

CENG 374E - INTRODUCTION TO COMPUTER SECURITY

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Cyber Security and Defense Researches in Turkey

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Gazi University

Computer Engineering Department

Presentation Plan

- **Cyber Security**
- **Cyber Security Issues**
- **Cyber Security in our country**
 - Programs
 - Projects
 - Theses
 - Articles
 - Conferences
 - Magazines
- **Reviews**
- **What to do for Cyber Security**

Description: Cyber?

TLA : The word CYBER is not included..

Virtual adjective

- *adjective*

Not real but designed in the mind, imaginary, hypothetical, estimated

2. mathematics

Algebraic expression which is taken on a negative number and has a root of second force

Description: Cyber Security?

“All of the methods policies, concepts, guidelines, risk management approaches, actions, trainings, best practice experiences and technologies used in order to protect information assets of the institutions, organizations and users ”



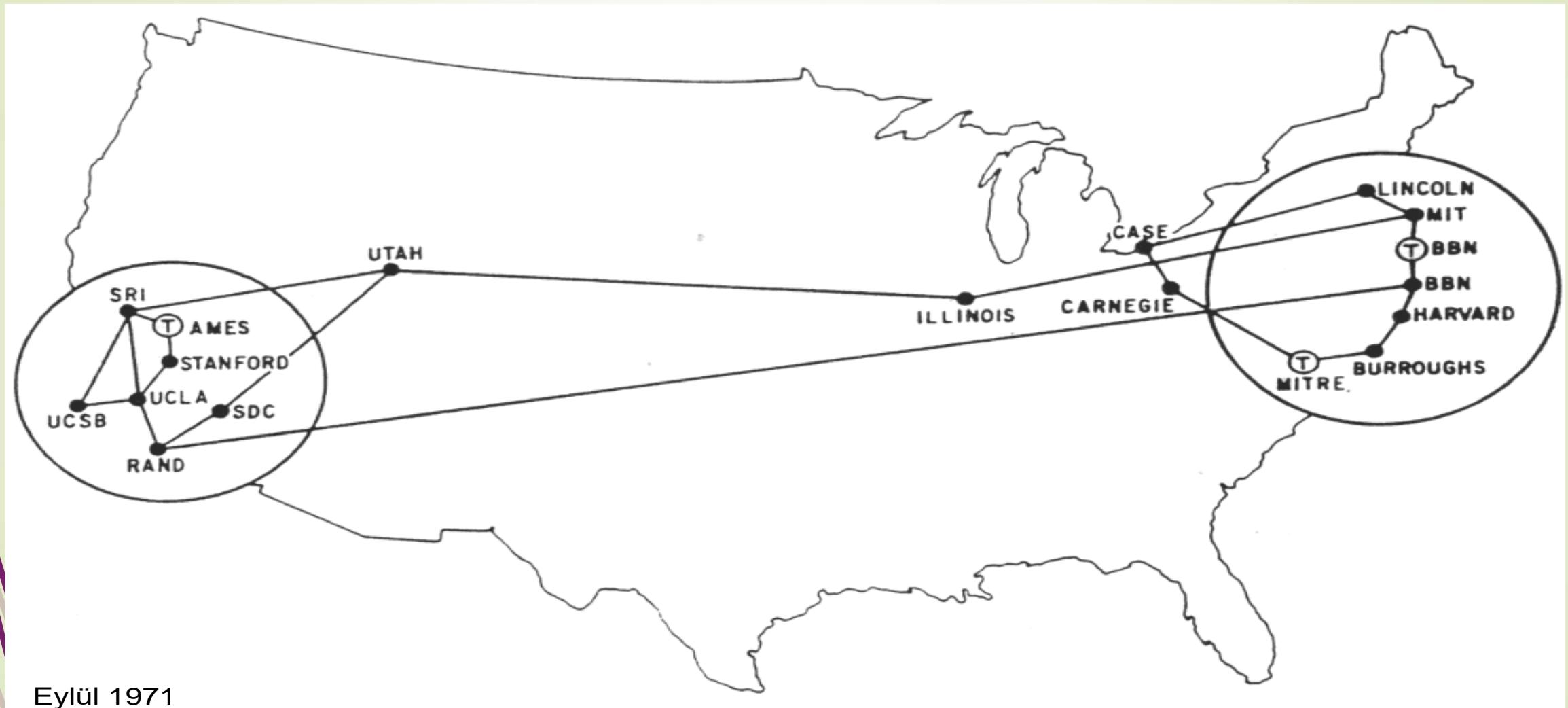
Main Target of Cyber Security?

- To protect information assets and resources of the institutions and organizations or of the nation in the most general sense, in line with the objectives, taking into account the values of organization, human, finance, technical and information, **before** the assets and resources **get in trouble.**

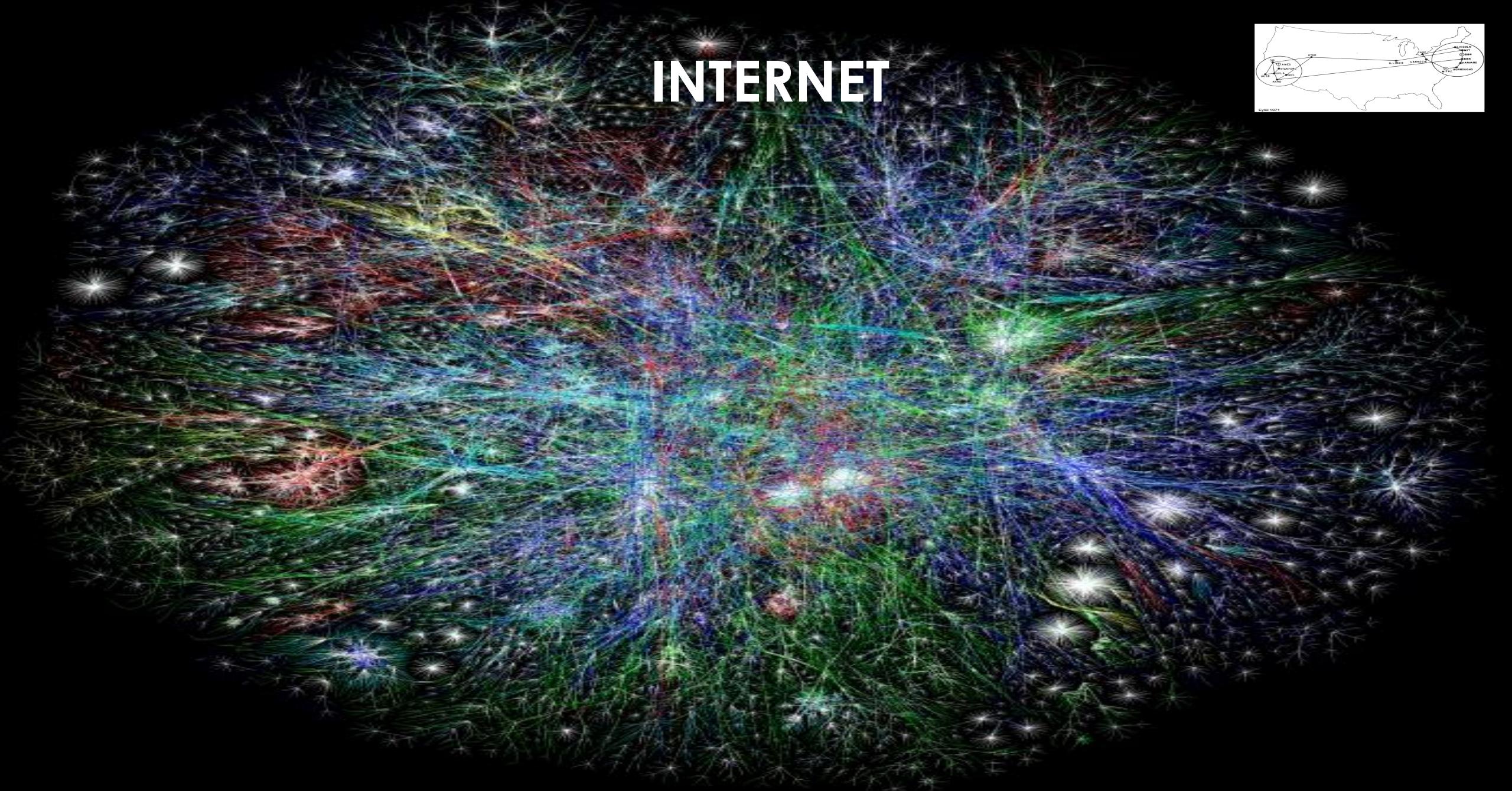
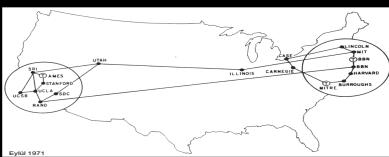


CYBER SPACES

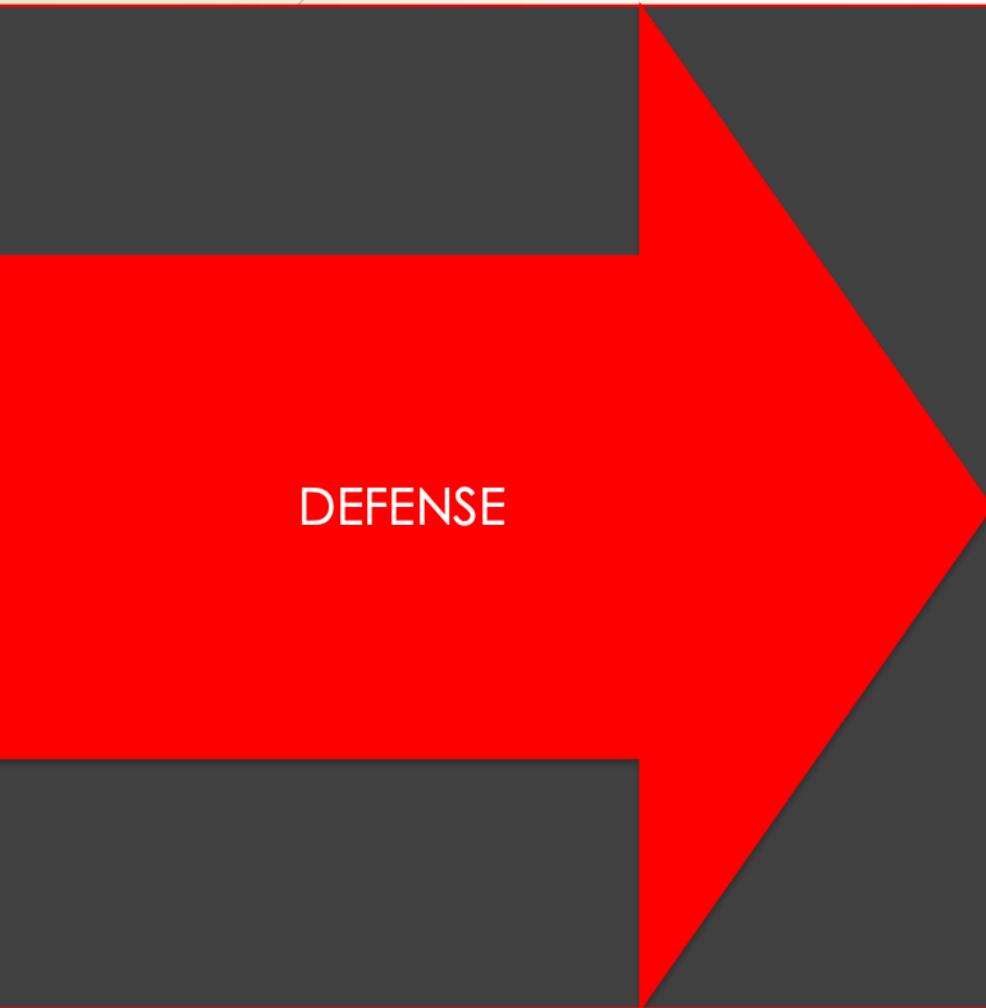
INTERNET



INTERNET



CYBER SPACES

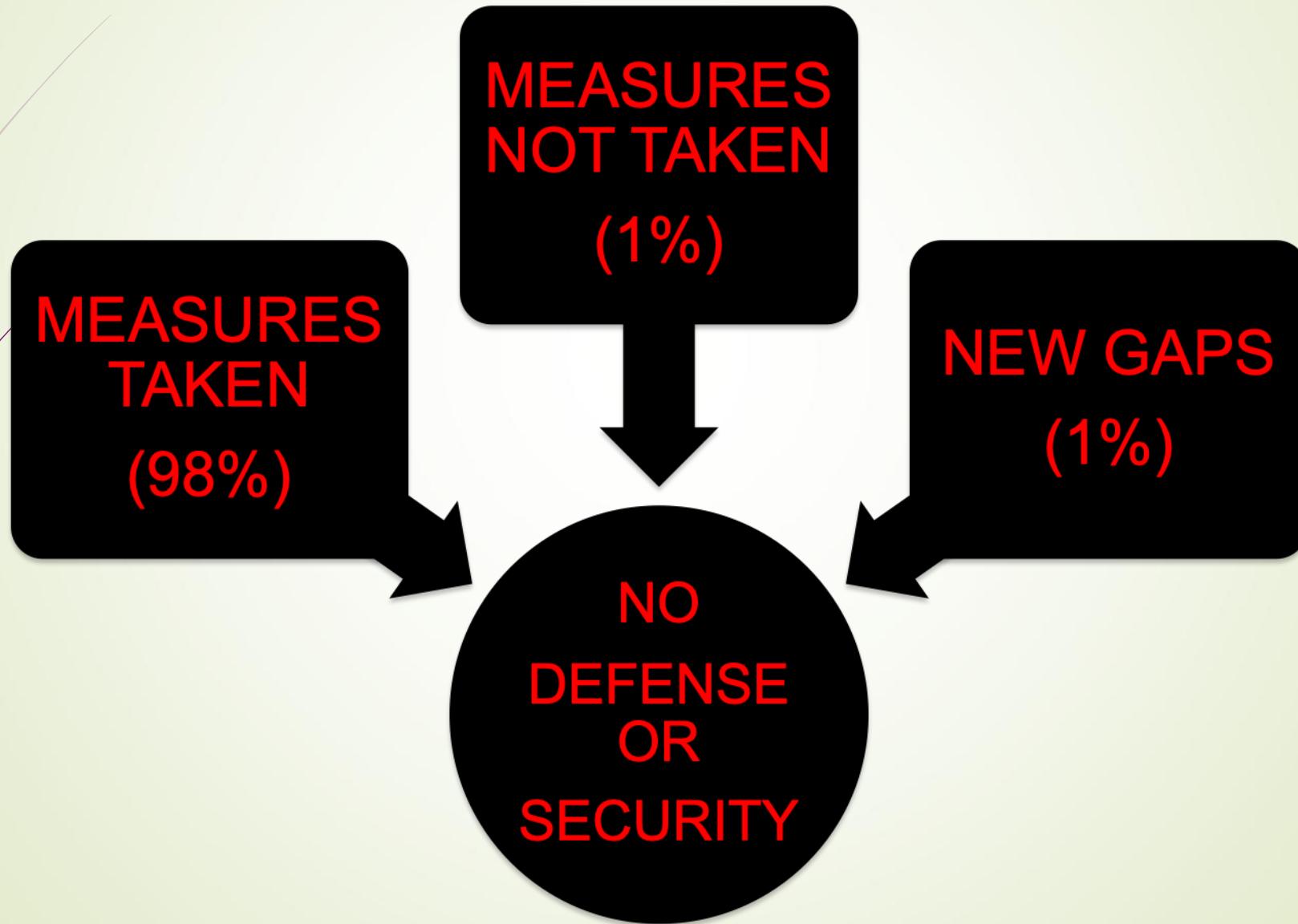


DEFENSE



THREATS
ATTACKS
OMISSIONS
GAPS
MISTAKES
VULNERABILITIES

CYBER SPACES





CYBER SPACES

- Attacks are now comprehensive..
- Multiple attacks are popular..
- Scenarios are being written and tried..
- Mixed structures are included..
- Unknowns / Not considered cases..
- Contain innovation..
- Require tracking..
- Require high quality and new knowledge..



CYBER SPACES

- Number of spyware is increasing.
- They differ.
- They can hide themselves
- They can be invisible
- They can copy again even if you delete
- They can be present, after a while absent
- They are categorized in many different ways.

Cyber Spaces

1. Provides independence from time and space..
2. Accelerates access..
3. Increases efficiency..
4. Brings Development / Change..
5. Simplifies Life, Management and Inspection..
6. Offers a good environment to make open intelligence..
7. Available to use as an **Attack / Defense** space..



Cyber Spaces

1. Hard to control for incognizants..
2. Brings forward those who know its gaps..
3. It helps to bad people so much ..
4. It makes life unbearable for incognizants..
5. It's addictive..
6. It partly influences the personal development negatively..
7. It enslaves the underdeveloped societies..
8. It can be used as a **war environment** ..
9. ...

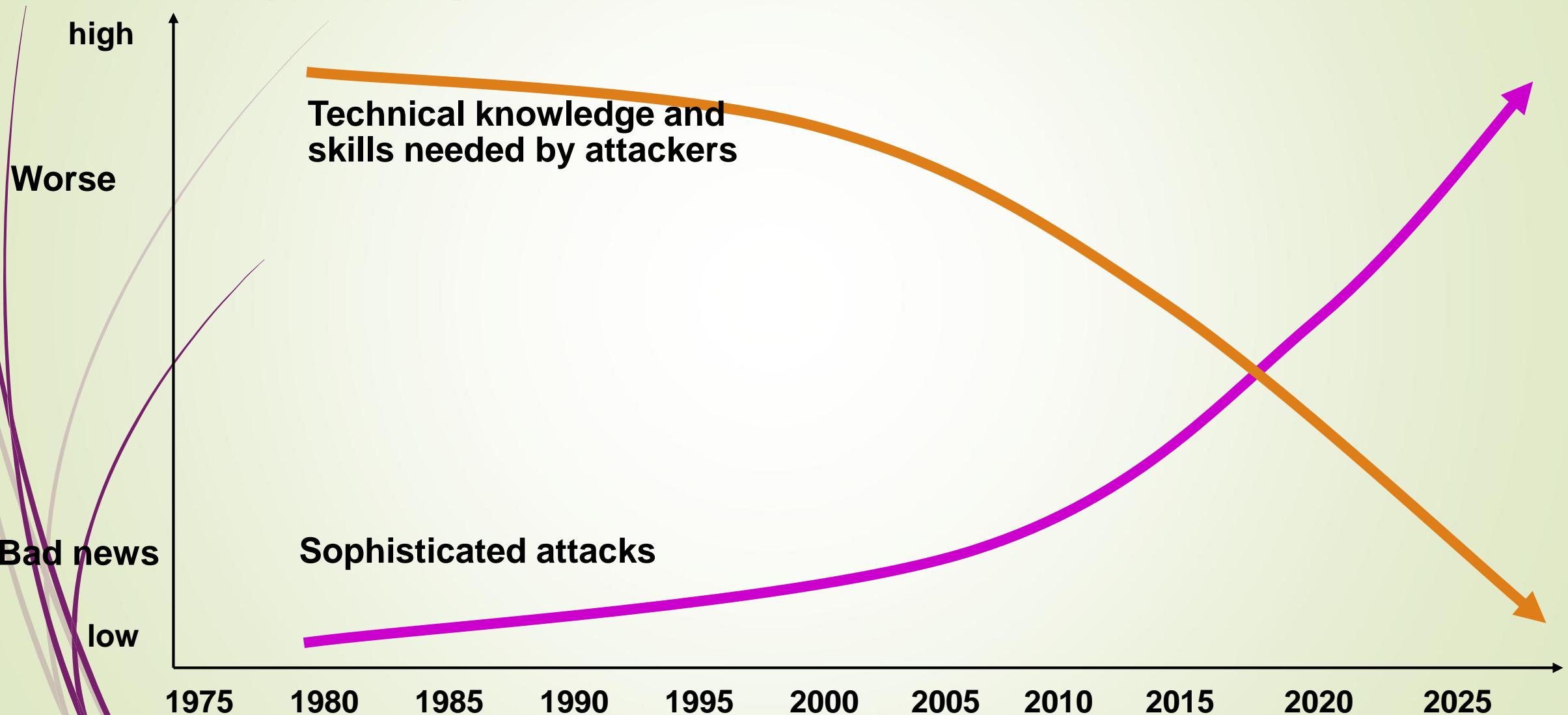


Cyber Spaces

1. Getting common..
2. Applications are on the rise..
3. Threats, dangers, attacks are increasing..
47870, 49003, 50999 , 54256, 73632 (nvd.gov),
4. New solutions are being developed..
5. Need-to-know subjects are increasing..
6. The parameters to be done and controlled are constantly increasing.

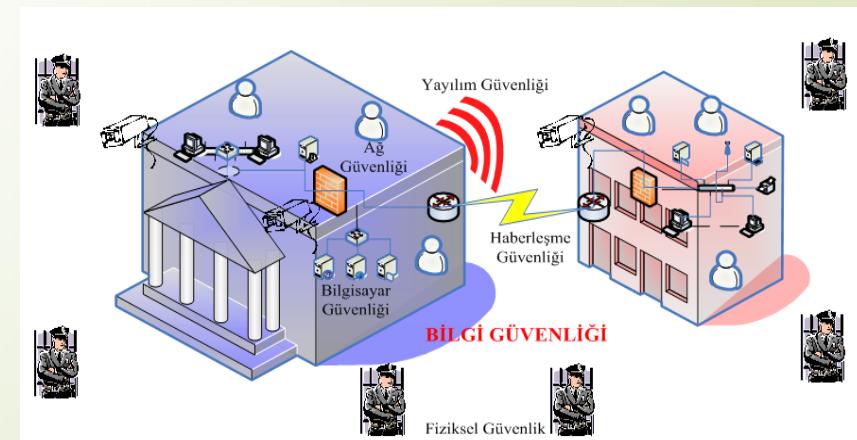


Cyber Spaces



Cyber Spaces

- Physical Security
 - Communication Security
 - Propagation Security
 - Computer Security
 - Network Security
 - Information Security
 - Hardware Security
 - Software Security
 - Operating System Security
 - Social Network Security
 - Mobile Device Security
 - Database Security
 - Web Technologies Security
 - Web Applications Security
 - Protocol Security
 - Server Security
 - IPv6 Security
 - Wireless Network Security
 - Cyber Security
 - ...
- Web browser security
 - Secure software development
 - Steganographic security
 - SCADA Security
 - RFID Security
 - Critical Infrastructure Security
 - Industrial System Security
 - Google Security
 - Crypto analysis
 - Steganalysis
 - Password Security
 - Cyber warfare
 - War games
 - Critical Infrastructure



Cyber Spaces : Cyber Weapons

- Computer viruses,
- Maggots,
- Trojan
- Exploits
- Key logger software
- Spyware
- Phishing

Cyber Spaces : Cyber Silahlar

- Memory Stick
 - To drop the memory stick
 - To sell in the market
 - To lend / borrow
- Listening / monitoring software
- STUXNET, DUQU, FLAME,..



Cyber Spaces

Fierce battle of good and bad

- Attacking Party
- Defending Party
- Unaware Party
- Impartial parties
- ...

Cyber Spaces

Attacking Party

- Attacks are increasing
- Knowledge level of attacks decreases rapidly
- Malicious codes are rapidly spreading by evolving and changing
- Establishment of organized virtual criminal organizations
- Always one step ahead of the good ones

Cyber Spaces

Defending Party

- Weakest link of the security
- Ignorance, apathy, undervaluing,
- Inability to provide 100% security
- Fund of knowledge(Investment, Training and Time)
- Confidence to people
- Mistrust inherent in the E-world

Cyber Spaces

Others

- Being used
- Relaxed
- Weak awareness
- Weak information
- Asleep

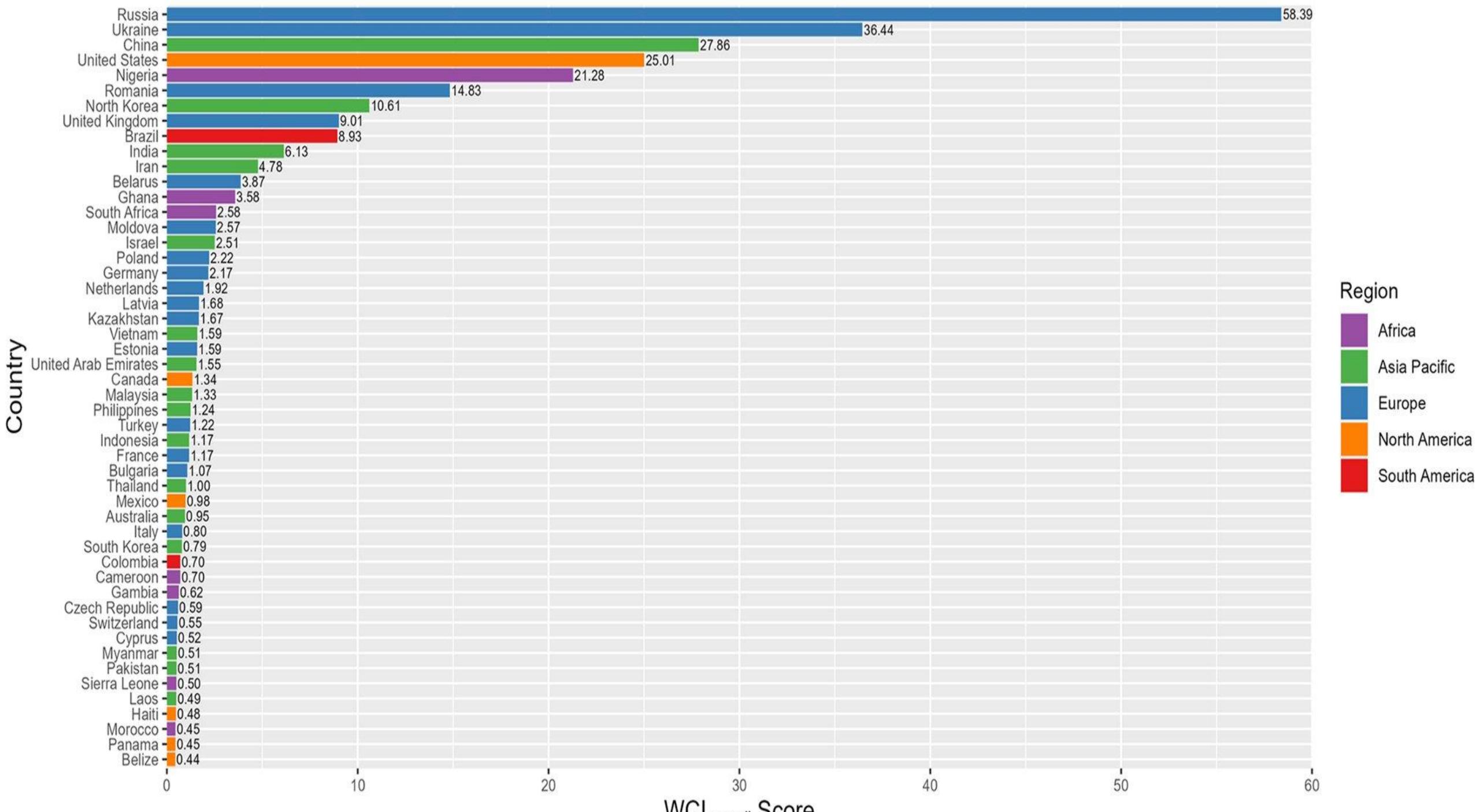


Güncel Tehditler

CYBERCRIME INDEX

Ranking countries by cybercrime threat level

	Ranking	Country	WCI score		Ranking	Country	WCI score
	1	Russia	58.39		11	Iran	4.78
	2	Ukraine	36.44		12	Belarus	3.87
	3	China	27.86		13	Ghana	3.58
	4	United States	25.01		14	South Africa	2.58
	5	Nigeria	21.28		15	Moldova	2.57
	6	Romania	14.83		16	Israel	2.51
	7	North Korea	10.61		17	Poland	2.22
	8	United Kingdom	9.01		18	Germany	2.17
	9	Brazil	8.93		19	Netherlands	1.92
	10	India	6.13		20	Latvia	1.68



CS Statistics, Threats and Trends in 2024

- US\$9.5 Trillion Predicted cost of cybercrime in 2024 (Cybersecurity Ventures)
- US\$4.45 Million Average cost of a data breach (IBM)
- 20% Increase in cyberattacks in 2023 (Apple)
- 207 Days Average time to detect a data breach (IBM)
- 80% of data breaches involved data stored in the cloud (Apple)
- 73% of small businesses surveyed reported a cyberattack (ITRC)

Cybersecurity Trends in 2024

Statistics



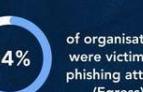
Threats & Trends

Advances in AI

The rise of AI allows people without technical skills to become cybercriminals (Forbes)



61% of cyber security leaders are concerned with AI chatbots in phishing (Egress)



AI-powered cyber security can help businesses protect themselves from evolving threats.



~1 in 5 businesses already use AI within their cyber security (Tech.co)

Phishing attacks continue to evolve, leveraging advanced AI and ML techniques to become more dangerous.

Phishing attacks

Phishing attacks continue to evolve, leveraging advanced AI and ML techniques to become more dangerous.



Ransomware Attacks

Ransomware attacks drastically spiked in frequency and aggressiveness last year, and expect this trend to continue.



66% of organizations were attacked by ransomware in the last year (Sophos)



83% of U.S. small businesses are not financially prepared to recover from a cyberattack

Safeguard your organization now with
Apollo Secure

TOP 10 CYBERSECURITY THREATS IN 2024

Threats from
Social Engineering



Cloud
Vulnerabilities



Poor Data
Management



Risk from
Configuration
Mistakes



The Risk of
Ransomware Attacks



AI-Powered Threats



Poor Cyber Hygiene



Business Email
Compromise (BEC)



Supply-Chain
Vulnerabilities



Future Threats from
Quantum Computing





RESEARCHES IN OUR COUNTRY

ACADEMICS
(STAFF,
PUBLICATIONS)

KNOWLEDGE ABOUT EXISTING TECHNIQUES, TOOLS, TECHNOLOGIES,
CAPABILITIES, OTHER RESOURCES

CAREER
DEVELOPMENT

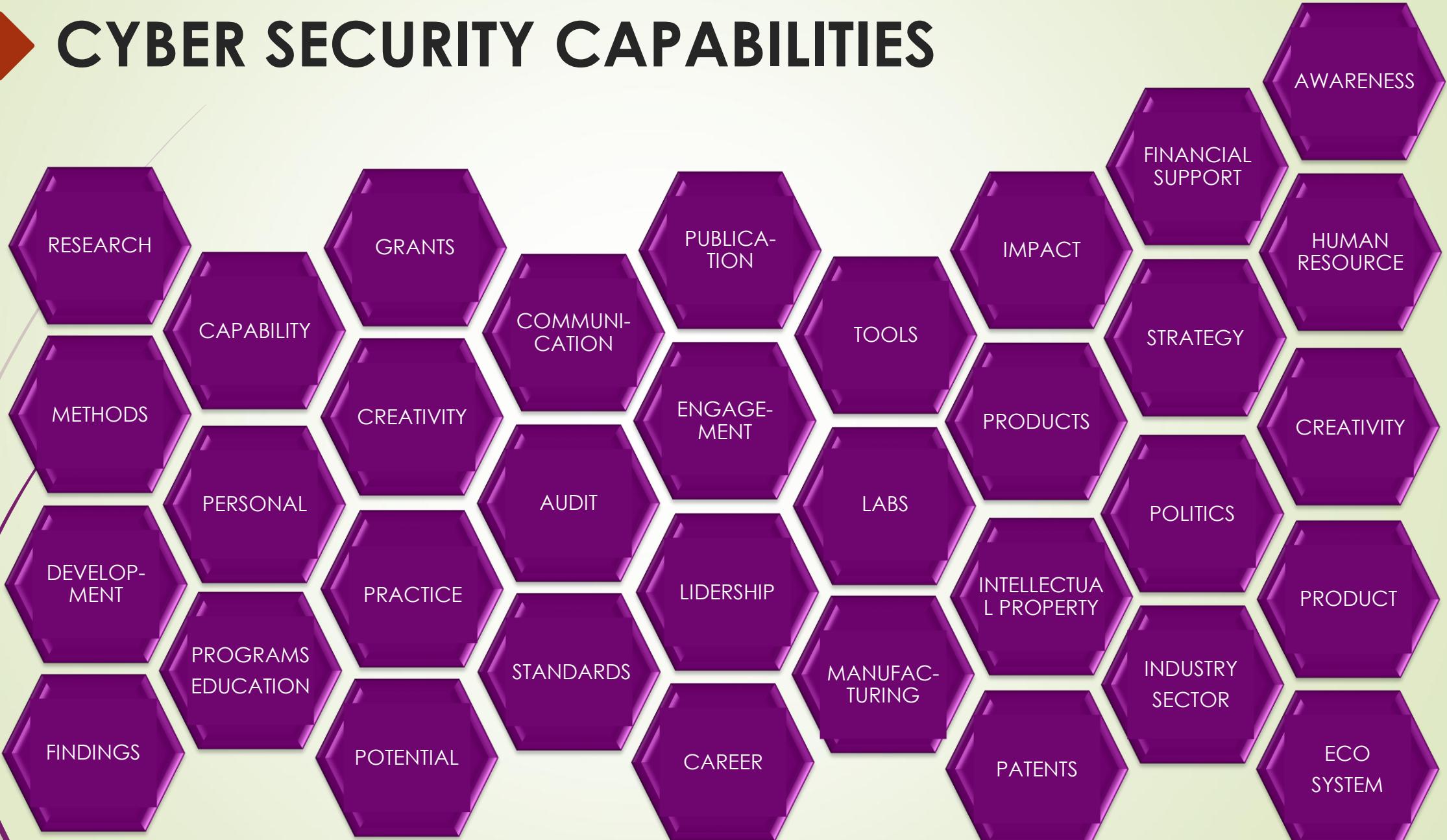
INTELLECTUAL
PROPERTY

INDUSTRY-
ACADEMIA
INTERACTION
&
COMMUNICATION

RESEARCH
METHODOLOGY

RESEARCH GRANTS
&
INDUSTRY FUNDS

CYBER SECURITY CAPABILITIES



CYBER SPACE ITEMS

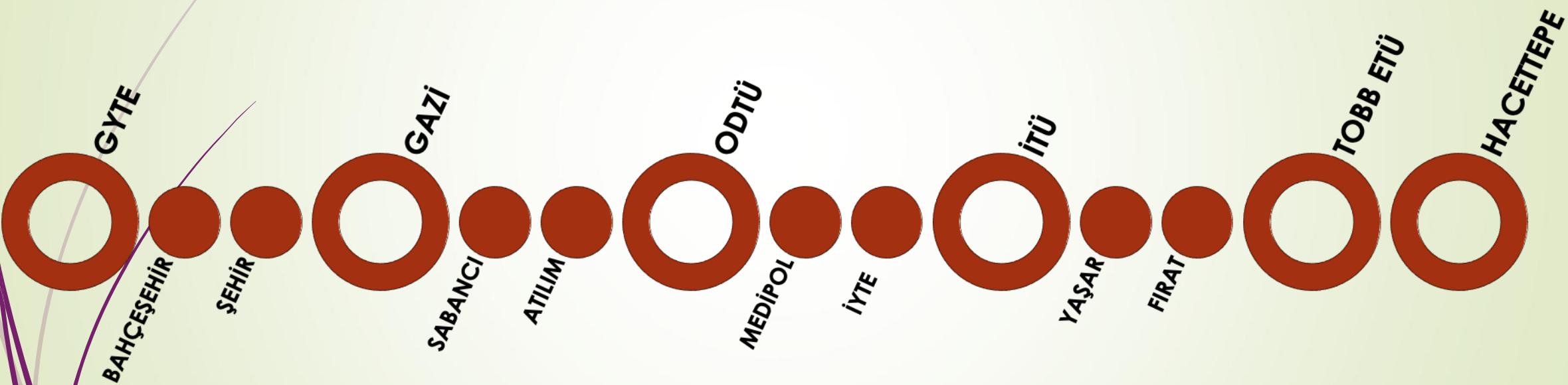


DEPARTMENTS STARTED

- CYBER SECURITY
- INFORMATION SECURITY
- INFORMATION SECURITY ENGINEERING
- INFORMATION SECURITY ENGINEERING AND CRYPTOGRAPHY
- ELECTRICAL, ELECTRONICS AND CYBER SYSTEMS
- FORENSIC INFORMATICS
- FORENSIC INFORMATICS AND CYBER SECURITY
- BIG DATA ANALYSIS
- SMART GRID
- FORENSIC INFORMATICS ENGINEERING

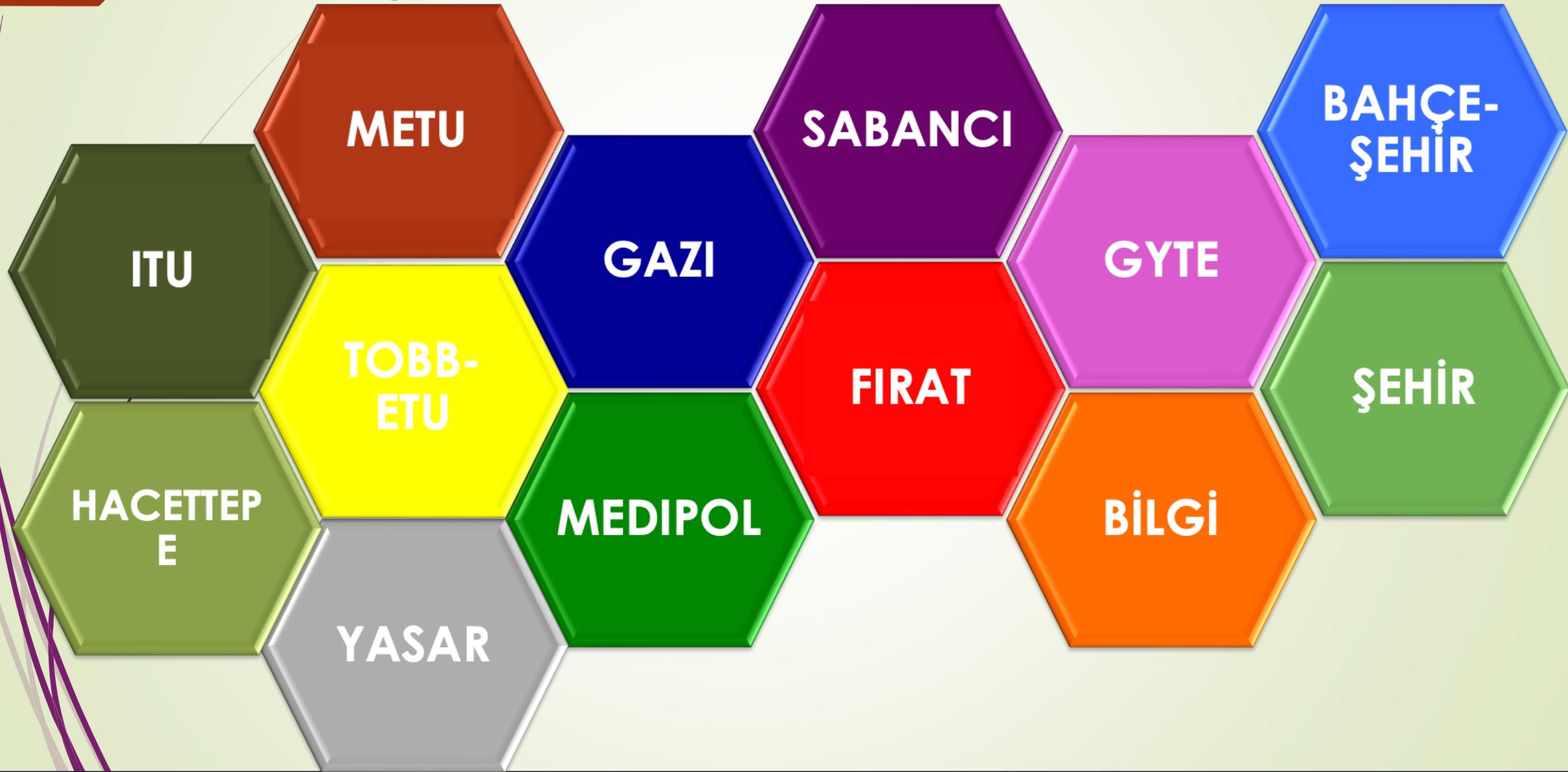


Cyber Spaces



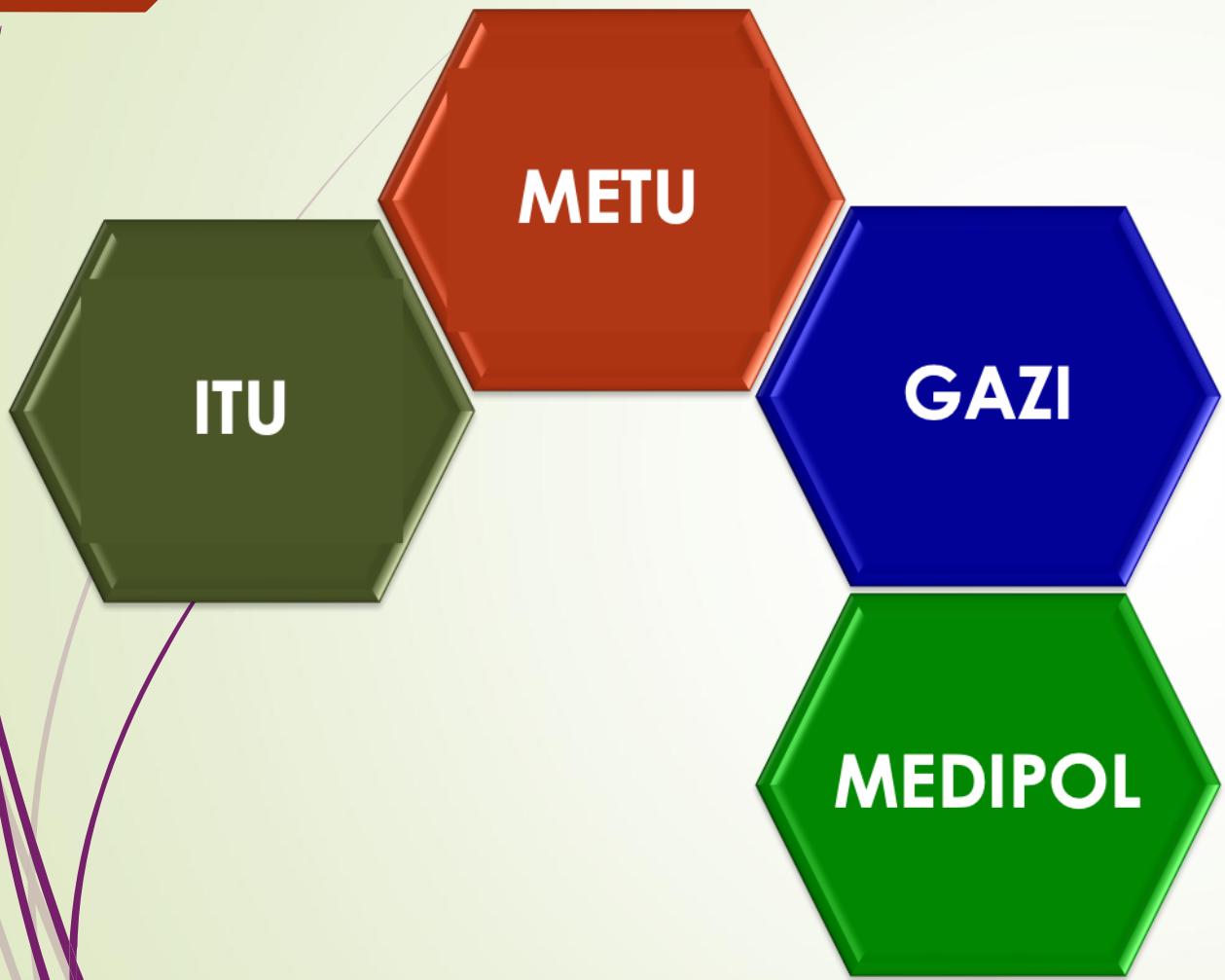


UG/GRADUATE PROGRAMMES

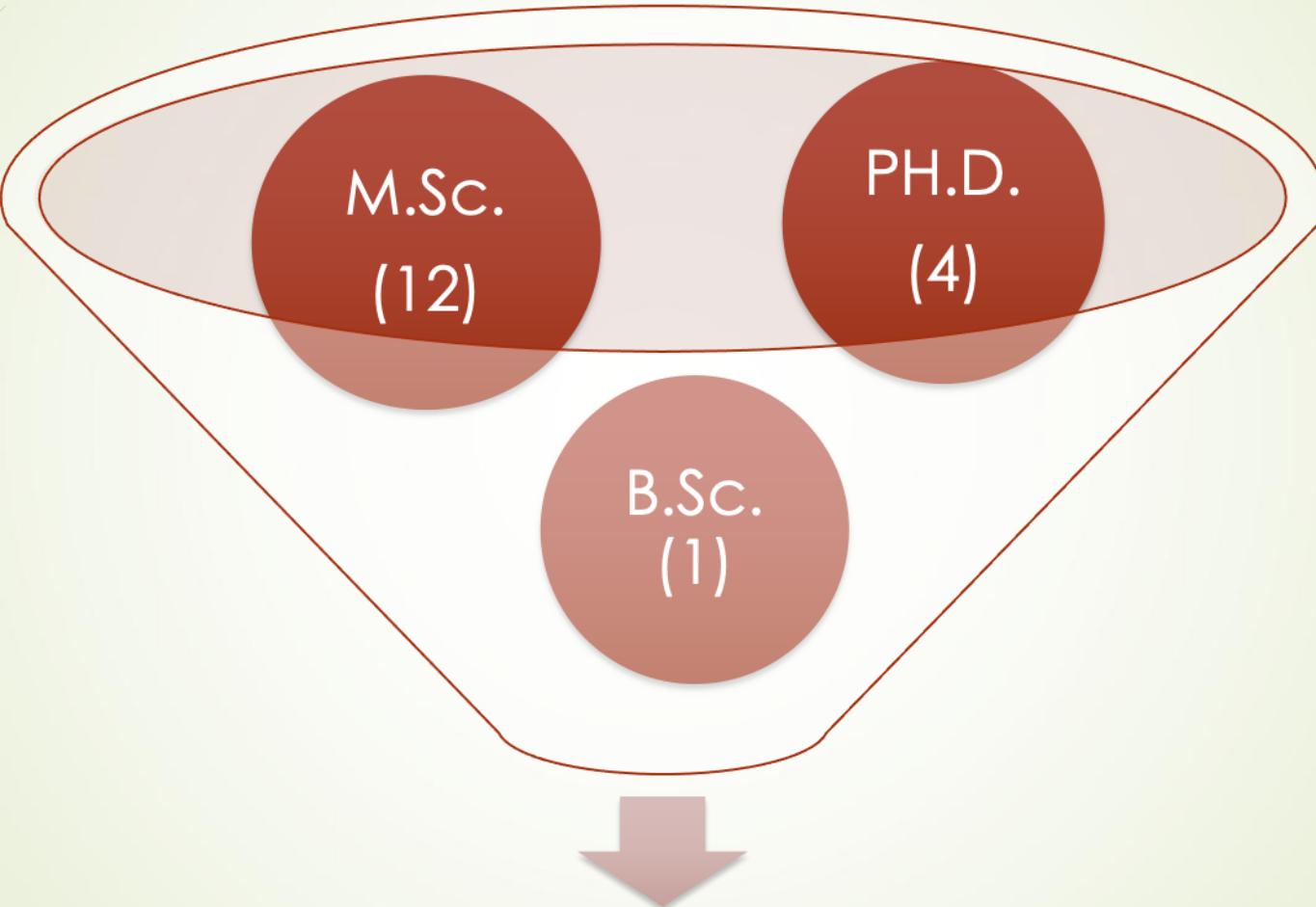




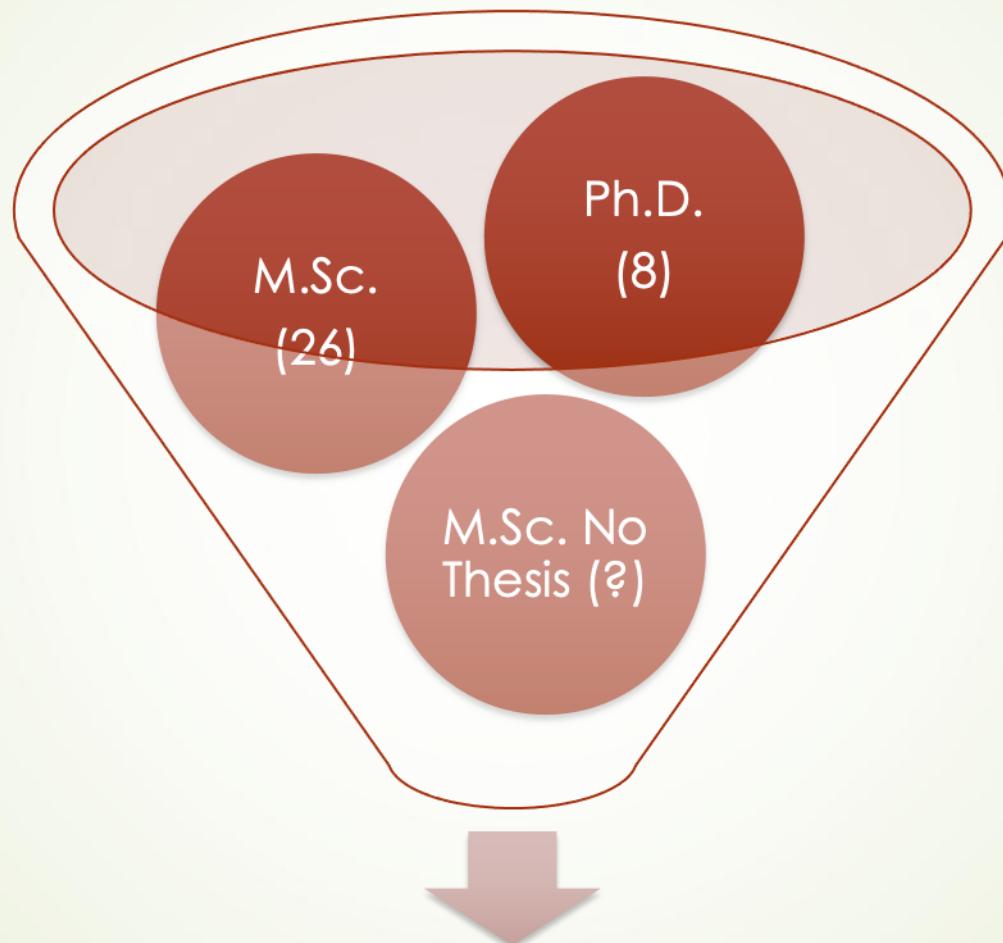
POSTGRADUATE PROGRAMMES



PROGRAMMES

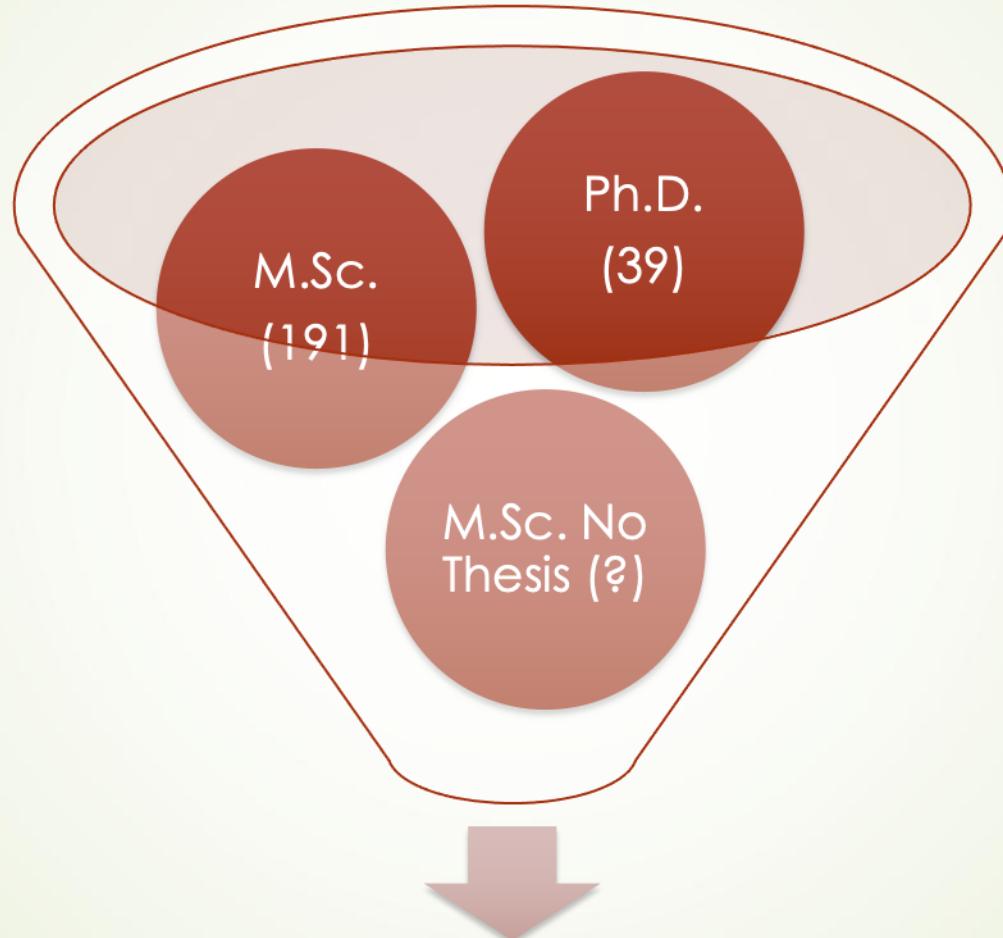


THESES (2000-2016)



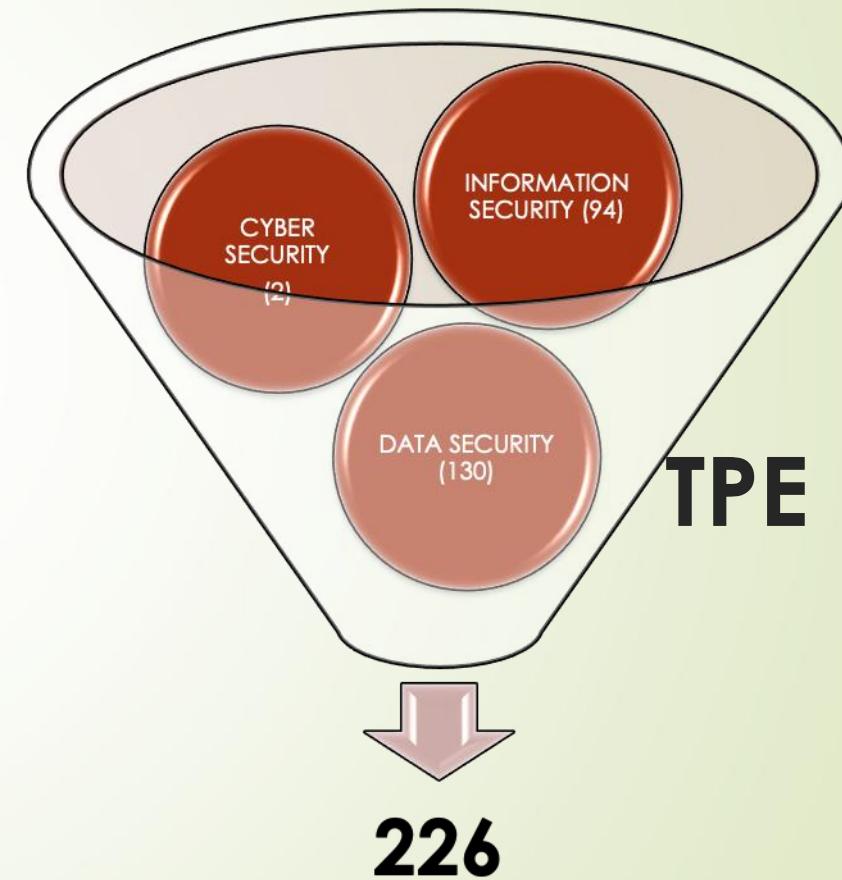
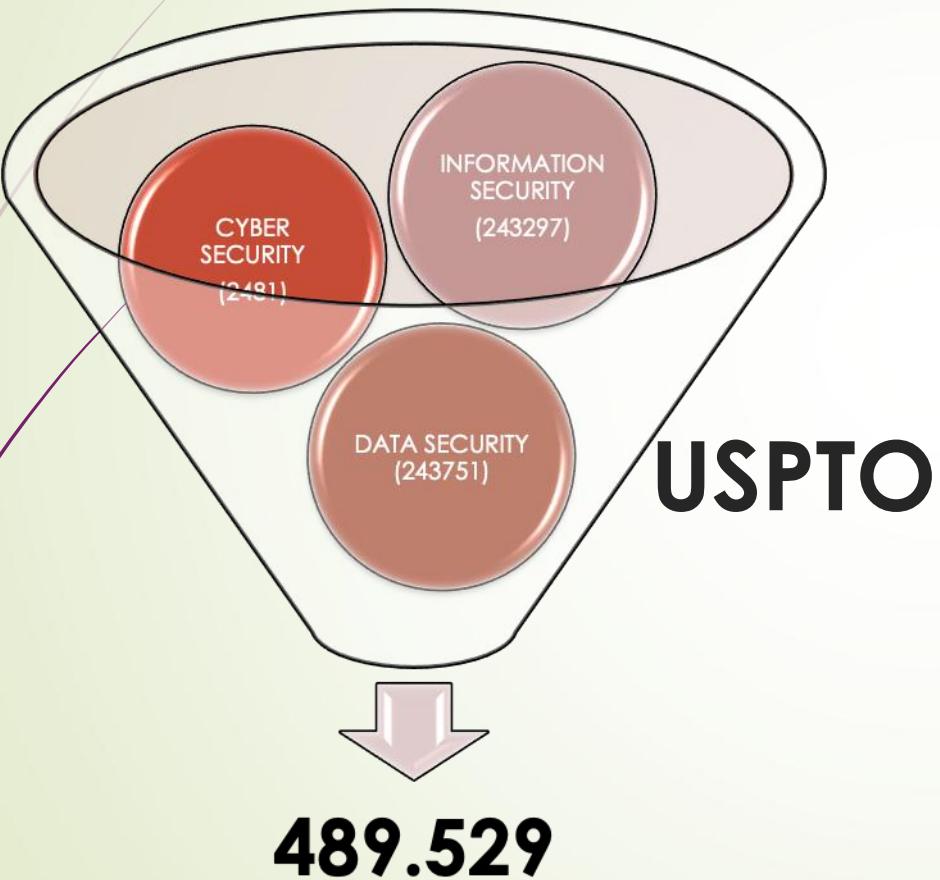
$$33 \text{ (Information Security)} + 1 \text{ (Cyber Security)} = 34$$

THESES (.....-2016)



Cryptology = 231

PATENTS (CYBER+INFORMATION+DATA SECURITY)



GOOGLE SCHOLAR

RESULTS FOR ARTICLES AND OTHER PUBLICATIONS

Words Searched	General	Journals	Gazi Univ.	Journals (GÜ)
“Cyber Security”	176	99	41	34
“Information Security”	1100	624	260	208
“Data Security”	402	201	63	52
“Cyber Defense”	43	26	9	5
“Cyber War”	74	44	13	9
“Spyware”	51	41	27	25

SCIVAL SCOPUS

(INFORMATION+CYBER SECURITY)

NO OF PAPERS	Year	World	TR
	2010	241	0
	2011	262	2
	2012	465	2
	2013	762	5
	2014	717	5
	2015	735	6
	Total	3192	20

SCIVAL SCOPUS

(INFORMATION+CYBER SECURITY)

NO OF AUTHORS	Year	World	TR
	2010	700	0
	2011	970	3
	2012	1230	4
	2013	1801	10
	2014	1950	11
	2015	2163	12
	Total	7068	39

IEEE XPLORER DIGITAL LIBRARY

(CRYPTOLOGY+CRYPTOGRAPHY+CRYPTANALYSIS)

Year	World	TR
2010	3568	21
2011	2983	26
2012	2858	14
2013	2966	29
2014	3140	14
2015+2016	3250+272	32+1
Total	19.037	137

IEEE XPLORER DIGITAL LIBRARY (INFORMATION+CYBER+SECURITY)

YEAR	WORLD	TR
2010	3300	12
2011	2664	13
2012	2527	8
2013	1944	9
2014	2445	6
2015+2016	2043+411	13+3
TOTAL	20.279	82

WoS THOMSON REUTERS

NO OF PAPERS

(CRYPTOLOGY+CRYPTOGRAPHY+CRYPTANALYSIS)

Year	World	TR
2010-2016	10.802	123

(INFORMATION SECURITY)

Year	World	TR
2010-2016	25.226	215

(CYBER SECURITY)

Year	World	TR
2010-2016	2.489	24

LABORATORIES AND RESEARCH

Name	Date of Establishment	Institution
TÜBİTAK UEKAE	1982	TÜBİTAK
National Centre for Response to Cyber Events	2013	BTK-TİB
Cyber Security Institute3BLAB	2014	Tübitak BİLGE&M
Cyber Defense and Security Research Laboratory	2014	ODTÜ
Karaelmas Cyber Security Implementation and Research Center	2014	Bülent Ecevit University
Cyber Attack & Defense Simulation Laboratory	2014	Information Security Academy
Cyber Security Laboratory	2015	Sakarya University
Cyber Security and Biometric Research Center	2015	Yıldız Technical University
Cyber Security and Big Data Analytics Research Center Laboratory	2016	Gazi University
Cyber Defense Technology Center	2016	Havelsan
Cyber Fusion Center	2016	STM A.Ş.
Cyber Security Operations Center	2016	Ministry of Environment and Urban



COMPANIES CONDUCTING R&D

NETAS

ICTERRA

C2TECH

HAVELSAN
COMODO

ASELSAN
MILSOFT

STM A.Ş.

BİZNET

LABRİS

PROJECTS (BİLGEM)

SORT
Cyber
Space
Trap
System

VKÖS
Data
Leakage
Preventing
System

FILTER
Internet Access
Control and
Reporting
System

STAMP
Cyber
Threats
Detection
System

HARMAN
External
Media
Management
Analysis
System

SİBERMEYDAN CTF
Cyber Security
Sim. and Racing
Media

PROJECTS

TÜBİTAK CSI

- 2015, 11 Projects, Outgoing 3 projects
- 23.4 million TL

NETAŞ

- NOVA

BİZNET

- ISmart, Engerek, KEP ve SignArt

ICTERRA

- ATEŞ

.....

PROJECTS

TÜBİTAK –ARDEB Calls for Information Security

Call Period: Every Term

2015-2: Sustainable Information and Network Technologies

2016-1: Cyber Security

2016-2: Cryptology

2017-1: Security Technologies for Smart Systems and Media

2017-2: Security in Electronic Services

CONFERENCES

ISCTURKEY

BİLGEM

EEA

AB

TBD

GAZİ

METU

ISA

CSA

ISDFS

CONFERENCES (ISCTURKEY)

E-İmza Semp
2006

ISCTurkey
2008

2012

2014

2016

M-İmza
2007

2010

2013

2015

- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
-

JOURNALS / MAGAZINES

TÜBİTAK-UEKAE
MAGAZINE
(2011)

ULUSLARARASI
BİLGİ GÜVENLİĞİ
MÜHENDİSLİĞİ
DERGİSİ
(2015)

(2011)
INTERNATIONAL
JOURNAL OF
INFORMATION
SECURITY SCIENCE

(2016)
CYBERMAG

DRILLS

BOME
Information
System Security
(2008)

Cyber Shield
Drill
(2012)

International
Cyber Shield
Drill
(2014)

(2011)
National Cyber
Security Drill

(2013)
National Cyber
Security Drill

UEKAE/BİLGEM

Cyber Security
Common Sense
Workshops to
Academics

Security
Conferences

Summer
Schools

ISC for
Public
Institutions

ISC for
Private
Sector

Contests

SUMMER-WINTER SCHOOLS

SUMMER
CAMP Bilgi
University
2011

SUMMER
CAMP
TÜBİTAK
2013

WINTER
CAMP
Erciyes
University
2015

WINTER CAMP
Sakarya
University
2016

2013

2015

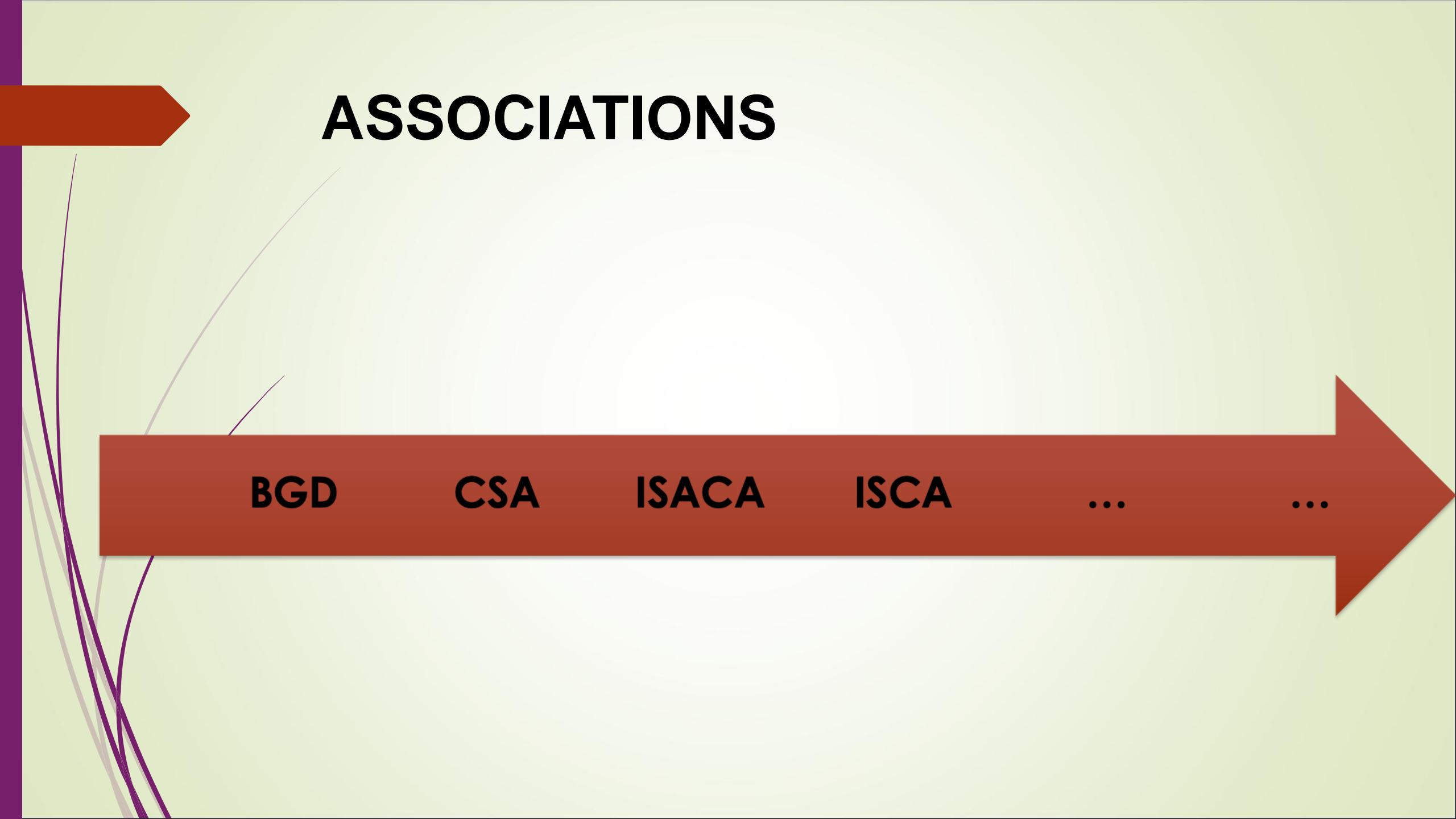
2016

2012
SUMMER CAMP
Development
Ministry

2014
WINTER
CAMP

2015
SUMMER
CAMP
GAZİ

2016
SUMMER
CAMP
IYTE



ASSOCIATIONS

BGD

CSA

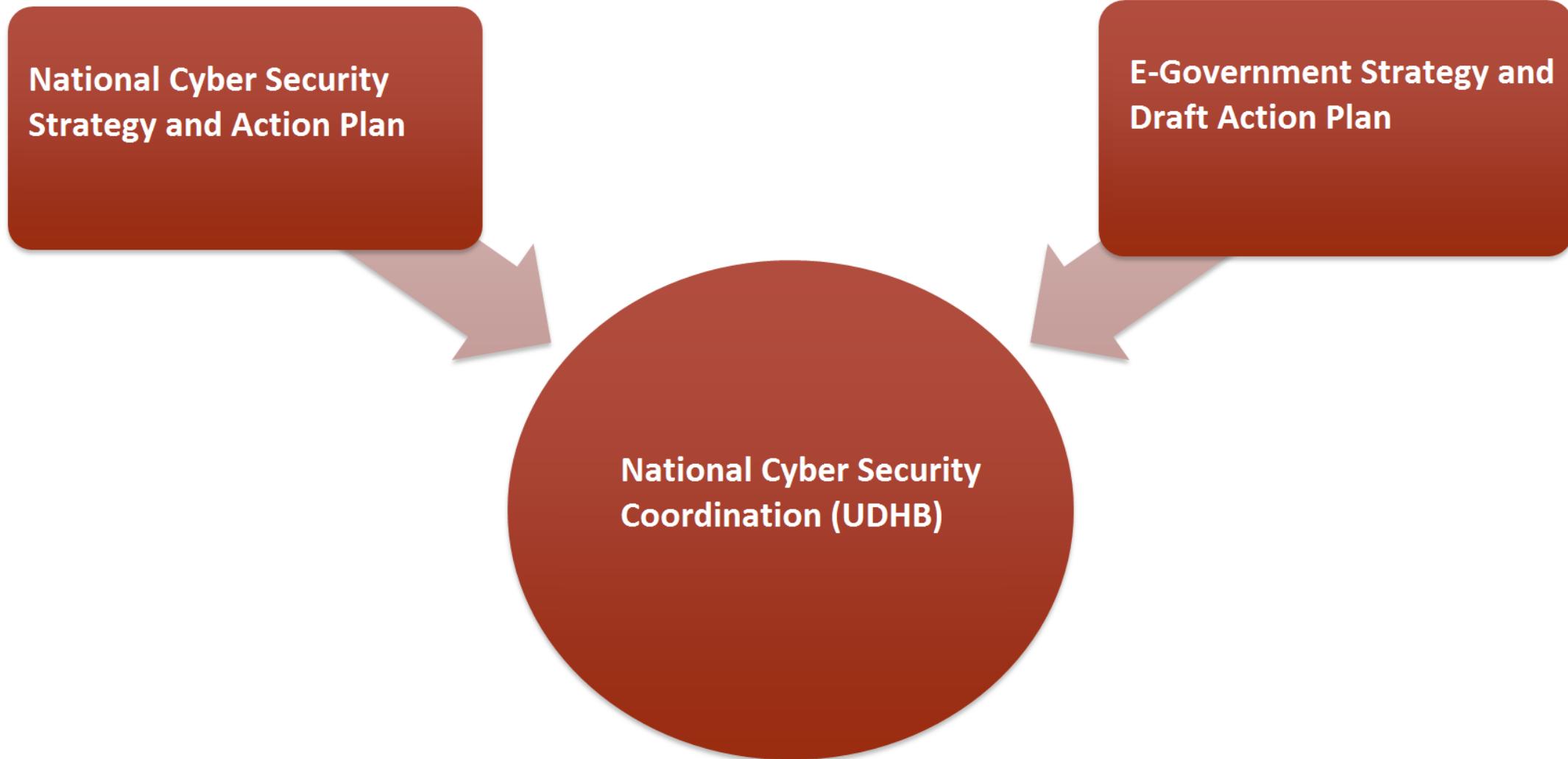
ISACA

ISCA

...

...

NATIONAL STRATEGY AND ACTION PLAN



STANDARDISATION

Cyber Security Certification

**System Security
Certification**

TS 27001 BGYS

**Staff
Assignment**

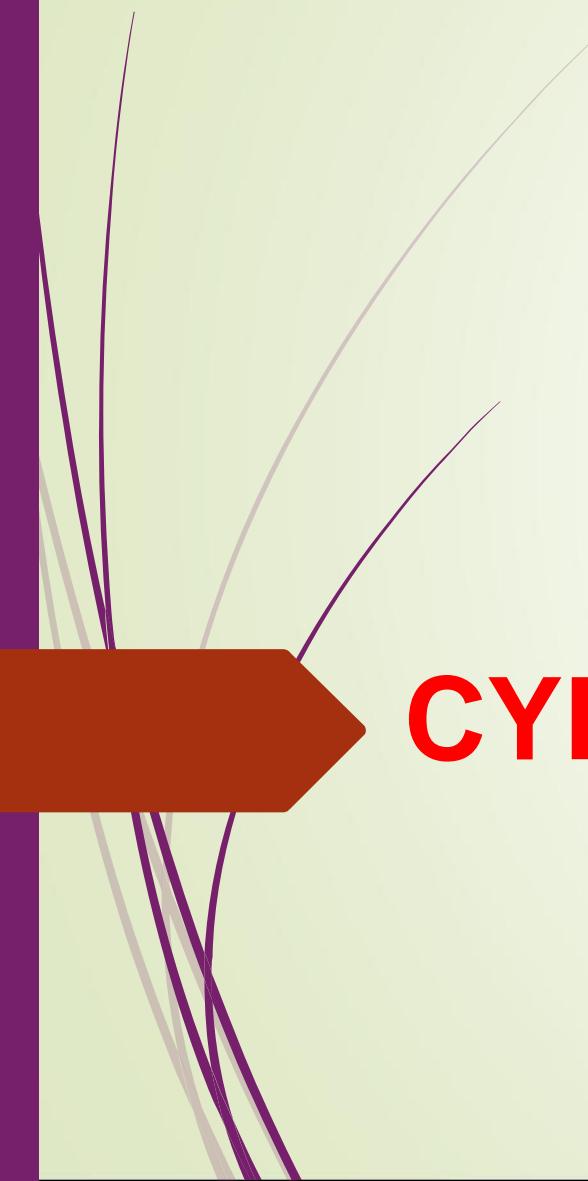
Software Designer
Leakage Test

**Product Security
Certification**

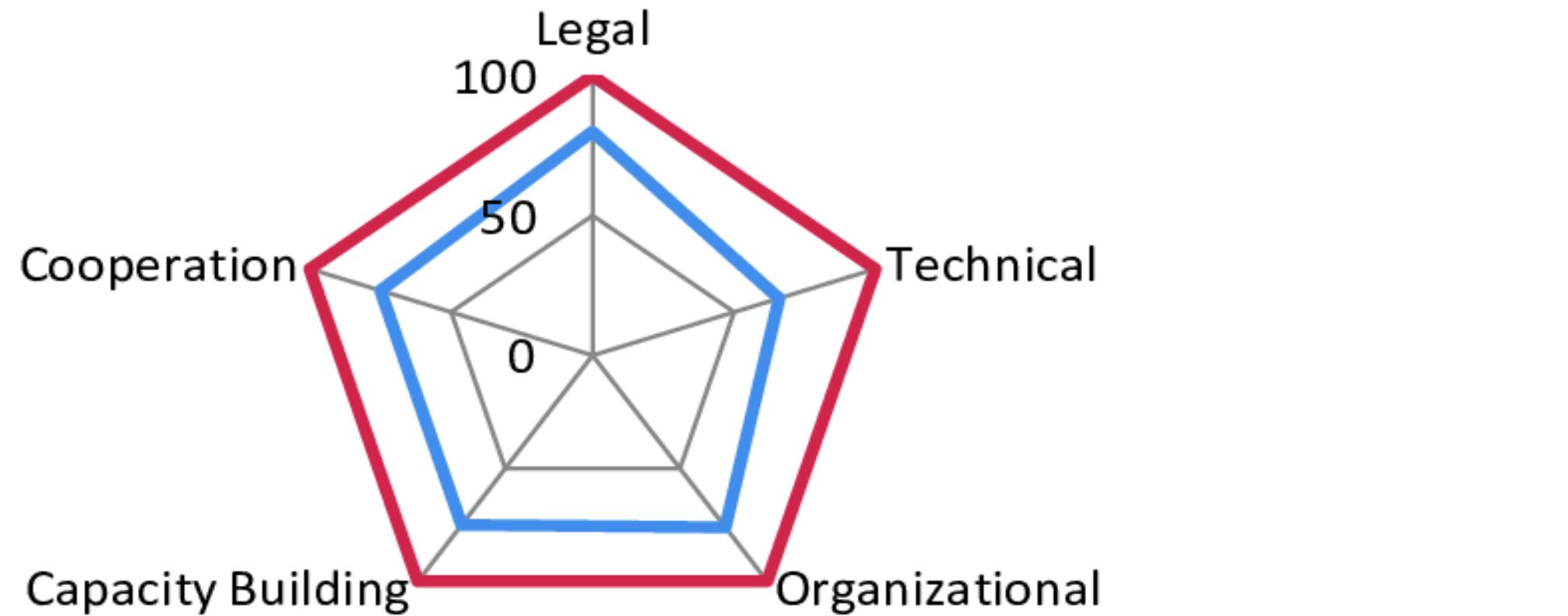
Joint Criteria
Site Security
Crypto Module



BOOKS

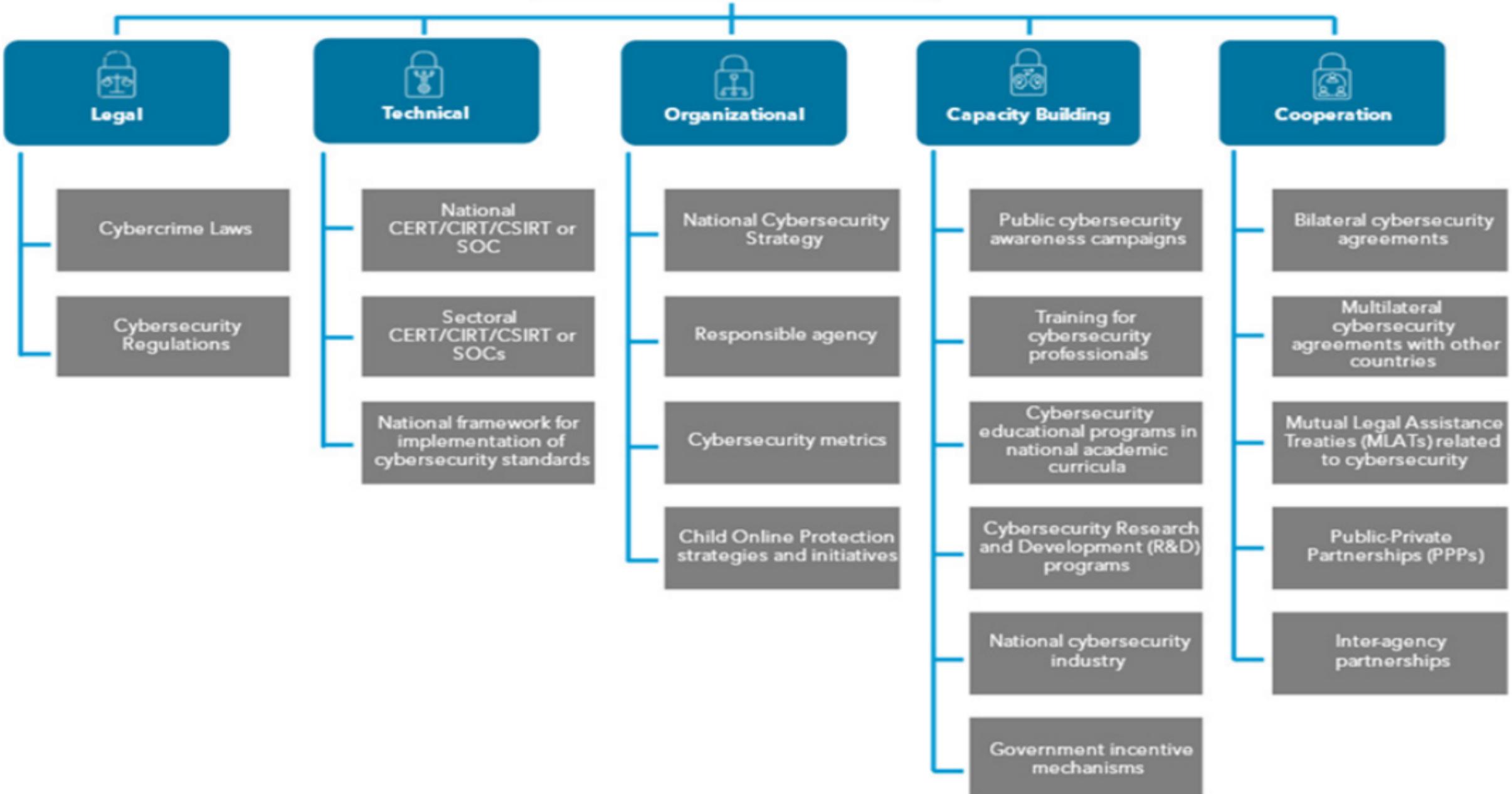


CYBER SECURITY INDEX OF TURKEY



— Performance of Türkiye
— Full Performance

GCI Overall Score

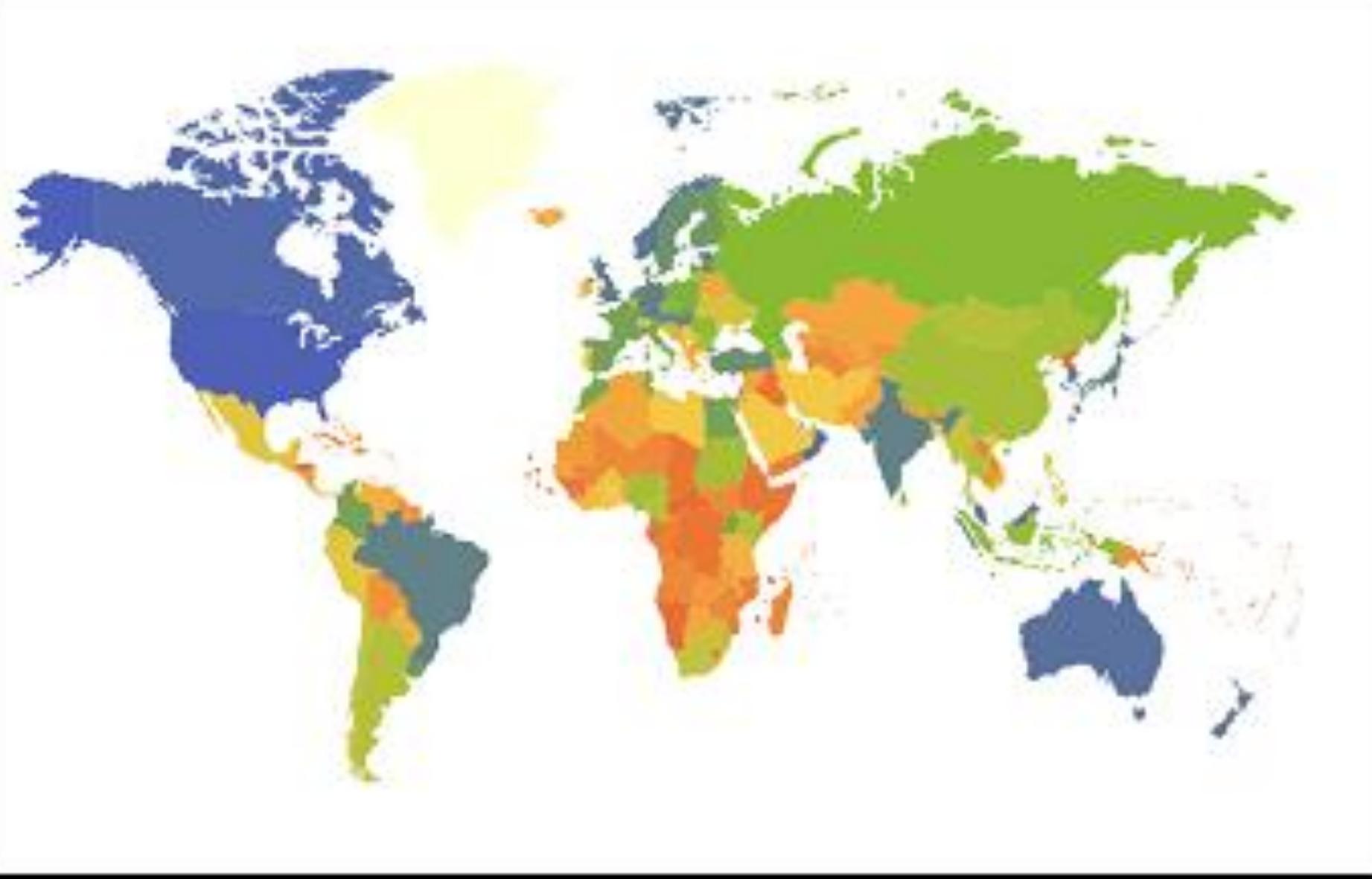


COUNTRY	INDEX	GLOBAL RANK
United States of America	0.824	1
Canada	0.794	2
Australia	0.765	3
Malaysia	0.765	3
Oman	0.765	3
New Zealand /Norway	0.735	4
Brazil	0.706	5
Estonia	0.706	5
Germany	0.706	5
India	0.706	5
Japan	0.706	5
Republic of Korea	0.706	5
United Kingdom	0.706	5
Austria	0.676	6
Hungary	0.676	6
Israel	0.676	6
Netherlands	0.676	6
Singapore	0.676	6
Latvia	0.647	7
Sweden	0.647	7
Turkey	0.647	7

World Cyber Security and Defense Index 2014

- Legal Measures
- Technical Measures
- Organizational Measures
- Capacity Building
- Cooperation

Resource:
<http://www.itu.int/en/ITU-D/Cybersecurity/Documents/WP-GCI-101.pdf>



World Cyber Security and Defense Index

2014

2015

(105), (195)

Source:
[http://www.itu.int/en/ITU-D/
Cybersecurity/Documents/
WP-GCI-101.pdf](http://www.itu.int/en/ITU-D/Cybersecurity/Documents/WP-GCI-101.pdf)

Africa

Asia

TR

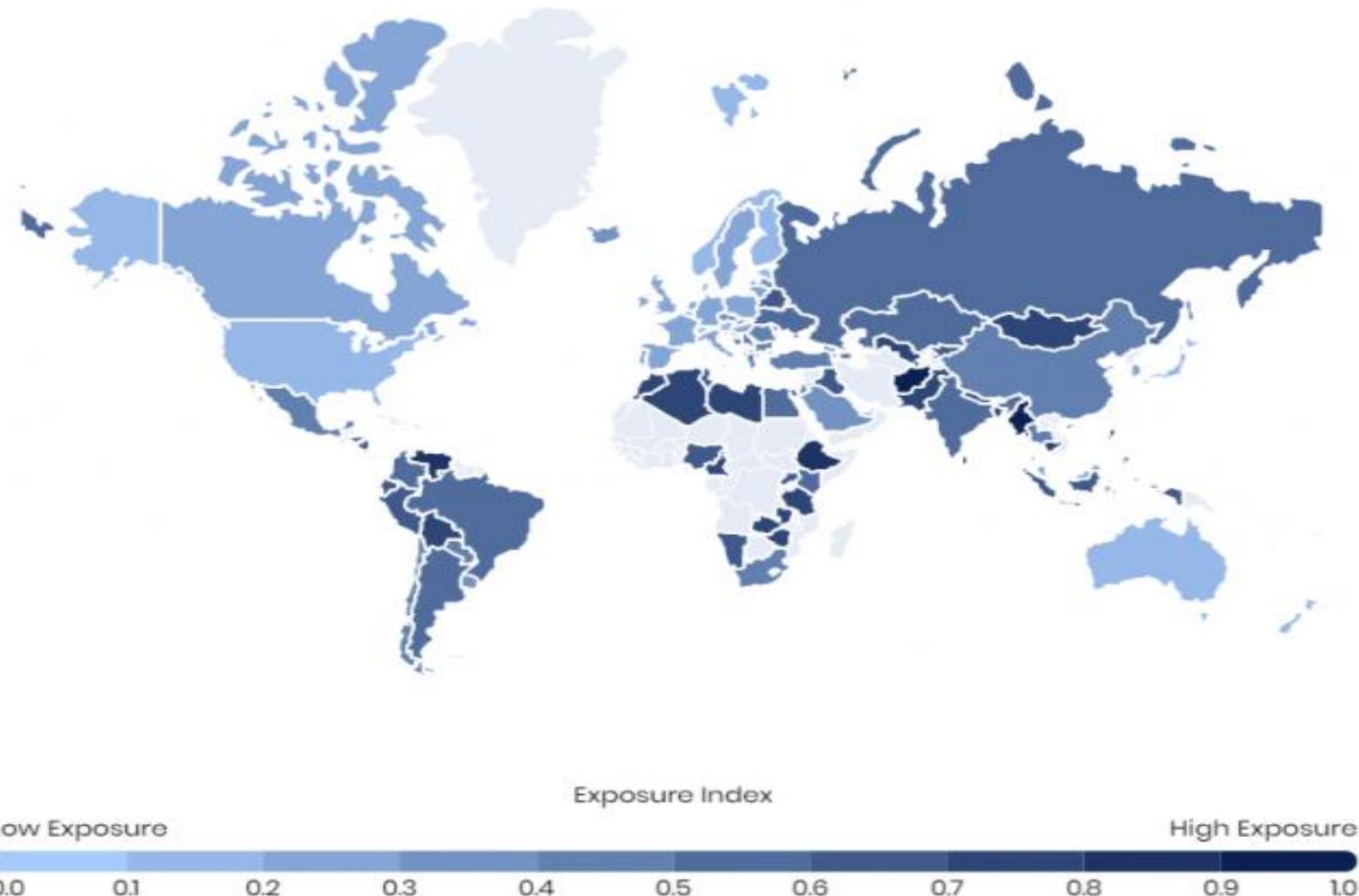
ABD

Global Cybersecurity Exposure Index 2020

From 0 to 1, the Cybersecurity Exposure Index (CEI) calculates the level of exposure to cybercrime by country. The higher the score, the higher the exposure.

Search

Country	Rank	Score
Finland	1	0.110
Denmark	2	0.117
Luxembourg	3	0.124
Australia	4	0.131
Estonia	5	0.134
Norway	5	0.134
Japan	6	0.138
United States	7	0.145
Austria	8	0.162
Switzerland	9	0.172



Share

made with

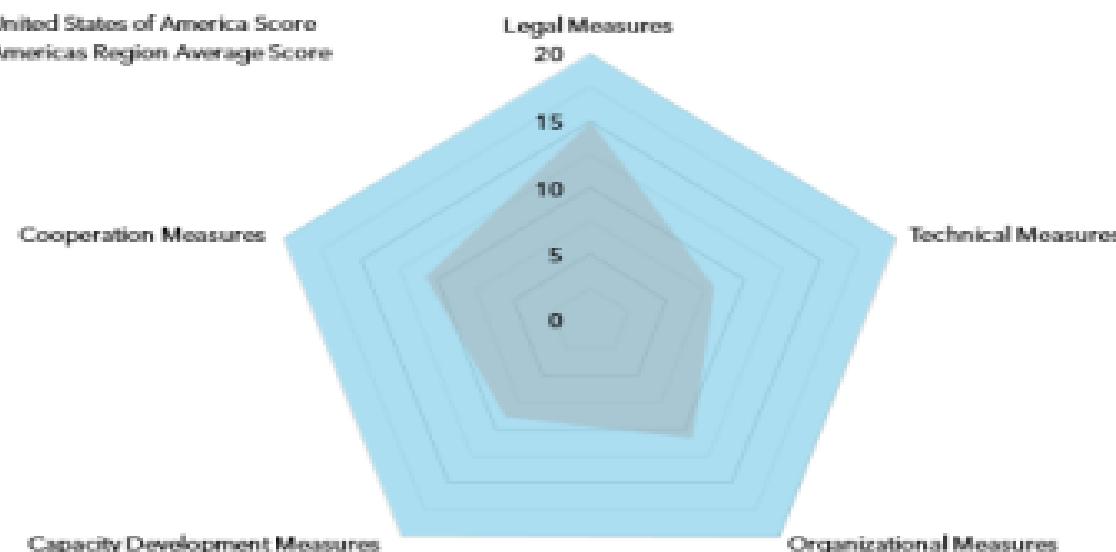
infogram

Global Cybersecurity Index 2024

United States

United States

■ United States of America Score
■ Americas Region Average Score



Country Score

out of maximum 20 points per pillar

Legal Measures	Technical Measures	Organization Measures	Capacity Development	Cooperation Measures
20	20	20	19.86	20

*Countries are classified according to www.iui.int.

GCI 5th Edition Country Performance

Area(s) of Relative Strength

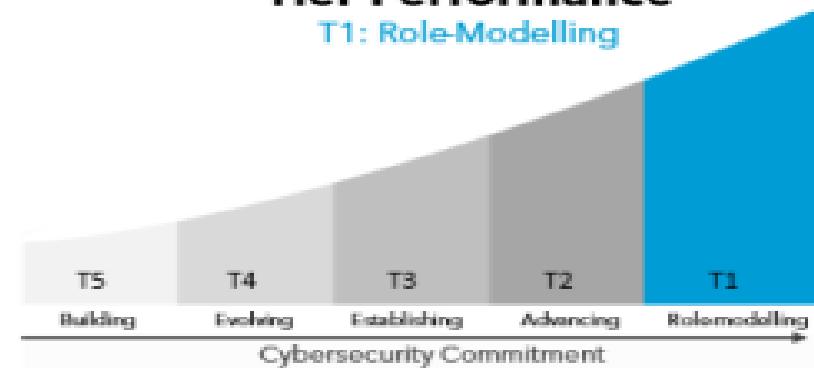
Technical Measures
Organizational Measures
Legal Measures
Cooperation Measures

Area(s) of Potential Growth

Capacity Development Measures

Tier Performance

T1: Role-Modelling



China

ChinaGCI 5th Edition Country Profile

People's Republic of China Score
 Asia Pacific Region Average Score

**Country Score**

out of maximum 20 points per pillar

Legal Measures	Technical Measures	Organization Measures	Capacity Development	Cooperation Measures
20	17.14	18.34	18.46	17.7

Areas of Relative Strength

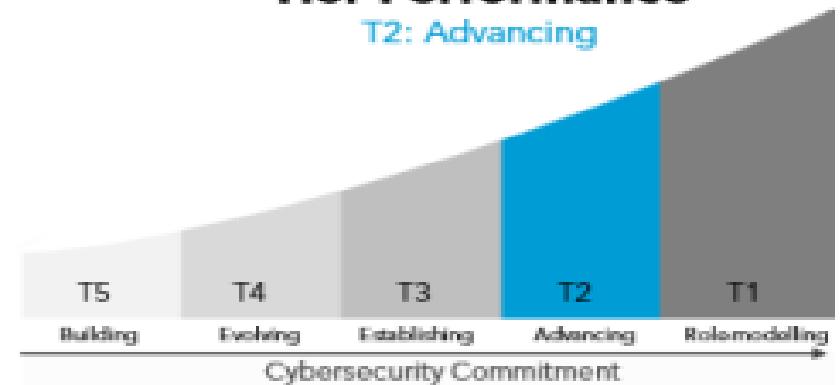
Legal Measures
 Organizational Measures
 Cooperation Measures

Areas of Potential Growth

Technical Measures
 Capacity Development Measures

Tier Performance

T2: Advancing



Türkiye Score
Europe Region Average Score



Country Score

out of maximum 20 points per pillar

Legal Measures	Technical Measures	Organization Measures	Capacity Development	Cooperation Measures
20	20	20	20	20

*Countries are classified according to www.itu.int.

Areas of Relative Strength

Legal Measures
Technical Measures
Organizational Measures
Capacity Development Measures
Cooperation Measures

Tier Performance

T1: Role-modelling



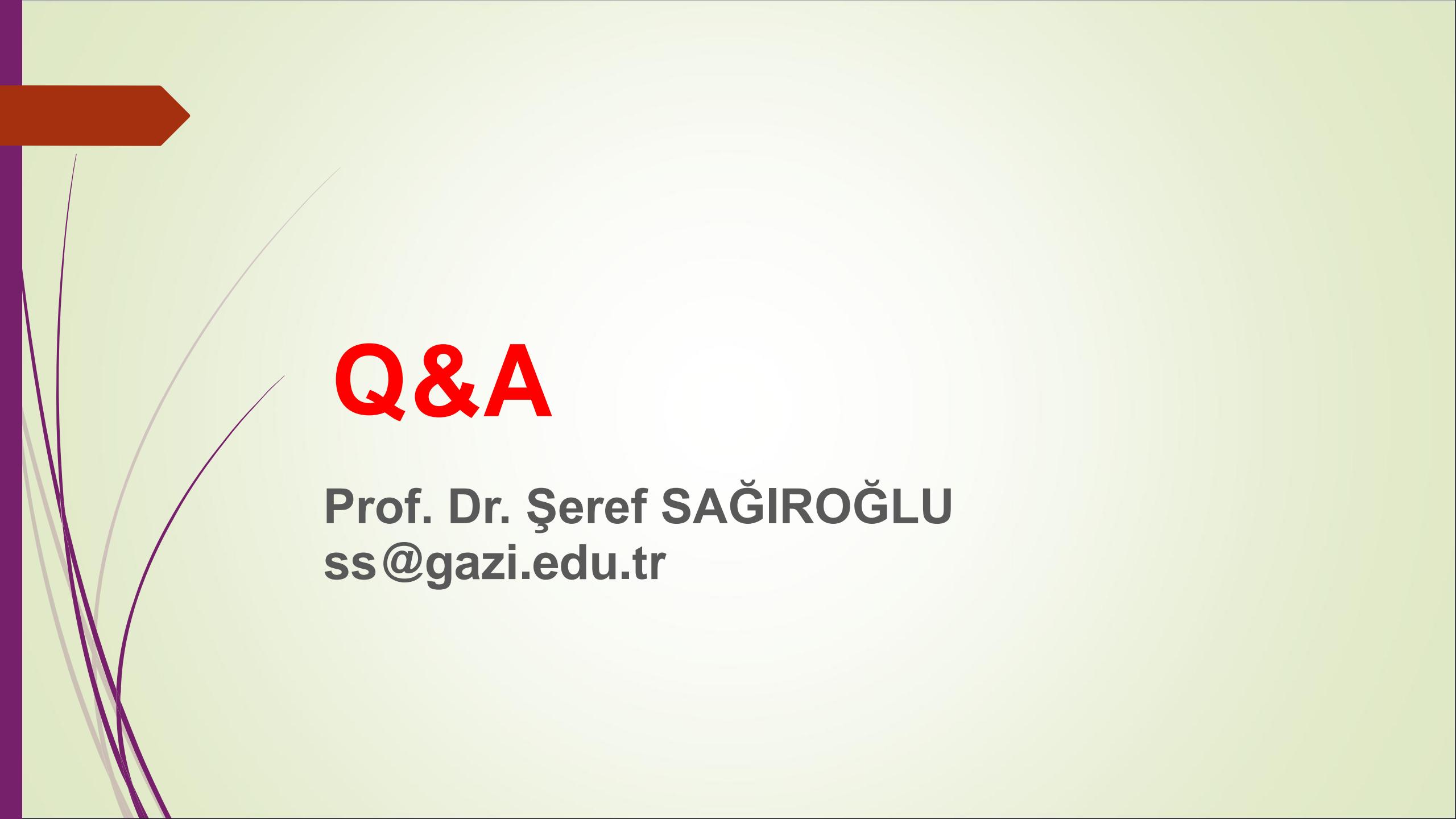
CONCLUSIONS

- Cyber security is a critical research field
 - Technical
 - Social
 - Economical
 - Psychological
- Contains many threats as well as opportunities
 - To establish cyber security ecosystem
 - New challenges
- Indicators, publications, organizations, programs have shown that Cyber Security defense are not bad in theory but **not in practices.**



CONCLUSIONS

- Needs more programs to be established
- Need more research laboratories
- Need more collaborations
- Need sharing good practices
- Need for more experts
- Need more skills in many topics
- ...



Q&A

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ss@gazi.edu.tr