OCTOBER 2023

Strategies For Getting Information From The Control Network

Elliott Middleton – Product Director - operations control

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Elliott Middleton

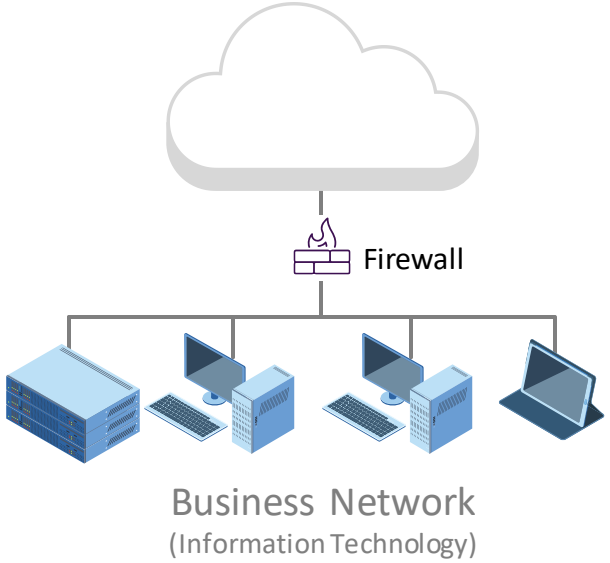
Product Director – operations control

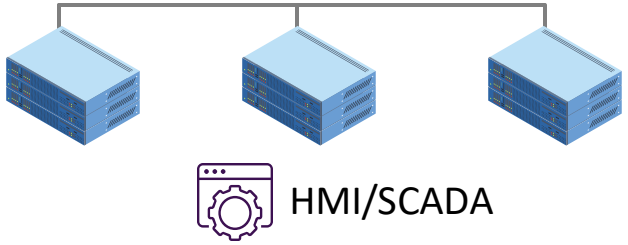
AVEVA

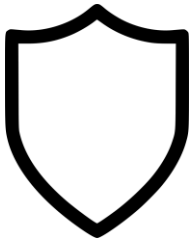
elliott.middleton@aveva.com

The Dilemma

Most of the Users







Safety Critical

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Reasons to Bridge Domains

Make information more accessible

Fuel process improvement initiatives

Enable self-service analysis & reporting

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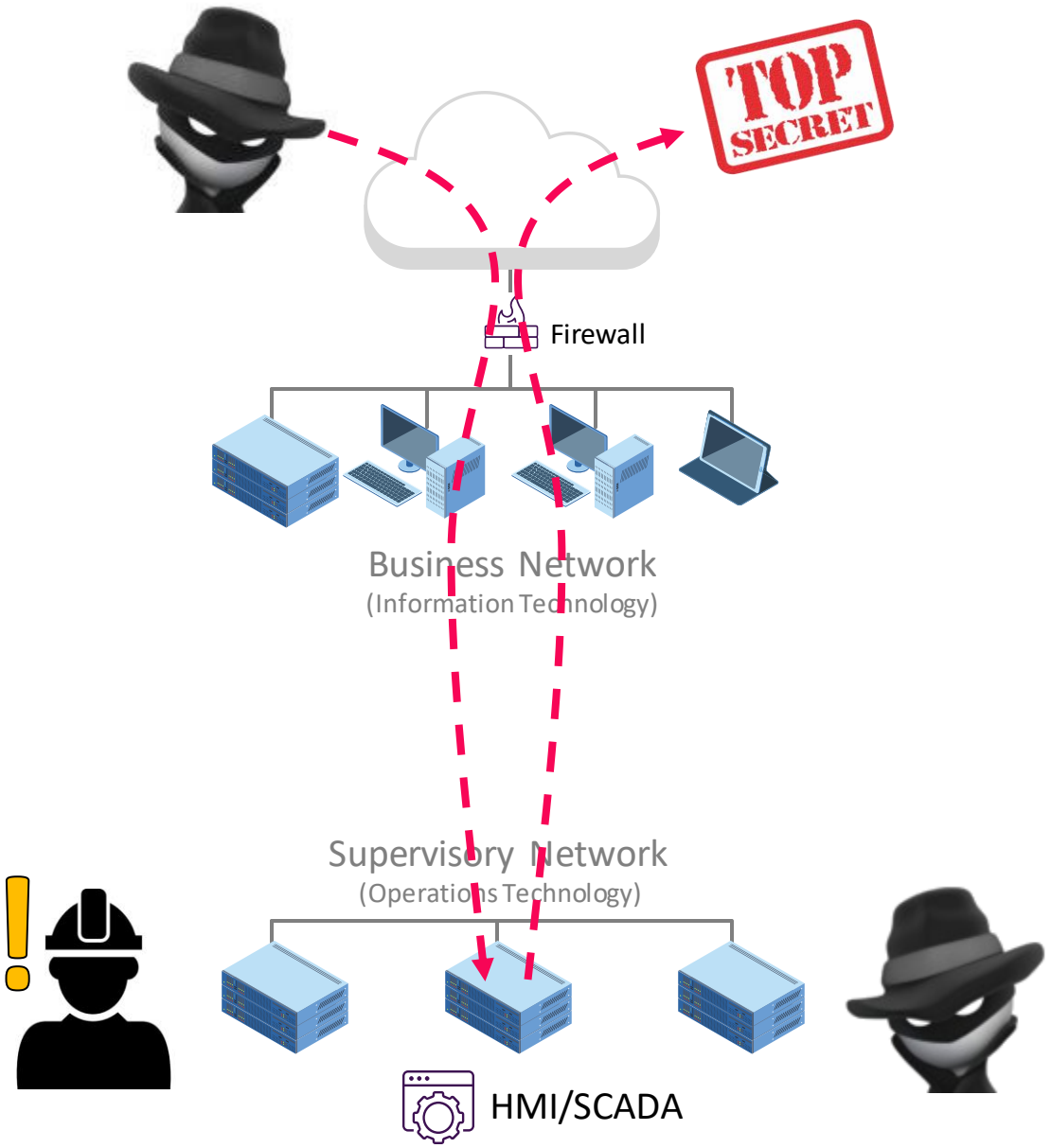
Threats



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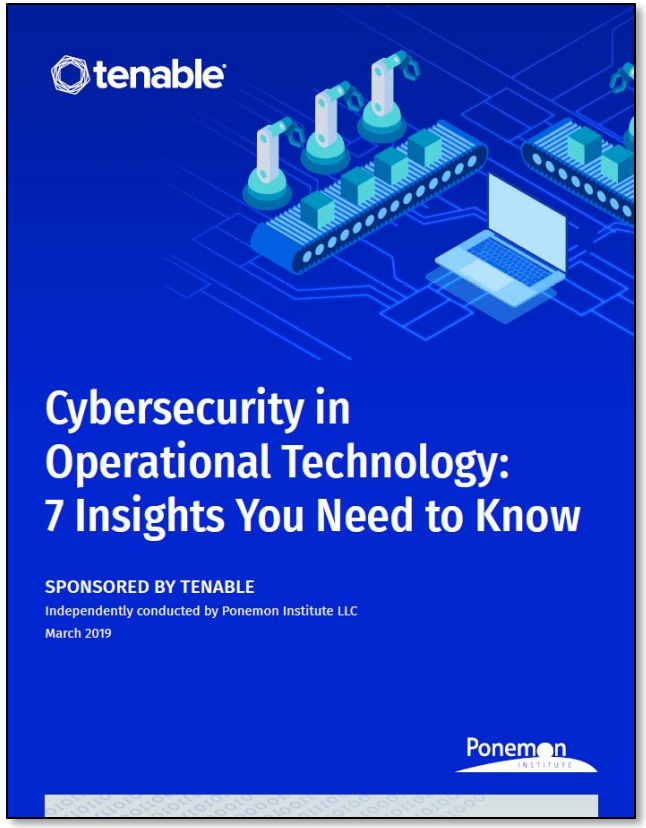
Cybersecurity Threat



2019 Cybersecurity Survey

- Focused on operational technology (OT)
- At least one participant is an AVEVA Historian customer (Taiwan Semiconductor)
- 701 total participants

Highlights:

- ? experienced plant *downtime* in the last 24 months
- ? experienced a nation-state attack

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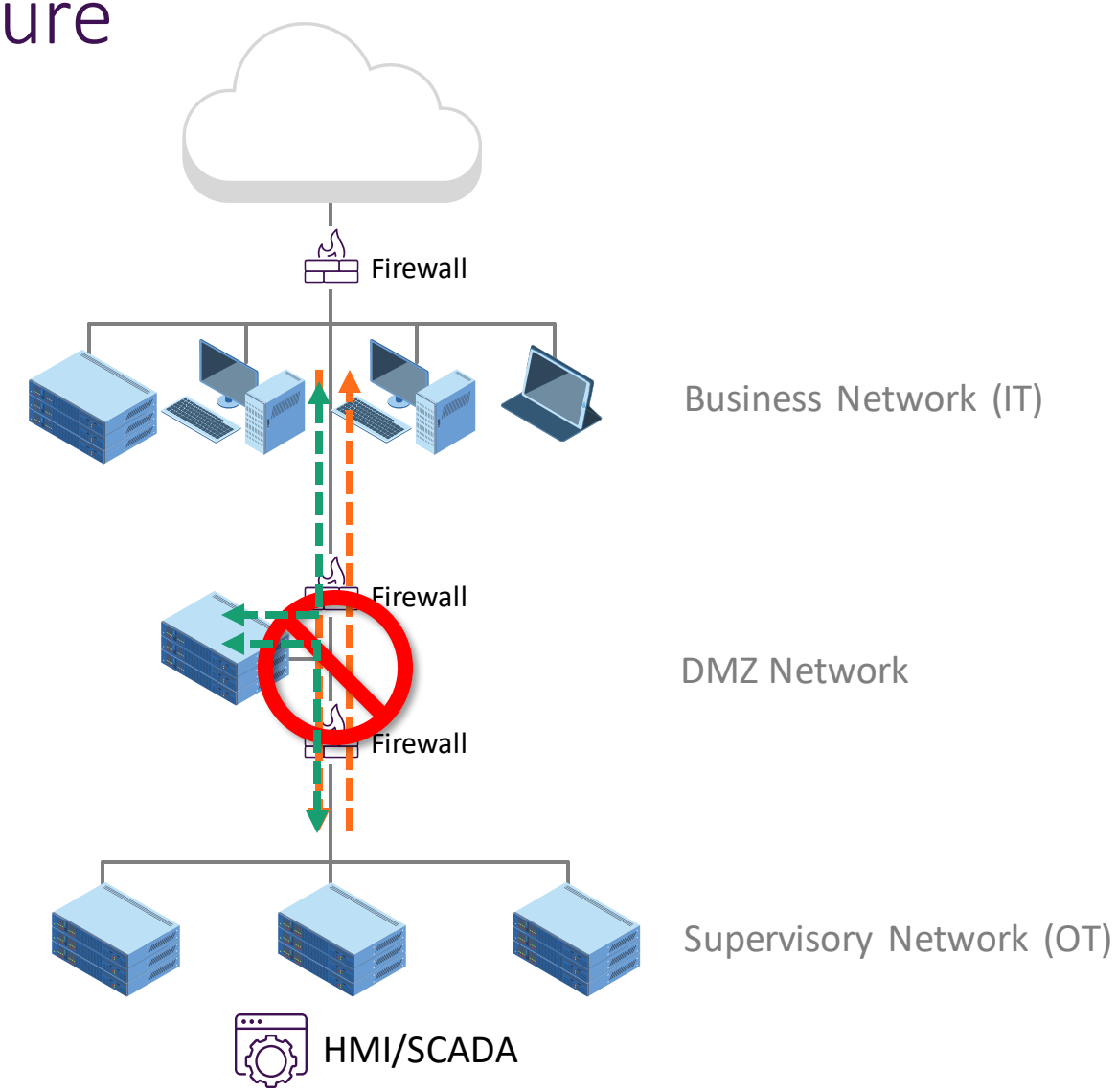
Best Practice Architecture

NERC-CIP
NIST

- No direct access between Supervisory/Business networks
- Only to adjacent network (DMZ)



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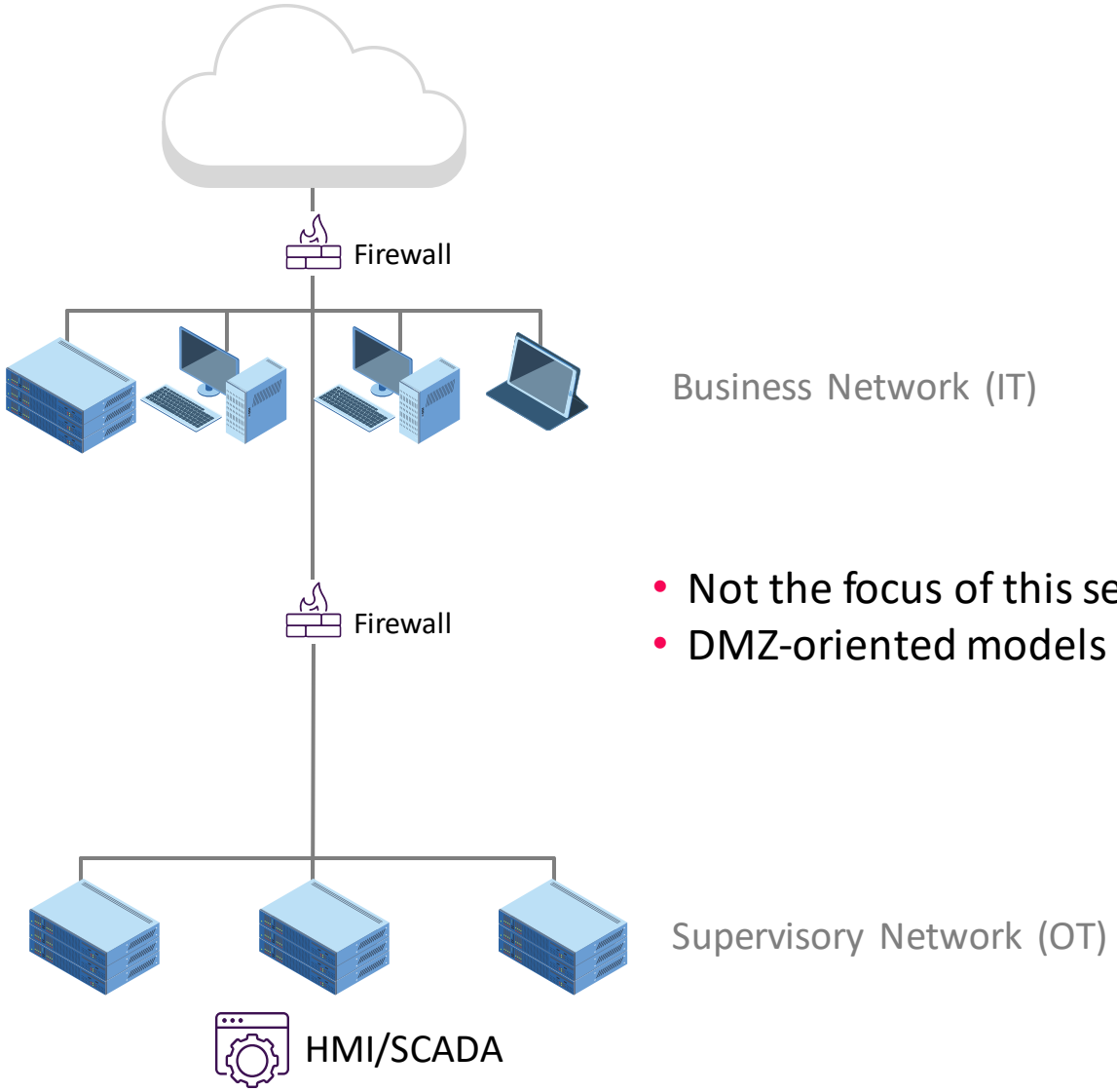
Common Architecture



- Less isolation than dual firewalls
- Simpler to use & manage

- Not the focus of this session
- DMZ-oriented models can be adapted

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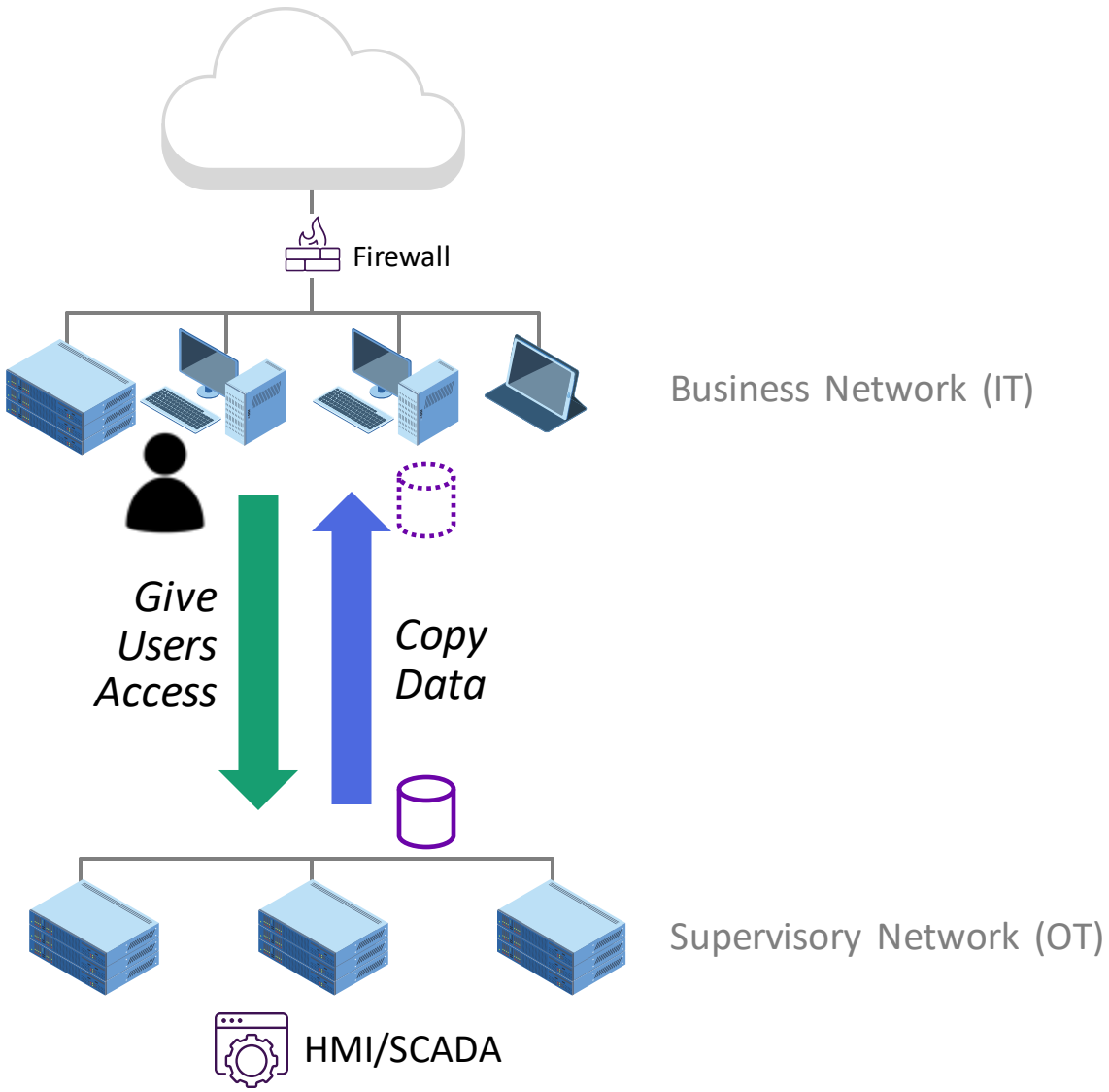
General Approaches



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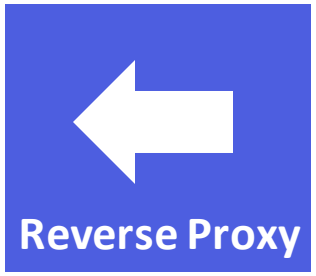
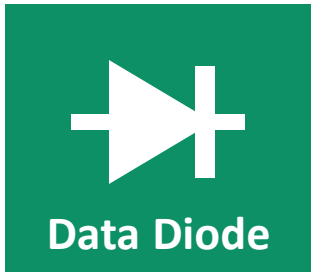
Strategies to Bridge IT/OT





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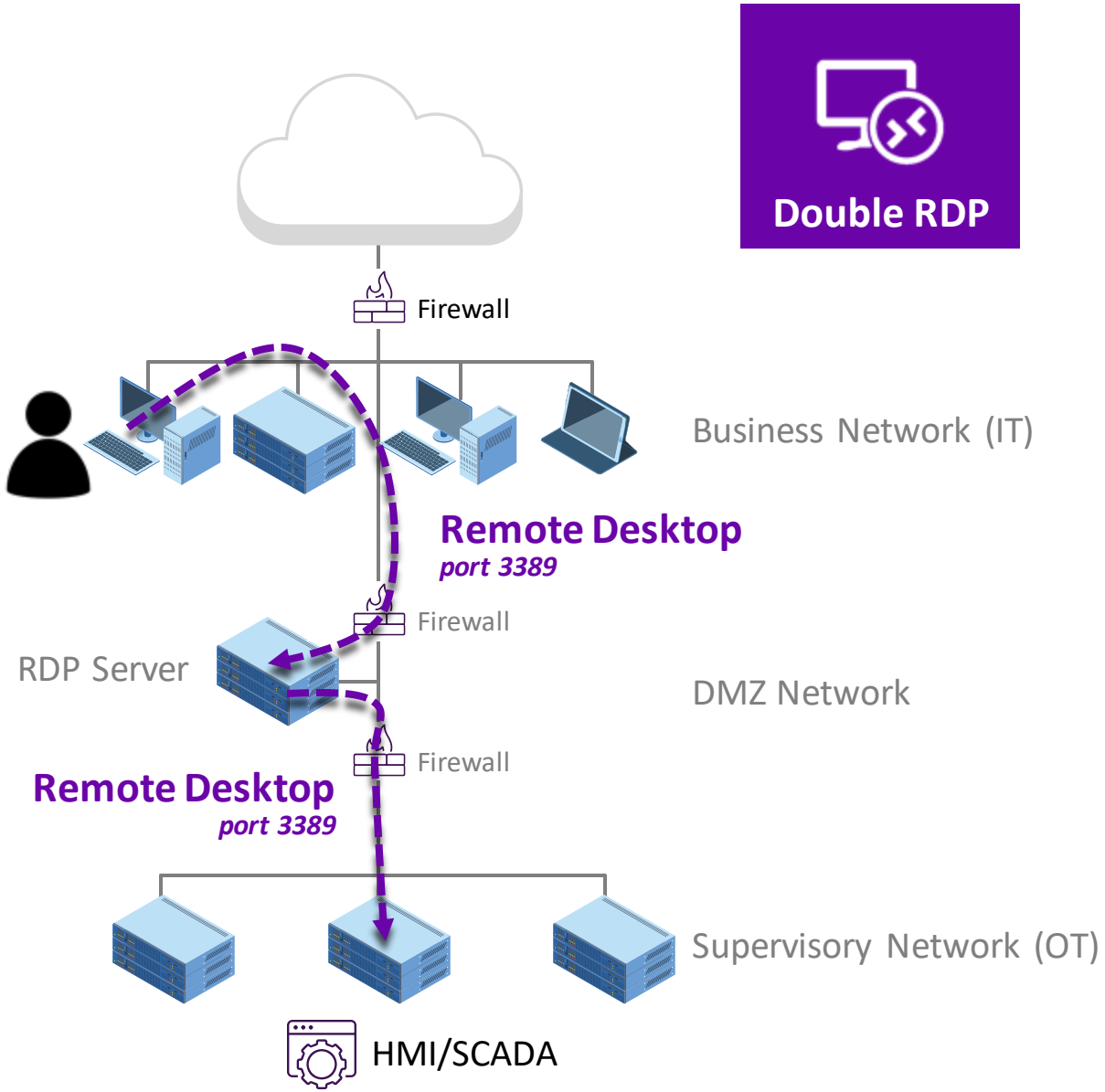
Double RDP

- Approach
  - RDP Server in DMZ
  - Open RDP to DMZ from IT network, to OT from DMZ
- Pros
  - Gives users access
  - Simple to define & manage
  - Secure protocol
- Cons
  - Requires inbound access to DMZ, OT
  - Multiple user logins to manage (2-3)
  - Only user access
  - Higher resource requirements than some options
  - Need care to restrict rights appropriately
- Example Threat: Compromised credentials, user error



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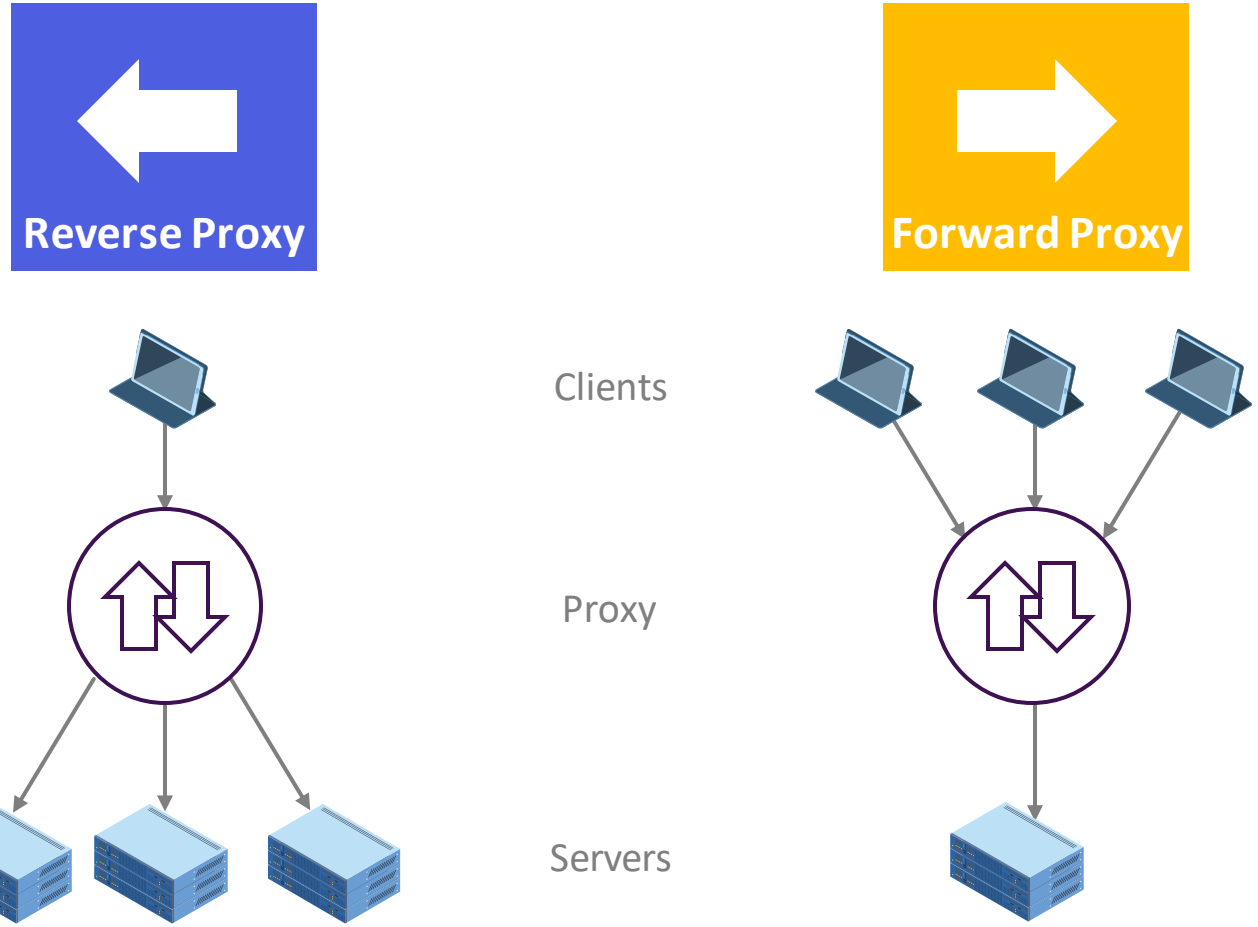
Web Proxies



- In front of server
- Isolates servers

- In front of clients
- Protects clients

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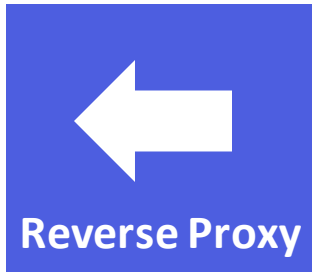
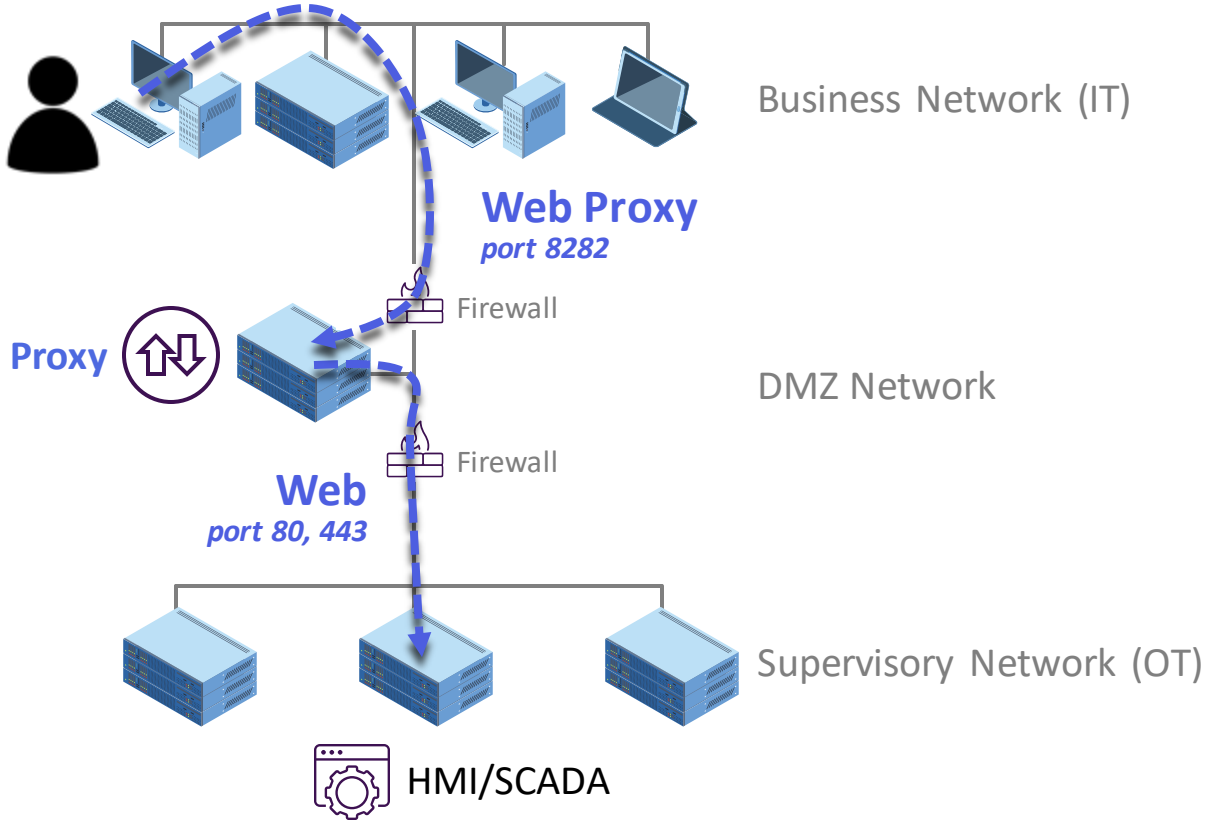
Reverse Web Proxy



- Approach
  - Proxy server in DMZ
  - Open Web to DMZ from IT network
  - Open Web to OT from DMZ
- Pros
  - Simple browser access
  - More narrow access
  - Proxy is mostly transparent to users
- Cons
  - Requires inbound access to DMZ, OT
  - Certificate management for HTTPS
  - Manage proxy settings
- Example Threat: Log4Js



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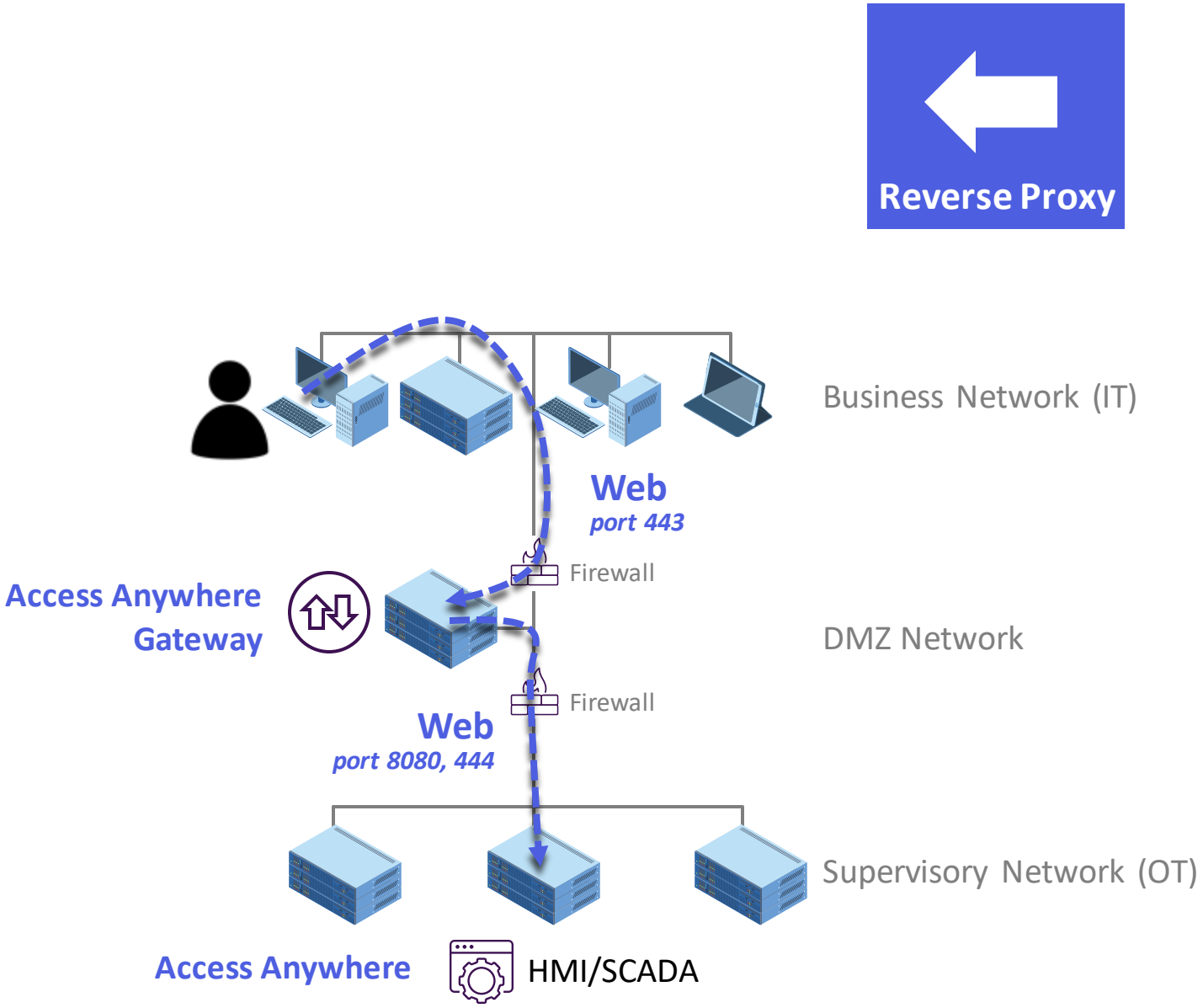
Reverse Web Proxy

With Access Anywhere Gateway

- Approach
  - Proxy server in DMZ
  - Open Web to DMZ from IT network
  - Open Web to OT from DMZ
- Pros
  - Simple browser access
  - More narrow access
  - Proxy is mostly transparent to users
- Cons
  - Requires inbound access to DMZ, TO
  - Certificate management for HTTPS
  - ~~Manage proxy settings~~
- Example Threat: Log4Js



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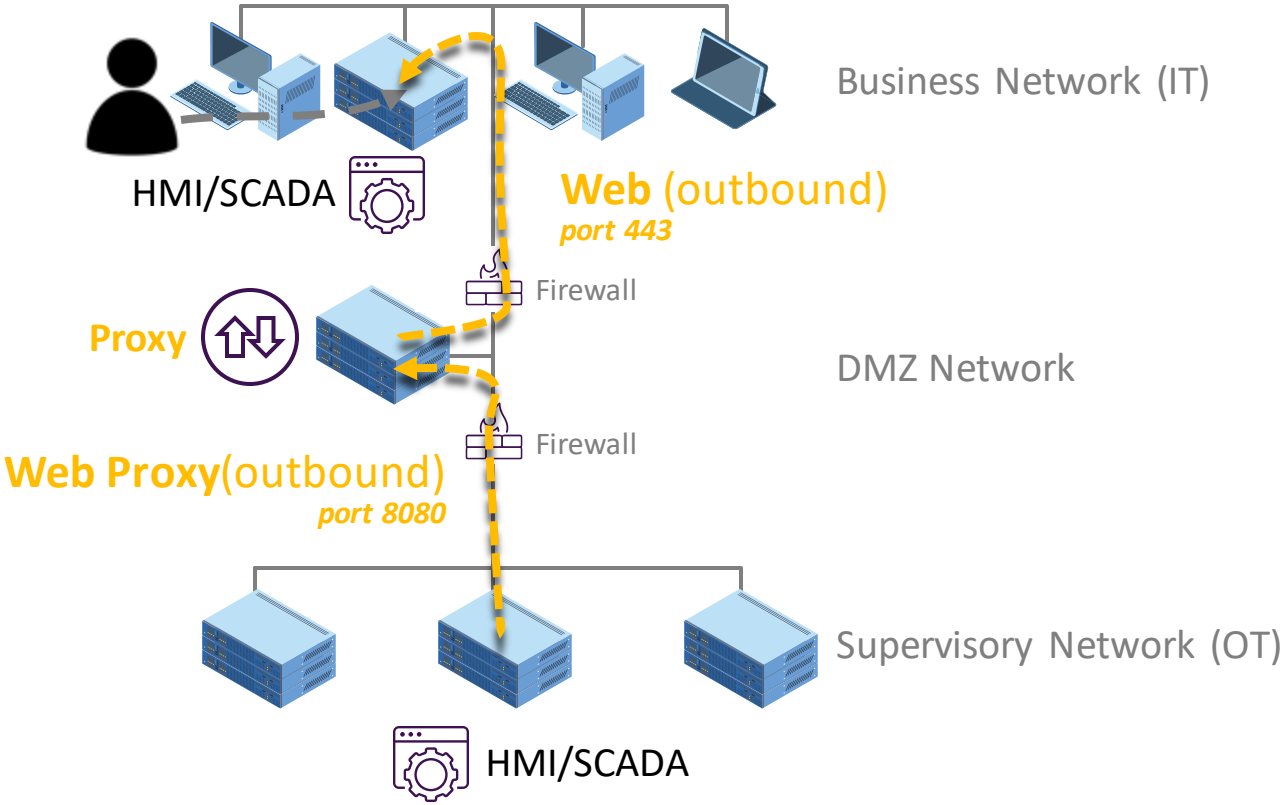
Forward Web Proxy

- Approach
  - Mirror to on-premises
  - Proxy server in DMZ for publishing
- Pros
  - No access to DMZ, OT required
  - Simple, broader access possible
  - Single Sign On (SSO) common
- Cons
  - Cost to maintain mirrored system
  - Manage “allow list” to limit access



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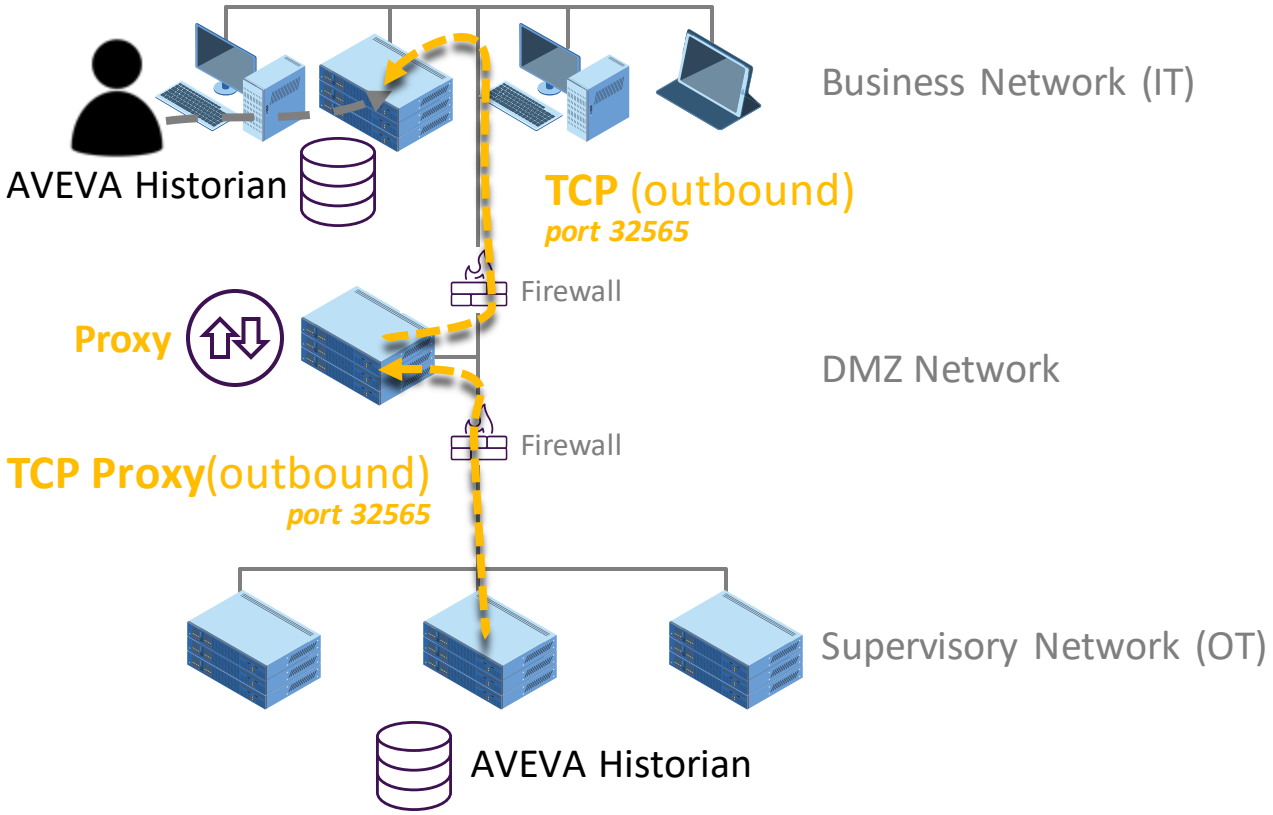
Forward Web Proxy

With AVEVA Historian 2023 R2

- Approach
  - Mirror to on-premises
  - Proxy server in DMZ for publishing
- Pros
  - No access to DMZ, OT required
  - Simple, broader access possible
  - Single Sign On (SSO) common
- Cons
  - Cost to maintain mirrored system
  - Manage “allow list” to limit access



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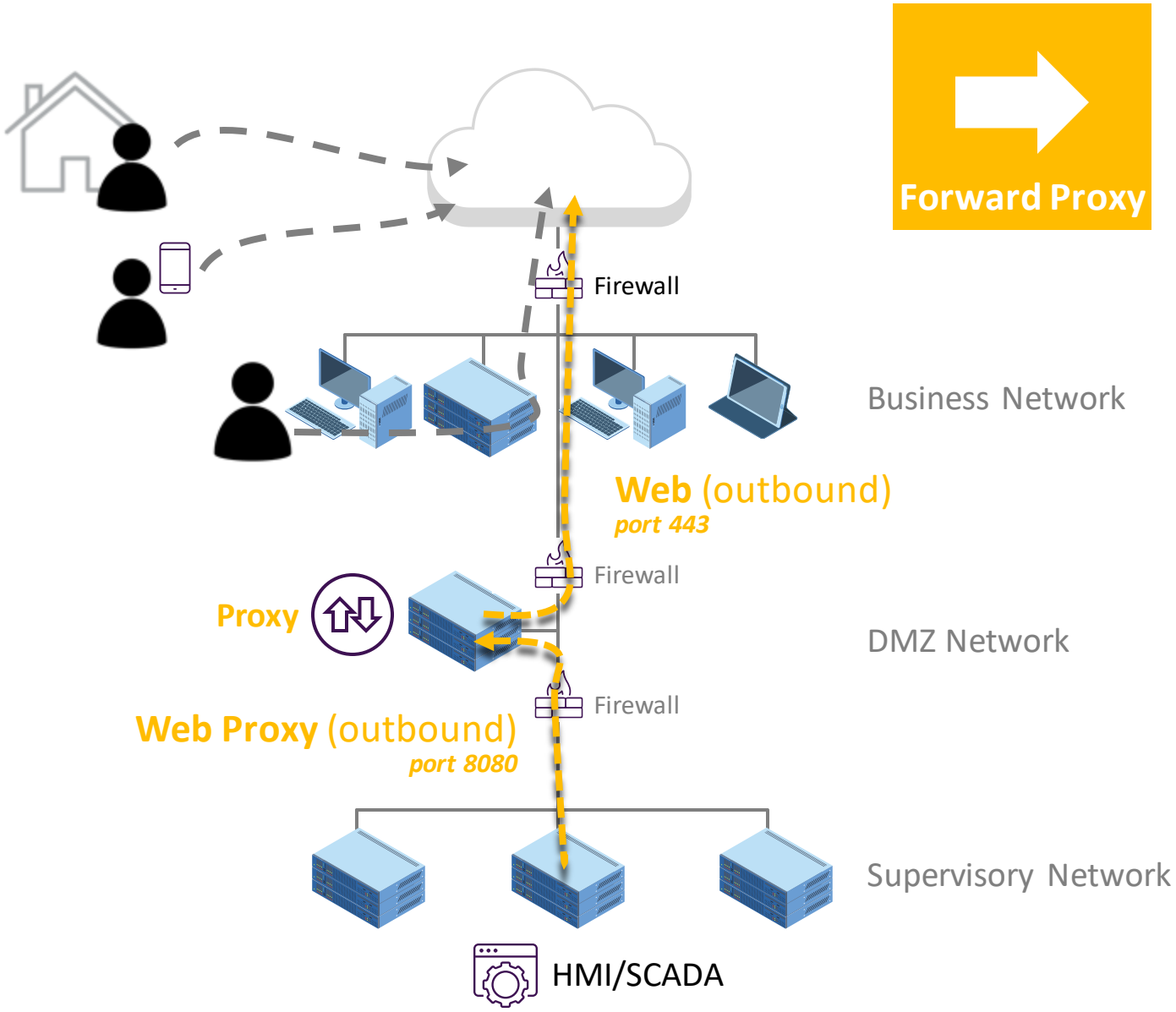
Forward Web Proxy

- Approach
  - Publish data to Cloud
  - Proxy server in DMZ for publishing
- Pros
  - No access to DMZ, OT required
  - Simple, broader access possible
  - Might use SSO
- Cons
  - Requires additional cloud subscription
  - Manage “allow list” to protect against malware, exfiltration, updates
- Example Threat: malicious site



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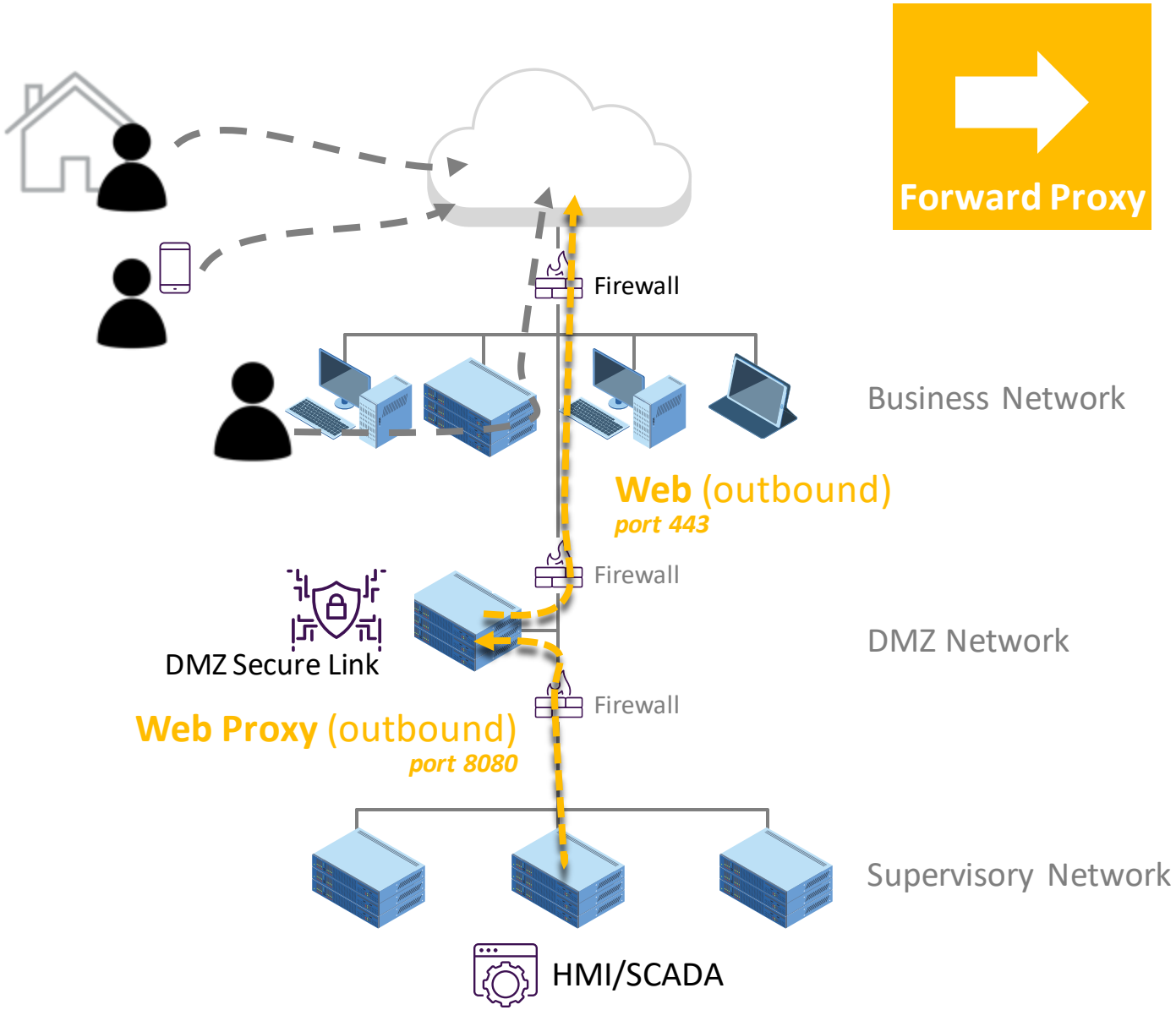
Forward Web Proxy

With DMZ Secure Link

- Approach
  - Publish data to Cloud
  - Proxy server in DMZ for publishing
- Pros
  - No access to DMZ, OT required
  - Simple, broader access possible
  - Might use SSO
- Cons
  - Requires additional cloud subscription
  - ~~Manage "allow list" to protect against malware, exfiltration, updates~~
- ~~Example Threat: malicious site~~



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Forward Web Proxy

With DMZ Secure Link

- Approach
  - Publish data to Cloud
  - Proxy server in DMZ for publishing
- Pros
  - No access to DMZ, OT required
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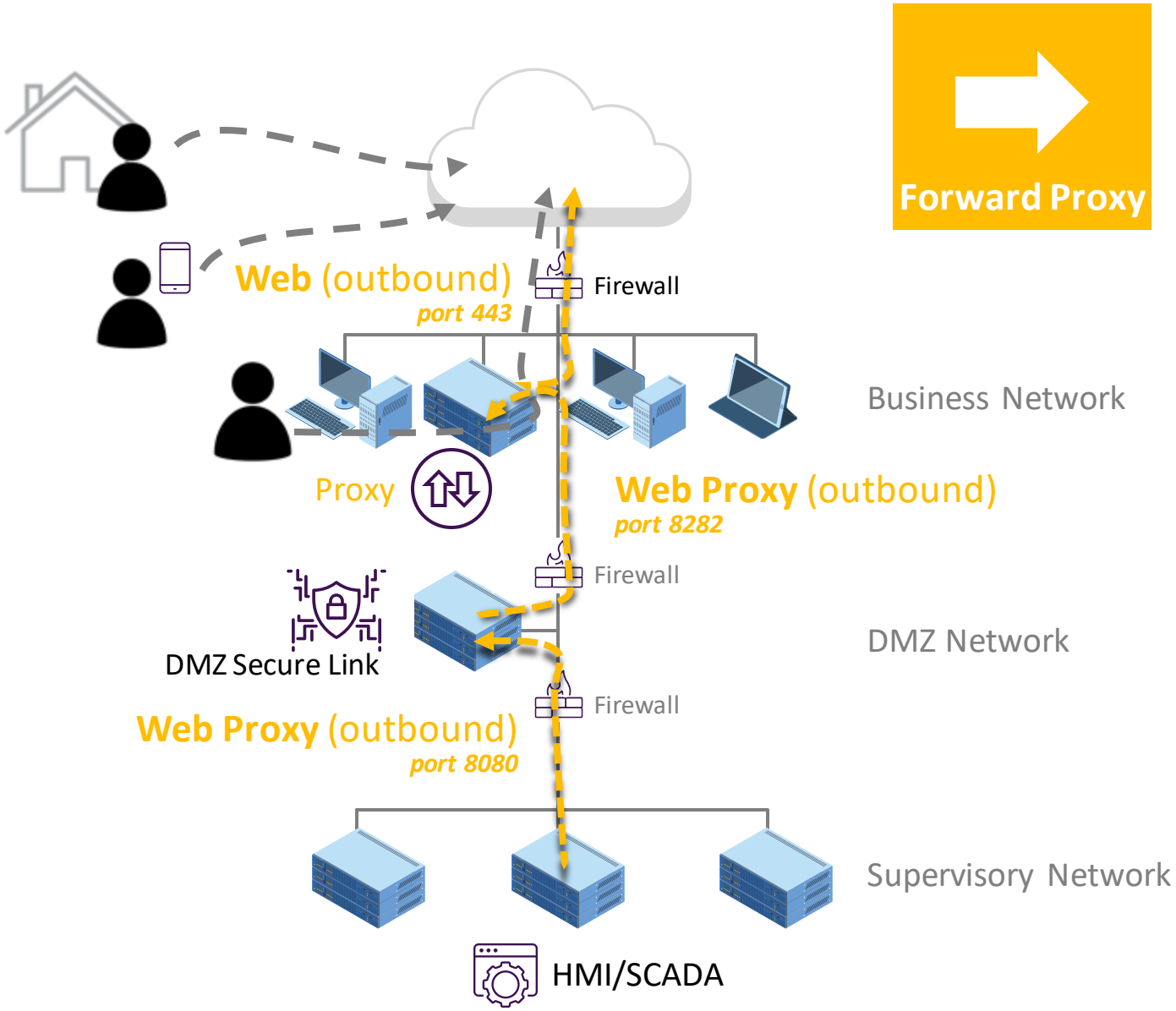
  - ~~Manage "allow list" to protect against malware, exfiltration, updates~~
- ~~Example Threat: malicious site~~



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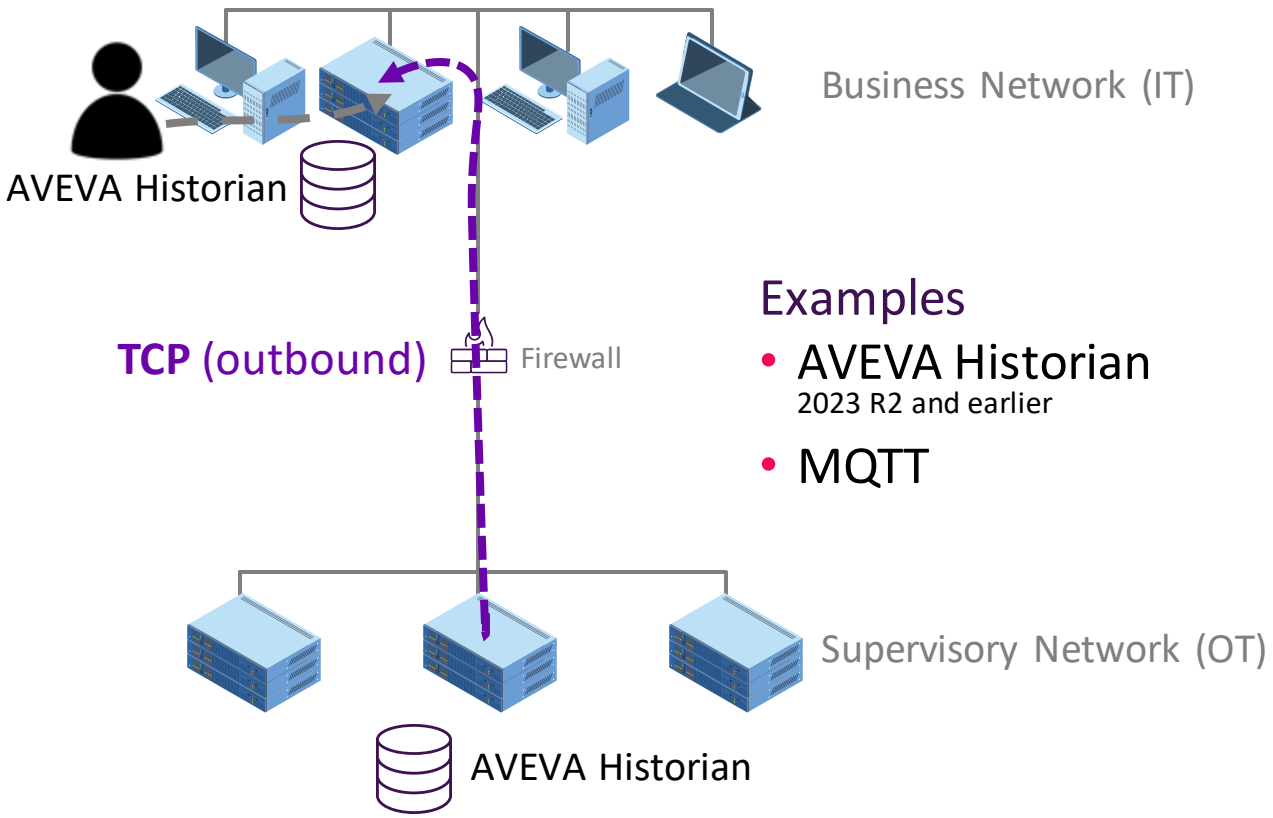
Simple Firewall (no DMZ)

- Approach
  - Mirror to on-premises (IT) system
  - Connections *from* OT to IT only
- Pros
  - Simple user access
  - Single Sign On (SSO) common
- Cons
  - Less protection for OT
  - Cost to maintain mirrored system



Examples
- AVEVA Historian
  2023 R2 and earlier
- MQTT

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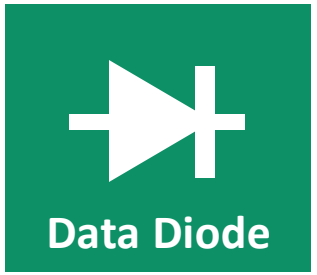
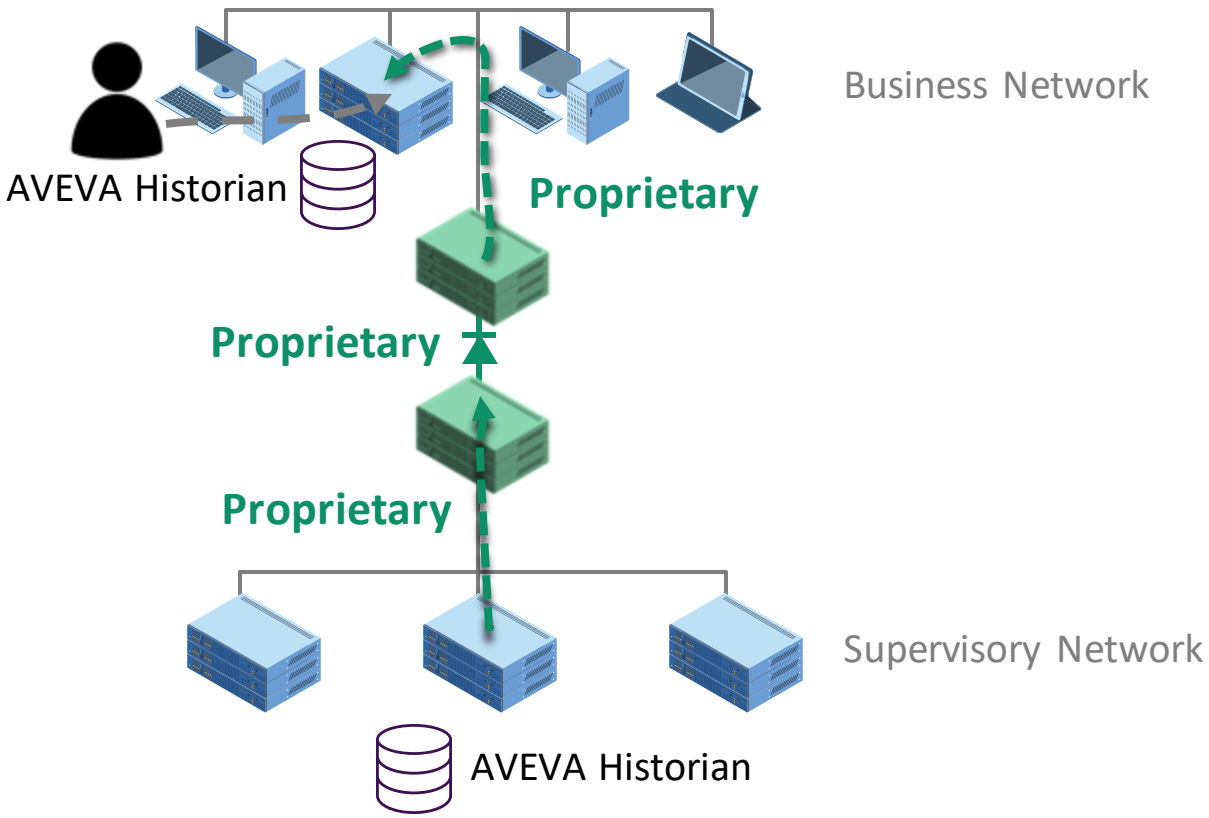
“Data Diode”



- Approach
  - Dual computers (vs. firewalls)
  - Connected with 1-way optical network
  - Proprietary mirroring
- Pros
  - Simple user access
  - Guaranteed 1-way “push”
- Cons
  - Unreliable delivery
  - Cost, proprietary solution
  - Cost to maintain mirrored systems
- Example Threat: Direct OT network & physical access



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Summary of Strategies

	Double RDP	Reverse Proxy	Forward Proxy	Data Diode
+	• Flexible access • Simple to setup • Secure protocol	• Simple browser • Narrow access • Nearly transparent	• Simple access • No DMZ/OT access • SSO possible	• Simple access • True one-way • SSO possible
−	• Inbound access • Multiple logins • More resources • Limit rights	• Inbound access • Certificate issues • Manage proxy	• Mirrored system • Manage allow list	• Mirror system • Cost • Proprietary • Unreliable delivery

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Other Challenges

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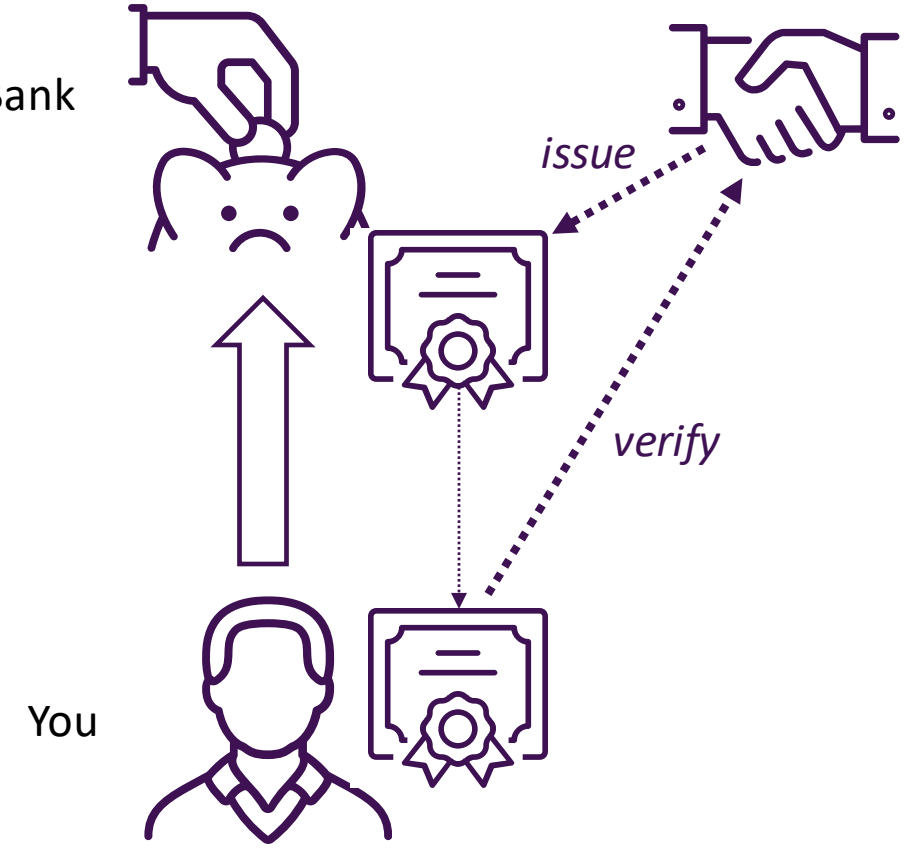
Certificate Basics

1 Your Bank

Trusted Authority 2



Threats

- Eavesdropping
- Tampering
- Impersonating

Challenges

- Authority
- Expiration
- Revocation

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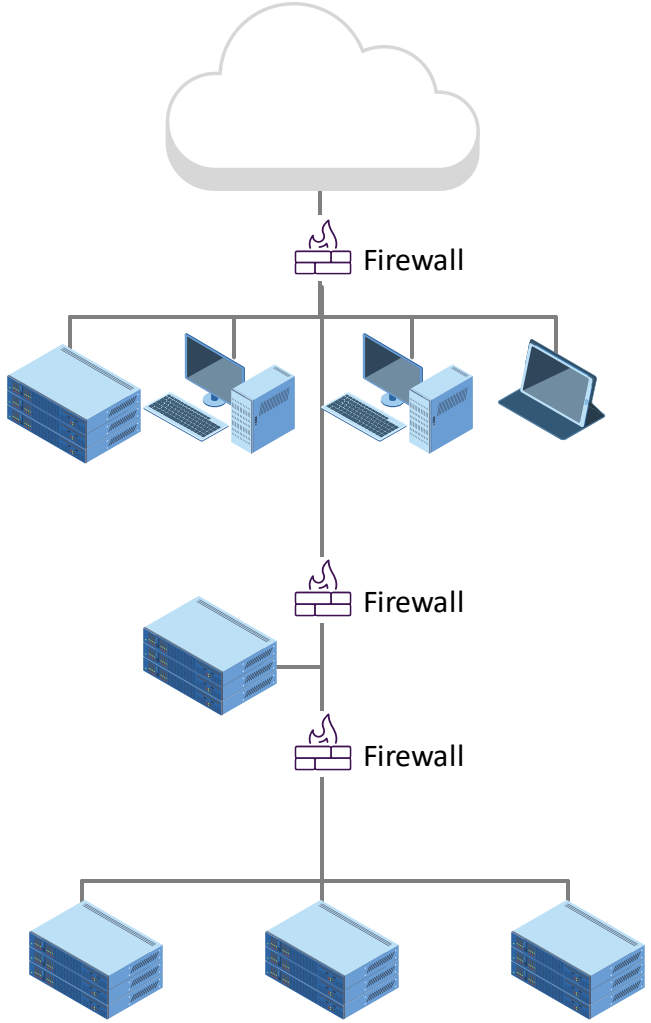
Certificate Challenges

Trusted Authority



Challenges

- Where to place authority?
- How to handle expiration
- Access to revocation list

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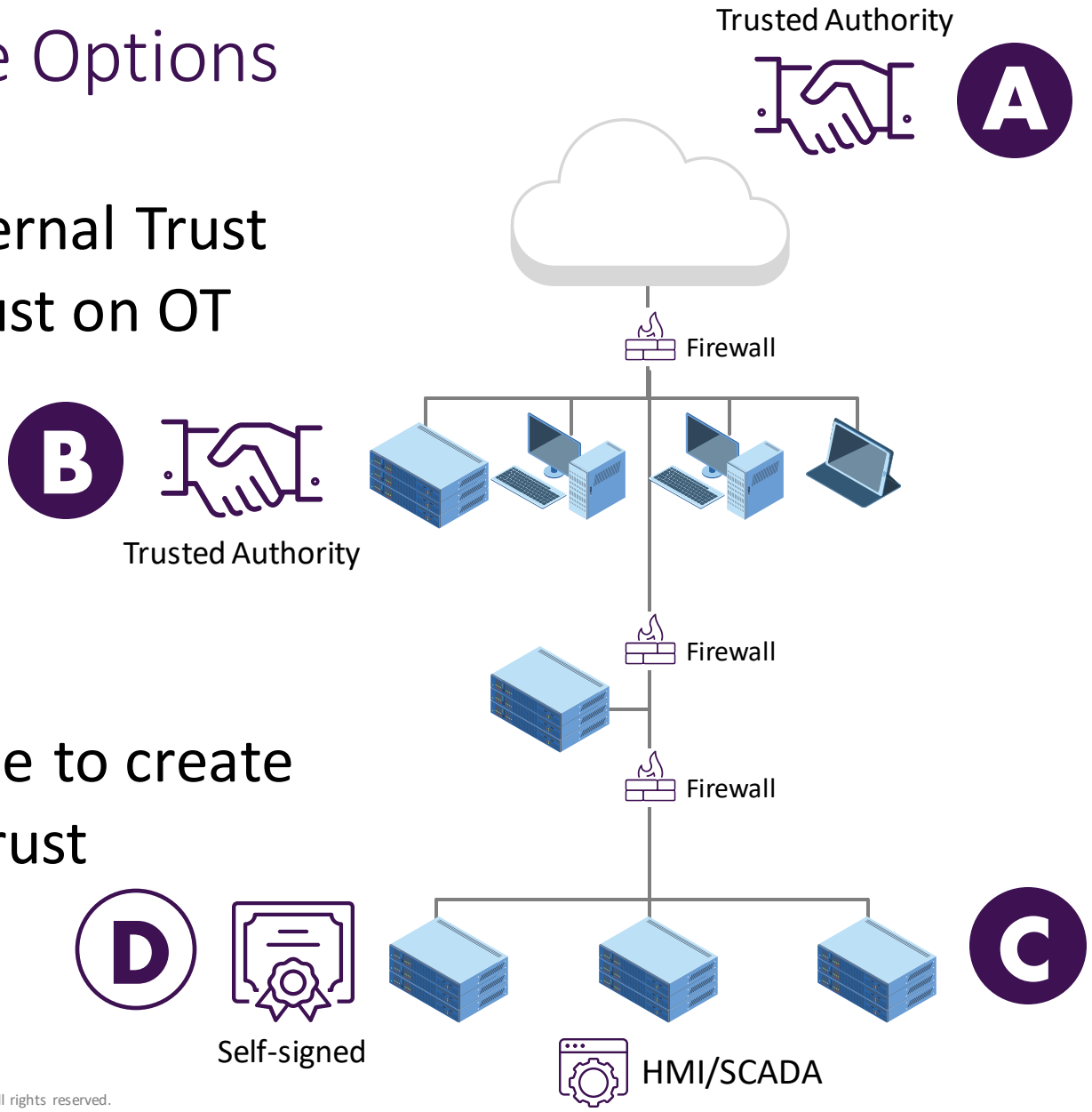
Certificate Options

- Pro: Internal Trust
- Con: Trust on OT



- Pro: Wide Trust
- Con:
  - Cost
  - Trust on OT

- Pro: Simple to create
- Con: No trust

- Pro: Internal Trust
- Con: Trust on IT

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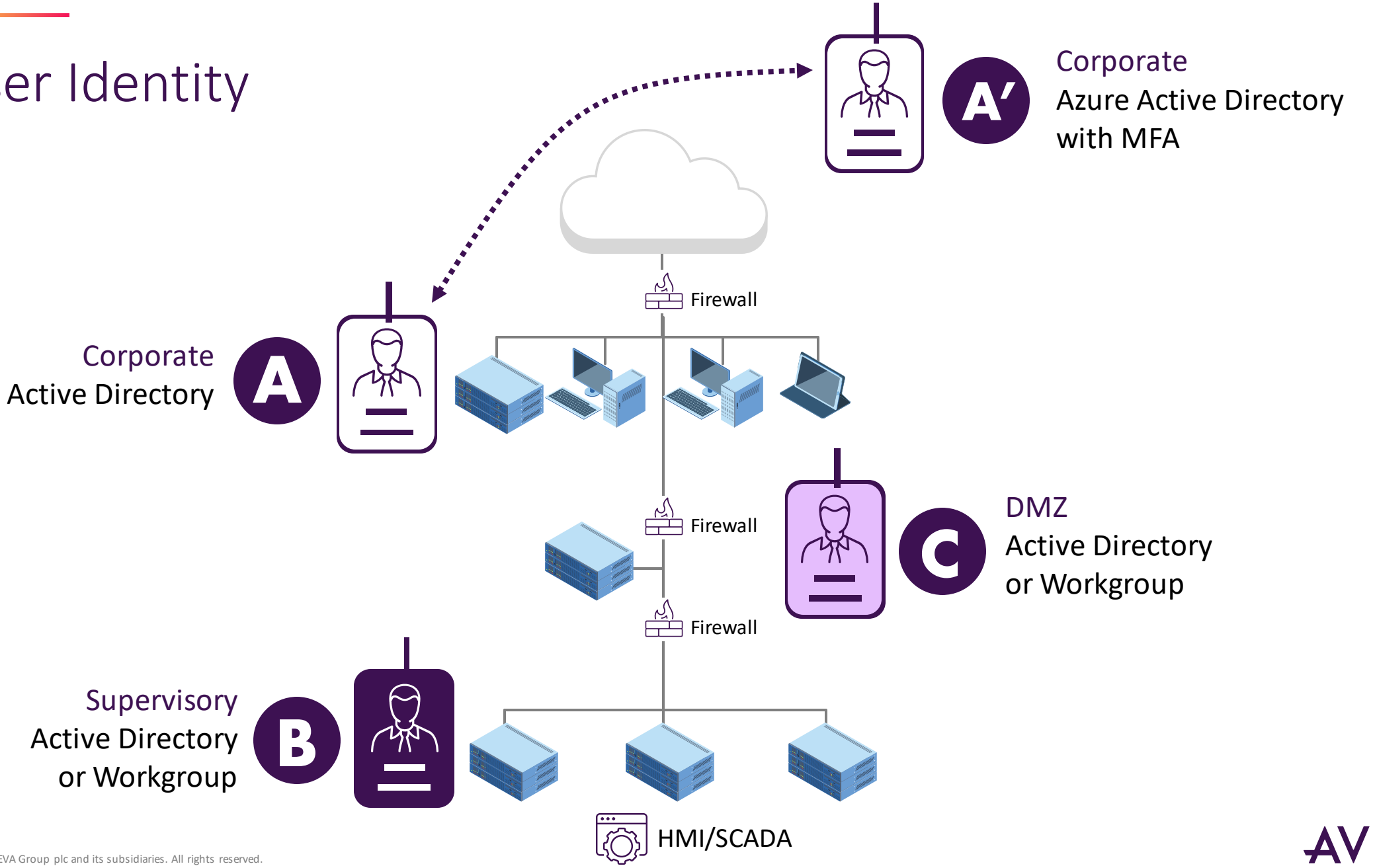
User Identity



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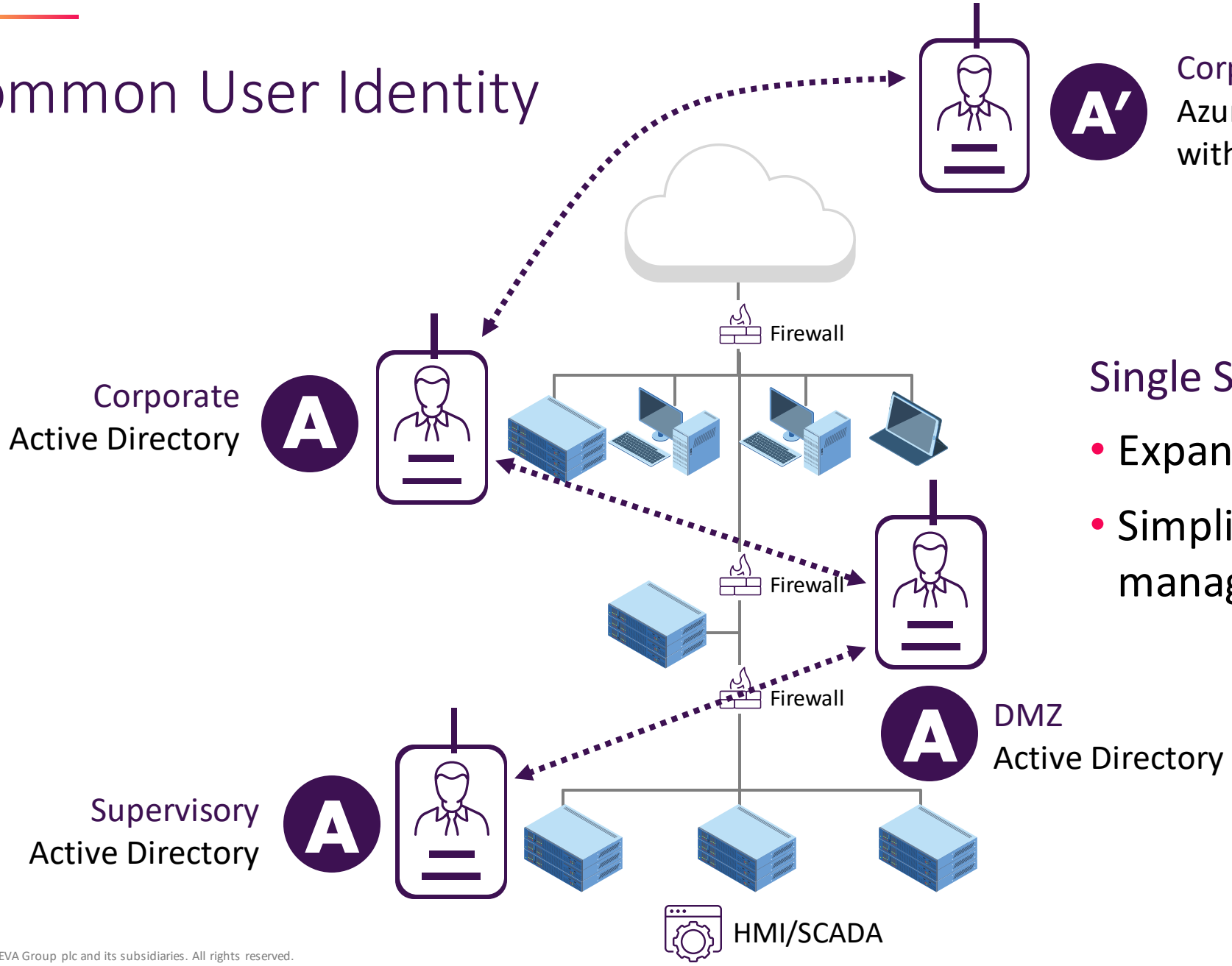
Common User Identity



Single Sign-On (SSO)

- Expands connectivity needs
- Simplified identity management

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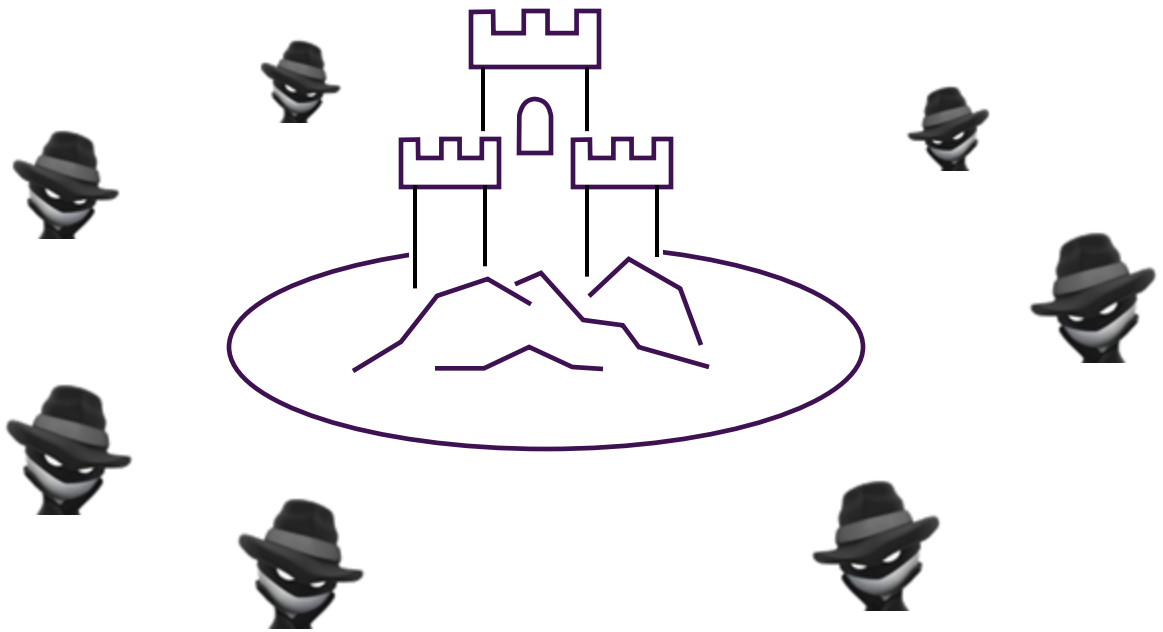
Security Models



- “Castle & Moat”
  - All the threats are outside
  - Focus on securing the perimeter
  - Trust insiders
- Reality
  - Insiders can be compromised
  - “Good guys” can make mistakes

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Security Models

- "Castle & Moat"
  - All the threats are outside
  - Focus on securing the perimeter
  - Trust insiders
- Reality
  - Insiders can be compromised
  - "Good guys" can make mistakes
- "Zero Trust"
  - Treat every system as if it is exposed to the Internet
  - Block/deny by default

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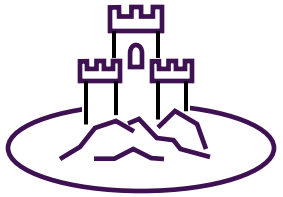
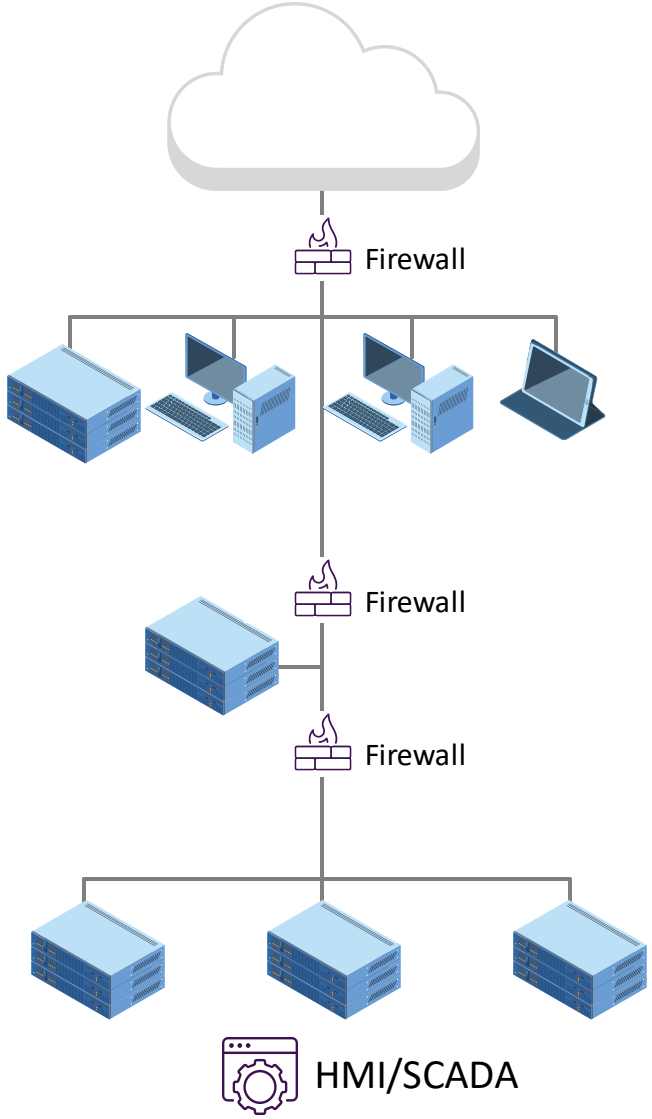
Recommendations for Operations

- Begin “Zero Trust” on IT network



- Continue protecting the OT perimeter

- Expand “Zero Trust” to OT network



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Reasons to Bridge Domains

Make information more accessible

Fuel process improvement initiatives

Enable self-service analysis & reporting

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Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Strategies For Getting Information From The Control Network

Thank you!

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