Introduction to the Training Workshop
Notorious Security Incidents in the Finance Sector

January 14th, 2021

John Soldatos, FINSEC Project

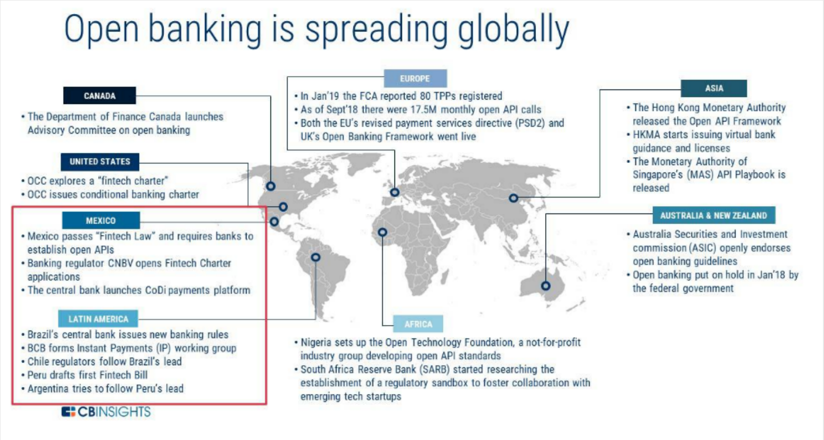
Background & Motivation

Stakeholders & Critical Infrastructures of the Finance Sector are densely Interconnected

- Financial Supply Chain Services (e.g., SWIFT/SEPA Transactions, Trading)
- PSD2 & Open Banking increase the number of interconnected (supply chain) services
- Security Incidents on one organization can impact interconnected organizations (incl. possible cascading effects)

Critical Infrastructures in Finance are large scale Cyber-Physical Systems

- Cyber Assets (e.g., networks, computers, software systems)
- Physical Assets (e.g., buildings, data centres, ATM devices)
- Cyber-Physical Interconnection



Open banking is spreading globally

CANADA
- The Department of Finance Canada launches Advisory Committee on open banking

UNITED STATES
- OCC explores a "fintech charter"
- OCC issues conditional banking charter

MEXICO
- Mexico passes "Fintech Law" and requires banks to establish open APIs
- Banking regulator CNBV opens Fintech Charter applications
- The central bank launches CoDi payments platform

LATIN AMERICA
- Brazil's central bank issues new banking rules
- BCB forms Instant Payments (IP) working group
- Chile regulators follow Brazil's lead
- Peru drafts first Fintech Bill
- Argentina tries to follow Peru's lead

EUROPE
- In Jan'19 the FCA reported 80 TPPs registered
- As of Sept'18 there were 17.5M monthly open API calls
- Both the EU's revised payment services directive (PSD2) and UK's Open Banking Framework went live

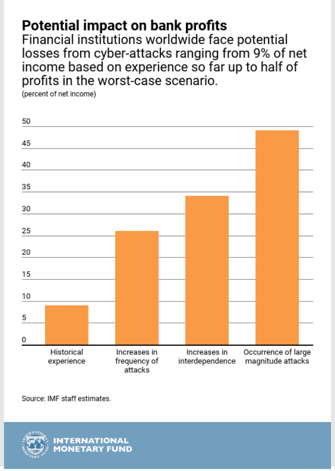
AFRICA
- Nigeria sets up the Open Technology Foundation, a not-for-profit industry group developing open API standards
- South Africa Reserve Bank (SARB) started researching the establishment of a regulatory sandbox to foster collaboration with emerging tech startups

ASIA
- The Hong Kong Monetary Authority released the Open API Framework
- HKMA starts issuing virtual bank guidance and licenses
- The Monetary Authority of Singapore's (MAS) API Playbook is released

AUSTRALIA & NEW ZEALAND
- Australia Securities and Investment commission (ASIC) openly endorses open banking guidelines
- Open banking put on hold in Jan'18 by the federal government

CBINSIGHTS

9% of Profits at Risk due to Cyber-Attacks (source: IMF)



Potential impact on bank profits

Financial institutions worldwide face potential losses from cyber-attacks ranging from 9% of net income based on experience so far up to half of profits in the worst-case scenario.

(percent of net income)

Source: IMF staff estimates.

INTERNATIONAL MONETARY FUND

Bangladesh Bank cyber heist

- The Incident:
  - Bangladesh Bank's offices closed (February, 2016)
  - Fraudsters intruded the SWIFT network of the bank and initiated US $1 billion to Federal reserve bank of New York out of which $850 million were blocked
  - 3/35 fraudulent instructions → transferring $101 million: $20 million traced to Sri Lanka & $81 million to Philippines
- **Attack had its roots in the manipulation of the SWIFT Alliance Access software**
- **One of the biggest cyber heist in history**

Dridex take down operation and revival

- Dridex is a banking malware : most active 2015 - 2016
- At Oct 2015 UK’s National Crime Agency (NCA) in cooperation with Federal Bureau of Investigation (FBI) & Europol coordinated a take-down activity by ‘sinkholing’ infected computers’ traffic
- Cybercriminals were believed to be based in Eastern Europe and target end users via documents delivered by e-mail addresses that seem legitimate.
- **£20M of estimated losses in the UK alone took place**
- **Dridex malware continues to evolve and remains a serious threat to end-users of financial services**

Bank of Valetta Attack

- February 13, 2019 hack of Bank of Valetta
- malware planted on the bank's internal servers
- Security analysts believe that EmpireMonkey cybercrime group is believed to be behind this attack
- From a technical perspective, attackers used macros to copy wscript.exe to another file
- **Hackers transferred €13 million ($14.7 million) from the bank's internal systems to accounts in the UK, the US, the Czech Republic, and Hong Kong**

Retefe: The 5 year long banking malware

- Retefe is a special banking malware that has been seen active between 2014 and 2019
- Banking malware that is primarily targeting German, Swiss and Austrian individuals
- Malware operators used advanced methods to redirect users to spoofed internet banking sites in order to steal banking credentials
- Malware evolved from using proxies to Tor network and stunnel (secure tunneling) to redirect users in spoofed sites to achieve its illicit purposes

Typical Retefe attack scenario:

- infected users are directed to fake HTTPS login pages, when trying to access their e-banking
- fake site requires login credentials and/or additional personal data
- unsuspecting victims can easily be fooled

DarkVishnya: Eight banks hacked in Eastern Europe

- At least 8 banks were hacked from the inside between 2017 and 2018
- Executed with the use of inexpensive netbooks, Raspberry Pi and Bash Bunny
- Didn’t use any of the traditional delivery methods like phishing emails but a visitor pretending to be a courier or a job seeker connected the device to the banks’ network
- Device offers remote access to the attackers via e.g. a 3G/LTE (Long Term Evolution) modem
- Difficult to detect because there is no infection in the banks IT equipment

Cobalt Group Cybergang

- Cybergang targeting financial institutions (e-payment systems, ATMs, SWIFT)
- Cobalt is likely associated with the Carbanak remote backdoor
- banks in more than 40 countries have been allegedly attacked by Cobalt group: losses are estimated to be above EUR 1 billion

Example:

- SpicyOmelette attacks: vulnerability in a JavaScript script to grant attackers remote access to infected systems.
- Infection of the systems delivered via phishing emails
- Once the victim clicks on them he/she is redirected to an Amazon Web Services (AWS) Uniform Resource Locator (URL) controlled by Cobalt
- installs the SpicyOmelette script, which appears signed by a valid and trusted certificate authority (CA)

Europe Physical Security Attacks: ATM Robbery on a BNP machine in Nanterre

- BNP ATM machine in Nanterre 2017
- officer in charge of resupplying an ATM was beaten to the ground and handcuffed and threatened with a gun by several individuals disguised as police officers
- Forced to open the airlock, and enter the codes allowing the money to be recovered
- Robbery of 400,000 euros

Cyber Security Incidents & Lessons Learned

Incident	Lessons Learned
Bangladesh Bank cyber heist	• SWIFT transactions should be conducted only on computers that are isolated from the rest of the network • Special security measures should be employed for every computing system that accesses the SWIFT computing system
Dridex take down operation and revival	• Collaboration among financial services firm around the world • Sharing information information with security experts & law enforcement agencies, enable the disruption of cybercrime teams
Attack against the Bank of Valletta	• Risk assessment to account the vulnerabilities of multiple assets, interdependencies and cascading effects of possible attacks • Need for becoming more intelligent & proactive
Retefe: The 5 year long banking malware	• Users won't verify the certificate issuer → vulnerable to data and money theft • Banks must therefore make sure that their users become aware of such attacks

Cyber Security Incidents & Lessons Learned

Incident	Lessons Learned
Cobalt Group Cybergang	• Beed for integrated risk assessments that cover all assets • Importance of building and disseminating cyber-security knowledge that is specific to financial sector
DarkVishnya: Eight banks hacked in Eastern Europe	• Several attacks are launched from the inside • Importance of inside security measures such as the verification and use of trusted devices
ATM Robbery on a BNP machine in Nanterre	• Physical security attacks against the banking system are still happening • Technology (e.g., surveillance systems) can boost protection against such incidents

Extending the Lessons Learned for the Finance Sector

Increased use of e-transactions today:

More opportunities for cybercriminals

Developed malware re-used by new cybergangs

→ Catching the criminals is not the solution, their approaches evolve

Law enforcement operations need international cooperation:

→ Implementation of automated and trusted data exchanged

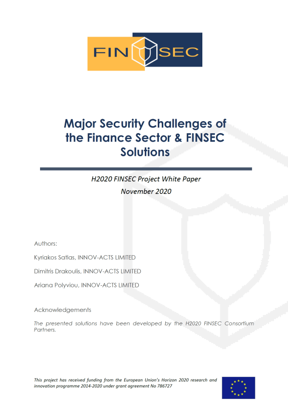
Cybercriminals utilize different techniques to evade detection

Malicious parties evolve their approaches in accordance to current IT trends

→ Financial institutions must remain at the forefront of security innovation

More Information - Free Downloads (Finsecurity.eu)

White Paper: “Major Security Challenges of the Finance Sector & FINSEC Solutions”: https://finsecurity.eu/digital-finance-academy-for-security/major-security-challenges/



Major Security Challenges of the Finance Sector & FINSEC Solutions

H2020 FINSEC Project White Paper

November 2020

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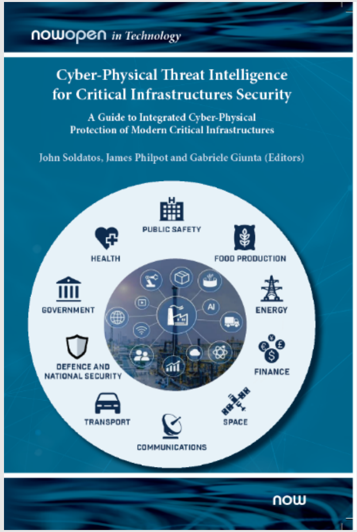
Open Access Book (free download): John Soldatos (ed.), James Philpot (ed.), Gabriele Giunta (ed.) (2020), "Cyber-Physical Threat Intelligence for Critical Infrastructures Security: A Guide to Integrated Cyber-Physical Protection of Modern Critical Infrastructures", Boston-Delft: now publishers, http://dx.doi.org/10.1561/9781680836875
Download at:
https://www.nowpublishers.com/Article/BookDetails/9781680836868



nowopen *in Technology*

Cyber-Physical Threat Intelligence for Critical Infrastructures Security

A Guide to Integrated Cyber-Physical Protection of Modern Critical Infrastructures

John Soldatos, James Philpot and Gabriele Giunta (Editors)

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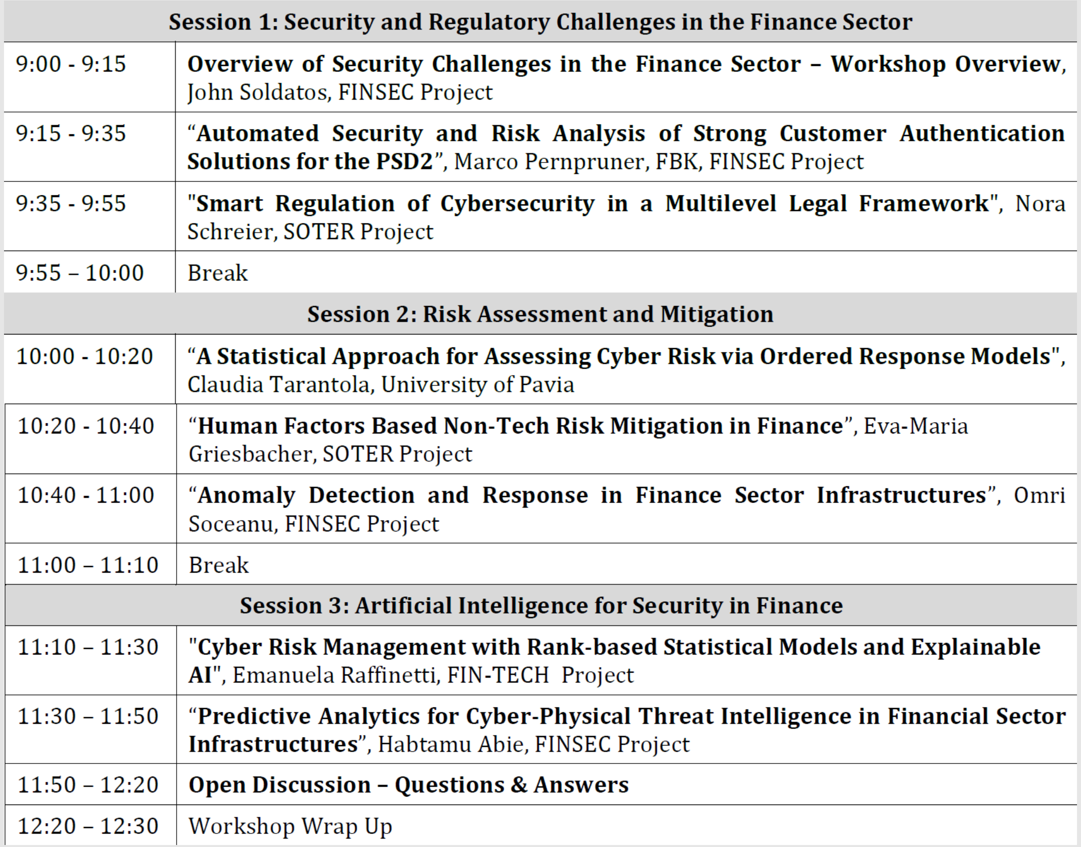
Agenda



Session 1: Security and Regulatory Challenges in the Finance Sector	
9:00 - 9:15	**Overview of Security Challenges in the Finance Sector – Workshop Overview**, John Soldatos, FINSEC Project
9:15 - 9:35	"**Automated Security and Risk Analysis of Strong Customer Authentication Solutions for the PSD2**", Marco Pernpruner, FBK, FINSEC Project
9:35 - 9:55	"**Smart Regulation of Cybersecurity in a Multilevel Legal Framework**", Nora Schreier, SOTER Project
9:55 – 10:00	Break
Session 2: Risk Assessment and Mitigation	
10:00 - 10:20	"**A Statistical Approach for Assessing Cyber Risk via Ordered Response Models**", Claudia Tarantola, University of Pavia
10:20 - 10:40	"**Human Factors Based Non-Tech Risk Mitigation in Finance**", Eva-Maria Griesbacher, SOTER Project
10:40 - 11:00	"**Anomaly Detection and Response in Finance Sector Infrastructures**", Omri Soceanu, FINSEC Project
11:00 – 11:10	Break
Session 3: Artificial Intelligence for Security in Finance	
11:10 – 11:30	"**Cyber Risk Management with Rank-based Statistical Models and Explainable AI**", Emanuela Raffinetti, FIN-TECH Project
11:30 – 11:50	"**Predictive Analytics for Cyber-Physical Threat Intelligence in Financial Sector Infrastructures**", Habtamu Abie, FINSEC Project
11:50 – 12:20	**Open Discussion – Questions & Answers**
12:20 – 12:30	Workshop Wrap Up