



R&D UPDATE | insight

Business Outcome Optimisation: R&D Update

A Mood International Technical White Paper

MooD[®]
DIGITAL BOARDROOM

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Summary

A summary of new R&D funding from Simon Smith, CTO of MooD International

What is contributing the most to the outcomes that matter?
What doesn't seem to make much difference at all? What do I need to pay attention to that might be losing me money?

MooD International, already the recipient of two successive Queen's Awards for Innovation, has recently won a further round of R&D funding in collaboration with the UK's University of York*.

The aim of this new stream of research is to make it easier for organisations to establish how well their operations and investments are contributing to business outcomes, through a radical increase in the level of automation that can be brought to bear on this issue.

The results of this work are contributing to a new class of solution that will provide a significant advance over regular management information and decision support solutions.

This new kind of solution brings us a step closer to achieving the vision of how businesses will increasingly need to operate:

1. able to interpret and exploit the increasing amounts of 'big data' available to a business and
2. able to operate agile decision and action processes that roll on a constant and evolutionary basis.

Technically, this is achieved through an 'always on' collaborative decision capability that continuously optimises across emerging cause and effect dependencies in a Business Operating Model.

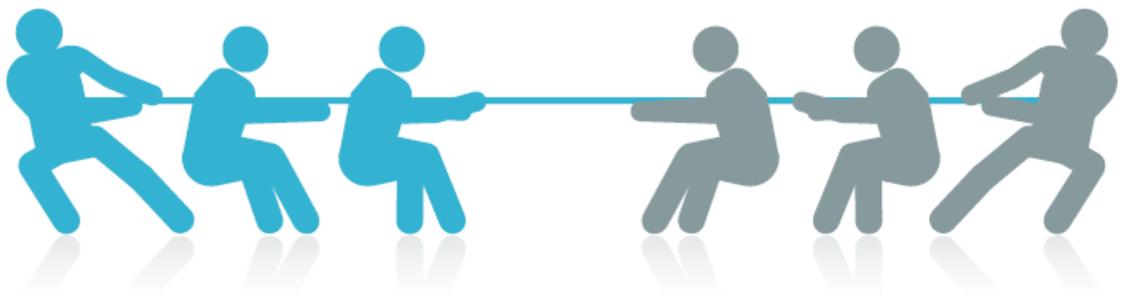


These next generation decision systems will be capable of providing a 'suggestion layer' for the business leader - reacting to changes in the business and its environment, and addressing questions such as: What is contributing the most to the outcomes that matter? What doesn't seem to make much difference at all? What do I now need to pay attention to that might be losing me money?

Such questions represent pressing operational needs that typically derive little benefit from data science outside of one-off consulting projects, or expensively set-up domain-specific AI and analytics.

Some more on the problem

Current approaches to managing business are excessive in the effort they require to keep line of sight open between operational investment and the achievement of business outcomes.



At MooD International we're very familiar with the needs of major enterprises as they look to suppliers for services that help with their infrastructure, systems and operations.

Consider a new contract for support: a service provider, new to a business, and facing the demand of 'better service, with lower cost'. Why can't a supplier that is the 'expert' in how to, say, run financial processes, simply design a better way of working, implement systems and processes, and run then reap the reward, jointly with the customer?

In our experience there are two reasons.

One is that the supplier is not working in isolation, or in a greenfield site.

Rather, a range of internal organisations and other external suppliers continue to be active, often with unclear and overlapping responsibilities. So for the customer, it's crucial that a clear line of sight is established between the things that it needs to have an impact on – the outcomes – and the operations being managed and evolved by its suppliers.

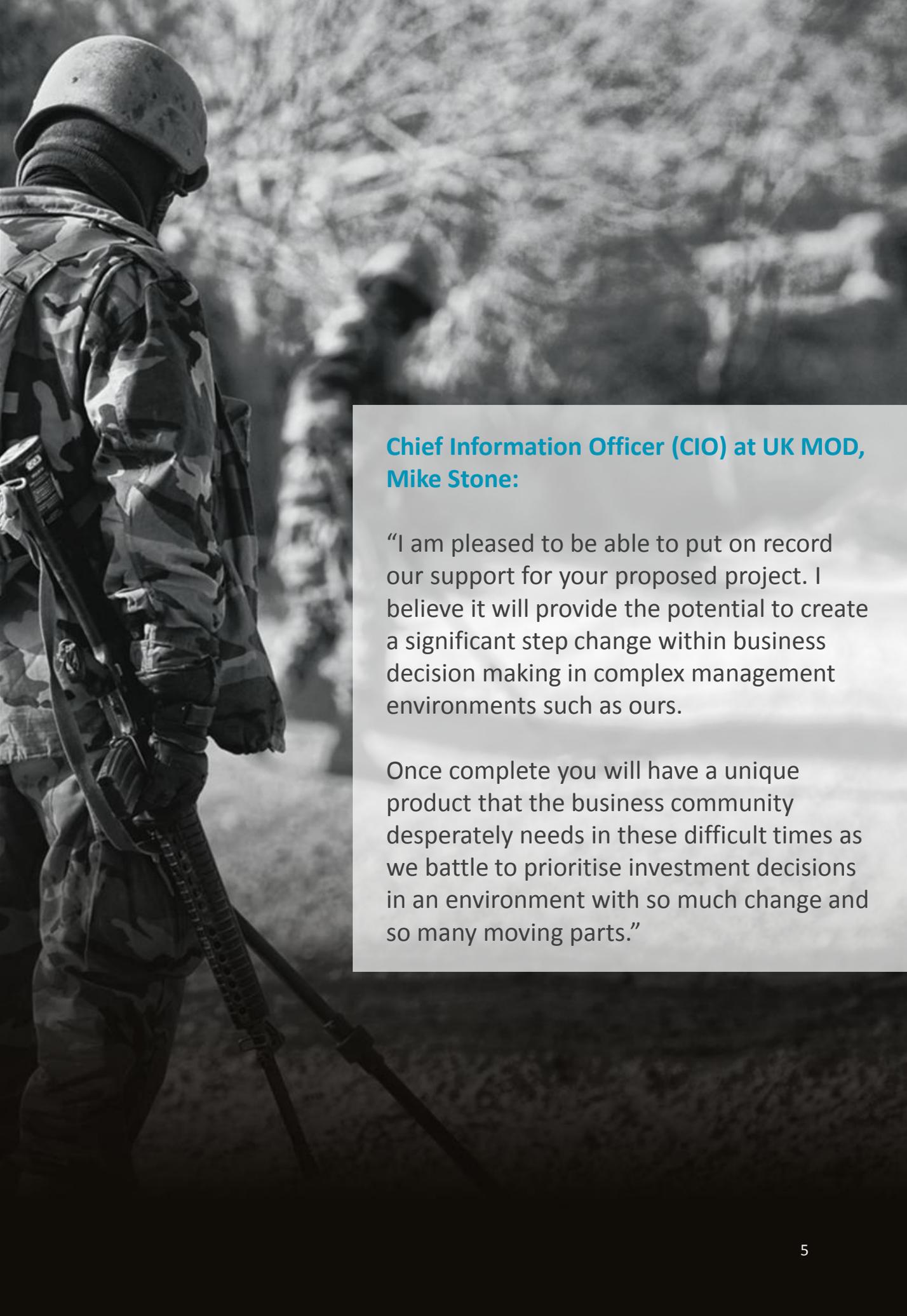
The second reason, though, is the real show-stopper.

Even if that line of sight can be established at the point of contract, across at least some of the stakeholders, things will change in all sorts of ways that are significant enough to make the contract unworkable both technically and commercially.

Changes in the competitive landscape, customer demand, commercial playing field or even the very first actions of the suppliers themselves can break the assumptions under which things were most likely to have worked for all parties.

Current state of the art processes and tools for risk management, budgeting & resource planning and project management all need an excessive amount of effort, expertise, luck - or all three - to keep that momentary line of sight open.

Without better systems to manage and expose the cause and effect assumptions that contracts are built on, many opportunities to achieve better business outcomes would simply not be identified or evaluated.



**Chief Information Officer (CIO) at UK MOD,
Mike Stone:**

“I am pleased to be able to put on record our support for your proposed project. I believe it will provide the potential to create a significant step change within business decision making in complex management environments such as ours.

Once complete you will have a unique product that the business community desperately needs in these difficult times as we battle to prioritise investment decisions in an environment with so much change and so many moving parts.”

Three enabling trends

We see three trends in the technology landscape which indicate that now is a good time to really address the problem.

One. Greater availability of data.

A lot is being talked about the importance of access to and availability of data. We work with organisations on the full spectrum from those that have regular business systems that generate small amounts of low integrity data, through to organisations that generate so much data that no current infrastructure could process or store the amount involved. For many organisations the concept of big data is still distant – in particular where the business has not been ‘designed for the Internet of Things’. But the bar is rising.



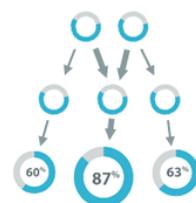
Two. Causal approaches to business performance technology.

There is a growing recognition that it is not enough for a business to monitor and report on data – rather, there is a pressing need to develop an understanding of why things are the way they are, and what options there might be for intervening to achieve a better situation. Long understood by business management and policy makers, the ability to go from captured data, to correlated data, to cause and effect is just starting to appear in the digital world. This is a strong and defining characteristic of MooD’s software – inferring manipulable causal networks from a business network, in a way that is compatible both with statistical analysis and with the way that business leaders think about their business, in terms of risk, opportunity and investment.



Three. Advances in computer science via the digital games industry.

We’re not talking about gamification – the potentially spurious addition of game-like user experience in other domains – but the fact that business decision making shares some fundamental characteristics of the more complex kinds of game – imperfect information, multiple players and outcomes, and evolving rules of the game (actions that can be taken). Advances in Artificial Intelligence (AI) for decision making that are capable of handling some of these problems are starting to appear. Although these are being applied with increasing success in particular in the digital games industry, they are based on sound and more generally applicable Computer Science.



Overview of technical detail

MooD's business operating model is in essence a graph of the business that connects the major things of material interest in business operations.

MooD Software is in widespread use in a number of industries, with its Business Operating Model establishing transparency over how business outcomes are actually being achieved.

The Business Operating Model, the heart of the software, is implemented as a network of business concepts and dependencies that is fed with operational data, and is exposed and manipulated through business-relevant visualisations as a business system in its own right – a recipe that has won MooD International two successive Queen's Awards for Innovation.

MooD's Business Operating Model is in essence a graph of the business that connects the major things of material interest in business operations. Each node and edge carries with it time-series data concerning status, performance and events.

This graph, as well as being analysable in its own right, supports a causal network – the cause and effect dependencies that explain how the business works. This network can be further analysed to establish what is driving business outcomes, and how things could be configured to better achieve the right balance and trade across those outcomes.

Graphs and networks, like MooD's causal network, are generally exploited through some kind of search algorithm – so Amazon might use product targeting search algorithms to find what your friends are interested in, to better inform which products are likely to be most relevant.

We are applying a particular kind of search algorithm to our causal network, taken from the digital game domain. The intention is to improve the understanding of which paths, formed by different business actions, get to the best, and worst, business outcomes – and so generating suggestions for what could be working, or not working in terms of contribution to what really matters.

This approach to search, known as 'Monte Carlo Tree Search', operates by incrementally traversing the network, but under differing assumptions of which actions are being taken, and to what effect. Technically, some of the characteristics of this approach are particularly helpful for the kind of application in which a MooD Business Operating Model is typically deployed.

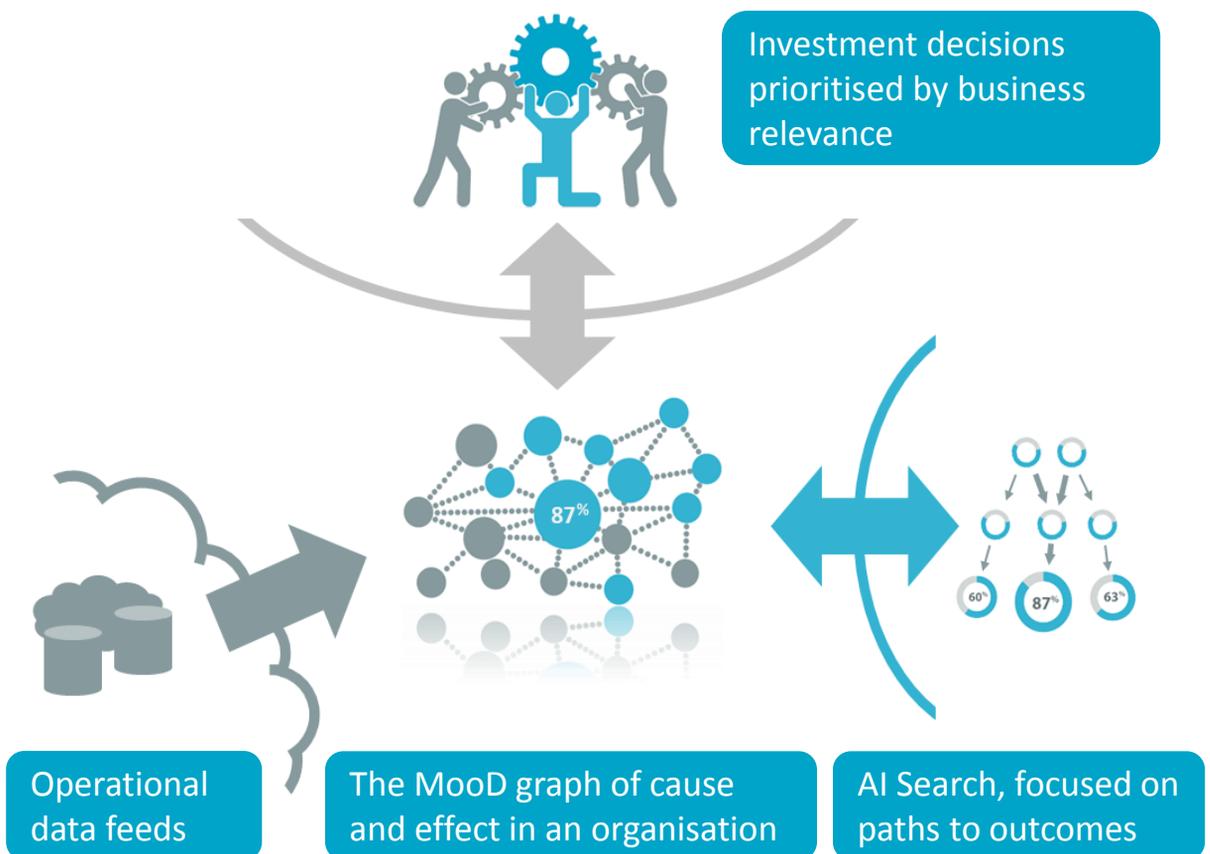
For example, the approach operates well even when interrupted with changes to the rules (new / different interventions being discovered or proposed), and doesn't require a 'theory of the game' to have been worked out up front – clearly beneficial when dealing with contextual, evolving business operations.

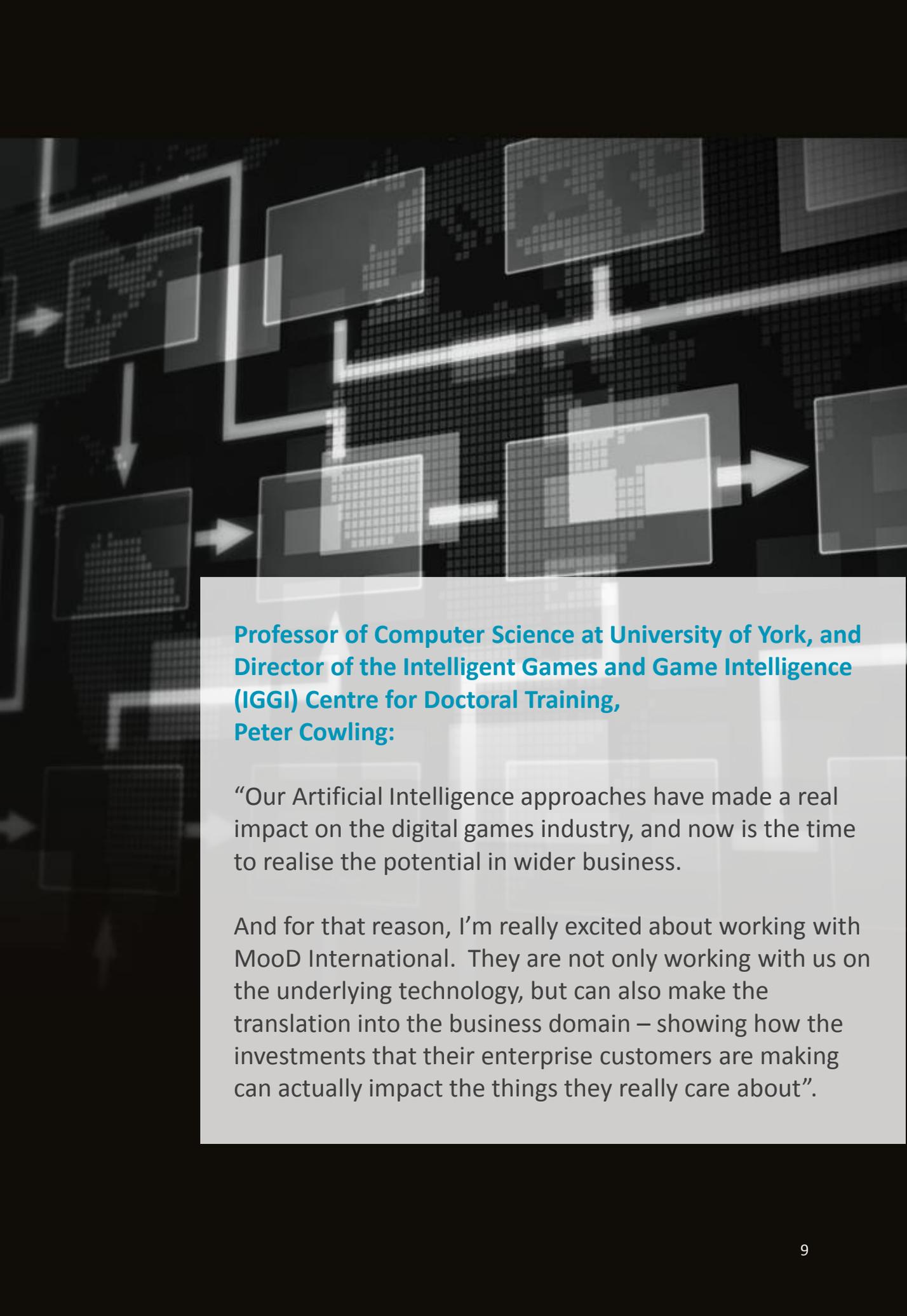
Crucially, this technology is being developed to operate efficiently with little computing power, but to scale with the increase in the available resources as new approaches to cloud, processing and storage come on stream.

Overview of technical detail

We are applying a particular kind of search algorithm, to a causal network, from the digital game domain, with the intention of understanding which paths, formed by different business actions, get to the best, and worst, business outcomes.

Three trends integrated into an operational system for business relevance





**Professor of Computer Science at University of York, and
Director of the Intelligent Games and Game Intelligence
(IGGI) Centre for Doctoral Training,
Peter Cowling:**

“Our Artificial Intelligence approaches have made a real impact on the digital games industry, and now is the time to realise the potential in wider business.

And for that reason, I’m really excited about working with Mood International. They are not only working with us on the underlying technology, but can also make the translation into the business domain – showing how the investments that their enterprise customers are making can actually impact the things they really care about”.

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