



2013 Image acquisition campaign

CID, Digital Earth and Reference Data Unit, JRC Ispra –

*Serving society
Stimulating innovation
Supporting legislation*

Outline

1. Evolution
2. Overview
3. High Resolution (HR)
4. Very High Resolution (VHR)
5. Issues
6. Expenditure
7. Image return
8. CAP Checks Campaign 2014

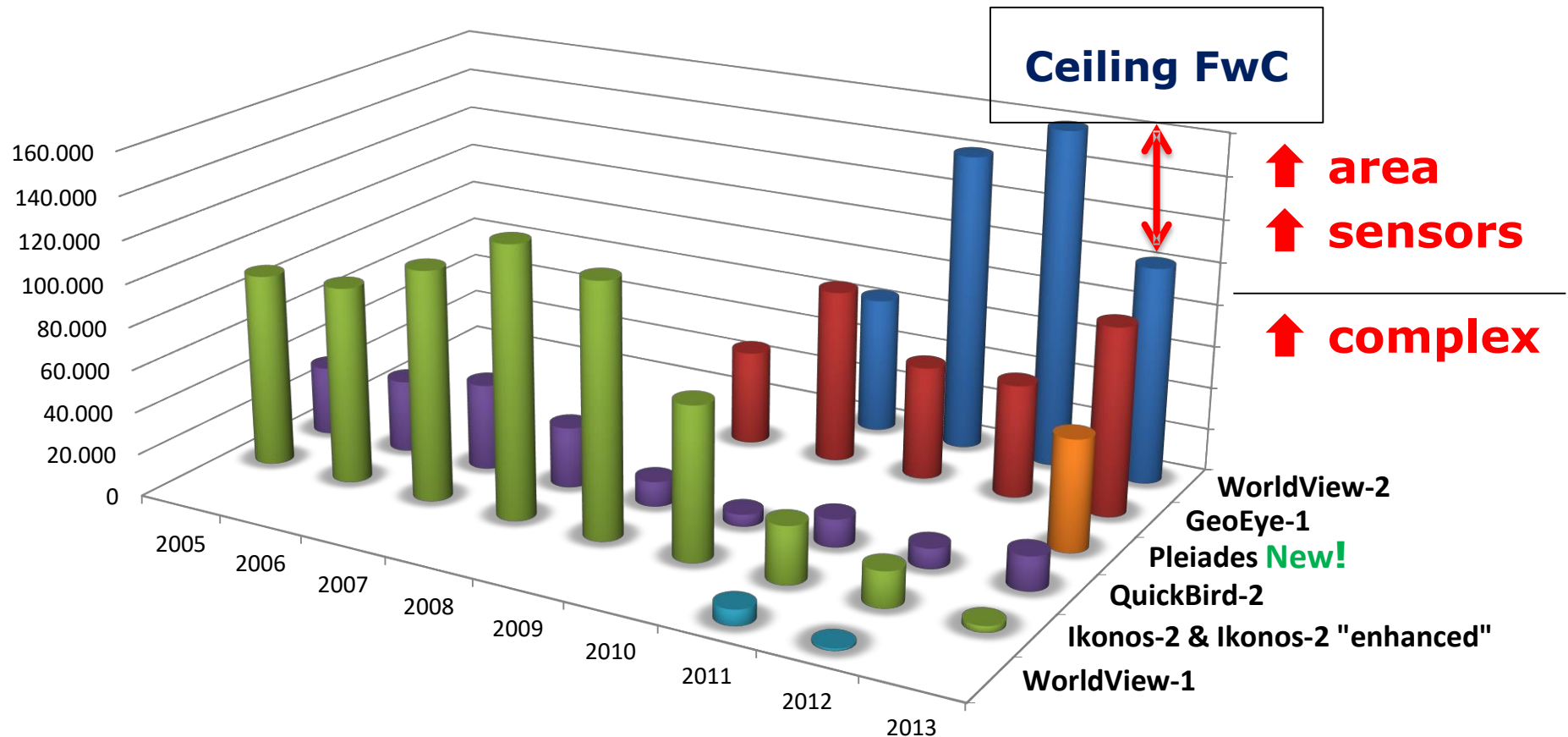
1. Evolution

		2003	2004	2005	2006	2007	2008	2009	2010*	2011*	2012*	2013*	
HR	Images	680	690	690	693	657	538	655	671	735	640	662	≈
	M€	1.60	1.70	2.00	2.30	2.30	1.60	2.13	2.12	2.00	1.57	1.62	≈
VHR	Km²*10³	12	50	126	127	150	160	175	224	242	242	267	x 22
	M€	0.30	1.60	3.00	3.00	3.30	3.80	3.90	4.55	5.10	4.87	5.28	x 18
M€		1.90	3.30	5.00	5.30	5.60	5.40	6.03	6.67	7.10	6.44	6.90	x 4
MS		12	22	24	23	24	24	25	27	27	27	28	x 2

* Including LPIS zones

1. Evolution

Purchased area by VHR prime sensors [km²]



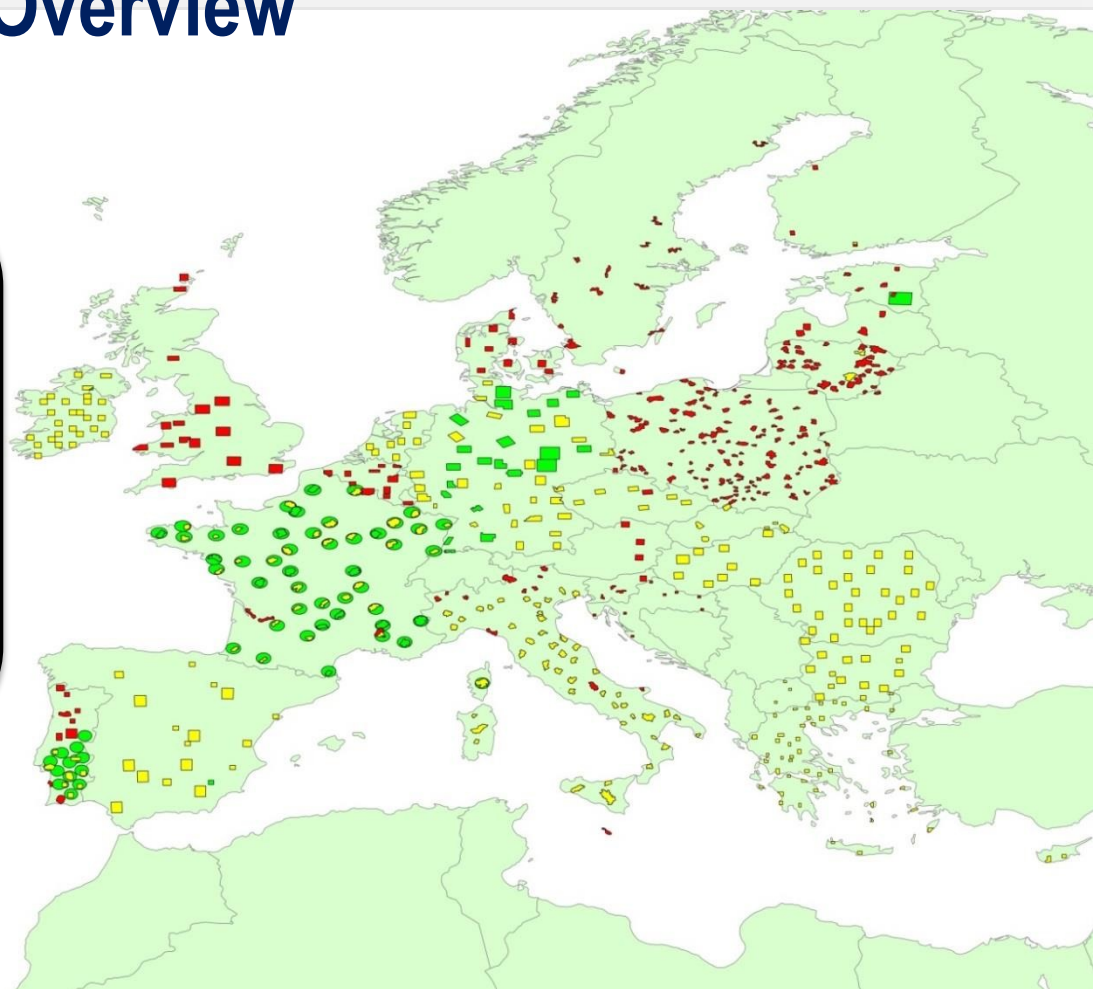
2. Overview

Participation:

- 25 MS CwRS or CwRS + LPIS
- 3 MS LPIS “only” (AT, LU, FI) and UK(Sc)
- 2 Pilot (IS, MK)

Legend

- VHR
- VHR/HR
- HR



3. High Resolution (HR) - Overview

Purchased images – 662 (640 in 2012) / **716 ARs opened** (28 closed)->**97%** (92% in 2012)

Failed – 26 ARs (29)

Av. no. of images per zone – 2.24 (2.83)

Extensions – 111 ARs

+ zones

≈ images

Windows	Purchased	Success rate
Autumn	72	97%
Winter	84	91%
HR-1	182	93%
HR(VHR)	5	-
HR+1	242	99%
HR+2	76	100%
HR+3	1	100%
TOTAL	662	97%

Additional requests – 22 images; 6 purchased

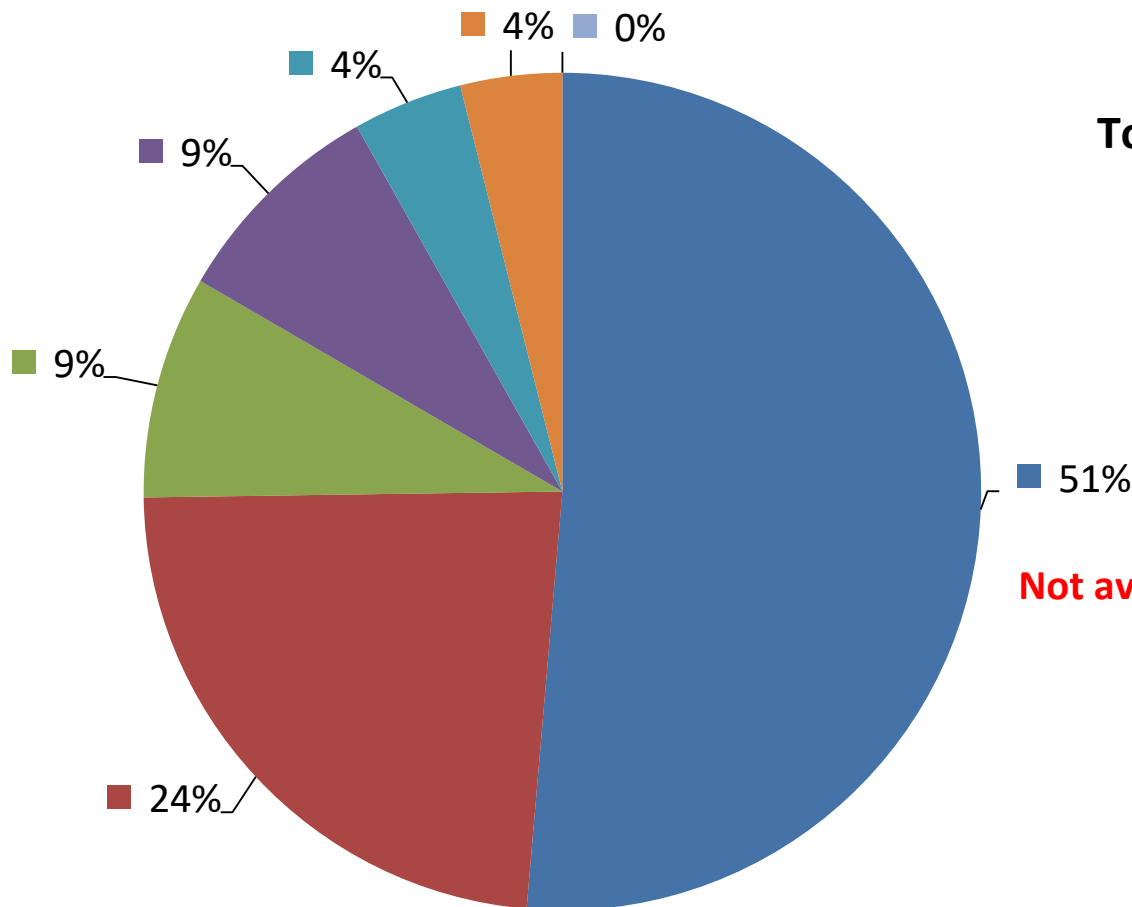
* In parenthesis comparison with 2012 Campaign

3. High Resolution (HR) – Image providers

Window	ASTRIUM	DMC	EUROMAP	SSC
Autumn	69	0	2	1
Winter	59	24	0	1
HR-1	123	36	17	6
HR(VHR)	4	1	1	0
HR+1	150	72	7	13
HR+2	47	23	1	5
HR+3	1	0	0	0
TOTAL IMAGES	453	155	28	26
% of TOTAL	68% (69% in 2012)	24% (15%)	4% (3%)	4% (2%)

* In parenthesis comparison with 2012 Campaign

3. High Resolution (HR) – Sensors



Total **purchased** images **662**

Ranking:

■ SPOT-5 - 340 (211 in 2012)

■ DMC - 155 (97)

New! ■ SPOT-6 (as from 18/6/13) - 57

Not available! ■ SPOT-4 (until 10/01/13) - 56 (230)

■ Resourcesat-1 & 2 - 28 (22)

■ Theos - 26 (13)

■ Formosat-2 - 0 (0)

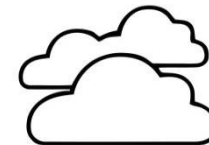
4. Very High Resolution (VHR) – Overview

Planned/purchased – 266,927 km² (242,318); 523 zones; 25 2nd VHR -> 100% (=)

Failed for dedicated sensor – 249 km²; 1 zone partial (AT)

Extended – 10,973 km² (3,889); 20 zones -> 96%* -> bad weather

Re-tasked – 515 km² (0); 4 zones -> floods



Speculative back-up purchased – 249 km² (5,799); 1 zone partial (AT)

* Success rate calculated in dedicated window (without extensions)

* In parenthesis comparison with 2012 Campaign

4. Very High Resolution (VHR) – Image providers

New!

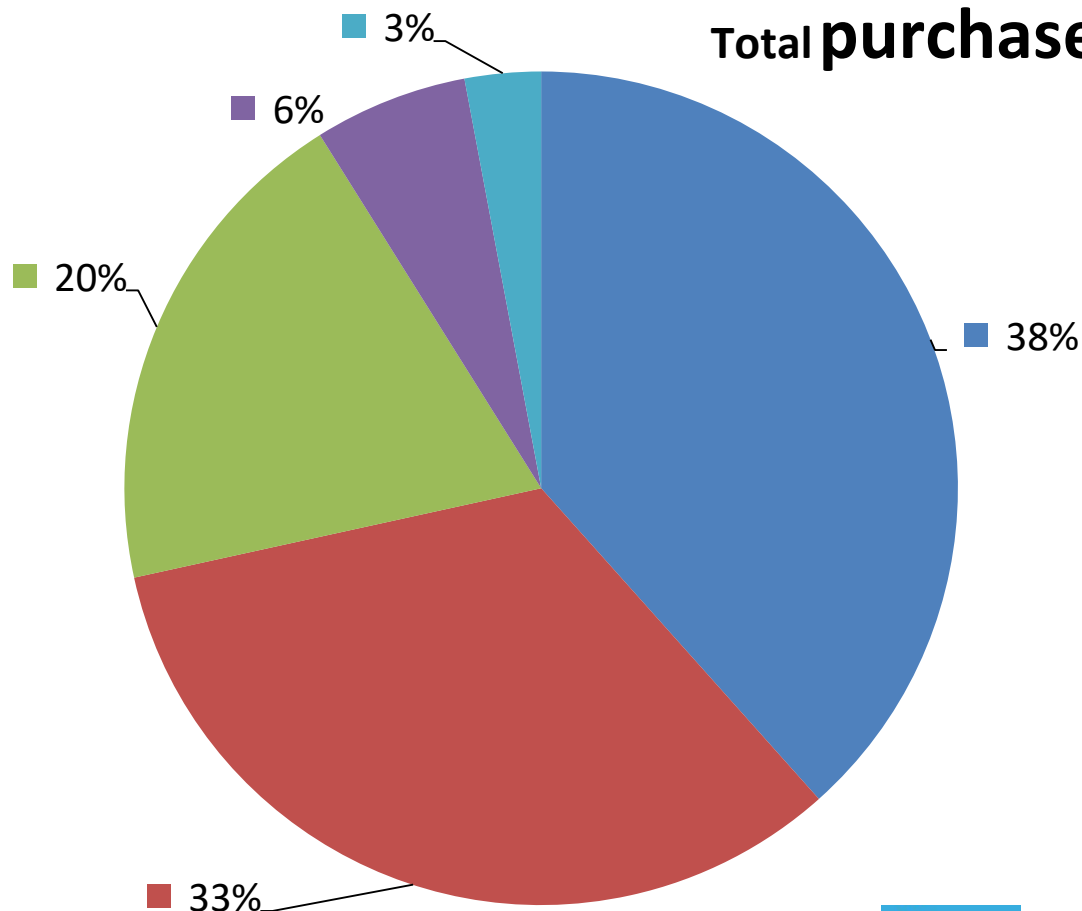
	EUSI	eGEOS	ASTRIUM
Purchased area [km²]	118,125 (163,751)	96,652 (68,879)	52,150
Success rate [area]	100% - 99%*	100% - 95%*	100% - 92%*
Av. acquisition time [days]	15 (=)	21 (24)	18
Av. upload time [days]	< 1 (=)	< 1 (=)	3
Av. time 1st - last acq. [days]	15 (10)	16 (12)	18
Re-tasked [zones]	1 (0)	3 (0)	0
Haze flag [% uploads]	5% (22%)	3% (6%)	1%

* Success rate calculated in dedicated window (without extensions)

* In parenthesis results of 2012 Campaign

4. Very High Resolution (VHR) – Sensors

Total **purchased** area (CwRS + LPIS) **266.927 km²**



Ranking:

■ WorldView-2 - 102,473 (159,251 in 2012)

■ GeoEye-1 - 88,530 (52,518)

New! ■ Pleiades - 52,150

■ QuickBird-2 - 15,901 (6,371)

■ Ikonos-2 - 7,873 (16,361)

4. Very High Resolution (VHR)

Cloud cover on upload

■ WV2 ■ GE1 ■ IK2 ■ QB2 ■ PL



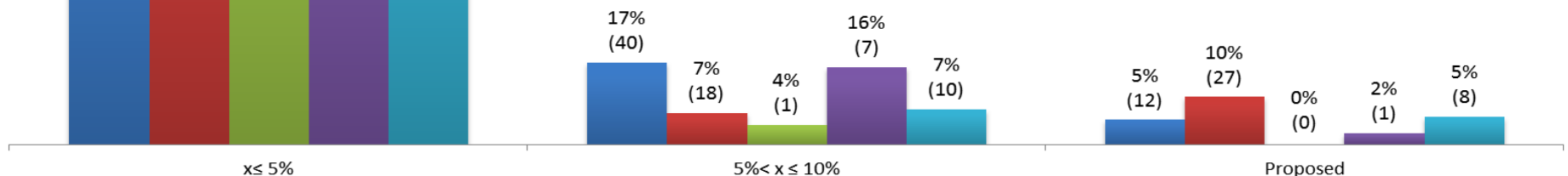
2013

N.of uploads	$x \leq 5\%$	$5\% < x \leq 10\%$	Proposed
704	580	76	48
	<u>82%</u>	11%	7%

Slightly worse performance than in 2012 -> Bad weather

Proposed

			Proposed
576	514	42	20
	89%	7%	3%



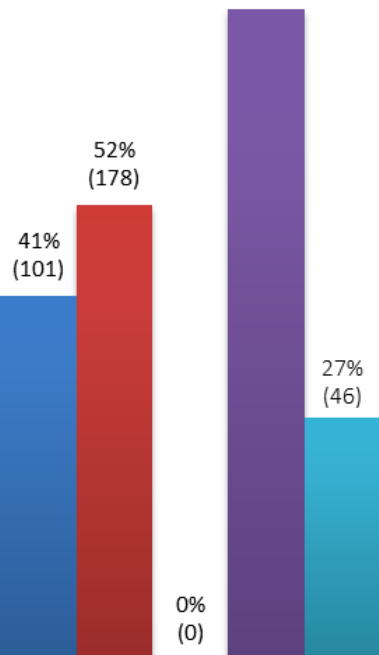
4. Very High Resolution (VHR)

Elevation angle of accepted images

■ WV2 ■ GE1 ■ IK2 ■ QB2 ■ PL



75%
(30)



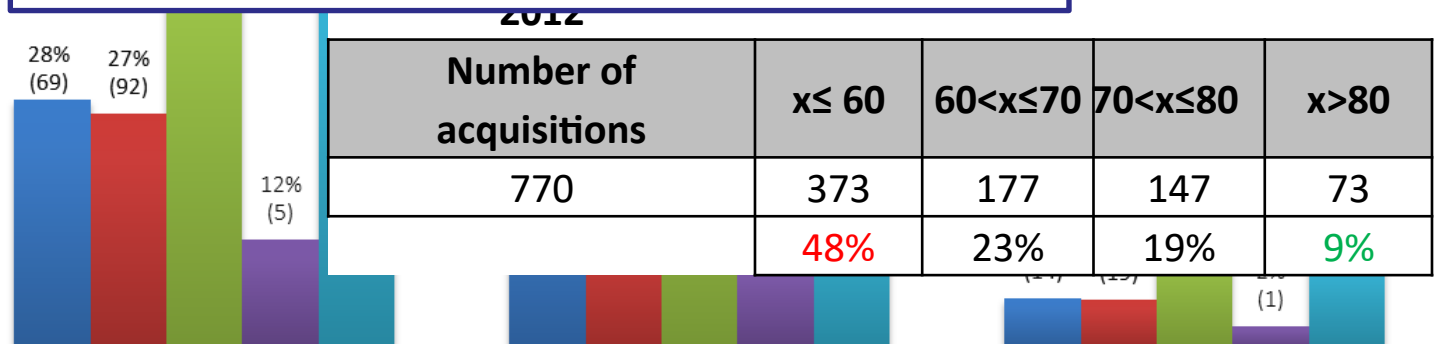
$x \leq 60^\circ$

Slightly better performance than in 2012

2013

Number of acquisitions	$x \leq 60$	$60 < x \leq 70$	$70 < x \leq 80$	$x > 80$
823	355	256	155	57
	43%	31%	19%	7%

50%
(19)



$60^\circ < x \leq 70^\circ$

2012

Number of acquisitions	$x \leq 60$	$60 < x \leq 70$	$70 < x \leq 80$	$x > 80$
770	373	177	147	73
	48%	23%	19%	9%

$70^\circ < x \leq 80^\circ$

$x > 80^\circ$

4. Very High Resolution (VHR)

Speculative backup

- **Planned/Opened** – 158,254 km²; 59% of total area (88%)
- **Purchased** – 249 km² (5,799); 0.1% of total area; 1 partial (AT) by QB2

Constellation tasking (WV2-QB2, GE1-IK2)

- **Resulted in** – ↓ av. acq. time and ↓ av. time between acq. -> **efficient**

Planned	Average acquisition time [days]	Time delay between acquisitions [days]
WV2	15	20
QB	28	20
EUSI constellation	↓ 8	↓ 7
GE1	23	22
e-GEOS constellation	↓ 19	↓ 12

4. Very High Resolution (VHR)

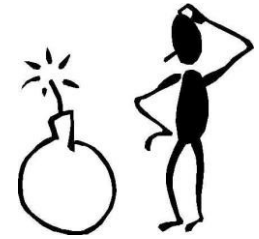
Extension of the window

- **Change** – used instead of ‘competitive’
- **Length** – Weekly extensions
- **Extensions results** – **10,973** km² (3,889);
20 zones; 4% of total
- **Sensors purchased** – dedicated in 100%
of cases after extension
- **Result** - 100% AOI



* In parenthesis comparison with 2012 Campaign

5. Issues



- **New IP** – fine-tuning at beginning of Campaign (e.g. xml, shapes, CC declaration, '.md5' files, ...)
- **Ordering** – some complains, delay in very few cases $< 1\%$ of total (> 7 days)
- **VHR changes** – of windows due to bad weather -> IP shown flexibility and swiftness
- **Image cut to tight** – some imagery delivered were not completely covering the sites
- **Ceiling reached on EUSI FWC** – impossible to accommodate all IRs
- **Some problems** – wrong delivery notes and image format, band mis-registration of QB imagery (SK_NOLE), radiometry problems (NL_WOUDE), processing in ERDAS of PL, etc...

6. Expenditure

VHR	5.28 M €
HR	1.62 M €
<hr/>	
TOTAL	6.90 M €



0.48 M € surplus at Campaign end will be used for autumn imagery & bulk orders for CwRS 2014

7. Image return (status 29/11/13)

- **Source imagery** – harvested automatically to CID portal via FTP
- **Image return** – of VHR ortho-corrected data on-going (deadline 1st of Dec):
 - ✓ 22/37 contractors have returned imagery
 - ✓ 8/37 are in process of delivery
 - ✓ Waiting info from:
 - BE_FL, GR, IE, LV, PT, UK_Sc



8. CwRS Campaign 2014

Planning

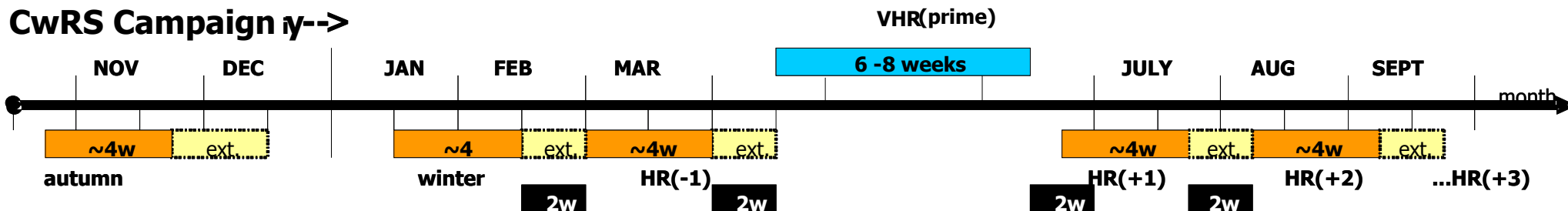
- **HR estimation:**
 - ✓ 758 HR images in total (+7%; 702 in 2013)
- **VHR estimation:**
 - ✓ 520 VHR zones in total (-1%; 523 in 2013)
 - ✓ 250,000 km² in total (-6%; 266,927 in 2013)



8. CwRS Campaign 2014

Status to-date

CwRS Campaign $\gamma \rightarrow$



- Already started for HR imagery:

✓ **Autumn** - opened 66/66 image requests (FR 40, ES 18, PT 4, UK 4);
24 accepted (FR 20, PT 4)

✓ **Winter** - opened 34/80 image requests (24 IE, 10 DE);
8 accepted (IE)

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (1/8)

- 3 tenders ongoing:
 - ✓ VHR 'profile'
 - ✓ HR 'profile'
 - ✓ 'broker' (as a backup to above, and for JRC non-CAP use)
- methodology is mature for 'outsourcing'/ market is mature for 'outsourcing'
- we expect an increased efficiency in the management of the image acquisition process

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (2/8)

Goal of outsourcing:

- The awarded framework contractor will take all necessary measures to:
 - ✓ reach the goal of minimum 95% success rate of image supply on time, according to specifications;
 - ✓ ensure that no conflict of interests or any other situation arises that could compromise or could be perceived as compromising the impartial and objective performance of the framework contract.
- The JRC will control the quality of the supply and related services

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (3/8)

Timescale, for award of framework contracts (FWCs):

- VHR/HR 'profile' planned award early 2014
- 'broker' planned for mid-2014 (meanwhile presently running FWC will be used as a backup)
 - ✓ Technical specifications for the tendering in its final stage
 - ✓ Short list created of eligible companies

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (4/8)

Meaning of the 'profile' approach:

- No sensors preference any more (just request your 'profile' in LioDotNet, and send your shapefiles as normal)
- Direct interaction between MS Administration (and/or their contractor) with image provider (FW Contractor)
- Faster delivery (by Acquisition, not by AOI or no. of completed AOIs)
- IDQA plays a very important role
- JRC QA/QC, and final validation role

8. CAP Checks Campaign 2014

Image Profile ID	Description	Spatial Res	Radiometric resolution (**) and spectral bands	abs. 1-D rmse (*)	Cloud Cover (CC) over AOI	Acquisition programming	Remarks	Possible sensors
A1. VHR prime - CwRS	Pan+Multispectral (Bundle)	GSD≤0.75 m	PAN	x,y ≤ 2m	≤10%	Priority programming		WV2, GE1, QB2, Pleiades (PL)
		GSD≤3 m	MS (at least 4 bands)					
	Pan-sharpened	GSD≤0.75 m	at least 4 bands				MS GSD≤3 m	
A2. VHR prime - LPIS and CwRS/LPIS "hilly/mountainous" or "complex topology"	Pan+Multispectral (Bundle)	GSD≤0.75 m	PAN	x,y ≤ 2m	≤10%	Priority programming		WV2, GE1, QB2, Pleiades (PL) with elevation angle restrictions in Table 6.
		GSD≤3 m	MS (at least 4 bands)					
	Pan-sharpened	GSD≤0.75 m	at least 4 bands				MS GSD≤3 m	
A3. VHR prime - Pan only	Pan	GSD≤0.75 m	PAN	x,y ≤ 2m	≤10%	Priority programming		WV2, GE1, QB2, PL, WV1
A4. VHR Stereo	Pan+Multispectral (Bundle)	GSD≤0.75 m	PAN	x,y ≤ 2m	≤10%	Priority programming		WV2, GE1, QB2, Pleiades (PL)
		GSD≤3 m	MS (at least 4 bands)					
	Pan-sharpened	GSD≤0.75 m	at least 4 bands				MS GSD≤3 m	
B. VHR archive	as any of above	as any of above	as any of above	as any of above	as any of above	Archive	used for archive search	as any of above
C. VHR re-task	as any of above	as any of above	as any of above	as any of above	as any of above	Priority programming	used for re-task	as any of above
D. VHR proposed	as any of above	as any of above	as any of above	as any of above	10%>CC≤30%	Priority programming	proposed	as any of above
E. VHR back up	Pan+Multispectral (Bundle)	GSD≤3 m	PAN	x,y ≤ 5.0m	≤10%	Priority programming		any of above, or more commonly IK2, WV1, EROSB, F2, SPS, S6 PSH, THEOS, etc.
		GSD≤12 m	MS (at least 3 bands)					
	Panchromatic	GSD≤3 m	PAN					
	Pan-sharpened	GSD≤3 m	at least 3 bands					

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (6/8)

Image Profile ID	Description	Spatial Res (***)	Radiometric resolution (**) and spectral bands	abs. 1-D rmse (*)	Cloud Cover (CC) over AOI	Acquisition programming	Possible sensors
F. HR prime - CwRS	Multispectral	GSD≤25 m	3 bands at least including G, R, NIR (preferably also B, and SWIR)	x,y ≤ 1.5 x GSD	≤ 1% validated (profile F1) ≤ 5% proposed (profile F2) ≤ 20 % retained (profile F3)	Priority programming	SPOT5/6, Resourcesat 1/2, RE, F2, THEOS, DMC2 etc.
	Pan-sharpened	GSD≤5 m					
G. HR archive - CwRS	as any of above	as any of above	as any of above	as any of above	as any of above	archive	as any of above

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (7/8)

In practice for this Campaign:

- Autumn / winter HR Campaign
 - Already started - and will be fully managed by JRC (MS requests, LioDotNet, running 'as normal')
- Rest of HR and VHR will be handled by JRC until 'outsource'. Suitable point in time will be decided :
 - LioDotNet requests and interaction with MS Administration
 - Feasibility (for the VHR)
 - Image Acquisition

8. CAP Checks Campaign 2014

Outsourcing - Status and Overview (8/8)

- LioDotNet
 - ✓ v.2013 - being used presently for the autumn/winter HR
 - ✓ v.2014 - new version being developed and will be launched at moment of 'outsource' (accomodating for profiles etc.)
- HR/VHR Specifications
 - ✓ v.2013 used at present for the autumn/winter HR
 - ✓ v.2014 ready, and will be released to MS Administrations at moment of 'outsource'