



Synchrophasors in the Utility Control Center: Today and the Future

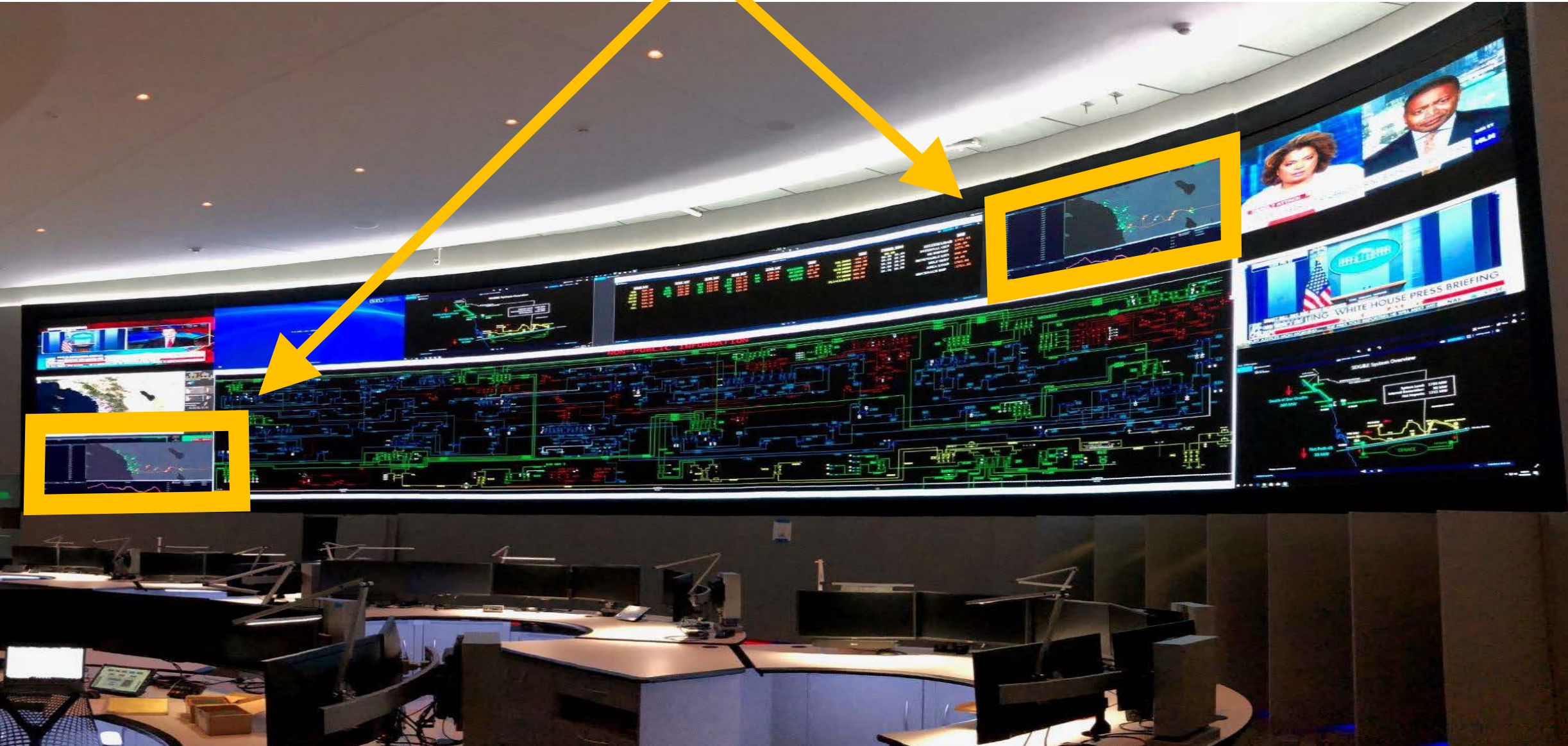
Tariq Rahman (SDG&E®), Greg Zweigle (SEL)

NASPI, November 2020





The Next Generation WASA System at SDG&E

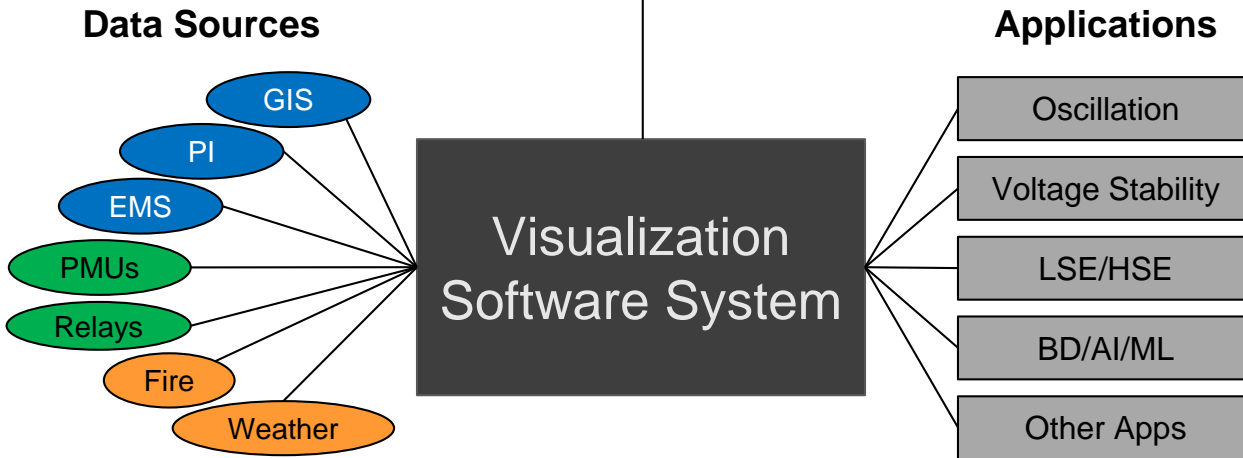




A visualization software system (VSS) platform that provides:

- Single information visualization and navigation HMI for all applications including multi-layer geospatial displays
- Centralized intelligent event detection and alarm management
- Platform handle all system integrations with other systems and various data sources
- Open API for integrating all types of applications

Provide greatly enhanced and extended WASA capabilities to system operators!





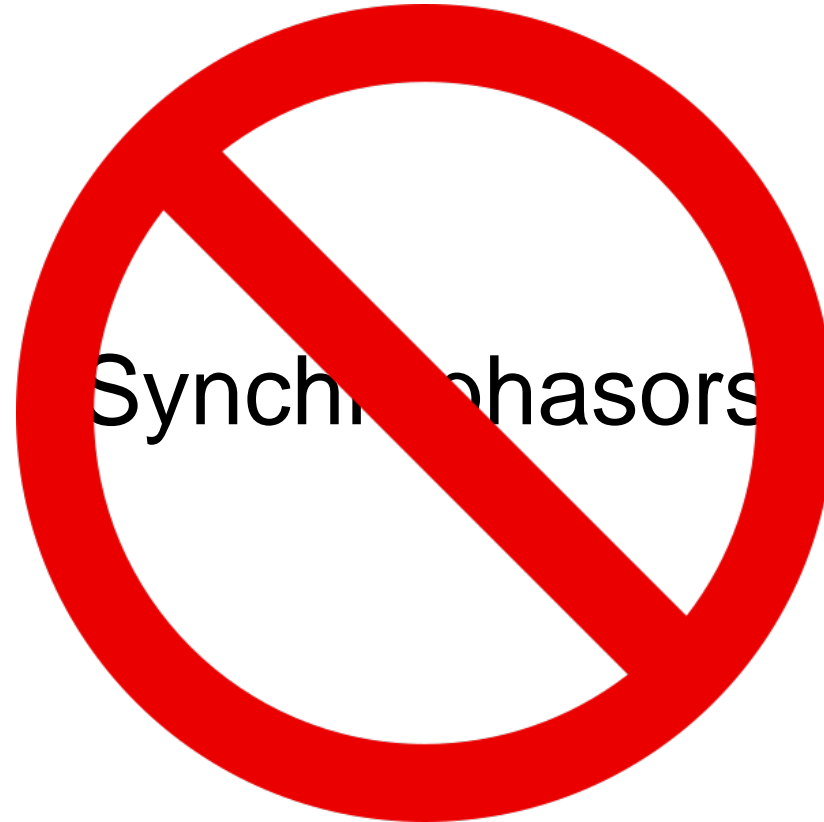
What Does The Operator Care About?



Synchrophasors



What Does The Operator Care About?





What Does The Operator Care About?



What is the state of my power system?

- What does that state mean?
- Is the present state secure?
- Is the present state safe?
- Is it reliable?



What Does The Operator Care About?



What is the system going to do next?

- What events is the system vulnerable to?
- Why is the power system doing what it is doing?
- What should I do next?



What Does The Operator Care About?



If the system is not safe or secure:

- How do I get the power system from where it is, to a safe and secure state?
- How do I get the power system to that new state, in a safe and secure manner?



We provide the Operator huge amounts of data



Weather

Generation

RTCA

Fire

News

Phone/Chat

Alarms

One-line

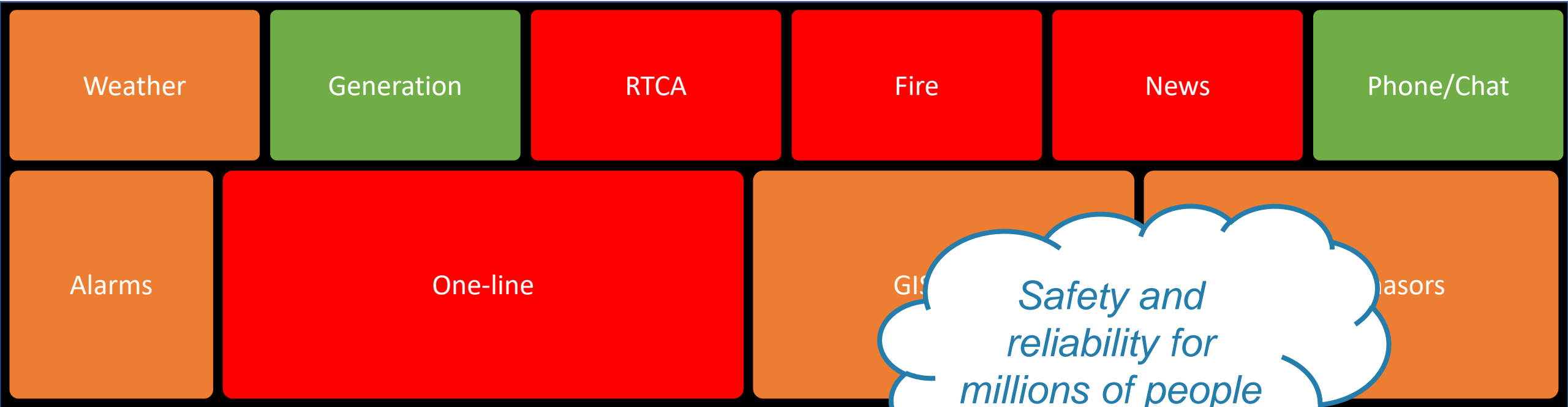
GIS Map

Synchrophasors





We provide the Operator huge amounts of data



Safety and reliability for millions of people





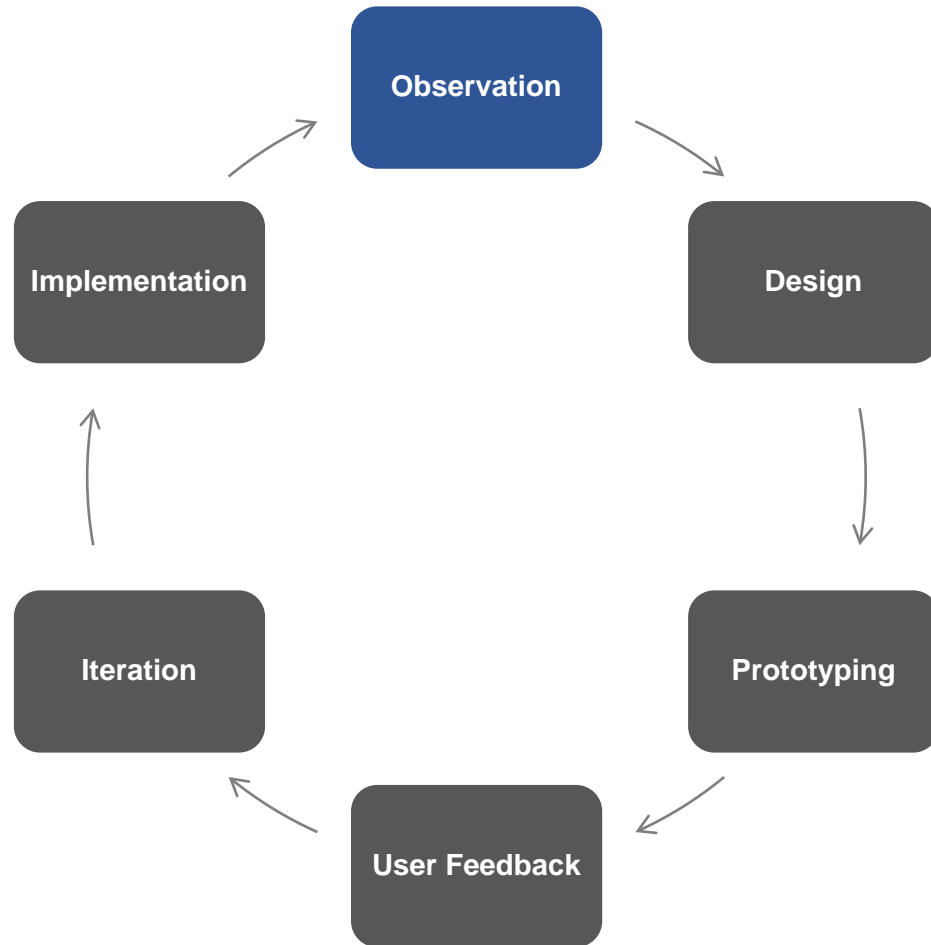
Software solutions must focus on making
operations (and engineering)
simpler,
safer,
more reliable,
more economical.

Synchrophasor
applications
(techno-speak)



What operators
care about

It's hard, but there is a process...



Understanding the Operator:

- Spending time in the control center
- Operator input
- Define personas
- Document workflows



Observation Examples from SDG&E WASA

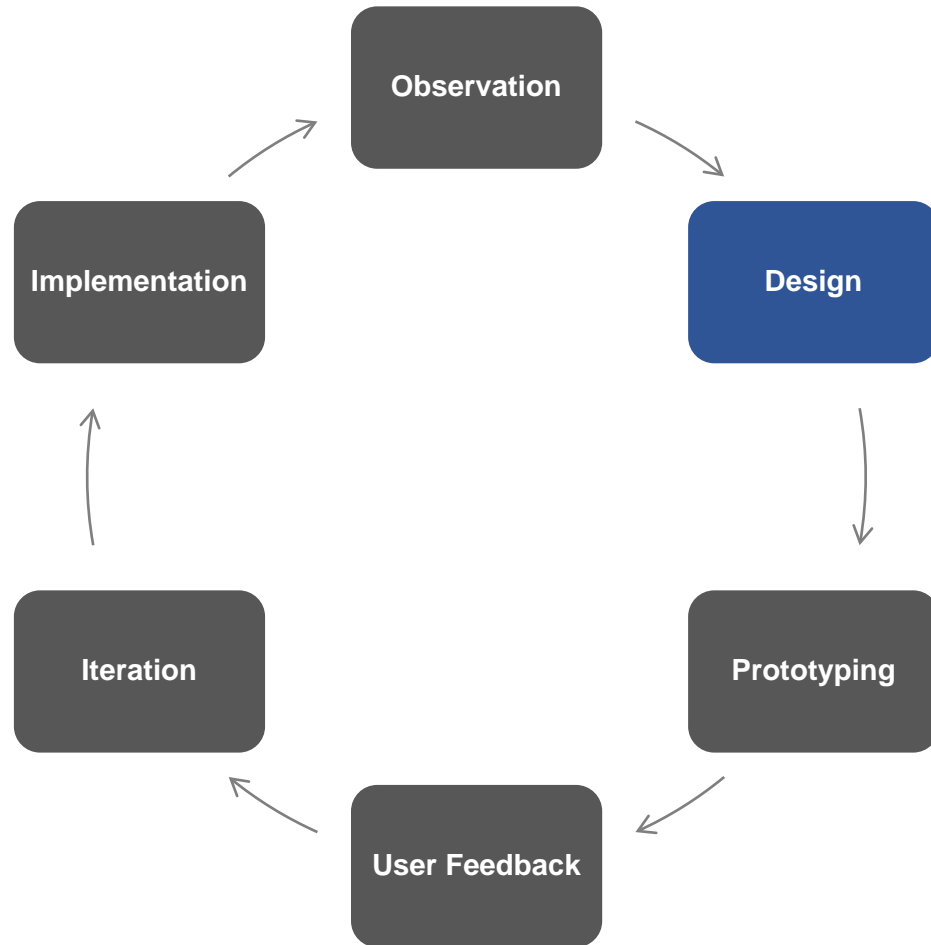


Quotes from SDG&E Operators:

“5 minutes is a blink of an eye in our environment.”

“I have a mental model of everything.”

“Synchrophasor data must be combined with other data to help me make a decision.”



Innovating for the Operations Center:

- Results from operator observation
- New technology
- Operating procedures
- Engineering practices

Operator needs from
Design step:

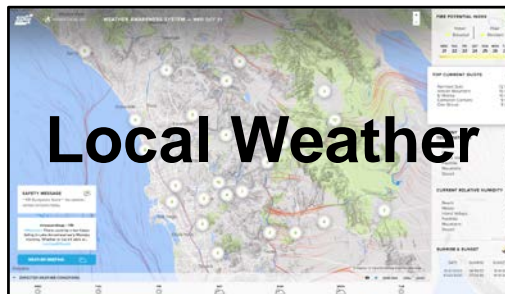
Technology:

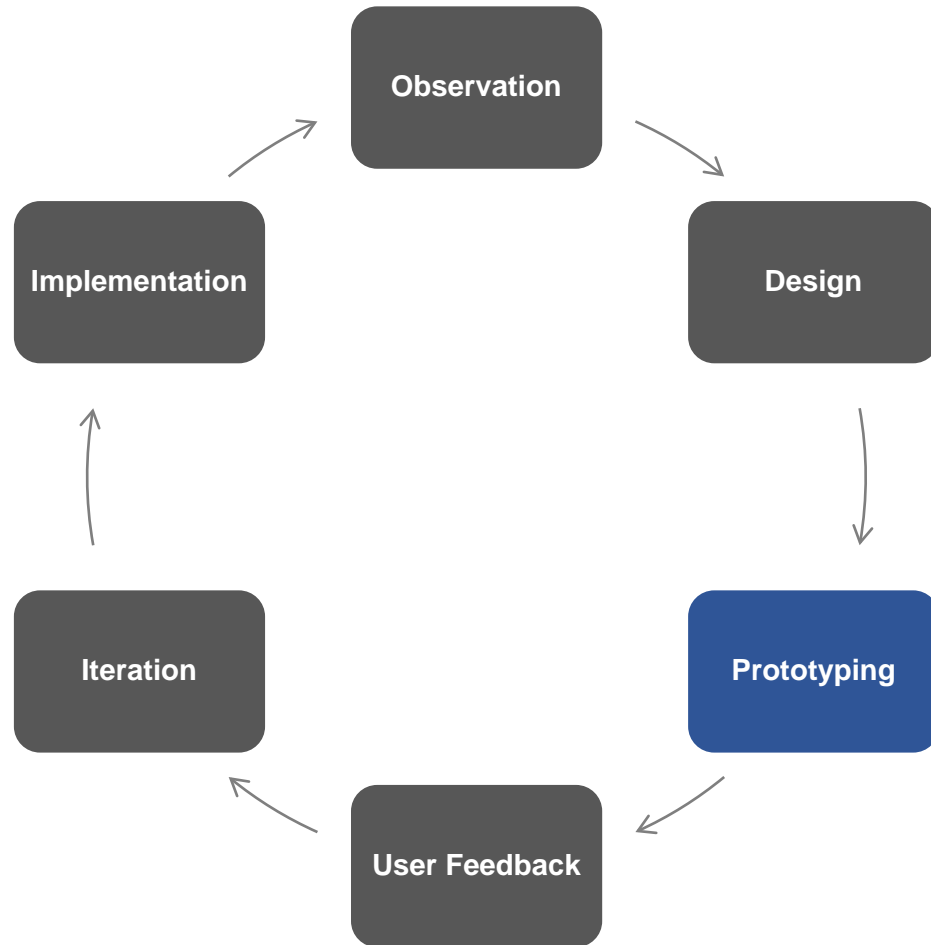
Design:

*Quickly access
data for
transmission line*



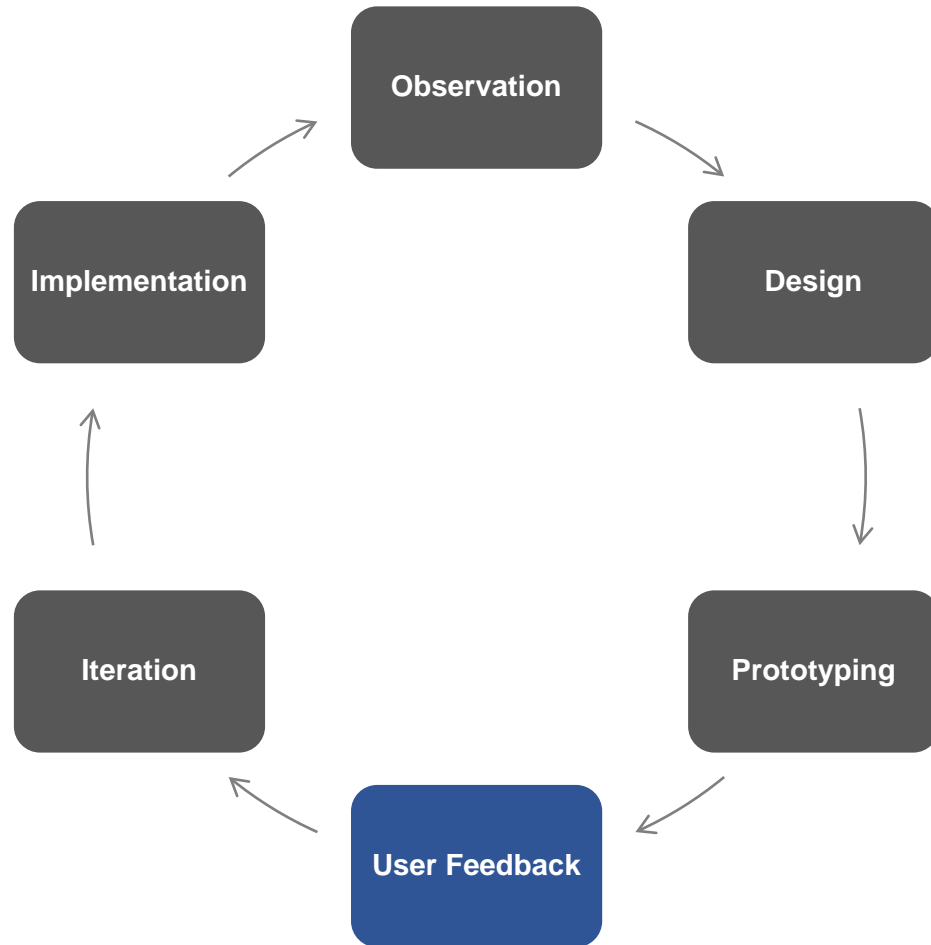
One-click
navigation to asset
data via map





Goals of Prototyping:

- Get feedback to user quickly
- Maximize development team efficiency



Benefits of User Feedback:

- Validate ideas early
- Direct operator feedback
- Uncover new opportunities

In Development

App/Feature 1

App/Feature 2

App/Feature 3

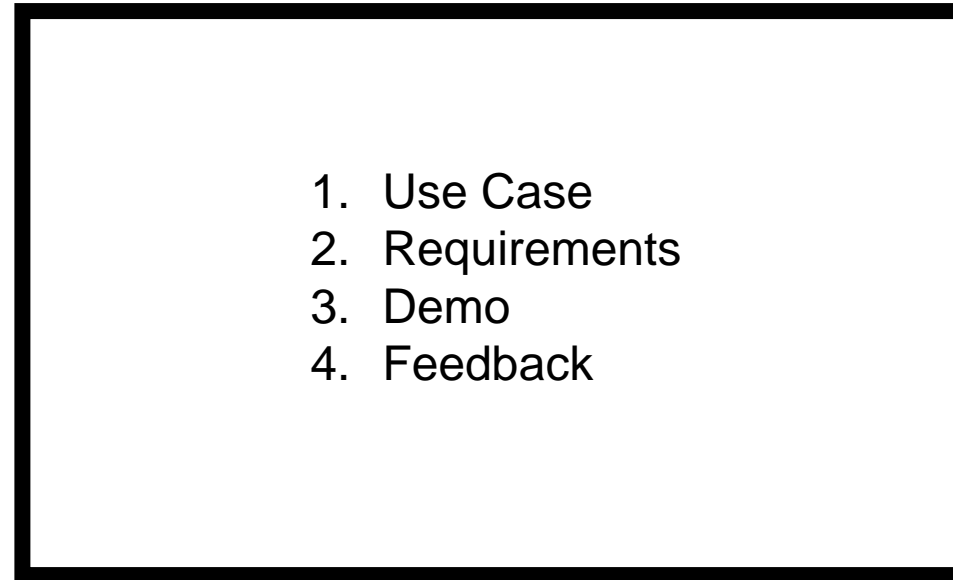
App/Feature 4

App/Feature 5

App/Feature 6



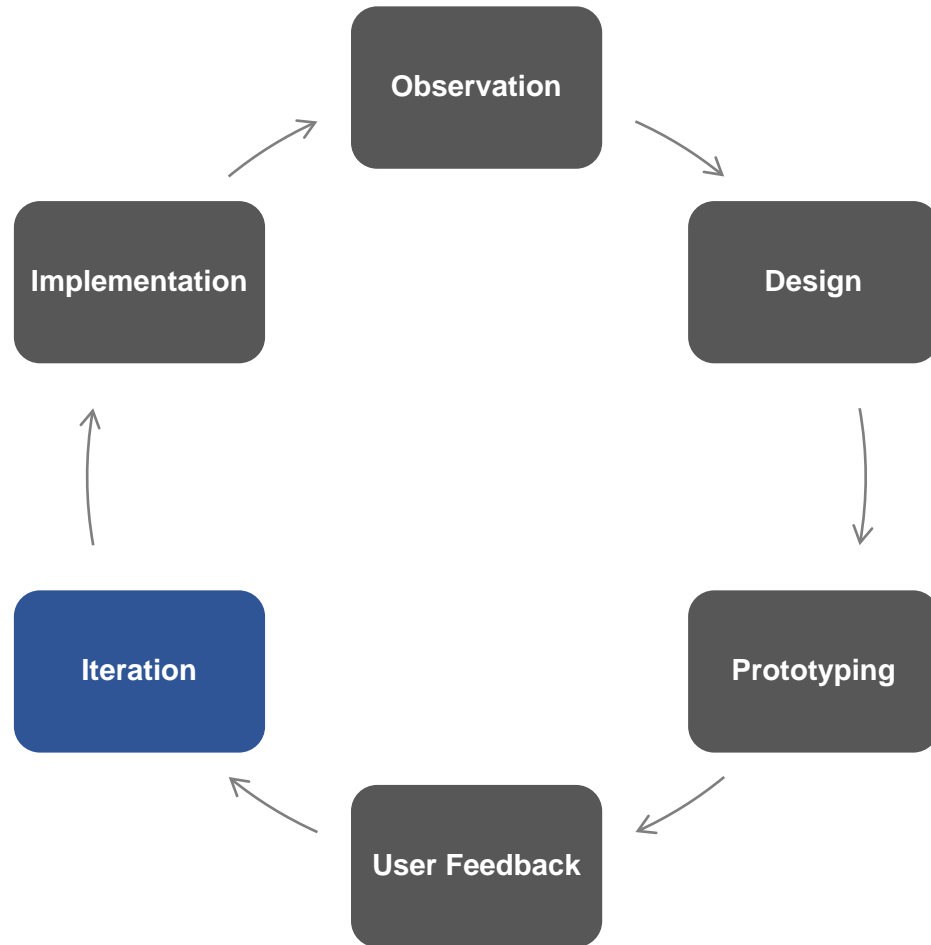
Monthly Demo Day



SDG&E Users Group



Operators, Engineers,
Advisors, and
Management team
(SDG&E, Quanta)



Importance of Iteration:

- Integrate feedback from operators
- Fine tune design
- Builds trust with operators

Operator Need:

Operator Feedback:

Iteration:

*Quickly access
data for
transmission line*

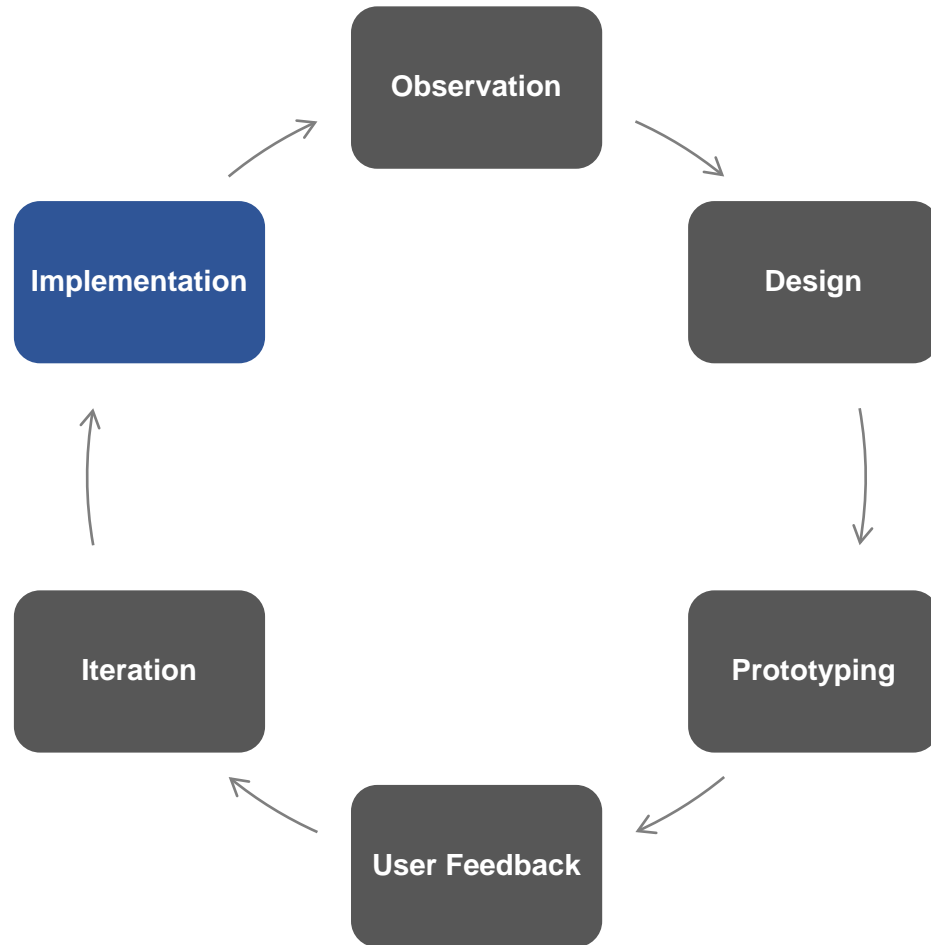


What if I don't know
the exact GIS location
of the transmission line



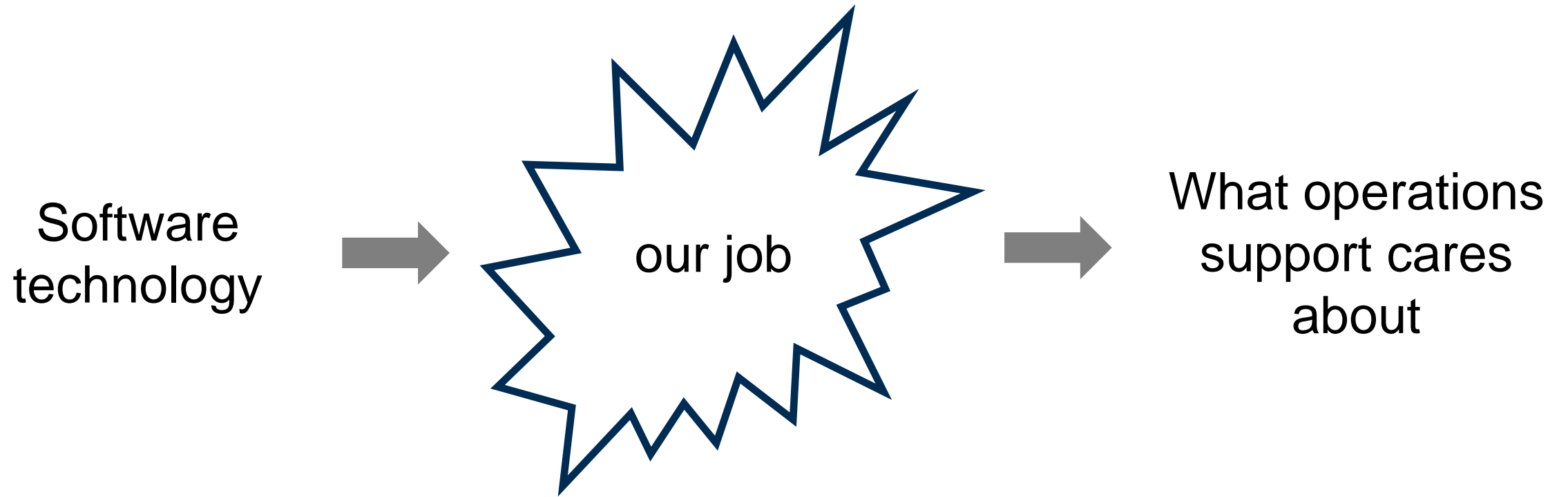
Asset Search

Synchrowave Operations	TL23	Q
2020	/230KV Lines/TL23003	
11:51	/230KV Lines/TL23004	
	/230KV Lines/TL23010	
	/230KV Lines/TL23011	
	/230KV Lines/TL23015	
	/230KV Lines/TL23021	
	/230KV Lines/TL23023	
	/230KV Lines/TL23042	
	/230KV Lines/TL23051	
	/230KV Lines/TL23055	

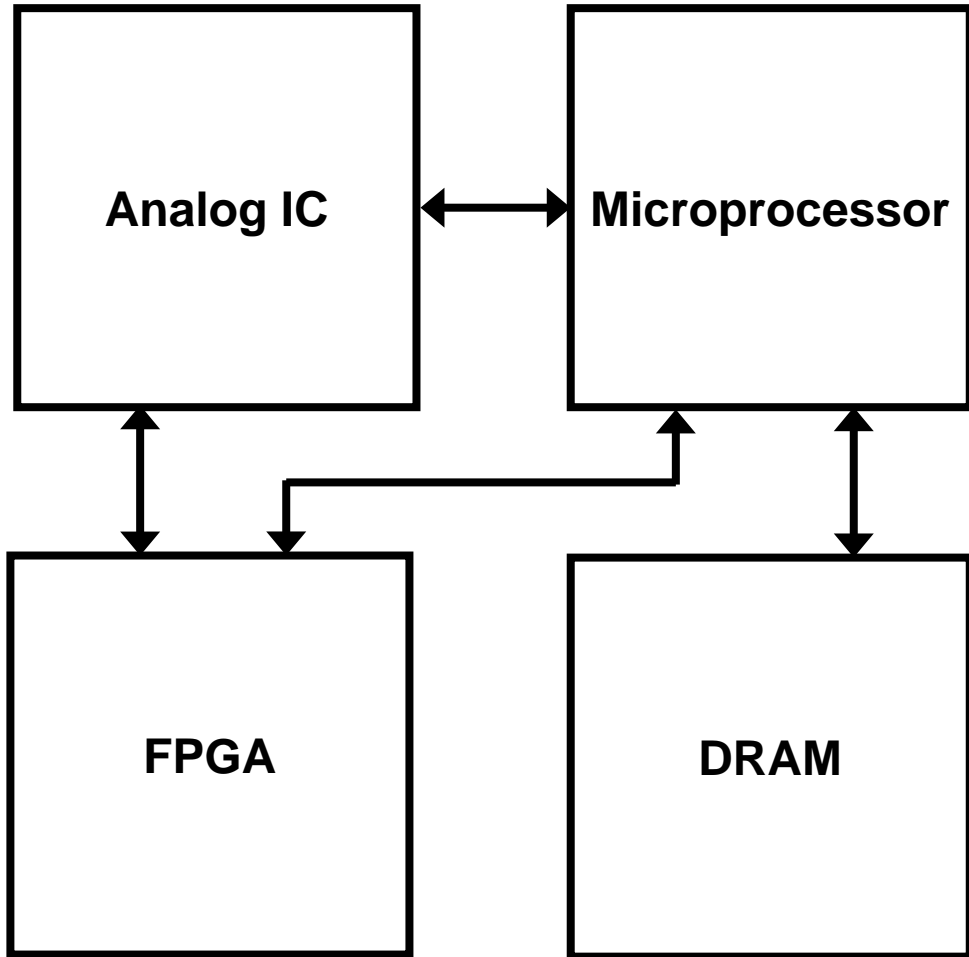


The “final step”:

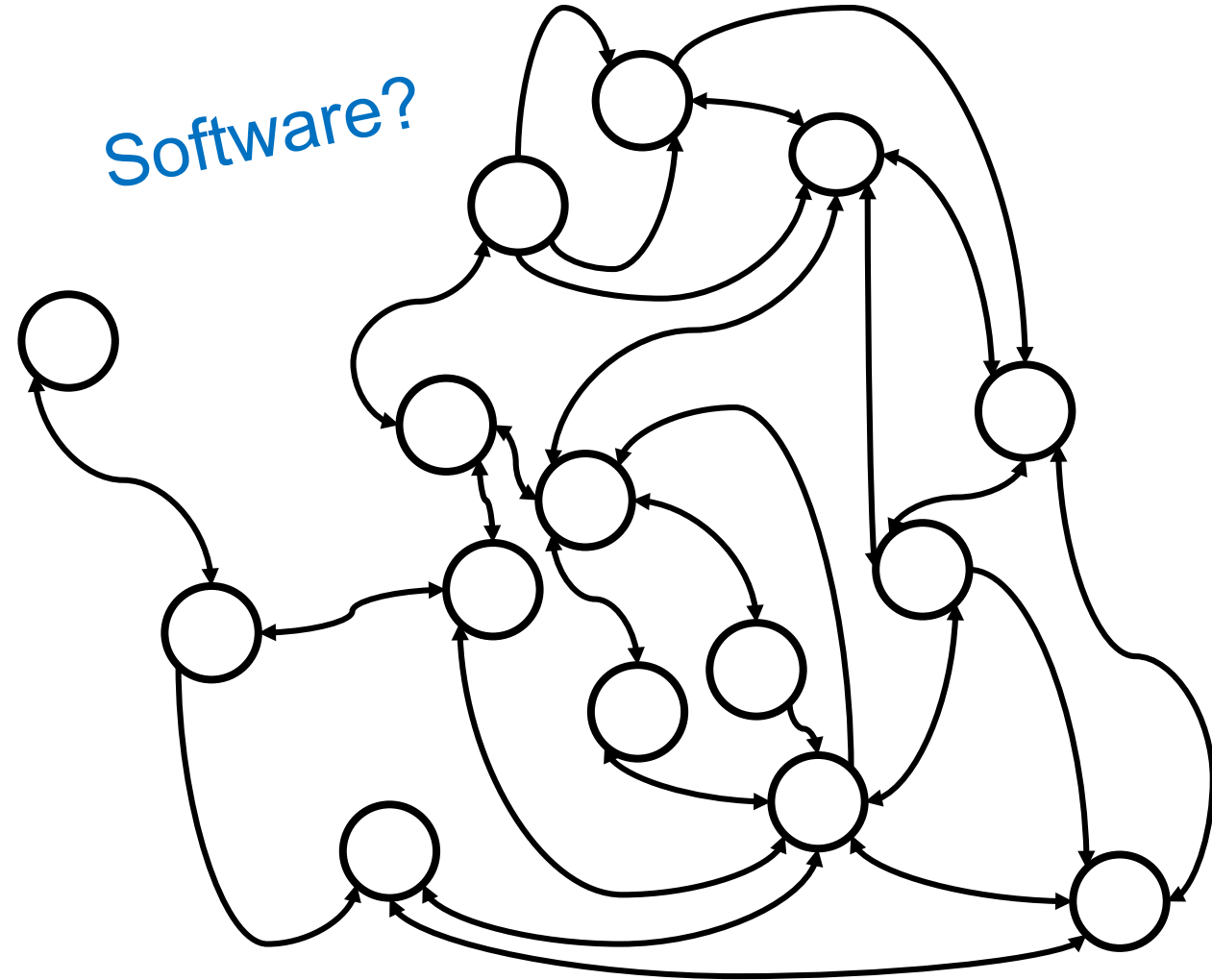
- Final Specifications, Code, Test
- Share with the world
- Continue collaborating



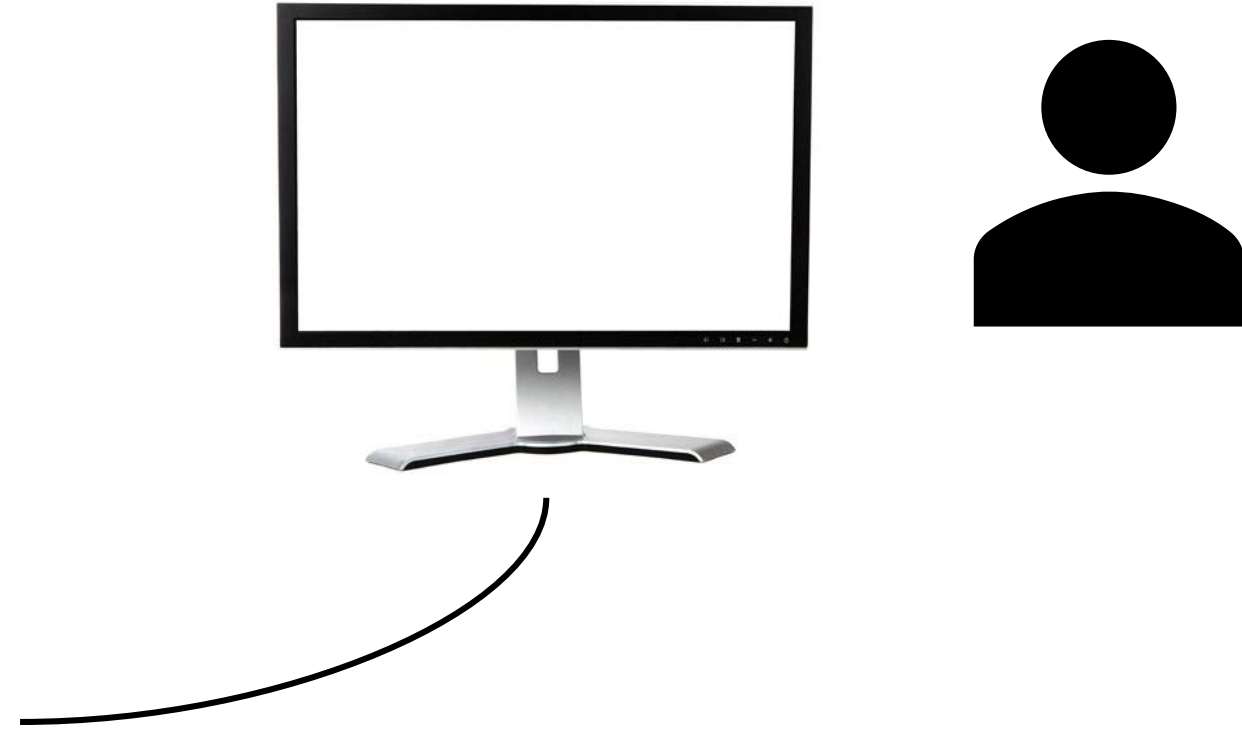
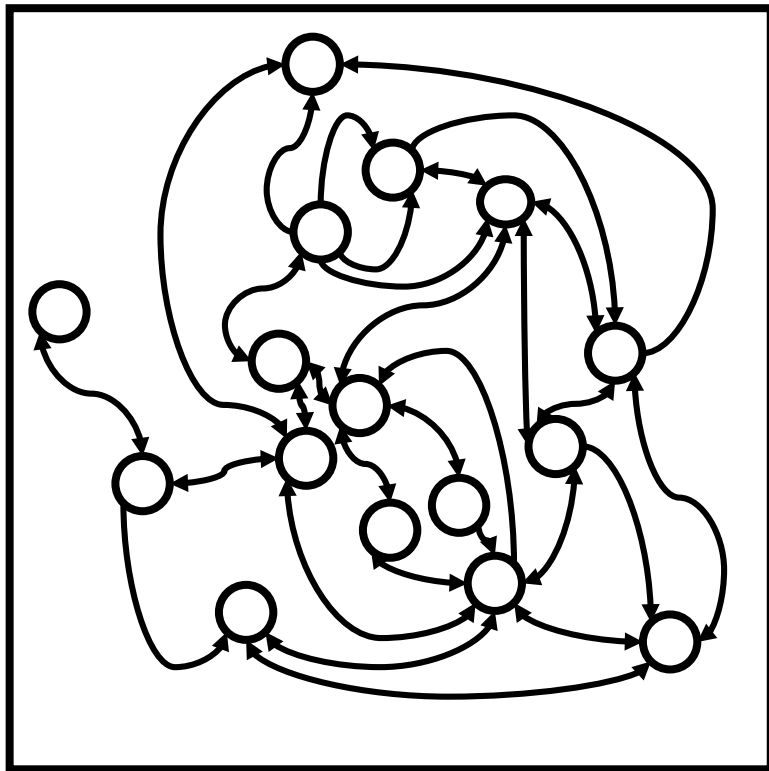
Hardware



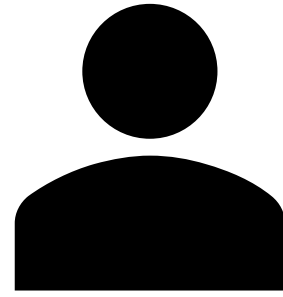
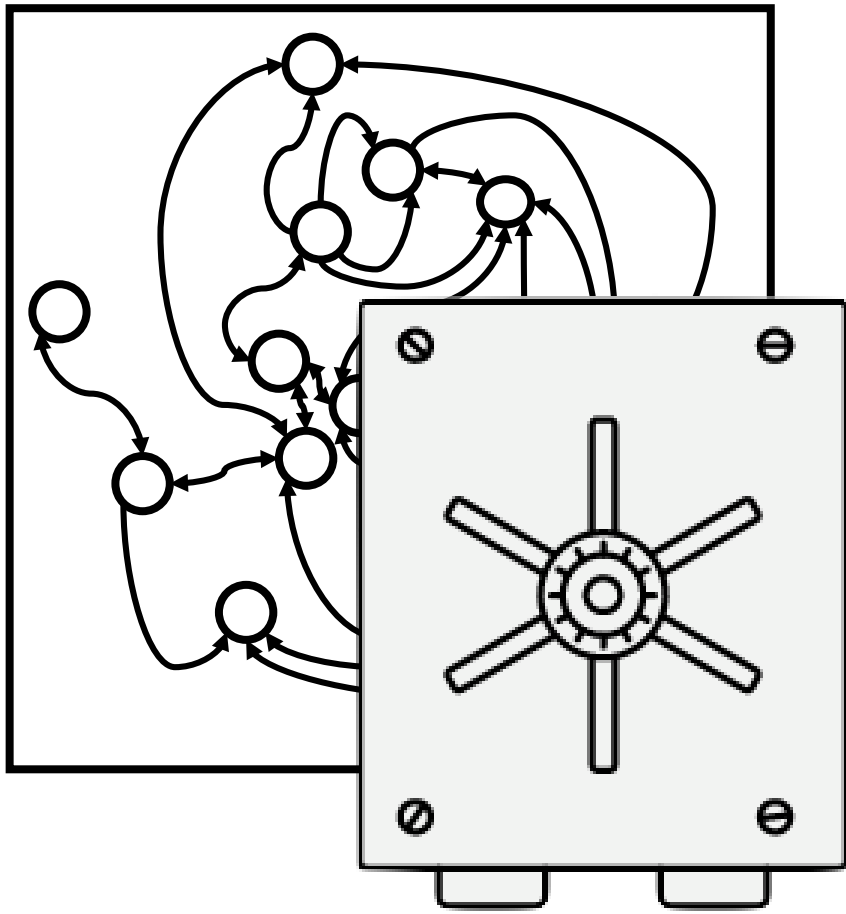
Software?



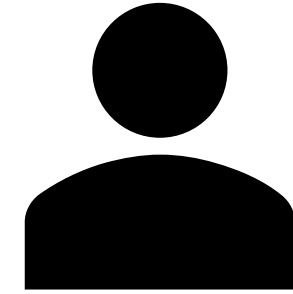
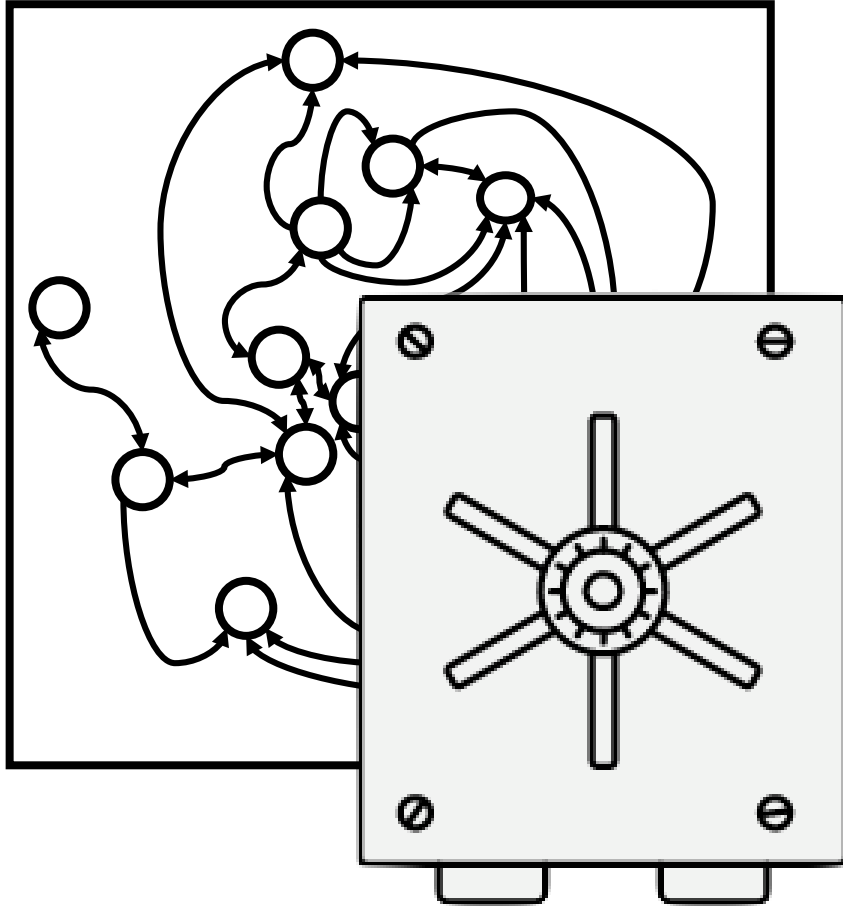
Why Would The User Care?



Why Would The User Care?



Why Would The User Care?

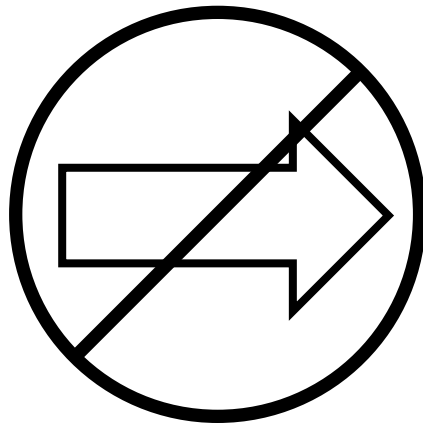
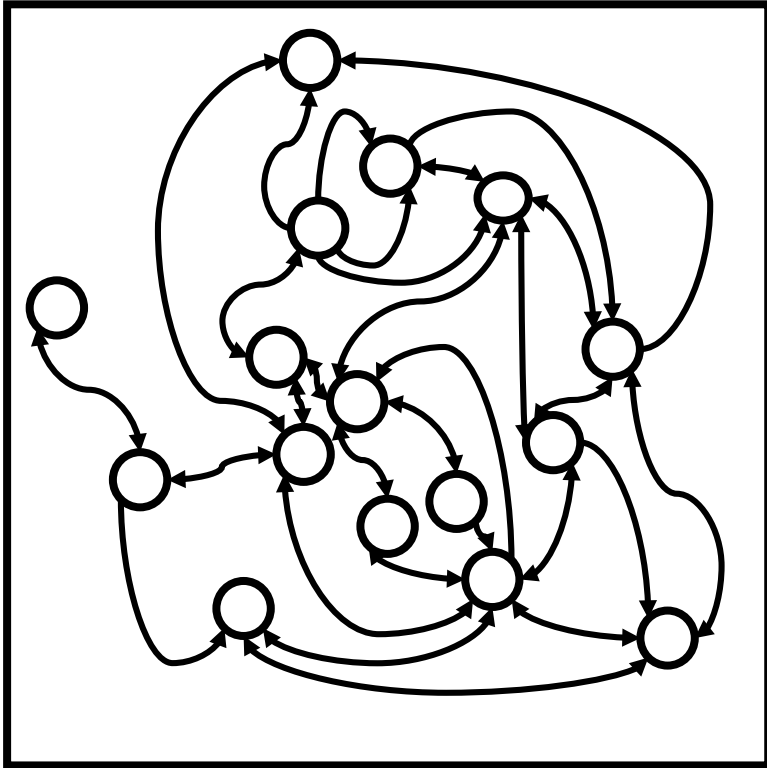


- Simplicity
- Quality
- Lead Time
- Openness
- Cybersecurity

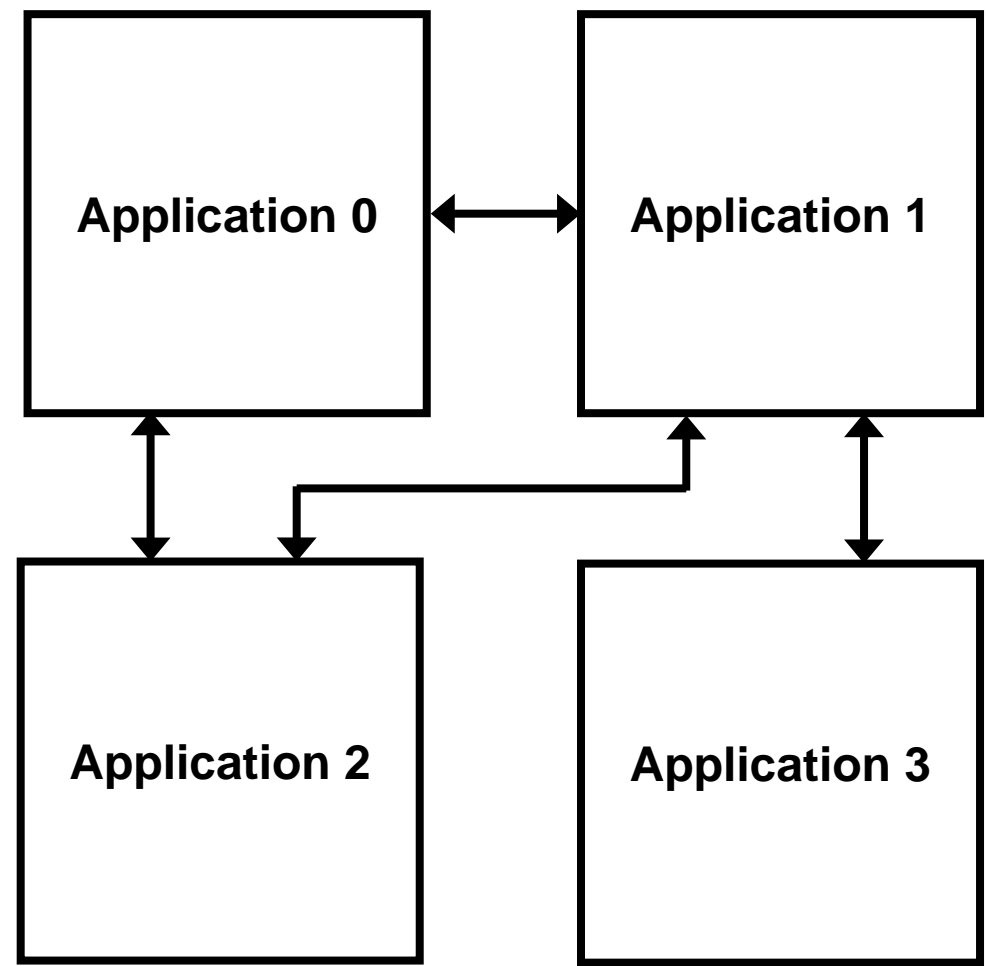


I Want Independently Manageable Applications!

But, non-modular on the inside inhibits modular on the outside.

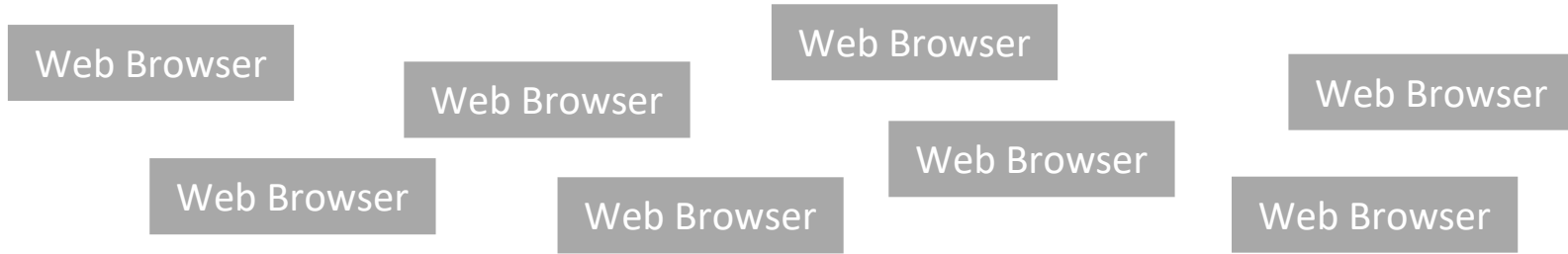


Software

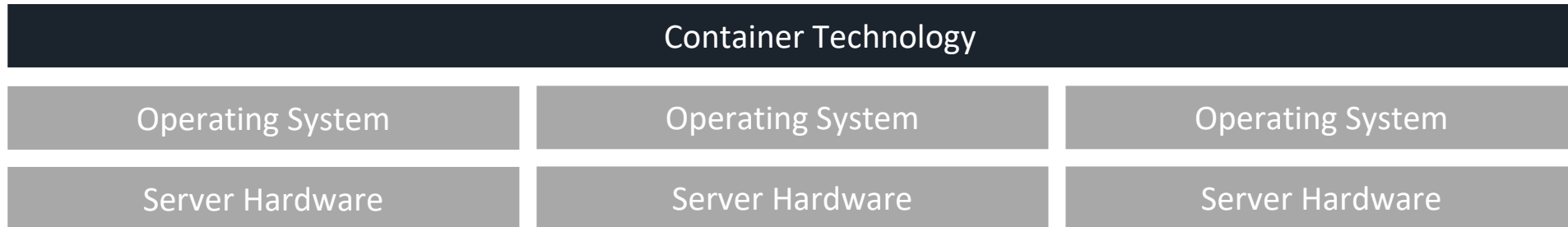




Modern Redundancy, Reliability and Cybersecurity



Example Applications





WASA Software for Today's World



Modern Software Technology



WASA Software for Today's World



Connect To All Utility Data (more than synchrophasors or “POW”)

Modern Software Technology



WASA Software for Today's World



Designed In Collaboration With System Operators

Connect To All Utility Data (more than synchrophasors or “POW”)

Modern Software Technology