



Yellow Sub Hydro Ltd – Tech Brief

In engineering, mathematical modelling is ubiquitous and often an inter-disciplinary activity for many design processes. It is frequently the case that the mathematical modelling output from one discipline becomes the input to another. This is particularly true with designs that are affected by surface water and groundwater systems, where water can be viewed simultaneously as a valuable resource, a nuisance, a hazard, and a critical component of our environment that must be protected.

You don't fully understand something until you quantify it. But you understand nothing at all if all you do is quantify it. Therefore, insight is more valuable than a numerical result.

It is commonly thought that the purpose of a mathematical model is to help understand how a system works. While this perspective is largely true, for an engineer who is responsible for a design, the model's utility must be taken one step further by using the model results to make a decision. However, it is typically the case that the decision maker for a project is not the same person who produced the model. This creates a communication gap where the modeller's interpretation of the real-world system is usually perceived as a 'black box' by the decision maker. This communication gap exists because there is a depth and nuance to mathematical modelling which is difficult to share in a written report.

Technology with Purpose

Rising to face this black box model problem, our team aboard Yellow Sub Hydro Ltd have developed a cloud-based application for near real-time simulations of surface water and groundwater through a watershed to help understand impacts due to natural and manmade changes to the system. **We call this interactive watershed simulator 'Periscope'.** We are very proud of it and hugely excited by its potential to positively impact globally across multiple sectors and industries, including; regulation, agriculture and livestock, forestry, minerals and extractives, water utilities, thermo-electric, and more.

"Two minds are better than one" is a tested and true principle of science and engineering. It is with this spirit of testing ideas and collaboration that we have designed Periscope as a virtual environment for interactive and collaborative experiments on the hydrological system.

'**Periscope**' bridges the communication gap between hydrologists, engineers, and other decision makers by allowing these key stakeholders to see and even participate in the modelling process and gain the valuable insights that the modelling process provides. These complex water simulations can now become 'live' and constantly responsive to stakeholder inquires and current weather conditions.



Periscope - An Interactive Digital Environment

More than just a better approach, '*Periscope*' is an entirely new system of managing and communicating strategic water resources – reimagined from first principles. This is a cloud-deployed Software as a Service (SaaS) product with an intuitive web-user interface to maximise scalability and accessibility. Our clients are predominantly businesses either responsible for, or contingent upon water.

A model can never be proven true. It can however be proven false. Each unsuccessful attempt to falsify our model provides greater confidence in the model result. Frequent testing of our model is the key to confident decision making.

Periscope provides:

- a combined surface and groundwater simulator with real time interaction capabilities;
- encyclopaedic knowledge of your site and surrounding area which grows over time;
- a live and sharable database;
- real time interactive data analytics of your site, including benchmarking against 'similar' conditions;
- sharable communication and presentation outputs designed to communicate with a range of audiences from highly technical (graphs and charts) to general public (infographics);
- analogue and prototyping simulators for real time detailed analysis;
- a set of live 'base' models to start your project but are adjustable to suit the project study; and
- a sharable workshop environment to promote "Computer Aided Thinking" amongst teams.

Our Interactive Digital Environment is also a project management assistant which provides:

- automatic updates to the database and routine analysis;
- it will also provide reminders to collect data as scheduled;
- send warning emails when the data falls out of specification; and
- provide tutorials on observing, measuring, and modelling in hydrology.

Our clients and other stakeholders in water can now evaluate a broad range of 'what if' scenarios in real-time using our platform. If we can democratise access to data and decisions around water in this way, then as a population, we dramatically increase our chances of making better decisions around our most precious shared resource.

The future's bright...the future's Yellow!

We are proudly a triple-bottom-line B Corporation Certified business seeking, above all, to solve big problems and leave only positive tracks.

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