



# **.ATCA Read out System product presentation**

- **Equipment, Function, Application, Roadmap**
  - RD51 Miniweek Dec. 2014



# Introduction

## ➤ **ATCA offers suitable infrastructure for aquisition and Control Systems**

- Backplane, compact system , 10G connection over Backplane between Slots and for output
- Frontpanel, up to 24 input connectors per Mezzanine Board
- Rear I/Os (RTM) additional space for Fiber outputs and other extensions.

## ➤ **Scalability:**

- 1 Slot, 1U ATCA Crate
- 2 Slot, 3U ATCA Crate
- 6 Slot, 5U ATCA Crate
- 14 Slot 13/14U ATCA Crate
- 2 Slot, 1U MTCA.4 Crate with MTCA.4 ADC Form factor
- 6 Slot 5U MTCA.4 Crate
- 12 Slot9U MTCA.4 Crate



# Systems



Scalable DAQ System for  
detector readout  
Up to 624 analog Channels in  
14- Slot crate  
10G optical Interface over RTM



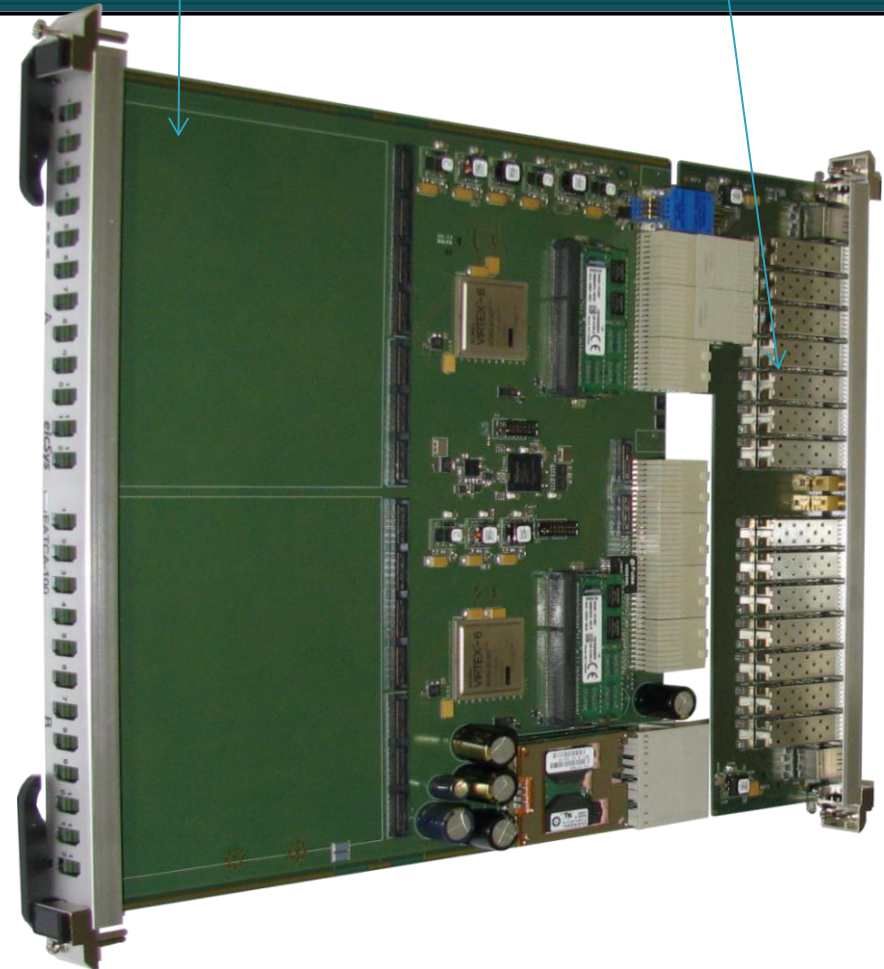
# Boards

EATCA-100

ERTM-100

## ATCA blade

- 2 plug-able mezzanine cards with standardized Mezzanine pinouts
- Reorganized Interface connectors for Mezzanines
- Separate Power Connectors to the mezzanines
- 2 Virtex 6 FPGAs (EAD-M1)
- 2 DDR3 memories
- Integrated board management
- Flexible clock distribution
- Manageable power supply
- High speed Zone 2 and Zone 3 interfaces (full mesh configuration.
- RTM with 4x10 GB Links



Quelle: SRS update, RD51 Miniweek, 18.1.2011





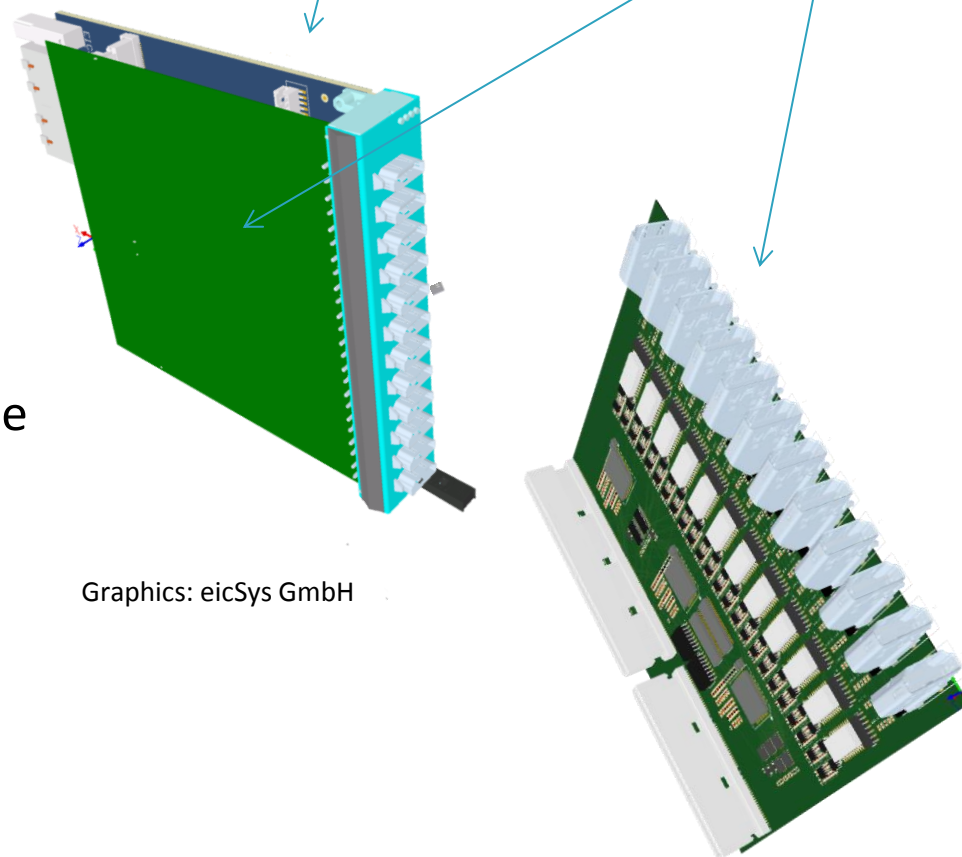
# Boards

EMTCA-100

EAD-MX

## MTCA Carrier

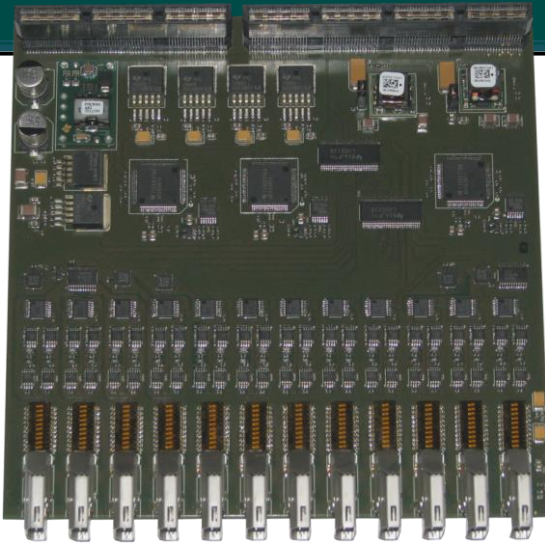
- 1 plug-able mezzanine card with standardized Mezzanine pinouts
- Reorganized Interface connectors for Mezzanines
- Compatible to ATCA Mezzanine Interface
- 1 Virtex 6 FPGA (EAD-M1)
- 1 DDR3 memories
- Managed by MCH
- Double width, Full Size Board
- Ready for RTM connection
- Start development: II/III Q. 2015



Graphics: eicSys GmbH



# Boards



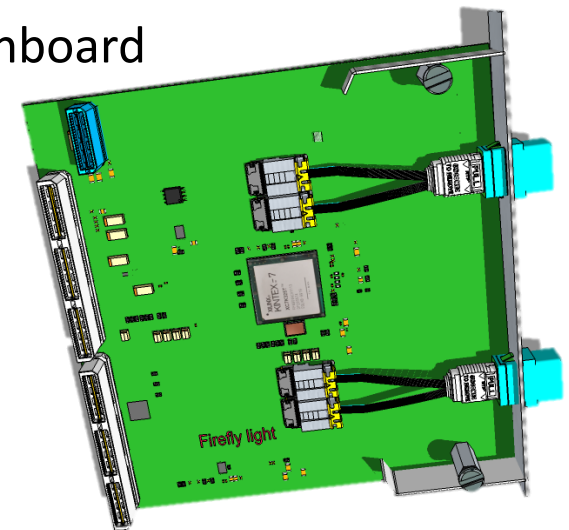
Picture: EAD-M1 Rev. 0

## EAD-M1 Mezzanine Board Rev. 1

- Pluggable module compatible with EATCA-100
- 3 serial 8 channel ADCs (ADS5282) – total number of channels = 24
- 12 HDMI connectors compatible with detector readout Hybrids (Beetle and APV based)
- Integrated board management
- Separate Power connector
- Compatible to OC Box Mainboard

## EAD-M2 Mezzanine Board

- Pluggable module compatible with EATCA-101
- 3 serial 8 channel ADCs (ADS5282) – total number of channels = 24
- 2 Firefly connectors compatible with Ocx Box optical Input
- Integrated board management
- Separate Power Connector



Graphic: EAD-M2 Rev. 0  
Source: H. Muller

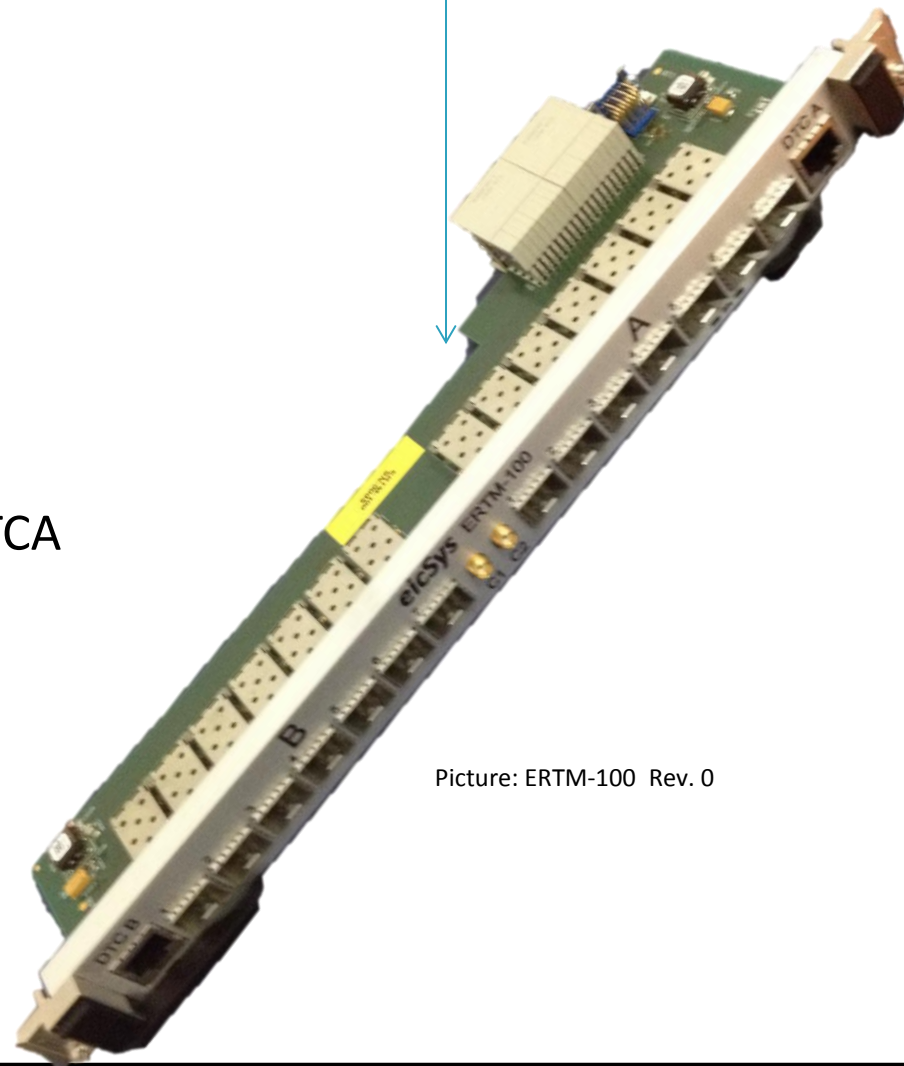


# Boards

ERTM-100

## ATCA RTM

- 7 1-4GB Interfaces to each Mezzanine Board
- 2 SMC Interfaces
- 1 DTC Link for each mezzanine
- Management is realized through the ATCA Shelf manager
- Next Revision has 2x10 GB Links
- 4 1-4 GB Links

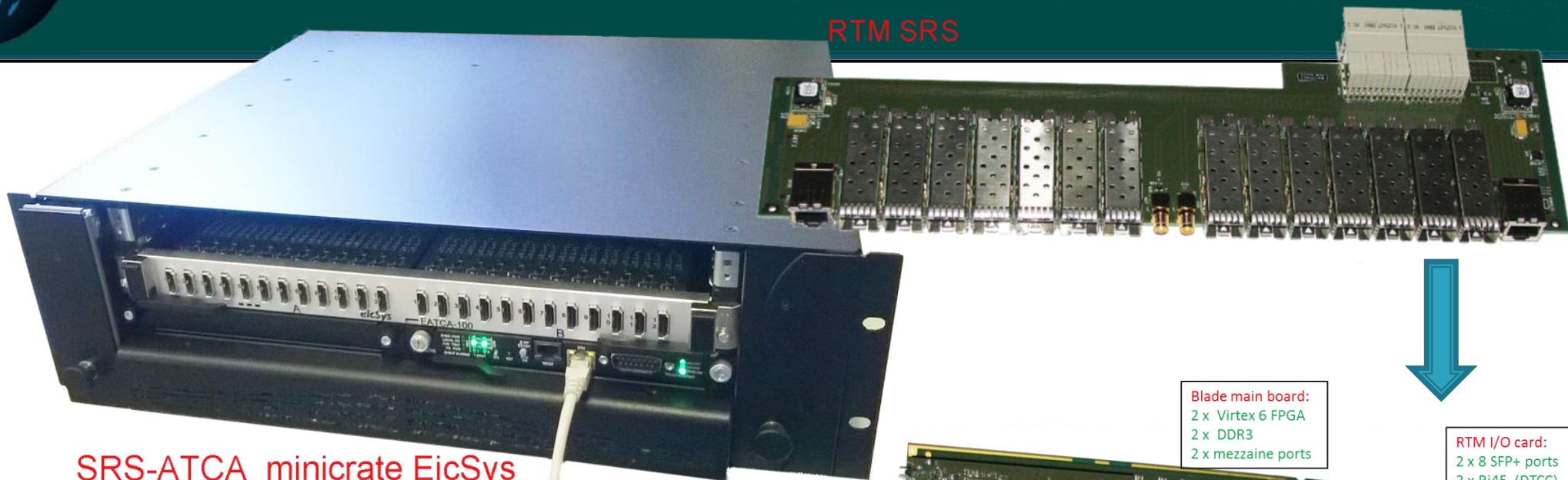


Picture: ERTM-100 Rev. 0



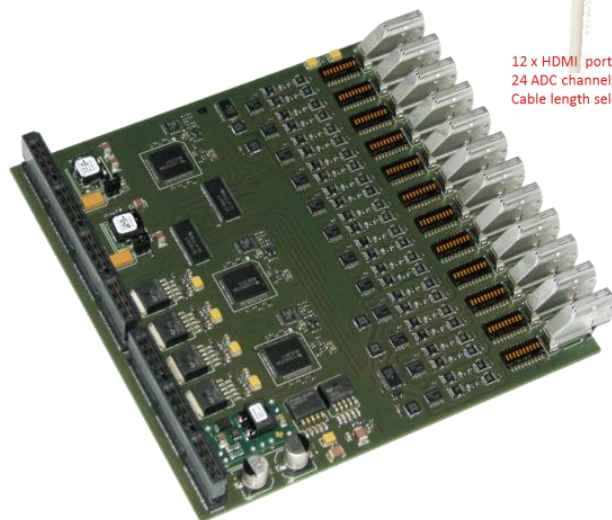


# System configuration



## SRS-ATCA minicrate EicSys

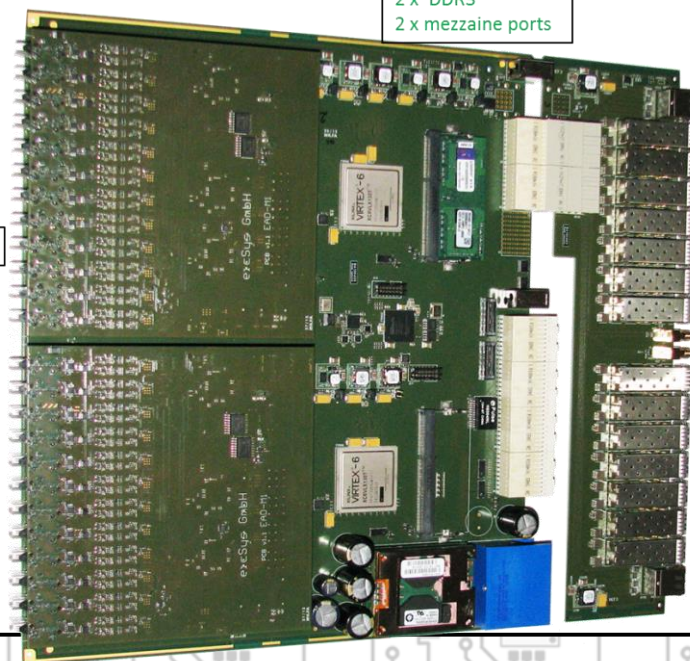
1 Blade with 2 x ADC mezzanines for 6 k APV readout channels



12 x HDMI ports  
24 ADC channels 12 bit  
Cable length selection

2 x Mezzanines (ADC):

2 mezzanines:  
max 6144 channels  
APV/Beetle/VFAT







# LHC experiments: from detector to counting room

DETECTOR

$r < 1\text{m}$

DETECTOR- FRAME

$r < 5\text{m}$

Cavern

$r < 100\text{m}$

Counting room

$r < 200\text{m}$

Online

$r > 200\text{m}$

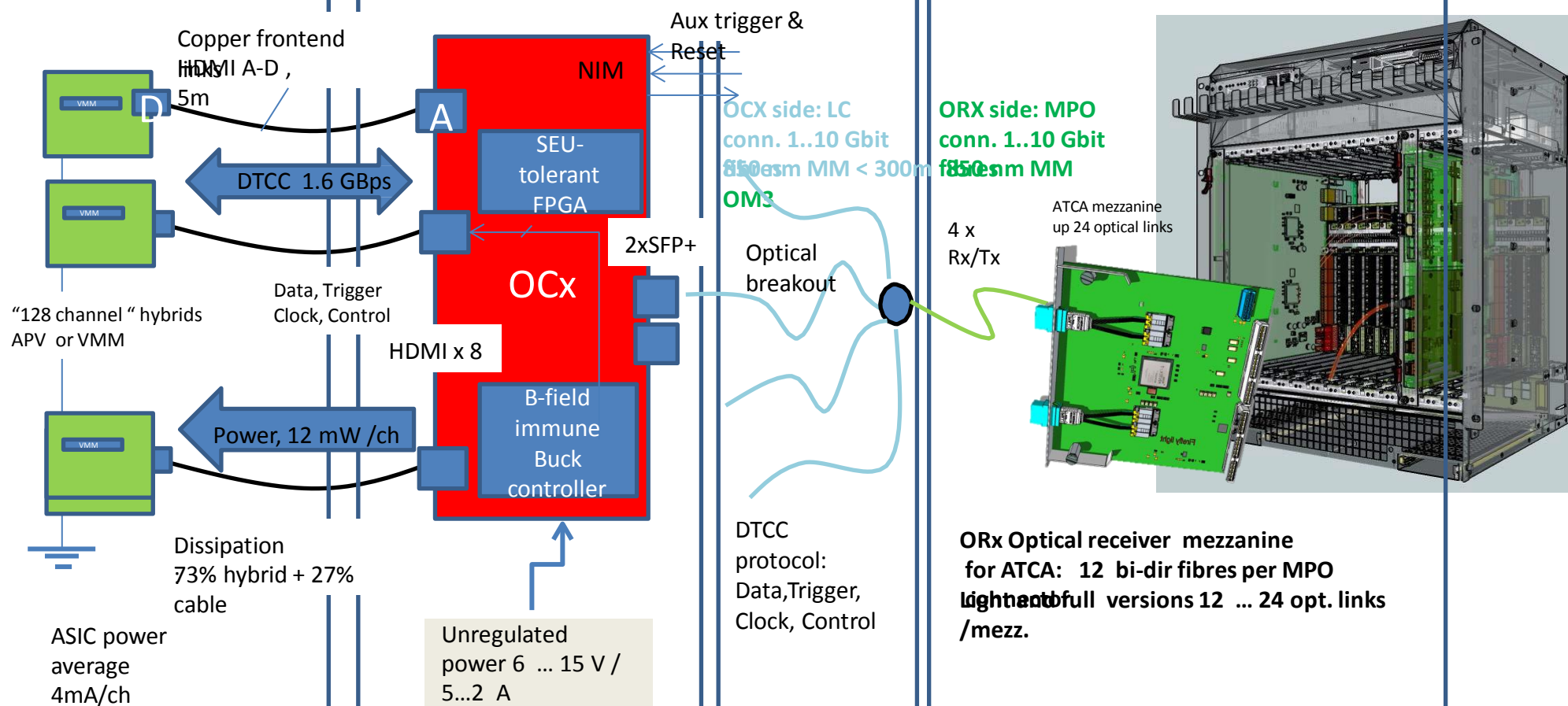
High radiation up 1MRad  
Magnetic fields up 2T

Moderate radiation <15kRad  
Magnetic fields < 1 T

noisy & harsh  
environment

Low radiation  
Low magnetic field < 5 Gauss

Standard  
networks





# •Variants

DETECTOR

$r < 1\text{m}$

DETECTOR- FRAME

$r < 5\text{m}$

Cavern

$r < 100\text{m}$

Counting room

$r < 200\text{m}$

Online

$r > 200\text{m}$

High radiation up 1MRad  
Magnetic fields up 2T

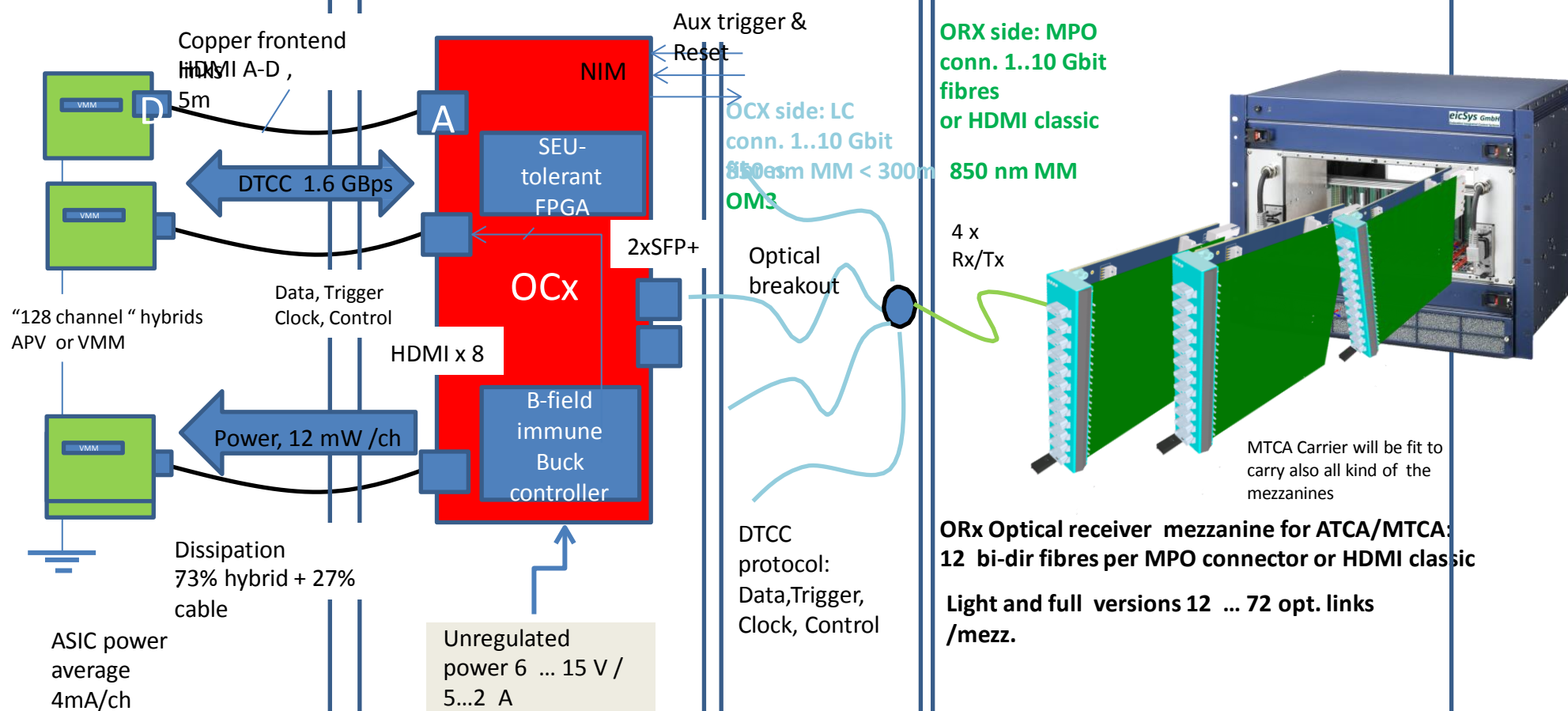
Moderate radiation <15kRad  
Magnetic fields < 1 T

noisy & harsh  
environment

Low radiation  
Low magnetic field < 5 Gauss

Standard  
networks

SRS –MTCA\*





# .Further Developments

**More Flexibility with both Platforms: ATCA; MTCA.4 but:**

- What about Numbers of ADC Channels?
- What about fibre lines as Interface for Mezzanines?
- What about new FPGA's like Kintex 7?

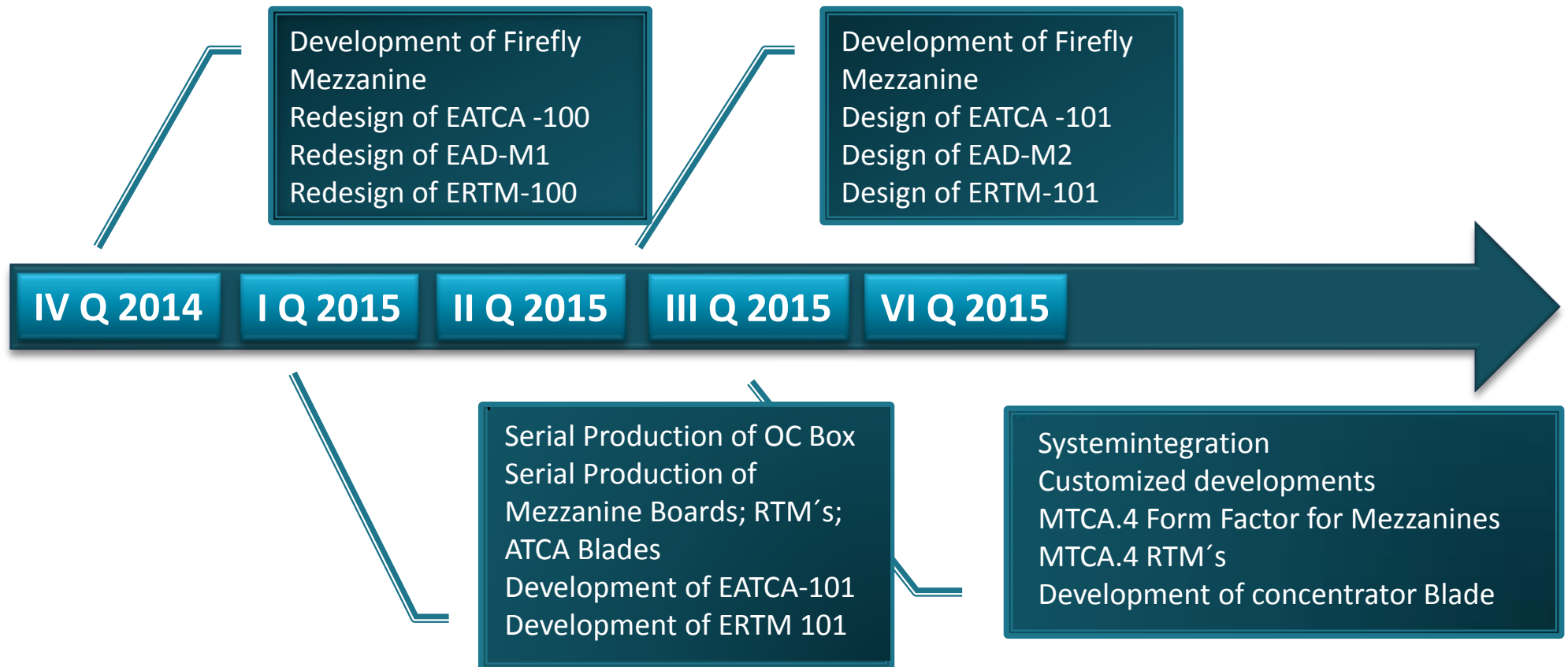
**Further activities from *eicSys GmbH*:**

- Licensed Manufacturing for OC Boxes and Software!
  - Start in 2015
- Turn Key System Integration and Software development





# Roadmap for further developments





**Thank you for your attention**

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