

# VLTI: an update

JMMC Annual Meeting 2015

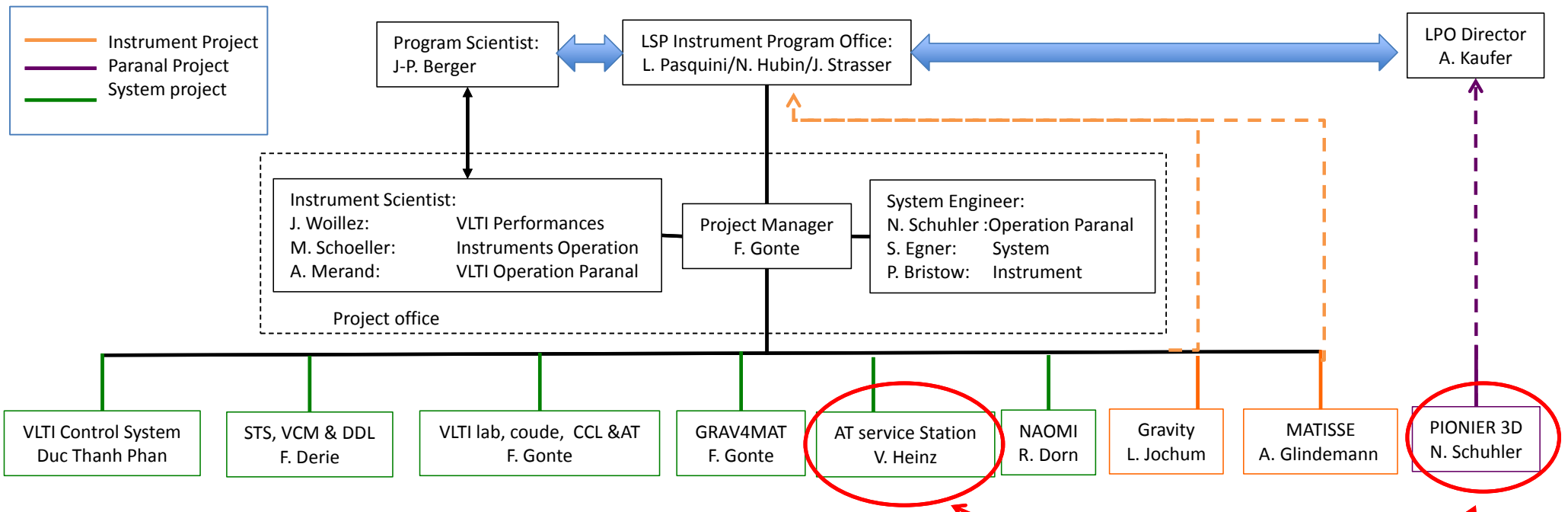


# INFRASTRUCTURE



# A new organisation since June 2015

## Today



# An extended team

many names not here but crucial support

**Directorate of Operations**

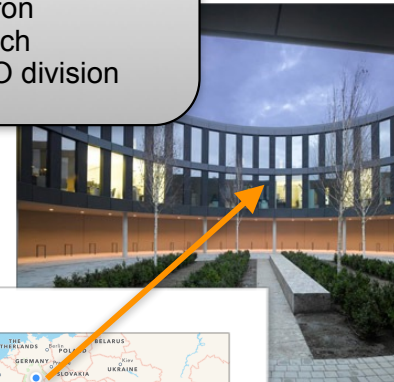


Paranal

**Quality control & pipeline**

I. Percheron  
A. Gabasch  
E. Garcia + DMO division

Garching



**Directorate of Engineering**

**VLTI engineers**

F. Delplancke  
T. Phan Duc  
L. Andolfato  
R. Abuter  
S. Engner  
C. Schmid  
+ Many others

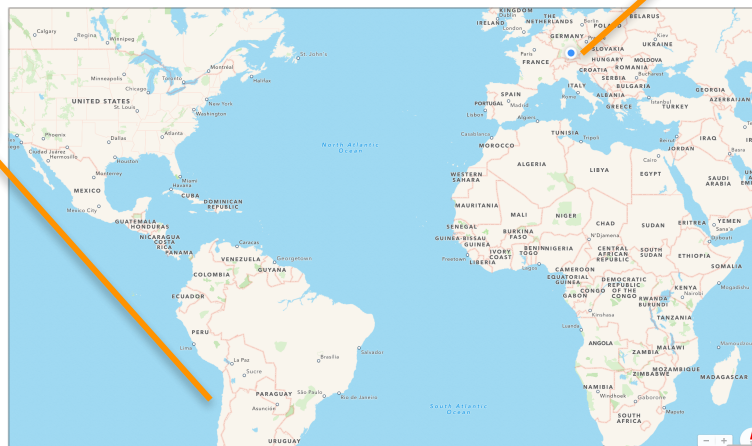
**Department of instrumentation/mechanics/electronics**

**VLTI System Engineering**

N. Schuler, P. Bourget, S. Poupar, J. Alonso ...

**SCIOPS**

A. Mérand  
W.-J. de Wit, A. Pino + 8 staff (astronomers + TIO)  
+ 2 post-doc



**Directorate of Programs**

**GRAVITY/MATISSE I Scientist + PM + SE**

M. Schöller, L. Jochum, P. Bristow, A. Glindemann

**VLTI Infrastructure PM**

F. Gonte

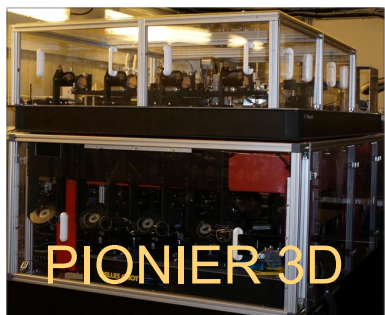
**VLTI scientist:**

J. Woillez

**User Support**

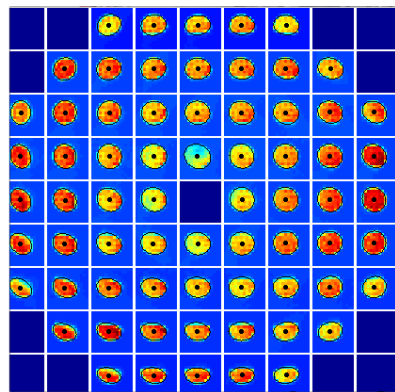
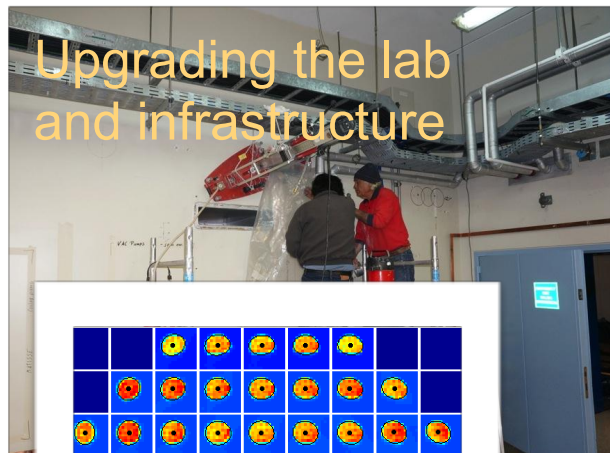
C. Hummel  
M. Wittkowski

# Upgrade the infrastructure



PIONIER 3D

Upgrading the lab and infrastructure



Contribution to CIAO

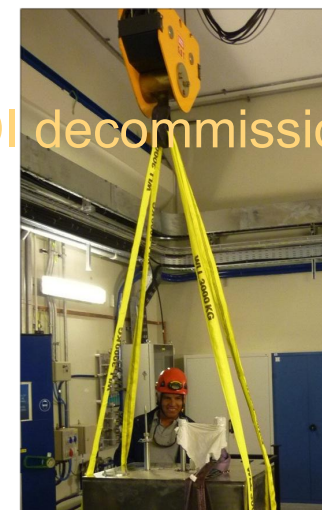


UT adaptation to astrometry

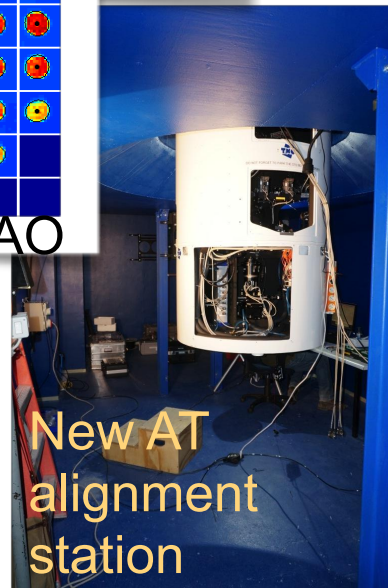


GRAVITY contribution  
Prepare GRAVITY and MATISSE spots  
GRAVITY goes here!  
MATISSE goes there!

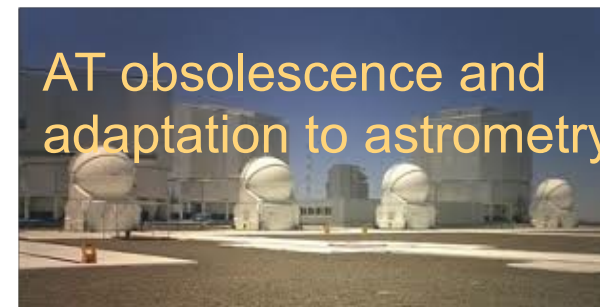
MIDI decommissioning



Eight star separators

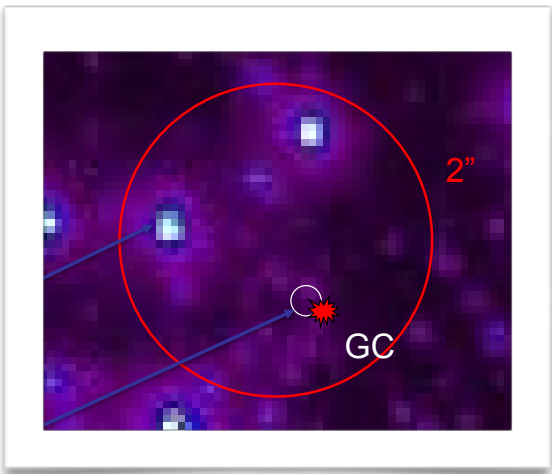


New AT alignment station

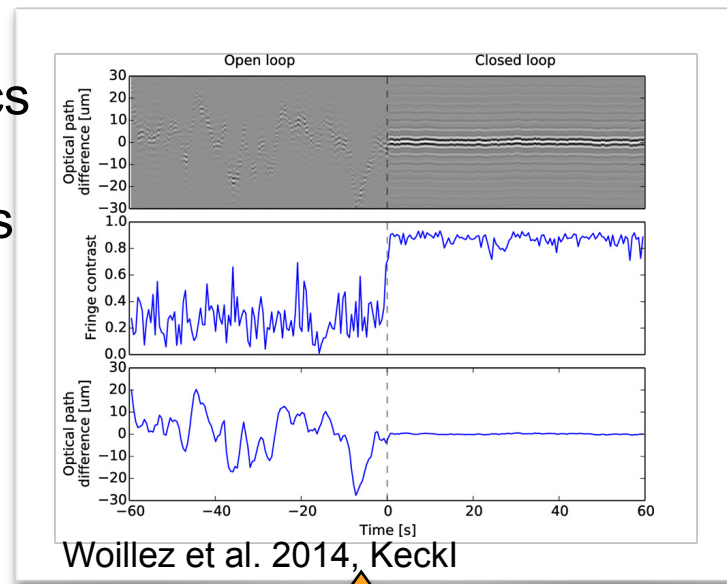
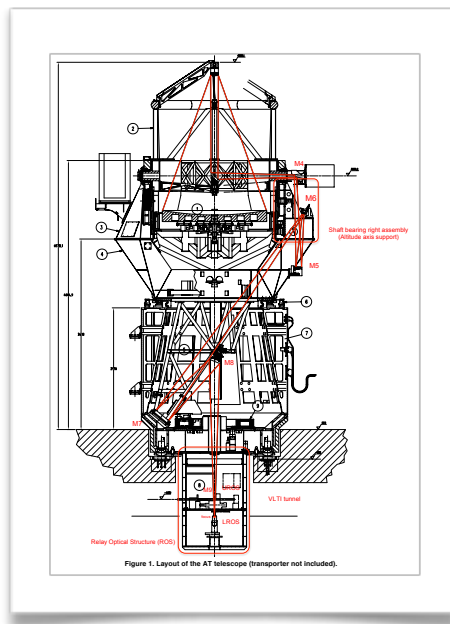


AT obsolescence and adaptation to astrometry

# Improve performance



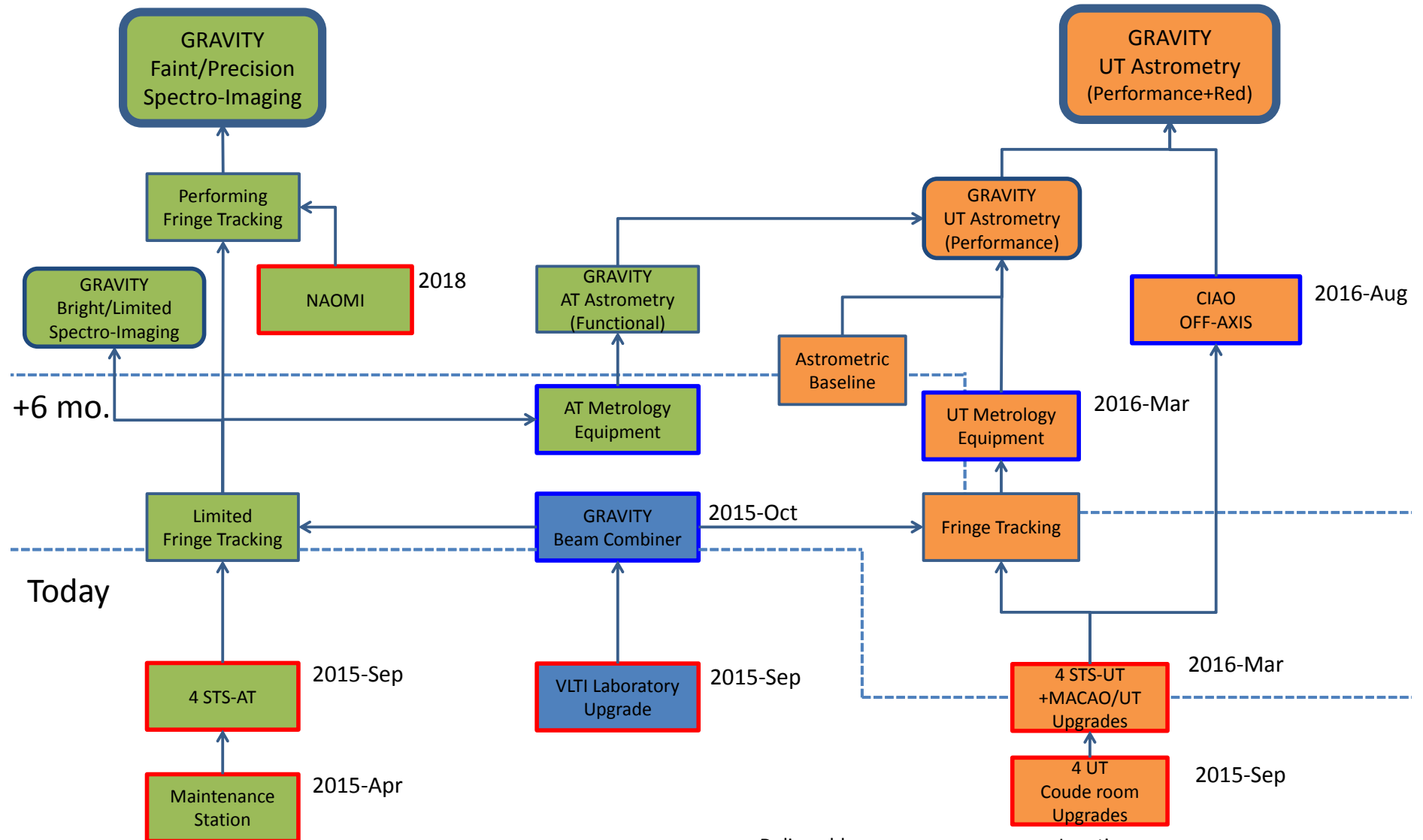
**NAOMI:** Adaptive optics for the VLTi  
**CIAO:** IR WFS for UTs



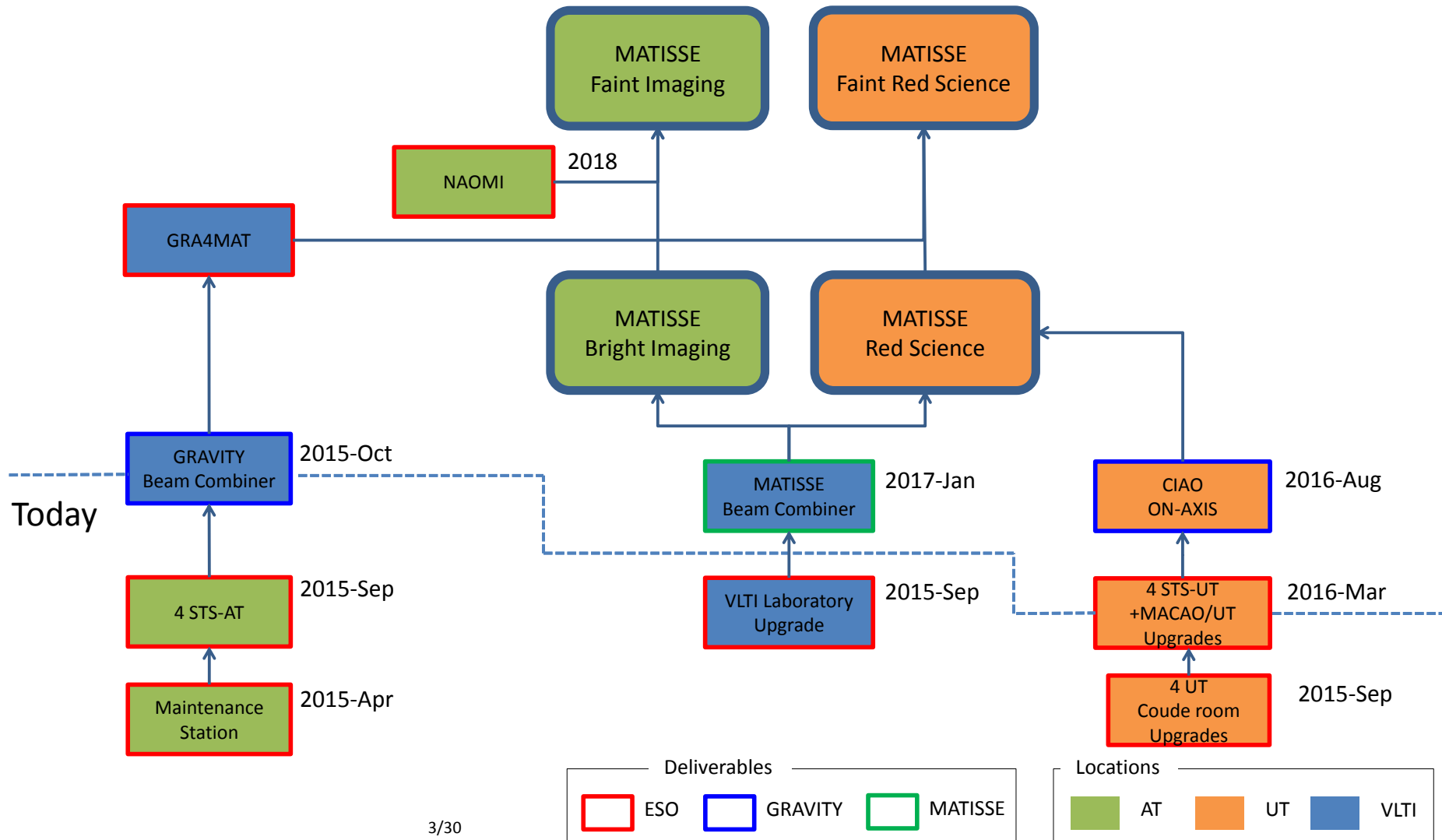
**PHASING** the array:  
**GRAVITY** for MATISSE phase the array

**ENABLE** Astrometry/ Phase referencing  
 Gravity

# Gravity



# MATISSE





# Some statistics

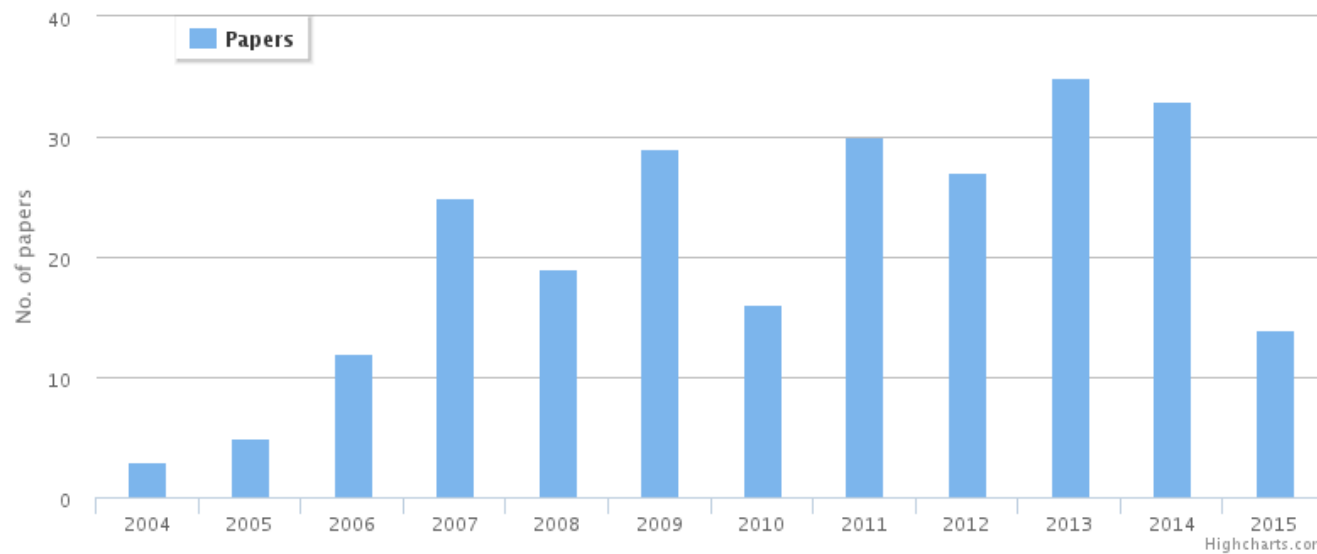
	97	96	95	94	93
V_UT	7.5	18.2	0.0	32.1	39.3
V_AT	55.9	175.1	0.0	127.0	134.5
Total	63.4	193.4	0.0	159.1	173.7

	V_UT	V_AT	Total
AMBER	7.1	12.7	19.8
PIONIER	0.4	43.2	43.6

No. of papers per year

Source: telbib

Query: year:[\* TO 2016] and (instrument:AMBER OR instrument:MIDI OR instrument:PIONIER)



# Update

- PIONIER/AMBER back in science operation
- Full PIONIER data reduction support (ESO-IPAG agreement)
- Gravity first commissioning finishing tomorrow
- NAOMI proceeding to FDR - ESO-IPAG sub-contract
- GRAVITY for MATISSE (GRA4MAT): Phase A conducted. New project structure discussed with MATISSE and GRAVITY (1st meeting Dec 3rd)

# GRAVITY



Science Spectrometer RTDC - @wgv

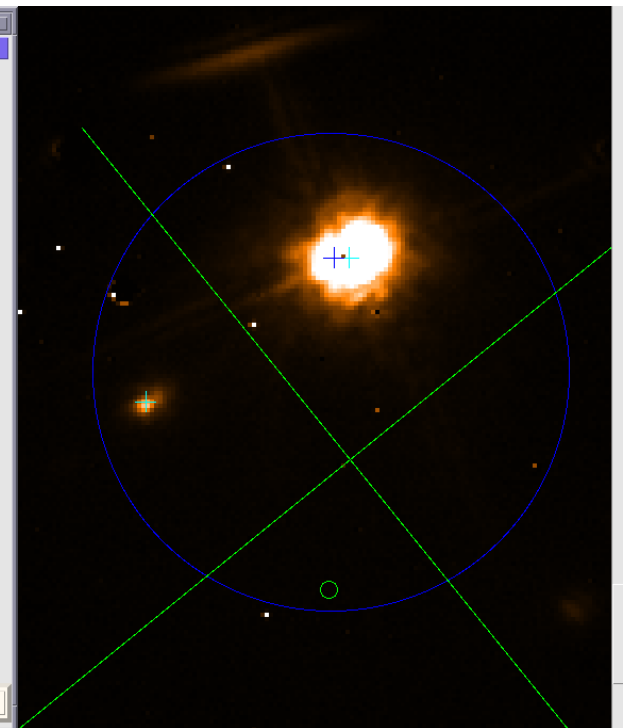
Bias: 0 Active  
 Name: NCCIR2  
 On [Print] [Copy] [Paste] [Refresh]

Camera: NCCIR2  
 Status: Attached  
 Attach Detach Set

Low: -28.57  
 High: 174.60  
 Auto Cuts Min/Max

ResolutionMedium (R ~ 500)

AT4	0	vertical	horizontal
	180	vertical	horizontal
	90	vertical	horizontal
AT2	270	vertical	horizontal
	0	vertical	horizontal
	180	vertical	horizontal
	90	vertical	horizontal
AT3	270	vertical	horizontal
	0	vertical	horizontal
	180	vertical	horizontal
	90	vertical	horizontal
AT1	270	vertical	horizontal
	0	vertical	horizontal
	180	vertical	horizontal
	90	vertical	horizontal
AT3	270	vertical	horizontal
	0	vertical	horizontal
	180	vertical	horizontal
	90	vertical	horizontal
AT1	270	vertical	horizontal



# COLLABORATION ESO-JMMC

- JMMC: an exceptional contribution to optical interferometry
- ESO-JMMC collaboration: delivery of a calibrator catalog completed (and presented to STC)
- VLT Expertise center: how can ESO help?

# VLTI ROADMAP



# Goal of the roadmap

- Established with EII
- Establish the scientific pertinence of VLTI in the “ELT era”
- Identify key scientific areas where VLTI is unique
- Single area killing case vs. workhorse
- Identify key scientific areas where VLTI can act in synergy with other facilities (e.g PLATO)
- Define an instrumental/infrastructure roadmap to reach this goal (technological readiness)
- STC oversight (april 2016) - VLTI community days (sept 2016)



# Timeline

- Epoch 1 (2015-2020): Make GRAVITY & MATISSE a success engage the community
- Epoch 2 (2020-2030): Third generation instrument(s) with limited infrastructure upgrade
- Epoch 3: Infrastructure upgrade (?)



# Key areas of scientific strength for AREAS of strength (ASTRONET, USD, ESO Prioritisation)

## VLT

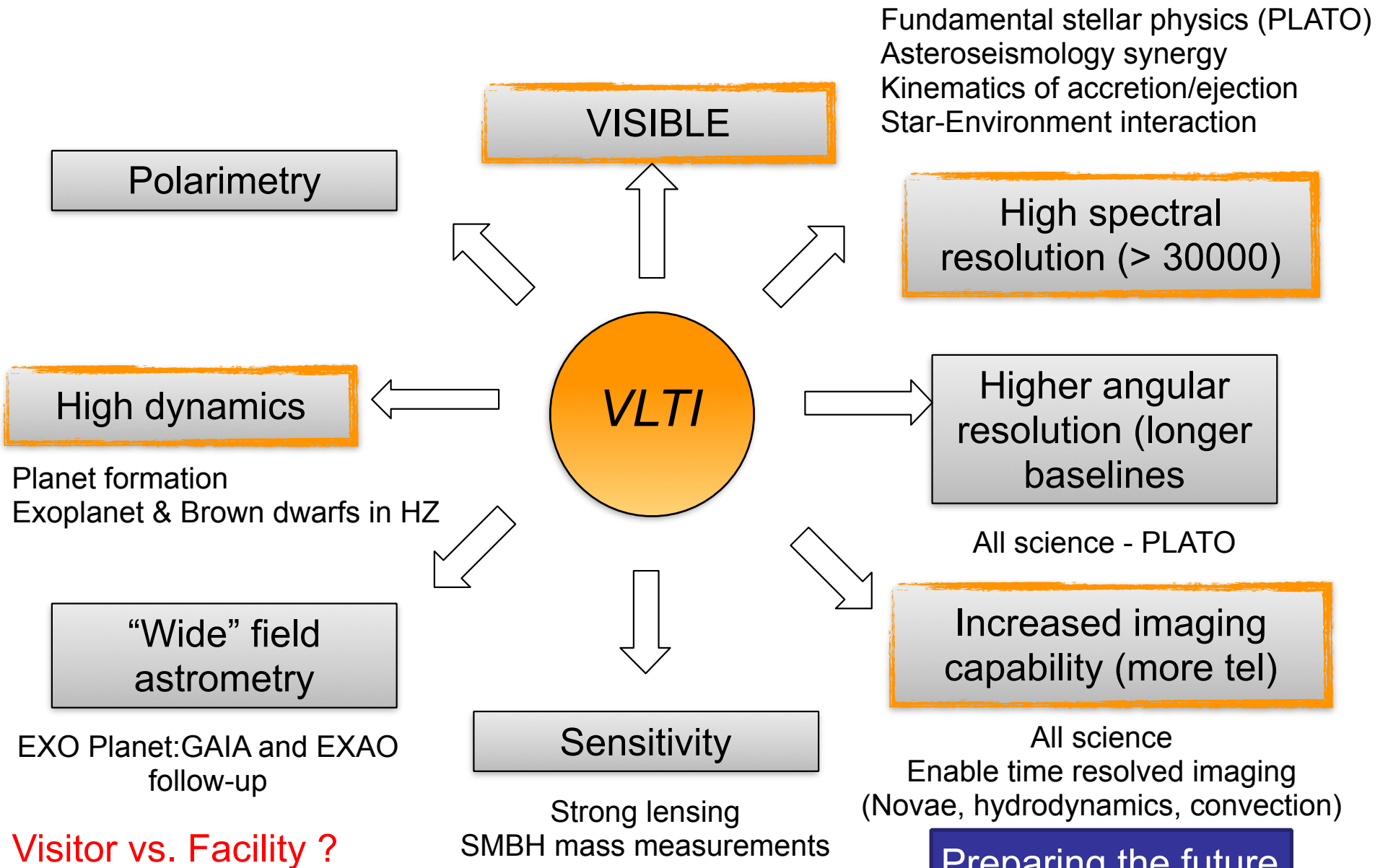
- Fundamental stellar physics including rotation, pulsation ...
- How do stars and planetary systems form?
- How do stars enrich galaxies?
- How do massive stars form and interact with their environment?
- How do SN progenitors work?
- Binaries from birth to death.
- Do we understand SMBH interaction with host galaxy
- The galactic center

Global approach  
vs single object  
approach

## AREAS to investigate

- Improvement of the cosmological distance scale;
- Ground based astrometric follow-up of exoplanet detections (post-GAIA);
- Characterisation of host stars in the context of exoplanet and asteroseismology transit missions (e.g PLATO);
- Constraints on strong lensing.
- Microlensing

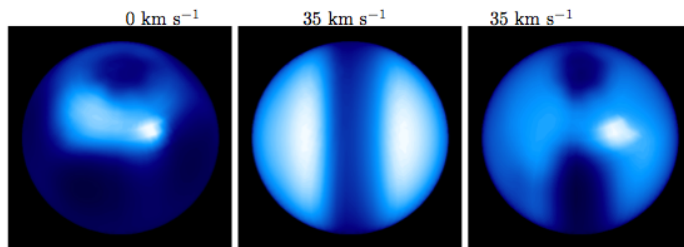
# Establish the instrumental roadmap



# Initiatives communautaires

## ✧ White paper: visible interferometry (P. Stee OCA)

### SCIENCE CASES FOR A VISIBLE INTERFEROMETER



- Allard France - Benisty Myriam - Bigot Lionel - Blind Nicolas - Boffin Henri  
 - Borges Fernandes Marcelo - Carciofi Alex - Chiavassa Andrea - Creevey Orlagh  
 - Cruzalebes Pierre - de Wit Willem-Jan - Domiciano de Souza Armando - Elvis martin - Fabas Nicolas - Faes Daniel - Gallenne Alexandre - Guerrero Pena Carlos  
 - Hillen Michel - Hoenig Sebastian - Irland Michael - Kervella Pierre - Kishimoto Makoto - Kostogryz Nadia - Kraus Stefan - Labeyrie Antoine - Le Bouquin Jean-Baptiste - Lebre Agns - Ligi Roxanne - Marconi Alessandro - Marsh Thomas - Meilland Anthony - Millour Florentin - Monier John - Mourard Denis - Nardetto Nicolas - Ohnaka Keiichi - Paladini Claudia - Perraut Karine - Perrin Guy - Petit Pascal - Petrov Romain - Schaefer Gail - Schneider Jean - Shulyak Denis - Simon Michal - Soulez Ferreol - Stee Philippe - Steeghs Danny - Tallon-Bosc Isabelle - Tallon Michel - Ten Brummelaar Theo - Thiebaut Eric - Thevenin Frederic - Van Winckel Hans - Wittkowski Markus

## ✧ High dynamics 3-5 micron visitor instrument

### A high-precision thermal infrared instrument for the VLTI

D. Defrère, O. Absil, S. Lacour, J.B. Le Bouquin, B. Mennesson, J. Surdej, and K. Tristram

Synopsis: *We propose to unlock the next level of high-dynamic range observations of the VLTI with a nulling interferometric instrument operating in thermal infrared, a sweet spot to image and characterize young extra-solar planetary systems.*