Herschel Legacy Science Phase Readiness Review

Data Processing

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European Space Agency

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Recap: post-operations plan

Nutshell, for Data Processing group:

- **Support creation of the best possible products**
- **No Herschel resources after post-ops**

Thus, data processing legacy:

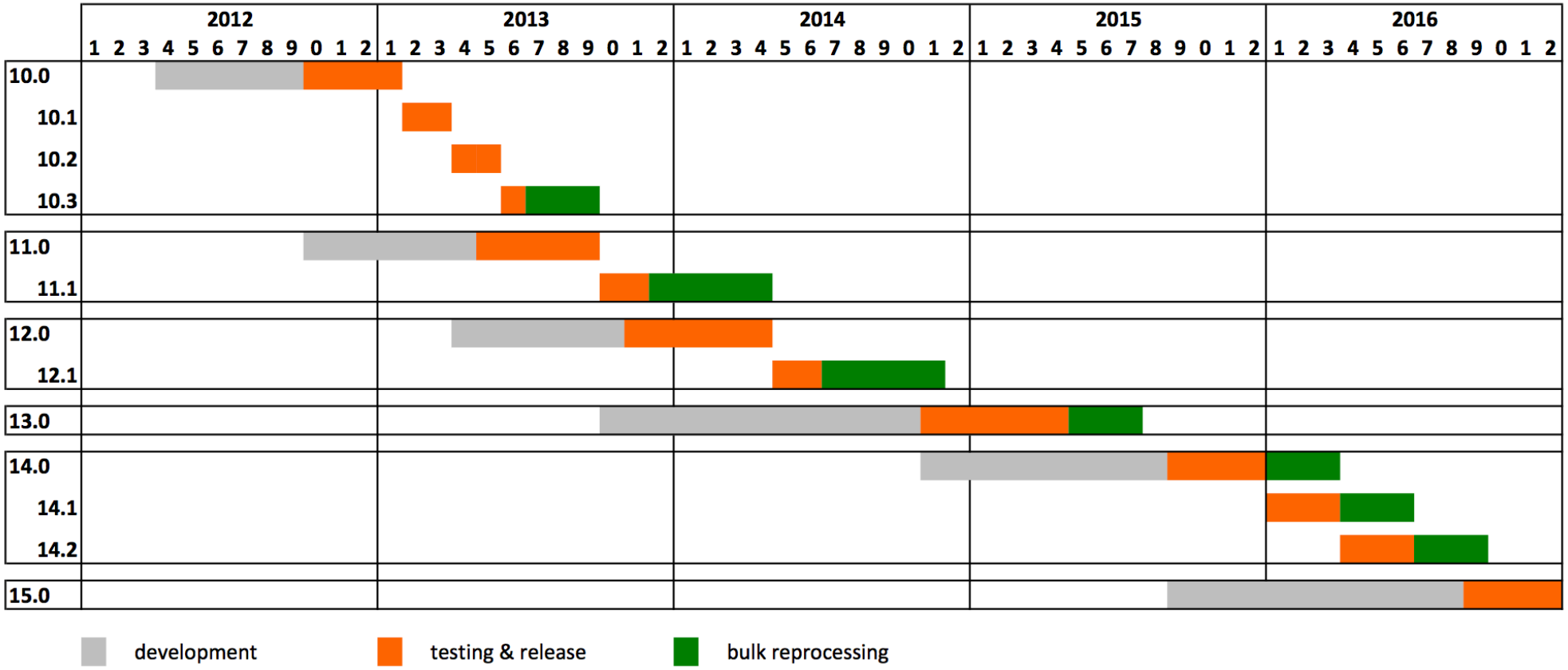
- **Legacy Science Products stored in Archive**
- **Software stored in legacy infrastructure**
- **Other data in legacy infrastructure**

Recap: POPS plans 2012 Data Processing

Given resources allocated at minimum level:

- **1st: support bulk processing & quality control**
  - resulting in high quality legacy products from pipelines
- **2nd: maintenance of interactive data processing**
  - supporting further exploitation of Herschel data in detail
- **3rd: software documentation**
  - supporting further exploitation Herschel data without availability of a help desk
- **other wishes, in general**
  - best effort basis or cannot be addressed
  - virtual machine thought to be addressed as part of under geo return project (DASLT)

Releases: version roadmap



Releases: Key features

Key features of each release described in Wiki

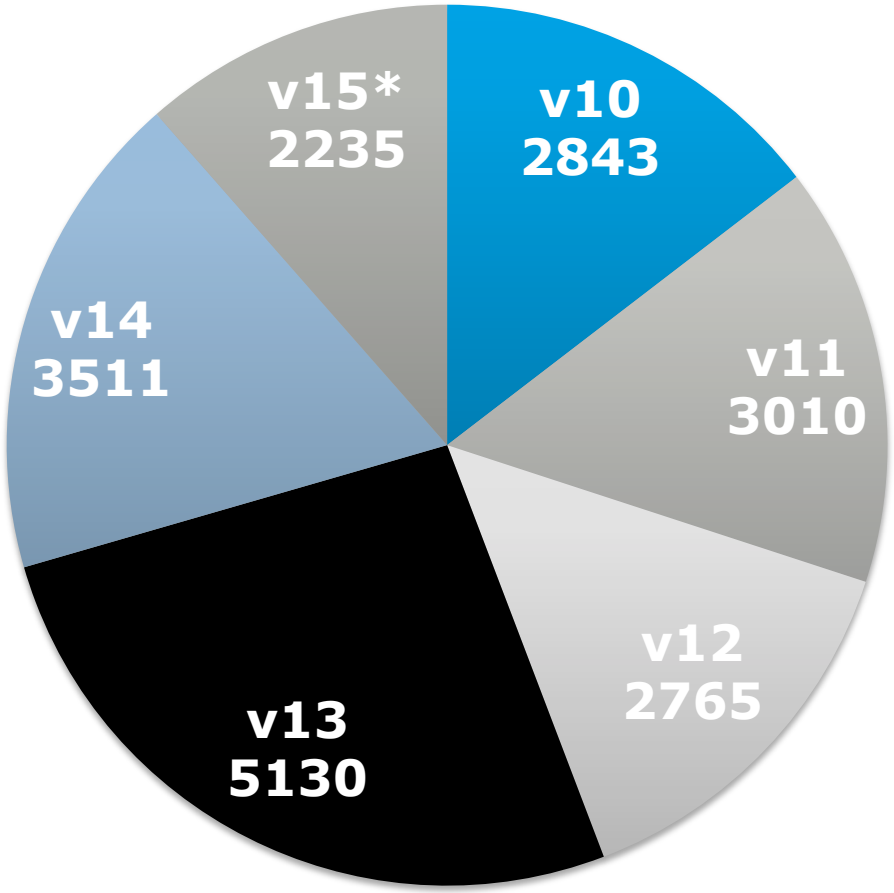
- version 10 – see: HipeWhatsNew10x
- version 11 – see: HipeWhatsNew11x
- version 12 – see: HipeWhatsNew12x
- version 13 – see: HipeWhatsNew13x
- version 14 – see: HipeWhatsNew14x
- version 15 – to be written

Releases: cycle control & prioritization

- **All stakeholders represented in configuration control boards (CCBs)**
- **CCB follows MoSCoW prioritization on tickets**
  - **M**ust have – *will block release*
  - **S**hould have – *important, but won't block*
  - **C**ould have – *desirable, if time permitting*
  - **W**ould have – *nice, but re-planned for next release*

Phase of specific version	Controlling configuration board
Development	Common and Instrument CCBs
Verification and validation	System CCB
Operations	Core CCB

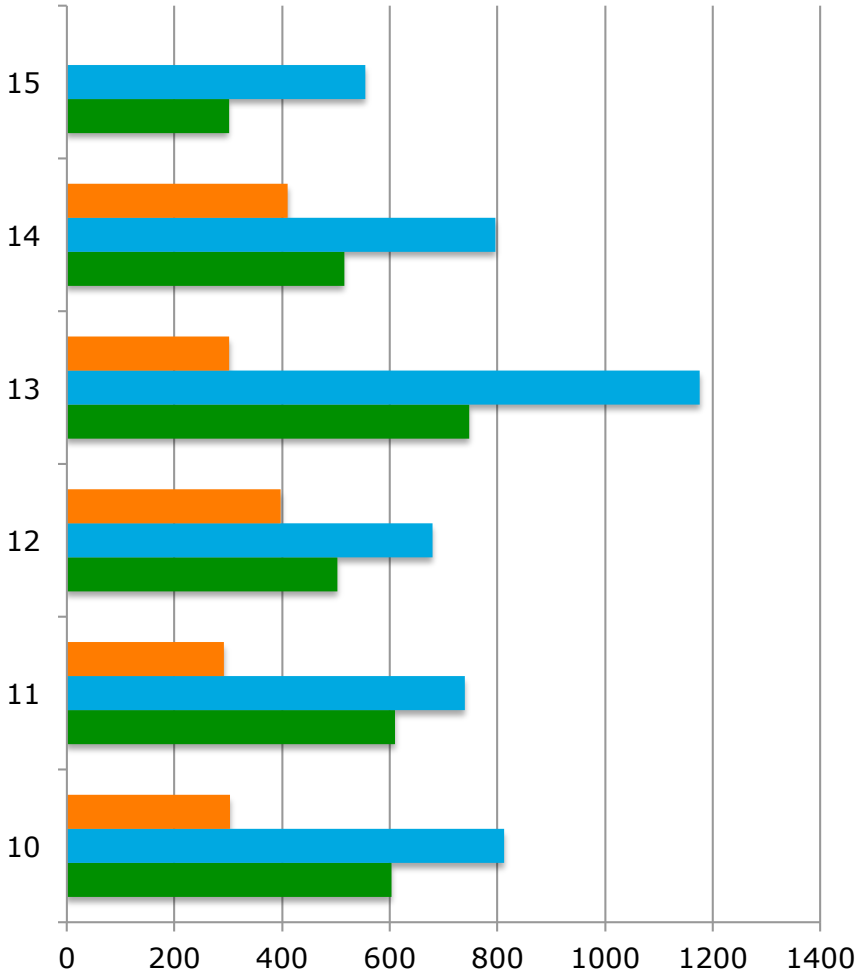
Releases: versions and software builds



Continuous integration:

- software builds created per version
- as of version 13, the development cycle increased from ½ a year to 1 year
- builds for version 15 is a projection

Releases: versions vs deliverables



- spr - bug fixes
- scr - change requests
- patches - fixes resulting from validation process
- as of version 13, the development cycle increased from ½ a year to 1 year
- progressive reduction resources reflected in number of deliverables

Software: trackers

Used for software development, validation and handover software:

- **CIB – Continuous Integration Build system**
  - http://herschel.esac.esa.int/hcss/build.php
- **JIRA – issue tracker**
  - http://herschel.esac.esa.int/jira/
- **Sonar – Code quality tracker**
  - http://herschel.esac.esa.int/sonar/
- **AT – Automatic Tester pipelines & userscripts**
  - http://herschel.esac.esa.int/at/

Software: outlets

User installers

- http://www.cosmos.esa.int/web/herschel/hipe-download

Developer installers

- http://herschel.esac.esa.int/hcss/build.php

Online documentation

- http://herschel.esac.esa.int/hcss-doc-15.0/
- http://herschel.esac.esa.int/hcss-doc-14.0/
- :

Platform support

- Microsoft Windows 32/64-bit: Vista onwards
- Apple OSX: Mountain Lion onwards
- Linux 32/64-bit

Handover: Instrument Consortia

- **Consortia leaving at different pace**

- **HIFI: March 2016**
  - and last hand over work about to be completed
- **SPIRE: June 2016**
  - Spectrometer group already left March 2016
- **PACS: December 2016**
  - Two key developers already leave in July 2016

- **Managing hand over process**
  - procedure same for all consortia

Handover: HIFI

- **Kick-off meeting October 2015**
  - hand over procedure
  - roadmap definition
- **10 common modules**
  - 8 handed over
  - 2 remain in hands of HIFI
- **17 HIFI specific modules**
  - 10 handed over
  - 2 in validation
  - 5 in progress
- **81% completed– see: JIRA**

Handover: SPIRE

- **Kick-off meeting November 2015**
  - hand over procedure
  - roadmap definition
- **14 Common modules**
  - 8 handed over
  - 4 remain in hands of SPIRE
  - 2 in progress
- **53 SPIRE specific modules**
  - 16 handed over
  - 21 in validation
  - 16 in progress
- **73% Completed – see: JIRA**

Handover: PACS

- **Kick-off meeting March 2016**
  - hand over procedure
  - roadmap definition
- **11 Common modules**
  - *initiated*
- **17 PACS specific modules**
  - *not started yet*

The unexpected: Removing versant

Versant: object oriented database

- Single commercial dependency since start of development
- License and support costs shared between HSC and ICCs
- Faced serious upgrade and maintenance issues
- License issues for post-operations and legacy phase

Refactor process

- Decided to remove dependency at Paris Meeting (May 2014)
- Localized and controlled but serious refactoring effort
- Completed and validated as of HCSS version 14 (Dec 2015)

The unexpected: Archive performance

Performance issues

- very poor query performance
- stability issues ingestion products and querying archive (AIO)
- seriously hampered bulk data reprocessing
- impacted user experience during bulk processing as well

Joint Archive/HSC effort

- definition of new hardware
- definition of deployment roadmap
- execution test & roll-out campaign
- significantly improved situation

The unexpected: Network infrastructure

Performance issues

- network disruptions and inexplicable slowness
- affected progress with v11, v12 and v13
- impacted bulk processing activities of above versions
- drained resources to mitigate the effects

Joint CSG/HSC effort

- HSC providing continuous analysis and reports
- CSG/Network investigations specific to HSC
- general/major upgrades of network infrastructure in 2015
- significantly improved situation mid development v14 onwards

The unexpected: New bulk processing needs

Original plan

- HCSS 14 release December 2015
  - bulk processing January-February 2016
- HCSS 15 release December 2016
  - bulk processing January-February 2017

Adaptation of plan needed

- instrument consortia expertise leaving earlier than v15
- increase of required extended processing efforts
- in tension with validation and acceptance efforts
- need for accommodating plans accordingly

The unexpected: revised schedule

Revised approach (summary)

- **HCSS 14.x**: Primary focus on improving legacy products
- **HCSS-14.0**: released mid December 2015
  - full validation and acceptance testing
  - bulk reprocessing all instruments
  - planned to be last processing for HIFI, but …
- **HCSS-14.1**: released early April 2016
  - last bulk reprocessing SPIRE
  - in addition unforeseen bulk reprocessing HIFI needs
- **HCSS-14.2**: release planned early July 2016
  - bulk reprocessing PACS
  - placeholder for unforeseen SPIRE needs
- **HCSS-15.0**: release planned December 2016
  - interactive environment updates only

Unexpected changes: GRID changeover

1st time expected: 2011-2012

- from Sun GRID by Complutense University of Madrid
- to Univa GRID implementation
- migration hardware and software to new GRID

2nd time unexpected: 2015-2016

- imposed by ESAC infrastructure
- migration to new ESAC GRID6 environment
- pros: upgraded OS, faster I/O, expanded capacity
- cons: extra efforts into adaptation, validation and migration

Current challenges: human resources

Controlling transfer of knowledge

- people leaving earlier than planned
- both at Instrument Consortia and Herschel Science Centre
- NAOC (China) could not find funding as assumed in POPS 2012

Addressed by

- advancing hand over of software modules where needed
- minimizing maintenance by test automation
- minimizing maintenance by code quality control
- introducing SCRUM approach as of February 2015

Current challenges: source code

Software Code repository

- Herschel uses CVS (antiquated) and will not be maintained
- SOCCI (under geo-return) or Github.com (public repository)?
  - either migration is non-trivial
  - migration not possible while consortia still connected
  - no resources available for actual migration
- Open source licenses and 3rd party libraries
  - a few libraries are in tension with each other
  - HSC has no resources to address/replace them

Legacy destination

- Main source code shipped as part of installer
- CVS dump on COSMOS (utility server)
- Migration to GIT on best-effort basis only

Current challenges: software binaries

- **Preserving medium term usage (<5 years)**
  - direct installation of software
  - direct reuse software components
- **Preserving long term usage (beyond)**
  - provision of pre-installed Virtual Machine
  - unclear status DAS-LT (under geo-return)
  - at minimum HSC will provide own Virtual Machine
- **Legacy destination**
  - Planned to use a COSMOS utility server
  - For both virtual machine and direct installation

Current challenges: raw data

Legacy raw data

- Consolidated raw telemetry
- Raw auxiliary, raw ancillary data etc.

RAWDAR (under geo-return)

- Work in progress
- New approach and not ready in time for Herschel

Legacy destination

- Planned to use a COSMOS utility server instead