X-Force Red – OT Scary Stories

Agenda

- About XFR
- Security challenges in OT/SCADA environment
- Our approach
- Stories:
  - Major energy company
  - Major airport
  - Utility provider

About IBM X-Force Red

IBM elite team of hackers

Regular speakers at conferences

Dedicated to delivering offensive security testing

People with many years of global experience delivering projects for customers of all profiles

Our delivery results are driven by the creativity and qualifications of our experts, combined with methodical approach & cutting edge tools

CREATIVE METHODOLOGIES

Creative approach to security assessment
- Thinking outside of the box
- Understanding the architecture and design of the solution first

Rational method of automated testing
- Proper use of existing tools
- Creating own tools and scripts tailored to a particular scenario

Choosing the right domain to focus on
- Source code and dynamic testing
- Device platform testing

Collaborative team management
- Division of responsibilities, yet interchangeable skill-sets
- Dynamic testing and source review members collaborate to uncover and verify security issues

TEAM SKILLS & QUALIFICATIONS

PENTESTING
- **EC-Council** Certified Ethical Hacker
- **SANS** Advanced Penetration Testing - GXPN
- **SANS** Certified Web Application Penetration Tester (GWAPT)
- Offensive Security Certified Expert (OSCE)
- Offensive Security Certified Professional (OSCP)

INCIDENT RESPONSE/FORENSICS
- **EC-Council** Certified Hacker Forensic Investigator
- **GREM** GIAC Reverse engineering malware

SEMI-EMBEDDED SCADA-SPECIFIC
- **IACRB** Certified SCADA Security Architect

INFORMATION SECURITY AND RISK MANAGEMNT
- **ISC2** Certified Information Systems Security Professionals (CISSP)
- **ISACA** Certified Information security manager (CISM)

GIAC · IACRB Information Assurance Certification Review Board · C|EH Certified Ethical Hacker

What IT Security is about?
- Today's security drivers

OT Security Challenges

Complex environment

- Various integrated technologies operated by different vendors
- Attack surface mostly unknown

Lack of asset inventory

- Which systems, applications and other assets do they have?
- Which assets matter most?

Fragile and critical systems

- Many systems can become unstable if not tested properly

Custom and specific systems

- Often the technology is custom and not publicly known.
- Requires a specific skillset and test strategy

X-Force Red Penetration Testing Services

"Criminal-minded" testing to uncover vulnerabilities

Virtual and on-site manual testing

Ad-hoc testing or subscription services

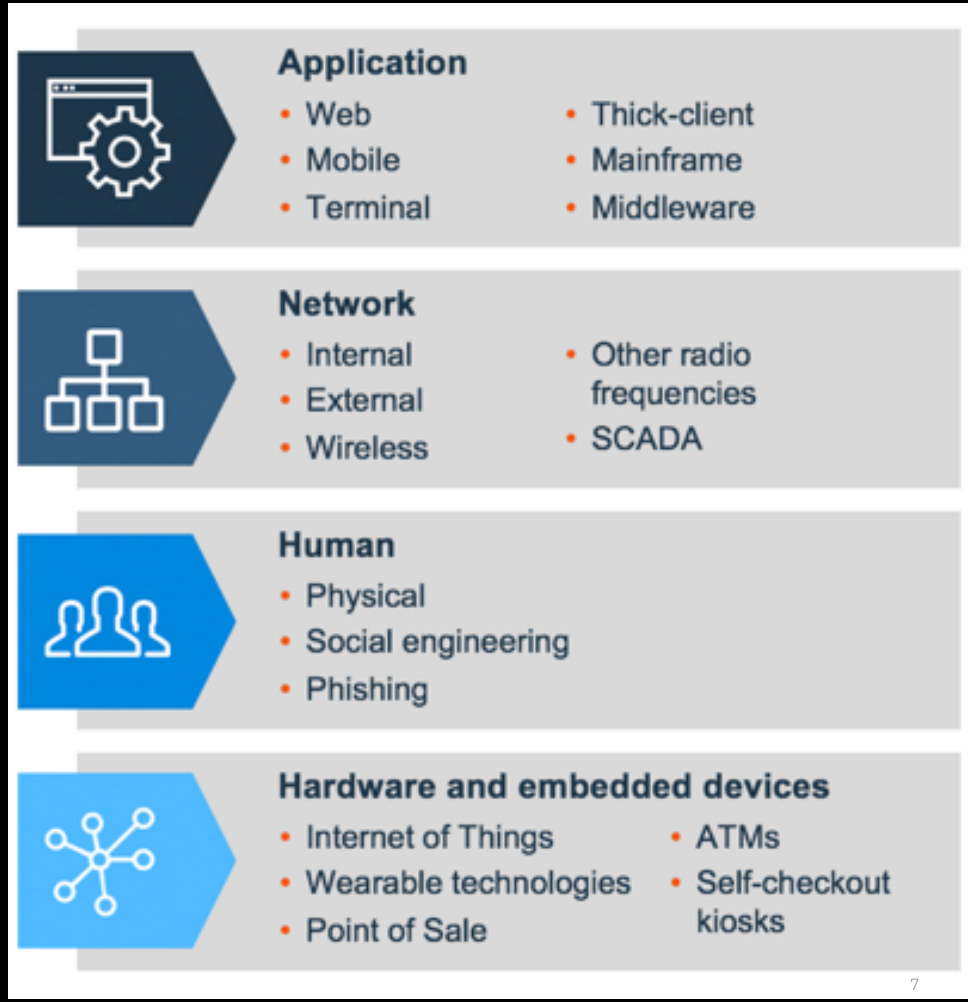
Managed program prioritizes which assets need testing

"Red Labs" IoT, IIoT, OT testing during design and beyond

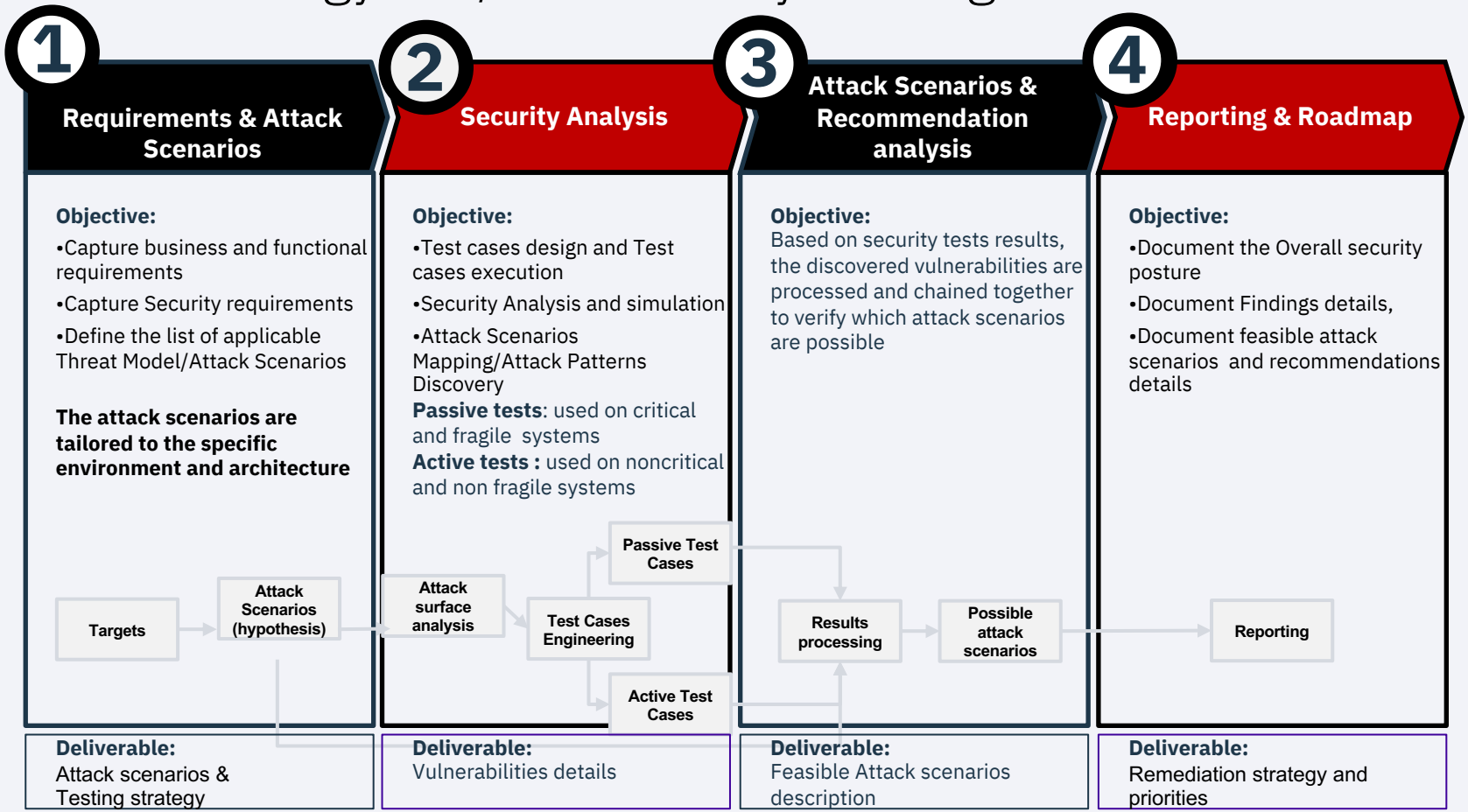
Testing covers various possibilities for intrusion

- External Threat
- Insider
- Malicious User or Customer
- Hacktivist

Report findings of what we tried and what we found



Methodology: OT/ICS Security Testing



OT Assessment Story: A Major Power Company

Business Challenge:

- The customer wanted IBM to test the security of their Smart Gateway devices prior to the roll out to customers to ensure that they were secure from attackers and customer tampering.

What We Did:

- As this was an embedded device we used a different approach than for a typical penetration test. We used our embedded/mobile device test framework that we developed.
- Many critical vulnerabilities found which could lead to device, billing and backend system exploitation. This included root access to the device itself, passwords and customer data being sent over the Internet as clear text (un-encrypted), etc.

Benefits:

- Customer was very pleased and extremely surprised by just how quickly and completely we had compromised the device and exposed serious flaws in it.
- We supplied the customer with a very detailed report and a set of recommendation to assist them in securing the device and data in transit.

IBM tested the embedded device at the lowest possible level, using our embedded/mobile device test framework to identify security flaws in the OS, PCB and data transfer which could have led to the devices being compromised by an attacker or data modified by a customer.

OT Assessment Story: An International Airport

Business Challenge:

- The airport wanted IBM to test the security of their baggage handling systems including SCADA and ICS.

What We Did:

- Wireless networks connected to baggage infrastructure network were found in public areas of airport and used as an entry point.
- Exploting multiple vulnerabilities discovered in systems it was possible to gain full control of Active Directory, all systems and applications, including direct access to PLC devices and manipulating registers on them
- It would give attacker possibility to even impact X-ray machines used to scan content of baggage, making possible to pass dangerous materials inside a plane!

Benefits:

- The customer was given recommendations about how to implement remediation measures which would enhance security posture and protect this critical infrastructure from unathorized access.

IBM discovered wireless networks connected to critical baggage manipulation systems. These system having multiple vulnerabilities could give the ability for attacker to manipulate baggage controls leading to the possibility of loading dangerous materials and devices into a plane, which could have dire consequences!

OT Assessment Story: Utility Middle East

Business Challenge:

- The company wanted IBM to test if it was possible to reach the internal SCADA networks from the internet, using a spear phishing attack via e-mail. The company wanted to target the technical staff specifically.

What We Did:

- The client had a highly secure mail filtering system, efficiently preventing any e-mail attacks generated from any of the standard frameworks, freely available to, and in use by, hackers on the Internet.
- IBM instead designed the malicious mail-campaign, using a manual approach, tailored to circumvent the very restrictive filtering mechanism, that allowed the campaign to go through to the intended targets inside the organization.
- Once the campaign went through, a large percentage of the staff were tricked into giving up their intranet credentials (and full mailbox access through an insecure webmail) and several staff members were lured into installing a backdoor on their workstation, allowing IBM full access to the intranet from the outside, by pivoting off of the compromised workstations. This access included staff documents, sensitive fileshares and access to SCADA Web interfaces.

Benefits:

- The customer learned, that while their mail filter was efficient, they should not rely on technology alone.
- Hackers often choose to go for the „human element“ and the customer was advised to work on security awareness campaigns and education, to strengthen the staff appreciation of the importance of Security.

IBM showed, that using the human element as an attack vector, it was possible to circumvent system security. By not using common frameworks, but instead creating specific tools to generate the e-mail campaign and the backdoor payload, IBM demonstrated that a determined hacker can get around filters and antivirus deployed in an organization

Thank you

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