3rd Project meeting

London (April 15, 2013)

RainGain

To improve fine-scale measurement and prediction of rainfall and to enhance urban pluvial flood prediction, with advanced radar technologies

WP1:

Installation and testing of rainfall radars

RainGain WP1

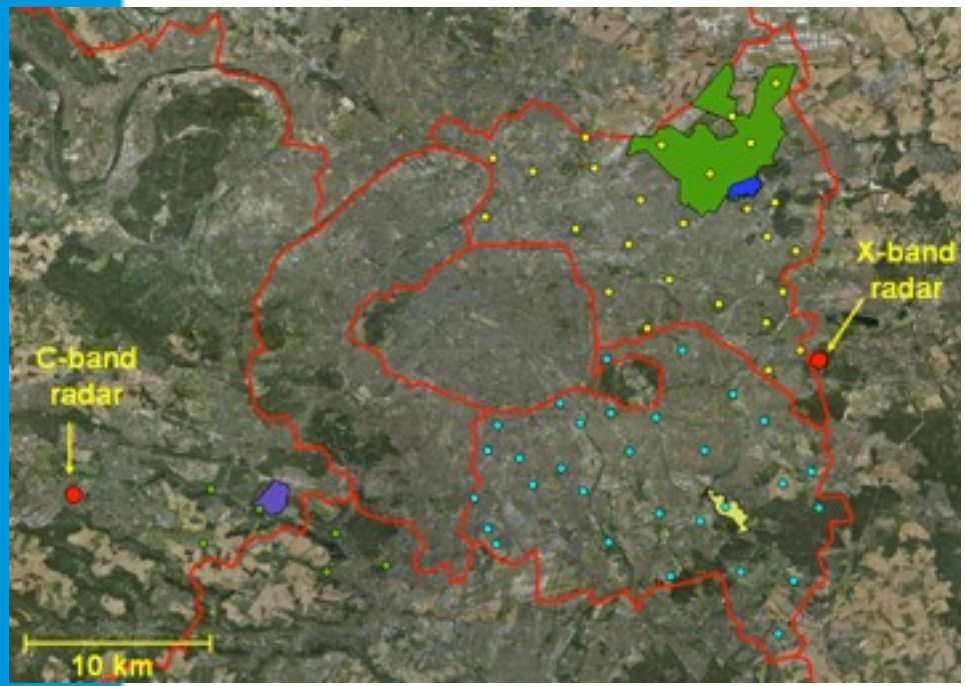
WP1	A1 Radar acquisition	A2 Radar installation and testing	A3 Appraisal of existing rainfall data	A4 Future use and ownership of radar
	Output: Radars NL, F	**Output: report on testing**	Output: presentations at pilots (NOG)	**Output: agreement with future owner (NL)**

Partners are at various stages :

- FR and NL are acquiring new polarimetric radars
  - Public tenders turn out to be complex
- BE had already a radar
- UK borrowed a radar

Paris

Radar implementation



Interest of having two radars (X of RainGain, C of Météo-France at Trappes) rather far apart

- Storms generally from West, discharges from East
- East of Paris:
  - low visibility from Trappes
  - Important test field for urban research (Marne-la-Vallée),
  - in particular within the programme « Numerical City »
  - PST Paris-Est on urban systems
  - Several gauge networks (>2 x 30) + C-band radar

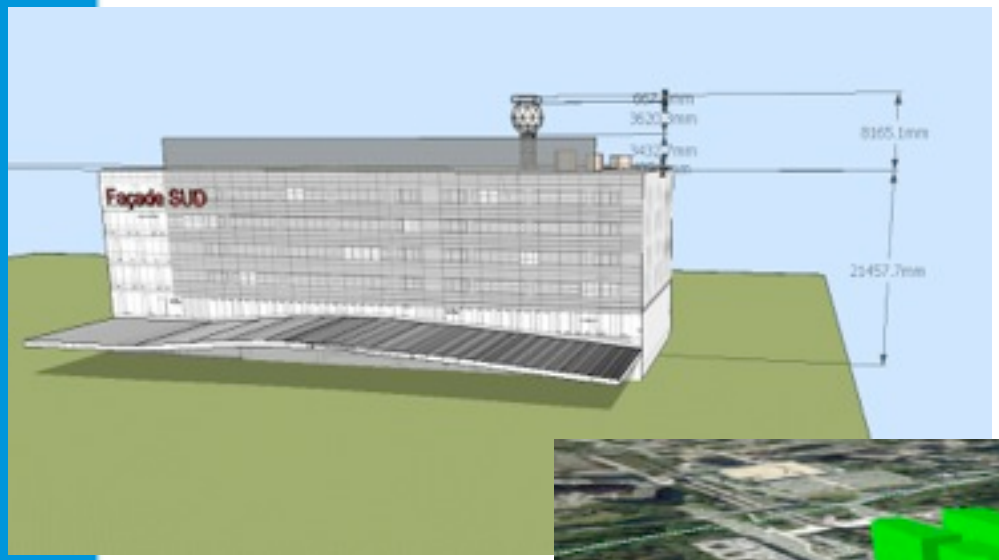
Paris

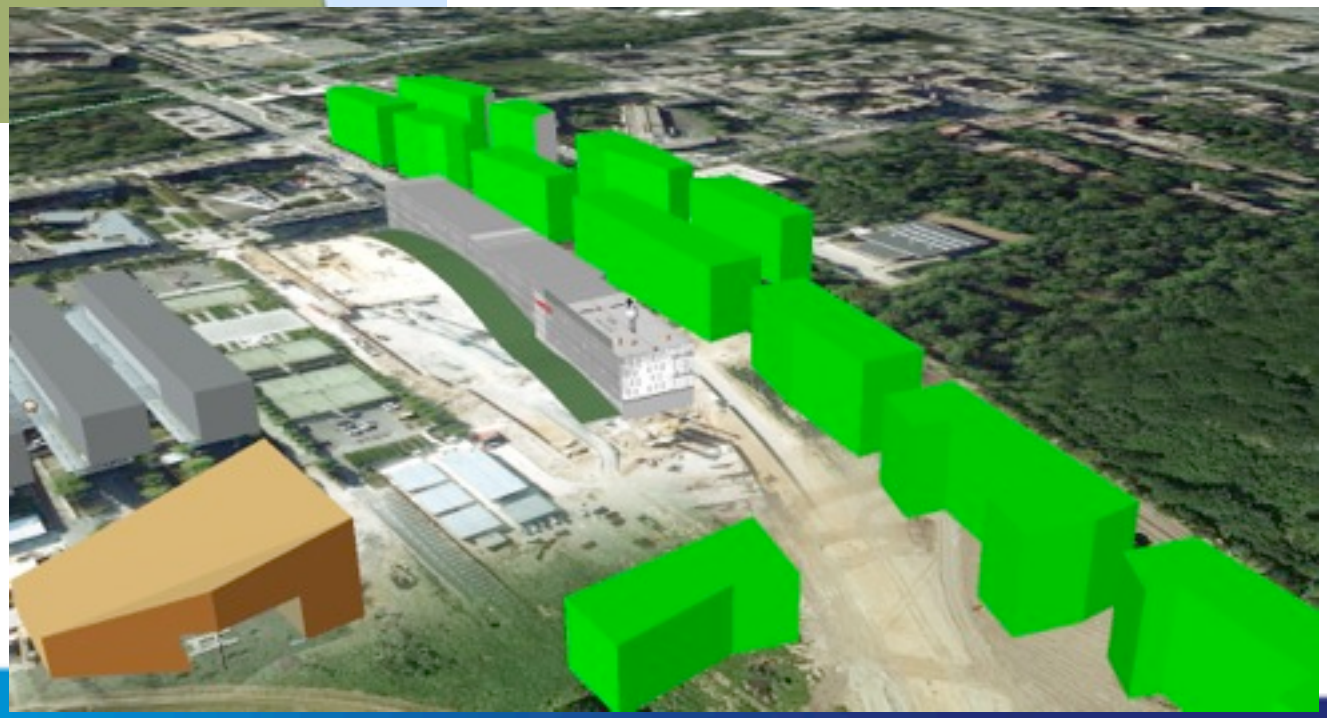
Radar implementation

A rather systematic study of the potential sites with GIS tools (ENPC) and in-situ visits with the help of Veolia and CG94

Paris Radar implementation

Back to Paris-Est Campus





Paris Radar implementation

Back to Paris-Est Campus

Paris Radar implementation

Back to Paris-Est Campus

Paris

Public tender

- Prepared and analysed by ENPC with Meteo-France, some consultancy with TU Delft
- Published 03/08/13, with a deadline of 19/09/13
- 83 basic requirements and a conformity matrix, but with a flexibility of 15%
  - Open call
    - with/without radome, but with wind resistance 50 m/s (180 km/h)
    - antenna with/without offset, but secondary lobe <30 dB, same for polarisation separation
  - Basic requirements
    - $P_c \geq$ 50 kW (H+V)
    - angular velocity 0-30°/s
    - Pulse with: 2; 1; 0.5 μs (300, 150, 75 m)
    - Measurement range 0,5-60 km, detection 150 km
    - Primary data (Z_H , Z_{DR} , ρ_{HV} , V_R, σ_V, σ_Z)
    - digitalisation ≥14 bits
    - Specific coding for missing data and noise level
  - Complements
    - analytical signal: spatial heterogeneity of drops
    - refractivity on fixed echoes

Paris

Public tender

- 5 firms asked for details

- 2 met the deadline
  - Ineo-Novimet
  - Selex

Ineo-Novimet

Selex

- Rather similar and high performance
  - more originality with Ineo-Novimet
  - Less operational experince
  - Large budget difference (≈30%)

Paris

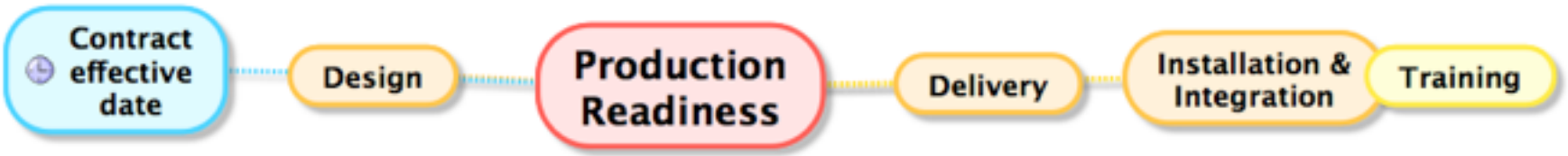
Selected radar

METEOR 50DX

COMPACT WEATHER RADAR

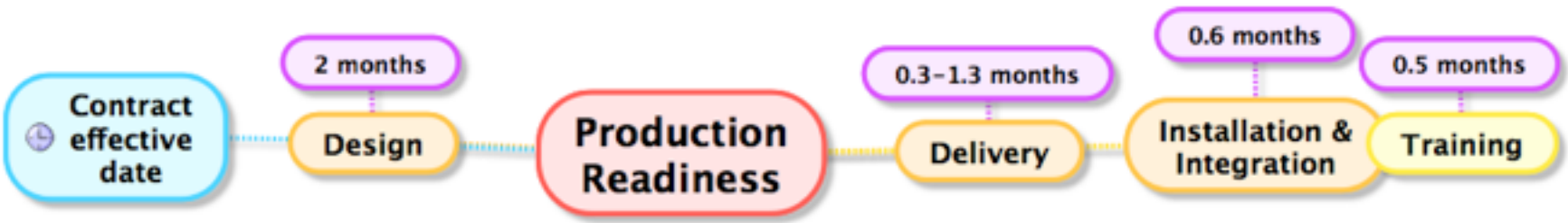
Paris

Radar acquisition



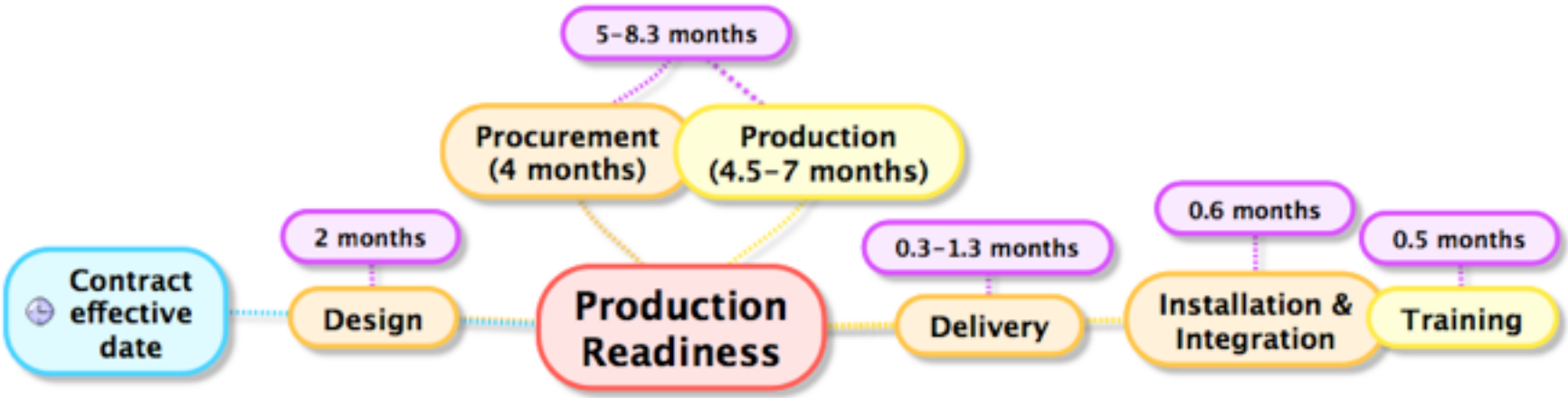
Paris

Radar acquisition



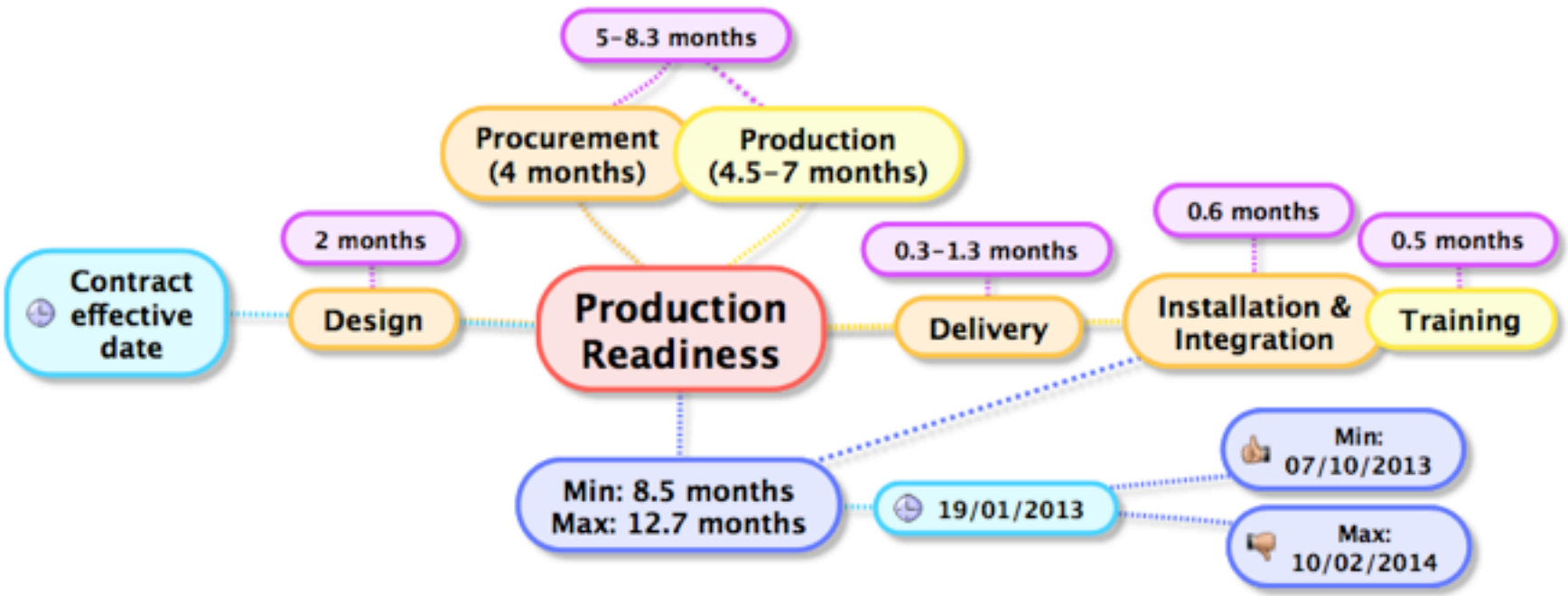
Paris

Radar acquisition



Paris

Radar acquisition



25/03/2013

Rotterdam

Specs Rotterdam radar

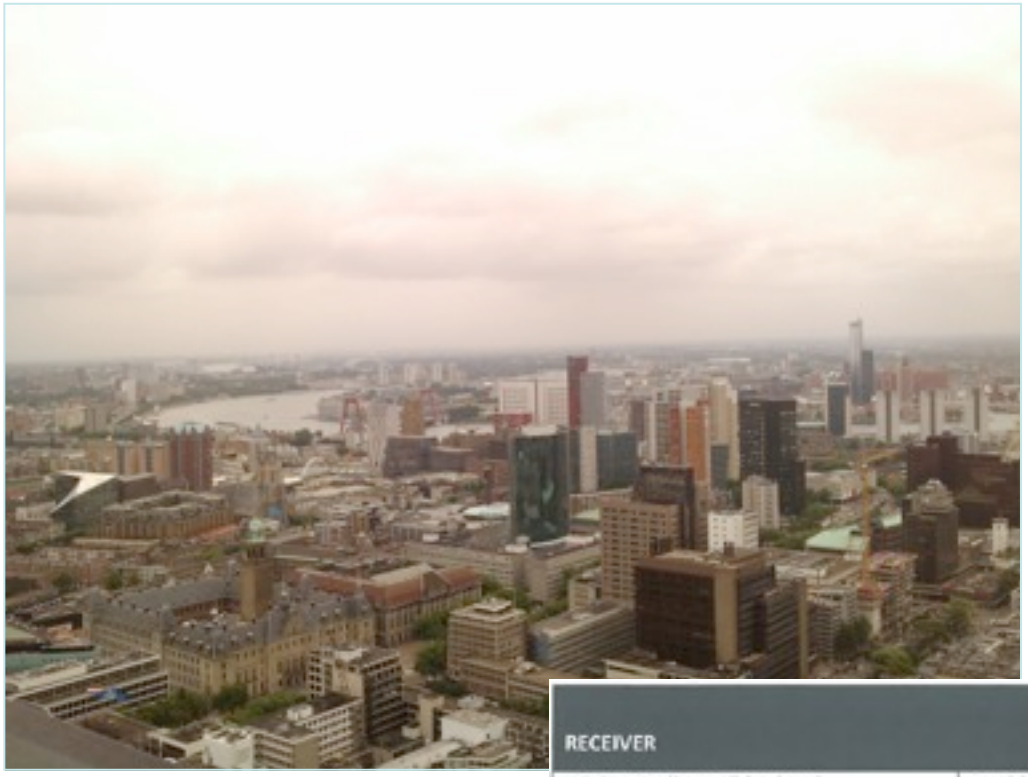
RADAR SYSTEM		Compliant ?
Radar Type	Polarimetric Doppler Weather Radar	YES, (FM-CW)
Frequency	9.3 - 9.5 GHz	YES
Minimum operational range	200 m	YES
Maximum operational range	60 Km	YES
Range resolution	≥ 30m	YES
Sweep rate	Up to 2500 Hz	YES
Transmitter polarization	Sweep to sweep H V	YES
Receiver polarization	Simultaneous H/V Dual-channel receiver	YES
Transmit power stability	≤ ± 0.1 dB per second ≤ ± 1.0 dB per day	YES
Phase noise from sweep to sweep	≤ ± 1° per second	YES
Indication of the required sensitivity	≥ 10dBZ at 30Km	YES

Rotterdam

Specs Rotterdam radar

ANTENNA		
One-way half-power beamwidth	1.8° in azimuth and elevation	YES
Side lobes level	First side lobes less than -25dB Then less than -28dB	YES
Integrated cross polarisation isolation	> 25 dB	YES
Azimuth operating range	0° - 360° continuous	YES
Elevation operating range	0° - 90°	YES
Angular positioning accuracy	± 0.1°	YES
Scanning speed	0 (stopped) - 5 rpm	YES
Radome	No radome, 24/7 all weather	YES
Antenna Control	software	YES
		YES

Rotterdam



Specs Rotterdam radar

RECEIVER		
Minimum discernible signal	≤ -102 dBm at 30m resolution	YES
Linear Dynamic Range	> 70 dB	YES
Maximum number of range bins	At least 2000	YES
Signal output	Native I/Q for both channels H and V in 16 bit	YES

Leuven

Aquafin:

- Four additional rain gauges installed by Aquafin and operational since about 6 months:
  - final testing and acquisition of these additional rain gauges, and
  - telemetry system for the automated data transfer of both the existing and newly acquired rain gauges
- Maintenance agreement for the radar after radar was brought back into operation after a revision period
- Improved radar data flows (radar WP1 <-> data validation and processing

➢ *See Leuven case presentation Johan Van Assel for more details*

Leuven

KU Leuven:

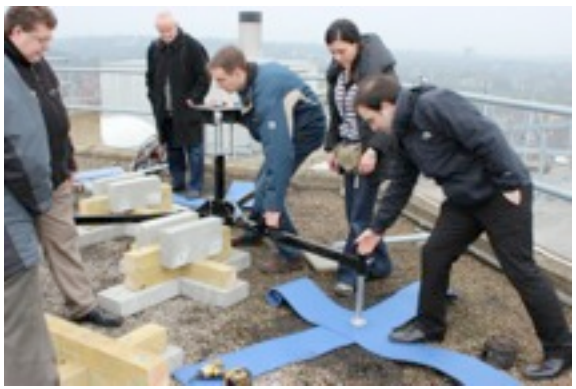
- Dynamic calibration of rain gauges (correction for tipping losses) + method exchanged with London case
- Visit to / negotiation with DHI on getting access to the raw radar signal (before preprocessing): after recommendation at WP2 Leuven International Workshop
  - ➢ Outcome: no access to the raw data, but to preprocessing product

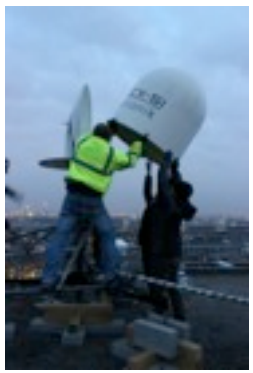
London

Installation of an X-band radar “Rainscanner”on loan from Selex for 6 months

(Not initially envisaged, so it is a “bonus”)

Installation on the roof of an hospital





Safety issue regarding the access to the roofs

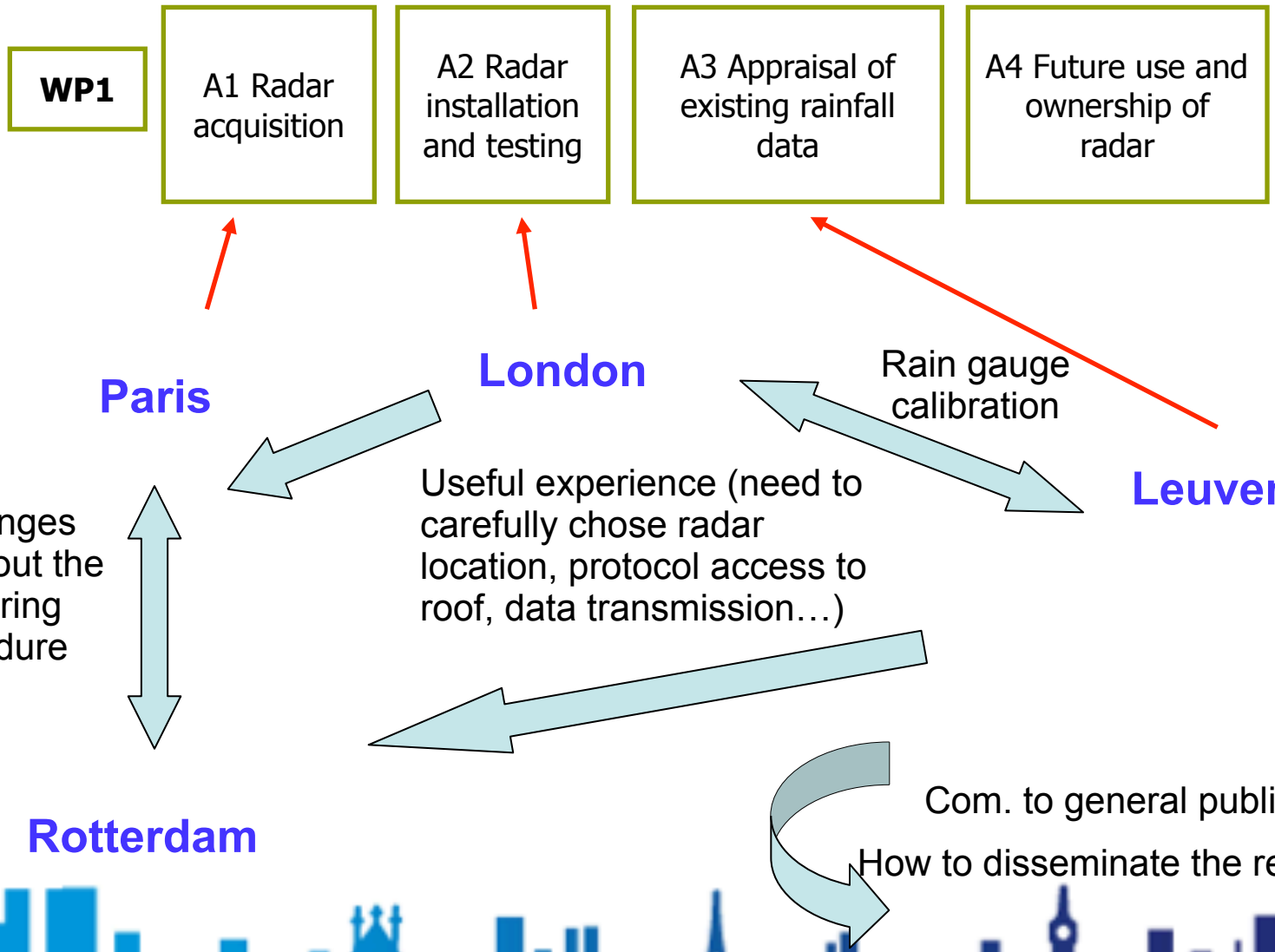
→ Dvp of a new protocol for accessing the roof

(the experience of Leuven was helpful)

London

Initial dvp of a website for dissemination of results

RainGain WP1



Future

- difficulties faced during the radar acquisitions :
  - implied delays
  - also brought important lessons for the future
- a one year extension would be desirable to begin exploitation of data