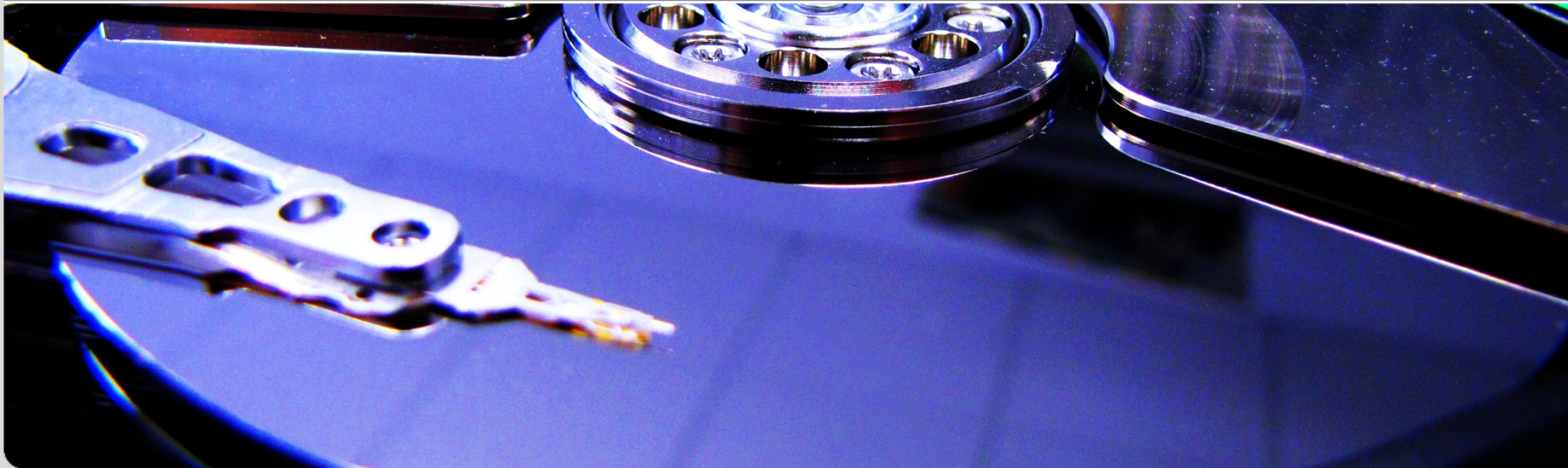


# ***DLCL Key Technologies: Status + Future***

Rainer Stotzka,  
Richard Grunzke, Volker Hartmann, Michael Hausmann, Jürgen Hesser, Thomas Jejkal, Nick  
Kepper, Ralph Müller-Pfefferkorn, Halil Pasic, Rasmus Schröder, Danah Tonne, Xiaoli Yang

The LSDMA DLCL-Key Team – Heidelberg, Dresden, Karlsruhe



# Status



4 (+EU) locations

5 (+1) subprojects:

- Lightoptical Nanoscopy (Heidelberg, Mannheim)
- High Throughput Microscopy: Gen Scans (TU Dresden + MPI of Molecular Cell Biology and Genetics)
- High Throughput Microscopy: Selective Plane Illumination Microscope (Karlsruhe)
- Electron Microscopy (Heidelberg)
- Material Research: Tomography Beam Line at ANKA (Karlsruhe)
- *ESFRI project DARIAH: Digital Research Infrastructures for the Arts and Humanities (Europe)*

# Status

## Regular phone conferences:

- April
- June
- August



## Publications:

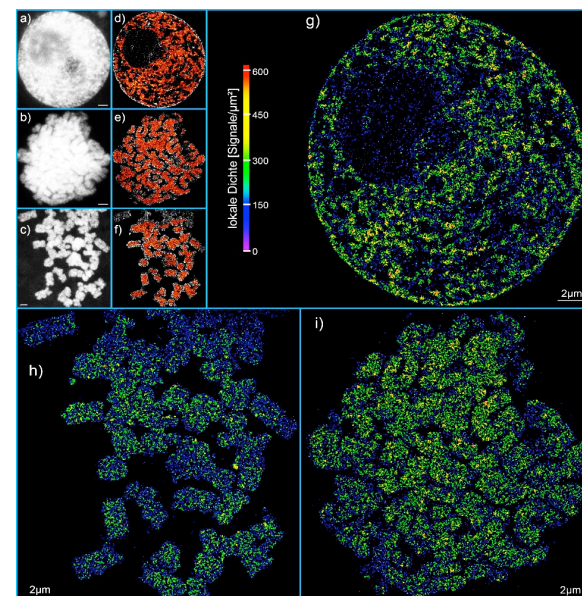
- [1] DLCL-Key Anforderungsanalyse, June 1012
- [2] DLCL-Key Foliensatz, June 2012
- [3] DLCL-Key Aktivitäten Quartal 1+2/2012, July 2012
- [4] Xiaoli Yang, Halil Pasic et al., Data Intensive Computing of X-Ray Computed Tomography: Reconstruction at the LSDF, submitted to PDP2012
- [5] Danah Tonne et al., Access to the DARIAH Bit Preservation Service for Humanities Research Data, submitted to PDP2012
- [6] Simon Ochsenreither, Workflow zur Verarbeitung von rechenintensiven Lichtscheibenmikroskopie-Daten, BA-Thesis, DHBW Karlsruhe, September 2012
- [7] D. Haas, H. Pasic, et al., Status of the ultra fast tomography experiments control at ANKA, accepted at PCaPac 2012

# Lightoptical Nanoscopy

## Workplan:

- 2013** Definition of tool tree for image data evaluation, data storage and image visualization
- 2014** Data life cycle analysis, development data workflow for specific *applications* in *biomedicine* and *radiation research*
- 2015** Application analysis for meta data handling – multi user test

SPDM of nucleosomes



## Most important requirements:

- Data storage facilities
- Data life cycle definition
- Application dependent evaluation
- Meta data handling

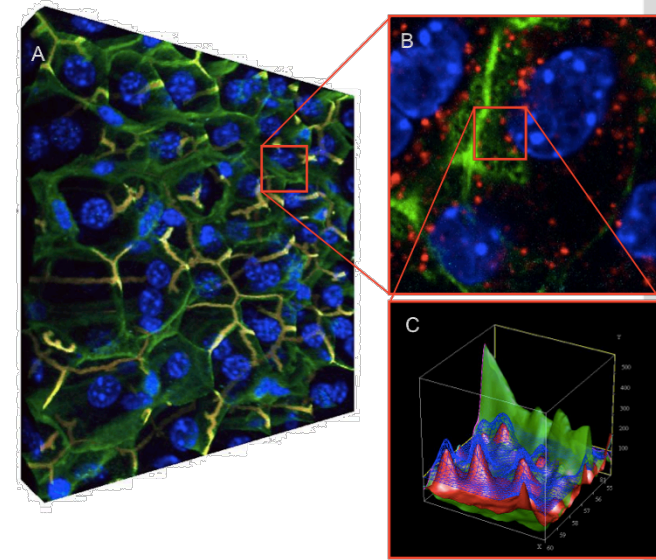
## DSIT Services

- ❖ Federated Identity Management
- ❖ Federated Data Access
- ❖ Meta Data Catalogues and Repositories
- ❖ Archive Service
- ❖ Monitoring
- ❖ Data Life Cycle Support
- ❖ Data Intensive Computing

# High Throughput Microscopy: Gen Scans

Workplan:

- 2013** Improvement data organization, data formats
- 2014** Data life cycle analysis, development data workflow, analysis and meta data handling



Most important requirements:

- Data life cycle definition
- Meta data handling
- Analysis workflow and seamless integration into the biologist's working environment

## DSIT Services

- ❖ Federated Identity Management
- ❖ Federated Data Access
- ❖ Meta Data Catalogues and Repositories
- ❖ Archive Service
- ❖ Monitoring
- ❖ Data Life Cycle Support
- ❖ Data Intensive Computing

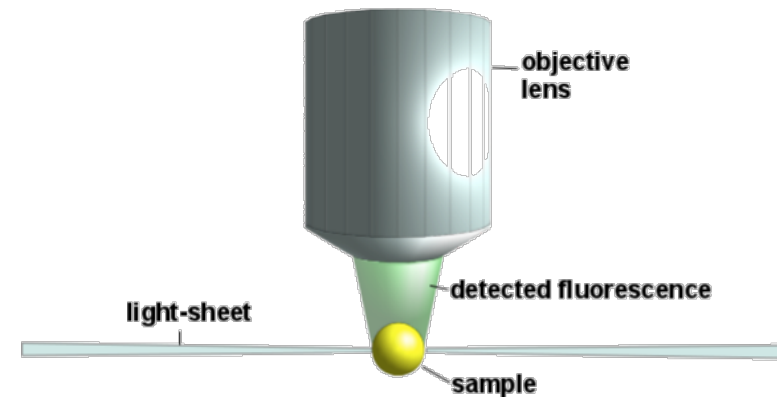


# High Throughput Microscopy: Selective Plane Illumination Microscope

Workplan:

**2013** Development of an image analysis workflow based on ImageJ and HADOOP

**2014** Graphical user interface for workflow management (editor, monitoring)



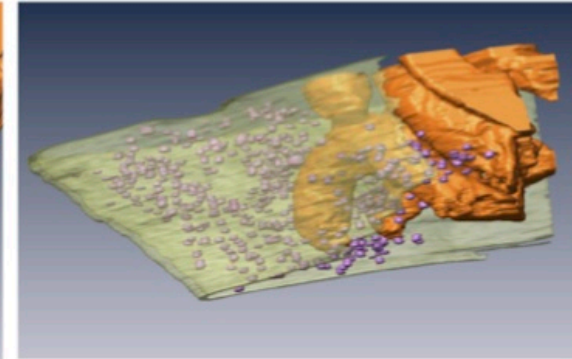
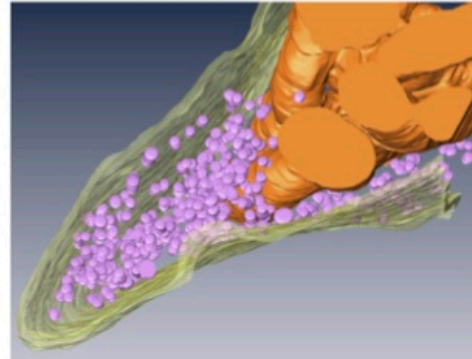
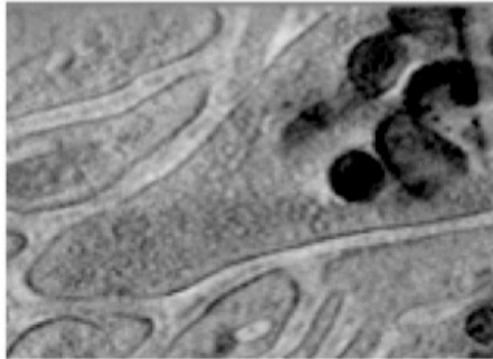
Most important requirements:

- Performant data access
- Meta data
- Data intensive workflows

## DSIT Services

- ❖ Federated Identity Management
- ❖ Federated Data Access
- ❖ Meta Data Catalogues and Repositories
- ❖ Archive Service
- ❖ Monitoring
- ❖ Data Life Cycle Support
- ❖ Data Intensive Computing

# Large Volume Electron Microscopy



Wacker et al., Microscopy&Microanalysis, (2010)

## Workplan:

- 2013** Define sample preparation and microscopy workflow, data recording and meta data scheme
- 2014** Automation of data recording workflow, 3D reconstruction pipeline, life cycle archiving

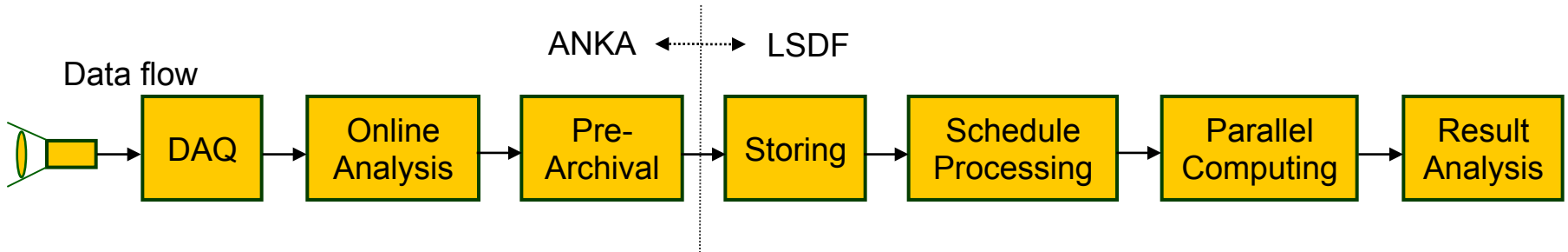
## Most important requirements:

- Data life cycle definition
- Meta data definition and handling
- Analysis / 3D reconstruction workflow
- Performant data access
- Data intensive workflows

## DSIT Services

- ❖ Federated Identity Management
- ❖ Federated Data Access
- ❖ Meta Data Catalogues and Repositories
- ❖ Archive Service
- ❖ Monitoring
- ❖ Data Life Cycle Support
- ❖ Data Intensive Computing

# Material Research: Tomography Beam Line at ANKA



## Workplan:

**2013** Development of data life cycle components within the beam line and the LSDF

Development of reconstruction algorithms

**2014** Automated workflow with data placement in the LSDF repository

## Most important requirements:

- Sustainable data life cycle definition
- Performant data access
- Meta data
- Data intensive workflows

## DSIT Services

- ❖ Federated Identity Management
- ❖ Federated Data Access
- ❖ Meta Data Catalogues and Repositories
- ❖ Archive Service
- ❖ Monitoring
- ❖ Data Life Cycle Support
- ❖ Data Intensive Computing



# DLCL-Key: Planned Publications



- A. Zyl, ..., M. Hausmann, ..., J. Hesser, Deblurring Axial Tomography using Non-Linear Regularization
- J. Lux, ..., M. Hausmann, Reconstruction and optical sequencing of a DNA repeat expansion unit by location nanoscopy.
- Xiaoli Yang, Halil Pasic et al., Data Intensive Computing of X-Ray Computed Tomography: Reconstruction at the LSDF, submitted to PDP2012
- Danah Tonne et al., Access to the DARIAH Bit Preservation Service for Humanities Research Data, submitted to PDP2012
- Volker Hartmann, Jens Otte, et al., Selective Plane Illumination Microscope
- Halil Pasic et al., Data Life Cycle Design at ANKA
- D. Haas, H. Pasic, et al., Status of the ultra fast tomography experiments control at ANKA, accepted at PCaPac 2012

# Conclusions

- a. DLCL-Key: ***broad spectrum*** of scientific projects
- b. Heterogeneous*** team, ***highly motivated***
- c. Nearly all ***DSIT services*** will be required
- d. Workplan (18 months) is defined

## Next steps:

- Overlaps and common tools need to be defined:  
imaging, large data volumes, ...
- Establish knowledge and software exchange?

# International Activities



## **Research Data Alliance** ([www.daitf.org](http://www.daitf.org))

### Data Access and Interoperability Taskforce

#### 1.-3.10. Global Data Meeting Washington (WW)

- Forum to achieve interoperability
- Define building blocks of a data/information infrastructure
- Definition of Working Groups (12-18 month)

#### 22.-24.10. EUDAT conference (Barcelona)

#### 3.-4.12. e-IRG Meeting on Data Issues (Amsterdam)

#### 18.-20.3.2013 Global Meeting on Data Issues (Gothenburg)

### Literature:

Riding the Wave, Knowledge Exchange: A Surfboard for Riding the Wave

Gemeinsame Wissenschaftskonferenz des Bundes und der Länder: Gesamtkonzept für die Informationsinfrastruktur in Deutschland, April 2011