Aspetos Profissionais e Sociais da Engenharia Informática

Security issues and challenges

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1

Covered aspects....

- AI
  - Market, technology, what is "IA"
- Open source models, trabalhos derivados
- Marcas, IPR
- Standards
- Dilemas de personalidade – tempo e constância.
- Applied AI issues: autonomous driving and decisions

2

2

Today....

- Cybersecurity – what is it and what is the impact
- Cybercrime
  - Employment and information leakage
- Reputation
- Legal intercept
- Cybermarket

3

3

CYBERSECURITY

4

Importance of Cyber Security

- "The only system which is truly secure is one which is switched off and unplugged, locked in a titanium safe, buried in a concrete bunker, and is surrounded by nerve gas and very highly paid armed guards. Even then, I wouldn't stake my life on it."
  - **Gene Spafford**

- There is nothing like absolute security
- We are only trying to build comfort levels, because security costs money BUT lack of security may cost much more
  - Comfort level is a manifestation of efforts as well as a realization of their effectiveness & limitations
  - Challenge:
    - security has clear costs, while lack of security may have cost

5

Cyber Security Defined

- Cyber Security's goal: **Protect our information and information systems**
- Cyber Security is: "**Protection** of information systems **against unauthorized** access to or **modification** of information, whether in storage, processing or transit, and against the **denial** of service to authorized users, including those measures necessary to detect, document, and counter such threats."
  - This version is very reductionist: ICT is now merged with society, so in reality we are talking about protecting assets.

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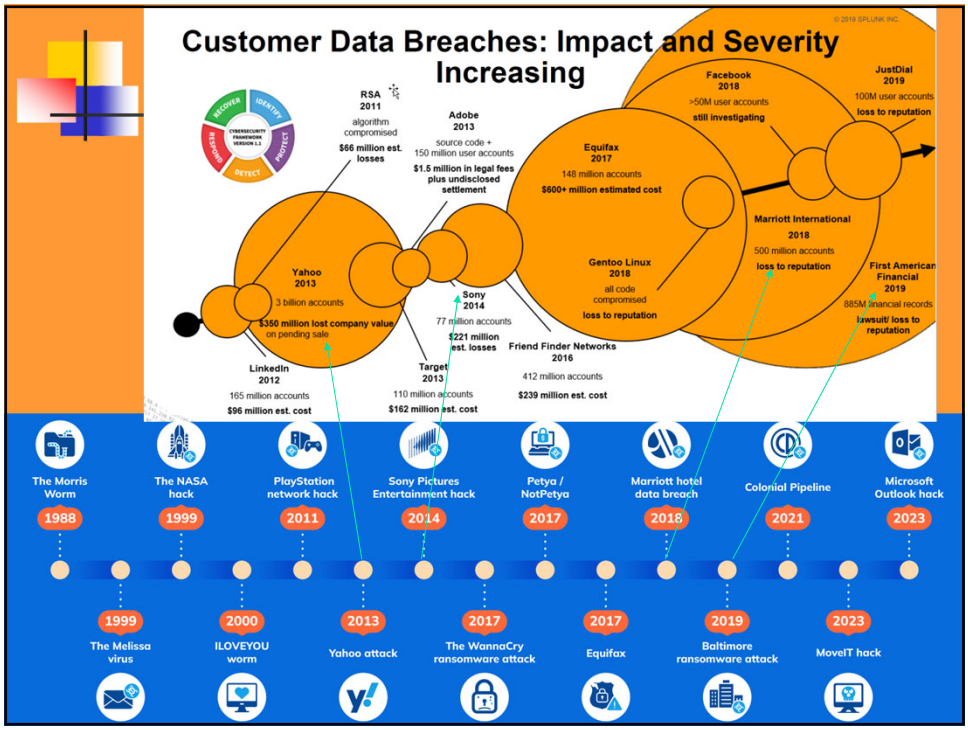

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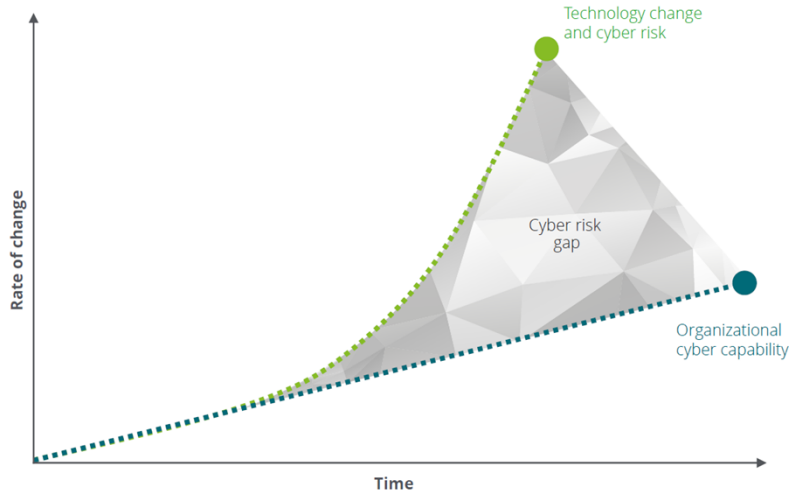
Cyber needs are increasing



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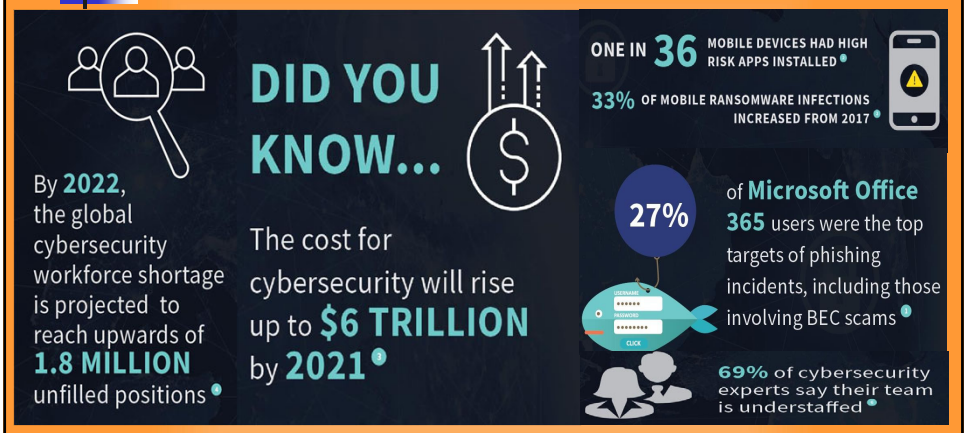
Cyber Security



https://www.varonis.com/blog/data-breach-statistics/

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Cyber Security Domains

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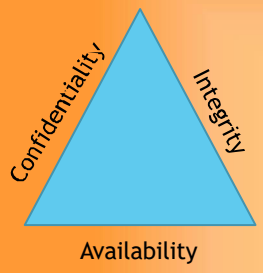
Recall: What is a Secure System? (CIA Triad)



- ***Confidentiality*** - restrict access to authorized individuals
- ***Integrity*** - data has not been altered in an unauthorized manner
- ***Availability*** - information can be accessed and modified by authorized individuals in an appropriate timeframe

12

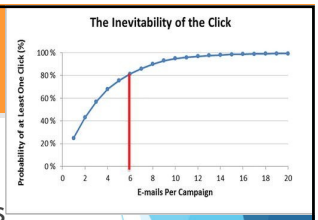
Recall: Sensitive Data

- Information is considered **sensitive** if the **loss** of **C**onfidentiality, **I**ntegrity, or **A**vailability could be expected to have a **serious**, **severe**, or **catastrophic** adverse **effect** on organizational operations, organizational assets, or individuals.
- **Types** of sensitive information include:
  - Personnel
  - Financial
  - Payroll
  - Medical
  - Privacy Act information.
- This definition does not clarify **the separation between company and legal considerations**. Some sensitive data is *legally* sensitive, other is *corporate business* sensitive.

13

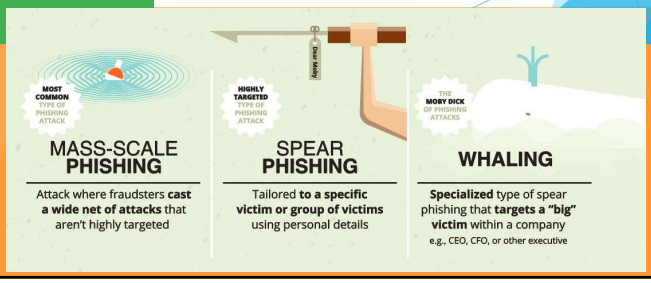
13

Phishing and Spear-phishing Attacks



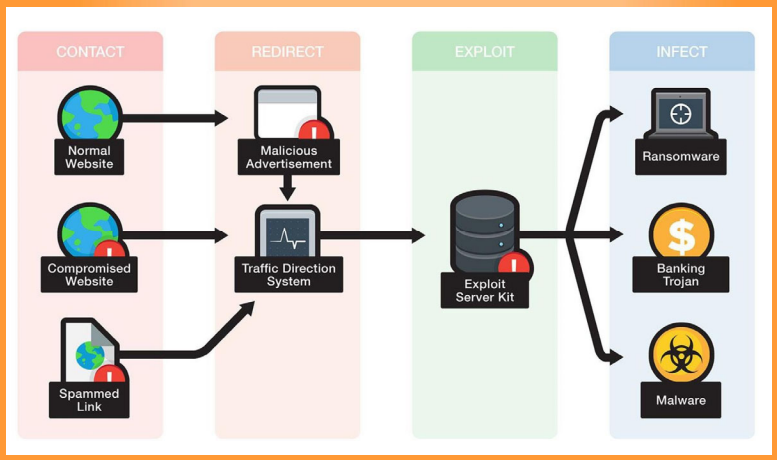
WHAT KINDS OF THREATS ARE THERE?

- Social Engineering Scams
- Common Malware and Ransomware
- Business Email Compromise
- Fake websites that steal data or infect devices
- And much more



14

Setting an Exploit Kit



15

Identity Theft

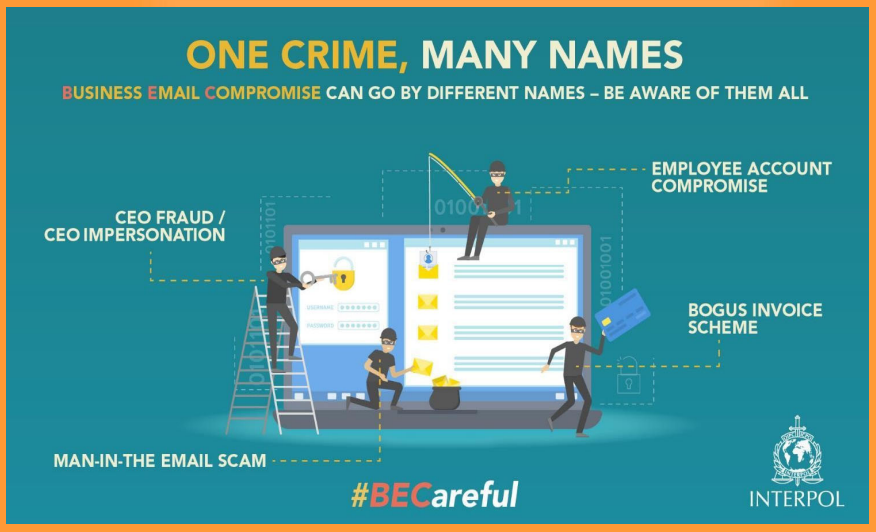
- Impersonation by private information
  - Thief can 'become' the victim
- Reported incidents rising
- Methods of stealing information
  - Shoulder surfing
  - Snagging
  - Dumpster diving
  - Social engineering
  - High-tech methods
- Loss of privacy
  - Personal information is stored electronically
  - Purchases are stored in a database
    - Data is sold to other companies
  - Public records on the Internet
  - Internet use is monitored and logged
  - **None of these techniques are illegal**

16

Example Attack: Business Email Compromise

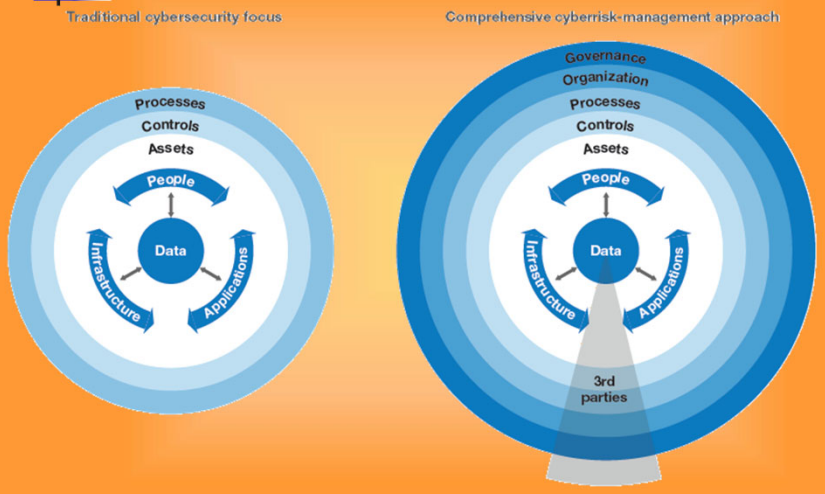
17

Business Email Compromise impact



18

Changing challenges



19

False Sense of Security?

20

CRIME

21

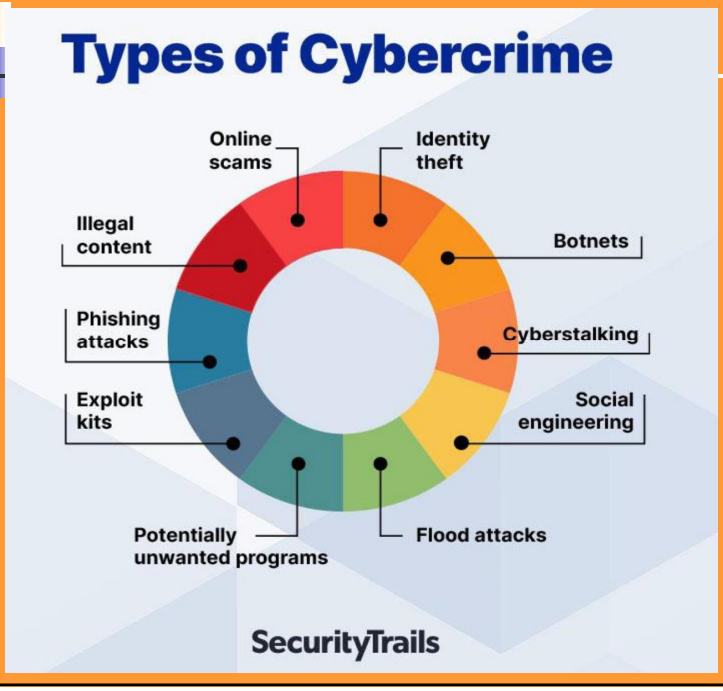
Cyber Crime

Cyber Crime is a generic term that refers to all criminal activities done using the medium of communication devices, computers, mobile phones, tablets etc. It can be categorized in three ways:

- **The computer as a target** – attacking the computers of others.
- **The computer as a weapon**- Using a computer to commit "traditional crime" that we see in the physical world.
- **The computer as an accessory**- Using a computer as a "fancy filing cabinet" to store illegal or stolen information.

22

Types of Cybercrime



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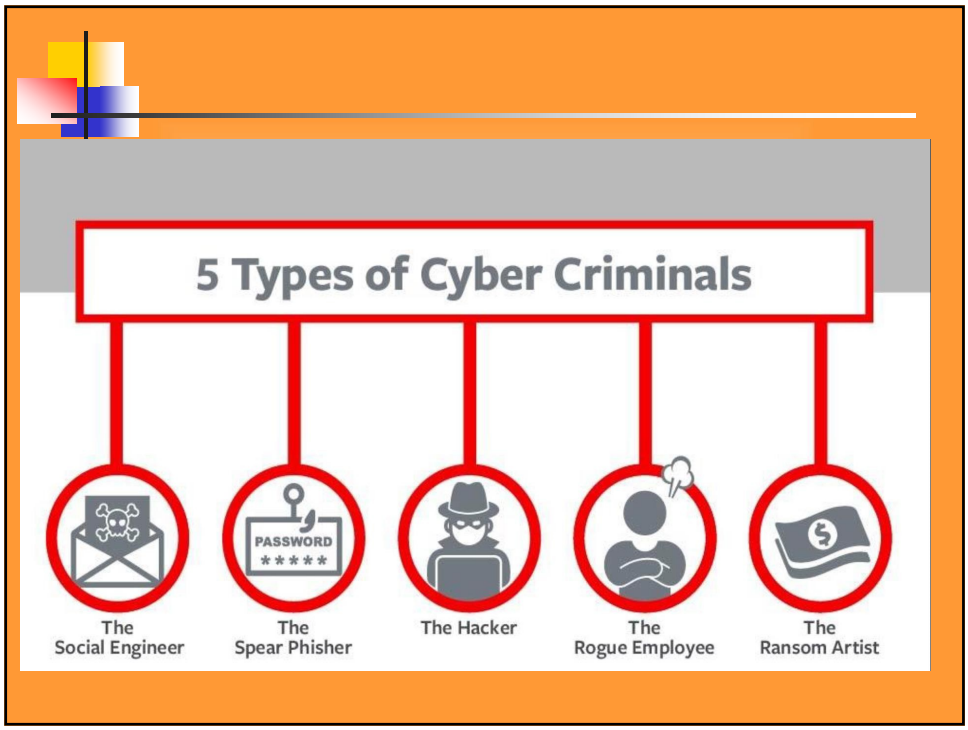
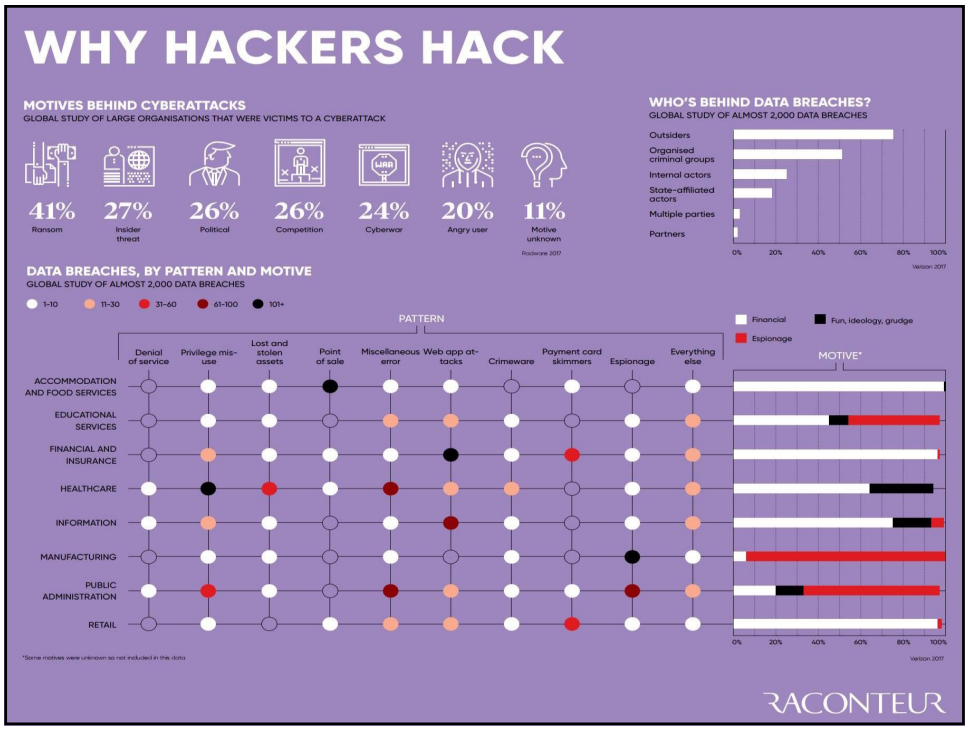

5 Types of Cyber Criminals
PASSWORD
*****
The Social Engineer
The Spear Phisher
The Hacker
The Rogue Employee
The Ransom Artist

24


WHY HACKERS HACK
MOTIVES BEHIND CYBERATTACKS
GLOBAL STUDY OF LARGE ORGANISATIONS THAT WERE VICTIMS TO A CYBERATTACK
41% Ransom
27% Insider threat
26% Political
26% Competition
24% Cyberwar
20% Angry user
11% Motive unknown
WHO'S BEHIND DATA BREACHES?
GLOBAL STUDY OF ALMOST 2,000 DATA BREACHES
Outsiders
Organised criminal groups
Internal actors
State-affiliated actors
Multiple parties
Partners
DATA BREACHES, BY PATTERN AND MOTIVE
GLOBAL STUDY OF ALMOST 2,000 DATA BREACHES
1-10
11-30
31-60
61-100
101+
PATTERN
Denial of service
Privilege misuse
Lost and stolen assets
Point of sale
Miscellaneous error
Web app attacks
Crimeware
Payment card skimmers
Espionage
Everything else
Financial
Fun, ideology, grudge
Espionage
MOTIVE*
ACCOMMODATION AND FOOD SERVICES
EDUCATIONAL SERVICES
FINANCIAL AND INSURANCE
HEALTHCARE
INFORMATION
MANUFACTURING
PUBLIC ADMINISTRATION
RETAIL
RACONTEUR

25

Cybercrime as a Service

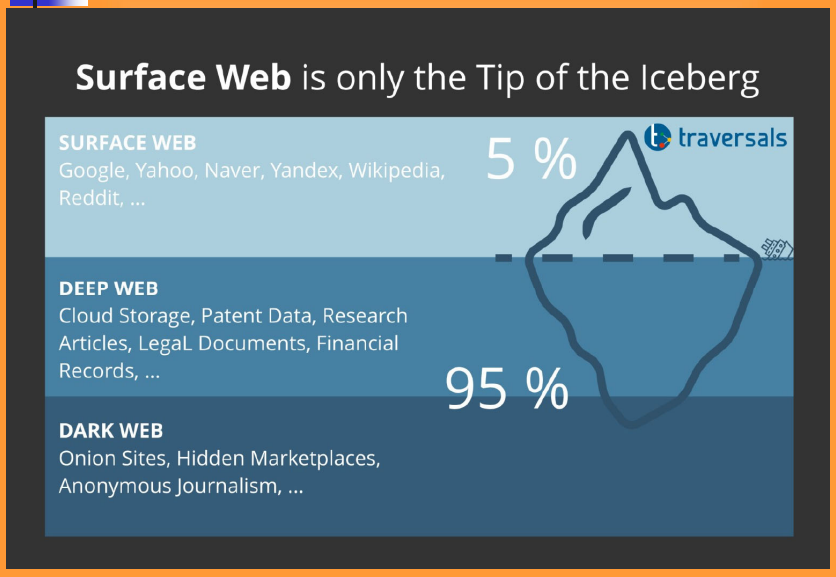
26

Cybercrime as a Service costs

SERVICE	BITCOIN (Typical price range listed along with the highest listed price)	USD (Typical price range listed along with the highest listed price)
HACKING WEB SERVER (VPS OR HOSTING)	0.034 - 0.0449, 0.47	$220 - $500, $3,000
SETTING UP KEYLOGGER	0.0263	$170
DDOS (PRICES MAY VARY)	0.0534, 0.078 - 0.39	$350, $500 - $2,500
HACKING PERSONAL COMPUTER	0.0364, 0.044 - 0.55	$280, $500 - $3,500
HACKING CELL PHONES	0.047 - 0.093	$300 - $600
EMAIL HACKING	0.078 - 0.12	$500 - $800
SOCIAL MEDIA ACCOUNT HACKING	0.0352, 0.054 - 0.11	$230, $350 - $700
CHANGE SCHOOL GRADES	0.19 - 0.58	$1,200 - $3,750
FUD RANSOMWARE + DECRYPTER	12 MO / 0.14 6 MO / 0.076 1 MO / 0.019	12 MO / $900 6 MO / $490 1 MO / $120

27

Web, Deep Web & Dark Web



28

Global Cyber Security Trends

Recent studies reveal three major findings:

- **Growing threat to national security** - web espionage becomes increasingly advanced, moving from curiosity to well-funded and well-organized operations aimed at not only financial, but also political or technical gain
- **Increasing threat to online services** – affecting individuals and industry because of growth of sophistication of attack techniques
- **Emergence of a sophisticated market for software flaws** – that can be used to carry out espionage and attacks on Govt. and Critical information infrastructure. Findings indicate a blurred line between legal and illegal sales of software vulnerabilities

Mischievous activities in cyber space have expanded from novice geeks to organized criminal gangs that are going Hi-tech, to state-level actors (funded cyber groups)

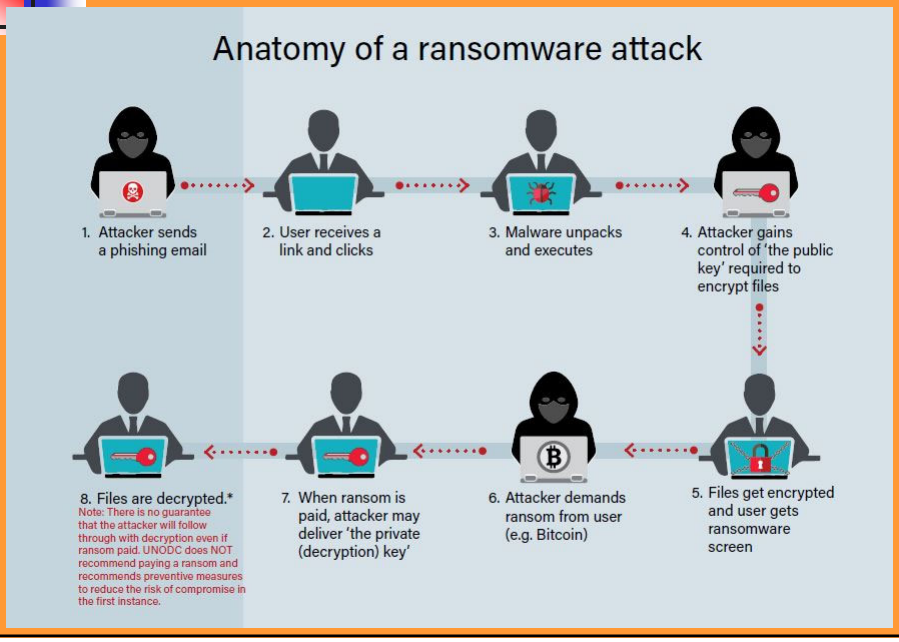
29

Attacks today are AUTOMATED!

It's not some person sitting at his hacker desk all day typing out ping commands to IP addresses via the command prompt manually…

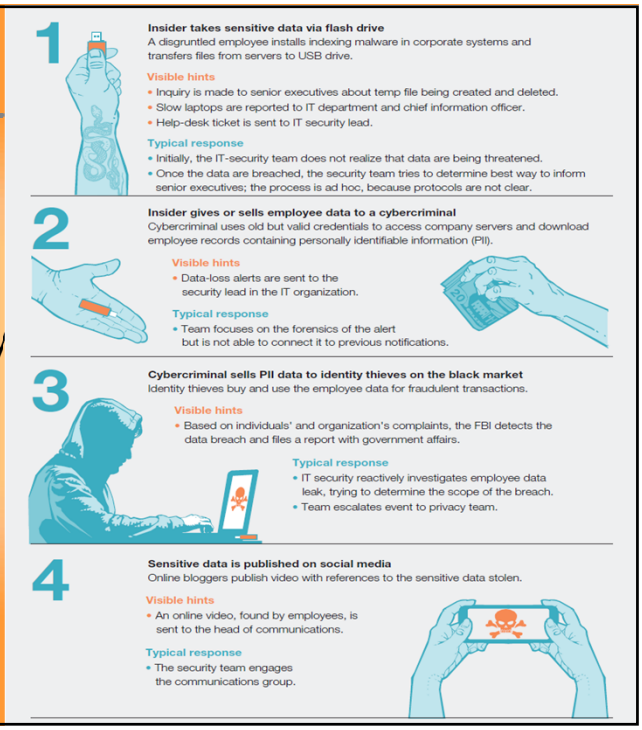
30

Ransomware attack



31

- Event and response
  - PII Personally identifiable information



32

What does a Cyber Security Professional look like?

33

Multiple Protection for Computers

A data processing system can involve:

- patented hardware and software
- patented computer architecture on circuit designs
- patented business methods
- trade secret production processes
- trade secrecy for collateral know-how
- copyrighted microcode
- copyrighted operating system
- copyrighted instruction manual
- semiconductor chips protected as mask works
- consoles or keyboards protected by design patents
- or as trade dress under trademark principles
- trademark registration

34

How We Protect Information?

- People
  - Training, education, awareness, repetition
- Process
  - Governance, oversight, policy, reporting
- Technology
  - Firewalls, IDS/ISP, SIEM, anti-malware
  - Strong passwords, Logging/monitoring
- **Which is the weakest link?**

35

Opinion

- People
  - Cyberatacks have to do with psychology
  - People do not care
  - People do not understand
  - Bias affect behaviour
  - People make mistakes, go complancent
  - People are not to be trusted

37

37

Groups at risk

■ Very likely ■ Somewhat likely ■ Not likely

Top assets	Employee populations with access	Insider-threat actions they might take: Fraud/theft	Exposure	Destruction	Likely personas involved
Intellectual property for new products	• R&D team • Business-unit (BU) exec	■		■	• Flight risk • Disgruntled
Financial forecasts	• Finance/investor-relations team • BU execs	■	■		• Financially stressed • Negligent
PII/PHI[1]	• HR team • Sales team	■	■	■	• Negligent • Reckless • Snooper
High-net-worth customer information	• High-net-worth sales and delivery team	■		■	• Flight risk • Financially stressed
Core financial platform	• IT team • BU execs	■		■	• Saboteur • Disgruntled
Records of corporate conduct	• HR/legal		■	■	• Attention seeker

[1] PII = personally identifiable information, PHI = protected health information.

38

Cyber Security and Privacy Starts and Ends with People!

Commit to a disciplined practice of information security and continue to refresh yourself so you don't become a point of vulnerability in our security defenses.

39

Situational Awareness

- To practice good situational awareness, take the following precautions, including but not limited to:
  - Avoid discussing topics related to business outside premises, whether you are talking face to face or on the phone
  - Remove security badges after leaving your office
  - Don't talk about work outside office
  - Avoid activities that may compromise situational awareness
  - Be discreet when retrieving messages from smart phones or other media

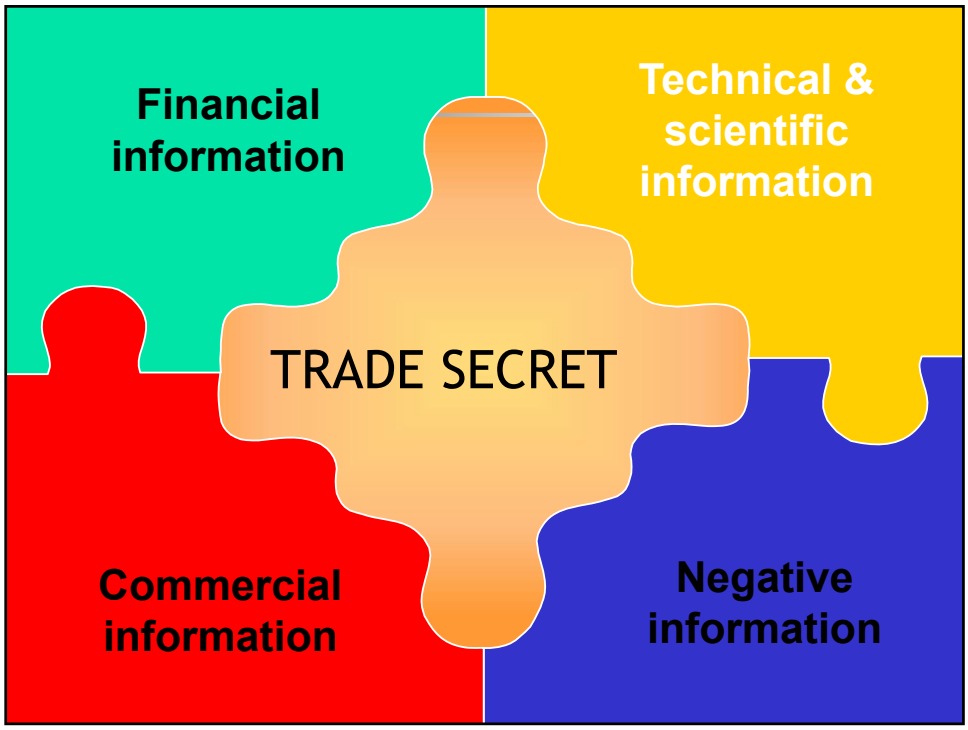
40

40

General principles:

- Information that has **commercial value** and that has been **scrupulously kept confidential** will be considered a trade secret (TS).
  - Owner will be entitled to **court relief** against those who have stolen or divulged it in an illegal manner.

41



42

Legal Action

COURT RELIEF if: **TS** + **"THEFT"**

Only theft if wrongful !

Courts will only grant relief if someone has improperly acquired, disclosed or used the information

43

Trade-secrete & employees

1. New employees

- Brief on protection expectations early
- Obligations towards former employer!
- Assign all rights to inventions developed in the course of employment
- NDA/CA
- Non-compete provision

•Reqts
•Limits

2. Current employees

- Prevent inadvertent disclosure (ignorance)
- Train and educate
- NDA for particular task

3. Departing employees

- further limit access to data
- exit interview
- letter to new employer
- treat fairly & compensate reasonably for patent work

44

Non-Competition Clauses (covenants not to compete) in Labour Contracts

After employee leaves prior employer:

- May he work for competitor?
- May he work in related job?
- May he open a competing business?
- Is covenant not to compete enforceable?

45

Class built slide (2024 and 2025)…

- May he work for competitor?

Employee: Yes. After: Yes

- May he work in related job?

Employee: Yes. After: Yes

- May he open a competing business?

Employee: No. After: Yes

- Is "covenant not to compete" enforceable?

Yes, by rightful termination with employee.

Real answer – depends on the LAW and on the legal framework (country, court).

For international contracts this is an essential caution for the employee (note: trade secrets link here)

46

46

LAWFUL INTERCEPT – THE TECHNOLOGY

48

Why lawful (legal) Intercept?

- How to fight
  - Terrorism
  - Pedophilia rings
  - Cyber stalking
  - Data theft
  - Industrial espionage
  - Ilegal trade (e.f.drugs, guns) on the internet
- What are the problems with Legal Intercept?
  - Privacy
  - Security

49

49

Two types of LI

- **Passive Interception:** This enables LEAs to capture the delivery of data and voice communications, providing the ability to filter and extract data and voice.
- **Active Interception:** This enables LEAs access to service provider networks by providing standardized interfaces for real-time access to communication service during investigations.

50

50

Two types of information

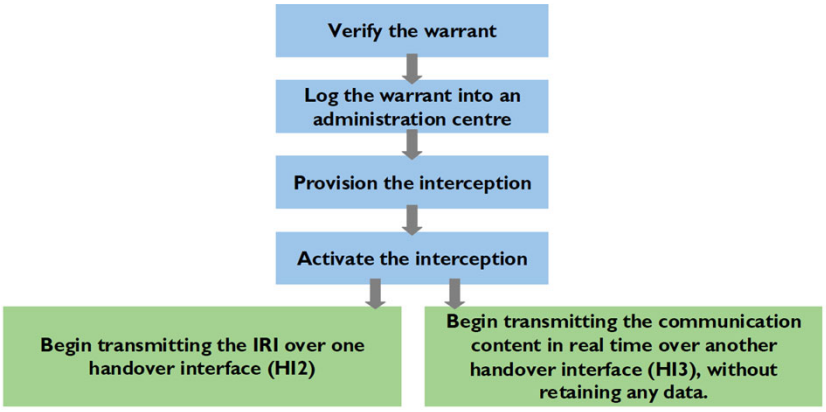
- **Content of communications (CC)** - This refers to the information exchanged between two or more users. This includes voice, video, chats, information or message contents.
- **Intercept Related Information (IRI)** - This is a collection of information or data related to the target. This includes location, log or successful and unsuccessful communication attempt, source and destination of calls, IP addresses, time or duration, Metadata, etc.

51

51

Operation on LI center

Full process more than technology!



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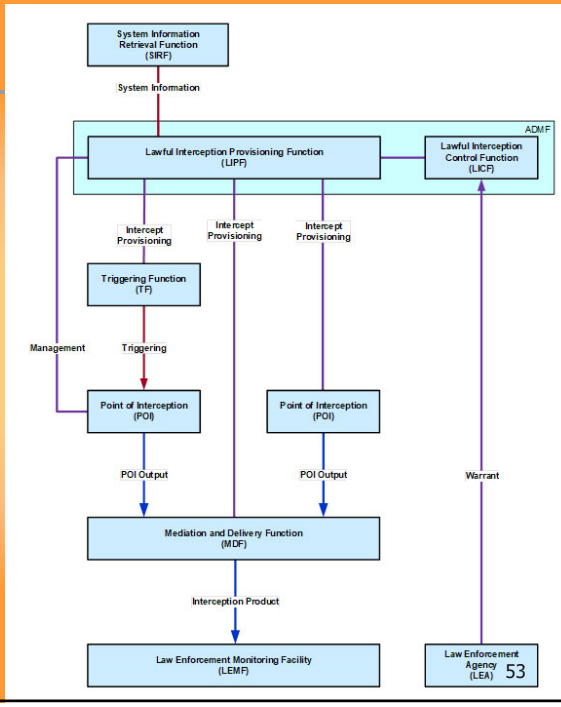
Technology



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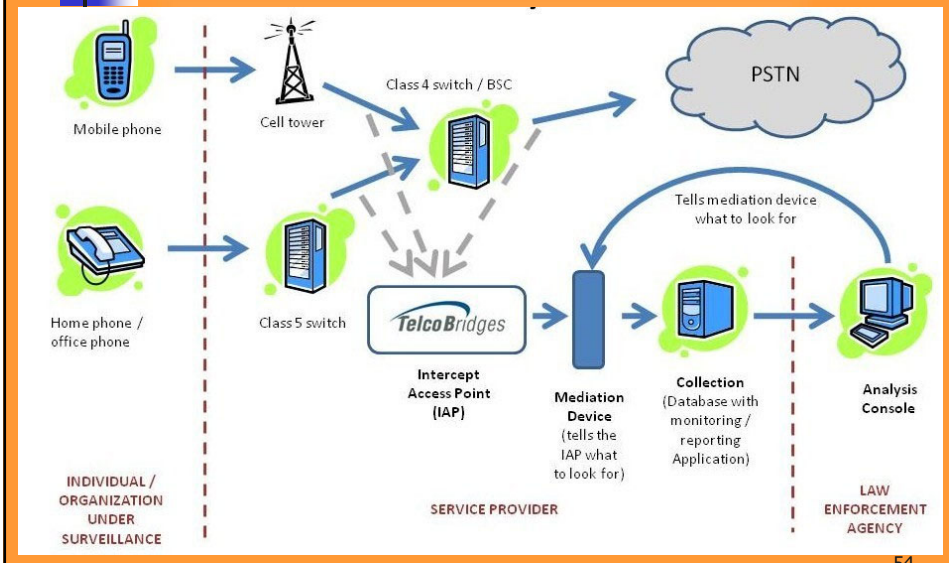
Telco technology for LI



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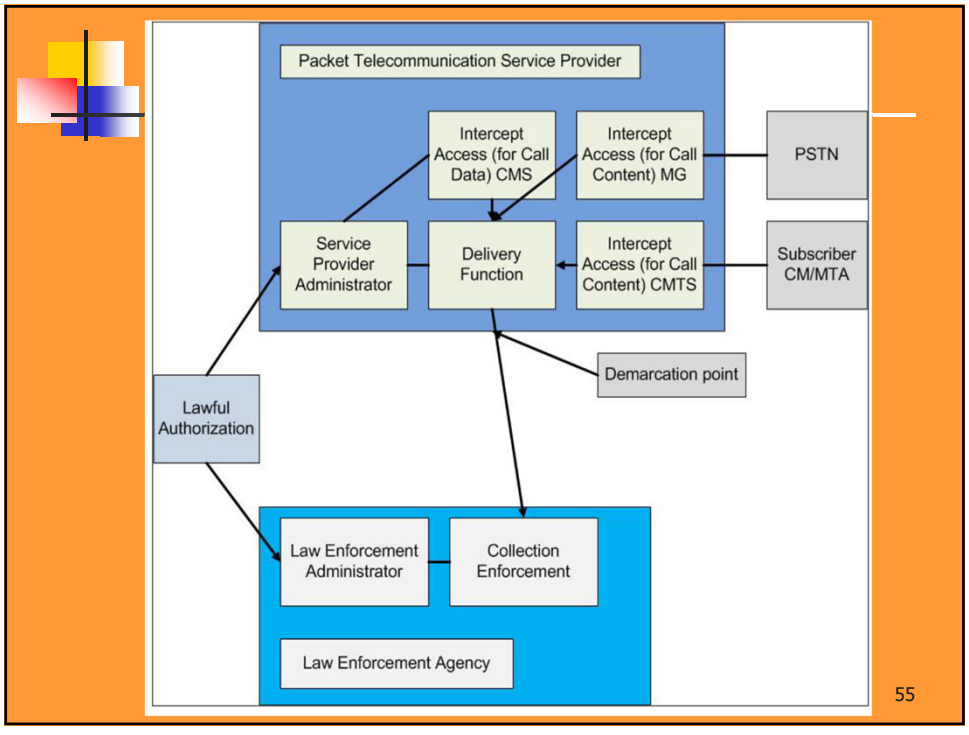

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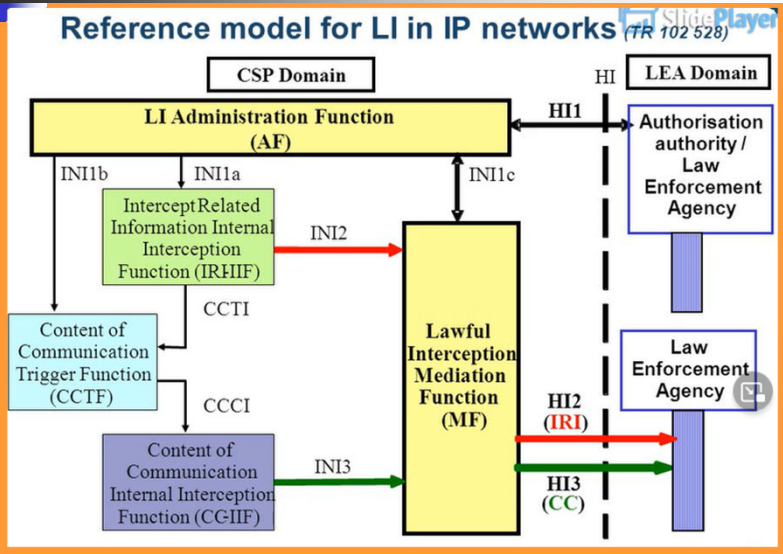
Lawful Intercept: also in IP networks



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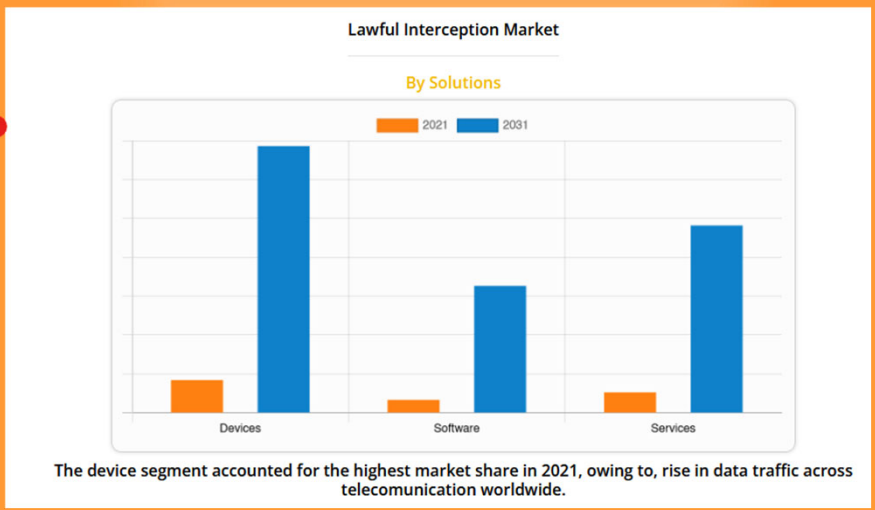
LI on the rise...



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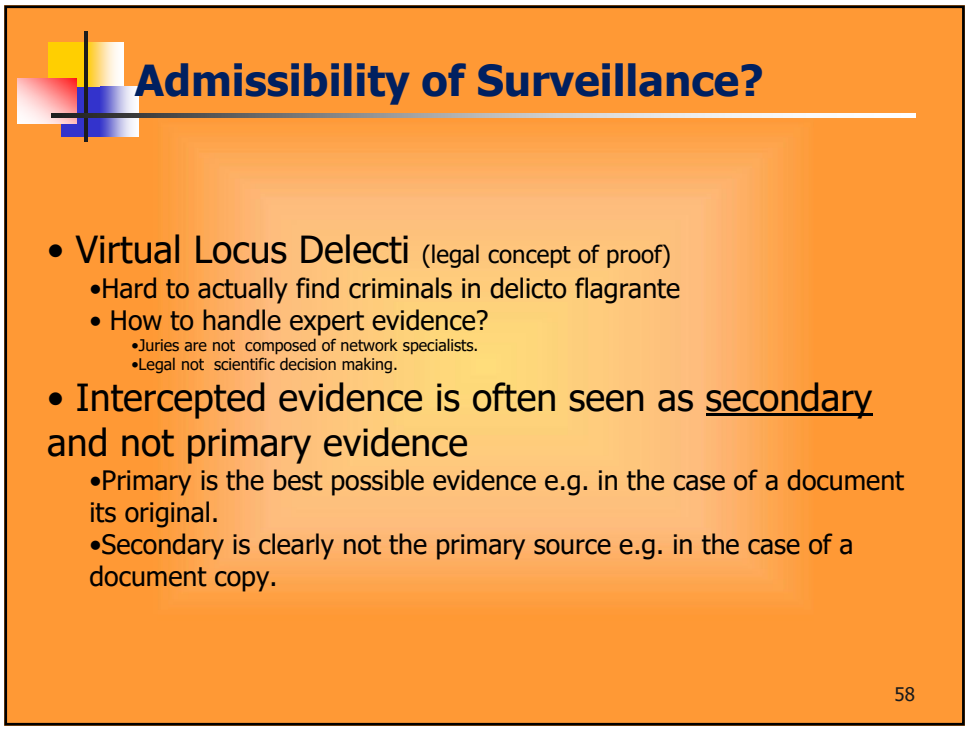
Admissibility of Surveillance?
• Virtual Locus Delecti (legal concept of proof)
•Hard to actually find criminals in delicto flagrante
• How to handle expert evidence?
•Juries are not composed of network specialists.
•Legal not scientific decision making.
• Intercepted evidence is often seen as secondary and not primary evidence
•Primary is the best possible evidence e.g. in the case of a document its original.
•Secondary is clearly not the primary source e.g. in the case of a document copy.
58

58