RSAConference2019
Asia Pacific & Japan
Singapore | 16–18 July | Marina Bay Sands

SESSION ID: CMI-W09

Industry 4.0 and Attacks on Manufacturing Networks, Myths or Reality?

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Question: a two years old malware can cause over 80 mil loss in one day.

Is this a myth or reality?


https://www
id=THHIANTHTH
Not Secure
focustaiwan.tw/news/aeco/201811160009.aspx
Latest
Politics
Cross-Strait
Economics
Entertainment & Sports
Taiwan Semiconductor
TSMC De
Issued by: TSMC
Issued on: 2018/0
Hsinchu, Taiwa
degree of infecti
August 6.
TSMC expects th
Company is conf
Most of TSMC's
next few days.
This virus outbre
confidential infor
ak on the evening of August 3, which affecte
80% of the company's impacted tools have
evenue to be about three percent, and impac
its forecast of high single-digit revenue grow
their wafer delivery schedule. The details wil
ed a virus to spread once the tool was conne
then security measures.
Virus outbreak caused almost NT 2.6 billion (US 84.28 mil) of loss
<3/08/2018>
What really had happened?
TSMC Spokesperson
Lora Ho
Senior Vice President &
Tel: 886-3-5054602
TSMC Acting Spokesperson
Elizabeth Sun
Senior Director, TSMC Corporate Communications D
Tel: 886-3-5682085
Email: elizabeth_sun@tsmc.com
Taipei, Nov. 16 (CNA) Taiwan Semiconductor Manufacturing Co. (TSMC), the world's largest contract chipmaker, reported Thursday that it lost NT$2.6 billion (US$84.28 million) in the

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Renault-Nissan is resuming production after a global cyberattack caused stoppages at 5 plants

REUTERS

Laurence Frost and Naomi Tajitsu, Reuters May 15, 2017,

Renault-Nissan said on Monday that output had returned to normal at nearly all its plants, after a global cyber attack caused widespread disruption including stoppages at several of the auto alliance's sites.

Renault and its Japanese partner are the only major car manufacturers so far to have

Forbes

Billionaires | Innovation | Leadership | Money | Consumer

9,396 views | Jun 22, 2017, 05:00am

Cyber Attack At Honda Stops Production After WannaCry Worm Strikes

Peter Lyon Contributor ⓘ

I focus on all things to do with cars.

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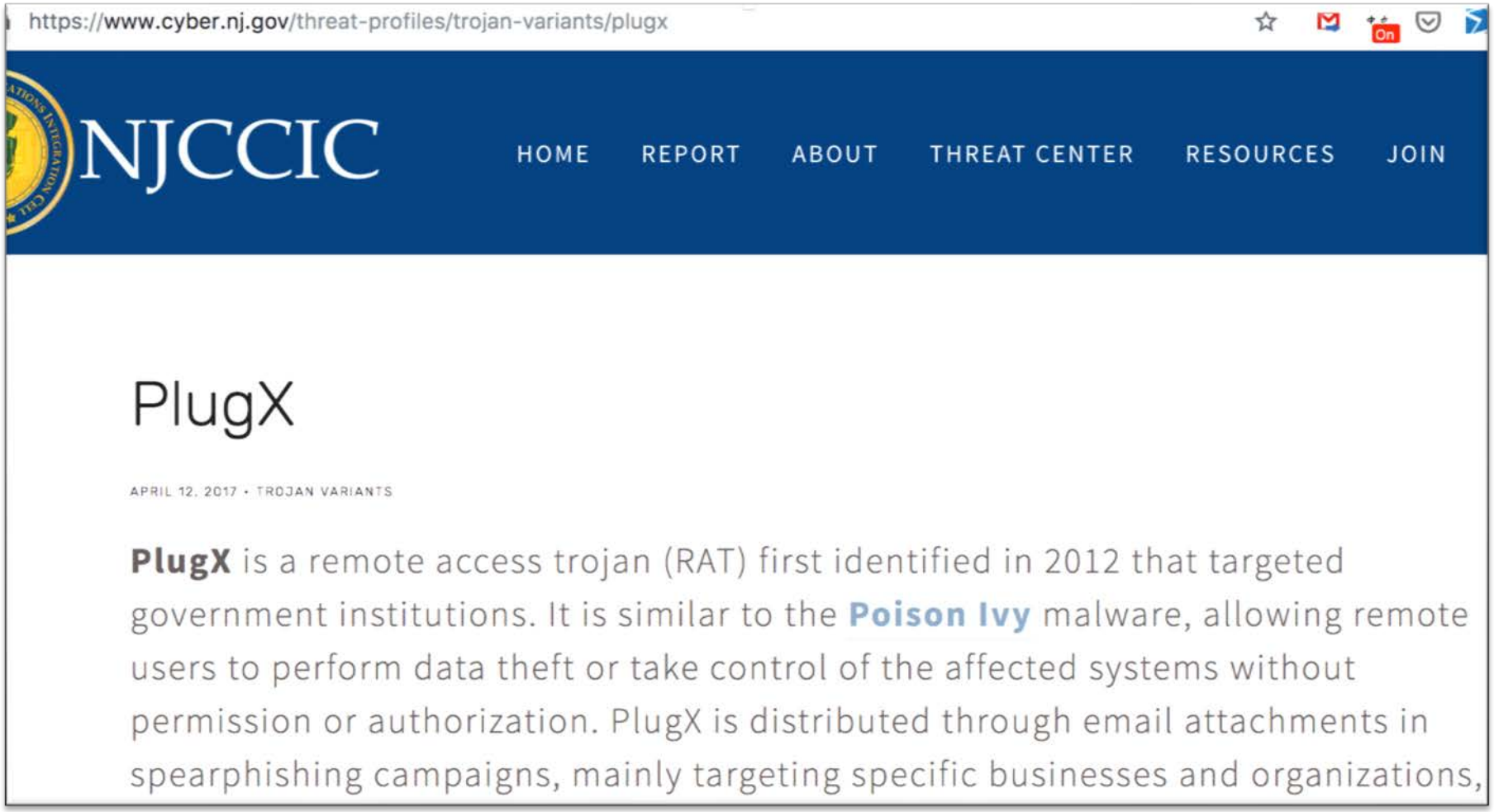
Targeted Attacks in Manufacturing Networks: a case study

Duck Test: if it walks like a duck, is it really a duck ☺

PlugX on Manufacturing Network



PlugX and Ransomware: incident highlights

- 2017/09/10 02:00:42 AM: Identified execution of C:\\RECYCLER**demo.exe**
- The binary was deployed through **IIS web service** process **w3wp.exe**
- Dropped **BKDR_PLUGX.ZTEG**:
  iusb3mon.dll sha1: cedd4391f03b00b319e93b6a7f8fd69fbc6059e5
- 2017/09/10 02:00:40 attacker uploaded **HKTL_MIMIKATZ**: C:\\RECYCLER\\m32.exe
- Spread laterally
- This Victim: a manufacturing enterprise in **China**

Our indicators match the ransomware incident?

- An incident was reported by tencent (https://s.tencent.com/research/report/461.html on a different victim
- The hacker **extorted the victimized company** in the message on the desktop

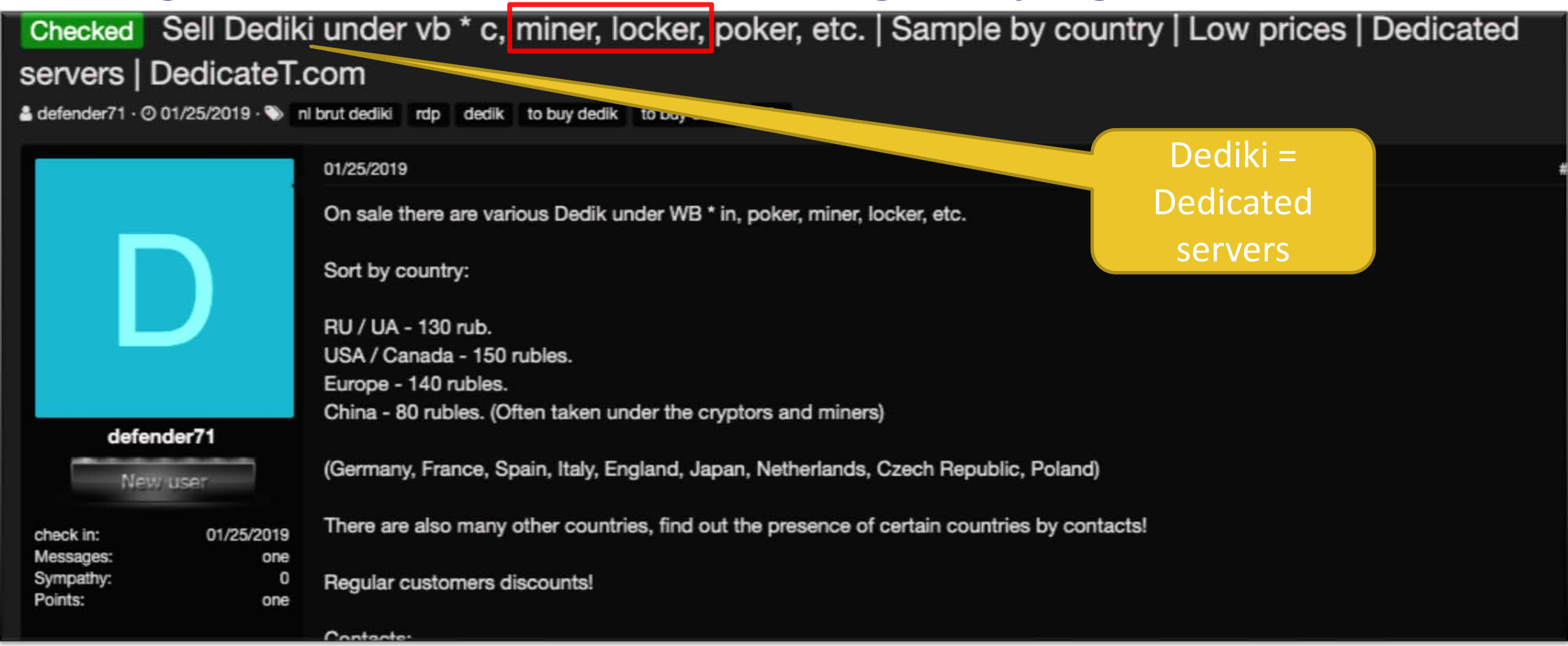
"We are not a ransomware that spreads automatic ally, we are professional hacker organization that specifically targets enterprises" .. Give us 9.5 BTC!

PlugX for ransom is not a single instance. Attacker Targets Manufacturing Industry

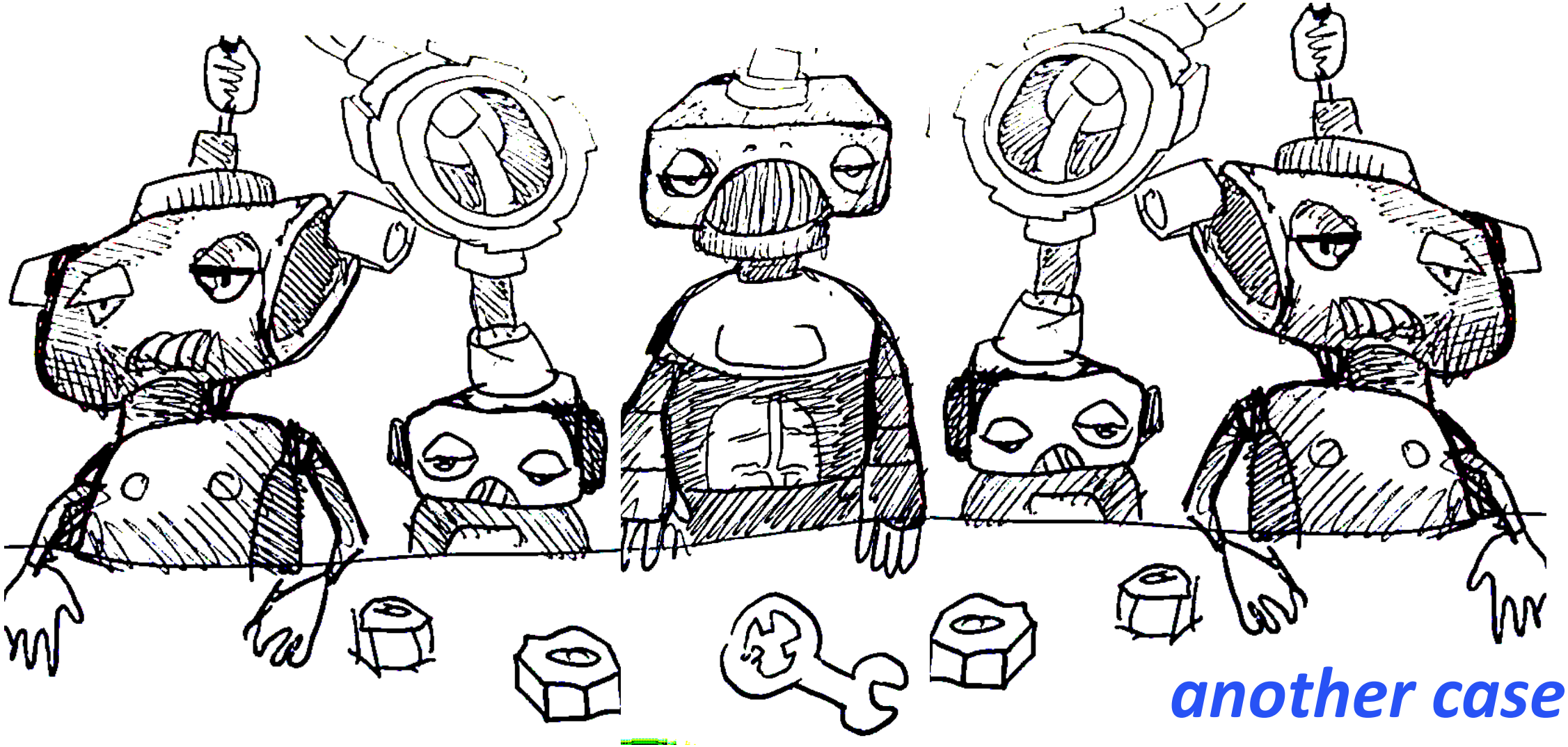
- We identified more targets in Taiwan and China

Date	Detection Path	Accessed by	Detection	Industry	Country
09/09/2017 18:03	C:\RECYCLER\demo.exe	C:\WINDOWS\system32\inetsrv\w3wp.exe	BKDR_PLUGX.ZTEG	Manufacturing	CN
20/09/2017 08:34	C:\PerfLogs\demo.exe	C:\Windows\explorer.exe	BKDR_PLUGX.ZTEG	Manufacturing	CN
09/10/2018 01:39	C:\root\80.exe	C:\WINDOWS\system32\inetsrv\w3wp.exe	BKDR_PLUGX.DUKRX	Manufacturing	TW

Not a Single Instance: Targeted ransomware and mining campaigns

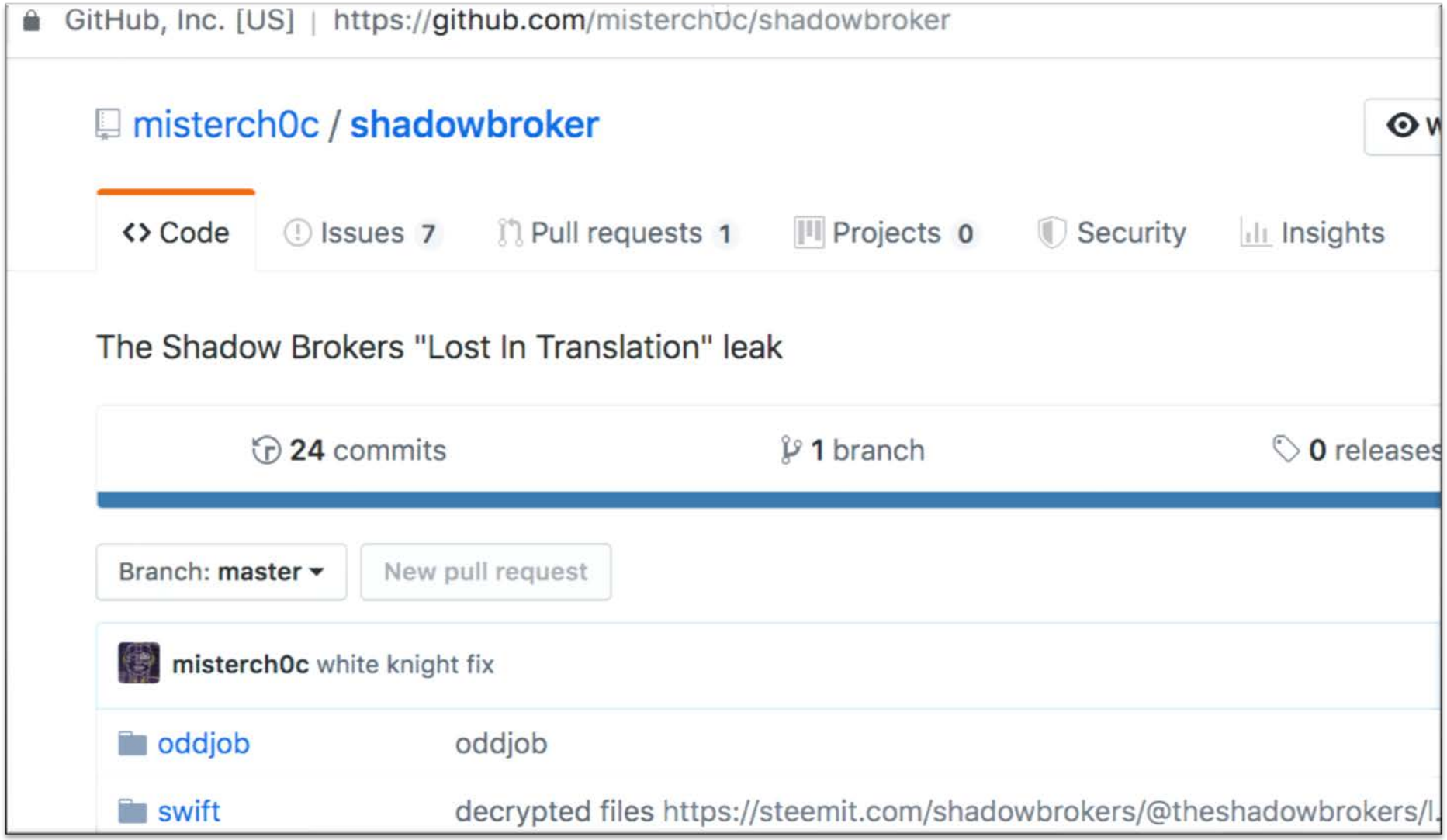


Strange things in Manufacturing Networks

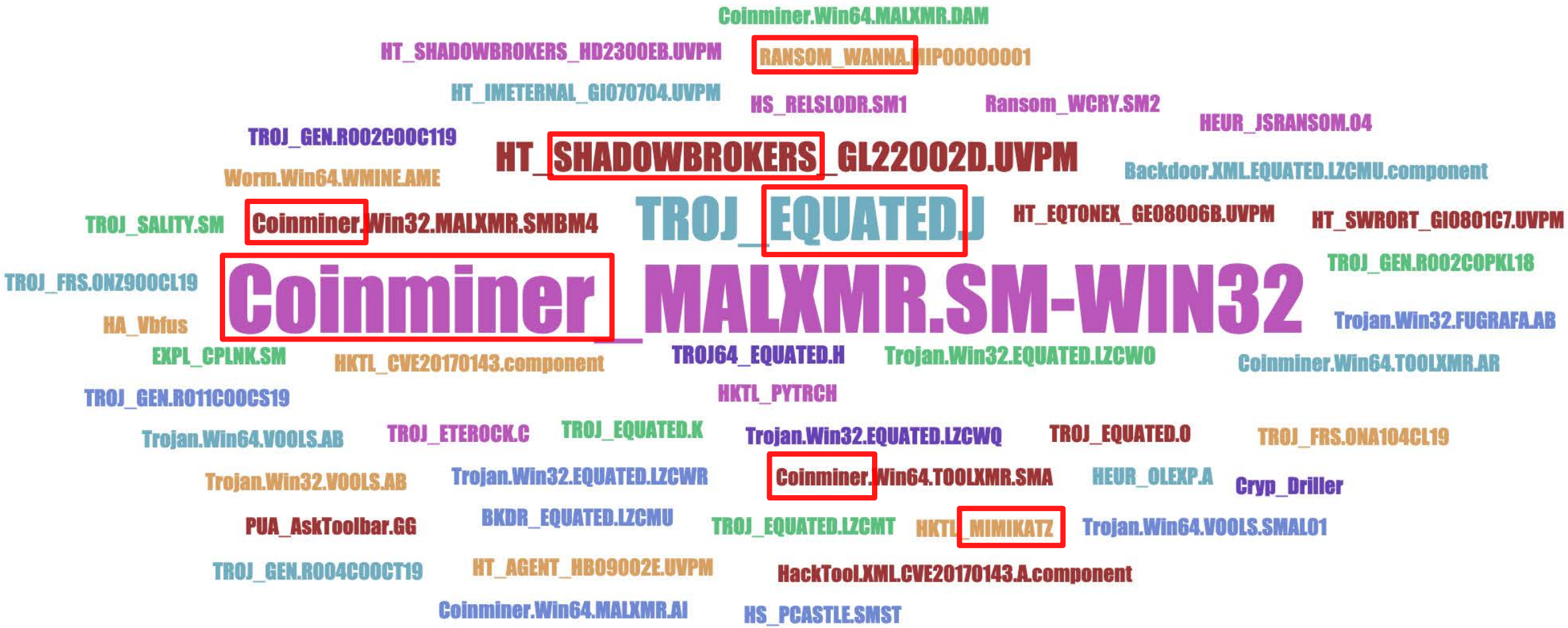


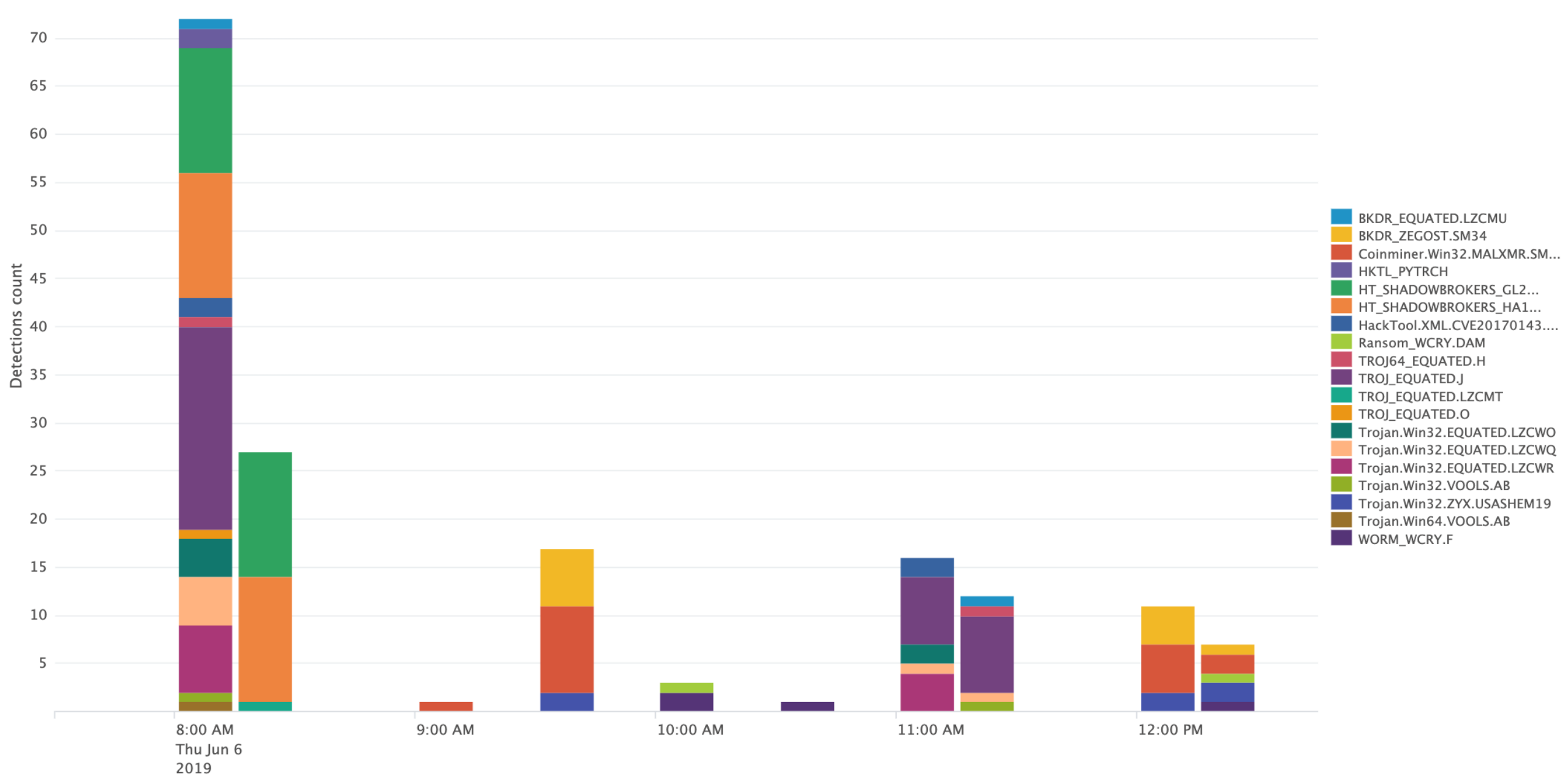
another case

Equation tools weaponized to distribute coin miner

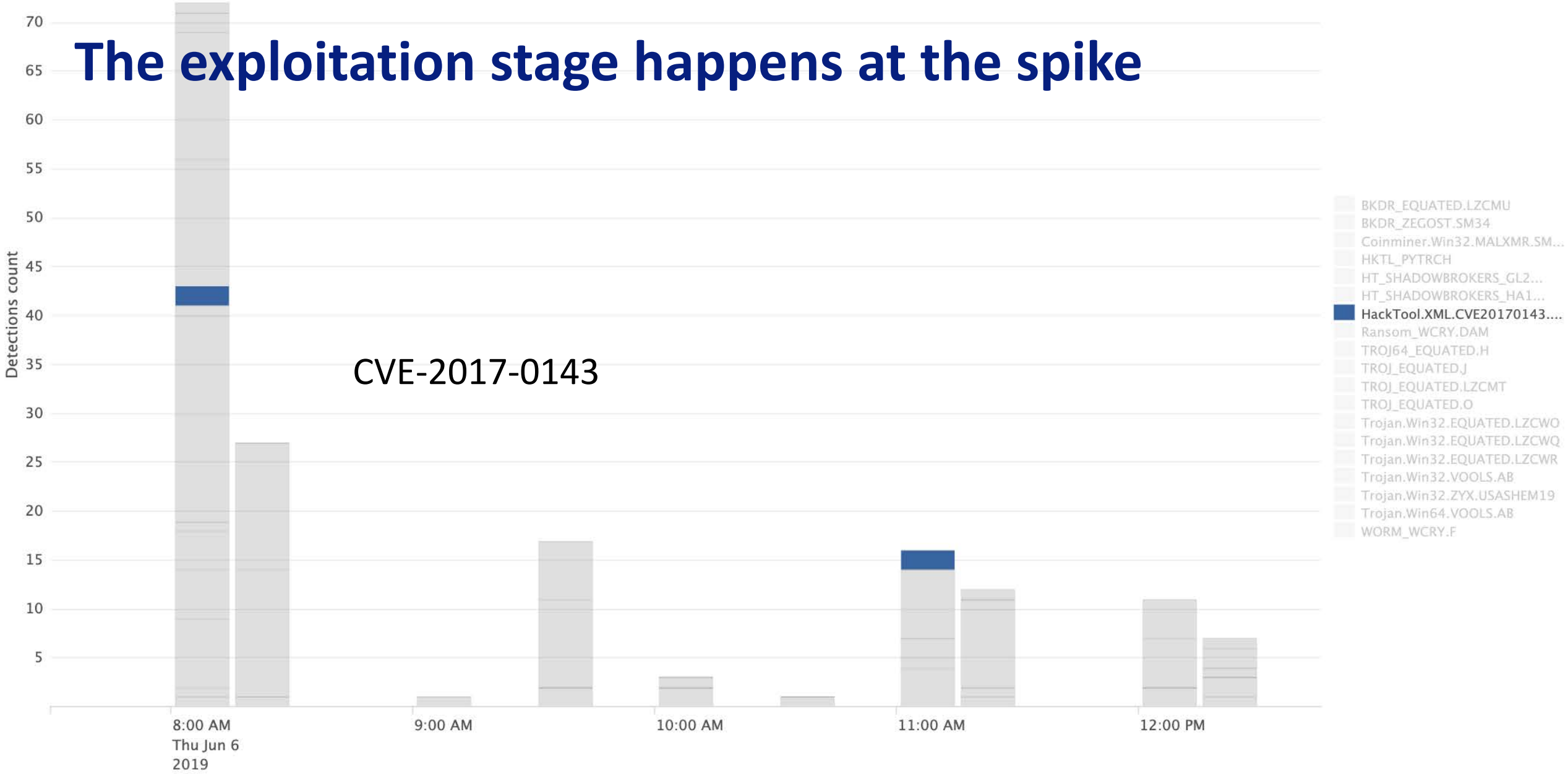


Snapshot of activity in the affected infrastructures




Detections count
70
65
60
55
50
45
40
35
30
25
20
15
10
5
8:00 AM
Thu Jun 6
2019
9:00 AM
10:00 AM
11:00 AM
12:00 PM
BKDR_EQUATED.LZCMU
BKDR_ZEGOST.SM34
Coinminer.Win32.MALXMR.SM...
HKTL_PYTRCH
HT_SHADOWBROKERS_GL2...
HT_SHADOWBROKERS_HA1...
HackTool.XML.CVE20170143....
Ransom_WCRY.DAM
TROJ64_EQUATED.H
TROJ_EQUATED.J
TROJ_EQUATED.LZCMT
TROJ_EQUATED.O
Trojan.Win32.EQUATED.LZCWO
Trojan.Win32.EQUATED.LZCWQ
Trojan.Win32.EQUATED.LZCWR
Trojan.Win32.VOOLS.AB
Trojan.Win32.ZYX.USASHEM19
Trojan.Win64.VOOLS.AB
WORM_WCRY.F

The exploitation stage happens at the spike



CVE-2017-0143

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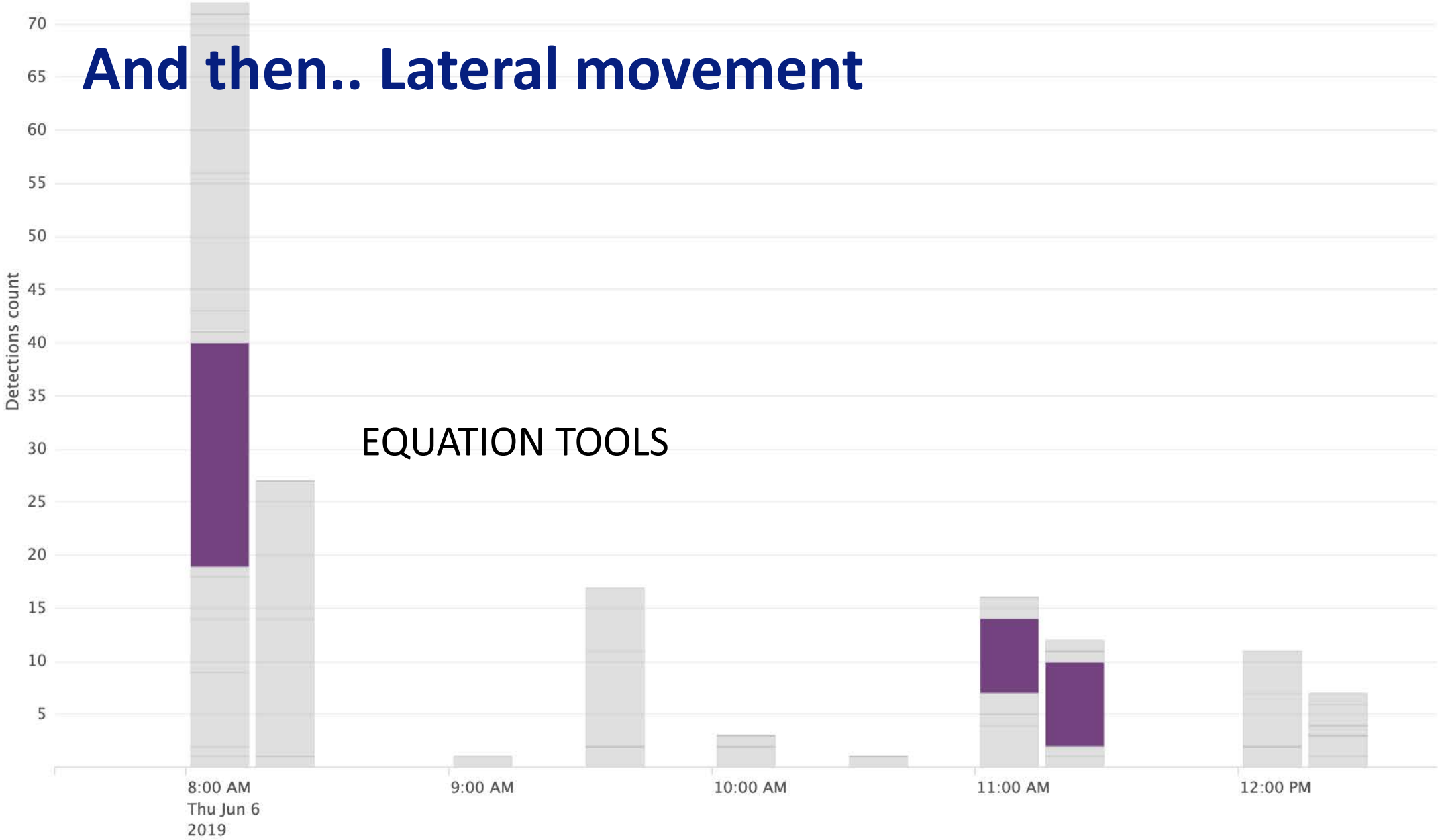
And then.. Lateral movement



EQUATION TOOLS

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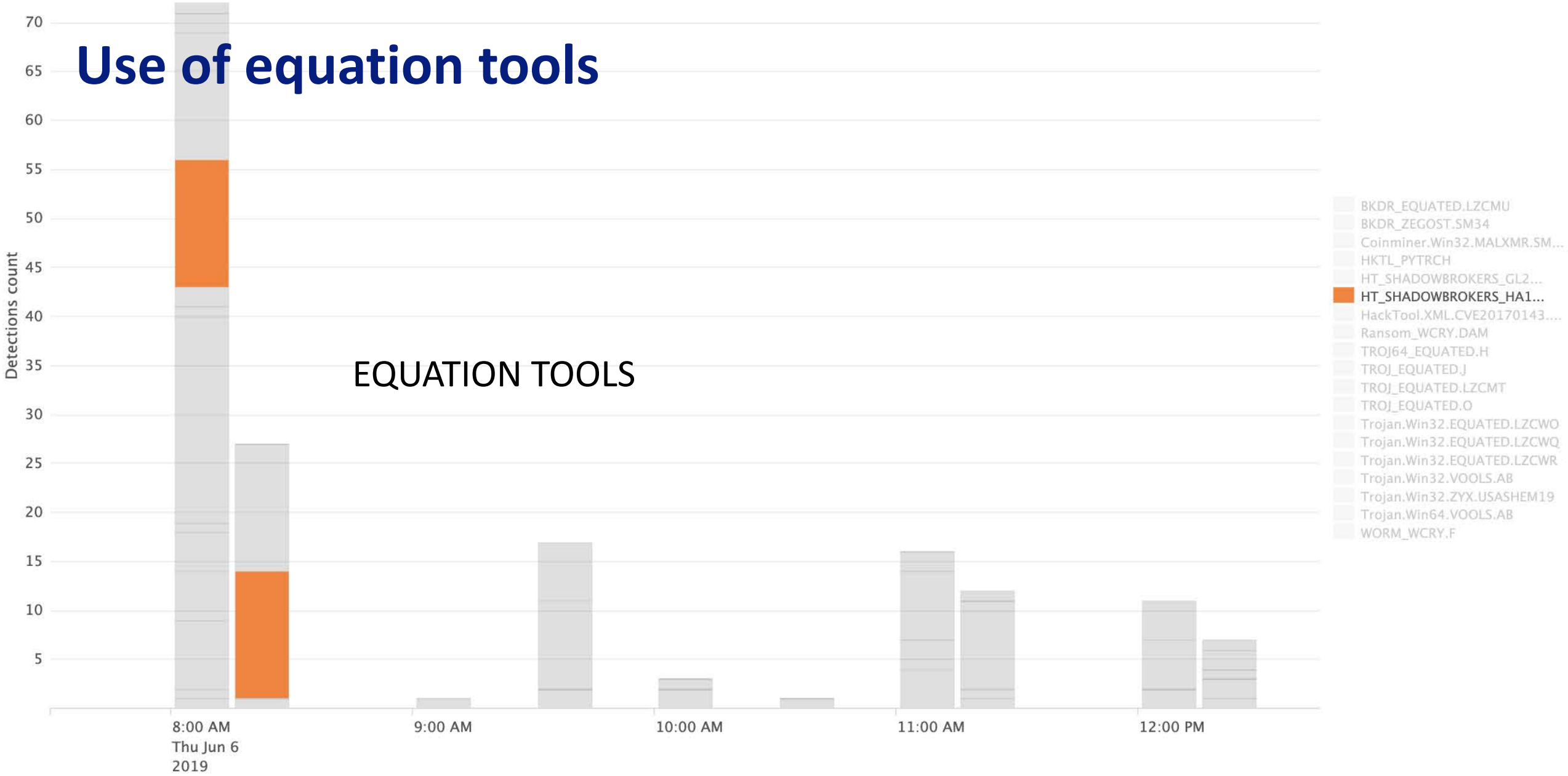
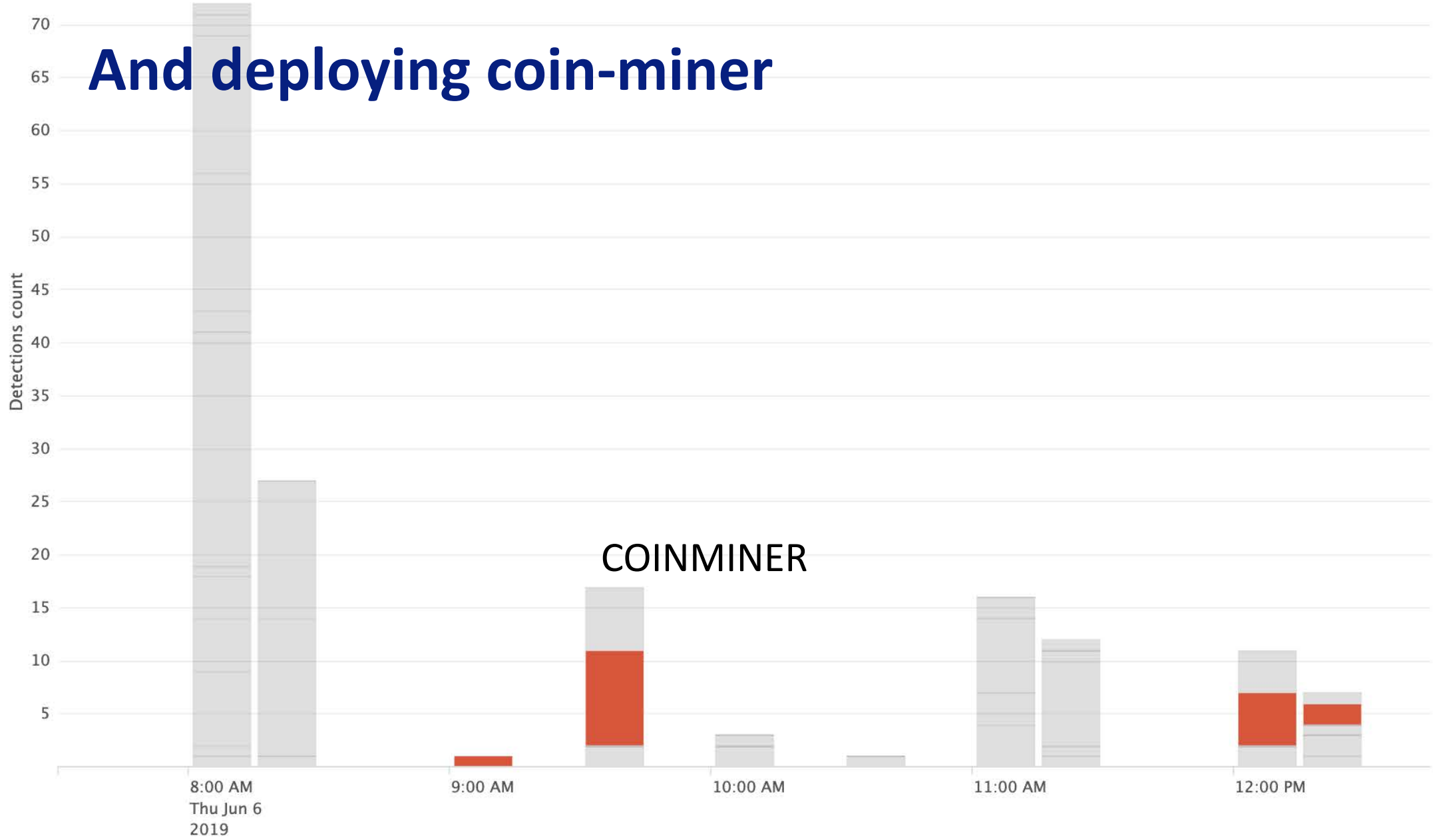
Use of equation tools



And deploying coin-miner



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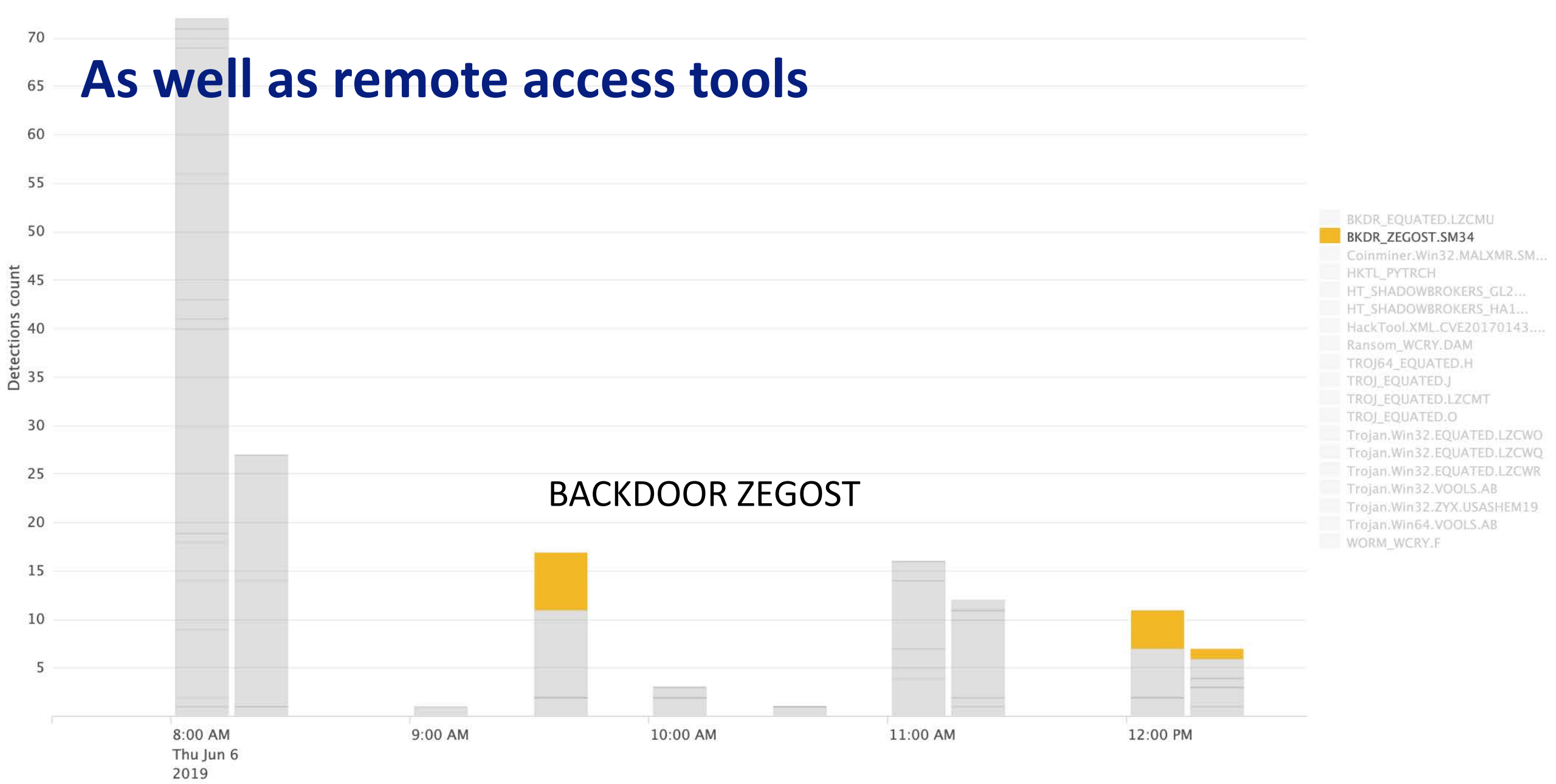
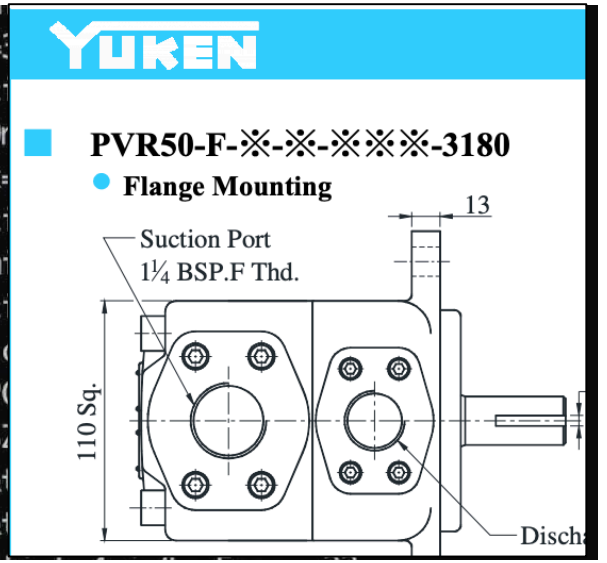
As well as remote access tools



Examine the victims

- HRM-3 IBM-PED JA02-SARTHANA K3Server KAVITHA-PC LenaOffice2 MG1795-LAB-AND MG3624-DIV-DHD NetAdmin-DC operation-asst **PortEng1-PC** **PVR150-PC PVR50-PC** **RCH12001D** RD-3 RKH-HISteam RKSSH-Acc-PC rksshfr RKSSH-HR3 RNV-CR-WF SAL-Leslie SAPERPDEV Shashi-HP SVShah-PC SZ-RDNB002 TallyEC-PC Thomas-Win7 VALVE-TESTING1 VENKAT-FIN Win-Marc Win-SolomonPC3 YE-MAINSTORE3 YEQC-DELL YE-SHIPPING5 **YUDESIGN-5** YU-STORE-1



Important Observation

- All of the victim machines of this campaign were on INTERNAL network. Possibly protected by a firewall, Intrusion Detection System and so on.
- This did not stop the opportunistic attackers from breaking in.

Advanced Targeted Attack Tools Found Being Used to Distribute Cryptocurrency Miners

Posted on: June 13, 2019 at 5:09 am **Posted in:** Malware **Author:** Trend Micro

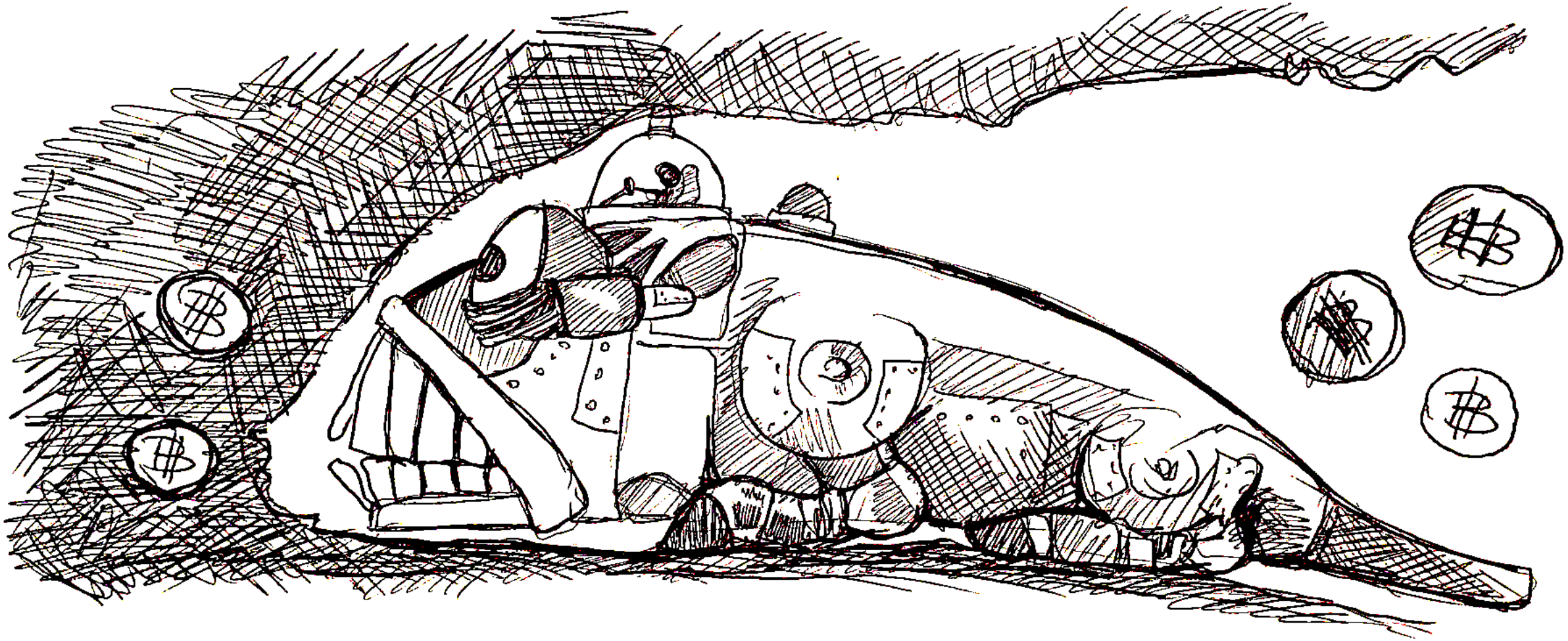
by Cedric Pernet, Vladimir Kropotov, and Fyodor Yarochkin

Regular cybercriminals appear to be taking a page from targeted attack actors' playbooks — or rather, toolkits — to maximize their profits from illicit activities like cryptojacking.

One of the differences between regular cybercrime and targeted attacks is intent: The former will almost always have immediate financial gain as its main motivation while the latter will have other goals, for example, intellectual property theft. Furthermore, the mindsets of the threat actors can be very different. Regular cybercriminals will typically need to think of how they can compromise as many individual devices as possible (for example, to deliver ransomware, coin miners, or banking trojans) while targeted attack threat actors will need to plan how to infiltrate and gain full access to corporate networks and remain as discreet as possible.

https://blog.trendmicro.com/trendlabs-security-intelligence/advanced-targeted-attack-tools-used-to-distribute-cryptocurrency-miners/

APT tools For Coin mining and Ransom



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Modern Manufacturing networks

Lets understand the environment and its weaknesses

What is Industry 4.0?

1700s

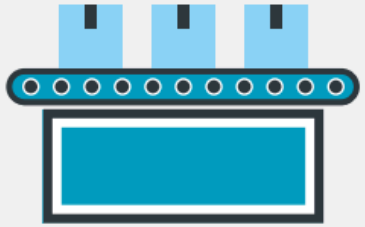
Mechanical manufacturing

Steam-powered machines replaced human labor

1.0

1800s

Mass production

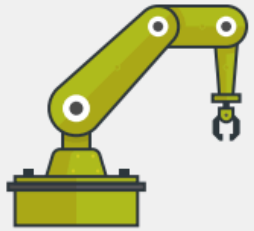


Electric-powered machines aided the production of goods in massive quatities

2.0

1900s

IT automation



IT enabled the use of geographically disparate systems, reducing production cost

3.0

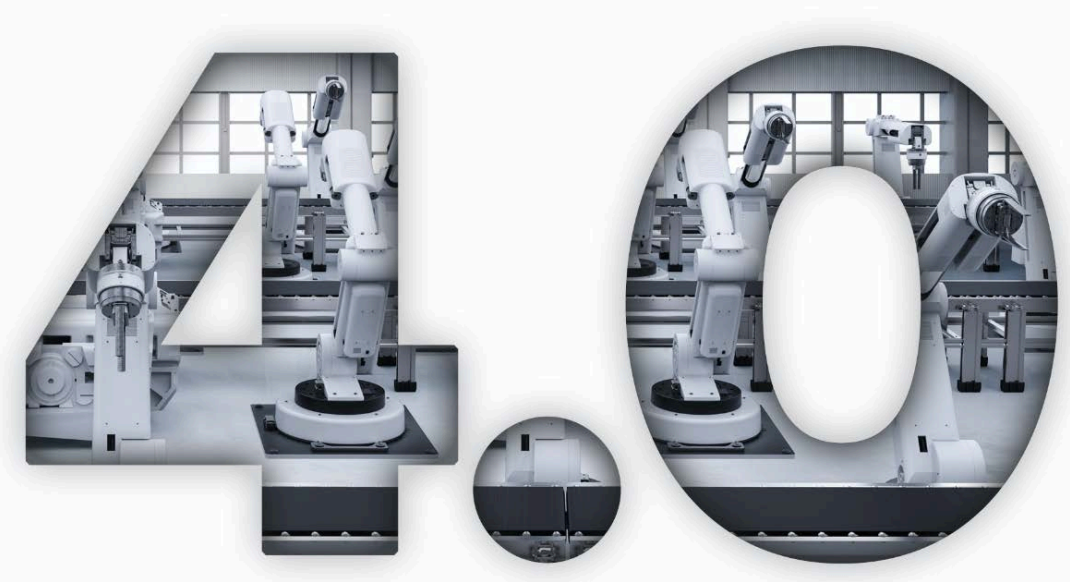
2000s

Cyber-physical system use

Technologies like ML/AI enabled automated information sharing and even decision making

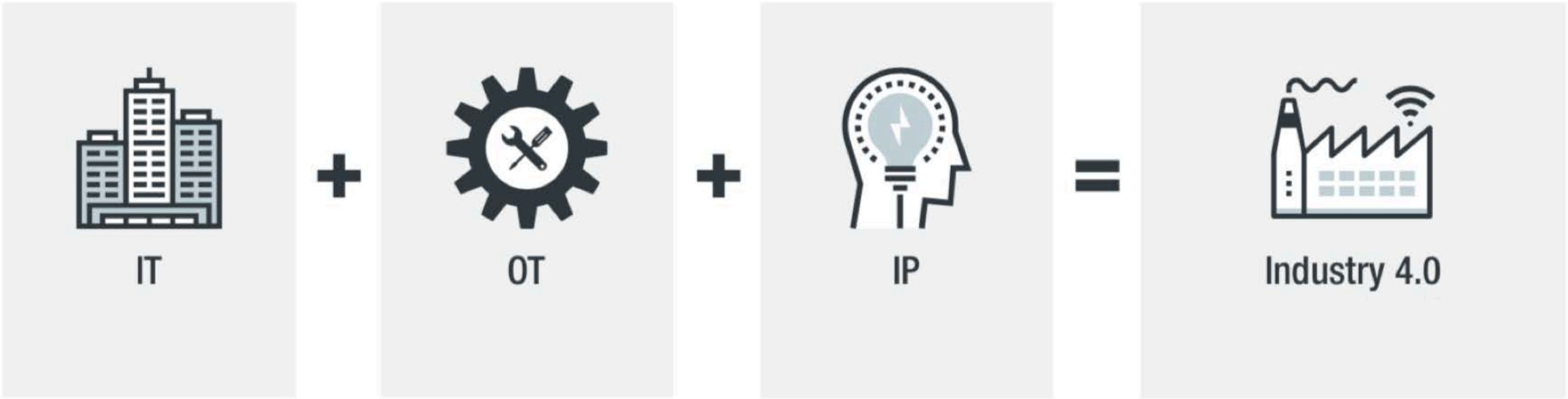
4.0

Is Industry 4.0 a Buzzword? – No



Country	Strategy	Issue Date
China	Made in China 2025 中国製造2025重点領域技術路線図	May-15
Germany	Industrie 4.0	Nov-11
India	Make in India Digital India	Sep-14
Japan	Connected Industries Society 5.0	Mar-17
Russia	4.0RU	Jul-17
US	Industrial Internet Consortium Manufacturing USA	Mar-14

Convergence of IT, OT and IP



Information **T**echnology

Operational **T**echnology

Intellectual **P**roperty

Convergence of traditional **IT**, **OT** equipment and **IP** assets

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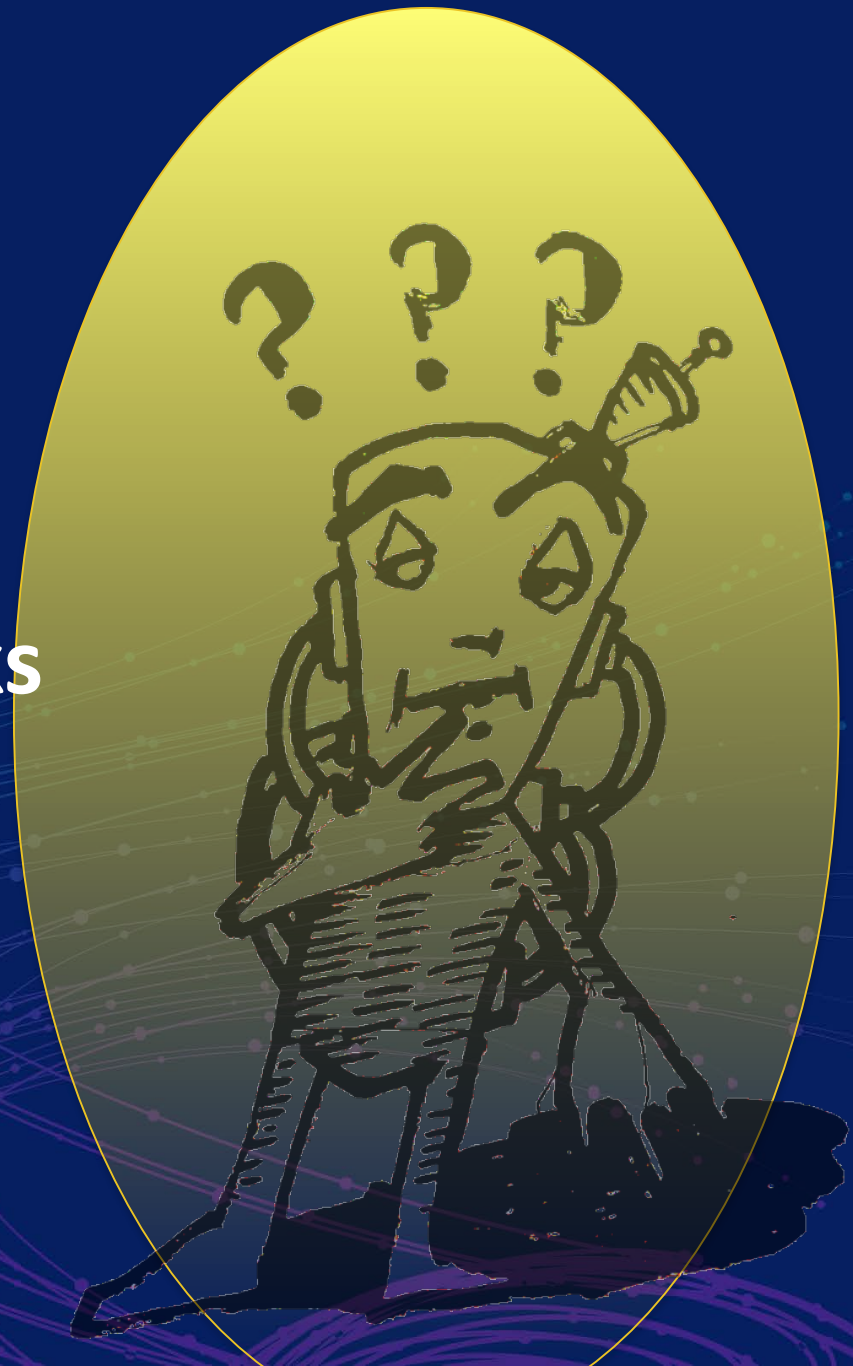
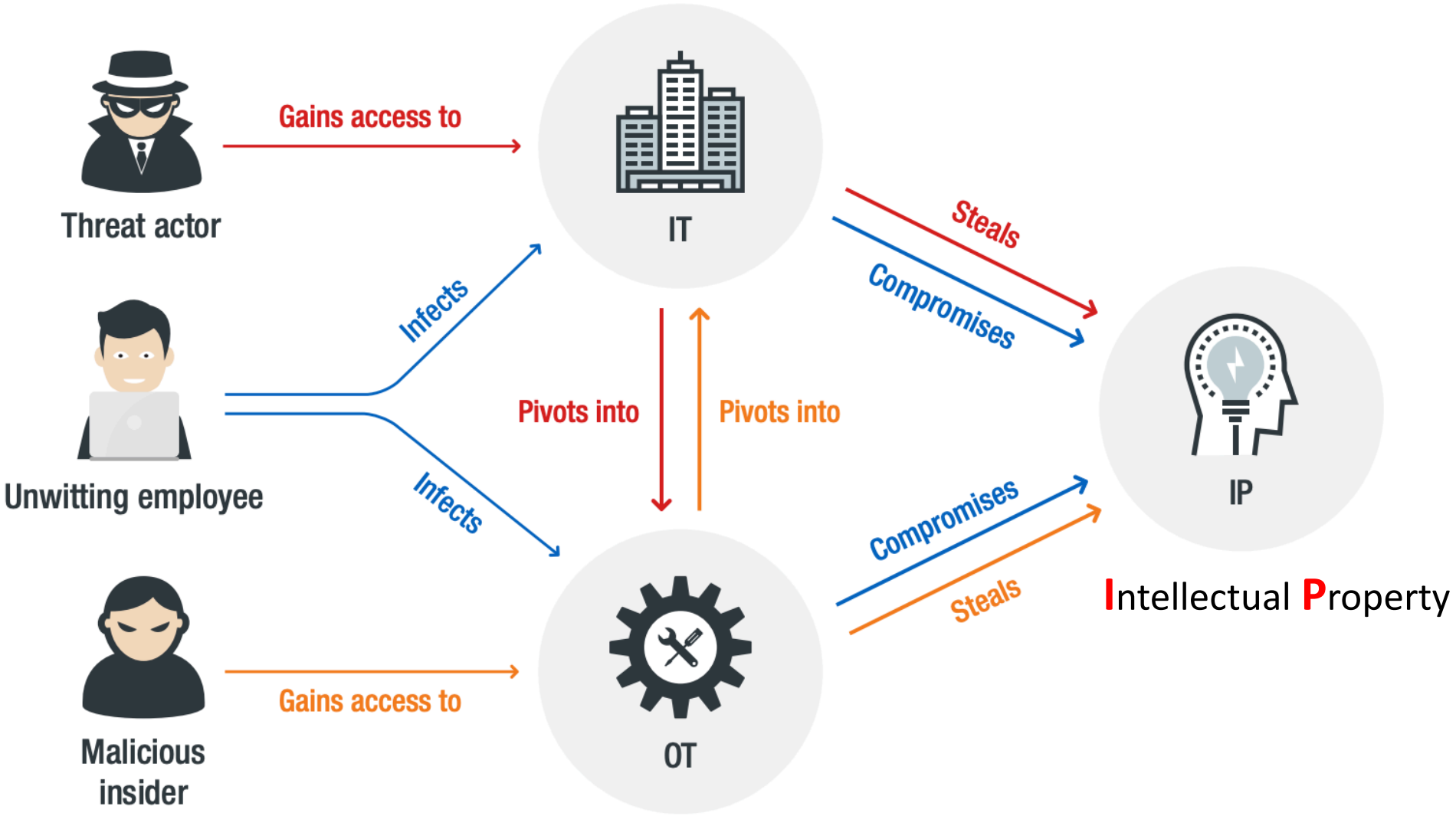
So how Manufacturing networks differ from regular IT?

What are the problems?



So how Manufacturing OT networks differ from regular IT?



Availability

Use of Windows XP in Manufacturing

OS Type	Manufacturing Industry	Other industries	Difference
Windows 7	60.2%	61.0%	-0.8%
Windows 10	28.9%	29.4%	-0.5%
Windows 8.1	5.3%	5.8%	-0.5%
Windows XP	4.4%	2.5%	+1.9%
Windows XP 64-bit	0.5%	0.3%	+0.2%
Windows 8	0.4%	0.7%	-0.3%
Windows Vista	0.2%	0.2%	0.0%
Windows 2000	0.1%	0.1%	0.0%

Percentage point differences between distribution of operating systems in Manufacturing and other industries based on Trend Micro telemetry data for the period from July to December 2018

Prevalence of Downad in Manufacturing

Malware Type	Manufacturing Industry	Other industries	Difference
Trojan	39.3%	40.6%	-1.3%
PUA	14.7%	15.3%	-0.6%
Worm	9.9%	8.3%	+1.6%
Hacking tool	7.5%	6.7%	+0.8%
Cryptocurrency miner	4.0%	3.6%	+0.4%
Adware	3.6%	4.4%	-0.8%

Malware Family	Manufacturing Industry	Other industries	Difference
WannaCry	3.3%	3.2%	+0.1%
Downad	2.9%	1.2%	+1.7%
Coinminer	2.0%	0.5%	+1.5%
MalXMR	1.8%	1.2%	+0.6%

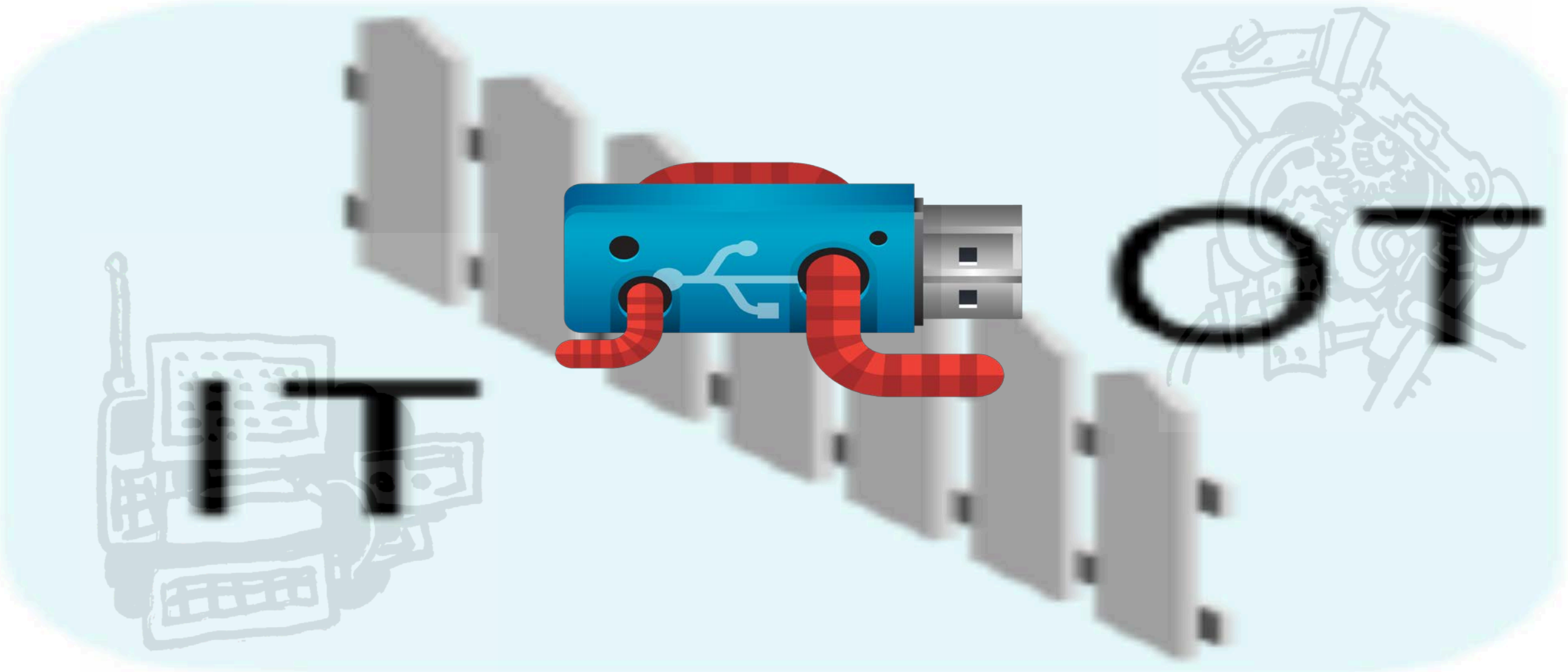
Percentage point differences between distribution of malware types and families in Manufacturing and other industries based on Trend Micro Telemetry for the period from July to December 2018

Malicious Autorun.inf detections

Manufacturing	25.77%
Government	13.49%
Education	12.73%
Healthcare	11.68%
Technology	5.63%
Energy	4.66%
Oil and gas	2.80%
Utilities	2.44%
Banking	2.07%
Retail	2.05%
Others	16.68%

Detections of Autorun.inf across industries based on Trend Micro Telemetry for the period from July to December 2018

Data exchange via USB between IT and OT



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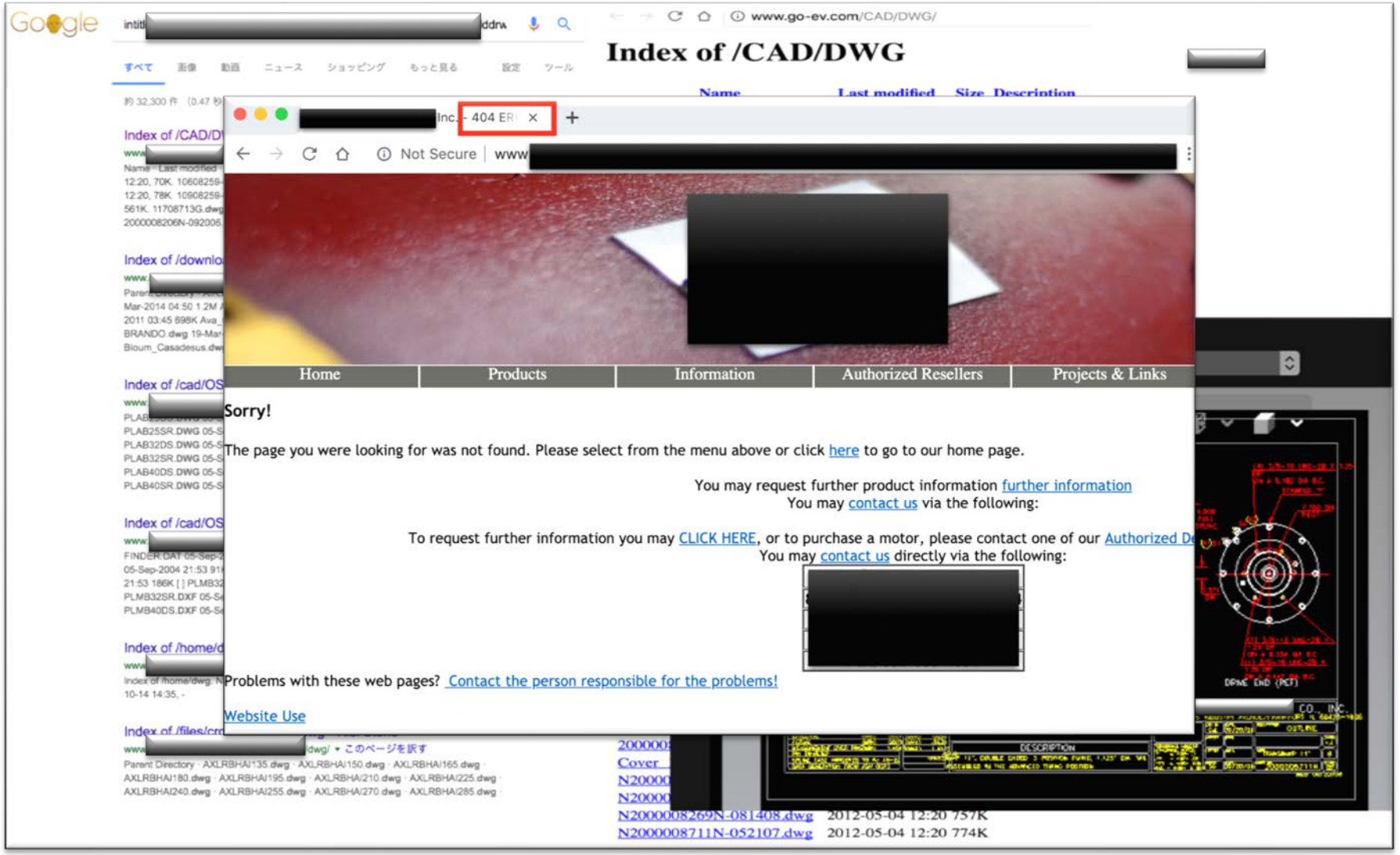
Threats and Risks to Intellectual Property In Manufacturing industry

Unintentional leaks due to poor configuration



Malicious CAD files

ACM_SHENZ.A

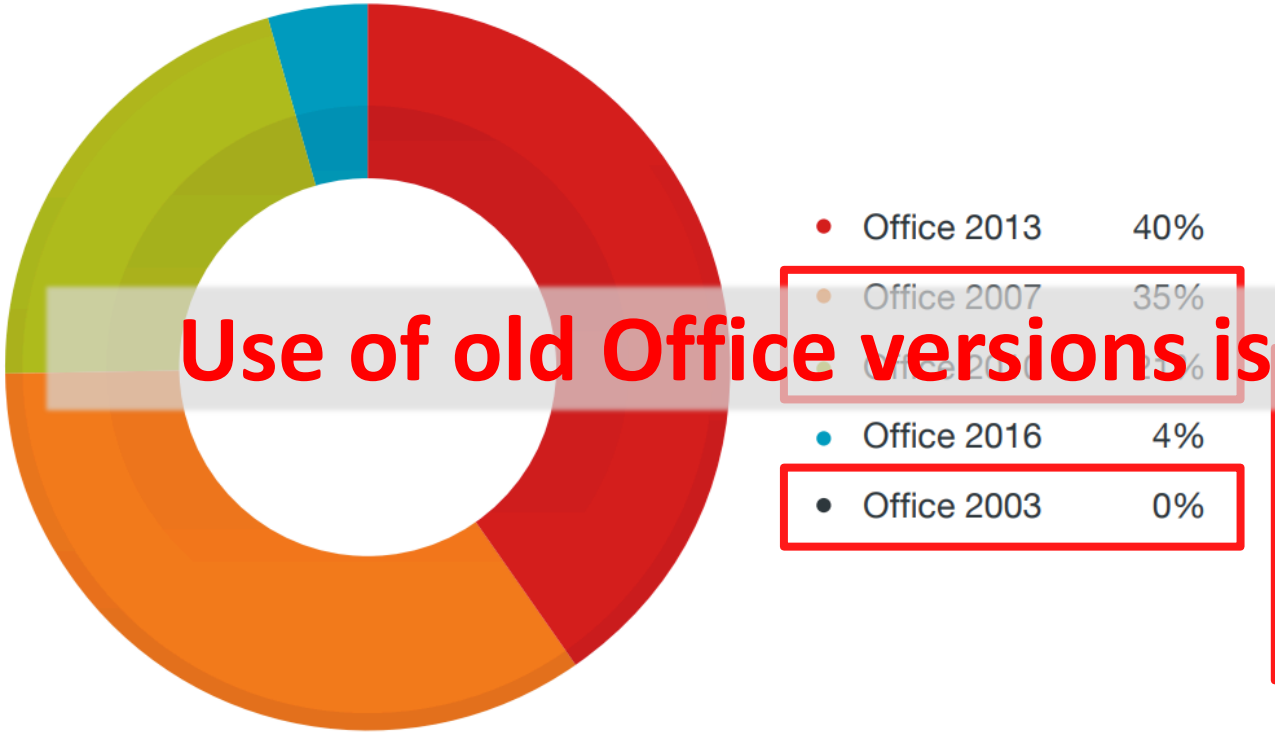
- Create a user with admin privileges
- Create writable network shares
- Open ports for SMB with vulnerabilities

ACM_MEDRE.AA

- Send PST file of Microsoft Outlook to a predefined email address
- Send an opened CAD (DWG) file to a predefined email address

CAD files can be weaponized for espionage

Use of older version of Microsoft Office



Microsoft Word 97 macro (W97M) detections by Microsoft Office version

Use of old Office versions is common in Manufacturing

Version	Support	Default macro behavior	Block from the internet	Trusted locations	Require digital signature	Block per application
Office 2016	Supported until 2025	Block until the user clicks the *Enable Macros* button	Yes	Yes	Yes	Yes
Office 2013	Supported until 2023	Block until the user clicks the *Enable Macros* button	Yes*	Yes	Yes	Yes
Office 2010	Supported until 2020	Block until the user clicks the *Enable Macros* button			Yes	Yes
Office 2007	Supported until 2017	Block until the user clicks the *Enable Macros* button			Yes	Yes
Office 2003	Not supported	Macros run automatically			Yes	Yes

**The feature was added to Office 2013 by Microsoft Update.*

Comparison of versions of Microsoft Office, which includes Microsoft Word, from the National Cyber Security Centre

Distribution of Confidential information

日本企業の文書が掲載されているのは中国の検索サービス大手、百度（バイドゥ）が運営する文書共有サイト「百度文庫」。ＩＴ関連会社「クロスワープ」（東京）が調べたところ、2017年６月～18年２月だけで186社の文書掲載が確認された。いずれの資料にも「機密」を意味する注意書きが記されていた。

画像の拡大

日本企業の内部文書も掲載されている文書共有サイト「百度文庫」

文書が掲載されていた企業はメーカーからサービス業まで多岐にわたる。製品の設計図や社内研修で使われたとみられる製品機能の説明資料のほか、飲食店チェーンの接客マニュアルもあった。

Stolen Confidential Documents can be distributed in public

止まらぬ日本企業の文書流出　中国サイトに186社分（日本経済新聞・2018年3月1日）
https://www.nikkei.com/article/DGXMZO27564530010320 18CR8000/

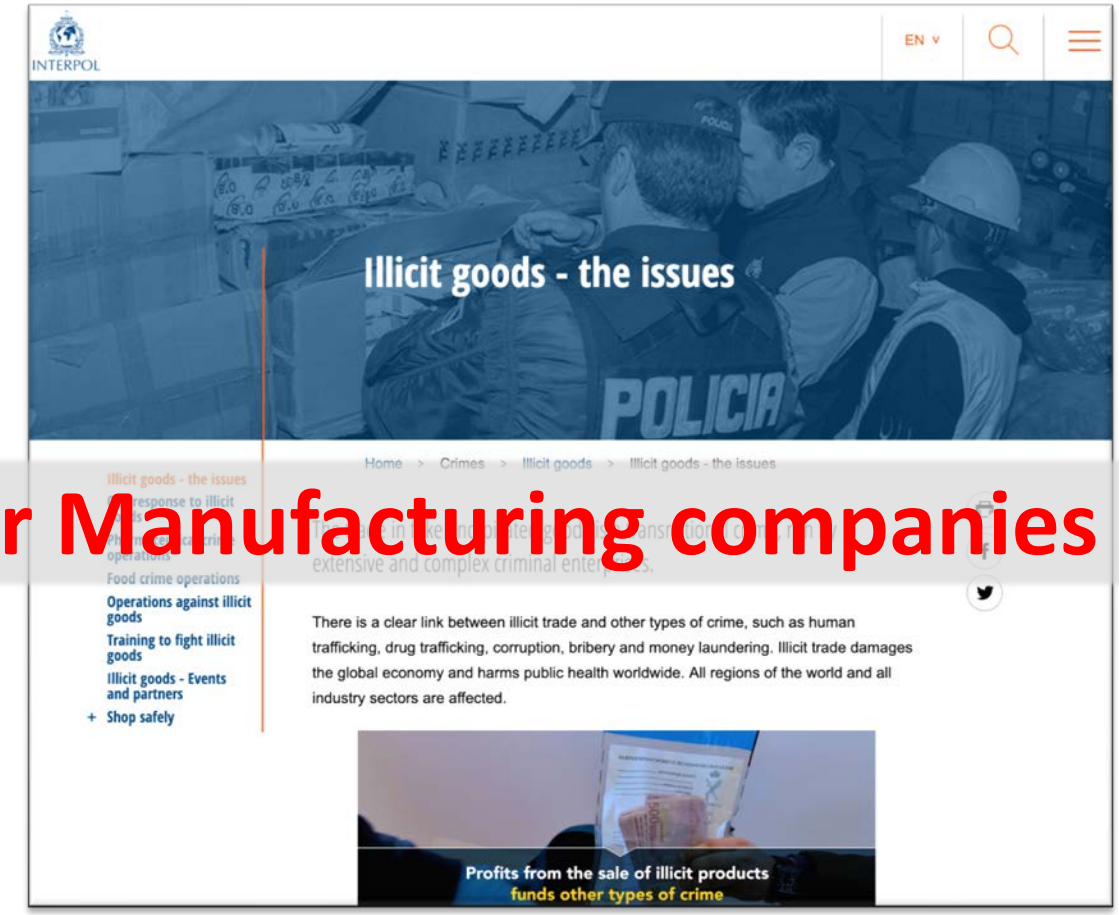
第２回情報技術情報防衛シンポジウム
「中国における営業秘密漏えいの実態、及びこれに対する効果的な対応方策」
（IP FORWARD・2015年1月27日）
https://www.ipa.go.jp/files/000043950.pdf

Distribution of leaked CAD files

Stolen CAD data also can be distributed in public

Sites showing leaked CAD files pertaining to a popular smartphone

Counterfeit products issue



Counterfeit is a serious issue for Manufacturing companies

$250billion a year damage worldwide

https://news.un.org/en/story/2014/01/459622-new-un-campaign-spotlights-links-between-organized-crime-and-counterfeit-goods

One of major crimes for INTERPOL

https://www.interpol.int/en/Crimes/Illicit-goods/Illicit-goods-the-issues

Counterfeit becomes “Supercopy”

The issue can be more serious in the era of Industry 4.0

潜入！闇のマーケット　中国“スーパーコピー”の衝撃 2016年9月6日
http://www.nhk.or.jp/gendai/articles/3857/1.html

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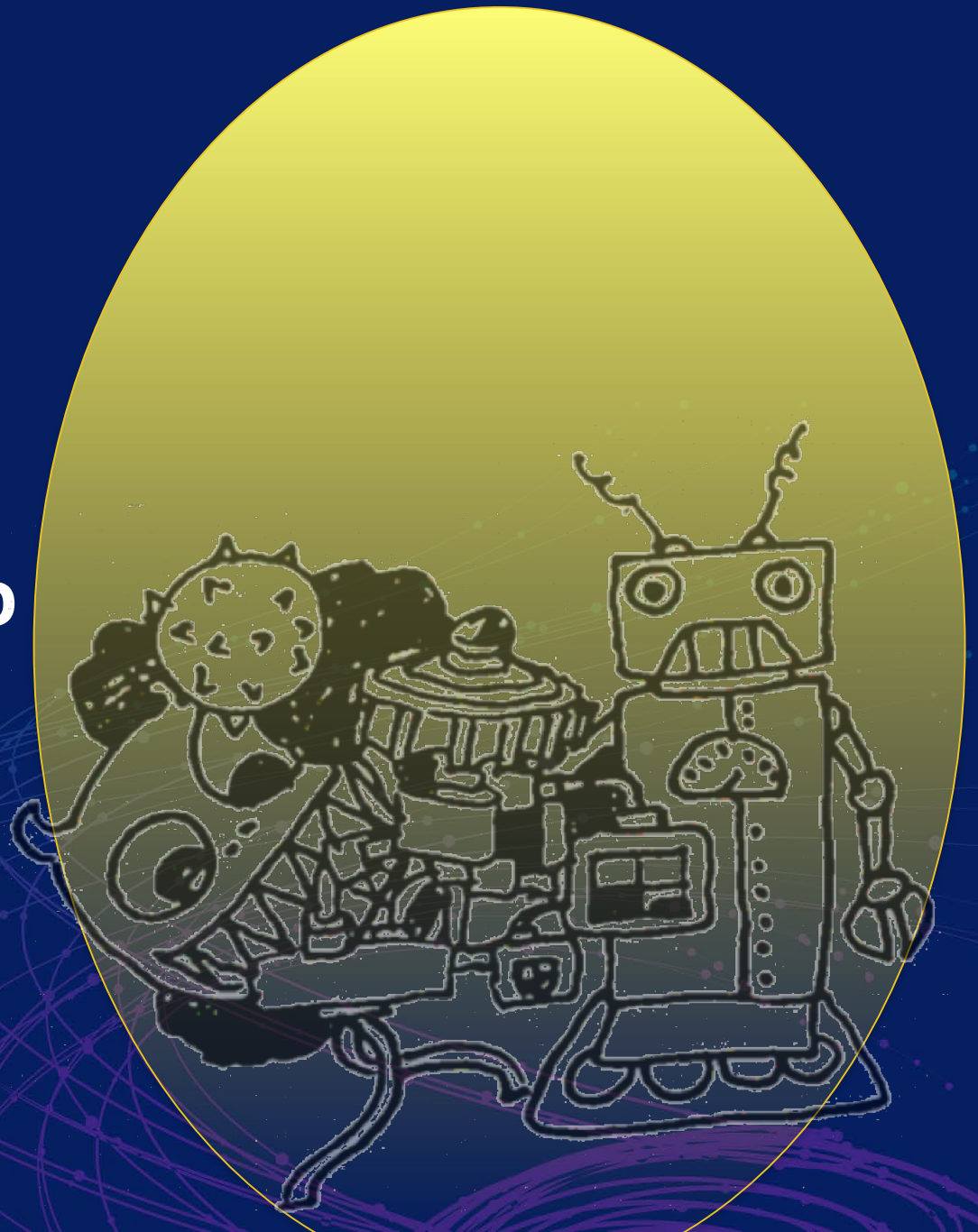
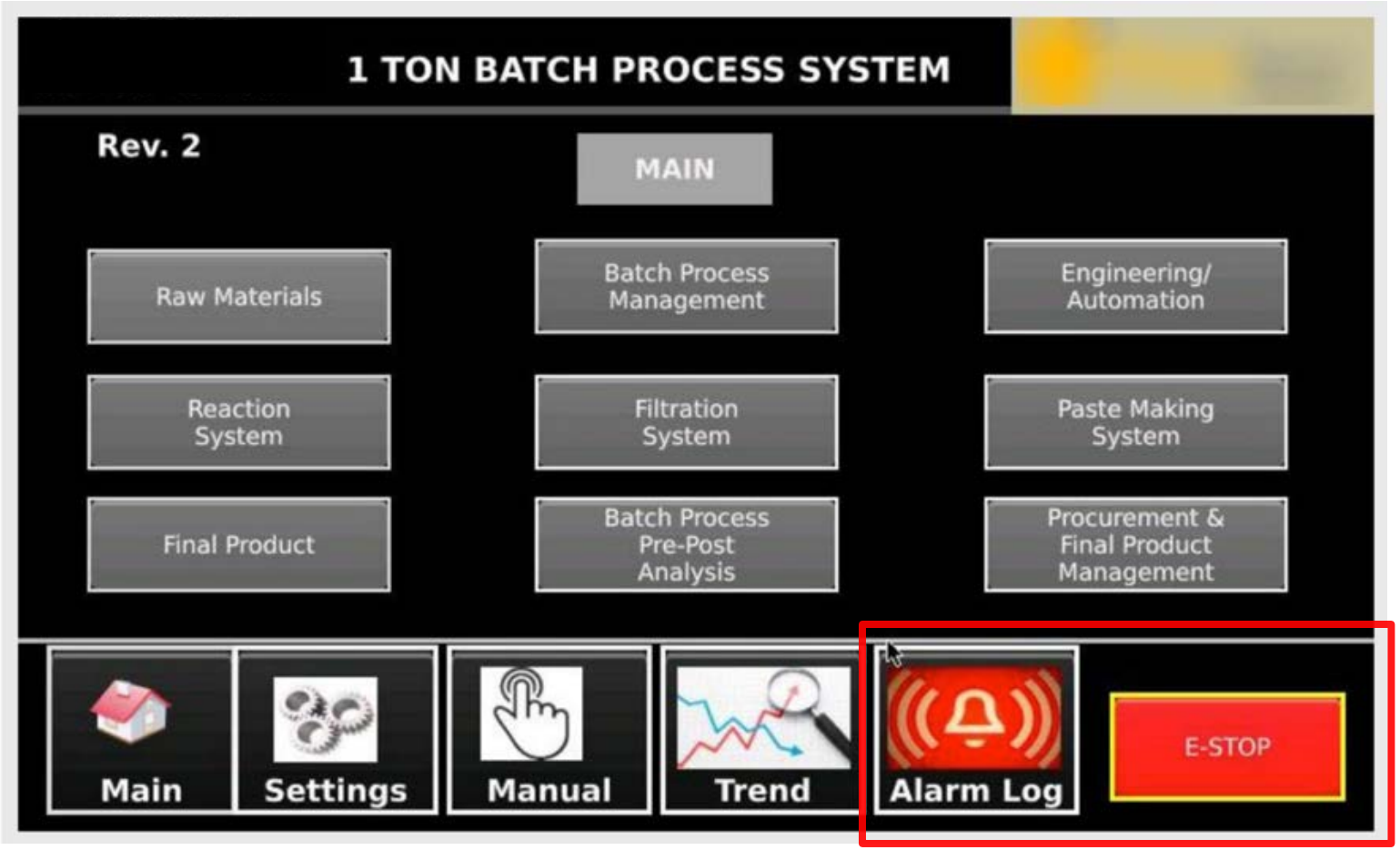
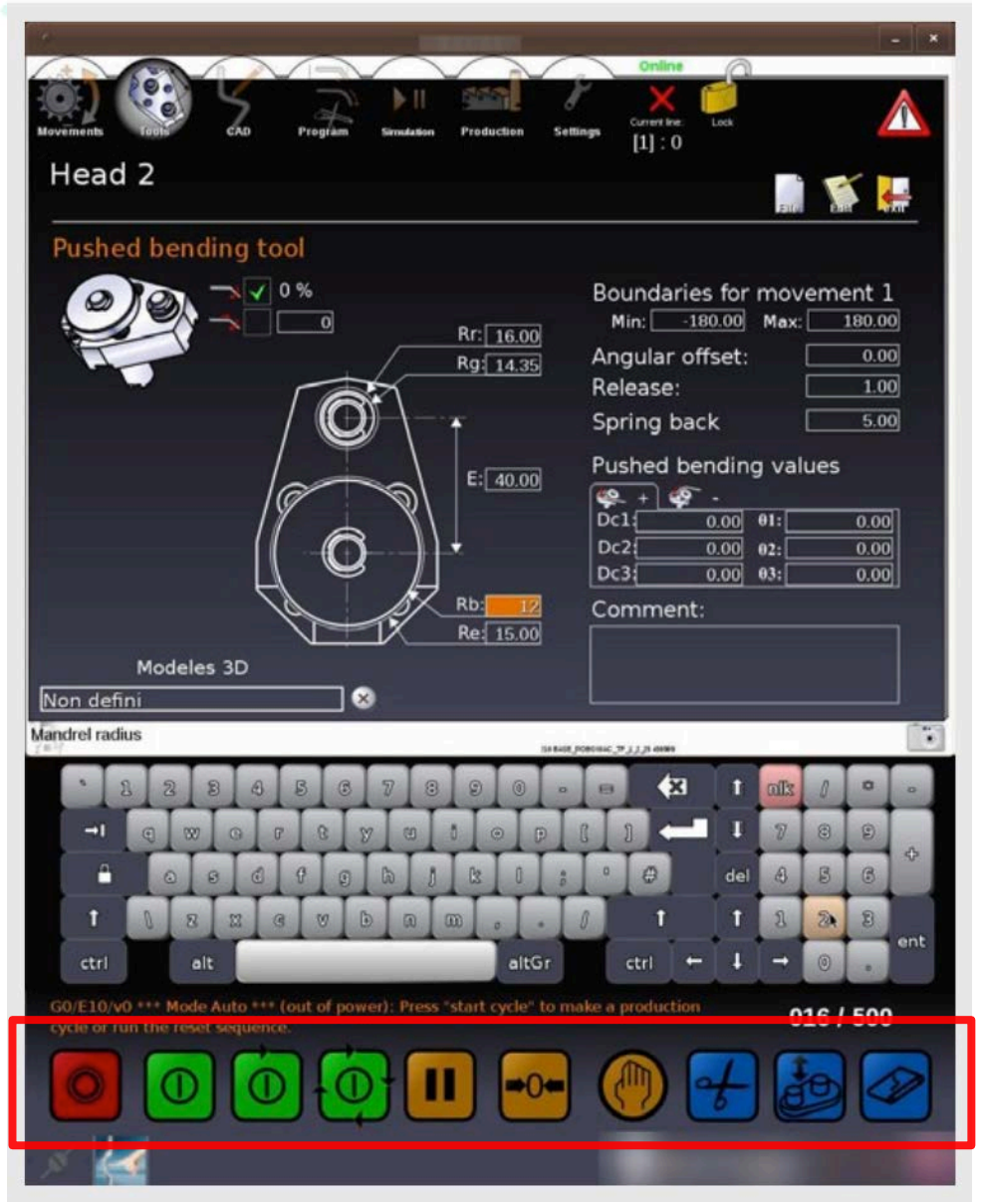
Other Threats and Risks to exposed OT systems



Exposed ICSs





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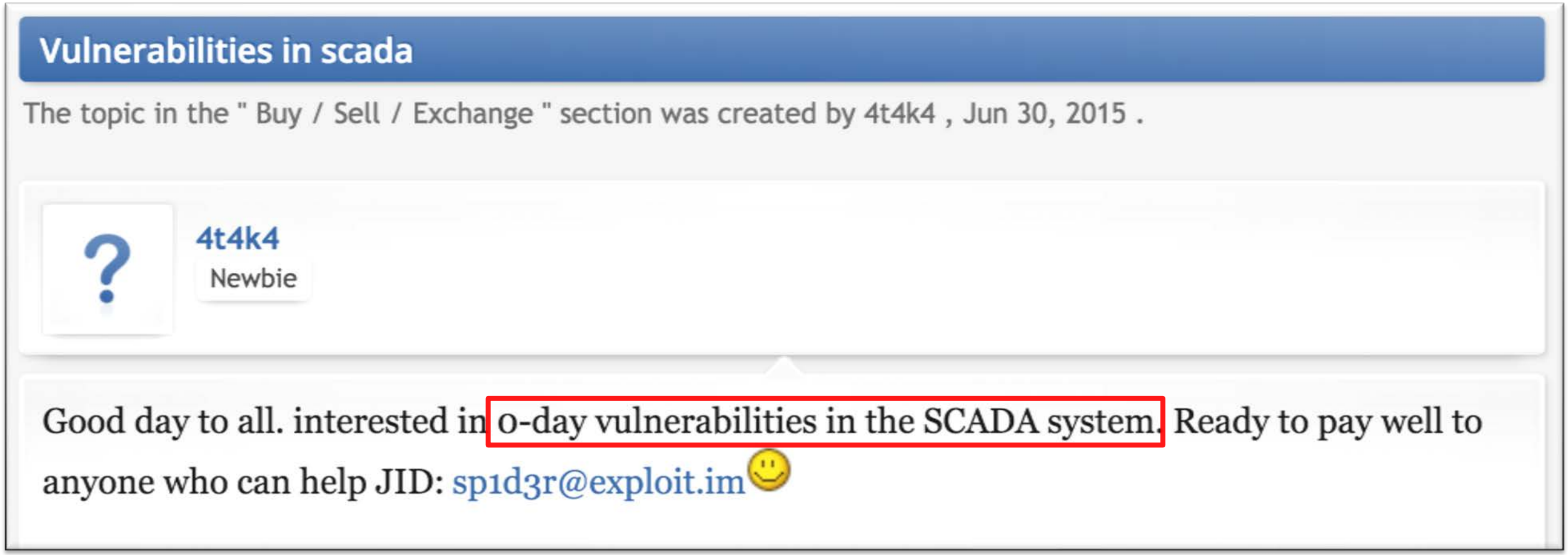
Underground Activities Related to Manufacturing industry

SCADA 0days dealt on the Underground



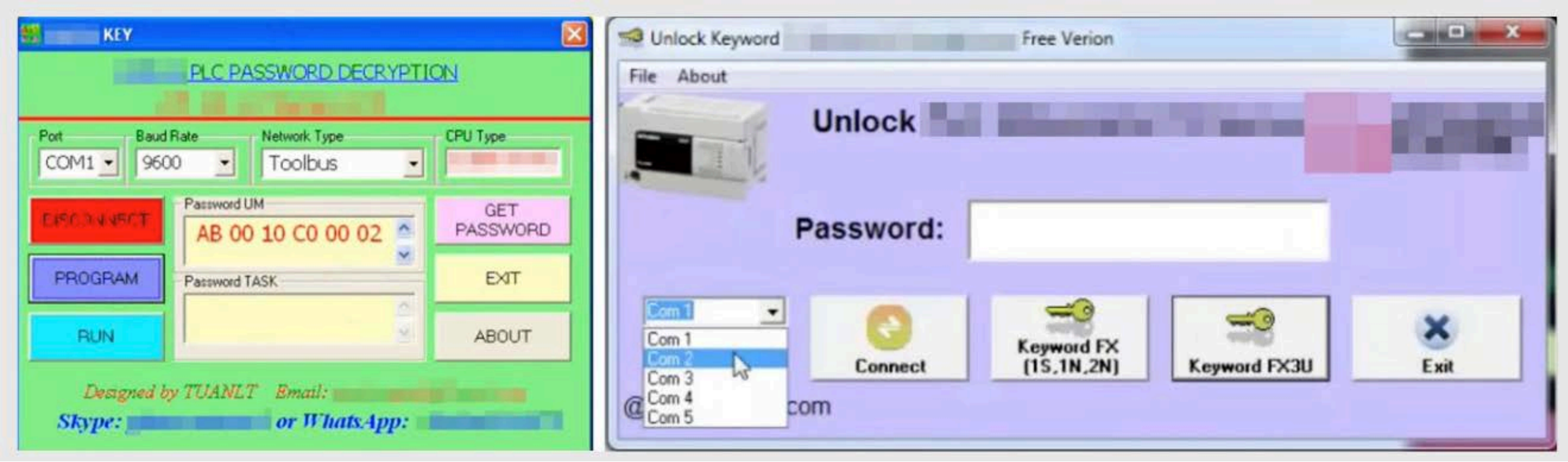
Vulnerabilities in scada

The topic in the " Buy / Sell / Exchange " section was created by 4t4k4 , Jun 30, 2015 .

4t4k4
Newbie

Good day to all. interested in 0-day vulnerabilities in the SCADA system. Ready to pay well to anyone who can help JID: sp1d3r@exploit.im

PLC password crackers sold online on the underground



Klassny
Member
Registered: 2014-10-12
Posts: 15
PM

Intellectual Property, Assets, Confidential, Industrial Spionage

Dear EVO

I'm looking for anything that falls that category. If you work on a big name, multinational, bank, tech firm or whatever. Im buying:

- Blueprints, CAD, CAM Files
- Source Code, Software
- Confidential Documents
- Custom sensible information, competitive advantage
- Finance Algos, Black Boxes

We discuss revenue details on PM. If you hate your employer or you think you worth more, talk to me.

Rent-A-Hacker

Products | FAQs | Register | Login

Rent-A-Hacker

Experienced hacker offering his services!
(Illegal) Hacking and social engineering is my business since i was 16 years old, never had a real job so i had the time to get really good at hacking and i made a good amount of money last +-20 years.
I have worked for other people before, now i am also offering my services for everyone with enough cash here.

Pric
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peo
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So s
Pric
You

Tec
- W
- C/
- Od
- Sp
- Ba
- Ar

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Product	Price	Quantity
Small job, for example: Email and Facebook hacking, installing trojans, small DDOS	250 EUR = 0.029 ฿	1 X Buy now
Medium-large job, ruining people, espionage, website hacking, DDOS for big websites	500 EUR = 0.059 ฿	1 X Buy now
Large job which takes a few days or multiple smaller jobs, DDOS for protected sites	900 EUR = 0.106 ฿	1 X Buy now
UPGRADE: INSTANT reply within 30-60 minutes instead of 24-36 hours for urgent cases. If i need longer this will get refunded. Only buy this together with one of the other options.	200 EUR = 0.024 ฿	1 X Buy now

Industrial equipment purchase request

10.05.2018, 21:22 # 1

CobaltDron
Newbie

Group: Members

Joined: 15-February-2013

0 posts
Thanks: 9
Thanked 2 Times in 2 Posts
Put by (2) Dislajk: 2
Поставили Дизлайк 0 times in 0 posts

Reputation: 1

[Buy] Need to drive the equipment

Greetings friends, I need a man who will drive the equipment I need is not expensive, who will make cheaper, so I will work.

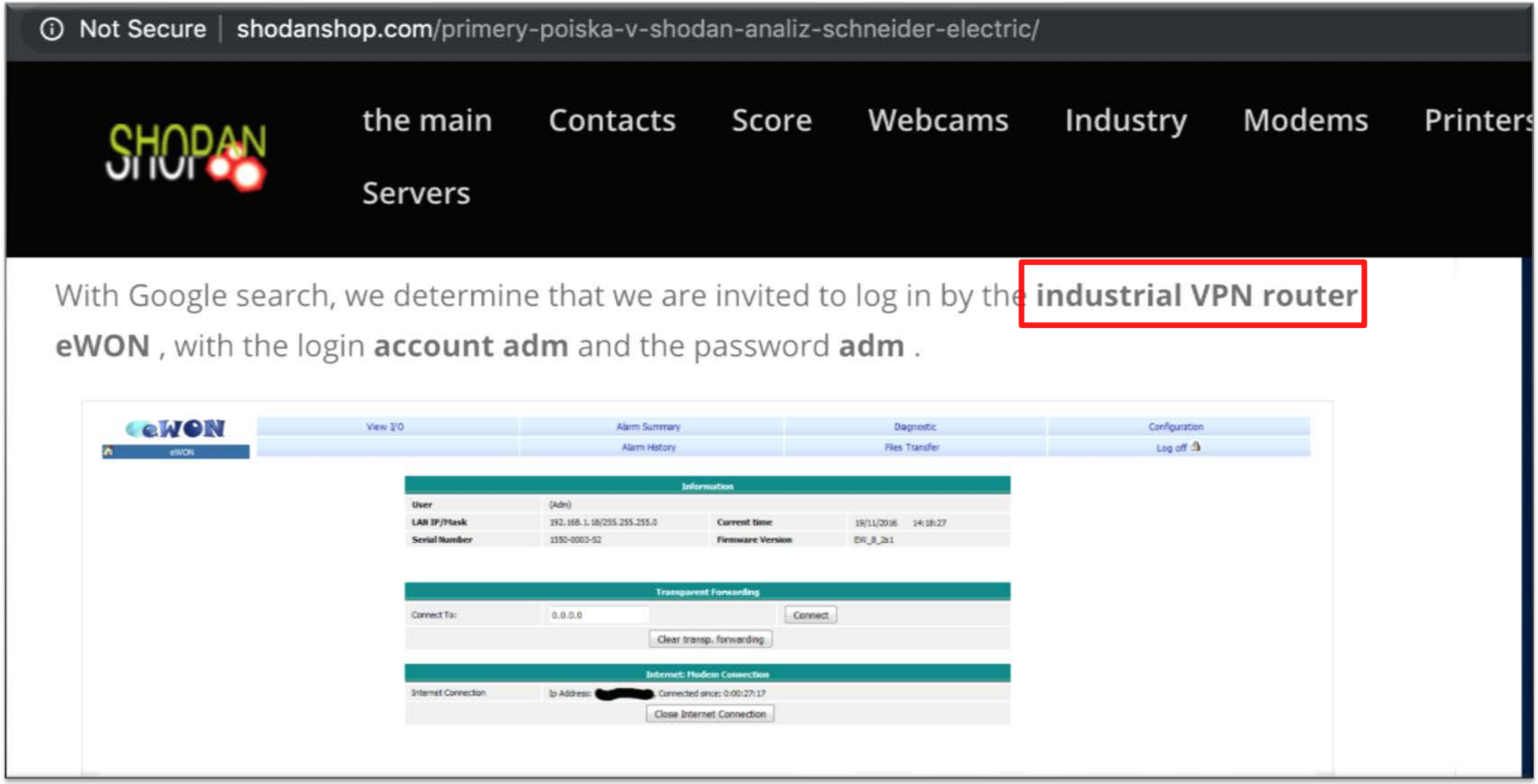
immediately write to drive away the shkolodrocherov.

I will work only through the guarantor, at my expense, the guarantor until I receive the machines I need.

machine tools on 3-15т.р.
only about 3-5 stations, the situation will show, I can take the staf even at your own address for your convenience. further will work with a proven person on a permanent, telephones and small electronics, buying up both on order and without, if there are such people here, write to the cart.

dog CobaltDron

Shodan Shop with Industrial Section



225 Industrial ICS Access System For Sale!

by teamkelvinsecteam - 03-20-2019, 10:05 PM

teamkelvinsecteam

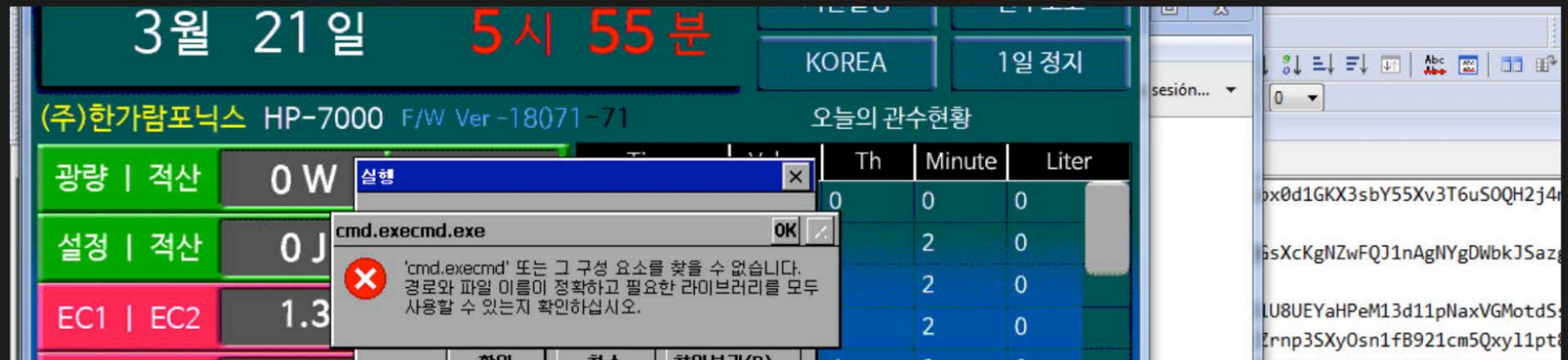
KelvinSecurity
Hacking Team experiences

KelvinSecTeam Hackers

Posts	712
Threads	632
Joined	Apr 2018
Reputation	143

1 YEAR OF SERVICE

03-20-2019, 10:05 PM



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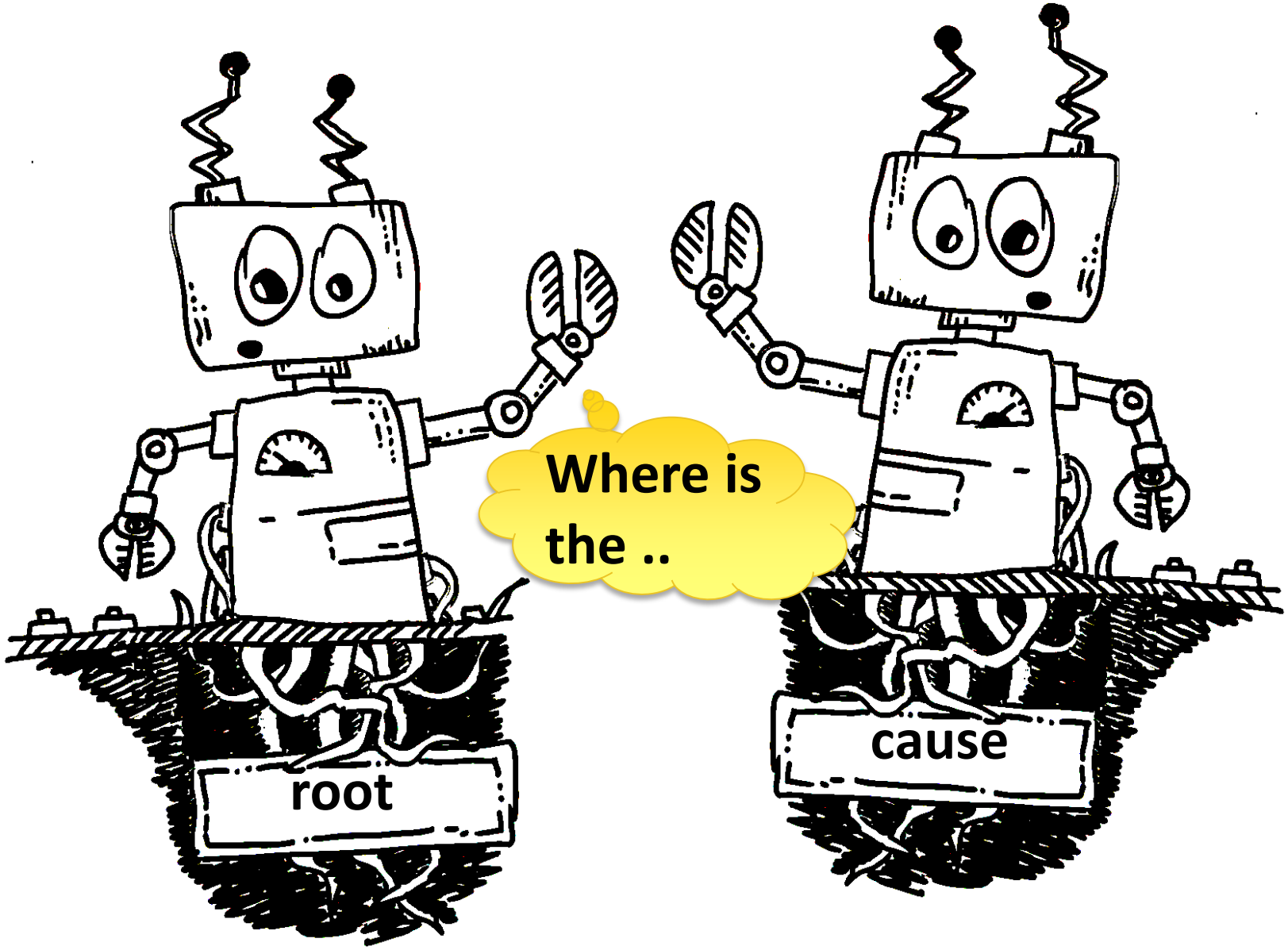
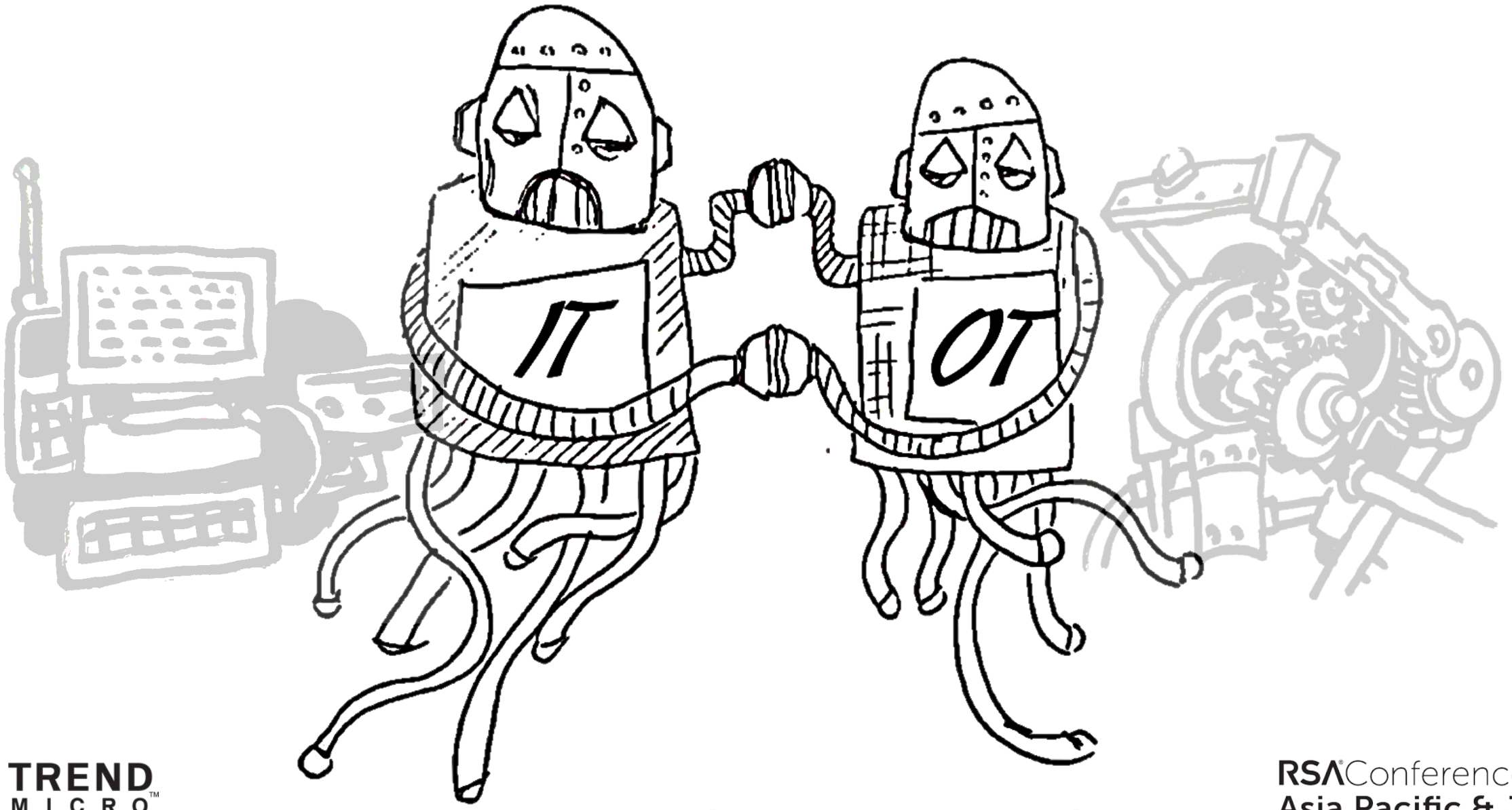
Examining the root causes and best practices

And answer the question “WHY”

THE ROOT CAUSE



Interconnection between IT and OT

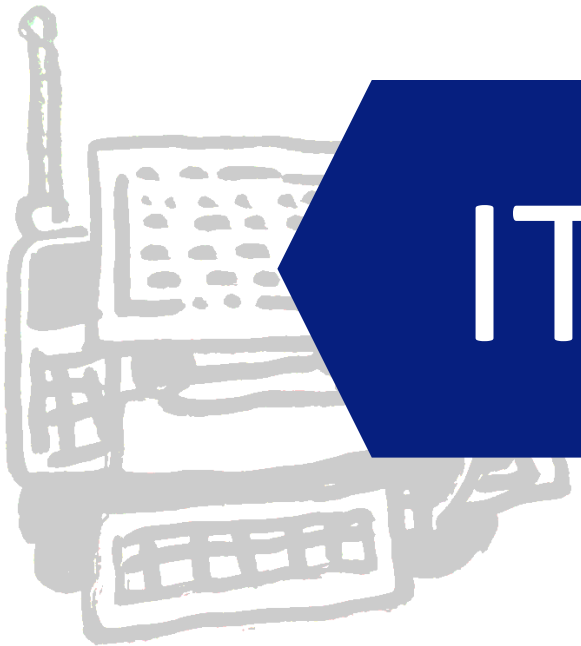


Equipment Lifecycle

3-5 years

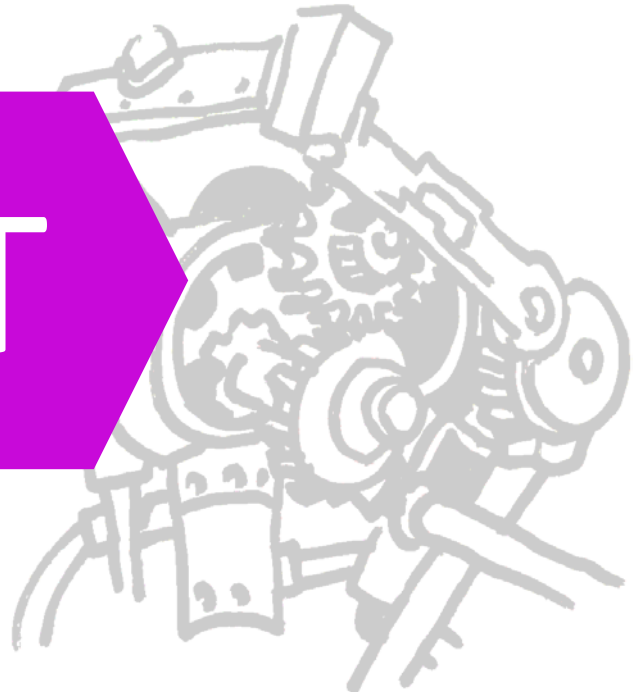
vs

26-34 years



IT

OT



Stay UP TO DATE

Threat Modeling: identify Information flows

- Think like a hacker: How could Intellectual Property Information be exfiltrated from my network?
- What are the information flow channels?
- What are controls that allow me to prevent this?

Defense in Depth

- Defense in Depth is extremely critical in context of Industry 4.0
- Do not assume that the OT networks are isolated
- Stay up to date
- Segregate and Segment
- Enforce controls

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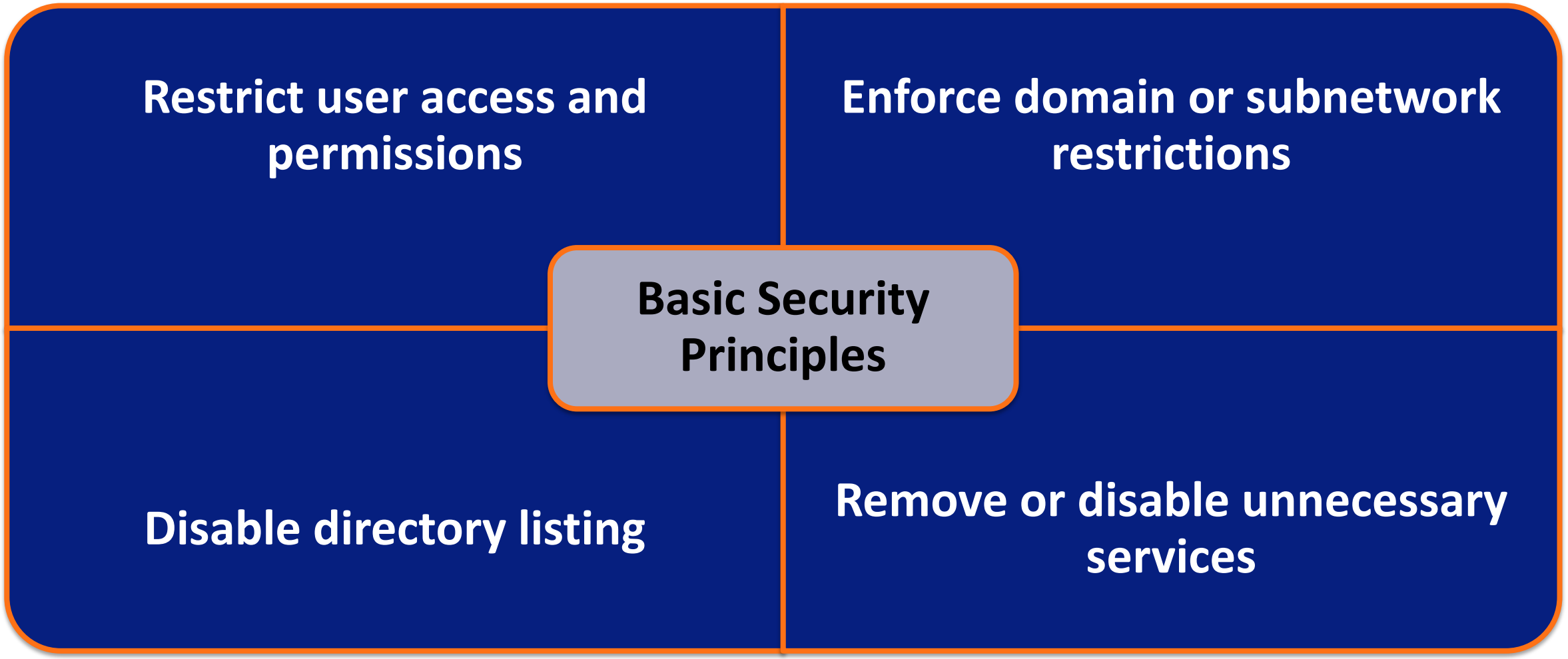
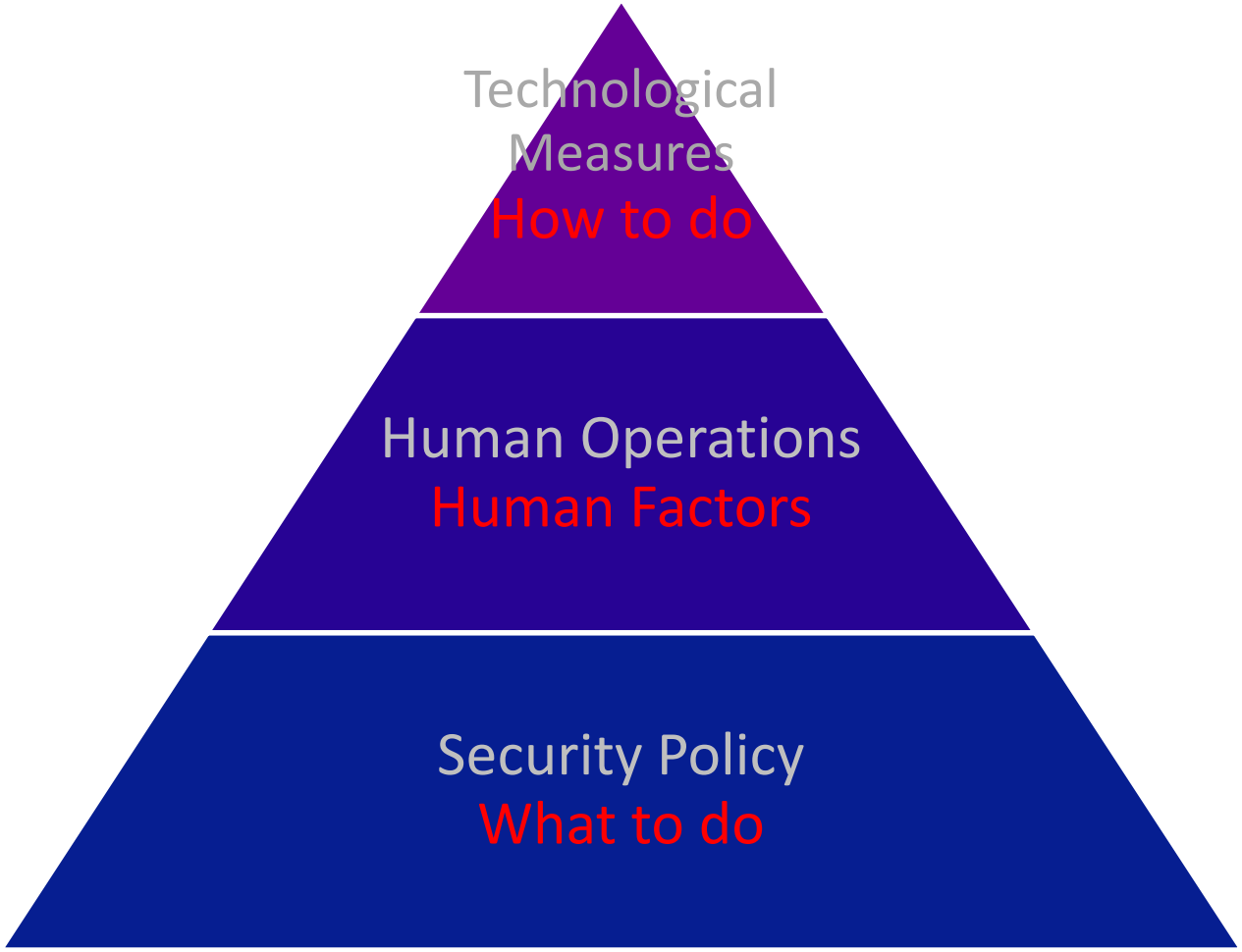
Security Recommendations For Manufacturing

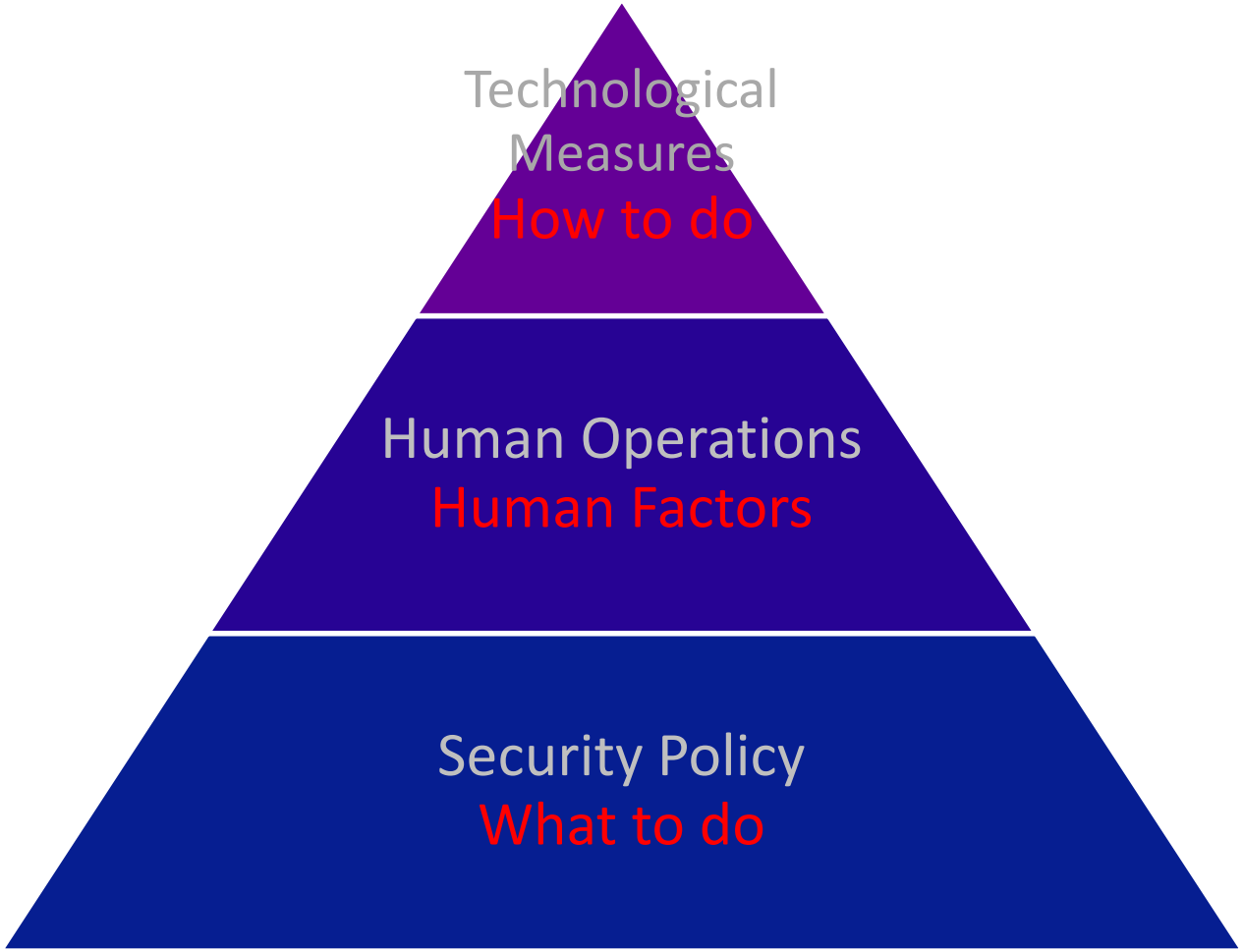
Basic Security Principles



Security Recommendations for Manufacturing

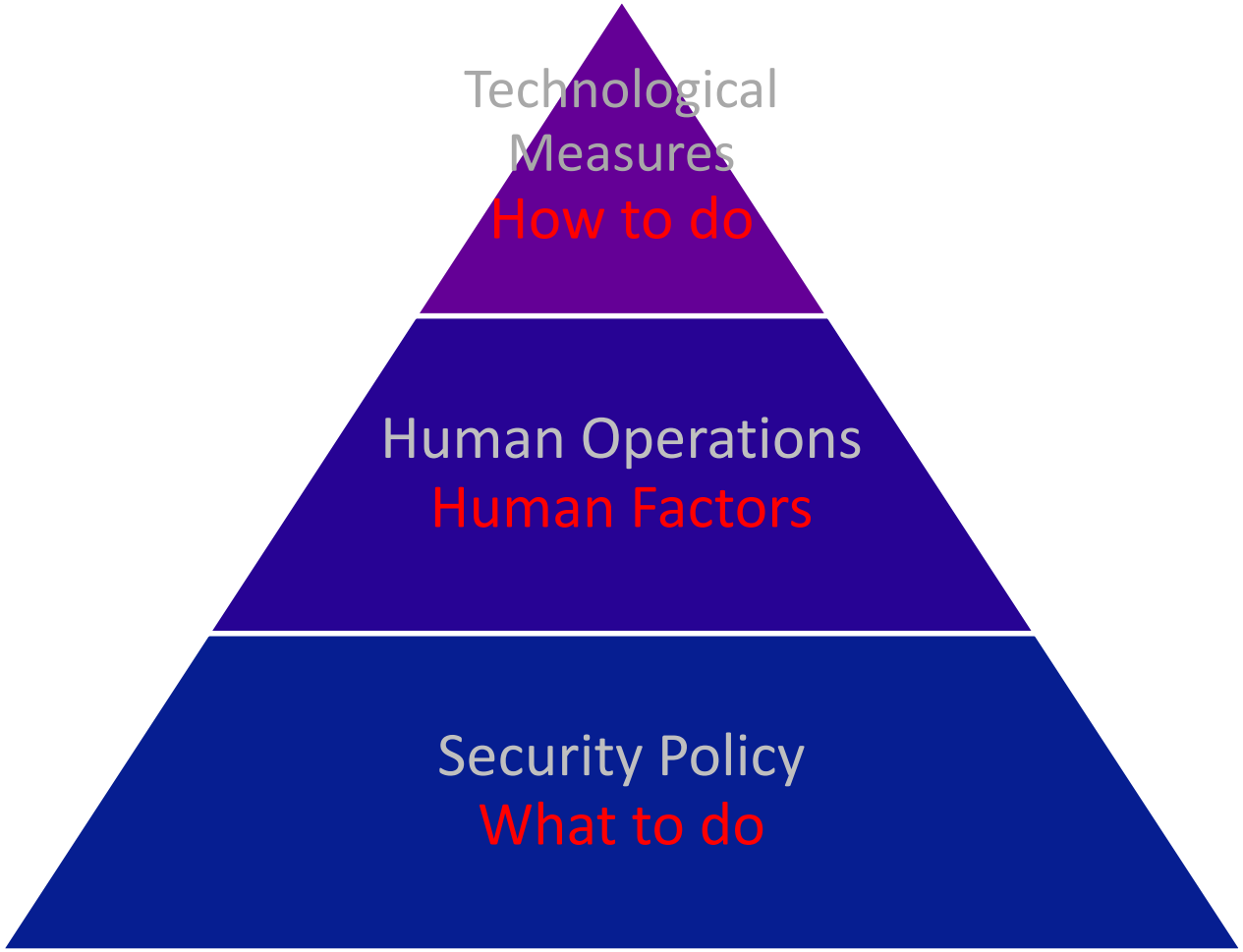


Security Recommendations for Manufacturing



- Accounting and Prioritization of Assets
- Making Security a Requirement
- IEC 62443 Compliance

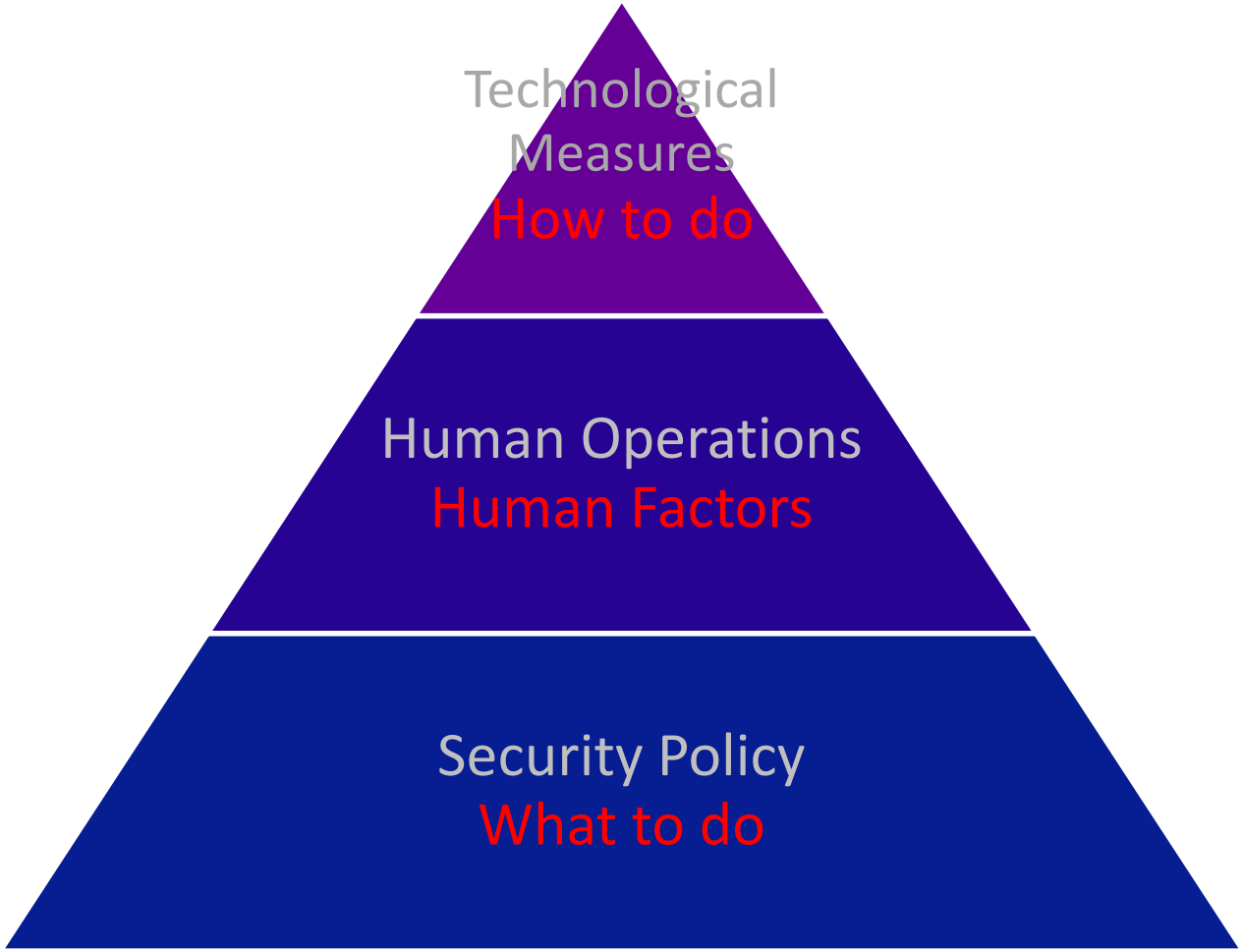
Security Recommendations for Manufacturing



- User Education
- Cooperation between IT and OT

- Accounting and Prioritization of Assets
- Making Security a Requirement
- IEC 62443 Compliance

Security Recommendations for Manufacturing



- Application of Appropriate Protection

- User Education
- Cooperation between IT and OT

- Accounting and Prioritization of Assets
- Making Security a Requirement
- IEC 62443 Compliance

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Conclusions and Final Remarks

Myth Buster

Assumption	Myth?
OT network is closed and isolated	Myth
Windows XP is still in-production in the manufacturing	Reality
Mostly targeted by APT groups	Myth
Industry 4.0 is a buzz word	Myth
CAD files are safe	Myth
Industrial equipment may be operated by outsiders	Reality
Customized PLC password crackers	Reality
Old Worms and Infections still active in OT Networks	Reality
Blueprints, CAM files are targeted only by APT groups	Myth

So what is a real Myth?

Attacks on Manufacturing Networks are always sophisticated

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Thank you!

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bakuei_matsukawa@trendmicro.com