PROTECTING OUR CYBER SPACE
STAYING AHEAD OF THE GAME

BASEL ALOMAIR

NATIONAL CENTER FOR CYBERSECURITY TECHNOLOGY (C4C)
KING ABDULAZIZ CITY FOR SCIENCE AND TECHNOLOGY (KACST)

What is Cybersecurity?

- A very wide-ranging term with no standard definition
- **Cybersecurity** is the science of protecting networks, computers, programs and data from attack, damage or unauthorized access.
- **Cybersecurity** is the availability, integrity and secrecy of information systems and networks in the face of attacks, accidents and failures.
- We can divide it into
  - knowing what to do—science of cybersecurity
  - Knowing how to do—engineering of cybersecurity

Cost of Cyber Attacks

60 M attacks - 164k per day

ITP.net (2015)

Cost of Cyber Attacks

Cost of Cyber Attacks

2.1 Trillion (2019)

JUNIPER

Attacks on the Rise

CERT-IN: India's Cyber Security Agency
Complaints made
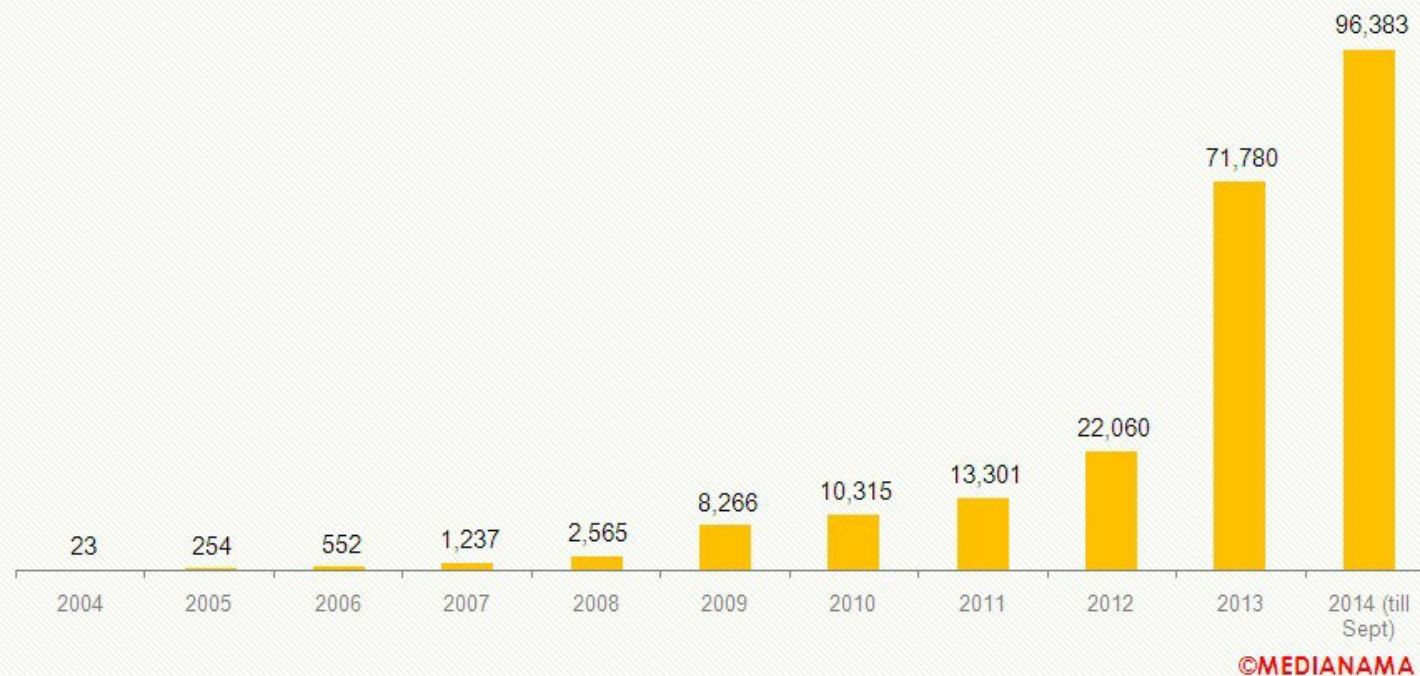
Year	Complaints
2004	23
2005	254
2006	552
2007	1,237
2008	2,565
2009	8,266
2010	10,315
2011	13,301
2012	22,060
2013	71,780
2014 (till Sept)	96,383

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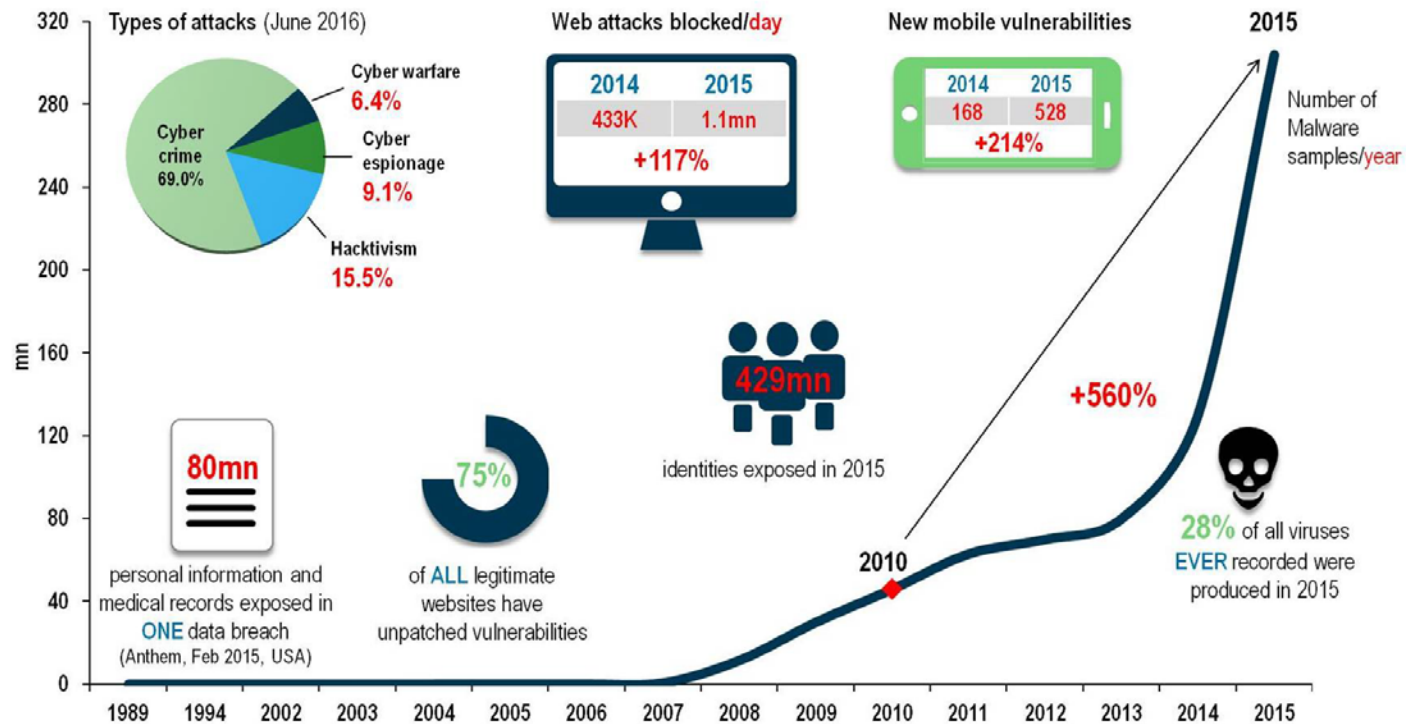
Attacks on the Rise

Attacks on the Rise

18% success rate

26% average cost

Ponemon
INSTITUTE

2015 Cost of Data Breach Study:
Global Analysis

Benchmark research sponsored by IBM
Independently conducted by Ponemon Institute LLC
May 2015

IBM.

Ponemon Institute© Research Report

Cyber Warfare

- Operation Orchard
- Stuxnet worm
- DoD vs. China
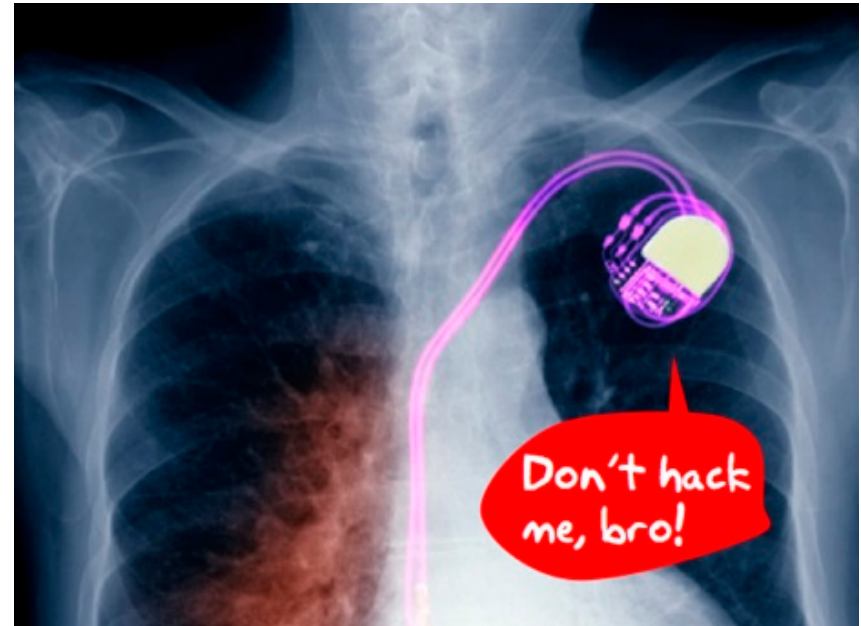- Ukraine power outage
- 120 countries using Internet as a weapon

It's Personal!

- Smart cars are being hacked!

- Pacemakers can also be hacked!
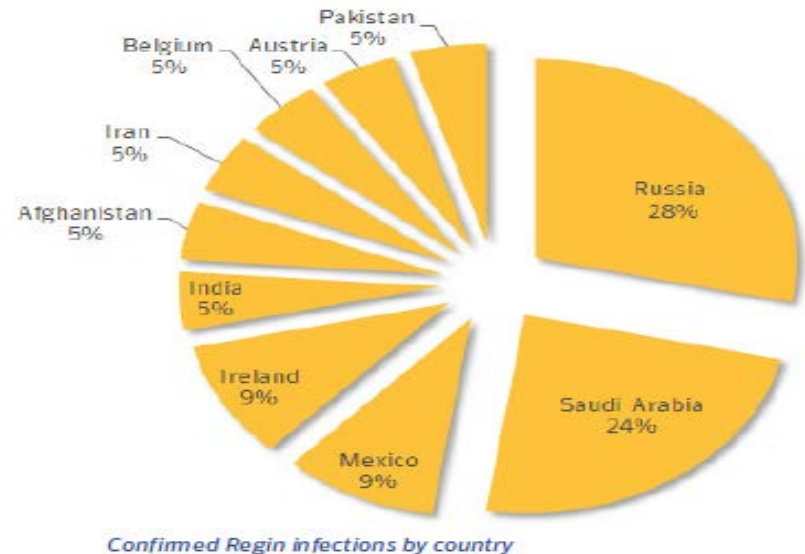
Tip of the Iceberg

Regin

- **Regin** is a multi-purpose data collection tool.
- Multiple versions were found in the wild.
- **Targets:** several corporations, institutions, academics, and individuals

At least since 2008

Confirmed Regin infections by country

Russia 28%
Saudi Arabia 24%
Ireland 9%
Mexico 9%
India 5%
Afghanistan 5%
Iran 5%
Belgium 5%
Austria 5%
Pakistan 5%

Threats

- Any device with an IP is a target
- Nation states have the potential to disrupt an enemy's economy and perhaps reach their strategic objectives without risk to their armed forces
  - "If you want to hit a country severely you hit its power and water supplies. Cyber technology can do this without shooting a single bullet."
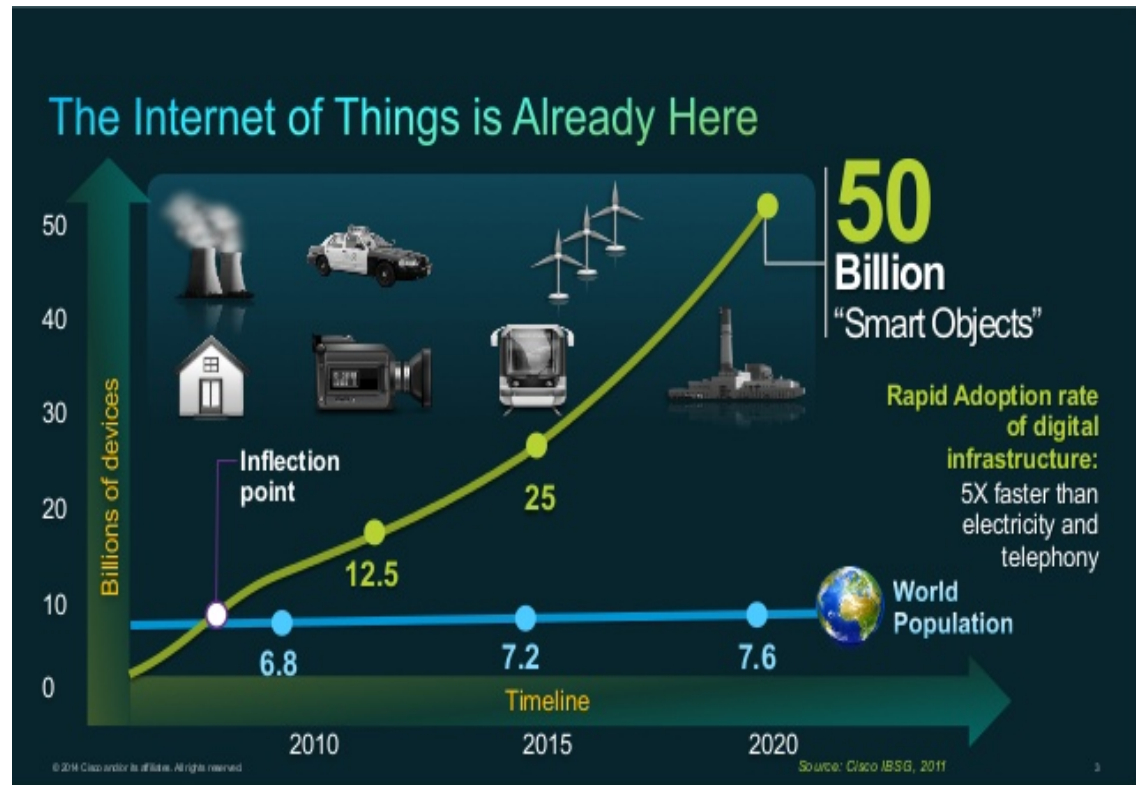   - Isaac Ben-Israel (Major General Israeli Air Force)
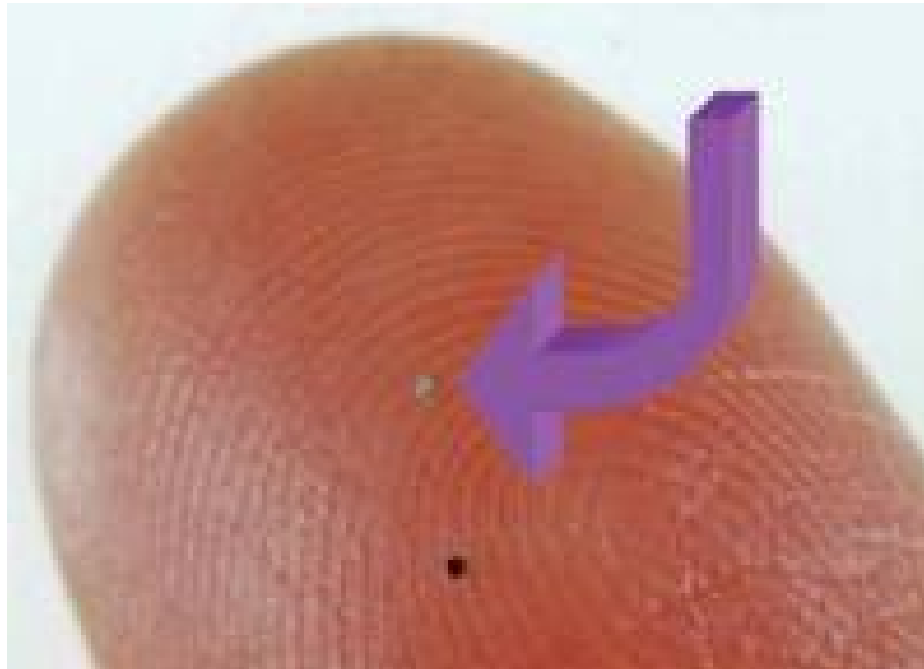
Internet of Things

- Objects and people will be equipped with identifiers

- Managed and inventoried by computers

- CISCO: more than 50 Billion devices by 2020

The Internet of Things is Already Here

50 Billion "Smart Objects"

Rapid Adoption rate of digital infrastructure: 5X faster than electricity and telephony

Inflection point

World Population

Internet of Things

Internet of Things

- Security firm: Global cyberattack was launched from more than 100,000 everyday appliances
- Poorly protected "smart" devices may be easier to infect and control than PC, laptops, or tablets
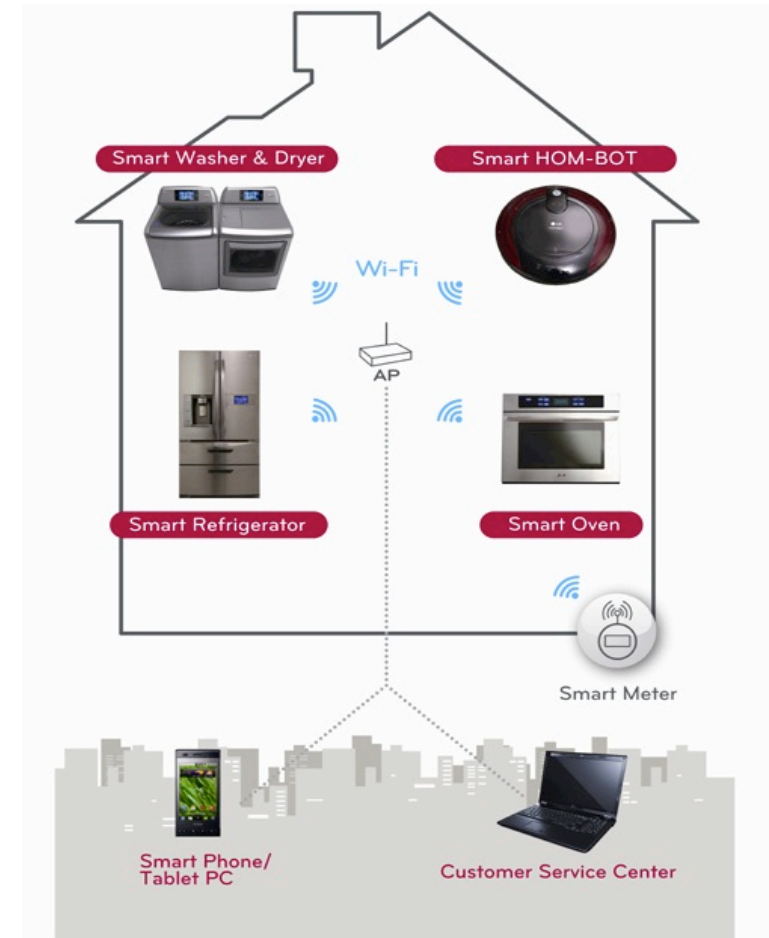
Recent Results

	Speed cycles/byte	Energy consumption µJ/bit
SHA-like	40.18	20-30
Our results*	0.02	0.00026

* Alomair and Poovendran, U.S. Patent 9,166,793, October 20, 2015, entitled EFFICIENT AUTHENTICATION FOR MOBILE AND PERVASIVE COMPUTING, (IEEE Transactions on Mobile Computing).
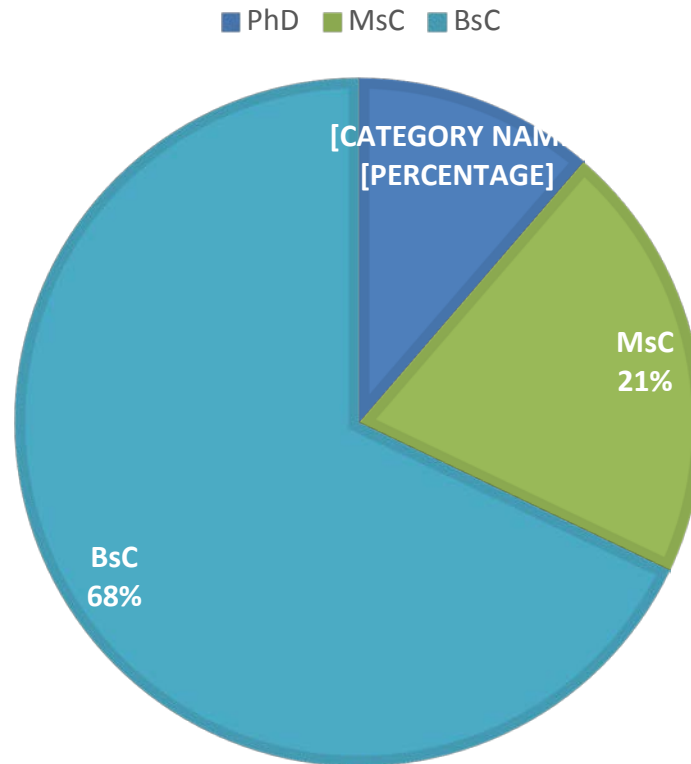
Conclusion

- Cyber threats are increasing
- Attackers are changing strategies continuously
- Must stay ahead of the game
- Research, research, and more research
- INVEST IN PEOPLE

The C4C

PhD: 6
MsC: 11
BsC: 43
Total: 60

Legend: PhD, MsC, BsC

Pie chart values:
- [CATEGORY NAME] [PERCENTAGE]
- MsC 21%
- BsC 68%

Thank You!