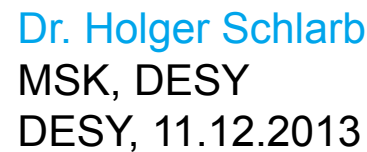


and workshop organization



- Nov. 2005: Reliability Workshop in Grömitz, Germany
 - Joint meeting with ILC (intern. linear collider, 33km, 500GeV)
- Dec. 2007: XFEL Crate-Standard Workshop
 - MicroTCA and ATCA was defined to be used
- Mar. 2009: First PICMG Meeting “xTCA for Physics”
 - Hardware group: rear I/O and timing
 - Software group: standardization of interfaces for FPGAs...OPsys
- Oct. 2011: Official announcement of PICMG Specification
 - “MTCA.4 Enhancements for Rear I/O and Precision Timing”
- Jul. 2012: Start of Helmholtz Validation Fund
 - „MicroTCA.4 for Industry“

What is the HGF validation fond?

- Finance instrument to support the spin-off and technology transfer from scientific, technical inventions or developments from HGF centers to the industry and society
- Validation: increase of value (material/immaterial) with direct application to society / industry
- Ideally: generate commercial product

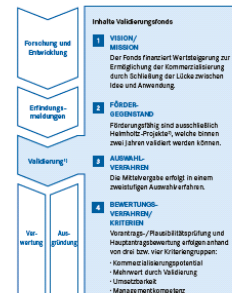
Boundaries:

- Duration max. 2 years
- Funding max. 2 M€/a (50% by HGF)

Screening of DESY (2011):

- “MTCA.4” good candidate

Helmholtz-Validierungsfonds
auf einen Blick



Weitere Informationen finden Sie im Leitfaden zur Antragsstellung, der wie die Ausschreibung und die Antragsformulare zum Download zur Verfügung steht: www.helmholtz.de/ausschreibungen

Ansprechpartner

Kontakt:
Für weitere Fragen stehen Ihnen die Technologietransferstellen der Helmholtz-Zentren zur Verfügung.

Ihr Ansprechpartner in der Geschäftsstelle der Helmholtz-Gemeinschaft ist:
Dr.-Ing. Jörn Krupa
Referent Technologietransfer
Anna-Luise-Karsch-Strasse 2
10178 Berlin
Telefon +49 30 206 329-72
Fax +49 30 206 329-70
joern.krupa@helmholtz.de

Foto credit: Helmholtz-Bericht



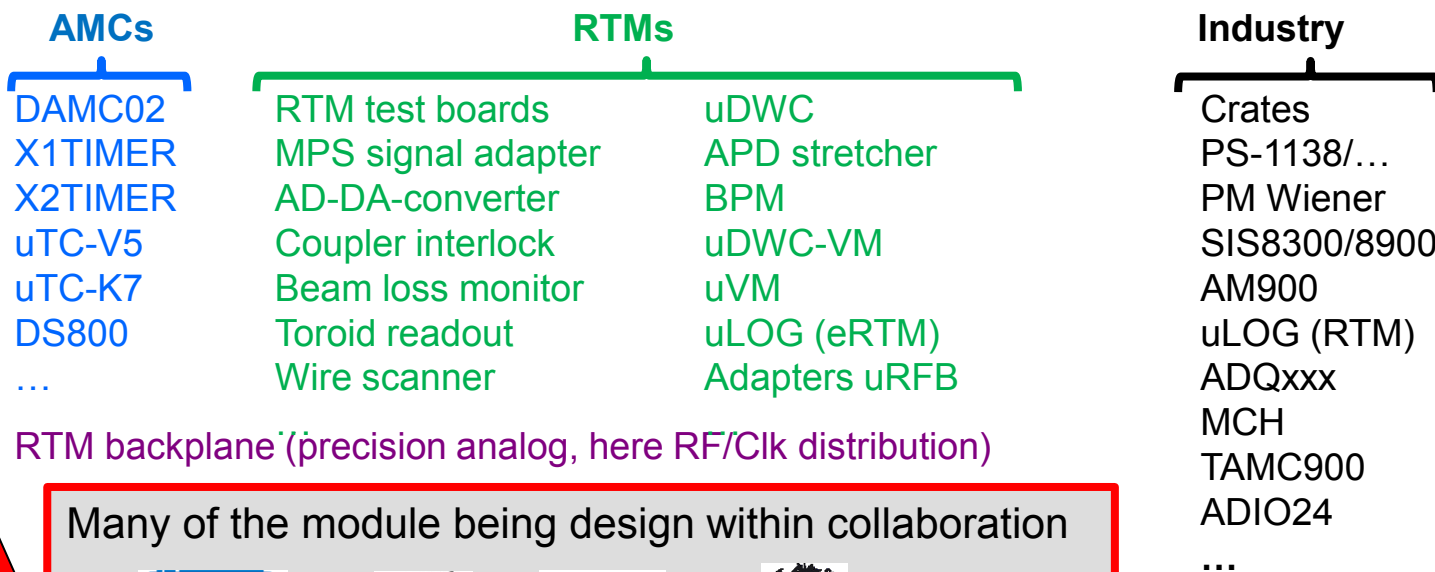
HELMHOLTZ-GEMEINSCHAFT
DEUTSCHER FORSCHUNGSZENTREN

HELMHOLTZ-VALIDIERUNGSFONDS



Board developed for X-FEL/FLASH

- ... 2012 substantial investment to develop platform and various modules:



Many of the module being design within collaboration



...

struck innovative
systeme

powerBridge
Computer

Schroff®

ELMA
Your Solution Partner

CONCURRENT
TECHNOLOGIES

TEWS
TECHNOLOGIES

Telkoor
Power Supplies Ltd.

SP Devices
Signal Processing Devices

Instrumentation
Technologies



- Jan 2012: Pre-proposal
- Apr 2012: Proposal (~ 20 sub-packages)
- Jun 2012: Approved full funding received 4 M€
- Jul. 2012: Project start

Main objectives of project:

Establish MTCA.4 electron crate system

- In accelerator community
- Industrial branches
- Scientific community

by reducing the market entry barriers and foster MTCA.4 to industry

Business model:

- Marketing for the RF controls modules via Company using DESY License

Funding distribution: **4 Mio€**

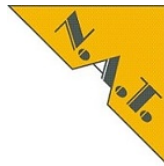


> Status 29. October 2013

■ Cooperation partners

• Original HVF Consortium (7):

ELMA
Your Solution Partner



struck innovative
systeme

AMPECON

Schroff®

TEWS
TECHNOLOGIES

AD-TE-C

• New Partners (5):

IC INTERFACE
CONCEPT
ADVANCED ELECTRONIC SOLUTIONS

eicSys GmbH
Embedded Integrated Control Systems

COSYLAB

powerBridge
Computer

CAENels
Gear for Science

• Negotiation phase(5):


vadatech inc.
THE POWER OF VISION

HARTING Pushing Performance

 **kontron**

Laurin AG

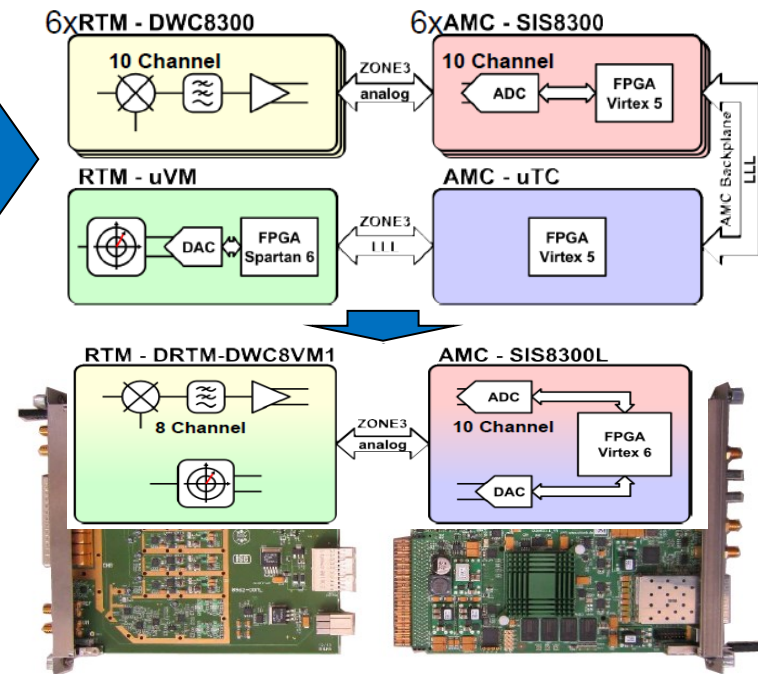
wieNER
Plein & Baus Elektronik
Work für Industrie-Elektronik
Nuklear-elektronik
Experten-Schulung

AP1: RF control system in MTCA.4

AP1.1 Revision of existing modules

AP 1.1.1 Field Detection (uDWC)
AP 1.1.2 Controller (uTC)
AP 1.1.3 RF driver unit (uVM)
AP 1.1.4 Local RF-Generation (uLOG)

32 cavities
~mdeg precision



AP1.2 Cost opt. for Single Cavities Applications

AP 1.2.1 Field detector with RF driver (uDWC-VM)
AP 1.2.2 High-end Digitizer (DAQ-LNC)

AP1.3 Extending Portfolio in Frequency

AP 1.3.1 Field detector with RF driver (uVM, 0.35-6GHz)
AP 1.3.2 Local RF-Generation (uLOG, 0.35-6GHz)
AP 1.3.3 RTM with local clock circuit (uCLK-RTM, 10-350MHz)
AP 1.3.4 Global clock generation (uCLK-eRTM, 10-350MHz)
AP 2.2.8 Backplane Development for 10 Gbit/sec Transfer Speed

AP1.4 Supplementary systems for RF control

AP 1.4.1 Multi-channel Direct RF-sampling (uDS800)
AP 1.4.2 AMC carrier with motor/RTM with Piezo driver (uFMC20)

AP1.5 Introduction of RTM-RF Backplane

AP 1.5.1 Development of RTM-RF Backplane concept
AP 1.5.2 Crate integrated RF source (uOSC_eRTM)

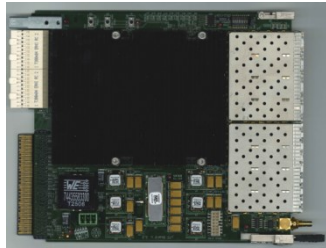
Due to modularity
only moderate effort
required to develop
RF controls for

- 1/2/4/.. Cavities
- NRF/SRF
- 10-6000 MHz
- valuable add on's

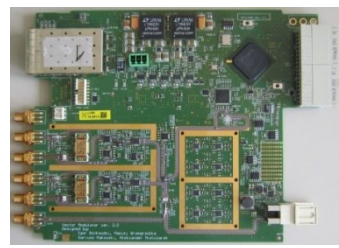
➤ Board developed for licensing ...



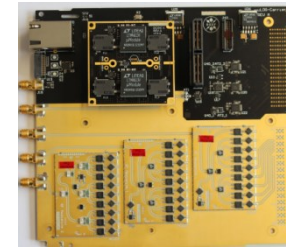
DRTM-DWC10



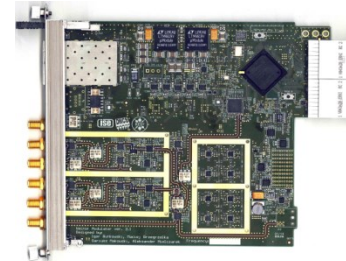
DAMC-TCK7



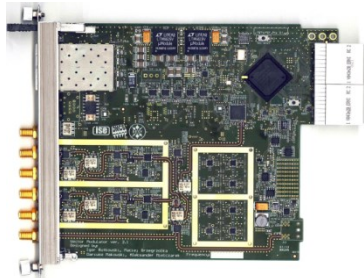
DRTM-VM2HF



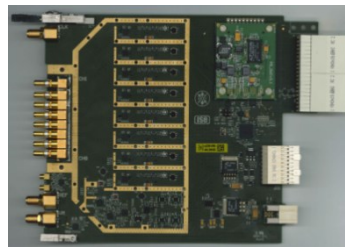
eRTM-LOG1300



DRTM-VM2LF



DRTM-VM2LF



DRTM-DS8VM1



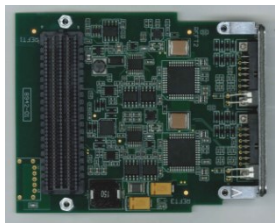
DAMC-FMC20



DRTM-PZ4



DRTM-DWC8VM1



DFMC-MD22



DAMC-DS800

... Together 27 hardware projects,
... ~ 16 developed by DESY
... ~ 6 developed by Industry,
... ~ 5 joint effort DESY & Industry

AP2: Completion of MTCA.4 for industry and institutions

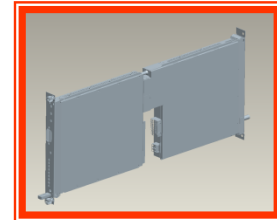
Extension of product portfolio for MTCA.4

1. Industrial production of timing module
2. 2 GSPS, 4 channel, 12bit ADCs on RTM & AMC
3. 32 ch., 40MSPS, AMC-RTM with analog shaping capability
4. Management low noise power supplies



EMI optimization and classification of MTCA.4 components

1. EMI test board development
2. EMI current distribution in MTCA.4 crate
3. Optimization of crate-contact transitions
4. Shields for AMC/RTM boards
5. EMI Bypass-concept
6. Vibration studies and vibration reduction
7. EMI classification of AMC and RTM boards commercially available
8. AMC Backplane/connector/board development towards 10Gbit/sec



Application of MTCA.4 in industry

1. Integrated klystron life-time and LLRF system

Evaluation of MTCA.4 market

1. Market evaluation for industry
2. Market evaluation for institutes
3. Optional industry order after evaluation



Integral test of MTCA.4 in large facility, availability, failure analysis

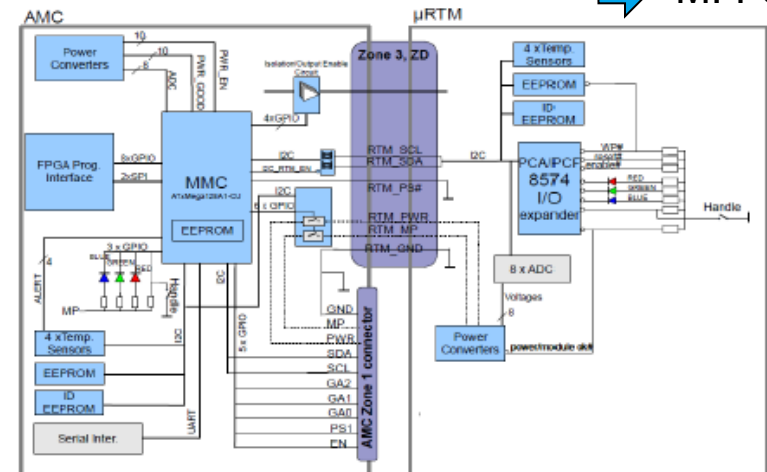
1. Inter-compatibility of boards/sub-systems, radiation, remote controllability



- F. Ludwig

Class/DL1 / Zone		a	b	c	d	e	f
MTCA 4 management	00	1 PWRM	PWRM	PWR	SDA	TDK	TDK
		2 PWRM2	PWRM2	NP	SDA	TD	TMS
Digital clocks feed I/O		3 AWC CLK0	AWC CLK0	RTM CLK0+	RTM CLK0-	OUT0+	OUT0-
		4 AWC TCLK0	AWC TCLK0	OUT0+	OUT0-	OUT0+	OUT0-
User configuration		5 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		6 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		7 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		8 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		9 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		10 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
User Configuration	01	1 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		2 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		3 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		4 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		5 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		6 P0U0+ / OC	P0U0+ / OC	P0U0+	P0U0-	P0U0+	P0U0-
		7 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		8 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
		9 P0U0+	P0U0+	P0U0+	P0U0-	P0U0+	P0U0-
Standard G0t-Links		10 G0tM1 CLK RX	G0tM1 CLK RX	G0tP1 RX	G0tP1 RX	G0tP1 TX	G0tP1 TX

- ➡ M. Fenner



AP3: Support and consulting for industry and institutions

MTCA.4 support and consulting

FAQ

Hotline

1 FTE for direct support → webpage!

Tutorial, every 1 month “hands on”

6 in 2013

18 in 2014 (6 advanced)

MTCA.4 users guide

Book published by DESY/NAT

Products marketing & information

~~2~~ → 3 MTCA.4 workshops (9-11.12.2014)

Special task forces

Marketing on industrial exhibitions

28 (+11) in 2013

30 (+10) in 2014 planned

Webpage

MTCA Tutorials at DESY (05/2013)



IPAC 2013 Shanghai



TWEPP 2013 Perugia

Embeddedworld 2013
Nürnberg



European Microwave
Week2013

Webpage URL <http://mtca.desy.de/>



What comes next...

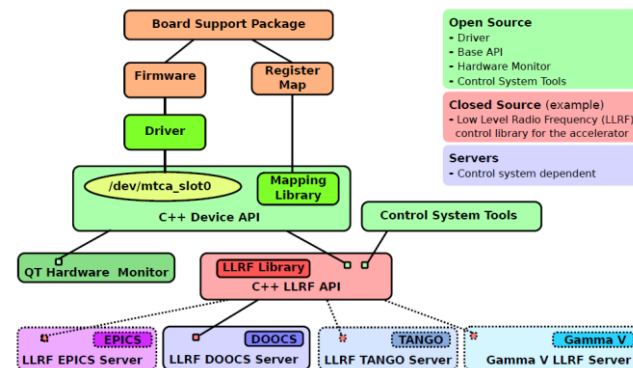
Focus for 2014:

➤ Interoperability issues to be solved!

- AIW25 will be at DESY @ Apr 2014
- AIW26 like at Vadatech @ Oct 2014



➤ Focus on firmware/ software “easy to integrate”

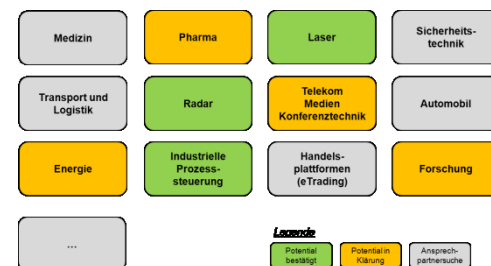


➡ MTCA4U, M. Killenberg
➡ COSYLAB

➤ Marketing:

- Science: change focus towards new fields
 - Instrumentation/Laser/Radar/Astrophysics/Plasma/....
- Industry: to be continued...
 - Industrial processing
- Start program to approach Technical Universities

Market study by DESY, T. Walter



➤ HGF Accelerator & Research Program (ARD) 2015-2019

- Tech. Transfer of MTCA.4 to HGF centers (HZB/HZDR/KIT/GSI/HZJ/DESY)

Management



Thomas Walter

Contracts



Ilka Mahns

Old faces...



Developers



**HELMHOLTZ
GEMEINSCHAFT**

Since spring/summer 2013

Software



Martin Killenberg

Tech. Marketing



Annika Rosner

Event/Markt.



Katharina Fein

Development



Michael Fenner

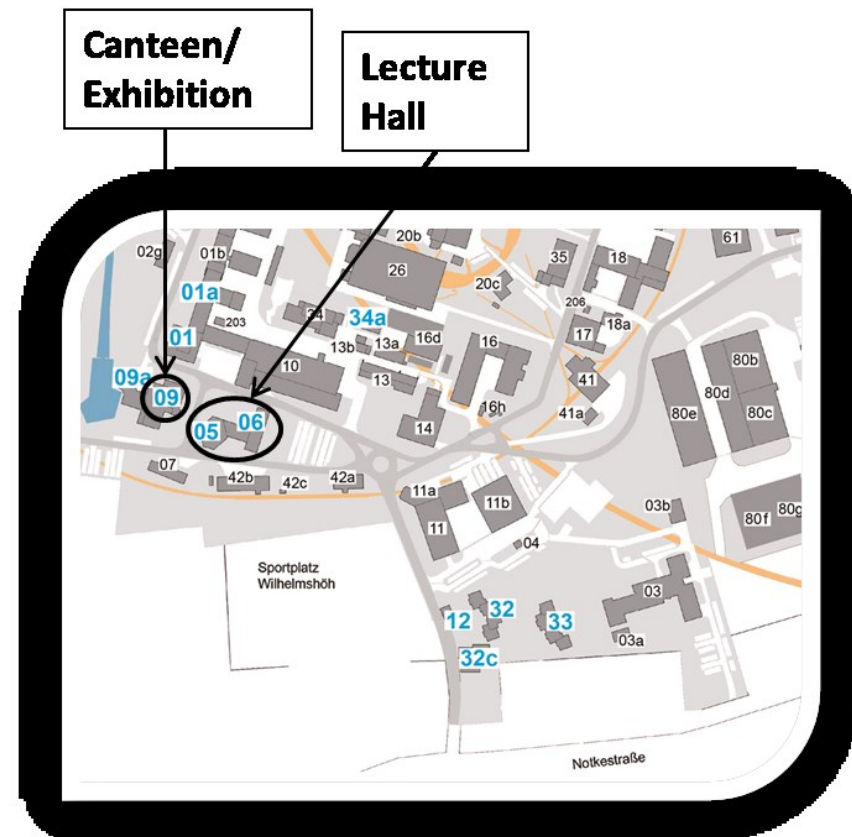
Workshop organization

Lunch

- Lunch tickets valid until 10 €
- DESY canteen building 9, opposite of lecture hall

Dinner

- Wednesday, November 11th at 20:00
- During exhibition in building 9
- end 22:00



DESY tour

- Meeting point → in front of the registration desk
- Please be on time!
- Canteen closes at 14:00 → lunch in cafeteria possible (also building 9)



Group photo

- > Wednesday, November 11th at 13:10
- > Meeting point (depending on weather) in the lecture hall or in front of building 5

WLAN

- > name "**MTCA-Workshop**"
- > Password **bFtL9hXb**



Please note: the workshop will be audio and video recorded for live streaming. The talks will be stored and published after the workshop.

**Wish you an informative
and pleasant
2nd MTCA Workshop**

Thanks for attention