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Managing Security Risks In Today's Complex Internet Landscape

Merike Kaeo, CTO Farsight Security
merike@fsi.io

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Goals For Today

- Understand the complexity we are creating
- Knowing the right questions to ask
- Admitting that we all need to take more action
- Working together to reduce risks in our infrastructures

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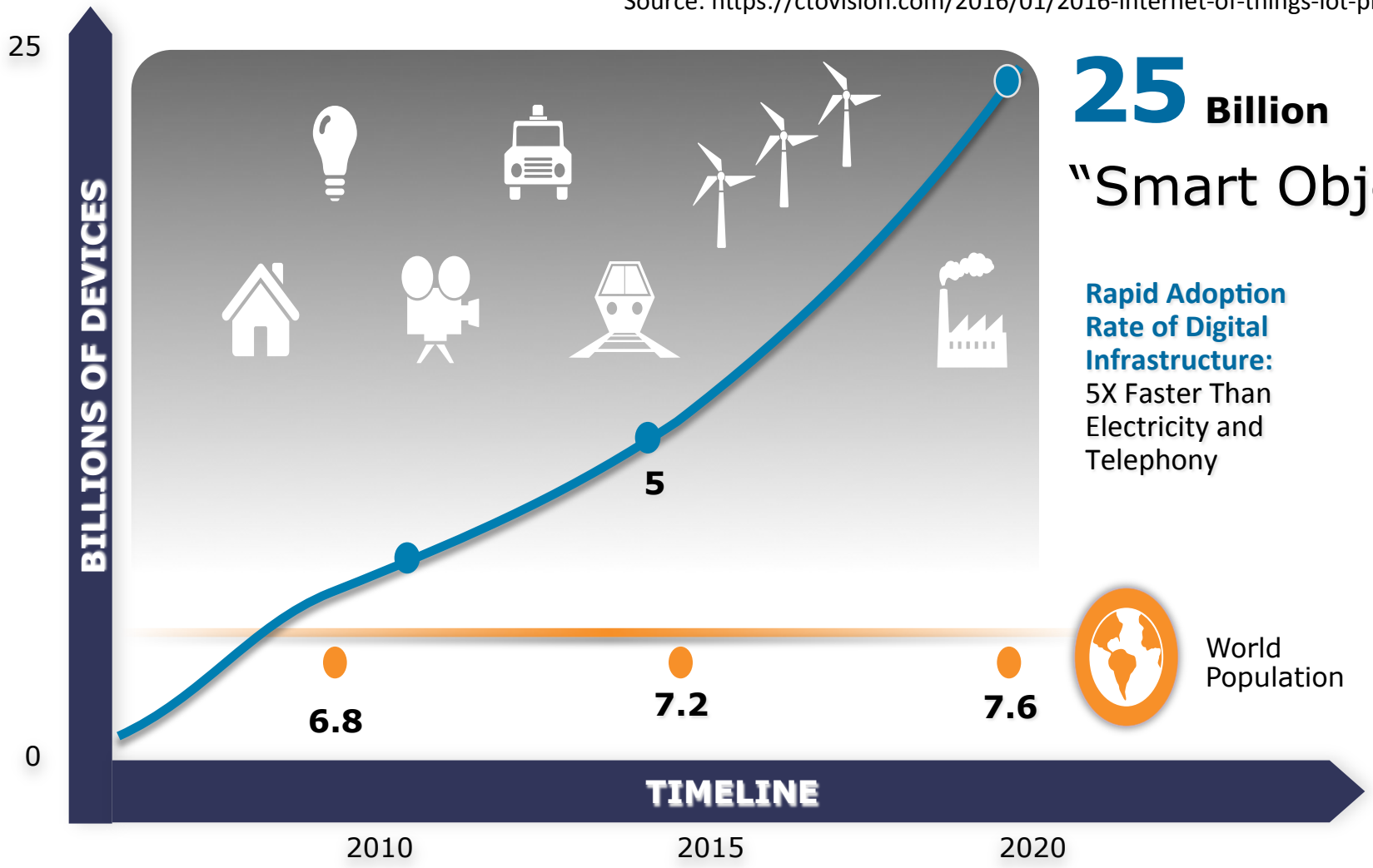
IoT Predictions

Source: https://ctovision.com/2016/01/2016-internet-of-things-iot-predictions/



25 Billion

"Smart Objects"

Rapid Adoption Rate of Digital Infrastructure:
5X Faster Than Electricity and Telephony

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We Are in a Period of Rapid Change

- Intelligent, interconnected devices are continuing to be connected to the global Internet
- Governments, businesses and individuals are moving their resources to the Internet with blind trust
- Data is accumulating faster than it can be organized or protected
- The complexity of the Internet ecosystem creates a rich environment exploitable by activists, criminals, and nation states
- Data will continue be stolen or modified using subtle, persistent, directed attacks

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Current and Future Concerns

- Greater data privacy issues will be exposed
- Implementations will have flaws but no upgrade path
- Security compliance often does NOT translate to realities of operational security
- Security continues to be an exercise in blind trust
  - Vendor implementations
  - Operational deployments
  - Technical standards

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Security Goals

- Controlling Data Access
- Controlling Network Access
- Ensuring Network Availability
- Protecting Information In Transit
- Preventing Intrusions
- Responding To Security Breaches

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Most Common Threats and Attacks

- Unauthorized access
  - Thru insecure hosts or password cracking
- Eavesdropping
  - Looking for passwords, credit card numbers, or business secrets
- Hijacking (i.e. taking over communications)
  - Inspect and modify any data being transmitted
- IP spoofing (i.e. faking network addresses)
  - Impersonate to fool access control mechanisms
  - Redirect connections to a fake server
- DOS attacks
  - Interruption of service due to system destruction or using up all available system resources for the service (CPU, memory, bandwidth)

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Security Controls

- User Authentication / Authorization
- Device Authentication / Authorization
- Access Control (Packet or Route Filtering)
- Data Integrity
- Data Confidentiality
- Auditing / Logging
- DoS Mitigation

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Big Issue: Credential Compromise

- Being victim of a phishing attack
- Laptop gets stolen
- Sharing your password with another person
- Re-using same password on many systems
- Spyware on your computer installed a keylogger
- Storing your private key in an easily accessed file
- Sending credentials in cleartext emails
- Using simple to guess password
- Unpatched security vulnerabilities are exploited

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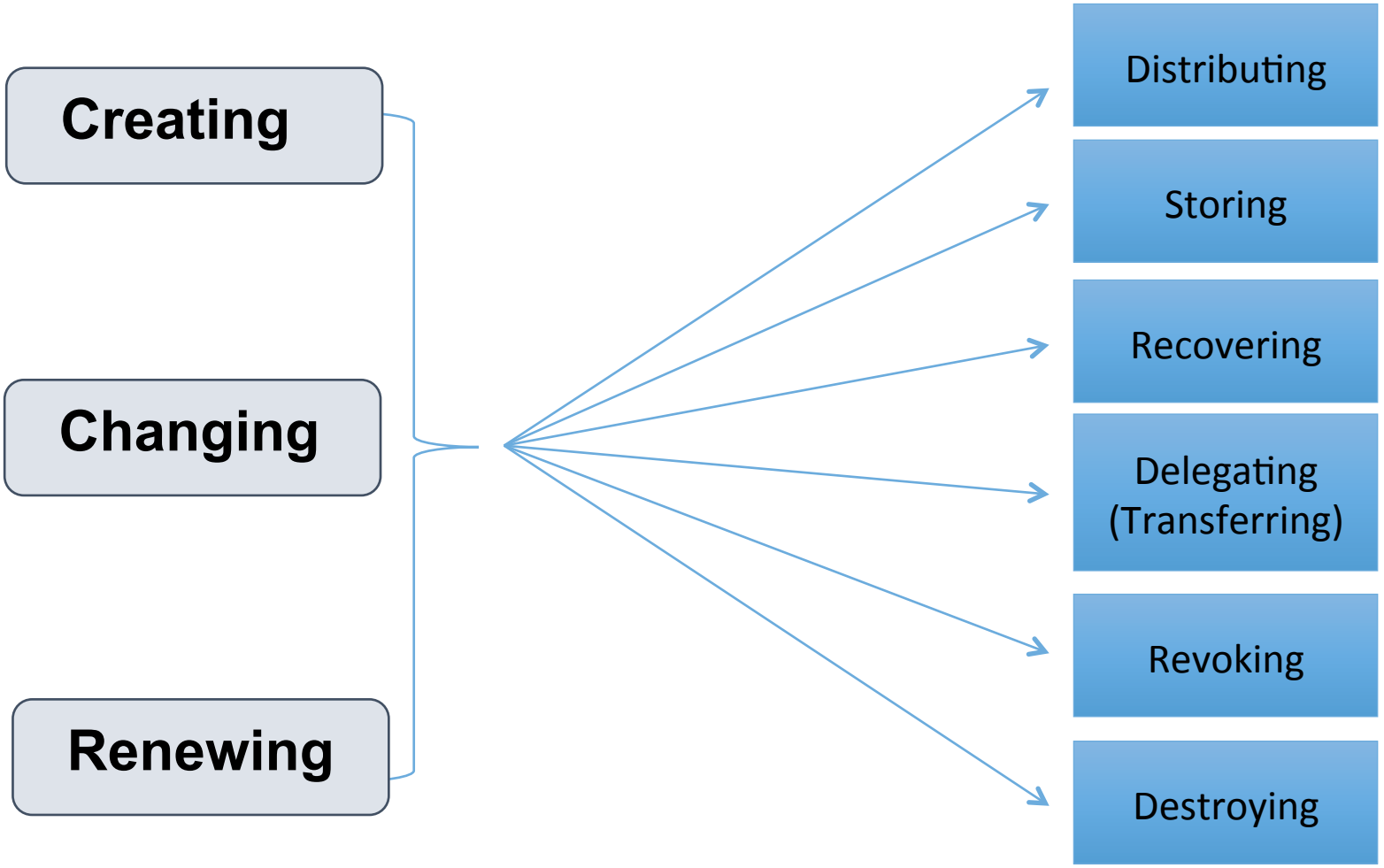
Credential Management Process



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Improving Credential Management

- Know ALL credentials that are utilized in your environment
- Encourage the use of 2-factor authentication
- Create specific process to address ENTIRE credential management lifecycle
- Assess specific risks in your operational procedures and create a plan for improvement

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Keeping Up With Vulnerabilities

- Know Your Operating Systems and Application Versions
  - For TLS/SSL can use publicly available tests
  - https://www.ssllabs.com/ssltest/
- Get On Mailing Lists For Vendor Security Announcements
- Subscribe to National CERT Alert Lists
- Follow Security Industry Blogs
  - http://ccnso.icann.org/resources/cybercrime-resources.htm

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Exploitable Protocols

- IPv6
  - You are using it even if you think you are not
  - It is similar to IPv4 but different
  - Can vendor products detect and protect against attacks and malware utilizing this protocol?
- DNS
  - Do you know where your DNS traffic is going?
  - How would you detect when users going to malware sites?
  - How would you protect from amplification attacks?
  - Do you know how many domains you own?
  - Do you know who your registrar is?

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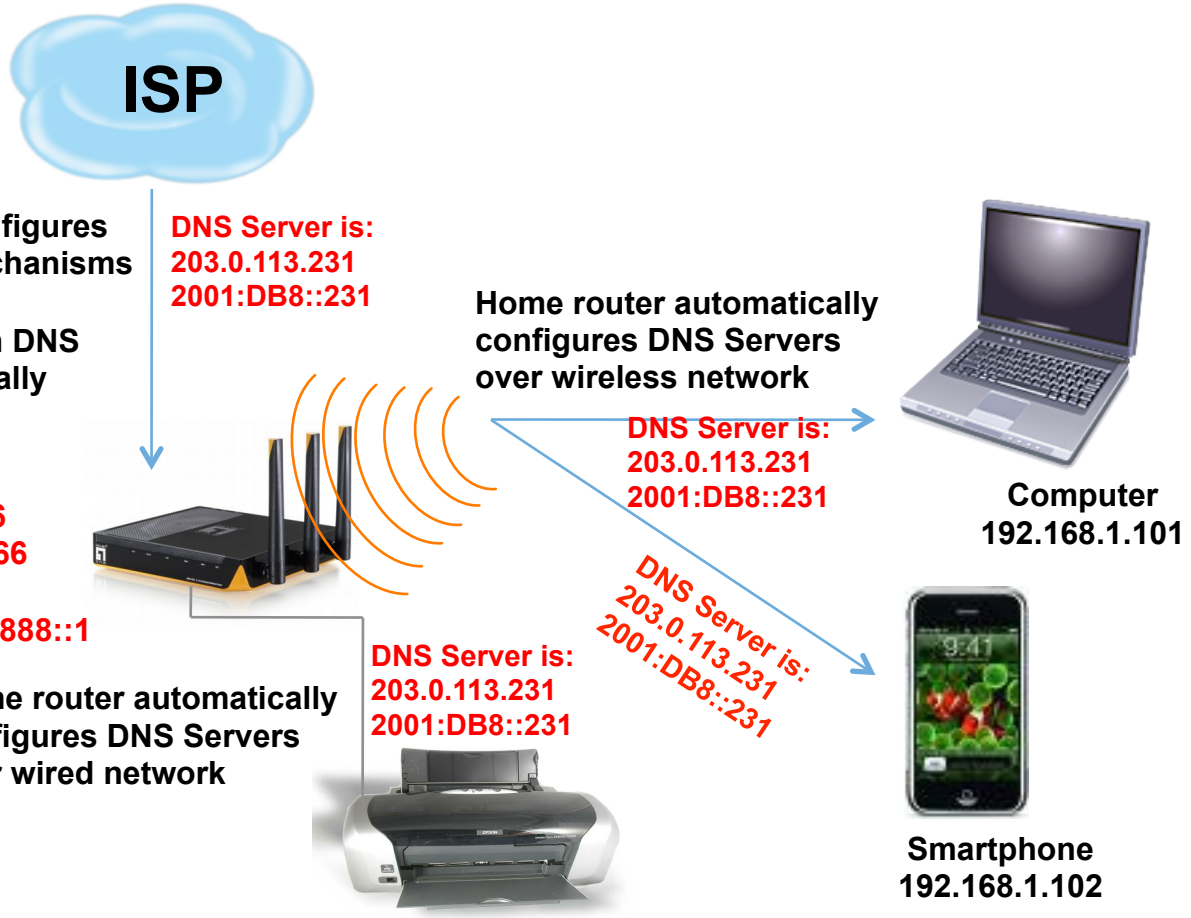
Recursive DNS Server Configurations

- Service provider automatically configures DNS Servers using automated mechanisms
  OR
- Service provider provides you with DNS Server IP addresses that get statically configured



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DNS Amplification Attack Example

Compromised User Devices

Recursive DNS Servers send legitimate questions to authoritative servers

Recursive DNS Servers

1

Forged information is used to make it look like intended victim sent legitimate questions to Recursive DNS Servers.

2

3

Authoritative servers send back legitimate replies

4

Legitimate responses from Recursive DNS Servers create large DDoS attack to victim.

Authoritative DNS Servers

Victim

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Some DNS Statistics

278 Million *Current Domain Names*

100+ Million *ccTLD Domains*

10+ Billion *Current Hostnames*

Questions That Can Be Answered Using Passive DNS

- Where did this domain name point to in the past?
- What domain names are hosted by a given nameserver?
- What domain names point into a given IP network?
- What subdomains exist below a certain domain name?
- What new names are hosted in ccTLDs?

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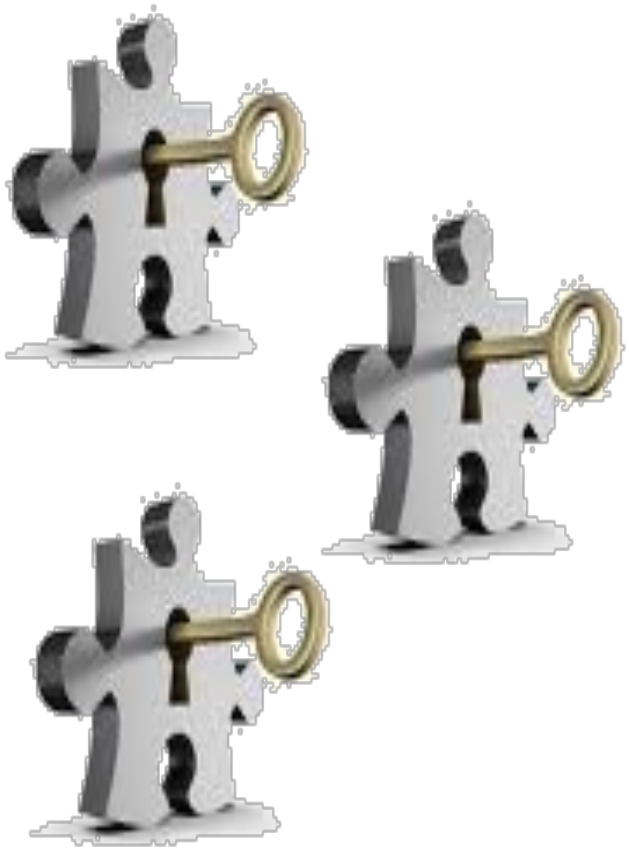
Sharing Security Related Data

- Everyone knows sharing is fundamentally good
- Many discussions around ***wanting*** to share
- Government, private sector and public sector alliance efforts have been ongoing
- Most issues relate to liability concerns and regulatory environments
- More action is needed



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Criminals Really Good At Sharing

- Websites advertise Botnets and Malware for hire
- Vulnerabilities and Exploits are traded on an 'open market'
- There are no enforceable rules for NOT sharing
- Utilizing social media is making sharing much more efficient

Choose Custom Botnet
- Number of Hosts
- Geographic Region
- Bandwidth
- Duration
- etc

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We Also Need To Start Sharing

- Initial Step – Build Trust Thru Networking
- Start by sharing for specific use cases that don't impact privacy and personally identifiable information (PII)
  - SSH Brute Force Attack
  - DNS/SNMP/NTP Amplification Attack
  - Passive DNS Information
- Investigate how to share data that may impact privacy/PII and what can be anonymised but still be useful
  - SPAM / Phishing details

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Do You Have A CIRT ?

- You should have a Computer Incident Response Team established
  - Who is part of this?
  - What are their responsibilities?
- Important – define a single individual to be in charge of final decisions (also have a backup for this individual)
- Know who you need to contact
  - Legal / regulatory responsibility
  - Upstream ISPs who may help filter on DDoS attacks
  - Impacted individuals

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Concluding Thoughts

- Business Risk Tolerance Weighs Into Security Decisions
- Play An Active Role In Managing Security Controls
  - Cannot hand off all security liability to cloud providers
- Perform Basic Security Hygiene
  - Create Effective Credential Management Processes
  - Restrict Access to Applications, Hosts and Network Segments
  - Perform Regularly Scheduled Firmware / Software Upgrades
  - Disable Unused Applications and Services
  - Configure Logging with Regularly Scheduled Log Reviews
  - Use Cryptographic Protection to Transfer and Store Data