



Vertiv and Academia: Innovating for Today and Tomorrow

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Moderator:
Alissa Comella
The Ohio State University



Gregory Ratliff
Vertiv Corporation

An Introduction to Vertiv

Architects of Continuity™

Gregory Ratcliff
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Technology underpins and enriches almost every aspect of our lives.

Technology drives the global demand for data.

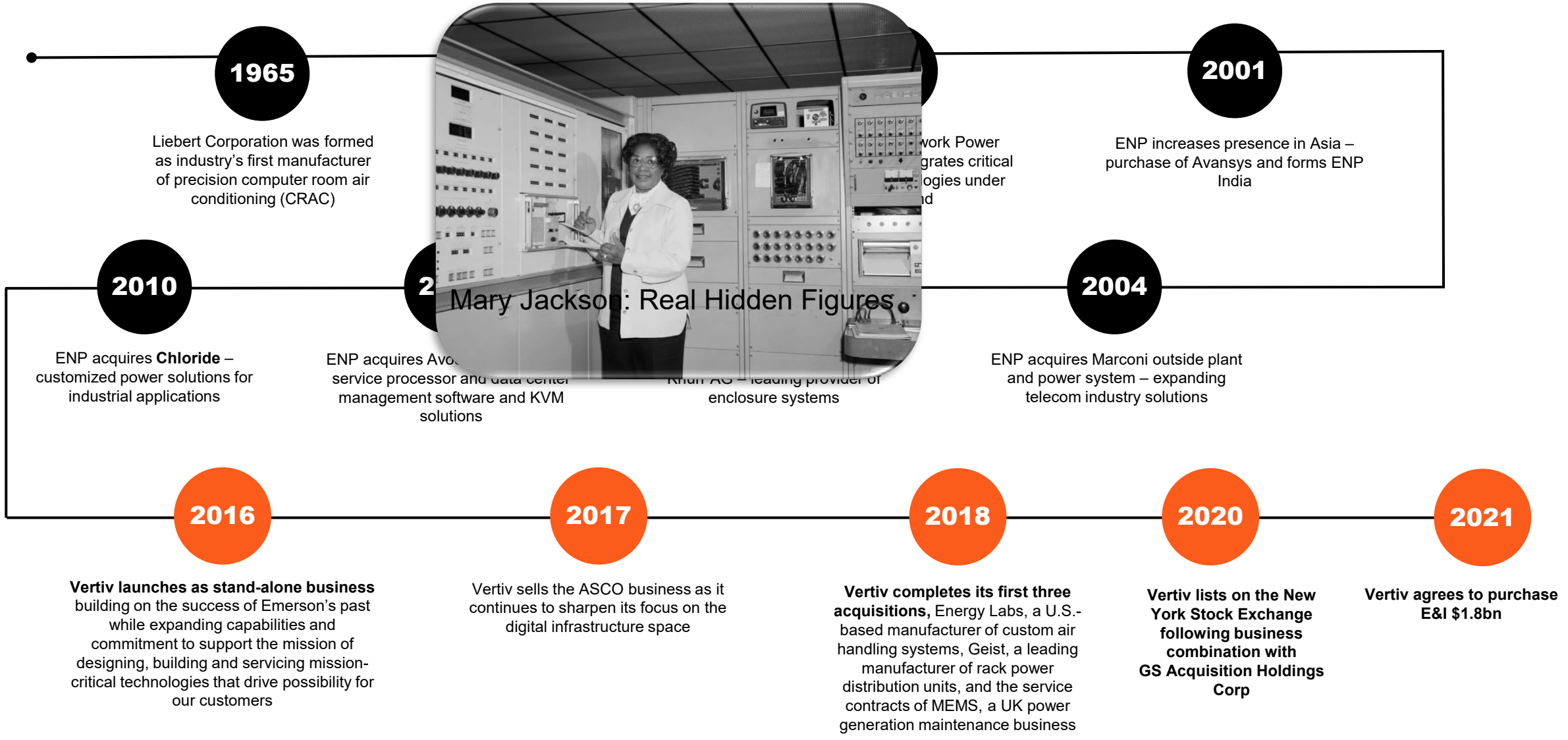
Vertiv provides the products and services infrastructure needed to manage that data.





Vertiv timeline

Combining the entrepreneurial spirit of a startup with the resources and reach of an established leader.



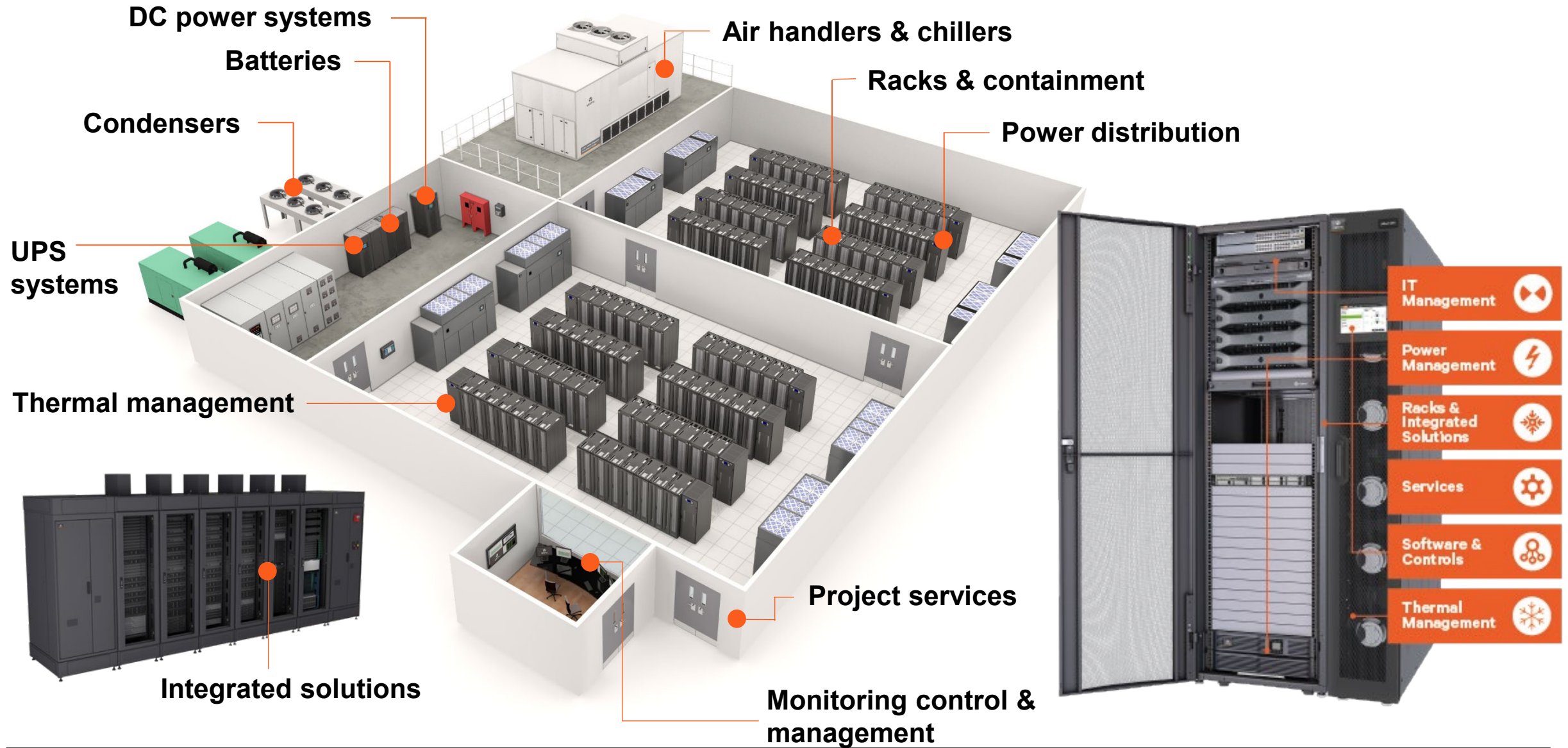
Our focus on *data centers*

*Enabling reliability, efficiency and scalability:
Hyperscale/Cloud, Colocation, Enterprise and
Edge.*

- Expertise from design through construction and commissioning derived from decades of experience
- Innovative solutions that reduce costs, improve management and speed deployment
- World-class services that drive uptime and deliver insights into performance
- Product, system and integrated solutions for: Enterprise, Colocation, Hyperscale and Edge



Vertiv data center applications





Our focus on *communication networks*

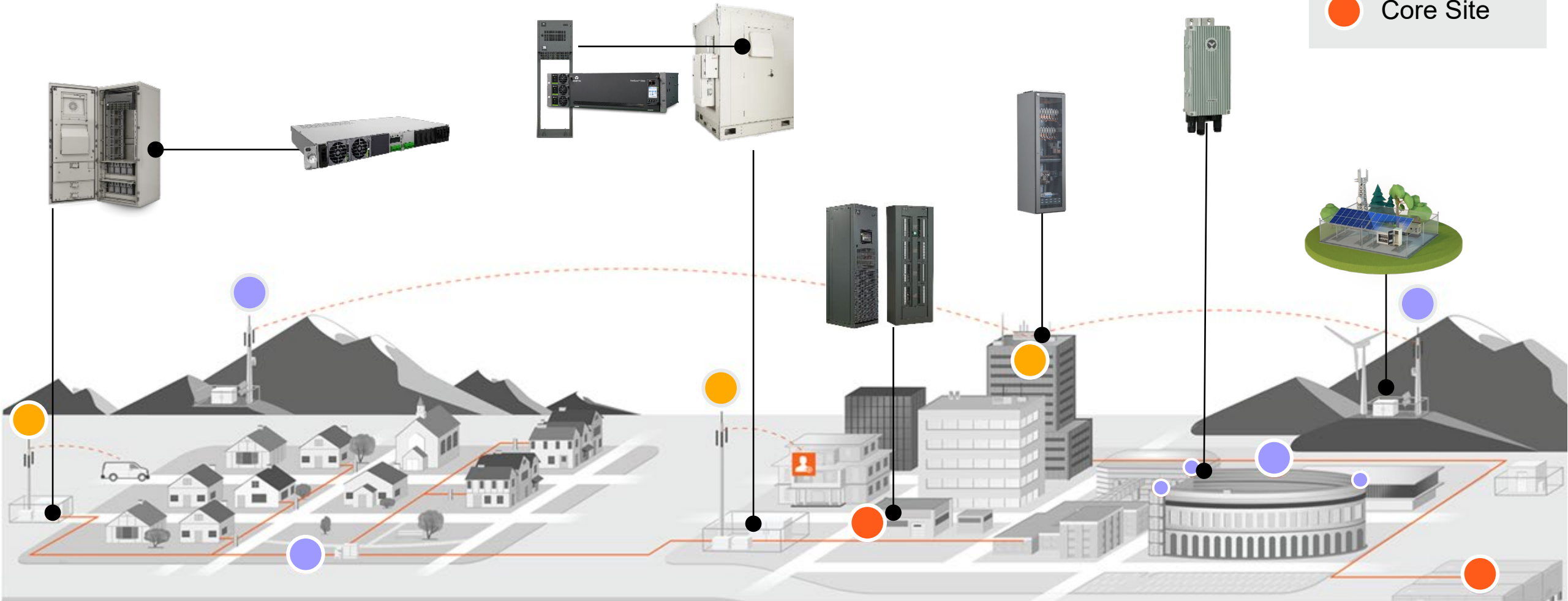
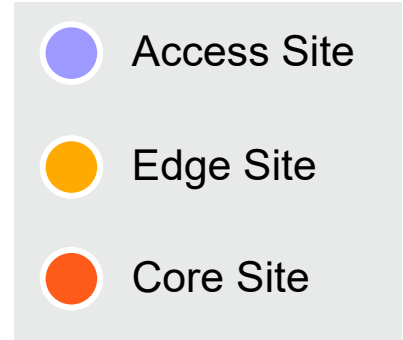
Provide smart, fast, flexible solutions for advanced networks and network management: Macro Site, Central Office, Small Cell and Data Center.

- Innovation-enabling flexible architectures
- Fast deployment, turnkey solutions, seamless service
- Intelligent systems for smart, holistic network management
- Future-forward solutions supporting 5G and a variety of sites including: Small Cell, Macro Site, Central Office and Data Center



Vertiv telecom applications

We deliver product and solution versatility, enabling multiple applications.



Our presence

Meeting our customers demand for data – wherever they are.



Worldwide	
Manuf. and Assembly Locations	19
Service Centers	300+
Service Field Engineers	3100+
Technical Support/Response	250+
Customer Experience Center/Labs	15
University Relationships	50
Funded University Projects	16

Americas

Manuf. and Assembly Locations	8
Service Centers	165+
Service Field Engineers	1370+
Technical Support/Response	100+
Customer Experience Center/Labs	5

Europe, Middle East, and Africa

Manuf. and Assembly Locations	6
Service Centers	70+
Service Field Engineers	580+
Technical Support/Response	80+
Customer Experience Center/Labs	6

Asia Pacific

Manuf. and Assembly Locations	5
Service Centers	57+
Service Field Engineers	1150+
Technical Support/Response	70+
Customer Experience Center/Labs	4

Focus Areas of Technology

ELECTRONIC COMPONENTS



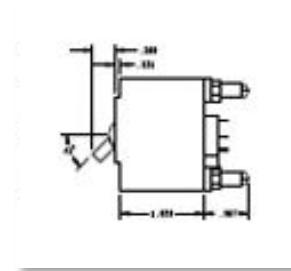
Capacitors
Magnetics
Microprocessors
Power Conversion
Sensors

ENERGY STORAGE



Flywheel
Fuel Cells
Lithium
Super Capacitors

DISTRIBUTION



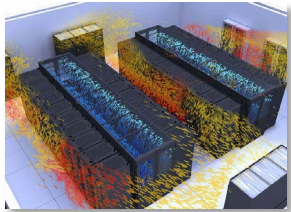
Breakers
Controls
Meters

HEAT REJECTION



Compressors
Desiccants
Heat Exchangers
Fan Technology
Chiller Technology
Pumps

HEAT DISTRIBUTION



Heat Rejection Systems
Refrigerants
Liquid Cooling
Thermodynamics
Nano Tech

ALTERNATE ENERGY SOURCES



Fuel Cells
Hydrogen
Wind
Solar
Grid Storage

CONTROLS



Big Data
Artificial Intelligence
Machine Learning
Simulations
Design Productivity
Sensors

MANUFACTURING



3D Printing
Methods of Assembly
Automation

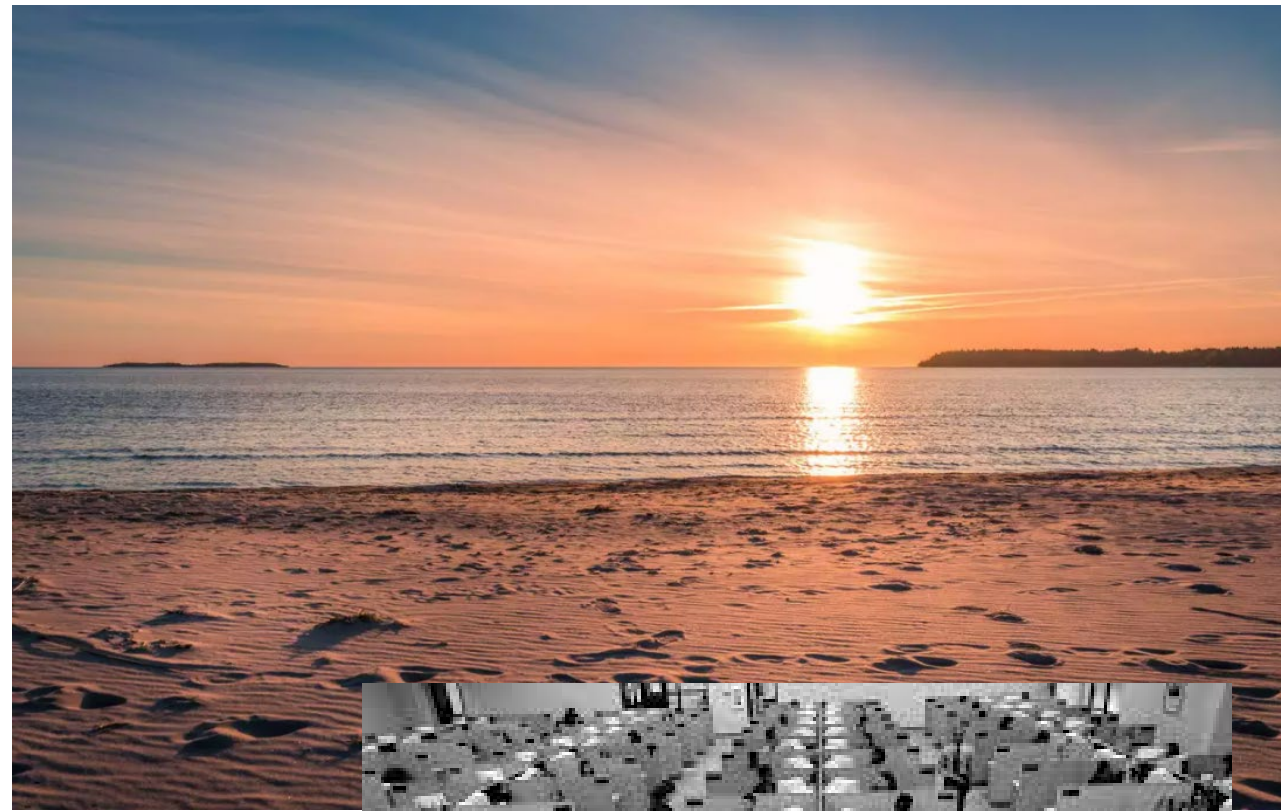


Innovation@Vertiv

Now, Near, Far

Now, Near, Far

- **About our Culture and Patterns**
- **Shadow Strategy (Today)**
- **Antibodies**
- **Fear (is it misplaced?)**
- **Leverage TRL with CRL**
- **CAVU**
 - Clear and Visibility Unlimited
 - Customers, Associates, Vendors, Universities



Innovation Team's High-level Process

1	Identify Identify the needs of the industry / LOBs through clear communication with and from the LOB leaders.
2	Find Search for organizations and useful technology - emerging, existing, or competitive intelligence – by tapping personal networks, alma maters, technology transfer professionals, external scouts, and technology databases or from CAVU.
3	Select Team helps answer two main questions to determine whether a technology should proceed to the next stage of their process – <i>is the innovation novel? And, if so, to what extent is it relevant to Vertiv?</i> Other questions to consider are – <i>what is the disruption potential to the company if we do not nurture this idea or project? Is the competition doing the same thing?</i> A SWOT (strengths, weaknesses, opportunities, and threats) analysis of your technology will assist you in answering these questions.
4	Assess The Team supports categorizing, ranking and prioritization of innovation. Help identify potential intellectual property. Then help assigning the appropriate project type (exploratory, watching, mentoring, funded, partnership, precompetitive).
5	Disseminate Preparing the most recent developments and sharing findings through one-page updates, briefs and with their teams. It is also critical to keep any relevant supporting resources such as project charters, agreements (NDAs)*, images, test reports, and milestones, on MS Teams.

* Requires assistance from the Legal Team.

Scouting

Everywhere: Vendors, Startups, Universities, Customers, Associates.



Finding Actionable Value and Innovation

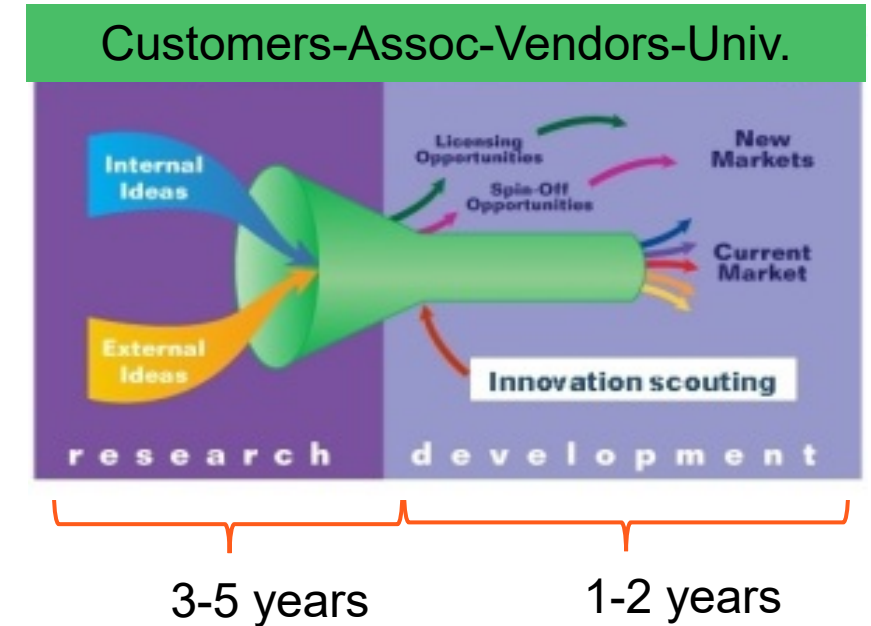
In support of our strategic innovation requirement, Stephen Liang has established an Innovation Office, led by Greg Ratcliff, Chief Innovation Officer.

The primary role of the innovation office is to capture, curate, and publish to Vertiv staff relevant technology that will benefit Vertiv 2-5+ years in the future (perpetually).

Consider this as the manifesto for Vertiv technology scouts:

“We, the technology scouts, have been recruited and tasked to assist Vertiv programmers, engineers, offering managers and our factories with learning about relevant technologies that will be important to Vertiv in 2-5 years.”

Together the technology liaisons and scouts will scour academia and the world through the lens of finding value for Vertiv’s future. Once located, we will curate, organize, and teach others what we have learned through the innovation site, technology briefs and **tailored*** periodic updates.

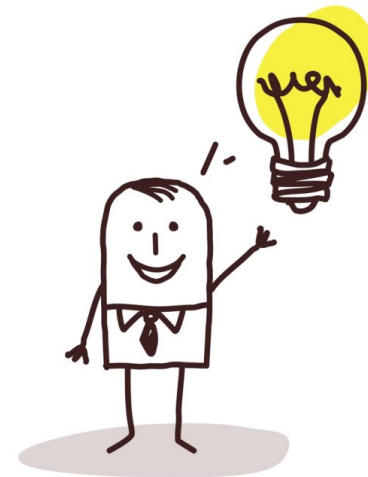
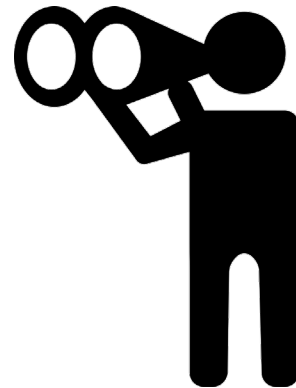
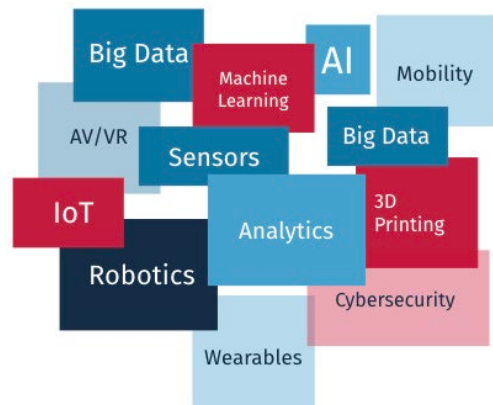


Innovation Strategy – Technical Scouting

The **internal corporate culture is the most important driver** of corporate innovation. A culture of innovation is one that actively encourages and supports creative, even unconventional, thinking among its employees and allows innovation to flow through it.

Technology Scouting is an element of technology management in which (1) emerging technologies are identified, (2) technology related information is channeled into an organization, and (3) supports the acquisition of technologies.*

Technology Scouting DOES NOT develop products, engineer solutions, or conduct market research. It assists Vertiv with identifying and implementing existing technical solutions in order to improve our products, services, or processes.



Emerging Technologies → **Scouting** → **Ideas / Readiness**

*Technology Scouting as defined by Wikipedia, the free encyclopedia.

Technology Scouting Roles – Liaisons and Scouts

Goal: To bring advanced technology to our Lines of Business and Centers of Excellence.

Liaison */noun/*

Helps organizations or groups to work together and provide information to each other.

Scout */noun/*

Identifies emerging technology, knowledge, and span internal boundaries.

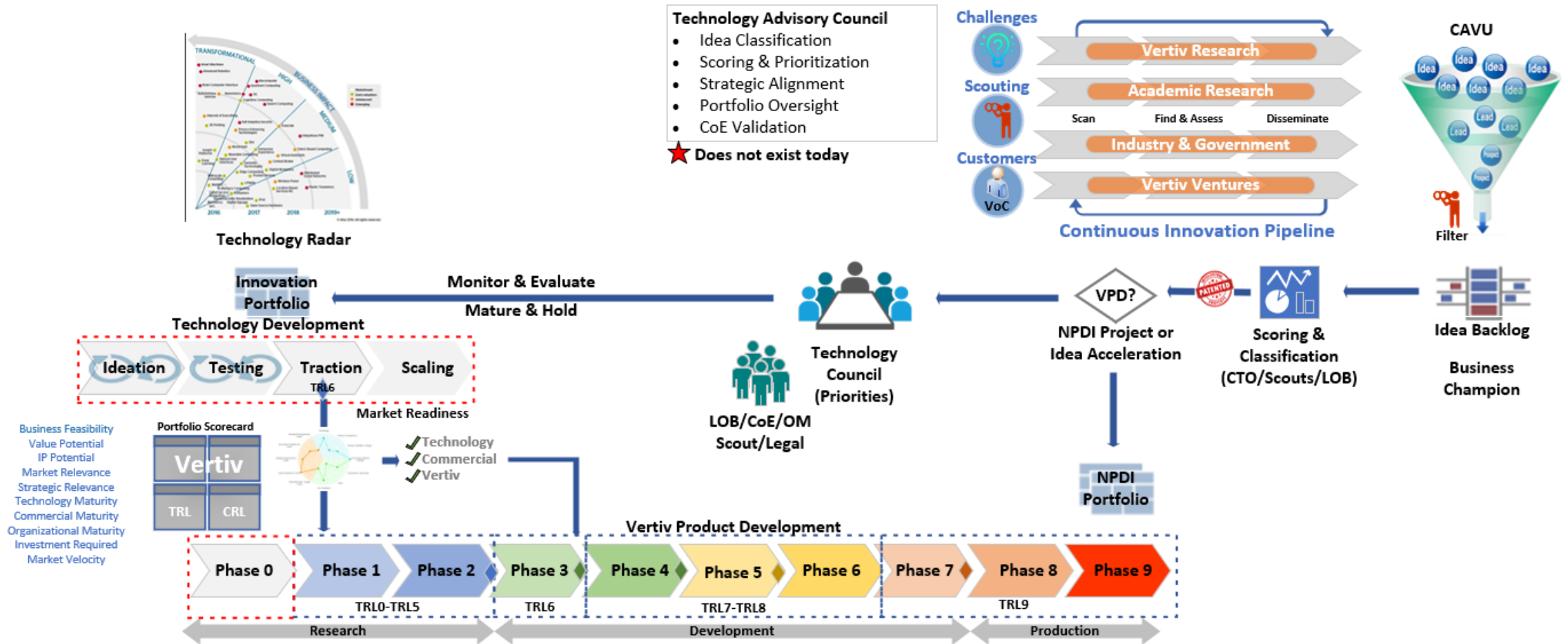
Specific Responsibilities

- Maintain thorough knowledge of our business, as well as an understanding of how that impacts the other entities of contact.
- Monitor, and communicate the strategic objectives of the business to LOB scouts
- Work with other staff members to develop a greater understanding of the business needs.
- Shares observations broadly, particularly new, unique and differentiating ideas, projects, concepts.

- Searches proactively for relevant solutions for Vertiv's unique needs.
- Ensures the effective sharing of information through regular meetings (weekly, monthly, etc.) internally and externally.
- Mentor and guide researchers in creating and updating written briefs that discuss research project progress, challenges, and plans.
- Curates / collects supporting project materials from researchers.
- Provides monthly briefs to Innovation Team.

Process

Not Adopted, Socializing, Tuning



Scouting Lessons Learned: August

Its new for us to invest in winning later R&D

Our First Class of Scouts

- Great Minds
- Busy Staff (and workload changes happen)
- Leader's "go to" Person (Thank you)



Improve Dissemination

- Manage Up in our Organization
- Improve Visibility

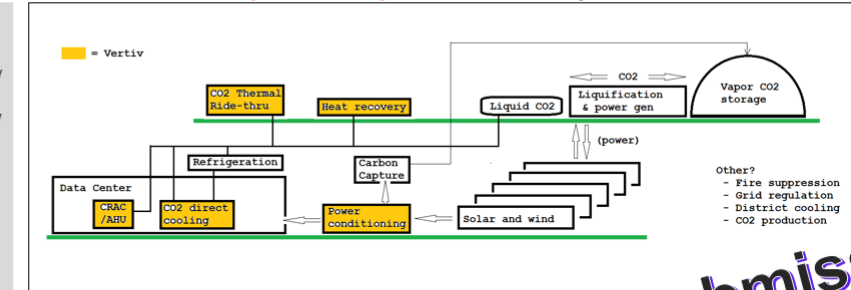
CO₂ (power, cooling, other) integration for Data Centers

Summary

Description: Whereas hyperscale datacenter owners are early-adopters for green tech, Whereas hyperscale infrastructure is open to change, Whereas there is an abundance of new technologies around solar/wind power gen, energy storage, and carbon capture, and Whereas most technology application is directed at utility scale – Therefore integration solution by Vertiv application is directed at utility scale – Therefore integration solution by Vertiv scaling and packaging new tech for data centers has great potential for innovation.

Value Statement: Application of direct carbon capture (Climeworks, 1pointFive) with CO₂ refrigeration & energy storage (Energy Dome) combined with custom thermal and power systems (Vertiv) are used to provide 24x7 operation on wind/solar energy alone, with no utility power, no diesel generators and with liquid CO₂ thermal storage onsite, and enabling low-temp (-60F CO₂) direct chip cooling. Excess data center power capacity drives carbon capture for green benefits (carbon offset \$\$\$'s, etc).

Research or Development entity: Proof of Concept collaborations TBD



Opportunities / Risk

Opportunity

- Overall cost savings, Solar/Wind utilization, Rising summer temps from utility, Heat capture, Carbon capture, Thermal ride-thru, Energy storage, Paradigm shift

Risks

- Key technologies by others, Difficult to secure expensive POC, Collaboration details



Further information: [Climeworks_EnergyDome_1pointFive](#)

Example: August 2021 Submission

Ideas > Remove Blockers > Enhance Culture



- Results: Looking for BEANS*
- Communicate: Teach the importance of technology readiness
- Identify potential Vertiv IP early
- Part Time Roles: Does it work?

Questions and Discussion

Thank you

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Joint University Technology Licensing

September 17, 2021 | 9:15 - 10:15 AM ET



Moderator:
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University of
Michigan

THANK YOU!



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Strengthening
University-Industry
Partnerships