

# Securing Critical Infrastructures In The Financial Sector

Digital Transformation in Finance Institutions



# Digitalization

- Digital is becoming the way to do business
- Conversion of physical products and services into digital goods
- For the financial industry, digitalization implies that services offered do not involve any physical component:
  - E.g.,
    - cash is transformed into online and mobile payments
    - passbooks are transformed into apps

# Digital goods

	<u>Physical goods</u>	<u>Digital goods</u>	
<b>Cost structure</b>	■ Variable cost	<b>High</b>	<b>Zero</b>
	■ Fixed cost	<b>It depends</b>	<b>High</b>
	■ Distribution cost	<b>High</b>	<b>Low</b>
	■ Warehouse cost	<b>High</b>	<b>Low</b>
	■ Marketing cost	<b>It depends</b>	<b>It depends</b>
<b>Pricing</b>	■ Available pricing techniques	<ul style="list-style-type: none"> <li>■ Limited pricing formulas</li> <li>■ Usually constant values which depend variable costs</li> </ul>	Several pricing approaches: <ul style="list-style-type: none"> <li>■ Based on usage</li> <li>■ Fixed (“all you can eat”)</li> <li>■ Free (advertising)</li> <li>■ Quantity discounts</li> <li>■ ...</li> </ul>

# The digital customer

<i>Characteristics</i>	<i>Description</i>
⌘ Connected	<ul style="list-style-type: none"><li>■ Is online</li><li>■ Use personal computers, tablets, smartphones, wearables to get informed and stay up-to-date 24/7</li></ul>
⌘ Informed	<ul style="list-style-type: none"><li>■ Access to a wide variety of information enables customers to compare prices, read product reviews and ratings, compare seller service</li><li>■ Put pressure on prices, quality of service and profit margins</li></ul>
⌘ Wary	<ul style="list-style-type: none"><li>■ Difficult to convince, skeptical on ads</li><li>■ Seek for other 'trusted' sources of information such as word-of-mouth, product reviews and personal recommendations</li></ul>
⌘ Vocal	<ul style="list-style-type: none"><li>■ Willing to voice their opinions, provide authentic expressions of their customer experience</li></ul>

## Impact on businesses

- A significant number of offline businesses is moving to online
- It is easier for customers to conduct market research and compare their options
- Competition will be based on the companies that offer the most sophisticated experiences
- It is easier for competitors to take over/lose their market share
- It is easier for competitors to imitate products/services
- Trust in traditional advertising is failing and trust in user-generated content wins trust of the digital customer
- Customers want their opinion to be heard

## Impact on digital markets

- Digital content is becoming important and companies which facilitate access to information are more likely to survive
- High-performing websites, mobile applications, content creating components and personalized experiences are more likely to assist companies in maintaining their customers
- Data collected can assist businesses to better understand their audiences and inform them on how to engage their audiences



*Digital  
Transformation  
in the Financial  
Sector*



# History of the digitalization in the financial sector

- In the 60s, the financial sector began to use computers
- Late 60s, ATM machines
- Early 70s, worlds first electronic stock market
- Mid 70s, swift foundation established and provided secure messaging network
- Early 80s, first online bank (i.e., individuals and small businesses could check their account balance)
- Late 90s, rise of the Internet enables banks to provide online banking services through their website
- Late 90s, first mobile payments through SMS

# The transformation of financial services

Transformation level	Banking IT (up to around 2008)	FinTech (after 2008)
<b>External organization</b>		
- Regulation	low equity requirements, low supervision	stricter rules; less protection
- Business model innovation	branch business & offline services	online & mobile services
- Governance of infrastructures	centralized institution as focal firm	distribution of tasks
- Payment style	majority of customers using cash	non-cash payments increase
<b>Network organization</b>		
- Networking	small number of network partners	many specialized partners
- Margins and cost structure	high margins in core business	lower margins, higher competition
- Competitors	other traditional financial service providers	start-ups, lateral entrants

# The transformation of financial services

Transformation level	Banking IT (up to around 2008)	FinTech (after 2008)
- Culture	hierarchical	cooperative, agile
- Customer retention	high customer loyalty	reduced switching costs
<b>Internal organization</b>		
- Business focus	process-oriented	customer-centric
- Customer interaction	offline first	online first, omni-channel
- Core competencies	distribution, products, transactions	online distribution; platforms
- Vertical integration	high integration	low integration
- Service portfolio	banks are general service providers	small diverse providers
- Automation	processes require manual steps	fully-automated processes
- IT-architecture	monolithic systems, inhouse development	modular systems, APIs

# The digital customer in the financial sector

## Existing customers

- Existing customers are slowly acquiring the characteristics of the digital customer and moving towards digital financial services
- Very expensive to convince existing customers to change their financial services provider

## New market entrants: young customers, Gen Z (born in mid 90's- early 00s)

- Specific characteristics that diversify them from other market segments

# The digital customer in the financial sector

## New market entrants:

- Digital natives: Tech savvy, mobile technologies, social media and internet were available at all stages of their life
- Always connected: Able to use their mobile devices in an effective, efficient and secure manner
- Persistent on convenience: Complete their banking tasks regardless of time/place/device, waiting is not acceptable
- Lack brand loyalty: If they are not satisfied by the services offered, they will easily move to a competitor

# The digital customer in the financial sector

- **New market entrants:**
  - Examples of products targeting this segment



- - Peer-to-peer lending
- Target low risk customers for which banks cannot provide the desired conditions
  - Offers convenience and efficiency, Takes less than 30 seconds to provide a personal loan quote



- Opens account in minutes
- Spend abroad at the interbank exchange rate
- Easy to send and request money in seconds

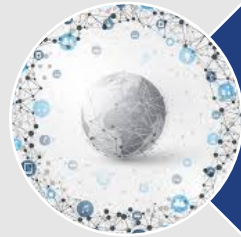
# Regulation

- Regulation in the financial industry is necessary for:
  - Financialization: Modern economies are highly depend on the financial sector
  - New technologies: Need for privacy and customer right protection as it is becoming easier to trace individual behavior
  - Protection: Monitoring of payments, avoidance of illegal financial transactions and money laundering

# Impact of regulation in the financial sector

- Market confidence: Trust in the financial system
  - Stability: Ensure the stability of the financial system
  - Customer protection: Protection of private customer information
  - Protection against financial crime: Prevent the funding of illegal actions such as terrorism
  - Control foreign participation in the financial markets
- Banks need to constantly invest in new technologies and in rebuilding their systems such that they comply with new regulations





# *Digital Ecosystems*

# Digital Ecosystems

## *Characteristics*

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### ⌘ Definition

### ⌘ Purpose

### ⌘ Apple's Example

## *Details*

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- Network of organizations, may include suppliers, distributors, customers, competitors, government etc.
- Dependence matters
  
- Cooperate and compete to deliver a specific product or service
  
- Apples' ecosystem of suppliers, app developers, hardware add-on companies, retailers ,users

## Example from the financial sector

Citibank's Citi Pay for Android:

- Digital wallet for installing mobile payments
- Mobile payments in store for MasterCard's master pass service
- MasterCard's master pass connects with all the NFC protocol, with Fin.X, a solution for mobile payments by mFoundry
- mFoundry includes 850 banks and retailers in the US that also use and enable Master Pass, thus enabling the technology to be accepted in numerous places

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- This relations are fundamental for Citibank's success

# Assessing the ecosystems power

## *Factors*

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### ⌘ Productivity

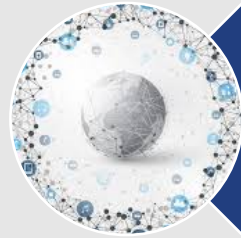
- The ability to consistently transform technology, and other raw materials of innovation into lower cost and new products

### ⌘ Robustness

- Measure by return on investment
- The ability of ecosystem to survive an expected disruptions
- Measure by survival rate of companies in the most robust ecosystem over time

### ⌘ Niche

- The ability to be able to support a variety of niche players to help the ecosystem absorb shocks, and to encourage innovation
- Measure: degree of differentiation in the ecosystem



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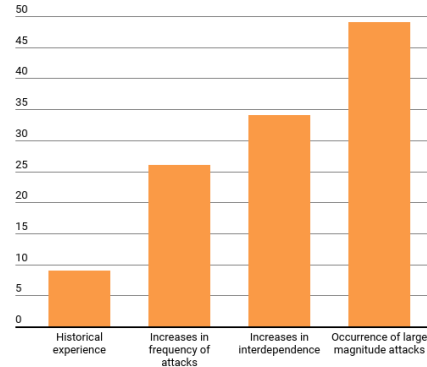
## Critical Infrastructures in Finance are large scale Cyber-Physical Systems

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

### 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.

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

# 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)

## Open banking is spreading globally

