

Managing a very large PI System

Presented by **Narendra Raju and Sarah Fisher**



MISO Overview



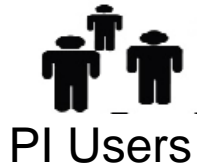
MARKET AREA



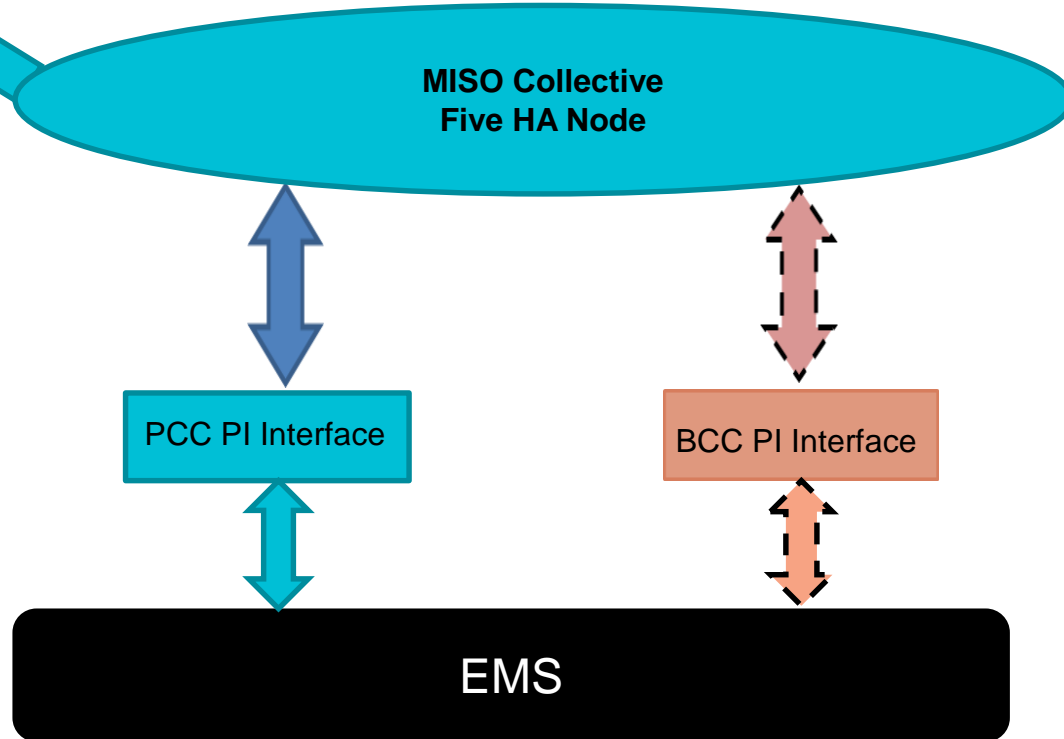
RELIABILITY COORDINATION AREA

- Not-for-profit, member based organization administering wholesale electricity markets.
- Generation Capacity
 - 178,396 MW (Market)
 - 192,803 MW (Reliability)
- Historic Peak Load (set July 20, 2011)
 - 127,125 MW (Market)
 - 133,181 MW (Reliability)
- 65,787 miles of transmission
 - 500kV, 345kV, 230kV, 161kV,
138kV, 120kV, 115kV, 69kV
- 15 states (Reliability)
- One Canadian province

Miso PI System



PI Users



PI System Details

- 700,000 PI Tag System
- 2 GB data (PI Archives) every 13 hours
- *Five HA PI servers*
- *Eight PI Interface Servers – Esca habConnect Interface*
- *Four PI Advanced Computing Engine (PI ACE) Servers*
- *Two PI WebParts Servers*
- *PI Clients – Process Book, PI DataLink, RTWebparts, PI-OLEDB*

PI Data Usage

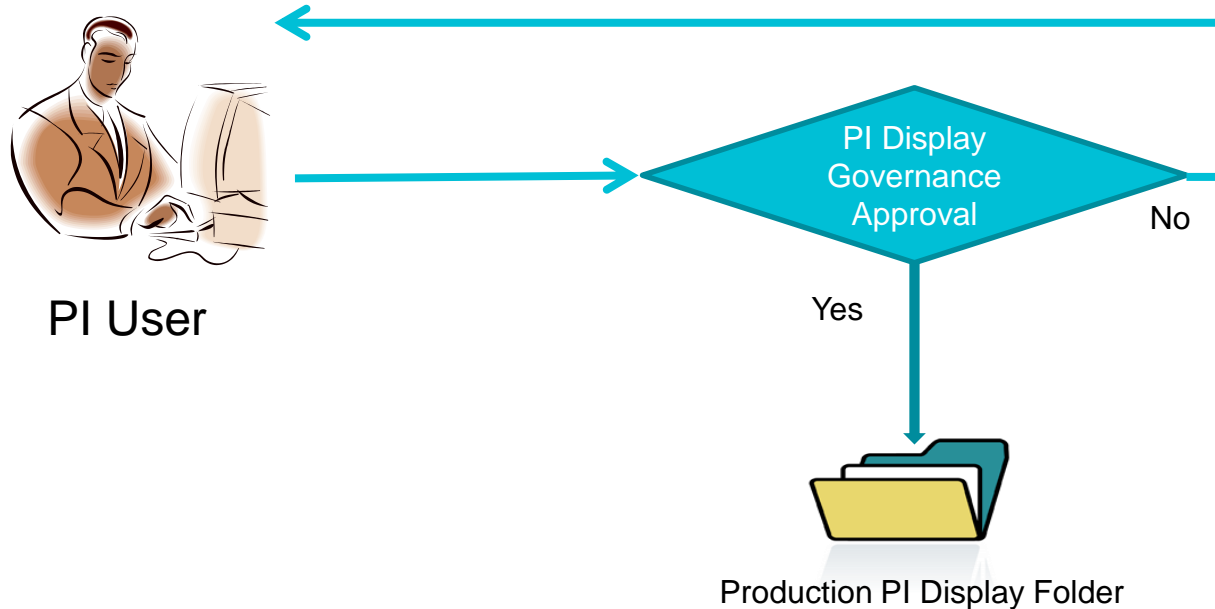
- Performance Metrics
- NERC Compliance Data
- Real Time Balancing Authority Generation Data
- Tie Line Data & Monitoring
- EMS Data Trending and Historical Analysis
- EMS Oncall Support
- Load Forecast Study

Managing PI System

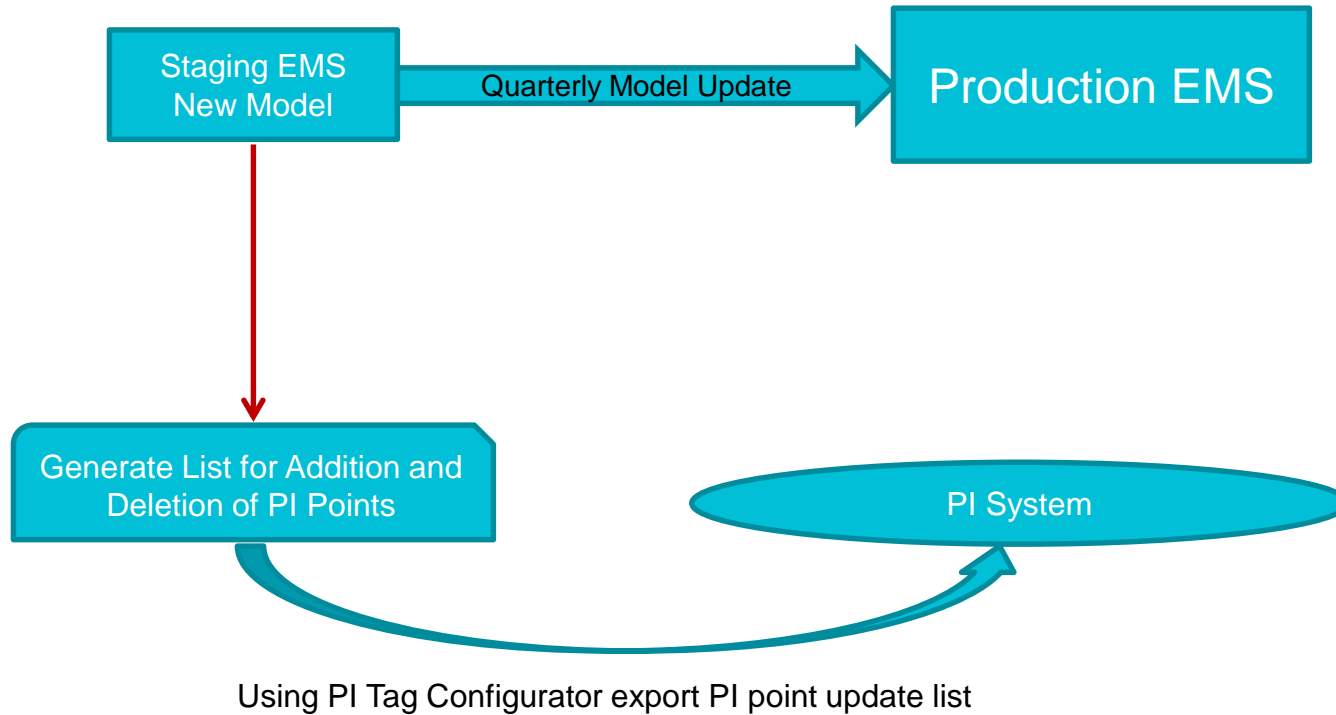


- PI Display Management
- PI Point Update
- Offline Storage of PI Archive Data
- PI Software and Operating System Upgrade
- PI System Failover

PI Display Management

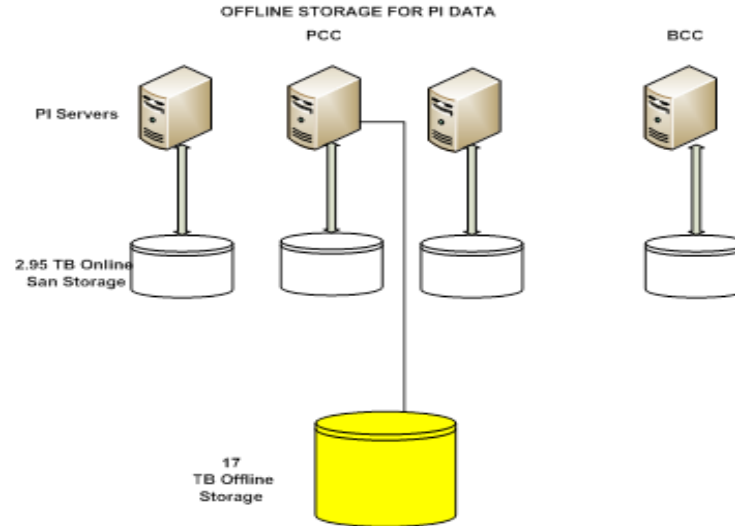


PI Point Update



Offline Storage

Miso implemented off-line storage of PI data by moving out PI data archive files (older than two years) to offline, un-replicated, mid-tier, less expensive storage. The PI system host two years of on-line data for PI users.



PI Software Upgrade



PI System are upgraded every two years.

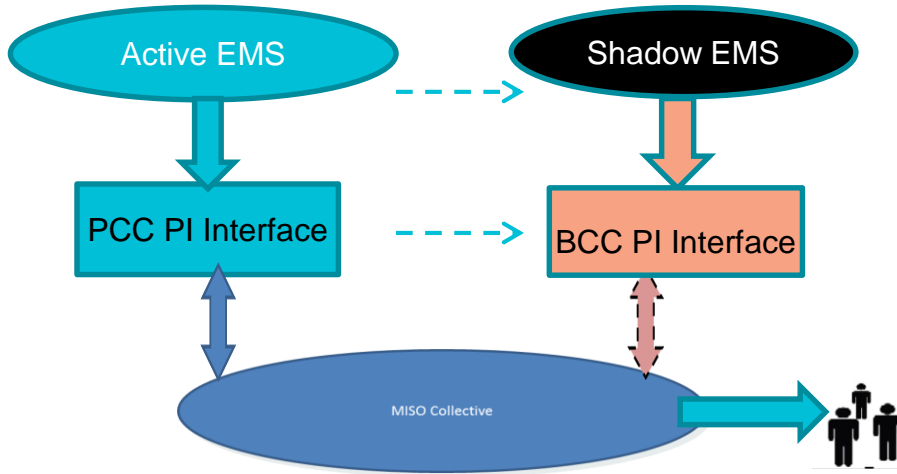
Any Emergency Patch or Update will be implemented

PI servers are patched twice a year

PI user accounts are managed by Active Directory

PI System Failover

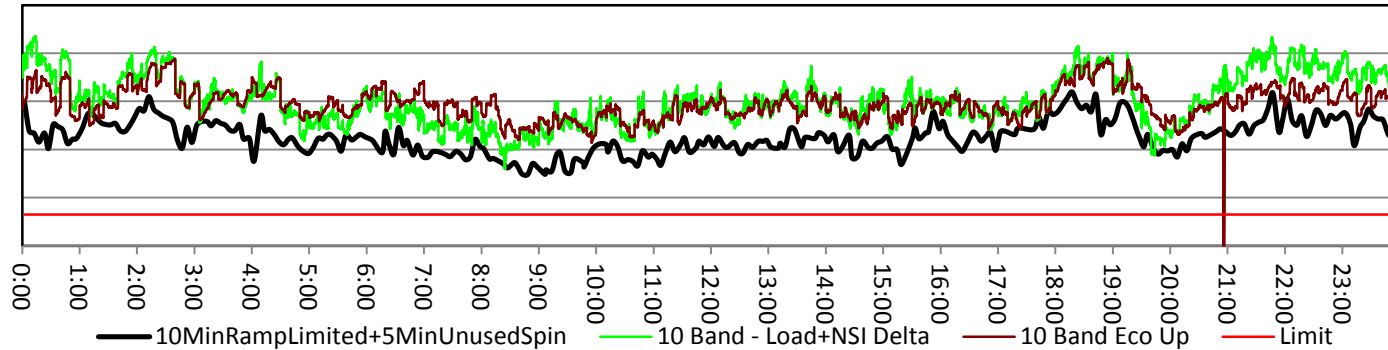
PI interfaces switchover between PCC and BCC sites executed using a script.



PI Data Usage

Performance Metrics

Spinning Reserve

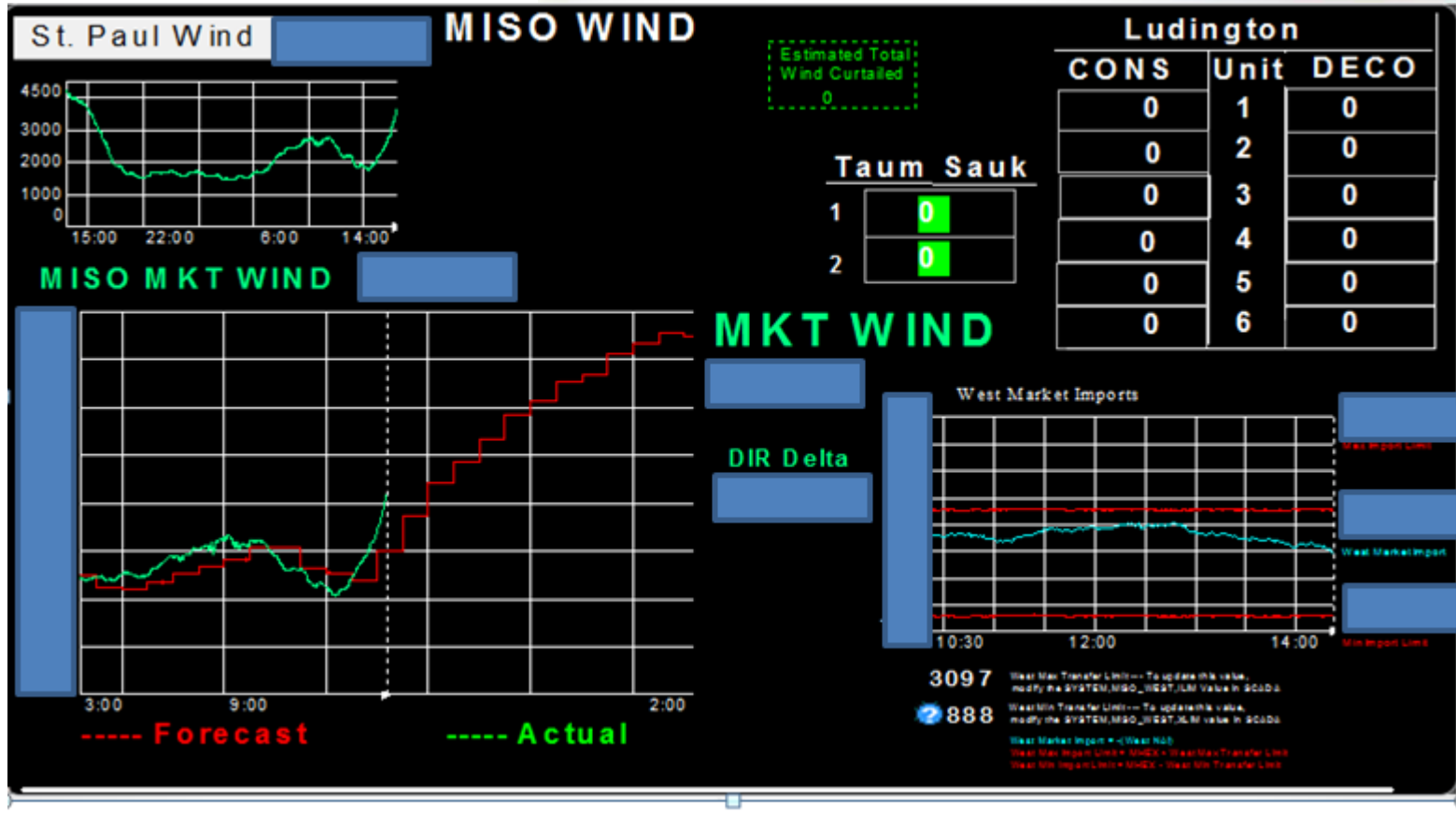


The MISO ACE MW plot displays the following data series and metrics:

- Max Ace last 3 min.**: 915
- NSI Delta Timer**: 00:00:00
- Tie Comp.**: 524
- Freq. Comp.**: 13
- Deployed Reg.**: -353
- NSI Delta**: -3

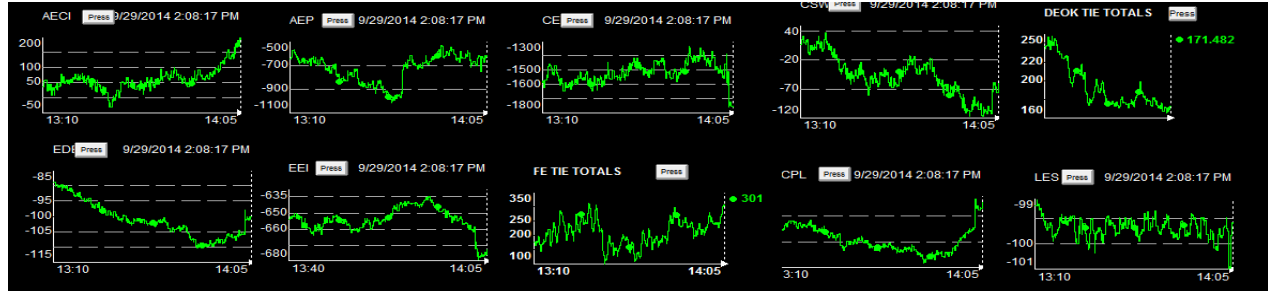
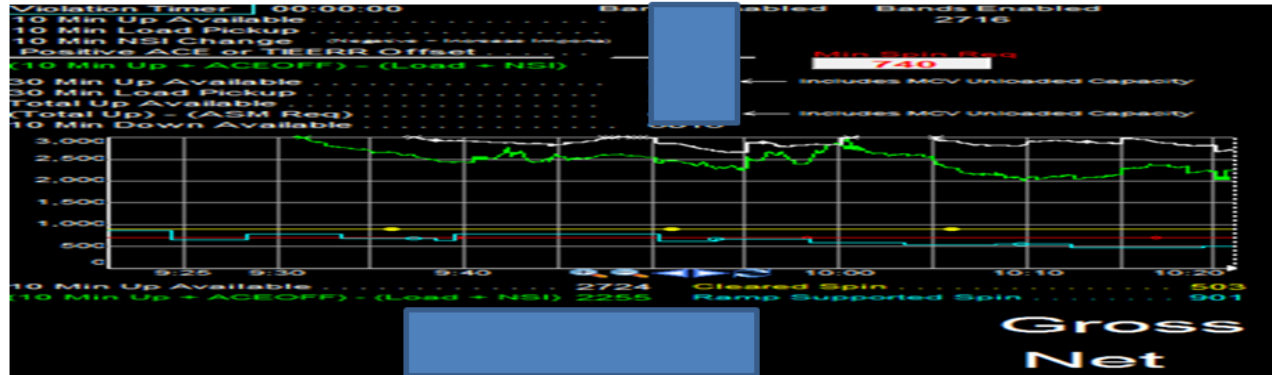
The plot shows a green line for the total ACE, a blue line for the frequency component, and a red line for the deployed regulation. The x-axis represents time from 13:30 to 13:55. The y-axis represents MW, with a scale from -1000 to 1000.

MISO Wind



PI Data Usage

Real Time Balancing Authority – Generation and Tie Line Monitoring

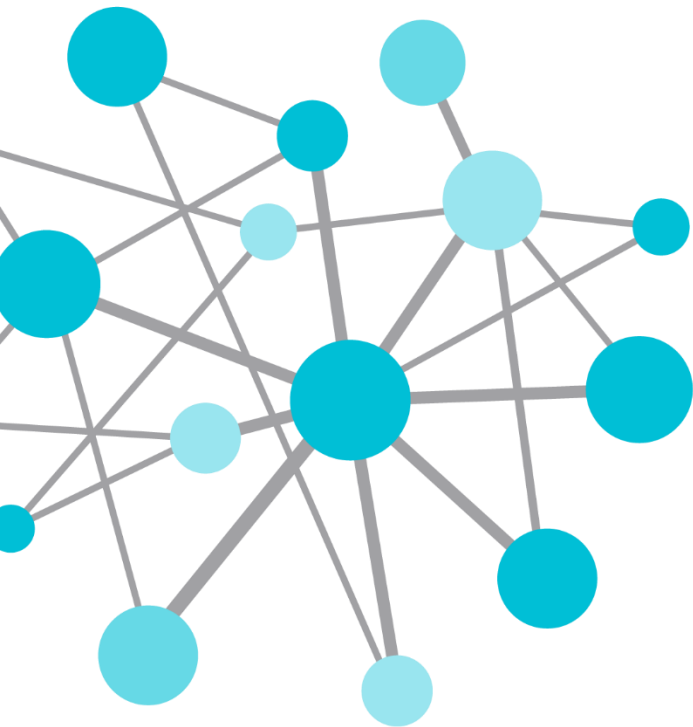


Conclusion



PI is important tool to MISO Real-Time Operation for managing key aspects of grid reliability, integrating market data with EMS data and its operator friendly PI Clients

“While PI up time is better than 99%, our PI Administrators are able to respond and correct issues within minutes and often correct any issues prior to Operations noticing a problem”



Questions ?

Contact Info



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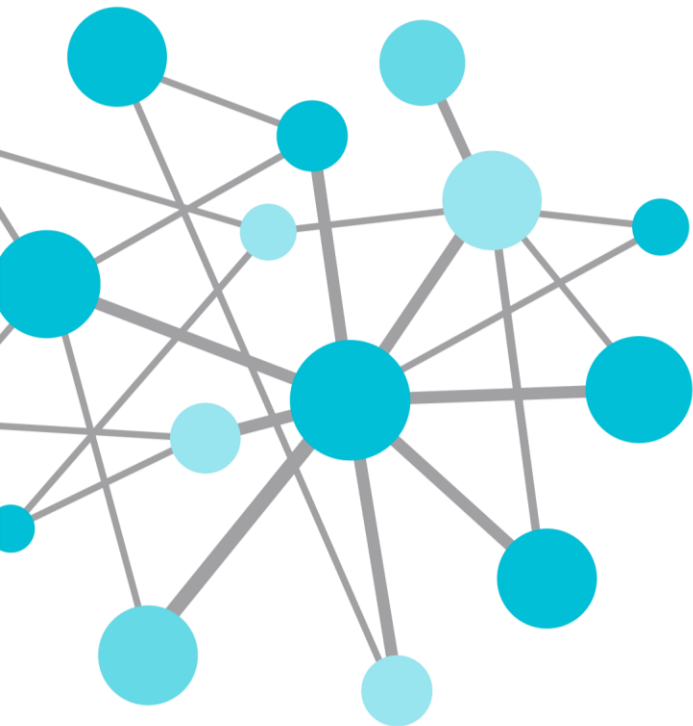
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