

DIGITALIZATION

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Trends and drivers for digitalization

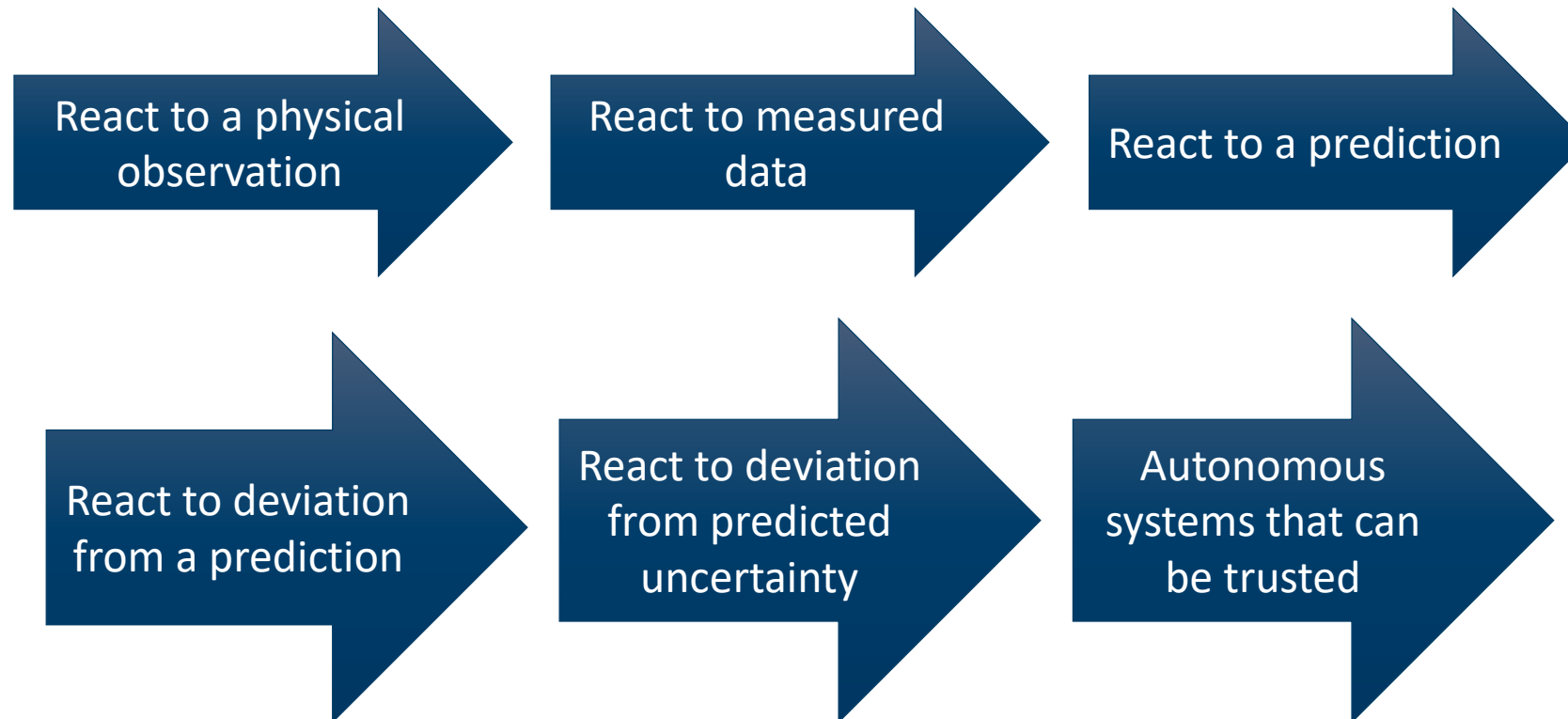
- New renewables and interconnections demand balancing from hydropower
- Focus on asset optimization in a multi-market setting
- Shorter timeframes for decision making and higher resolution in schedules
- New conformance requirements for physical delivery
- Installation of sensors adding information about system state
- Gained awareness from use of data driven algorithms
- Cross-discipline achievements enabled by reliable software modules and interfaces

Potential for value creation

- Streamlined maintenance processes, from interval based to condition based
- Increased flexibility due to better monitoring
- Cost effective unification of operation and maintenance
- System services from virtual powerplants
- Improved models from increased availability of data
- Be attractive for th best candidates

Prerequisites for operational use

- Quality assurance and harmonization of data
- Cyber security measures
- Acceptance of existing and new technology



Ongoing and upcoming initiatives

- Installation and operation of sensor systems
 - Labs for creating situations that do not frequently occur in real life
 - Research power plants, Pilot-E, relation to SmartGrids
 - Standardization and demonstration of transfer value
- Digital twin of turbine, generator and hydraulic structures
 - Sira-Kvina as an example
- Digital twin of the entire river
 - State-dependent water delay, comparison with actual observations
- Data-driven algorithms
 - iScheduling, GoHydro, AssetLife, INCOME, etc



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