



HydroMeteorological and Environmental Industry Association

WMO-HMEI Collaboration

First Mile Workshop

19 February 2024

Agenda item (3.3), HMEI Member Perspective
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Our changing world is altering how we collect and how we can use environmental data





The First Mile is evolving to adapt to

- support multiple applications for environmental data,
 - Environmental Monitoring **and** Early Warning / Real-time Operations uses
- use software to increase the return on hardware investment,
 - Data analytics enhance data reliability, credibility, and spawn new uses
- improving outcomes by integrating data for multiple uses.
 - Wider community support → sensing network sustainability
 - More resilient disaster risk reduction tools



Environmental Monitoring and Early Warning / Real-time Operations

Both synoptic weather data and real-time environmental data are required for effective environmentally-related emergency management, operations, and disaster preparedness; one does the modeling-forecasting, the other reports the truth about what's happening now.

Environmental Monitoring purpose



Monitoring systems are designed from the ground up to measure and record environmental information over time.



Observations are the primary inputs for global atmospheric and hydrometeorological models on which forecasting relies.



Data quality and continuity are critical to climate tracking and for successful future planning.



These observations are the sources of record for high-value and high-cost, environmentally-based decisions and investments over the long term.

Key Environmental Monitoring data attributes

- Regular time series observation (no missing data)
- Longer (e.g., 1-hour) latency acceptable for model input data
- High-accuracy/-resolution sensors, robust instruments
- Backup data collection methods (polling telemetry, SDI-card, ...)
- Data may be quality controlled and reviewed manually for the climate record
- Data management includes audit records to support legal chain-of-custody requirements





EWS / real-time Operational purpose

- Real-time information is required for emergency operations to save lives and property in severe weather events and other environmental disasters
- Real-time operations are thus safer and optimized with real-time data
- Sensing network design must provide robust, resilient real-time information, when and wherever needed
- In the past and even today, many real-time data were not archived, a knowledge tragedy from a climate record perspective.



Key EWS / Operational data attributes

Collect data quickly, reliably

- Near real-time observations
 - latency 0-5 minutes, depending on nature of risk / operation
- Dedicated communications channels for backbone observations
 - loss of information can be catastrophic
- Redundancy for resilience
 - no single points of failure, multiple paths, data sources

Need trusted, valid data

- Strong automated data validation
 - no time for human review
- Multiple data sources assure validity
 - in intense events; observations may be record-breaking
- Resiliency means reliability!
 - power, cellular, Internet access impacted during disasters
 - local failures can have devastating impacts, e.g., turbine feedback for hydropower

The best disaster risk reduction solutions leverage Both Worlds



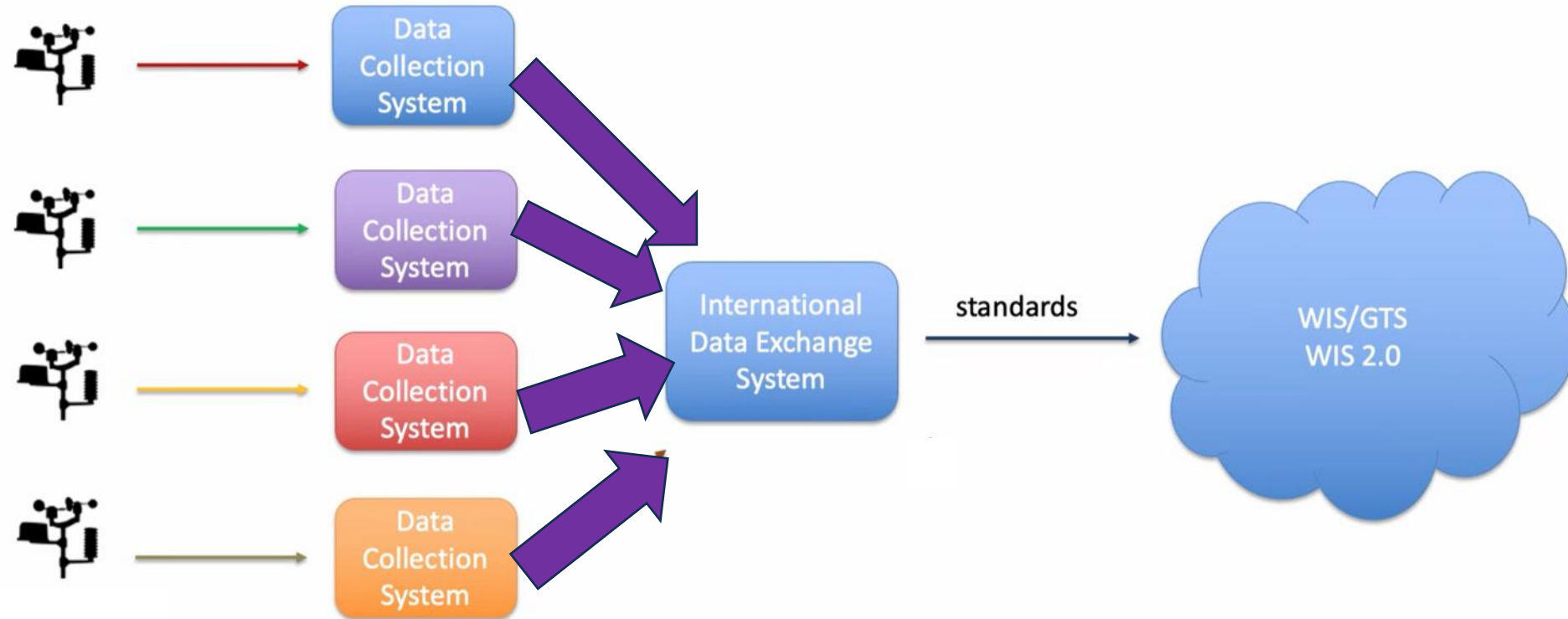
- Integrating environmental monitoring with real-time early warning systems can lead to more robust environmental management and disaster preparedness strategies.
- Environmental monitoring provides the necessary forecast and context for understanding the significance of real-time data, while early warning systems create the agility needed to respond to immediate threats.
- Together, they help in not only reacting to emergencies but also in planning and implementing long-term environmental management and climate adaptation strategies.
- In summary, while environmental monitoring and real-time early warning data serve different purposes, their integration is crucial for comprehensive environmental management, disaster preparedness, and resilience building.



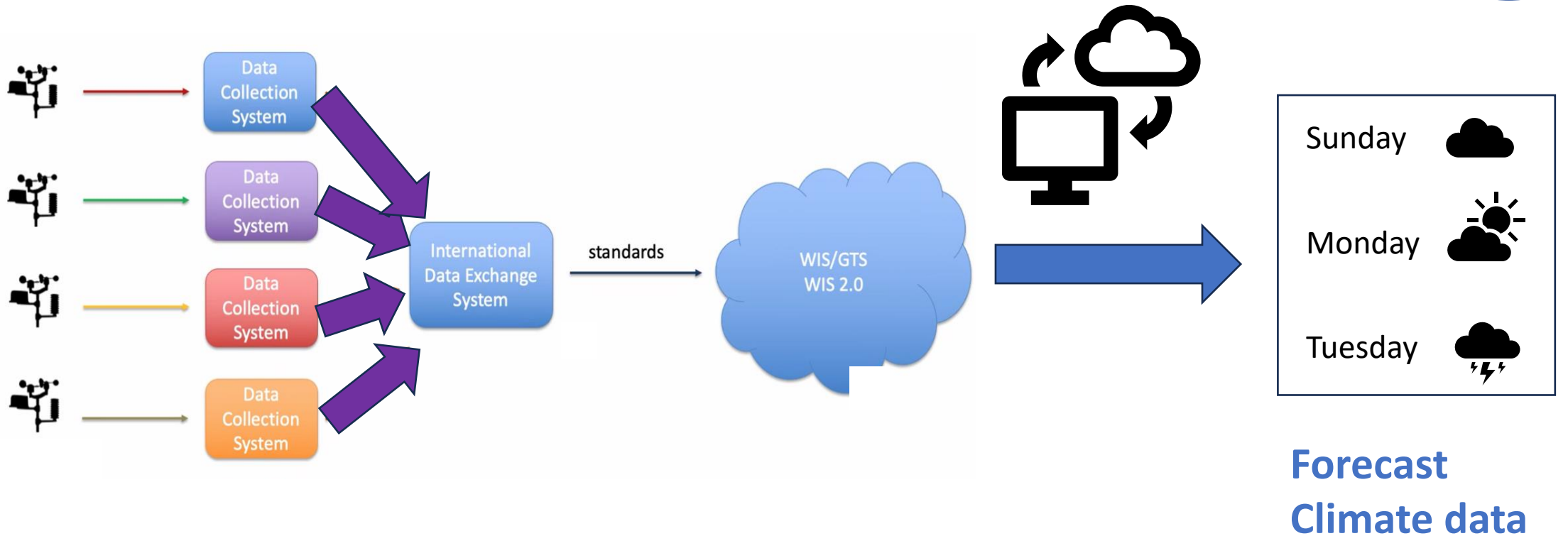
Multi-use software increases returns on investment in monitoring hardware

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Sensing station-dedicated data collection



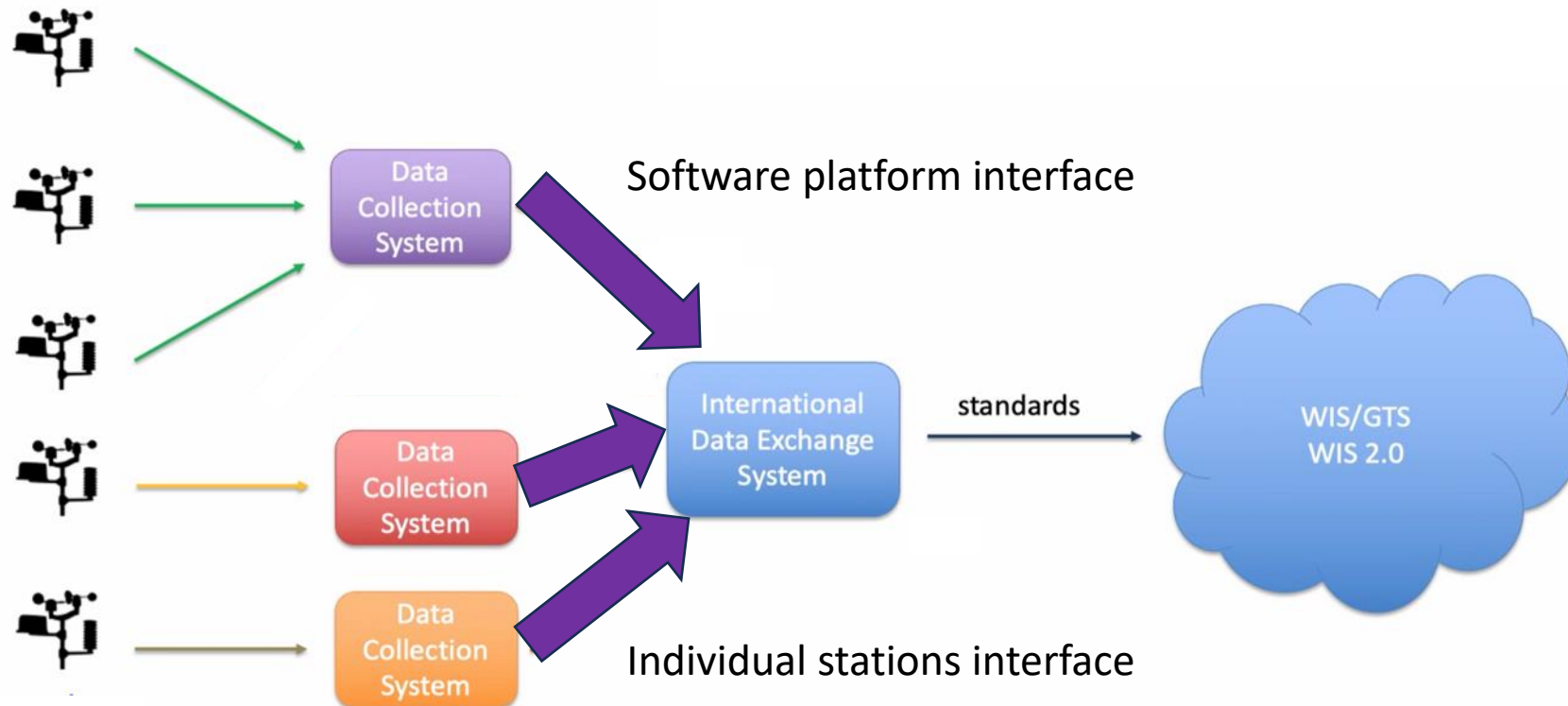
Environmental monitoring value



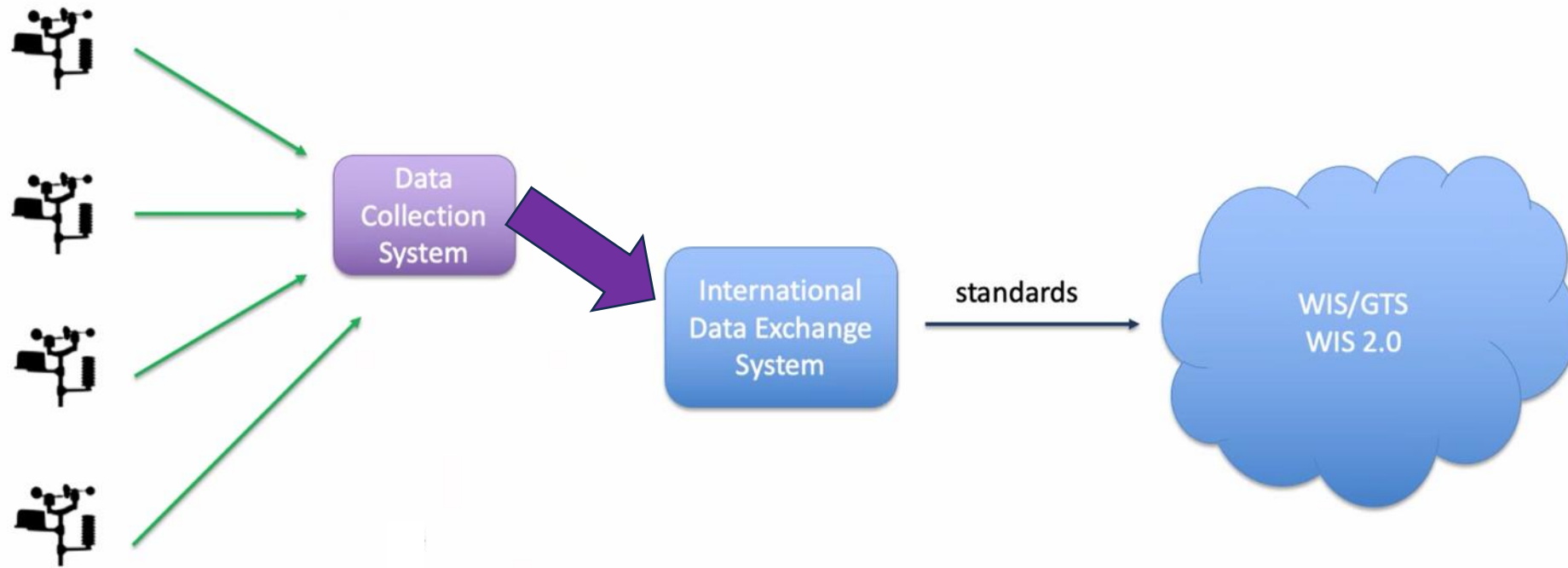
General architecture has standard exchange



- Heavier and lighter versions protocol for platform vs. station interfaces
 - ALERT2 example – path strength, encryption, route analytics, test transmissions, ...

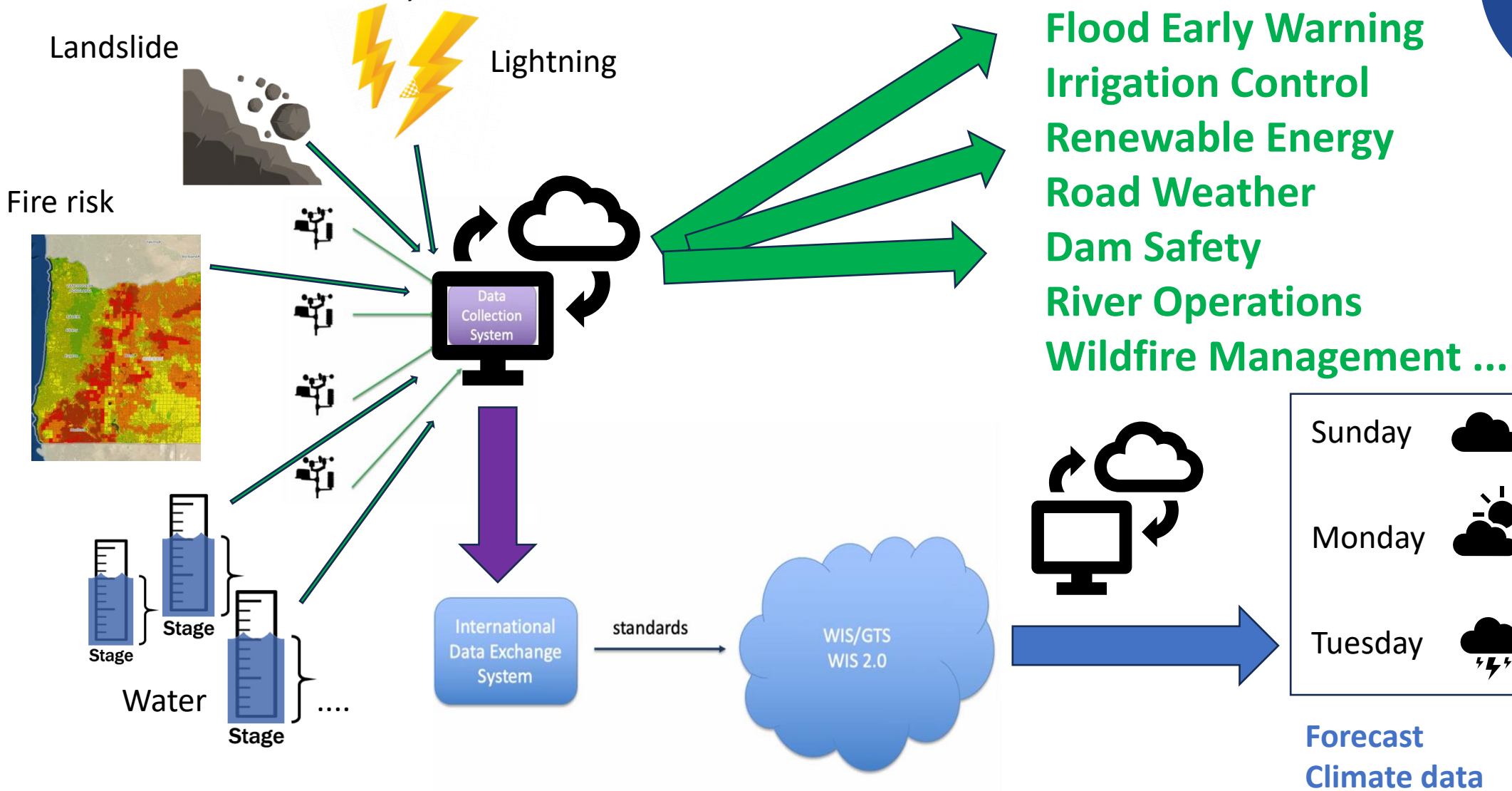


Multi-stations (and sources) software data collection...

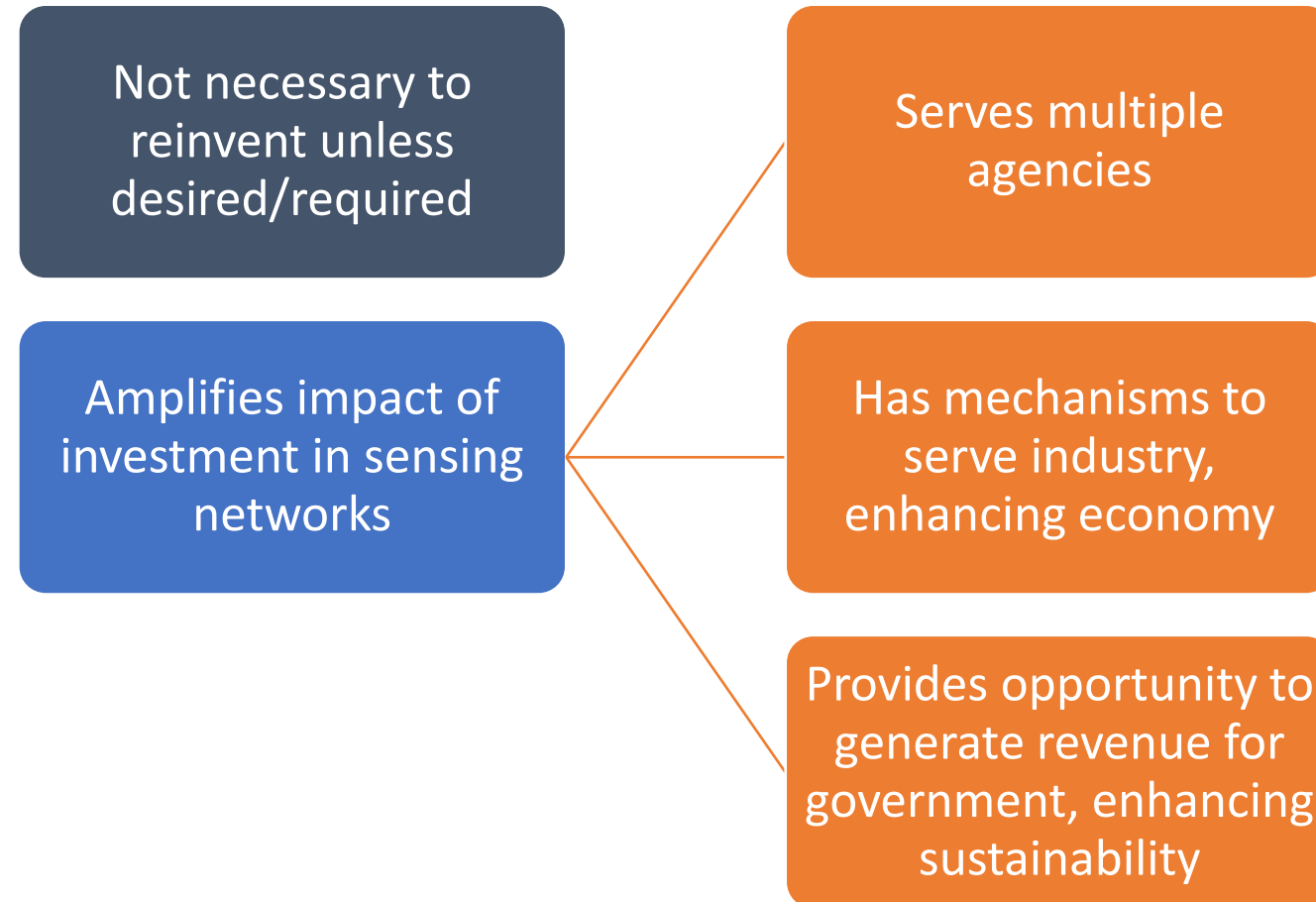




...can empower Disaster Risk Reduction!



Multi-use platforms are available today





Extending the reach of investments

- Important to leverage the legacy networks already in place; solutions require support for existing networks to maximize value.
- Enterprise software should support integrating multiple network types:
 - Many existing solutions still using single technology stack
 - Maximum benefit is achieved by integrating multiple networks and station types into a common view/platform
 - For example, the water resources agency, the meteorological agency, and the early warning system managers: The stations from each benefit the others' missions
- Integrating new data stations and sources to support both monitoring and EWS / real-time operational applications provides the greatest value returned by investment for future networks.





Thank You

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