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IBM Data Center Services Executive
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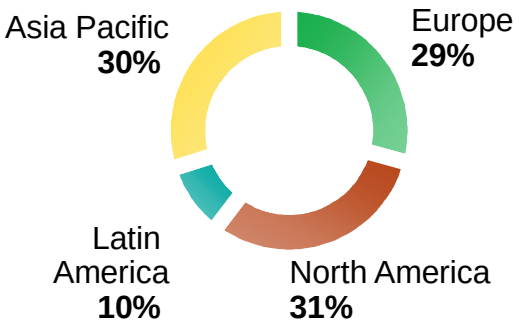
Data Center Design for the 21st Century:

Best practices on Operational Efficiency from the IBM Data Center Study

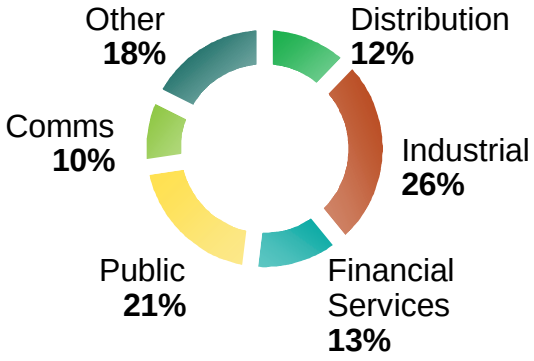
The study addressed server, storage, network, facility and data center operations to learn what is being implemented today

It represents 308 clients in 7 countries and 25 industries

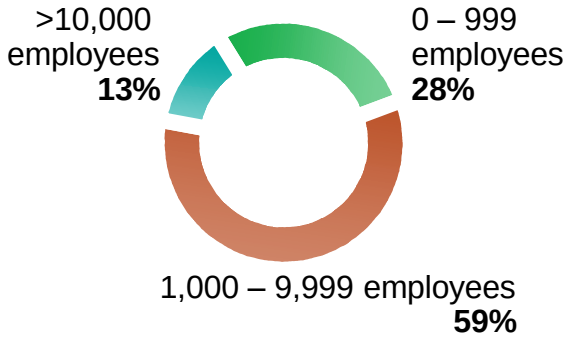
Geography



Sector



Organization Size

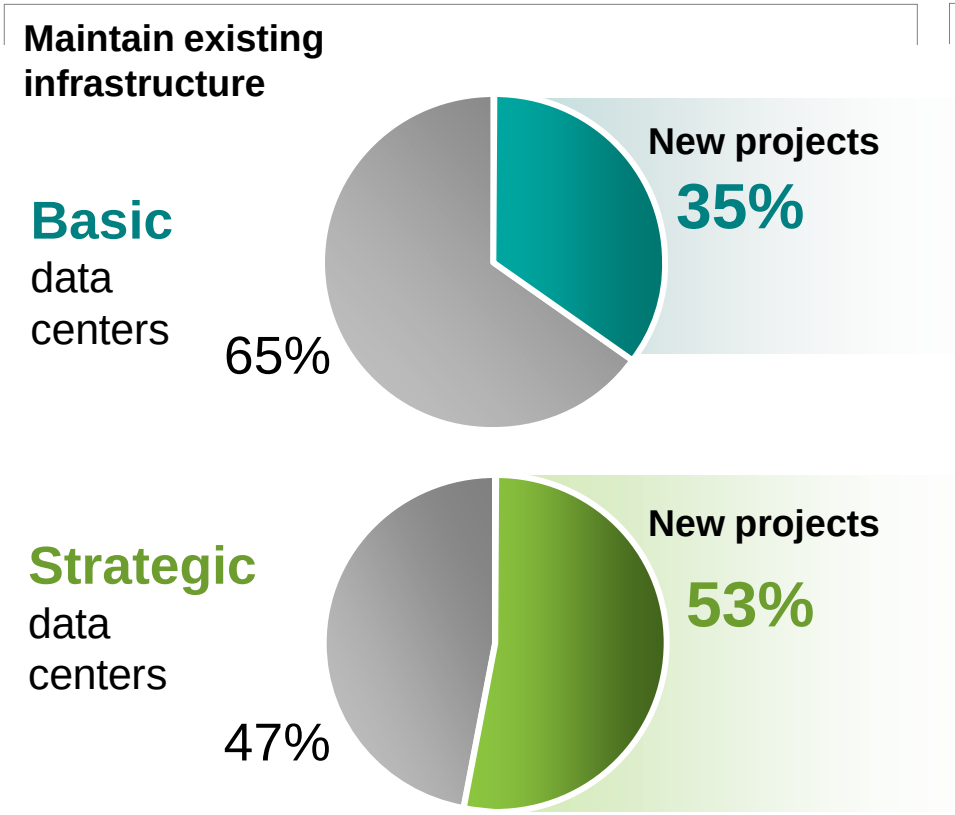


58% plan significant data center investments in next 2 years

68% are the first to adopt or rapid technology adopters

One in five, or 21%, of clients have highly efficient data centers—and are allocating 50% more of their IT budget to new projects

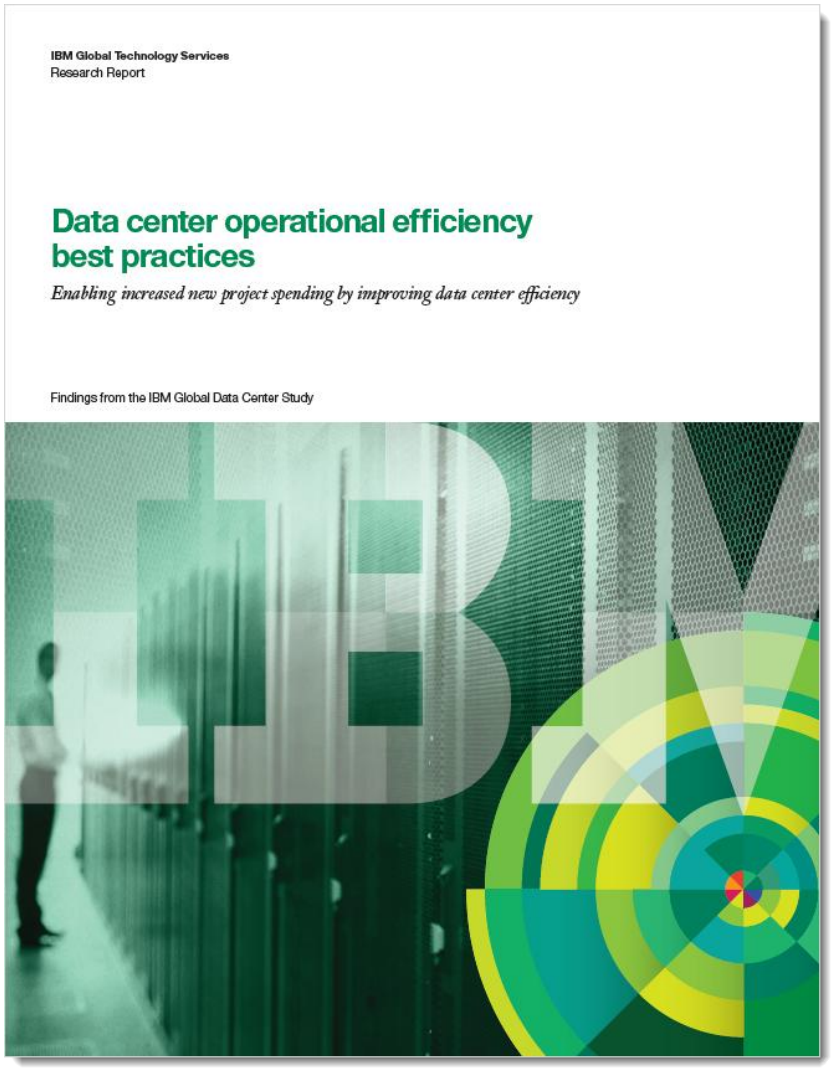
How much of your IT budget is spent on:



Improving data center operational efficiency allows spending to go to:

- Improving public safety or providing more citizen services
- Transforming core banking and payment systems
- Implementing smart grids or improving generation performance
- Allocating funds to other business priorities

Characteristics of highly efficient data centers

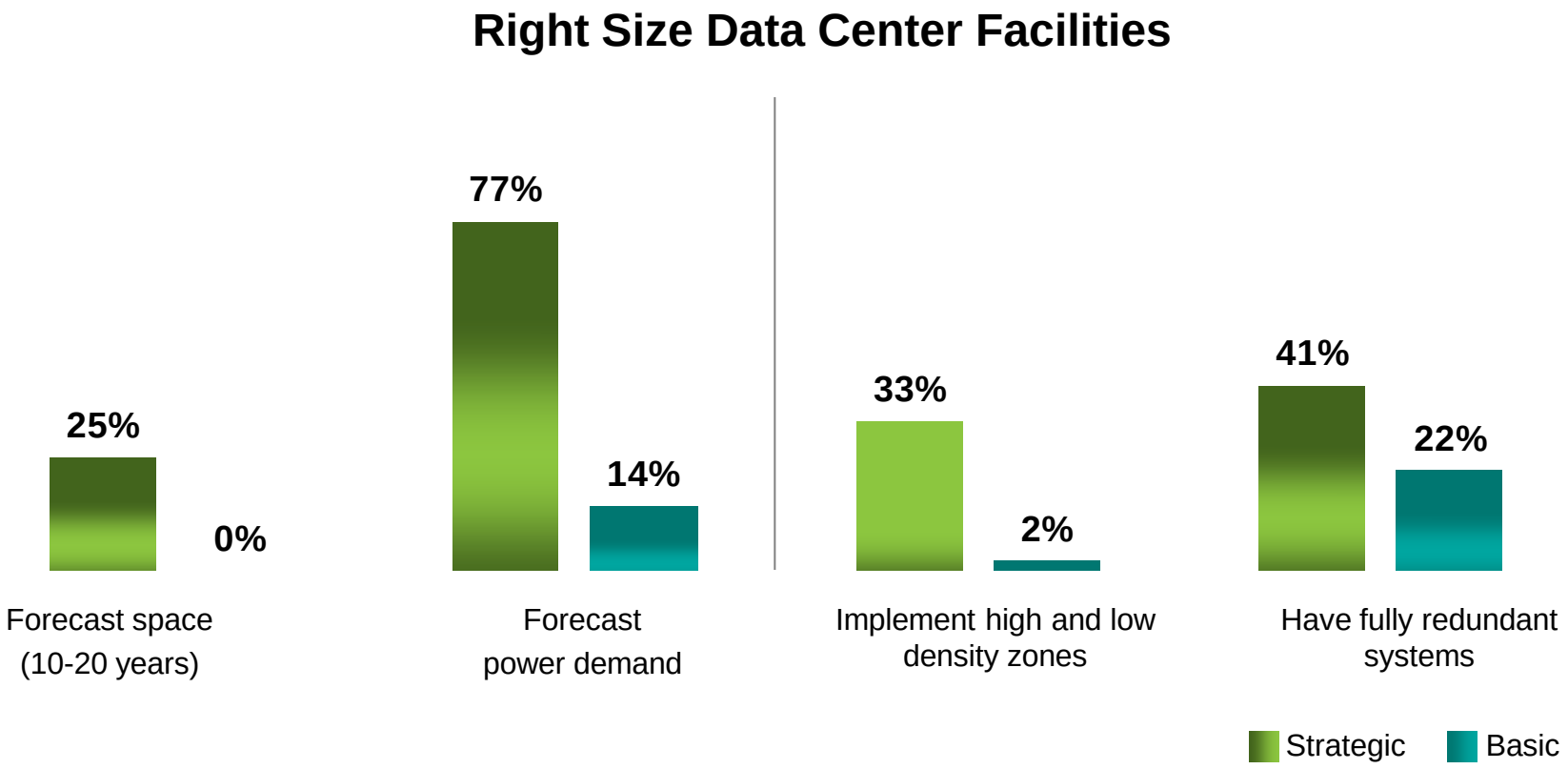


- **Optimize** the IT and facilities assets to maximize capacity and availability
- Design for **flexibility** to support changing business needs
- Use **automation** tools to improve service levels and availability
- Have a **plan** that aligns with the business goals and keep it current

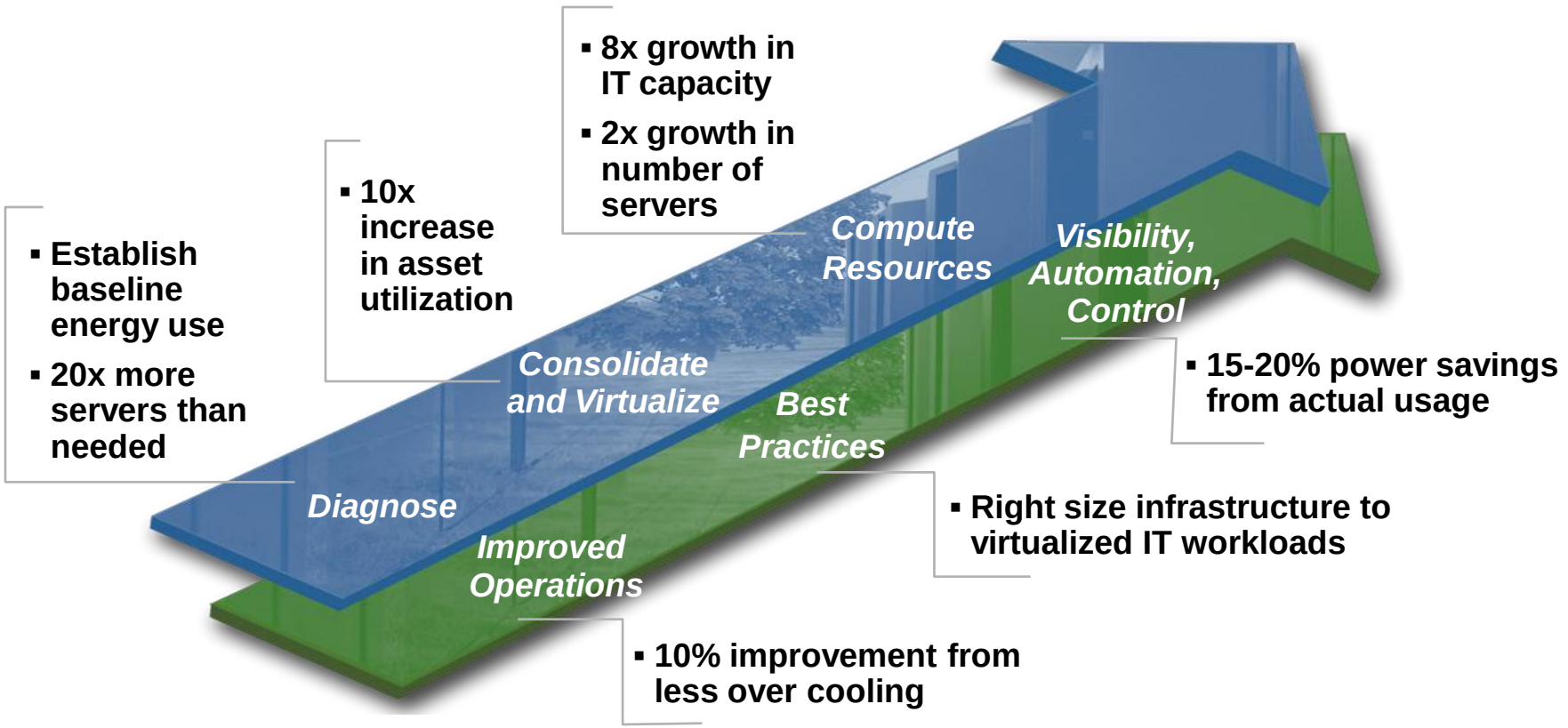
Design implications from highly efficient data centers

- Right size capacity and availability to get the best return on investment
- Design for flexibility to support changing business needs
- Optimize long-term data center operational expenses, not just up-front capital costs

Highly efficient data centers right size by matching business needs to current and future capability



Rightsizing can yield significant benefits. An IBM data center in Lexington gained 8x IT capacity and avoided $50M capital cost



Use analytic tools and software monitoring to right-size the facility infrastructure after server virtualization projects

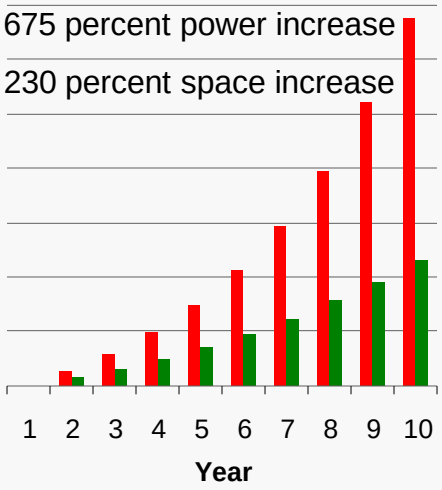
Analytical tools can be used to right-size capacity providing a solution tailored to meet your business growth

Business plan

Capacity forecast

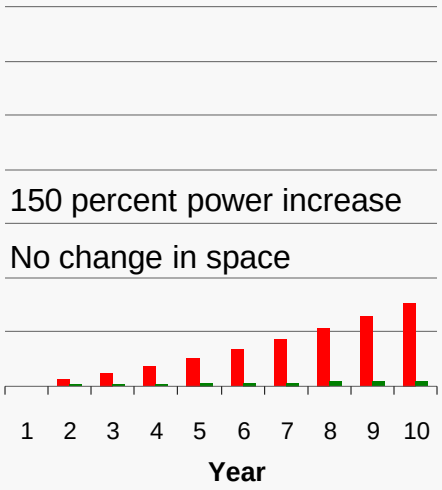
Design direction

Banking and finance customer in volatile market



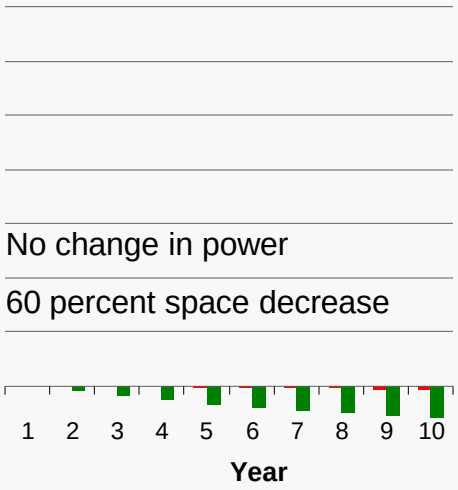
IBM created a modular expansion plan for the data center by linking capital and operational expenses to business growth.

Distribution company in stable agricultural market



IBM recommended retaining their existing data center with power and cooling upgrades, reducing capital expense by US$13 million.

Business unit of hospitality organization in low-growth market



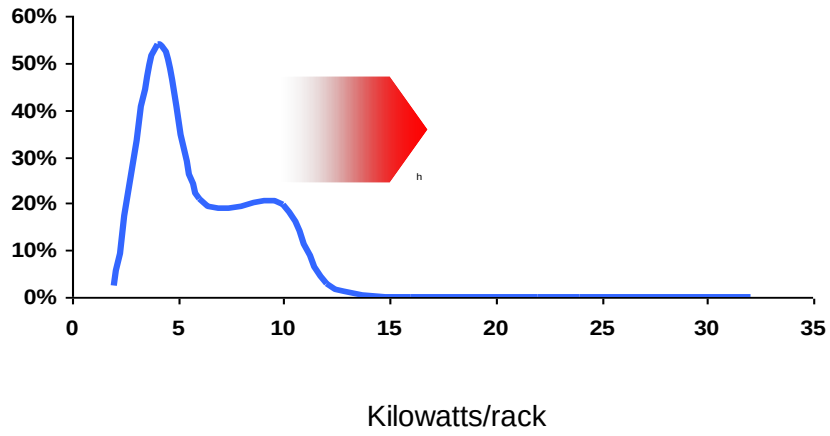
IBM provided metrics for a staged release of physical space, aiding lease negotiations and saving US$400,000 per year.

* Based on IBM client engagements; individual results can vary.

Analysis shows the impact of your technology lifecycle providing improved plans to maximize capacity and flexibility for change

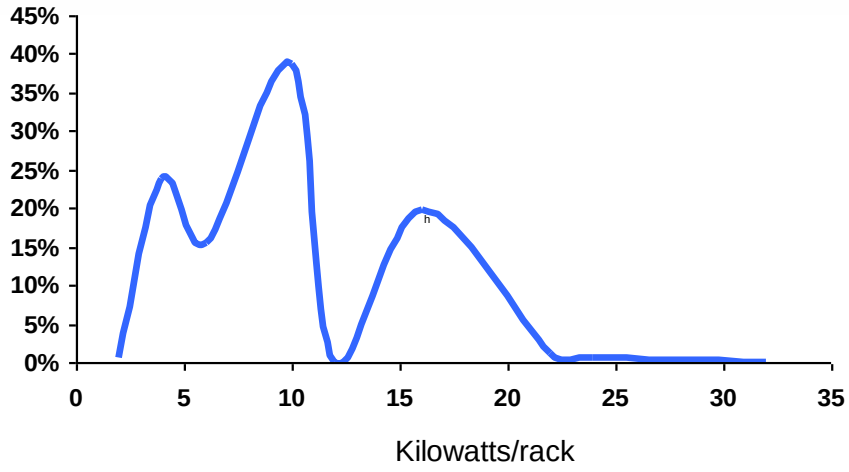
Today

50% of server density is < 5 kw/Rack or less



2020

60% of server density is > 10-20 kw/rack



- **Predicted density over a period of time is a pre-requisite to better design**
- **Analytics can create a density requirement model to plan for changes over time**
- **Support unknown capacity: design for 3-5x power density over a 10-year time**
- **Designing high / low density zones saved over $1 Million per year**

Based on IBM estimates from client engagements

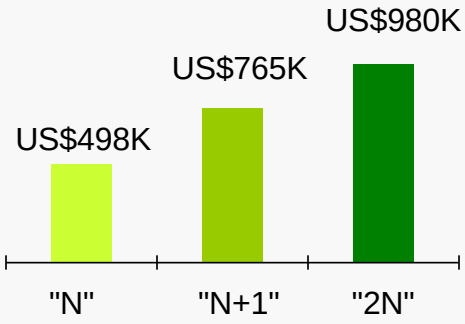
Availability analysis can be used to identify the cost and impact trade-offs for your organization to frame a complex decision

Cost
Generate data center designs alternatives

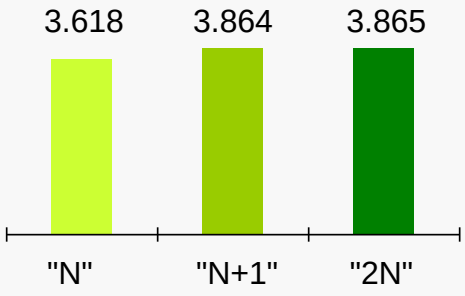
Value
Forecast for the business benefit of each alternative

Optimal solution
Determine the most efficient design

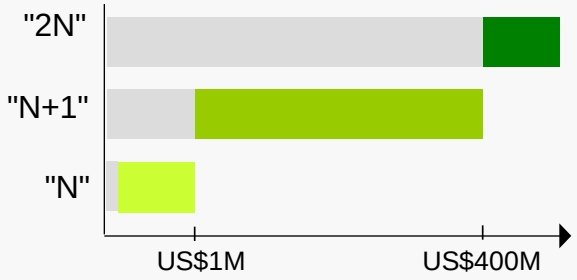
Generator redundancy[1]



Additional annual expenses[2]



Reduction in annual outages[2]

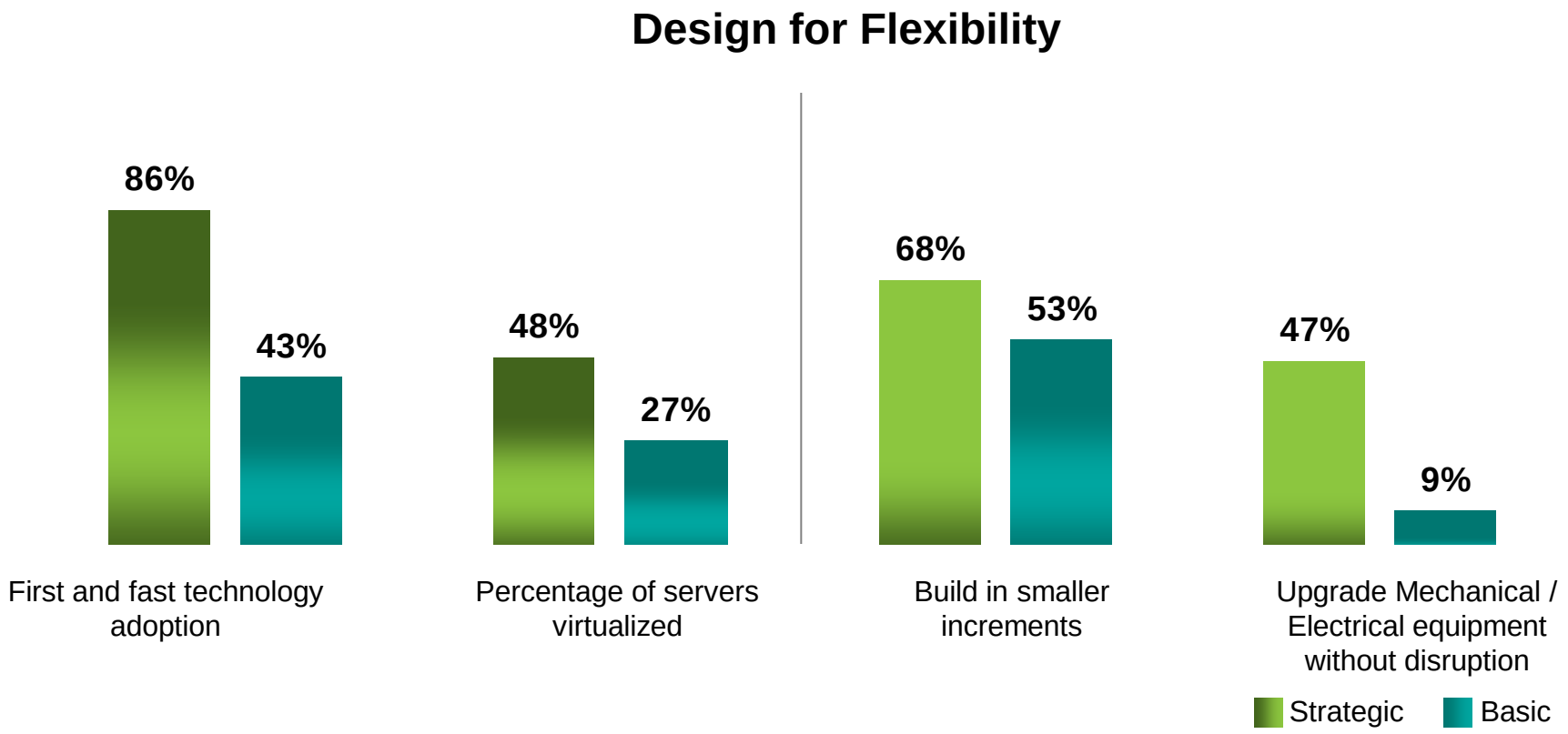


Cost per outage to justify additional expenses[2]

[1]Other applications include cooling system redundancy, electrical system distribution, UPS technology, etc …

[2]Based on IBM Proprietary Analytics using expected lifespan of equipment, data center vulnerabilities and operational quality

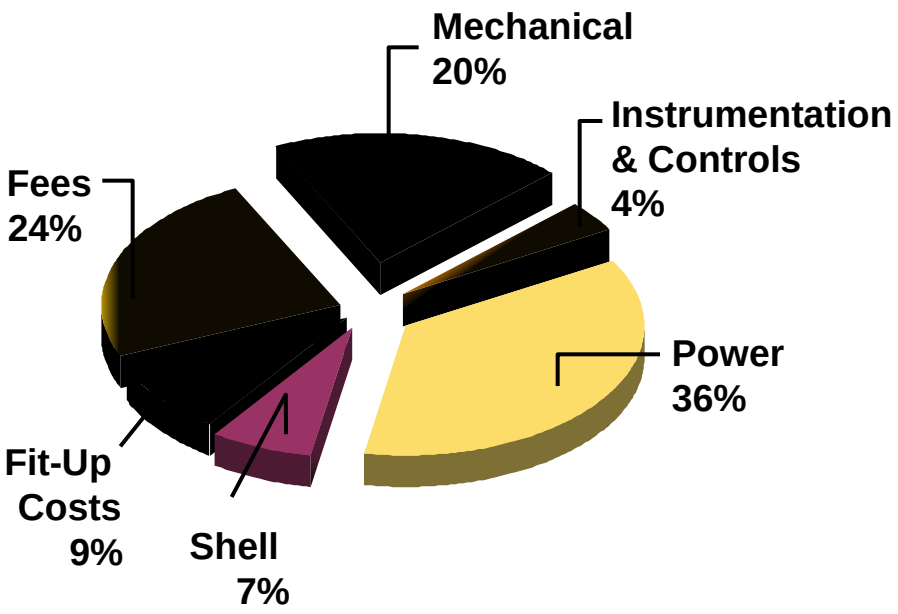
Highly efficient data centers recognize that change occurs naturally and have designed more flexibility into their approach



Capital and operational cost analysis shows data centers with on demand capability is a practical and cost effective solution

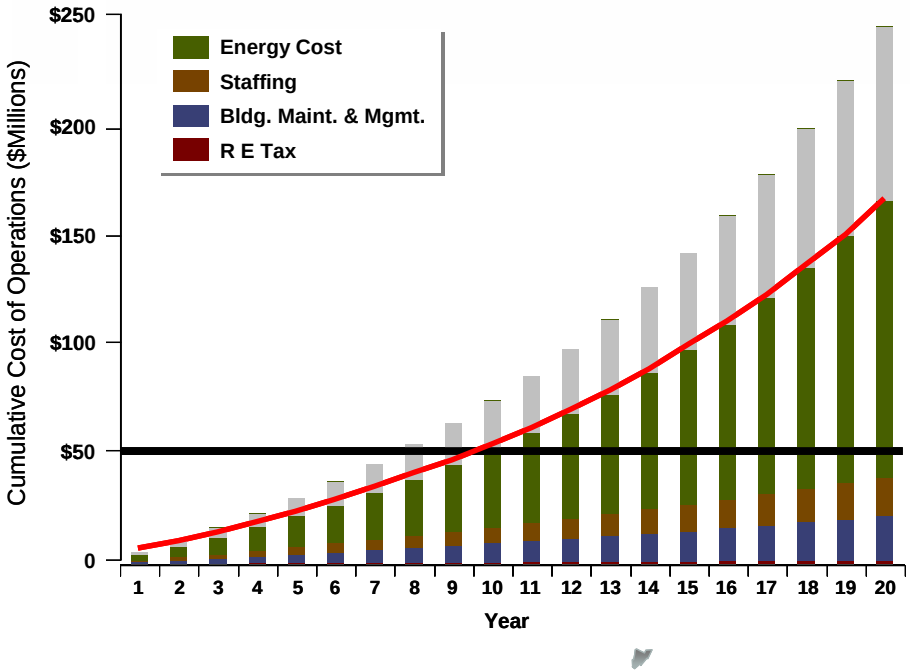
Data center capital costs

60% costs from mechanical / electrical systems



Facility operating costs

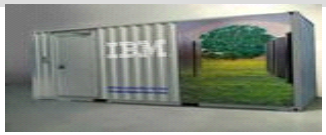
3-5X capital costs; energy can be 75%



SCALABLE MODULAR DATA CENTER

ENTERPRISE MODULAR DATA CENTER

PORTABLE MODULAR DATA CENTER



HIGH DENSITY ZONE

Data centers with a long and extended life without disruptive retrofits despite changing demands from technology is becoming a reality

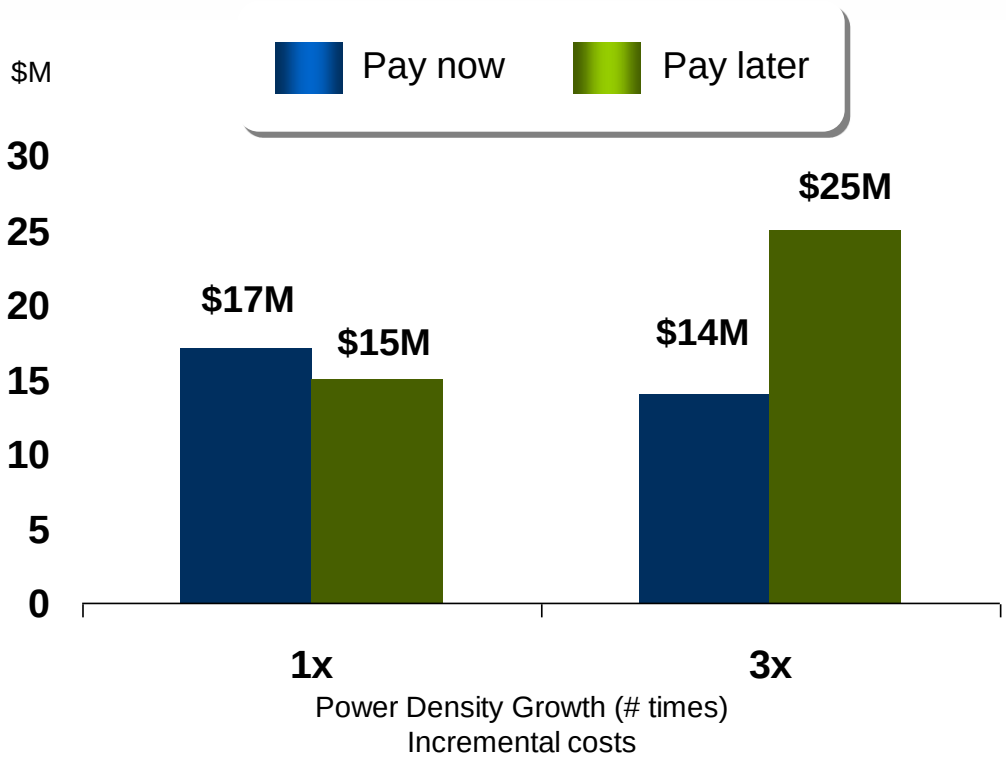
Good design is an insurance policy that provide flexibility.

5-10% up front capital costs versus paying ~50% higher costs plus a disruptive retrofit later.

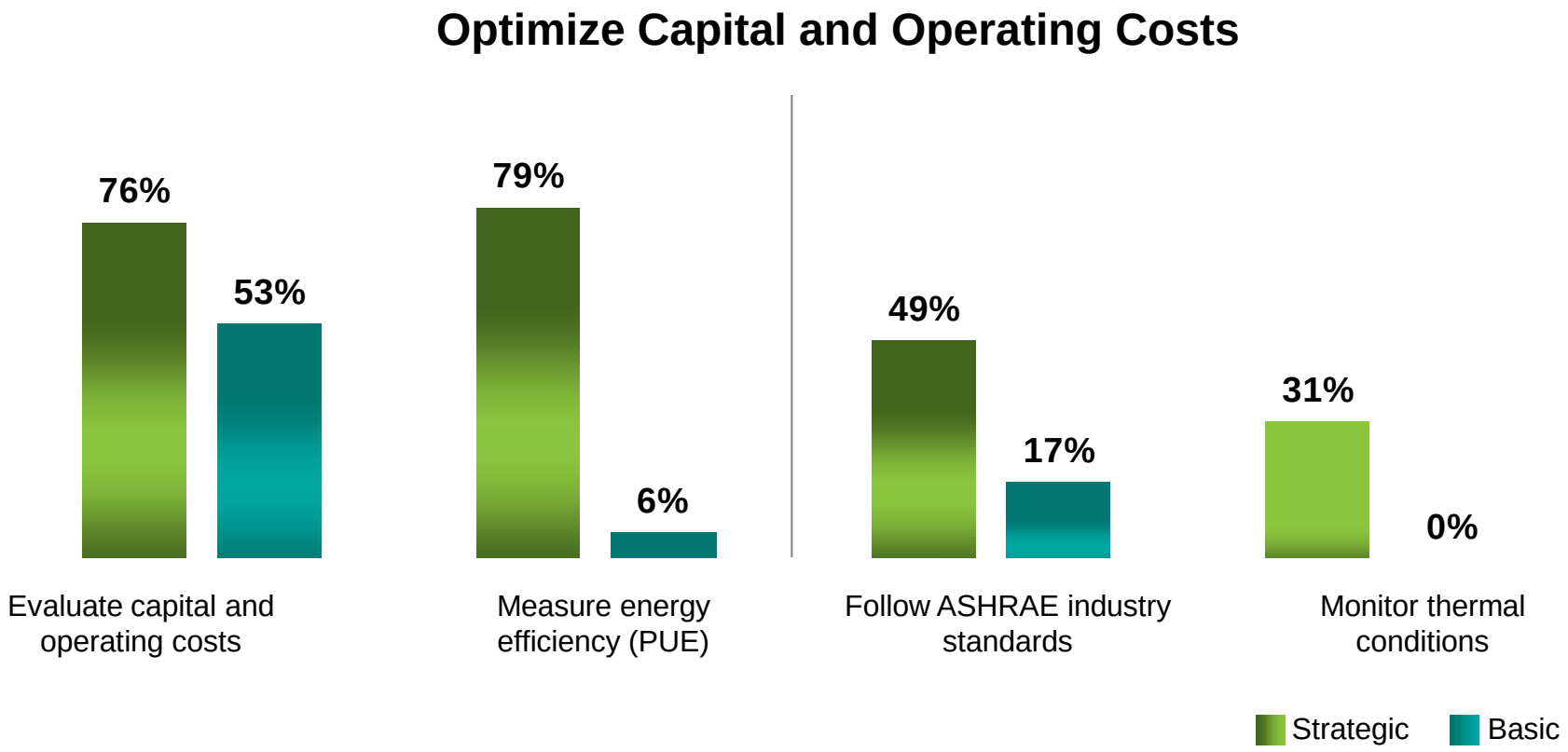
- Provision for potential water cooling
- Modular UPS design and chiller plant design
- Electrical switchgear sized to grow

Capital Costs

Provide up to 3x the power density with lower up front capital costs



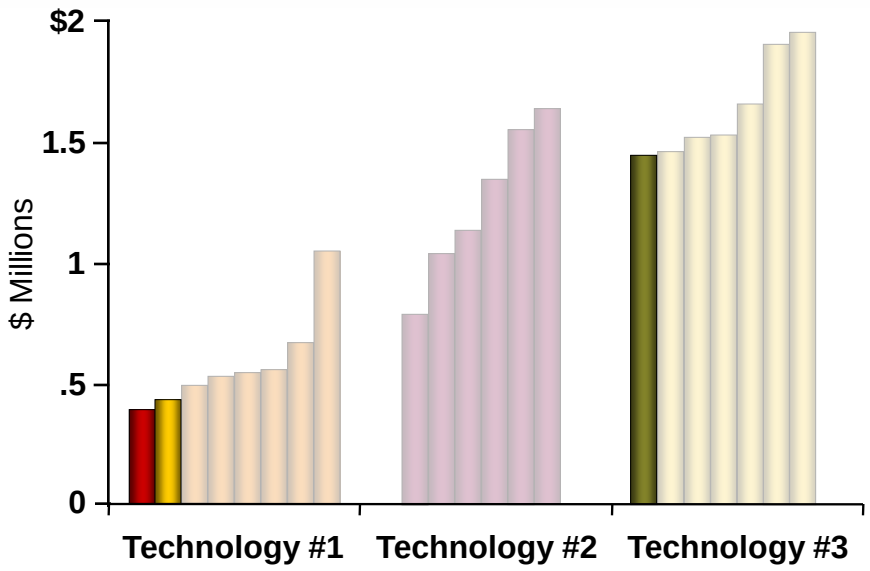
Highly efficient data center optimize capital and operating costs over the 10-20 year useful life of the facility



A singular focus on capital costs can lead to sub-optimized data centers

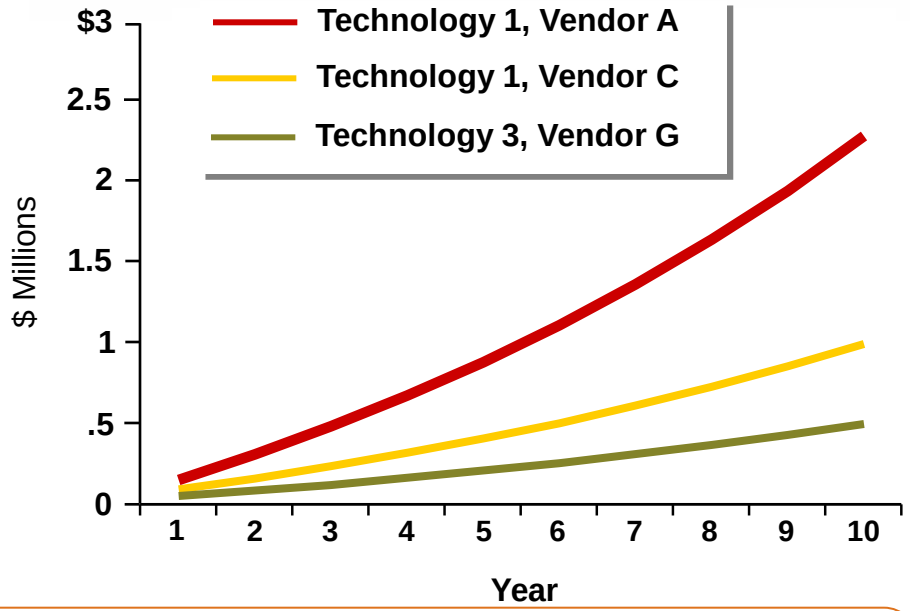
Capital Cost Analysis

Show 5x difference in technology alternatives



Operating Cost Analysis

Show 2.5x difference for vendor alternatives



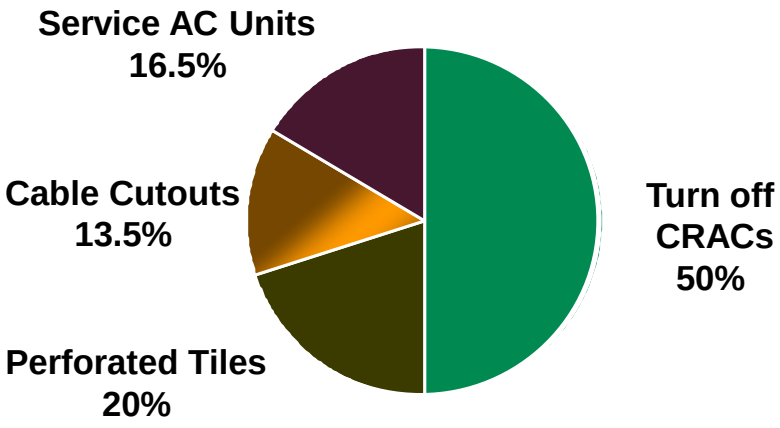
Reduce data center total costs 15-30% over its useful life
Improve decisions looking at vendor and technology tradeoffs

Source: IBM Estimates

Monitoring and management tools provide on-going visibility to improve operational management and operational costs

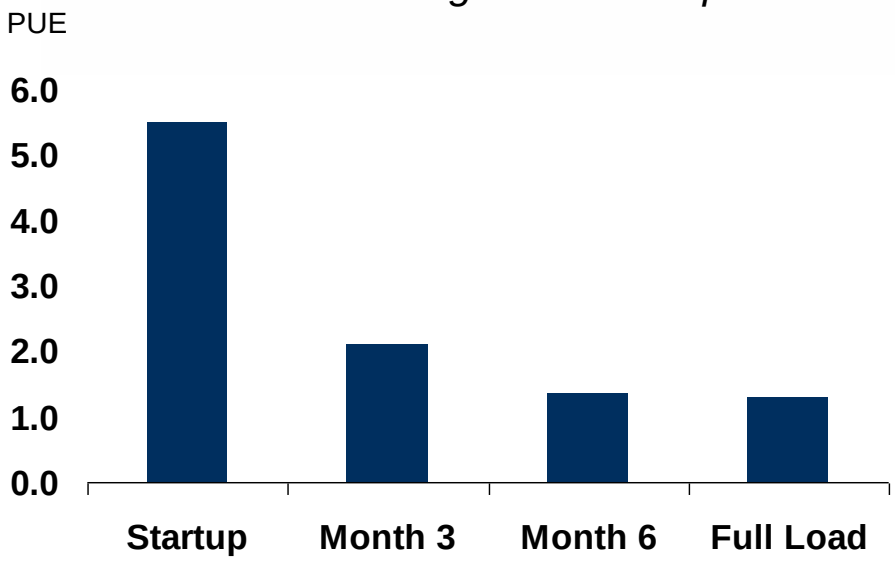
Insight from Analytics

Power savings from improved cooling efficiencies



On-going Monitoring

5x improvement in PUE based on monitoring from start-up



Use real-time monitoring for day-to-day visibility
Analytics provide insight to go beyond the "low hanging" fruit

“No regrets” actions to improve your next data center facility

“Right-size” capacity and availability

- Find underutilized assets and make changes
- Use analytics to define capacity and availability to meet the business needs
- Use real time management systems to stay focused continued improvement

Design for flexibility

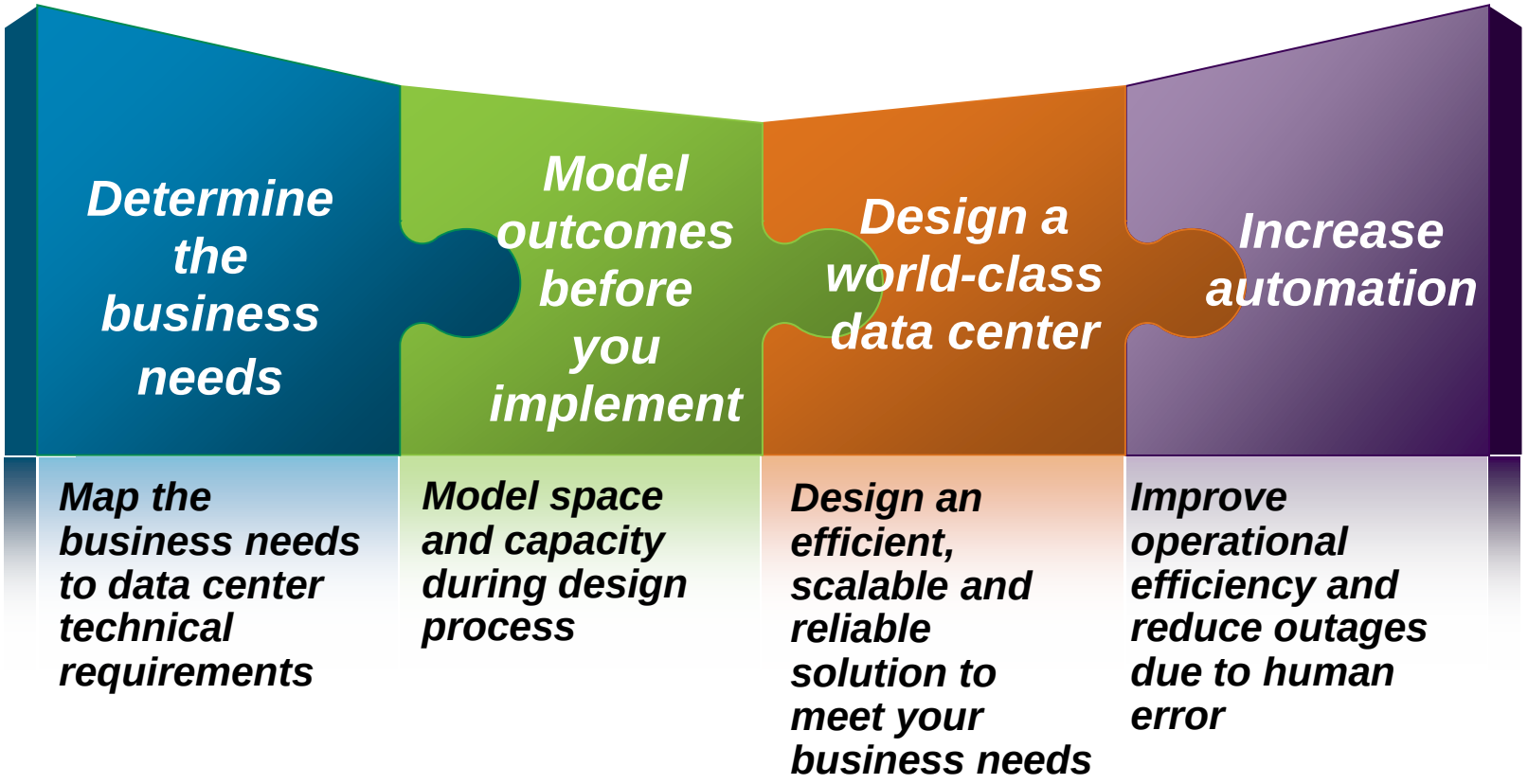
- Design any new infrastructure investments for scalability to support changes in demand and technology
- Allow for scalability in smaller increments over time
- Design for additions to be non-disruptive
- Plan for water cooling to support higher density servers

Optimize total costs over the long term

- Measure efficiency on a real time basis
- Ensure trade-offs between capital and operating costs are included in all business cases
- Implement actions that will provide short payback in all situations

A trusted partner knows one size does not fit all. They will help you determine the right solution to meet your needs

- Design / build 200-300 world-class data centers each year around the world
- Experts help design an efficient, scalable and reliable solution to meet your business needs
- End to end solution provider from strategy to design to move in ready



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