

# *Clarus* Program Requirements

Breakout 08:45 – 10:00

Wednesday, November 16

# Users of *Clarus*

- Weather service providers
- Public agency maintenance and construction personnel
- Rail system personnel
- Traffic management personnel
- Transit personnel
- Freight community
- Emergency management and public safety personnel

# Data Sharing Agreements - Contributors

- Authorized representative
- Types and units of measurement of data
- Metadata
  - Contributor
  - Collectors
  - Stations (e.g. ESS)
- Intended use of data and distribution category
- Adhere to intellectual property requirements
- Current statutes, regulations, and rules apply

# Data Sharing Agreements – Requestor

- Distributed data based on distribution category
- Metadata
  - Requestor
  - Communications
  - Access
- Use data according to data sharing agreement
- Adhere to intellectual property requirements
- Current statutes, regulations, and rules apply

# Clarus Reporting - Contributor

- Statistics on operation
- “Acceptance and use” of data and information
- Successes and failures in data and information transmission
- Policies, processes, and procedures to reject data

# Contributor Reporting - *Clarus*

- Changes in authorized personnel/offices
- Known errors and modifications in data and information
- Periods of data and information outages
- Changes, alterations, replacements, or elimination of sources of data

# Clarus Stakeholders

- *Clarus* IMT
  - Enhance public understanding and benefits of *Clarus*
  - Review *Clarus* policies
  - Determine frequency of policy meetings
- *Clarus* ICC
  - Nominate technical experts
    - Task forces, meetings, reviews, etc.

# Three Terms to Remember...

- ***Clarus System***

- Tools for sharing surface weather observations and relevant surface transportation conditions

- ***Clarus Program***

- Operations and maintenance functions and personnel needed to sustain the *Clarus System*

- ***Clarus Initiative***

- Development of tools, models, decision support that leverage the *Clarus System*
- End-to-End processes spanning data gathering to road weather information products & services
- Research activities that support creation of road weather information products & services

# Clarus System

- Hosted at one or more physical locations
- Track its constituent hosts
- Allocate each contributor and collector to a specific host
- Aggregate environmental data from other *Clarus* hosts
- Distribute queries to other *Clarus* hosts

# Clarus System

- Implement industry accepted standard interfaces
  - Hardware
  - Software
- Operate on redundant hardware and communications
- Support modular components
- Alert users to system modifications

# Clarus System

- Utilize uninterruptible power supply
- Publish environmental data at 3 times the volume rate received
- Support 600 concurrent users
- Support 6,000 registered users
- Reject information when deemed appropriate

# Clarus System

- Location Specification
  - Standard GPS (latitude, longitude, elevation) within 50 feet
- Timestamp
  - Coordinated Universal Time (UTC)

# Clarus System

- Mitigate denial-of-service attacks
- Respond to 95% of all requests for environmental data 95% of the time

# Clarus Program

- Maintain a test environment
- Test software and hardware changes in test environment prior to deployment
- Maintain 24/7 operations
- Provide
  - Network management tools
  - Setup support
  - Customer service
  - Trained support staff

# Clarus Program

- Define data quality checking methods, criteria, and rules
- Define data retention standards
- Document standards
  - Accommodate contributions of new sensor technology
  - Support multiple methods of data delivery

# Clarus Program

- Operate system
  - *Clarus* IT Security Plan
  - OMB Circular A-130, Management of Federal Information Resources, Appendix III, Security of Federal Automated Information Resources
  - NIST guidelines
  - Personnel security management

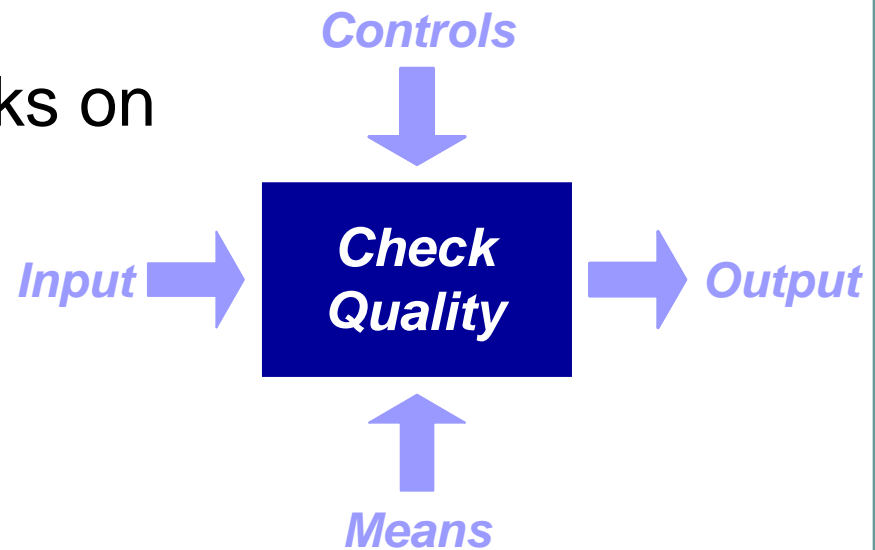
# *Clarus* Quality Checking Requirements

Breakout 10:45 – 12:00

Wednesday, November 16

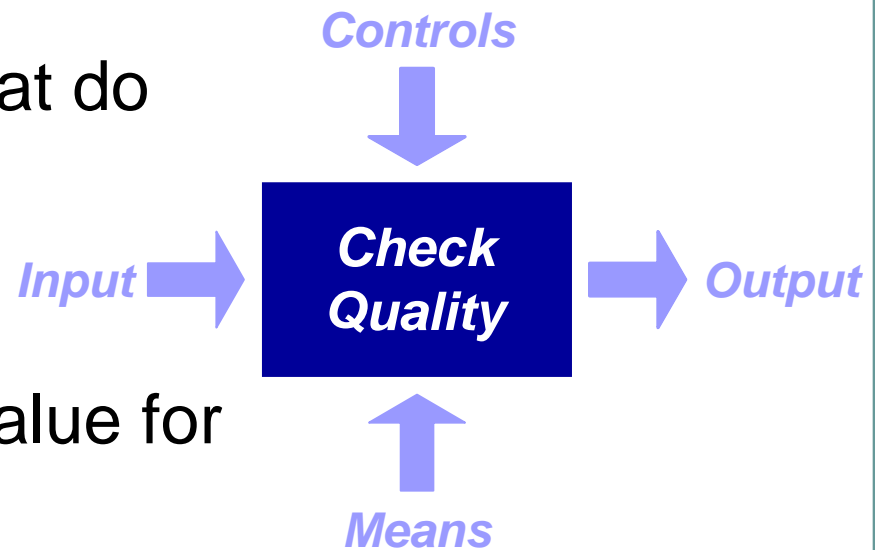
# Quality Checking Services

- Shall...
  - Perform quality checks on environmental data
  - Be individually configurable
  - Be processed in a configurable order
  - Commence as new data arrives in the data cache



# Quality Checking Services

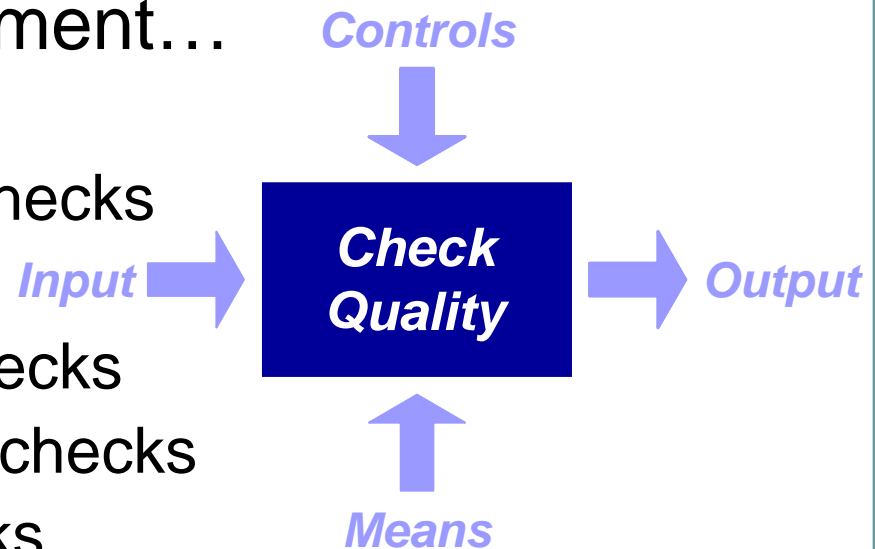
- Shall...
  - Apply quality flags that do not modify the obs
  - Set a specific flag for each check
  - Allow a confidence value for each check
  - Support checks for new observation types
  - Log transactions



# Quality Checking Services

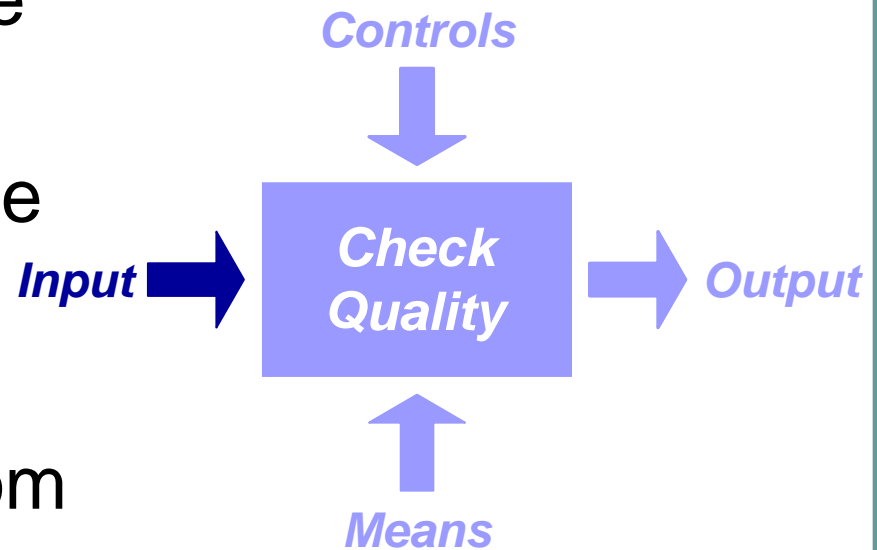
- Shall be able to implement...

- Sensor range checks
- Climatological range checks
- Manual checks
- Spatial consistency checks
- Temporal consistency checks
- Variable-specific checks
- Situation-specific checks
- Location-specific checks
- Historical checks



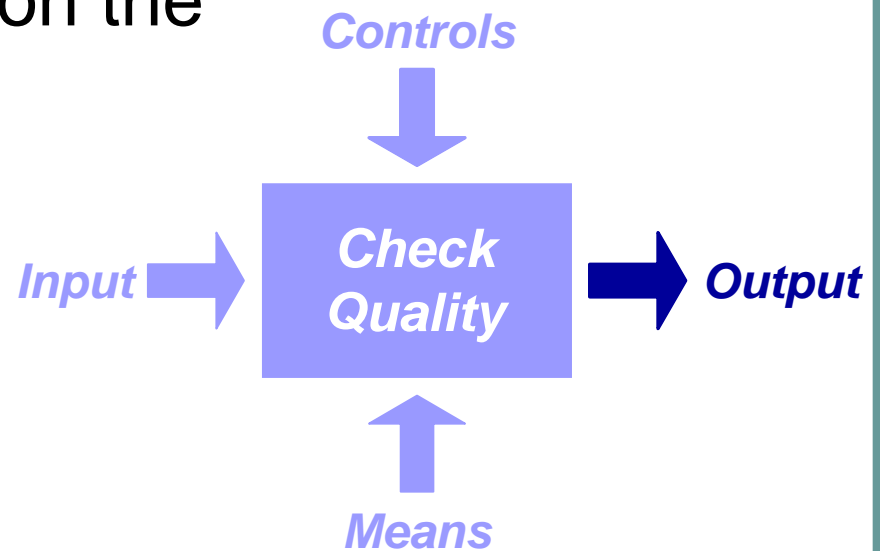
# Quality Checking Services

- Shall get data from the QED Cache
- Shall get rules from the Config/Admin Services
- Shall get metadata from the EM Cache



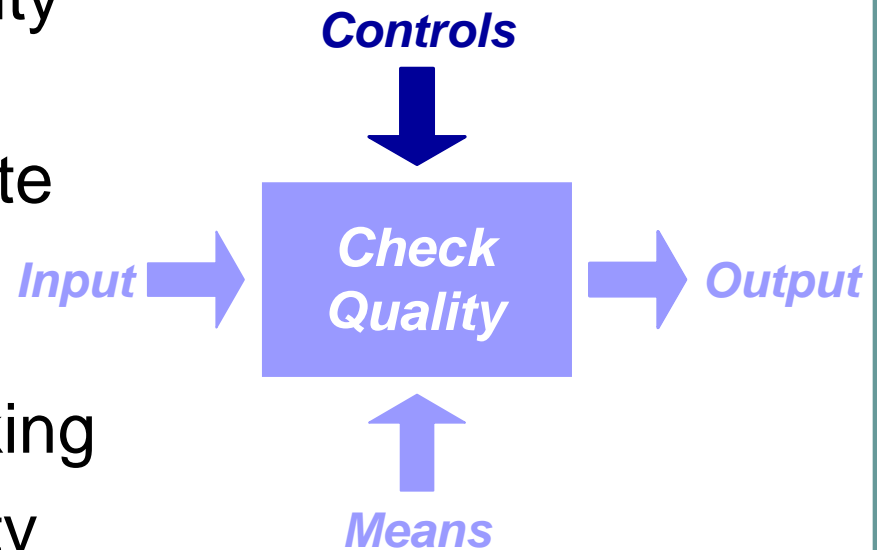
# Quality Checking Services

- Shall set quality flags on the observation data



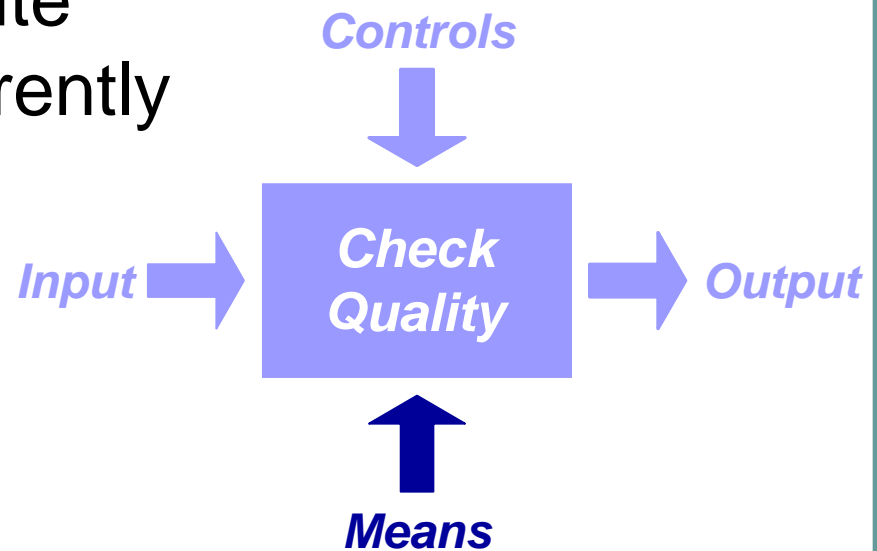
# Quality Checking Services

- Shall be subject to quality checking schedules
- Shall be able to complete an automated check within 10 seconds of data available for checking
- Shall complete all quality checks within 20 minutes of data available for checking



# Quality Checking Services

- Shall be able to execute quality checks concurrently



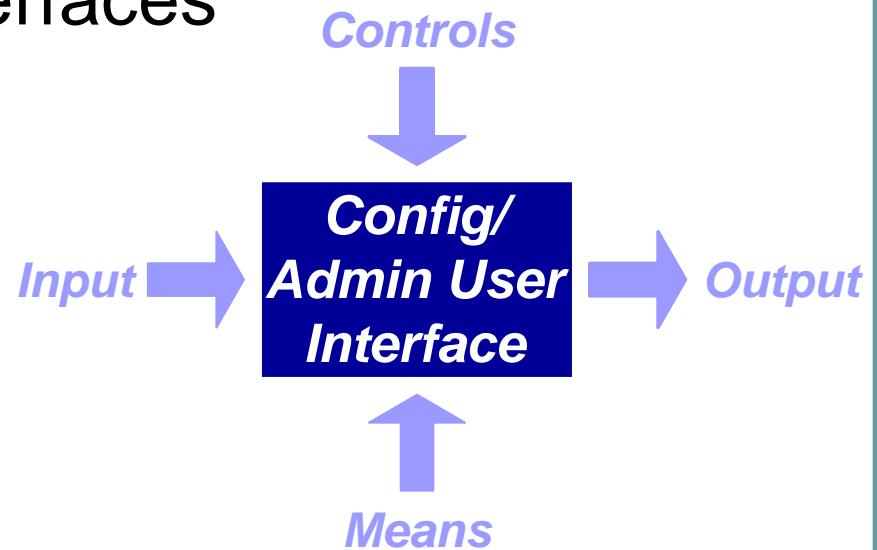
# Configuration and Administration Requirements

Breakout 02:15 – 03:00

Wednesday, November 16

# Config. and Admin. User Int.

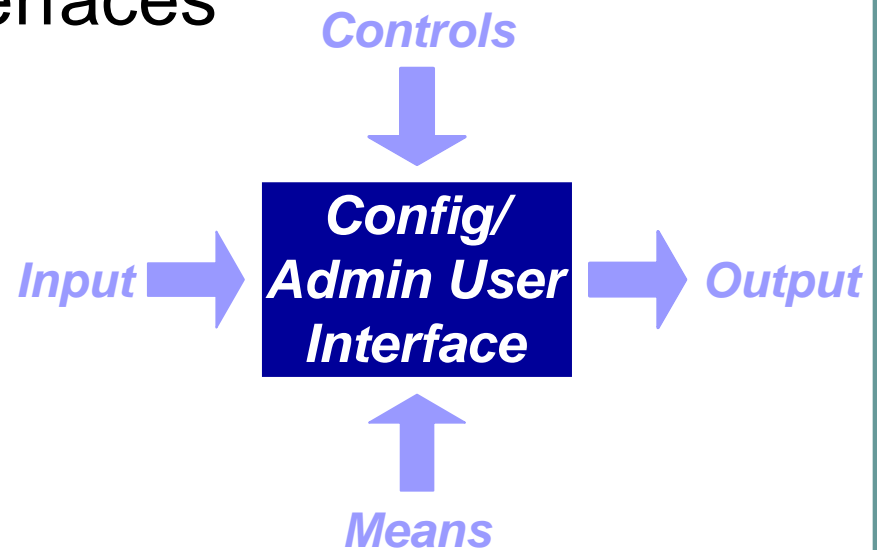
- Shall provide user interfaces for...
  - Managing metadata
    - Contributors
    - Collectors
    - ESS
    - For new obs types
  - Managing security group membership



# Config. and Admin. User Int.

- Shall provide user interfaces for...

- Managing schedules
  - Collectors
  - Quality checking
- Managing rules
  - Data sharing
  - Quality checking
  - System admin access

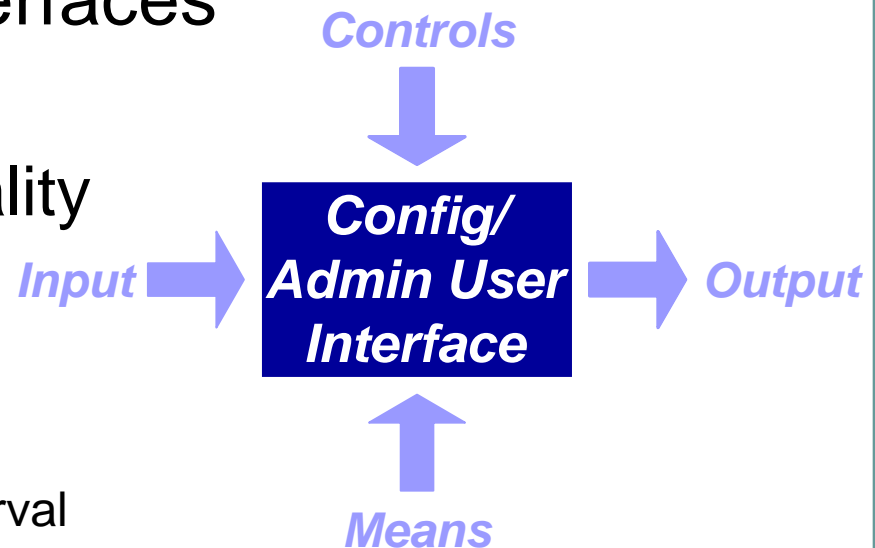


# Config. and Admin. User Int.

- Shall provide user interfaces for...

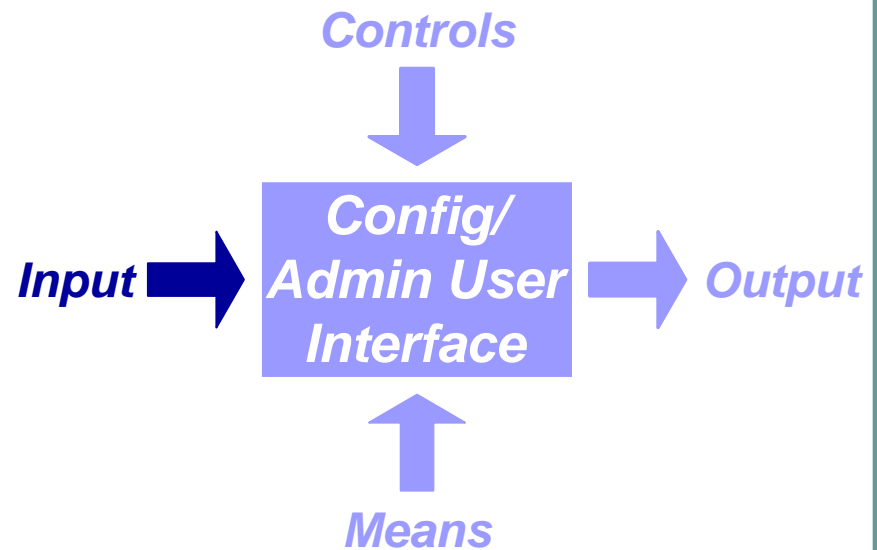
- Applying manual quality flags

- To a set of obs
  - From an ESS
  - Over a fixed time interval
  - Over an open-ended time interval
- By qualified personnel



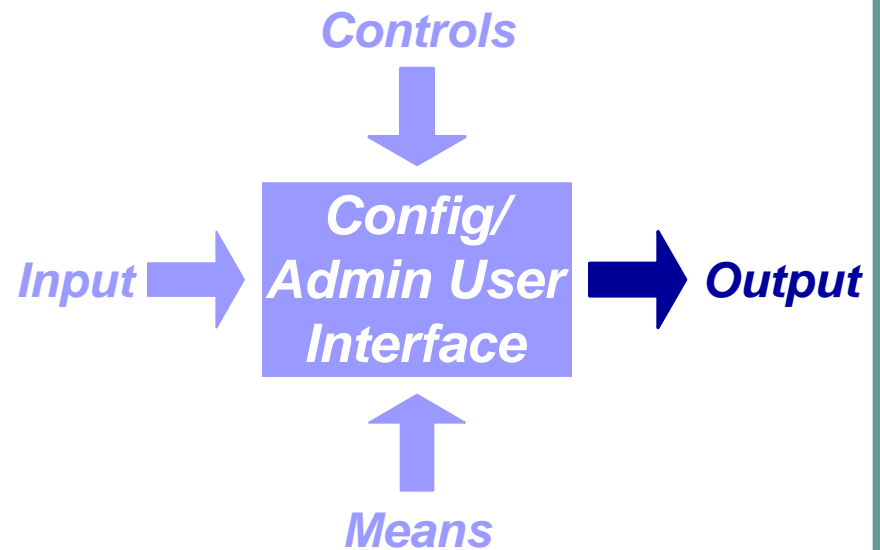
# Config. and Admin. User Int.

- Shall receive...
  - System state from CAS
  - Updates from users



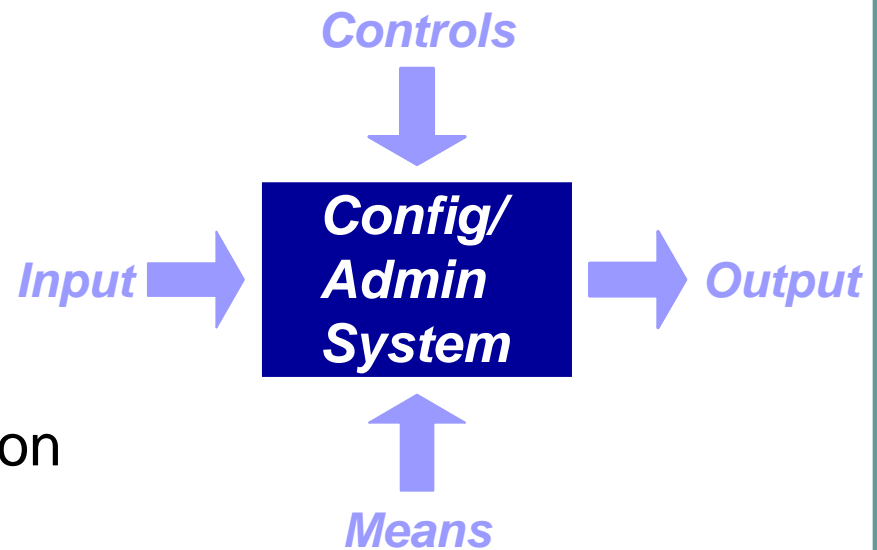
# Config. and Admin. User Int.

- Shall provide...
  - System state to users
  - Updates to CAS
  - Manual flags to QCS



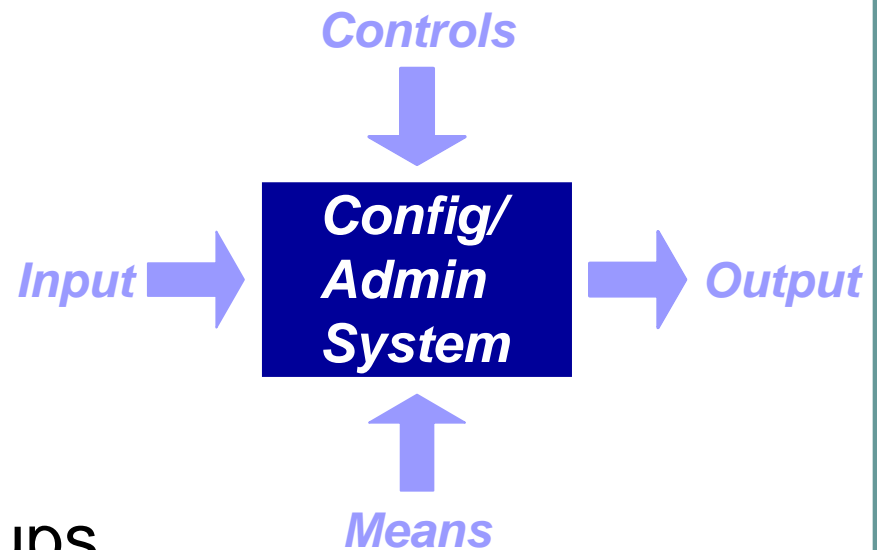
# Config. and Admin. Services

- Shall...
  - Configure services
    - Collector
    - Quality checking
    - Data dissemination
    - Metadata dissemination
  - Log transactions
  - Log operations statistics



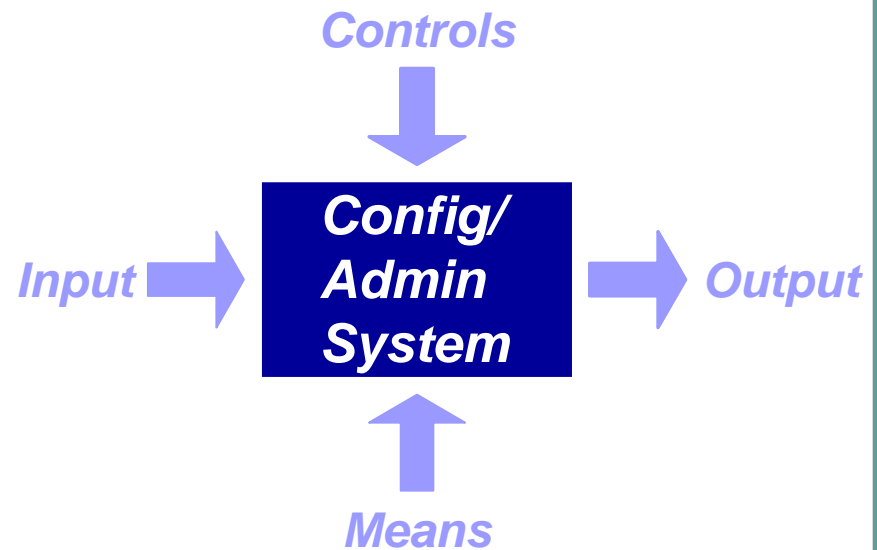
# Config. and Admin. Services

- Shall...
  - Manage metadata
    - Contributors
    - Collectors
    - ESS
    - For new obs types
  - Manage security groups
    - Administrators
    - Quality technicians
    - Users



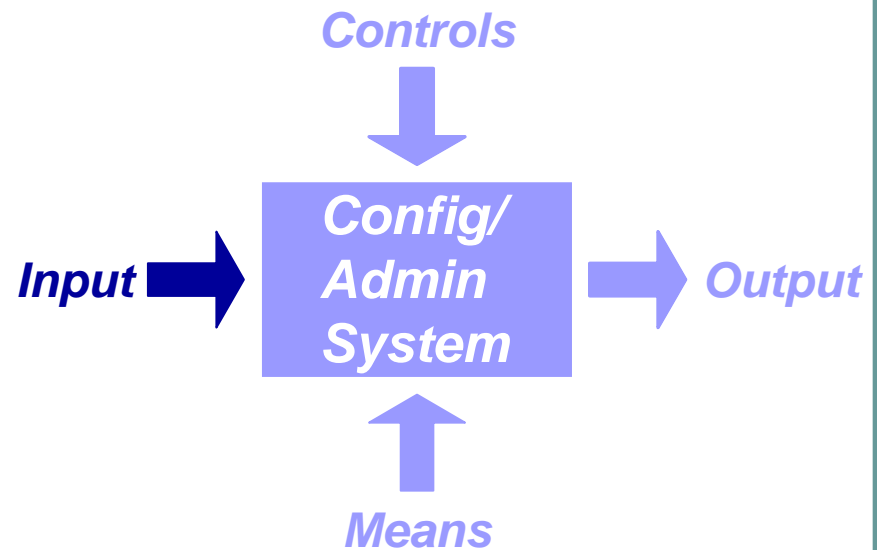
# Config. and Admin. Services

- Shall...
  - Manage schedules
    - Collectors
    - Quality checking
  - Manage rules
    - Data sharing
    - Quality checking
    - System admin access



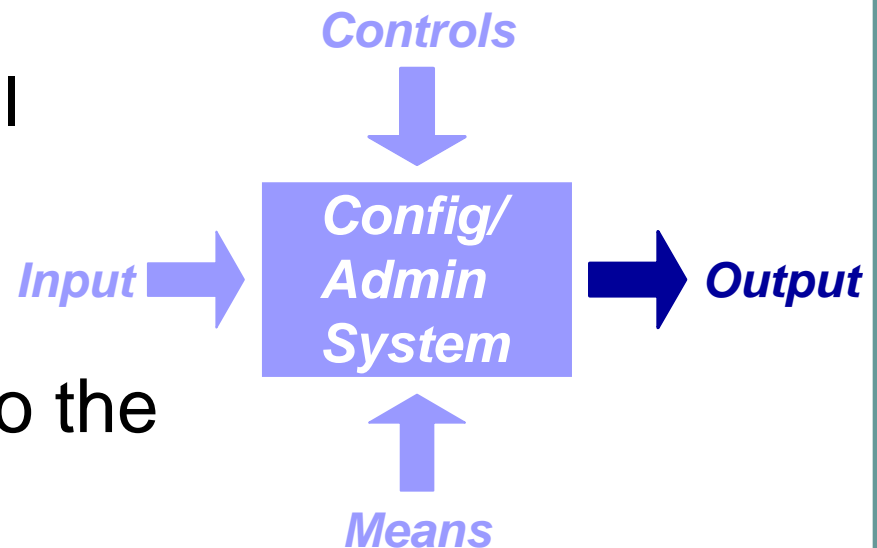
# Config. and Admin. Services

- Shall receive...
  - Updates from CAUI
  - EM data (through CAUI)



# Config. and Admin. Services

- Shall provide...
  - System state to CAUI
  - Schedules to SS
  - Rules to QCS
- Shall save metadata to the EM Cache



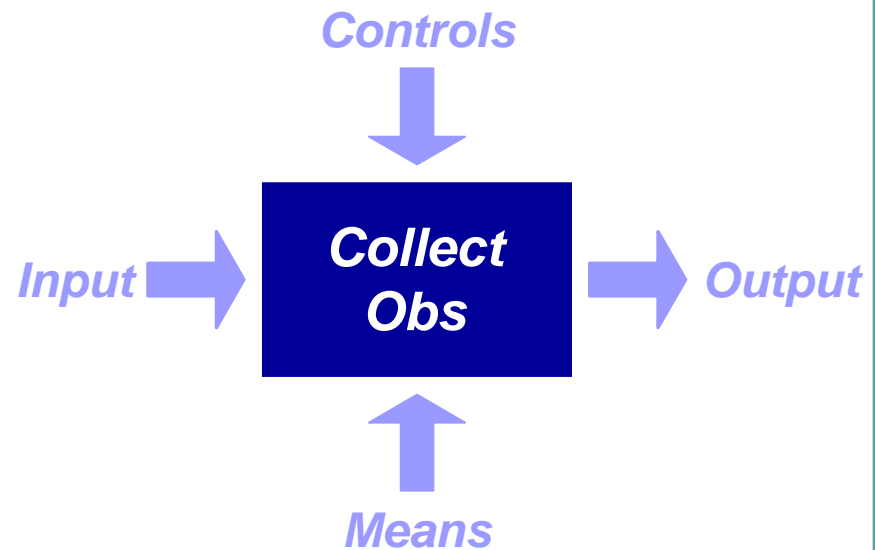
# Collector Services Requirements

Breakout 03:30 – 04:15

Wednesday, November 16

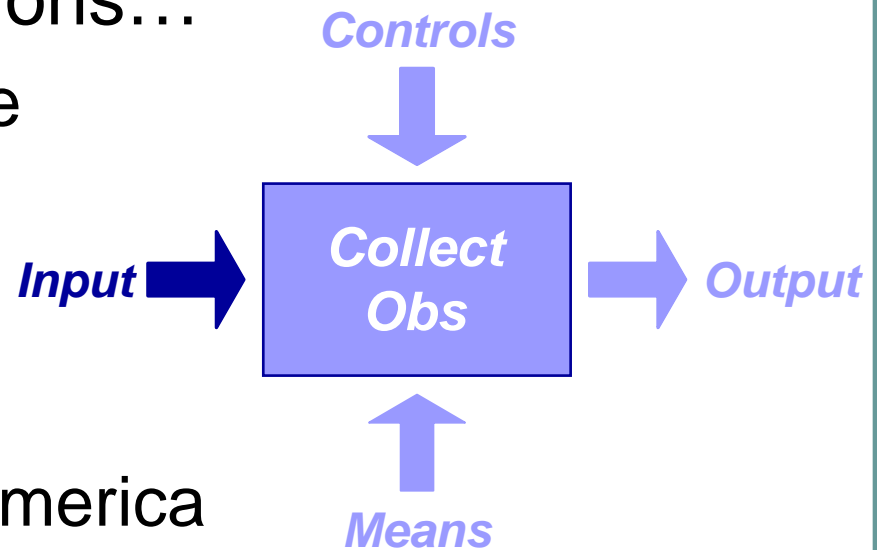
# Collector Services

- Shall...
  - Get observations
  - Adjust collection schedules
  - Convert units
  - Format data
  - Save data to cache
  - Log transactions
  - Log errors



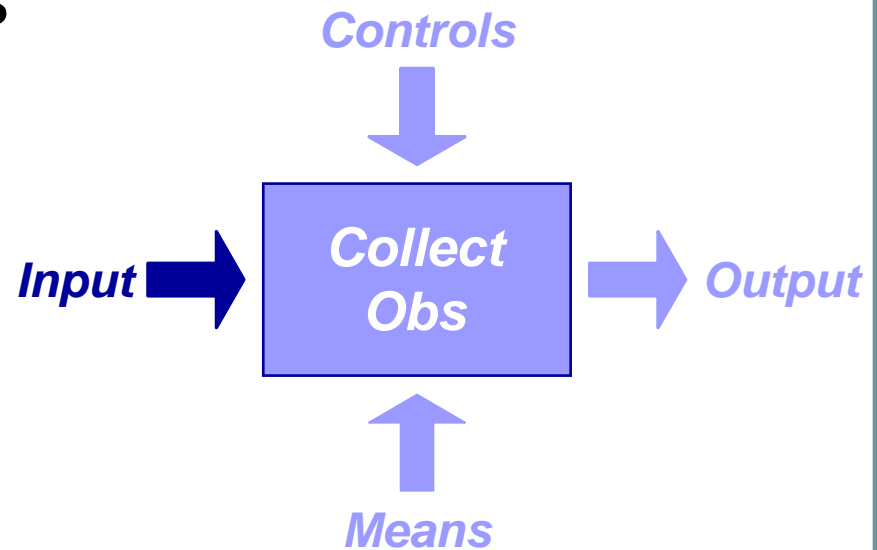
# Collector Services

- Shall accept observations...
  - With identified source
  - With location
  - With timestamp
  - With known units
  - From across North America
- Shall be able to pull obs
- Shall be able to receive pushed obs



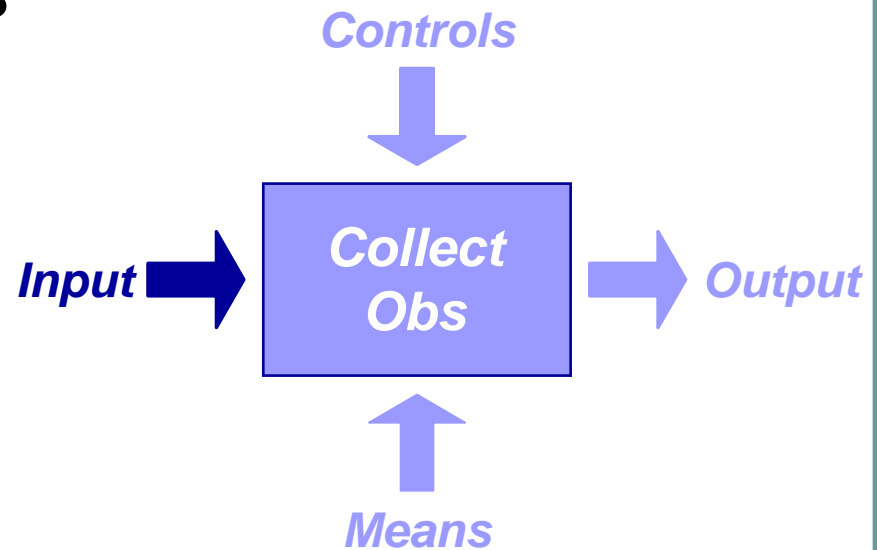
# Collector Services

- Shall get observations from...
  - In-situ collectors
  - Remote collectors
  - ESS collectors
  - VII collectors
  - Image collectors
  - Weather service providers
  - New sources



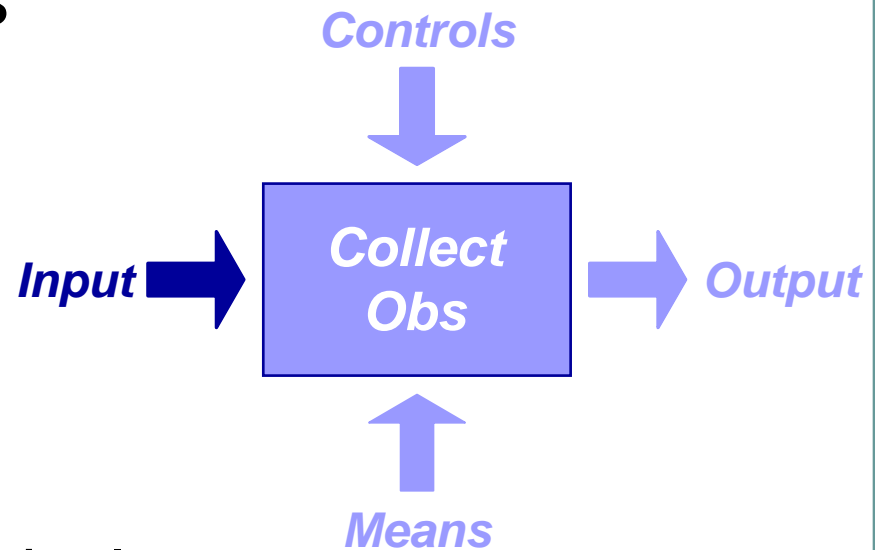
# Collector Services

- Shall get observations originating with...
  - Rail systems
  - Rail vehicles
  - Road vehicles
  - Maintenance and construction vehicles
  - Service patrol vehicles
  - Transit vehicles
  - Emergency vehicles



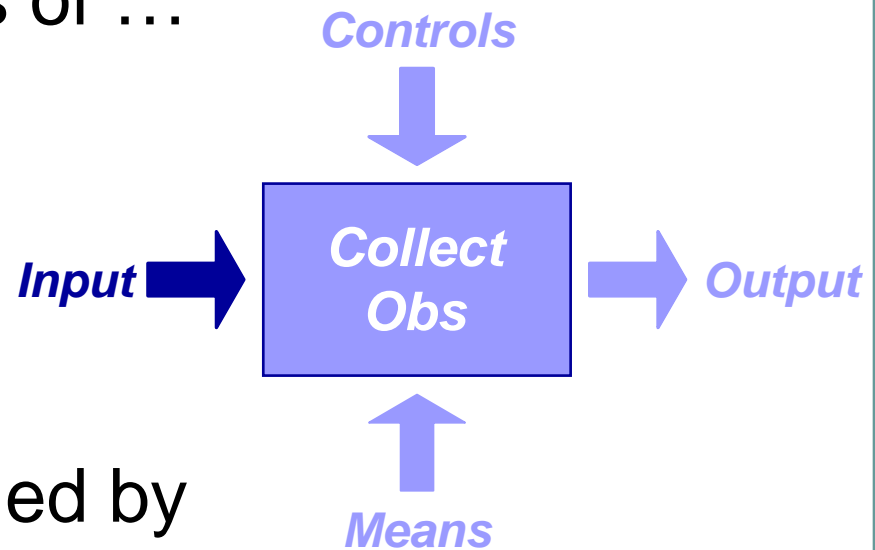
# Collector Services

- Shall get observations formatted for ...
  - *Clarus* (XML)
  - ASCII text (comma-separated values)
  - NetCDF
  - Canadian Meteorological Markup Language (CMML)



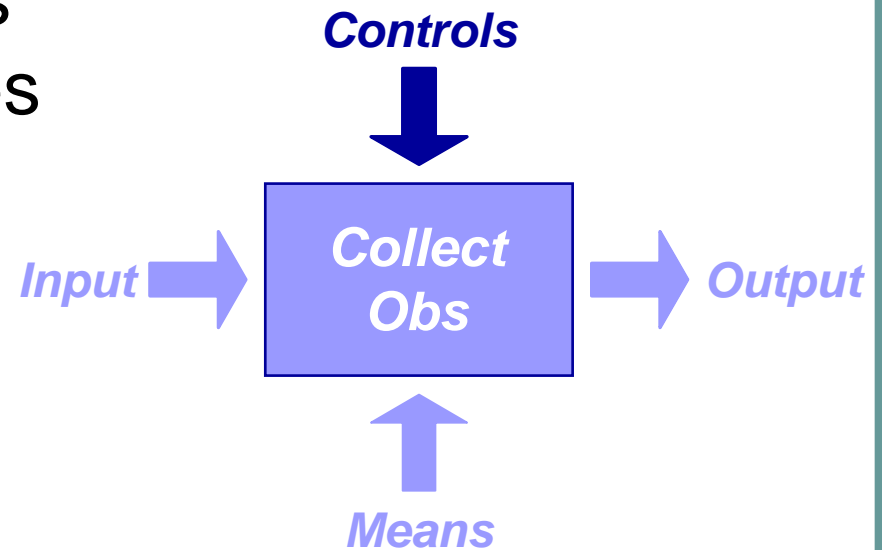
# Collector Services

- Shall get observations of ... conditions
  - Atmospheric
  - Hydrologic
  - Pavement / surface
- Shall accept obs defined by
  - NTCIP 1204
  - TMDD
  - CMML



# Collector Services

- Shall get observations according to schedules



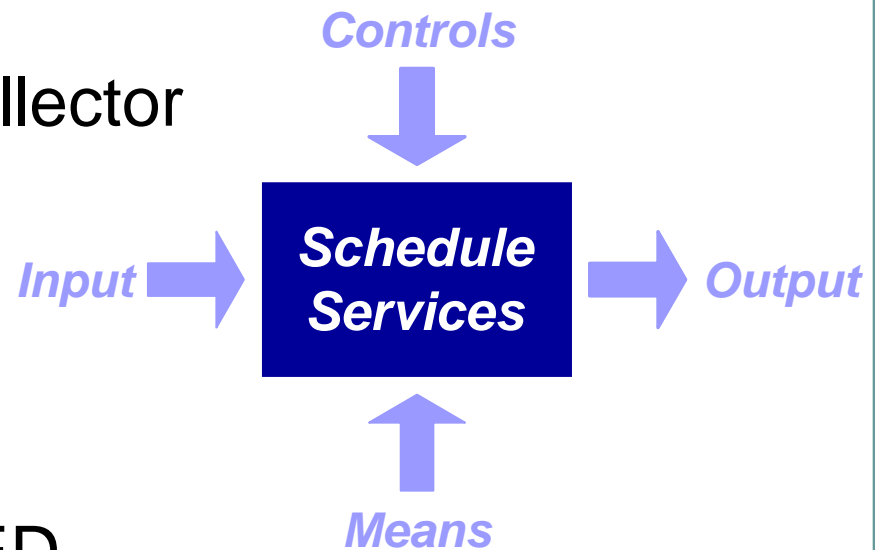
# Watchdog and Scheduling Service Requirements

Breakout 03:30 – 04:15

Wednesday, November 16

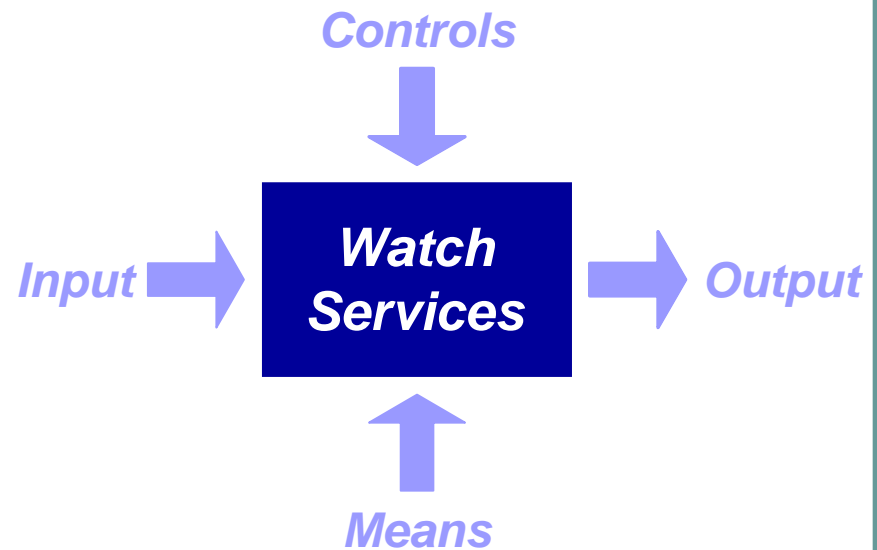
# Scheduling Services

- Shall...
  - Be able to initiate Collector Services
  - Be able to initiate Quality Checking Services
  - Be able to initiate QED Services
  - Log transactions



# Watchdog

- Shall...
  - Monitor the system state
  - Be able to restart unresponsive services
  - Log its activities



# Qualified Environmental Data Service Requirements

Breakout 08:30 – 09:30

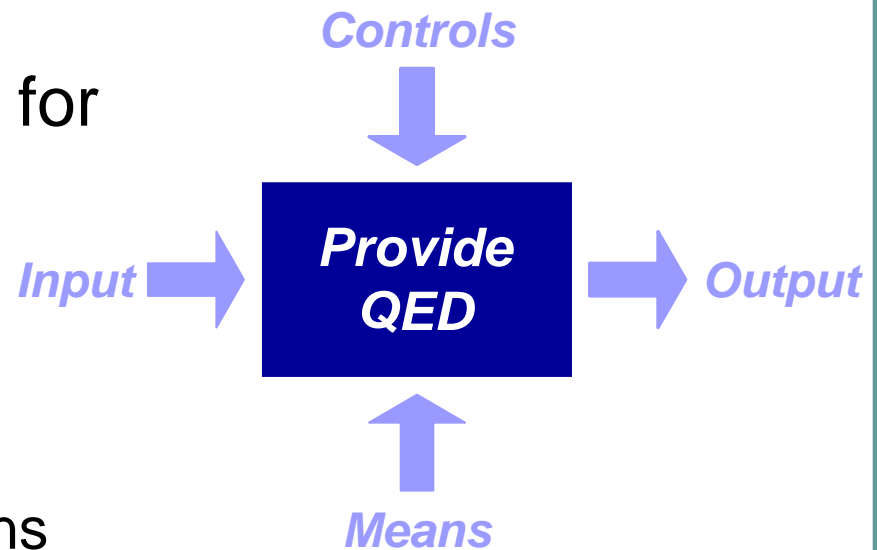
Thursday, November 17

# Qualified Environmental Data Cache

- Shall...
  - Store data from the Collector Services
  - Store data based on NTCIP 1204 definitions
  - Allow storing new observation types
  - Keep quality flags with the observation data
  - Keep observation data for seven days
  - Support 470 million current observations
  - Provide data to QED Service queries
  - Respond even if no records match query

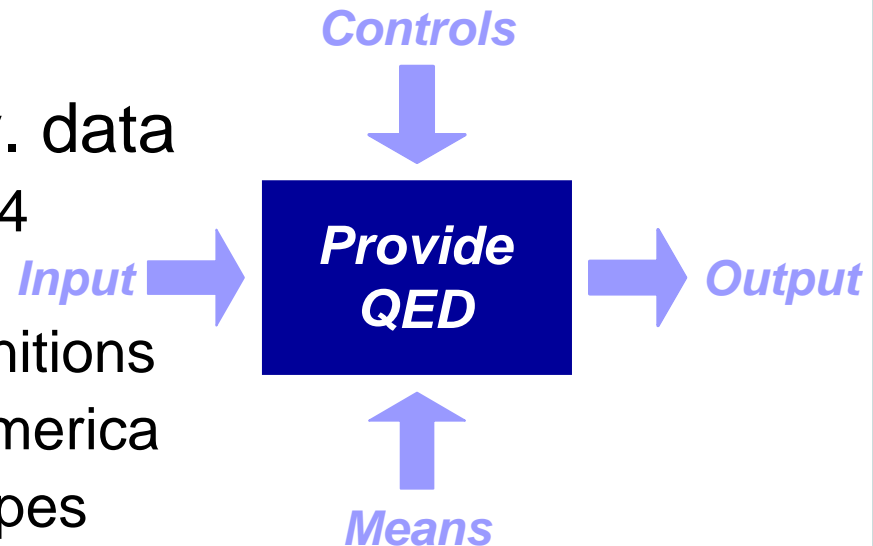
# Qualified Env. Data Services

- Shall...
  - Respond to requests for data
    - As scheduled
    - When polled
    - Based on change
    - Based on subscriptions
  - Restrict dissemination based on data sharing rules



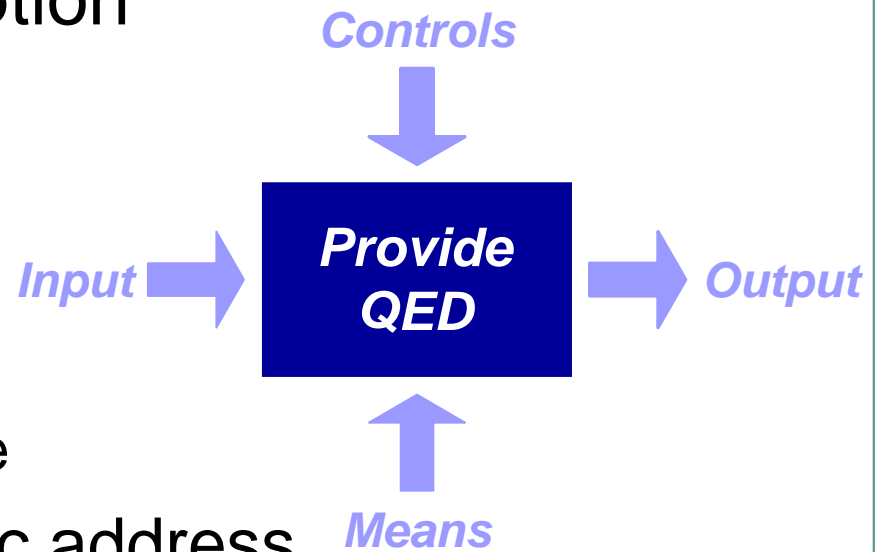
# Qualified Env. Data Services

- Shall...
  - Provide qualified env. data
    - Based on NTCIP 1204 definitions
    - Based on TMDD definitions
    - From across North America
    - Including new data types
  - Provide QC feedback
    - Based on quality flags
    - With all quality flags
    - With QC statistics



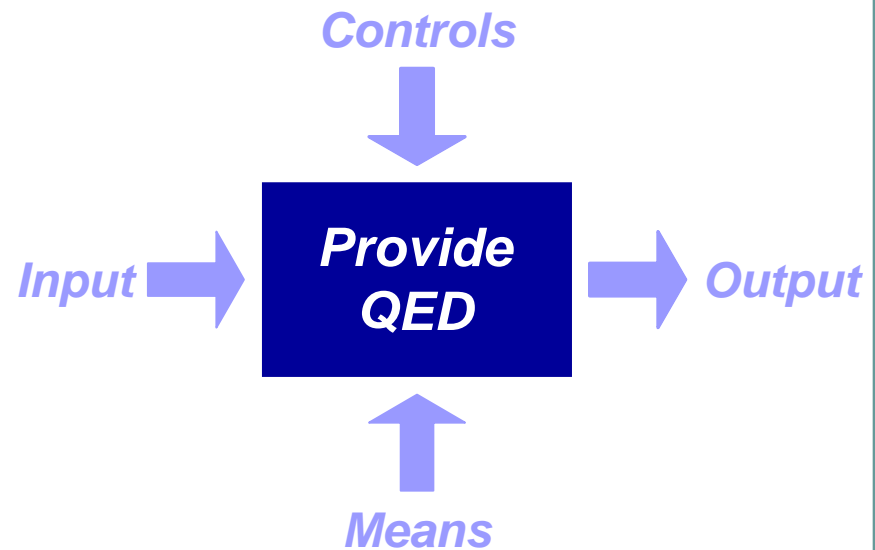
# Qualified Env. Data Services

- Shall support subscription requests...
  - Including a query and trigger
    - On a schedule
    - On a quality flag state
  - Returned to a specific address
  - Defaulted to the requesting address



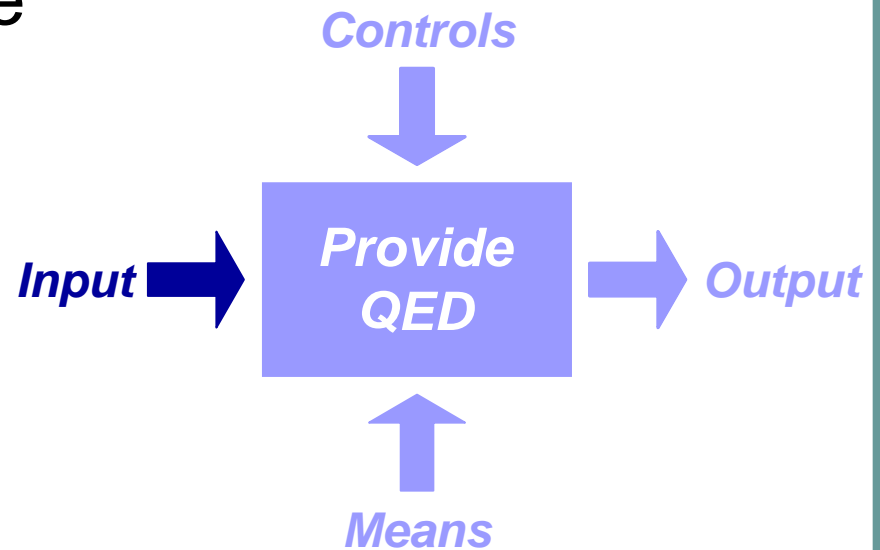
# Qualified Env. Data Services

- Shall uniquely identify subscriptions
- Shall automatically delete a subscription with expired criteria
- Shall log transactions



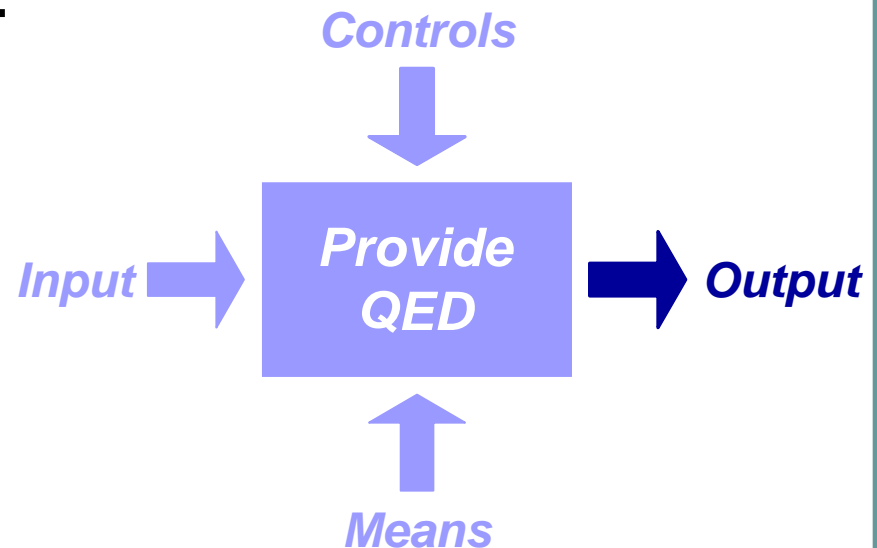
# Qualified Env. Data Services

- Shall get data from the QED Cache



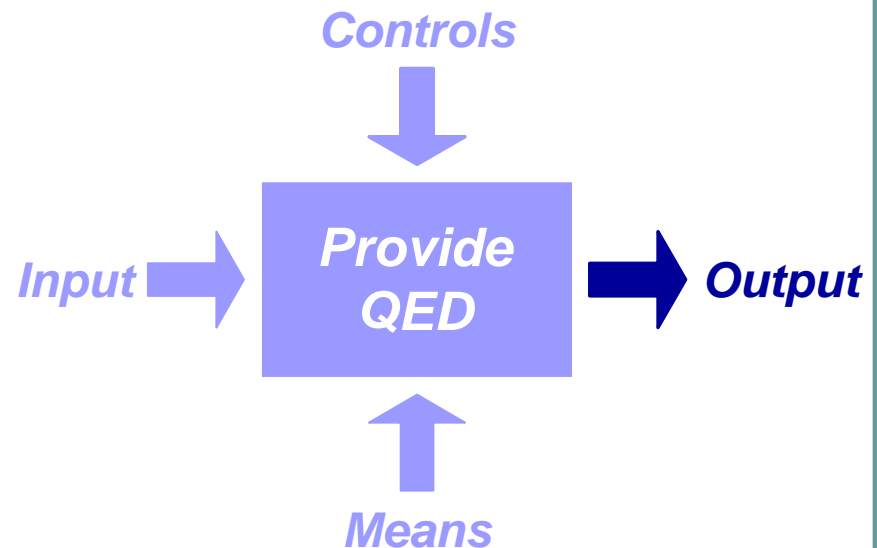
# Qualified Env. Data Services

- Shall allow query by...
  - Timestamp range
  - Location
    - Lat/long and radius
    - Lat/long pairs
  - Quality flag
  - Source (contributor)
  - ESS
- Shall tailor output to requested parameters



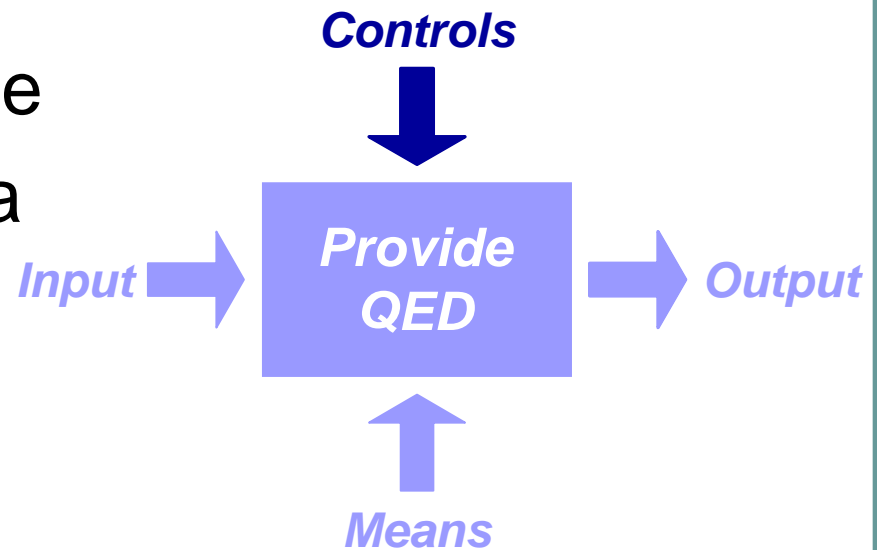
# Qualified Env. Data Services

- Shall provide output in...
  - NetCDF
  - HDF
  - CMML
  - ASCII CSV text
- Shall support new formats
- Shall use standard Internet protocols



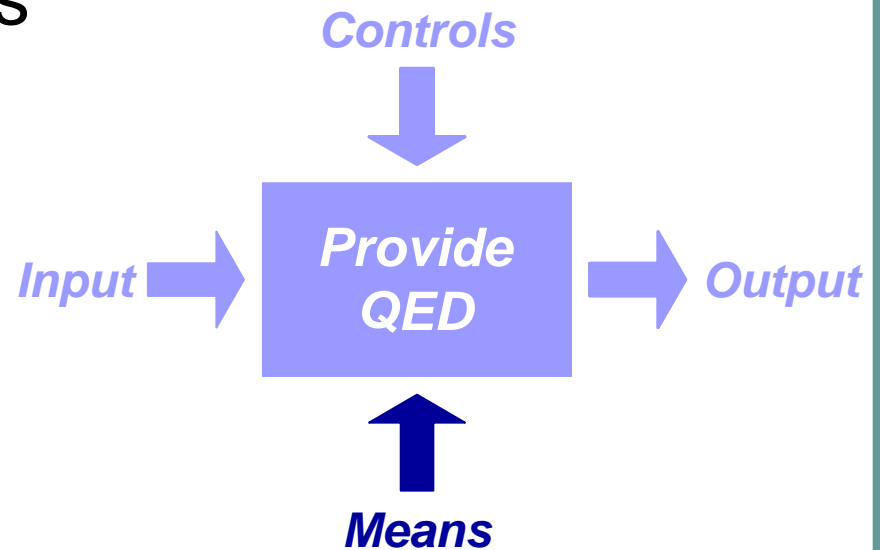
# Qualified Env. Data Services

- Shall respond to a request within 1 minute
- Shall publish new data within 20 minutes of receipt
- Shall handle 300 simultaneous requests



# Qualified Env. Data Services

- Shall process requests concurrently



# Environmental Metadata Service Requirements

Breakout 08:30 – 09:30

Thursday, November 17

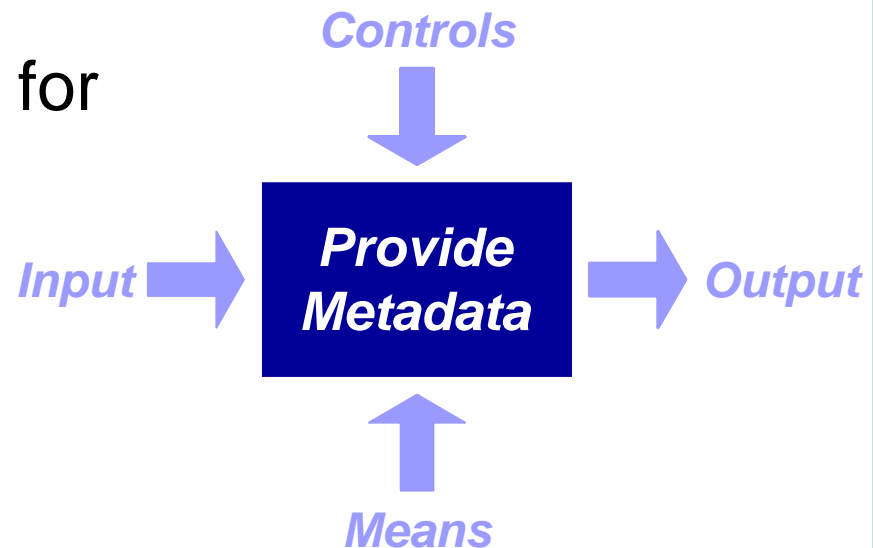
# Environmental Metadata Cache

- Shall...
  - Store metadata based on TMDD/MSETMCC
  - Allow storing metadata for new sensors (observation types)

	ID	Contact/ Backup Info	Owner	Equip List	Link to Images	Assoc Pavement Data	Location (Lat/ Long/Elev)
Contributor	✓	✓					
Collector	✓	✓	✓				
ESS	✓	✓	✓	✓	✓	✓	✓

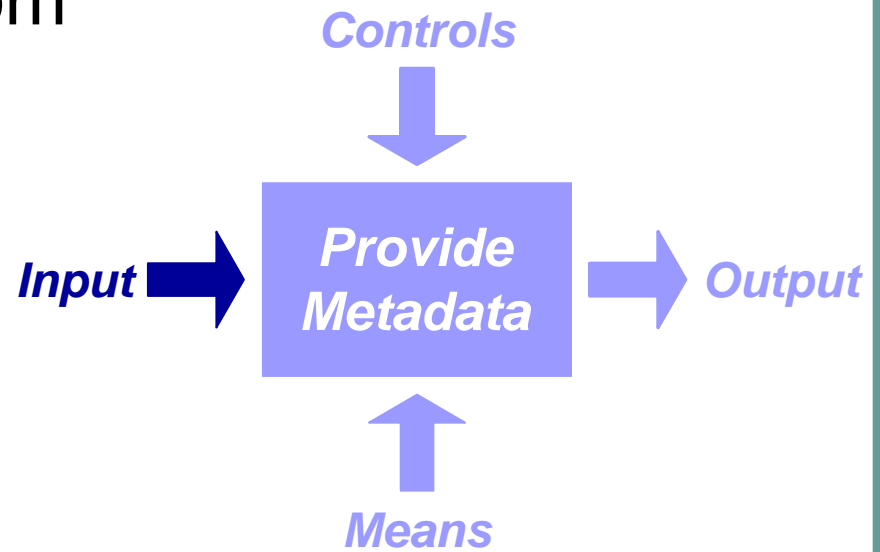
# Environmental Metadata Services

- Shall...
  - Respond to requests for metadata (polling)
  - Provide metadata on contributors, collectors, and ESS
  - Log transactions
  - Be subject to data sharing agreements
  - Allow for new obs/sensors



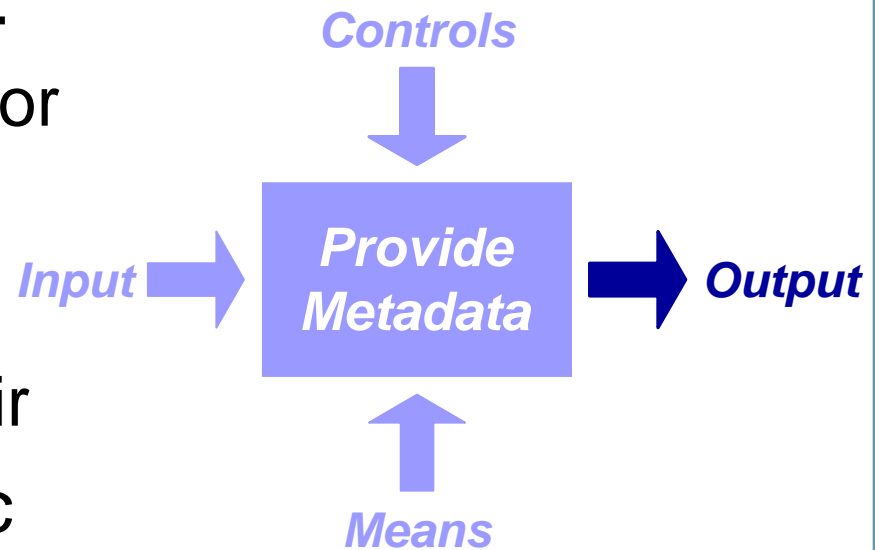
# Environmental Metadata Services

- Shall get metadata from the EM Cache



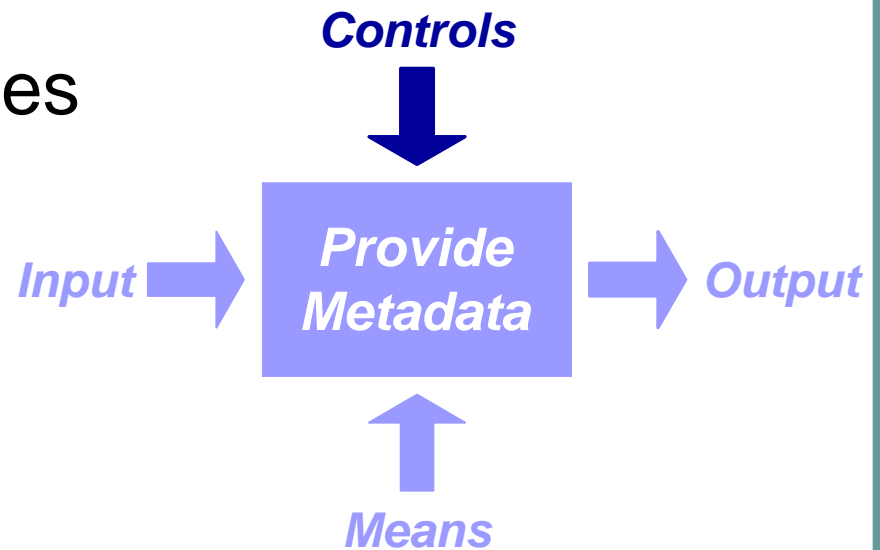
# Environmental Metadata Services

- Shall allow query by...
  - Contributor or collector
  - ESS
  - Lat/long and radius
  - Bounding lat/long pair
- Limit output to specific parameters
- Use standard Internet protocols
- Provide ASCII CSV output



# Environmental Metadata Services

- Shall respond to a request within 5 minutes



# Environmental Metadata Services

- Shall process requests concurrently

