

CASCADING OUTAGE PREVENTION IN COLOMBIA

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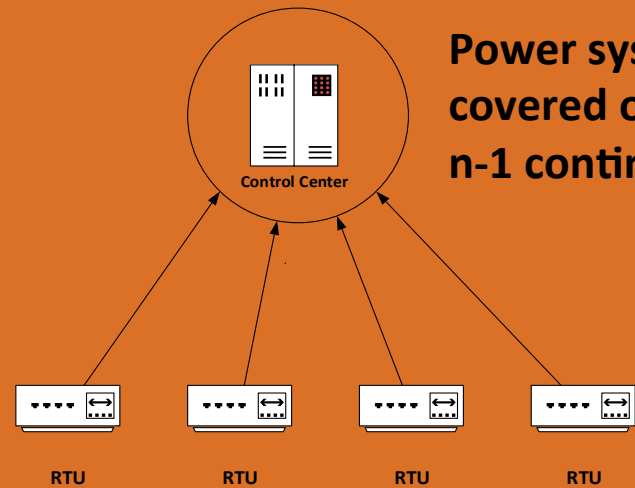
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PROBLEM

All the decision are centralized

Power system is covered only under n-1 contingencies.



No synchronized data



HOW WE PREVENT CASCADING OUTAGES BEFORE WAMS?

Restrictions of power transportation on the transmission network are identified using criteria previously defined .

Contingencies are evaluated previously to real-time in order to maintain the stability under n-1 contingencies.

Long , medium and short term planning of generation resources and transmission, in order to guarantee accomplish with the stability and reliability criteria.

However is not possible to have a 100% secure system because the size and complexity of power system makes difficult to prevent all the possible events.

COLOMBIAN BLACKOUT 2007

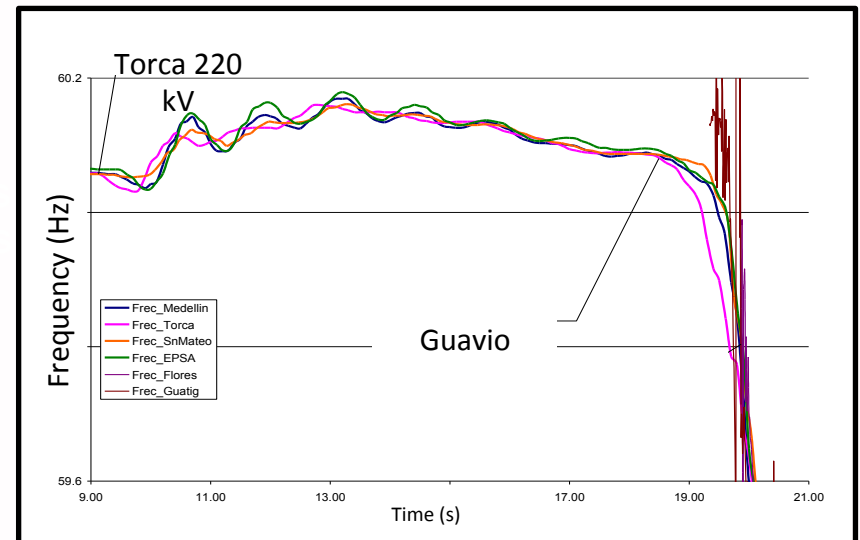
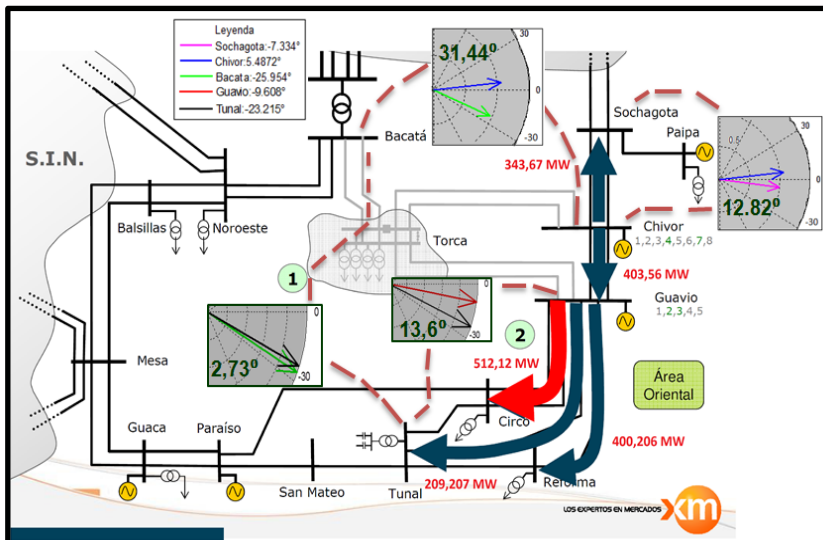
Normal maintenance maneuvers.



Detection of a non fault current by the protection system.

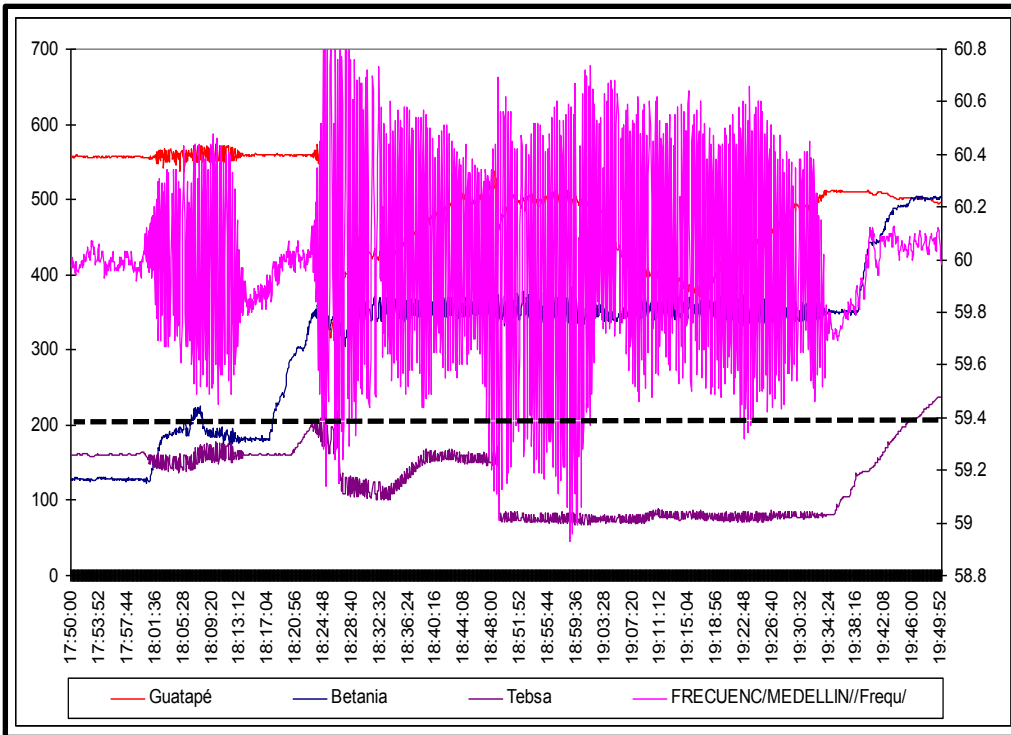


Blackout

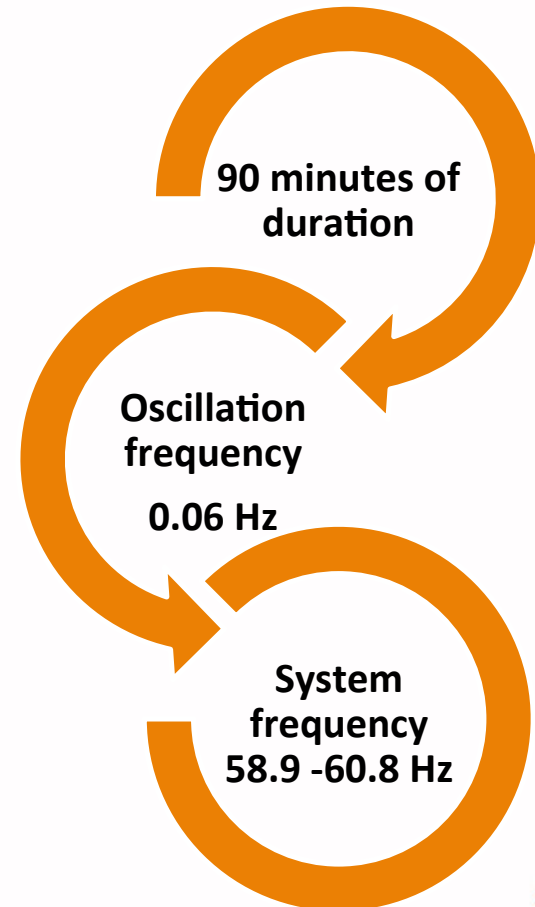




OSCILLATION EVENT 2008

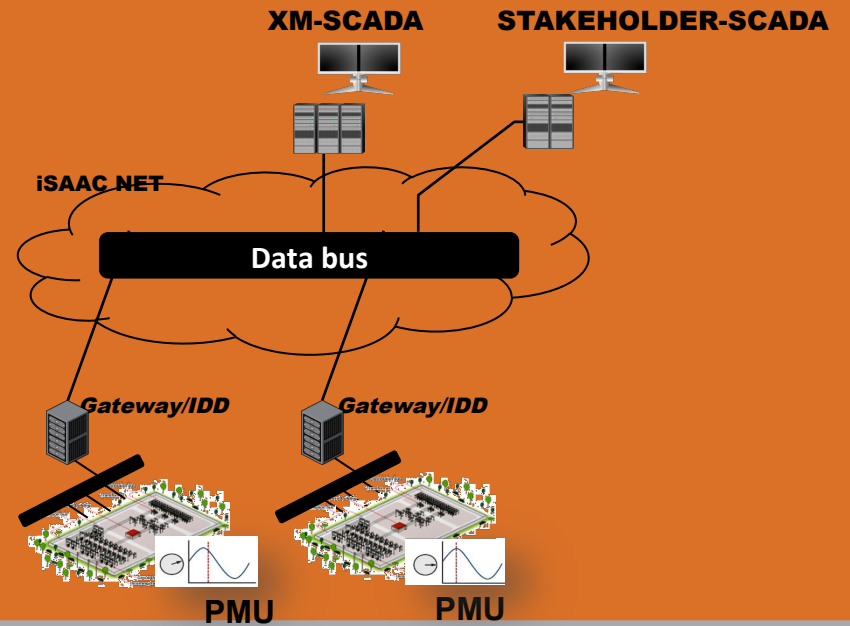


Under frequency relay activation shedding
15 % of the demand.





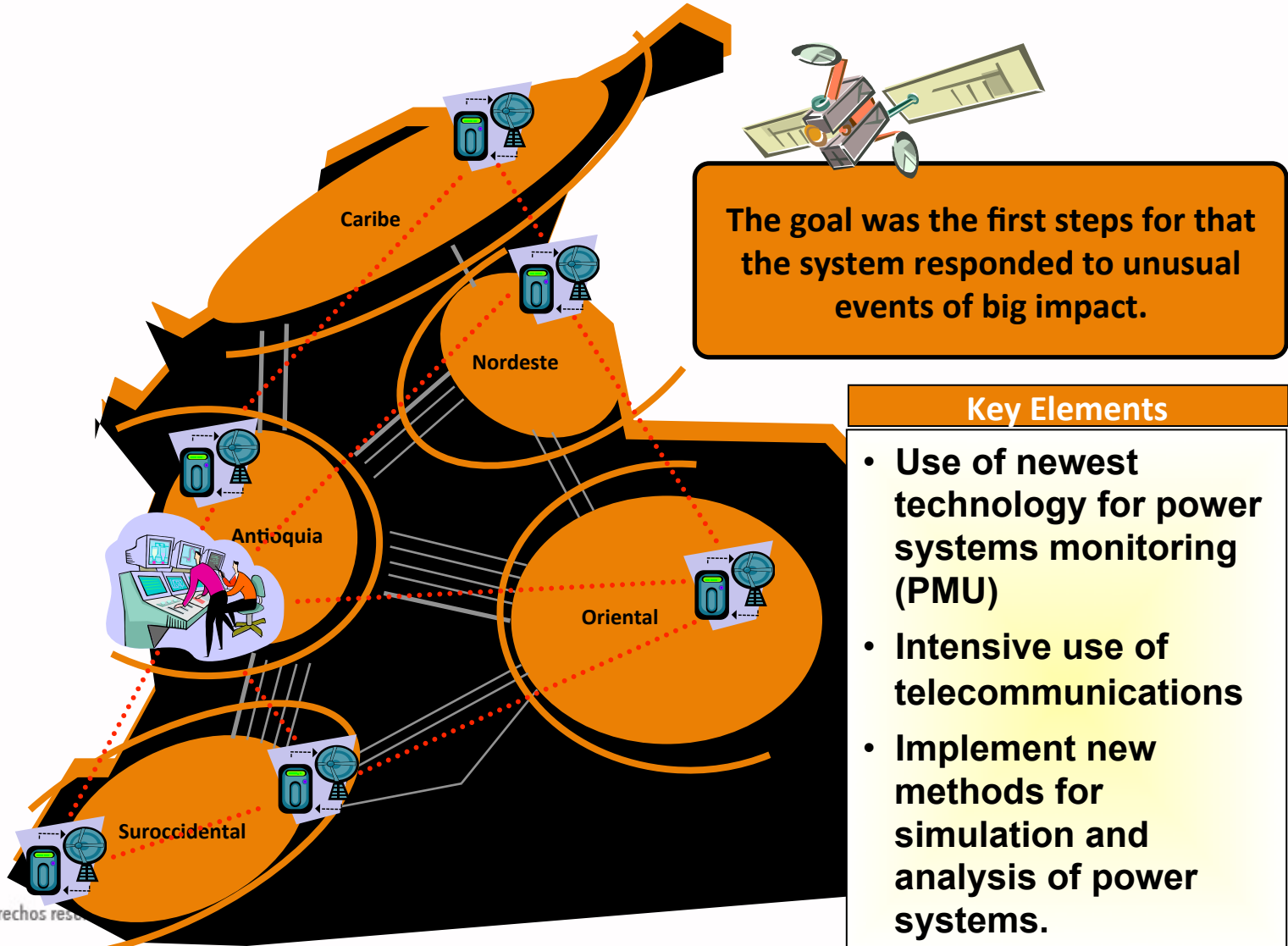
SOLUTION



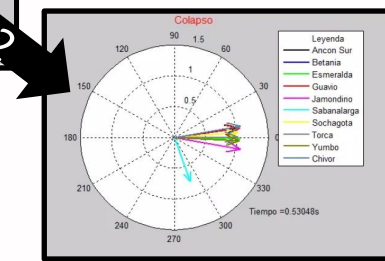
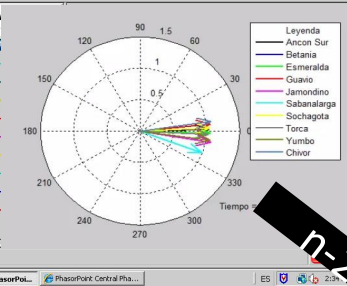
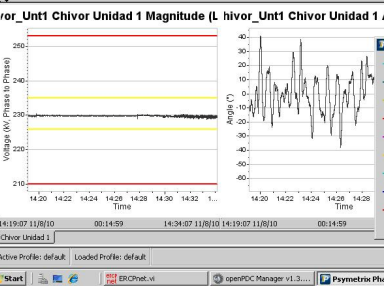
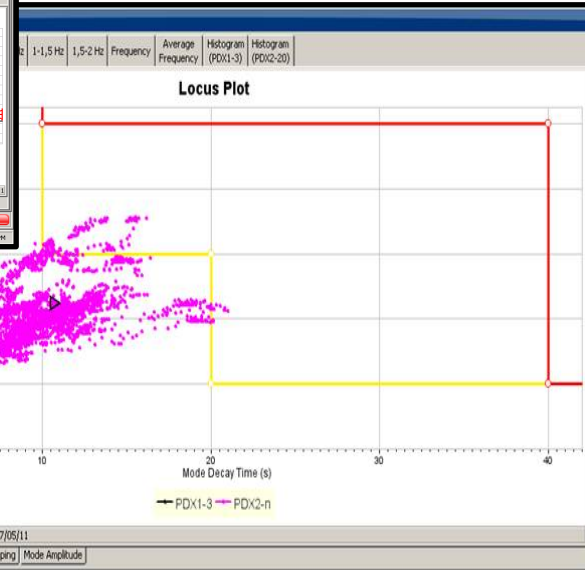


ACTIONS AFTER BLACKOUT





WAMS/SITUATIONAL AWARENESS – SIRENA RESULTS





ISAAC- INTELLIGENT SUPERVISION AND ADVANCED CONTROL SYSTEM

The goal is develop the architecture for the future supervision and real time control.



1

Synchrophasor measurements

2

Communication based in IP

3

Functionality distributed in substations

4

Advanced protection schemes

5

Situational Awareness





ROAD MAP FOR ISAAC INCREMENTAL DEVELOPMENT

2015

(Current Status)

- **Working WAMS**
- Conceptual Design finalized
- iSAAC Roadmap finalized

2020

- **Advanced supervision (no protection and control)**
- Some SIPS implemented [with PMUs+IDD]

2025+

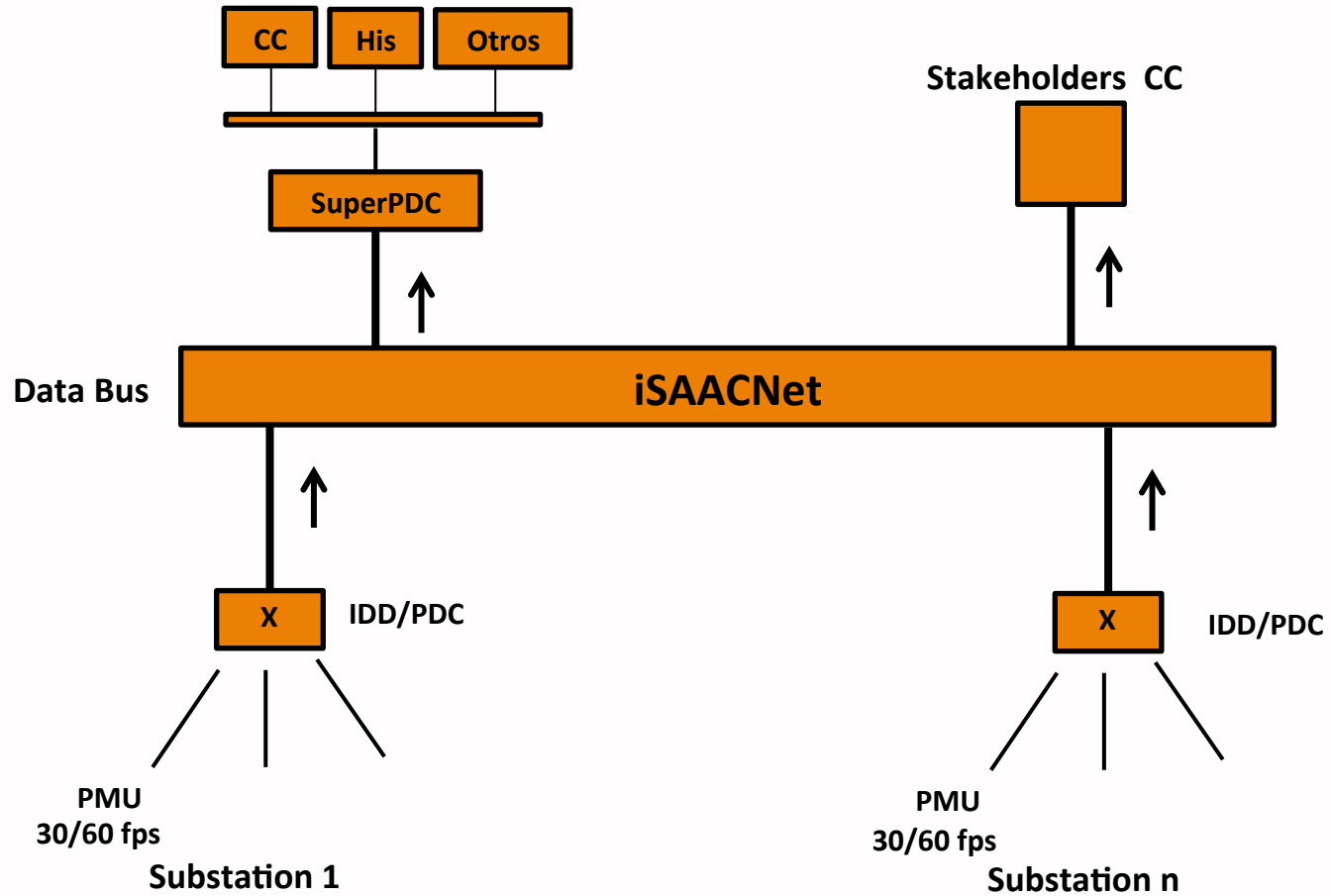
- **Complete iSAAC implementation**
- Frequency control

2016/2017

- **WAMS & SCADA/EMS integration**
- Detailed Technical Requirements for iSAAC software architecture
- Technical Requirements for IDD

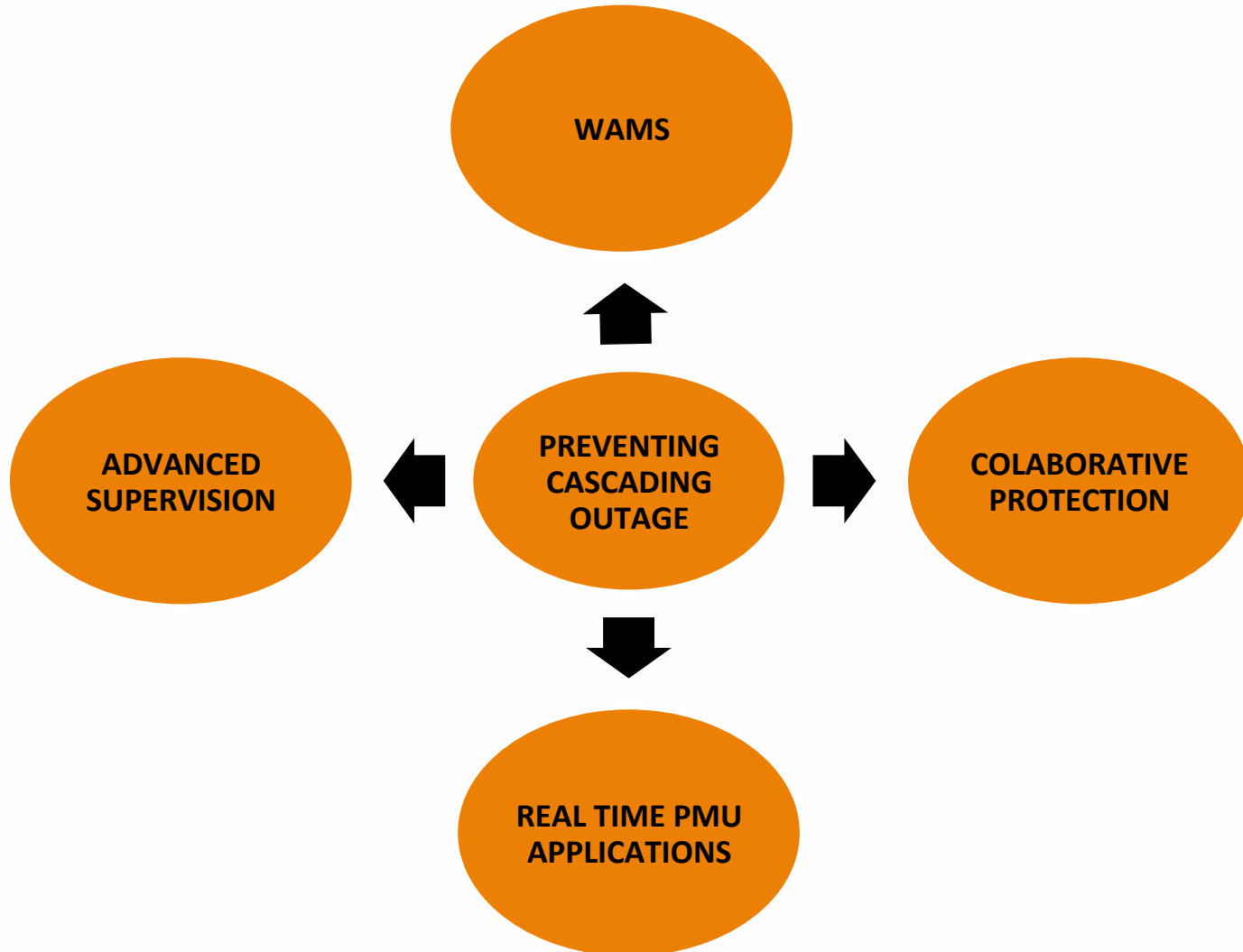
2022/2023

- **Collaborative Protection (no control)**
- Full IDD implementation
- PMU based Volt/Var control





CONCLUSIONS





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