



# Central Analytical Laboratories (CAL) - Central Radiocarbon Laboratory

## CRL update

Samuel Hammer, Johannes Lux, Stefan Lanz,  
Bernd Kromer and Ingeborg Levin

*Institut für Umweltphysik, Uni Heidelberg*

ICOS Atmosphere Monitoring Station Assembly (MSA)

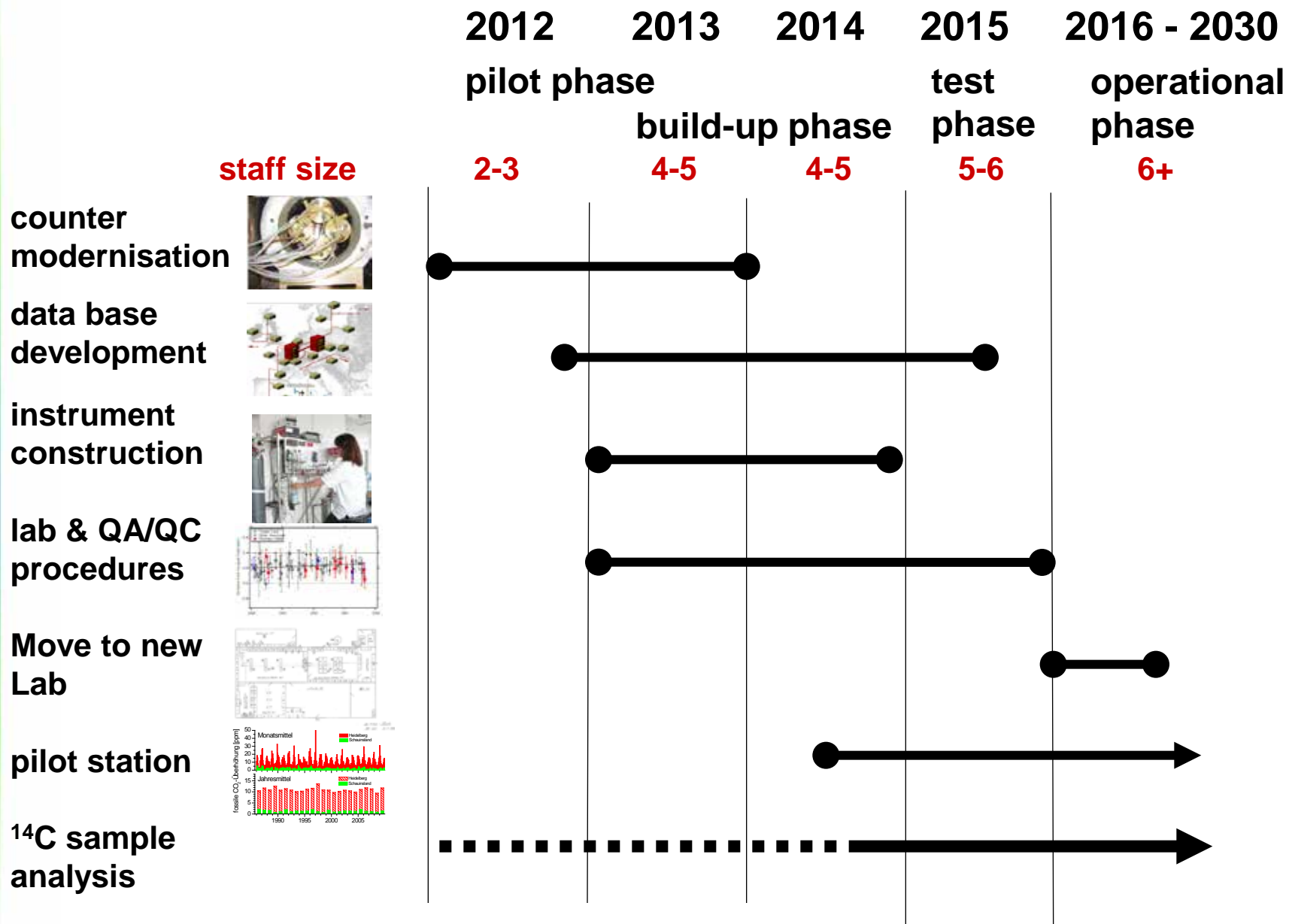
13.-14.November 2013, Paris



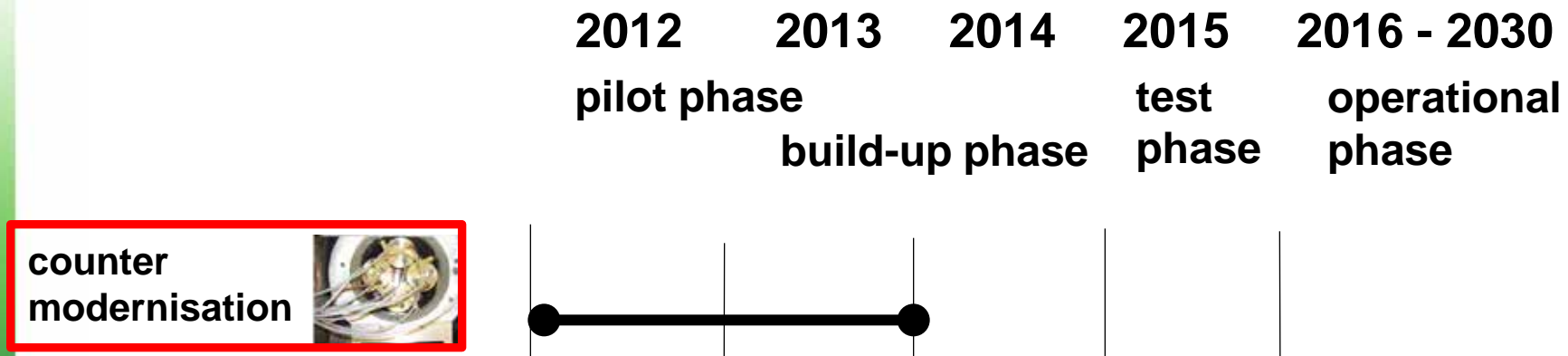
Bundesministerium  
für Bildung  
und Forschung



# CRL implementation plan



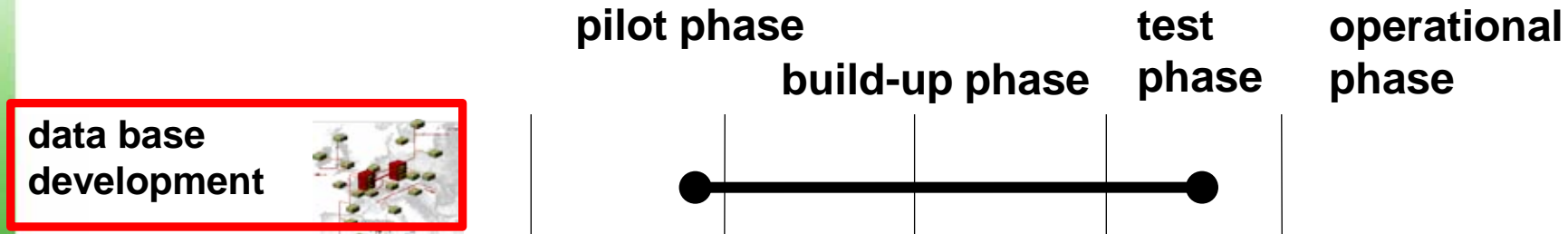
# CRL implementation plan



- Ø 50% of all counters have new counting wires, ongoing according to requirements
- Ø New pre-amplifiers were designed, tested and installed in 3 counters, successive implementation according to requirements
- Ø A prototype CPU was designed and successfully tested. The final version is currently manufactured for all counters.



# CRL implementation plan



- Ø First QC tools for the conventional counting were realised
- Ø Database structure for  $^{14}\text{C}$  flask samples was set up and is currently tested
- Ø Automated link between the CRL DB and the AMS facility in Mannheim is established and currently tested



# CRL implementation plan

**instrument construction**

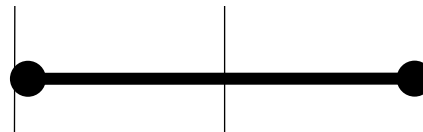


**pilot phase**

**build-up phase**

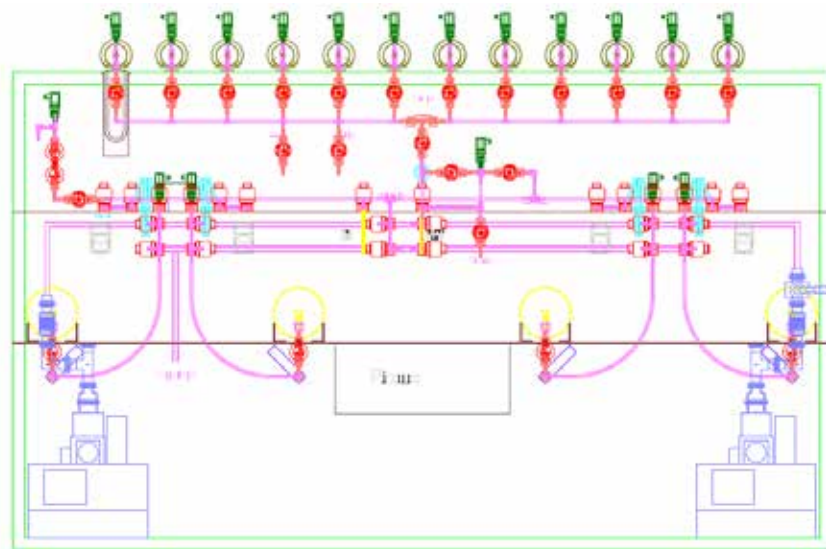
**test phase**

**operational phase**

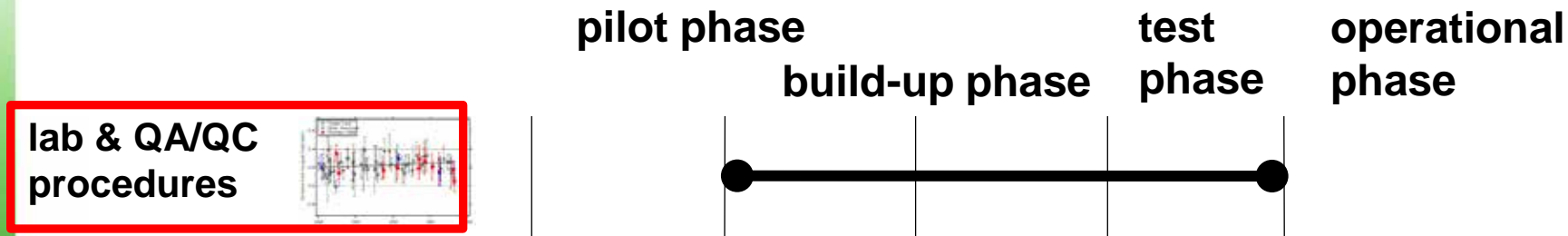


Ø New 4-fold CO<sub>2</sub> purification device is ready for testing

Ø Flask extraction- and graphitisation unit is currently designed



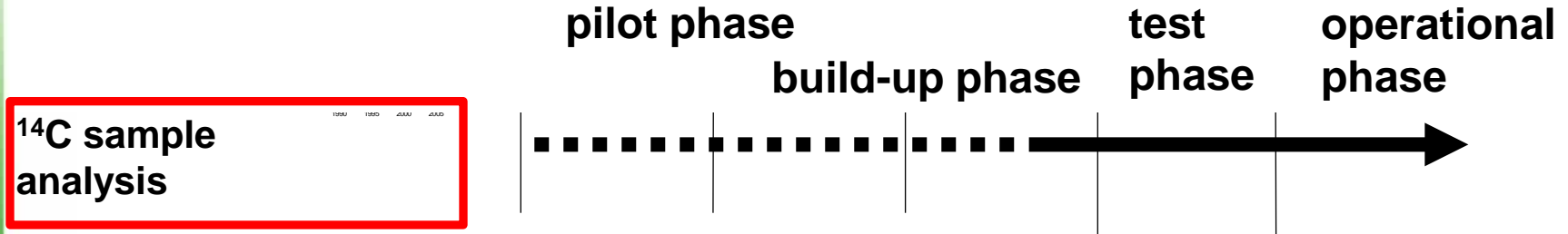
# CRL implementation plan



- Ø Regular analysis of three QC sample types were implemented for the convention counting
- Ø Two long-term AMS surveillance cylinders for AMS were established
- Ø Routine comparison between conventional- and AMS measurement techniques



# CRL implementation plan



approx. 150 (ICOS) samples analysed  
in 2013:

Ø Jungfrauoch  
Ø Mace Head  
Ø Heidelberg

Ø Trainou  
Ø Cabauw  
Ø OPE



# CAL task list - Summary CRL

Task List	Status	tentative start*
Build $^{14}\text{CO}_2$ systems for integrated samples	tests of new integrated sampling device for AMS samples	Q4/ 2014
provide NaOH solution for large volume $^{14}\text{CO}_2$ integrated sampling	ongoing, design of improved shipping containers	ongoing
Analyse NaOH solution samples for $\text{D}^{14}\text{CO}_2$ , $\text{d}^{13}\text{CO}_2$	ongoing, increase capacity	ongoing
Analyse flask air samples for $\text{D}^{14}\text{CO}_2$ , $\text{d}^{13}\text{CO}_2$	Prototype operational, designing final device and ordering components	2015
communicate flask air analysis data to ATC (via FCL)	database programming started, collaboration with FCL	2015
communicate with station PIs for NaOH shipment and in cases of problems (via CAL DB)	logistics database incl. web front end planned in coop. with FCL	2015
keep track of flask location (via CAL DB)	logistics database / web front end planned in coop. with FCL	2015



## Task List

## Status

## Start\*

Prepare reference gases

compressor, sampling line in place, system designed → order of components

Q2 / 2014

Calibrate standards relative to WMO scales, re-analyse standards

CRDS & FTIR delivered, GC set up → testphase; 9 WMO standards in Boulder

Q2 / 2014

analyse flask air samples for CO<sub>2</sub>, d<sup>13</sup>CO<sub>2</sub>, d<sup>18</sup>O-CO<sub>2</sub>, CH<sub>4</sub>, (d<sup>13</sup>CH<sub>4</sub>, dD-CH<sub>4</sub>), N<sub>2</sub>O, SF<sub>6</sub>, O<sub>2</sub>/N<sub>2</sub>

GC- & CO<sub>2</sub>-IRMS systems constructed → test phase

Q2 / 2014..  
..Q3 / 2014

condition flasks with dried air

designed, main components ordered

Q2 / 2014

leak - check flask after analysis, repair flasks if necessary

designed, components to be ordered

Q3 / 2014

communicate flask air analysis data to ATC

database programming and collaboration with ATC started

2015

communicate with station PIs for flask shipment and in cases of problems

logistics database incl. web front end planned

2015

keep track of flask location

develop flask sampler prototype and initiate commercialization

software development, final design adaptation

Q2 / 2014