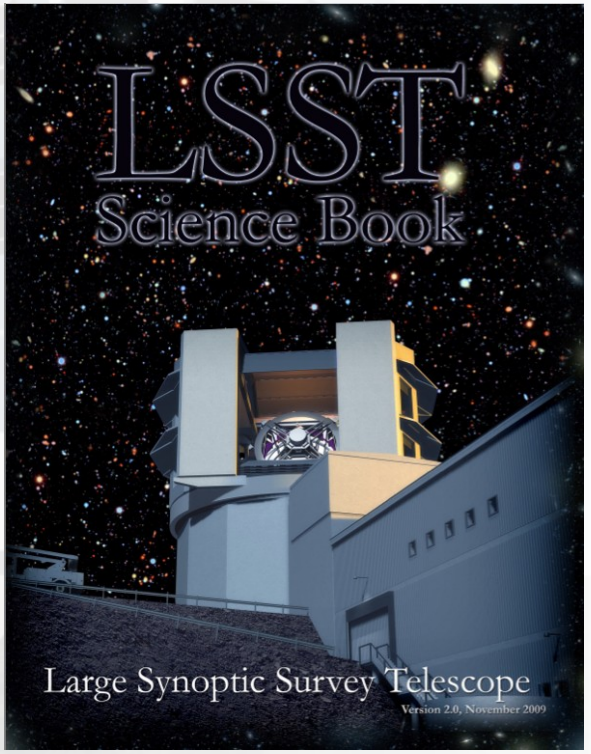
News from

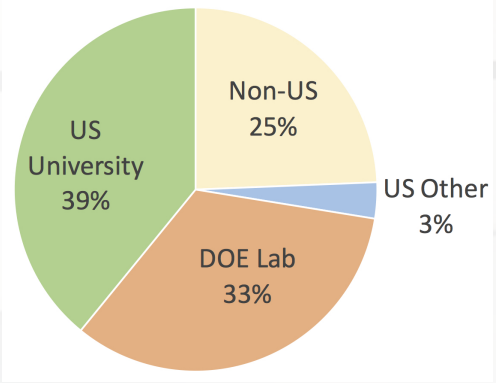
Emmanuel Gangler – LPC – Clermont-Ferrand (France)

Science collaborations

- **9 science collaborations**
  - Galaxies (~50 members)
  - Stars, Milky Way, and Local Volume (>~100 members)
  - Solar System (N/A)
  - **Dark Energy** (824 members !!!)
  - Active Galactic Nuclei (~50 members)
  - Transient/Variable stars (>~100 members)
  - Informatics and statistics (>~50 members)



arXiv:0912.0201



Those numbers are steadily growing !

DESC working groups

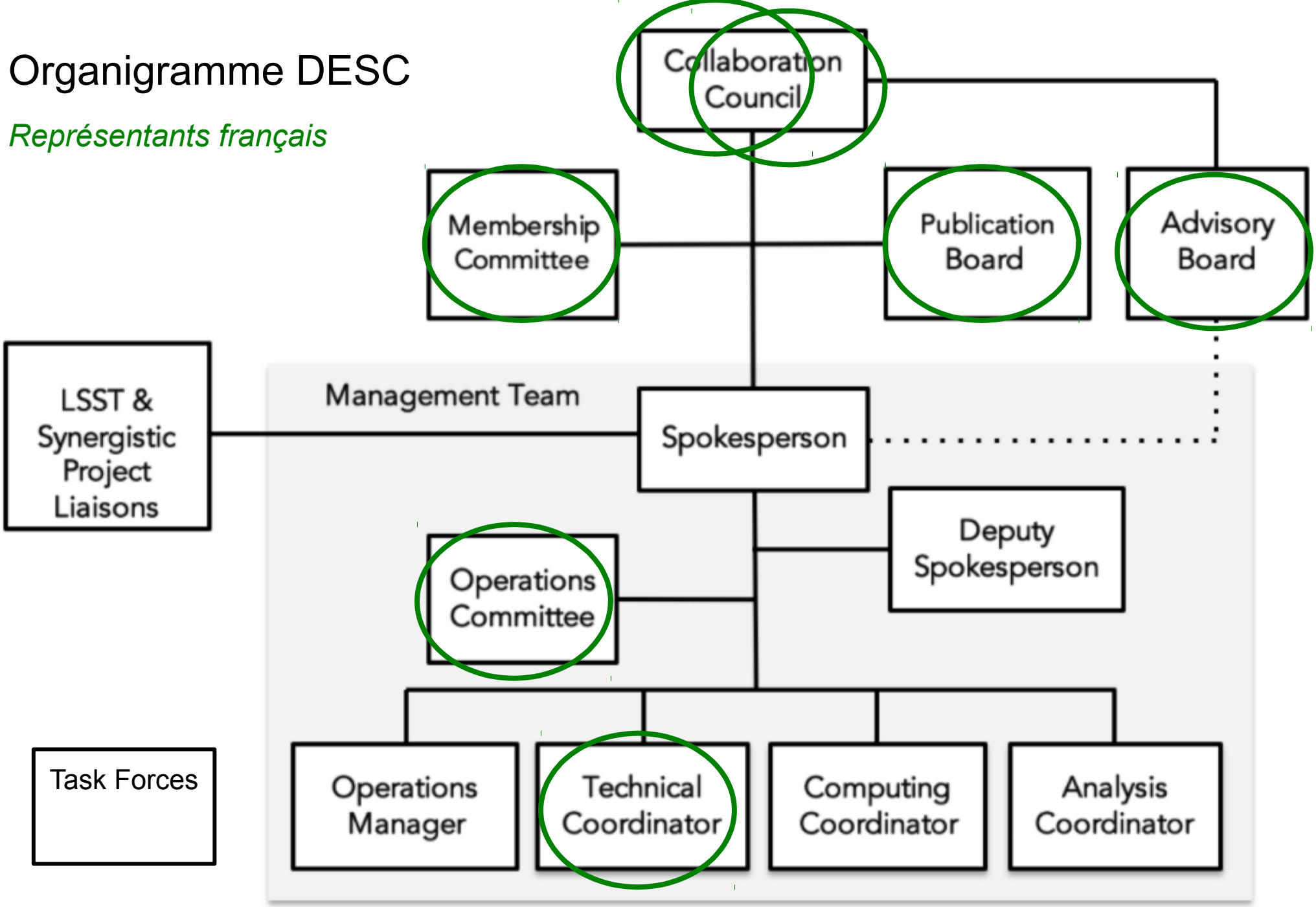
- **Background Cosmology** is addressed by **Type Ia supernovae**[WG], Strongly lens systems[WG], (BAO)
- **Dark matter structure and growth** probed by Weak gravitational lensing[WG], Galaxy clustering[WG], and **Clusters of Galaxies**[WG]
- **Photometric Redshifts**[WG] are a common source of systematics
- LSST will constrain Dark Energy by Probe combinations[WG] (ex: 3x2 pt), it is a **systematics-limited project.**
- **Technical aspects: Calibration**[WG], **Sensors**[WG] play a significant role for the quality of the FoM.
- **Computing aspects:** Cosmological[WG] and Survey Simulations[WG] as well as **computing infrastructure**[WG] are key ingredients of the project

DESC task forces

- **Task forces are addressing high priority and timely DESC projects**
  - **Blending:** seems more a long-term effort than a Task Force. Pan-LSST connections
  - **Commissioning:** sporadic activity…
  - **Data Access:** how to access data for DESC needs beyond the science platform tools
  - **DC2:** simulation roughly of the size of commissioning data.
  - Follow-up: starting task force to identify key non-LSST data products. **Shall we join ?**
  - **Observing strategy:** set out in place to answer the call for cadence white papers and decision process.

Organigramme DESC

Représentants français



+2 +2 +2 !

DESC

Membres DESC 800 members; 192 "Full members" *(sont aussi members)*

- Non US members : 76 FR (IN2P3) (+18), 89 UK (+14), ~62 (+31) autres
- Non US Full members : **29 FR (+3)**, 14 UK, 9 autres

  IN2P3 représente 15% de l'effectif actif !

Responsabilités :

- Management team (6 personnes) dont P. Antilogus (LPNHE) (Technical Coordinator)
- Présence dans les conseils à tous niveaux (~1-2 FR / conseil) :
  - Advisory board (D. Boutigny, LAPP),
  - Collaboration council (É. Aubourg, APC ; E. Ishida, LPNHE),
  - Operation Committee (P. Antilogus, LPNHE ; E. Gangler, LPC),
  - Membership Committee (C. Combet, LPSC),
  - Publication Board (P. Astier, LPNHE),
  - Collaboration Council Nominating Committee (E. Gangler - chair, LPC)
  - Spokesperson Nominating Committee (J. Cohen-Tanugi, LUPM)
- Groupes de travail et task Force:
  - Coordination
    - Sensor anomalies WG (P. Astier, LPNHE),
    - Photometric Corrections WG (N. Regnault, LPNHE),
    - Data Access TF (D. Boutigny, LAPP),
    - DM-DC2 TF (J. Cohen-Tanugi, LUPM)
  - Activité visible dans 12/14 Working Groups (analyse, calcul, technique) ; 5/6 Task Force
- Opérations :
  - 2 pipeline scientists (D. Fouchez, CPPM ; P. Gris, LPC)

Note

- DESC has standing and ad hoc committees to fill
- Agreement with Collaboration Council chair to appoint a French researcher per committee.

  → this is good… but can be time consuming !
- **To be filled currently:**
  - Publication Board
  - Meetings committee
  - Membership review policy committee
  - Speakers Bureau policy committee
  - Code review policy committee

    → Appel aux bonnes volontés !
- Note : soutien en mission aux personnes investies dans DESC

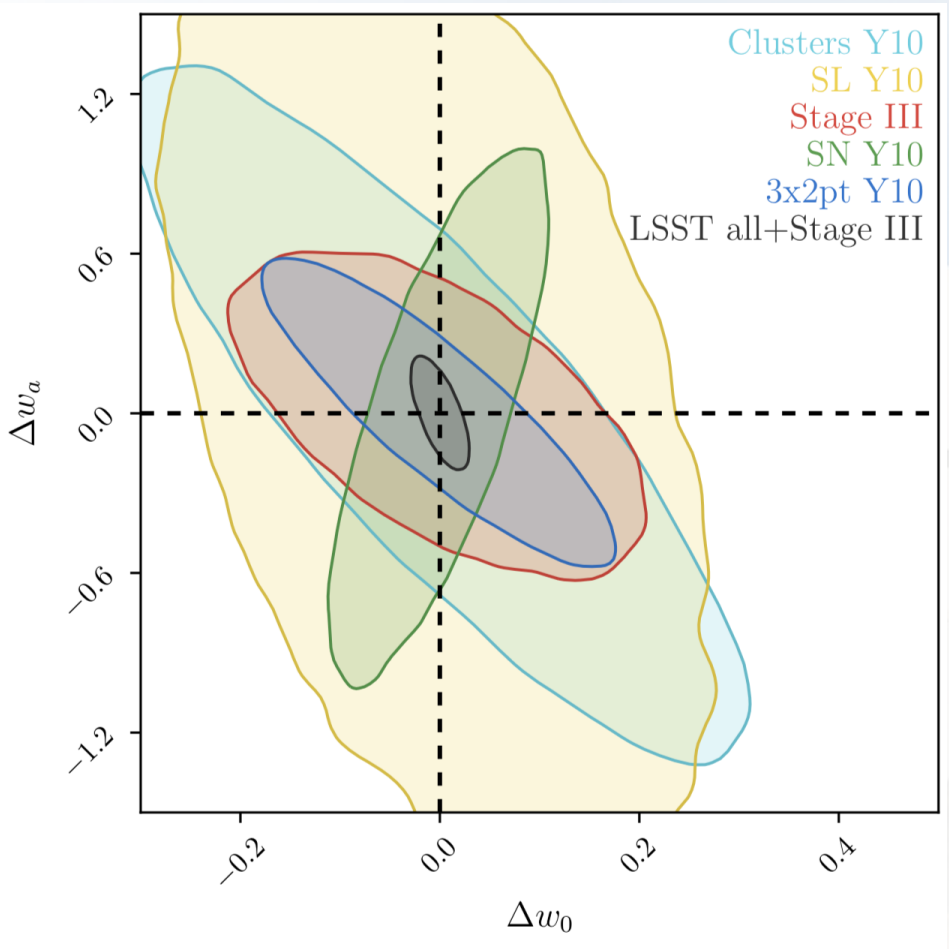
How to keep up

- **DESC Seminars !**
  - Gravitational waves (follow-up, modified gravity)
  - Computing (coding, data access at NERSC)
  - **Science Requirements Document**
  - **Blending**
  - **Camera Data opportunities**
  - **Calibration**
  - **Observing strategy**

  → DESC seminars cover activities of interest for LSST-France !

Science Requirements ArXiv 1809.01669

10 year forcasts

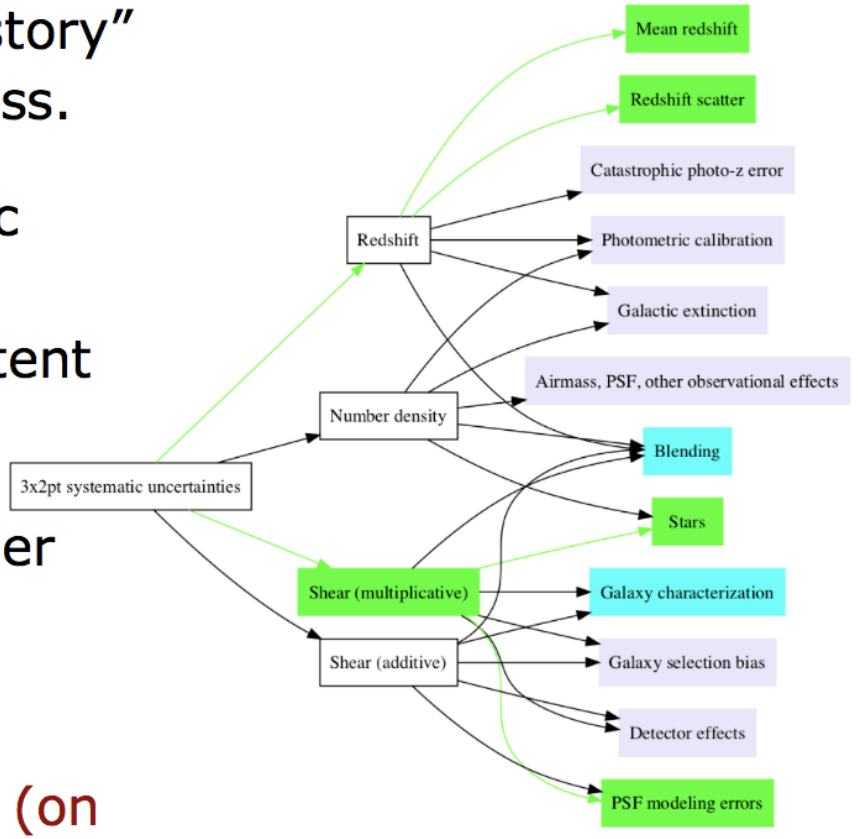


- Forecasts for 1 and 10 yr
- Full review of known systematics
  - Calibratable and self-calibrated
- Target: FoM of 500 for 10yr
  - Calibratable systematics should not dominate statistics
- Requirements for each probe

No author from France !

Lessons: near-term

- The "structure growth + expansion history" combination is critical to DESC's success.
- We learned what sources of systematic uncertainty require more work to understand, and/or need a self-consistent treatment across probes.
- The key aspects in need of R&D or other resources are:
  - Photometric calibration for SN
  - Photometric redshift requirements (on mean & scatter for tomographic bins)
  - Impact of blending on shear calibration and photo-z



Specific requirements for Dark Energy

Shear:

- **Photo-z syst.:**
  - mean photo-z of bin :< 0.001(1+z)
  - Photo-z scatter: <0.003(1+z)
- Redshift-dependent shear calibration < 0.003
- **PSF model** size <0.1%
- *Stellar contamination* < 0.1%

Supernovae: **[+ Cadence, identification]**

- **Calibration:**
  - Filter 0-points < 1mmag
  - Filter mean wavelength < 0.1 nm
  - Lambda-dependent calibration < 4.4 mmag per 550 nm
- **Light-Curve modelling** < 3% of SALT2 errors (See Pierre-François's talk)
- MW extinction < 30% current uncertainties

Joint Probes:

- Ensure Blending

R&D Needed:

- **Blending** (**number density, shear**)
- *Galaxy characterization* (**shear**)

Analysis	Priors	Y1 FoM (ceiling)	Y10 FoM (ceiling)	Target
LSS	Stage III (not w_0, w_a)	10 (13)	10 (14)	1.5
LSS	None	6.7 (8.4)	6.6 (9.1)	1.5
WL+LSS	Stage III (not w_0, w_a)	31 (37)	66 (87)	40
WL+LSS	None	22 (27)	49 (68)	40
CL	Stage III (not w_0, w_a)	9 (11)	17 (22)	12
CL	None	6.5 (8.2)	12 (17)	12
SN	Stage III (not w_0, w_a)	36 (44)	157 (211)	19
SN	None	10 (12)	32 (48)	19
SL	Stage III (not w_0, w_a)	1.6 (2.0)	6.9 (9.4)	1.3
SL	None	1.3 (1.7)	4.4 (6.1)	1.3
All	Stage III	142 (156)	505 (711)	500
All	None	108 (135)	461 (666)	-

Note:

Clusters, LSS, strong lensing requirements not as difficult as for Sheer and Supernovae

Spectroscopic follow-up

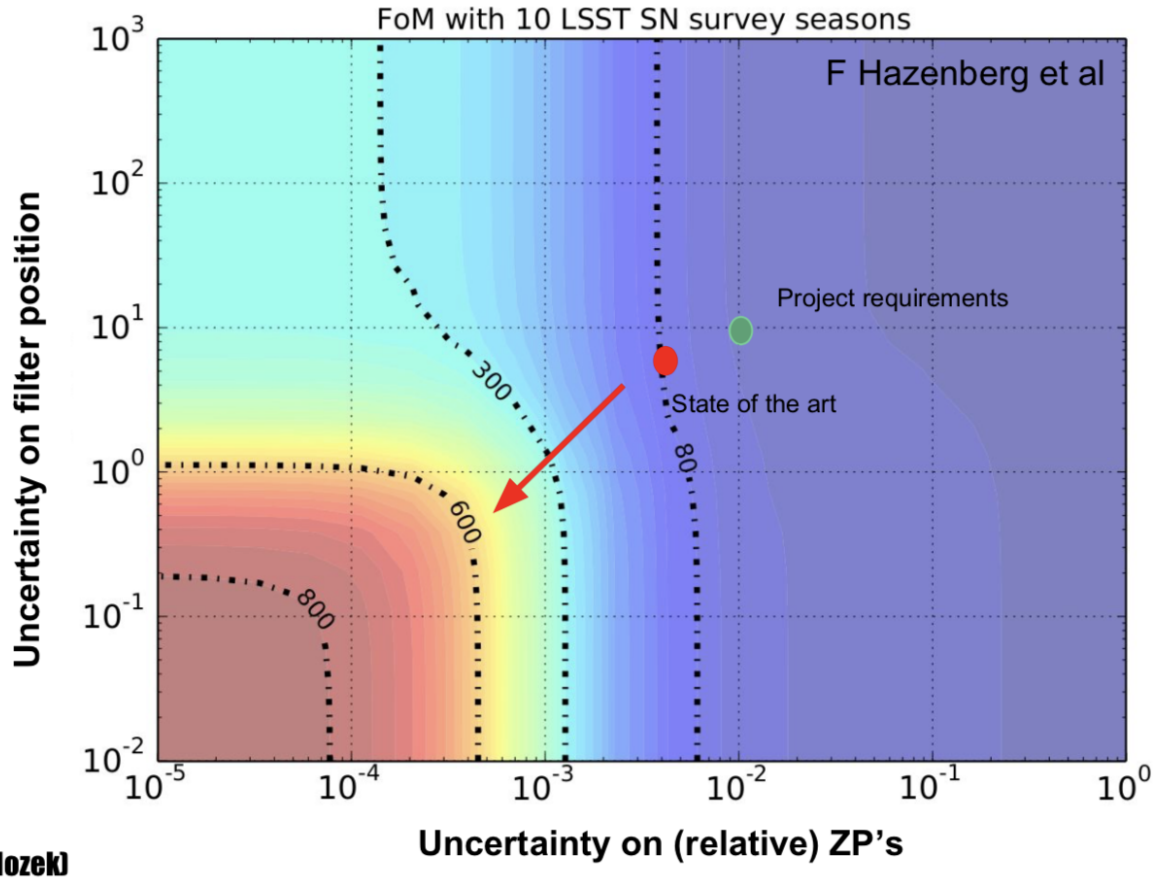
Amount of time required for each survey from the Kavli/NOAO/LSST report (sorted by telescope aperture; in dark-years). Leader for each column shown in red.

Instrument / Telescope	Total time, Photometric Redshift Training (y)	Milky Way halo survey (8000 sq. deg., y)	Local dwarfs and halo streams	Galaxy evolution	Supernova hosts	Total (8000 sq. deg. halo survey, y)	Total (20k sq. deg. halo survey, y)
4MOST	7.7	12.6	10.1	4.2	0.05	34.7	53.6
Mayall 4m / DESI	5.1	6.7	9.5	1.1	0.03	22.5	32.5
WHT / WEAVE	9.0	13.3	8.3	4.9	0.06	35.5	55.4
Magellan LASSI	1.8	9.5	3.3	0.4	0.04	15.1	29.3
Subaru / PFS	1.1	8.2	2.0	0.5	0.04	11.9	24.1
VLT / MOONS	4.0	67.0	1.9	2.2	0.29	75.4	175.9
Keck / DEIMOS	10.2	473.1	8.3	5.6	2.04	499.2	1208.8
Keck / FOBOS	3.1	81.7	1.4	1.7	0.35	88.2	210.8
ESO SpecTel	0.7	**1.3**	1.2	0.2	**0.01**	**3.4**	**5.3**
MSE	0.6	3.1	1.1	0.2	**0.01**	5.1	9.8
GMT/MANIFEST + GMACS	0.4	16.9	**0.3**	0.2	0.07	17.9	43.2
GMT/MANIFEST + GMACS	0.8	16.9	**0.3**	0.4	0.07	18.4	43.7
TMT / WFOS	1.8	74.4	1.3	1.0	0.32	78.8	190.5
Fiber WFOS	0.3	31.4	0.5	**0.1**	0.13	32.5	79.5
E-ELT / MOSAIC Optical	0.6	62.3	1.1	0.3	0.27	64.6	158.1
E-ELT / MOSAIC NIR	1.2	62.3	1.1	0.6	0.27	65.5	159.0

Impact of calibration

How much does this matter ?

- SRD & PCWG work have made clear that DESC has strong calibration requirements, beyond Project requirements)



(See also DESC SRD (Mandelbaum, Scolnic, Hlozek)

Blending Task Force Near-term Goals

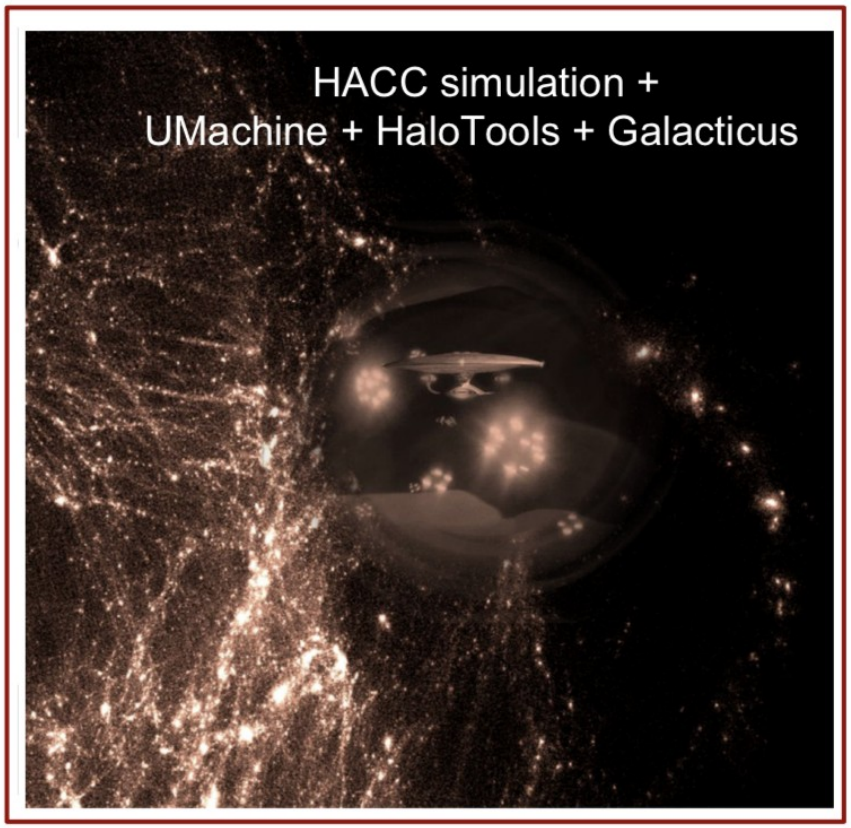
(as set out in September 2017)

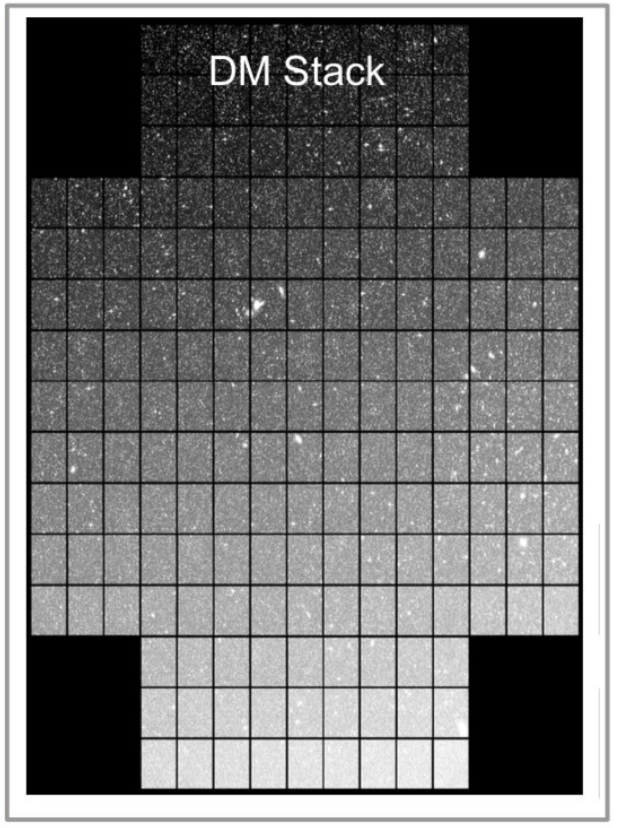
Study the impacts of blending on all dark-energy probes for different algorithms in the science pipeline, including *galaxy detection, shape measurements* and *photo-z measurements*.

1. Survey the current state-of-the-art algorithms with a set of focused presentations and discussions:
   - How well (if at all) does the algorithm currently handle blending?
   - How easily can the algorithm be adapted to (better) handle blending?
   - What are the appropriate metrics to quantify blending impacts for this algorithm?
2. Survey past and ongoing efforts to assess impacts of blending (including those outside DESC).
3. Review blending assumptions used in current forecasting tools.
4. Study the current plan for processing of blended objects in DM level-2 design (Secs. 5, 6, 7 of LDM-151).
5. Prepare reference data sets (simulations and real data -- ground and space) [*and tools*] and implement metrics for quantifying blending impacts on relevant algorithms.
6. Identify challenges that are not already being addressed, suitable for a group or an individual to take ownership of.

DESC End-to-End Simulation Workflow

- Responsibility of Cosmological Simulations Working Group
- Responsibility of Survey Simulation Working Group
- Input
- Output delivered to collaboration
- Users





Extra-galactic catalog generation

5000 sq. degree

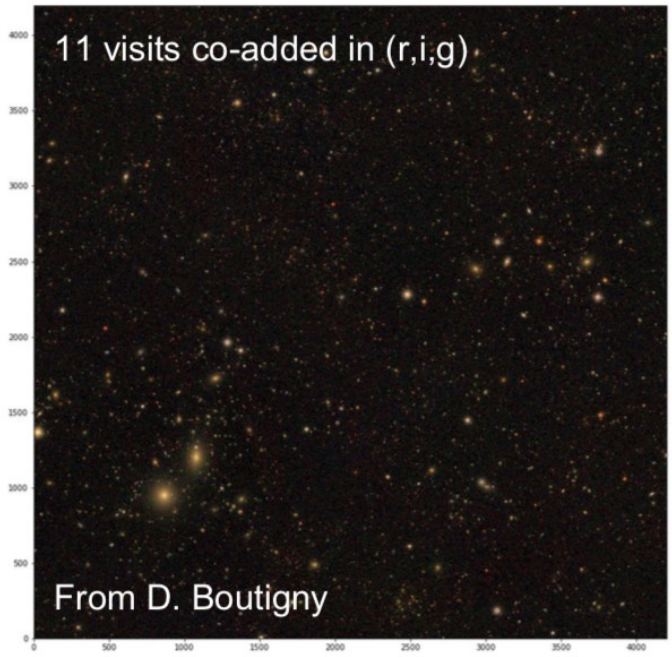
Image simulations

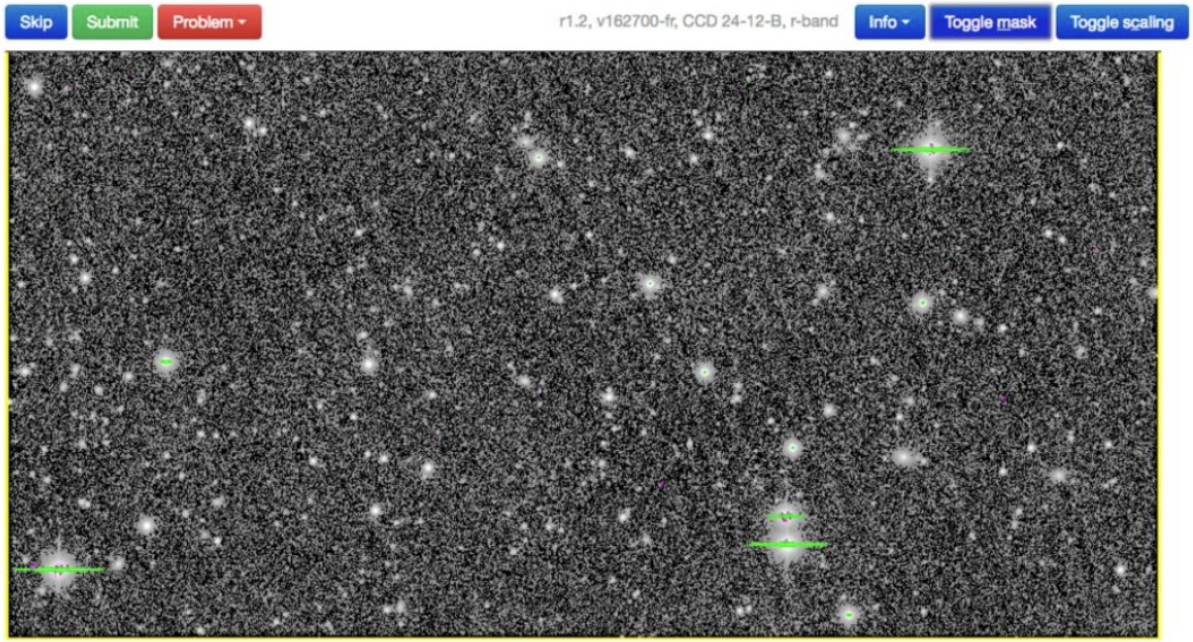
300 sq. degree
10 years

DM processing

DC2: Simulated LSST Images

PhoSim (Peterson et al.) on NERSC KNL: 1000 nodes allows us to produce 1 full focal plane visit image every 30 seconds - as fast as LSST



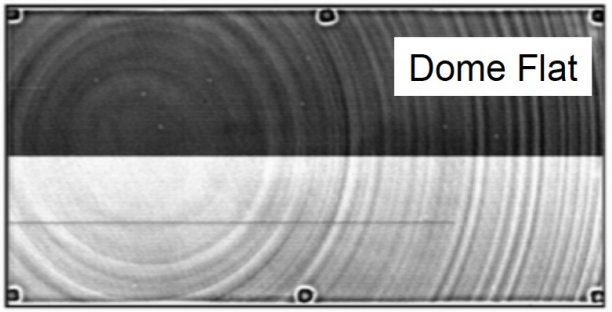


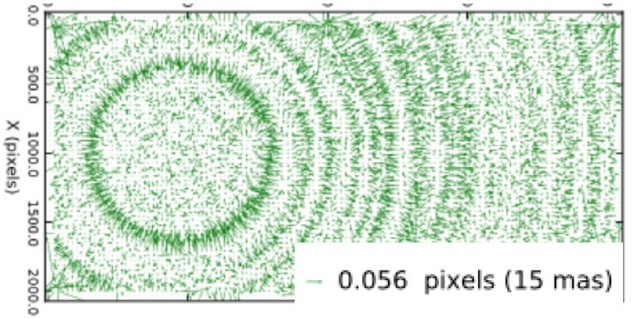
Second image simulation tool; ImSim uses GalSim to produce LSST-specific simulations with tunable levels of complexity.

We use both codes, with a plausible variety of astrophysical and observational effects, to stress-test our analyses

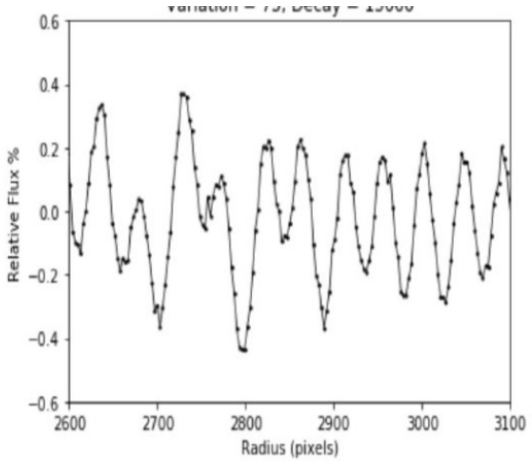
End-to-end cosmological simulations

- Getting ready for LSST data: computing, science validation
- An opportunity for testing mitigation schemes for *sensor defects*
  - One example : **Tree Rings**

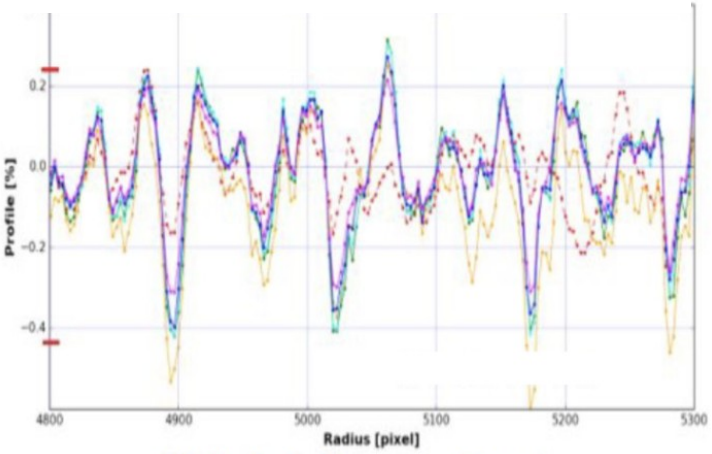




DECAM
Plazas 14



PhoSim Flat



HY Park, A. Nomerotski and D. Tsybychev, Properties of tree rings in LSST sensors, 2017 JINST 12 C05015

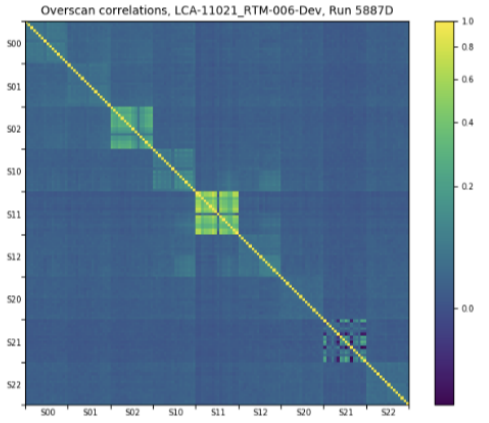
A. Nomerotski et al.

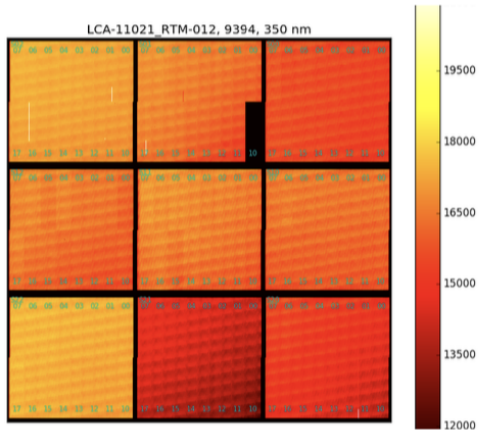
Simulation

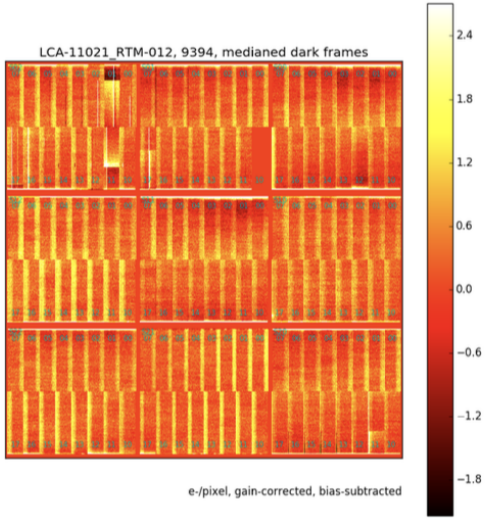
Real Data

Open Camera and I&T Topics

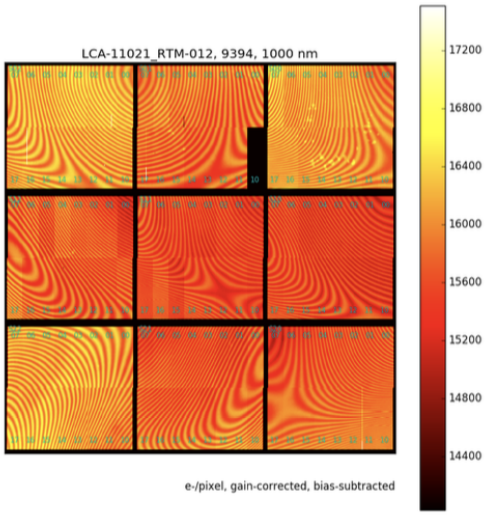
- Noise Correlations
  - Rule out artifacts
  - Assess impact on 2-pt Functions
- QE variations
  - investigate variations, eg. annealing patterns
  - Evaluate differences between EO testing flat fields vs. real images
- Bias shifts due to saturated stars.
  - study single spot images
  - Evaluate correction scheme
- Digitization issues
  - evaluate non-uniform population of digital outputs
  - any impact on real images?







Open Camera and I&T Topics



- e2V Fringe patterns
  - study origin of the Fringes
- Behavior of mid-line break in sensors
  - evaluate charge sharing at the mid-line break
- Study full AOS corrections of intra-Camera misalignment.
- Use DM stack code for Instrument Signature Removal, compare against EO test code
  - simple ISR = overscan, bias, gain & linearity
  - DM/stack-club workshop Nov 14,15

Coordination scientifique

- Un aspect multi-dimensionnel
  - Vis-à-vis de l'IN2P3: soutien au responsable projet
    - Suivi des activités,
    - Argumentaire pour soutenir la demande des moyens
  - Stratégique:
    - Y a-t-il des directions plus prometteuses que d'autres ?
    - Y a-t-il des coups à jouer vis-à-vis de LSST/DESC ?
  - Concret:
    - Sur quoi bossent les collègues ?
    - Partage des savoir-faire et outils

Suivi des activités

- DESC est une collaboration très active (2 conf calls/jour en moyenne)
- L'activité française a elle aussi pris son essor

  → **besoin de relais pour suivre les thématiques**

  - A forte implication française
  - D'intérêt stratégique
- Comment organiser en pratique l'échange d'informations ?
  - LSST-France ?
    - Combien de réunions annuelles ? (1 ou 2 ?)
  - Webinaire de la coordination scientifique
    - De bonnes présentations, mais fréquentation en baisse
    - Quelques retours :
      - Bon moyen d'approfondir certains sujets, de faire connaître les jeunes
      - Mais globalement trop de conf calls
    - Juste milieu à trouver…
  - Newsletter ?

Stratégie / politique scientifique

- **La participation dans DESC est notre priorité !**
  - Le travail doit se faire en connection avec les groupes de travail/les task force/le management de DESC
  - DESC a une politique de projets qui se veut inclusive
  - La prise de responsabilité dans DESC est un traceur de notre implication
- Ce qui ne veut pas dire qu'on est forcément d'accord sur l'ensemble de la **stratégie** de DESC:
  - Position singulière de l'IN2P3 : à la fois projet LSST et DESC
    - Aller des pixels aux contours cosmo
    - Prendre en charge des sujets à la frontière (calibration, cadence…)
    - Lien commissioning - science
  - Expertises historiques et moyens à disposition
    - Rôle du CCIN2P3, expertise sur les SN
    - Travail de préparation sur données réelles (CFHTLS, HSC, ZTF)
    - Environnement IN2P3

→ Comment organiser au mieux cette discussion ?

En pratique

- Il existe déjà des **sous-structures de fait** dans notre activité scientifique
  - Le travail concret se fait en petit groupe, par affinités et proximité
    - Chaque groupe de travail a ses habitudes
    - Avec une certaine porosité entre groupes

    → *reconnaître les sous-structures existantes*

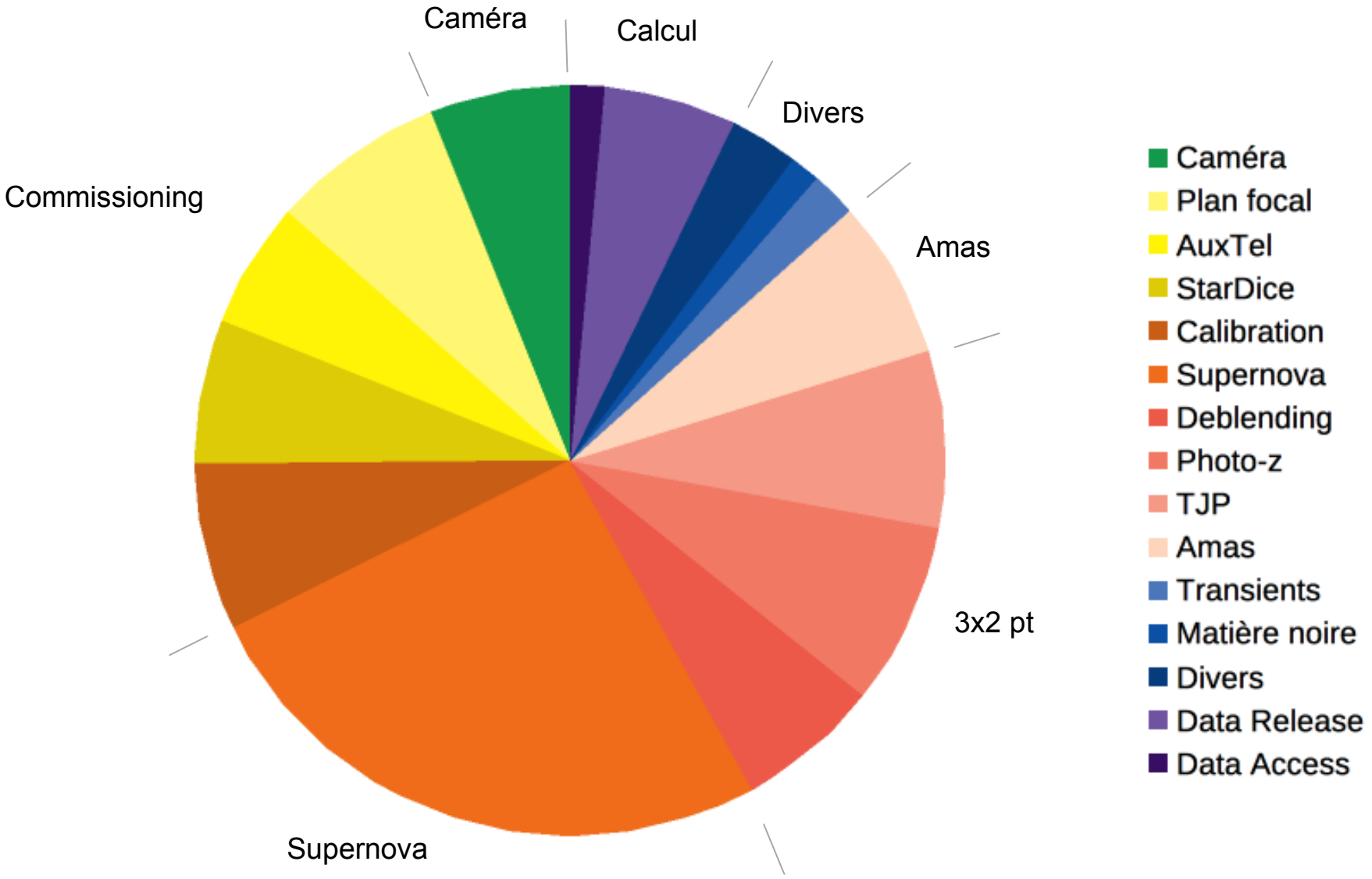
    ...et les regrouper quand ça fait sens d'un point de vue thématique

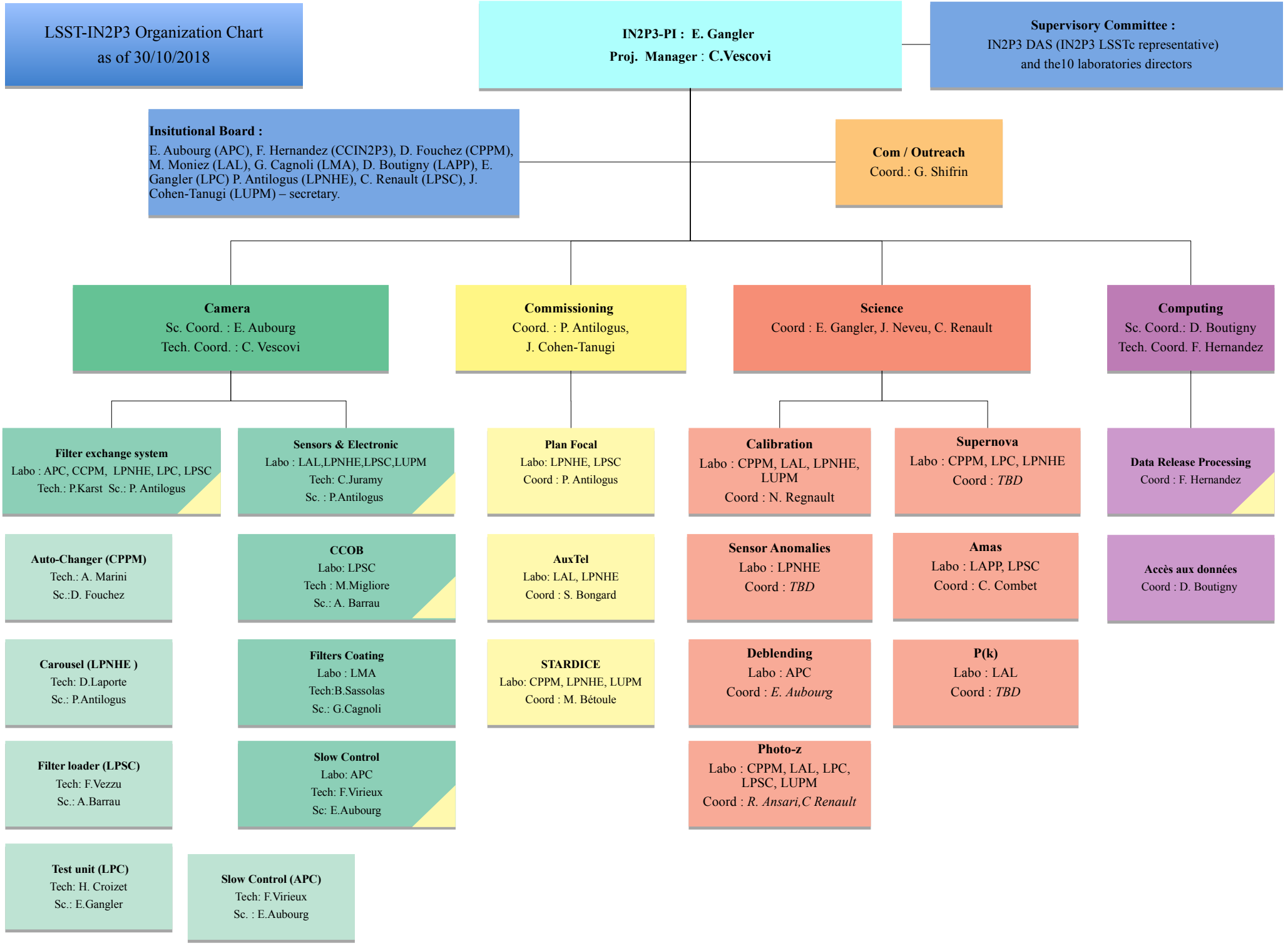
    (coalescence bottom-up)
- La **discussion entre sous-groupes** peut être améliorée
  - En général effective à l'intérieur d'un même labo
  - Plus difficile au niveau national sur un sujet donné

  → *favoriser les échanges entre labos.*

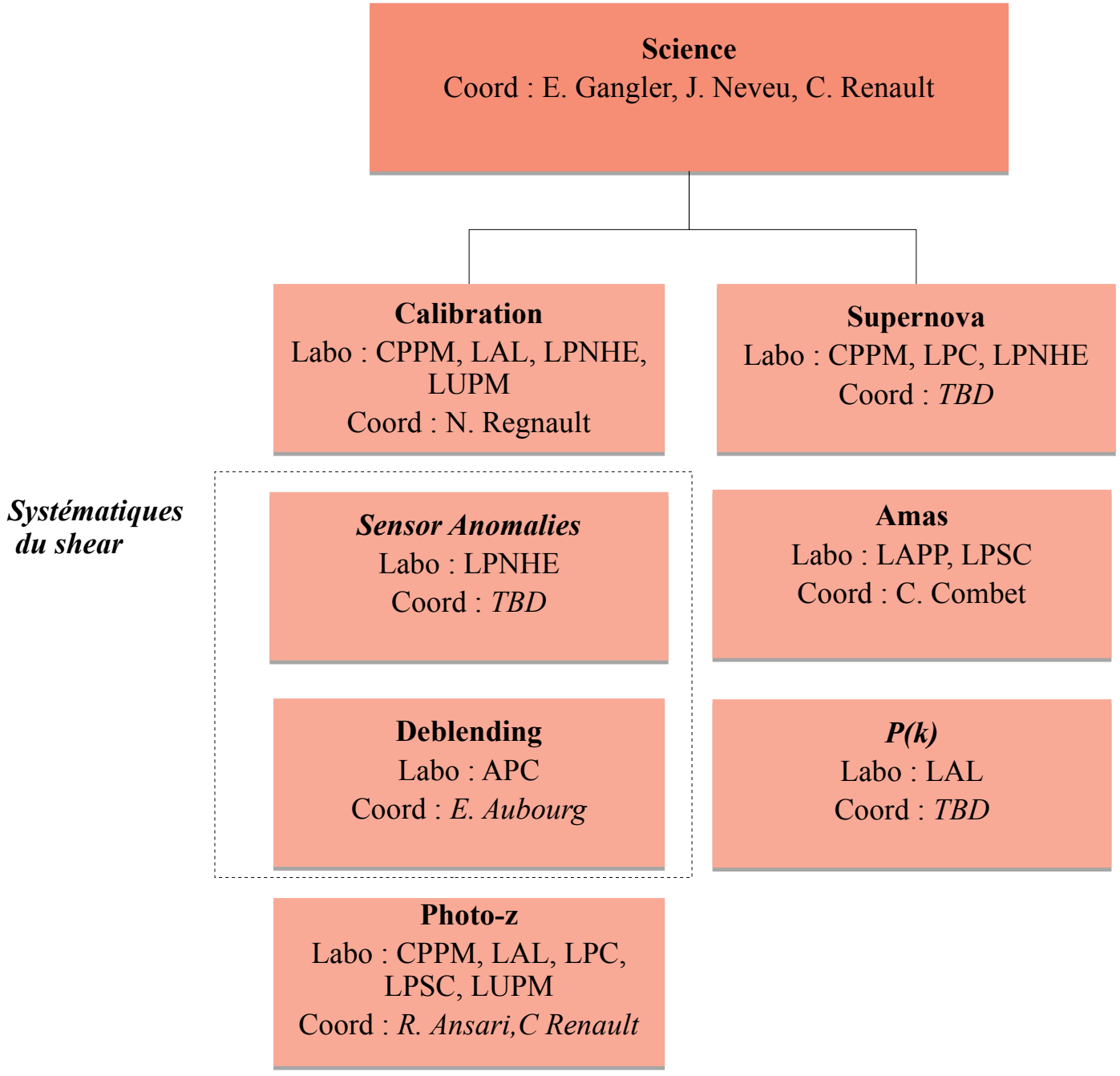
Répartition des forces françaises

ETP Chercheurs 2019




LSST-IN2P3 Organization Chart
as of 30/10/2018
IN2P3-PI : E. Gangler
Proj. Manager : C.Vescovi
Supervisory Committee :
IN2P3 DAS (IN2P3 LSSTc representative)
and the10 laboratories directors
Insitutional Board :
E. Aubourg (APC), F. Hernandez (CCIN2P3), D. Fouchez (CPPM), M. Moniez (LAL), G. Cagnoli (LMA), D. Boutigny (LAPP), E. Gangler (LPC) P. Antilogus (LPNHE), C. Renault (LPSC), J. Cohen-Tanugi (LUPM) – secretary.
Com / Outreach
Coord.: G. Shifrin
Camera
Sc. Coord. : E. Aubourg
Tech. Coord. : C. Vescovi
Commissioning
Coord. : P. Antilogus,
J. Cohen-Tanugi
Science
Coord : E. Gangler, J. Neveu, C. Renault
Computing
Sc. Coord.: D. Boutigny
Tech. Coord. F. Hernandez
Filter exchange system
Labo : APC, CCPM, LPNHE, LPC, LPSC
Tech.: P.Karst Sc.: P. Antilogus
Sensors & Electronic
Labo : LAL,LPNHE,LPSC,LUPM
Tech: C.Juramy
Sc. : P.Antilogus
Plan Focal
Labo: LPNHE, LPSC
Coord : P. Antilogus
Calibration
Labo : CPPM, LAL, LPNHE, LUPM
Coord : N. Regnault
Supernova
Labo : CPPM, LPC, LPNHE
Coord : TBD
Data Release Processing
Coord : F. Hernandez
Auto-Changer (CPPM)
Tech.: A. Marini
Sc.:D. Fouchez
CCOB
Labo: LPSC
Tech : M.Migliore
Sc.: A. Barrau
AuxTel
Labo: LAL, LPNHE
Coord : S. Bongard
Sensor Anomalies
Labo : LPNHE
Coord : TBD
Amas
Labo : LAPP, LPSC
Coord : C. Combet
Accès aux données
Coord : D. Boutigny
Carousel (LPNHE)
Tech: D.Laporte
Sc.: P.Antilogus
Filters Coating
Labo : LMA
Tech:B.Sassolas
Sc.: G.Cagnoli
STARDICE
Labo: CPPM, LPNHE, LUPM
Coord : M. Bétoule
Deblending
Labo : APC
Coord : E. Aubourg
P(k)
Labo : LAL
Coord : TBD
Filter loader (LPSC)
Tech: F.Vezzu
Sc.: A.Barrau
Slow Control
Labo: APC
Tech: F.Virieux
Sc: E.Aubourg
Photo-z
Labo : CPPM, LAL, LPC, LPSC, LUPM
Coord : R. Ansari,C Renault
Test unit (LPC)
Tech: H. Croizet
Sc.: E.Gangler
Slow Control (APC)
Tech: F.Virieux
Sc. : E.Aubourg

Structure proposée: :



- **Ces questions relèvent de la coordination scientifique !**
- **“Il faudrait déjà savoir ce qu’on fait dans DESC” (Berrie)**
- Feuille de route:
  - Finaliser les groupes thématiques
    - Chaque groupe doit avoir (au moins) **1 reponsable**
      - Chargé d’interagir avec le responsable projet et la coordination scientifique
        - News, sessions LSST-France, …
        - Besoins budgétaires (par ex. Workshops DESC)
      - … et de suivre l’activité au niveau national et dans DESC
    - *Retour attendu pour fin novembre.*
  - Toiletter la coordination scientifique
    - Mandat de l’actuelle coordination se termine au printemps
    - Evolution possible du format:
      - Assemblée des responsables + un chair
      - Ou comme maintenant: 1 ou 2 personnes.
  - Fin 2019 : bilan et ajustement