The Gaia-ESO Survey

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Survey Co-PIs: Gerry Gilmore & Sofia Randich
300++ CoIs (mostly from Europe, but not only)
90++ institutes, about 50 CoIs from INAF

"L'Italia in Gaia", INAF – Roma, 14 Febbraio 2013

Gaia-ESO survey in a nutshell

- **Public** large spectroscopic survey with FLAMES@VLT (Giraffe + UVES)
- **300 (240+60) nights** (30n/semester) over **5 (4+1) years**; start 12/2011 (P88), end 9/2016 (P97)++; visitor mode
- **All populations of the MW:** Halo; Bulge; Thick & Thin discs; open clusters and associations; > 10^5 field stars; 100 OCs
- **Uniform analysis:** First homogeneous overview of the distributions of kinematics and element abundances in the Galaxy

History

8/2010: ESO Call for Letters of Intents for Large Public Spectroscopic Surveys

10/2010: Two Gaia-related LoIs submitted

MW field –Gilmore/ Ocs - Randich

1/2011: both LoIs approved (out of 23) and invited to submit a merged proposal → **Added Value**

6/2011: Proposal approved by PSSP and OPC

10/2011; 2/2012: SMP approved; contract with DG

31/12/2011: first light

2/2013: 13 obs. runs completed (65 nights); 2 internal DRs; 1 production run completed; science verification starting

Scientific Drivers

The formation and evolution of the MW and its component stars and stellar pops.

- The (dynamical) evolution of clusters: from birth to disruption
- Stellar evolution (ages, masses)
- Galaxy phase-spase substructure
- Halo substructure, Dark Matter
- Formation and nature of the bulge
- Formation of the thick and thin discs

Product Releases

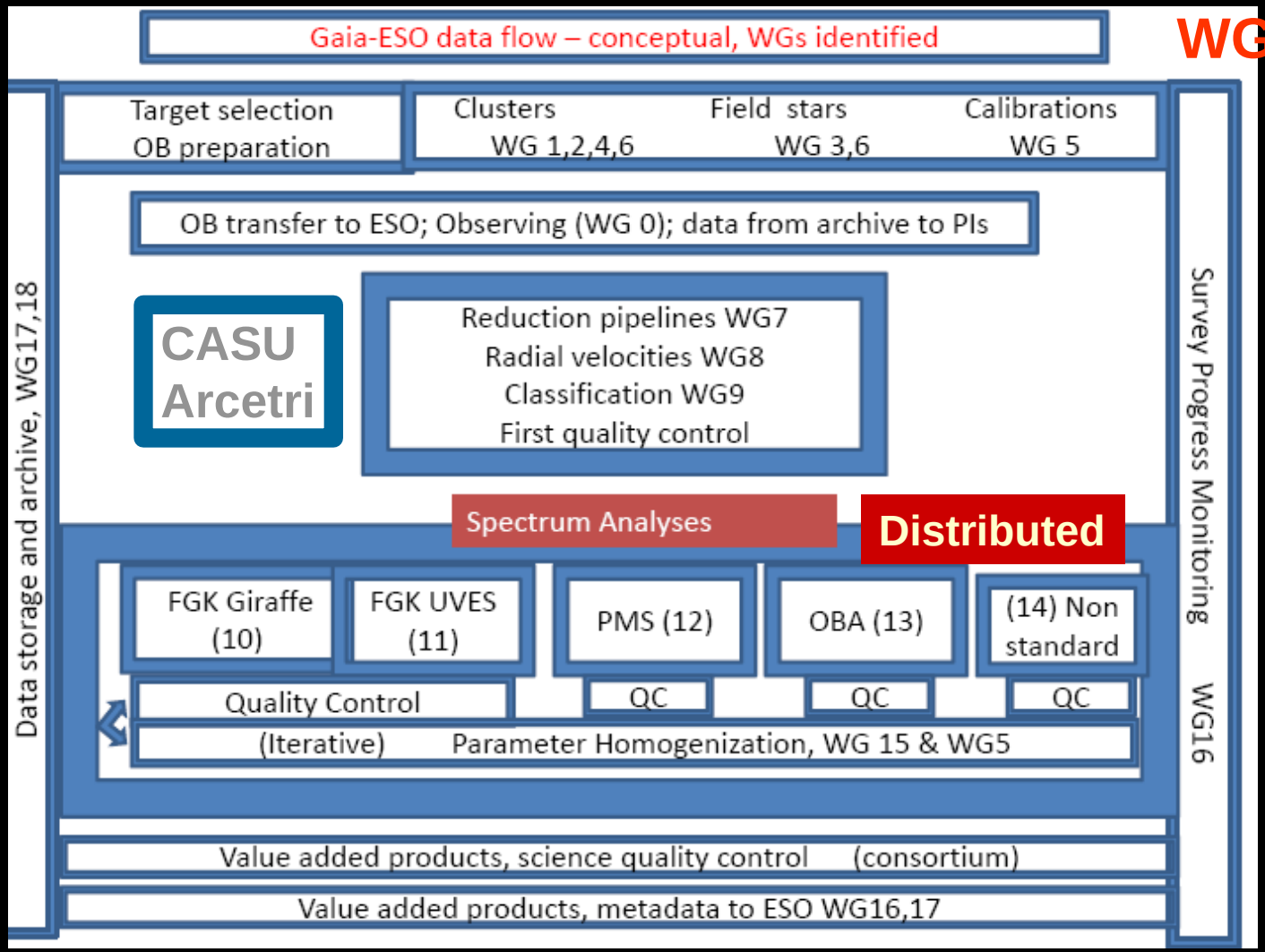
- All **raw data** immediately **public**
- **3-level data products** with different time scales
  - **Level-1:** 1D spectra, associated photometry, object classification and RVs (release every 6 months)
  - **Level-2:** RV variability info, atmospheric parameters and abundances (yearly releases)
  - **Level-3:** all of the above for final co-added data and mean cluster metallicities (end of survey)

GES vs. Gaia

- The GES is **not** a Gaia follow-up
- The GES has **stand-alone value;** benefit from and add value to Gaia:
- GES spectroscopy **complements and completes Gaia astrometry** and viceversa for selected samples of stars/clusters

- RVs: → V=19 (vs. G_{RVS}=16); 0.25 km/s (vs. > ~1 km/s)
- Complete stellar characterization (APs, activity, lithium, etc) and chemical labelling → V=17-18 (vs. G=15 for good accuracy)
- Chemical tagging → V=16 (vs. G_{RVS}=11)

Data flow, analysis, management



WG system

SC

M. Asplund (A)
J. Binney (UK)
P. Bonifacio (F)
J. Drew (UK)
S. Feltzing (S)
A. Ferguson (UK)
R. Jeffries (UK)
G. Micela (I)
I. Negueruela (Sp)
T. Prusti (ESA)
H.-W. Rix (D)
A. Vallenari (I)

INAF involvement

- **Institutes:** Arcetri, Bologna, Capodimonte, Catania, Padova, Palermo, Torino, Univ. PD, Univ. CT, Sapienza, Univ. PA; 50++ people
- Contribution to **most WGs**
- Presence in **SC** (SR, Micela, Vallenari)
- **Leadership of several WGs:** Cluster selection (Bragaglia; Magrini & Prisinzano), FPOSS/OBs (Flaccomio), Calibrations (Pancino), UVES reduction (Sacco), PMS spectrum analysis (Lanzafame)
- **Overlap** with **Gaia community**, **but not only** Gaia community

Conclusions and perspectives (1/2)

- Big Themes in European astronomy require ***space and ground based observations***
- MW studies key words: Gaia & Spectroscopy
- Gaia-ESO Survey among the largest and most ambitious ground based spectroscopic surveys ever attempted by European astronomy. The largest on a 8-m telescope

Conclusions and perspectives (2/2)

- GES **end of data taking and final release (2016) overlap with the 28 months Gaia int.** data **release**.
  Combined → full 6D phase space f(x,y,z,v_x,v_y,v_z), plus stellar parameters, and chemistry for a very large number and variety of stars: **core science plus legacy science**

- Future dedicated survey spectroscopic facilities are under study (WEAVE, 4MOST, MOONS), to allow Europe to carry the torch forward, **learning from the first effort**

THANK YOU!