

QUAREP-LiMi

Bringing a 15 year old idea to success ?

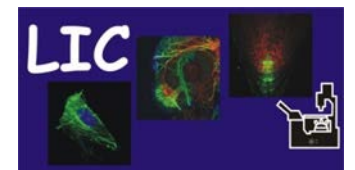
Quality Assessment and Reproducibility for Instruments & Images in Light Microscopy

Roland Nitschke

Microscopy and Image Platform (MIAP) Freiburg

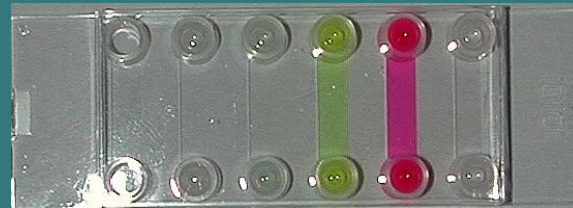
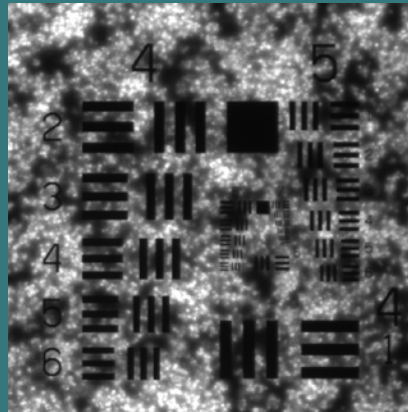
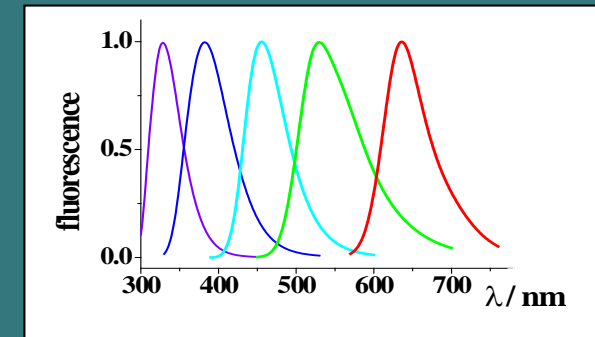
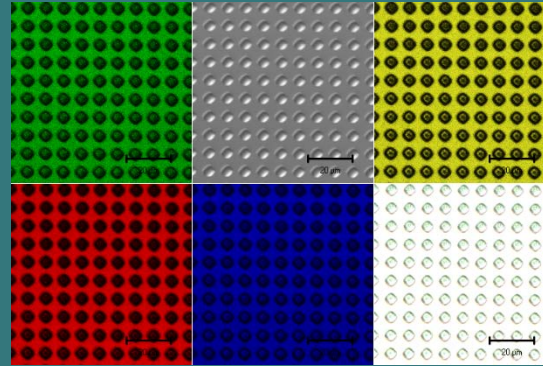
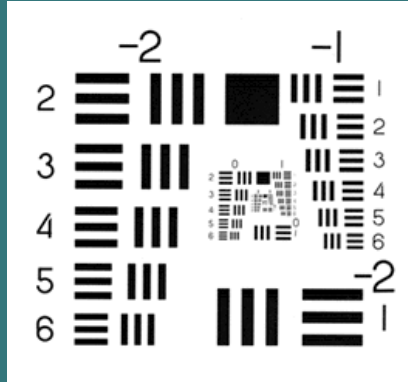
Life Imaging Center (LIC)

German Biolmaging (GerBI-GMB)

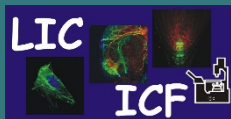


2005

Standardization, quantification and reproducibility in fluorescence and wide-field microscopy



FOM 2005
Special Session 90 min



Roland Nitschke & Ute Resch-Genger
Life Imaging Center (LIC) University Freiburg and
Federal Institute of Materials Research and Testing, Berlin



Standardization and Quantification

Why are standards needed

- Different reasons why standards are needed

We want to know if the performance of an instrument is comparable to yesterday or a week ago or 3 month ago or...

We want to allow pooling of data or quantification of signals even when conditions have changed by using standard measurements as a correction factor

We want to know if an instrument gives the maximum specified performance

We want to know what we can expect at all from an instrument in terms of alignment, intensity, field flatness, sensitivity...

We want to make instruments and instrumentation performances (objective to objective, instrument to instrument, brand to brand, wide field to confocal, confocal to deconvolution) more comparable

In core facilities or more general many scientific studies are often done on more than one instrument, so combining data from different instruments is very useful and needed or often mandatory

Intention of the GerBI - Industry interaction

Our interests are driven by:

1. Knowing more about general specs and the performance of systems, when and/or before we buy it and how it develops over time
2. Demand for more quantitative imaging data (measurements and projects running over longer time scales; reliability and comparability of data)
3. Characterize sensitivity and system noise to decide if it is possible to pick up small biological effects?
4. Giving always the best performance to our customers
5. Foreseeing/predicting upcoming repairs or planning pooled service requests
6. Understanding why certain systems in a facility are used less than others

Most important outcome of the meeting
– users were invited to join DIN/ISO committees

2016-2019

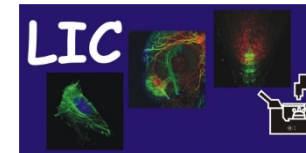
17th International Meeting European Light Microscopy Initiative (ELMI)

Core Facility Day

Dubrovnik, 23. May 2017

Report about  microscopy and optics activities

Roland Nitschke
Life Imaging Center (LIC) Freiburg
University of Freiburg, Germany



Topics of the DIN document in detail

3	Terms and definitions.....
4	Quantities
4.1	Resolution /strength of optical sectioning.....
4.1.1	Definition of resolution.....
4.1.2	Definition of strength of optical sectioning
4.1.3	Measurement
4.2	Uniformity of field
4.2.1	Definition of uniformity of field
4.2.2	Measurement
4.3	Co-registration accuracy.....
4.3.1	Definition of co-registration accuracy
4.3.2	Measurement of co-registration accuracy.....
4.4	Stability of illumination power
4.5	Field number of confocal scan optic
4.5.1	Definition of field number of confocal scan optic.....
4.5.2	Measurement of maximum diameter of scanned field
4.6	Scanning Frequency.....

Now its done, but.....

INTERNATIONAL
STANDARD

ISO
21073

First edition
2019-12

**Microscopes — Confocal microscopes
— Optical data of fluorescence confocal
microscopes for biological imaging**

*Microscopes — Microscopes confocaux — Données optiques des
microscopes confocaux à fluorescence pour l'imagerie biologique*



Reference number
ISO 21073:2019(E)

ISO 2019

A DIN/ISO norm does not include a measurement protocol or manuals. Companies do not have to use a DIN/ISO norm.

What can instrument users (we) do?

Ask the companies for instruments delivered with a protocol (ISO 21073), showing the real measured values with that system.

Ask the instrument funding agency to smoothly enforce funding only DIN/ISO compliant microscopes. This could result in may be getting soon only new instruments, which are specifically stated to keep the specs of the DIN/ISO document.

But what about the price tag for that? And what about keeping these specs over time? How and who can control that?

This brings us finally to some off the ideas of QUAREP-LiMi:

Develop in the microscopy community with the manufacturer and national standardization agencies instructions/manuals, practical teaching courses, and tools to evaluate the compliance of an instrument with the DIN/ISO norm and do repeated measurements to assure high quality instruments for the customers in your facility.

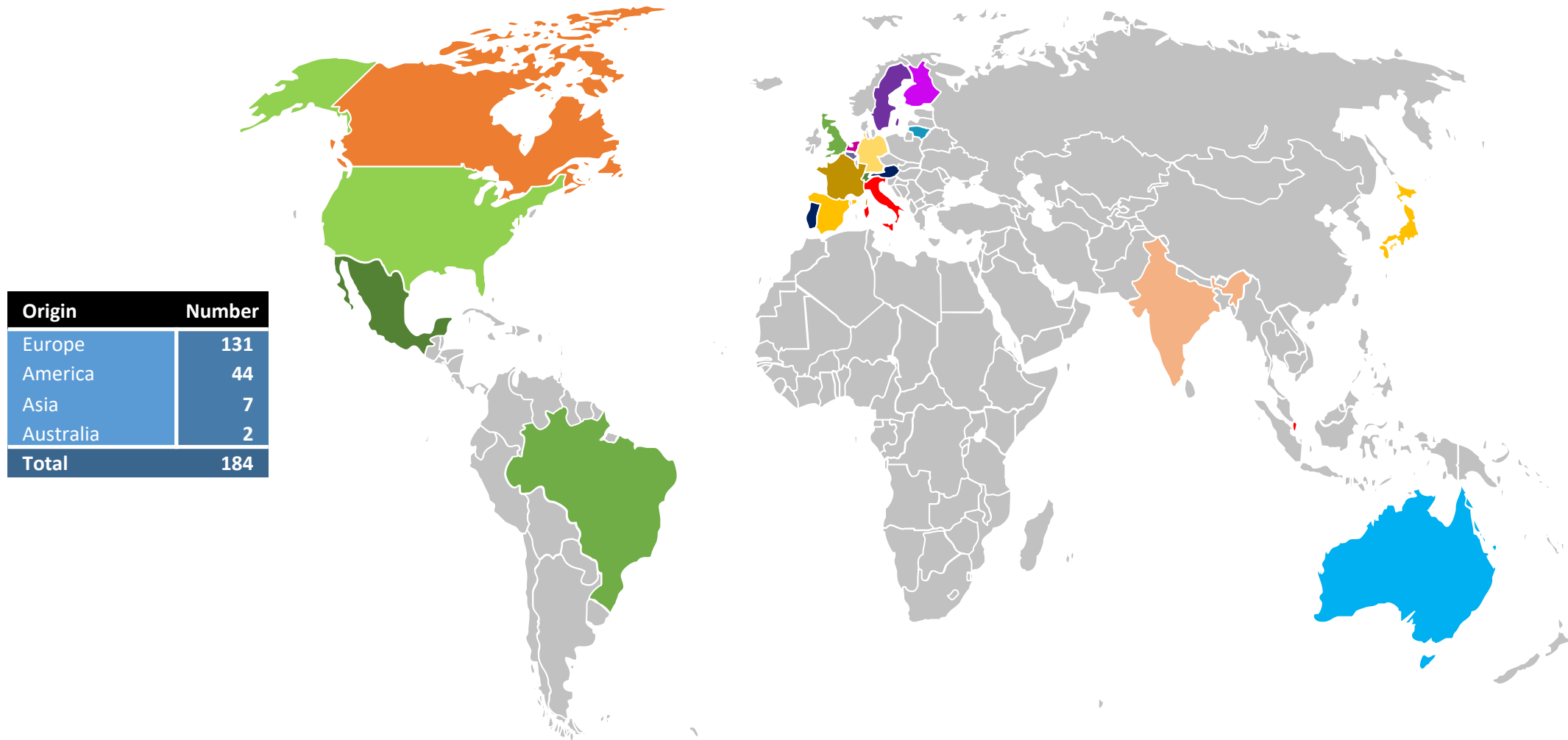
Quality Assessment and Reproducibility for Instruments & Images in Light Microscopy

QUAREP-LiMi is a group of enthusiastic light microscopists from Academia and Industry all interested in improving quality assessment (QA) and quality control (QC) in light microscopy.

Initiated by MIAP-Freiburg we came together in a first on-line Webmeeting on 28th of April, 2020 with about 50 attendees. By now the group has grown to about 185 people from all over the world.

In this meeting it was decided to establish ten workgroups (WG) for different topics of interest.

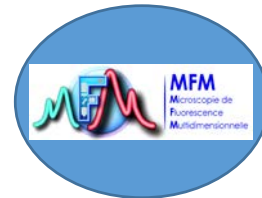
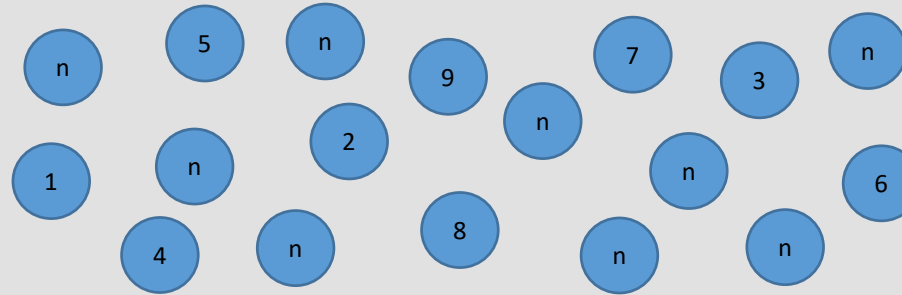
QUAREP-LiMi - Where do we come from?



QUAREP-LiMi members – who are we?

Affiliation	Number
Academia	114
Industry	53
Standard Organizations	11
others	6
Total	184

Microscopist and Imaging Scientist



Members	Number
female	51
male	133
Total	184



Working groups in QUAREP-LiMi

Working Group name	Member count	Function	First name	Last name	Country	1st meeting	2nd meeting	3rd meeting
WG 1 Illumination Power	41	Chair	Laurent	Gelman	CH	05.08.2020	02.09.2020	04.11.2020
		Vice chair	Natalie	Gaudreault	USA			
WG 2 Detection system performance	36	Chair	Britta	Schroth-Diez	D	07.09.2020	12.10.2020	09.11.2020
		Vice chair	Gert-Jan	Bakker	NL			
WG 3 Uniformity of field - flatness	29	Chair	Damien	Schapman	F	06.10.2020		
		Vice chair	Martin	Spitaler	D			
WG 4 System chromatic aberration and Co-registration	27	Chair	Hans	Fried	D	02.09.2020		
		Vice chair	Christian	Kukat	D			
WG 5 Lateral and Axial Resolution	47	Chair	Orestis	Faklaris	F	27.07.2020	01.10.2020	
		Vice chair	Glyn	Nelson	GB			
WG 6 Stage and Focus	27	Chair	Stanley	Schwartz	USA	16.09.2020		
		Vice chair	Arne	Seitz	CH			
WG 7 Metadata	49	Chair	Caterina	Strambio De Castillia	USA	30.07.2020		
		Vice chair	Susanne	Kunis	D			
WG 8 White paper	44	Chair	Ulrike	Boehm	USA	16.09.2020		
		Vice chair	Glyn	Nelson	GB			
WG 9 Planning + Funding	34	Chair	Roland	Nitschke	D	17.09.2020		
		Vice chair	Alex	Laude	GB			
WG 10 Image Quality	54	Chair	Thomas	Guilbert	F	06.08.2020		
		Vice chair	Ulrike	Boehm	USA			
WG 11 Microscopy Publication Standards	20	Chair	NN			Feb. 2020		
		Vice chair	NN					

More to come.... What is the needed/missing?

Suggested exemplified workflow for preparing ISO submanuals or measurements protocols in the Working groups of QUAREP-LiMi

Stage code	Stage	Associated document name	Abbreviation	Who is working on it Kind of work
00	Preliminary	Preliminary work item	PWI	Community, WG sets frame
10	Proposal	New work item proposal	NWIP	WG writing
20	Preparatory	Working draft	WD	WG writing + individual labs testing
30	Committee	Committee draft	CD	WG presents to all QUAREP members Discussion
40	Enquiry	Enquiry draft	DIS	Further and final testing Suggested changes by WG
50	Approval	Final draft	FDIS	QUAREP members voting
60	Publication	<i>ISO manual(protocol)</i>	ISO	Publication who, how and where ?
70	Review	ISO manual updated revised version		

Timeline of WGs will/can/must not be similar, but should aim to be synchronized when overlap or dependance exists

Modified from https://en.wikipedia.org/wiki/International_Organization_for_Standardization

Structure/Organisation of QUAREP-LiMi

All QUAREP-LiMi members come together approximately every 2-3 months in a General Meeting (currently only online). Next meeting takes place **Thursday the 25th of February, 15:00 - 17:00 CET**.

The eleven workgroups have a chair (C) and a vice chair, (VC) which are co-ordinating/organizing the work within the group, organize WG meetings, report about the results of the WGs in the General Meeting, help organize and maintain the content/information on the webpage and the cloud server. C and VC should form the time line - mile stones, frequency of meetings, practical work in groups The WGs can actively search/invite/interest more industry members. Currently 5 more companies are in the process of joining QUAREP-LiMi after being invited by RN.

Chairs and vice chairs have intermediate meetings between the General meetings (next early Febr. 2021).

Every member of QUAREP-LiMi has a personal write/edit access to the cloud server content.

Every member of QUAREP-LiMi can get write/edit access to the webpages and the calendar.

QUAREP-LiMi will try to get funding on national/international level to maintain the speed of progress of our work.

QUAREP-LiMi is in tight contact with DIN/ISO for co-ordinating some efforts.

More about QUAREP-LiMi

QUAREP-LiMi has a website <https://quarep.org>

The webpages give a short overview about QUAREP-LiMi and the work we do.

Content of the webpages: Memberlist, WG chair and member list, calendar of QUAREP-LiMi events, and meetings, specific description of the working groups tasks, Contact form

We run a cloud server (CS) as a common repository and exchange point for our work.

Available information on the CS:

Literature about QC & QA

Large database about measurement tools for QC & QA

Agenda and minutes/protocols and recordings of all the online meetings

White paper

QUAREP-LiMi is absolutely open for new members and we are looking forward to hear from you. If you want to join us fill out Contact webform <https://quarep.org/contact/>

or sent an E-Mail to: roland.nitschke@biologie.uni-freiburg.de



Thank you very much for your attention!

