**Opportunity of MSc Dissertation with Internship**

**(Tesi di Laurea in Azienda)**

| **Context of the research activity** | |
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| Motivations and objectives of the research | The research project is situated within the methodological framework of causal modeling, which is a branch of AI aimed at demonstrating the existence of a cause-and-effect relationship between decision variables and objectives of interest. This is an innovative industrial research area, for which there are not many applications present in the literature.  Specifically, two notions of causality are typically distinguished: general and actual. General causality concerns generic statements ("lubrication leads to an increase in efficiency). Conversely, actual causality focuses on particular events: "the accident was caused by the car's broken sensors (not the valve or other parts of the control system)."  Currently, the large interest is in general causality, as causal statements allow for making predictions. However, the objective of this thesis work is on actual causality, which focuses on specific instances and, then, it might be very useful for understanding how we can prevent outcomes similar to that specific instance in the future, although it is less useful for creating predictions. Actual causality is also a critical component of assigning blame and responsibility. This reason makes it particularly interesting for engineering applications of diagnostics for incident analysis, especially for proposing new importance measures to prioritize risk reduction interventions. Furthermore, the application of actual causality concepts for incident investigation has never been proposed in the literature. |
| Internship | The methodology will be developed together with reliability engineers and AI experts from ARAMIX srl and will be applied to real industrial case studies, especially in the emerging H2 sector.  ARAMIX is a highly qualified technical consulting company, which investigates and develops advanced methodologies and algorithms for the analysis of industrial systems and components, in support to several important industrial companies. |
| Required Skills | * Very good modeling skills * Very good knowledge of Python programming. * Interest in developing innovative algorithms to tackle real industrial applications. |
| Educational objectives | Professional skill in risk analysis |
| Names of the research director | Enrico Zio |
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| **Duration of the dissertation** | |
| Total thesis duration | Approximately 6 Months. No pending exams. |

**Starting date: June 2025**