
//RESILIENT
TOGETHER//
2022 Partner Exchange
Evolving BAS technology and implications for contractors
TRANE
TRANE TECHNOLOGIES

Agenda

Melissa Schumann

- **Trends**
- **How risk and security impact the contracting workflow**

Krista Hubbs

- **Communication changes at the equipment level**

Chris Gist

- **Flexibility in the offering: Trane's new unit control portfolio**

Trends

Market conditions

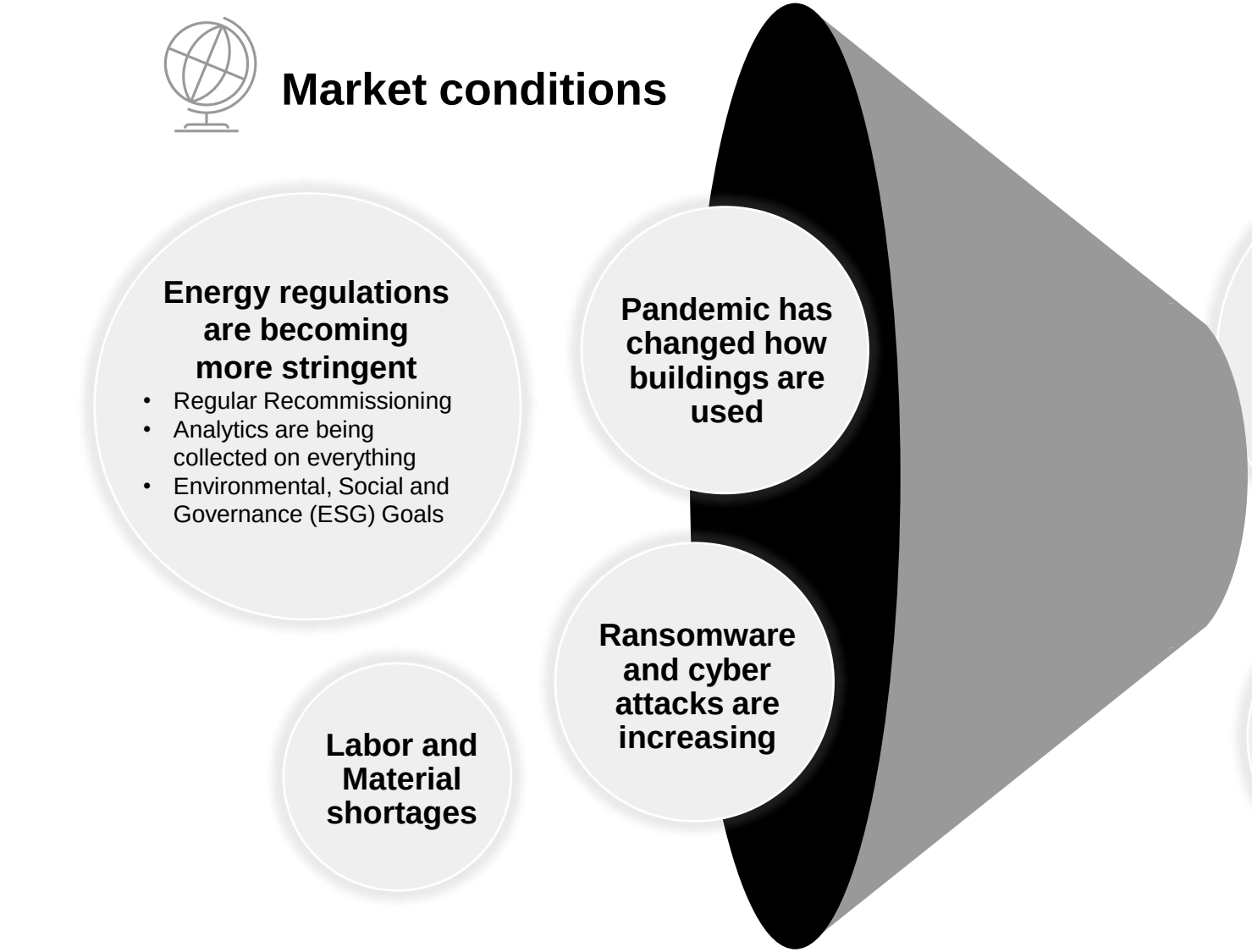
Energy regulations are becoming more stringent

- Regular Recommissioning
- Analytics are being collected on everything
- Environmental, Social and Governance (ESG) Goals

Pandemic has changed how buildings are used

Ransomware and cyber attacks are increasing

Labor and Material shortages



Customer Needs

Greater need for data

- System & equipment communication advances
- Enhanced tools that track system performance

Greater need for flexibility

- Design flexibility to combat product shortages and maturity
- Broader acceptance of wireless technology

IT Engagement and Risk Management

Secure Remote Access

- Fewer Facilities managers with responsibility for multiple sites

Communication changes at the equipment level

Communication Advances

Growth of IP

Advantages

- Faster speeds for large amounts of data
- Enables data driven decision making in buildings
- More data means better serviceability

Disadvantages

- More complexity and cost
- Security considerations

Greater adoption of wireless

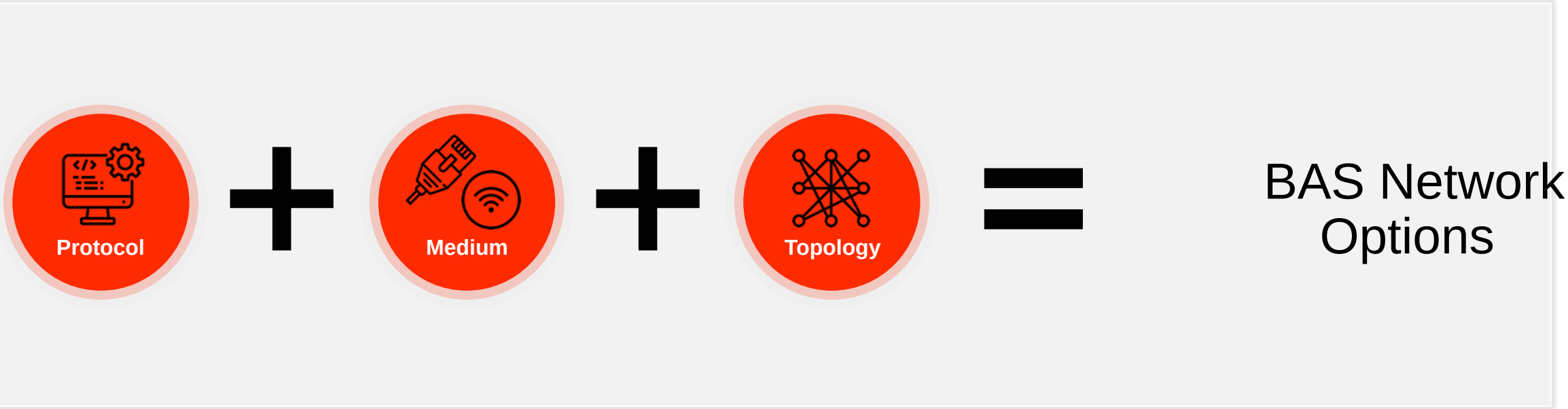
Advantages

- Flexible and lower cost installation
- Full range of sensor options
- Retrofit cost advantages for upgrades

Disadvantages

- Suboptimal for high-bandwidth needs

Defining your customer's communications approach



Consider a meeting with your co-workers

- Most of us speak the shared **language** of English (the **protocol**)
- And we have options about where we speak… (the **medium**)
- And once we know where we are speaking, we can decide how to best move our message… (the **topology**)

Buildings are no different.

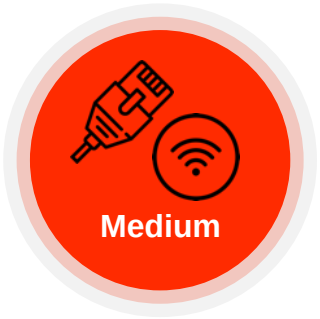
Step 1 is understanding *what* language the building is speaking, its **communication protocol.**

- BACnet®, Modbus, LonTalk, other proprietary languages
- Trane can speak most of these, but we believe in using an open standard protocol: BACnet, the industry-standard established by ASHRAE®
  - Provides interoperability
  - Allows for multi-system communication
  - Flexibility in who can access, service and manage your data points (allowing you to be vendor agnostic)
- BACnet Secure Connect is an encrypted version of BACnet that is coming into the market

TRANSLATION NECESSARY

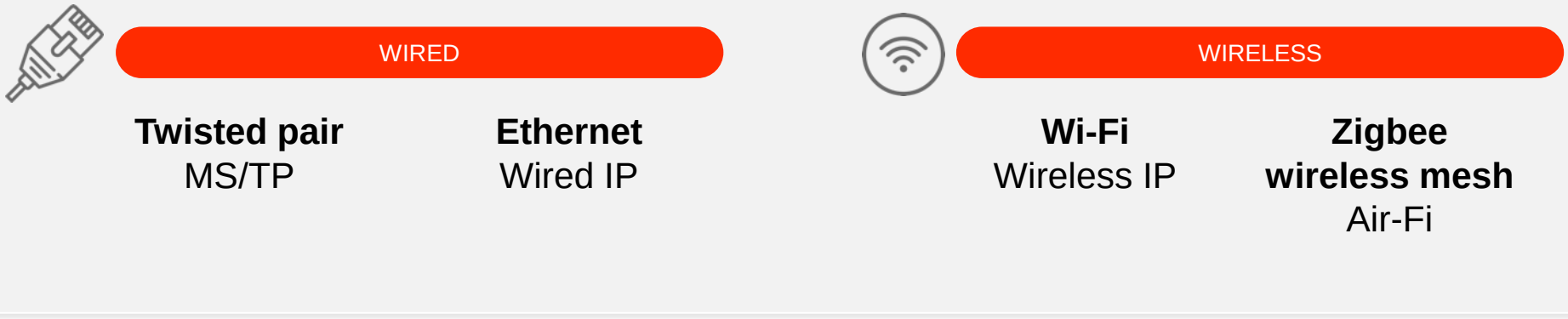
While **APIs are a great way to pass data, but they are not a standard open protocol**, which means that even with an API you still have coding or development to do to utilize it with your BAS. In our analogy, an API is most closely related to proprietary protocols.

Buildings are no different.



Then we think about “*where*” will your building communicate **(the medium)**.

We ask ourselves what is the best way to transport the language of BACnet, essentially it comes down to one big question, wired or wireless.

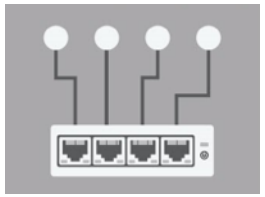


Topology

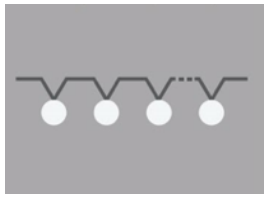
Finally, we think about how the message will pass from device to device in your building. We call this the **communication topology.**

WIRED

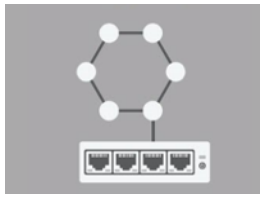
TOPOLOGY



Home Run/Star



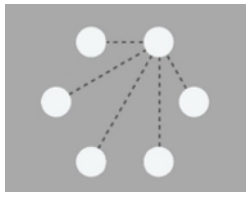
Daisy Chain



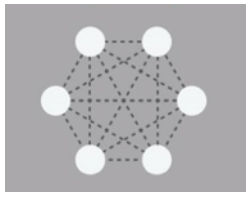
Ring

Protocol	BACnet/IP	BACnet MS/TP	BACnet/ IP	BACnet MS/TP	BACnet/IP
Medium	Ethernet	Twisted Pair	Ethernet	Twisted Pair	Ethernet
Bandwidth	High	Medium	High	Medium	High
Failure Recovery	***	***	*	*	**
IT Collaboration	High	Low	Medium	Low	High
Networking Expertise	Medium	Low	Medium	Low	High
Total Installed Cost	$$$$	$$	$$$	$$	$$$$

WIRELESS



Point-to-Point



Self-Healing Mesh

Protocol	BACnet/Wireless IP	BACnet/Zigbee
Medium	Wi-Fi	Air-Fi
Bandwidth	High	Medium
Failure Recovery	***	***
IT Collaboration	Medium	Low
Networking Expertise	High	Low
Total Installed Cost	$$	$

Project Considerations and Decision Makers

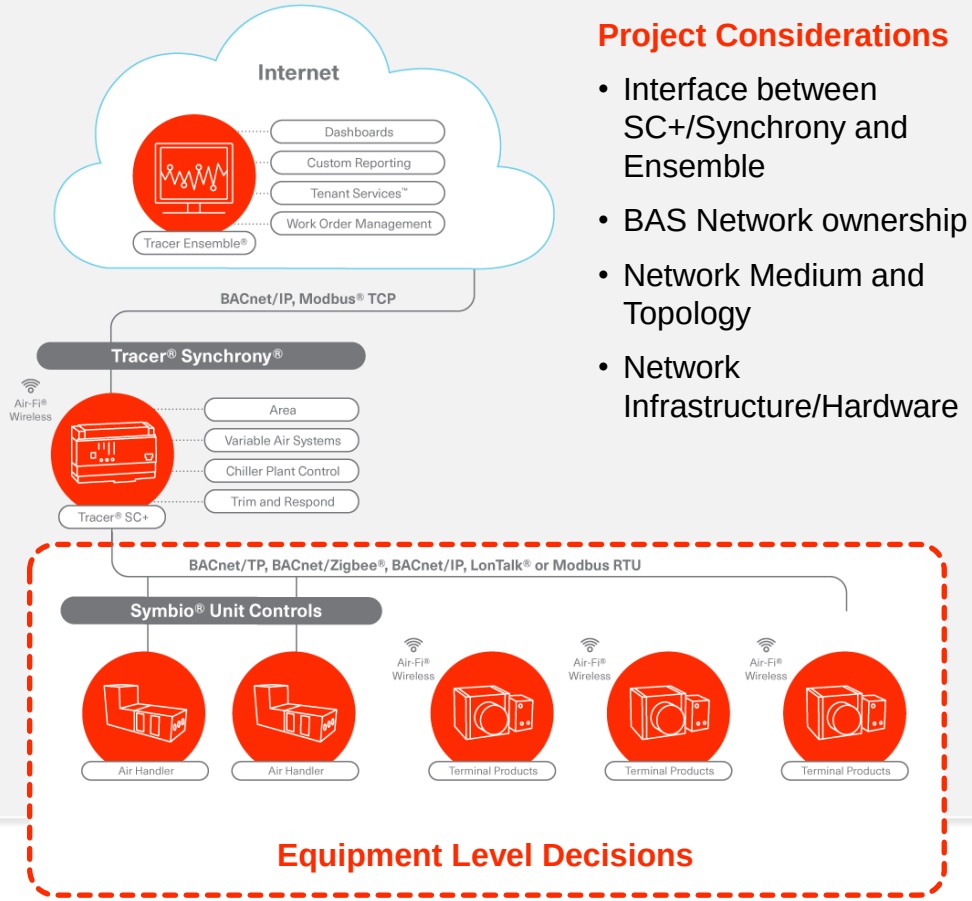
Customer/Stakeholder Concerns

Building Owner
cost, flexibility, energy use, comfort

Engineering/Contractor
ease of design/installation, serviceability

IT Manager
risk, IP connection, security

Building Operator
comfort, ease of use, remote access



Project Considerations

- Interface between SC+/Synchrony and Ensemble
- BAS Network ownership
- Network Medium and Topology
- Network Infrastructure/Hardware

Decision Makers

Protocol

Then: Owner + Engineer
Now: Owner + Engineer

Medium

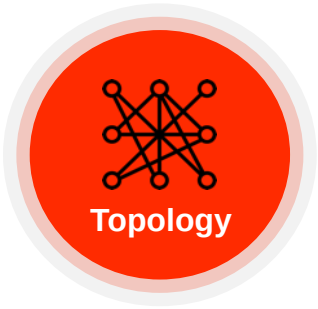
Then : Owner + Engineer
Now : Owner + Engineer + IT

Topology

Then : Contractor
Now : Contractor + IT

Key questions to ask when evaluating network options

- Are you interested in trending data at every level of your system?
- What are your reporting needs?
- What is your tolerance for downtime?
- Do you have the IT staff/expertise in house?
- Do you want to remotely access every piece of equipment? Specific equipment?
- How often are you reconfiguring your spaces?



Key Design Considerations

Is **BACnet/IP** specified at the unit level?

NO

Can **Air-Fi®** be used?

NO

Utilize **MS/TP** where:
- Building won't support Air Fi
- Heavy need for 3rd Party Integration
- Labor costs favor wired systems

YES

Are we required to use the customer's network infrastructure?
- When will this network be installed?
- Are the right contractors engaged at the right point in the project?
- Are roles and responsibilities clearly defined?

Is ring specified at any level of the system?

Is the equipment we're providing aligned to the customer's design expectations (racks, device types)?

YES

Leverage the flexibility, reliability and simplicity of **Air-Fi** as the primary BAS equipment and zone sensor communication.

Where it makes sense, **MS/TP** and/or **IP** (wired or wireless) can be used alongside **Air-Fi,** creating a hybrid system for:
- Specific areas of the building
- Specific pieces of equipment

Example: HVAC upgrades in an existing hospital

Considerations

- Potential interference from communicating hospital equipment
- Lots of zones with individual patient rooms and shifting spaces
- Combination of new construction and retrofit

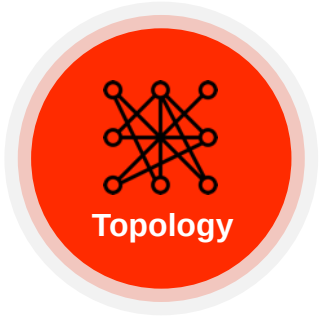
What a hybrid communications plan might look like

- Air-Fi
  - In room, utilize Air-Fi Wireless zone sensors to avoid additional installation costs by wiring in already built spaces (no need to break the ceiling pane or “be in the walls”)
  - Between the unit controllers, use Air-Fi Wireless to bridge older equipment into a modern network structure
- BACnet MS/TP
  - MRI rooms that are hard to reach with Air-Fi
  - Existing portion of the building that had existing wired infrastructure
- BACnet/IP
  - System controller and critical HVAC equipment to support more complex management
  - Chiller located in a remote portion of the site with existing network infrastructure

Takeaways

Open standard protocols best position you for future data needs

What you choose has implications for cost, complexity and engagement with IT



You can combine different network options to best suit a space or customer need

Resource

IP Application guide BAS-APG046

Trane has solutions that meet customer needs

- ✔ Secure remote access
- ✔ Communication flexibility
- ✔ Enhanced serviceability

Flexibility in the offering: Trane's new unit controls portfolio

How we are addressing changes

The Symbio® Platform Value

- Advanced Flexibility
  - BACnet/IP, BACnet/MSTP, Modbus, Air-Fi® Wireless
- Secure Remote Connectivity
- Enhanced Serviceability
- Complete Tracer® Integration

Enabled by Symbio™

Trane Equipment Controls Timeline: 40+ Years In The Making

1980-2000

Equipment Protocols:

Trane Proprietary
Comm 1/2/3/4

Not connected

1998-2008

Equipment Protocols:

LonTalk

Dial up modems

2008-Present

Equipment Protocols:

BACnet MS/TP,
BACnet/Zigbee

Web enabled

2019-Future

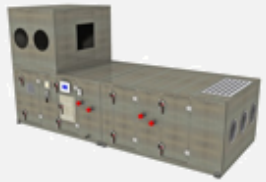
Equipment Protocols:

BACnet MS/TP,
BACnet/Zigbee,
BACnet/IP, Modbus,
LonTalk with adapter

Digitally enabled

Limited choices in the past – more choices now!

Symbio Across the Trane Equipment Portfolio

Chillers	Large Unitary	Light Unitary	Air Handlers	Terminal Units	VariTrane® Terminal Units
					

Symbio 800	Symbio 700	UC600	UC400	Symbio 210/210e
				

Flexible communication

Single Ethernet Port, Star Topology Support

Future Symbio Development

2-port Ethernet switch, star, daisy chain or ring support

BACnet MS/TP and Air-Fi Support

Controller Portfolio Flexibility

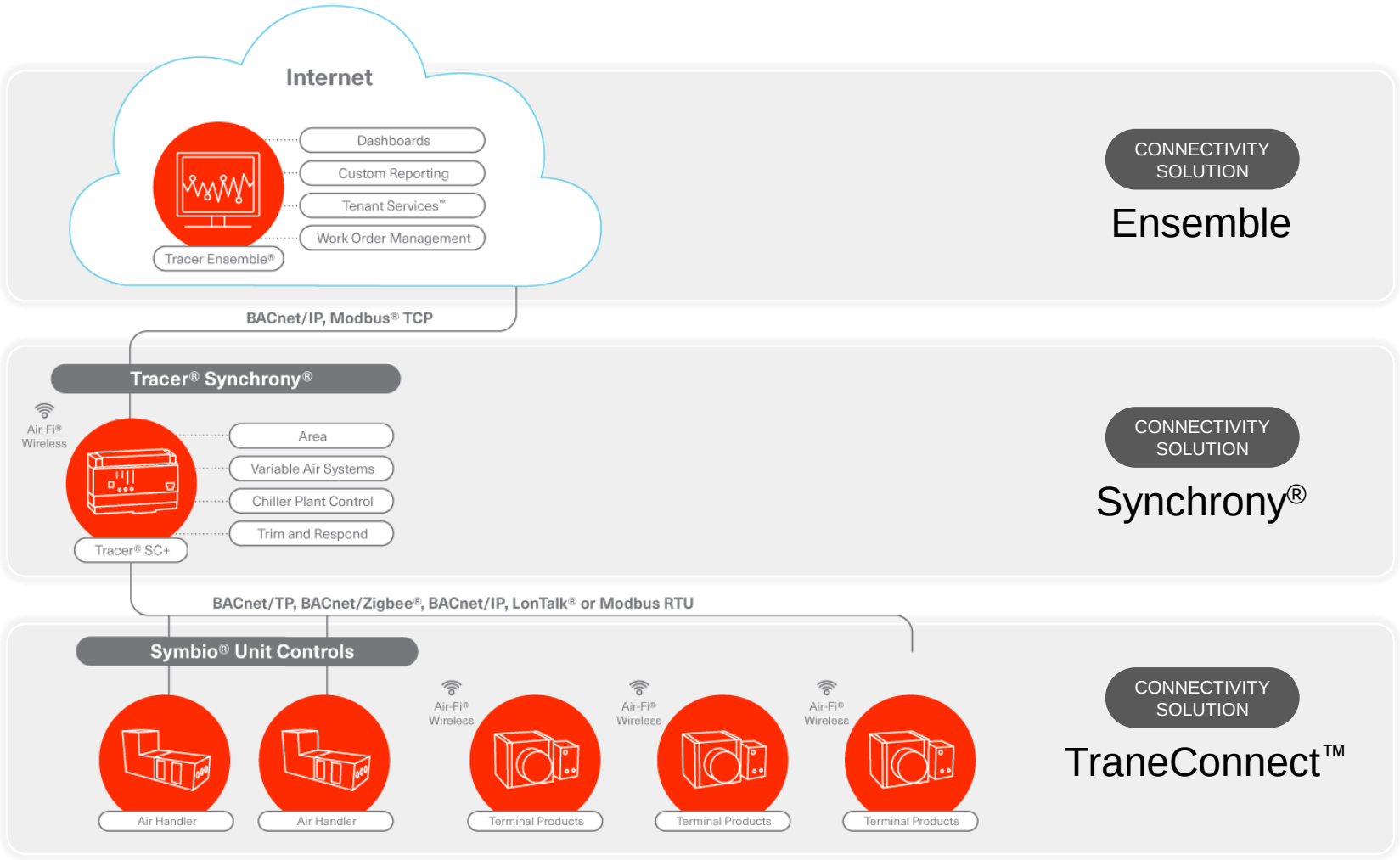
Controller Technology Maturity

- Outdated technology increases IT and serviceability risk
- Individual buildings may contain several generations of protocols, requiring system level coordination and integration
- Migration plans required to manage project timelines, budget and data needs

Supply Chain Challenges Addressed Through:

- Critical component procurement
- Product Engineering
- Expedited Migration to Symbio Platform
- Production Expansion and Prioritization

Tracer Integration and Remote Connectivity



Offerings tailored to the complexity and needs of the customer applications

Building blocks to facilitate connectivity and serviceability

Secure Remote Connectivity & Serviceability

CONNECTIVITY SOLUTION

TraneConnect™

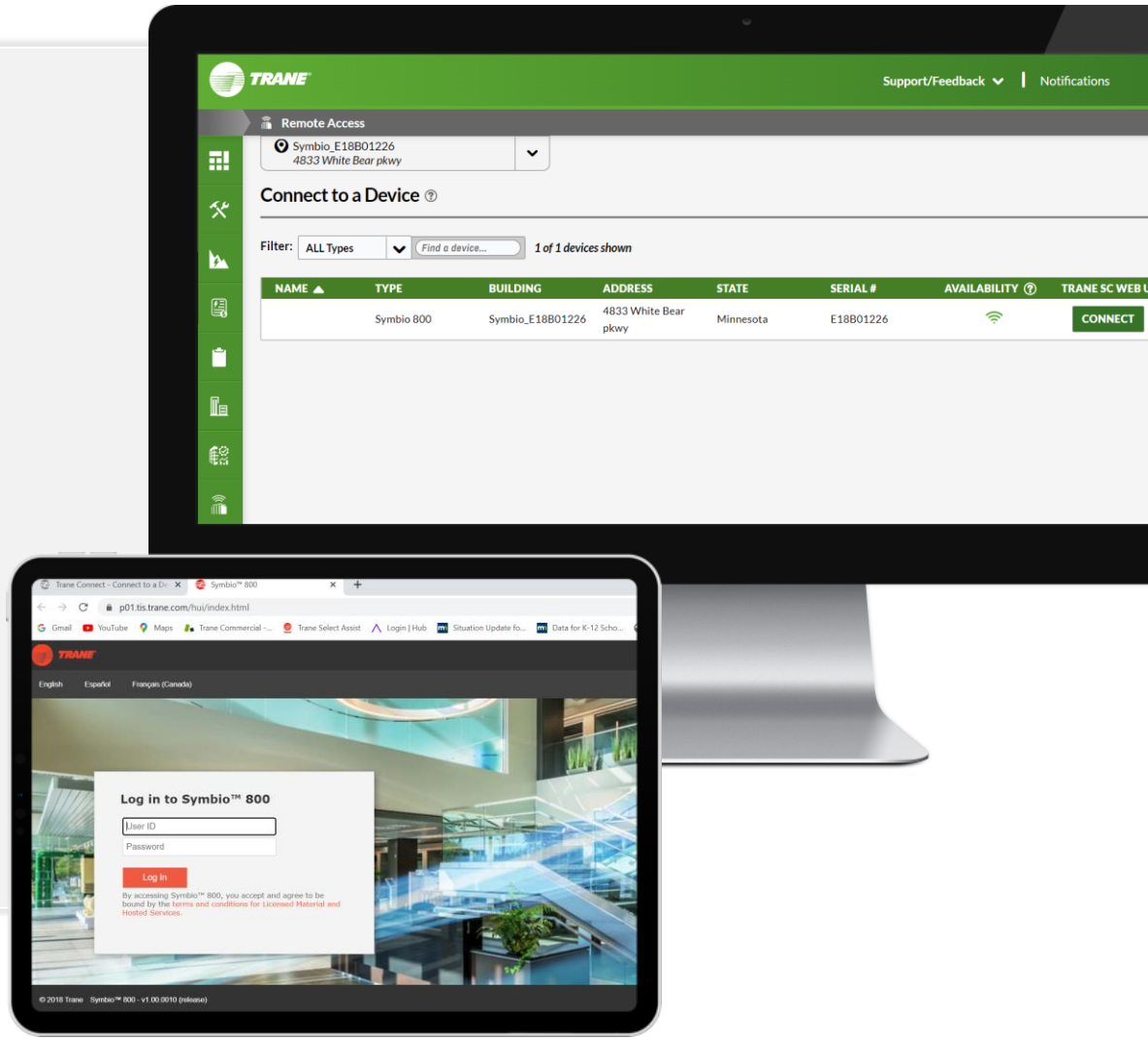
TraneConnect is a secure, cloud-based customer portal to access your building systems for remote monitoring, building management, and routine maintenance.

KEY BENEFITS:

- Platform for authentication and user management for secure remote access to:

BAS System Level	Equipment Level
• Ensemble	• Symbio 700/800
• SC+/Synchrony	• Future Symbio offerings

- Web user interface for status, troubleshooting
- Service tool pass through for issue resolution



Building Level System Integration

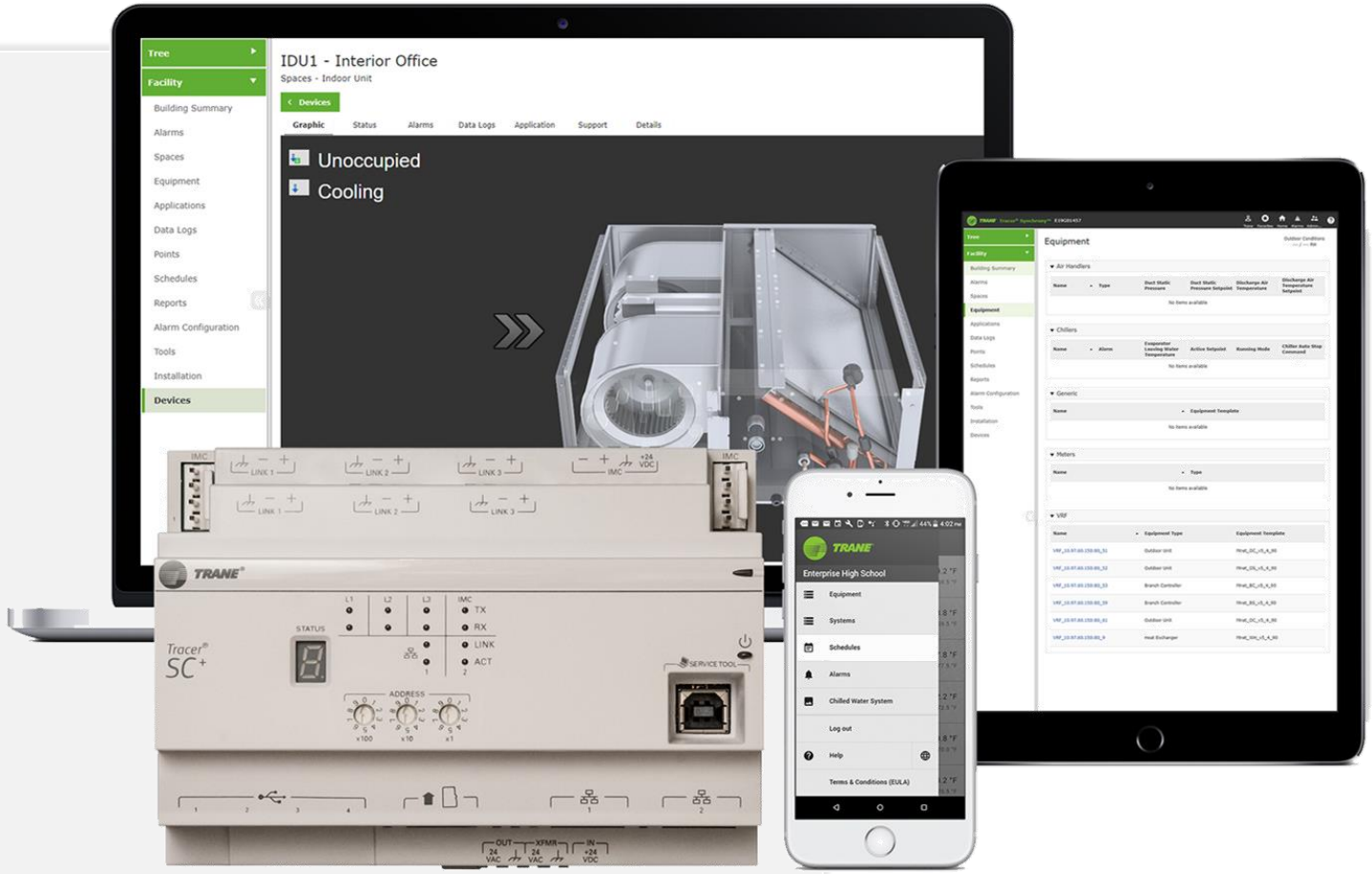
CONNECTIVITY SOLUTION

Tracer® Synchrony®

The built-in user interface for Tracer® SC+ provides full system access for facilities managers and service technicians.

KEY BENEFITS:

- Puts building automation at your fingertips via an intuitive mobile-friendly user interface
- Simplifies advanced functionality, making the system more practical and accessible
- Easy and intuitive, eliminating the need for repeated operator training



Enterprise Level System Integration

CONNECTIVITY SOLUTION

Tracer® Ensemble®

Tracer Ensemble is a web-enabled enterprise-wide building management system (BMS). It is the ultimate productivity tool, making it easy to modify schedules, build or view dashboards, send reports, and manage alarms from virtually anywhere.

KEY BENEFITS:

- A remote enterprise view of your entire organization
- Greater productivity for daily operation and troubleshooting
- *Enhanced energy management*
- More profitable tenant solutions
- Optimized use of buildings and maintenance staff


TRANE
How risk and security impact the contracting workflow
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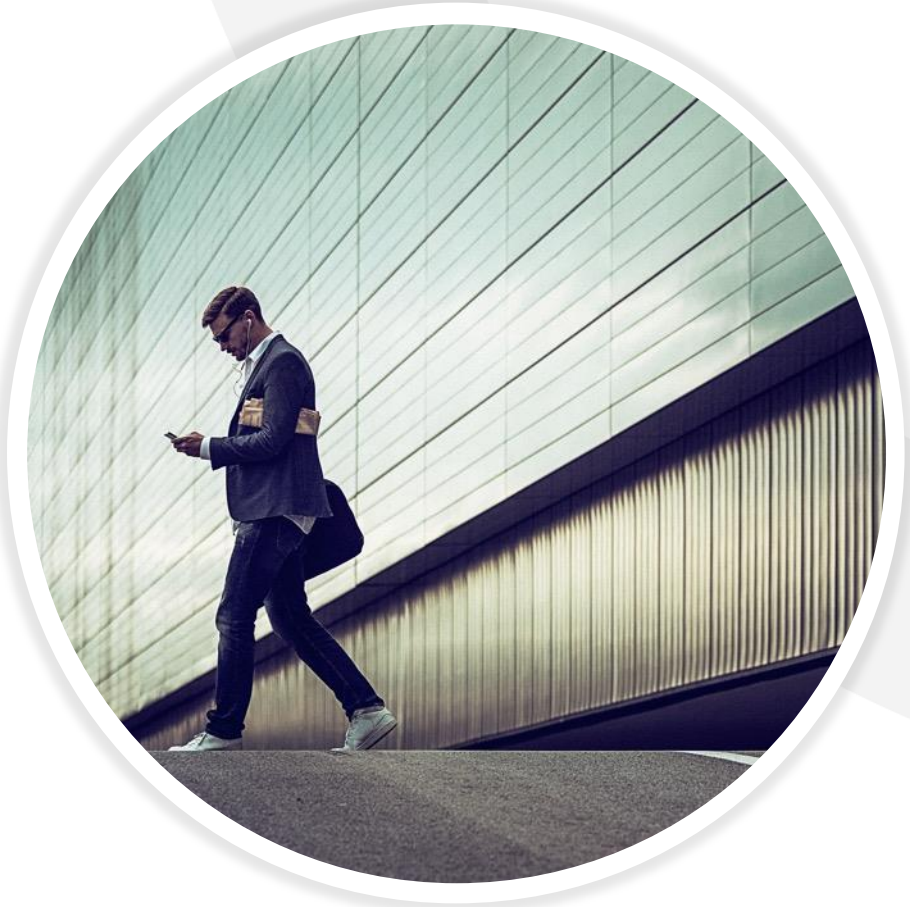
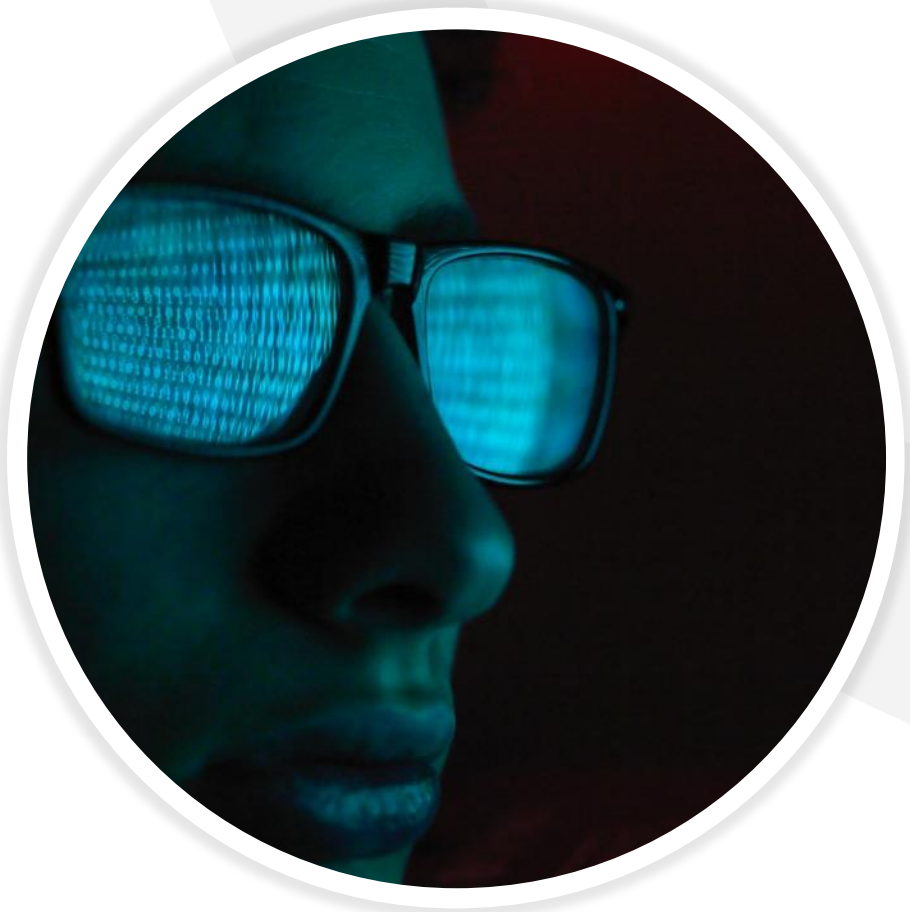
Secure Remote Access

- Fewer skilled building operators need to manage more buildings
- Access to systems any time/ anywhere
- Faster, smarter service
- Remote desktop services like log me in are no longer IT accepted solutions
- TraneConnect™ is accepted by IT staffs

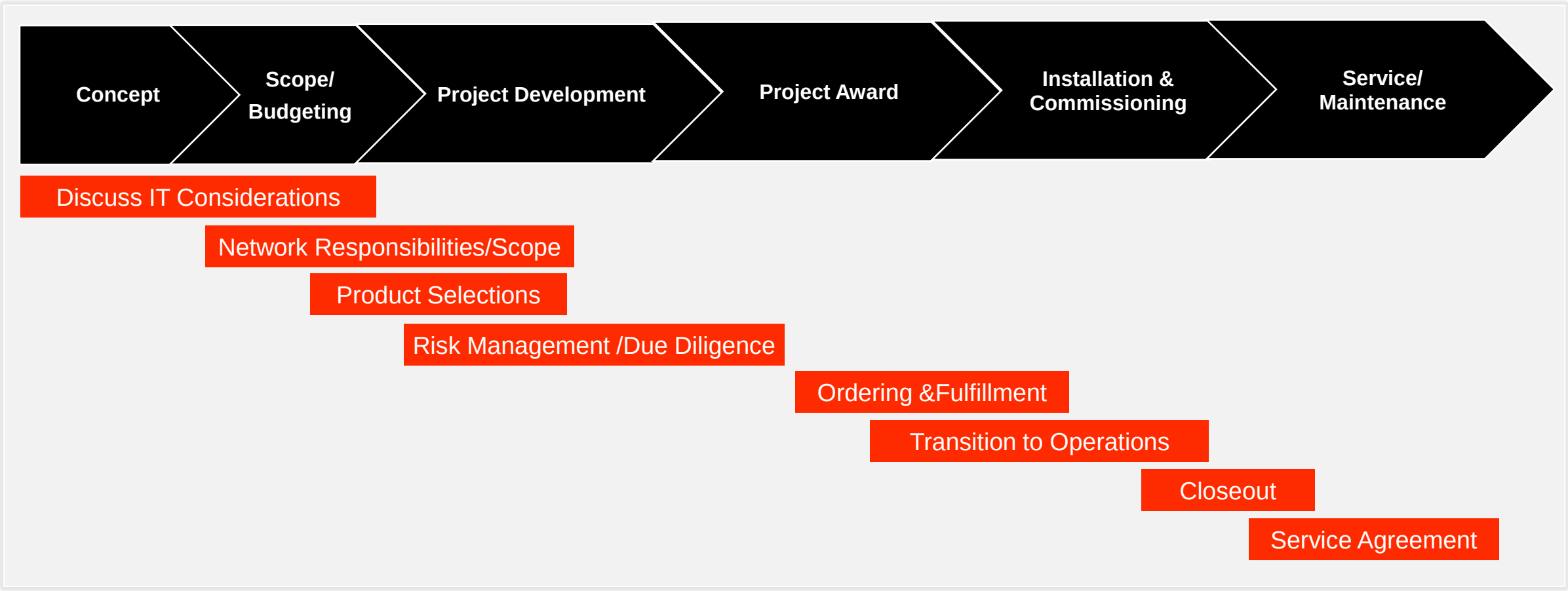


Increased scrutiny on BAS security

- Intensive risk management processes
  - Time consuming
  - Industry specific
  - Requirements data management
- Network considerations
  - Firewalls
  - Segregation
  - On prem vs hosted solutions
- Remote access enablement
  - Customer network/Cell router



Contractor’s Role in the Sales Process



What IT risk managers care about

- What kind of data is in the system
- What devices are on the network
- Who will have access to their network
- Authentication and Authorization of the control system
- Requirements for validation on how YOUR network is managed and accessed

Customers care about Data they need to protect

What type of Data?

- Personal Health Information (PHI)
  - HIPPA protections under the law
- Personally Identifiable Information (PII)
  - Names, Addresses, Social Security numbers
- Payment Card Information (PCI)
- Company Confidential Information (CCI)
- NOTE: BAS in general don't use PII, PCI or PHI (exceptions are email addresses)

What this means

- New or additional contract terms, data security policies and addendums
- Requests for cybersecurity insurance
- Proactive approach required! Due diligence can take months

Industry standards

- **SOC2** is a report capturing how a company safeguards customer data and how well those internal controls are operating. Issued by independent third-party auditors cover the principles of Security, Availability, Confidentiality, and Privacy.
- **ISO/IEC 27001** is a standard to manage information security such as financial information, intellectual property, employee details or information entrusted by third parties.
- **SIG**, The Standardized Information Gathering (SIG) questionnaire is used to perform an initial assessment of vendors, gathering information to determine how security risks are managed across 18 different risk domains.

Vertical Market Specific Certification Examples

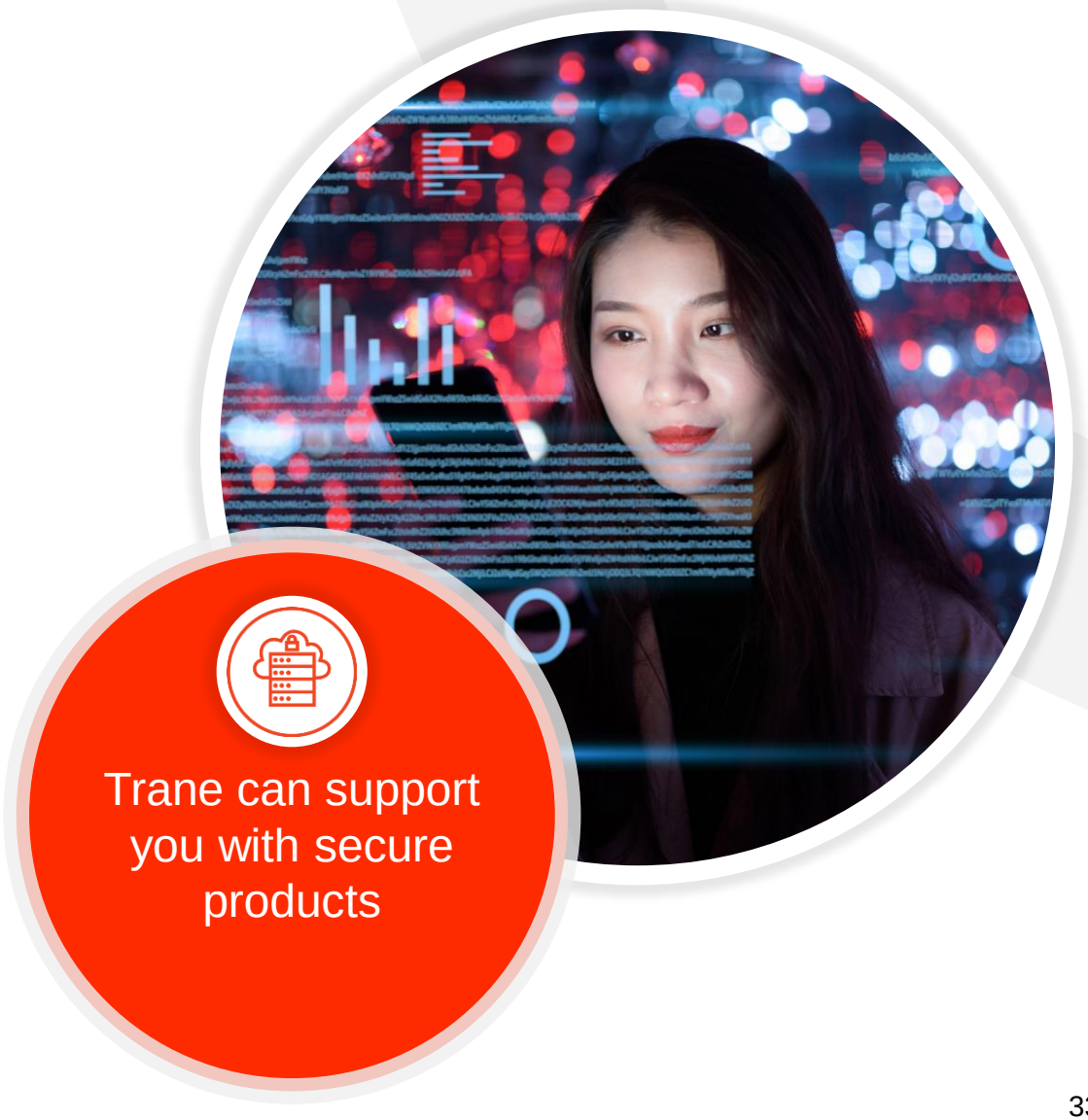
- HITRUST – Healthcare
- FEDRAMP – federal projects

Customer Specific Questionnaires

- Spreadsheet
- Web portal
- 3rd party vendor assessment

Trane's Cyber Security - Risk Assessment approach

- Trane has security embedded in the design process and in our products
  - Cyber Security data sheets to explain products to IT staff
  - Security Assurance Review (SAR) package
  - SOC2 Type II Pre-Assessment Report
    - Requires Non-Disclosure Agreement
- You have responsibility for your local operations
  - Ex. Hiring practices, Corporate network infrastructure, billing data



Resources for IT conversations

Cybersecurity for Controls & Intelligent Services | Hub (tranetechnologies.com)

Cybersecurity summaries

- Tracer® SC+ / Synchrony® IT & Cyber Security Summary (HUB-199032)
- Tracer® Ensemble® Cloud IT & Cyber Security Summary (HUB-199034)
- Tracer® Ensemble® On-Premise IT & Cyber Security Summary (HUB-199033)

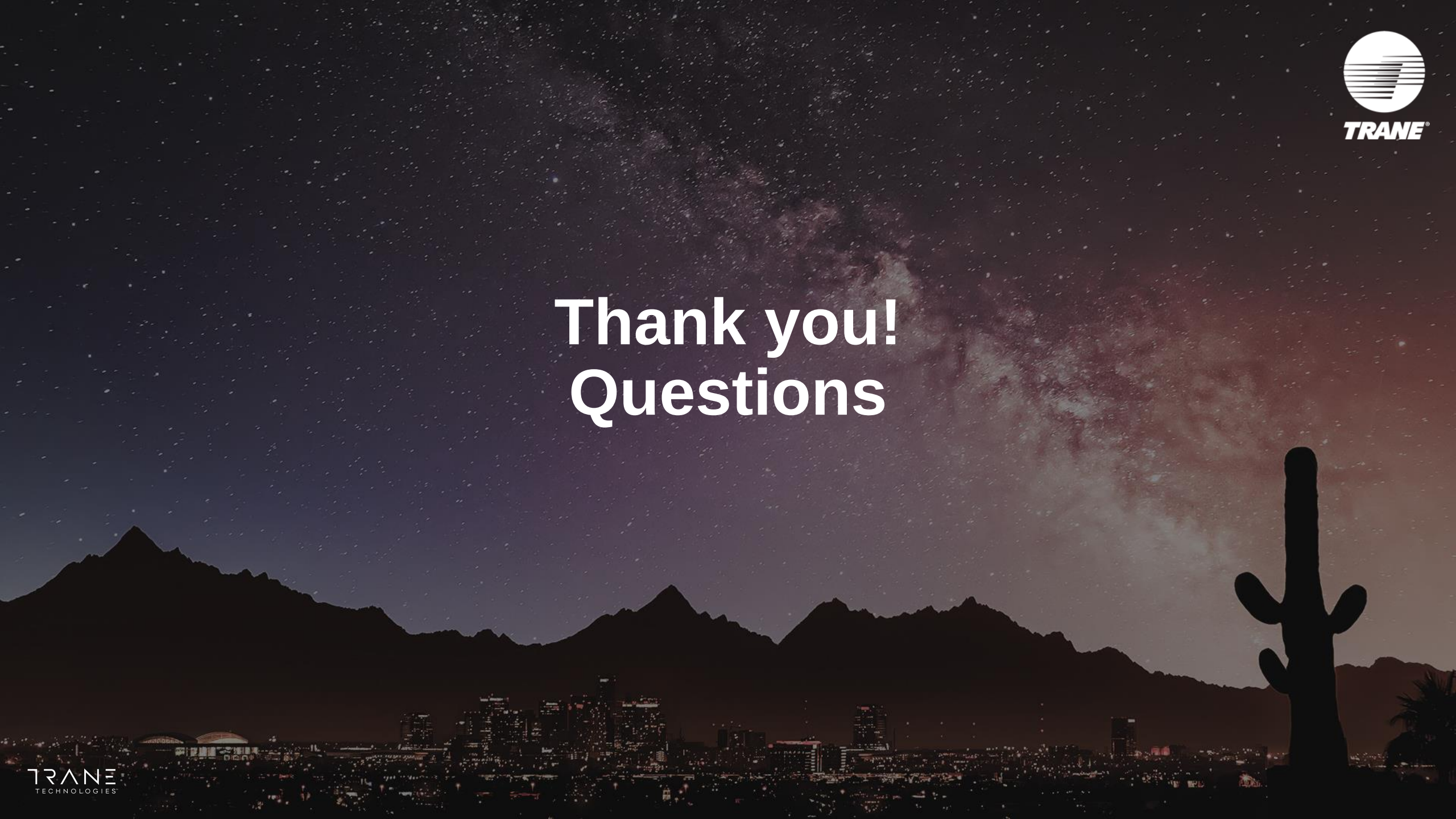
Presentation:
Controls Cyber Security Presentation for IT customers (HUB-209538)

FAQ from IT customers about Tracer products (HUB-211174)

Common terminology for IT discussions (HUB-211175)

Take advantage of Trends

Customer needs	Successful Customer outcomes
Greater need for data	**Digitally-enabled building operations and enhanced analytics**
Greater need for flexibility	**Communication via multiple protocols and topologies to address a range of applications**
Remote access	**Serviceable sites with higher customer satisfaction**
Increased due diligence from IT	**Partnership with IT for secure, reliable installations**


Thank you!
Questions