جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

طريق الإلهام الاكتشاف
Through Inspiration, Discovery

Introduction to Scientific Visualization with Avizo

KAUST Visualization Core Lab

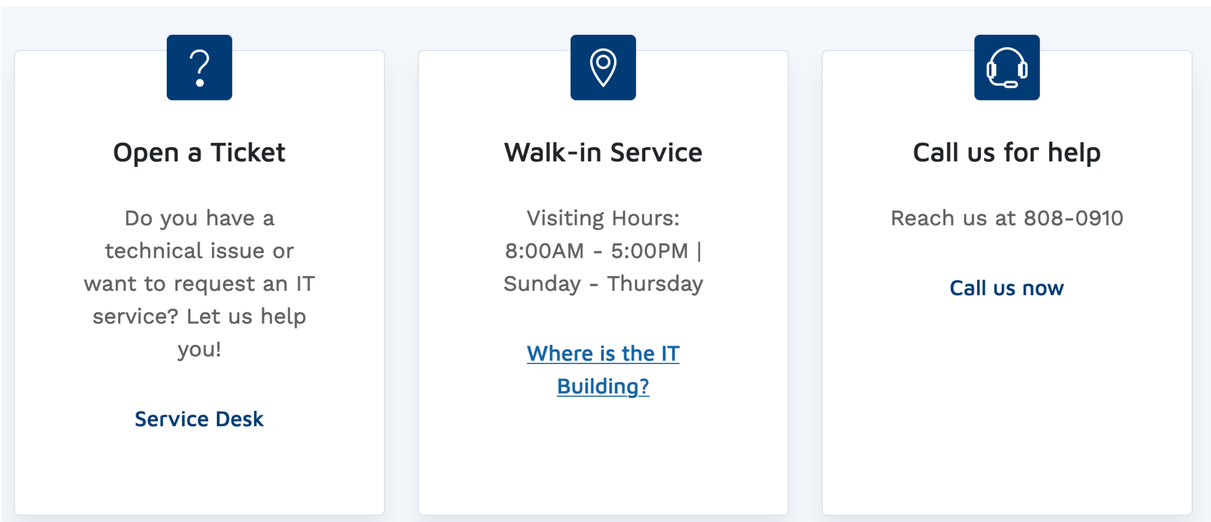
October 22, 2023

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

Avizo @KAUST

- 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:

Visualization Core Lab
Overview – Facilities & Services

KAUST CORE LABS

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

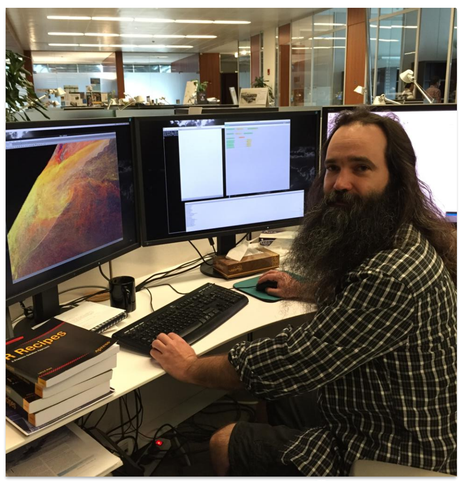
PROTOTYPING AND PRODUCT DEVELOPMENT
38 Staff

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 Sicat
VR/AR

- SCIENTIFIC VISUALIZATION
- VR DEVELOPMENT
- 3D RECONSTRUCTION

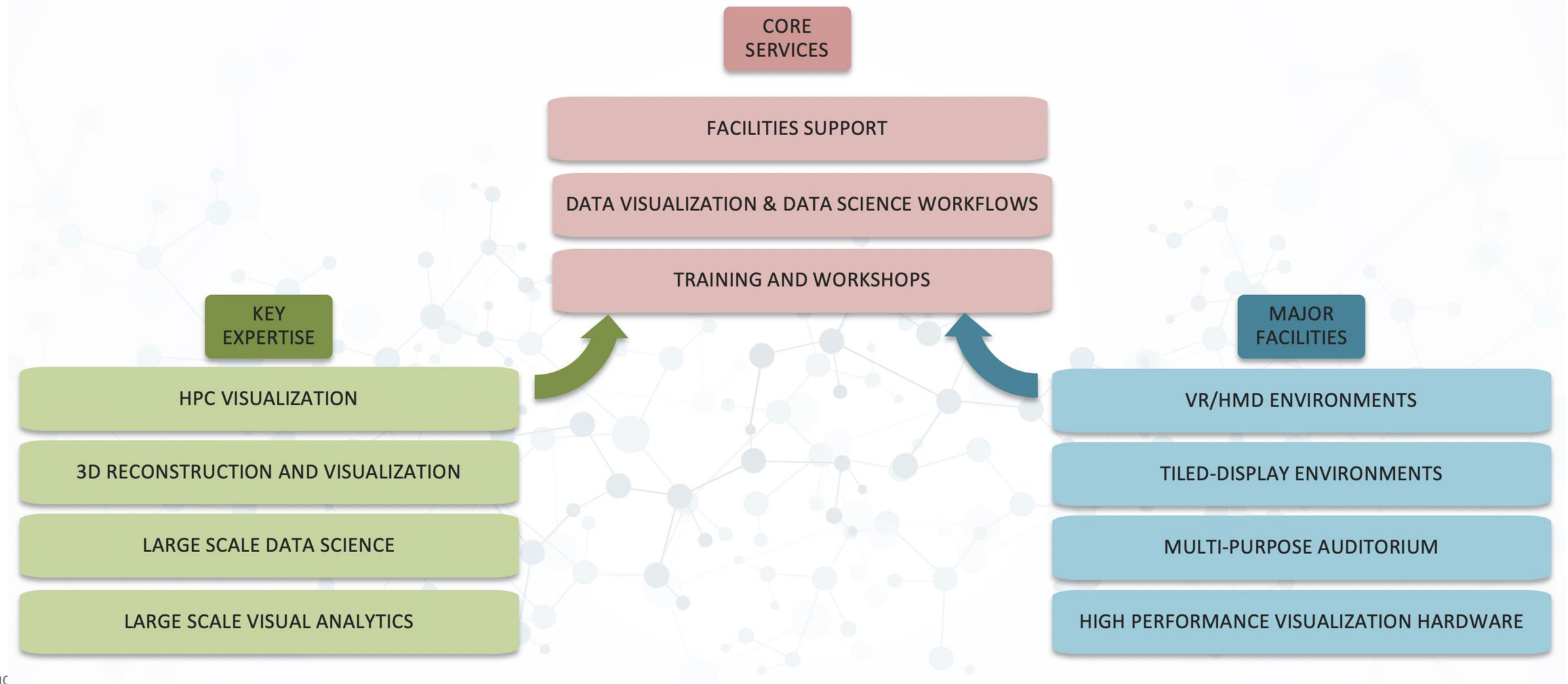
Dr. Didier Barradas
Data Scientist

- DATA SCIENCE
- MACHINE LEARNING
- DEEP LEARNING

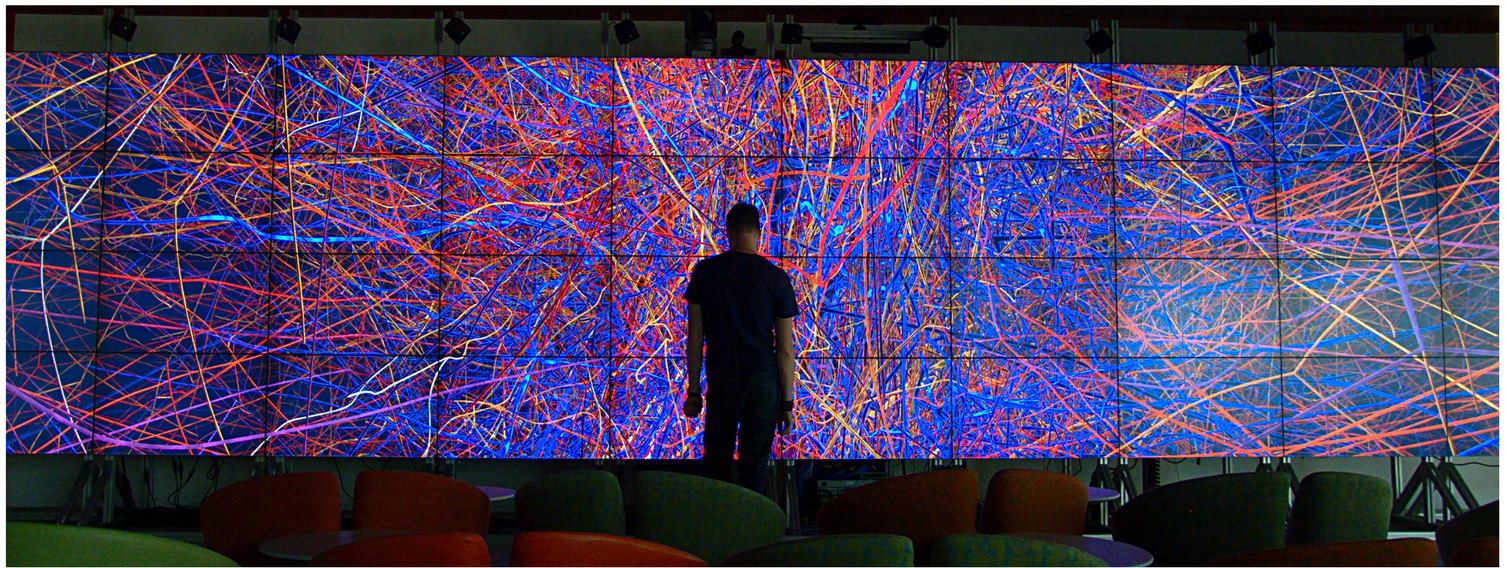
Dr. Abdelghafour Halimi
Data Scientist

- Data Science
- Machine Learning
- Deep Learning

KVL Services and Expertise

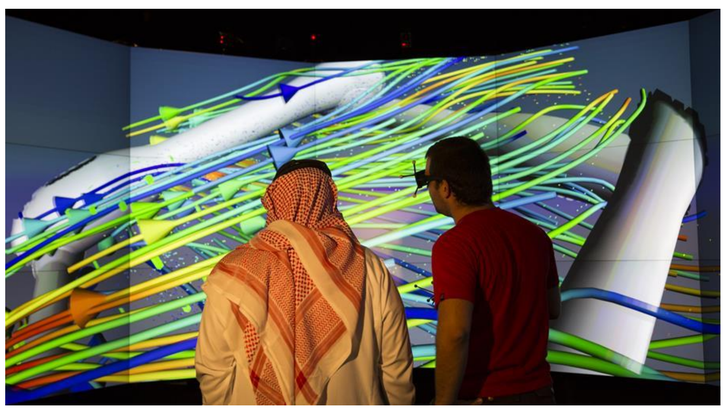


FACILITIES AND SPACES



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

HMD’s



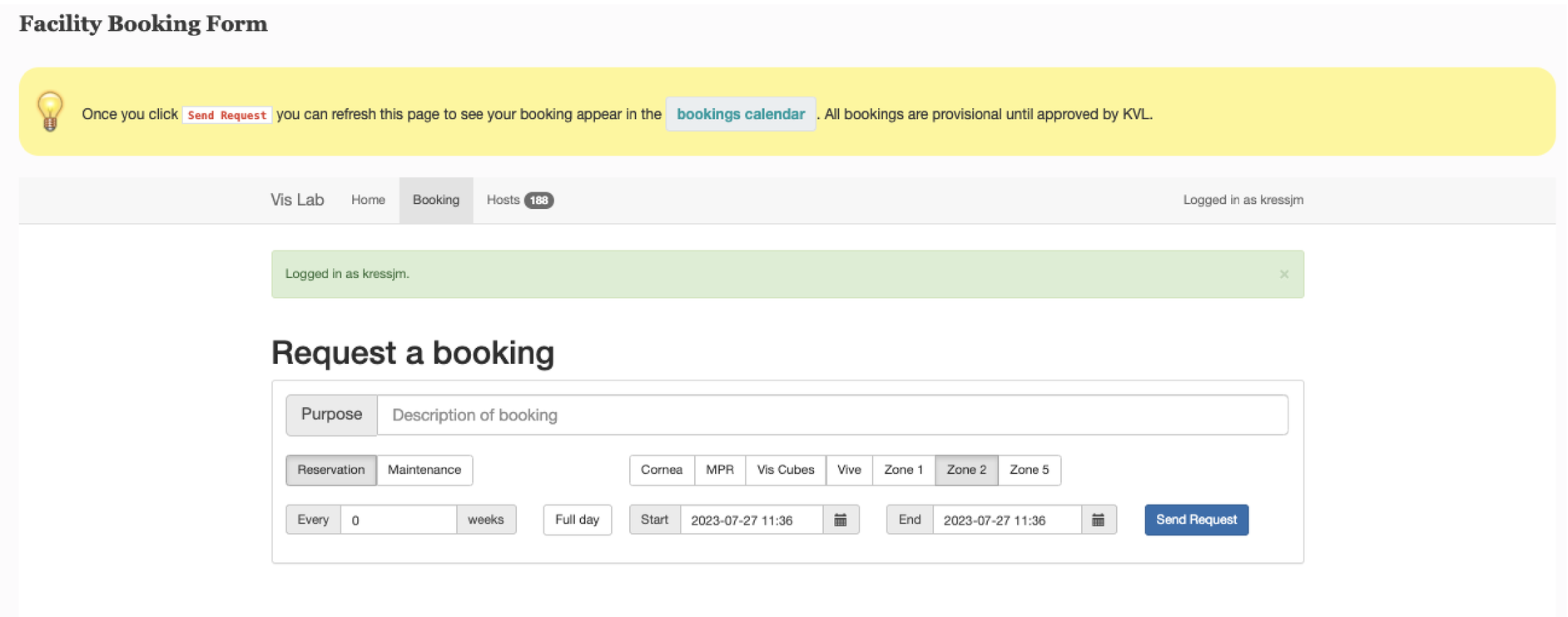
CUBES VR

ZONE 5 VR

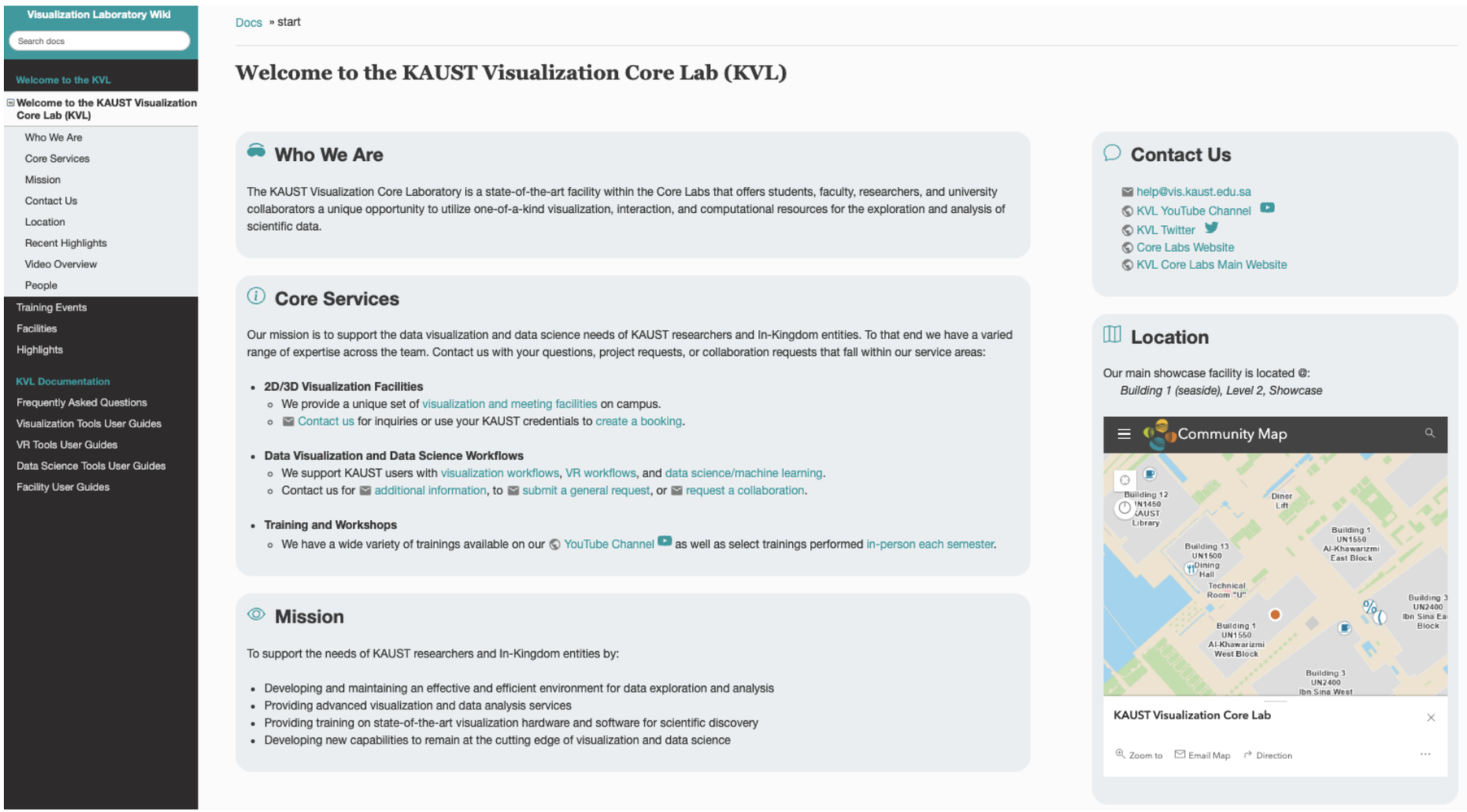
MULTI-PURPOSE ROOM

Accessing KVL Facilities

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



KVL Wiki: Facility Booking, FAQ, and More



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

KVL Training Events

https://wiki.vis.kaust.edu.sa/training/overview
https://www.youtube.com/@kaustvislab

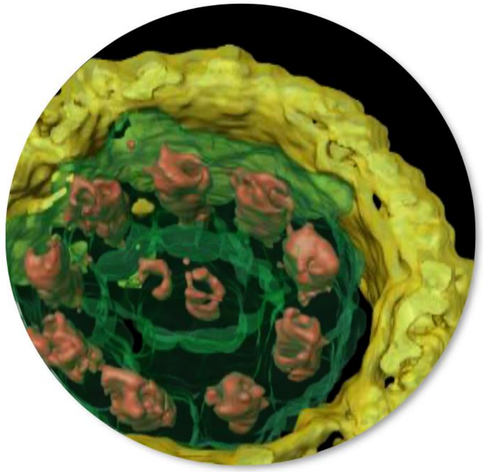
- Scientific Visualization Workshop Series
  - ParaView, VisIt, Avizo/Amira
- Data Science Workshop Series
  - Shell, Conda, Python, Git, and more
- Hands-on AI Tools and Techniques Workshop Series
  - Intro to Machine Learning/Deep Learning, Visualization for Data Science

Workshop: Goals and Agenda

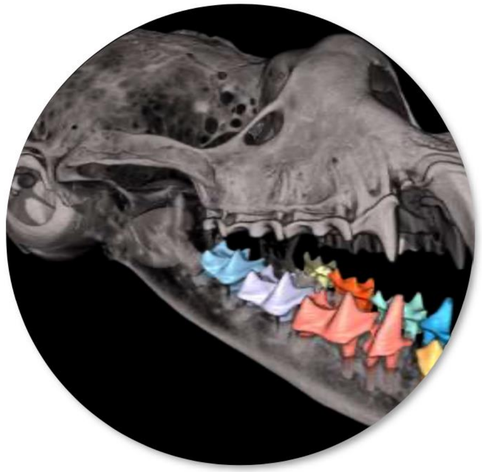
Workshop Goals

- 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

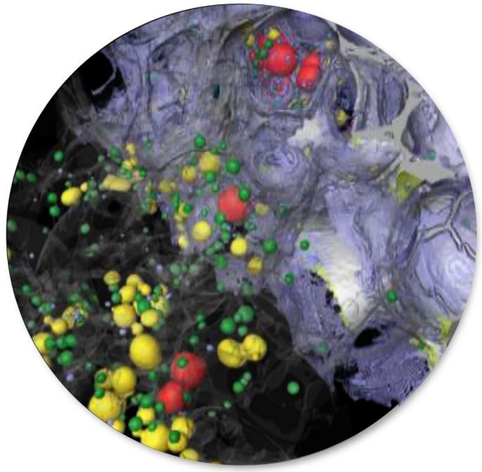
What is Avizo?



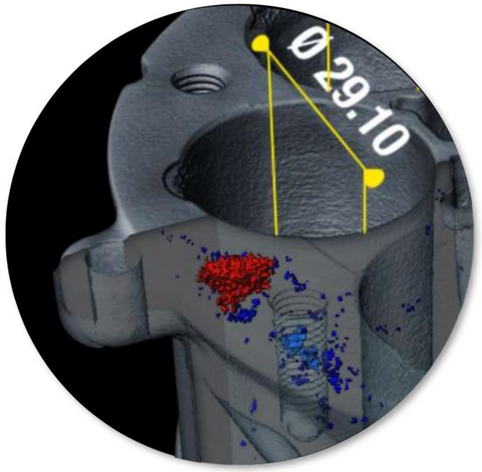
Amira Software
for Life Sciences



Avizo Software
for Natural Sciences



Avizo Software
for Materials Research



Avizo Software
for Industrial Inspection

Visualize | **Analyze** | **Understand**

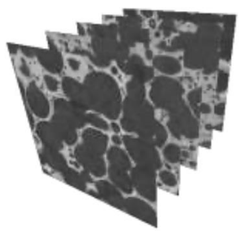
Visualization & analysis software for scientific and industrial data

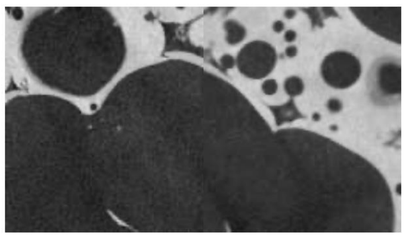
slide by Gwenole Tallec, ThermoFisher

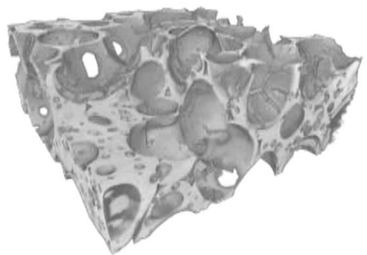
ThermoFisher SCIENTIFIC

What is Avizo?

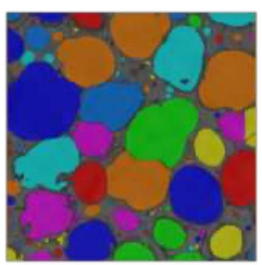
From Sample to Knowledge

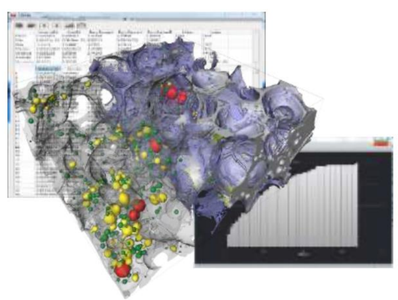






Data acquisition | Import | Filtering & pre-processing | Visualization





+ Large Data Management

+ Automation

+ Customization

Segmentation | Measurements & analysis | Presentation

slide by Gwenole Tallec, ThermoFisher

ThermoFisher SCIENTIFIC

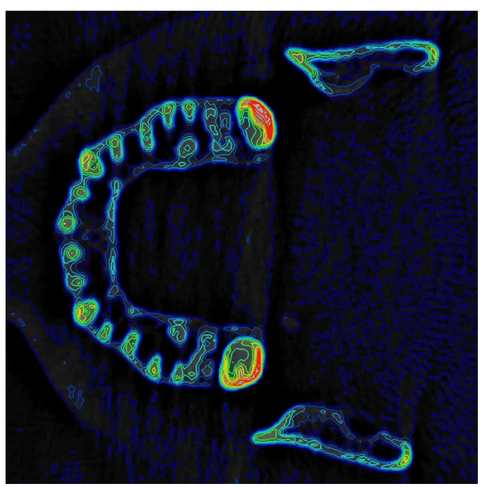
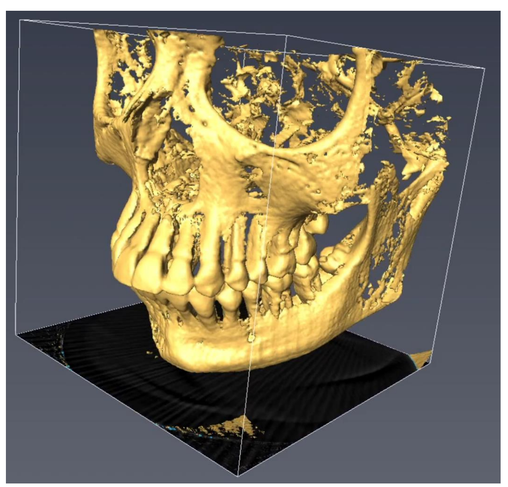
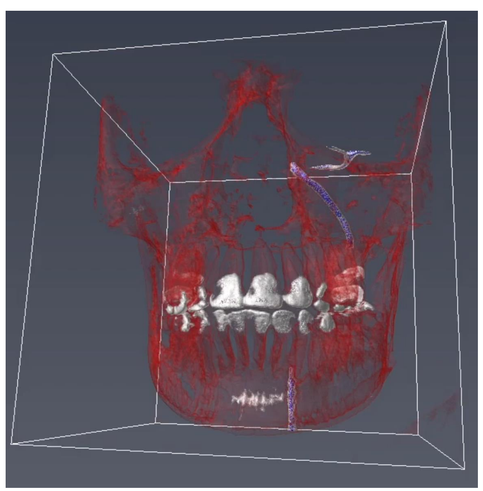
Today’s Agenda

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

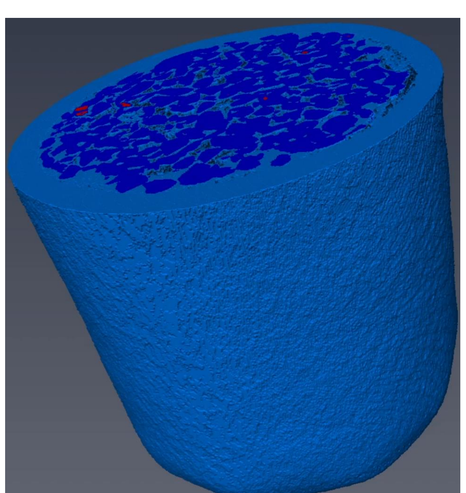
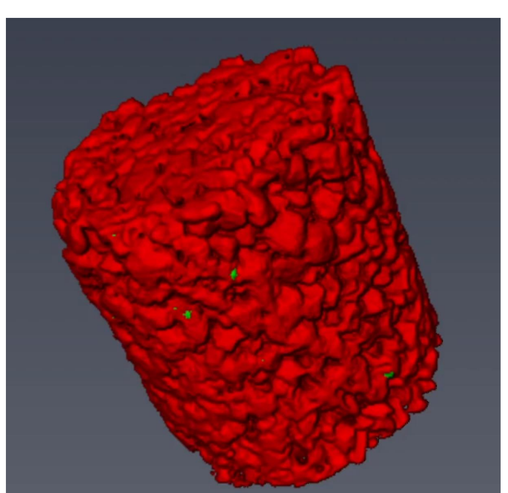
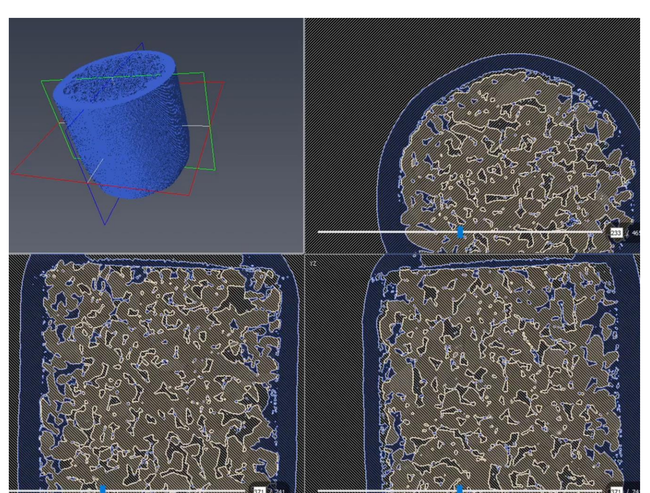
Introduction to Scientific Visualization with Avizo

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