech company owned by a family member of the instructor. The company provided the problem statement, Bowtie example material and feedback on the general design concepts but plays no role in grading or student evaluation.

At the end of the project, the company may offer informal feedback for educational purposes. Any recognition is purely honorary and does not affect course grade.

Todus Advisors is a RiskTech startup (www.todusavisors.com) that uses AI, and data science and visualization to manage risk. The company focuses on Bowtie visualization in high hazard industries.

Key Takeaway:
This is your chance to show how design + storytelling + interactivity can turn a complex risk model into something anyone can understand. Keep it simple, keep it clear, and focus on ideas that could inspire a real product.