



# Uptime, Downtime and Event Tracking

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**RtTech** Software Inc.

**RtTech**

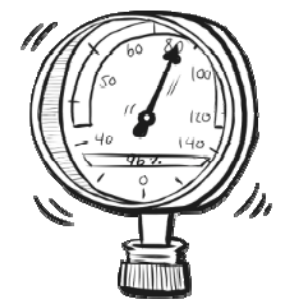
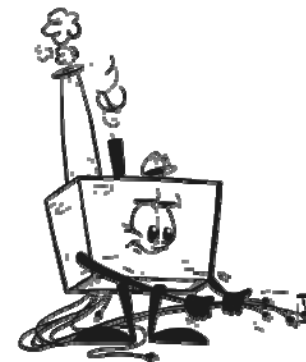
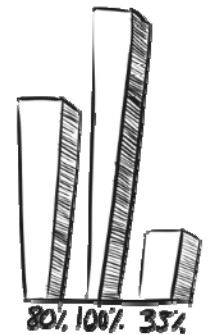
# RtTech Software

- RtTech is a company formed in November 2011 as a spin-off of **ADM's** Software division.
- Develops software products to improve **asset availability**, **utilization** and **utilities consumption**
- Based in NB, Canada
- Sales Offices in Australia and UK
- Customers in 13 countries (6 in Europe).
- **RtTech** Software and **OSIsoft** are partners



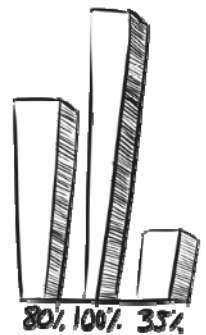
# RtTech Software

- Developers of:
  - **RtDuet**: Downtime Monitoring and Maintenance & Reliability KPI calculator
  - **RtEMIS**: Industrial Energy Management Information System



# RtDuet

**RtDuet<sup>TM</sup>**  
*Real-time Downtime, Uptime & Event Tracking*



# RtDuet – What does it do?

- Downtime Monitoring and Maintenance & Reliability KPIs like Availability, Utilization, OEE, MTBF, MTTR,...
- Automatically captures downtime events complete with associated equipment, problem, cause and category
- Generates standardized, real time reports for maintenance and capital planning
- Seamlessly shares data with other MES applications and databases through Web services.

# Why Manage Downtime

- Increased plant efficiency and performance
- Extended asset life cycle
- Calculate key maintenance and reliability metrics
- Reduced Unplanned Maintenance
- Reduced maintenance costs
- Improved product quality
- Greater visibility of asset performance
- Working smarter rather than harder

# Downtime in Operations

- Equipment Stoppages
  - Unplanned maintenance (breakdowns)
  - Scheduled maintenance
  - Operational delays (blockages, shift change)
  - Non-scheduled time
  - Idle (Energy supply, feed supply, stock-bound)
- Equipment Slowdowns
  - Aging equipment
  - Poor quality feed
  - Bottlenecks

# Typical scenarios

- Paper log sheets / Excel based solution
  - Inaccurate information
  - Time consuming
  - Sheets are lost
  - Comments can not be analysed or quantified
- Downtime collation time consuming
- Uncontrolled information
- Home grown reporting systems are expensive to develop and maintain.



# Rio Tinto – Argyle Diamonds

- Argyle Diamonds Overview
- OSIsoft at Argyle Diamonds
- Delay Accounting Overview
- Project Scope
- RtDuet Implementation
  - Features, Problems, Solutions
- Questions?

**RioTinto**

# Argyle Diamond Mine - Background

- Commissioned in 1985 @ 3 Mtpa
  - Crushing, Screening, DMS, X-Ray
- Peak Capacity
  - 40 Million Carats
  - 10 Mtpa
- Signature Pink Diamonds
- Underground Future – Block Caving



# Past:



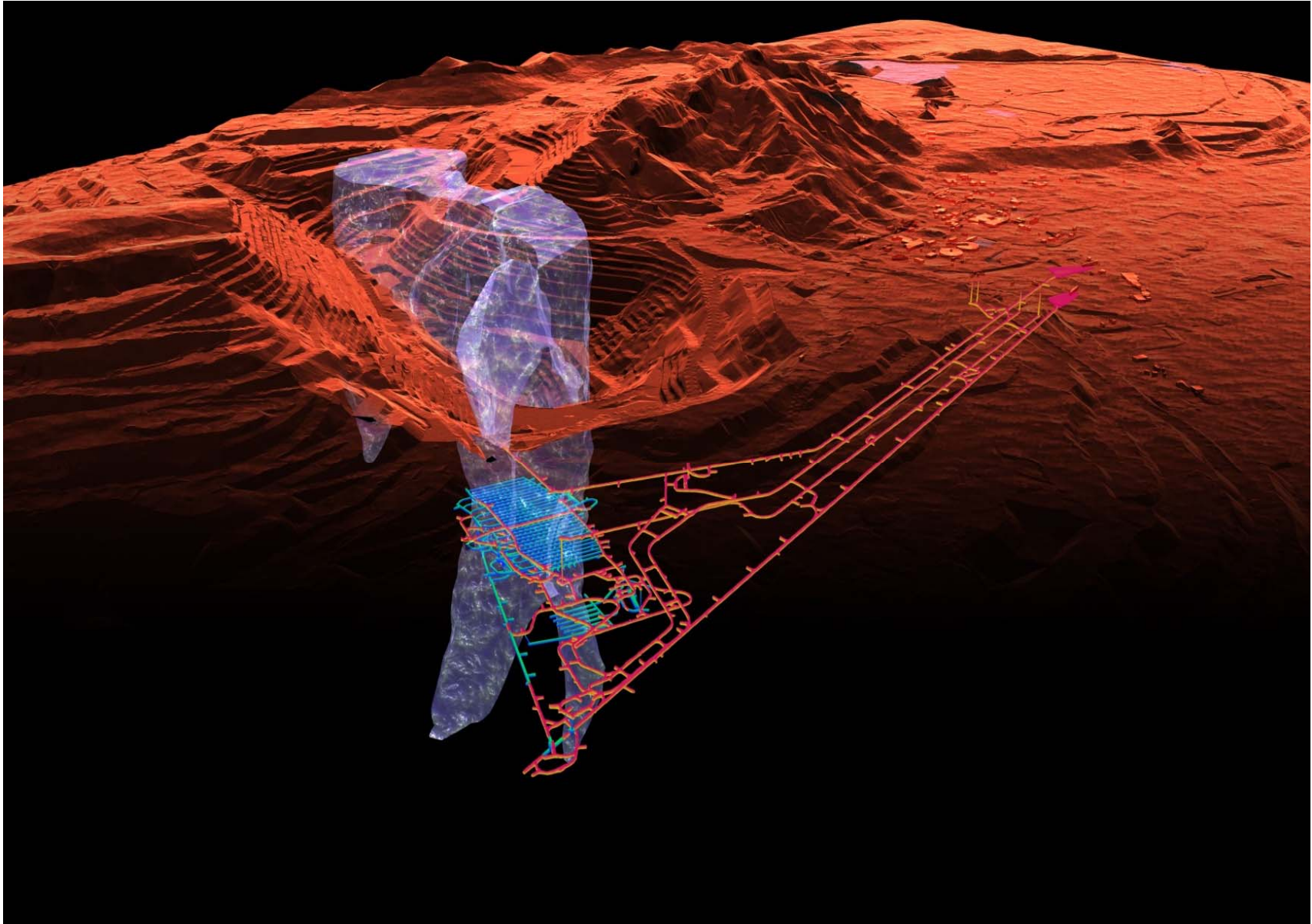


# Present:





# Future:



# OSIsoft at Argyle Diamond Mine

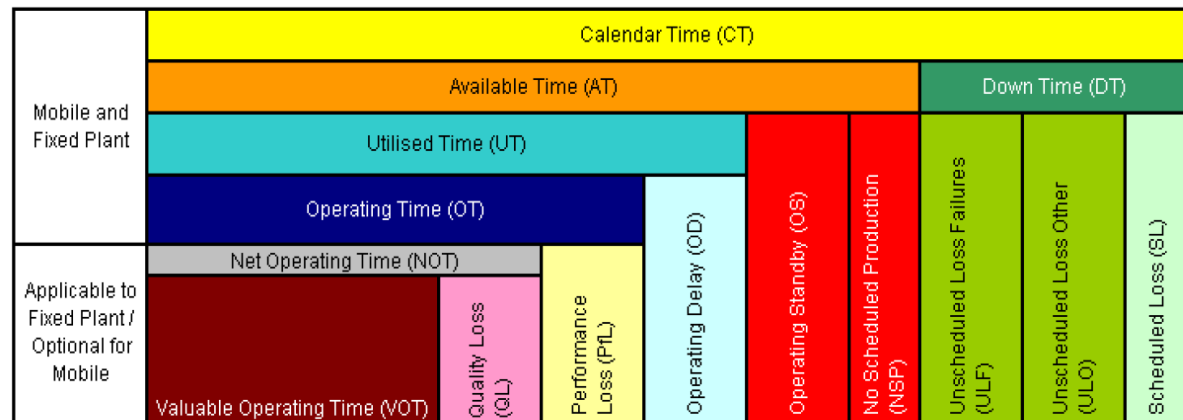
- PI System – 6000 tags
- 2009:
  - Installed to monitor power station
- 2010-2012:
  - Process Plant daily reporting (Datalink)
  - Process Plant analytics (ProcessBook & Datalink)
  - Process Plant Delay Accounting (AF & RtDuet)

# Delay Accounting – What is it?

- Record plant events:
  - Downtime (plant stops)
  - Reduced capacity
    - (rate or quality)
  - Accurate data essential
- Attach detail:
  - Related Equipment
  - Nature of fault
  - Reason code
  - Root Category
  - Comments

# Delay Accounting – Why?

- Benefits
  - Accurate data for asset metrics
  - Focus maintenance
  - Identify opportunities
  - Justify capital spend
- End Goal:
  - Increase availability & utilisation





# Delay Accounting - Legacy System

- In-house development – Mid 90's
  - Citect P2B, MS Access, Ellipse\Corvu
- Positives:
  - Fast, Familiar, Stable
- Negatives:
  - No support or knowledge
  - Poor data quality & reporting
  - Large quantity of small delays

The screenshot shows the 'Delay Accounting' application window. It features a menu bar with 'Operations', 'Records', 'Filter', 'Data', 'Application', and 'Copy/Paste Details'. Below the menu bar are several buttons: 'Accounting', 'Split', 'First', 'Refresh', 'Last', 'Unaccounted Only', 'Select Date', 'Quit', and 'Close'. The 'Select Date' button is set to 'Tue, 06 Jul 10'. The 'Copy/Paste Details' section has buttons for 'Button', 'View', and 'Copy'. The main data area is a table with columns: 'Module', 'Start', 'End', 'Duration', 'Location', 'Reason', and 'Equipment'. The table contains multiple rows of delay records, each with a 'Copy' button to its right.

Module	Start	End	Duration	Location	Reason	Equipment
QMSC	06 Jul 11:03					
QMSC	06 Jul 10:51	06 Jul 11:03	00:11	HMS SC	Operating	PSC High Density
QMEMBY	06 Jul 10:39				Common Tails Common	POXMOD Modular Shut
QMTA	06 Jul 10:33	06 Jul 10:40	00:07	Rolls Crusher 1A	Operating	FD1A01 Blocked Discharge Chute
QMCV1XS2	06 Jul 10:24	06 Jul 10:26	00:01	Rolls Crusher Common	Operating	CV1XS2 Metal Detected
QMCV1XS2	06 Jul 10:20	06 Jul 10:24	00:03	Rolls Crusher Common	Operating	CV1XS2 Metal Detected
QMTX	06 Jul 10:17	06 Jul 10:30	00:13	Primary Crushing	Operating	CR1X01 Rock in Bowl
QMC3E	06 Jul 10:07	06 Jul 10:49	00:42	Recrush 18RC	Operating	DN2001 Awaiting Ore
QMPFED	06 Jul 09:58	06 Jul 10:02	00:03	HMS Common	Operating	SPS301 High
QMSO	06 Jul 09:44	06 Jul 10:37	00:52	HMS Concentrate Transfer	Operating	BNSX01 High Level in Bin
QMSO	06 Jul 09:44	06 Jul 10:37	00:52	HMS Concentrate Transfer	Operating	BNSX01 High Level in Bin
QMSO	06 Jul 09:44	06 Jul 10:37	00:52	HMS Concentrate Transfer	Operating	BNSX01 High Level in Bin
QMSC	06 Jul 09:44	06 Jul 10:46	01:01	HMS Concentrate Transfer	Operating	BNSX01 High Level in Bin

# Delay Accounting Project Scope

- Replace legacy system
  - No longer supported
  - Requirement to improve quality
  - Take advantage of software advances
- Commenced in 2010
  - Managed by Metallurgy Superintendent
  - Assigned to Graduate Metallurgist
  - Limited resources

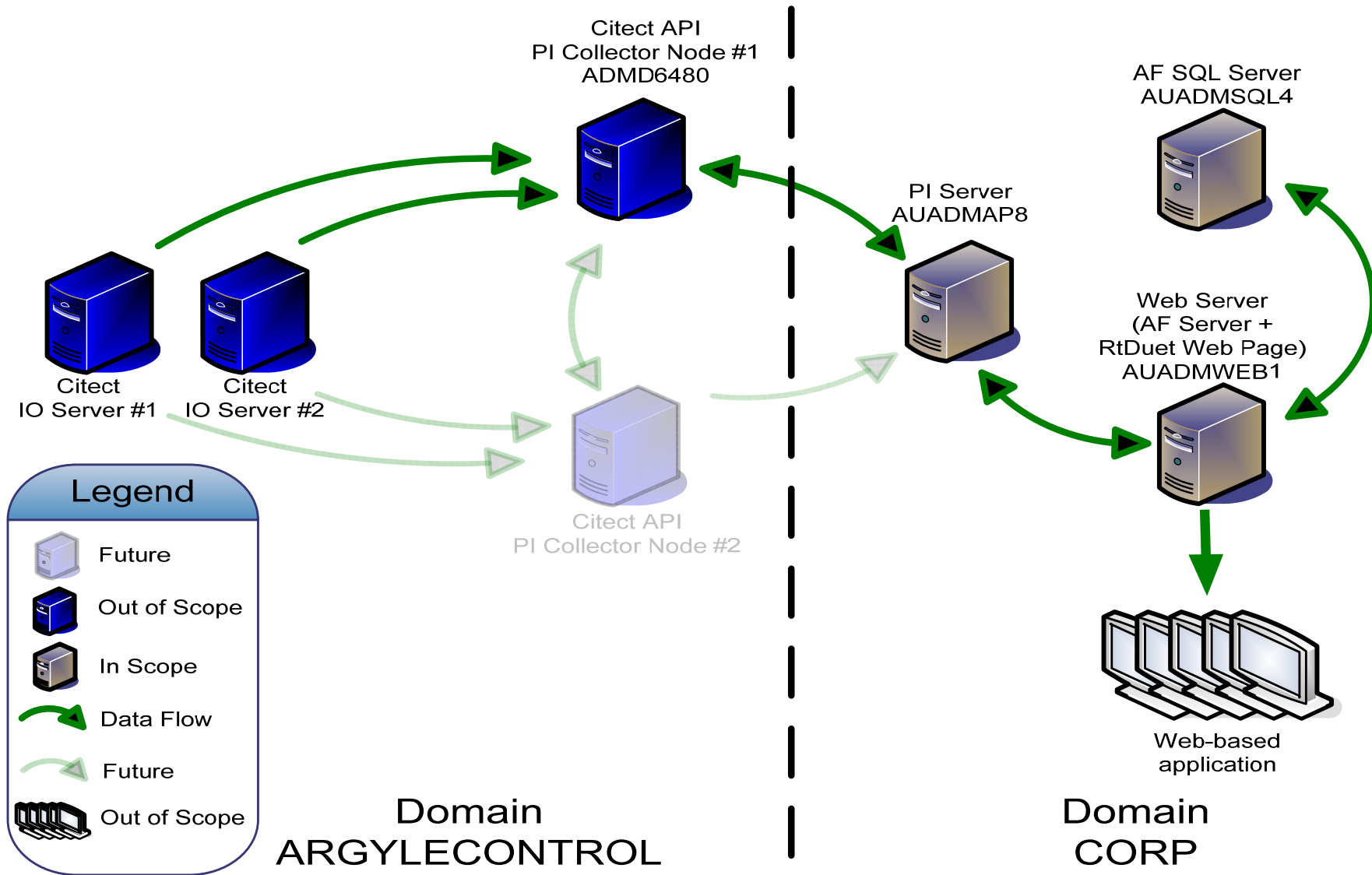
# Research - Investigate options

- Existing System
- MS Excel Solution
- Ampla
- RtDuet

# RtDuet

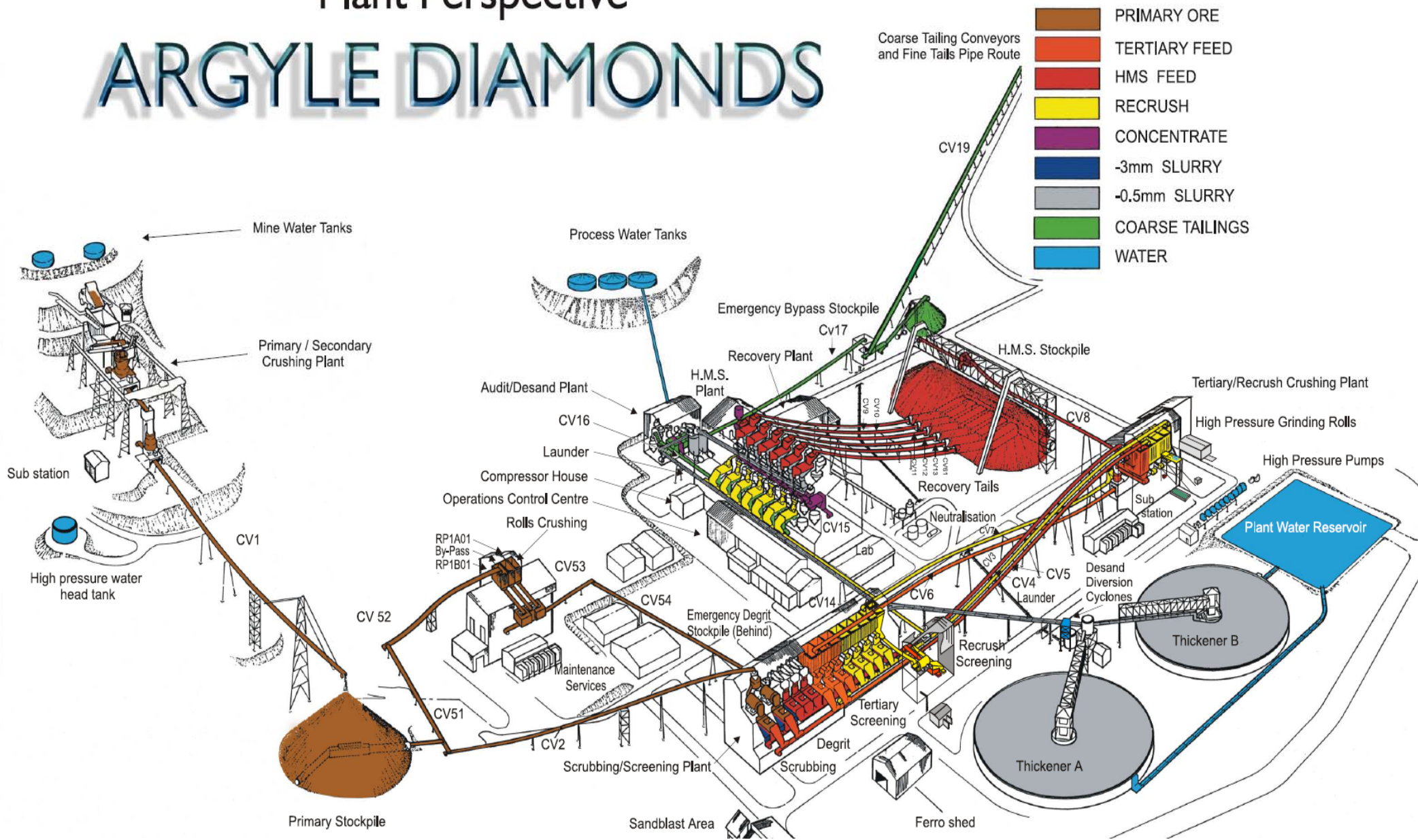
- Focused solution – great value
- PI AF Event frames – new technology
- Continuous development & support
- Exciting features
  - Web based management/reporting
  - Flexible configuration
  - Validation
  - Auto-classification

# RtDuet System Architecture

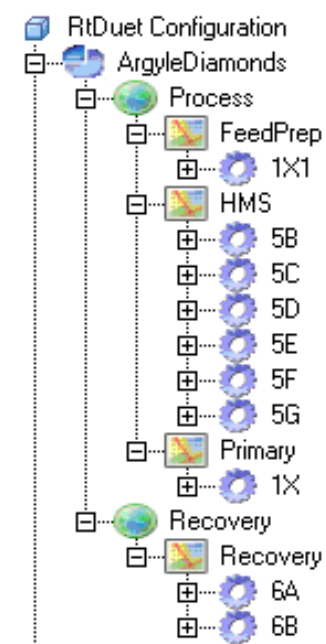
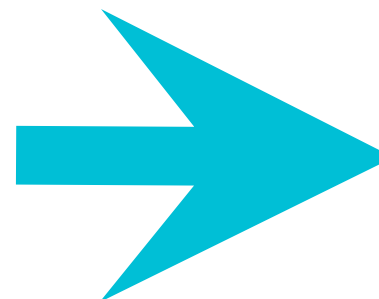
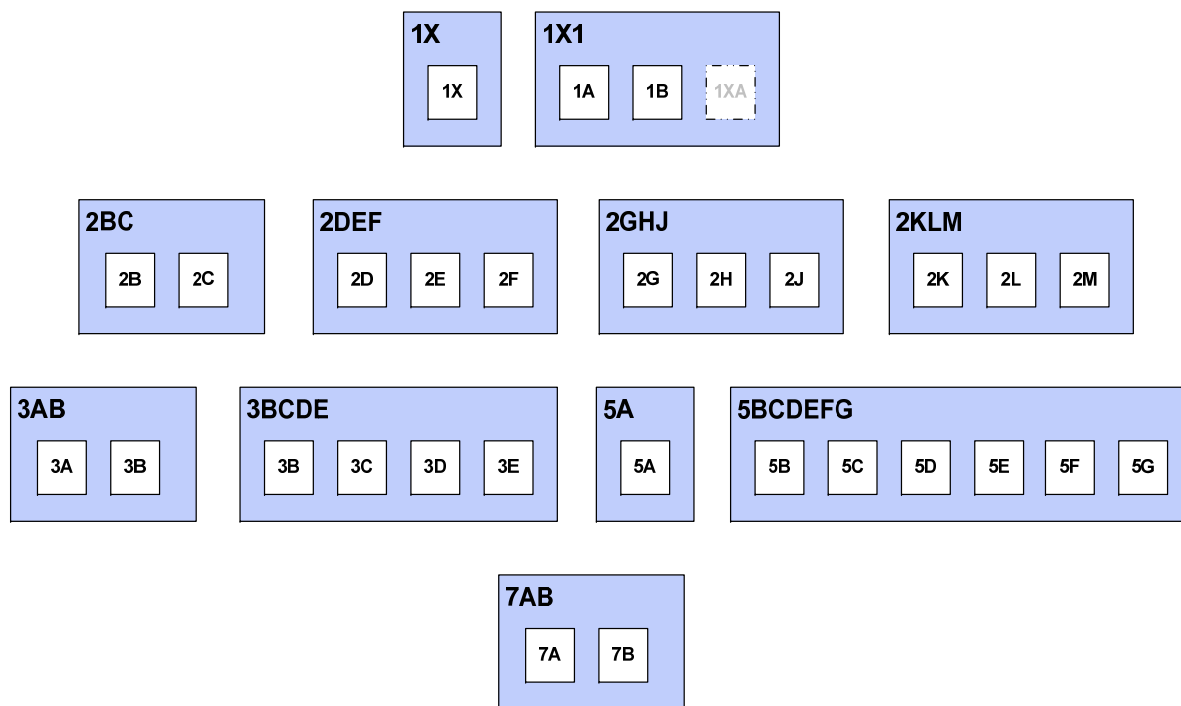


## Plant Perspective

# ARGYLE DIAMONDS



# Development of Plant Model

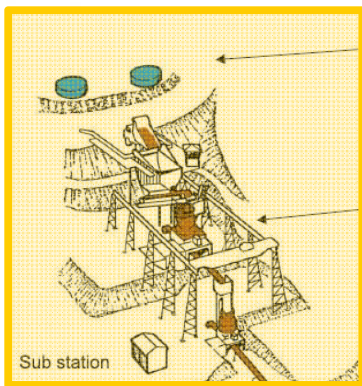
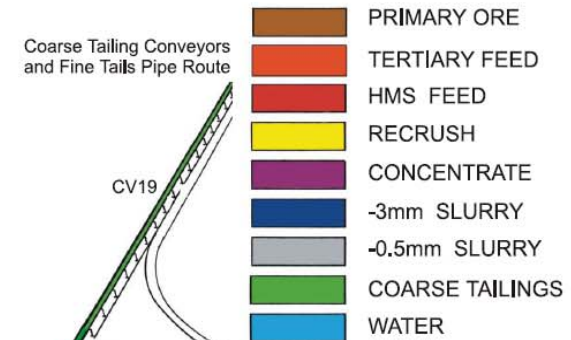




Primary Crushing – 1 MC  
Main Plant Feed – 1 MC  
Heavy Media Sep – 6 MC

## Plant Perspective

# ARGYLE DIAMONDS



Mine Water Tanks

Primary / Secondary  
Crushing Plant

Sub station

High pressure water  
head tank

CV1

Primary Stockpile

Process Water Tanks

Audit/Desand Plant

CV16

Launder

Compressor House

Operations Control Centre

Rolls Crushing

RP1A01

RP1B01

CV52

CV53

CV54

CV51

CV2

CV5

CV4

CV3

CV6

CV7

CV8

CV9

CV10

CV11

CV12

CV13

CV14

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CV252

CV253

CV254

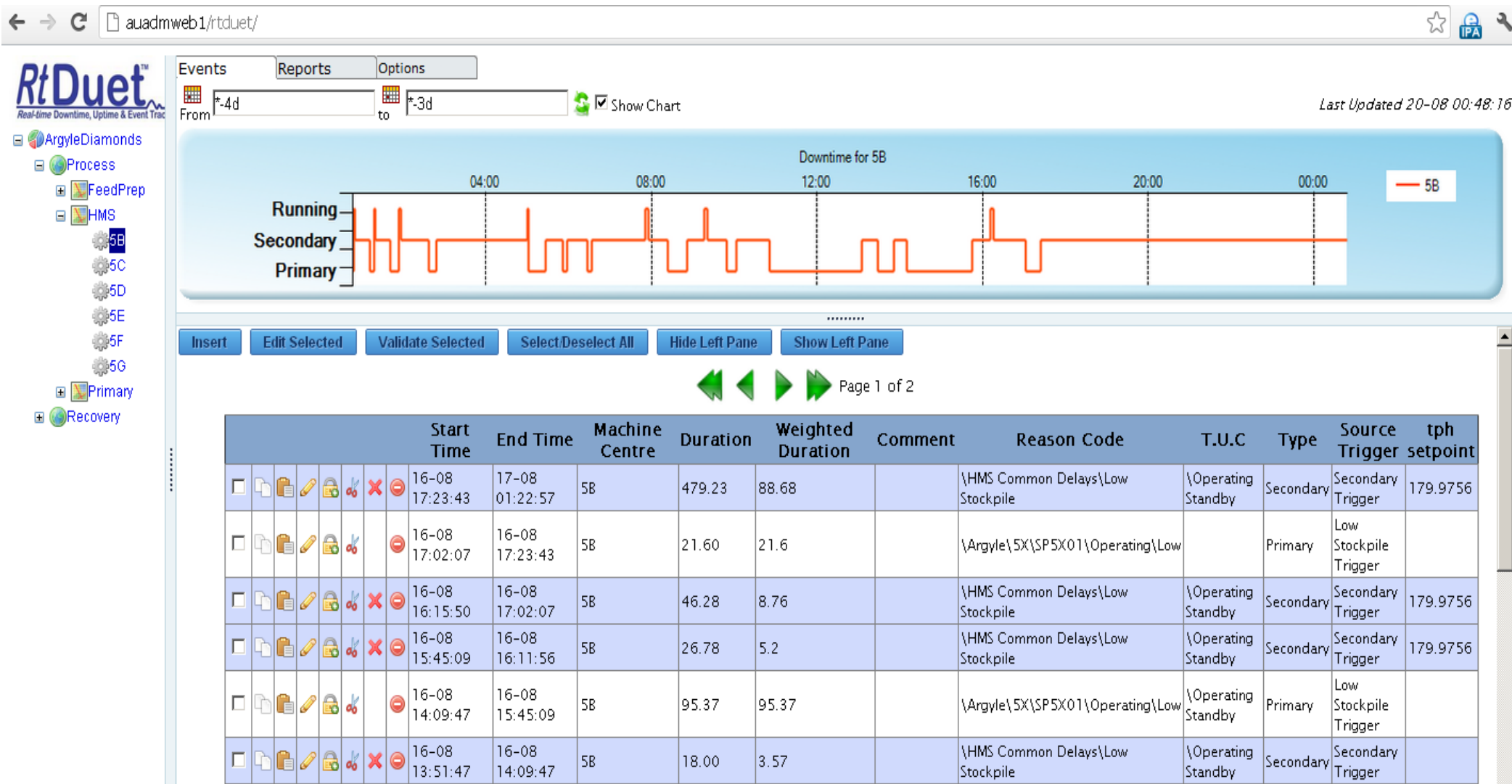
CV255

CV256

CV257



# Operator Interaction



# Operator Interaction

**RtDuet**  
Real-time Downtime, Uptime & Event Tracking

Events Reports Options

From \*-4d to \*-3d Show Chart

Last Updated 20-08 00:54:15

Insert Edit Selected Validate Selected Select/Deselect All Hide Left Pane Show Left Pane

Page 1 of 1

	Start Time	End Time	Mac Cen
	16-08 17-08	17-20:23 01:23:01	5C
	16-08 17-07:02	16-08 17-20:23	5C
	16-08 16-38:23	16-08 17-07:02	5C
	16-08 13-05:25	16-08 16-37:24	5C
	16-08 10-55:43	16-08 13-05:25	5C
	16-08 10-39:19	16-08 10-52:31	5C
	16-08 10-15:40	16-08 10-39:19	5C
	16-08 09-56:02	16-08 10-15:40	5C
	16-08 08-41:40	16-08 09-56:02	5C
	16-08 08-19:42	16-08 08-41:40	5C
	16-08 05-54:47	16-08 08-19:42	5C

**Edit Event**

**5C**

Start Time: 16-08 10:55:43

End Time: 16-08 13:05:25

Event Type: Downtime

Comment: Holed cyclone - ops changed out

Time Usage Code:

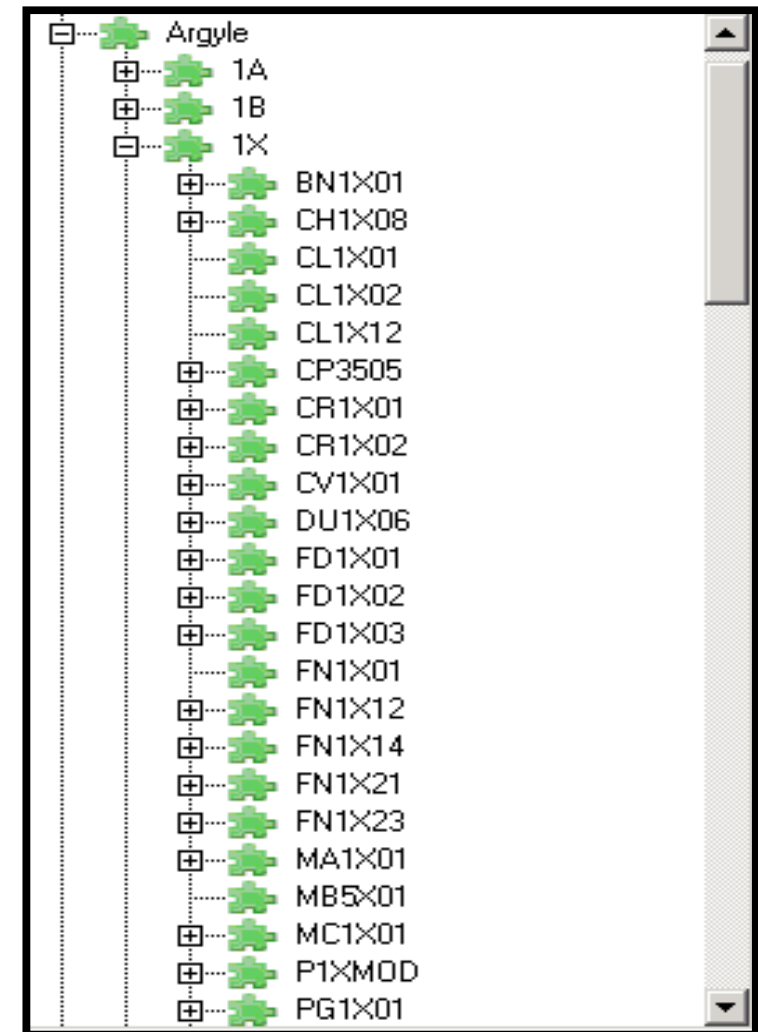
Ore Type:

OK Clear Fields Cancel

- 3X Common
- 4A
- 4B
- 4X
- 5A
- 5B
- 5C
  - CV5C10 - CONVEYOR PRIMARY HMS FEED
  - CY5C01 - CYCLONE HEAVY MEDIUM
  - CY5C04 - CYCLONE DENSIFYING
    - Instrumentation
    - Mechanical
      - Repair Line / Pipe
      - Replace Cyclone
    - Operating
      - DM5C01 - DEMAGNETISING COIL SECURIT
      - FV5C24 - BYPASS LINE ISOLATION VALVE

# Operator Interaction

- Problem:
  - Operators could not identify equipment by code.



# Operator Interaction

- Solution:
  - Cross-reference equipment list
  - Look-ups using PI AF

The screenshot shows the PI System Explorer application. On the left is a 'Library' tree with categories like Analysis Categories, Attribute Categories, Element Categories, Reference Type Categories, Table Categories, Templates, Enumeration Sets, Reference Types, and Tables. The 'EquipmentList' table is selected under the 'Tables' category. The main pane displays the 'EquipmentList' table with columns: EquipNo, ItemName, AccountCode, ParentEquip, EquipStatus, and EquipName. The table contains 15 rows of equipment data.

EquipNo	ItemName	AccountCode	ParentEquip	EquipStatus	EquipName
MTH4400	HAULING UNIT RIG MT4400.	33401350	MHAULING	A	MTH4400 - HAU...
MTH789	170 TONNE HAULING CAT 789.	33401355	MHAULING	A	MTH789 - 170 T...
MTOTADADC	MINING DEPARTMENT TOYOTA DUAL CABS (IN)	33204616	MTOTAS	A	MTOTADADC - ...
MTOTAPC	MINING DEPARTMENT TOYOTA WAGONS (IN)	33204616	MTOTAS	A	MTOTAPC - ...
MTOTAS	MINING DEPARTMENT TOYOTAS. (INSIDE)	33204616	MLIGHTVEHCLS	A	MTOTAS - MI...
MTR785	WATER TRUCKS 95 KL	33201500	MSECONDARY	A	MTR785 - WATE...
MTRAINING	MINE TRAINING COSTS	33001420	MADMIN	A	MTRAINING - MI...
MTS1230	SERVICE TRUCK TANK - FOR FMS.	33201500	MTS769	A	MTS1230 - SER...
MTS1231	SERVICE TRUCK TANK - FOR FMS.	33201500	MTS769	A	MTS1231 - SER...
MTS769	SERVICE TRUCK CAT 769	33201500	MANCILLARY	A	MTS769 - SERVI...
MTS773D	SERVICE TRUCK CAT 773D	33201500	MANCILLARY	A	MTS773D - SER...
MTYRE	MINE TYRE SERVICING	33201425	MADMIN	A	MTYRE - MINE ...
MU3102	MULTIPLEXOR CENTRAL CTRL FIBRE OPTIC	35354645	BCOMMS	A	MU3102 - MULTI...

### Elements

- RtDuet Configuration
- RtDuet Reason Tree
  - Argyle
    - 1A
      - BN1A01**
      - FD1A01
      - FN1A01
      - FN1A02
      - FN1A03
      - MM1A01
      - MM1A02
      - P1RA
      - PG1A02
      - PG1A03
        - Electrical
        - Mechanical
        - Operating
      - PG1A04
      - PG1A05
      - RP1A01
    - 1B
    - 1X
    - 1X1
    - 2B
    - 2C
    - 2D
    - 2E
    - 2F
    - 2G
    - 2H
    - 2J
    - 2K
    - 2L
    - 2M
    - 2X

### BN1A01

General
Child Elements
Attributes
Ports
Version

Filter

Name	Value
ARI Visible	True
Code	
Display Text	BN1A01 - BIN HPRC FEED

Group by:
☐ Category
☐ Template

Name: Display Text

Description:

Configuration Item:

Categories:

Default UOM: <None>

Value Type: String

Value: BN1A01 - BIN HPRC FEED

Data Reference: Table Lookup

Settings...

```
SELECT EquipName FROM EquipmentList WHERE EquipNo = '%Element%'
```

#### Table Lookup Data Reference

Table: EquipmentList

Result column: EquipName

Summary: <None>

Order by: <None> ASC

Unit of Measure: <None>

Time Zone: <None>

Where

Column: AccountCode
Operator: =
Attribute or Value: ARI Visible

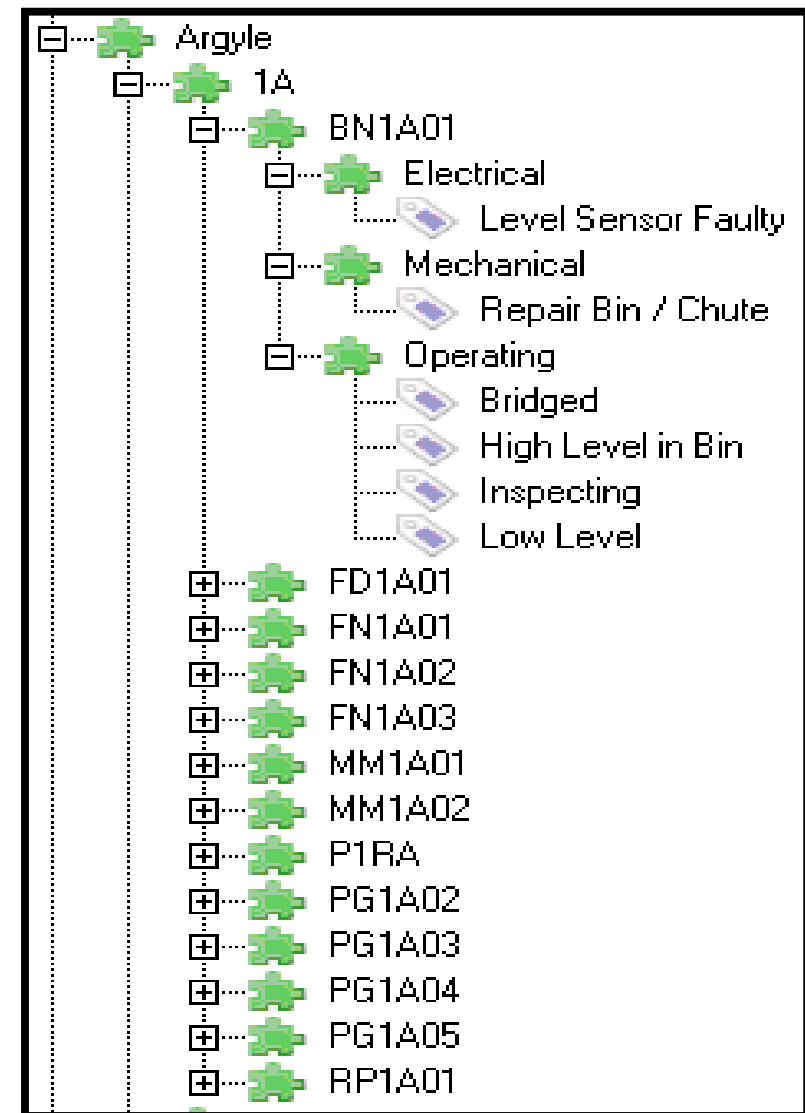
Add And
Add Or

Complete WHERE Clause: EquipNo = '%Element%'

OK
Cancel

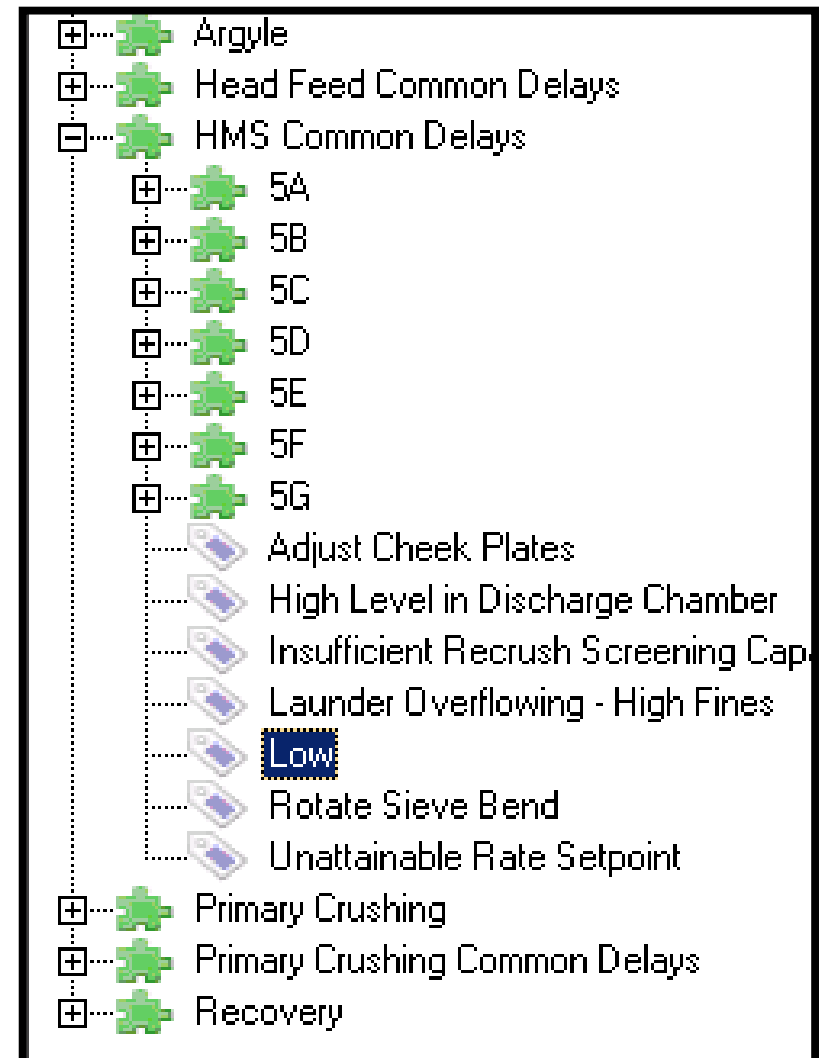
# Operator Interaction

- Problem:
  - Most delays assigned to a few common reasons.
  - Takes 5 clicks to reason code in tree.



# Operator Interaction

- Solution:
  - Weak referencing in PI AF used to create 'shortcuts'
  - 2 clicks to common reasons
  - Full path still maintained



Database Query Date Back Check In Refresh New Element

### Elements

- Elements
  - Root Categories
  - RtDuet Aliases
  - RtDuet Configuration
  - RtDuet Reason Tree
    - Argyle
      - Head Feed Common Delays
      - HMS Common Delays
        - 5A
        - 5B
        - 5C
        - 5D
        - 5E
        - 5F
        - 5G
        - Adjust Cheek Plates
        - High Level in Discharge Chamber
        - Insufficient Recrush Screening Capacity
        - Laundry Overflowing - High Fines
        - Low
        - Rotate Sieve Bend
        - Unattainable Rate Setpoint
      - Primary Crushing
      - Primary Crushing Common Delays
      - Recovery

### Low

General Child Elements Attributes Ports Version

Name: Low

Description:

Template: RtDuet Reason Tree Leaf

Categories:

Default Attribute: <None>

[Extended Properties](#)

Find: [Parents](#) [Models](#) [Layers](#) [Connections](#) [Analyses](#) [Event Frames](#)

#### Parents of Low

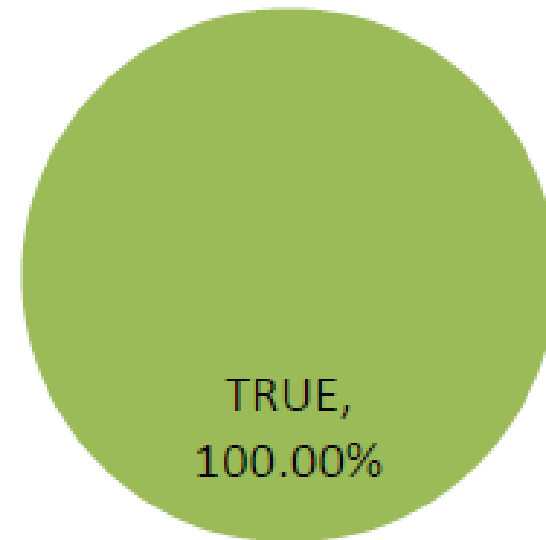
Name	Path
HMS Common Delays	RtDuet Reason Tree\HMS Common Delays
Operating	RtDuet Reason Tree\Argyle\5X\SP5X01\Operating



# Validation & Analysis

- Daily by Metallurgists
  - Essential part of system, promotes high quality data
  - Investigate & fill blanks
  - Reclassify vague reasons

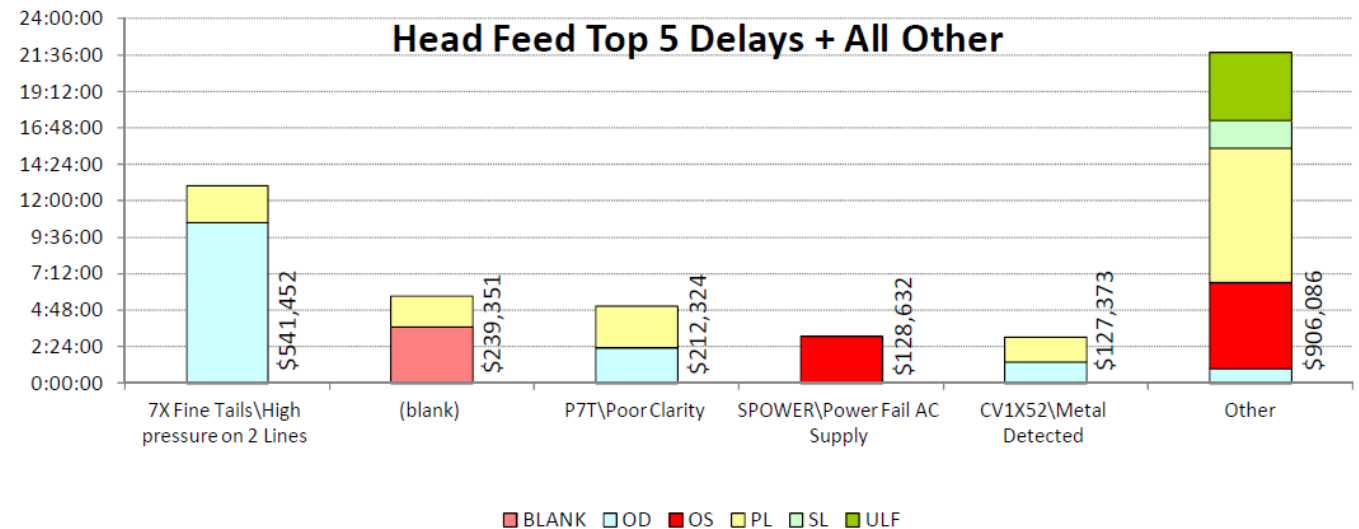
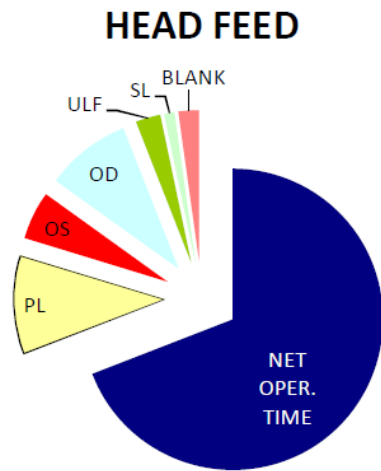
## % of Delays with Reasons Validated by Metallurgists



# RtDuet - Reporting

- Excel-based reporting
  - Developed in-house using RtDuet Web Service
  - VBA automation to refresh, print & email
- Future Plans
  - Standardised & customisable reports
  - MS-SQL, Excel-to-HTML
  - Increase accessibility to non-metallurgy staff

# RtDuet - Reporting



AVAILABILITY (%)	96%	MTBF	16:59:40	SCHEDULED LOSS RATIO	29%
EFFECTIVE UTILISATION (%)	80%	MTTR	0:29:58	ASSET UTILISATION RATIO	69%
EFFECTIVE USE OF AVAILABILITY (%)	83%	MTBS	0:51:51	OEE	70%

# RtDuet Customers



# Contact Us

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# THANK YOU

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