# Risk Intelligence

How Artificial Intelligence can transform Risk Management

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## 0.1 Foreword

This book is not a training manual on how to build Artificial Intelligence (AI) models. It is intended as an executive's guide to applying AI technologies to transform risk management into a proactive management tool for informed decision-making and exploiting opportunities.

It expands on book 1 - *"Mastering 21st Century Enterprise Risk Management"*, and assumes readers understand event driven and objective base risk management. This includes the use of scenario analysis, casual mapping, horizon scanning, and risk aggregation. If you are not comfortable with these techniques, I strongly suggest reading my previous book before proceeding. As an Executive's Guide, it covers these topics at a high level, so it is an easy read.

AI, although a technical subject, it is not difficult to understand from an application and management perspective. I have taken the approach that the reader does not have prior technical IT or AI background or knowledge. Hence, I have used everyday language to explain the techniques and concepts.

The title refers to AI, but more accurately I am referring to the whole raft of disruptive technologies. This general term covers the swath of technologies that are changing the face of the world as we know it. From bitcoin to drone pizza delivery these new technologies are IT based, use an augmented intelligence, and are most likely "cloud" dependent. End-point delivery might be via a local hardware device, but the solutions rely on distributed or massive processing power facilitated by "the cloud".

These disruptive technologies open a completely new level of ability to risk management for identifying, evaluating, and monitoring risk. Also for control and mitigation as well as training and reporting. My Top 10 Disruptive Technologies that will change Risk Management in the 2020s are:

1. Probabilistic Modelling – to mirror real-world uncertainty and aggregate the effects of risk on strategic objectives.
2. Knowledge Graphs – to map risk network relationships to identify and understand sources of risk.
3. Neural Networks (aka Deep Learning) - to classify risk, identify patterns in data and images, and recommend courses of action.
4. Big Data & Predictive Analytics - to build risk collateral, identify trends & evolving risk, anomaly detection, and threat management.
5. IoT – Intelligent Things - to monitor changes in environmental factors in real-time, and using streaming analytics to identify stress and internal risks.
6. Virtual & Augmented Reality - to gain a quantum leap in staff training, building a robust risk culture, and provide real-time expertise to critical tasks.
7. Natural Language Processing (NLP) - providing text analysis to identify regulatory compliance issues and sentiment analysis to monitor behaviour.
8. Robotic Automated Processes (RPA) – AI infused workflows to augment human processes integrating research and risk-based decision-making at the coalface.
9. Blockchain Distributed Trust Systems – that will transform everything from cybersecurity and supply chain risk to making individuals responsible for their carbon footprint.
10. Bayesian Decision Networks – applying expert experience and probabilistic modelling to risk scenarios to identify the most likely outcome of complex events.

These are just some of the AI-based techniques that will transform ERM from today's mystical based approach of coloured heat maps

and the risk matrix. In its place will be a real value-adding management technique to drive growth and exploit opportunities.

This book builds on my 10 years of providing AI embedded solutions in mission critical risk and compliance. I have implemented pro-active AI risk analytics solutions using deep learning to identify and classify risk, random forests & regression models for scenario analysis, and Bayesian networks for aggregation of risk. These practices are in use with the likes of Victorian Infectious Diseases Reference Laboratories, Australian Quarantine Inspection Service and the Australian Department of Defence, all leaders in risk and compliance.

**Gregory M Carroll – July 2021.**

# CHAPTER 1 INTRODUCTION

## 1.1 Enterprise Risk Management

### *Risk Intelligence*

To become relevant, Risk Management has to move from a subjective awareness to a practical toolkit for operational managers to make informed decisions. Since Napoleon, the military has relied on such support. They call it “Military Intelligence”.

Military intelligence is defined as:

> *“a military discipline that uses information collection and analysis approaches to provide guidance and direction to assist commanders in their decisions.”*

In the same vein, we can define Risk Intelligence as:

> *“a business discipline that uses information collection and analysis approaches to provide guidance and direction to assist managers in their decisions.”*

Ask any manager what they need to make a decision and they will tell you they want the facts. Operational information interpreted

with experience. Not lists of possible maybes, or a coloured thought-bubble matrix. AI technology can provide insightful recommendations based on historical data, and proven mathematical insights, i.e. situational awareness. A commander's ability to adjust strategy in the heat of battle is the key to success. In today's volatile business environment, managers need no less.

Gartner predicts that by the end of 2024, 75% of organisations will move from piloting AI to its mainstream adoption. This will drive a five times increase in streaming data and analytics infrastructures.

AI can advise strategy-makers on likely scenarios and influences, create networks to monitor changes in the environment, and provide rank and file with the collateral they need to achieve objectives. Given the right set of tools, Risk Management teams can provide Risk Intelligence to support your commanders in the field.

## *The New Normal*

While many are still debating what will be the new normal post COVID, I am prepared to go out on a limb and call it. Simply, it is a fluid operational environment, with continual disruption, requiring flexible and innovative response. And I mean normal. Identifying and handling issues will be a soft skill of future survivors. No stress involved, just part of their day to day work.

Solutions will not only need to be innovative, but composite. Multiple techniques and approaches taken simultaneously. New terms like psychometric and not so new ones like bionic, will become the standard vernacular in business engineering. From work-life balance and augmented reality, creative solutions require the combination of multiple disciplines social and business, people

and process, psychological and technological, physical and digital, human and AI.

At the start of the industrial revolution, societal change was the biggest change and hardest to manage. Traditional jobs were lost and new ones were created yes, but the bigger problem came from the changes in values. Movement of people from the countryside to towns, land to money, working hours, and moving outdoors to indoors, resulted in changes in health and hygiene. This all took a toll on their mental and social wellbeing. Old habits die hard and tend to require generational change to assimilate the new norm. Instead of 100 years, COVID accelerated this to one, 2020.

We are now subject to the Chinese curse, “may you live in interesting times!” The change is now on us, and we have to take a serious look at changing our mindset or be left behind. As covered in my last book, Millennials won’t have a problem. They already existed in the new normal, to the point they don’t “get” the old world. Gen-Z are being educated in it, while Gen-Y will probably adapt fairly easily. But what of Gen-X, now forty-plus? They are in serious threat of being run over by the younger generation hungry for promotion and looking for the chance. Watch your backs.

In my 20s, I worked in the UK and initially couldn’t understand their business success, given their lack of motivation and drive. As an Australian, our competitive nature always has us looking for a better way of winning. An example of the very different approach to business of Aussies and Brits was a Brit advertising executive criticism: “You Australians don’t understand advertising; all you want to do is flog (sell) stuff!”, to which I replied, “isn’t that the purpose of advertising?”. Apparently, in the UK it was about building image and market position, i.e. the long game. I subsequently learned that the secret to British business success is planning and development. Action is just a medium. Like the tortoise and hare, their methodical approach might appear longer, but counterintuitively, arrives at a better outcome sooner.

In the UK, I had to adapt or get left behind. To quote Charles Darwin:

***"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change."***

Artificial Intelligence (AI) is the electricity of the post-COVID world. It is the enabler of most disruptive technologies that are framing the new normal. Enabling capabilities for design and automation, to innovation and business transformation. It is not a fad, but the driver of all to come. Understand it and exploit it. Like using electricity, people don't need to understand the science of electrons moving from negative to positive polarity. They just developed electrical devices to solve production and communication problems. Even simpler, they bought pre-built electrical motors and connect its output driver-wheel to power their solution.

The analogy is obvious. If you understand the input and output of AI models, you can buy AI managed services from the Amazon, Google, IBM, or Microsoft, to develop new solutions to old problems. Philosophically, I am platform agnostic, but as a Microsoft Certified Professional (MCP), most of my hands-on experience has been with MS products. Therefore, when giving examples of different techniques, I will often quote a Microsoft product. But please, don't take this as me recommending Microsoft as the best solution. It is only one way of implementing the technique. The technique is what's important, not the platform. In fact, with the fast changing state of AI, each of the major players will move up and down in market leadership. You will be fairly safe choosing any one of them. It might even be a case of choosing different horses for different courses.

Enterprise Risk Management (ERM), is in dire need for such an overhaul. In Book 1 of this series, I covered why ERM has failed and how to transform it from an administrative overhead to a

proactive tool for decision-making and driving strategies. Having set the framework, Book 2 now offers the tools to automate ERM, and allow you to concentrate on maximising objectives, identifying opportunities, and innovating to make a better world.

## *Nature of Risk*

Although most think they know what risk is, there is considerable misunderstanding outside the risk fraternity. Like the motor vehicle, risk is neither good nor bad; it is how it is used. So before we dive in, I will cover a quick overview of the current approach to risk. To appreciate how AI can apply to risk management, the nature of risk must first be fully understood.

Saying risk is "the effect of uncertainty on objectives" is the equivalent of saying Gravity makes things fall toward the earth. Although it may be useful as a descriptive label, it is neither a definition nor provides for its practical application. The trouble with traditional risk management is that it looks at Risk as something in its own right. Some ethereal force. Risk does not exist.

But then again, neither does gravity. Gravity is an effect caused by a distortion in space-time. That's doesn't make its measurement and effect any less critical. In fact, we work with its measurement "weight", every day. We use it for the concentration of medicines to be taken and to work out the strength of beams to keep a roof over our heads.

To those working in explosive ordinance, infectious diseases, or in harm's way, risk is very real. Like gravity, we only measure its effect on something. We measure the risk of injury or the risk of success. To continue the analogy, weight is the measure of gravity on an object which varies relative to its mass and frame of reference (Einstein's Theory of Relativity). Risk varies relative to its features (like mass to gravity) and its terms of reference, the risk event. Therefore, measuring risk is not futile.

So what would be a better definition of risk? Well, taking a lead from financial risk, it is the mathematical variance (noise) in a process. A variance can be both negative or positive. So too, risk can be positive as well as negative, i.e. it can help your business as well as hurting it. Instead of some ethereal "risk rating", Risk needs to be measured. And its unit of measurement is "Value at Risk".

## *Managing Risk*

### Risk Management Systems

Although it sounds trifling, a risk management system is a **system** to **manage risk**. The reason I raise this is that most Risk Management Systems fail to even meet the definition of the term.

**System**, from the Oxford Dictionary is defined:

*"A set of things working together as parts of a mechanism or an interconnecting network; a complex whole".*

Let me reiterate: "*an interconnecting network; a complex whole*". Most Risk Management Systems do not even address complexity, which is the nature of the business environment, or "Context" as ISO 31000 refers to it. This is even before considering an interconnecting network of risks for the complex whole. Strike one!

**Manage**, is a verb, not a noun. It is an activity, not an item, and a Risk Register is a list of "risk items". Making a list might be adequate for those who want to check off

regulatory compliance, but it is not managing. Strike two!

**Risk**, as per ISO 31000, is the uncertainty in achieving your objectives. Therefore, a risk management system must start with the corporate objectives, both strategic and tactical. Not at the detailed risk item level, linked back to an arbitrary objective. Strike three!

## Enterprise Risk Management

Uncertainty arises from a lack of information related to, or understanding of, an event, its consequence, or likelihood. As an event in one part of an organisation can affect other unrelated parts (the butterfly effect), Enterprise Risk Management (ERM) requires an integrated approach.

Risks linked back to their corporate objectives creates an enterprise-wide integrated risk management system. However, simply linking does not allow tactical risks to roll-up and determine the uncertainty on corporate and strategic objectives. This inhibits the system from producing the optimal return on investment. Throughout this text, I refer to ERM when talking about the entire formal system and to risk management when discussing the practice of managing risk. However, the terms are really interchangeable.

## Operational Risk (OpRisk)

For those not used to the term OpRisk, Operational Risk, is the area of risk around the internal operations of a business, predominantly dealing with people and systems. When most people talk of enterprise risk management today, they are really referring to operational risk.