

# MCAS – Introductory Remarks

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# MCAS – Past and Future

- ▶ User's issues on usability and troubleshooting – MCAS is grid department project to address that
  - ▶ MCAS SVN has been established since 2009-02-14
  - ▶ The time has come to make decisions regarding the future of the MCAS project.
  - ▶ This Computing Techniques seminar is the first step in this process.
  - ▶ We will be shortly be scheduling a review of the MCAS project by current and potential future stakeholders.
  - ▶ The inputs from the computing techniques seminar and the review will be used to formulate the MCAS portion of the FY2011 Grid Department budget request.
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# Metric Correlation and Analysis

Computing technique seminar  
MCAS Team

# Connect the dots ...

**dCache service**

**Quick Finder**

Cell Services Pool Usage Tape Transfer Queue Detailed Tape Transfer Queue

Pool Transfer Queues Action Log

Pool Selection Configuration

**Status** **Various Queues**

Availability and response

File Edit View History Bookmarks Tools Help

SRM Monitoring

Model ?

PhEDEx – CMS Data Transfers

DB instance: Production

Sign in via Cert or via Password

Not logged in

Info Activity Data Requests Components Reports

Rate Rate Plots Queue Plots Quality Plots Routing Transfer Details Deletions Recent Errors

Graph Transfer Rate by Destination filter source destination

hide MSS nodes

Period Last 96 Hours up to Update

**CMS PhEDEx - Transfer Rate**

96 Hours from 2010-03-13 16:00 to 2010-03-17 16:00 UTC

Transfer Rate (MB/s)

Home System Servers Encp Help Mass Storage

STIKEN: Enstore for the Masses

**Overall Status**

- CD Mezzanine Powderhorn
- CMS Mezzanine Powderhorn
- SL8500s at GCC
- dCache CMS dCache

**Enstore Individual Server**

**Servers**

- Accounting Server
- Configuration Server
- Event Relay
- Inquisitor
- Volume Clerk

**Library Managers**

- 9940.library\_manager (down/power)
- CD-9940B.library\_manage
- CD-LTO3.library\_manager
- CD-LTO4F1.library\_manage
- CD-LTO4G1.library\_manage

SRM Requests (Copy, Put, Get)

Browse SRM Requests

Breakdown of errors for failed requests

Number of Requests vs time

Average Time Spent in each state for requests

Remote Transfers

Number of Remote Transfers vs time

Average Time Spent in each state for Remote Transfers

Requests for Space Reservation

Get filerequests in state "Ready" created in last 24 hours

Put filerequests in state "Ready" created in last 24 hours

http://cmsdcm3.fnal.gov:8081/srmwatch/servlet/StartPage

**Ganglia** FNAL TIER-1 RESOURCES Grid Report for Wed, 17 Mar 2010 10:55:32 -0500

Last hour Sorted descending

FNAL TIER-1 RESOURCES Grid

FNAL TIER-1 RESOURCES Grid (13 sources)

CPU's Total: 12537  
Hosts up: 1766  
Hosts down: 20

Load/Process

Memory

unspecified (general view)

CPU's Total: 36  
Hosts up: 5  
Hosts down: 1

Load/Process

Memory

CMSLPC (general view)

CPU's Total: 96  
Hosts up: 13  
Hosts down: 0

Load/Process

Memory

# Overview

- ▶ Use cases
- ▶ Design choice drivers
- ▶ Project architecture
- ▶ Case in point
- ▶ Support models
- ▶ Future

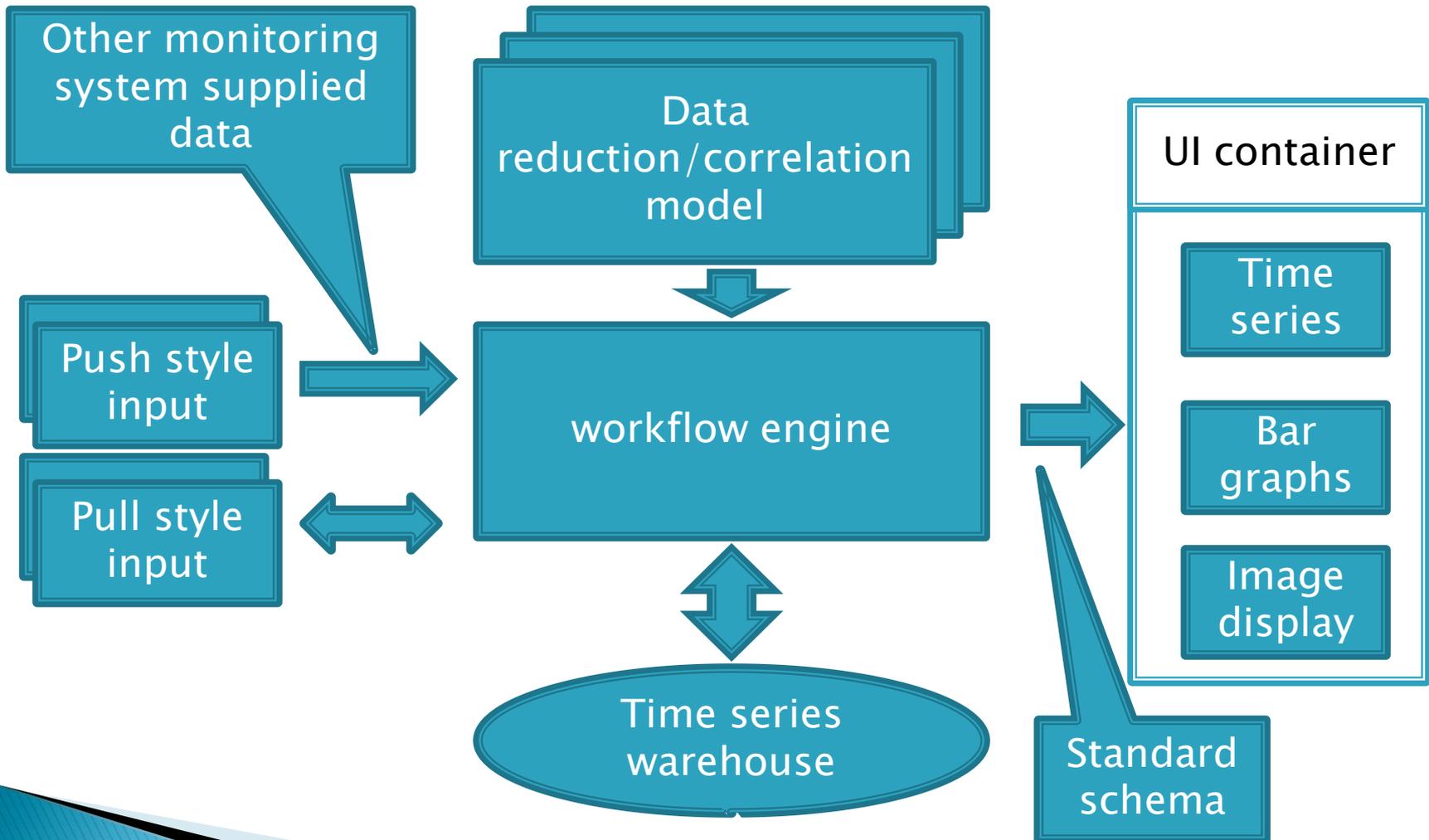
# Metric Correlation and Analysis: Use cases

- ▶ Access, reduce and represent disjoint metrics data
- ▶ Infrastructure to bridge providers of monitoring/status information
- ▶ Summarization of metrics on at-a-glance view
- ▶ Toolkit for building and hosting time series, health bar graphs, and image displays

# Design choices

- ▶ Usability
  - User supplied/pluggable data manipulation codes
  - Warehousing
- ▶ Operations and support
  - Product selection among open source or community driven products
  - Lightweight , independently maintainable components
- ▶ Development strategy
  - Adopt technologies to integrate these components into the desired data processing model
  - Leverage HTTP/REST to communicate system inputs and service interactions

# Project architecture



# Metric analysis modeling

- ▶ How to model analysis of information from different origins , formats, schemas ?
- ▶ How to track/change the composition of these data ?
- ▶ How to make implementation portable ?
- ▶ Model : data presentation + data interaction

# Mule-based workflows

- ▶ Atomic data transformation is a service
- ▶ Integrate data services into the desired data processing model
- ▶ Service integration applied to data transformation 'as service' implies a workflow that can define how data should be connected
- ▶ MULE – Swiss army knife of service integration
  - Supports a variety of service topologies, scalable
  - Event routing capabilities
  - Configuration driven

# What is our job here ?

- ▶ Define meta configuration layer that maps monitoring, or metric processing use cases onto Mule based service integration model
- ▶ Develop data processing ‘extensions’ – R, RDD, etc.
- ▶ Develop presentation layer sensitive to few well defined XML based schemas
  - All metric processing condenses its output into this subset

# Widgets, Portlets

- ▶ Workflow model generates content digestible by a set of end user metric viewing tools – Portlets
  - Time series display
  - Status Bar–graphs
  - Tables
  - Image viewing panes
- ▶ The composition of portlets is managed by JBoss container

# Warehouse service

- ▶ Working memory of the workflow engine
- ▶ Data archiving
- ▶ Data mining
- ▶ Principally designed to store historical data snapshots
- ▶ Supports query cost limits, data tiers
- ▶ Lightweight

## ▶ **Collect.**

- Warehouse data from different sources coming in HTML,XML,CSV formats

## ▶ **Workflow modeling**

- Rules to reduce, mine or merge data into analyzable content

## ▶ **Export.**

- View results via REST urls

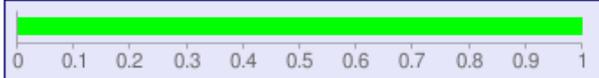
## ▶ **Compose UI.**

- Use collection of *standard* UI elements (tables, image displays, bar graphs, time series) to create dashboards

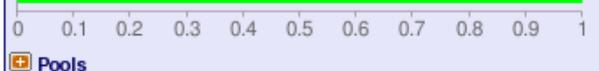
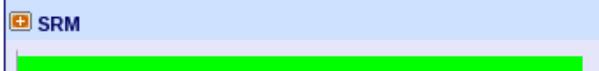
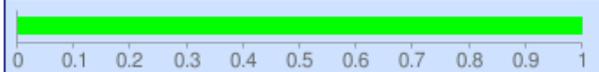
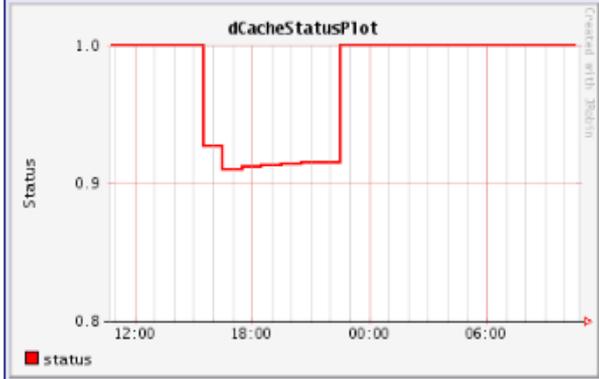
# Case in point: CMS facility

- ▶ Collect data from dCache info providers , Condor and srmwatch
- ▶ Setup summarization
- ▶ Setup health status reporting rules over summarized samples
- ▶ Arrange UI layout.
  - <http://mcas-int.fnal.gov:8080/portal/portal/cmsDcache>
  - <http://cmsdca.fnal.gov/>

**Cms Facility Health**

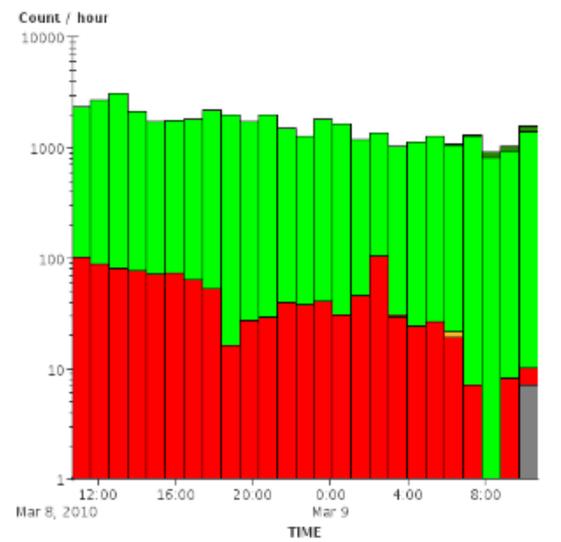
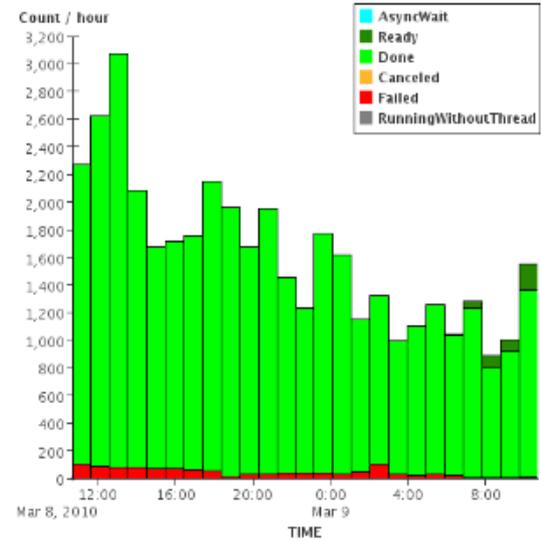


**dCache**  
 Total Value: 1  
 Green Value: 1  
 Graph URL: <http://chart.apis.google.com/chart?cht=bhs&chs=328x40&chd=t:1|0&chf=bg,s,E6E6FA|c,s,E6E6FA&chco=00FF00,FF0000,E6E6FA&chbh=10&chts=000000,11&chds=0,1&chxt=x&chxr=0,0,1>  
 1. name: dCache  
 2. status: 1  
 3. statusMax: 1



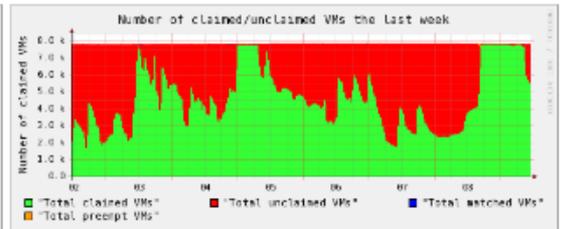
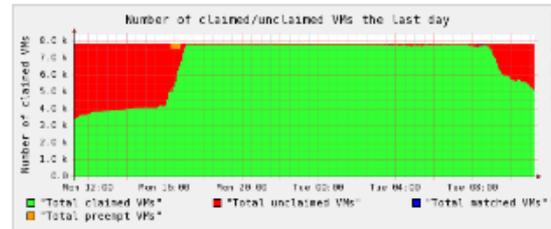
**CMSSRMDetailImages**

Click the image to show it in original size

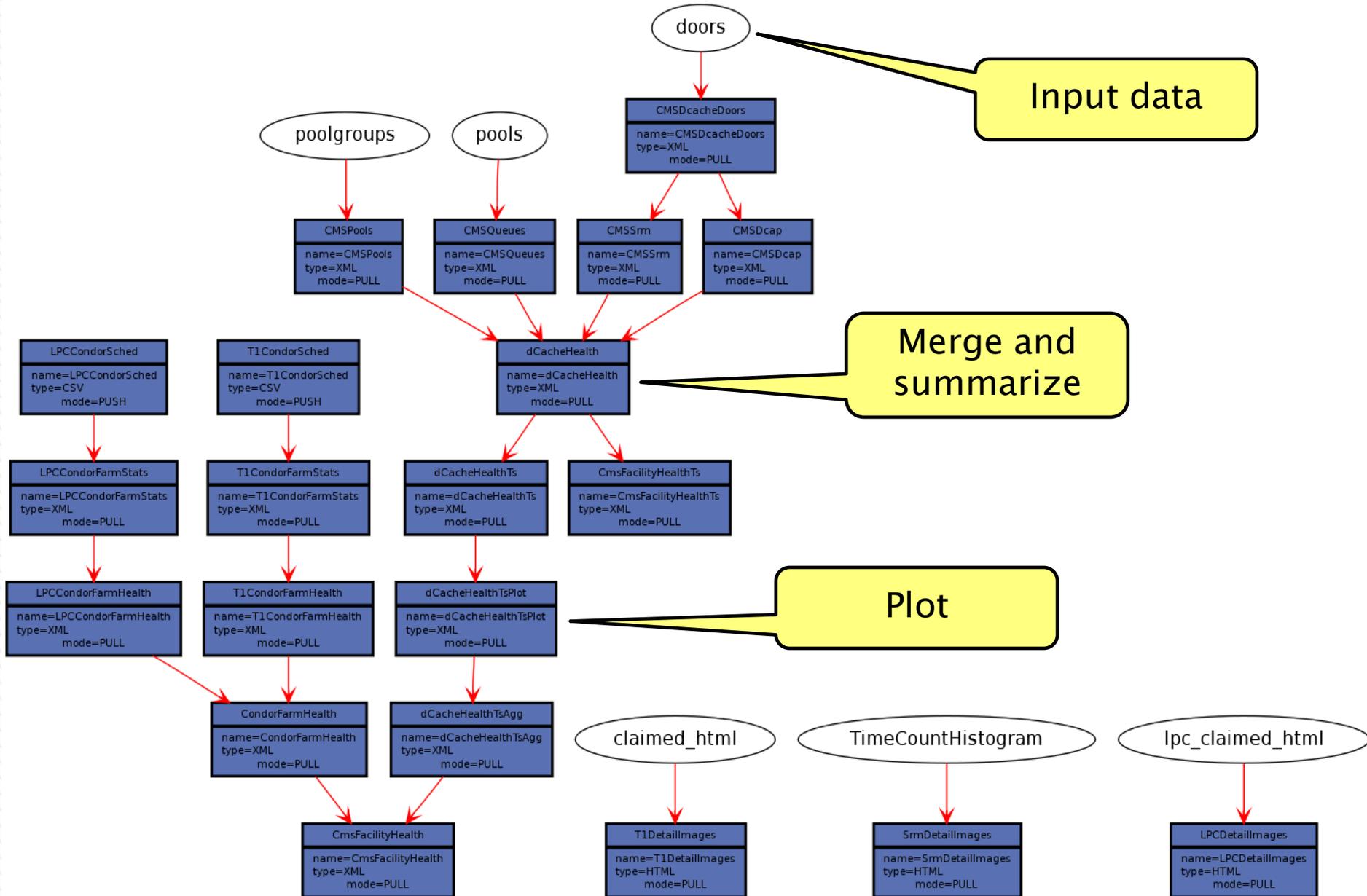


**CMST1FarmDetailImages**

Click the image to show it in original size



# MCAS Workflow: cms



# Adding new element ...

- ▶ Create testInput.ds
  - name=Input
  - type=XML
  - mode=PUSH
  - project=test
  - expiration\_time\_in\_days=10
- ▶ data-source-admin --add=./bin/testInput.ds
- ▶ deployConfig
- ▶ Get|Send XML metrics data with curl :  
<http://localhost:9090/test/Input/Get|Sink>

# Support models

- ▶ Central
  - Workflow models are distributed as packages and dropped into central deployment(along with their configs)
- ▶ Site level
  - Can also install MCAS locally

# Future work

- ▶ Integrate into production systems
  - <http://mcas-int.fnal.gov:8080/portal/portal/storage-investigation>
- ▶ Create metric reports using bigger building blocks
  - Understand system use patterns to generate wizard like applications for creating common reports
- ▶ UI research
- ▶ Produce standard metric schemas that can be integrated into CD wide reporting infrastructure

# Options for MCAS Future

- ▶ Close the MCAS project after this R&D phase
- ▶ Continue the MCAS project:
  - At a minimal level,
  - Focus on delivering a toolbox that can be taken by the wider community to stand up independent instances of MCAS,
  - Focus on implementing a production service at Fermilab,
  - Focus on implementing a production service for Fermilab and the wider community (OSG, etc.).

# \*Design choice drivers

- ▶ Usability
  - 500 page manual – FAIL
  - Intuitive model that makes sense
  - Non restrictive, generic. (this comes at cost)
- ▶ Development cost
  - Small development team
  - Emphasis on technology integration rather than technology development
- ▶ Operations and resource cost
  - Scalable, extensible, manageable