

Internet of Things (IoT) in the context of Critical Infrastructures

Roma, 26 ottobre 2020

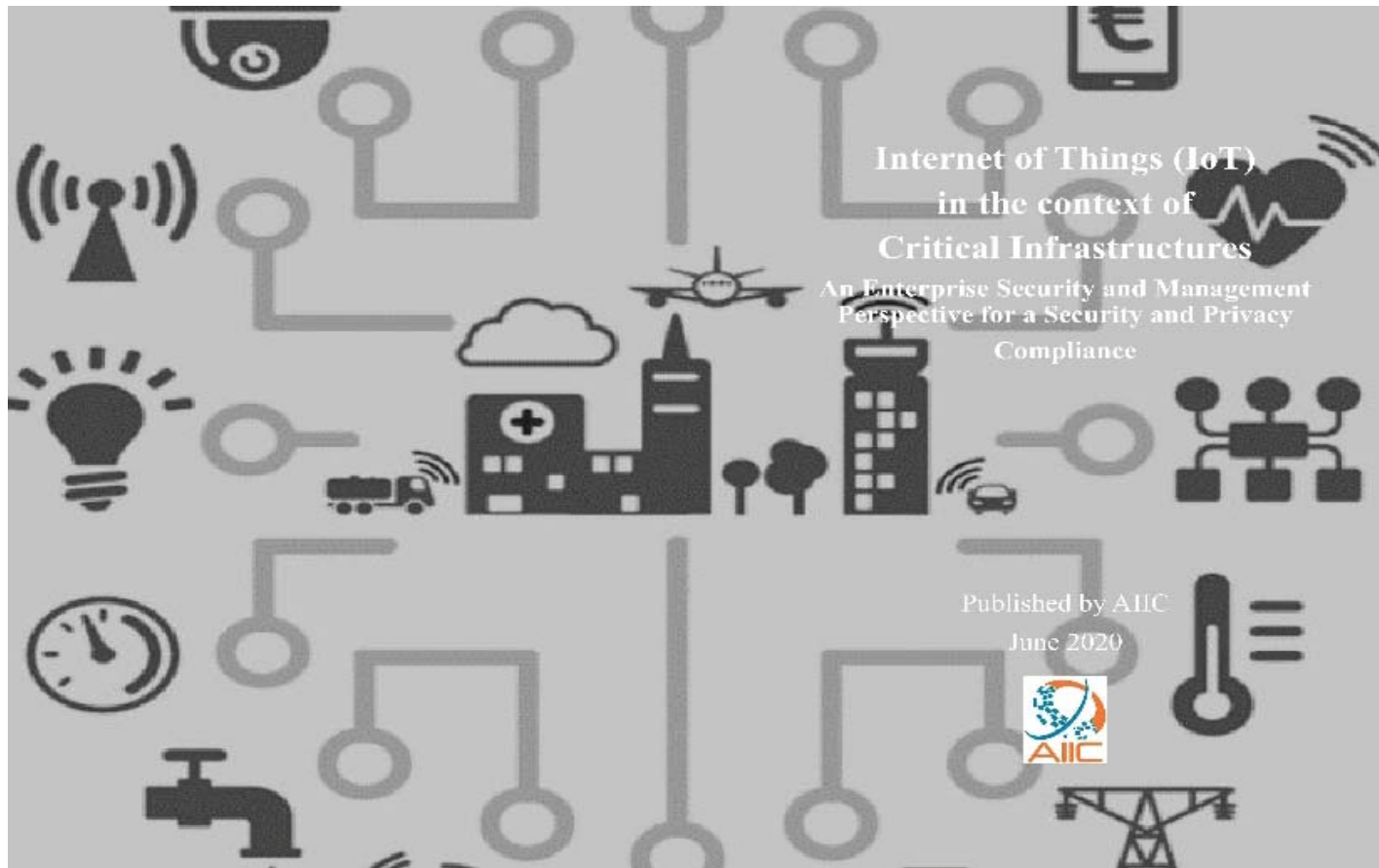
Architettura di un Sistema IoT – *Sandro Bologna*

Sicurezza dei Sistemi IoT – *Glauco Bertocchi, Alberto Traballesi*

Protezione Dati Personali nei Sistemi IoT – *Luigi Carrozzi*

Scenari di Attacco ai Sistemi IoT – *A. Socal, F. Ressa, L. Franchina*

Applicazione dei Sistemi IoT nel Mondo Ospedaliero – *Silvano Bari*





Silvano Bari



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Key questions addressed by the Report

What are the main components composing an IoT?

What are the main vulnerabilities?

What are the peculiarities of IoT security?

What are the main security issues?

What are the main privacy issues?

How is the problem being tackled at Standards level?

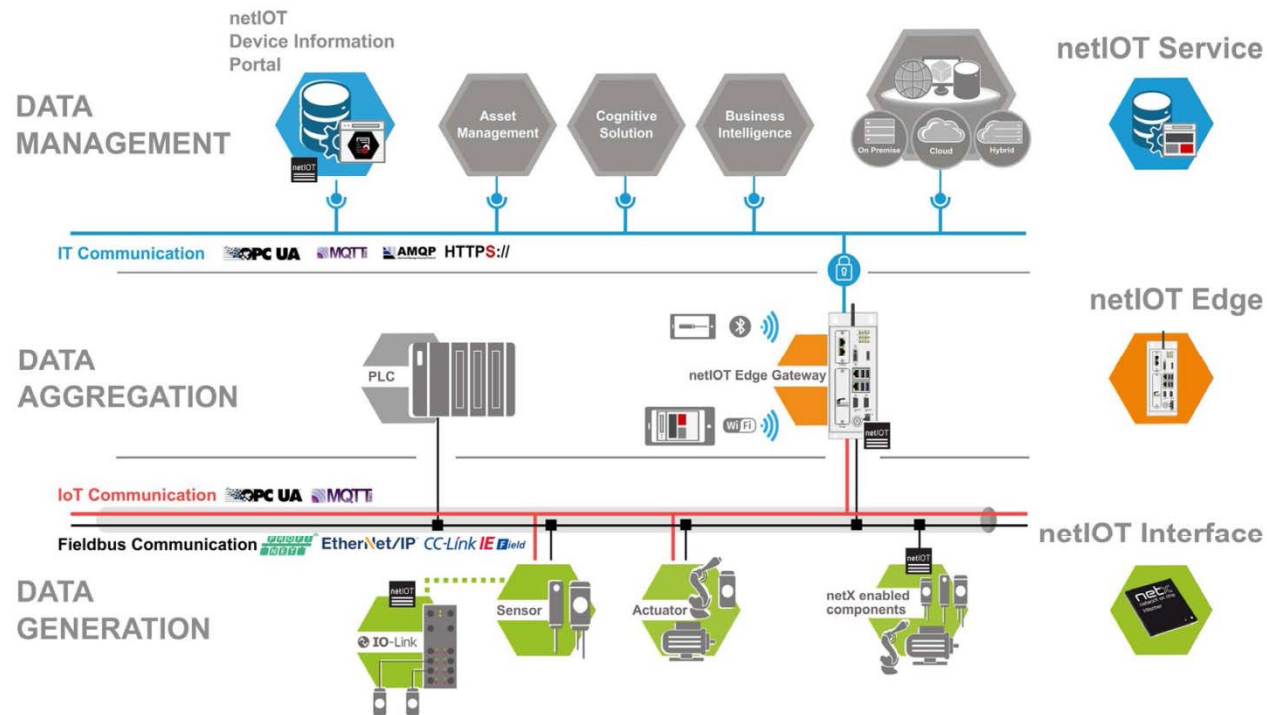
What strategies can a Company adopt to mitigate them?



THERE IS NO PERIMETER IN IoT



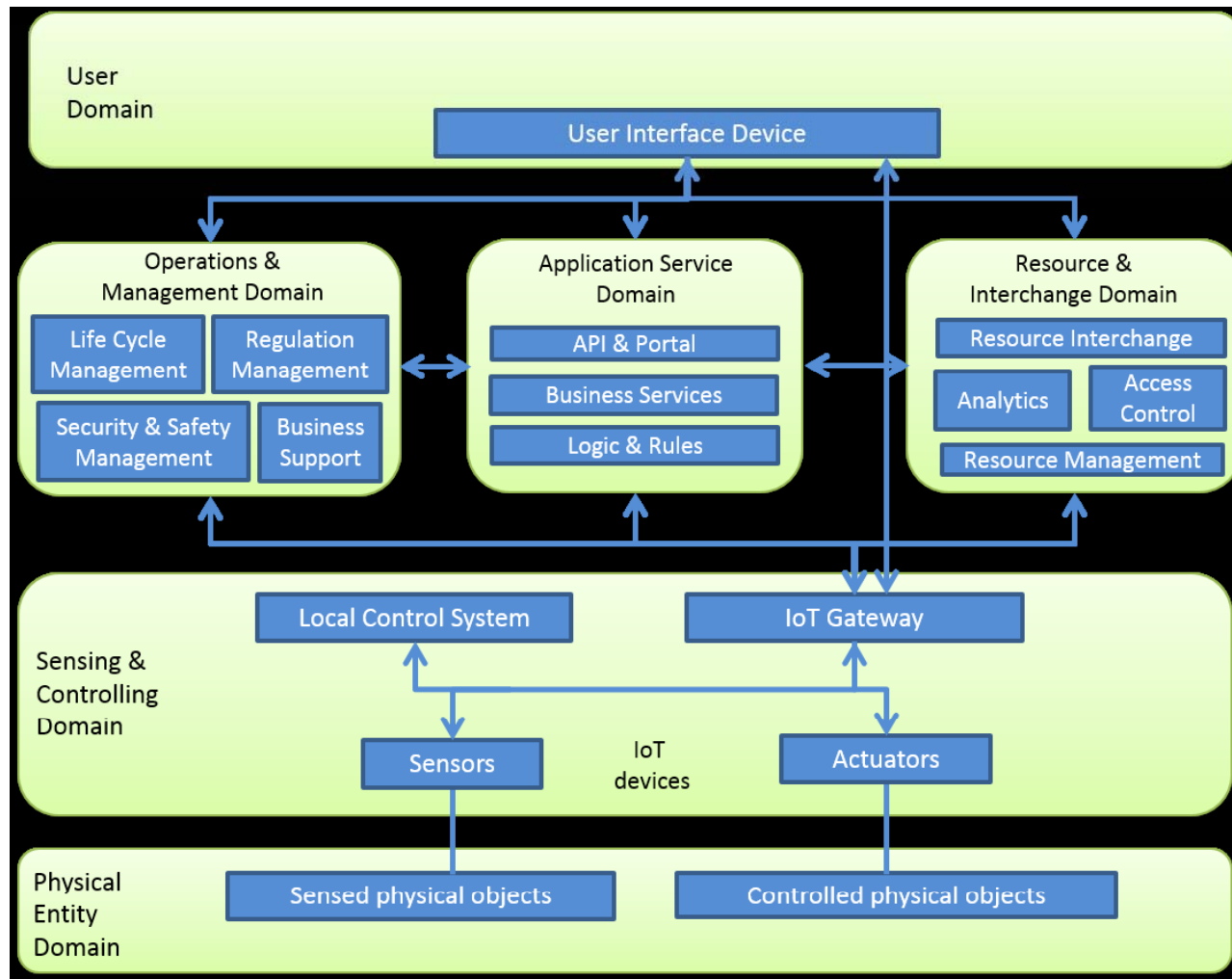
WHAT IS IoT?



Elements of IoT

(Source - Make Way for IIoT: Solving Automation's Unique Challenge – Advancing Automation eBook, Vol. XVIII, July 2019, pag.39)

IoT Reference Architecture



ISO/IEC CD 30141 IoT Reference Architecture (IoT RA)
(Source SerIoT Project deliverable D1.2)

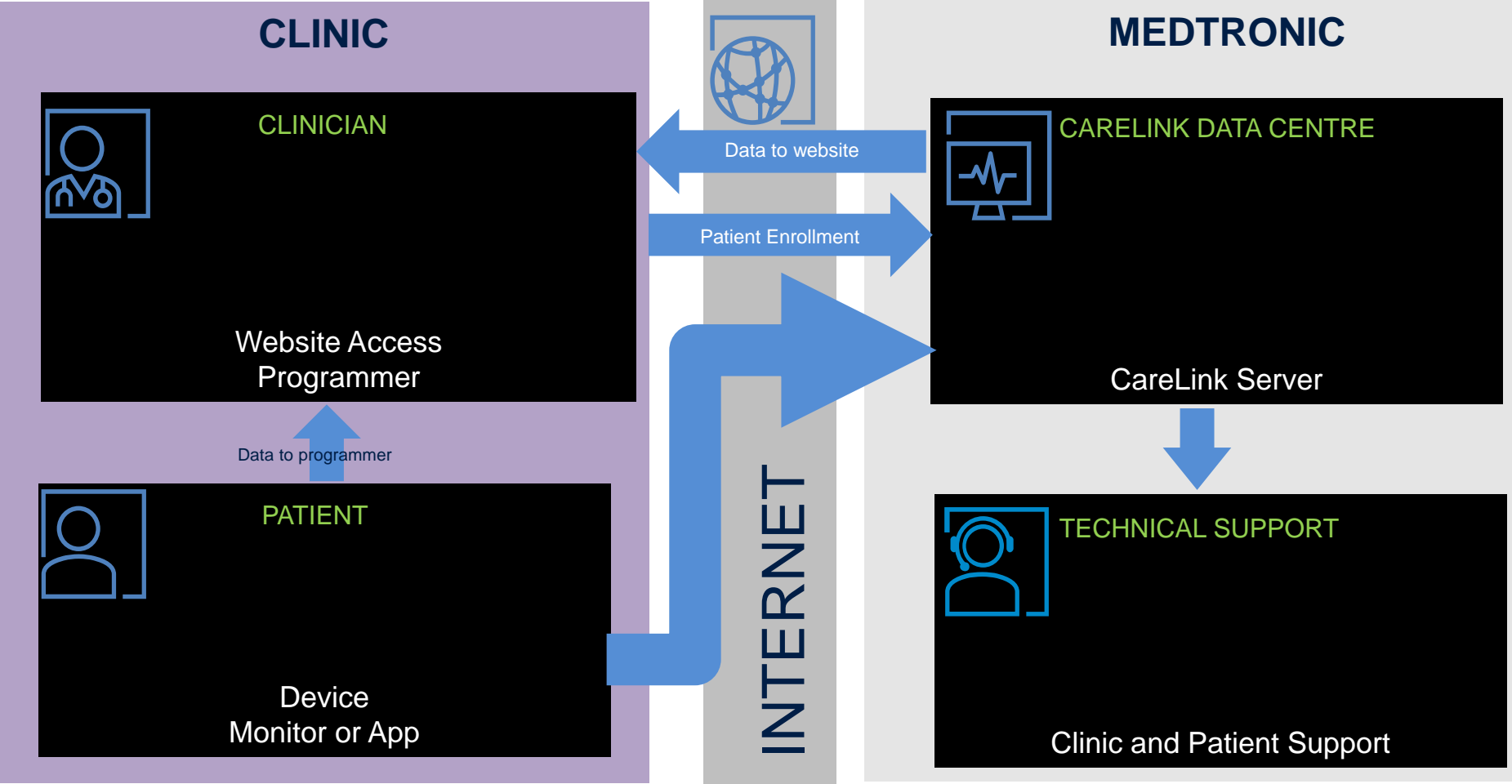
<https://seriot-project.eu/deliverables/>

Device	Description	Examples
Hardware	The different physical components (except sensors and actuators) from which the IoT devices can be built. These include microcontrollers, microprocessors, the physical ports of the device, the motherboard, etc.	Microcontroller Microprocessor Physical Ports and Connectivity
Software	Software comprises the IoT device's OS, its firmware and the programs and applications installed/running.	Operating system Firmware Applications
Sensors	These are the subsystems whose purpose is to detect and/or measure events in its environment and send the information to other electronics in order to be processed. There are sensors for a lot of purposes, such as to measure temperature, motion, etc.	Temperature Pressure Humidity Motion
Actuators	These are IoT device's output units, which execute decisions based on previously processed information.	Pumps Wheels
Devices to interface with IoT	These are devices whose purpose is to serve as an interface or as an aggregator between other IoT devices of a given IoT ecosystem. Moreover, devices used by users to interface and interact with IoT devices.	Connecting devices
Devices to manage IoT	These are devices specially designed to manage other IoT devices, networks etc.	Displays and keyboards
Embedded Process Units	They are based on a processing unit that enables them to process data on their own. They include embedded sensors and/or actuators, network capabilities to connect directly to the cloud, a memory footprint and the ability to run software.	Microprocessors PLC
Communication Protocols	They define the set of rules on how communication between two or more IoT devices must be performed through a given channel. There are many communication protocols, which can be either wireless or wireline-based. Examples of IoT communication protocols are ZigBee, MQTT, CoAP, BLE, etc.	Bluetooth Wi-Fi
Power Supply	It supplies electric power to an IoT device and to its internal components. The power source can be external and wired or a battery integrated in the device itself.	Electric Batteries Electric Connectors
Security Devices	This group comprises the assets specifically focused on the security of the IoT devices, networks and information. Most prominently, these include firewalls, Web Application Firewalls (WAF), CASBs for protecting the cloud, IDSs, IPSs and authentication/authorisation systems.	Hardware Firewalls Authentication Authorisation
Devices for Web-based Services	These are services within the World Wide Web, which provide a web-based interface to web users or to web-connected applications. This means web technologies can be used in IoT for Human-to-Machine (H2M) communications and for M2M communications.	Routers
Devices for Cloud Services	In IoT, the cloud backend can be used to aggregate and process data from dispersed devices, and it also provides computing capabilities, storage, applications, services, etc.	Gateways
Device and network management	The management of the IoT ecosystem devices and networks includes the software updates of the OS, firmware and applications. It also encompasses the tracking and monitoring of the devices and networks, collecting and storing logs that can later be used for diagnostics.	Devices for Logging, Monitoring, Tracking, Diagnostic

IoT Assets Taxonomy

CARELINK NETWORK

HOW DOES THE DATA FLOW?



MEDTRONIC

