



ORTOMATION.IO

OPTIMIZING YOUR WORLD

Introducing ORTO™

A Novel Approach Real-time Optimisation

3rd November 2025

Paul Oram

Who Are We?



- Dr Paul Oram
 - >30 years working for BP
 - Final role: Chief Engineer - Instrumentation, Control & Electrical
 - Visiting Professor at Imperial College London
 - Founder of Ortovation.io



- Andrew Ogden-Swift
 - > 40 years working in digital systems and applications on manufacturing plants
 - > 25 years in research and development
 - ExxonMobil; KBC; ABB; Honeywell Process Solutions; Seeq

The Challenge.....

Develop a universal RTO tool that allows the user to explicitly configure an Optimization Objective Function

$$\begin{aligned} &\text{Minimize (or Maximize)} && J(u, d) \\ &\text{by choosing} && u \in \mathbb{R}^n \\ &\text{subject to} && g_i(u, d) \leq 0, \quad i = 1, \dots, m \\ & && u \in \mathcal{U} \end{aligned}$$

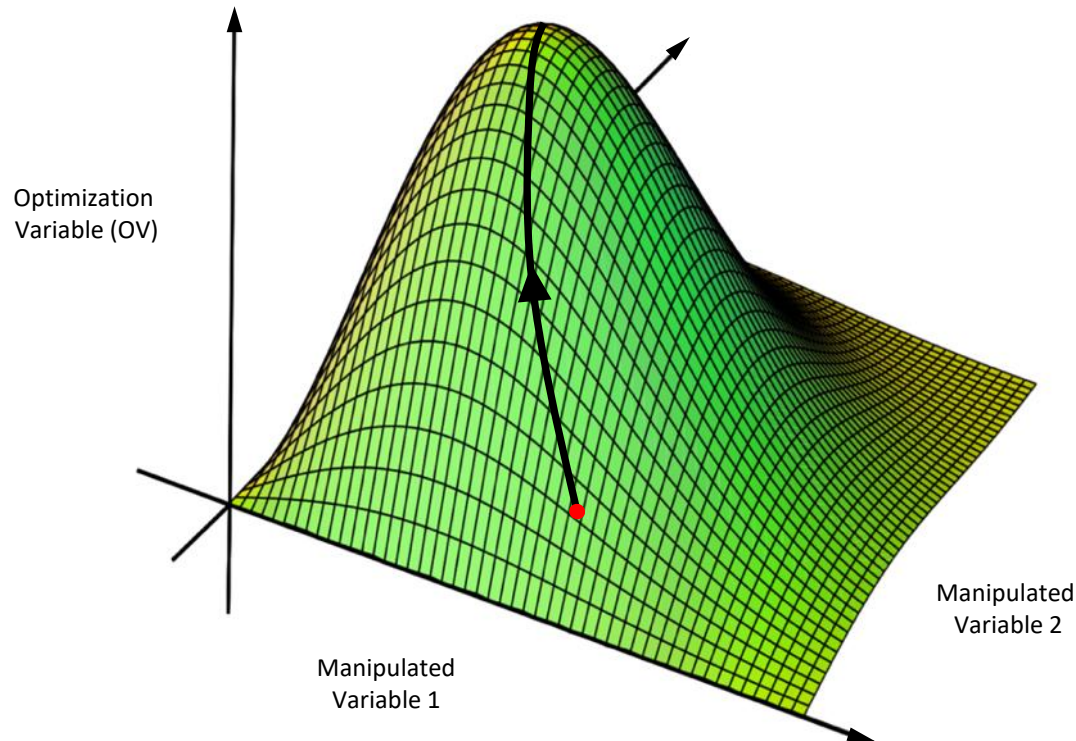
Where:

- u : manipulated variables (control inputs, setpoints).
- d : external disturbances/uncertain parameters (feed composition, demand, environment).
- $J(u, d)$: objective (e.g., profit, energy consumption, emissions).
- $g_i(u, d)$: constraints (safety limits, equipment bounds, product specs).
- \mathcal{U} : feasible operating region.

Make RTO implementation 'as simple as PID'

What is Real-time Optimization (RTO)?

Two MVs (no constraints):

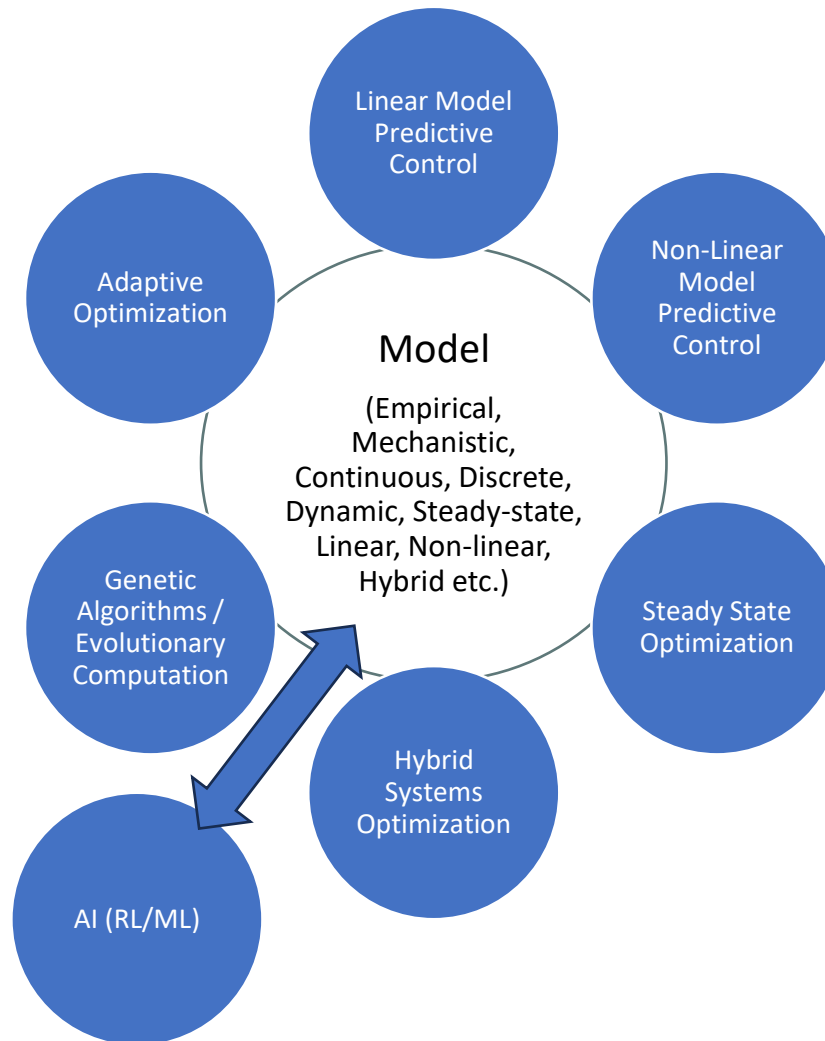


- **RTO** is a **generic technology** and has applicability across many industry sectors
- Works in **closed loop** (no human in the loop)
- Typically, the OV is a **proxy for profitability** e.g., an indicator / calculation of:
 - **Production** (maximize)
 - **Operating costs** (minimize)
 - **Emissions** (minimize)
- **Delivered benefits:** 2-10% in the OV
- **Payback** measured in months, if not days.
- **Existing market** size ~\$0.5B - ~\$1B / annum.
- **However**, there are an estimated **five million PID controllers** in operation across all plants worldwide, but only a **tiny fraction** of these are being written to by RTO. **Why?**

The current state-of-play.....

Existing technologies have been very **successful**, where:

- **Expertise** exists
- Companies have the **\$ resources**
- Applications justify the **time** and **expense** to **build** and **sustain** them



Dominant **commercial solutions** all have one thing in common: a **deep dependency** on having a **high-fidelity model** of the process.

Making implementing schemes:

- **Difficult** and **laborious** to build & maintain
 - Reliant on **specialised** and **scarce** experts
 - Prone to **model error**
 - **Costly**
 - **Opaque / black box** to the end user
-
- Current RTO market size ~\$0.5B-\$1B / annum
 - BUT, only ~10% of the possible market being served

The Opportunity

Traditional RTO is often ruled out or never considered because....

- The application doesn't warrant the **expense** to **build** and / or **sustain**.
- Site doesn't have access to the **expertise** to design, build and / or sustain application.

Traditional RTO is often switched off because...

- Growing **process-model mismatch** degrades RTO performance over time

- Current RTO market size
~\$0.5B-\$1B / annum
- BUT, only ~10% of the possible market being served

Our target market:

- Industry sectors and applications where traditional model-based solutions have been **overlooked, ruled out** or **failed**, due to:
 - An RTO **knowledge gap**
 - A **lack of expertise** to draw upon
 - Build and / or sustain **costs being too high**

So, what is ORTO™?

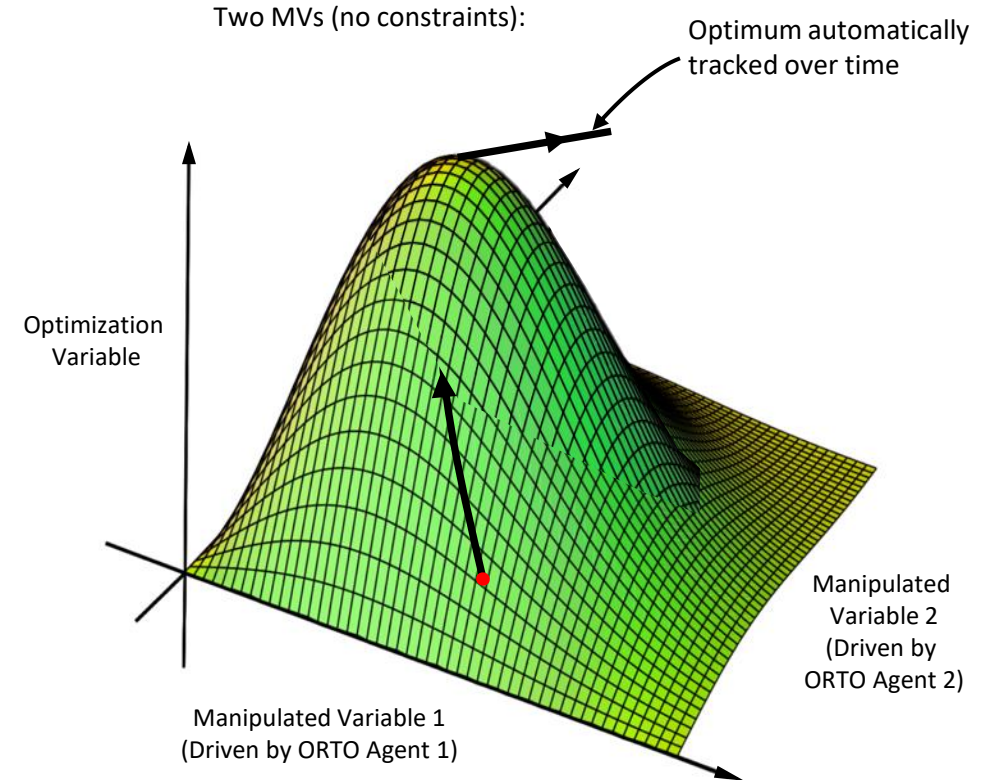
- A completely **novel model-free approach to process and system RTO**
- ORTO™ optimization schemes comprise of one or more '**ORTO Agents**'
 - Reside in dedicated ORTO™ software
 - Or, in OEM DCS / SCADA control libraries (future)
- Agents are:
 - **Simple** to configure and deploy
 - **Self-learning** and **autonomous**.
 - Work together, in closed loop, to **find** and then **track** the **optimum over time**
- Agents are not:
 - **AI** based

Presently, the ORTO algorithm is being kept as a **trade secret**. **Patents** are being prepared.



ORTOMATION.IO

OPTIMIZING YOUR WORLD



A new disruptive approach to process optimization....



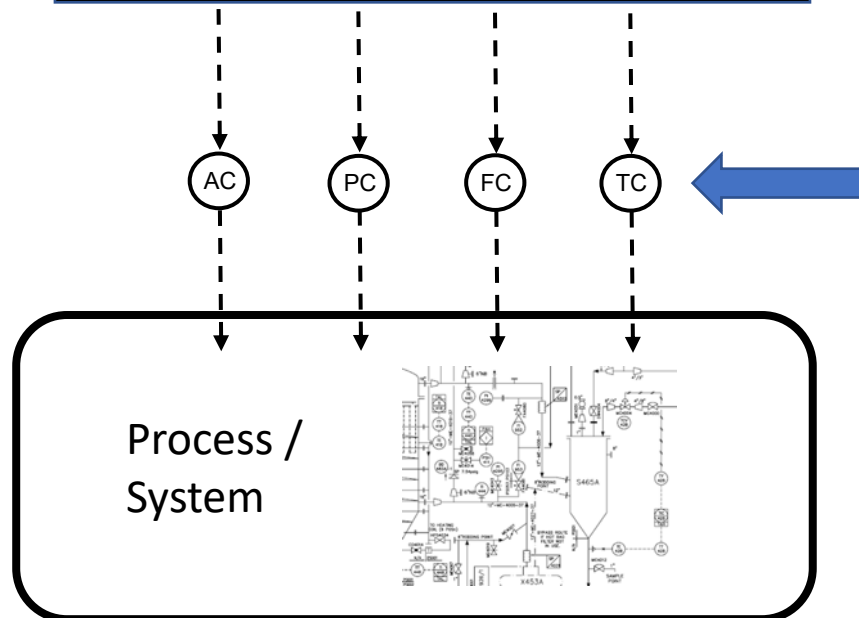
ORTOMATION.IO

OPTIMIZING YOUR WORLD

Existing RTO solutions – model dependency makes them:

- Difficult / dependant on scarce expertise
- Deteriorate
- Resource intensive
- Bespoke
- Require lots of maintenance

Traditional Real-time Optimization Software Solutions

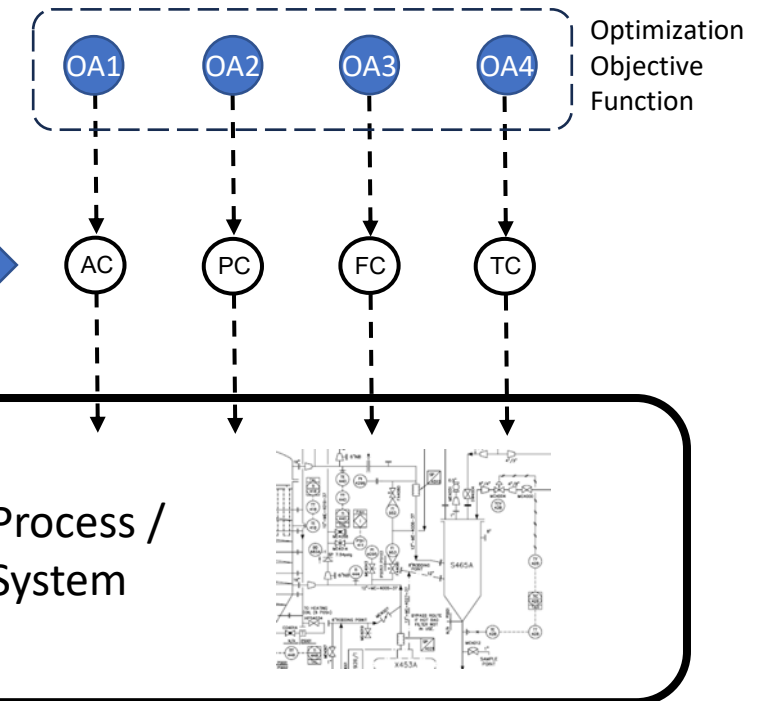


Regulatory PID:

- Simple
- Robust
- Intuitive
- Standardised / Scalable
- Minimal maintenance

'ORTO Autonomous Agent' (model-free) approach:

- Simple
- Robust
- Intuitive
- Standardised / Scalable
- Minimal maintenance

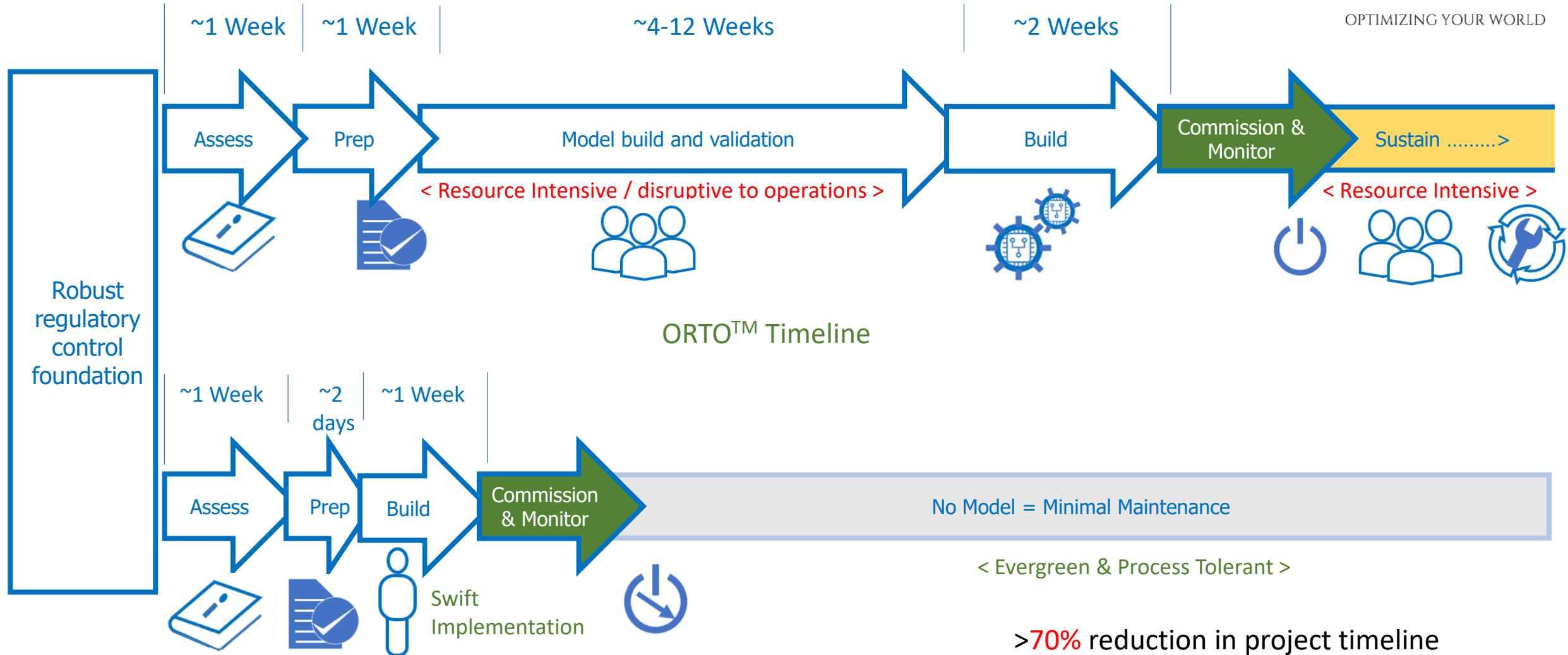


Traditional Model-based Optimizer versus ORTO™ Timeline



ORTOMATION.IO

OPTIMIZING YOUR WORLD



>70% reduction in project timeline

>90% reduction in maintenance

Key Milestones Achieved



ORTOMATION.IO

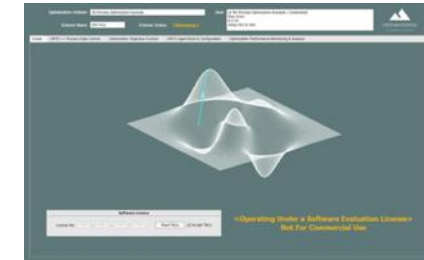
OPTIMIZING YOUR WORLD



1. Proof of Concept

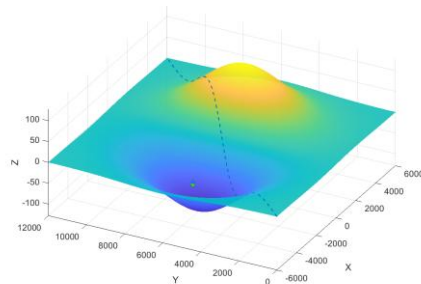
- Conducted with a major O&G company
- ORTO used to maximize catalyst life on a ULSD refinery unit
- ORTO succeeded where conventional RTO / AdCon techniques had failed

2. Commercial ORTO™ software developed



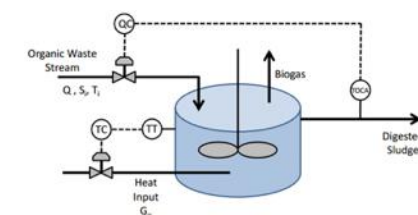
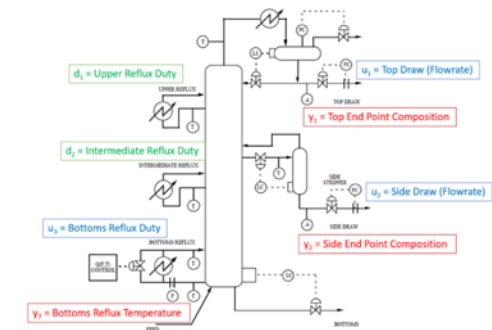
3. Internally tested to optimize systems / processes, for example:

- Numerous academic benchmark problems
- Distillation column optimisation
- Variable speed wind turbine power output maximisation
- Total power maximization from a wind farm
- Wider optimization problems, including
 - PID control adaptive tuning
 - Non-linear Model parameter estimation



4. ORTO independently tested and validated by a specialist third party

- Applied to 'benchmark' optimization problems:
 - Anaerobic Digestion Reactor
 - Shell Heavy Oil Fractionator
- All success criteria achieved:
 - Minimal training needed
 - Schemes quickly implemented
 - Constraints adhered to
 - True optimum found and then tracked
 - Software intuitive, easy to use



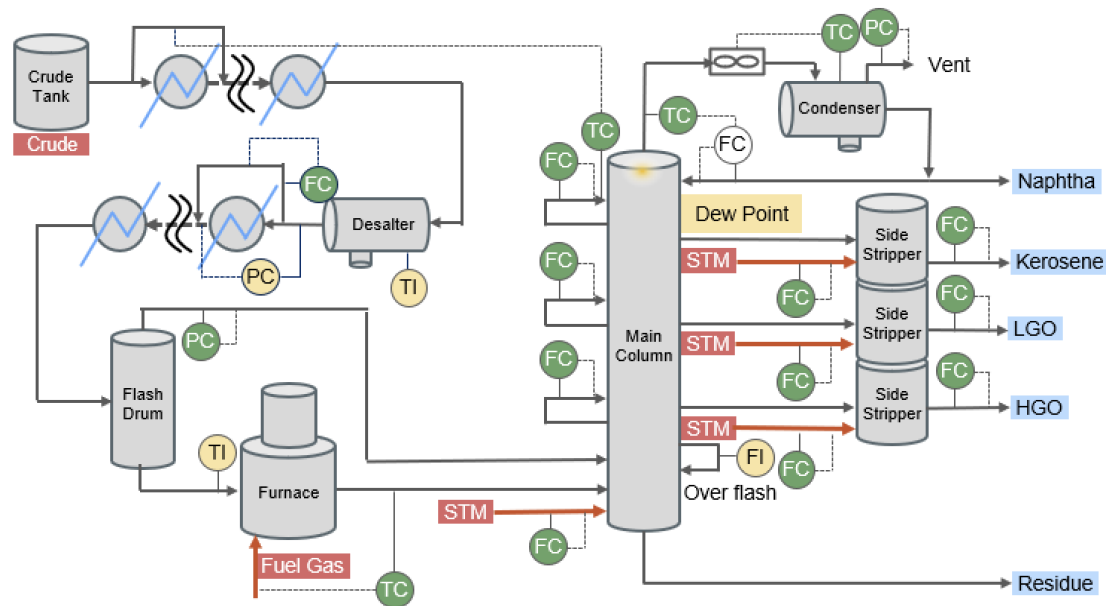


ORTOMATION.IO

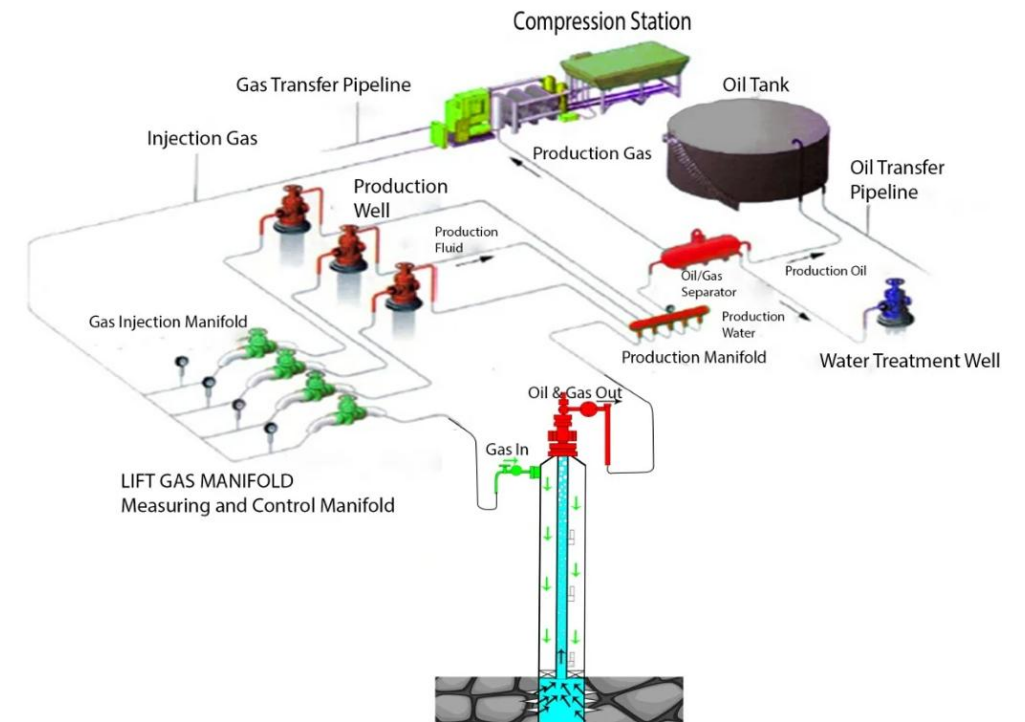
OPTIMIZING YOUR WORLD

Recent Applications

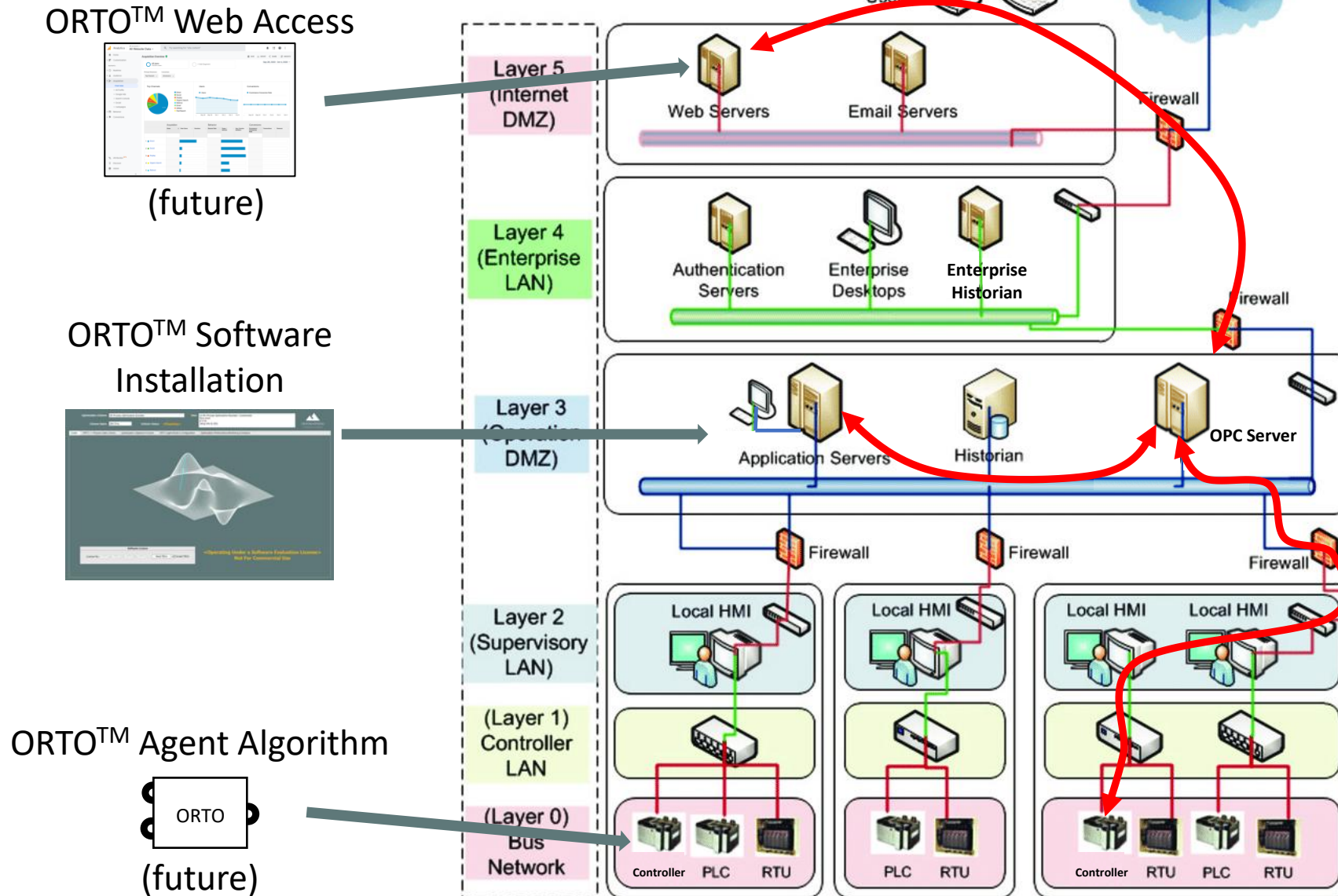
CDU Optimization



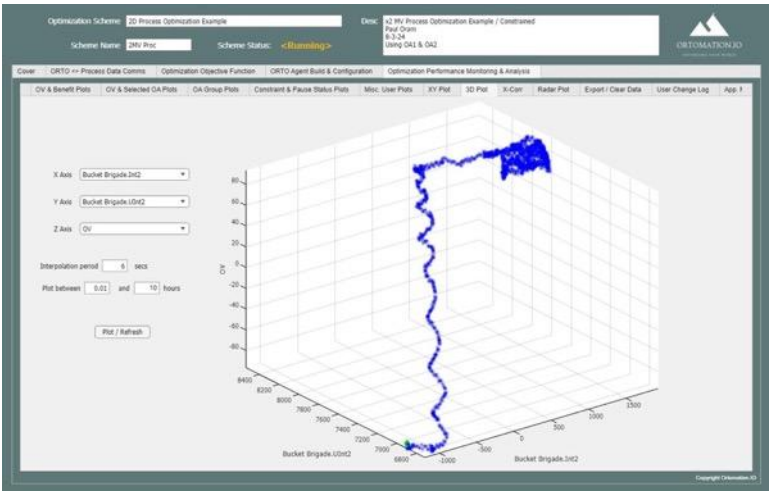
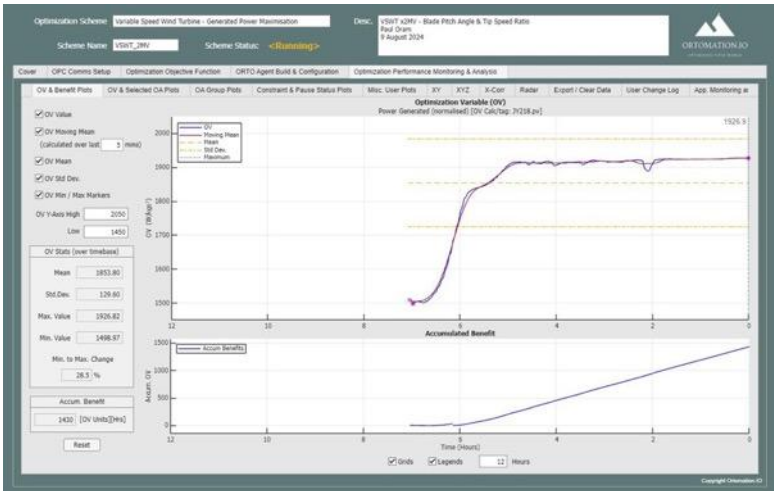
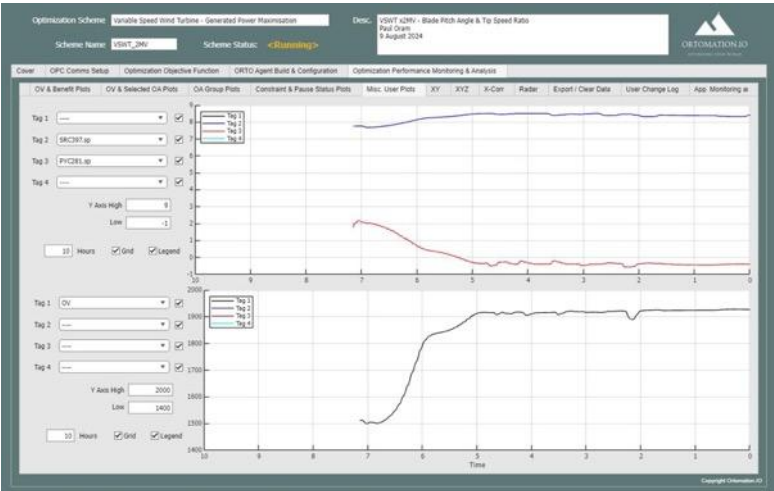
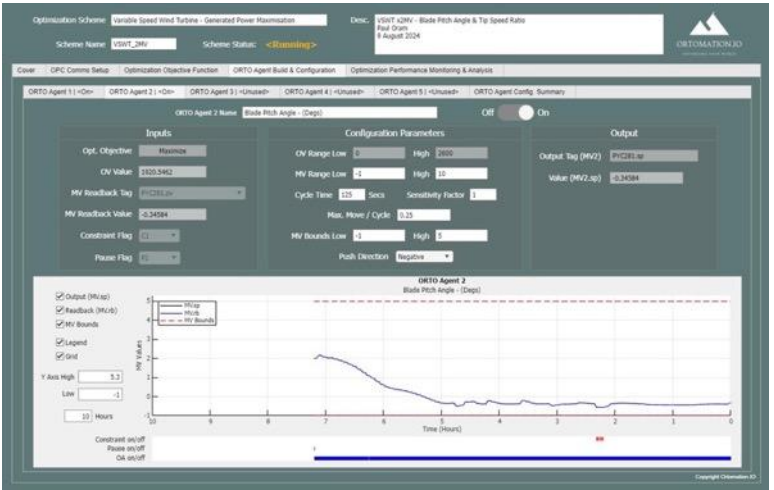
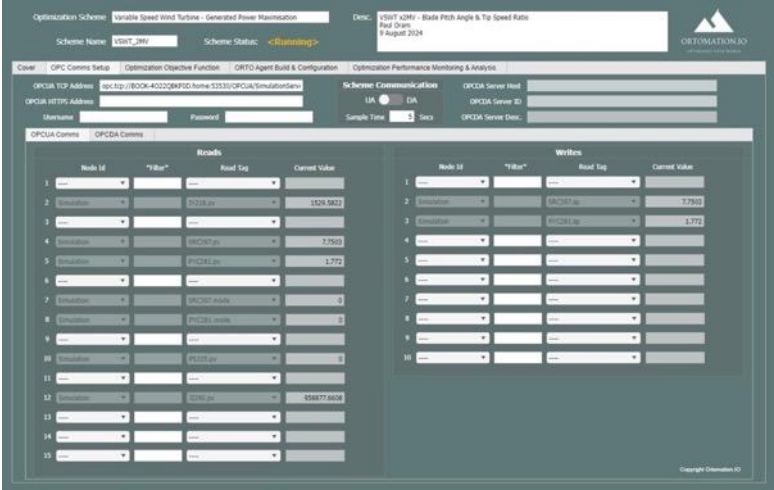
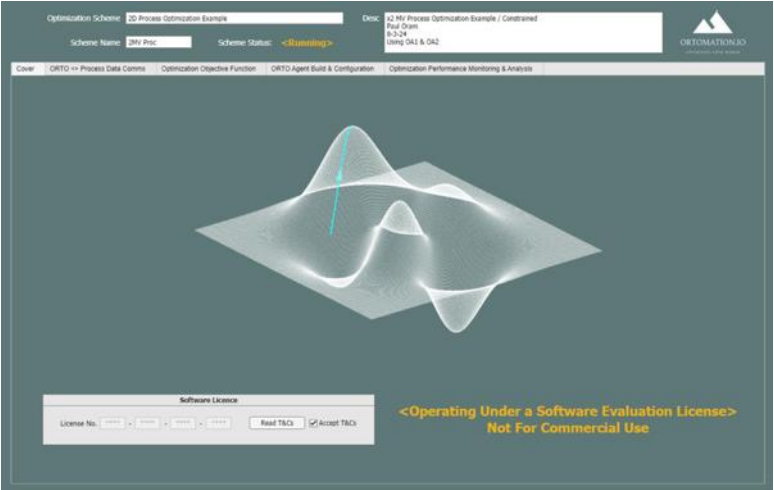
Gas Lift Optimization



Implementation Pathways....



ORTO software...



Differentiators

- Why is ORTO different? What are its key **USPs**?
 - ORTO is **model-free**, unlike traditional RTO technologies.
 - There is no process-model mismatch to affect performance.
 - Being model-free greatly simplifies build, commissioning and maintenance - speeds implementation
 - ORTO converges on and then tracks the true optimum, because its 'model' is the actual process.
- The ORTO algorithm is deterministic, whereas AI solutions are not.
 - For the same set of inputs, ORTO will give you the same output.
 - AI will not i.e., it is non-deterministic. Thus, how do you know AI has reached the true optimum? Answer: you don't.
 - AI is also only as good as the data it's been trained on. Extrapolate at your peril. What if your optimum operating point lies outside the training area?
- An ORTO optimization scheme is 'as simple to build as a PID scheme'.
 - No need to source expensive expertise.
 - Reduced time to benefits

ORTO can take RTO from being niche to ubiquitous, across all processes.

Summary

- ORTO is:
 - A completely **new approach** to real-time optimisation
 - **Model-free**
 - Dramatically reduces **engineering effort**
 - Highly **scalable**

‘As simple as PID’



ORTOMATION.IO

OPTIMIZING YOUR WORLD

Need more info?

Visit: www.ortovation.io

Contact: paul@ortovation.io
andrew@ortovation.io