Event Frames – A novel approach to enable life cycle management

Presented by: Warren Armstrong
Anglo American Platinum (AMPLATS)

World’s leading primary producer of Precious Group Metals
Supplying ~37% of the world’s newly refined Platinum.

Process Division:

- 3 Mines
- 15 Concentrators*
- 3 Smelters
- 1 Converter
- 2 Refineries
- 9 geographic operational areas

* Including managed and non-managed
Johannesburg, South Africa
Background

For 1gm of Platinum
Amplats mines 2671 kg of rock
Mills 913 kg of ore
To 80% less than 75 microns (mm)
or 0.075 mm

Why so fine?
UG2 Platinum Group Metal mineral size!
Typically 5 microns

2017 tonnages
29.7 million milled
78 Platinum
So how fine is bug dust?
Value Chain

Ore 3.2 g/t

Concentrate 125 g/t

Refineries 99.9200 %

Smelters 2700 g/t
life cycle tracking

EventFrames?
Business Challenge

“How may ingots are cast into a specific mould”
“How many ingots must be pulled from moulds today?”
“How many ingots are on specification”
“How many moulds are available for casting?”
“What is the average mould fill?”
...

Up-to-date ingot and equipment life cycle information was needed

All the product goes through this step
Business Challenge

• Details stored in Excel, process is manual
• Performance and planning metrics were time consuming to generate, especially when cross-month comparisons are needed
• The unique process meant there is no perfect fit application
• More custom applications?
• Another data store?
Linear product Life and action points

- Mould ready
- Cast and cool
- Remove lid
- Cool in mould
- Lift
- Cool/wait
- Crush
Equipment Life-cycle
Design, requirements match

- Each of the life cycle step has a start and end time
- Each step is associated with equipment
- An ingot goes into a mould cast by a ladle, or an ingot is in process area at a time

EventFrames

Use native Parent child relationships and References to Equipment Elements
Implementation

• EventFrames and the Asset Framework do the heavy lifting
  • Calculations on templates
  • Defaults on templates
  • Stores data

• Need a User to:
  • Enter Data
  • Create event frames to follow business logic with equipment references
  • Show summary information
Architecture

OSIsoft Asset Framework (AF)
- Elements
  - Assets, moulds, ladles...
  - Event Frame Templates
    - Ingot and state defaults
    - Data input templates
  - Event Frames
  - Data store
  - Search Capabilities

Administrators
Ad-hoc data

Ria web-service
AFSDK

HTML5 web-client

Users
Administrators
Results

• An EventFrame search with simple aggregation can answer the questions below

• For a production batch
  • What were the process inputs: materials, energy
  • What was the product quality and quantity
  • What mould\'s is the batch in
  • What ladles were used

• For a mould or ladle
  • How many ingots (or tonnes) were cast between repairs
  • How many patch repairs before a complete rebuild
  • How long between casts
## Mould View

<table>
<thead>
<tr>
<th>Date</th>
<th>2018</th>
<th>Jan</th>
<th>11 - Thu</th>
<th>Hours Due</th>
<th>12</th>
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### Moulds

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<th>Mould</th>
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<th>Date 2</th>
<th>Date 3</th>
<th>Date 4</th>
<th>Date 5</th>
<th>Date 6</th>
<th>Date 7</th>
<th>Due Date</th>
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### Summaries

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<th>Image</th>
<th>Name</th>
<th>Count</th>
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<td><img src="image1.png" alt="Mould OK" /></td>
<td>Mould Ok</td>
<td>103</td>
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<td><img src="image2.png" alt="Mould available" /></td>
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<td><img src="image3.png" alt="Mould in use" /></td>
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<td>77</td>
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<td><img src="image4.png" alt="Mould damaged" /></td>
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<td><img src="image5.png" alt="Mould on maintenance" /></td>
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<td><img src="image8.png" alt="Mould burner tipped" /></td>
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<td><img src="image9.png" alt="Ingot in mould with lid on" /></td>
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<td><img src="image10.png" alt="Ingot in mould - cooling" /></td>
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<td><img src="image11.png" alt="Total" /></td>
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<td>1173.67</td>
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Mould with Business logic
## State Configuration

### Ingot State List

<table>
<thead>
<tr>
<th>Order</th>
<th>Planned time</th>
<th>Description</th>
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<td>0</td>
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<td>Ingot in mould with lid on</td>
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<tr>
<td>1</td>
<td>432000</td>
<td>Ingot in mould - cooling</td>
</tr>
<tr>
<td>2</td>
<td>86400</td>
<td>Ingot on slow cool floor</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Ingot on crusher floor</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>Ingot crushed</td>
</tr>
</tbody>
</table>
Impact

• Live information for a manual process

• Utilising existing functionality
  • Saved ~400hr of initial development time
  • Simplified implementation and on going maintenance
  • Implementation could focus on business logic and user experience

• No New data stores
**Ingot life cycle management**

**Anglo American Platinum**
Our company exists to make a real difference for everyone whose lives we touch. We mine the materials that make modern life possible, in ways that are safer, smarter and more responsible.

**CHALLENGE**
Up-to-date ingot and equipment life cycle information was needed

- Ingot details stored in Excel sheets
- Information flow was slow
- Unique process
- Reduce customisation

**SOLUTION**
EventFrames will do the heavy lifting. Build a User interface with business logic only

- EventFrames, data store, Configuration, defaults, calculations
- Elements, configuration
- Leverage; parent-child relationships, complex referencing and flexible search

**RESULTS**
Web application build to enter data and manage operational logic.

- Existing functionality saved ~400hr of development time
- Plant data kept in one system
- Existing tools: less to implement and less to maintain
Event Frames – A novel approach to enable life cycle management

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Anglo American Platinum
Questions

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State your name & company

Please remember to...

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