State of the art technology at the service of High Energy Physics

Company Overview

Founded in 2007 close to Geneva

COTS for RT Control Systems in

- √ High Energy Physics
- √ Aerospace
- √ Transport

FPGA centric platforms

- √ High degree of customization
- √ Performance
- √ Obsolescence proof

IOxOS Technologies headquarters in Gland (Geneva area)

Why MicroTCA.4 ?

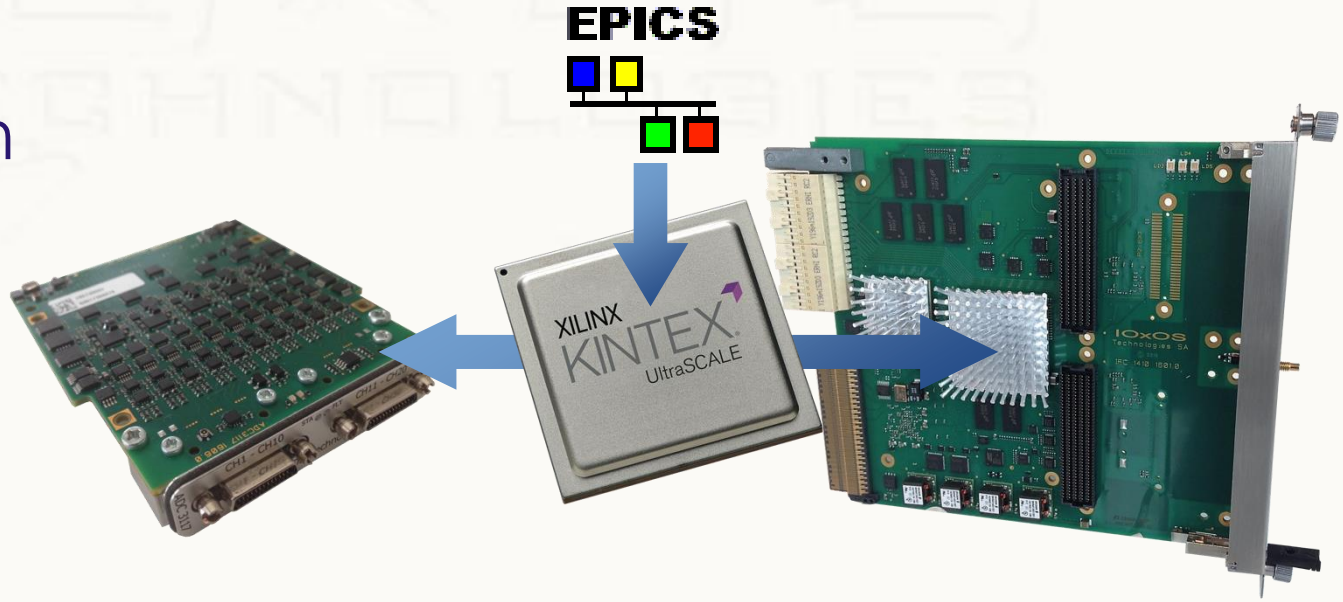
Why MicroTCA.4 ?

- ✓ Emergent open standard
- ✓ Main target: Accelerators and Large Experimental Physics
- ✓ Interoperability with other standards
- ✓ Growing community of users and manufacturers
- ✓ High-speed serial interfaces over backplane
- ✓ Synchronization over backplane
- ✓ Improved modularity (µRTM)
- ✓ Monitoring & diagnostic
- ✓ Redundancy

Building a MicroTCA.4 Ecosystem

A modular and long term available MicroTCA.4 ecosystem

- √ MicroTCA.4 product line of AMCs and µRTMs
- √ Comprehensive family of FMC modules
- √ FPGA Design Kits
- √ EPICS Integration

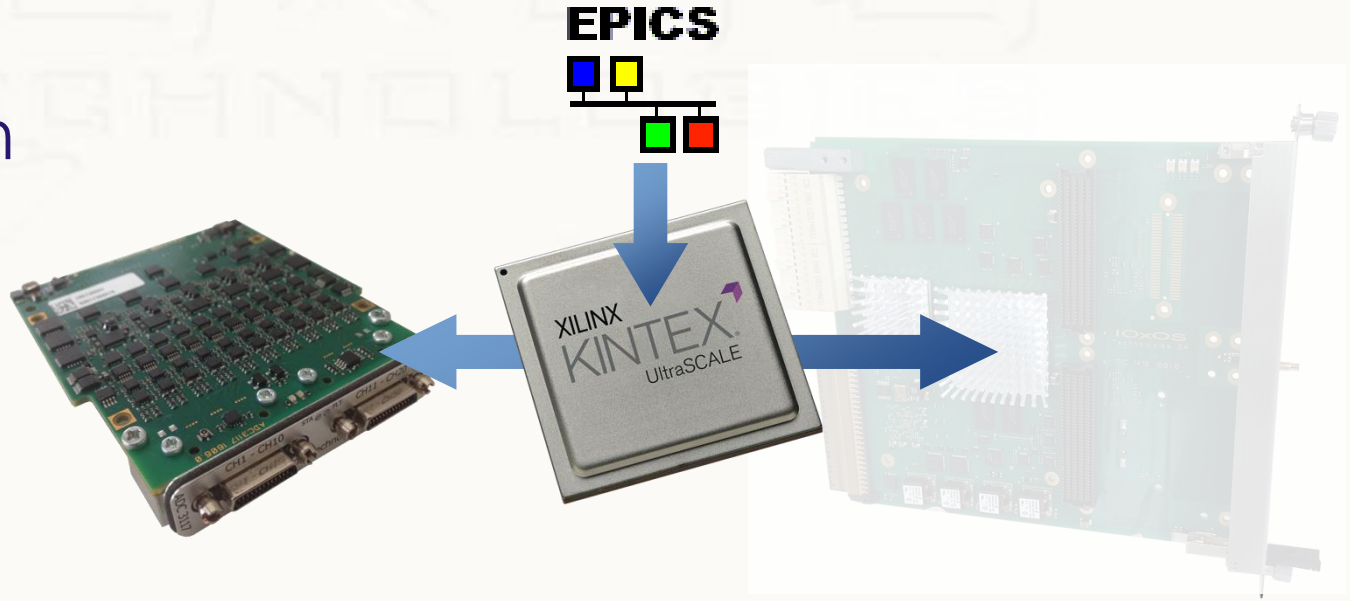


Building a MicroTCA.4 Ecosystem

A modular and long term available MicroTCA.4 ecosystem

- √ MicroTCA.4 product line of AMCs and µRTMs
- √ Comprehensive family of FMC modules
- √ FPGA Design Kits
- √ EPICS Integration

Common to existing VME Ecosystem!



Building a MicroTCA.4 Ecosystem

A modular and long term available MicroTCA.4 ecosystem

- √ MicroTCA.4 product line of AMCs and µRTMs
- √ Comprehensive family of FMC modules
- √ FPGA Design Kits
- √ EPICS Integration

IFC_1410 Intelligent FMC Carrier AMC

NXP QorIQ T2081 @ 1.8 GHz with AltiVec

Xilinx Kintex UltraScale FPGA (KU040/KU060)

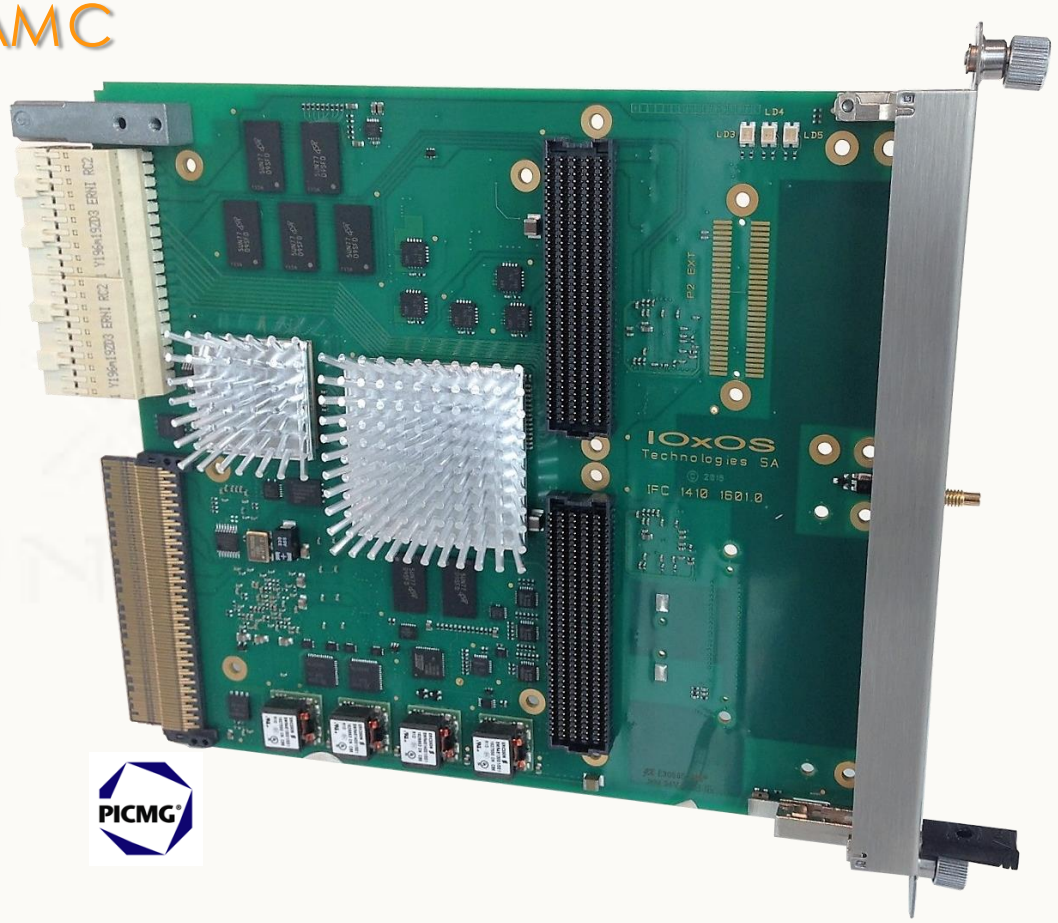
Powered by TOSCA III FPGA Design Kit

Local and remote configuration

Dual HPC VITA 57.1 FMC slots

Up to three PCI Express GEN3 blocks

DESY D1.4-compliant RTM interface



MTCA.4 Product Line of AMCs and µRTMs

RSP_1461 Com Extender µRTM

One SFP Gigabit Ethernet

Two SFP+ (10 Gigabit Ethernet)

Four SFP+ (user-defined SerDes)

Two SMA connectors for clock I/O

Custom I/O mezzanine

DESY D1.4-compliant RTM interface

MTCA.4 Product Line of AMCs and µRTMs

IFC_1420 High-Performance Digitizer AMC

NXP QorIQ T2081 @ 1.8 GHz with AltiVec

Xilinx Kintex UltraScale FPGA (KU040/KU060)

Powered by TOSCA III FPGA Design Kit

Local and remote configuration

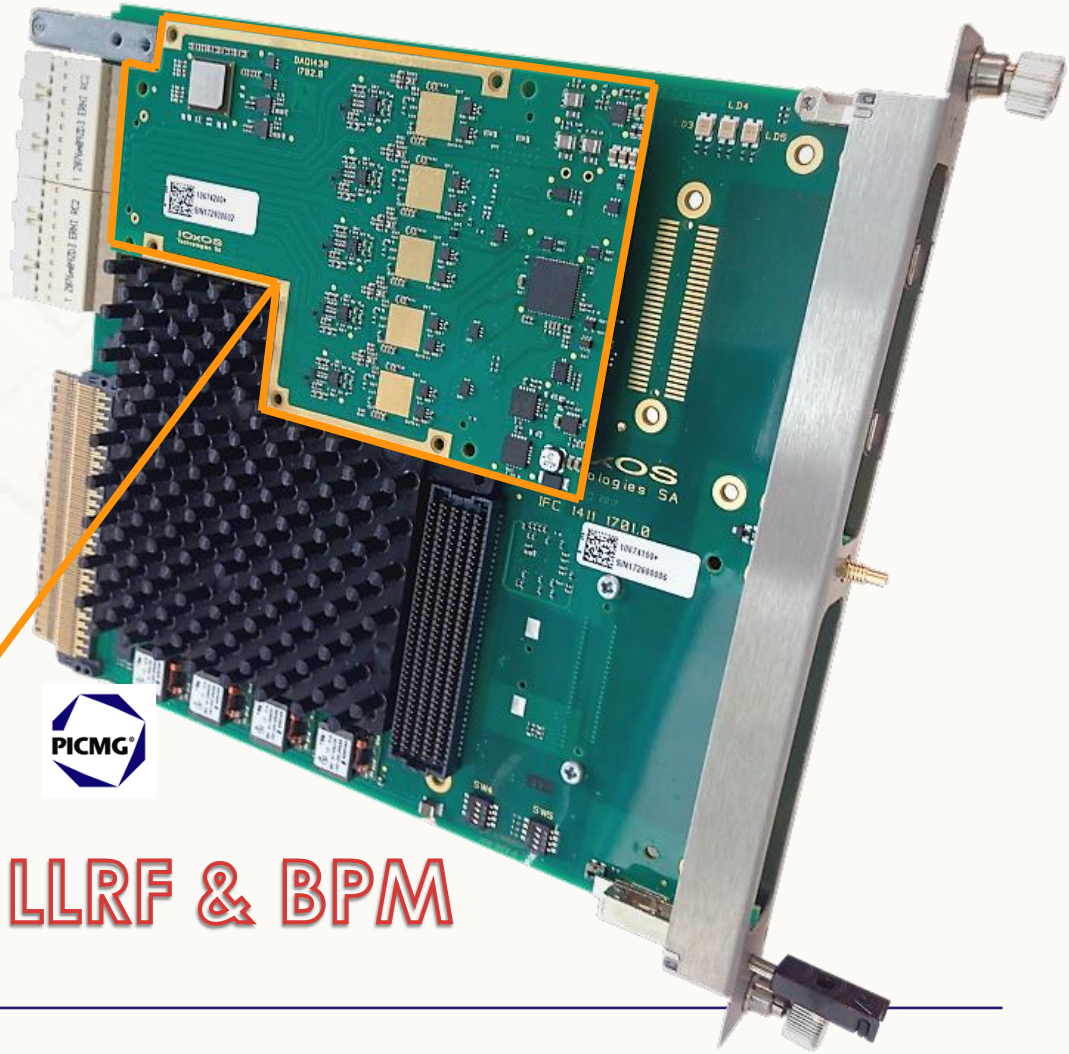
Single HPC VITA 57.1 FMC slot

Up to three PCI Express GEN3 blocks

DESY A1-compliant RTM for analog signals

Customizable onboard DAQ function:

- √ 10 channels ADC 16-bit @ 250 Msps
- √ 4 channels DAC 16-bit @ 1.5 Gsps



LLRF & BPM

Building a MicroTCA.4 Ecosystem

A modular and long term available MicroTCA.4 ecosystem

- √ MicroTCA.4 product line of AMCs and µRTMs
- √ Comprehensive family of FMC modules
- √ FPGA Design Kits
- √ EPICS Integration

Comprehensive Family of FMC Modules

ADC_3110/3111 Fast ADC

8 channels ADC 16-bit @ 250 Msps

AC or DC coupling inputs

Clock & user-defined inputs

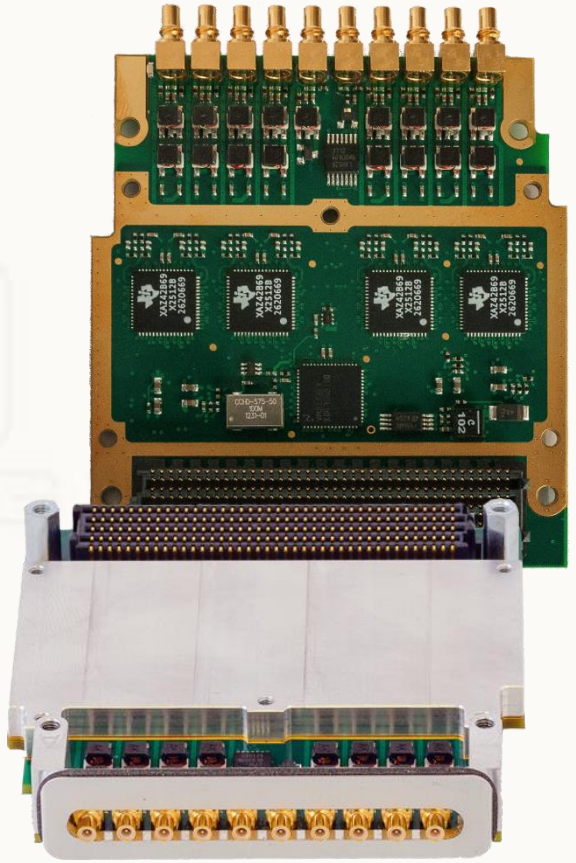
ADC_3112 Ultra-Fast ADC

4 channels ADC 12-bit @ 900 Msps

(1 Gsps with oversampling)

DC coupling inputs

Clock & user-defined inputs



DAC_3113 Fast DAC

Dual channel ADC 16-bit @ 250 Msps

Dual channel DAC 16-bit @ 250 Msps

DC coupling

Clock & user-defined inputs

ADC_3117 High-Density

20 channels ADC 16-bit @ 5 Msps

2 channels DAC 16-bit @ 1 Msps

Single ended or differential inputs

Clock & user-defined inputs

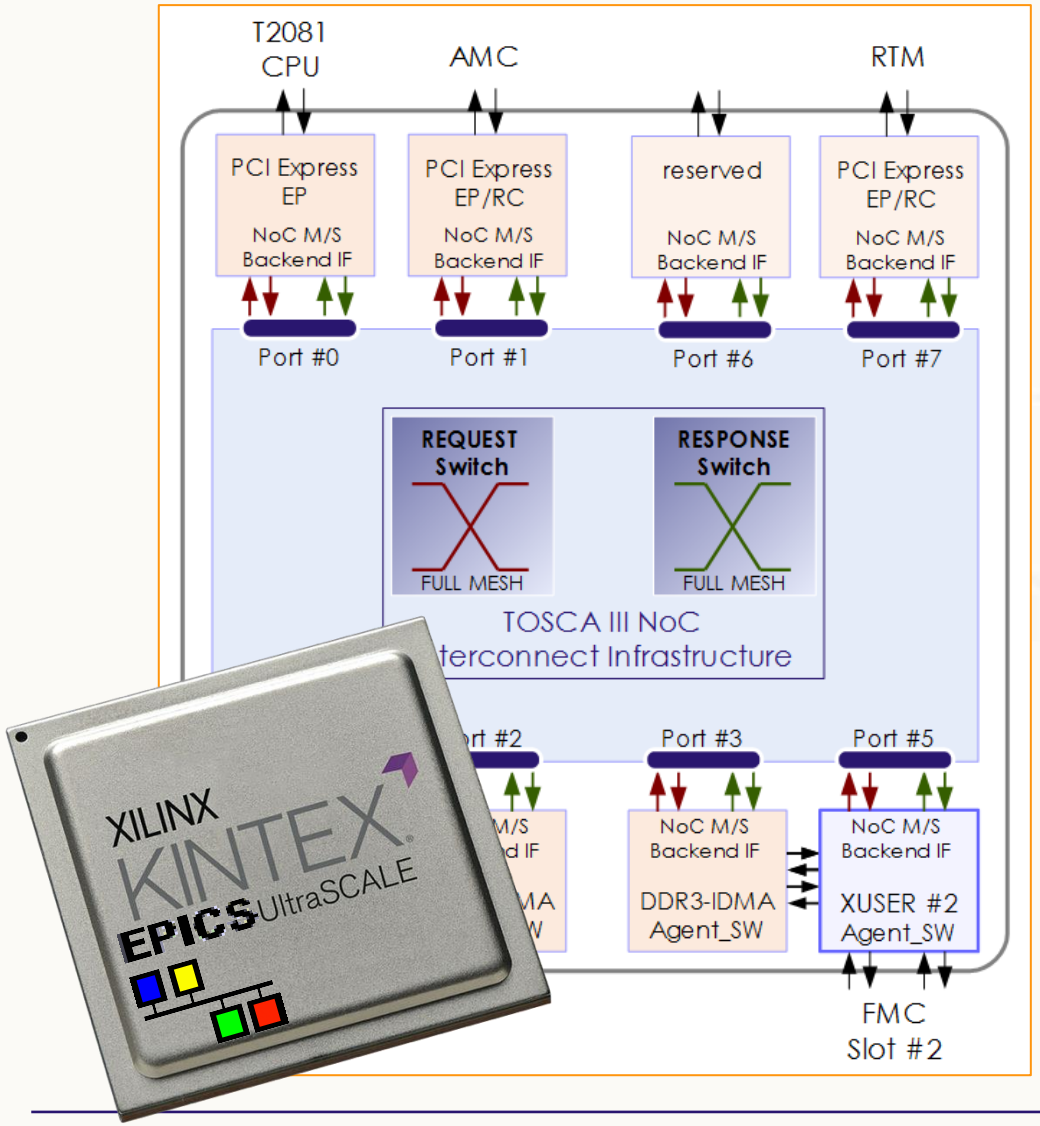
Building a MicroTCA.4 Ecosystem

A modular and long term available MicroTCA.4 ecosystem

- √ MicroTCA.4 product line of AMCs and µRTMs
- √ Comprehensive family of FMC modules
- √ FPGA Design Kits
- √ EPICS Integration

TOSCA FPGA Design Kit

7th MTCA Workshop for Industry and Research



Network on Chip (NoC) approach

Optimized for Xilinx Kintex UltraScale devices

Up to three PCI Express GEN3 blocks

VHDL source code fully available

Direct integration of FMC and AMC carriers

Significant reduction of development time:

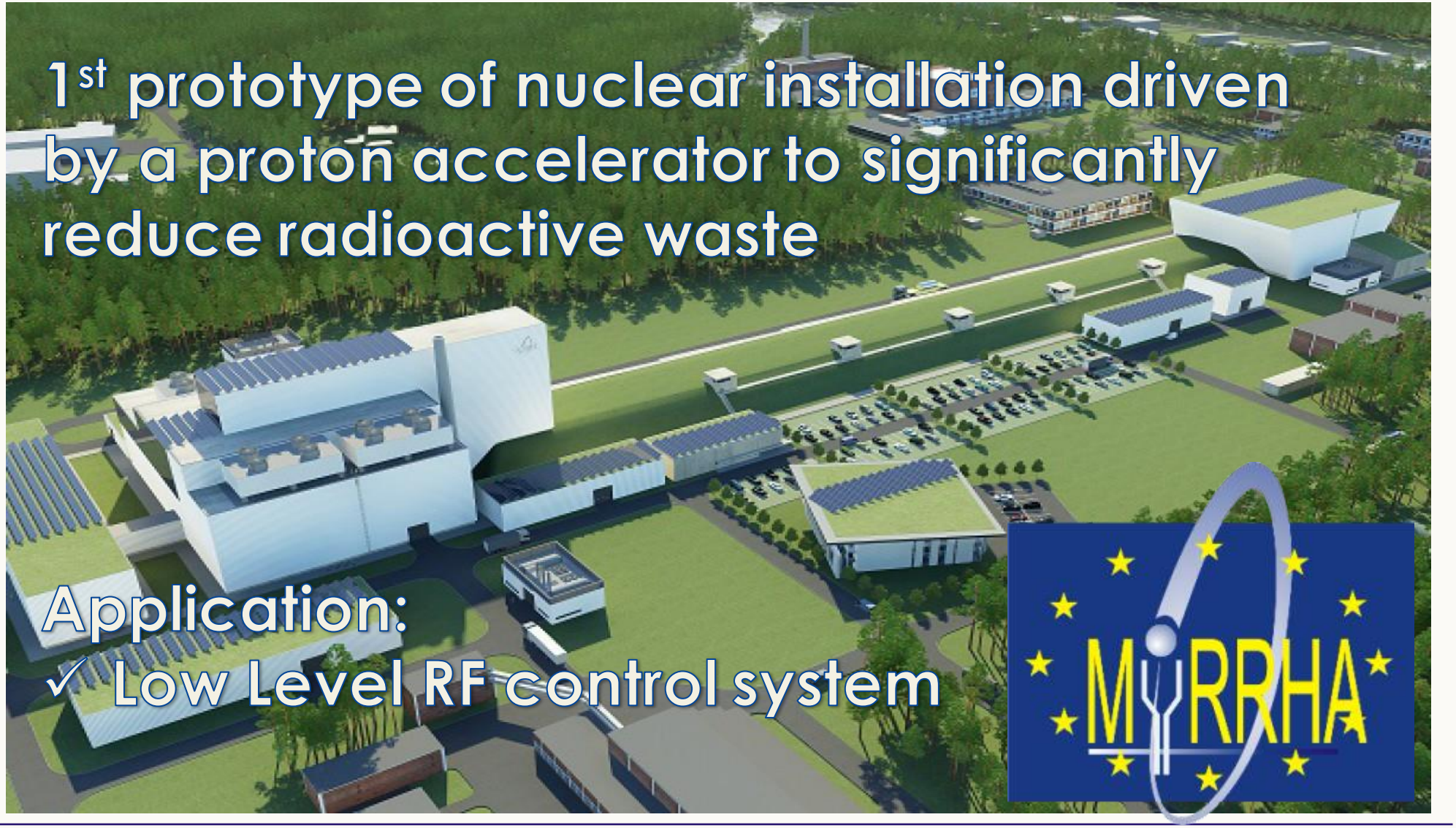
- √ Focus on user application
- √ Access to IOxOS Technologies IP library
- √ User Area dedicated simulation environment
- √ Reference designs

Total integration within EPICS ecosystem

Some ongoing projects…

European Spallation Source (Sweden)

MYRRHA (Belgium)



7 Conclusions and 1 Thought

7 Conclusions and 1 Thought

- ✓ Satisfactory performance and modularity
- ✓ Wide coverage of required control & diagnostics applications
- ✓ Some interoperability minor issues (MCH)
- ✓ Growing acceptance among users
- ✓ Increasing number of opportunities
- ✓ Solid alternative to historical form factors (VME)
- ✓ IOxOS roadmap will be strongly linked to MTCA.4

- ✓ Efforts must be done to go beyond the field of physics

Questions & Answers

"Our mission is to help you build and maintain your next generation control system by providing state of the art technology and a proactive customer service"