



EDINBURGH  
JUNE 16-21  
2019

# Attacks on Industrial and Manufacturing Networks

*Bakuei Matsukawa, Vladimir Kropotov, Fyodor Yarochkin and Ryan Flores*

**Trend Micro Research**

# An incident in Taiwan in 2018

Quick introduction for risks of Manufacturing industry



Virus outbreak caused almost NT 2.6 billion (US 84.28 mil) of loss

What really had happened?

### TSMC Det

Issued by: TSMC  
Issued on: 2018/08

Hsinchu, Taiwan  
degree of infection  
August 6.

TSMC expects th  
Company is confi

Most of TSMC's c  
next few days.

This virus outbre  
confidential inform

**TSMC Spokespers**  
Lora Ho  
Senior Vice Preside  
Tel: 886-3-5054602

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

### Spokesperson

TSMC Corporate Communications D  
2085  
h\_sun@tsmc.com

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



Laurence Frost and Naomi Tajitsu, Reuters May 15, 2017, 1:25

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



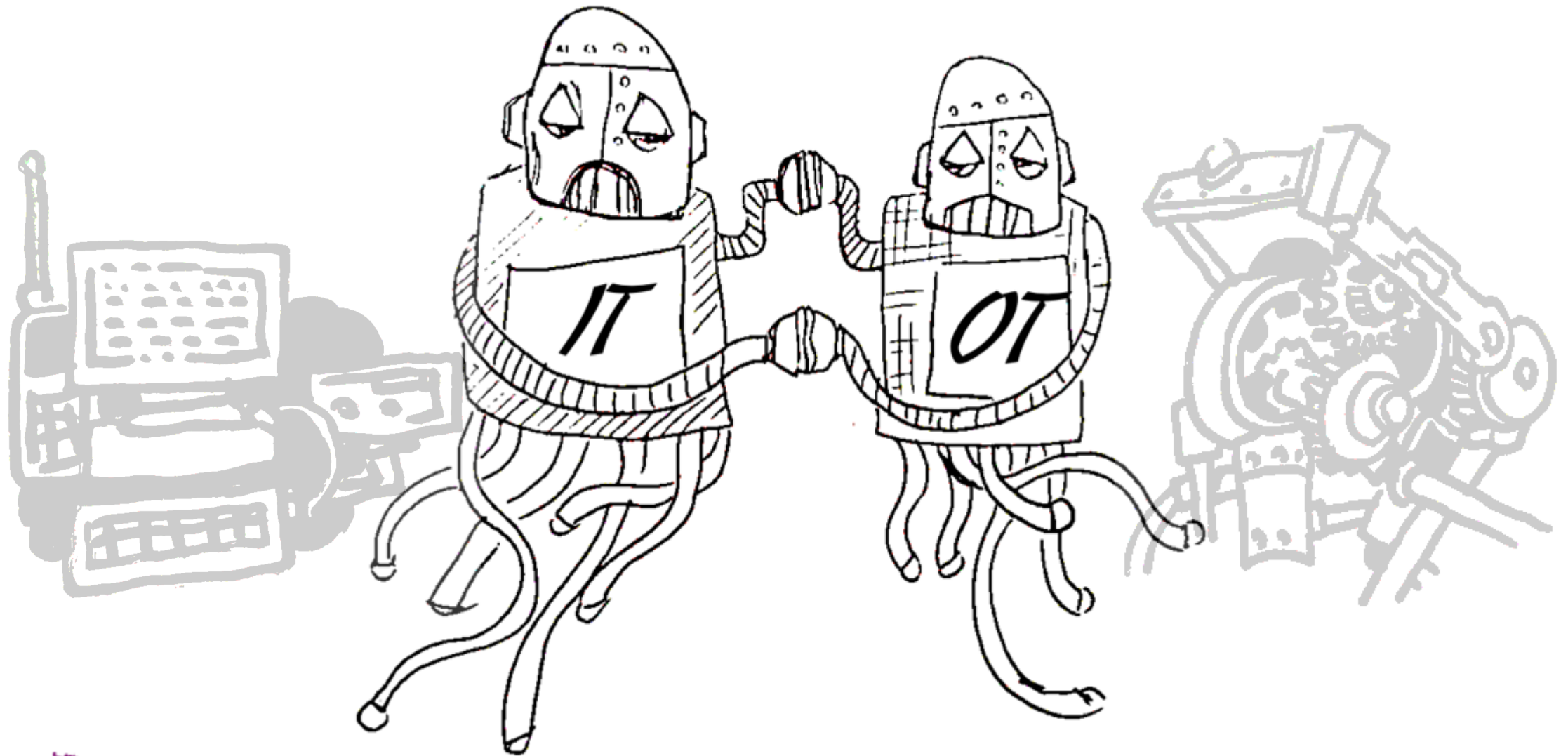
**Peter Lyon** Contributor ⓘ

*I focus on all things to do with cars.*

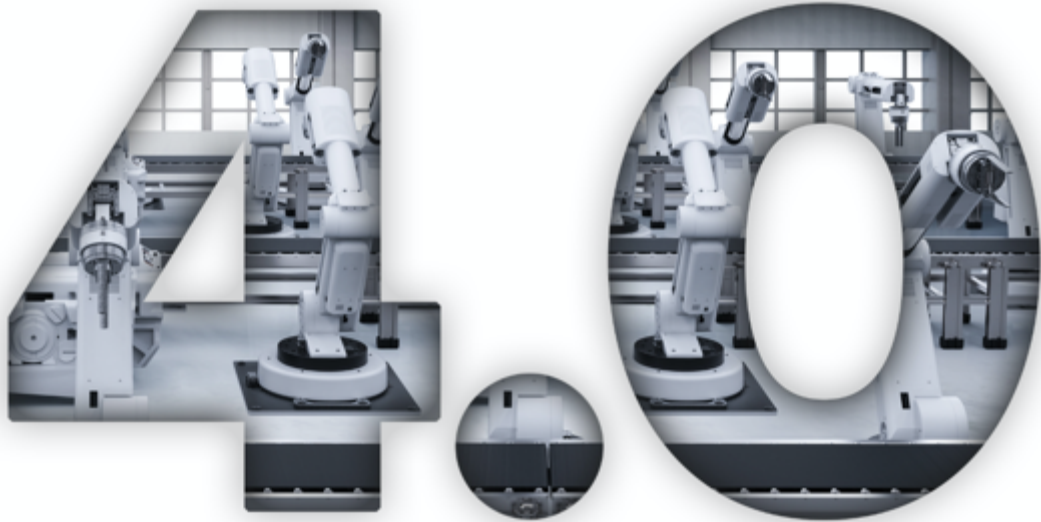
**What are the factors that made it happen?**



# Interconnection between IT and OT



# Is Industry 4.0 a Buzzword? – No

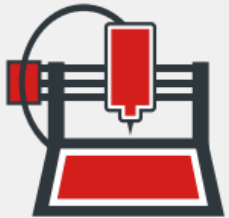


Country	Strategy	Issue Date
China	Made in China 2025 中国製造2025重点領域技術路線図	May-15
Germany	Industrie 4.0	Nov-11
India	Make in India Digital India	Sep-14
Japan	Connected Industries Society 5.0	Mar-17
Russia	4.0RU	Jul-17
US	Industrial Internet Consortium Manufacturing USA	Mar-14

# What is Industry 4.0?

1700s

**Mechanical  
manufacturing**

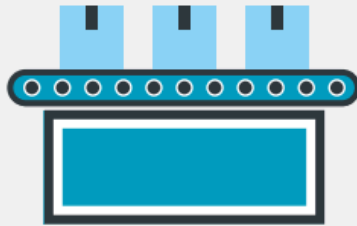


Steam-powered machines replaced human labor

1.0

1800s

**Mass  
production**

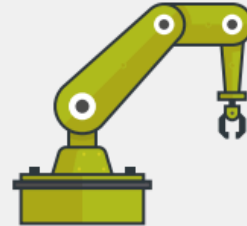


Electric-powered machines aided the production of goods in massive quantities

2.0

1900s

**IT  
automation**



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

3.0

2000s

**Cyber-physical  
system use**

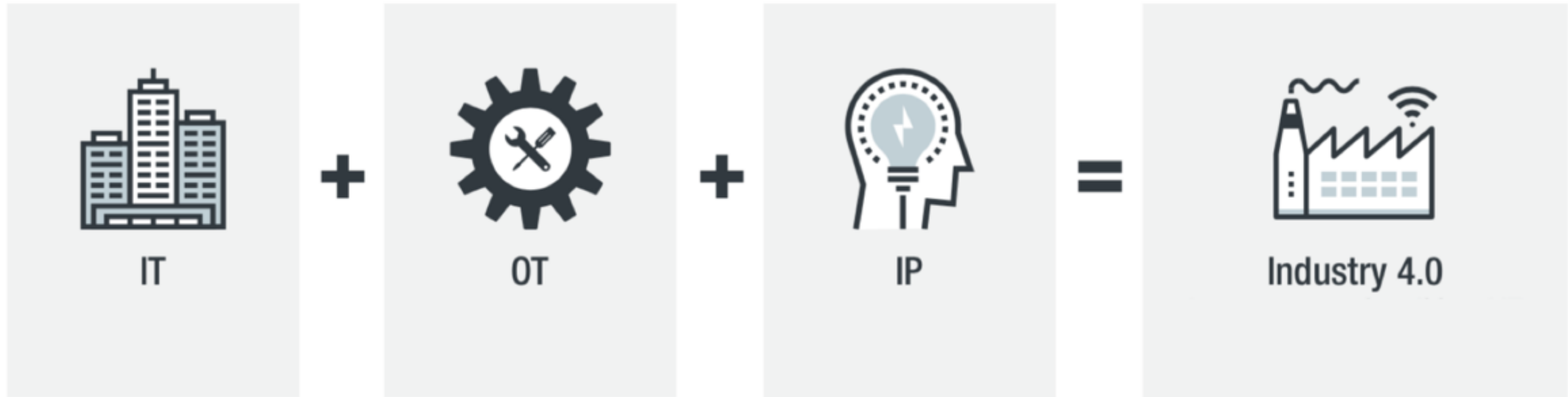


Technologies like ML/AI enabled automated information sharing and even decision making

4.0



# Convergence of IT, OT and IP



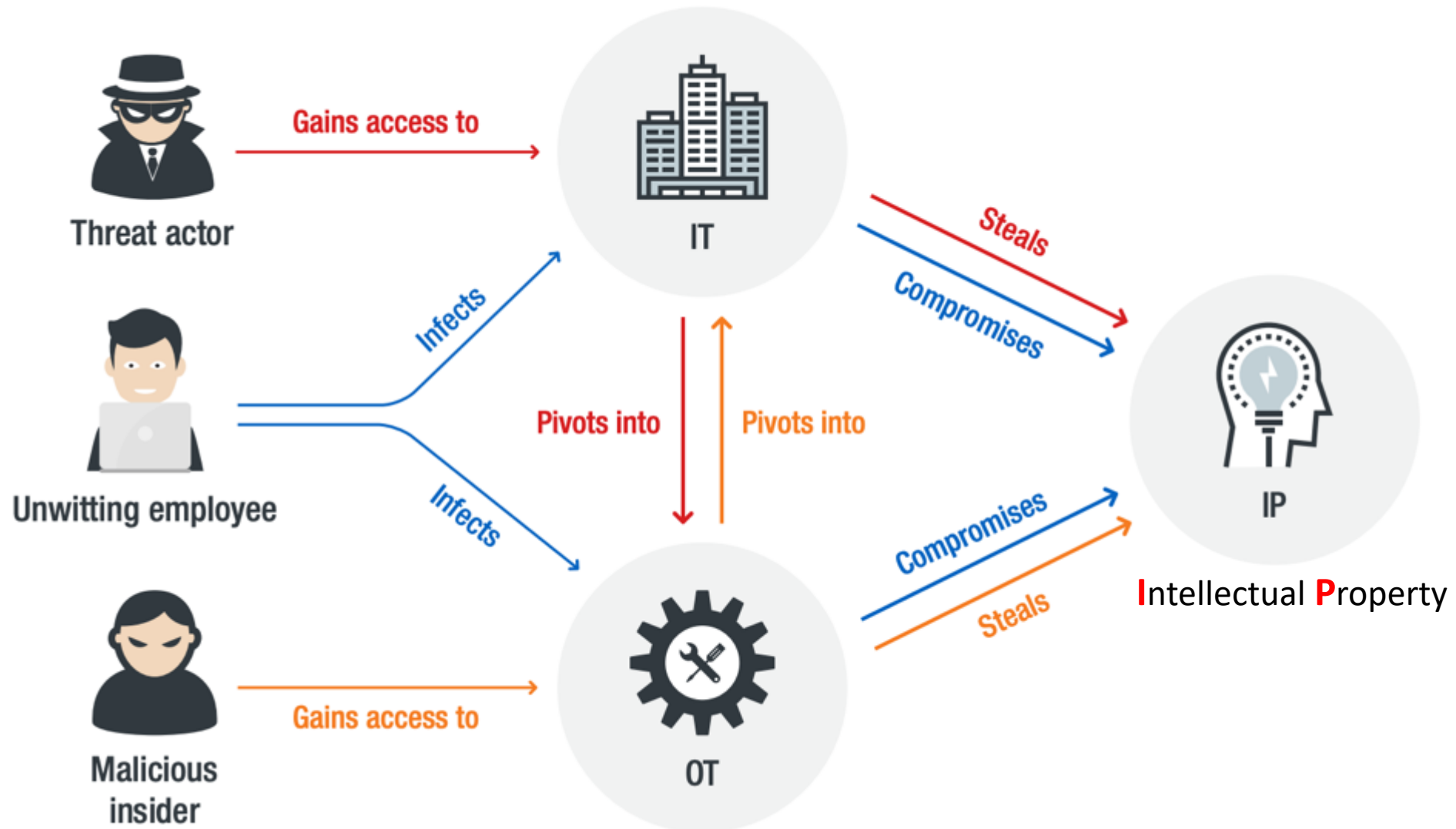
Information **T**echnology

Operational **T**echnology

Intellectual **P**roperty

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

# How threats can figure into the convergence





# Characteristics of Manufacturing Industry

Unique threat landscape to Manufacturing Industry

# Equipment Lifecycle

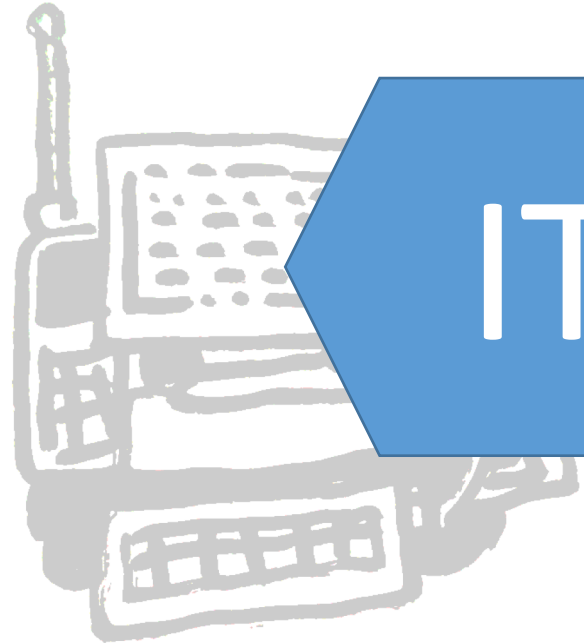
3-5 years

VS

26-34 years

IT

OT



# 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

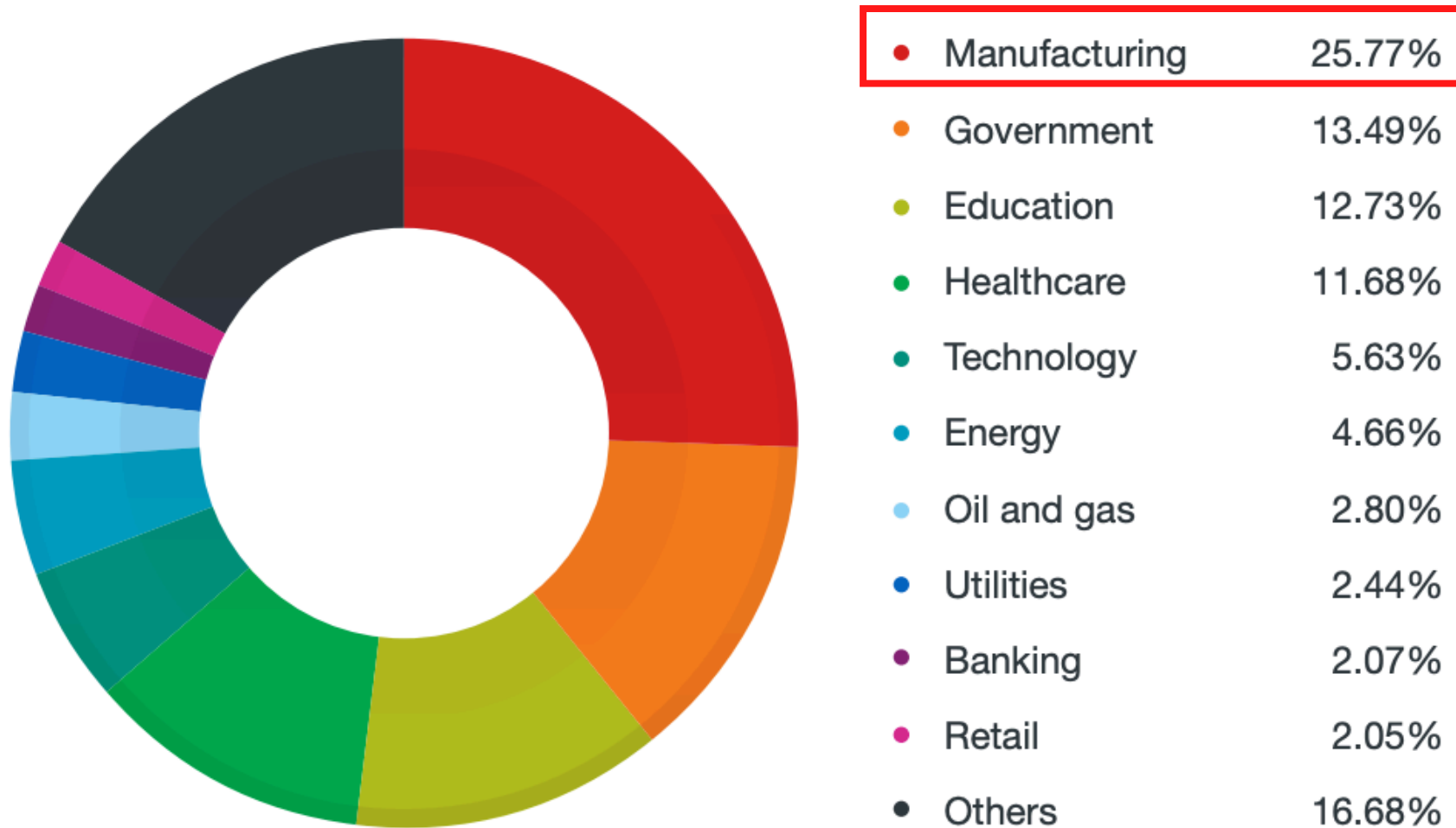
# Prevalence of Downad in Manufacturing

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

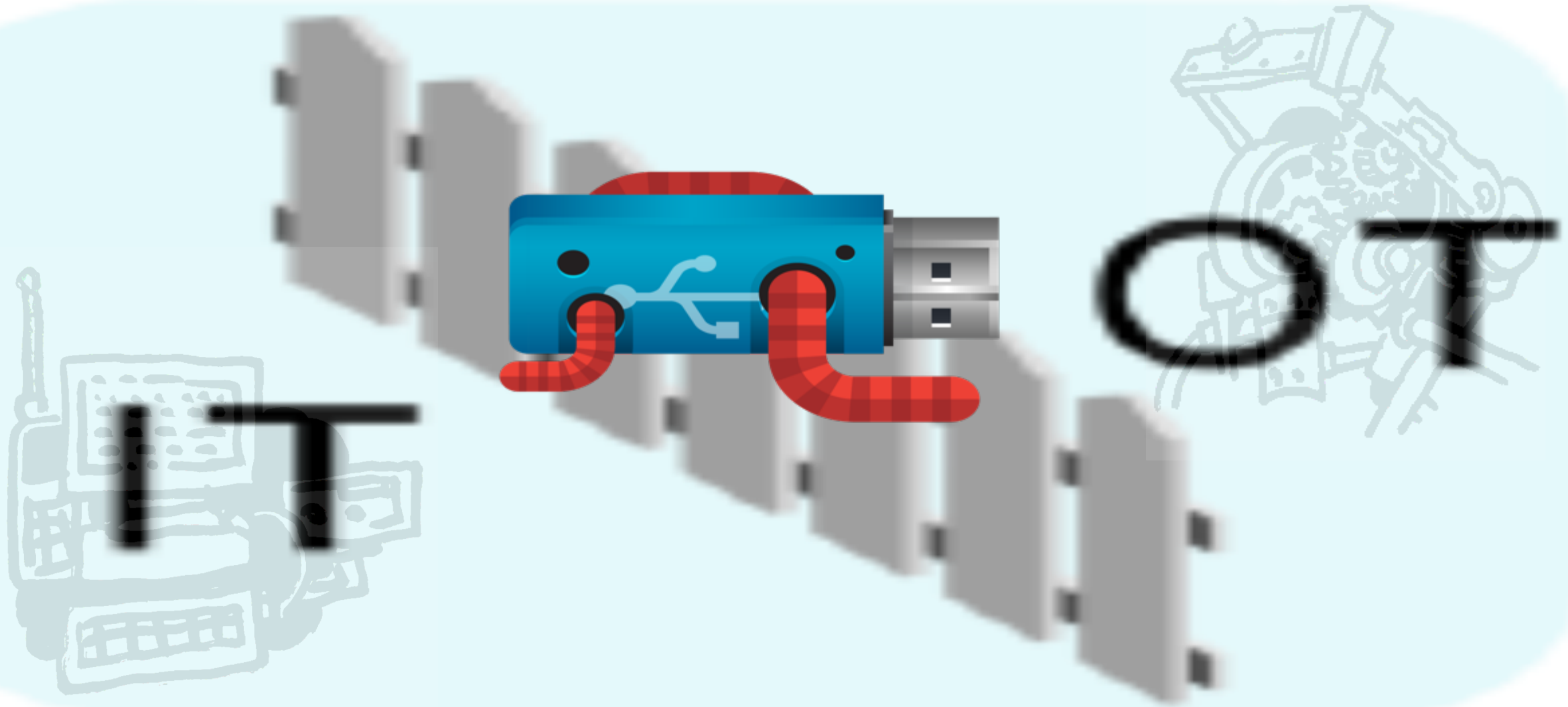
# Malicious Autorun.inf detections



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

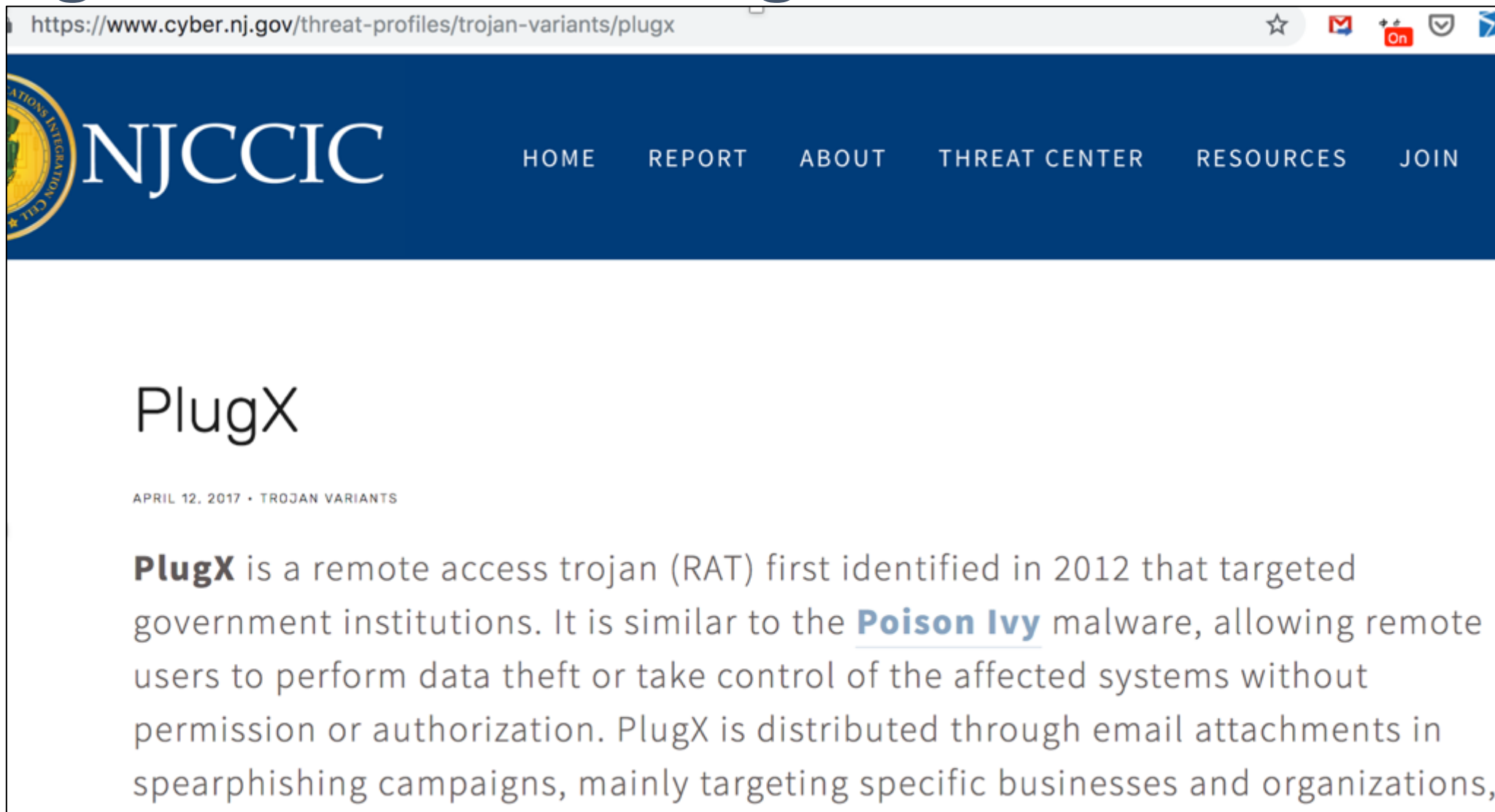


# Case study for Manufacturing Industry

PlugX for Ransomware




# PlugX on Manufacturing Network



The screenshot shows a web browser window with the URL <https://www.cyber.nj.gov/threat-profiles/trojan-variants/plugx>. The page header features the NJCCIC logo on the left and a navigation menu with links for HOME, REPORT, ABOUT, THREAT CENTER, RESOURCES, and JOIN. The main content area has a large heading "PlugX" and a sub-heading "APRIL 12, 2017 • TROJAN VARIANTS". The text describes PlugX as a remote access trojan (RAT) first identified in 2012 that targeted government institutions, similar to the Poison Ivy malware, and is distributed through email attachments in spearphishing campaigns.

https://www.cyber.nj.gov/threat-profiles/trojan-variants/plugx

 NJCCIC

HOME REPORT ABOUT THREAT CENTER RESOURCES JOIN

## PlugX

APRIL 12, 2017 • TROJAN VARIANTS

**PlugX** is a remote access trojan (RAT) first identified in 2012 that targeted government institutions. It is similar to the [Poison Ivy](#) malware, allowing remote users to perform data theft or take control of the affected systems without permission or authorization. PlugX is distributed through email attachments in spearphishing campaigns, mainly targeting specific businesses and organizations,

# PlugX and Ransomware: incident highlights

- 2017/09/10 02:00:42 AM" we 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
- Victim: a manufacturing enterprise in **China**

# PlugX for 9.5 Bitcoins ransom

- A similar 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 automatically, we are professional hacker organization that specifically targets enterprises"**

# PlugX for ransom is not a single instance

- 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

# Targeted ransomware and mining campaigns

Checked Sell Dediki under vb \* c miner, locker, poker, etc. | Sample by country | Low prices | Dedicated servers | DedicatET.com

defender71 · 01/25/2019 · nl brut dediki rdp dedik to buy dedik to buy dediki rdp

Dediki = Dedicated servers



defender71

New user

check in: 01/25/2019  
Messages: one  
Sympathy: 0  
Points: one

01/25/2019

On sale there are various Dedik under WB \* in, poker, miner, locker, etc.

Sort by country:

RU / UA - 130 rub.

USA / Canada - 150 rubles.

Europe - 140 rubles.

China - 80 rubles. (Often taken under the cryptors and miners)

(Germany, France, Spain, Italy, England, Japan, Netherlands, Czech Republic, Poland)

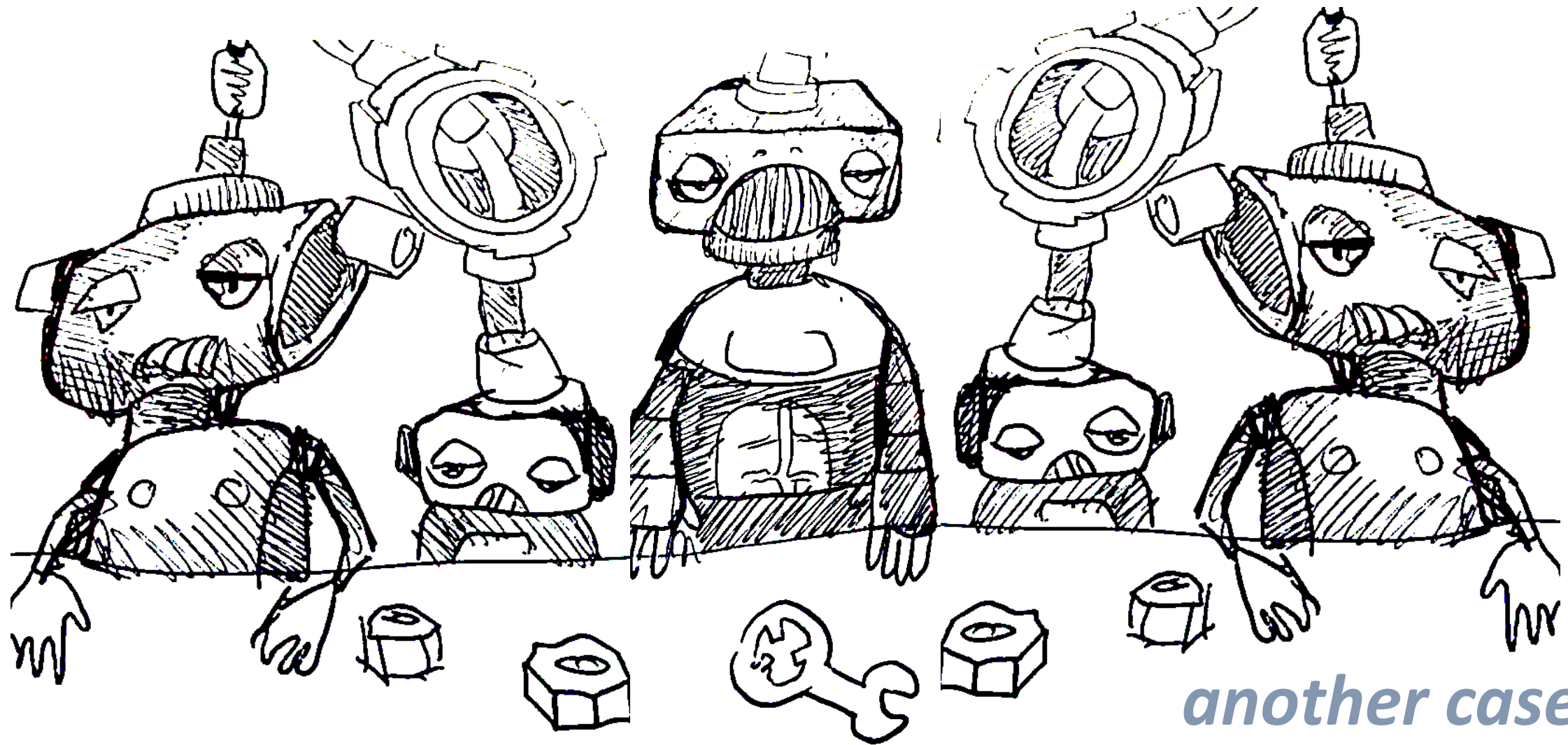
There are also many other countries, find out the presence of certain countries by contacts!

Regular customers discounts!

Contacts:



# Strange things in Manufacturing Networks



*another case*



# Equation tools weaponized to distribute coin miner

GitHub, Inc. [US] | <https://github.com/misterch0c/shadowbroker>

misterch0c / shadowbroker

<> Code   Issues 7   Pull requests 1   Projects 0   Security   Insights

The Shadow Brokers "Lost In Translation" leak

24 commits   1 branch   0 releases

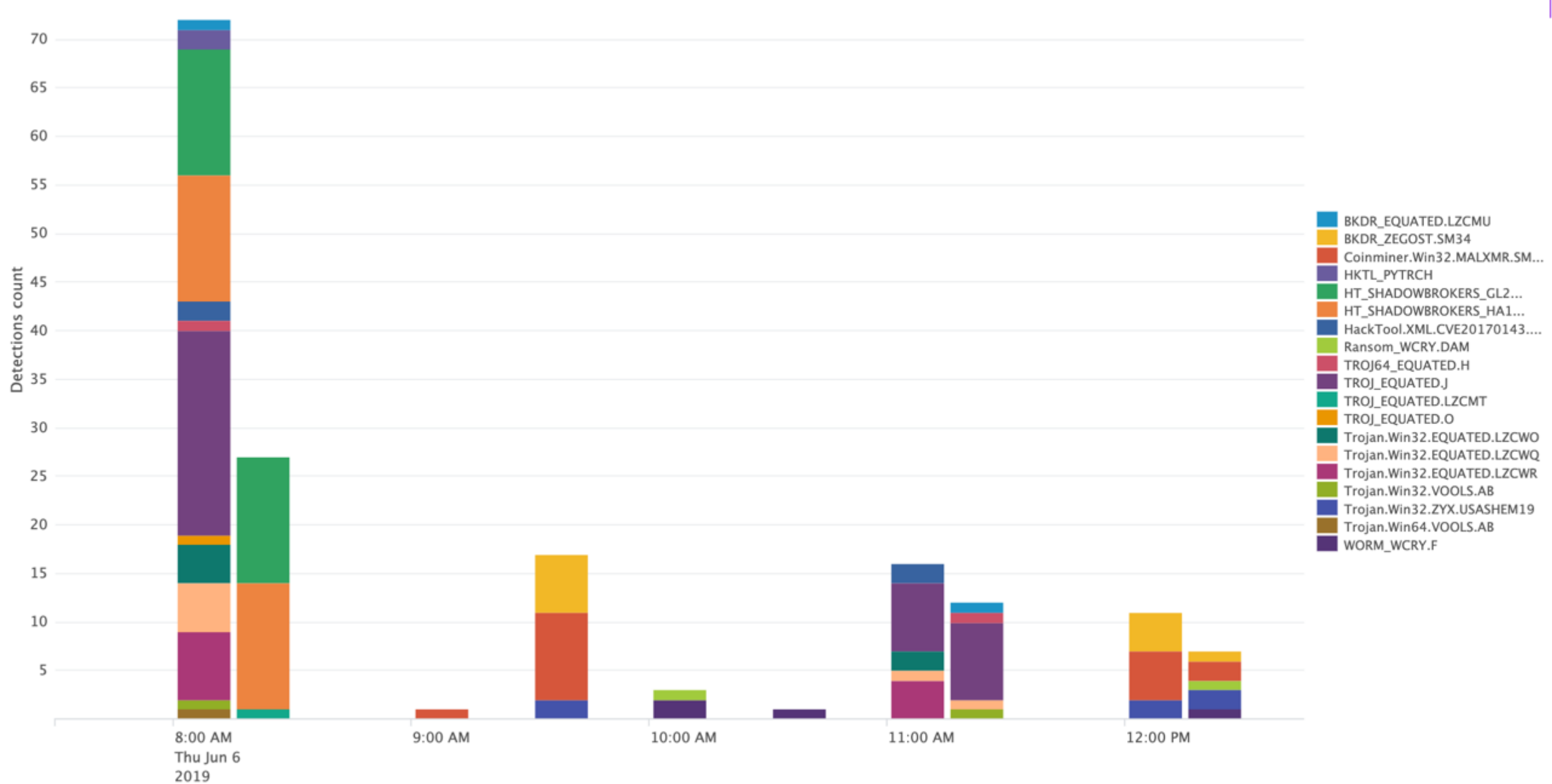
Branch: master ▾   New pull request

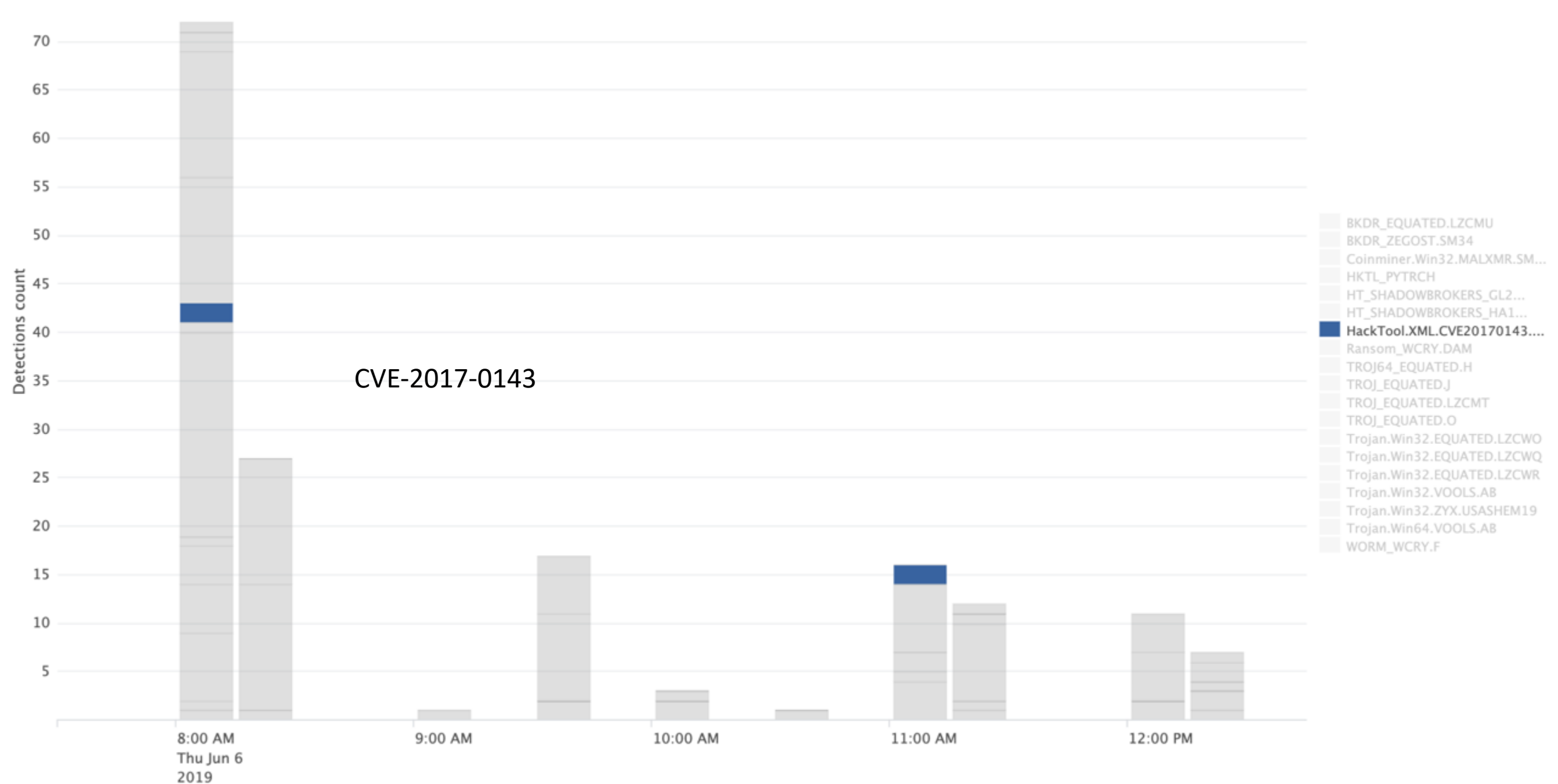
misterch0c white knight fix

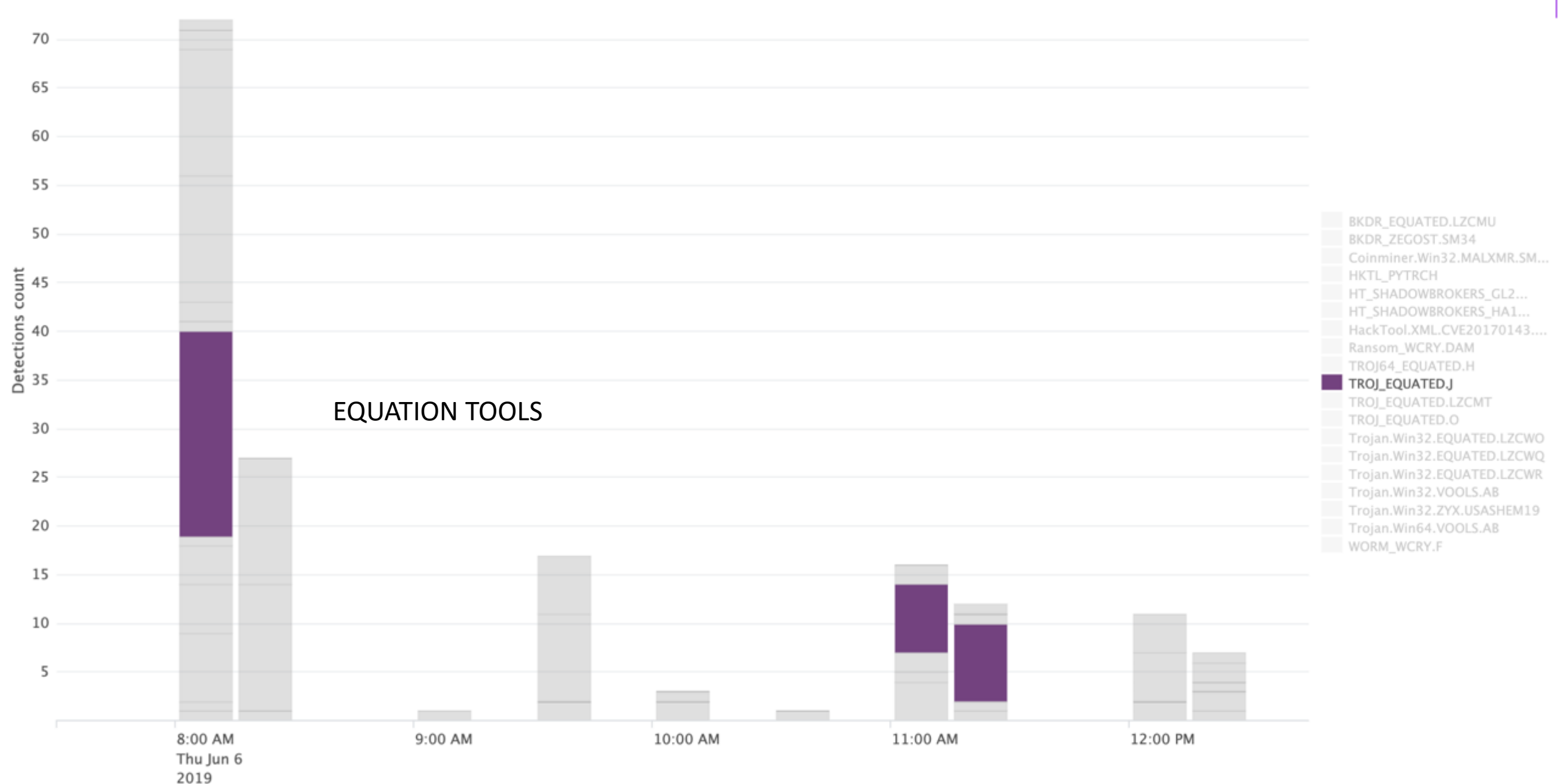
- oddjod oddjob
- swift decrypted files <https://steemit.com/shadowbrokers/@theshadowbrokers/l>

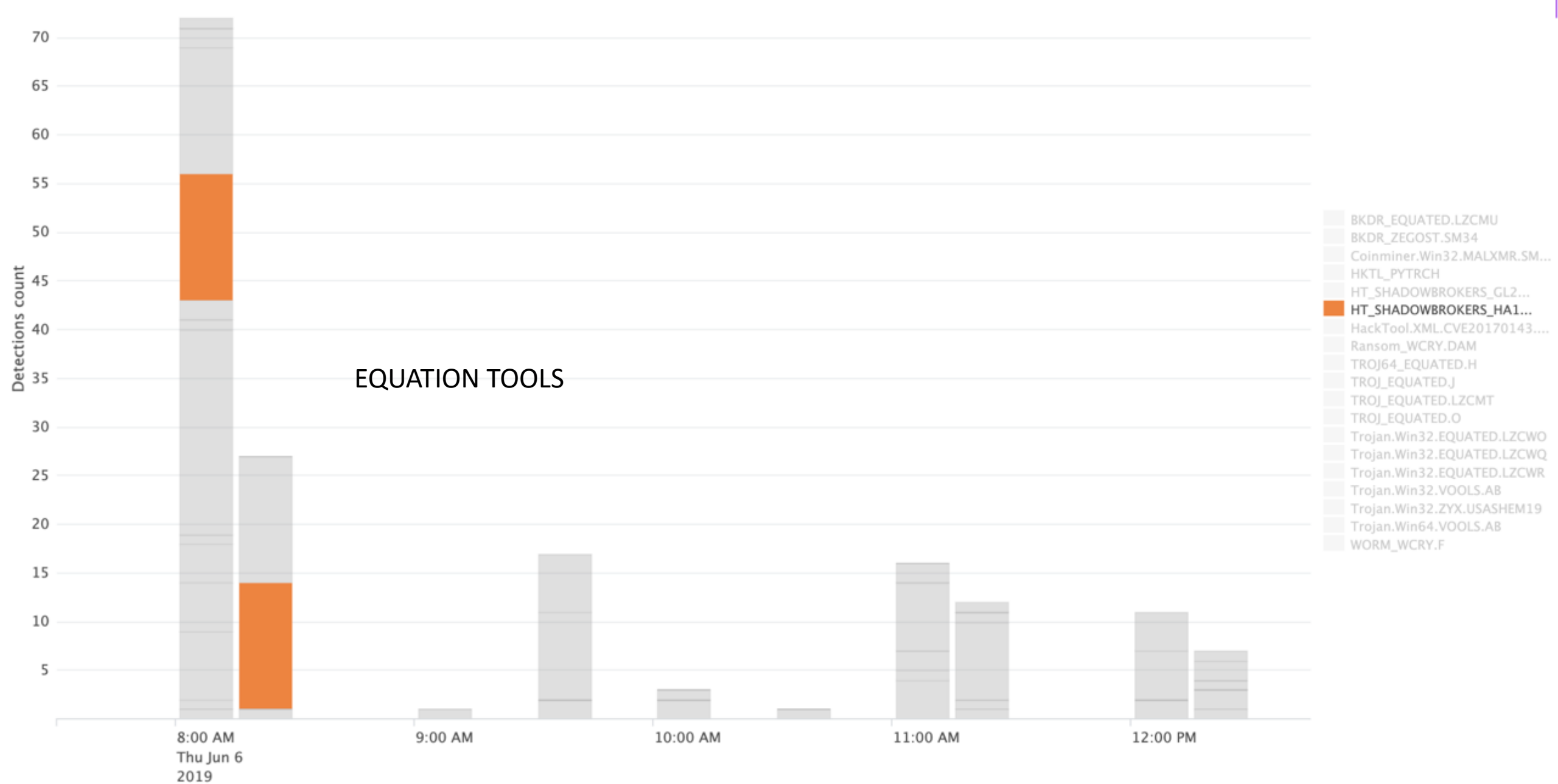
# Snapshot of activity in the affected infrastructures



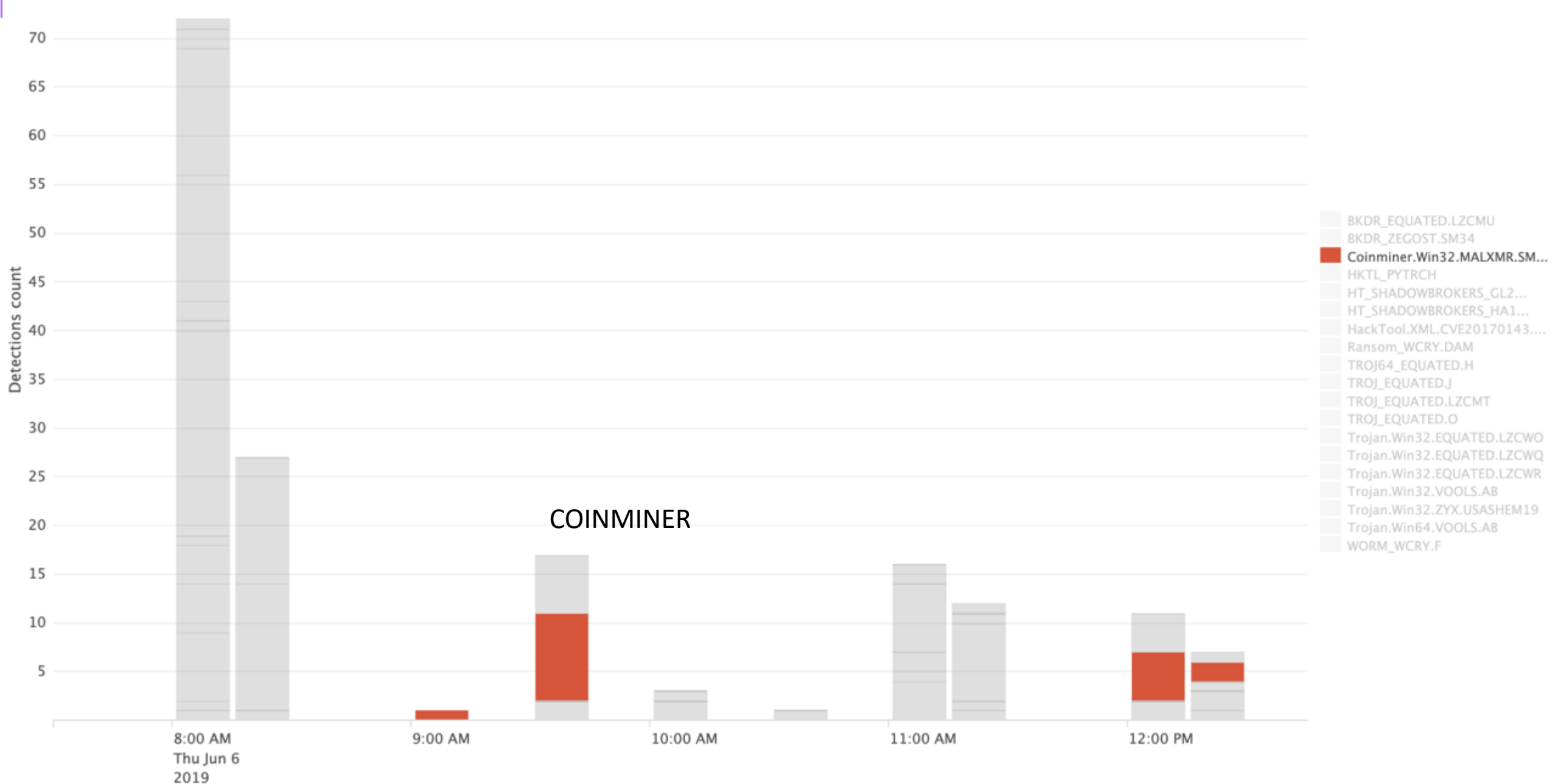




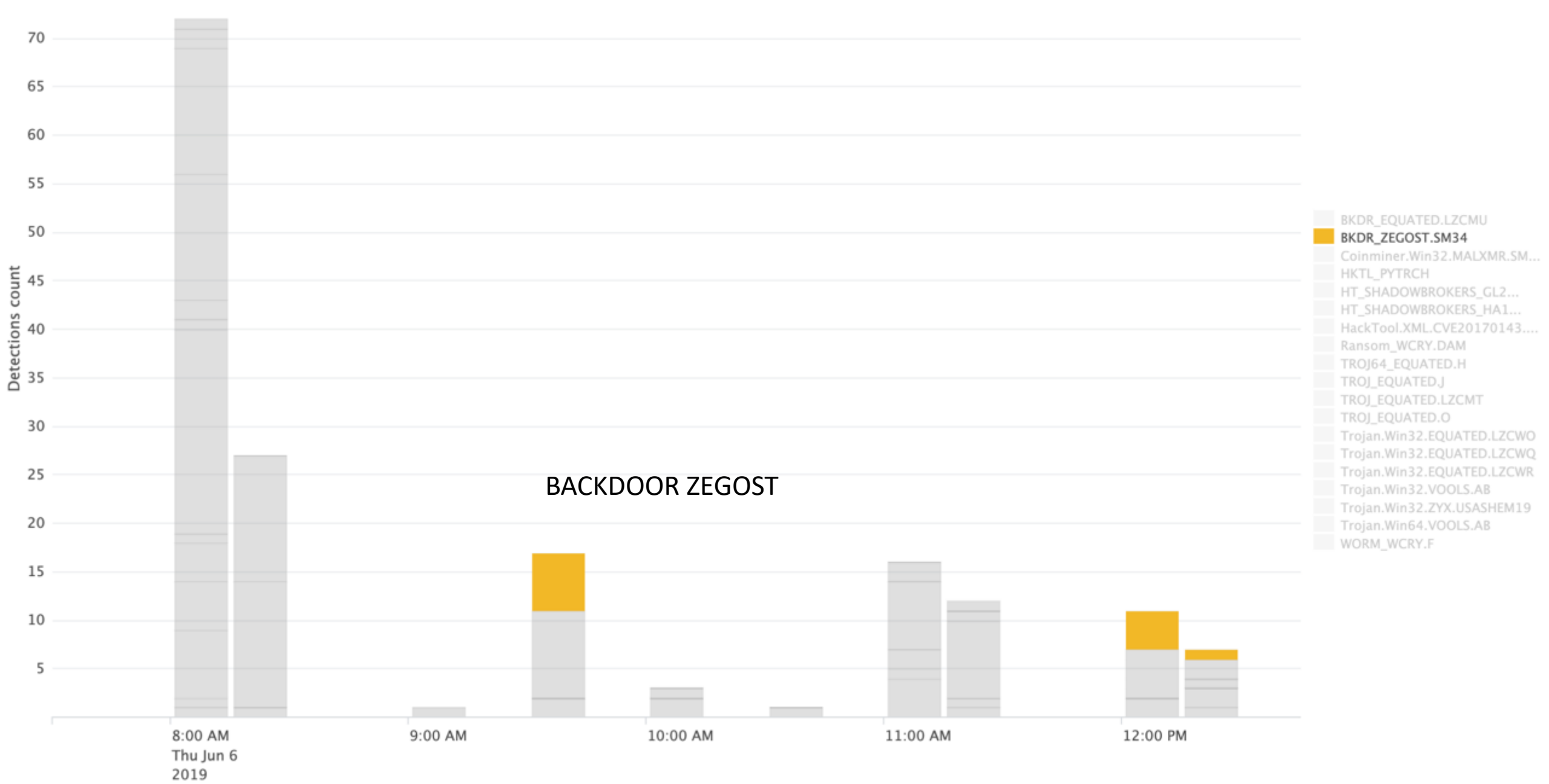




- BKDR\_EQUATED.LZCMU
- BKDR\_ZEGOST.SM34
- Coinminer.Win32.MALXMR.SM...
- HKTL\_PYTRCH
- HT\_SHADOWBROKERS\_GL2...
- HT\_SHADOWBROKERS\_HA1...**
- HackTool.XML.CVE20170143...
- Ransom\_WCRY.DAM
- TROJ64\_EQUATED.H
- TROJ\_EQUATED.J
- TROJ\_EQUATED.LZCMT
- TROJ\_EQUATED.O
- Trojan.Win32.EQUATED.LZCWO
- Trojan.Win32.EQUATED.LZCWQ
- Trojan.Win32.EQUATED.LZCWR
- Trojan.Win32.VOOLS.AB
- Trojan.Win32.ZYX.USASHEM19
- Trojan.Win64.VOOLS.AB
- WORM\_WCRY.F



- BKDR\_EQUATED.LZCMU
- BKDR\_ZEGOST.SM34
- Coinminer.Win32.MALXMR.SM...**
- HKTL\_PYTRCH
- HT\_SHADOWBROKERS\_GL2...
- HT\_SHADOWBROKERS\_HA1...
- HackTool.XML.CVE20170143...
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- 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



- BKDR\_EQUATED.LZCMU
- BKDR\_ZEGOST.SM34**
- Coinminer.Win32.MALXMR.SM...
- HKTL\_PYTRCH
- HT\_SHADOWBROKERS\_GL2...
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- 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



# Possible insight on victim machines

- 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

**YUKEN**

## ■ PVR 150-Series Single Vane Pumps

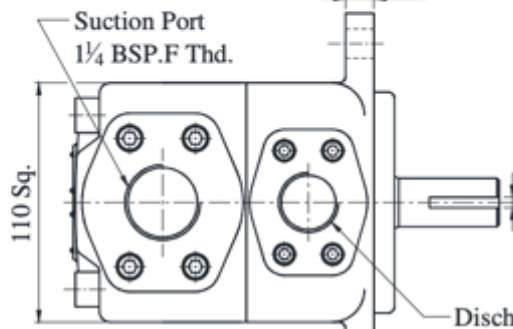
RCH12001 Repair camera head



**YUKEN**

■ PVR50-F-※-※-※※※-3180

● Flange Mounting



## 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*

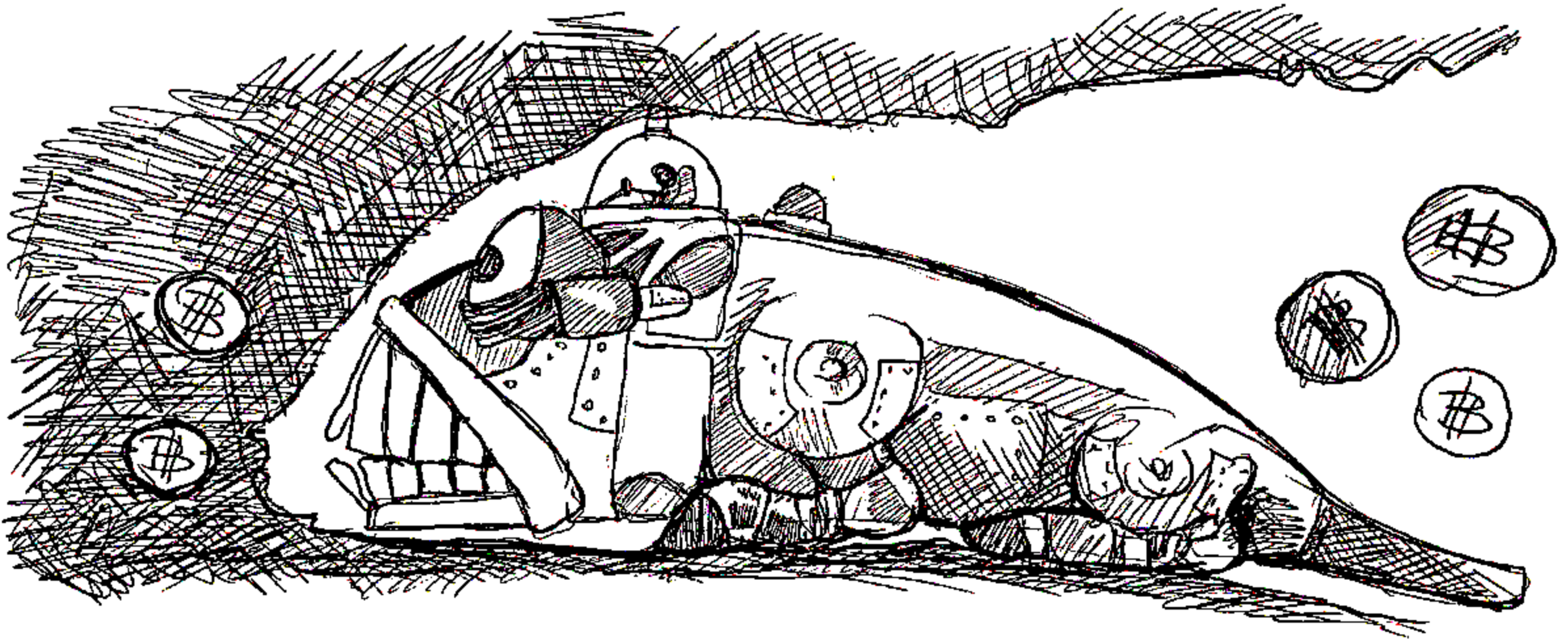
Regular cybercriminals appear to be taking a page from targeted attack actors' playbooks — or rather, toolkits — to maximize their profits from illicit activities like cryptojacking.

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



# Threats and Risks to Intellectual Property



# Unintentional leaks due to poor configuration

Index of /CAD/DWG

Sorry!

The page you were looking for was not found. Please select from the menu above or click [here](#) to go to our home page.

You may request further product information [further information](#)  
You may [contact us](#) via the following:

To request further information you may [CLICK HERE](#), or to purchase a motor, please contact one of our [Authorized Dealers](#)  
You may [contact us](#) directly via the following:

Name	Last modified	Size	Description
200000			
Cover			
N20000			
N20000			
N2000008269N-081408.dwg	2012-05-04 12:20	757K	
N2000008711N-052107.dwg	2012-05-04 12:20	774K	

# 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

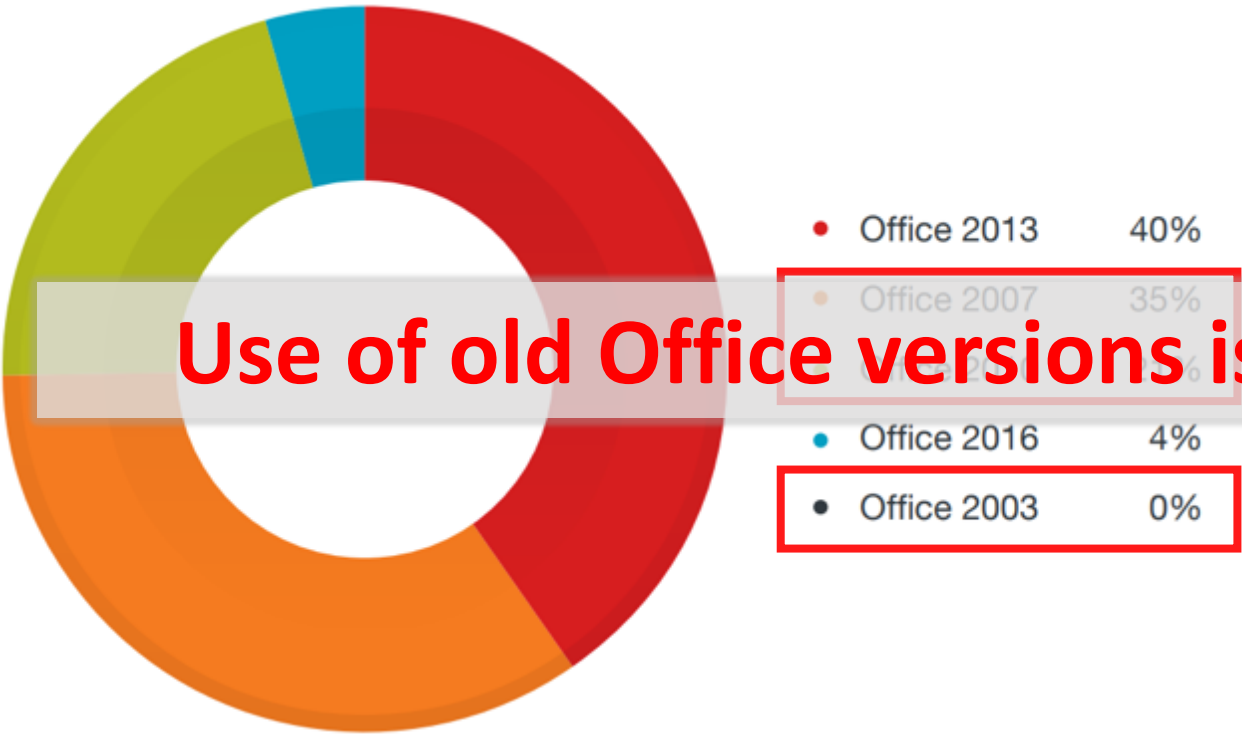
- Send PST file of Microsoft Outlook to a predefined email address
- Send an opened CAD (DWG) file to a predefined email address

**CAD file can be weaponized for espionage**

```
FAS4-FILE ; Do not change it!  
967  
88 $91      cW 50U ♥□oU 50T ♥♣S oU
```



# Use of older version of Microsoft Office



**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 <i>Enable Macros</i> button	Yes	Yes	Yes	Yes
Office 2013	Supported until 2023	Block until the user clicks the <i>Enable Macros</i> button	Yes*	Yes	Yes	Yes
Office 2010	Supported until 2020	Block until the user clicks the <i>Enable Macros</i> button				Yes
Office 2007	Supported until 2017	Block until the user clicks the <i>Enable Macros</i> button			Yes	Yes
Office 2003	Not supported	Macros run automatically			Yes	Yes

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

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

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

**Stolen Confidential Documents can be distributed in public**

意味する注意書きが記されていた。

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。



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」

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/DGXMZO2756453001032018CR8000/>

## インターネットを活用した新しい侵害形態

IP FORWARD

昨今、誰でも自由にワードやエクセル等のデータをアップロードでき、不特定多数の人間がダウンロードできるようにする「文書共有サイト」が急増

【文書共有サイトの例】



Copyright (C) 2015 IP FORWARD. All Rights Reserved.

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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

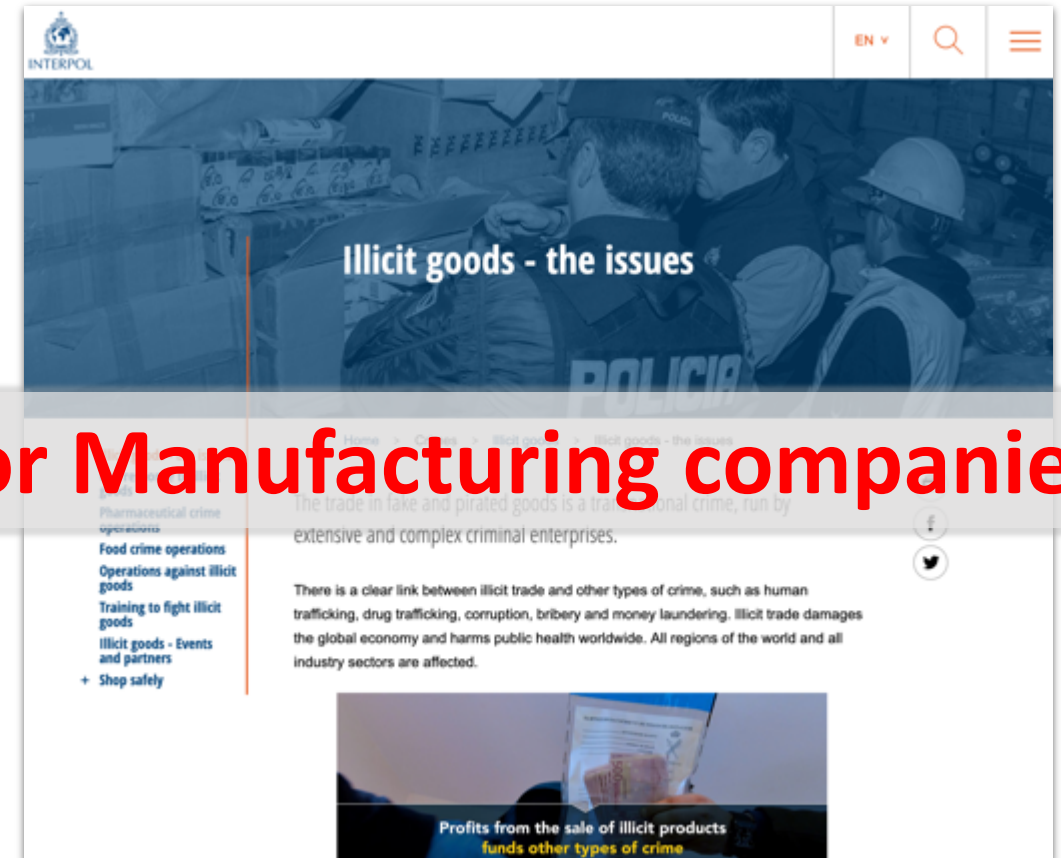


Sites showing leaked CAD files pertaining to a popular smartphone

# Counterfeit products issue



**Counterfeit is a serious issue for Manufacturing companies**



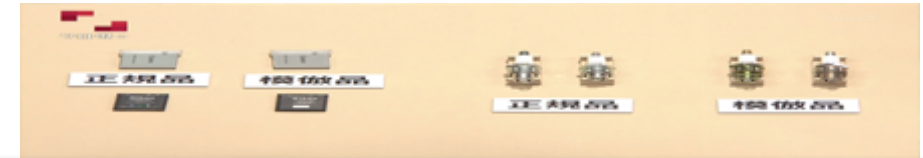
\$250billion a year damage worldwide

<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>

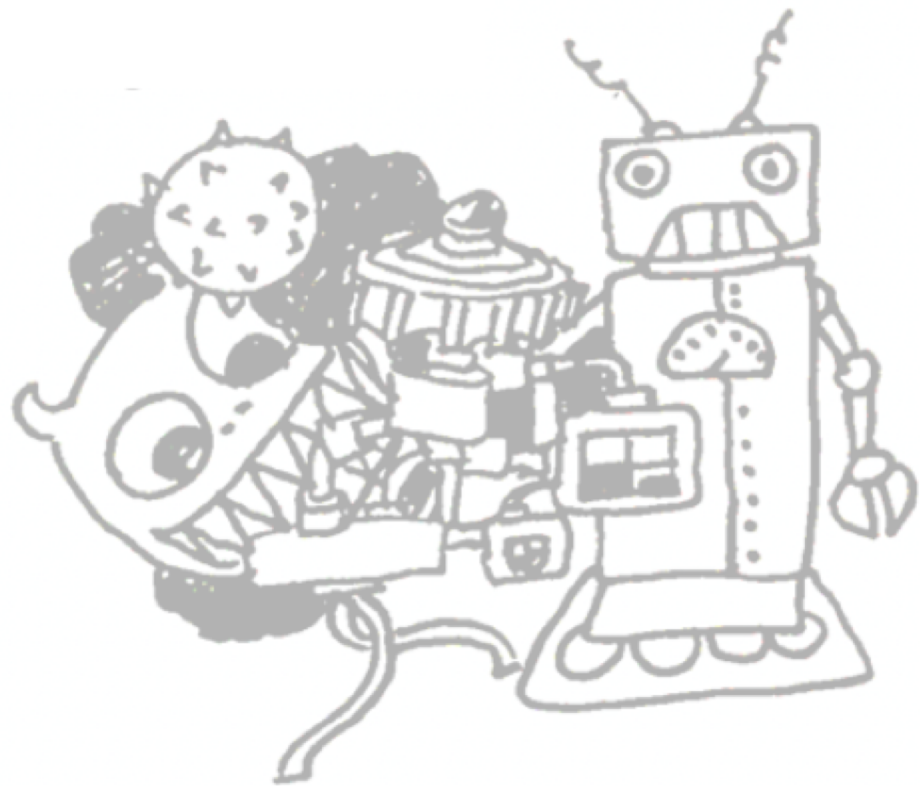
# Counterfeit becomes “Supercopy”



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>



# Threats and Risks to exposed OT systems





# Exposed ICSs

Head 2

Pushed bending tool

0 %

Boundaries for movement 1  
Min: -100.00 Max: 100.00

Angular offset: 0.00  
Release: 1.00  
Spring back: 5.00

Pushed bending values

Dc1	0.00	θ1	0.00
Dc2	0.00	θ2	0.00
Dc3	0.00	θ3	0.00

Comment:

Modeles 3D  
Non defini

Mandrel radius

G0/E10/v0 \*\*\* Mode Auto \*\*\* (out of power): Press "start cycle" to make a production cycle or run the reset sequence. 016 / 500

Buttons: Start, Stop, Pause, Feed Hold, Hand, Cut, Drill, Tap

## 1 TON BATCH PROCESS SYSTEM

Rev. 2

MAIN

- Raw Materials
- Reaction System
- Final Product
- Batch Process Management
- Filtration System
- Batch Process Pre-Post Analysis
- Engineering/Automation
- Paste Making System
- Procurement & Final Product Management

Main Settings Manual Trend Alarm Log E-STOP

# 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 .

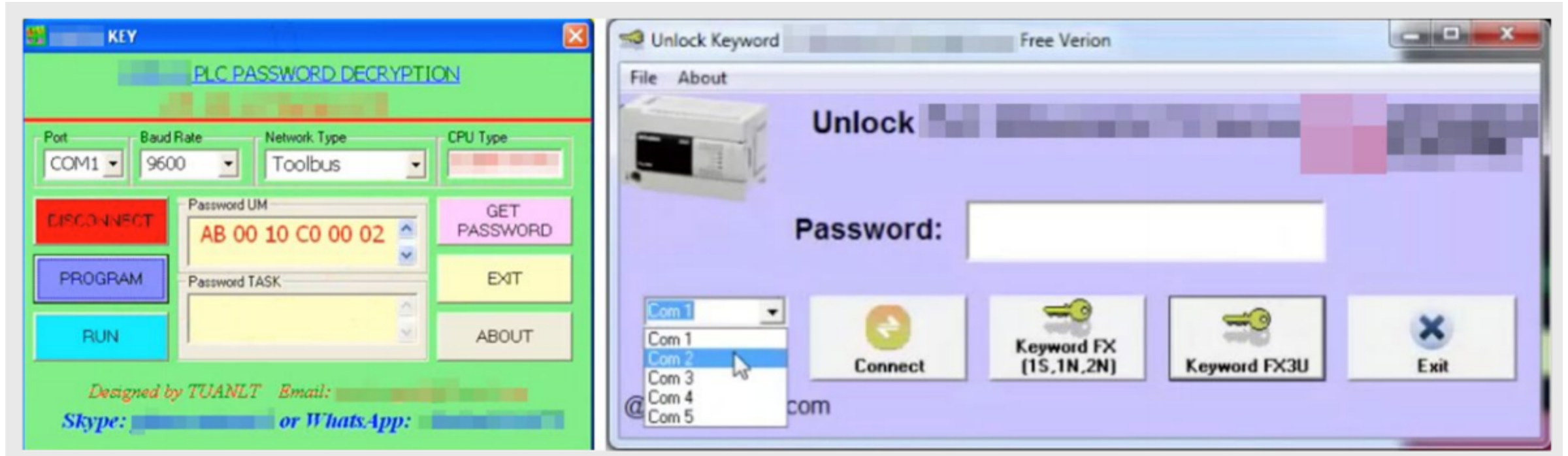


4t4k4

Newbie

Good day to all. interested in **o-day vulnerabilities in the SCADA system.** Ready to pay well to anyone who can help JID: [sp1d3r@exploit.im](mailto: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

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.

Product	Price	Quantity
Small job, for example: Email and Facebook hacking, installing trojans, small DDOS	250 EUR = 0.029 \$	<input type="text" value="1"/> X <a href="#">Buy now</a>
Medium-large job, ruining people, espionage, website hacking, DDOS for big websites	500 EUR = 0.059 \$	<input type="text" value="1"/> X <a href="#">Buy now</a>
Large job which takes a few days or multiple smaller jobs, DDOS for protected sites	900 EUR = 0.106 \$	<input type="text" value="1"/> X <a href="#">Buy now</a>
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 \$	<input type="text" value="1"/> X <a href="#">Buy now</a>

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# 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

Not Secure | shodanshop.com/primery-poiska-v-shodan-analiz-schneider-electric/



the main   Contacts   Score   Webcams   Industry   Modems   Printers  
Servers

With Google search, we determine that we are invited to log in by the **industrial VPN router** eWON , with the login **account adm** and the password **adm** .

Information			
User	(Adm)		
LAN IP/Mask	192.168.1.18/255.255.255.0	Current time	19/11/2016 14:18:27
Serial Number	1550-0003-52	Firmware Version	EW_8_2s1

Transparent Forwarding	
Connect To:	0.0.0.0 <input type="button" value="Connect"/>
<input type="button" value="Clear transp. forwarding"/>	

Internet: Modem Connection	
Internet Connection	Ip Address: [REDACTED] Connected since: 0:00:27:17
<input type="button" value="Close Internet Connection"/>	

KelvinSecTeam Hackers



Posts: 620

Threads: 551

Joined: Apr 2018

Reputation: 130

Credits: 252

KELVINSECTEAM

# INTELLIGENCE

www.ksecureteam.com

3월 21일 5시 55분

KOREA

1일 정지

(주)한가람포닉스 HP-7000 F/W Ver-18071-71

오늘의 관수현황

	Th	Minute	Liter		
광량   적산 0 W	0	0	0		
설정   적산 0 J	2	0			
EC1   EC2 1.3	2	0			
pH1   pH2 6.5	2	0			
급액   배액 0 L 0 L	4	2	0		
	3/20 11:17	1	3	2	0
	3/20 10:17	1	2	2	0
	3/20 09:17	1	1	2	0

cmd.exe

cmd.exe

실행

cmd.exe

cmd.exe

확인 취소 찾아보기(B)...

'cmd.exe' 또는 그 구성 요소를 찾을 수 없습니다.  
경로와 파일 이름이 정확하고 필요한 라이브러리를 모두 사용할 수 있는지 확인하십시오.

sesión...

0

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LU8UEYaHPeM13d11pNaxVG

Zrnp3SXy0sn1fB921cm5Qxy

EbVNSWB2Xt\mj1i07RY9Tx

R11zXJ1rkciL3L1CCQAACH

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# Conclusion and Final Remarks



# Impacts on the Manufacturing Industry

- Productivity Impact Through Production Disruption
- Business Impact Through Market Disruption
- Reputational Risks

# Securing your journey to Industry 4.0

- Manufacturing industry is in significant change
- Manufacturing companies need to be aware of the emerging threats and risks
- IT administrators need to cooperate with OT engineers

# Thank you!



*Bakuei\_Matsukawa*

*Vladimir\_Kropotov*

*Fyodor\_Yarochkin*

*Ryan\_Flores*

*<@trendmicro.com>*

**Trend Micro Research**