Capability Statement

Polymathian
Industrial Mathematics

Polymathian delivers the optimal answers to solve the most complex problems in your business **using Industrial Mathematics**.

About

Polymathian is an Industrial Mathematics company specialising in the development and commercialisation of hosted decision support software for heavy industry. Established in 2013, the company is headquartered in Brisbane, Australia with additional offices in Melbourne and Perth. Polymathian employs over 40 data scientists with formal qualifications in software engineering and mathematics.

Polymathian uses a range of decision science techniques including: machine learning and artificial intelligence, simulation, statistical analysis, mathematical optimisation (a branch of applied mathematics), heuristic and meta-heuristic techniques to find optimal solutions to problems faced by industry.

"Applying cutting edge Industrial Mathematics to complex mine planning situations saves time and money and Polymathian is now a major part of the intelligent mines of the future."

Peter Kane - Queensland Mining Awards Judge

Polymathian Product Portfolio

Polymathian have a range of hosted software platforms that provide planning and scheduling support for customers globally.

BOLT

An industry leading, multi-commodity blending and logistics optimisation tool for bulk supply chains. BOLT covers the entire supply chain from source to market to increase profits, reduce costs and maximise efficiency.

ORB

A world leading, mining optimisation platform, covering operations in real-time through to strategic planning time horizons.

RACE

An industry leading, rail supply chain optimisation tool for different combinations of inbound rail, terminal stockpiling and outbound vessel operations to maximise throughput and asset utilisation.

"BOLT has helped us transform our planning processes by improving the way we handle data, engage with stakeholders and reduced time to generate our 6 month plan by 10X ."

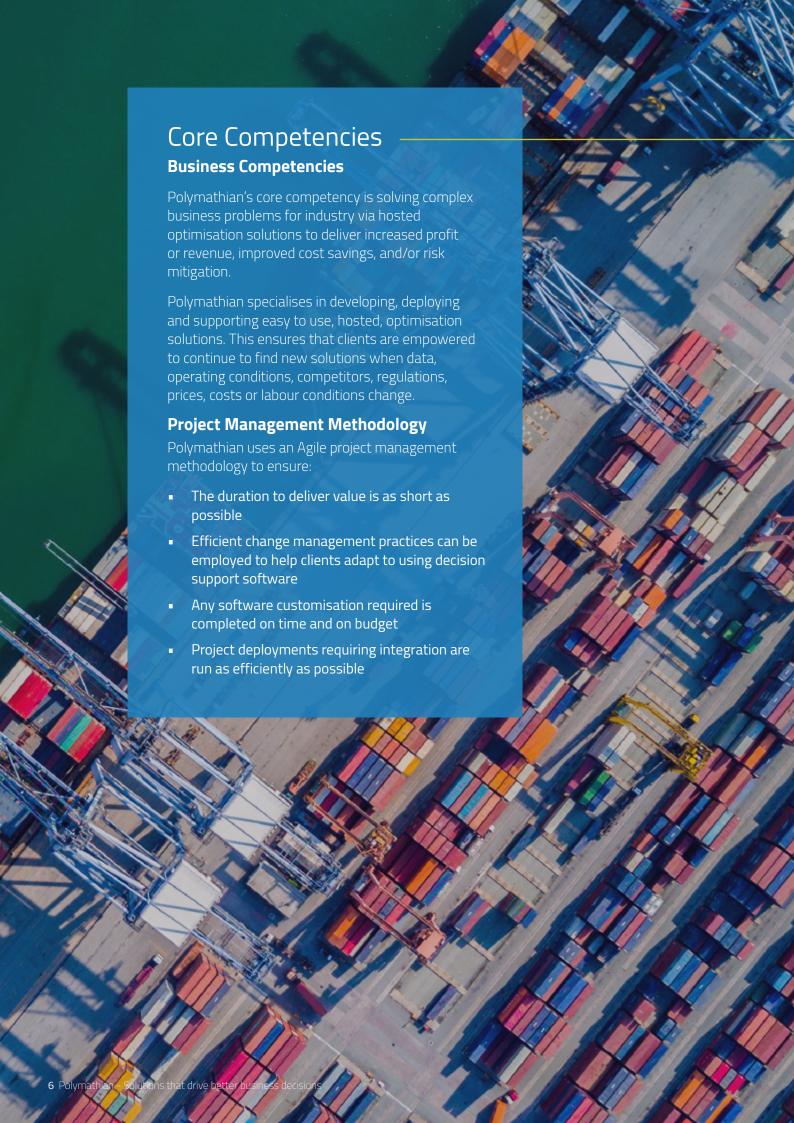Superintendent Integrated Operations - Tier 1 Producer

SOLO

A marine planning platform used to minimise service disruptions and maximise efficiency by optimally scheduling vessel, port movements and marine pilots.

VOLT

A data driven, digital process twin that helps energy and utility operators optimise asset dispatch, network operations and associated portfolios in real time.

GEAR

A prescriptive maintenance scheduling tool that optimises high volumes of complex maintenance events over time, while adhering to asset management strategies, resource and budgeting constraints, and safety thresholds.

Core Competencies

Business Competencies

Polymathian's core competency is solving complex business problems for industry via hosted optimisation solutions to deliver increased profit or revenue, improved cost savings, and/or risk mitigation.

Polymathian specialises in developing, deploying and supporting easy to use, hosted, optimisation solutions. This ensures that clients are empowered to continue to find new solutions when data, operating conditions, competitors, regulations, prices, costs or labour conditions change.

Project Management Methodology

Polymathian uses an Agile project management methodology to ensure:

- The duration to deliver value is as short as possible

- Efficient change management practices can be employed to help clients adapt to using decision support software

- Any software customisation required is completed on time and on budget

- Project deployments requiring integration are run as efficiently as possible

Technical Competencies

Polymathian's core technical competencies are:

1. **Mathematical optimisation**
   Linear, integer, quadratic and non-linear programming using all the commercially available mathematical programming packages.

2. **Heuristics and meta-heuristics for optimisation**
   Tabu search, guided local search, neural networks, simulated annealing, genetic algorithms, variable neighbourhood search, evolutionary algorithms and others.

3. **Machine Learning and Artificial Intelligence**
   Supervised and unsupervised learning algorithms, machine learning algorithm "automation'' via the application of Amazon Sagemaker.

4. **Simulation**
   Discrete event simulation using publicly available third- party packages or bespoke solutions when required utilitising Monte Carlo methods, queuing theory and others.

5. **Statistical data analysis**
   Forecasting, Bayesian techniques, clustering algorithms and others.

6. **Building, deploying and supporting hosted optimisation solutions**
   Polymathian's hosted software development platform, Tropofy, which is used to develop, customise, deploy and manage all the products that Polymathian licenses to its customers.

7. **Business consulting**
   A key step on the successful application of decision science is business consulting to ensure the right problem is solved and the best possible model is applied to the problem.

8. **Training**
   Polymathian staff have considerable experience in training end-users in hosted decision support software, running university courses to train students, and running in-house courses to teach business consultants how to frame and recognise optimisation problems.

"Polymathian have expertly modelled our caving operations with simulation methods, allowing us to validate our methodologies and assess their impact on productivity. We are impressed with how quickly they have been able to develop a simulation model with such a high degree of detail."

Daniel Hronsky - OZ Minerals

Differentiators

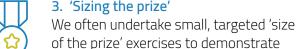**Polymathian's key differentiators are:**

1. Customer satisfaction

The key to Polymathian's success is customer satisfaction. Polymathian go above and beyond to ensure the customer is delighted with the project deliverables and outcomes. In addition, Polymathian works closely with customers after the project is finished to ensure they get the most out of the software. The majority of Polymathian's work comes from word of mouth.

2. Pragmatic project approach

Polymathian take pride in solving the mathematics before the IT. If there is no value to be added, then discussing IT deployment and infrastructure is simply time and effort wasted. However, decision support software solutions from Polymathian typically offer significant value and hence sell themselves. A pragmatic approach is therefore to split projects into a value-add phase, followed by deployment and integration phases, in which the latter are contingent on a sufficient value proposition.

3. 'Sizing the prize'

We often undertake small, targeted 'size of the prize' exercises to demonstrate the spectrum of potential value prior to a project starting as part of a broader business case development initiative. Such an exercise requires a range of simplifying assumptions to be made and sensible data to be available for a first approximation optimisation to be undertaken, to explore the potential increase in value that can be found. In short, we are happy to put our skills on the line to help win new work.

4. The Tropofy advantage

Access to the Tropofy platform is an enormous competitive advantage.

The Tropofy platform is the framework in which all Polymathian products are customised, developed and supported. This means any enhancement for any product (funded by customers or Polymathian) is undertaken within Tropofy. Thus, all customers for all products are always benefiting from a constant stream of platform improvements.

"HVCCC entered in to a long term partnership with Polymathian to improve the efficiency of coal chain operations by developing an innovative optimisation-based decision support tool. As a result RACE was developed, which is helping to revolutionise the way we model what is a very complex value chain."

Chad Moffiet - HVCCC

5. Empowering the customer

A key part of Industrial Mathematics is the delivery of a solution that empowers the client to continue solving the problem as business conditions change. Polymathian deliver a hosted, easy-to-use tool, rather than a report or slide deck. This is what sets Polymathian apart from its competitors.

6. Project Affordability

Polymathian is often successful in competitive tenders due to price differentiation. This success is largely due to our effective utilisation of the Tropofy platform which allows improvements made in every project to be rapidly pushed into others.

7. Quick returns on investments

The typical payback period for Polymathian projects for large industrial clients is a few months, and has even been as low as one week after delivery.
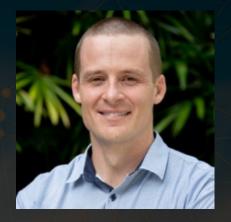
8. The speed of delivery

By using the Tropofy platform, experience, and partnerships with commercial decision support package vendors, Polymathian can configure and deploy solutions extremely quickly, with typical project durations of 8-12 weeks.

9. Staff quality and experience

Polymathian staff have an enormous breadth of experience in delivering Industrial Mathematics solutions to customers in a wide variety of domains. With this experience comes wisdom in understanding where the real value lies and hence how to focus project effort to achieve this as fast as possible.

Management Team

Polymathian is led by an experienced, responsive and engaged team, dedicated to guiding customer projects through to success. As a wholly owned and operated Australian business, Polymathian is committed to supporting local industry and export capability to international markets.

Ben Hollis, PhD
Director

Over 20 years' experience developing and commercialising optimisation based information systems for many of the world's largest companies spanning: passenger and bulk rail operations; terminal operations; transportation logistics; telecommunications; utilities; finance; sport; social services; health; marine; manufacturing and mining.

Jonathon White
Director

Over 15 years' experience applying advanced mathematics to some of industries toughest problems. Jonathon has solved problems for some of the largest companies globally in mining, rail, supply chain & logistics, shipping, oil & gas, to name a few.

Steven Donaldson
Partner

Over 10 years' experience as a project lead, mathematician and software architect. Steven has worked across a wide range of industries specialising in underground mining, rail, logistics and coal seam gas.

Clients

Polymathian's client list includes:

Contact Information

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