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2nd ENISA eHealth Cyber Security workshop, Vienna, Austria 2016

MEDICAL DEVICE SECURITY



CENSUS
IT Security Works

ABOUT CENSUS S.A.

- We provide IT security assessment services to customers worldwide
- Recent medical projects include:
 - Assessments of smart medical devices
 - Assessments of DICOM software components
 - Penetration tests to clinics
 - Assessment of platform for the exchange of medical data



“SMART” MEDICAL DEVICE CHARACTERISTICS

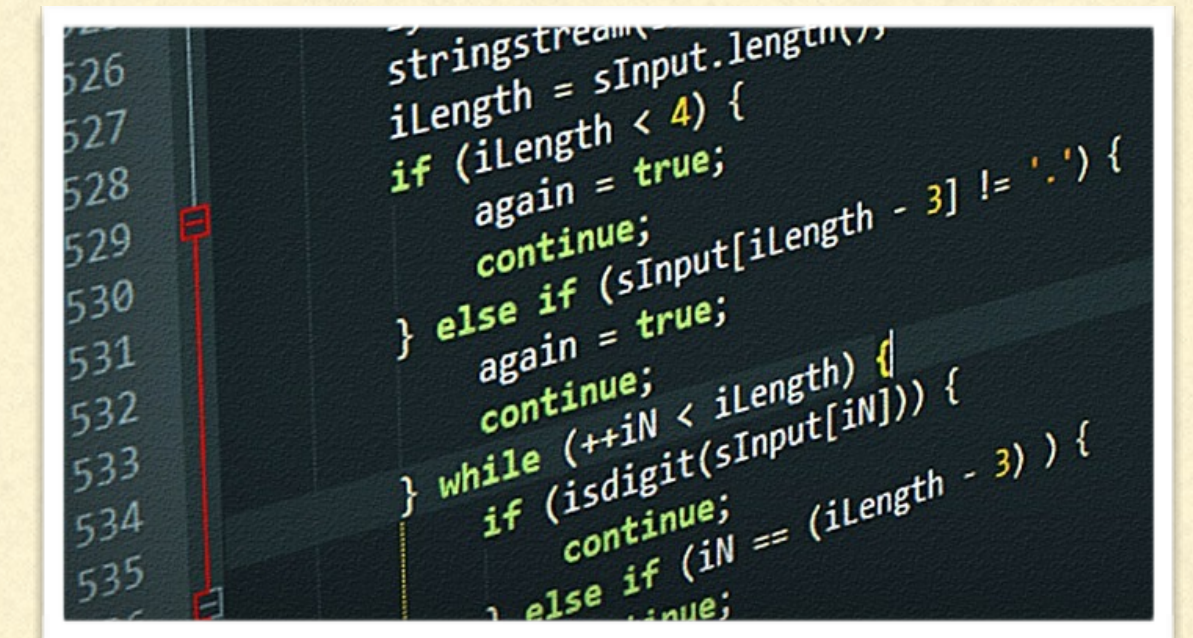
- Communication-enabled medical devices (Internet of Medical Things) capable of interacting with Medical Information Systems
- Remote monitoring and management capabilities
- Firmware update capabilities
- Sometimes require a separate “gateway” device for communication with vendor / clinic



Examples of smart devices

TYPICAL ISSUES

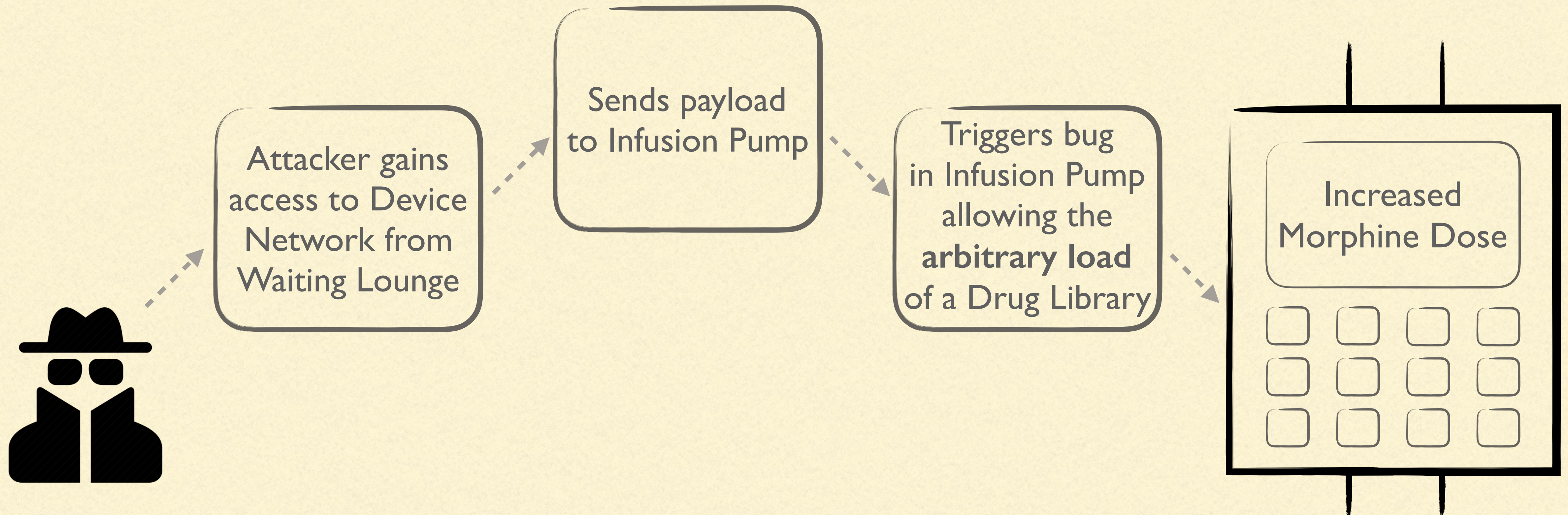
- Security defects in the device software
 - may allow an unauthorised entity to **control** the device and **collect / tamper** device data
- Insecure setup (flat network, default passwords etc.)
 - may allow an unauthorised entity to gain **remote access** to the device (sometimes from any point in the hospital network)



```
526   stringstream  
527   ilength = sInput.length();  
528   if (ilength < 4) {  
529     again = true;  
530     continue;  
531   } else if (sInput[ilength - 3] != '.') {  
532     again = true;  
533     continue;  
534   } while (++iN < ilength) {  
535     if (isdigit(sInput[iN])) {  
       continue;  
     } else if (iN == (ilength - 3)) {  
       continue;  
     }  
   }  
}
```



EXAMPLE ATTACK SCENARIO



THE RISKS

- Casualties
- Severe degradation of services
 - e.g. destruction of blood stock
- Clinical data theft and disclosure
- Financial and reputation impact



BUT WHO WOULD EXPLOIT THESE?

- A terrorist ?
- A nation-state actor ?
- A thief ?
- Someone working for a competitor (or an insurance company or ...) ?
- An insider ?
- Does it matter ?



MAJOR CHALLENGES

- At minimum, vendors will meet the security requirements set by certification bodies
- Doctors prefer to work with certain equipment based on non-technical factors
- A security patch may take a VERY LONG time to be prepared and rolled out
- Medical devices are not treated as critical infrastructure
 - Insecure setup and use
 - Vulnerability exploitation may go unnoticed

THE WAY FORWARD

- Governance
 - We need **information security officers** (not just IT officers) in medical institutions
- Awareness
 - Regular **security awareness training** for staff

THE WAY FORWARD

- Security Architecture for Medical Device setups
 - **Control** physical, network and service access
 - **Audit** interactions (tie to per-user accounts, no common / default credentials)
 - **Protect** data storage and transmission

THE WAY FORWARD

- Medical Devices need to pass three levels of Security Assessments prior to use



THE WAY FORWARD

- Product Security Checks
 - make sure that **the Vendor has taken security into consideration** during all phases of product development
- Model Security Assessment
 - makes sure that a **certified product meets security standards** and ships with mitigations for all identified vulnerabilities (or at least the significant ones)
- Setup Security Assessment
 - makes sure that the **setup of a particular device** is in accordance with the **organisation's security policy**

THE WAY FORWARD

- Openness
 - Information about critical security defects **must be disseminated** to all stakeholders
 - Third parties **must be allowed** to conduct security research on medical devices

QUESTIONS?

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Thank You!



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