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The Romance of Engineering in the Age of AI: Preserving Judgment in SFAIRP Assessments

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ABSTRACT

Engineering has always been about more than calculations. It is the story of human imagination turned into structures, machines, and systems that reshape the world. In the past, the romance of engineering was found in steel, stone, and steam — in bold projects that pushed the limits of what was possible. The romance of our time is not about conquering great physical divides, but rather about engineering responsibly, protecting resources, and creating a more sustainable future.

This paper highlights how tools have shaped both creativity and risk, our over-reliance. AI represents the next step: a powerful enabler of knowledge collation and analysis that can enrich hazard identification, likelihood assessment, and consequence evaluation. Large Language Models (LLMs) expand what is "reasonably discoverable," raising new legal and ethical considerations in demonstrations that risks have been reduced so far as is reasonably practicable (SFAIRP).

AI is not neutral. Its outputs reflect biases in data, popularity, and prior use, potentially reinforcing blind spots. Over-dependence also risks "cognitive debt," weakening an engineer's critical thinking and creativity.

Case study examples of AI use for data gathering in SFAIRP assessments will be provided, along with cautionary tales. This paper will argue that engineers must treat AI as an instrument, not a decision-maker—interrogating results, verifying against authoritative sources, and documenting diligence.

AI can extend capability, but professional judgment remains indispensable. The romance of engineering endures: fusing imagination with evidence, ethics, and responsibility.

KEY WORDS

AI, risk, SFAIRP, professional judgement, ethics

BIOGRAPHY

Kim is an IChemE and Engineers Australia Fellow, Chartered Chemical Engineer, Professional Process Safety Engineer and is registered with the Board of Professional Engineers of Queensland. She is a TÜV-certified Functional Safety Engineer and a certified WomanSpeak speaker.

Two decades of international operations and projects experience in oil, gas, chemical and mineral processing, has embedded a passion for enabling understanding of process safety topics in others.

She is currently Principal Consultant and Head of Training with Safety Solutions, and Secretary of the Parrot Society of Australia.