

FP7 Workpackage 9

Minutes of Steering Group Meeting

Edinburgh Sept 2013

Attendees

Mark Casali (MC), ESO

Colin Cunningham (CC), UKATC (Chair)

Roger Haynes (RH), AIP, Germany

Dave Melotte (DM) , UKATC

Phil Rees (PR), UKATC

Ian Robson (EIR) , Astronet

Hermine Schnetler (HS), UKATC

Andy Shearer (AS), Galway, Ireland

Eric Thiebaut (ET), CRAL, France

Filippo Zerbi (FZ), INAF, Italy

Apologies for absence

Jesus Burgos Martin, IAC, Spain

Jean-Luc Beuzit, Grenoble, France

1. PR outlined the purpose of the workpackage and the required outcomes. It was noted that there had been a change in emphasis from the previous KTN workpackage in the first phase of FP7 to require much more of an industry focus. This was formally through the setting up of an industry club and the running of an event to publicise the network.

2. The attendees introduced themselves within the context of OPTICON. RH, ET, CC, HS, FZ, PR and AS were representatives of other work packages within the OPTICON FP7-2. MC and EIR were representatives of Astronet and ESO respectively who also have development roadmaps that are relevant to this area.

CC asked which areas were not represented. PR pointed to the absentees who were from the solar astronomy and adaptive optics areas and hence these areas should be taken into account during the

discussions. Jesus Burgos had expressed the wish that Solarnet would be keen to collaborate with OPTICON.

3. PR then presented the aims of the meeting. The purpose was to define the activity that is required over the next 3.5 years within this workpackage. The previous KTN activities were presented and the method used to define the previous version of the roadmap. This method was to start with the top level drivers i.e. the science and facilities, then to identify the instruments needed to fulfil the aims of these facilities and finally to identify the technology gaps in realising these instruments.

It was also necessary to try and identify how the output from this work-package would feed into planning for Horizon 2020. The planning for Horizon 2020 is not clear and this is a topic that will be discussed at the next OPTICON board meeting.

4. EIR then gave an update of the Astronet science vision which has recently been completed and the facilities roadmap which is in the process of being updated. The Astronet roadmap is aiming to be a properly costed exercise.

Since the last version, many of the facilities suggested have become reality and others have been cancelled. There is a clear gap in the sub-mm/FIR and a need for cheap detectors. It was agreed that sub-mm was not included in any other EU programmes and this should be considered within this work-package.

The Astronet roadmap needs to move forward and is currently awaiting input from the community. There is no intention to prioritise amongst the science cases.

This led to a discussion about the role of facilities within the OPTICON programme and it was decided that this was already well covered within the activities of the major facilities providers such as ESA and ESO. The area where OPTICON can fill a need is in the niches where the major players are not interested. It was also agreed that where the technology readiness level (TRL) was very low, this was in the scope of research funding and where the TRL was high it could be funded through instrument build projects. The real gap was in the middle ground where little funding was presently being provided.

The role of 4m-8m class telescopes in the future was discussed. New technology for smarter use of these facilities would be of interest and it is not clear what the current owners are planning. The possibility of turning time on these facilities over for training and development activities was suggested and it was agreed that this was a nice idea. There is also some potential overlap with the Marie Curie training network. However, the scientific value of these facilities is still extremely high and it seems unlikely that this will happen in the foreseeable future.

EIR stated that from his discussions within the astronomy community he had formed the view that there was no drive for a wide field survey telescope, optical and IR astronomy are well served by the current and planned facilities. Some niche areas that remain are small, robotic observatories, polarimetry and high time resolution.

An area not yet completed within the roadmap is the outreach and public engagement section. This is an area which could be very significant and the possibilities within “citizen science” programmes should be investigated.

5. The previous version of the roadmap shows the Kilometre Optical Array and the Antarctic Observatory as the long term drivers. It is now believed that these will not provide impetus as the KOI will not happen and the Chinese are now pushing ahead on an Antarctic facility. The roadmap actually has no links onto these facilities as drawn and in fact is entirely driven by ESO (inc. ALMA). This was discussed and it was agreed that OPTICON should attempt to complement ESO rather than support in order to ensure that the niche activities had a chance of entering the mainstream.

6. MC then gave an overview of the E-ELT instrument program which is the main European facility driver and the ESO technology development program. The main activities are focussed on high order deformable mirrors, detectors and lasers. MC also described that ESO are attempting to change their relationship with industry. The idea is to focus on paying for activity rather than results. It is hoped that in this way, even when developments fail, the associated knowledge that is gained will come over to ESO. This is a much more collaborative way of working and a contract has already been placed to explore how this will work.

7. The role of industry was discussed and it was mooted that the aim should be to form partnerships of mutual interest with industry. This would maximise the return on investment as well as fulfilling the remit of knowledge exchange between academia and industry. The trick is in identifying where the common areas lie and the organisations working in these areas. There is no possibility that astronomy organisations can directly interest industrial partners as the potential contracts are too small. In that case it is necessary to move away from thinking about the application and into the underlying technology . The areas where there is a need for the same technology in very different applications need to be identified. In particular, where these other applications have potentially large markets. In this way, large investment could be levered.

It was suggested that a way forward would be to generate publicity material in order to “sell” some of the technologies that astronomy groups are currently working on to potential partners and rather than a single event, put together a road show to go to numerous industry trade shows.

MC suggested a good starting point would be the IRO forum which is an event organised by the large European science organisations to interface with industry. Needs and solutions are both presented.

ACTION MC : Provide details of the next IROForum

8. RH gave a presentation on the latest developments in photonics with applications in astronomy. There were many and varied and it highlighted the problem of trying to select priorities from among all of the potential technologies.

MC questioned whether most of these ideas would lead to real improvements in performance or whether they were mainly focussed on cost and space savings. RH believed that there was a mix of both and it was pointed out that size and cost were also issues in astronomy.

9. There was a discussion about whether we should restrict the discussion to technology or if methodology was also valid. PR stated that this depends on the methodology in question. For

example the method of measuring a surface profile is generic across a range of applications and we should consider this type of thing, whereas coronagraphy is an astronomy method which is unlikely to have applications in other areas. However, even in this type of case, if the method can be rephrased to cover a less application specific description it should still fall within the scope of this discussion.

The group then generated a number of favourite ideas within the remit of

- a) TRL 4-6
- b) Considerable interest for astronomy applications
- c) not actively being pursued by ESO or ESA
- d) potential for funding routes and applications outside of astronomy.

These were grouped into more general classes. The potential wider applications were then discussed.

The broad groups of ideas were:-

| Concept | Applications outside of astronomy | Notes |
|---|--|--|
| Novel Detectors | Biomedical, Military, Security, Remote monitoring, Telecoms | MKIDS, SPADS etc |
| Miniature mechanisms | Biomedical, Military, Security, Remote monitoring, Telecoms | Includes position feedback and control systems. These would be larger than MEMS but still very small. Potentially deformable mirror advances could come from this direction. |
| Metrology of surfaces | Precision manufacturing, Signal Processing, Machine Vision, Wavefront sensing and profilometry | Optical metrology can be extended to measurement of any surface shape |
| Fibre Bragg grating | Remote sensing, environmental monitoring, materials processing, medical imaging | 2D filters and wavelength selection. |
| Integrated design, test and data processing methods | Image processing, big data users | Includes hardware in the loop as well as data processing and data mining techniques. |
| Optical cross-connects | Telecoms | Photonic technology |
| Liquid crystals | Displays, construction | Well established technology that potentially has run out of steam due to contrast limitations |
| Lightweighting and | Aerospace, construction, offshore, active | |

| | | |
|-------------------|------------|--|
| active structures | structures | |
|-------------------|------------|--|

A vote was then taken on the priorities and these were ranked as follows

Metrology (43 points)

Novel Detectors (42 points)

Mechatronics (40 points)

Integrated design (37 points)

Fibre Bragg Gratings (35 points)

Lightweight and active structures (23 points)

Optical cross connects (16 points)

Liquid Crystals (13 points)

10. A discussion on the way to proceed was then held. It was felt that the process of workshops had advantages and disadvantages. The main advantage was that it led to some tangible, reportable outcome i.e. the workshop itself. It was however felt that there may be a better way to proceed and that is by trying to sell astronomy technology areas to industrial partners by directly connecting interested groups. The means to proceed was therefore agreed to be the following

Generate a directory of all technology development happening in European astronomy **ACTION PR**

MC offered to help as this was already an action taking place within the ESO technology programme.

Contact the relevant people and ask to provide a short summary of their activity then collate this into a brochure **ACTION PR**

Set up a website to disseminate this information. This may require registration (free of charge) to allow uptake to be measured.

Identify a list of appropriate forums to hand out the information directly **ACTION PR**

Generate an OPTICON mailing list **ACTION PR**

Use the outcome of this meeting to generate a next draft of the roadmap **ACTION PR**

Circulate roadmap throughout the community to solicit further modifications and update accordingly **ACTION PR**