ASHB
Association for Smarter Homes & Buildings

The Future of Services in Smart Buildings Think Tank

Harbor Research
Harry Pascarella, Vice President
Dan Chmil, Research Director

Connect to what's next™
www.ashb.com

About ASHB

About Harbor Research

Firm History

Harbor Research was the first firm to focus on Smart Systems, Services and the Internet of Things (IoT) and first to publish groundbreaking research on new business models in the Harvard Business Review in 2004 & 2005.

Clients and Engagements

For over 40 years we have focused on identifying, analyzing and helping clients to develop or adopt emergent technologies. Every relationship we develop is enhanced by the range and depth of these experiences.

Technology Developers & Suppliers

100+ clients

400+ engagements

OEMs and Service Providers

150+ clients

600+ engagements

Offices

Denver, Colorado - USA

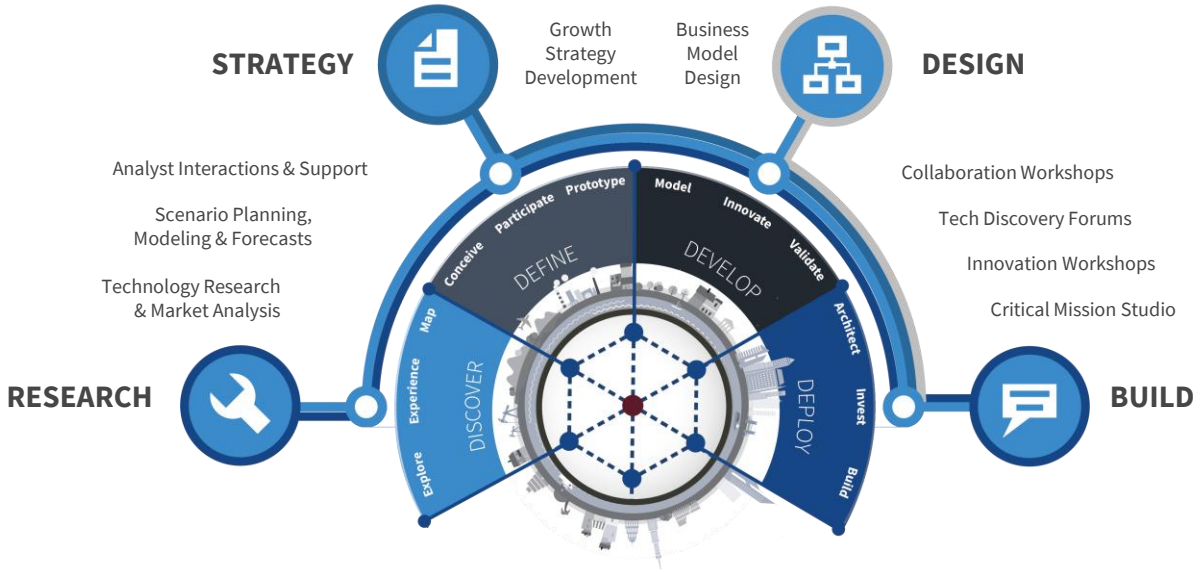
Berlin, Germany - Europe

Overview of Harbor's Services

Opportunity Identification
Research, market intelligence and Smart Systems market sizing and forecast model to ID tech-driven growth opportunities

Growth Strategy Development
Business model development & growth strategy consulting services

Venture Advisory
Venture development studio and advisory for mission-critical industries and tech



We work and facilitate strategy across corporate functions

Corporate Development | Business Development | Market Intelligence | Strategic Marketing | New Growth | Research & Development

Agenda & Overview

AGENDA

- Trends driving investment in services
- Evolution & Digitization of Services
- “Building as a Service” Models
- Questions & Open Discussion

OBJECTIVES

- **Analyze Smart Building Service Evolution & Requirements**
  Identify and analyze key trends driving the evolution of services in smart buildings. Define requirements and scope for digital services.
- **Define Building as a Service Models & Key Outcomes**
  Identify key business outcomes and objectives for customers and identify examples of “as a service” models applied in built environments, including how the approach helps customers achieve the desired outcomes.
- **Identify Opportunities for Your Business to Improve/Expand Services.**
  Explore opportunities, identify challenges, and consider collaboration mechanisms to develop digital service offerings.

ASHB
Association for Smarter Homes & Buildings

Trends & Market Dynamics

Key Trends & Forces are Driving Need for Greater Support

Macro Trends & Forces

- **Sustainability**
- **Artificial Intelligence**
- **Regulatory & Economic Uncertainty**
- **Operations Efficiency**

Facility Manager Role is Changing

- Experts are retiring
- Staffing shortages
- More responsibilities
- Tighter budgets

Building Systems are Becoming More Complex

- Mix of new & old systems
- New systems are more sophisticated
- More data & software

Facility Managers & Stakeholders Need More Support

Customers are Prioritizing Operational Efficiency, Sustainability, Experience & Reliability

ASHB & Harbor Research's 2024 Smart Building Technology Trends survey asked over 300 building owners, operators and managers about their priorities, needs, and challenges related to smart building and automation technology adoption.

What are your organization's top priorities for its facilities this year? (n=308)

Improving indoor environmental quality, augmenting existing labor force, other *< 25% each*

How would you rank the goals that have driven or would drive you to adopt smart technology for your building?

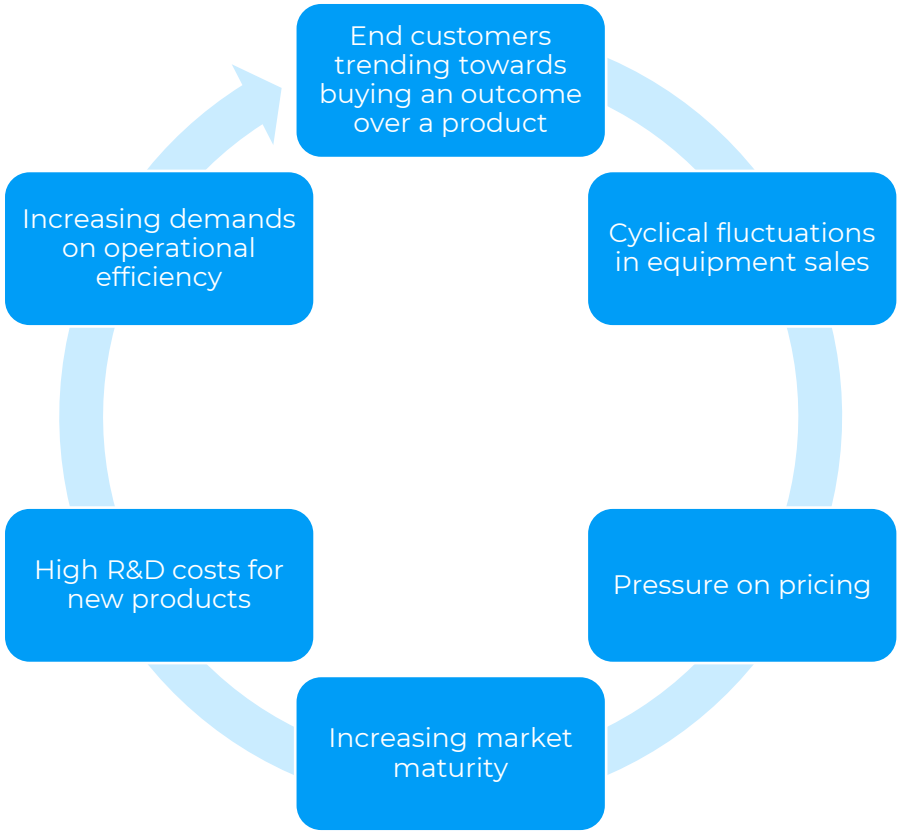
	Smart Buildings Adopters (n = 276)	Non-Adopters (n = 32)
1	Energy Efficiency & Sustainability	Energy Efficiency & Sustainability
2	Operational Costs	Operational Costs
3	Occupant Safety & Security	Occupant Health, Comfort & Productivity
4	Resiliency	Occupant Safety & Security
5	Occupant Health, Comfort & Productivity	Resiliency
6	Equipment & Asset Lifespan	Equipment & Asset Lifespan

Key Takeaways

- **Operational efficiency** and reducing costs is the top priority for building owners and operators, however, it is the #2 driving of new technology adoption behind **energy efficiency and sustainability**.
- **Occupant experience, safety, security, and health** are a secondary set of priorities and drivers for new technology adoption
- **Facility and system resiliency** is a secondary priority on par with occupant experience, but ranks lower as a driver of technology adoption, indicating that new tech may be seen as less reliable.

Suppliers are Investing in Aftermarket Services

Trends Accelerating OEM & Aftermarket Services



Outcomes for Suppliers

5-10x revenue opportunity from aftermarket services over the lifetime of equipment vs. the original equipment purchase price (Harbor Research, 2024)

30-50% margins from services, 2x that of standard equipment sales (BCG, 2025)

2x growth in shareholder returns since 2008 for companies with a greater focus on aftermarket services (McKinsey, 2024)

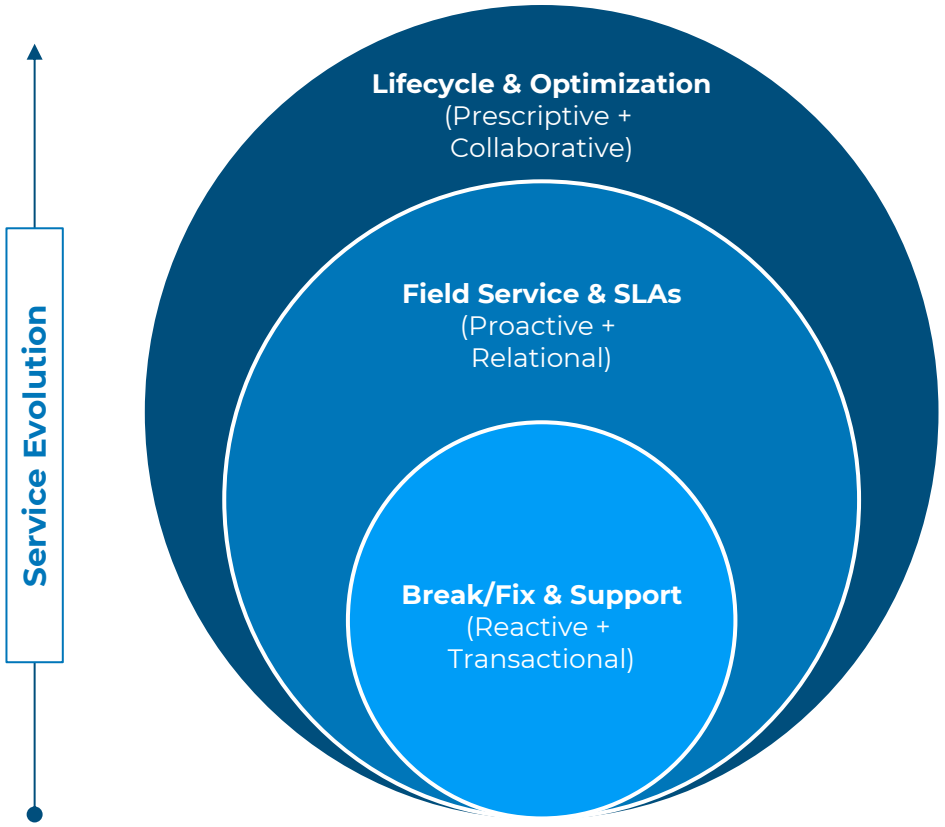
94% of OEMs predict growth in aftermarket services (PMMI, 2025)

ASHB
Association for Smarter Homes & Buildings

Evolution & Digitization of Services

The Evolution of Aftermarket Services

Aftermarket services are evolving to become more lifecycle-driven and prescriptive to add more value by helping customers achieve desired outcomes



Lifecycle & Optimization

- Service providers are fully integrated into customer environment, and take the lead on integrating more sophisticated systems and processes to increase operational efficiency
- Equipment/systems may be provided as managed services (as a service model) where suppliers offer high-touch and often on-site support to help customers achieve desired outcomes
- These services can be expanded to include aspects of the design and build stage of a building to better help customers achieve desired outcomes

Field Services & SLAs

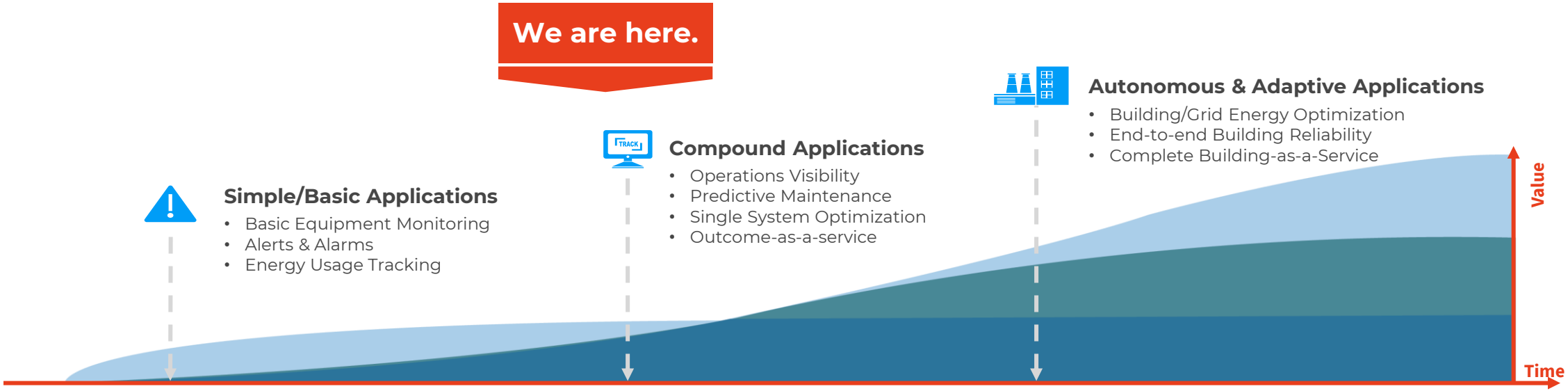
- Service providers may begin offering field service agreements that are more holistic (e.g., test and measurement in addition to maintenance), and can provide higher-touch, more proactive customer support
- Service providers' role becomes more consultative, and they may recommend specific system improvements

Break/Fix & Customer Support

- Customer is requesting specific services based on immediate or long-term needs
- Service provider may offer maintenance as part of a warranty
- For companies selling equipment, a reactive approach implies a product + break/fix services strategy

Intelligent Buildings Digital Maturity and Technology Evolution

We are still relatively early in the adoption and proliferation of intelligent buildings solutions. The most advanced customers are currently making the transition from simple to compound applications.

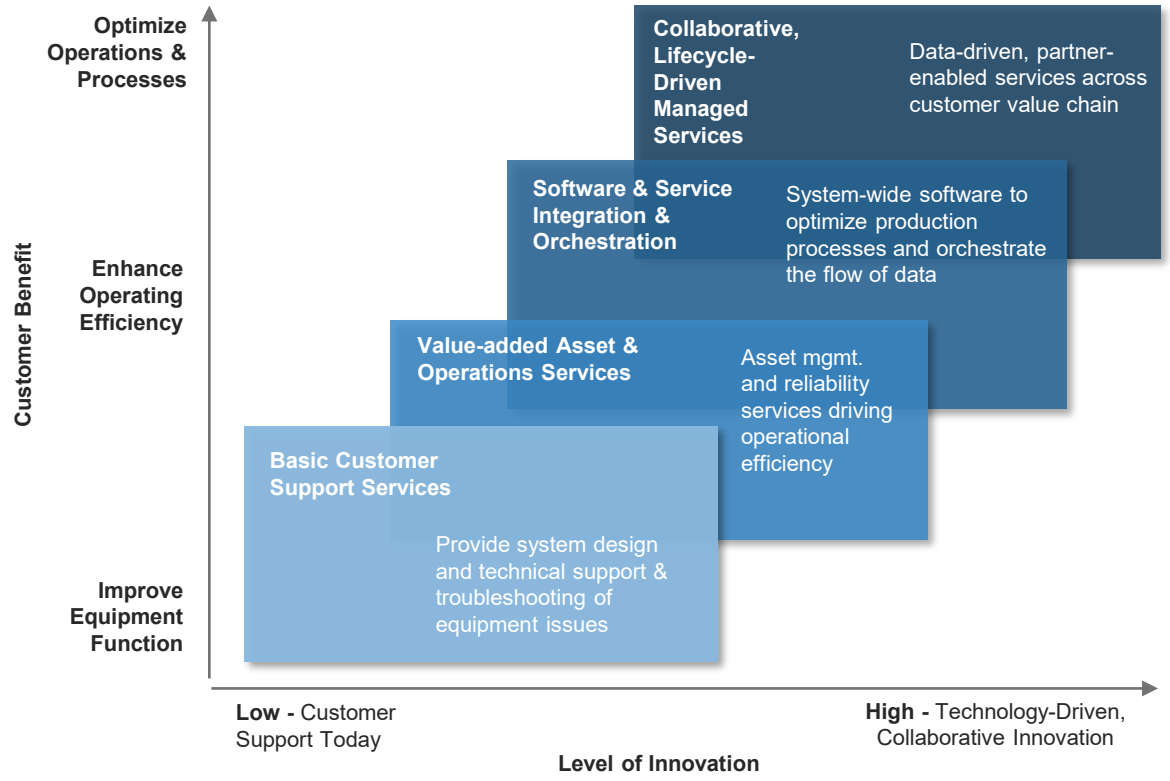


Technology Evolution	• Data collection via smart devices and sensors • Data aggregation via gateways • Simple dashboards • Rule-based, descriptive and diagnostic analytics • Modern BMS	• Building system data fusion and visualization • Integration of static and dynamic, real-time operations data, digital twins • Predictive and prescriptive analytics, basic AI	• Complete integration of BIM, BMS, and other systems data • Advanced AI for autonomous and adaptive system optimization

Digital Transformation is Creating New Services Opportunities For OEMs & Service Providers

As software and service capabilities expand, suppliers can enable tighter integration of equipment, software and services across customer operations, increasing value-add and account control

Evolution of Services & Digital Maturity



Example Digital Services Opportunities

- **Energy Management & Optimization Services.** Monitor, manage and optimize building and system energy usage while balancing the functionality of the building for its intended uses.
- **Asset Management & Reliability Services.** Leverage asset data, current service capabilities to expand asset management and reliability services
- **Outcome-based Managed Services.** In close collaboration with customers and other ecosystem participants, data-informed managed services can help customers achieve desired outcomes, such as greater reliability, sustainability, compliance, and more
- **Data and Service Orchestration.** Develop compound service record and "single source of truth" for all assets and systems by integrating data and service information from customer, OEM and third parties into one cloud environment with access permissions and dashboards for optimum visibility
- **Data-Driven Partner Enablement.** Feed data from customer assets, systems and software to third party service providers as needed to enable new value-added services

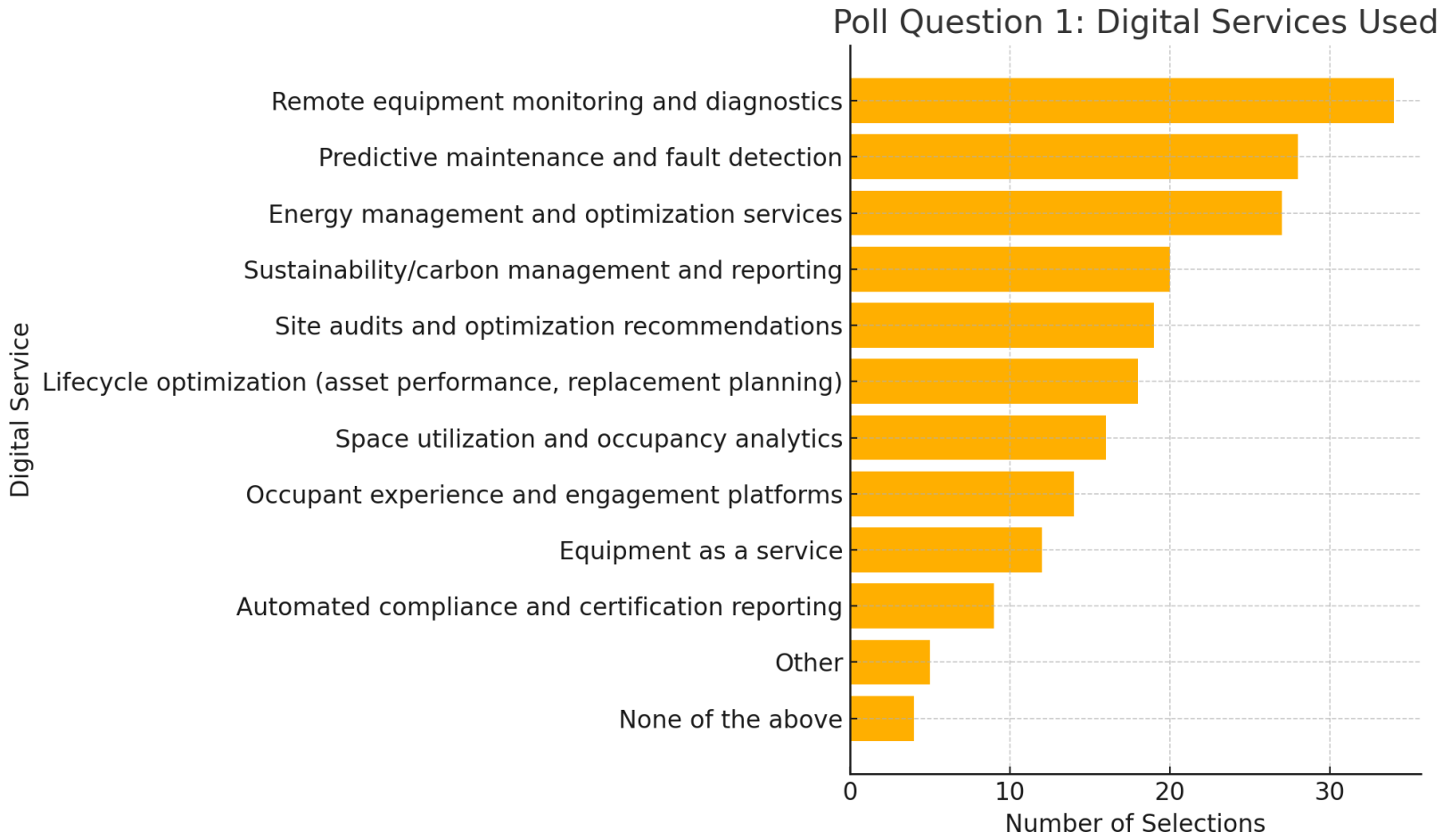
Poll Question

Which of the following digital services does your organization currently provide to building owners or operators?

(Select all that apply)

- Remote equipment monitoring and diagnostics
- Predictive maintenance and fault detection
- Lifecycle optimization (asset performance, replacement planning)
- Energy management and optimization services
- Sustainability/carbon management and reporting
- Occupant experience and engagement platforms
- Space utilization and occupancy analytics
- Equipment as a service
- Automated compliance and certification reporting
- Site audits and optimization recommendations
- None of the above
- Other

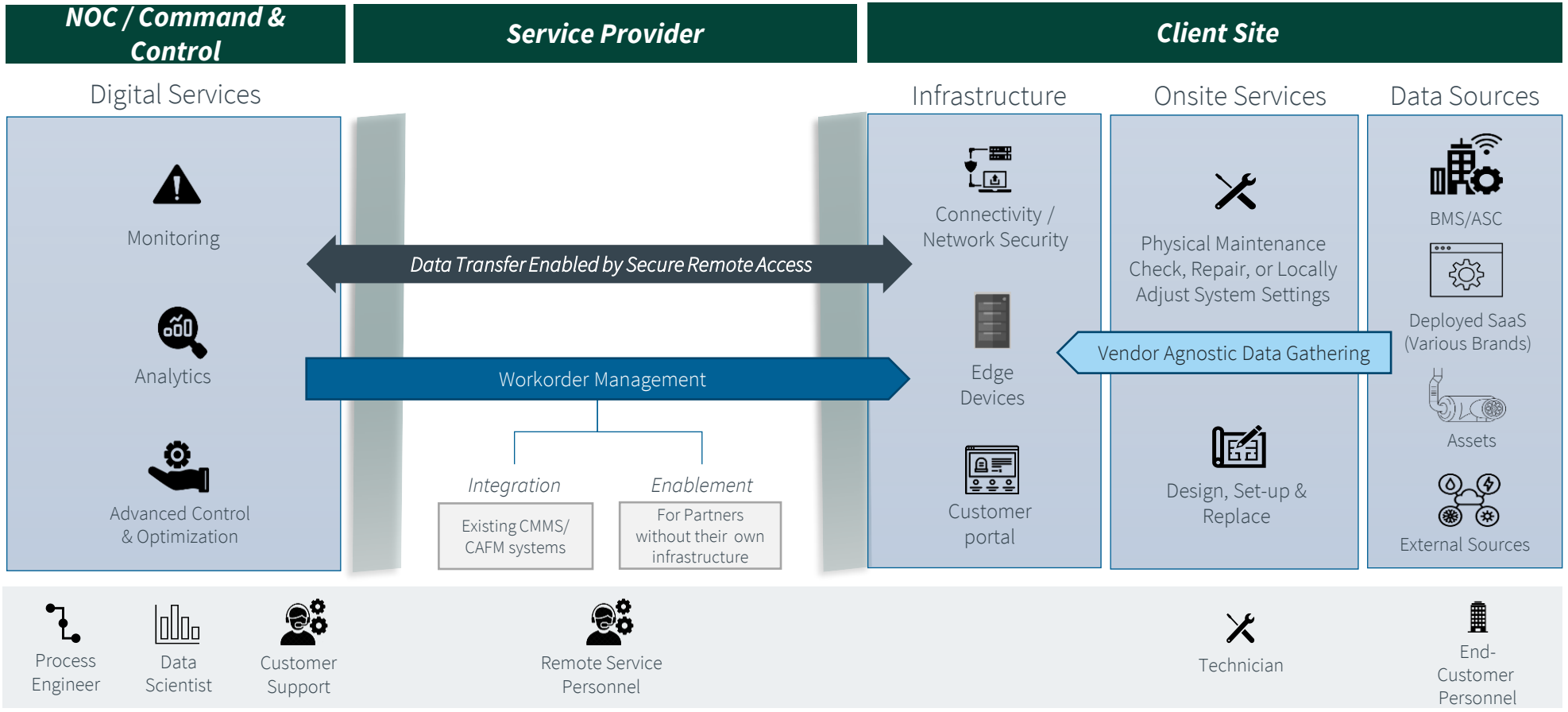
Poll Responses



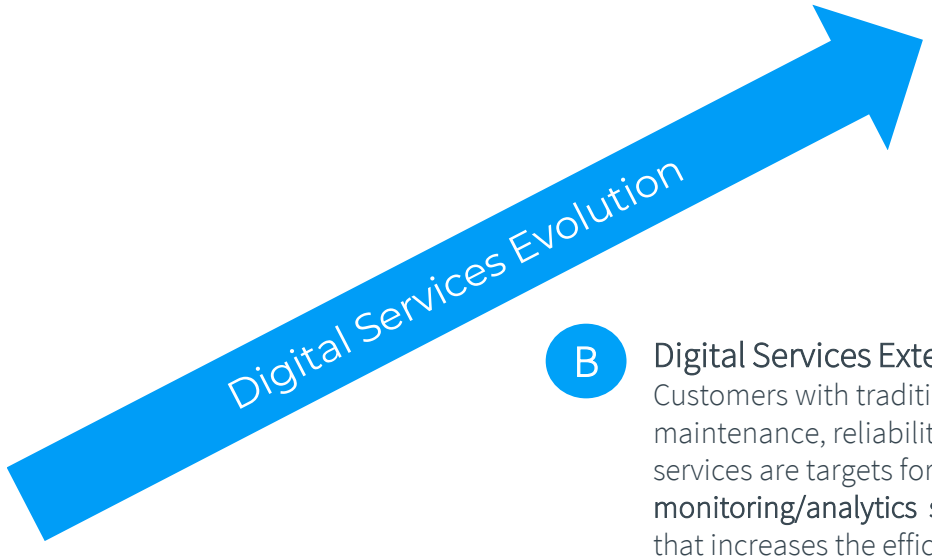
Note: 45 respondents answered Question 1. Multiple selections were allowed.

Digital Services Are Enabled By Secure Two-Way Data Transfer & Workorder Management

Network/service operations centers (NOCs) rely on secure two-way connectivity. Information is sourced from the building's system of records, assets, and deployed software. It is then disseminated to remote service personnel, field service personnel and partners as reports and workorders



Digital Services Evolution



A Over the Counter SaaS

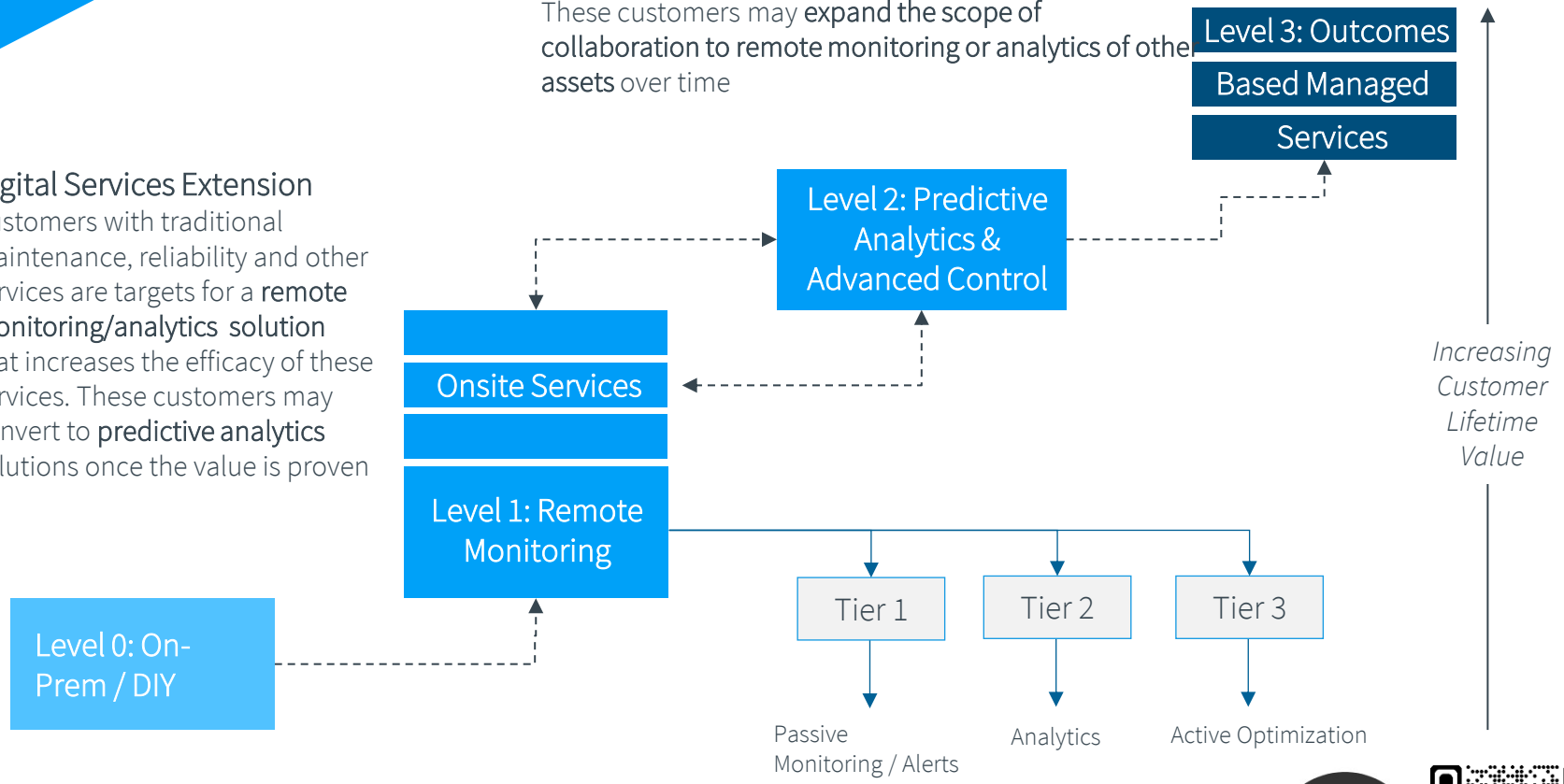
Many customers will prefer to start with **simple, on-premise, do-it-themselves monitoring solutions** due to security concerns, budget, and personnel resistance. As they see the value and security of these solutions, they may **convert to digital services**

B Digital Services Extension

Customers with traditional maintenance, reliability and other services are targets for a **remote monitoring/analytics solution** that increases the efficacy of these services. These customers may convert to **predictive analytics** solutions once the value is proven

C Outcomes-Based Managed Services Extension

A limited number of more sophisticated customers will adopt **predictive analytics** solutions for critical assets. These customers may **expand the scope of collaboration to remote monitoring or analytics of other assets** over time

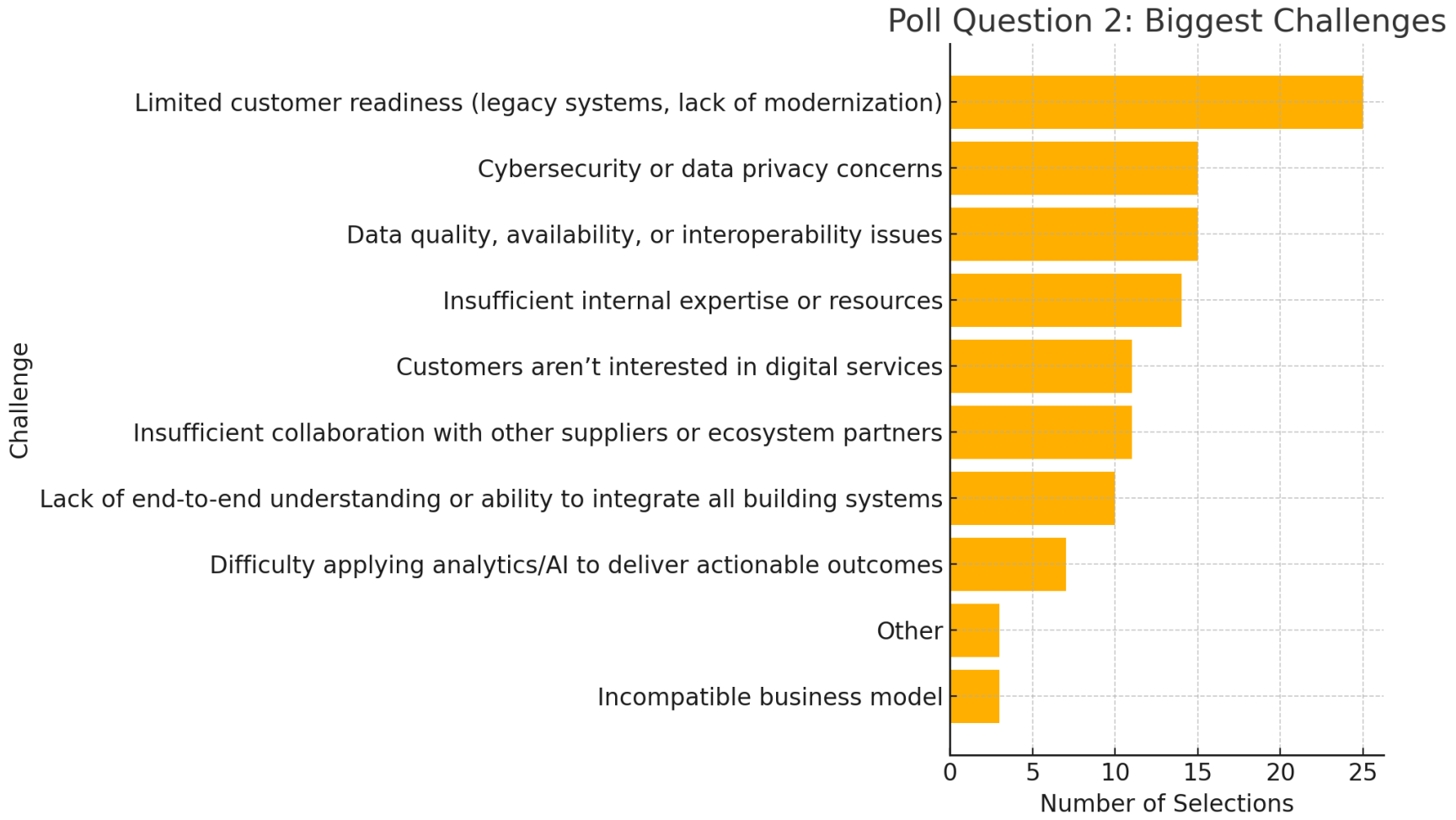


Poll Question

What is the biggest challenge your organization faces in delivering digital services (such as remote monitoring, analytics, or optimization) to building customers? *(Select up to 3)*

- Incompatible business model
- Lack of end-to-end understanding or ability to integrate all building systems
- Insufficient collaboration with other suppliers or ecosystem partners
- Limited customer readiness (legacy systems, lack of modernization)
- Difficulty applying analytics/AI to deliver actionable outcomes
- Data quality, availability, or interoperability issues
- Cybersecurity or data privacy concerns
- Insufficient internal expertise or resources
- Customers aren't interested in digital services
- Other

Poll Responses



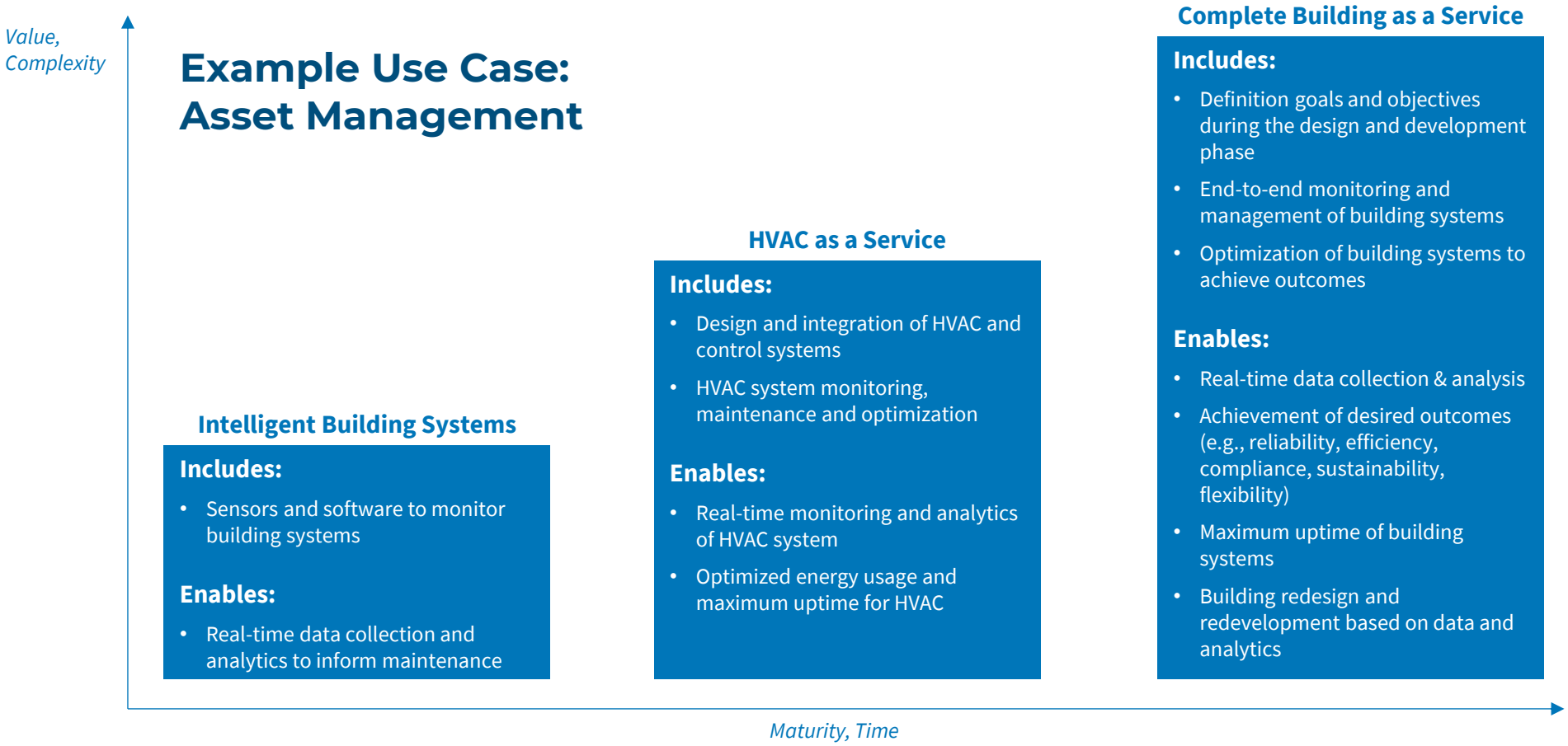
Note: 38 respondents answered Question 2. Multiple selections were allowed.

ASHB
Association for Smarter Homes & Buildings

“Building as a Service”

From Intelligent Buildings to Building as a Service

Leveraging sensors and software to inform building operations is typically the first step towards building as a service solutions, but management and optimization of building systems is required to achieve a true building as a service model.



What is Building as a Service?

Building as a Service is one of the latest iterations of the “as a service” model that covers the entire operation of a building, including the systems inside, to achieve outcomes desired by building managers and owners.

Building as a Service (BaaS) is a concept based on the ability for an individual or group of suppliers to manage the design, development, operations, maintenance and optimization of building systems informed by:

- the definition of customer requirements and goals
- the collection and fusion of static and dynamic building and system data, and
- the provision of services to optimize the building based on the desired outcomes.

While many building managers have incorporated technology to monitor, manage, and inform the maintenance of building systems, BaaS implies an end-to-end integration of technologies to enable lifecycle building management services that achieve building managers’ desired outcomes and priorities.

Key business enablers:

- Technology infrastructure
- Expert service and support personnel (captive or partner)
- Collaborative ecosystem across AEC and key building systems
- Service-based business model
- Willingness to experiment and innovate

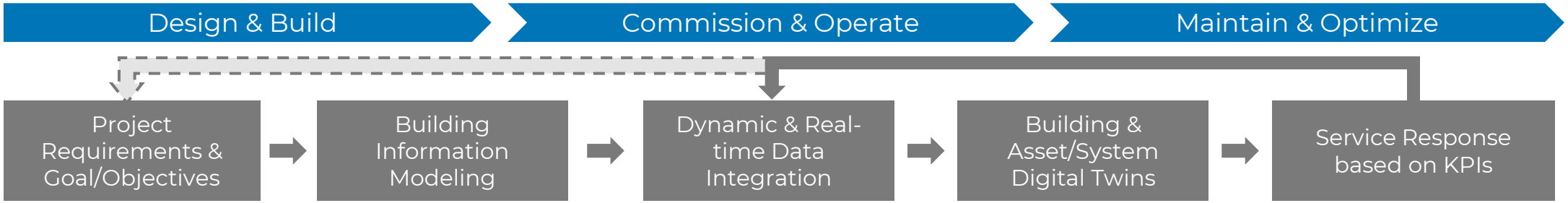
Key technology enablers:

- Building Information Models
- Digital sensors & IoT
- Networks for real-time data collection
- Digital twins & simulation
- Analytics & artificial intelligence

Building as a Service Model Overview

Building as a Service business models can take many forms based on the extent of systems covered by an “as-a-service” approach, however, a complete BaaS solution requires end-to-end collaboration and technical enablement

Building Lifecycle



Goals and objectives are set regarding the desired operations of a building, informing project & system requirements. Can be informed by business needs, regulations, and other inputs

From the requirements and as the building is built, a static representation of the building is developed, including geometric and building system models

Once the building is operating, real-time data from sensors, equipment, occupants, and third-party sources can be integrated with BIM into a living common data environment

Common data environment informs a digital twin of the building and the systems within it, creating a digital representation of real-time building operations and enabling the simulation and analysis of potential future states, including failure predictions, energy use, etc.

Based on the objectives and KPIs defined in the first step, services are provided to maintain, upgrade and optimize individual systems and the building as a whole to achieve desired outcomes. This creates an optimization loop, leading to more dynamic data collection, modeling, analysis and service.

To achieve a complete Building as a Service, a supplier would need to participate in the up-front project design and development, the integration of various technology systems, and the aftermarket optimization services, or collaborate closely with ecosystem partners to perform these functions

What Value Can BaaS Bring?

Building as a Service can target one, multiple or all customer objectives and priorities, and its exact value will depend on the configuration of solutions and services provided to achieve those objectives.

Building Owner/Operator Top Priorities (2024)

Example BaaS Values

1 Improving Operational Efficiency / Reducing Costs

- Create a "single source of truth" decreasing the number of systems/platforms building operators and service providers must engage with
- Proactively identify and recommend areas of improvement across building operations
- Effectively implement efficiency and optimization initiatives with greater visibility in all systems

2 Implementing Sustainable Practices & Technologies

- Offer complete energy management solutions leveraging data from all building systems
- Optimize equipment and systems specifically for energy efficiency
- Provide integrated sustainability management by identifying, remediating, and reporting on carbon emissions/equivalents for the entire building

3 Improving Occupant Experience & Amenities

- Offer tailored services that ensure optimal conditions for occupants by improving factors such as lighting, HVAC, and access to amenities through integrated systems
- Monitor, optimize and report on key health and wellness metrics in building
- Engage tenants directly and incorporate feedback into services, systems, and automation

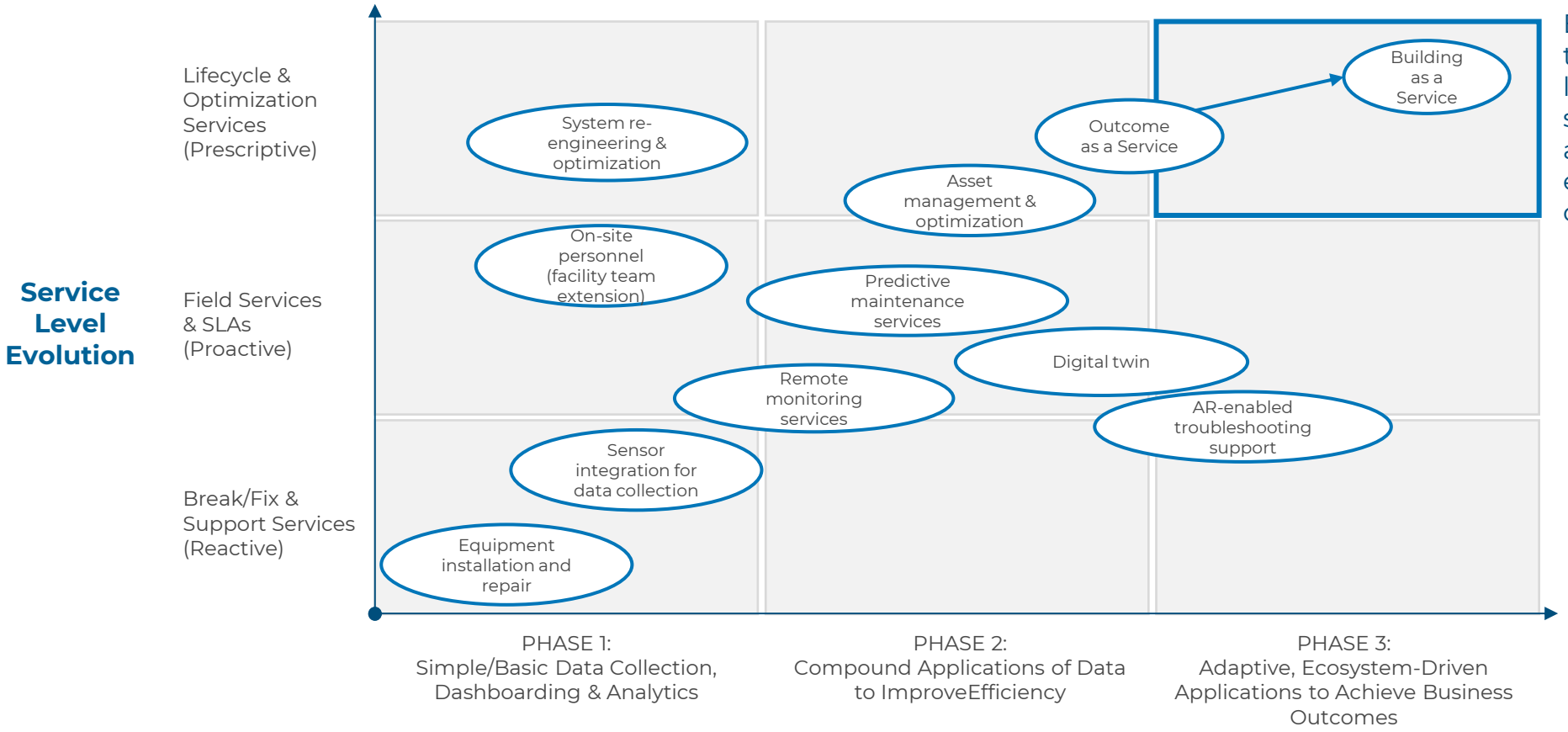
4 Improving Facility & System Resiliency, Reliability

- Use predictive analytics to anticipate maintenance needs and ensure continuous operation of critical infrastructure
- Optimize asset and system life and develop and execute system upgrade plans based on expected lifespans
- Offer a system and process for experimenting with and implementing new technologies

A major potential benefit of BaaS is **financial flexibility and risk mitigation.** As building budgets are often competing with other business budget demands, BaaS offers a path to pay for traditionally large capex projects over time (building retrofits, system upgrades, etc.)

Outcome & Building-as-a-Service Offerings Require Advanced Technology & Service Capabilities

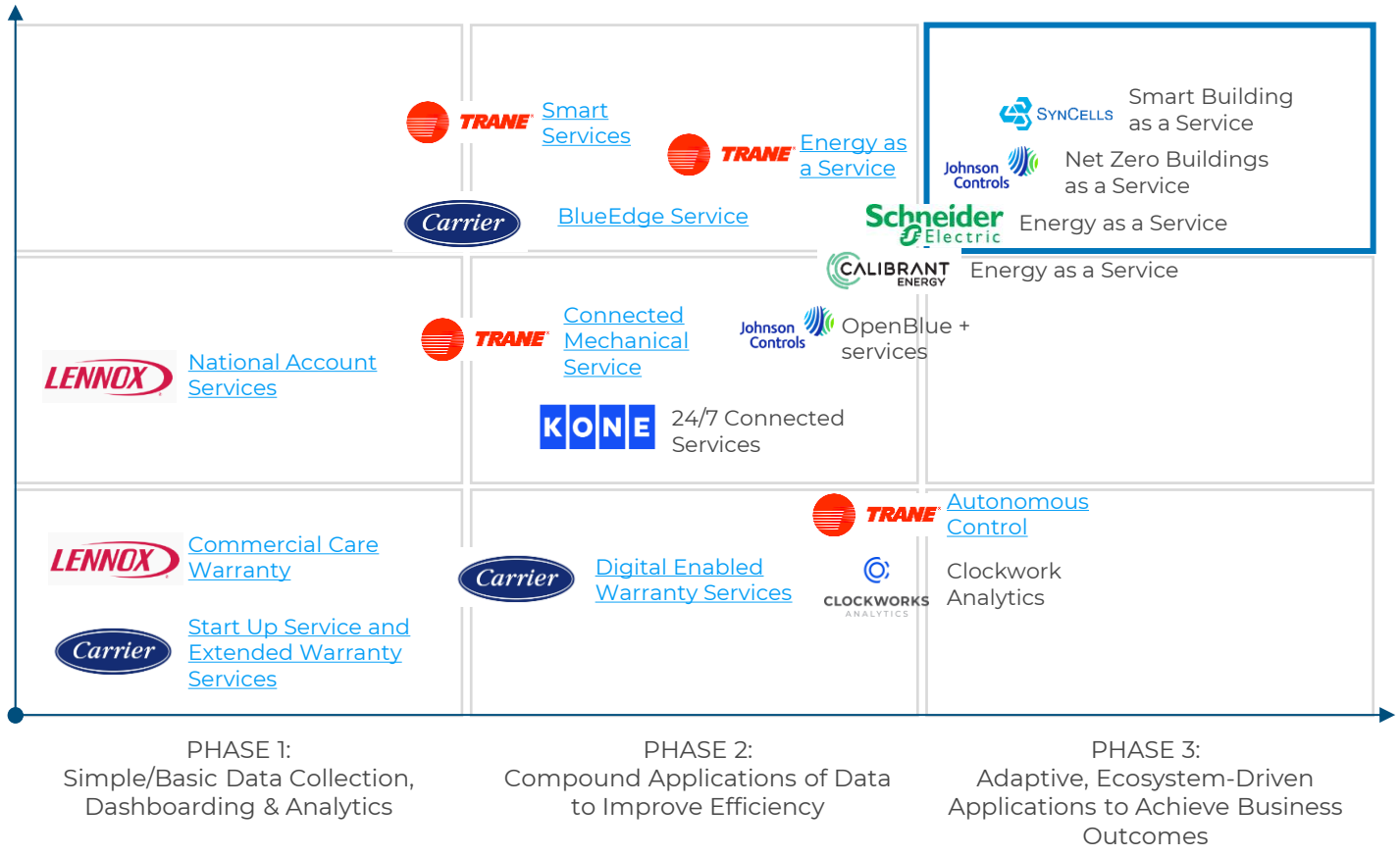
As service levels increase and more technology is incorporated into equipment and systems, OEMs and service providers can offer higher-value services. Ecosystem collaboration and advanced technology capabilities are required to provide true Outcome- and Building-as-a-Service" solutions



BaaS solutions represent the highest level of lifecycle and optimization services, combined with advanced, ecosystem-enabled technology capabilities

Companies Can Vary Substantially in The Level of Service They Offer

Companies can range from offering “basic” warranty to services, to more data-driven predictive maintenance deployed by their own technicians



Example Descriptions

Johnson Controls Net Zero Buildings as a Service — Subscription-based model covers full lifecycle of net zero effort, integrating digital solutions to achieve desired results

CALIBRANT ENERGY — Offers end-to-end energy infrastructure solution using subscription-based long-term contracts

SynCells Smart Building as a Service — Offers end-to-end solution to manage and optimize building energy, IT, and cybersecurity

KONE Connected 24/7 Services — KONE 24/7 Connected Services uses predictive maintenance to extend equipment life, with technician service supplied by Kone as well

Carrier BlueEdge Service — Uses digital tools to deploy predictive maintenance, supported by Carrier technician staff, with scope including end-of-life retrofits as well

TRANE Smart Services — Combines control systems, digital tools, and services to optimize customer energy use and other operational aspects based on goals

ASHB
Association for Smarter Homes & Buildings

Questions & Open Discussion

Questions & Considerations for Discussion

Questions & Considerations

- What are the key trends impacting your business? How is this impacting how you work with customers?
- What are the limiting factors today to providing more integrated, digitally-enabled services to customers?
- What is the ideal state of services-based business model(s) for your business? Why?

Next Steps for Further Research, Analysis & Action

1. Determine specific systems and opportunities to target with digital service initiatives based on current offerings, technology assets, and customer needs
2. Analyze and compare competitor offerings, strategies and marketing tactics to better understand how to set product and go-to-market strategy, position offerings and effectively target key decision makers.
3. Analyze partnership, venture building, joint venture, or corporate development opportunities for gaining new technology and digital service capabilities.

ASHB
Association for Smarter Homes & Buildings

Thank you!

Additional questions or interested in working with Harbor Research to develop or expand your digital services strategy? Get in Touch!

Harry Pascarella, Vice President
hpascarella@harborresearch.com

Dan Chmil, Research Director
dintolubbechmil@harborresearch.com