



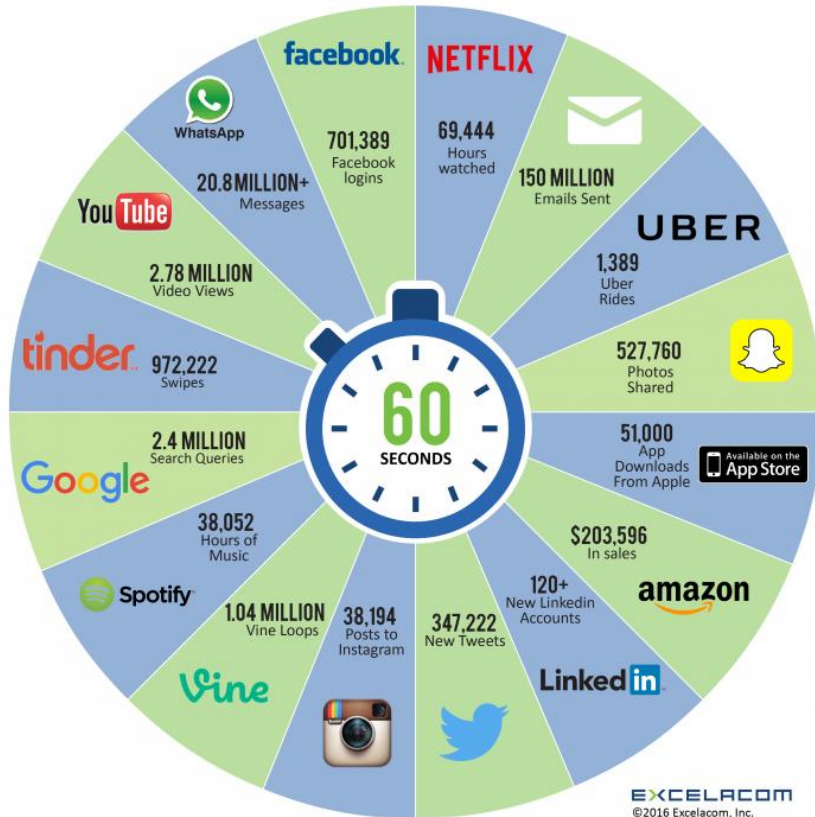
UTOPUS
INSIGHTS

**The Digital Energy
(r)Evolution**

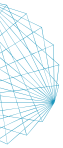
Kerrick Johnson
Co-Founder/Chief Ecosystem Officer
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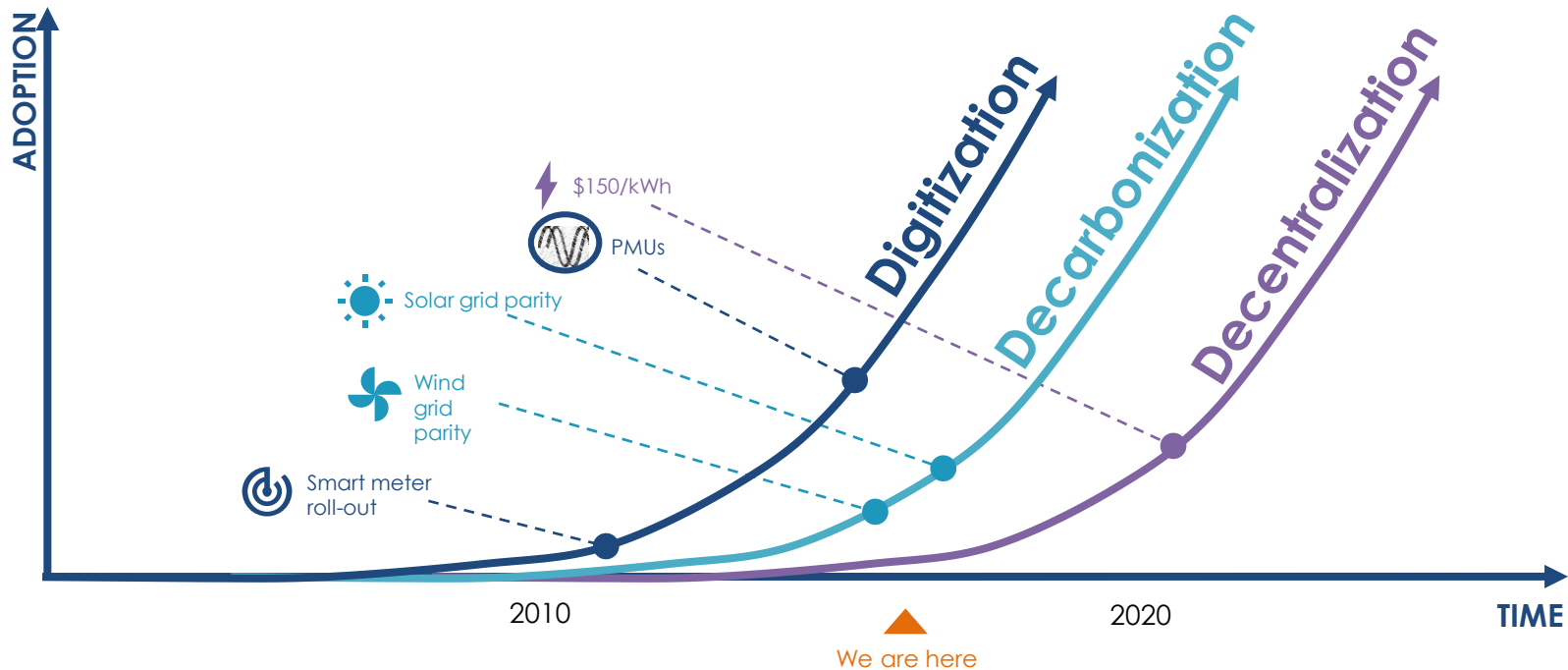
Is the future coming at us faster? Why?



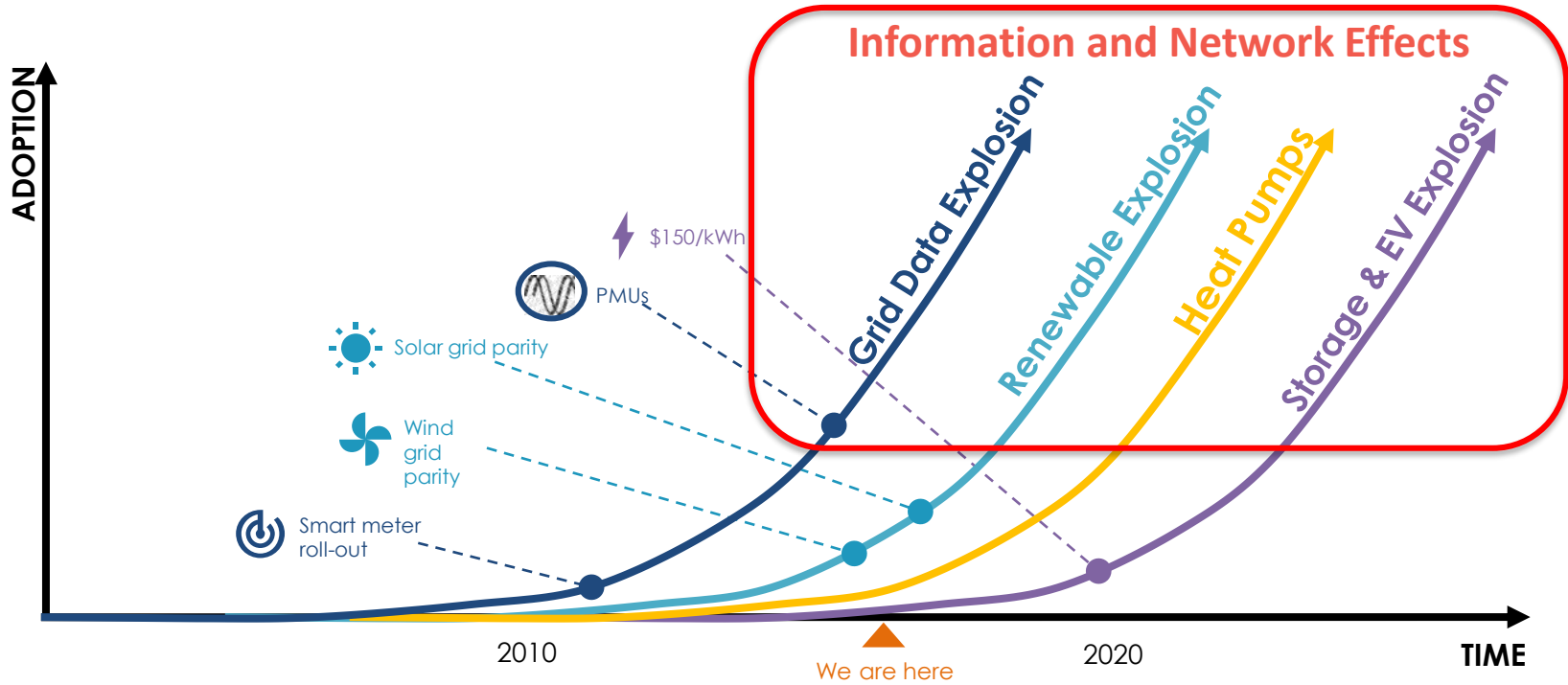
Google searches	2.4 M / minute	19 years
E-mail	150 M / minute	25 years
Snapchat	1.8 M / minute	6 years
Tinder	972 K / minute	5 years



Disruptive Energy... Three Big D's



Exponential and disruptive mega-trends





Worldwide 2015 new electricity generation spend

\$234,000,000,000

\$268,000,000,000



Worldwide 2016 oil and gas vs. electricity investment

\$708,000,000,000

\$718,000,000,000

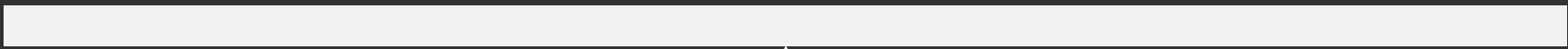




U.S. nuclear vs. renewable generation in March 2016

Nuclear gen.

Renewable gen.



Electrification enhances efficiency and flexibility



3x



4x



1.5 – 10x



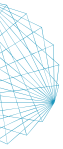
6x



Water heaters



Coming soon



Tipping points



Tipping points are caused by economics!



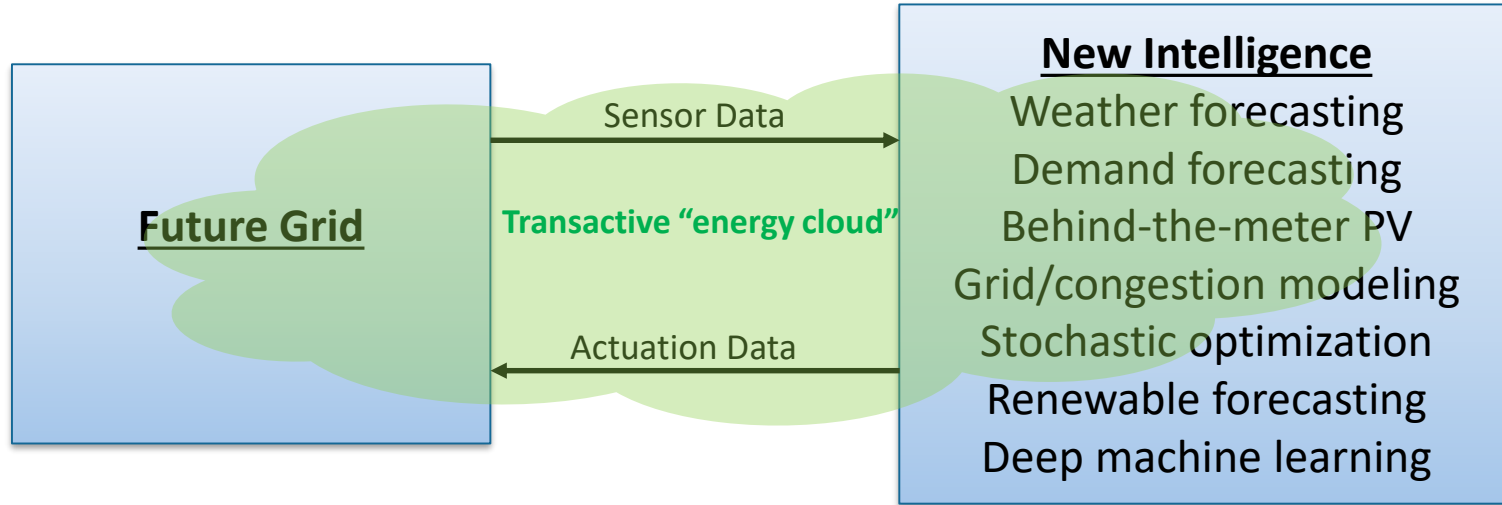
Tipping points are inexorable

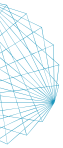


Tipping points are followed by mass adoption

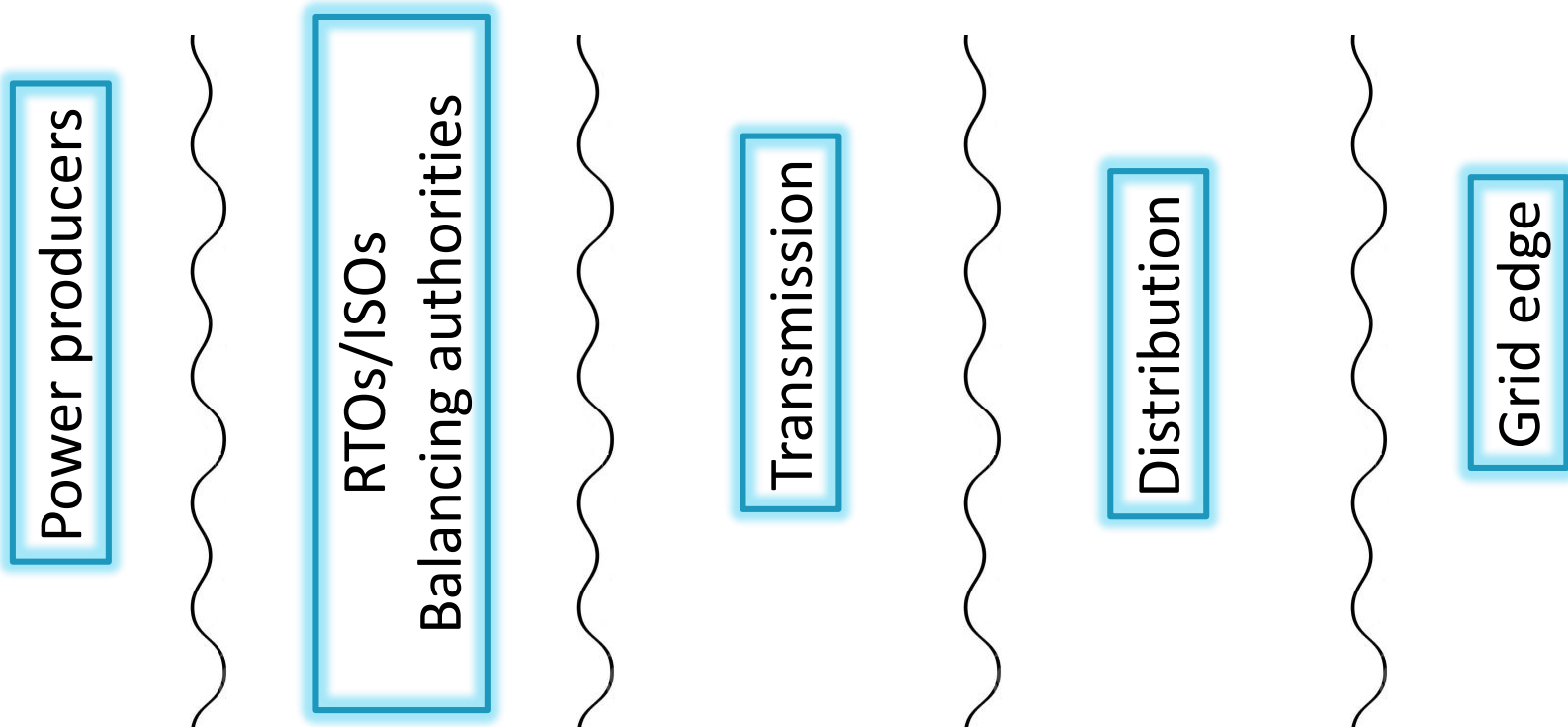


The transforming grid





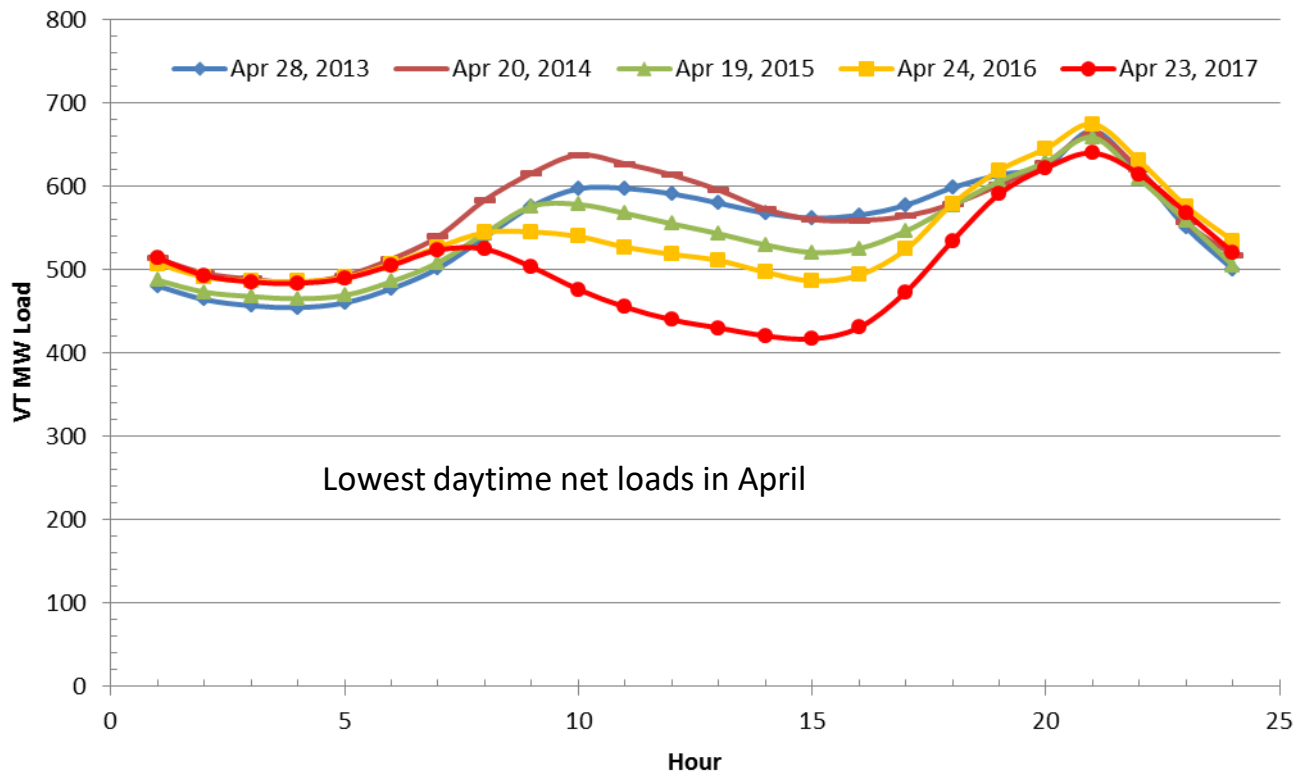
Boundaries blurring








Energy Analytics Platform



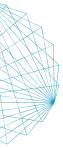
Solar PV impacts in April Vermont Net Loads



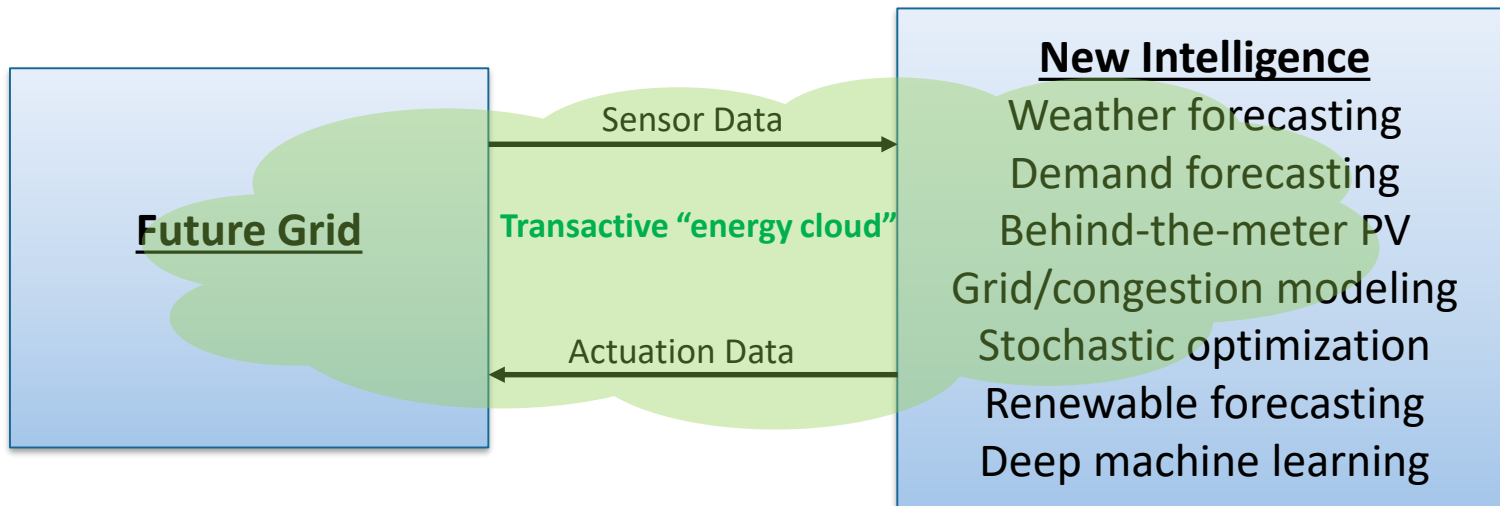
In short... we need a new orchestration

	When Supply is Scarce or Constrained	When Supply is Abundant and Plentiful
	“Later”	“Run the dishwasher”
	Discharge	Charge the battery
	Delay or vehicle-to-grid	Charge the EV
	Turn on expensive power	Curtail expensive power
	Post-heat, post-cool	Pre-heat, pre-cool

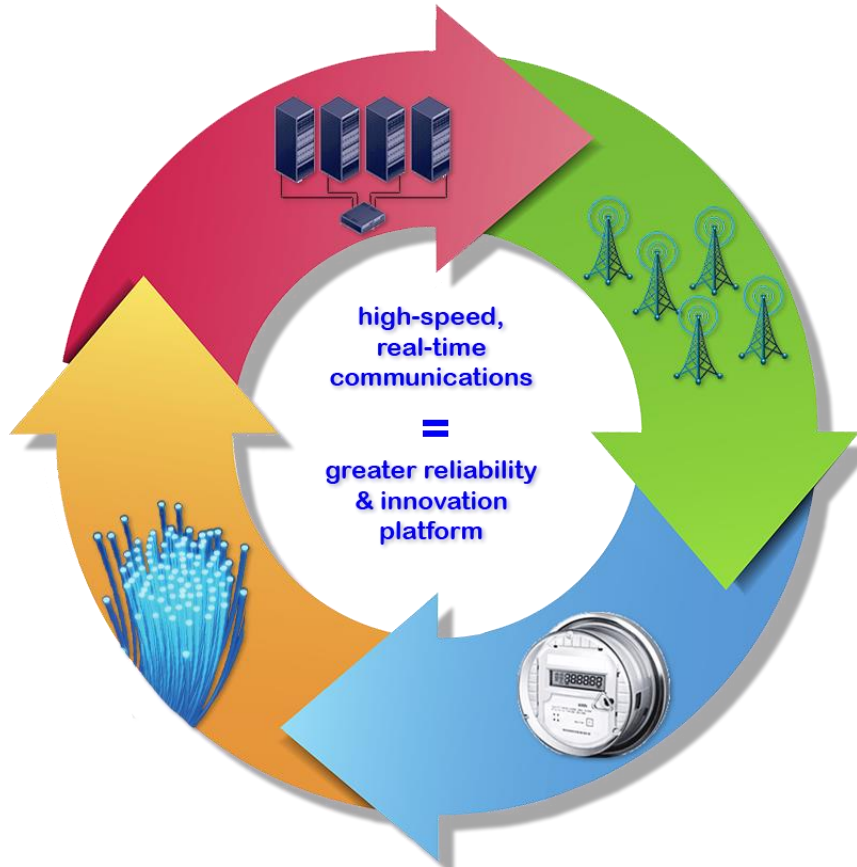
DER = “Distributed Energy Resources” or “Digital Energy Revolution”



Summary of the transforming grid



Grid innovation requires communication

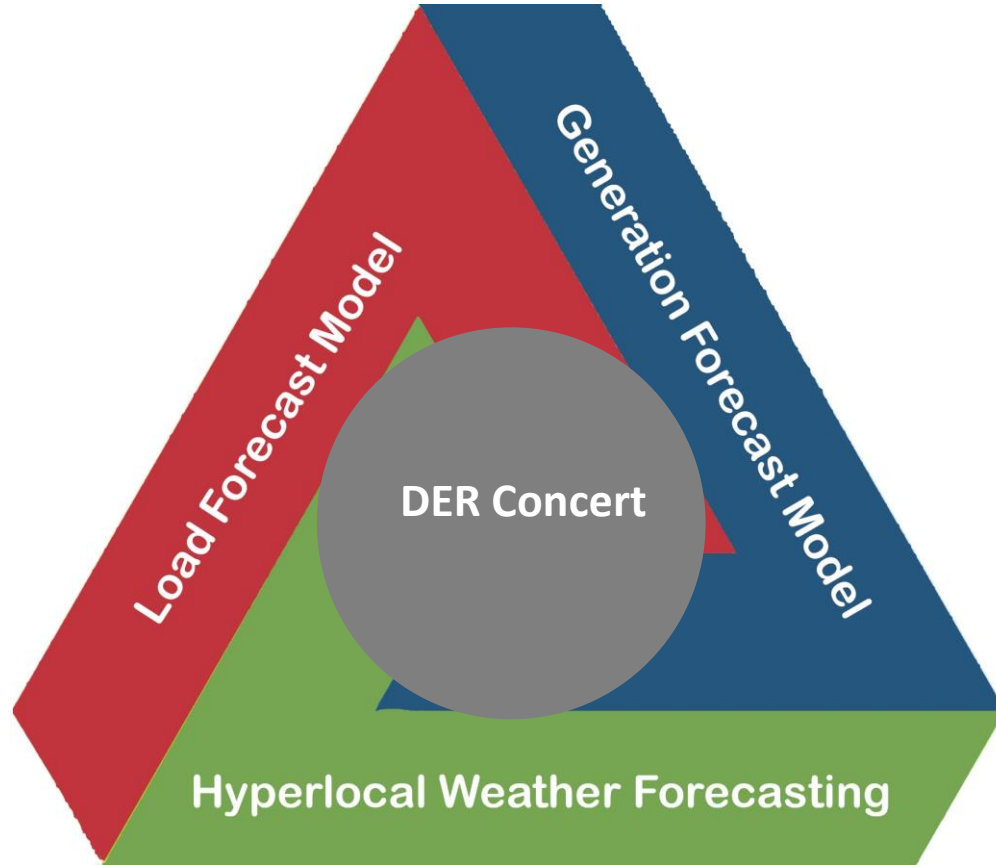


Statewide infrastructure

- Smart meters
- Fiber optic network
- Radio system
- High-performance computing cluster—HPCC

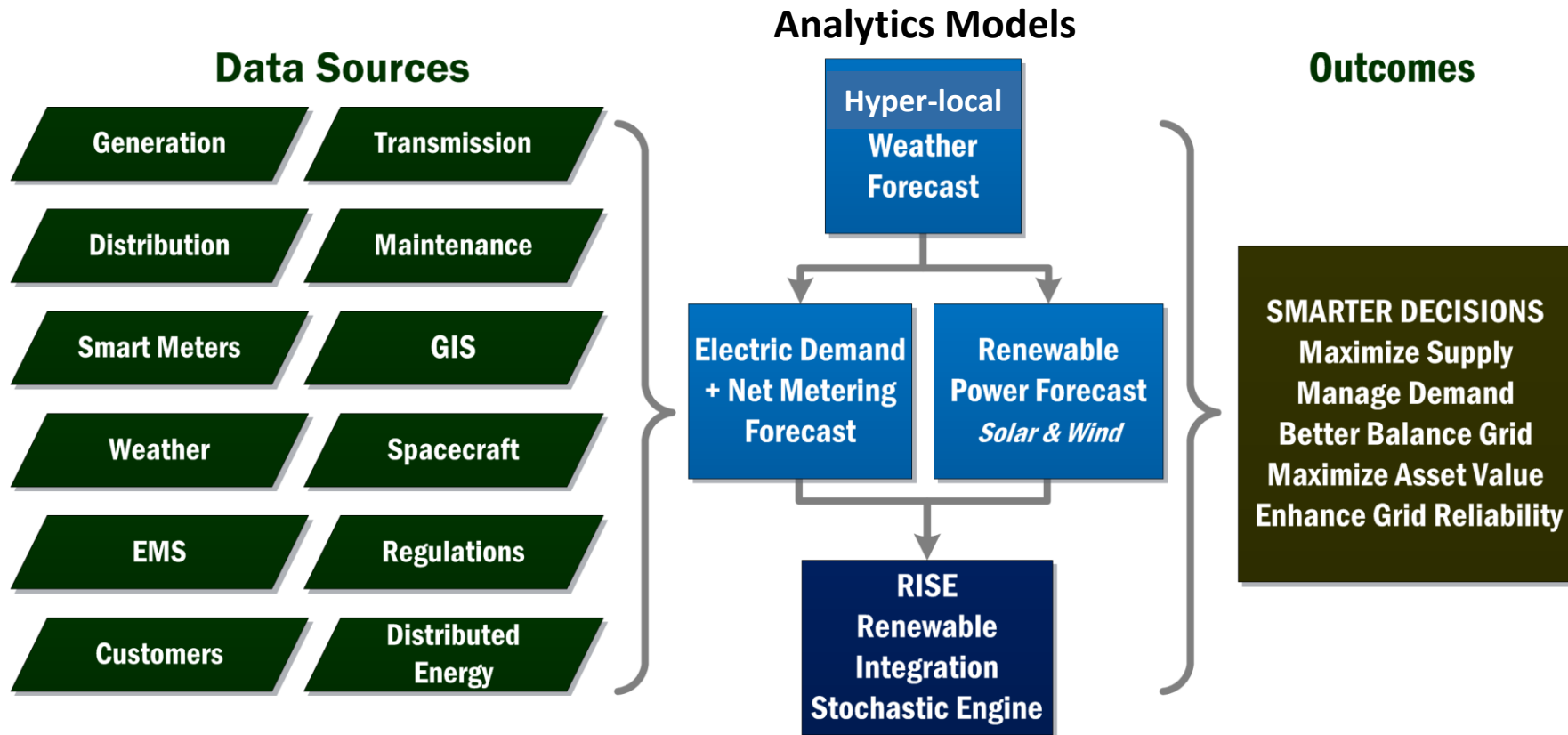


DER Concert: Vermont's integrated grid

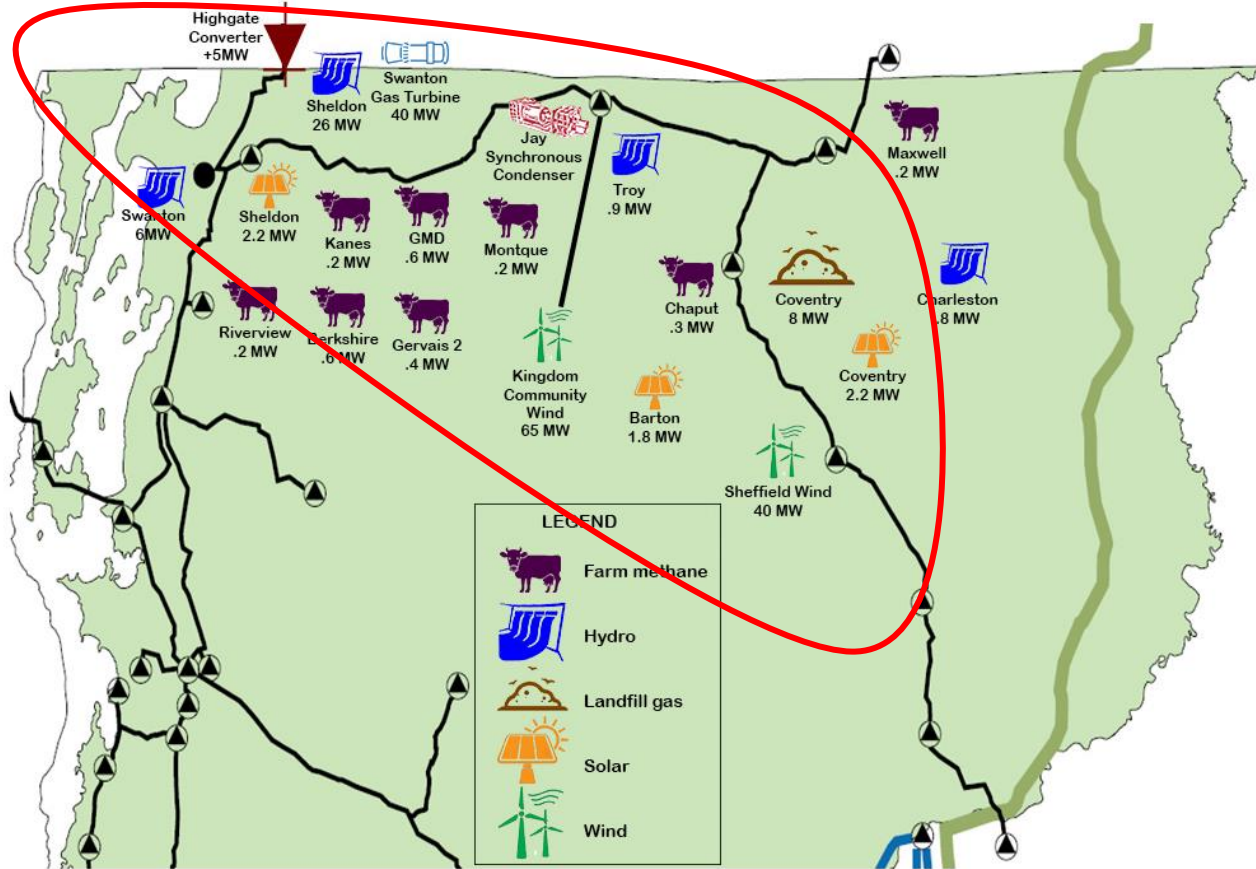




Need of the day: “a new intelligence”



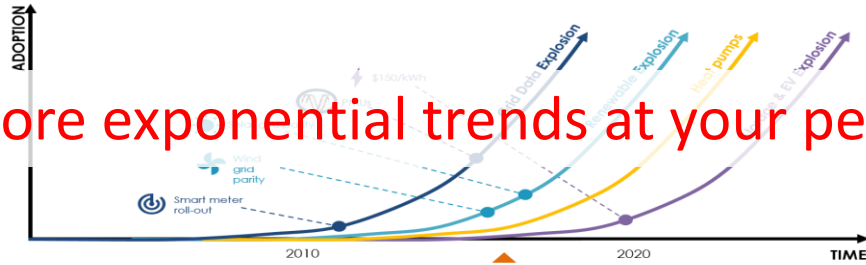
Current Challenge: effective orchestration of renewables





Take-Away Messages

Ignore exponential trends at your peril!



Winning technologies are determined by economics!



Embrace digital data and insights thereof!



Thank you!

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