



Euro-Biolmaging
European Research Infrastructure for Imaging Technologies in
Biological and Biomedical Sciences

WP7 Access to Innovative Technologies-ALM

Task 7.1

Organization of meetings with experts to identify innovative light
microscopy techniques and their demand for access

Task 7.2

Organization of a European community of leaders in microscopy
technology development

Deliverable 7.4

Interim report on emerging technologies in light microscopy with
potential and demand for access

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Deliverable 7.4

Interim report on emerging technologies in light microscopy with potential and demand for access

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1 General remarks

The major goals of WP7 are the identification and definition of emerging innovative light microscopy technologies for which a significant need for access throughout Europe exists or is anticipated, and the development of strategies for rendering such technologies accessible. Several activities in WP7 have been dedicated to address this task. **First**, WP7 breakout sessions were organized during the past three Euro-Biolmaging (EUBI) stakeholder meetings in 2009, 2010 and 2012, with the aim to discuss with EUBI stakeholders for which innovative light microscopy technologies a need for access exists or may exist in the future. **Second**, national EUBI coordinators have been elected by their national communities to discuss and organize national roadmaps for light microscopy and to identify emerging innovative light microscopy technologies for which a need for access exists, and identify potential providers of access to such technologies in their countries. These national coordinators met on June 10th, 2011 in a satellite meeting to the 11th ELMI meeting, in Alexandroupolis, Greece to specifically identify such innovative light microscopy technologies, for which a need for access exists (see D7.1 for the meeting report). **Third**, within the comprehensive pan-European survey on biological and biomedical imaging infrastructures conducted in 2011, WP7-specific questions related to the need for access and the possibilities to provide such access were included. More than 660 participants from 25 countries completed this survey, and their responses were analyzed.

2 Review of innovative light microscopy technologies

The innovative light microscopy technologies discussed in stakeholder meetings and at the national EUBI coordinators meeting are:

Technologies defined already at the EUBI application level

1. Super resolution microscopy.
2. Functional imaging (e.g. FRAP, FRET, FCS/FCCS).
3. Correlative microscopy.
4. High throughput microscopy for systems biology.

Technologies discussed at the EUBI 2009/2010 stakeholder meetings

5. Light sheet based fluorescence microscopy.
6. Correlative light/MRI microscopy.
7. Differential polarization laser scanning microscopy.
8. Non-linear-microscopy techniques (e.g. CARS, SHG and SRS).
9. Photothermal heterodyne imaging.
10. Single molecule imaging techniques.

Technologies discussed at the WP7 satellite meeting to ELMI 2011

11. Biomolecular imaging mass spectroscopy (BIMS).
12. Raman/ IR microscopy.
13. In vivo super-resolution microscopy.
14. Nano-antenna-based techniques.

Technologies discussed at the EUBI 2012 stakeholder meeting

15. Digital holographic microscopy.
16. Advanced intravital microscopy.
17. Technology to image morpho-functional intact neural networks.

The technologies from point 1 to 10 listed above were included in the EUBI pan-European survey in order to obtain further information on the extent of use and/or needs for access to the different light microscopy technologies (see Fig.1).

The survey indicates that there is a greater need for access to novel/ innovative light microscopy technologies defined in WP7 compared to the more established “high-end” light microscopy methods such as laser scanning confocal microscopy, deconvolution microscopy, spinning disk microscopy and also electron microscopy.

The opinion of infrastructure providers who participated in the survey on how they would consider the future demand of the WP7 technologies and their provision by existing imaging infrastructures was also queried (Fig.2). In general, established methods like laser scanning confocal microscopy, spinning disk microscopy or electron microscopy were considered by most of the infrastructure providers as very high, with about 15 to 20% of participants stating that the need would not be met by existing infrastructures for these technologies. In comparison, fewer considered the demand for access to technologies defined in WP7 as high. However, the majority of the infrastructure providers were of the opinion that this demand will not be met by current infrastructures (see Fig.2).

3 Summary and conclusions

In total 17 innovative technologies have been identified by WP7 for which need for access at the European level exists.

For these technologies the ratio “need for access” to “availability of access” is much larger than for established general light microscopy methods such as laser scanning confocal microscopy.

In general, infrastructure providers indicate that also well established ALM methods cannot satisfy the constantly increasing user demand. See Deliverable 6.1 – Work Package 6.

The EUBI pan-European survey results show that the need for access to these technologies will also be high in the future and will not be covered by currently existing infrastructures.

4 Figures

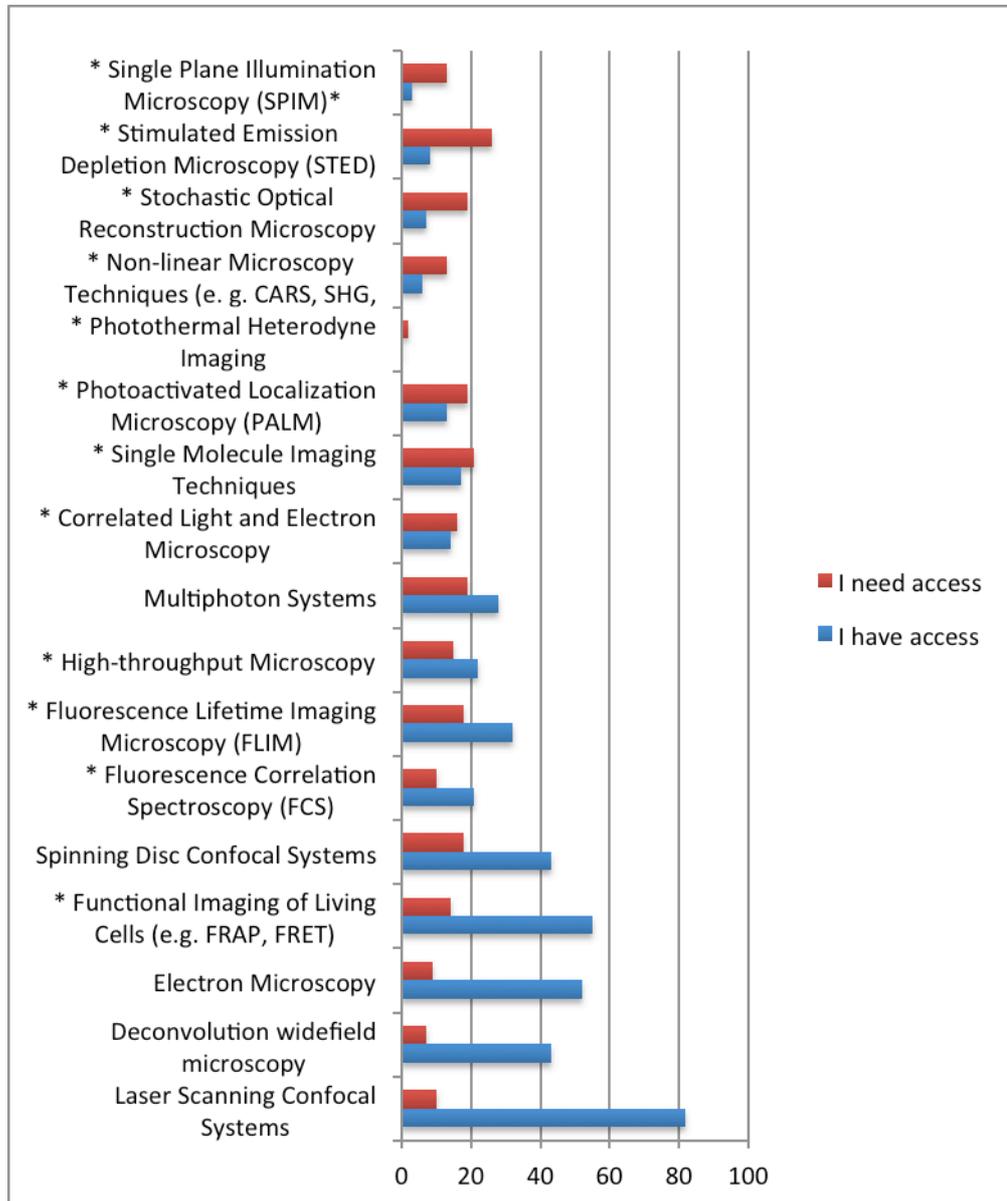


Fig.1 Light microscopy technologies and their current accessibility (normalized to the total number of participants and shown in %) by infrastructure users. Technologies marked by * belong to those defined in WP7. For comparison some technologies as they are investigated in WP6 (Advanced light microscopy, general access) are included. The technologies are listed from top to bottom with decreasing values for the ratio “I need access” to “I have access”.

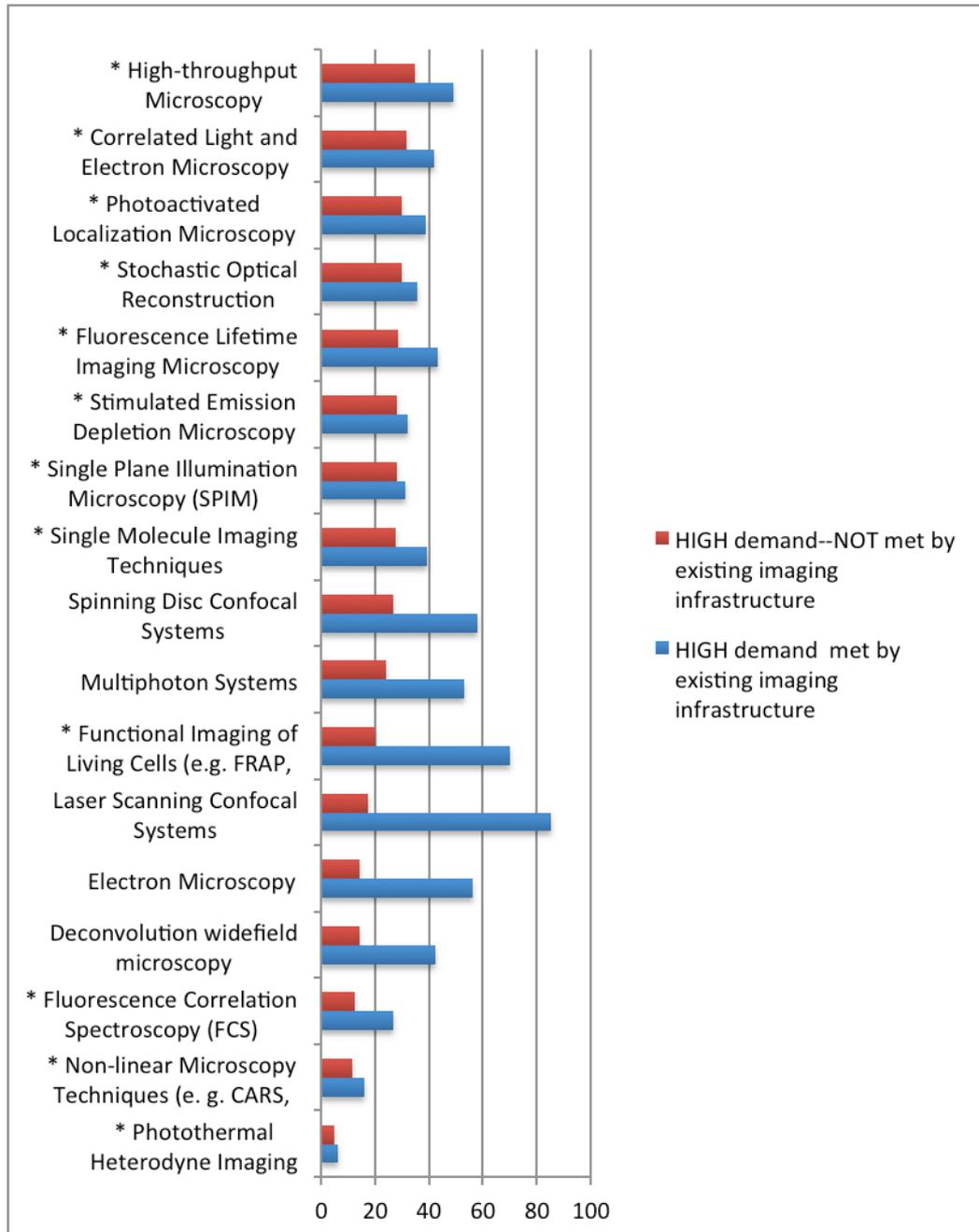


Fig.2 Future demand of the WP7 technologies and their provision by existing imaging infrastructures estimated by infrastructure providers (in % of participants answering these questions). Technologies marked by * belong to those identified as innovative and/or emerging in WP7. For comparison some technologies as they are investigated in WP6 (Advanced light microscopy, general access) are included.