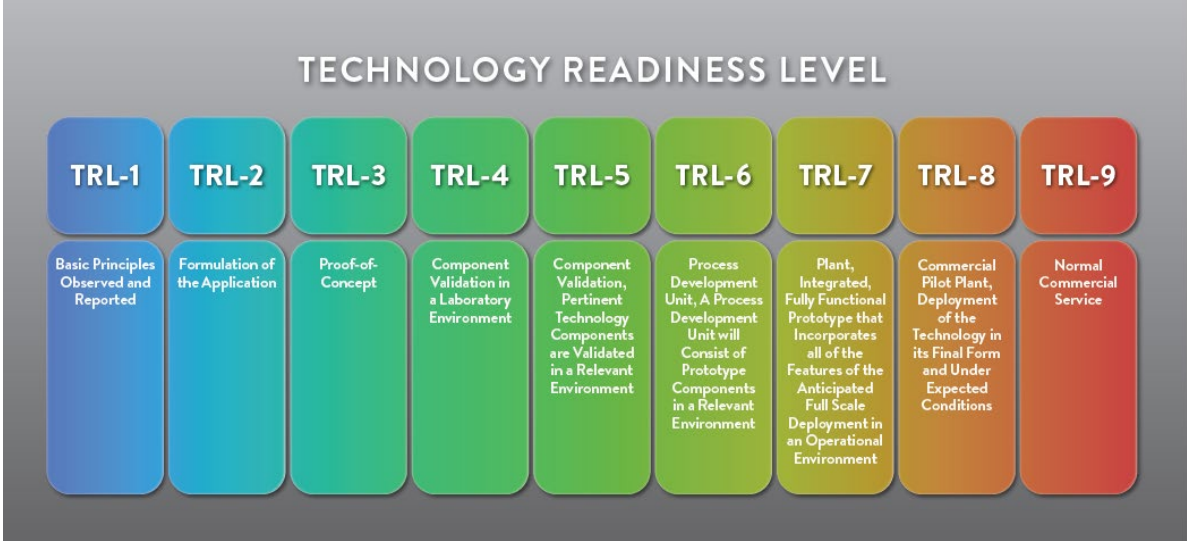



FRAMEWORKS for LONG DURATION ENERGY STORAGE (LDES)




Long Duration Storage Shot




Reduce storage costs by **90%***...

*from a 2020 Li-ion baseline



...in storage systems that deliver **10+** hours of duration



...in **1** decade

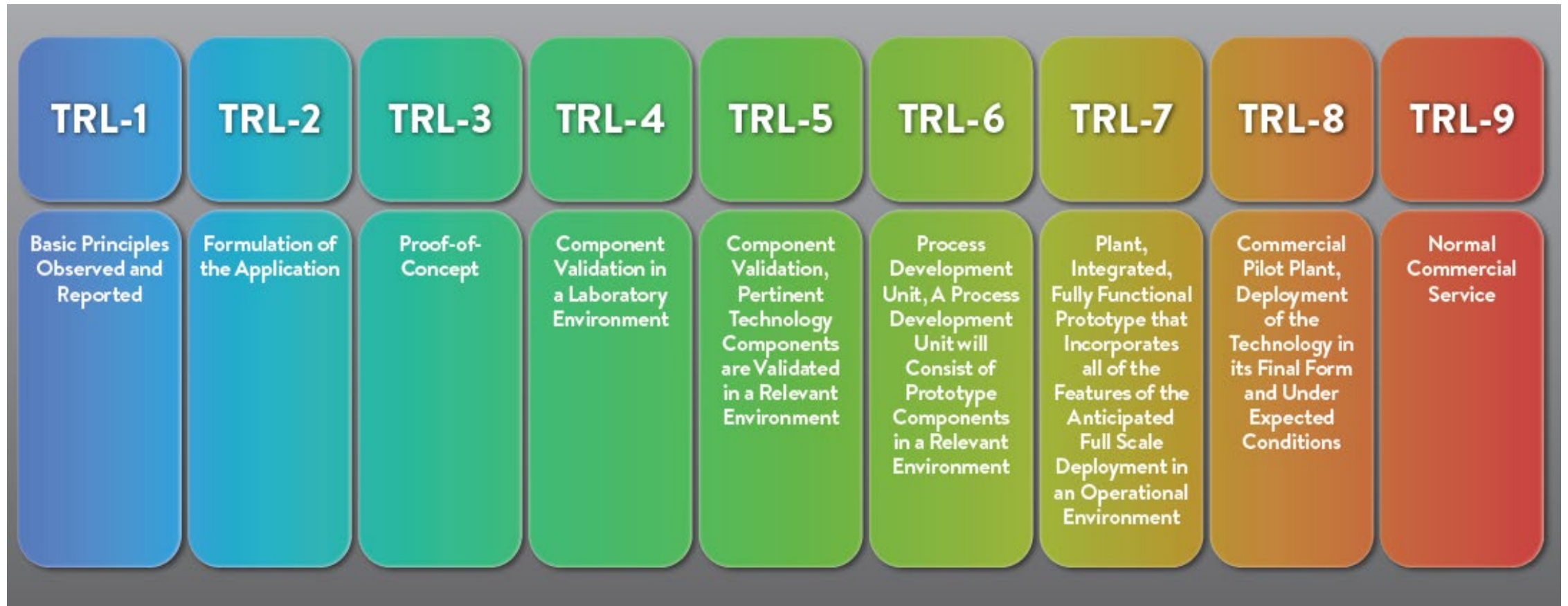
Clean power anytime, anywhere.

Russ Weed

CleanTech Strategies 

LDES National Consortium Annual Workshop
Session 5 – Technology Pitches
 Electrical Training Center, Commerce, CA
 September 10, 2024

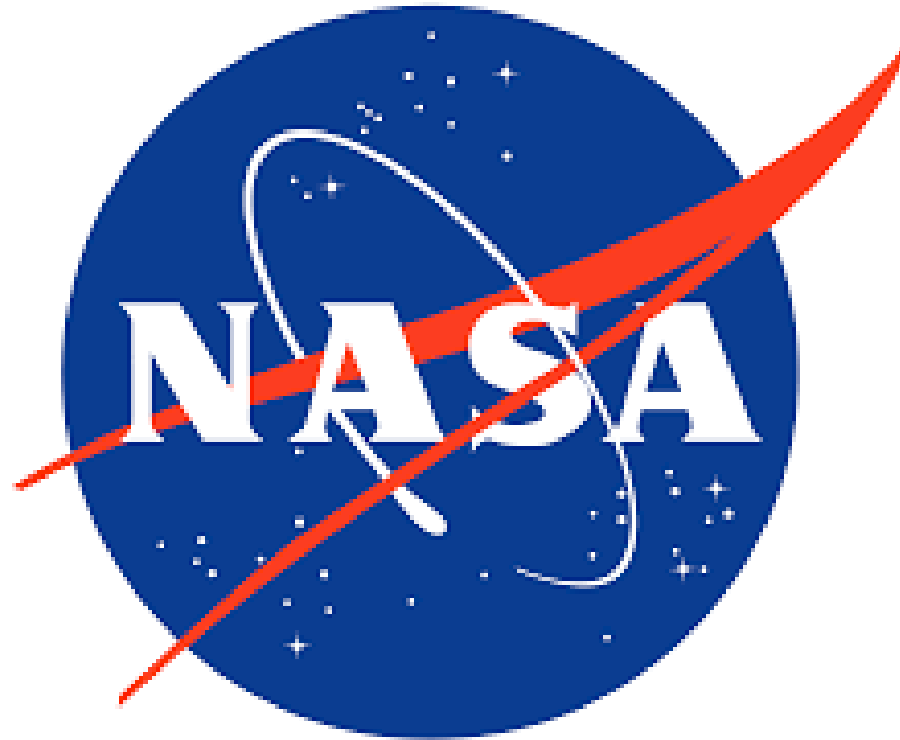
Framework: Technology Readiness Level (TRL)



<https://www.epri.com/research/programs/053125/results/3002024676>



Origin of TRL Framework



TRL Application:

Critical Facility Energy Resilience (CiFER)

DOE OE FOA 3384 (issued 8/5/24)

\$15M of funding – 3 Awards of \$5M

- c) Technology Maturity: Technology is sufficiently mature for an innovative field demonstration opportunity in a critical facility. This means the technology:
- i) Meets safety, operational, or integration requirements of the facility
 - ii) Has had previous testing and/or demonstration at a smaller or similar scale; beyond early-stage R&D (ex. single cell lab testing)
 - iii) Is not already a commercial solution for resiliency or a similar use case

<https://www.energy.gov/oe/articles/energy-department-pioneers-new-energy-storage-initiatives>

<https://www.fedconnect.net/FedConnect/default.aspx?ReturnUrl=%2fFedConnect%2f%3fdoc%3dDE-FOA-0003384%26agency%3dDOE&doc=DE-FOA-0003384&agency=DOE>

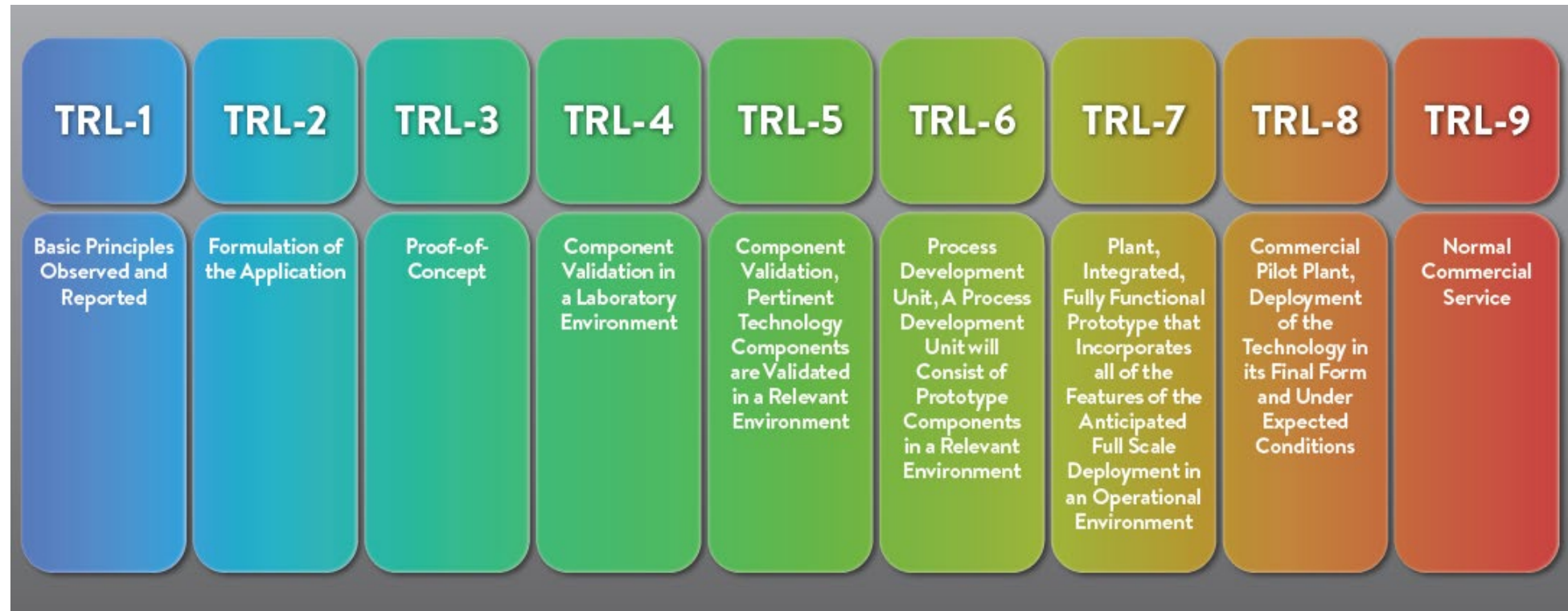


TRL Application:

Critical Facility Energy Resilience (CiFER)

DOE OE FOA 3384

\$15M – 3 Awards of \$5M

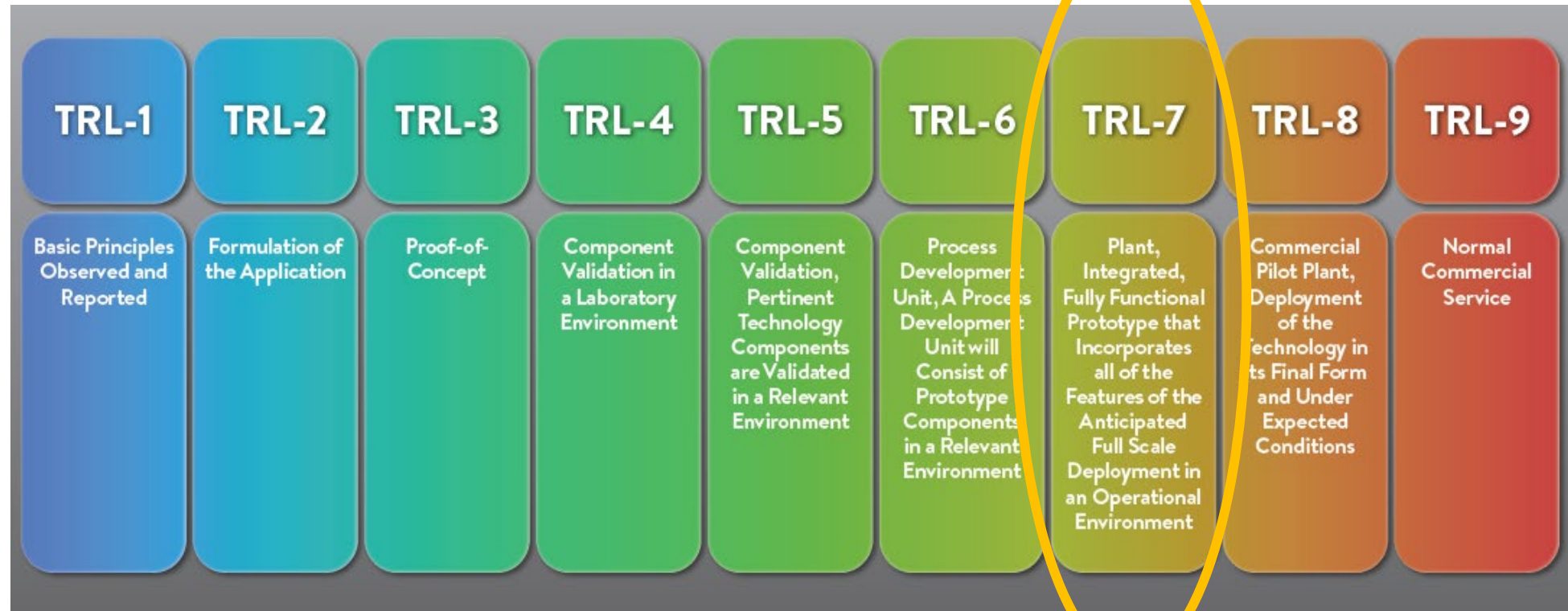


TRL Application:

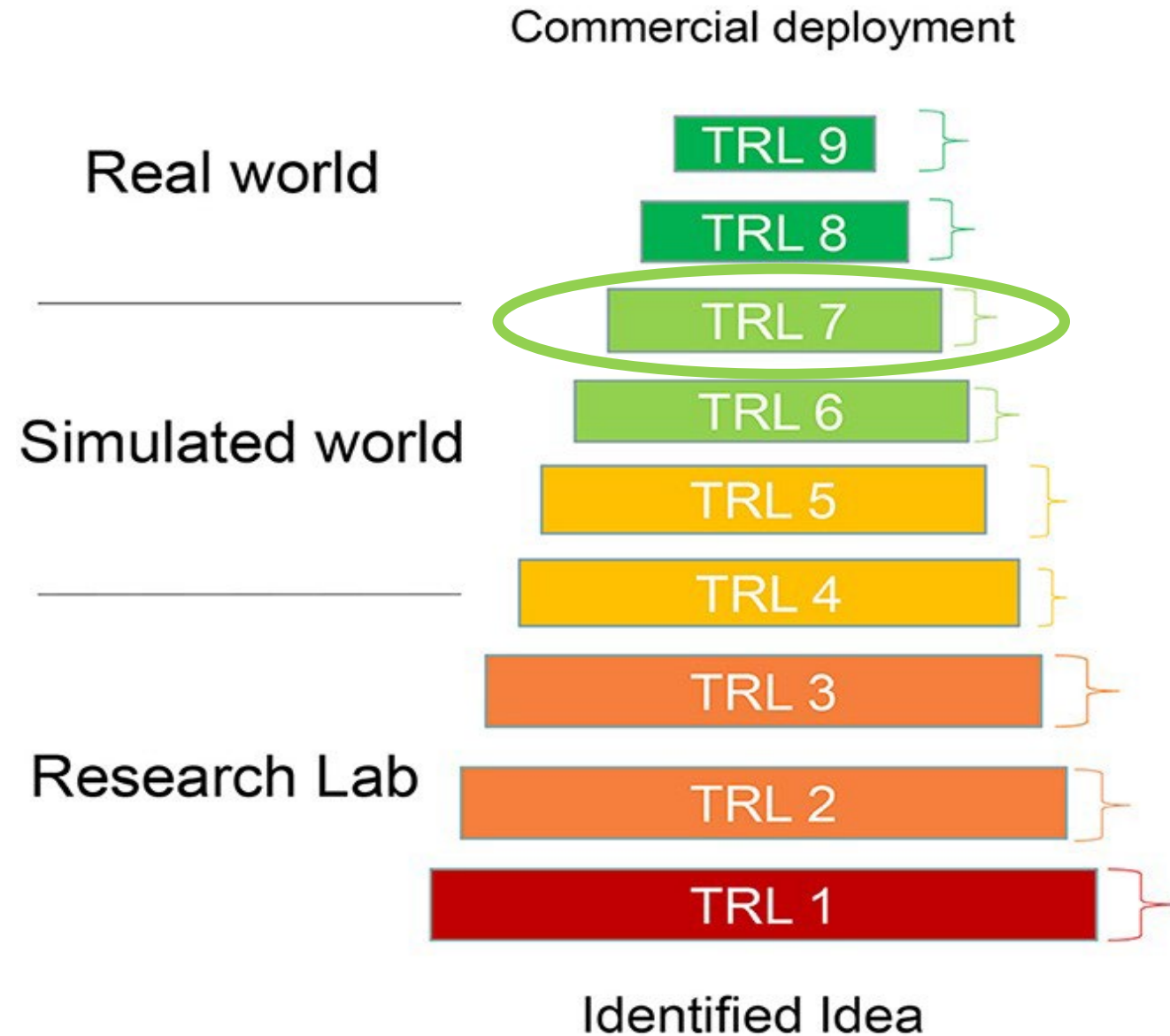
Critical Facility Energy Resilience (CiFER)

DOE OE FOA 3384

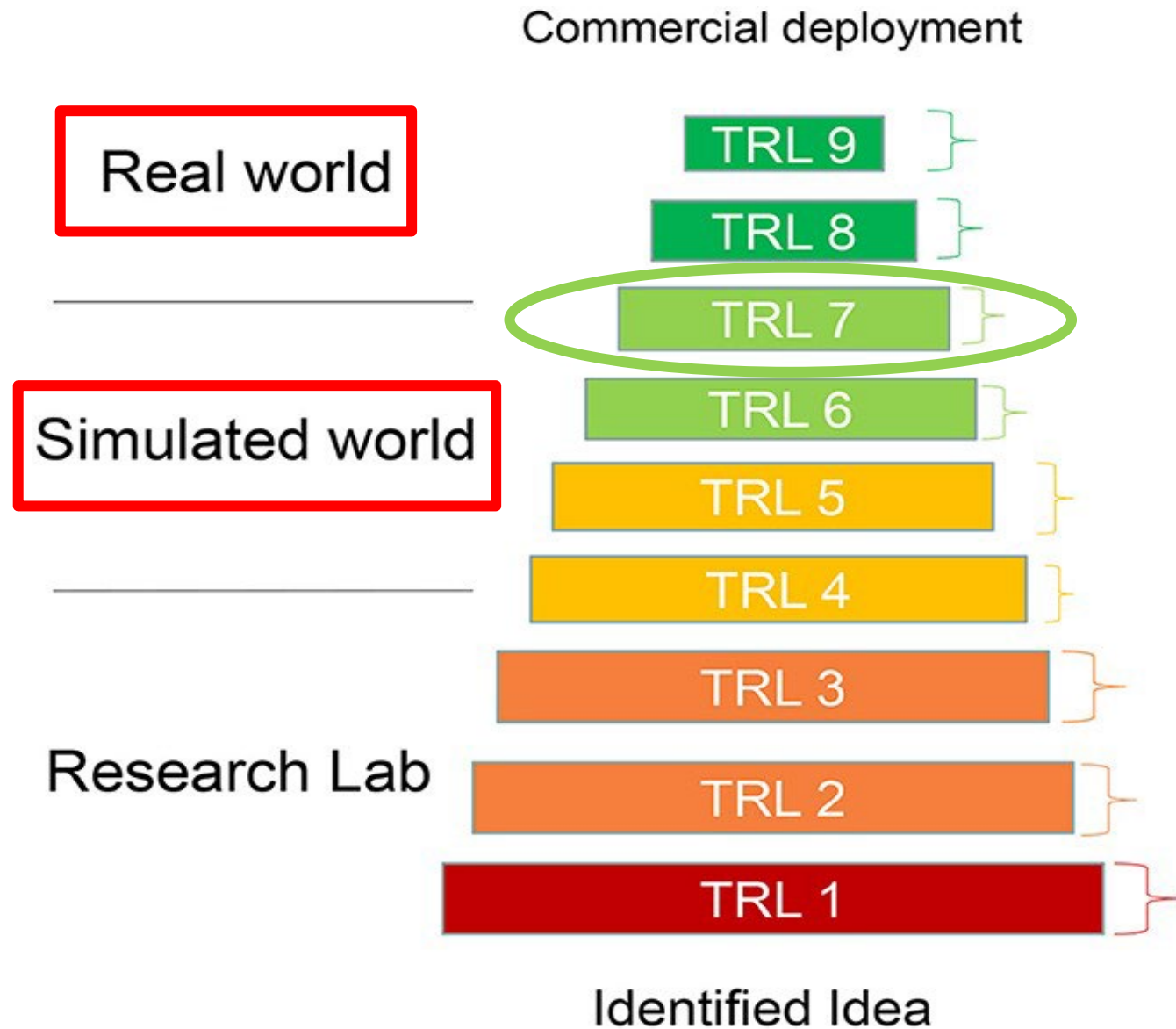
\$15M – 3 Awards of \$5M



TRL Segmentation



TRL Segmentation



Framework: US Energy Storage Grand Challenge



<https://www.energy.gov/energy-storage-grand-challenge/articles/energy-storage-grand-challenge-roadmap#:~:text=With%20six%20use%20cases%20that,2020%20baseline%20costs%20by%202030.>



\$0.05/kWh Metric

- **\$0.05/kWh** levelized cost of storage for long-duration stationary applications, a 90% reduction from 2020 baseline costs by 2030.^{1,2,3} Achieving this levelized cost target would facilitate commercial viability for storage across wide a range of uses including:
 - Meeting load during periods of peak demand
 - Grid preparation for fast charging of electric vehicles
 - Applications to ensure reliability of critical infrastructures, including communications and information technology.

<https://www.energy.gov/energy-storage-grand-challenge/articles/energy-storage-grand-challenge-roadmap#:~:text=With%20six%20use%20cases%20that,2020%20baseline%20costs%20by%202030>



\$0.05/kW 10h Metric

2

Long-duration storage refers to systems capable of providing storage for more than 10 hours

<https://www.energy.gov/energy-storage-grand-challenge/articles/energy-storage-grand-challenge-roadmap#:~:text=With%20six%20use%20cases%20that,2020%20baseline%20costs%20by%202030.>



What are useful metrics for kW100h?



C32 Generator Set | 830kW - 1250kW Diesel Generator



420 MW Simple Cycle Generation Peaker Plant



Thank You. Questions?



Russ Weed
President

CleanTech Strategies 

russ.weed@cleantechstrategies.us

(206) 851-1653 mobile

[Russ Weed | LinkedIn](#)

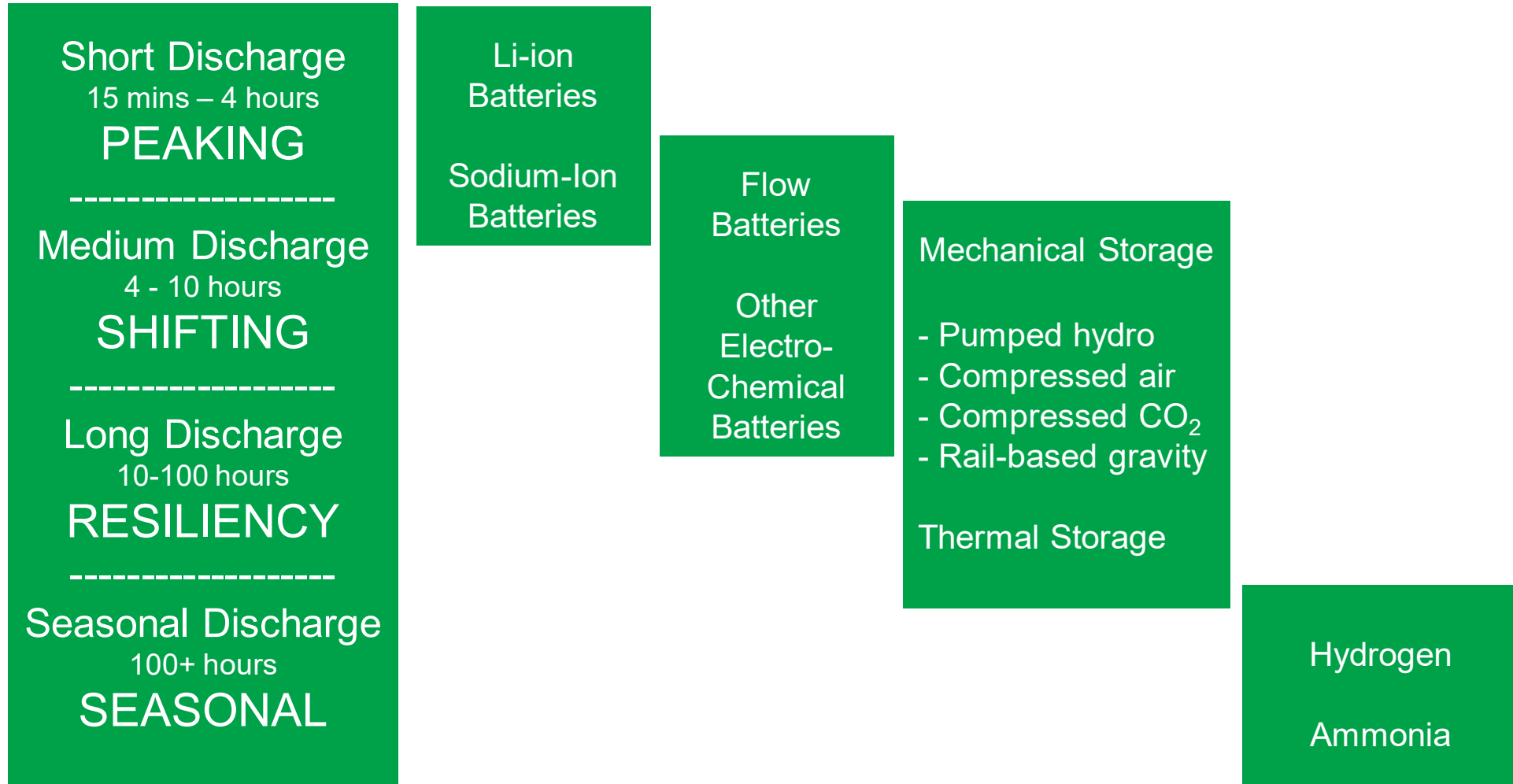
[CleanTech Strategies | LinkedIn](#)

APPENDIX

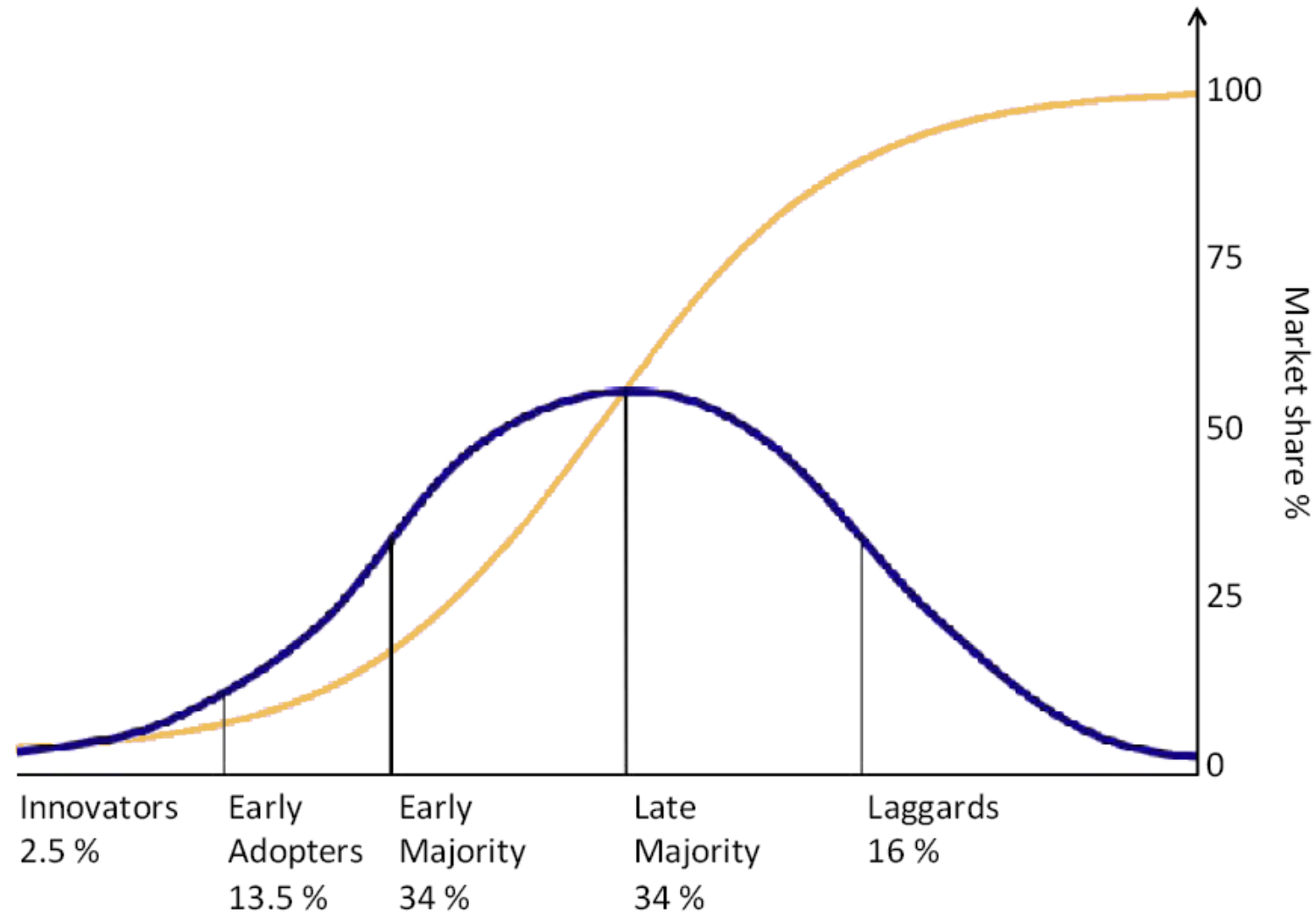


Framework: *ESS Segmentation*

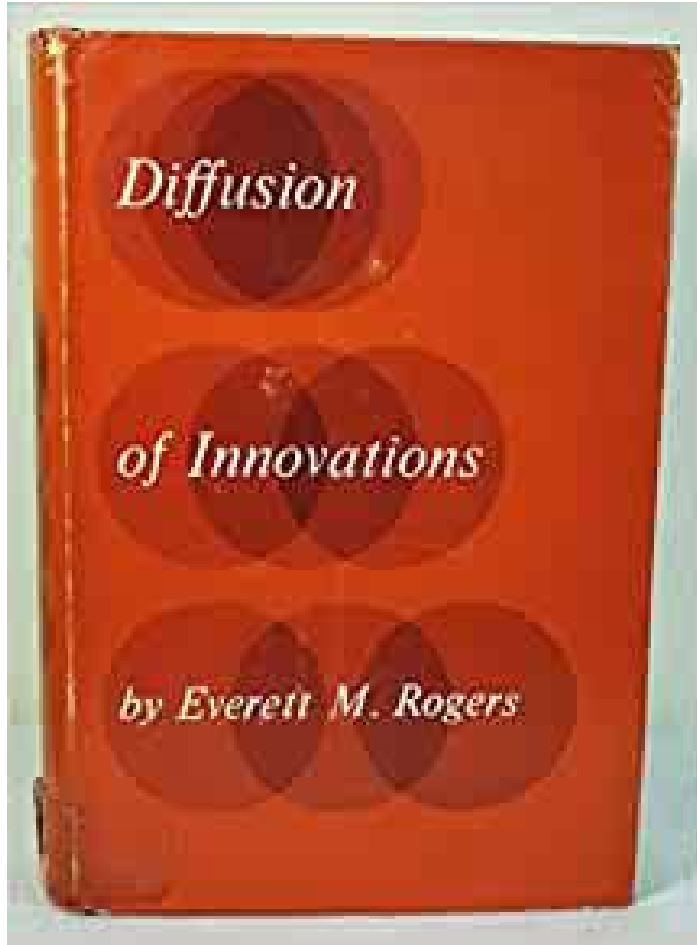
Discharge Capabilities, Use Cases, Technologies



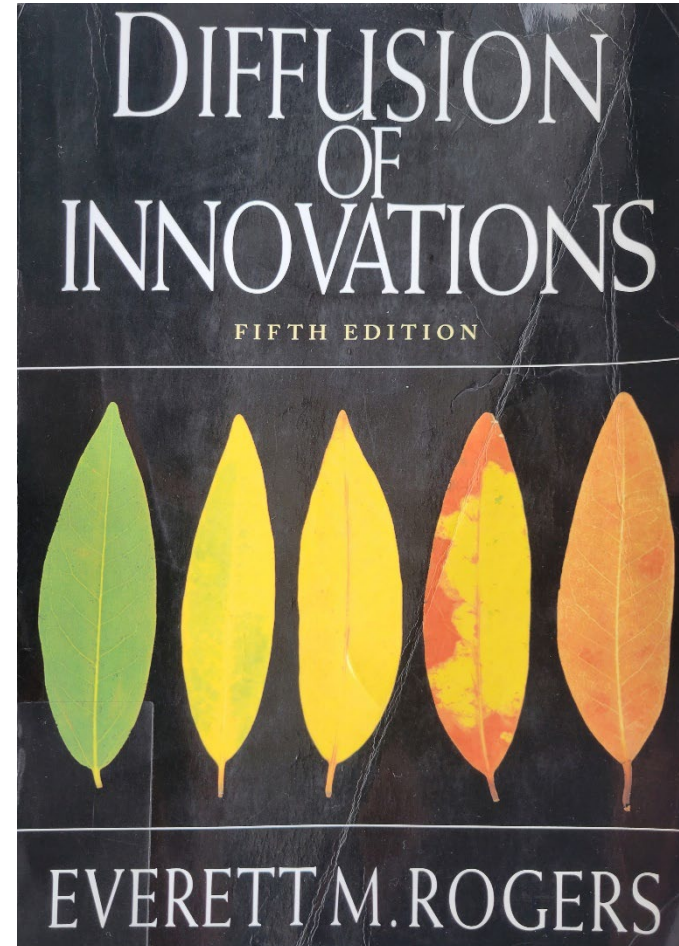
Framework: Innovation Adoption



“*Diffusion of Innovations*,” Dr. Everett Rogers



First Edition, 1962



Fifth Edition, 2003



“The Diffusion Process”

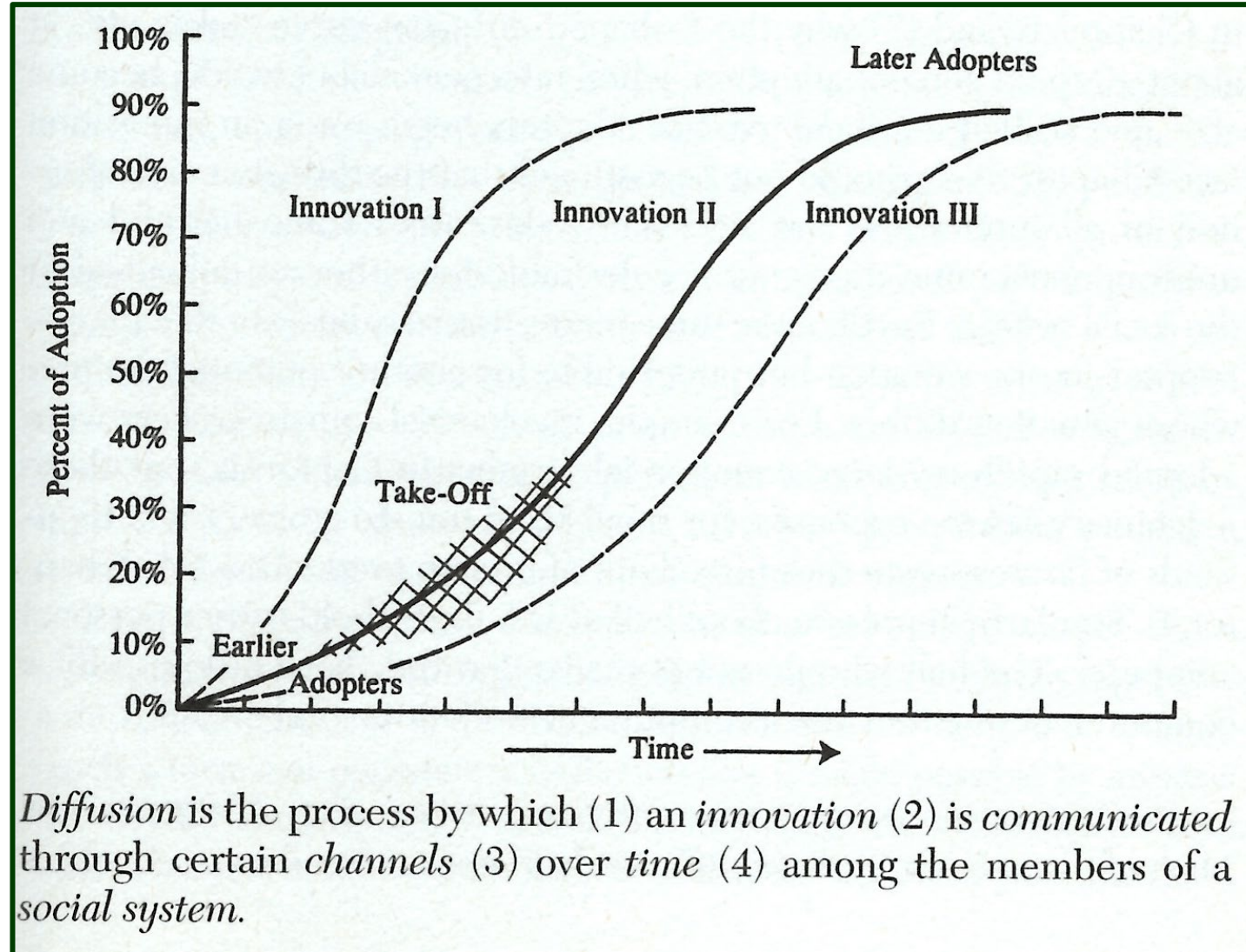


Figure 1-2, Page 11

