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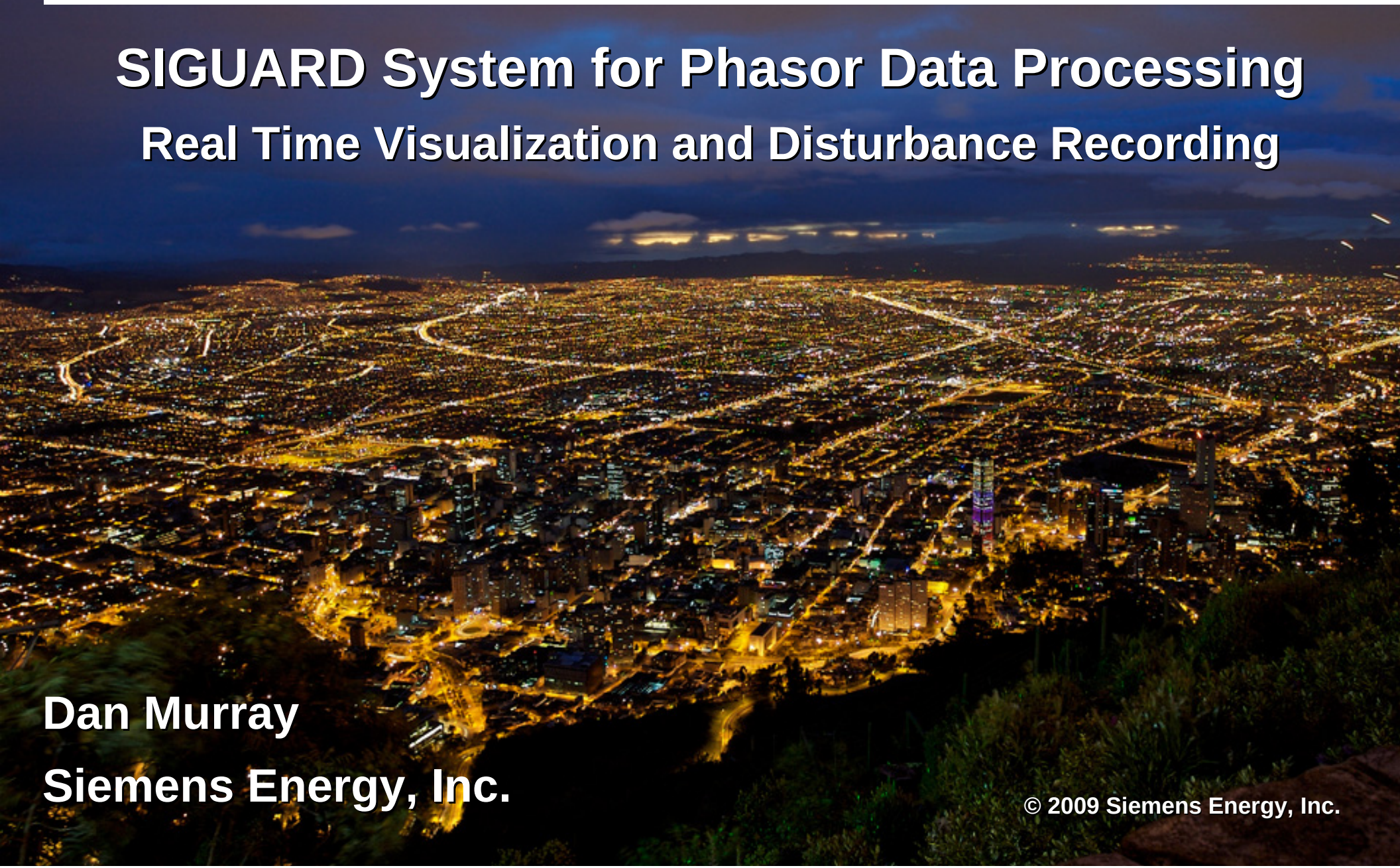
SIGUARD System for Phasor Data Processing

Real Time Visualization and Disturbance Recording



Dan Murray

Siemens Energy, Inc.

SIGUARD Phasor Data Processing System
System Description

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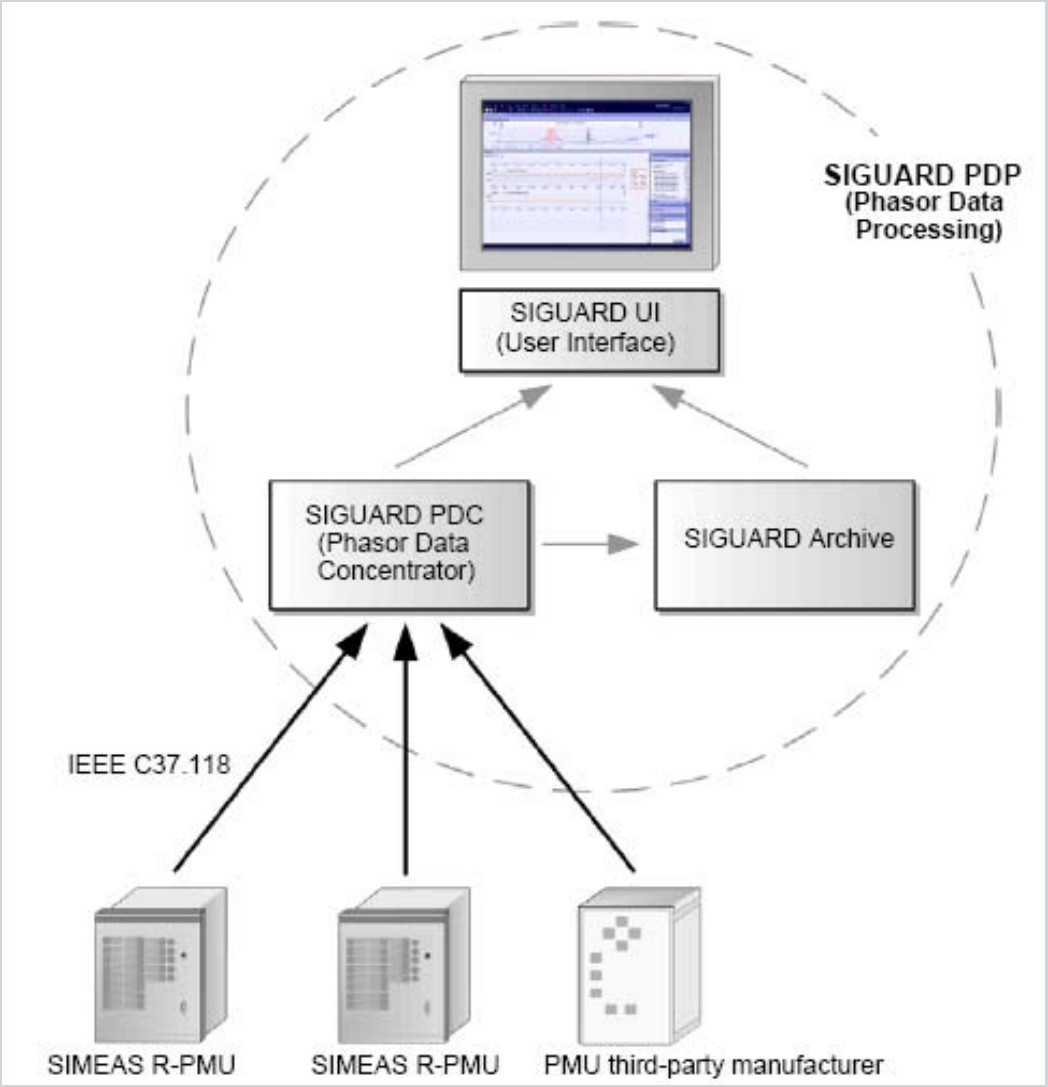

SIGUARD is a software-based

- Phasor Data Concentrator
- Data Archive
- User Interface

Users

- System operators
- Power system analysts

Modes of Operation

- Online: Real-time operation
- Offline: Post event analysis

SIGUARD Phasor Data Processing System
System Architecture

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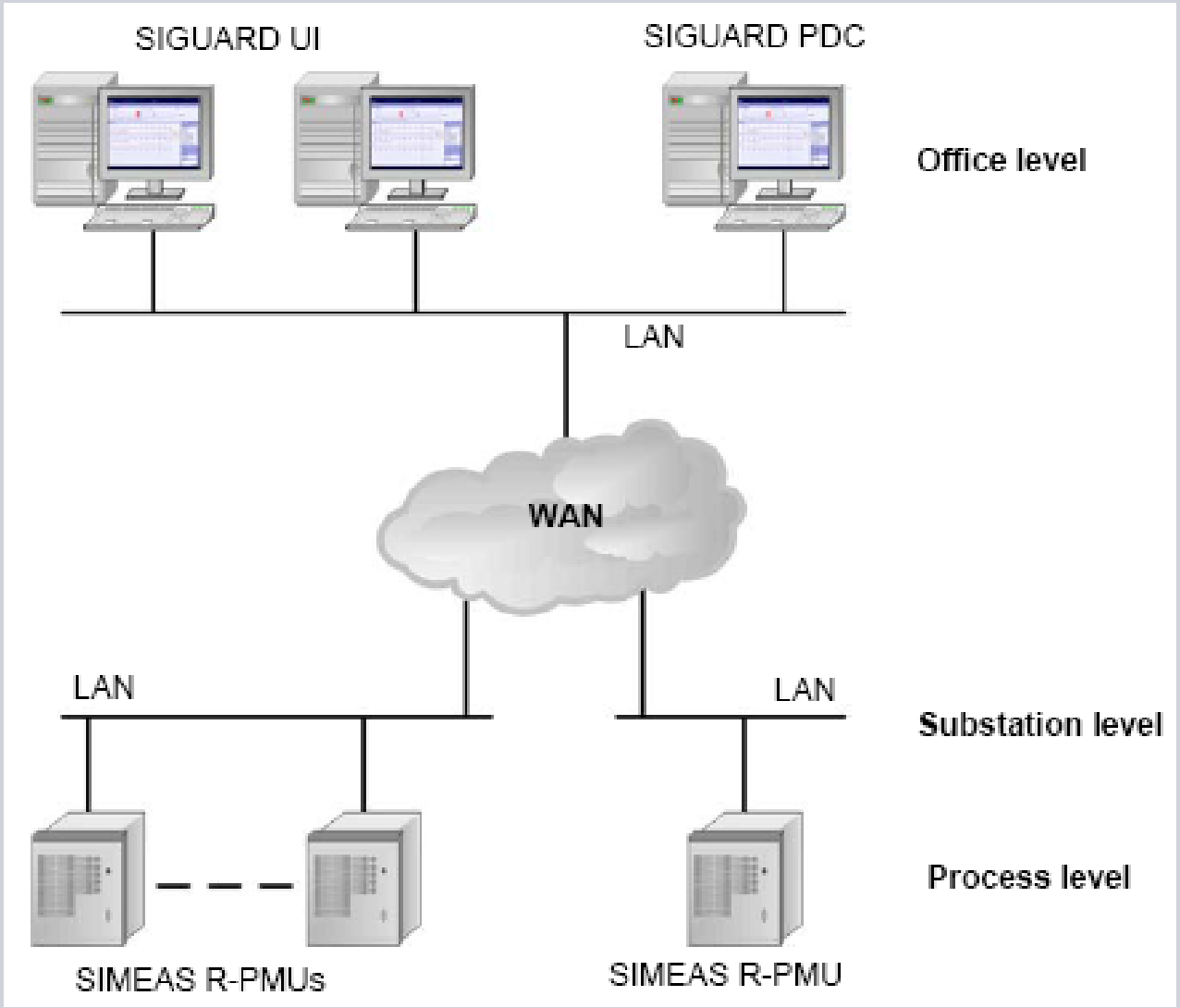

- Install on single PC or multiple PCs
- Supports multiple User Interfaces (UI)
- Works with all PMUs strictly conforming to IEEE C37.118 Standard

SIGUARD Phasor Data Processing System
Application Areas

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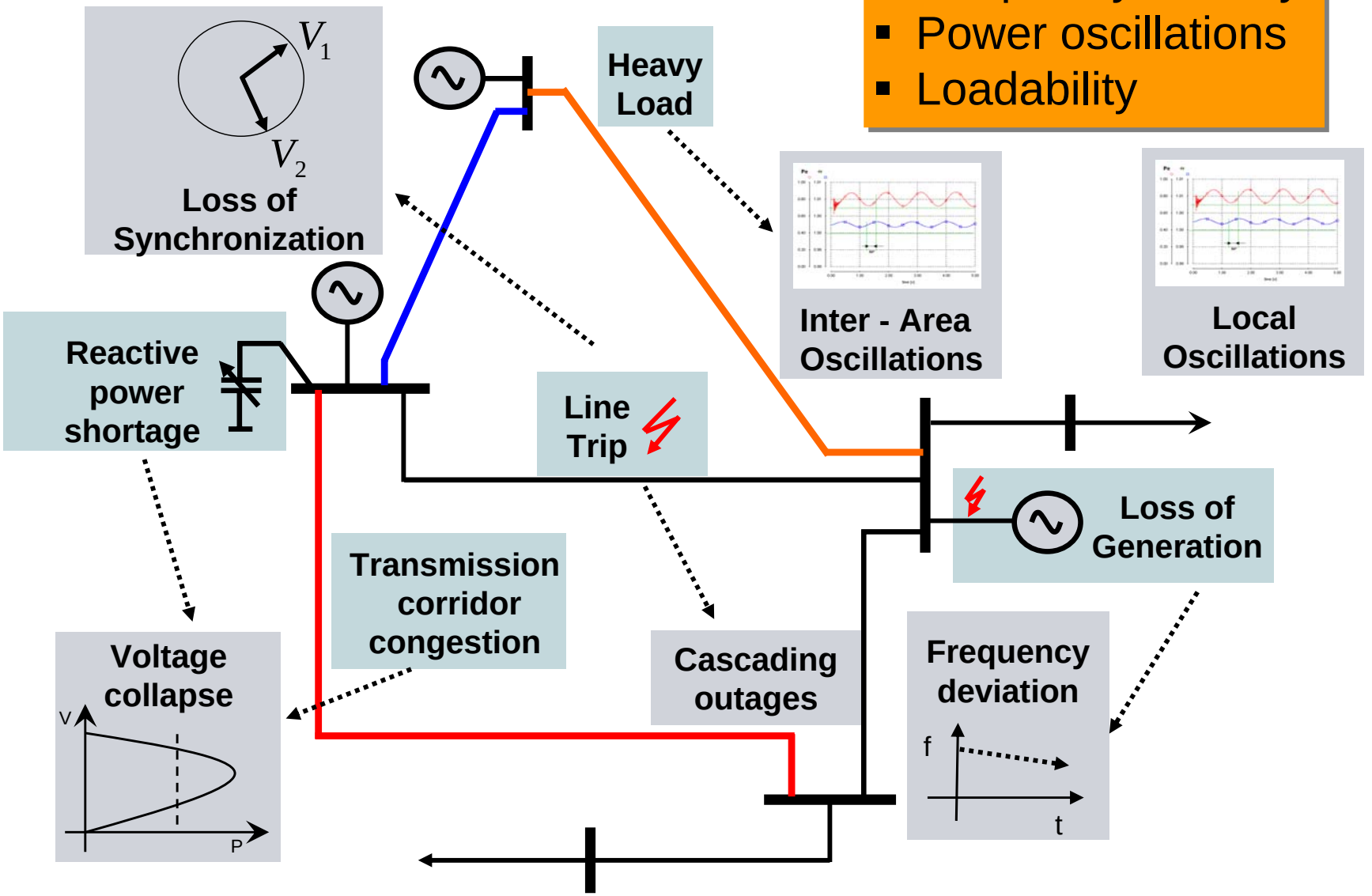
- Voltage stability
- Frequency stability
- Power oscillations
- Loadability



SIGUARD Phasor Data Processing System
User Interface

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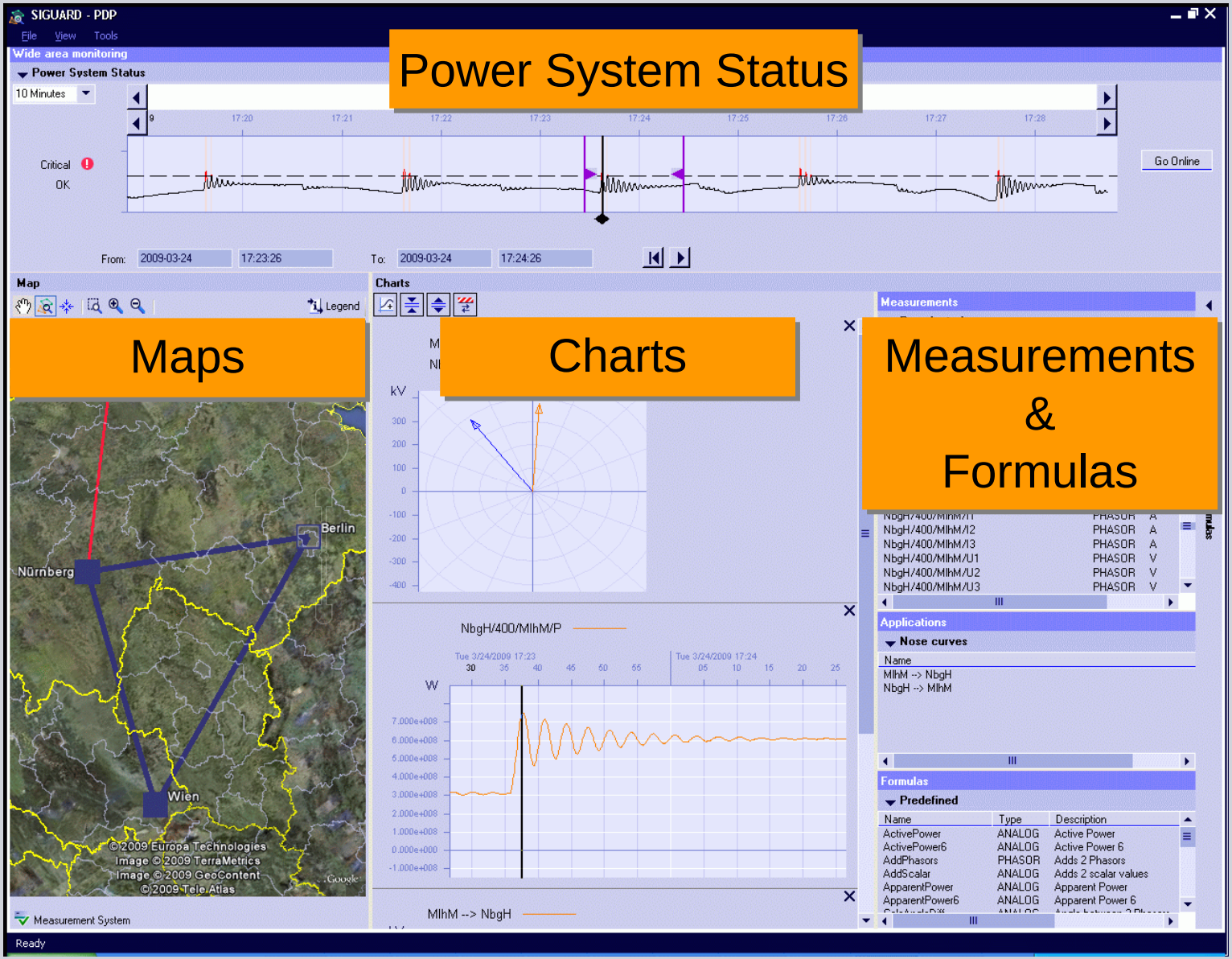

SIGUARD Phasor Data Processing System
User Interface

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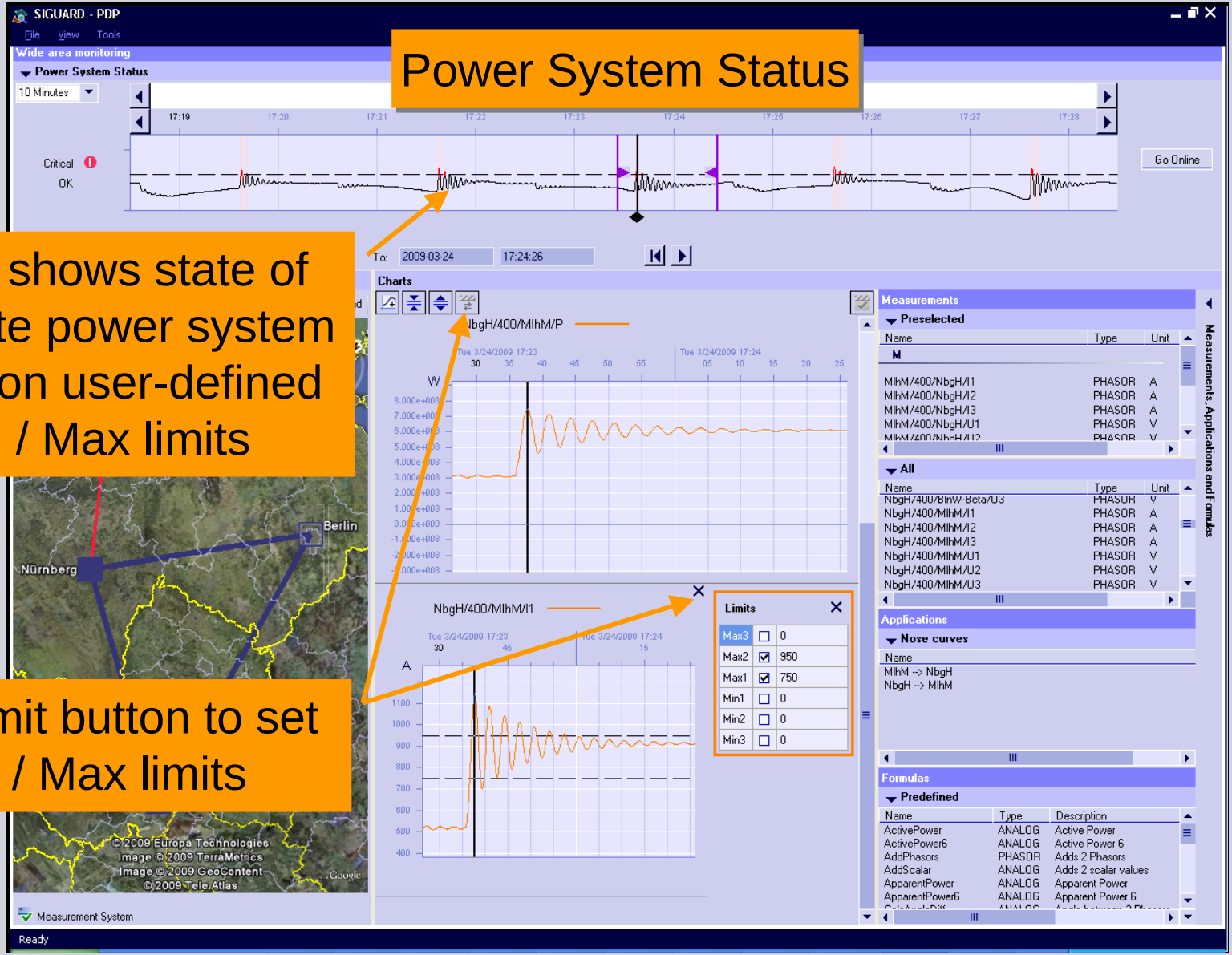

SIGUARD Phasor Data Processing System
User Interface

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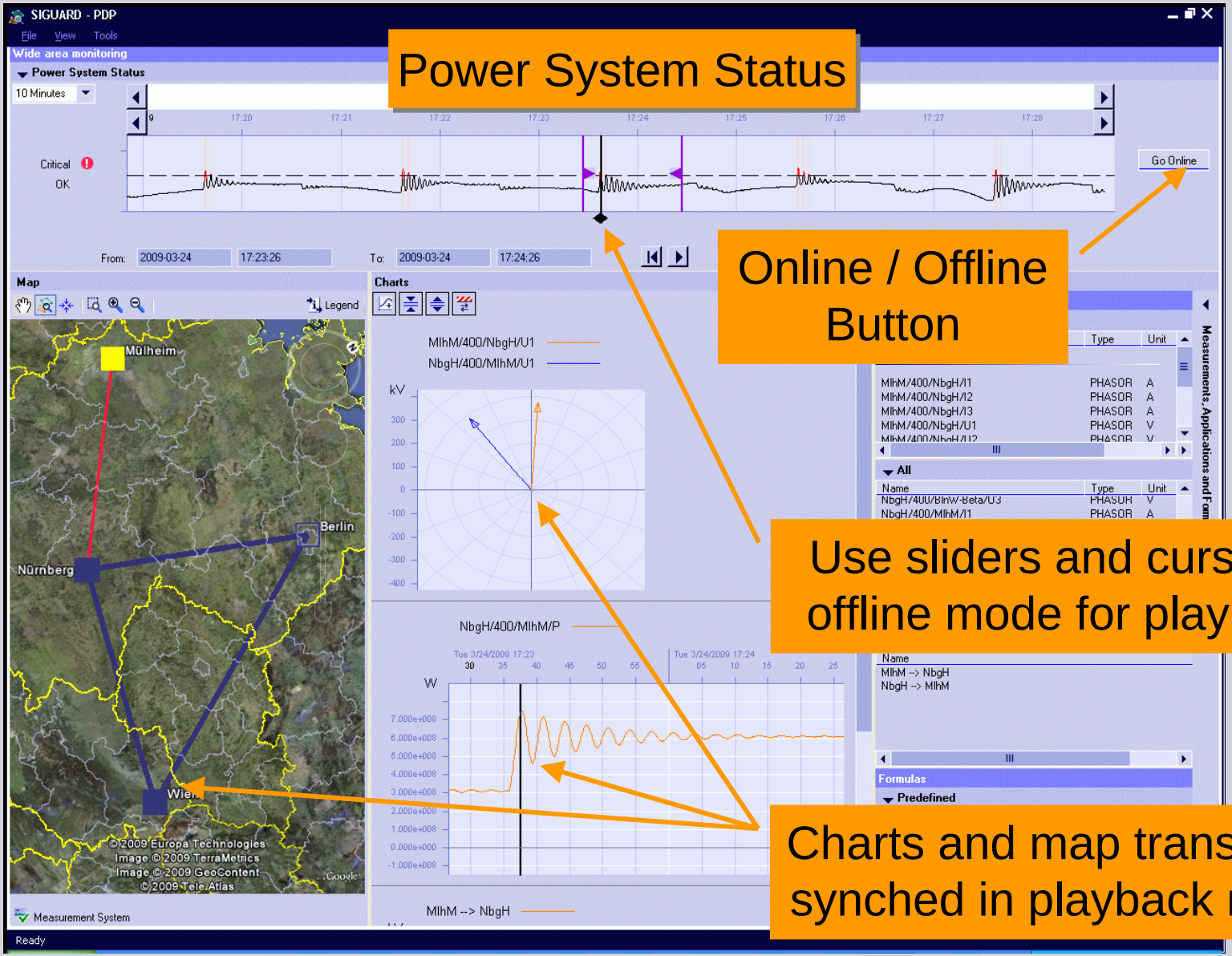

SIGUARD Phasor Data Processing System
User Interface

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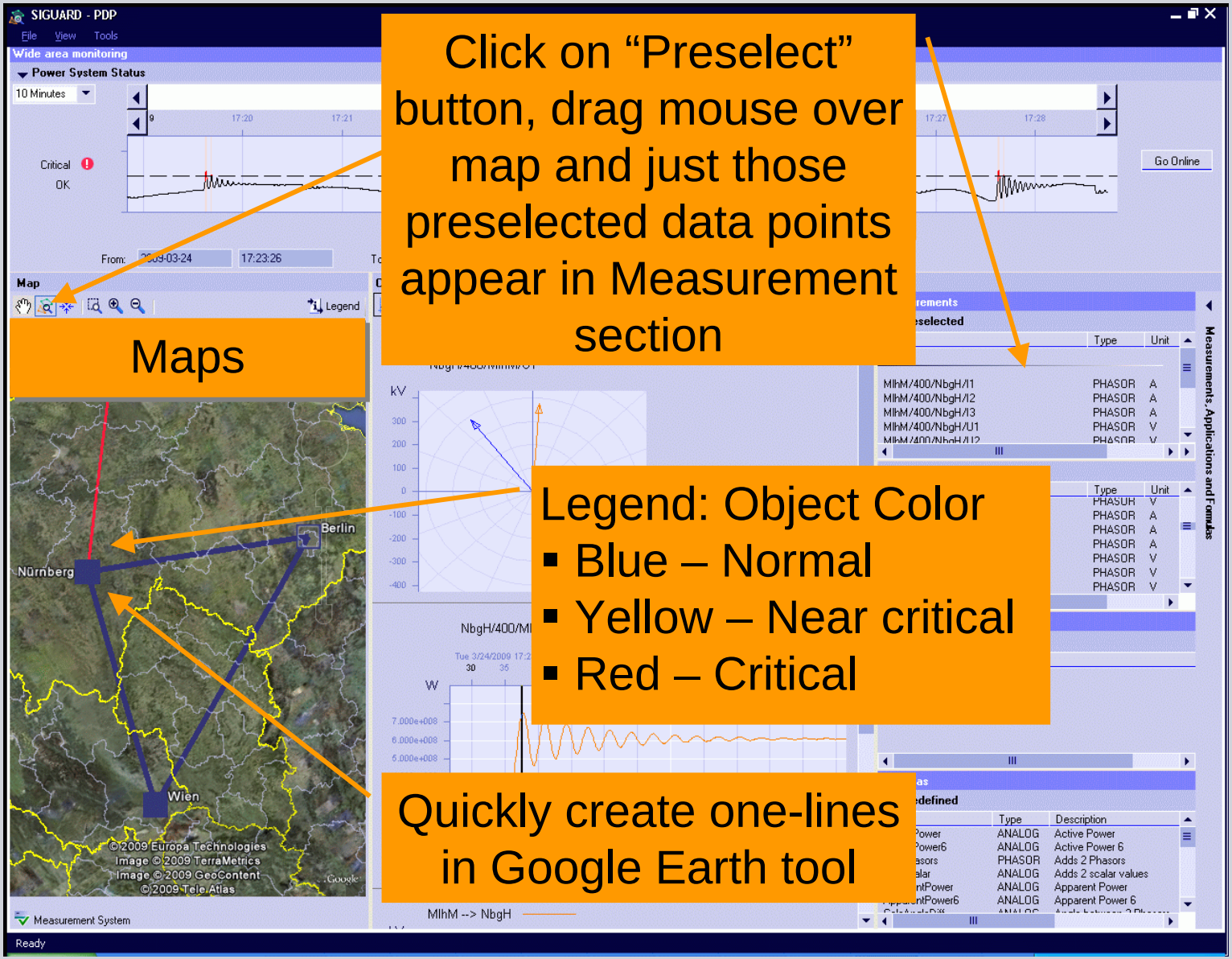

SIGUARD Phasor Data Processing System
User Interface

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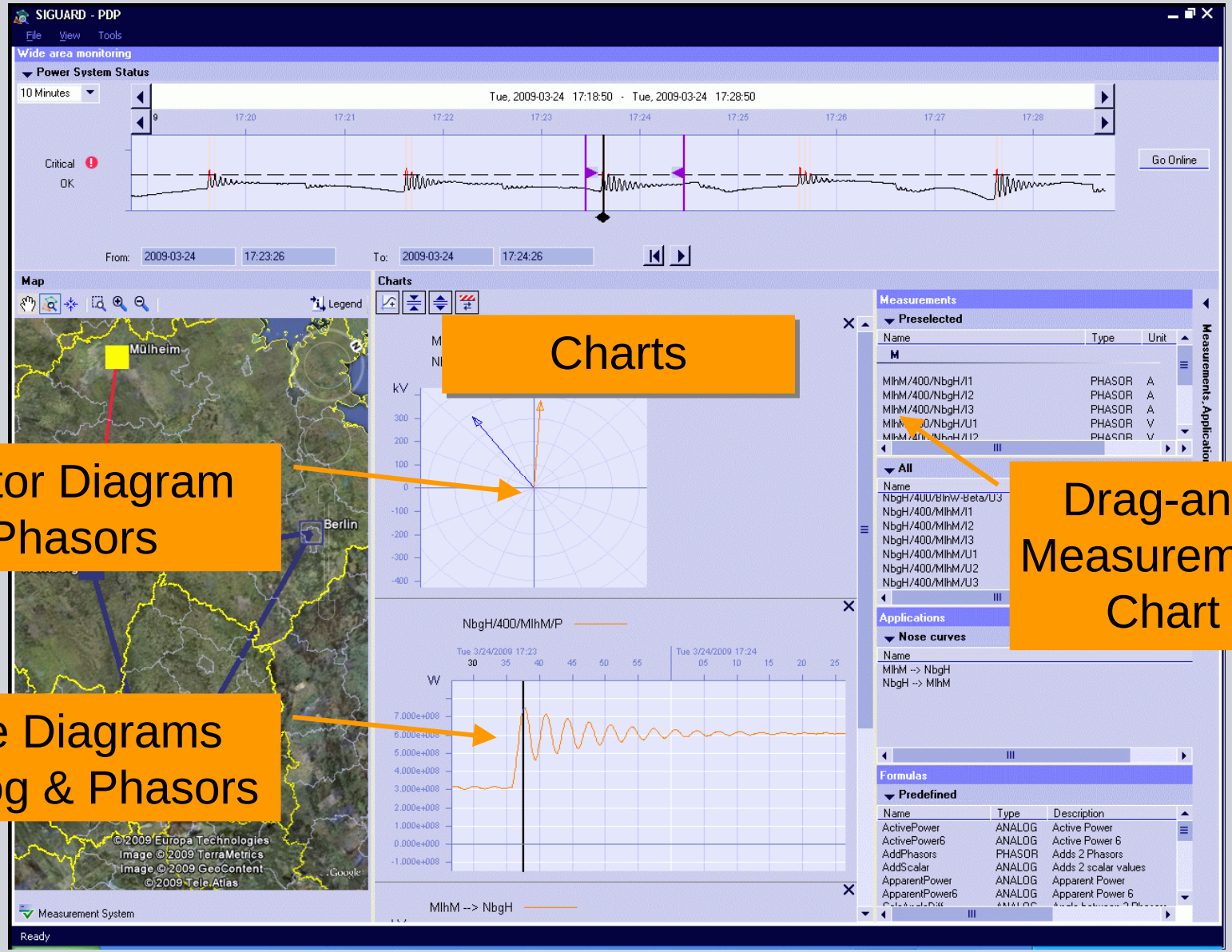

SIGUARD Phasor Data Processing System
User Interface

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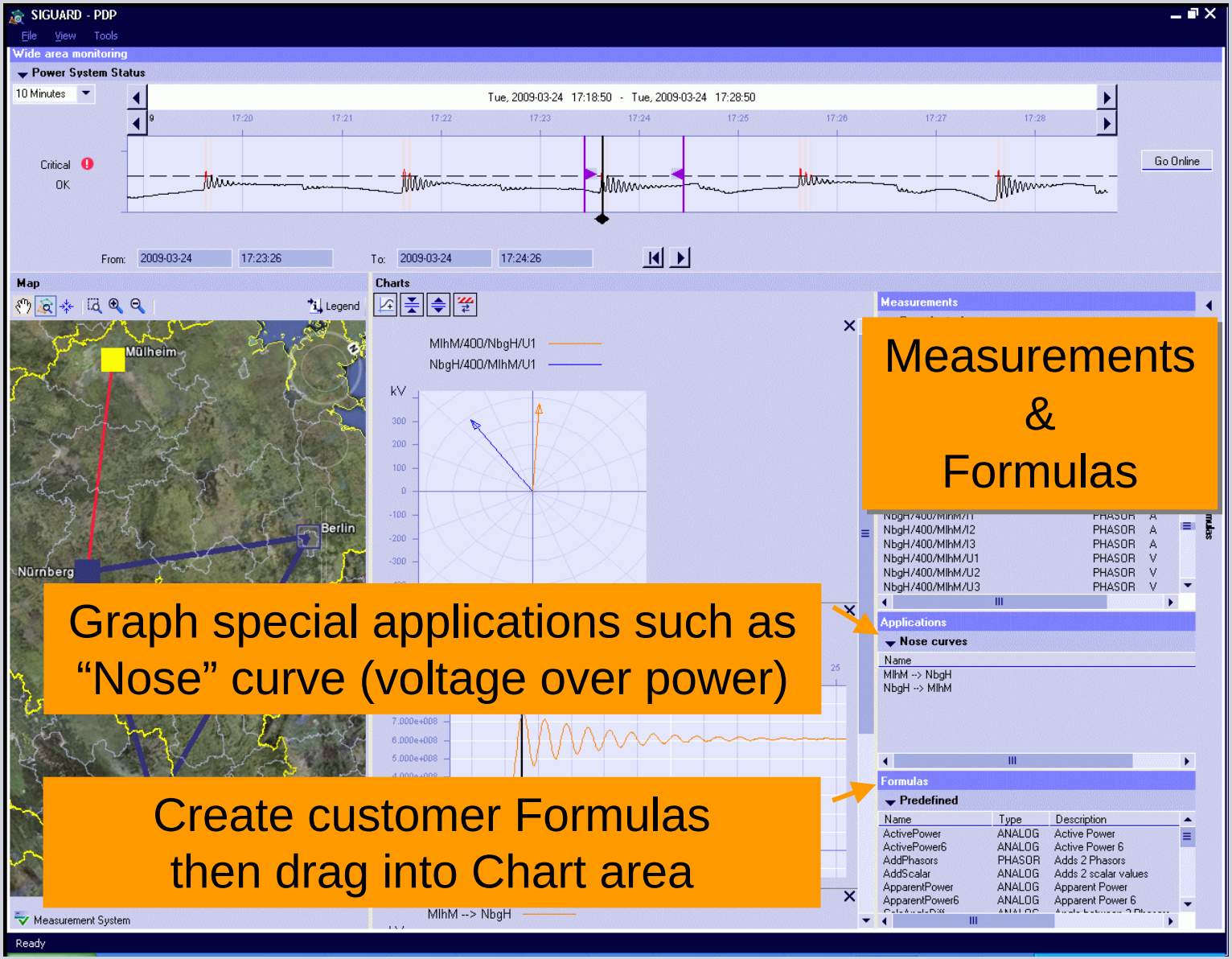

SIGUARD Phasor Data Processing System
Reporting

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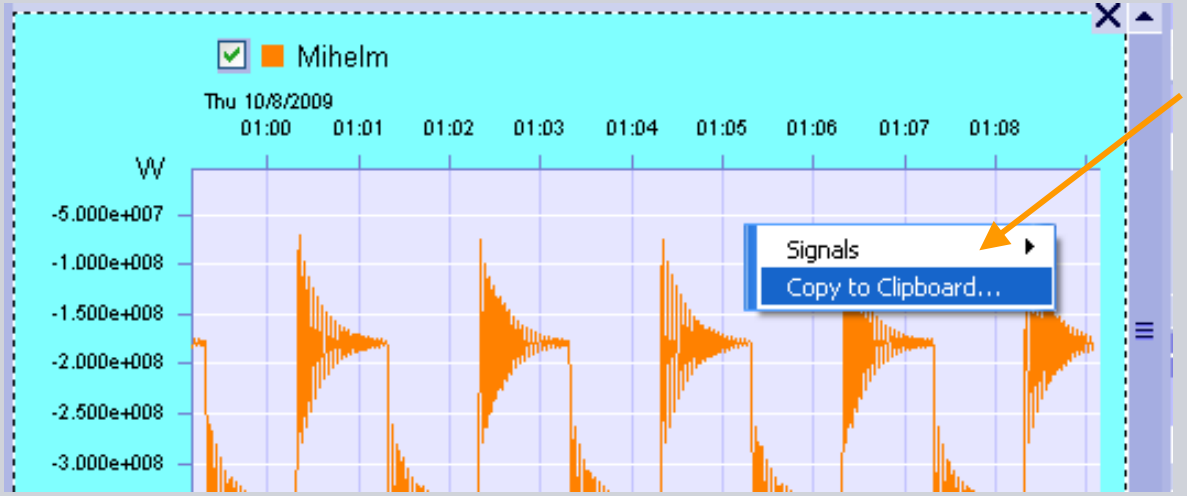
Copy and Paste



Right-click on Chart

*.csv Report

TimeStamp	MIhM/400/NbgH/df/dt	MIhM/400/NbgH/df/dt.qual	MIhM/400/NbgH/f	MIhM/400/NbgH/f.qual	MIhM/400/NbgH/1.val	MIhM/400/NbgH/1.deg	MIhM/400/NbgH/1.qual	MIhM/400/NbgH/2.val
Wed Mar 25 11:54:40:900 2009	-0.002033		49.999756		876	-24.165001	H1V	874
Wed Mar 25 11:54:41:000 2009	-0.002219		49.999798		890	-24.365999	H1V	890
Wed Mar 25 11:54:41:100 2009	-0.001661		49.999779		906	-24.479	H1V	905
Wed Mar 25 11:54:41:200 2009	-0.001533	DAI	49.999832	DAI	917	-24.656002	DAI	917
Wed Mar 25 11:54:41:300 2009	-0.001403	DAI	49.999847	DAI	930	-24.820999	DAI	929

Data Quality Codes

SIGUARD Phasor Data Processing System
Product Roadmap & Areas of Interest for Pilot Projects

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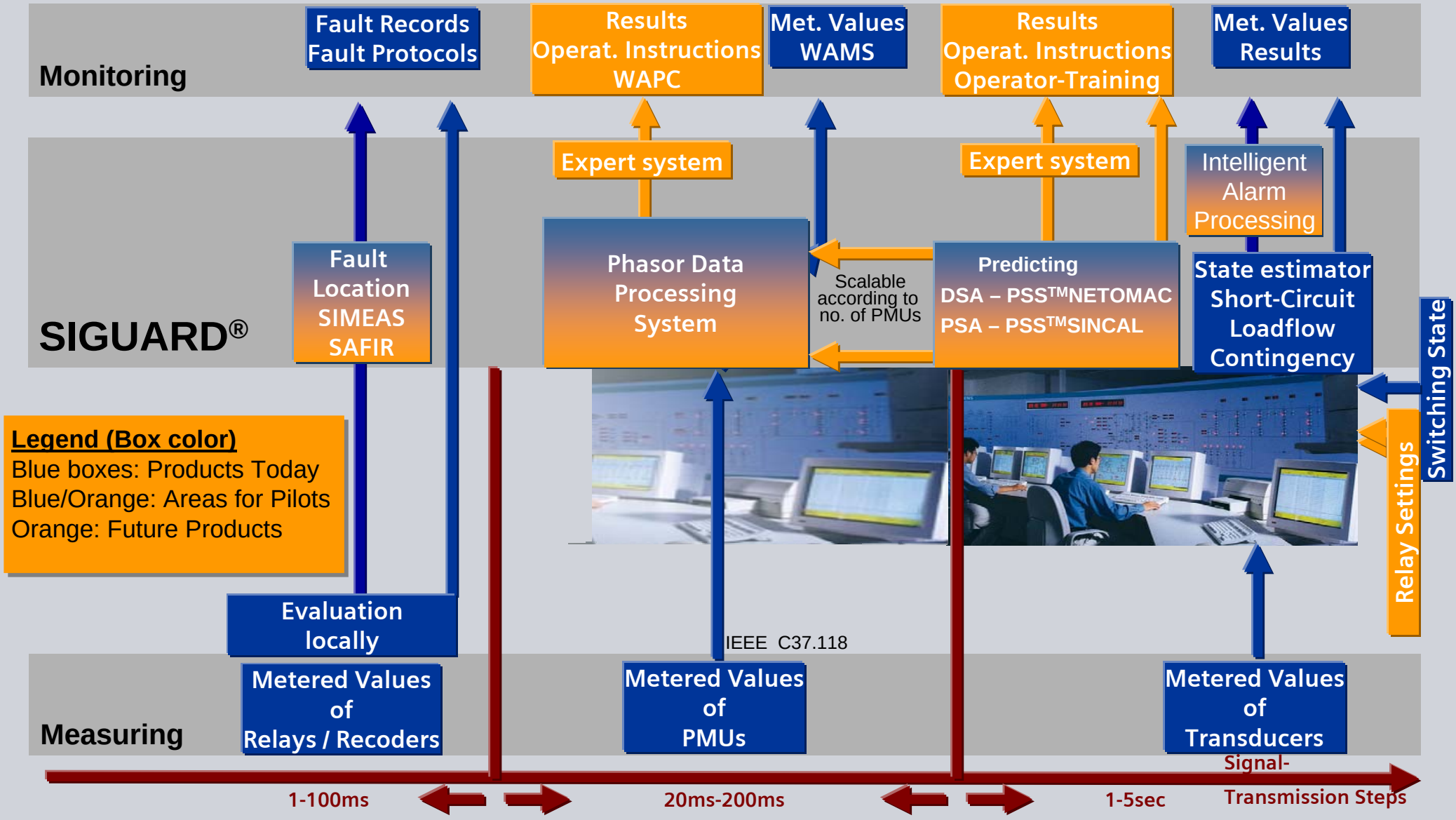

SIGUARD Phasor Data Processing System
Conclusion

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Primary Application Areas

- Voltage stability
- Frequency stability
- Power oscillations
- Loadability

Customer Benefits

- Operational support for preventing blackouts
- Close information gap between protection & SCADA measurements
- Greater loading of transmission lines while maintaining stability
- Fast analysis of power swings; quickly generate disturbance reports

Phasor measurement technology leads to future Smart Grid app's

- System integrity protection schemes (SIPS)
- Power oscillation damping devices (FACTS, fast valving)
- Real time state estimator