

الإلهام طريق
الاكتشاف
Through Inspiration, Discovery

جامعة الملك عبد الله
للعلوم والتقنية
King Abdullah University of
Science and Technology



Introduction to Scientific Visualization with Avizo

KAUST Visualization Core Lab



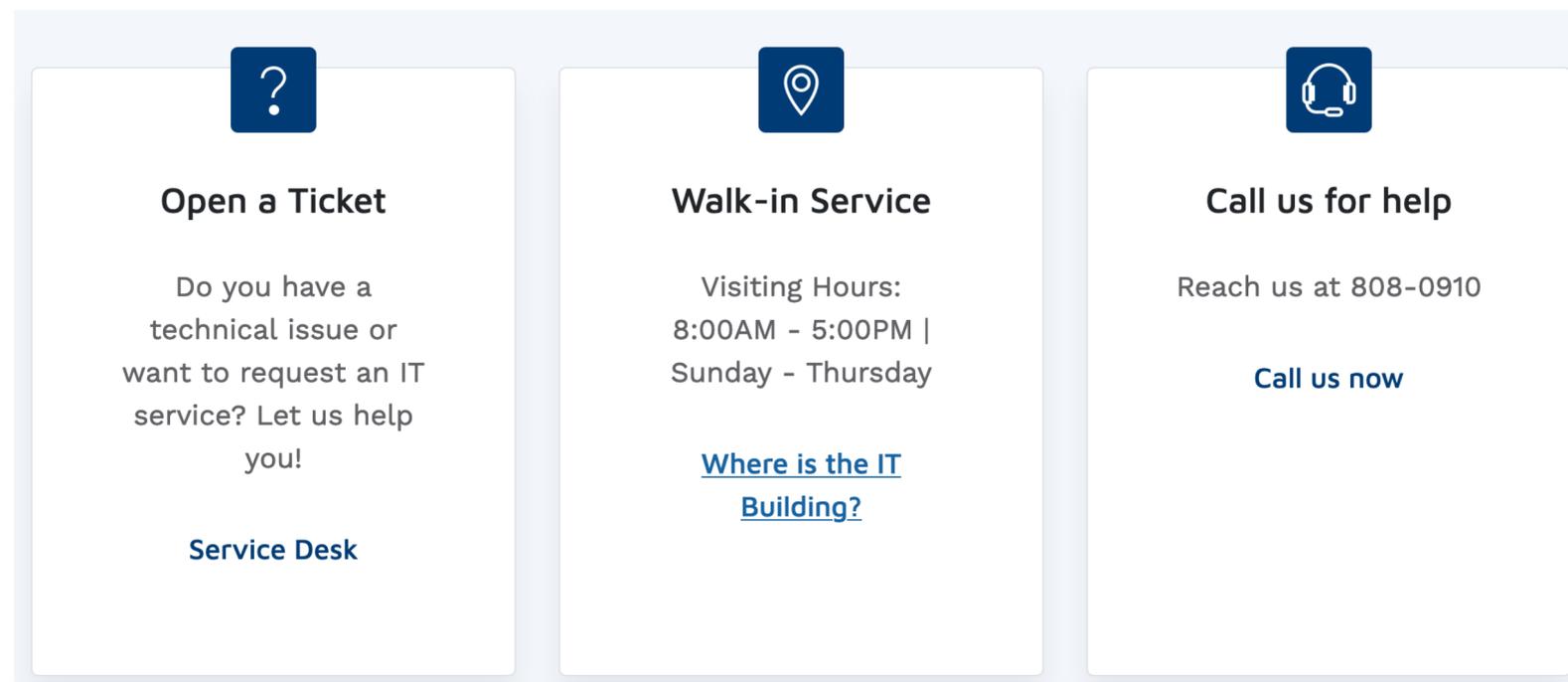


Getting Started

- Workshop Materials
 - Visualization Lab Wiki: <https://wiki.vis.kaust.edu.sa>
 - Training Page: <https://wiki.vis.kaust.edu.sa/training/overview>
 - Download data sets and slides:
<https://wiki.vis.kaust.edu.sa/training/scivis/2023/avizointro> |
Workshop Materials
- Recorded workshops available
 - KAUST Visualization Core Lab [youtube channel](#)



- Installation and licenses maintained by KAUST IT
 - <https://it.kaust.edu.sa/software/avizo> (Windows/Linux)
 - Get help at <https://it.kaust.edu.sa/home>



- Expertise at KAUST Visualization Core Lab (KVL)
 - Email us at help@vis.kaust.edu.sa



Avizo @IT Remote Workstations

- <http://myws.kaust.edu.sa/> (Avizo available on Ubuntu 18 only)
- Request access (first time only) at https://kaustforms.formstack.com/forms/remote_workstation_account
- Start latest version from command line:

A screenshot of a terminal window titled "Terminal - theusst@rsws13:~". The window has a menu bar with "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal content shows the user typing two commands: "module load avizo" and "start".

```
Terminal - theusst@rsws13:~
File Edit View Terminal Tabs Help
theusst@rsws13:~$ module load avizo
theusst@rsws13:~$ start
```



Visualization Core Lab Overview – Facilities & Services



12 CORE LABS

270 HEADCOUNT
45 FIELDS OF EXPERTISE



MANAGEMENT AND CENTRAL OPERATIONS

29 Staff



ANALYTICAL CHEMISTRY

21 Staff



IMAGING AND CHARACTERIZATION

26 Staff



PLANT GROWTH

10 Staff



ANIMAL RESOURCES

1 Staff



LAB EQUIPMENT MAINTENANCE

27 Staff



RADIATION LABELING

1 Staff



BIOSCIENCE

25 Staff



NANOFABRICATION

19 Staff



SUPERCOMPUTING

18 Staff



COASTAL AND MARINE RESOURCES

50 Staff



PROTOTYPING AND PRODUCT DEVELOPMENT

38 Staff



VISUALIZATION

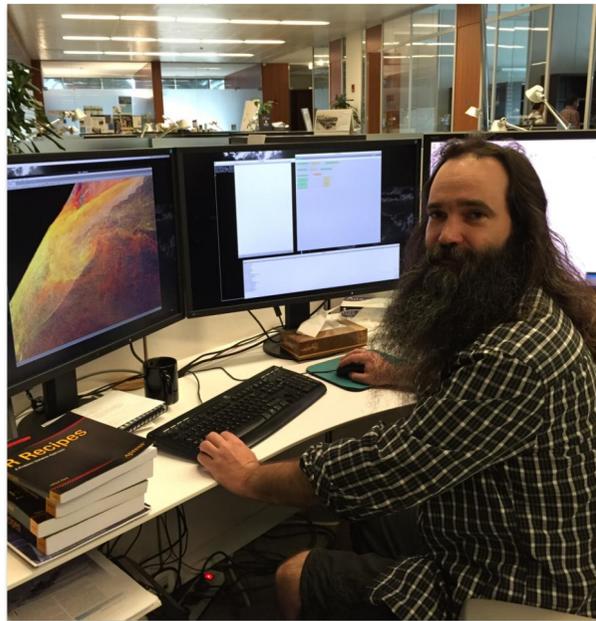
6 Staff

The Team



Dr. Sohaib Ghani
(LEAD STAFF SCIENTIST)

- VISUAL ANALYTICS
- INFORMATION VIS
- STATISTICAL ANALYSIS



Thomas Theussl
SCIVIS

- SCIENTIFIC VISUALIZATION
- LARGE DATA ANALYSIS
- DISTRIBUTED VISUALIZATION



Dr. James Kress
HPC SCIVIS

- VISUALIZATION SOFTWARE
- HPC INSITU VISUALIZATION
- DISTRIBUTED VISUALIZATION



Dr. Ronell Sicut
VR/AR

- SCIENTIFIC VISUALIZATION
- VR DEVELOPMENT
- 3D RECONSTRUCTION



Dr. Didier Barradas
Data Scientist

- DATA SCIENCE
- MACHINE LEARNING
- DEEP LEARNING

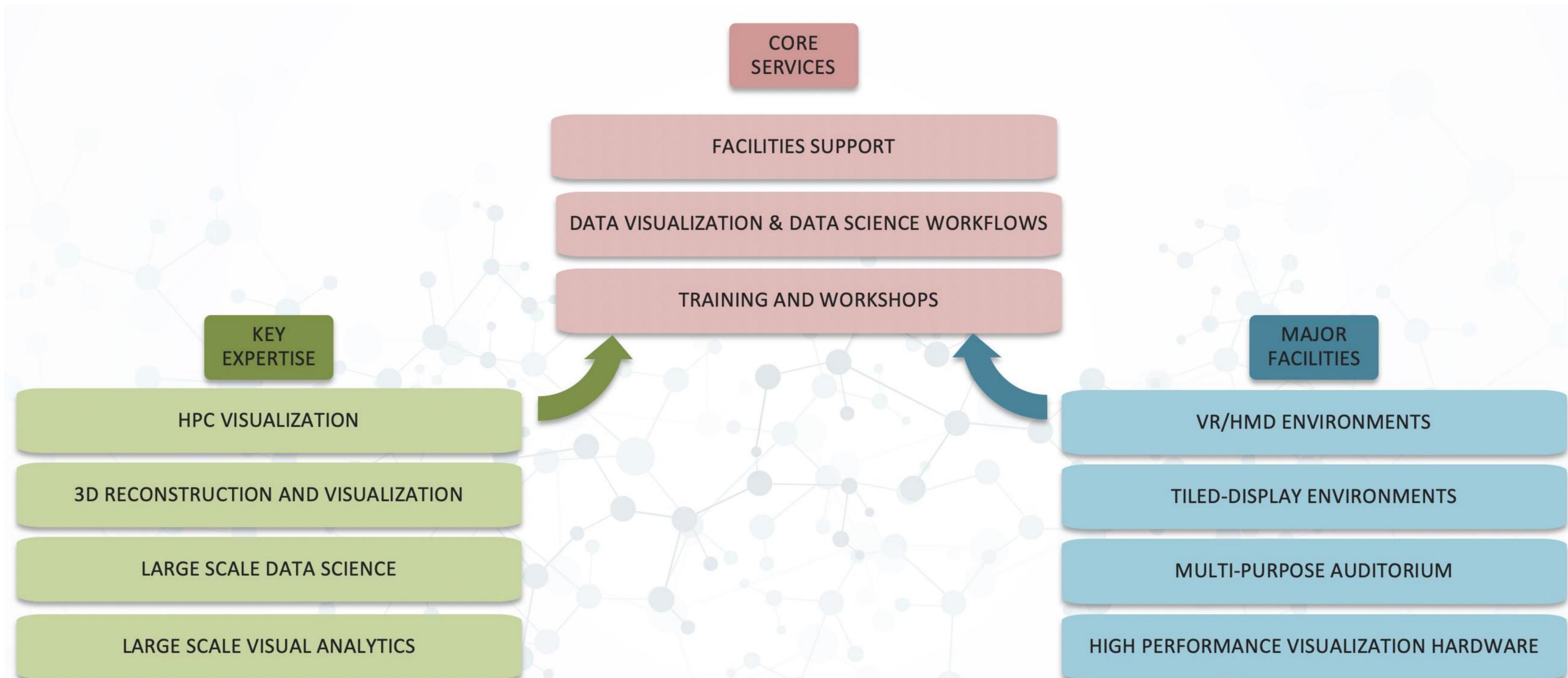


Dr. Abdelghafour Halimi
Data Scientist

- Data Science
- Machine Learning
- Deep Learning



KVL Services and Expertise





FACILITIES AND SPACES



ZONE 1/2 DISPLAY WALLS: 2D/3D Analytics



HMD's



CUBES VR



ZONE 5 VR



MULTI-PURPOSE ROOM



Accessing KVL Facilities

- Book here (requires Portal Credentials):
 - <https://wiki.vis.kaust.edu.sa/booking>
 - Email us for support: help@vis.kaust.edu.sa

Facility Booking Form



Once you click **Send Request** you can refresh this page to see your booking appear in the **bookings calendar**. All bookings are provisional until approved by KVL.

Vis Lab

Home

Booking

Hosts **188**

Logged in as kressjm

Logged in as kressjm. ×

Request a booking

Purpose

Description of booking

Reservation

Maintenance

Cornea

MPR

Vis Cubes

Vive

Zone 1

Zone 2

Zone 5

Every

0

weeks

Full day

Start

2023-07-27 11:36



End

2023-07-27 11:36



Send Request

KVL Wiki: Facility Booking, FAQ, and More



Visualization Laboratory Wiki

Search docs

Welcome to the KVL

▣ Welcome to the KAUST Visualization Core Lab (KVL)

- Who We Are
- Core Services
- Mission
- Contact Us
- Location
- Recent Highlights
- Video Overview
- People

Training Events

Facilities

Highlights

KVL Documentation

- Frequently Asked Questions
- Visualization Tools User Guides
- VR Tools User Guides
- Data Science Tools User Guides
- Facility User Guides

Docs » start

Welcome to the KAUST Visualization Core Lab (KVL)

Who We Are

The KAUST Visualization Core Laboratory is a state-of-the-art facility within the Core Labs that offers students, faculty, researchers, and university collaborators a unique opportunity to utilize one-of-a-kind visualization, interaction, and computational resources for the exploration and analysis of scientific data.

Core Services

Our mission is to support the data visualization and data science needs of KAUST researchers and In-Kingdom entities. To that end we have a varied range of expertise across the team. Contact us with your questions, project requests, or collaboration requests that fall within our service areas:

- **2D/3D Visualization Facilities**
 - We provide a unique set of [visualization and meeting facilities](#) on campus.
 - ✉ [Contact us](#) for inquiries or use your KAUST credentials to [create a booking](#).
- **Data Visualization and Data Science Workflows**
 - We support KAUST users with [visualization workflows](#), [VR workflows](#), and [data science/machine learning](#).
 - Contact us for ✉ [additional information](#), to ✉ [submit a general request](#), or ✉ [request a collaboration](#).
- **Training and Workshops**
 - We have a wide variety of trainings available on our [YouTube Channel](#) as well as select trainings performed [in-person each semester](#).

Mission

To support the needs of KAUST researchers and In-Kingdom entities by:

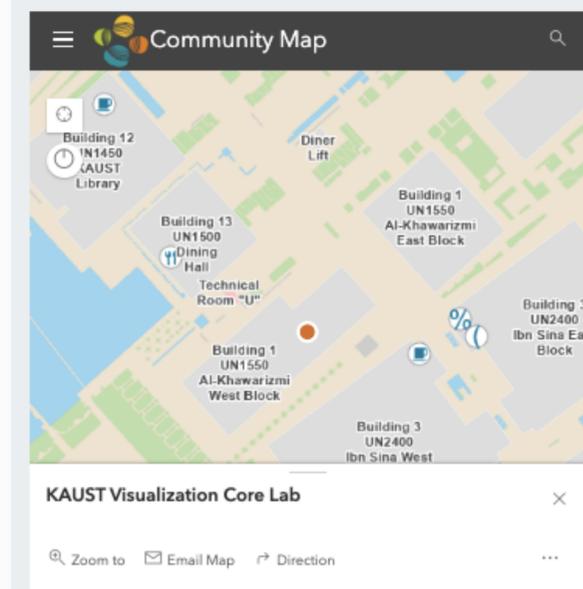
- Developing and maintaining an effective and efficient environment for data exploration and analysis
- Providing advanced visualization and data analysis services
- Providing training on state-of-the-art visualization hardware and software for scientific discovery
- Developing new capabilities to remain at the cutting edge of visualization and data science

Contact Us

- ✉ help@vis.kaust.edu.sa
- 📺 [KVL YouTube Channel](#)
- 🐦 [KVL Twitter](#)
- 🌐 [Core Labs Website](#)
- 🌐 [KVL Core Labs Main Website](#)

Location

Our main showcase facility is located @:
Building 1 (seaside), Level 2, Showcase



<https://wiki.vis.kaust.edu.sa>



KVL Training Events

<https://wiki.vis.kaust.edu.sa/training/overview>

<https://www.youtube.com/@kaustvislab>

- Scientific Visualization Workshop Series
 - ParaView, VisIt, Avizo/Amira
- Data Science Workshop Series
 - Shell, Conda, Python, Git, and more
- Hands-on AI Tools and Techniques Workshop Series
 - Intro to Machine Learning/Deep Learning, Visualization for Data Science



Workshop: Goals and Agenda

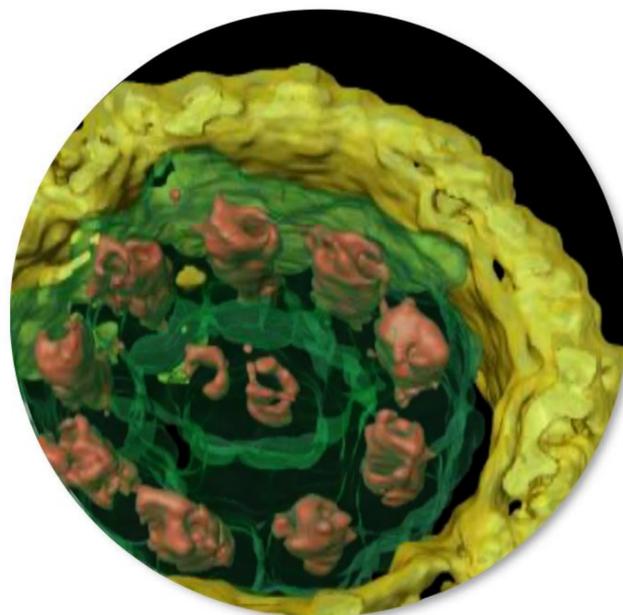


Workshop Goals

- Hands-on learning with Avizo
 - Introductory course
 - Interactive sessions
- What is Avizo (short history)?
 - Commercially supported software platform for 3D and 4D data visualization, processing, and analysis
 - Started as research project at the Zuse Institute Berlin (ZIB) named Amira
 - Visualization Sciences Group (VSG) in Bordeaux (France) continued the work on a complementary product named Avizo
 - In August 2012, FEI purchased VSG and brought the two software sisters Amira and Avizo back into one hand
 - In 2016 FEI has been bought by Thermo Fisher Scientific



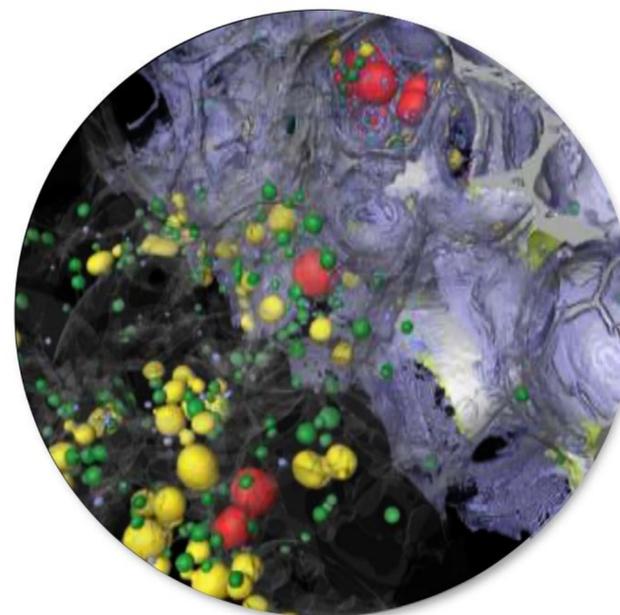
What is Avizo?



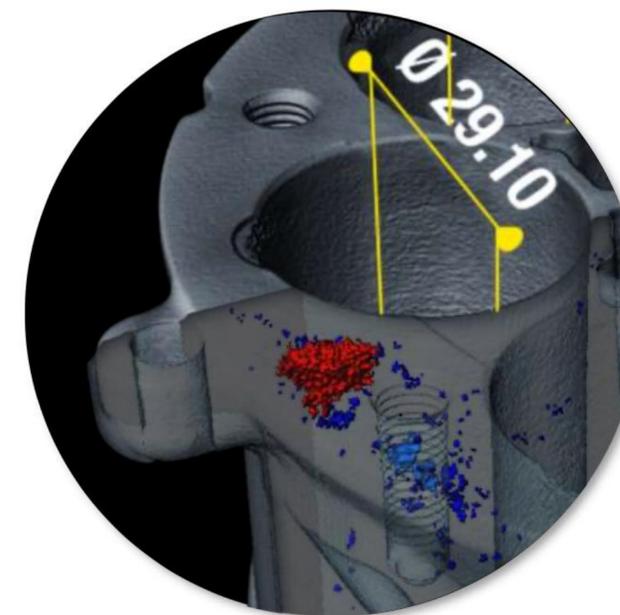
Amira Software
for Life Sciences



Avizo Software
for Natural Sciences



Avizo Software
for Materials Research



Avizo Software
for Industrial Inspection

Visualize

Analyze

Understand

Visualization & analysis software for scientific and industrial data

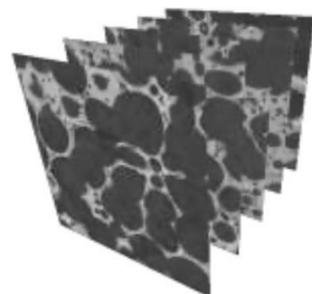


What is Avizo?

From Sample to Knowledge



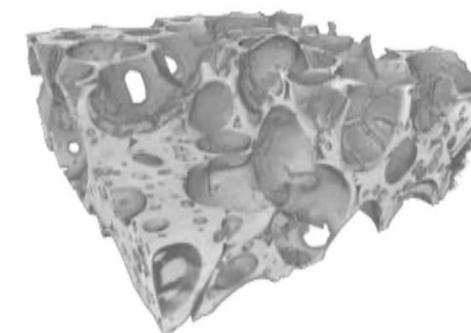
Data acquisition



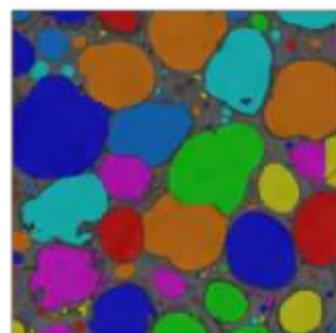
Import



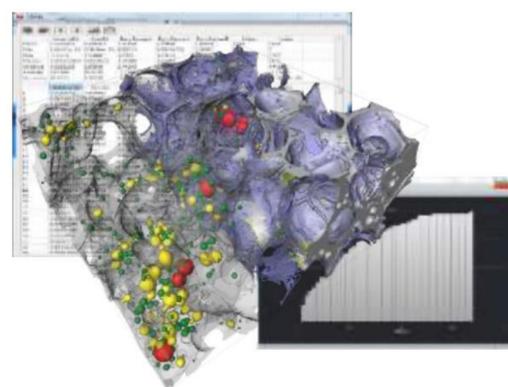
Filtering & pre-processing



Visualization



Segmentation



Measurements & analysis



Presentation

- + Large Data Management
- + Automation
- + Customization



Today's Agenda

Time	Topic	Speaker
~15 min	Introduction	Thomas Theußl
~45 min	Scientific Visualization: Scalar Fields	Thomas Theußl
5 - 10 min	— break —	-
~45 min	Scientific Visualization: Volume Segmentation	Thomas Theußl
5 - 10 min	— break —	-
30 min	The Avizo GUI and Features	Thomas Theußl
on demand	Q&A / Discussion	all

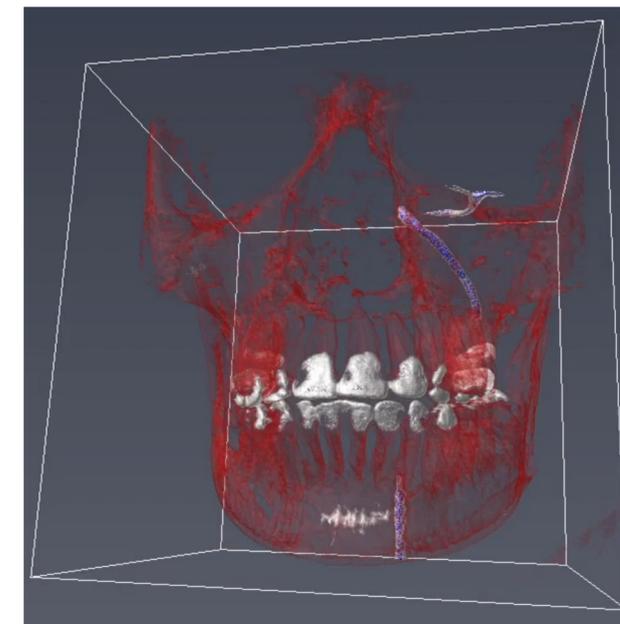
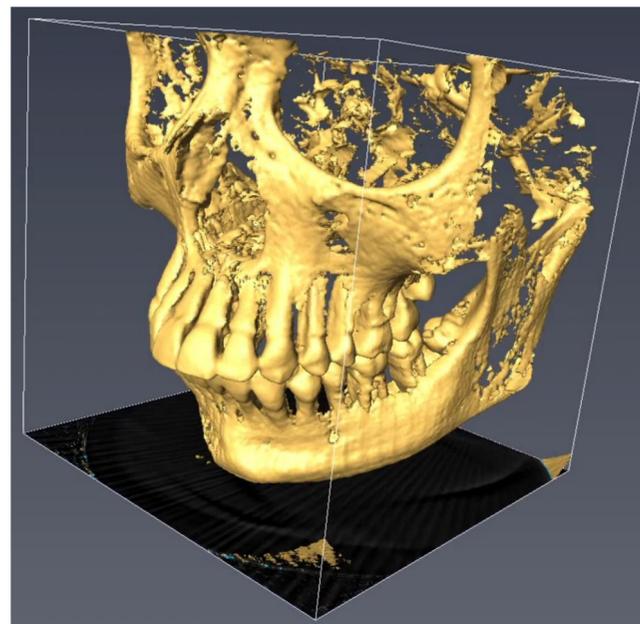
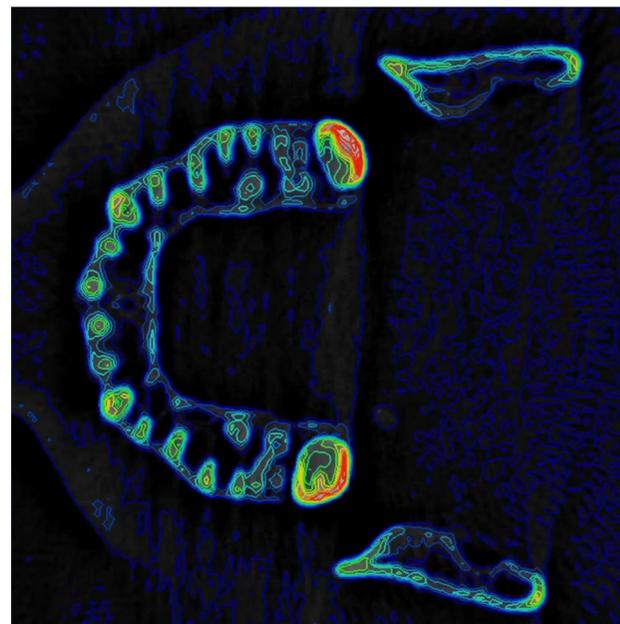


Introduction to Scientific Visualization with Avizo

Hands on exercises in Avizo using some basic visualization techniques

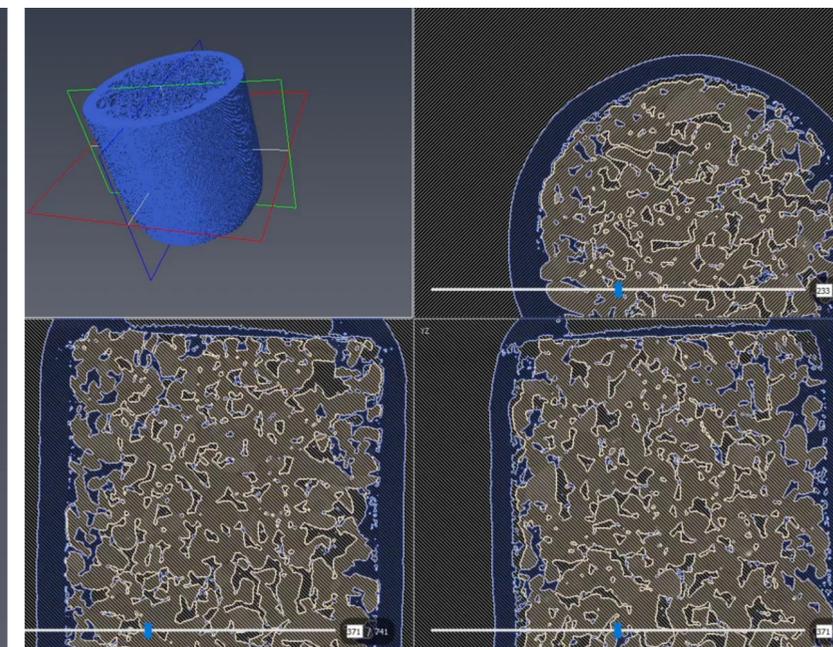
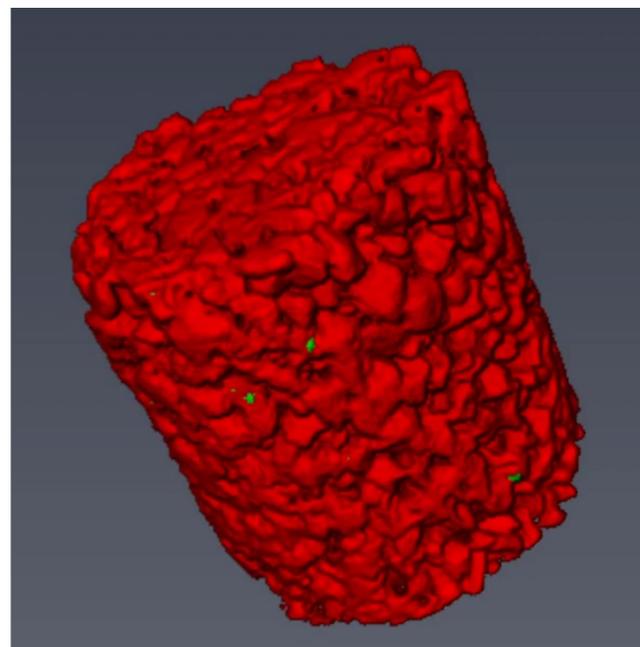
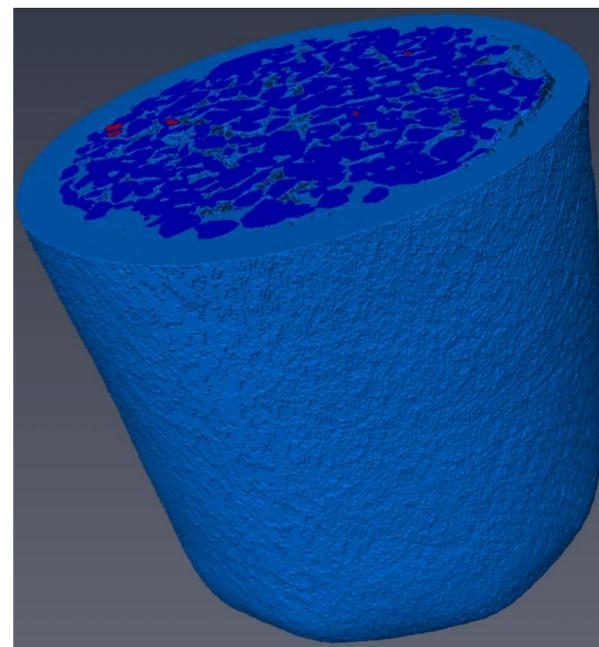
- Scalar field visualization:

- Slicing
- Isosurfacing
- Raycasting



- Volume segmentation:

- Thresholding
- Watershed
- Segmentation Editor





Scalar Field Visualization