



## White Paper

### Optimisation for the Modern Business Environment

The modern business environment is fast moving and complex. Constant change, high customer expectations, short lead times, complex relationships and low inventory pose significant challenges to traditional planning approaches, and leave little margin for error.

The Opturion next generation optimisation platform has been developed to address this problem. It has the power and flexibility to deal with the largest and most complex planning problems *and* solve problems in real-time. All plans are impacted by change; staff go sick, deliveries are delayed, machines break down. Traditional approaches, such as linear programming, were invented 70 years ago for planning purposes and are unsuitable.

In addition, traditional methods require time and considerable expertise to translate the problem from the real world into a form required by the solution method. The Opturion Platform enables the user to express the problem in a natural form and then automatically translates the problem such that a range of solution techniques can be used. This reduces development time, development cost and maintenance costs. It is the product of about 60 man years of research in Australia, which built upon the results of a large EU research program. The key features are power, speed flexibility and productivity.

A forerunner of the Opturion Platform was acquired by CISCO in the early 2,000's and is now used to optimise Internet traffic. They don't come any bigger than that!

### Optimisation

Optimisation is a key part of any decision support system. It is useful, beneficial and arguably essential, whenever we have the 3 C's: Choice, Complexity and Change. These are very important because:

- Without Choice, decisions are unnecessary
- Without Complexity, the solution is often apparent
- Without Change, the solution – once arrived at - works all of the time

Luckily for us, the modern business world has all of these, in spades. Managers have many options to choose from; complexity is rife; change is perpetual.

Optimisation is complementary to another important technology, analytics or big data. If we discover more about how our decisions impact customer behaviour, product performance, revenue and profits, we now have a way to optimise those decisions to achieve the desired outcome(s).

## Many Faces of Optimisation

Optimisation can work at many levels, and it is instructive to look the time line.

Strategic Optimisation considers the big, long term, often irreversible decisions such as building a new production or services facility, placing orders for equipment with long lead times, or staff recruitment. Questions such as location, size, capability need to be answered based on the most likely future scenarios. Often we want to maximise the upside whilst limiting the downside. Spreadsheets are commonly used, but while they can calculate and compare the consequences of a decision across a range of scenarios, they cannot calculate the consequences of all possible decisions across all possible scenarios.

Strategic optimisation can become very large; they often involve the whole enterprise over long time periods with multiple scenarios. The Opturion difference is the ability to invoke different solution methods. For example, the production planning problem is very different to logistics, but many organisations have both.

Tactical Optimisation is about getting the best out of what we have, now. It is very similar to traditional planning; how are we going to deploy our human and equipment resources over the next 1 to 3 months? It can be very detailed and precise where we are fairly sure of the future, for example production plans (what product, made where, on what machine) or transport plans (what delivery to which customer on what truck). We can also plan for uncertainty by allocating capacity more generally. For example, we need a number of people but we don't name them.

Tactical optimisation is much more detailed and complex, and the problem changes as the enterprise evolves. The Opturion platform deals well with complexity, particularly complex constraints, it is flexible and easy to maintain.

Operational optimisation deals with the age old problem that plans do not survive first contact with reality. Traditionally this is where the plan gets thrown out or modified on the run. The problem with this approach is that the focus is often about feasibility – can we even make the product, or deliver the goods – rather than efficiency. The other issue is that it is often difficult to understand what decisions were made and when, and impossible to deduce the reasons why. Operational optimisation is about repairing the plan, adapting it to the changed circumstances and operating at maximum efficiency.

Operational – or real time – optimisation requires speed and reliability. This is another area where the Platform excels, and has been proved to excel. It has been successfully applied to roster repair, schedule repair, disruption recovery and essentially dynamic problems such as mobile workforce scheduling and pick-up and delivery.



## Optimisation Modules

The Platform has access to three basic modules, each of which has a number of state-of-the-art solvers:

Opturion Router solves all types of geospatial problems such as routing, communications and location. Such problems are not amenable to many traditional mathematical approaches, which can be ineffective and slow. The Router has been proven to solve problems in a matter of seconds rather than minutes.

Opturion Scheduler is designed to solve sequencing and scheduling problems that frequently arise in manufacturing, particularly advanced or flexible manufacturing with short production runs and a wide range of products. These problems have almost an infinite number of possible solutions, making it impossible for humans to solve. Unlike traditional methods, the Opturion Scheduler does not need to group products into time based buckets (such as a week), instead it deals with events making it amenable to very short production runs of variable length; the very essence of advanced and flexible manufacturing.

Opturion Planner is designed to tackle the more conventional problems that arise in strategic and tactical planning, but with one essential difference: it can seamlessly call on a range of solution methods, including cost effective open source methods. Once the problem has been defined the user can switch, mix and match methods and compare results.

## Products

The Opturion platform is available in two forms; a cloud based service and an embeddable module with an application programming interface (**API**)

The cloud service accepts **JSON** (JavaScript Object Notation) input files and generates outputs in the same format. It can also accept inputs (and create outputs) as Excel and comma-separated values (**CSV**).

The embeddable module has a comprehensive API enabling a third party product or application to harness the power of the Platform.