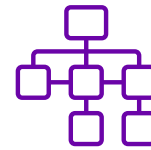NOVEMBER 2022

AVEVA™ Schedule AI Assistant – Applying Artificial Intelligence to Scheduling

Katarzyna Juda – Product Manager, AVEVA Unified Supply Chain

AV=VA

Effective economic optimization of hydrocarbon value chain can boost profitability by **$50 to 300 million** *per year for a typical oil refinery*

AVEVA Value Chain Optimization

Business process improvement
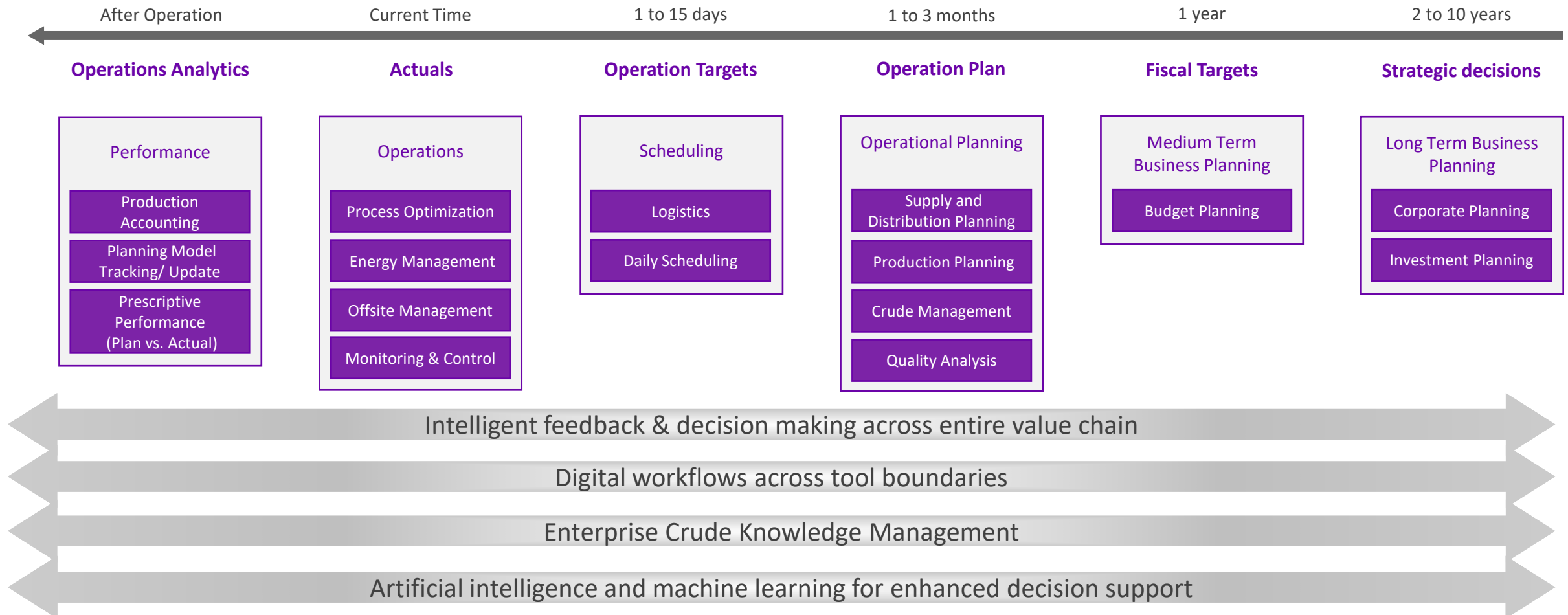
Break down silos

Better decision making

Improve margin and sustainability

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AVEVA's Value Chain Optimization

Enable Enterprise Collaboration & Agility to Maximize Profitability Across the Value Chain

After Operation	Current Time	1 to 15 days	1 to 3 months	1 year	2 to 10 years
Operations Analytics	**Actuals**	**Operation Targets**	**Operation Plan**	**Fiscal Targets**	**Strategic decisions**

Performance
- Production Accounting
- Planning Model Tracking/ Update
- Prescriptive Performance (Plan vs. Actual)

Operations
- Process Optimization
- Energy Management
- Offsite Management
- Monitoring & Control

Scheduling
- Logistics
- Daily Scheduling

Operational Planning
- Supply and Distribution Planning
- Production Planning
- Crude Management
- Quality Analysis

Medium Term Business Planning
- Budget Planning

Long Term Business Planning
- Corporate Planning
- Investment Planning

Intelligent feedback & decision making across entire value chain

Digital workflows across tool boundaries

Enterprise Crude Knowledge Management

Artificial intelligence and machine learning for enhanced decision support

Scheduling in Value Chain Optimization

Conflicting Targets Across the Value Chain

CRUDE TRADER

Processing experience: how was refinery performance for a particular crude?

Operational status: can I gain benefits of on a crude or distress cargo?

Maintenance: Impact in refinery profile?

Regulations: Impact on crude requirement?

REFINERY SCHEDULER

Feasibility: Is my schedule based on accurate crude and operation info?

Inventory: Are tanks available to receive next cargo?

Accuracy: are there margin leaks in plan v/s schedule v/s actual?

LOGISTICS PLANNER

Demand: what flexibility I have to fulfil product demand?

Market changes: What impact will a change in supply decisions have to the production economics?

TRADING	PLANNING	SCHEDULING	OPERATIONS	DISTRIBUTION

DOWNSTREAM MANAGER

How can I maximize profitability & agility across my Enterprise?

PRODUCTION PLANNER

Real capability: is my planning model accurate?

Profitability: Any constrains impacting best solution? Robust plan?

Operation: operating KPI's aligned with production planning objectives?

OPERATIONS MANAGER

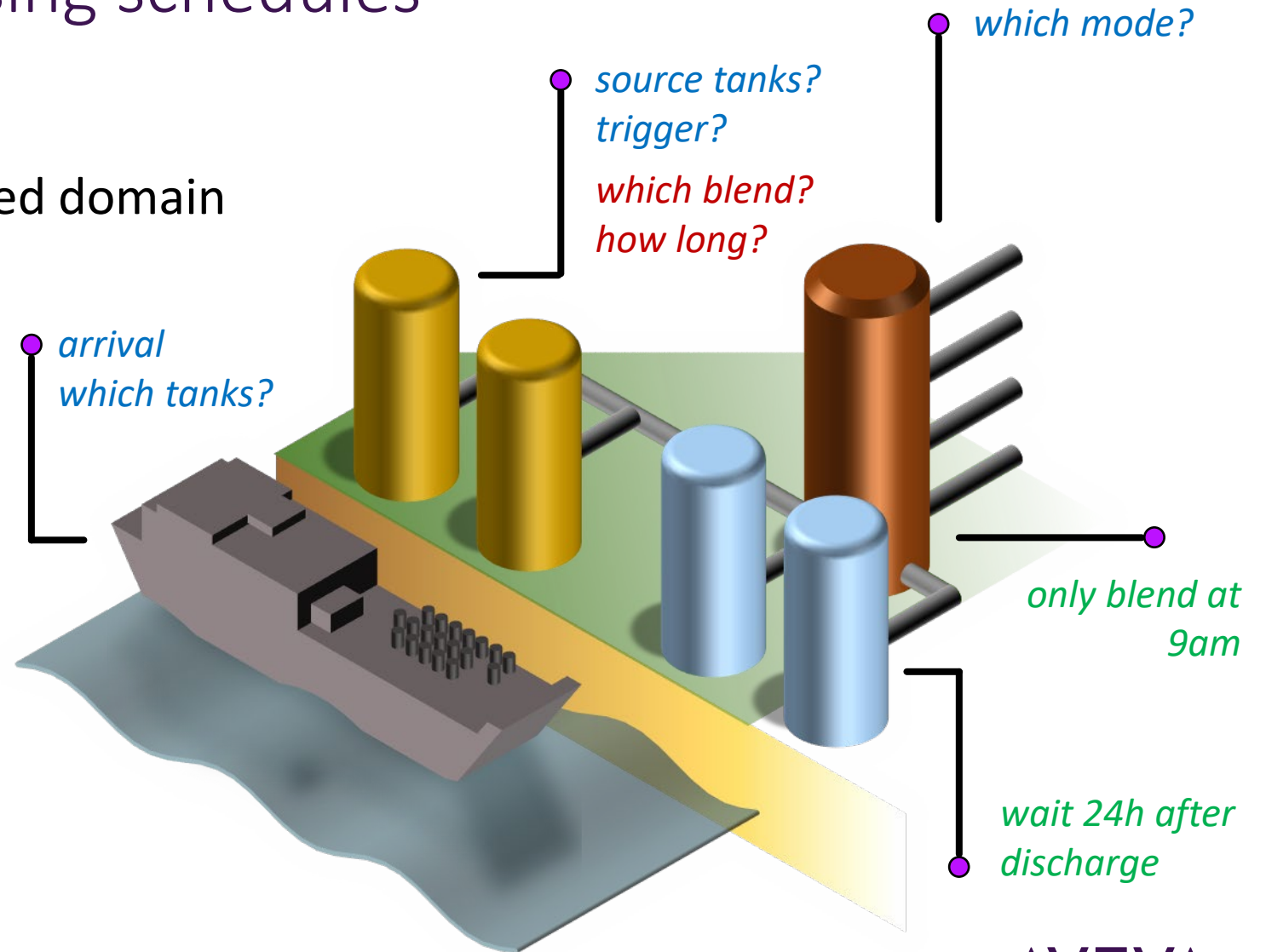**Safety**: is my plant safe and stable?

Workforce: what tools are available for better real time decision making?

Optimization: can I meet or improve planned target?

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The challenge of optimising schedules

What sort of problem?

- Complex decision-making in mixed domain
  - discrete
  - continuous
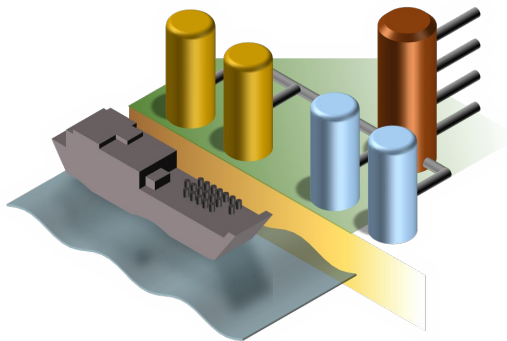- Refinery and schedulers' idiosyncrasies
  - algorithmic

source tanks? trigger?

which blend? how long?

which mode?

arrival which tanks?

only blend at 9am

wait 24h after discharge

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The challenge of traditional scheduling

Repetitive Trial and Error

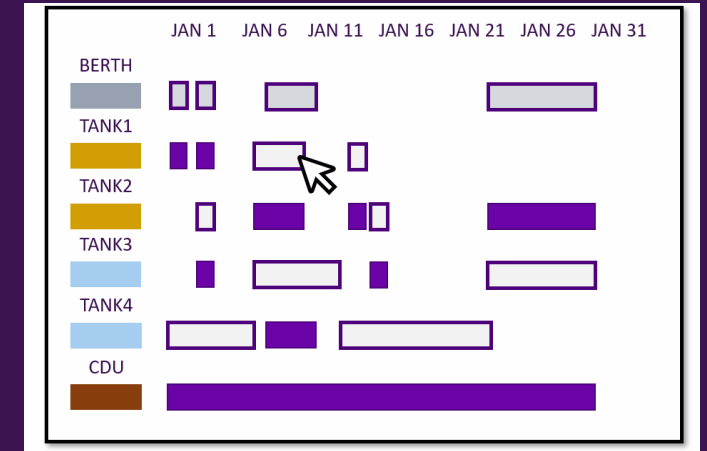USER

Start at **9:00 AM.**
Finish at **2:45 PM**.

~Hours

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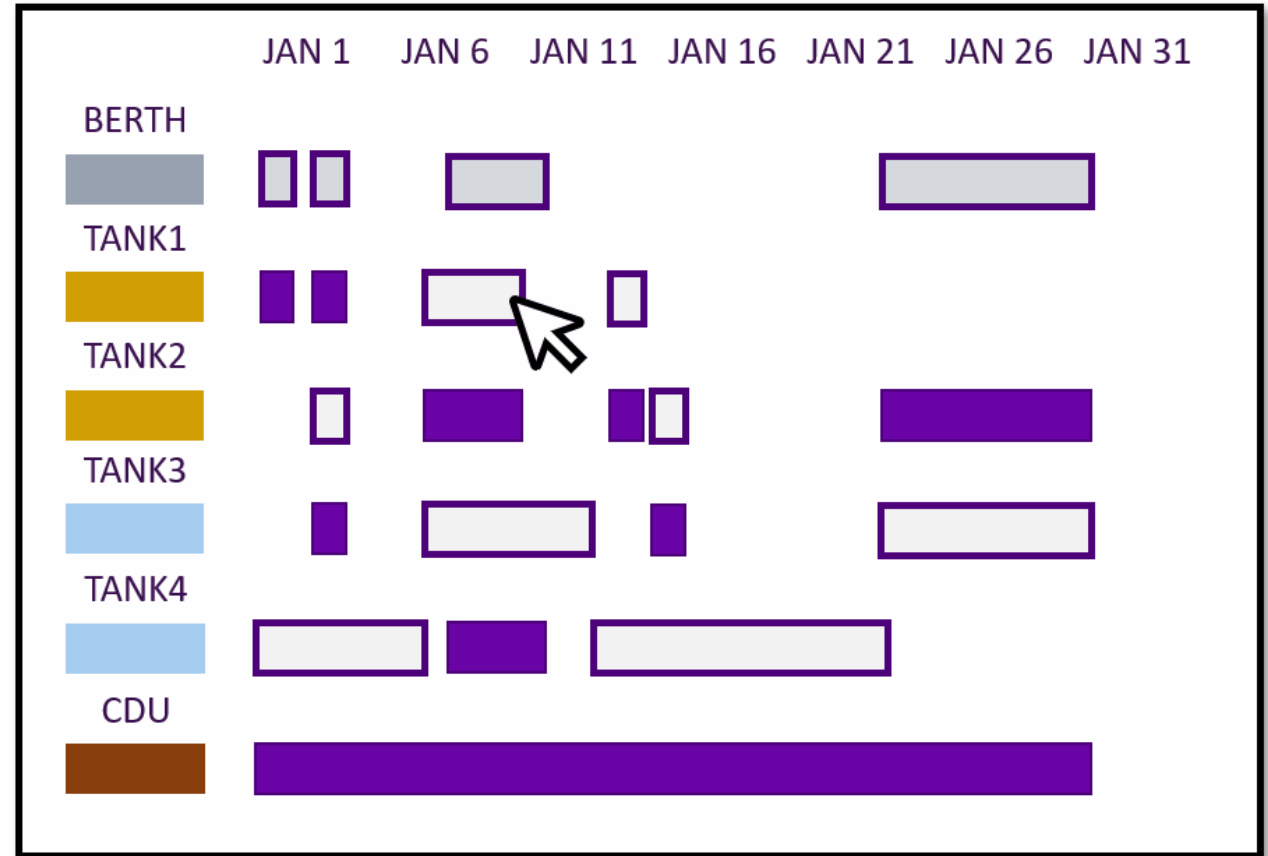
Traditional Scheduling

Summary

User performs trial and error to find feasible solution using "sophisticated calculators" tools

- Limited by human ability (trial and error)
- Slow reaction to change
- Basic optimization

Repetitive trial and error

Accuracy	Vs.	Speed
Automation	Vs.	Maintainability
Optimization	Vs.	Accessibility

AVEVA's solution: next generation scheduling

Rapid Schedule Generation

Start at **9:00 AM.**
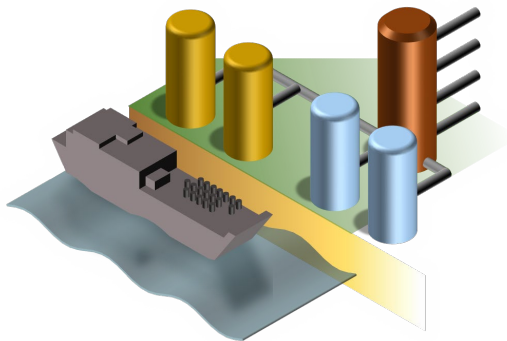
USER

DATA FEED
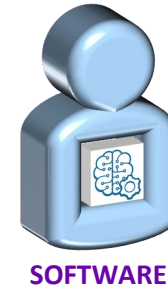
SOFTWARE

SOFTWARE SUGGESTS
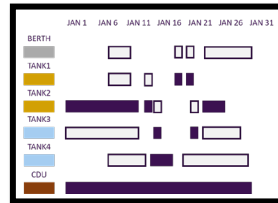
PRODUCTION SCHEDULE
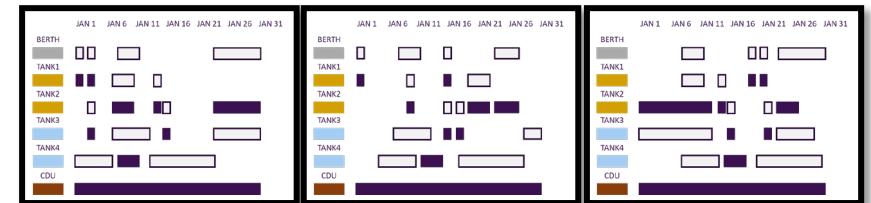
RECOMMENDATION 1   RECOMMENDATION 2   RECOMMENDATION 3

IMPLEMENT

SCHEDULER

USER SELECTS AND REFINES

~Minutes

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USC Schedule AI Assistant

Rapid schedule generation

User refines a system generated schedule to find an optimal solutions

- Rapid schedule generation
- Scenario planning and optimization built-in
- Intuitive user experience

DATA FEED

SOFTWARE

SOFTWARE SUGGESTS

RECOMMENDATION 1   RECOMMENDATION 2   RECOMMENDATION 3

SCHEDULER

USER SELECTS AND REFINES

IMPLEMENT

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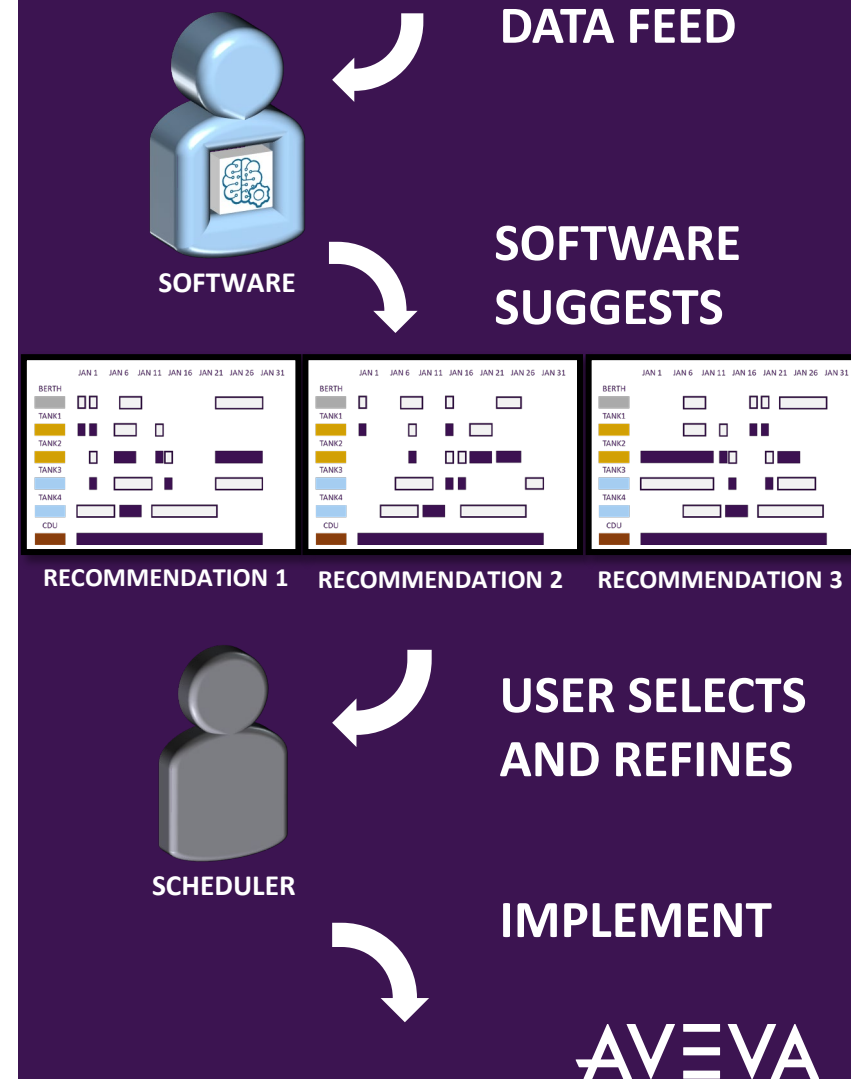
Example of this approach
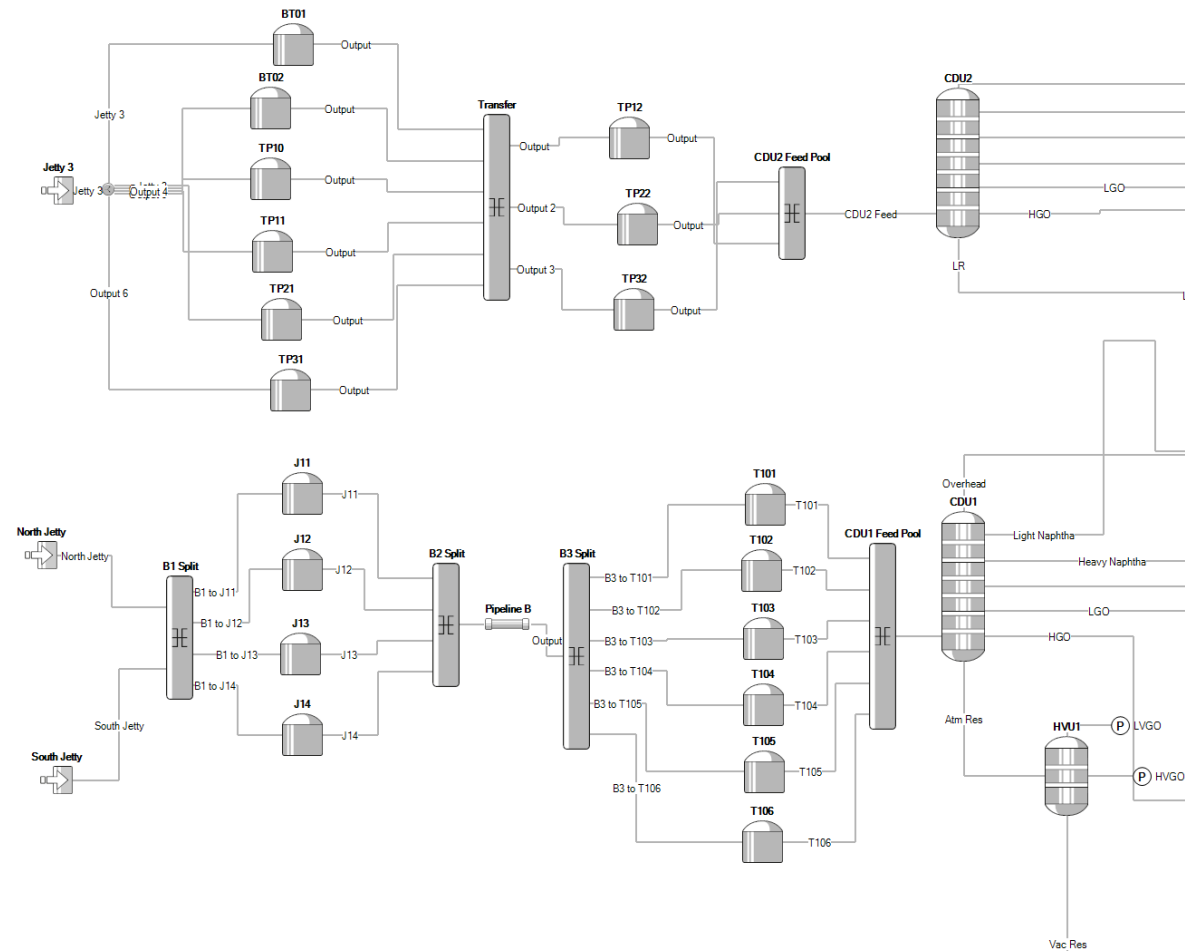
Maps, flight searches etc.

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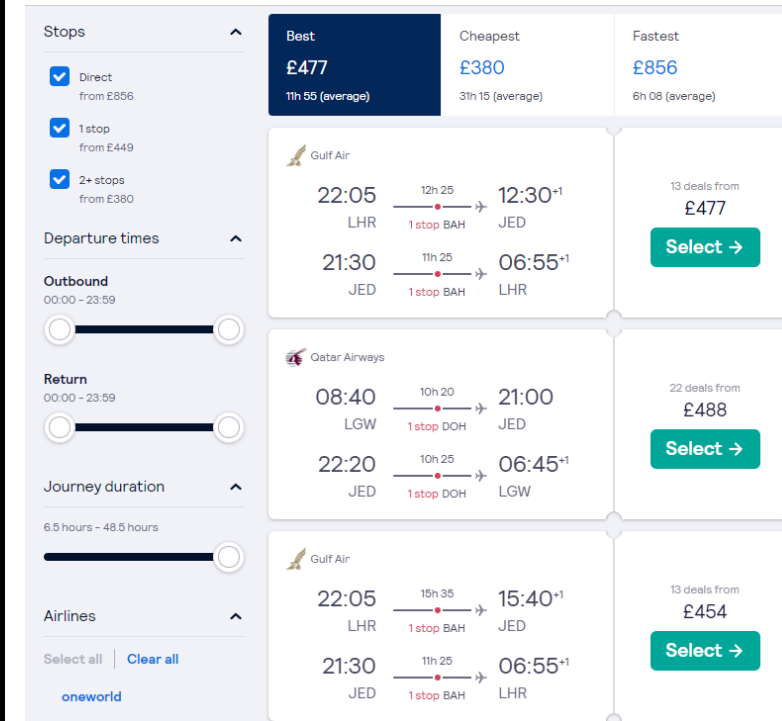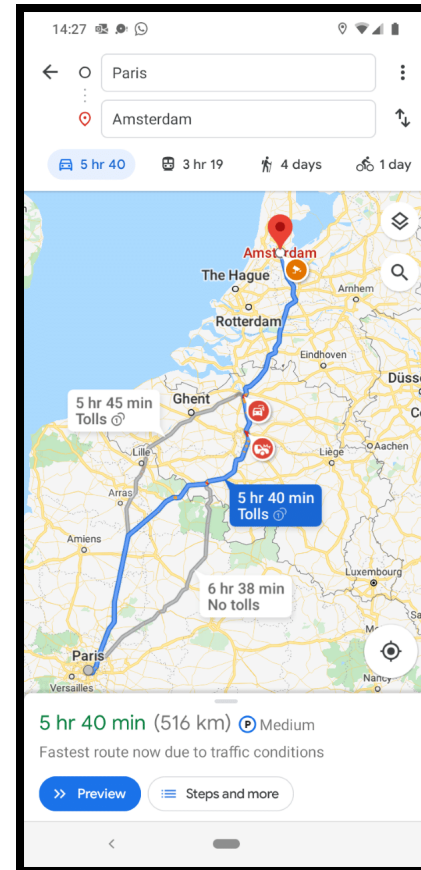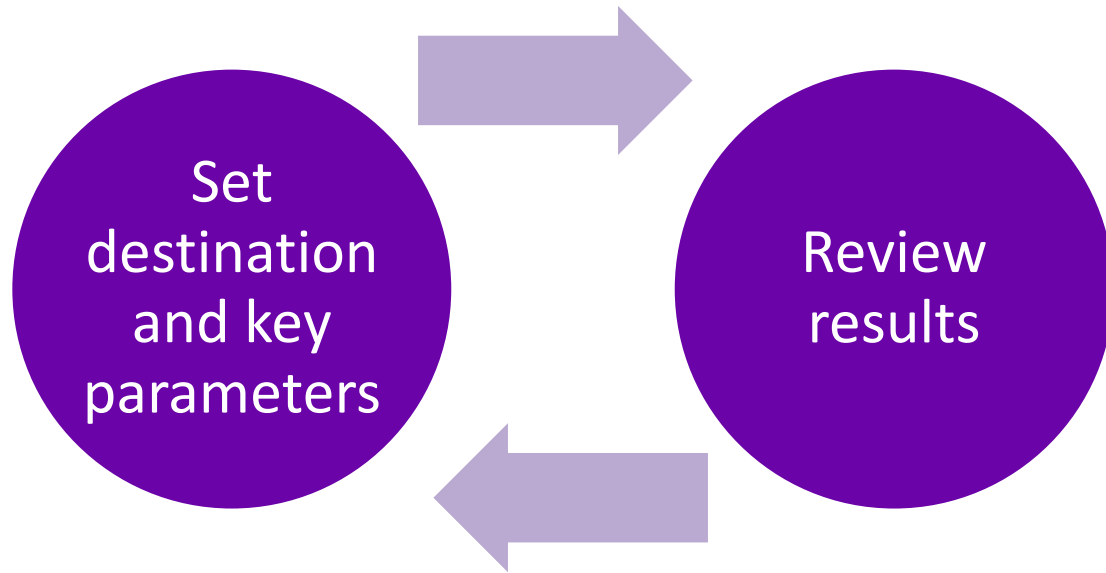
Demonstration

Rapid Schedule Generation

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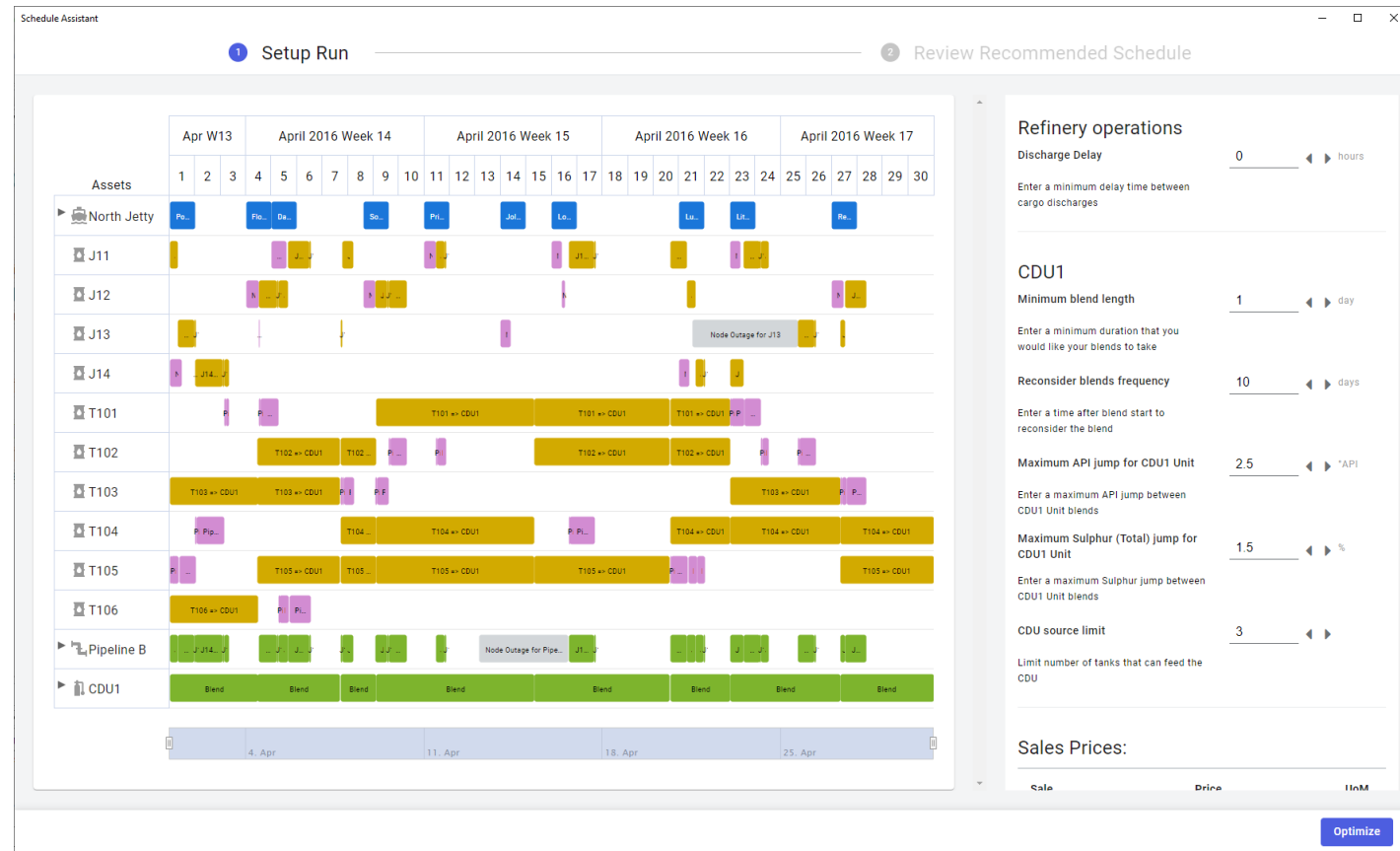# Schedule AI Assistant

Topology

Schedule AI Assistant

Rapid Schedule Generation

- Operating rules for Berths/Tanks/CDU
- Topological connections
- Material Property constraints
- Shipping Penalties & Delays
- Shared Resources
- Min/Max inv. for all tanks
- Flowrates to and from all units
- CDU-VDU property and flow constraints
- Multiple CDUs
- Crude blending constraints
- Exclusive use of assets
- Economic pricing steers
- Pump constraints
- Pipeline management
- Outages/Maintenance downtime

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Schedule AI Assistant

Summary

- Schedule AI Assistant **captures unique operating complexity and constraints** of specific site

- Using AVEVA Cloud with AI and Optimisation it **automatically generates** and evaluates **multiple schedules** in line with the objectives and anticipated events within the Supply Chain

- Output is practical **understandable instructions** with **strong explanatory power** which can be immediately implemented

- What would **take days of work** is completed **in seconds** with increased business agility and **optimised decision making**

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Questions?

Please wait for the microphone

State your name and company

Please remember to...

Navigate to this session in the mobile app to complete the survey.

Thank you

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