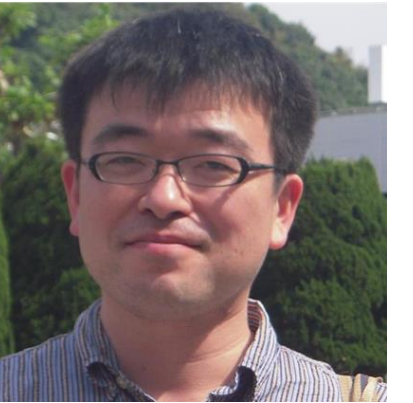


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Abstract

New software framework, DARUMA was developed to provide **staffs and users friendly system for control system of X-ray experimental stations**. DARUMA utilizes MADOCA used for controls of SPring-8 accelerator, and also provides general software tools for stations. DARUMA has merits to reduce maintenance costs and reuse basic software.

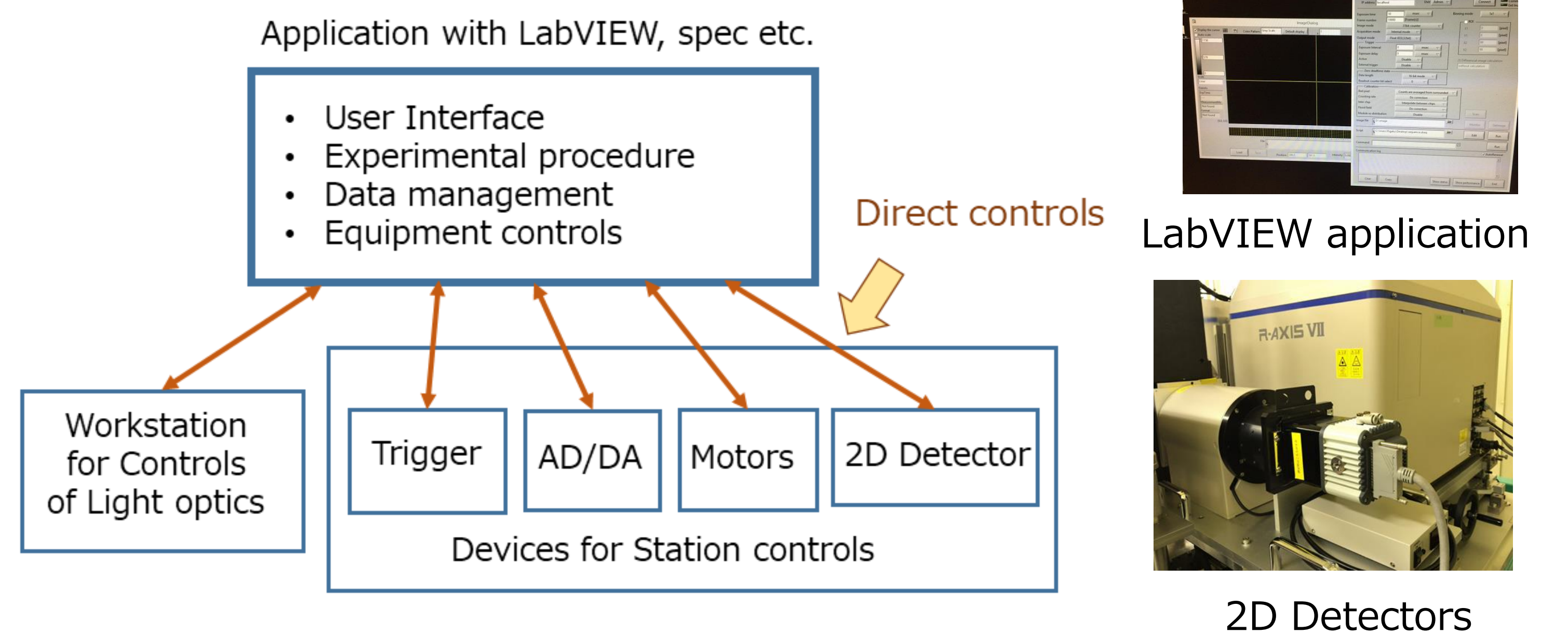


Demands on experimental stations at SPring-8

- Easy reconfiguration to update experimental setup
- Rapid preparation of measurement software
- Easy to reuse basic software tools



But time and costs are required for setup and difficulties in reuse of software due to current **monolithic application** in stations at SPring-8



Solution with DARUMA

✓ Separated software processes for each function with MADOCA

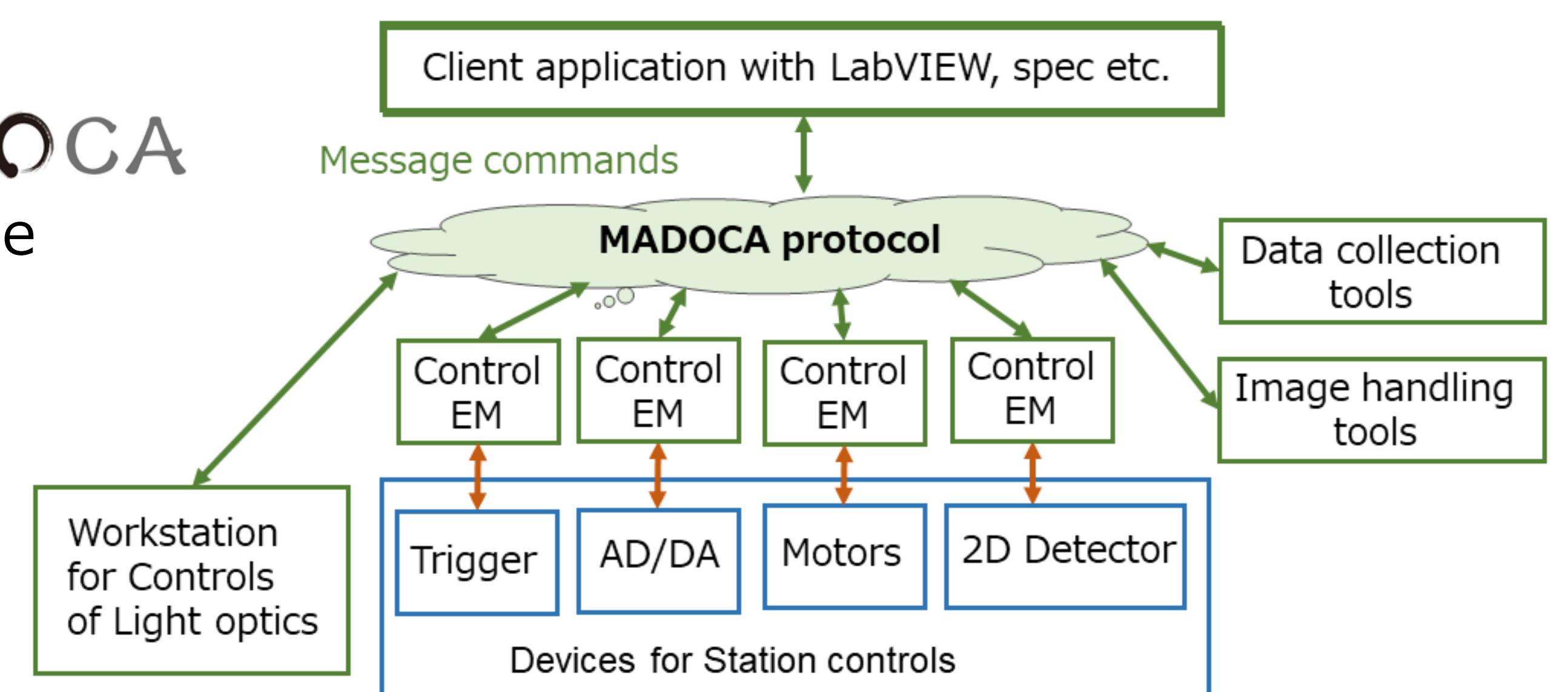
- Used for distributed controls in SPring-8 accelerator and beamline
- Useful features of MADOCA for stations:
Interface with LabVIEW, Python
Messaging with variable length data (Image etc.)

→ Facilitate reconfiguration to update experimental setup

✓ Developed general software tools for stations

- Equipment Manager(EM) for 2D detector, trigger, motor etc.
- Data collections, image handling
- Command procedure for measurements

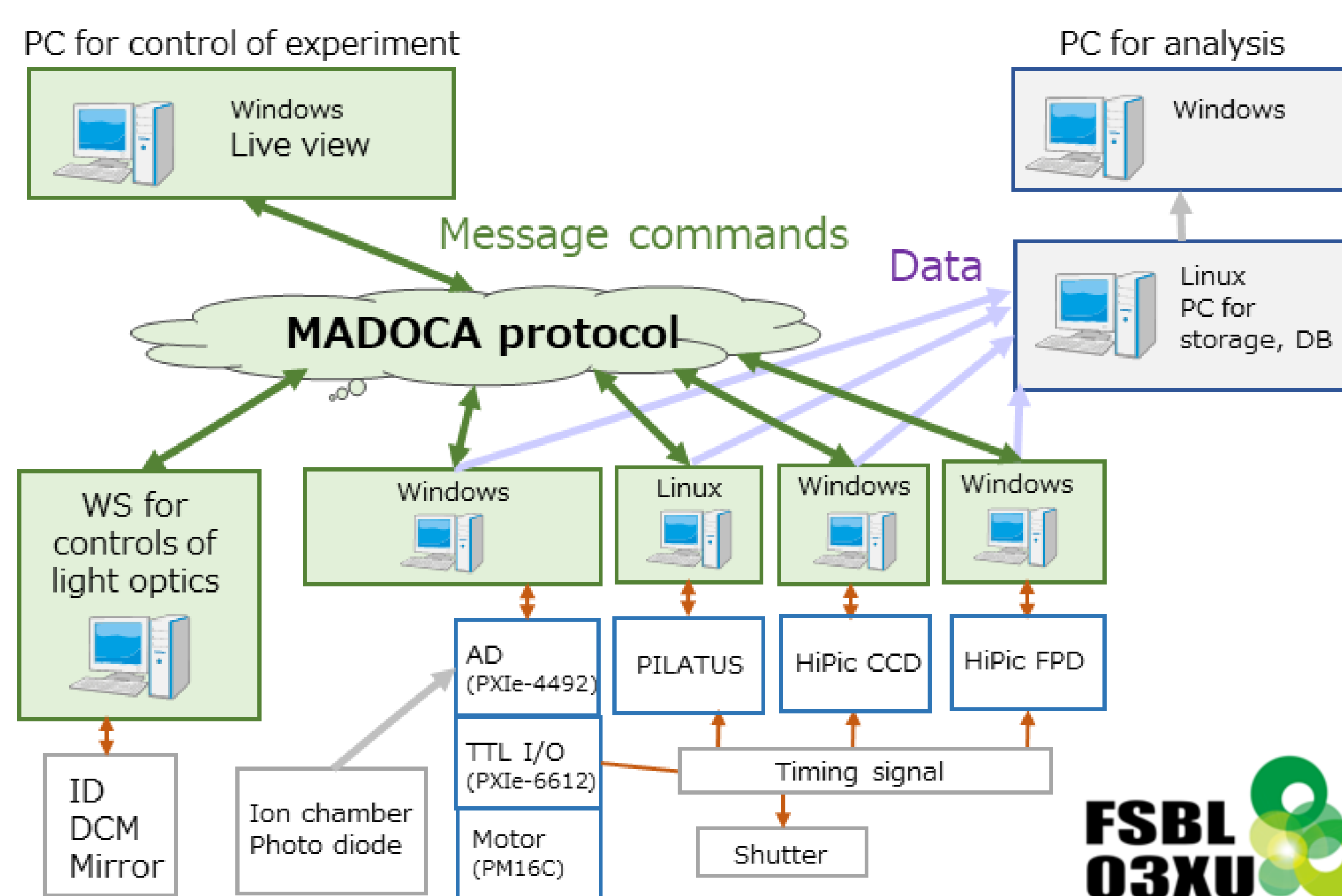
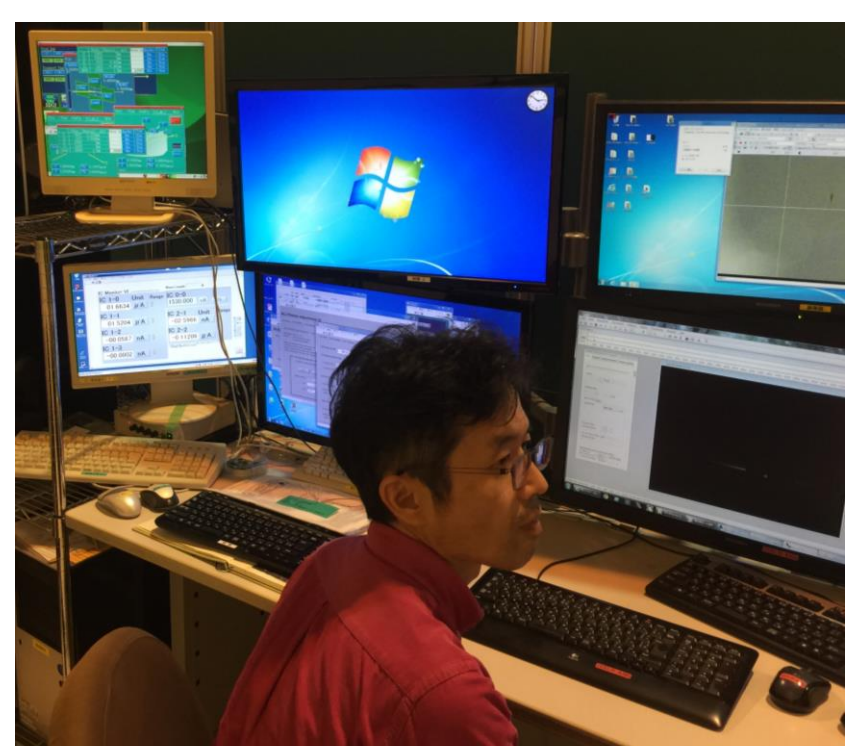
→ Easy to plugin for improved measurements



Staffs and users can concentrate on experimental procedure with user interface

DARUMA into SPring-8 BL stations

✓ BL03XU (soft material beamline)



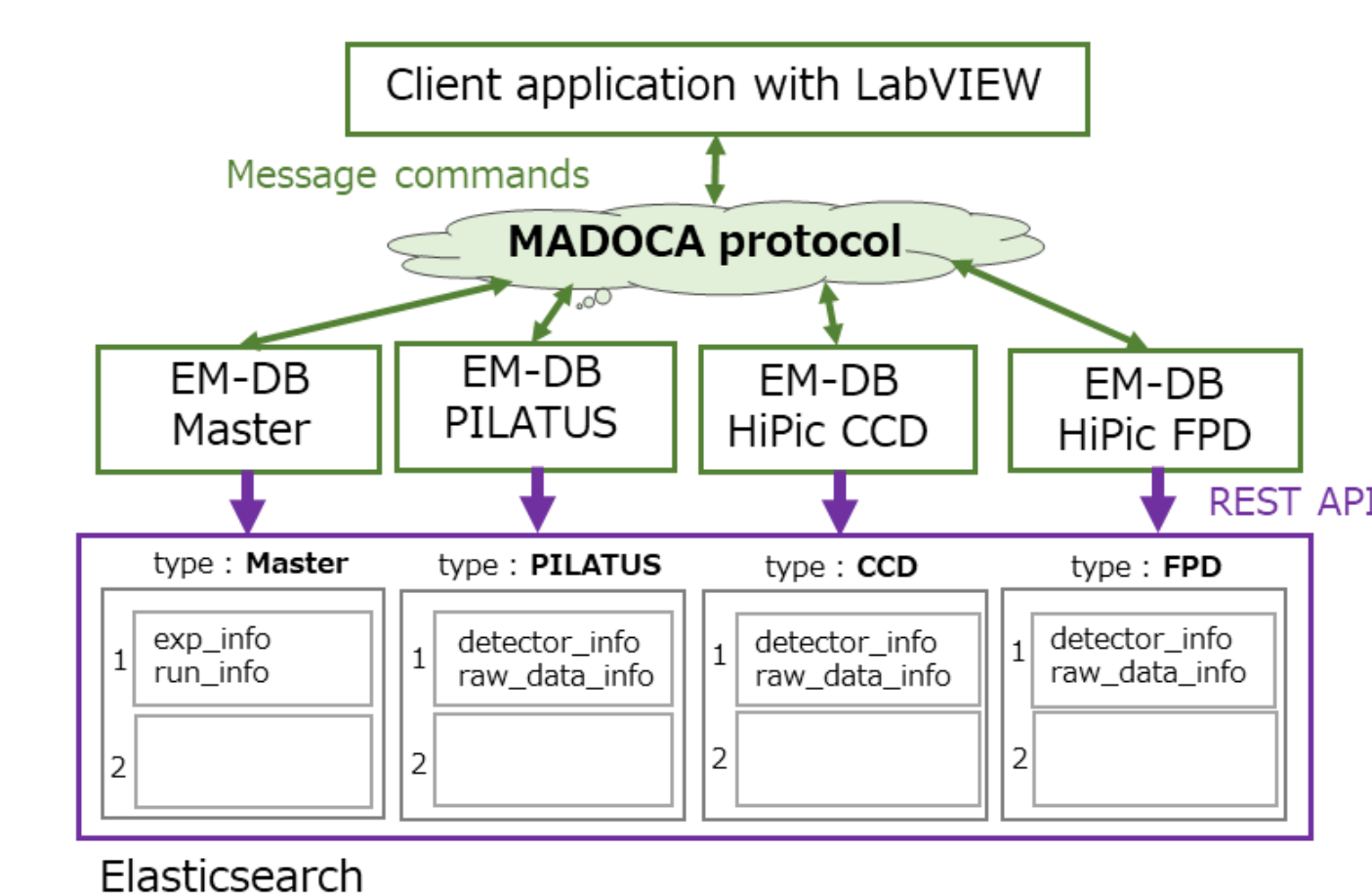
- Being smoothly replaced with DARUMA
- Ready : EM, Data collection, Image handling

✓ Other experimental stations at SPring-8

DARUMA was implemented for partial set of the control system:
EM of 2D detector, motors
and Image handling (Live view, Image integrated sum)

→ BL08W, BL13XU, BL14B2, BL19B2, BL46XU since this September

✓ Data logging



run_number	run_comment	timestamp	event_num	download	filepath	detector
1	NIAs-type MAs	2016-07-07 14:15:32.366	3	download	in/PILATUS/M03xu/	PILATUS
2	NIAs-type MAs	2016-07-07 14:15:30.158	3	download	in/PILATUS/M03xu/	PILATUS
3	NIAs-type MAs	2016-07-07 17:21:13.440	3	download	in/PILATUS/M03xu/	PILATUS
4	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS
5	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS
6	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS
7	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS
8	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS
9	NIAs-type MAs	2016-07-11 17:25:30.570	3	download	in/PILATUS/M03xu/	PILATUS

- Collected detector data is archived with

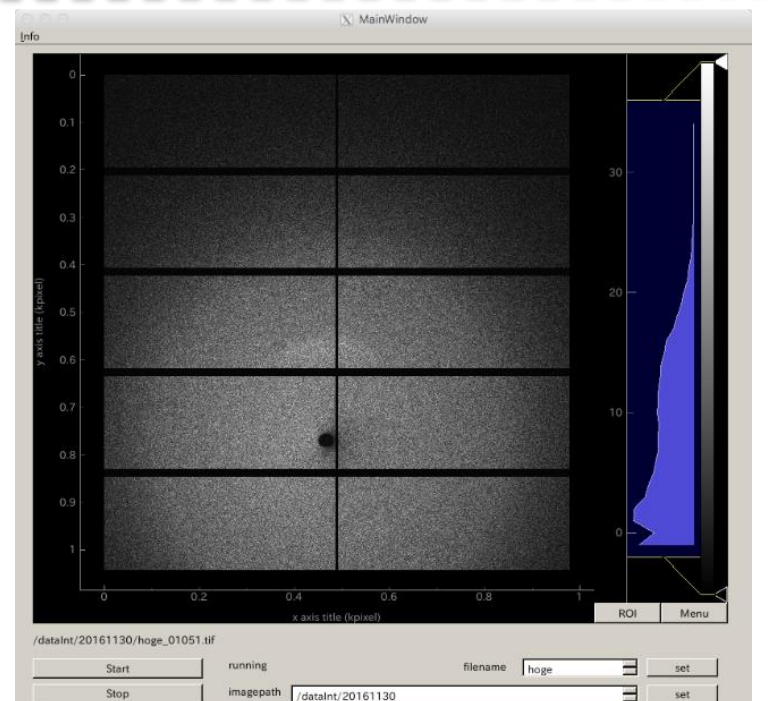


- ~10 Hz, M pixel image
- With meta data in measurement, voltage etc.
- For image data, path on the storage server is recorded

- Web portal Tornado for viewer of detector data
- Full-text search (Japanese) using elasticsearch

✓ Image handling

- Image data is transferred with message
- Live view with PyQT (pyqtgraph)
→ A few Hz for M pixel image data
- Image analysis through control EM
→ Image integrated sum (ROI)



Summary and Plan

- DARUMA for station software framework was developed and being applied to several stations at SPring-8
- Plan : Improve image handling tools, documents and installers to promote DARUMA into stations at SPring-8
→ Willing to complete DARUMA by drawing right eye!



References

- T.Matsumoto et al., "Next-generation MADOCA for SPring-8 control framework", Proc. of ICALEPCS 2013, San Francisco, USA (2013) p.944
- T.Matsumoto et al., "LabVIEW interface for MADOCA II with key-value stores in messages", Proc. of ICALEPCS 2015, Melbourne, Australia (2015) p.669