Hello, and welcome to the first of a new type of TridiumTalk – one designed to help our community of specifiers, consultants and designers understand more about the Niagara Framework and how it can be incorporated into projects to get the greatest results for you and your clients. My name is Michael Stabile of Tridium, nearly every day I talk to specifiers and end users who have questions about Niagara. Those discussions spawned the idea to create this Series.

Over the next two months we will be presenting 5 different sessions focused on helping you develop more detailed and powerful specifications, incorporate strong cybersecurity requirements, integrate analytics and design an OT network. Today's session is targeted for those with little or no exposure to the Niagara Framework – hence…

Niagara 101 for Specifiers.

During our time today, we hope to give you a better understanding of Tridium as a company, and what the Niagara Framework brings to building automation and to IoT (or the Internet of Things). Most importantly, we hope that you will recognize the capabilities, features and resources that Tridium and the Niagara Framework can offer.

Tridium - Connecting Minds and Machines

Founded in 1996, Tridium became a wholly owned, independent business entity of Honeywell in 2005

Global leader in Open Platform Building Automation

- **1 Million+** instances of Niagara operational
- **25,000+** certified professionals
- **1000+** developer partners
- Customers in **77+** countries
- **60+** OEM Partners (brands) with Niagara products

TRIDIUM

Tridium was founded over 25 years ago by a group of engineers who felt customers should have choice, and that building management systems should be flexible enough to adopt new technologies and evolving standards while allowing for the integration of “best of breed solutions”, regardless of manufacturer.

This strategy resonated with our customers, and soon dozens of manufacturers began licensing the Niagara Framework to sell under their own brands, often alongside their proprietary controller offerings. With over 1M instances of deployed, Niagara is the global leader in Open Platform Building automation…

Niagara helps many of the world's most demanding customers meet their building automation and IoT needs in one comprehensive, secure, flexible and open platform.

Whether you are planning the HVAC needs of a single building. or are integrating Smart Building technologies for a multi-national organization with extreme cybersecurity demands, Niagara can be scaled to your requirements.

What does Tridium Make?

The Niagara Framework - software that runs on controllers and servers

Supervisor for servers and workstations

JACE and Edge Devices and their expansion modules

Supporting Products

- Niagara Enterprise Security
- Niagara Analytics
- Niagara Data Service *(coming soon)*
- Niagara Drivers

Applications: Niagara Asset Manager and E-Signature *(21CFR Part11)*

Professional Services

JACE 8xxx

Niagara Supervisor - Server or Workstation

JACE 8000 plus I/O Modules

Edge10

TRIDIUM

So, what does Tridium actually produce? Primarily, we are a software company, and the Niagara Framework our core offering. It is much like an operating system for buildings and devices.

Tridium, and our partners produce a hardware device that we call a JACE, which stands for Java Application Control Engine. It is simply a device that allows you to connect to the various physical devices and their variety of networks – whether that is serial (485/232), IP, LON, or analog or digital signals

We also have many applications and drivers that are available through the various manufacturer brands and their distribution and integration partners, and on the Niagara Marketplace. (we'll talk about most of these later) Finally, our Pro Services group can be engaged directly for writing custom drivers and software projects that our partners may not offer.

How do you License Niagara?

Niagara 4 software has a perpetual license, with SMAs (*software maintenance agreements*) to enable access to the latest revisions of your Niagara version

Supervisor – Licensed per number of network (JACE) connections (1,2,3,10, 100, Unlimited)

JACE

Model	Devices	I/O Points	SMA Terms
8005	5	250	18m, 3Y, 5Y
8010	10	500	18m, 3Y, 5Y
8025	25	1250	18m, 3Y, 5Y
8100	100	5000	18m, 3Y, 5Y
8200	200	10,000	18m, 3Y, 5Y

Edge 10

Includes 10 points of I/O as shipped

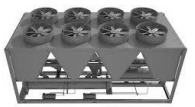
Can support up to 3 devices/50 points with expansion

SMA included for N4

TRIDIUM

Flexibility to Integrate, Monitor and Control

HVAC


Safety and Access




Lighting, Power and Water



Occupancy, Usage and Condition


PEOPLE DETECTOR


PEOPLE COUNTER


Flow

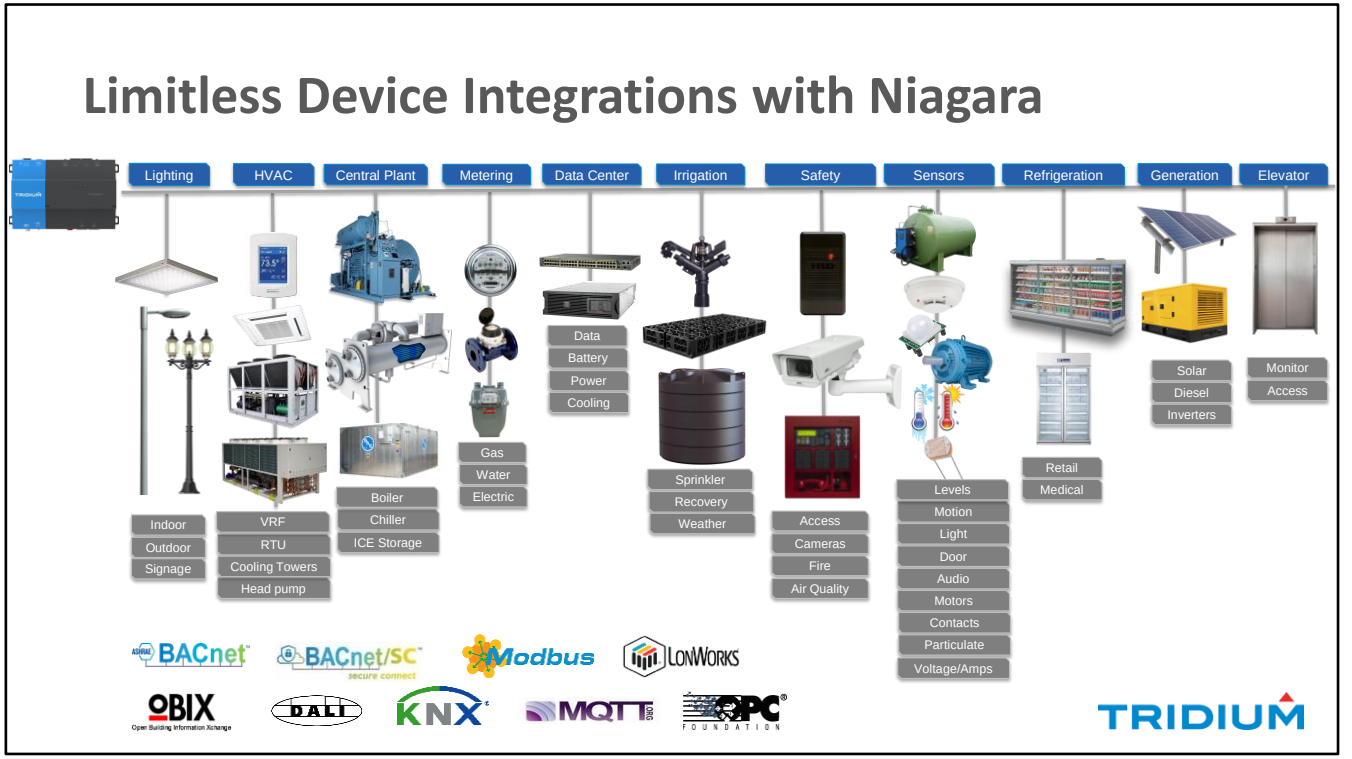

Leak


NOISE LEVELS


HUMIDITY LEVELS

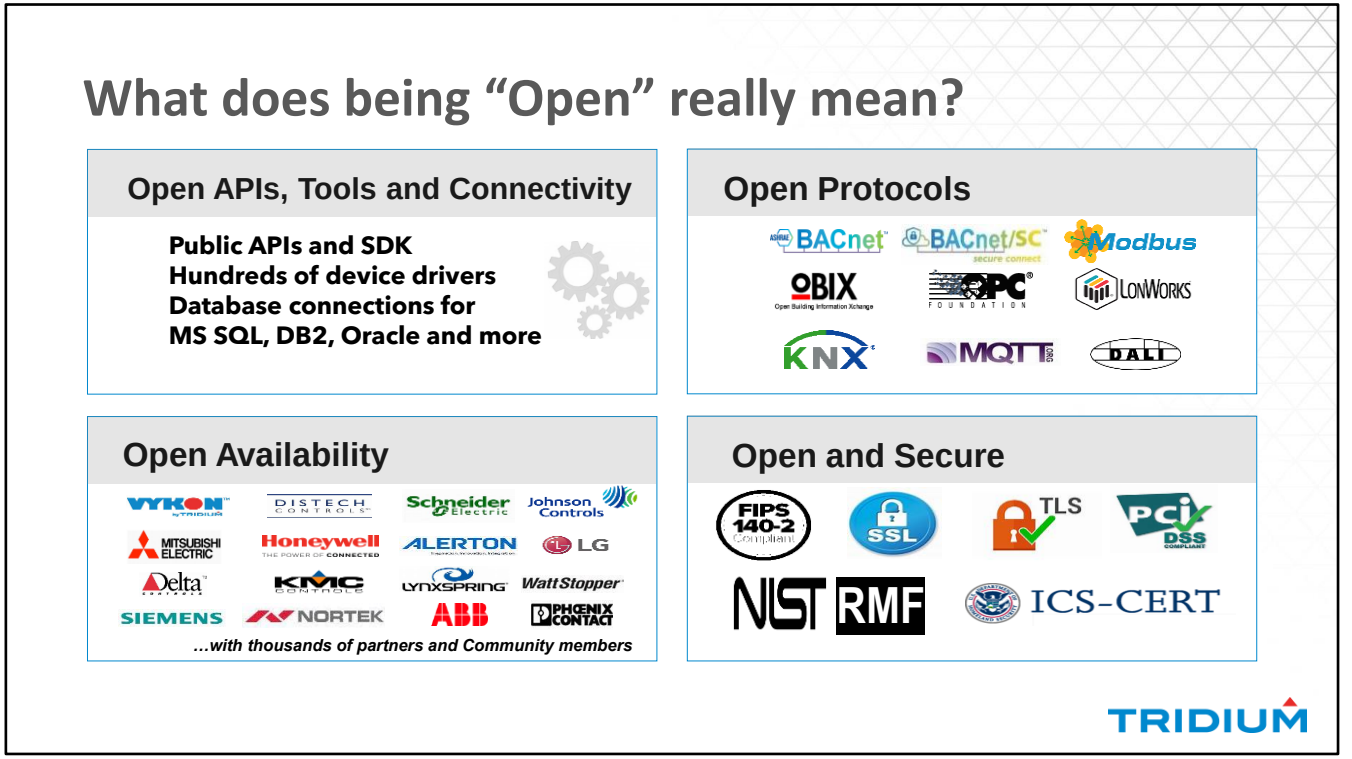

ENVIRONMENTAL MONITORS

TRIDIUM



Now that you know what we make – it is important to understand what we DO NOT make, but allow you connect to. Through the vast (and growing) support of industry protocols, (and the ability to create your own drivers, if necessary) Niagara allows you to access a devices from nearly any manufacturer for whatever systems you may be deploying.

It is entirely your choice to select the various components from whomever offers the best solution in the market, with the confidence that Niagara is highly likely to be able to integrate it into your environment.



Many companies will tell you they are “open” because they support BACnet. But that is not the measure of an open system. – if your downstream devices require proprietary licenses or software to program, or impose limits on your ability to choose providers for service and support, you can hardly be called “open”..

And we give our customers the tools to build their own drivers and APIs, and a community of developers who can help them, as well as our own Professional Services organization. This allows Niagara to grow and adapt as new drivers, APIs and protocols are developed, and as you can see, we already support BACnet SC.

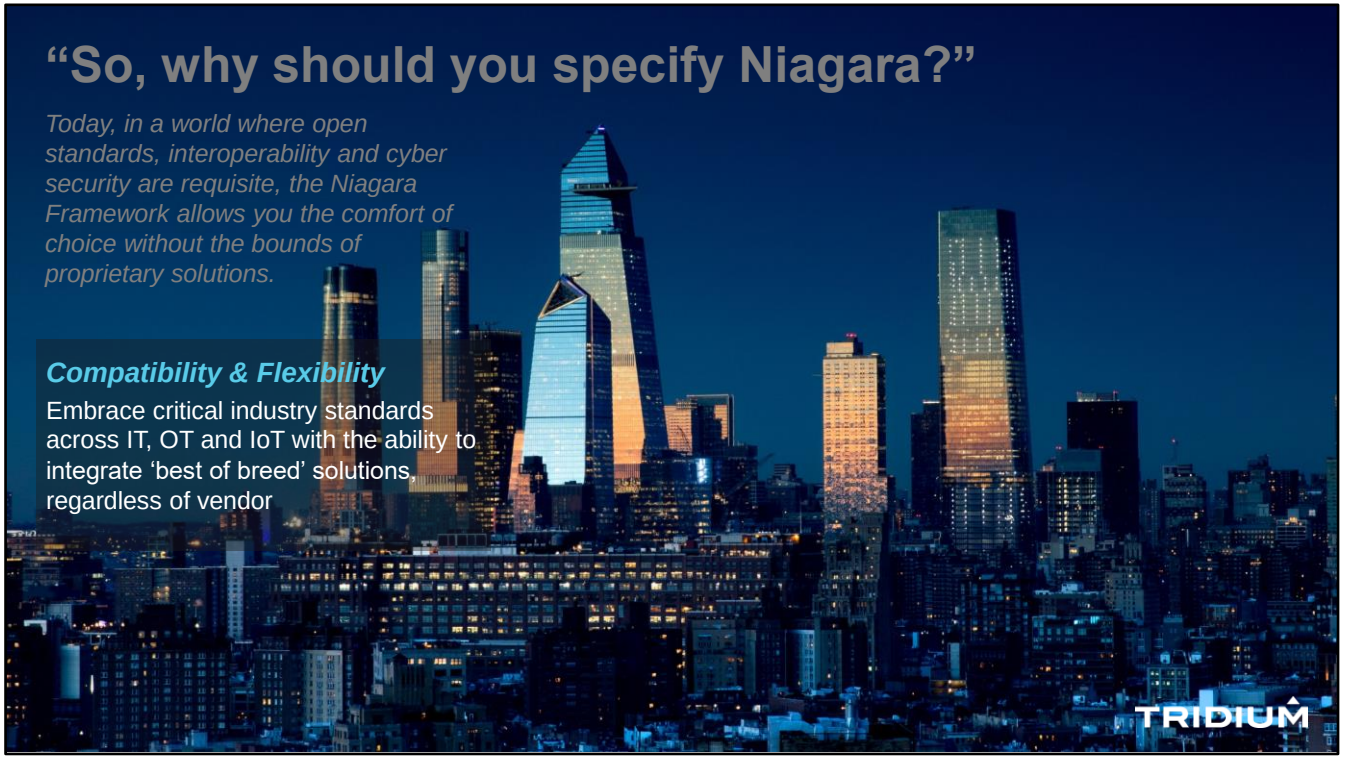
Open Availability: You can get competitive bids from multiple providers on systems from any manufacture, for purchase, installation and support

And we do all this with secure, encrypted communications for the most demanding environments

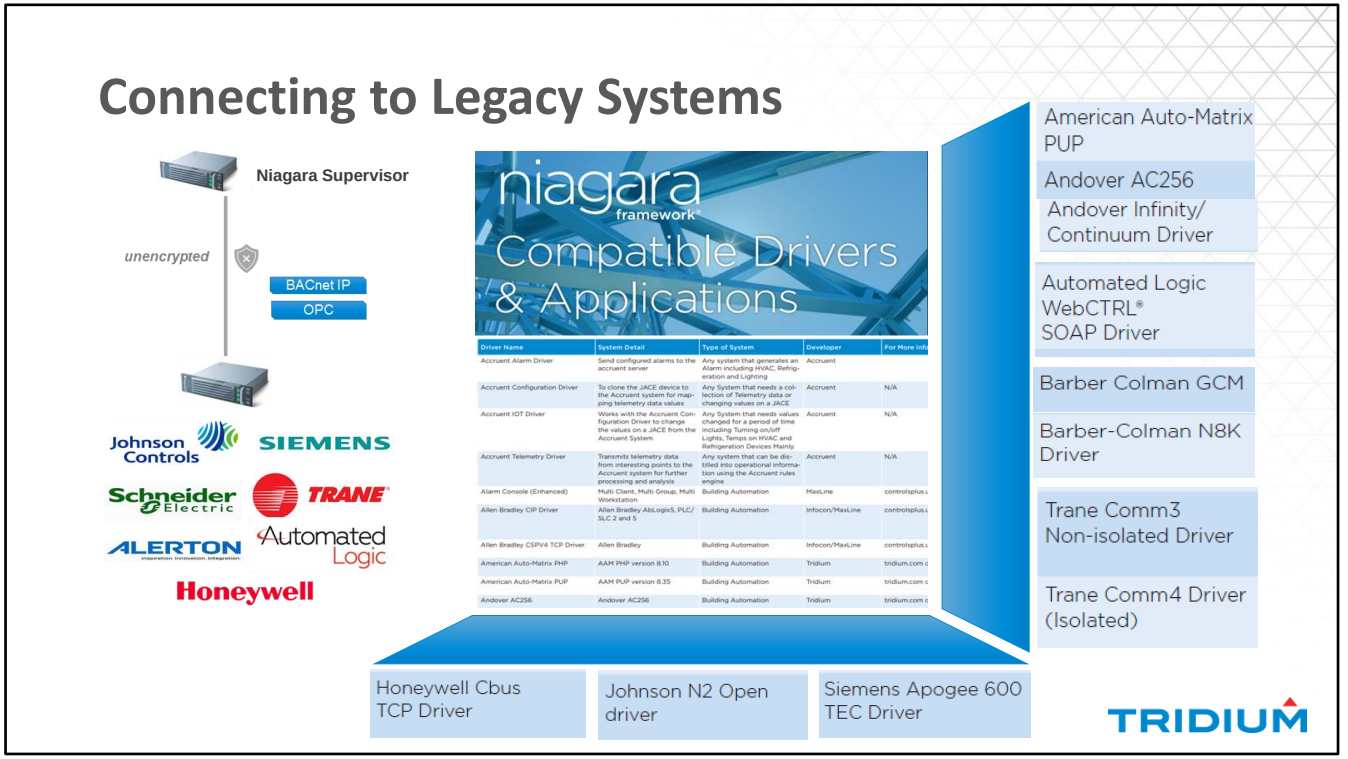
I am going to focus on four main areas today to help you understand why we believe that specifying open Niagara is the best option for your clients.

We will start off with Compatibility and Flexibility

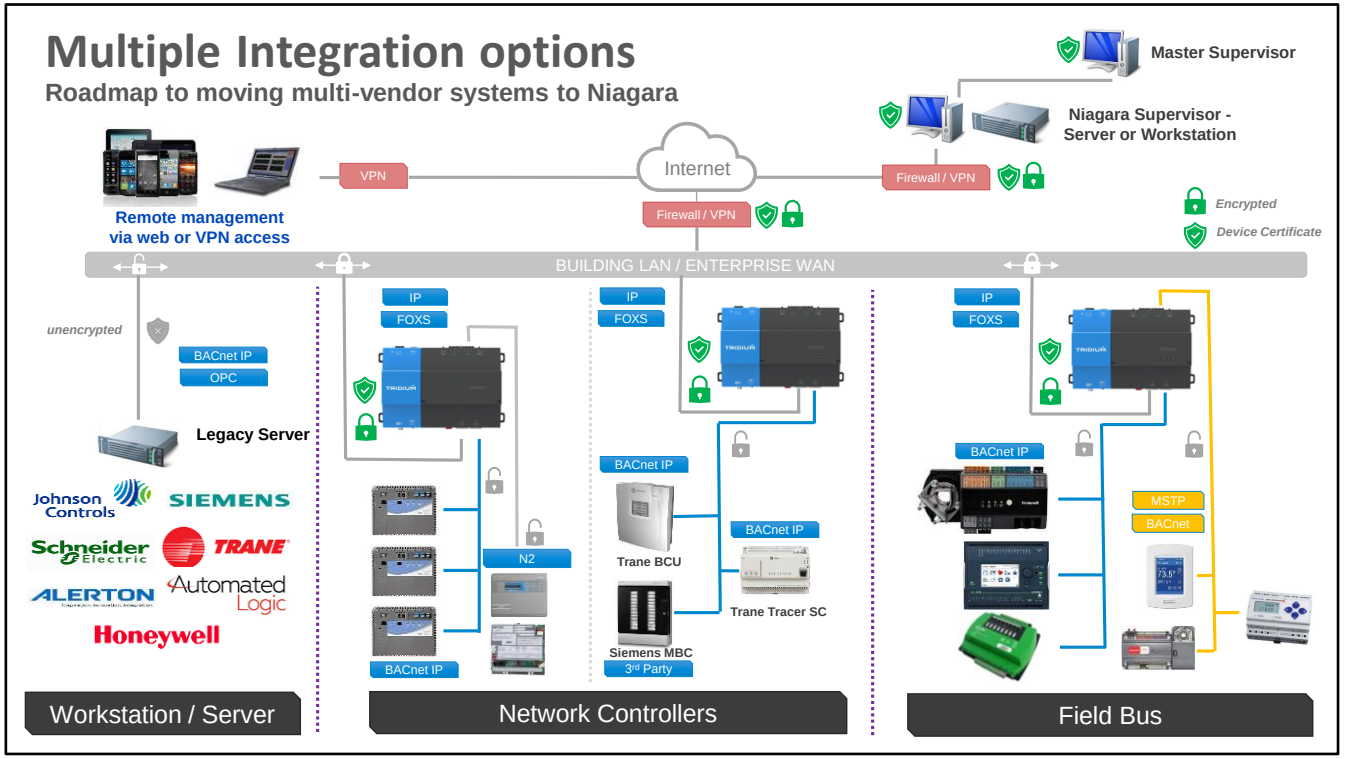
(I didn't randomly select this picture - in the center you can see the WarnerMedia Tower at 30 Hudson Yards, in NYC. This is a Niagara controlled building, and there is a case study available online from the Niagara Partner who performed the work)



Niagara enables you to choose “best of breed” solutions and if necessary, integrate products from multiple vendors in a single, unified environment.



With hundreds of drivers available you have many options for how to connect, monitor and control legacy systems. Here are just a few of the hundreds available from Tridium and our developer partners worldwide.



These next couple of slides are part of a deck that we have available to help you and your clients better understand the various pros and cons of each type of integration so you can plan and specify based upon your requirements.

As I previewed in the previous slide, you could can integrate from the Server level, providing a unified front end for a legacy multi-vendor environment, to network and field bus controller integration. (Briefly Describe Server level integration)

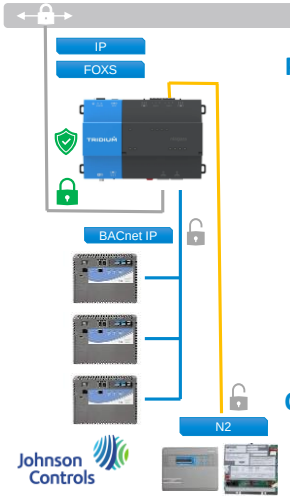
But additionally, we show that you have many options…

Network Controller Integration

via BACnet IP, OPC, Modbus TCP, LON

JCI Integration

via BACnet IP, NCEs, NAE, N30



Pros:

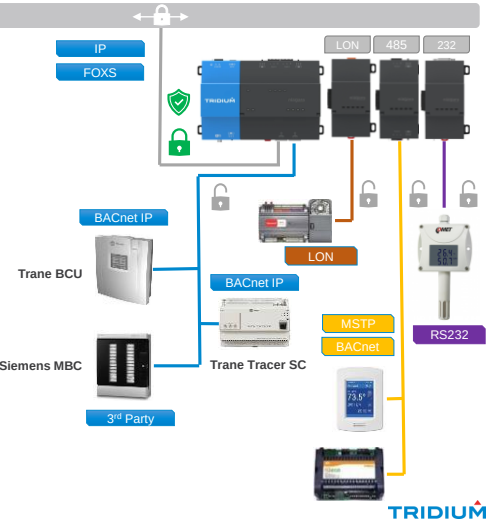
- Eliminates the legacy server that may be obsolete and not cyber secure
- Legacy Supervisory Controller can easily be added at the IP level to the Niagara Network
- Allows for incremental upgrade and integration to Niagara to modernize the entire infrastructure
- Advanced Niagara architecture, supporting common scheduling, analytics, alarming and mobile views

Cons:

- Leaves in place the existing controllers and software that may be obsolete or require proprietary or expensive tools and service contracts to manage

Multi-vendor Integration

via BACnet IP, Modbus TCP, or legacy drivers



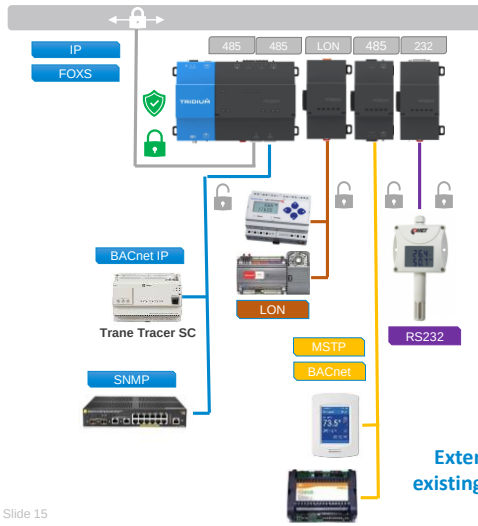
Slide 14

Here we expand the discussion to describe the benefits of integrating at the Network Controller level (highlight the security)

Field Bus Integration

via legacy drivers, BACnet IP, OPC, Modbus TCP, LON…

Join us Wednesday, November 16th for "Specifying an OT Network"



Use Cases:
- Upgrade to legacy buildings using existing field bus devices

Pros:
- Lowest cost of implementation
- Allows legacy systems to use of more advanced energy management strategies, mobile UI, analytics
- Best cybersecurity practices for legacy integrations
- Allows for legacy and new open protocols on same JACE
- Incremental upgrades, one infrastructure to the field bus level
- Common Niagara interface down to the application controller level
- Ability to mix and match legacy with new replacement controllers
- Eliminates two layers of legacy control
- Numerous options for multivendor equipment/protocol replacement

Cons:
- Potentially leaves in place existing controllers and software that may be obsolete or require proprietary or expensive tools and service contracts to manage

Extends the Niagara network as close to the field devices as possible. Keeps the existing infrastructure and allows you to replace AT YOUR CONVENIENCE and budget

Slide 15

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And as you drive integration deeper into the infrastructure, we highlight the benefits and issues at each level. If you would like to learn more about operational technology networks

Our second point on the benefits of specifying Niagara is based on Economics. As I mentioned before, Niagara allows you to solicit bids not only for a wide variety of providers for installation, service and support, but also enables those integrators to utilize Niagara controllers from various manufacturers whenever required…No more being tied to a single proprietary vendor for long term support contracts and their associated costs. Niagara providers earn your business every day.

Niagara – The Power of Choice

The Global leader in Open Platform Building Automation, Tridium's Niagara Framework is offered by over 60 OEM partners worldwide

As you can see, Niagara truly does give you the power of choice, there are over 60 worldwide brands that have Niagara Framework offerings. Even the biggest names in building automation, who all have their own proprietary offerings (ComfortPoint, Metasys, Desigo and EcoStruxture, for example) also have Niagara Framework offerings. You can still utilize the wide variety of HVAC devices that these manufacturers offer, along with the flexibility, power and security of having them controlled by open Niagara.

So, how can you be sure you ACTUALLY get an open system? Well, we have created the NICS…

Niagara Information and Conformance Statement (NICS)

The Niagara Compatibility Statement (NICS) for all Niagara Software shall allow open access and be set as follows: accept.station.in="*" accept.station.out="*" accept.wb.out="*" accept.wb.in="*". In any case, the end user shall maintain the right to instruct the contractor to modify any software license, regardless of supplier, as desired by the end user. *The contractor shall not install any "brand-specific" software, applications or utilities on Niagara Framework-based devices.*

All hardware and field-level devices installed shall not be limited in their ability to communicate with a specific brand of Niagara Framework JACE. They shall also be constructed in a modular fashion to permit the next generation and support components to be installed, in replacement of or in parallel with existing components. *All controllers must be able to be programmed within the Niagara Workbench*.

At the completion of the project, the owner shall be given all existing platform and station login credentials to include; super user (admin) usernames; passwords and passphrases.

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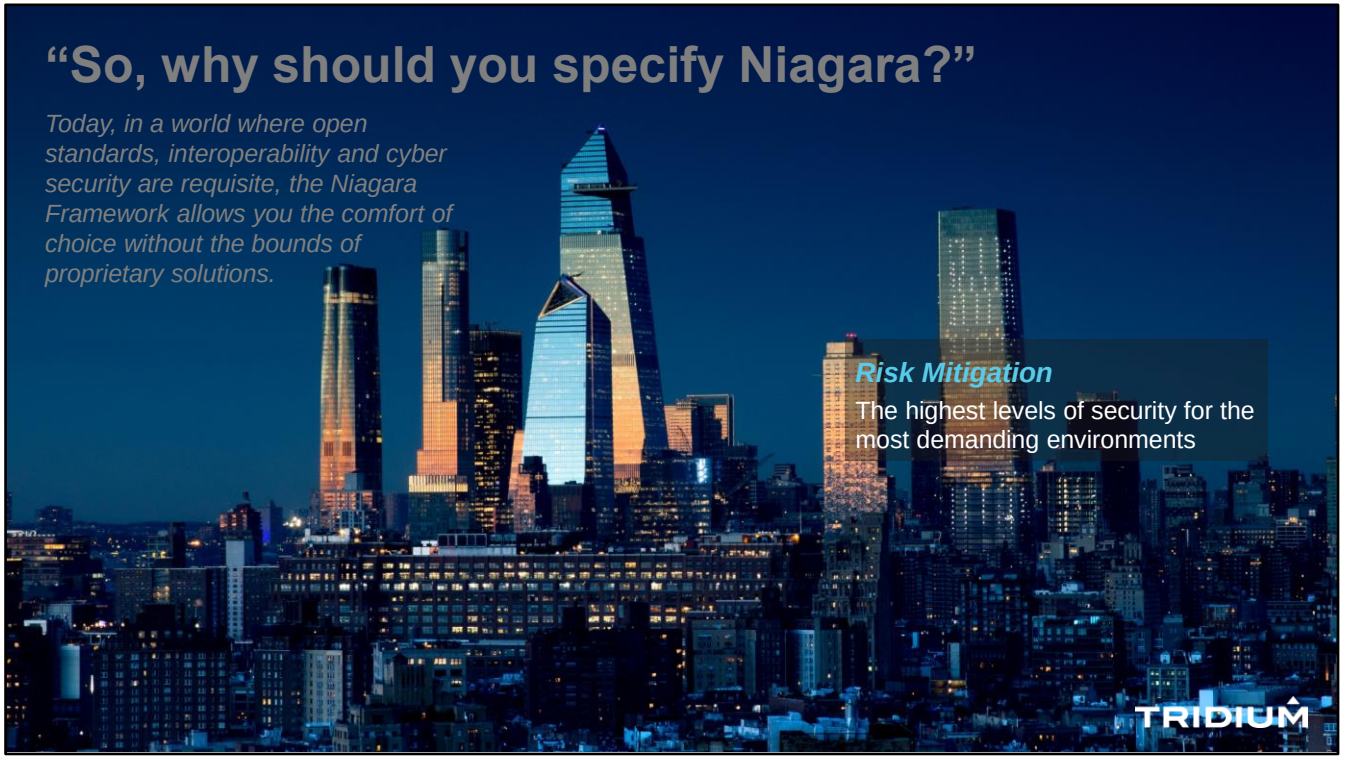
The Niagara Information and Conformance Statement, or NICS, is the key pillar to specifying Niagara – this verbiage incorporated into your specifications will ensure that you get a fully open control environment and is a part of our specification documents we have available for you.

Of particular importance is the requirement to make downstream controllers programmable from with the Niagara Workbench. I referenced this before, and it is here that you will specify your requirement so as to not get locked into proprietary tools and licenses.



As you know, cybersecurity is more important than ever. Niagara helps you mitigate risk by incorporating the most advanced cyber capabilities of any building control platform available.

Cybersecurity – a defense in depth approach

- **Strong Authentication** (SCRAM-SHA-256-bit DIGEST) with pluggable authentication schemes
- **PKI Integration** – Certificate management tools within the framework - ability to import/use 3rd party digital certificates with Niagara.
- **Role-Based Access Control** for authorization, providing access to security components by security role
- Use of **Internal Security Manager**, controlling authorization at the API level (protecting components of the framework from only accessing authorized methods & items)
- **Encrypted Communications & Encrypted sensitive information at rest** for confidentiality. FOXS and HTTPS utilize Transport Layer Security (TLS 1.3) - additional degree of integrity protection in the protocol
- **Digitally Signed & Validated Code**, providing non-repudiation and assurance of system integrity
- Integration Capability with Security Infrastructure, including **LDAP Directory Servers, Kerberos, and SAML 2** Identity Providers for Single Sign-On
- **Common-Sense User Account Management** (Forced Strong Passwords, User Lockouts, Forced Removal of Factory Default Passwords, the ability to rename /change known user names...)
- **Auditing** of user activity at customizable levels
- **Cybersecurity Team** - A dedicated team focused on continuous security improvements

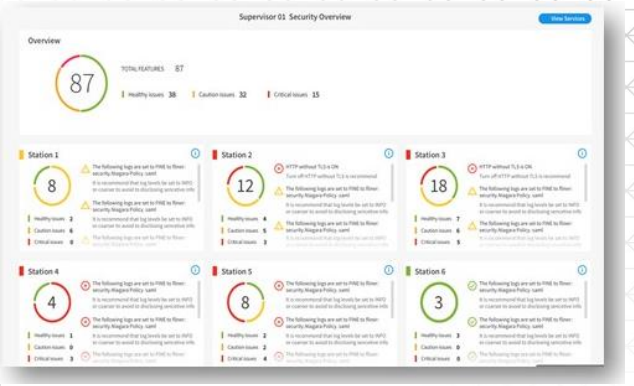
Tridium takes a multi-layered approach to cybersecurity and we have a dedicated team focused on this crucial feature. There are multiple TridiumTalks about this, as well as network hardening and configuration guides, and other downloadable documents and white-papers that are available to you.

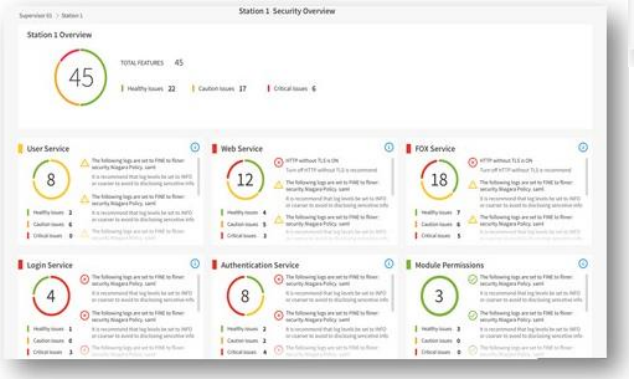
Security Dashboard

Quickly assess the security posture of your Niagara Network

Supervisor view shows all JACEs on your network

- Quickly identify issues with roll up view
- Triage Outliers
- Manage Certificates and access privileges





For a more in-depth discussion on cyber, join us Wednesday October 12th

"Writing Cybersecure Specifications for Buildings: What You Need to Know!"

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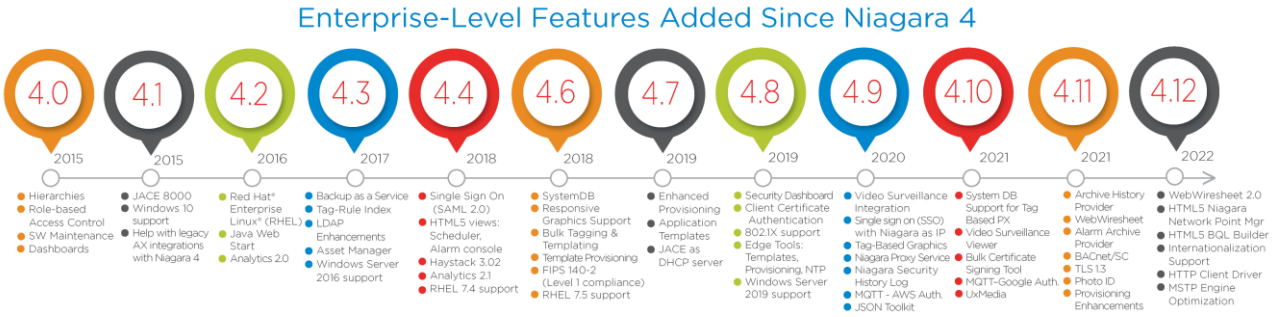
Introduced back in Niagara 4.8 is the Security Dashboard a Niagara service that can be configured to monitor the critical elements of your network, including the state of your Authentication Certificates and user permission levels. On October 12th I highly encourage you to join us for an in-depth discussion in the session…

"Writing Cybersecure Specifications for Buildings: What You Need to Know!"

Our fourth and final point for ‘Why you should specify Niagara’ is all about “Future Proofing” or the Protection of your Investment.

Protection of your investment…



The same JACE controller deployed in 2015 has vastly more capabilities today through constant enhancements to Niagara 4…

Slide 23

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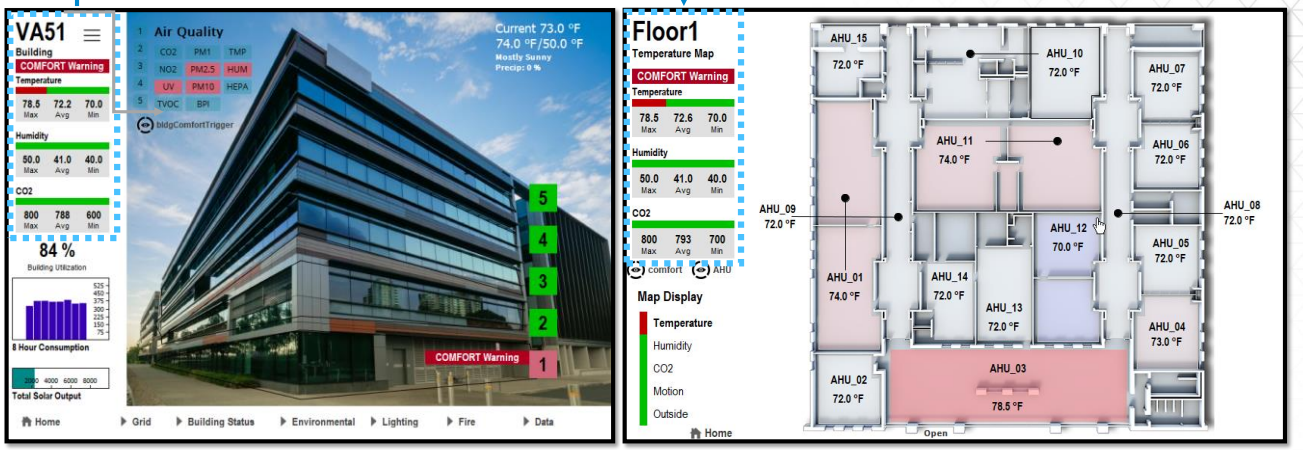
As you can (sort of) see here, Tridium is constantly enhancing Niagara with not only security updates, but also additional capabilities for new technologies that truly enhance the value of your already installed Niagara devices. A Niagara 4.0 system installed in 2015 with a Software Maintenance Agreement in place has been able to add valuable features such as

Niagara Asset manager in 4.3
SSO SAML 2.0 and the Alarm Console in 4.4
The Security Dashboard in 4.8
MQTT, Video integration and Security Logs in 4.9
BACnet SC Support and TLS 1.3 in 4.11

And 4.12 has just been announced with even more features…

Niagara Analytics – Built in tool-set



Build, Floor, Room, AHU

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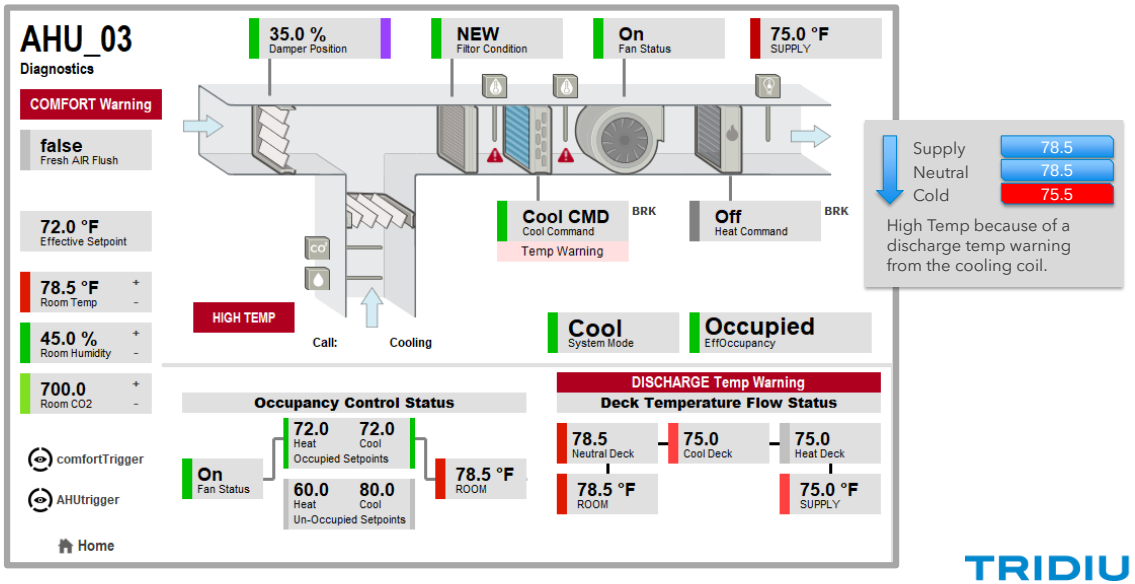
The Niagara Framework also has a built-in Analytics Service available to be licensed and configured to provide everything from energy management to Fault Detection and Diagnostics – either directly within the field controller, or on the server.

And if we drill down further by clicking on the AHU_03 to see what is triggering that alert…

FD&D – Drilling down for Root Cause



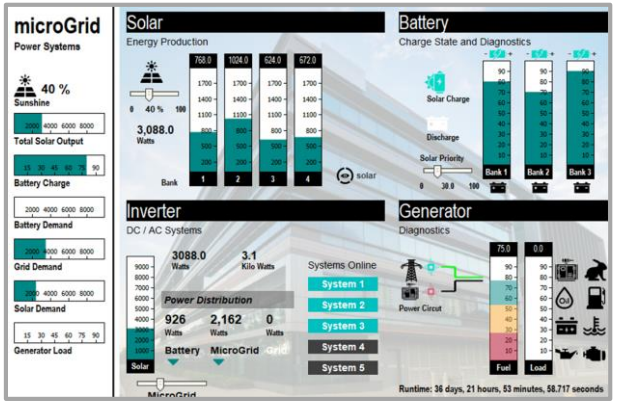
In terms of Fault Detection, here we can see that there is a warning on the cooling deck that shows we are not getting the expected temperature change (delta T) from the coil. At this point we might go ahead and cycle valves to see if there is something 'stuck' or send out a tech to check on this unit directly.

Additionally, Niagara Analytics can be configured with further diagnostic algorithms to help determine the issue at hand.

This is just one example of how the combination of Niagara Analytics and well-placed sensors can manage FD&D, helping to minimize truck rolls, and lead to better/faster service and potential cost savings…

Analytics Dashboard Examples

Energy Usage

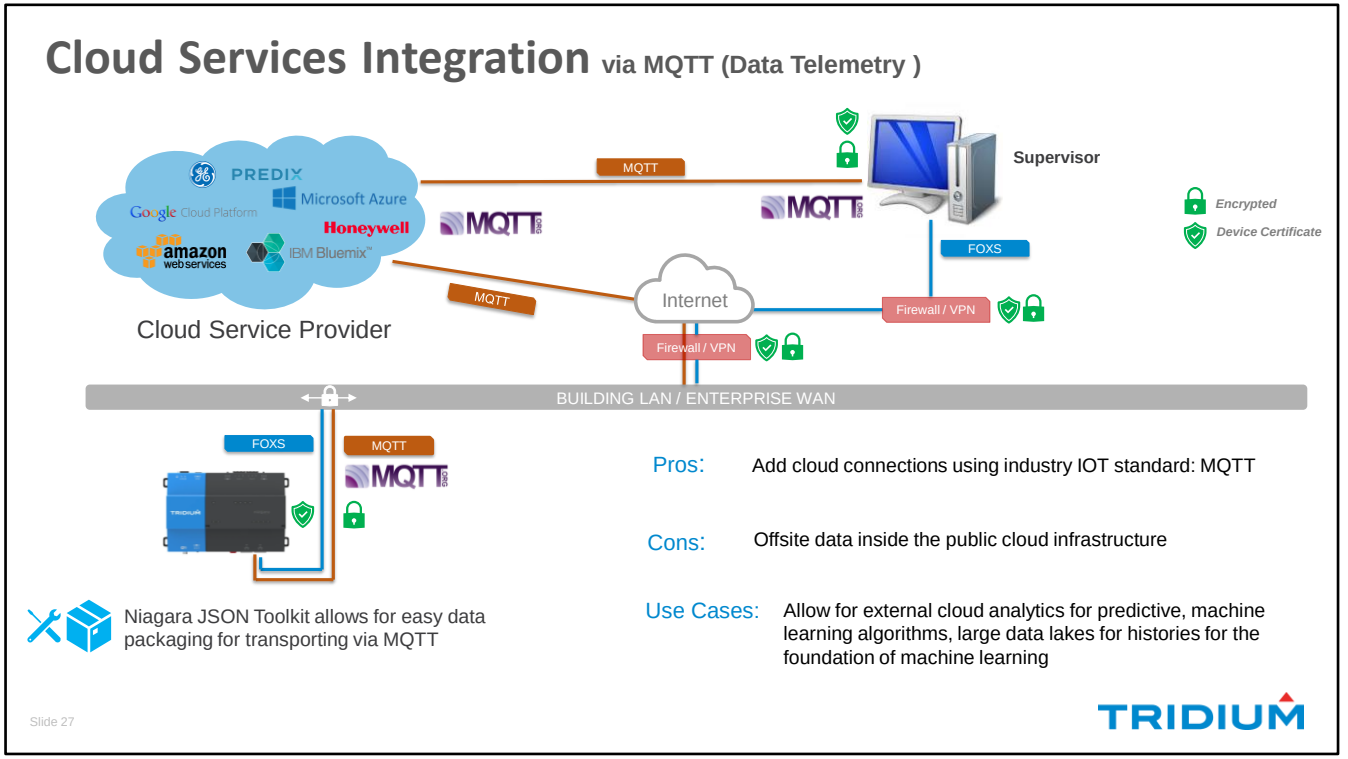


microGrid Management

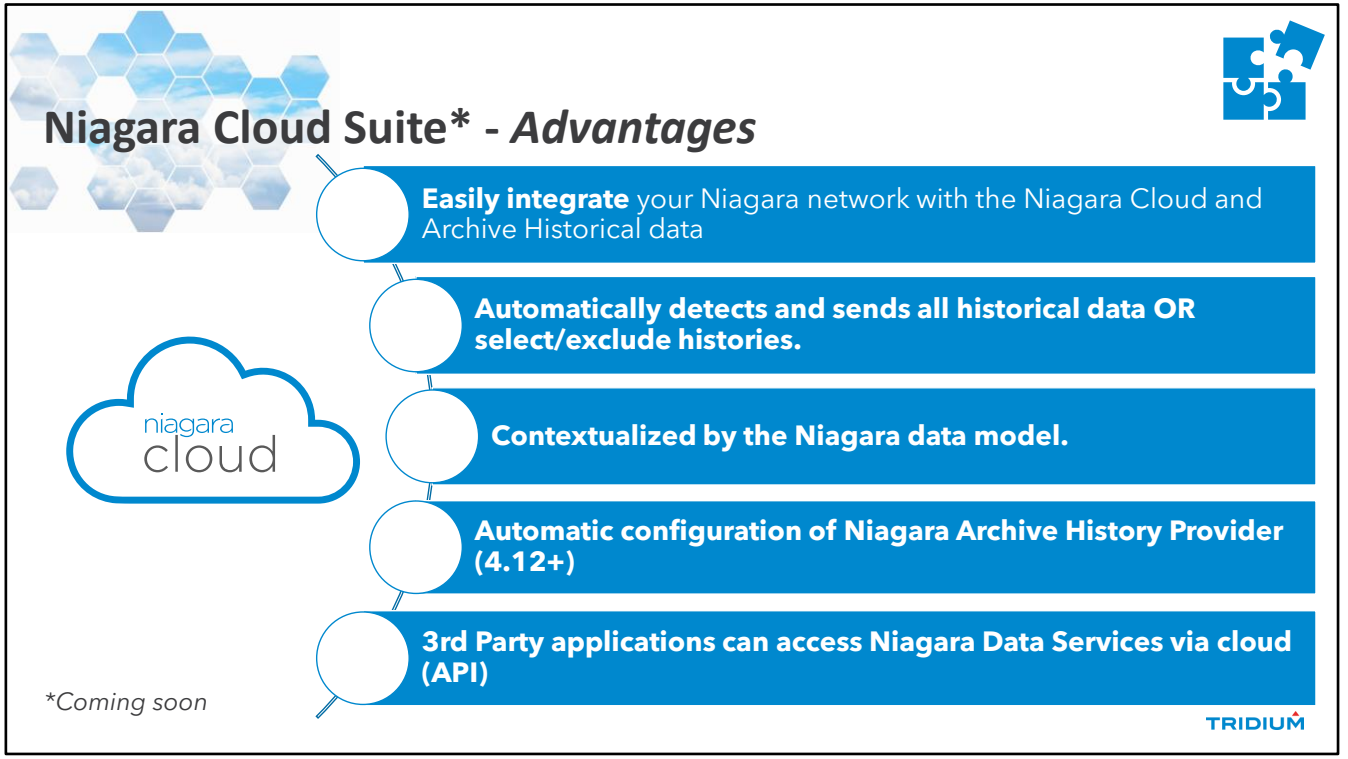
For a more on Analytics, join us Thursday, November 3rd
"Writing Analytics Specifications for Smart Buildings"

TRIDIUM

Here are a couple more dashboard examples that use Niagara Analytics to monitor energy usage and manage a microgrid.



And, as Cloud Service offerings grow, if you choose to subscribe to any of them, Niagara enables you to connect and integrate easily with a wide variety of tools, including…



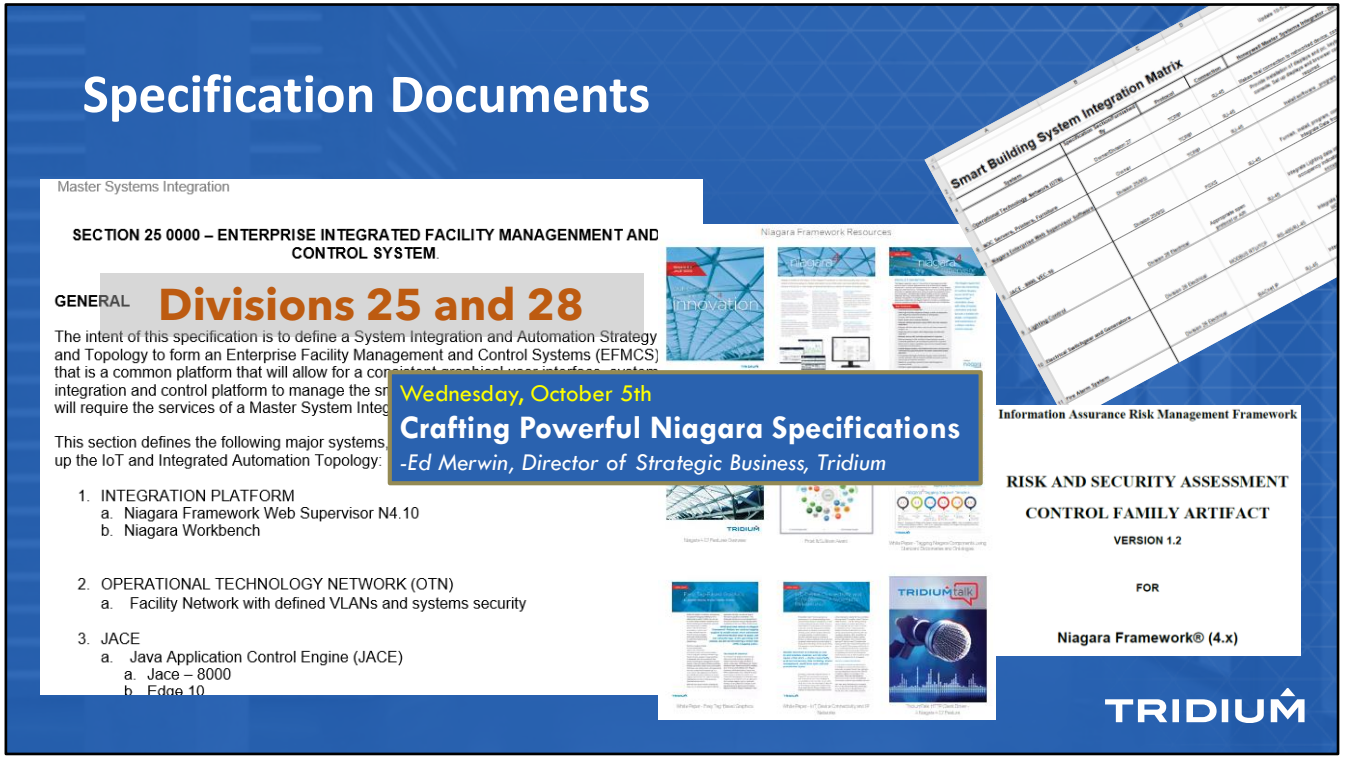
A brand-new offering - the Niagara Cloud Suite, being introduced soon. It provides a fast and simple way to enable contextually rich data to be linked (via APIs) to your selected cloud service provider or application. So, whether you choose to run fully "on-prem", in the cloud, or hybrid, Niagara has the tools to enable your operations.

Now that you know a bit more about Niagara and the features and services it has available, let's take look at how we at Tridium can help you

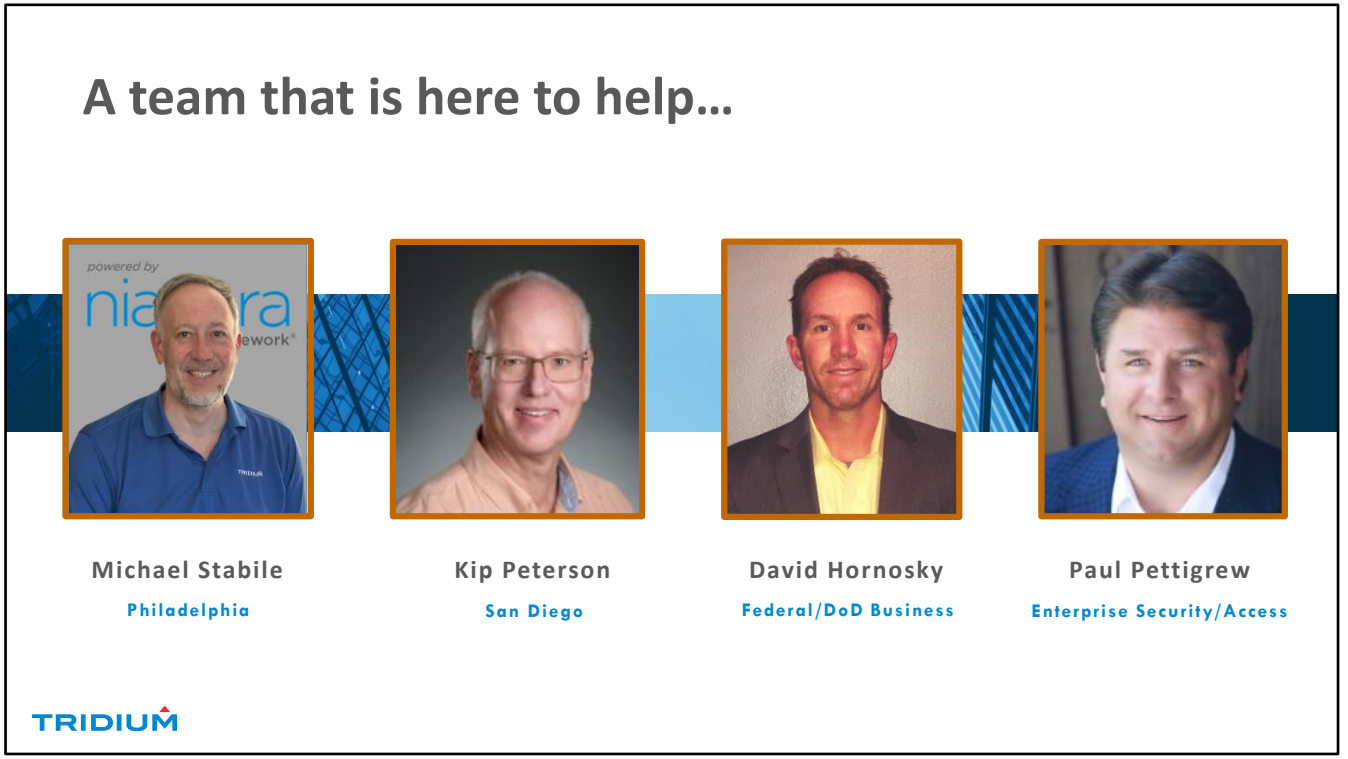
Here are three great resources available to you. First, **Tridium University** has dozens of classes for everyone - from End Users wanting to be able to manage their own systems, to certification training for our integration partners, to Developer tools for programmers.

Next, **Niagara Community** is a site that enables for the exchange of knowledge, advice and support between Tridium, our customers and our integration and support partners.

Finally, **Tridium Events**, (like the one you are attending today, are designed to provide information to the Niagara Community at large. TridiumTalks and Pro Tips Series are all recorded and available for online viewing. And our, Niagara Summit – a biennial event that is part trade-show, part training event and 100% immersion in all things (and people) Niagara, is a great event to meet industry professionals and hear from customers, developers and partners about how they are utilizing Niagara.



We often get requests for Div 25 and 28 verbiage, and we have spec documents we can share. You will hear more in our next installment of this series, ***Crafting Powerful Niagara Specifications***, about the documents and white-papers we have available, including a Smart Building Integration Matrix, product information sheets, Cybersecurity Papers, and for our DoD clients, the Risk Management Framework (RMF) artifacts they may require.



Finally, I would like to introduce our team of Business Development Professionals. I want to reiterate that we at Tridium DO NOT sell directly. This team exists to educate our customers on the value of the OPEN Niagara Framework, regardless of OEM brand. We can be engaged for presentations, and we can also help you identify integration firms appropriate to the requirements of your project.

Kip Peterson and I concentrate on specifiers and end users (of any type) – generally dividing the geography of North America. David Hornosky is our point-person for all things government related, particularly DoD and Federal. Paul Pettigrew specializes in our Enterprise Security and Access Control offerings. We work as a team, and often work together with you and your customer to ensure that your questions about Niagara are resolved. (our email format is first.last@tridium.com)

So, that's Niagara 101 – I hope that these four tenets of "why Specify Niagara" (Flexibility, Cost savings, Security and Future proofing) were informative and valuable for you. Thank you for your time, and please feel free to reach out to us for assistance. It's time for us to take a few questions…

And while we are gathering your questions, here's a quick reminder of the upcoming events in this series. Please join us for as many as you can, and feel free to invite others who might benefit as well.

Resources and Links

Tridium Website https://www.tridium.com/us/en

Tridium Library – Searchable for documents https://www.tridium.com/us/en/services-support/library

For info and to register for upcoming Specifier Events

Cybersecurity Page https://www.tridium.com/us/en/Products/niagara-cyber-defense

Page for Specifying Engineers https://www.tridium.com/us/en/Learn/by-role/specifying-engineer

Niagara Framework https://www.tridium.com/us/en/Products/niagara

Supervisor https://www.tridium.com/us/en/Products/niagara/supervisor

JACE https://www.tridium.com/us/en/Products/niagara/jace-8000

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Resources and Links … *continued*

Edge10 https://www.tridium.com/us/en/Products/niagara/edge10

Niagara Analytics https://www.tridium.com/us/en/Products/niagara-analytics

Enterprise Security https://www.tridium.com/us/en/Products/niagara-enterprise-security

Niagara Drivers https://www.tridium.com/us/en/Products/niagara-drivers

Tridium University https://www.tridium.com/us/en/services-support/tridium-university

Marketplace https://www.tridium.com/us/en/services-support/niagara-marketplace

Pro Services https://www.tridium.com/us/en/services-support/professional-services

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