

# Automated microscopy and analysis

Jan Valečka

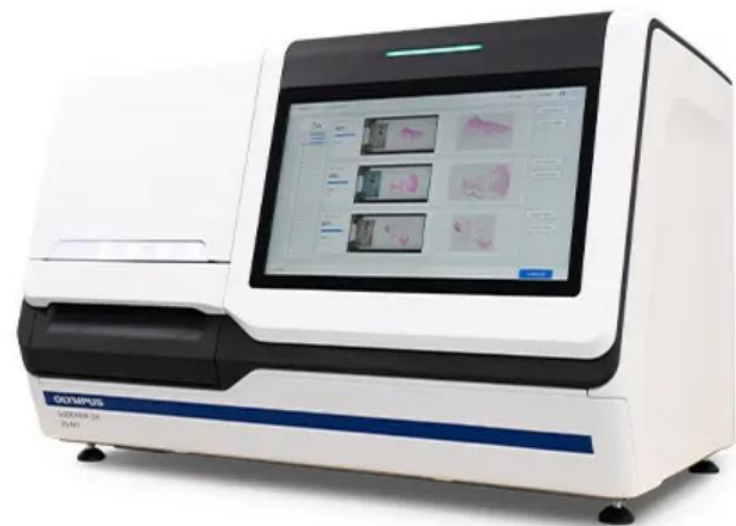
Light microscopy core facility IMG

# Automated microscopy

- What is it?
- Microscope finds the sample, images it and analyses it, you get numbers and illustrative images
- You find sample, microscope finds acquisition parameters, acquires images and analyses it
- You find sample, define parameters, microscope does the imaging, you define analysis and the SW runs it

# Slide scanners

- Mostly histology



# Tracking growth in an incubator

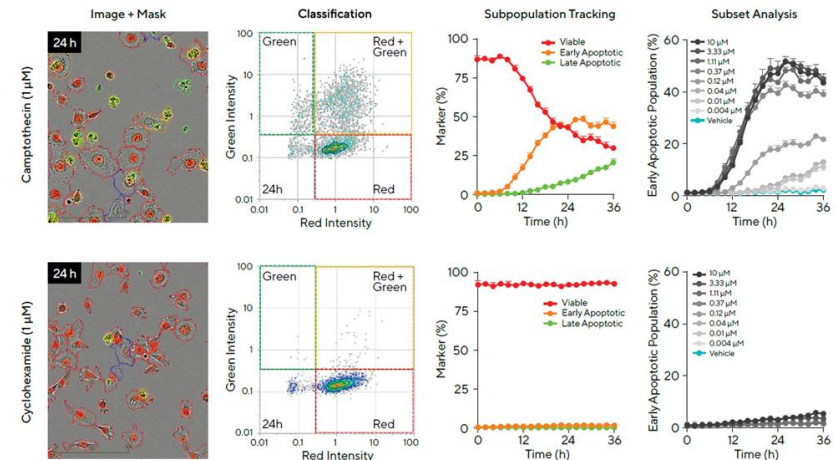
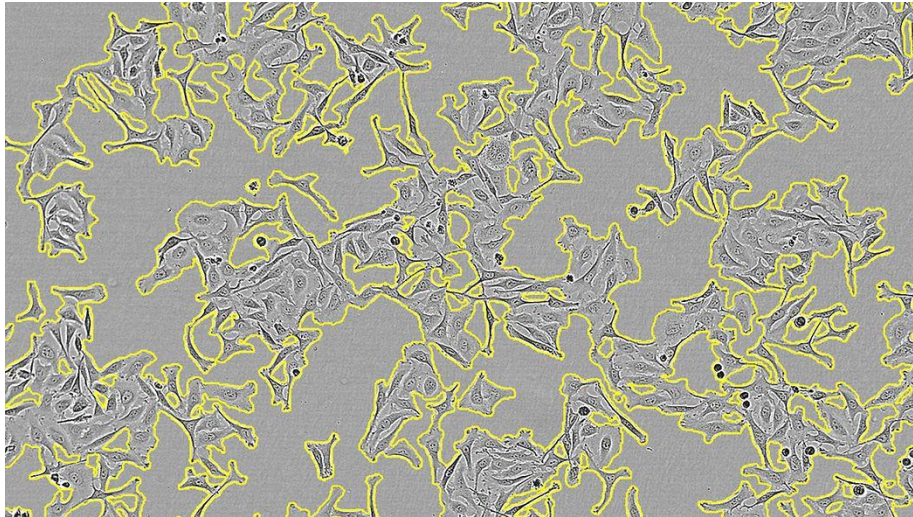
- Incucyte



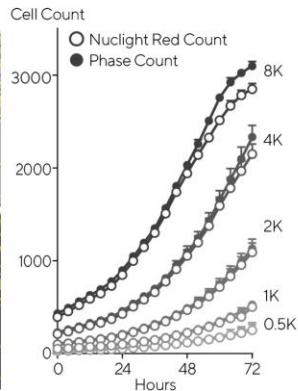


# Tracking growth in an incubator

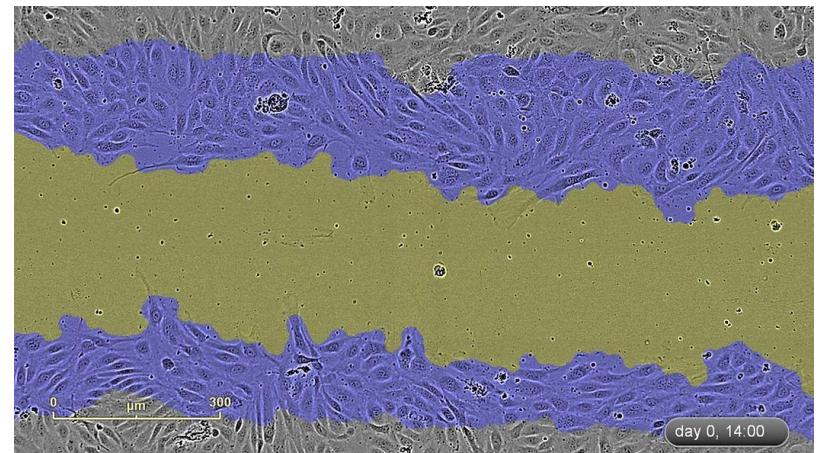
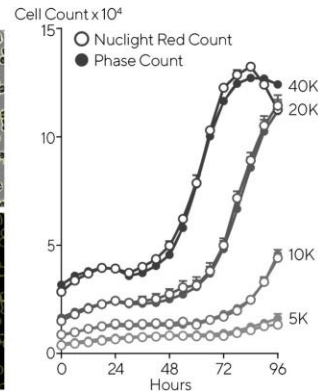
- Incucyte



Adherent Cells (A549)

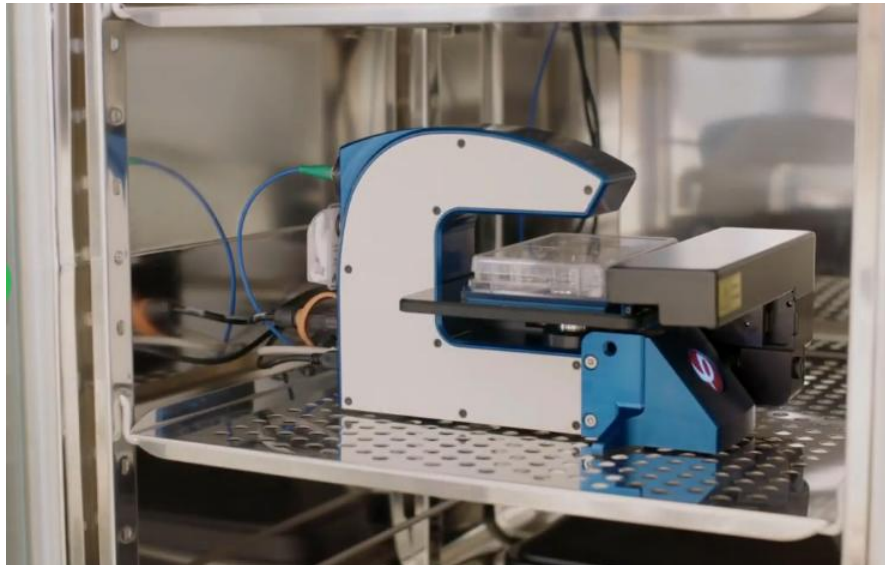


Non-Adherent Cells (Jurkat)



# Tracking growth in an incubator

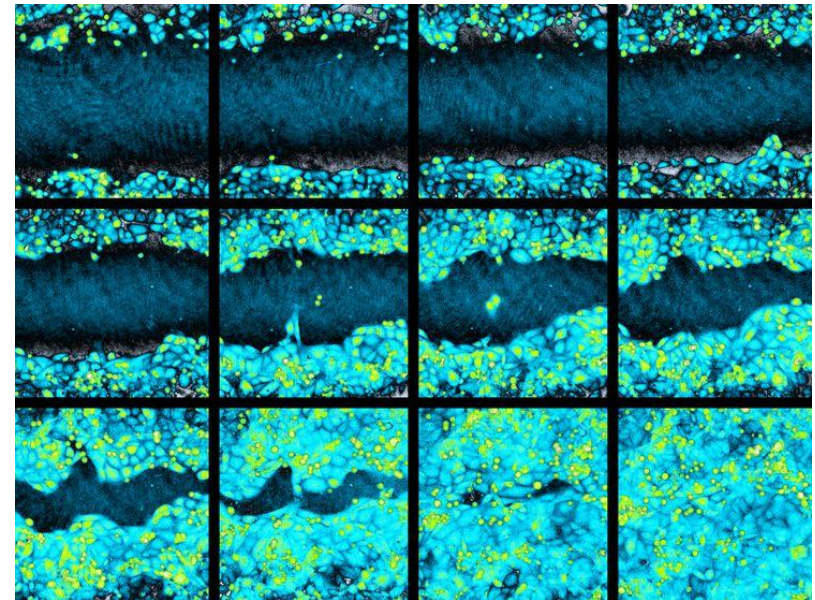
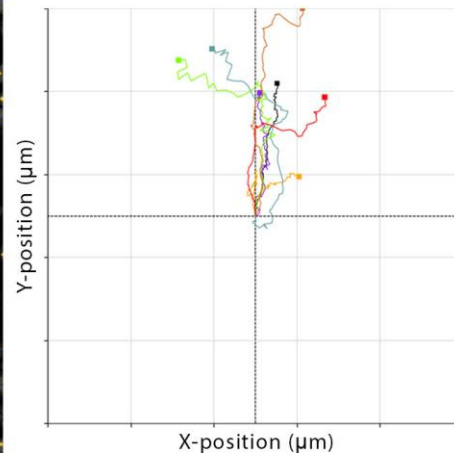
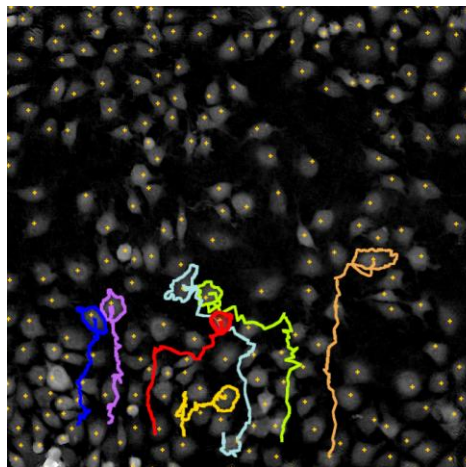
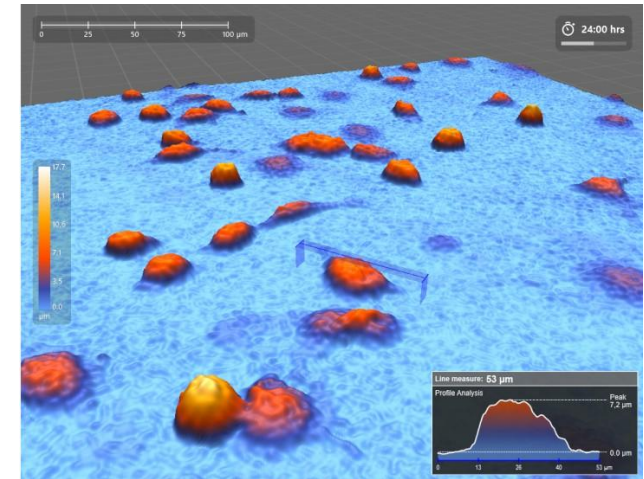
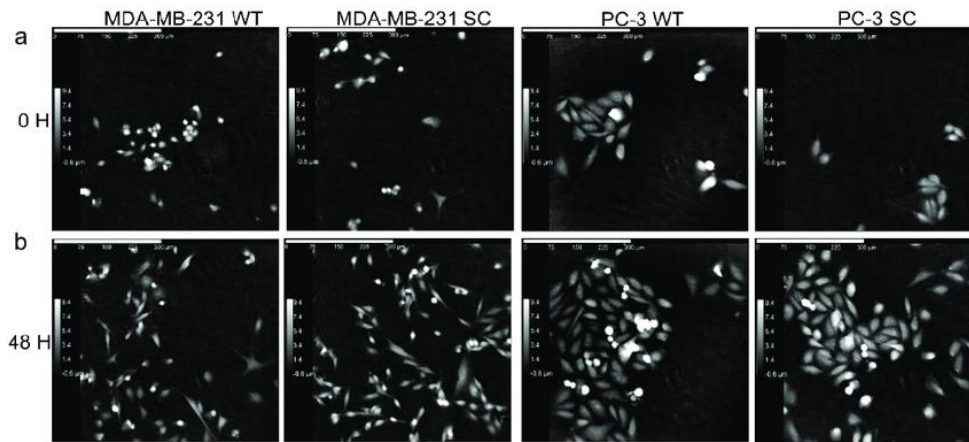
- Holomonitor





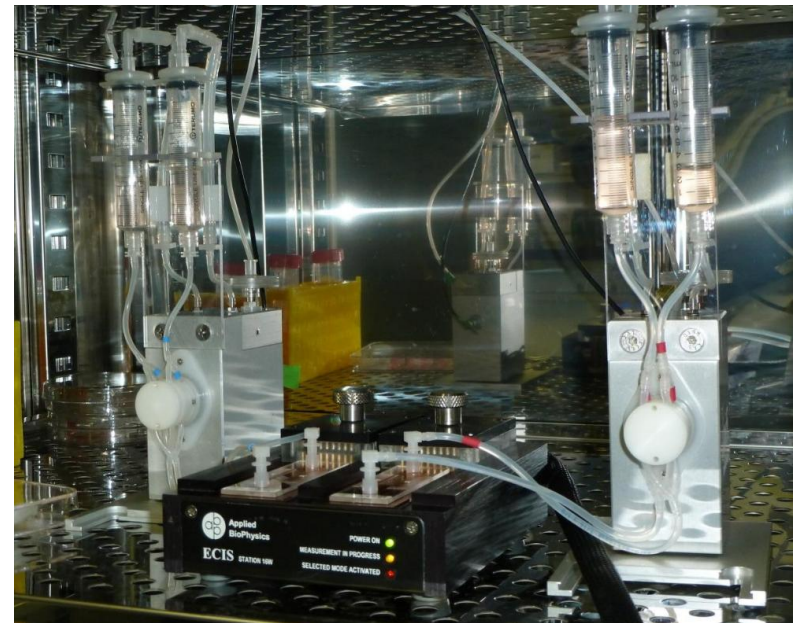
# Tracking growth in an incubator

- Holomonitor



# Tracking growth in an incubator

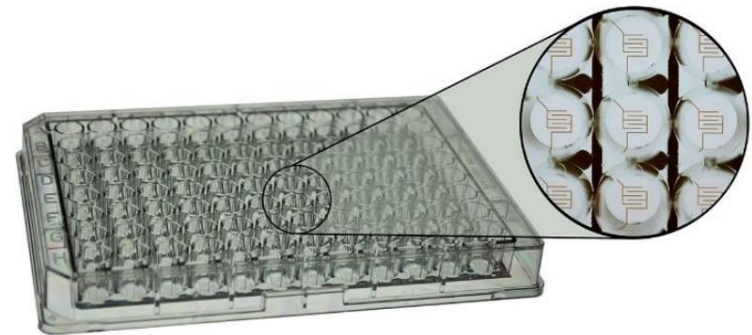
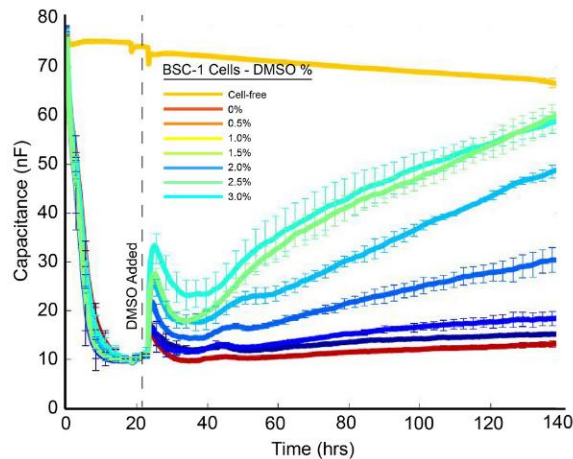
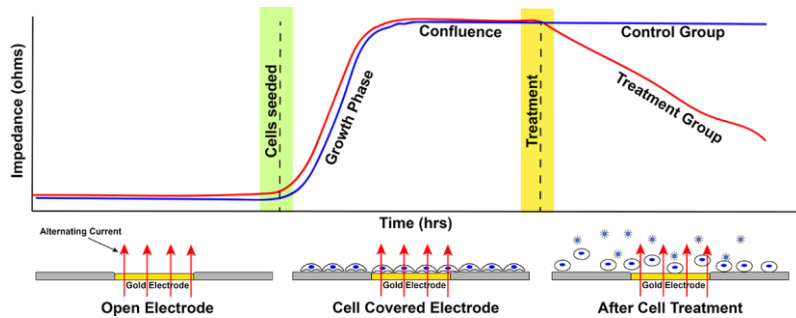
- Impedance measurements





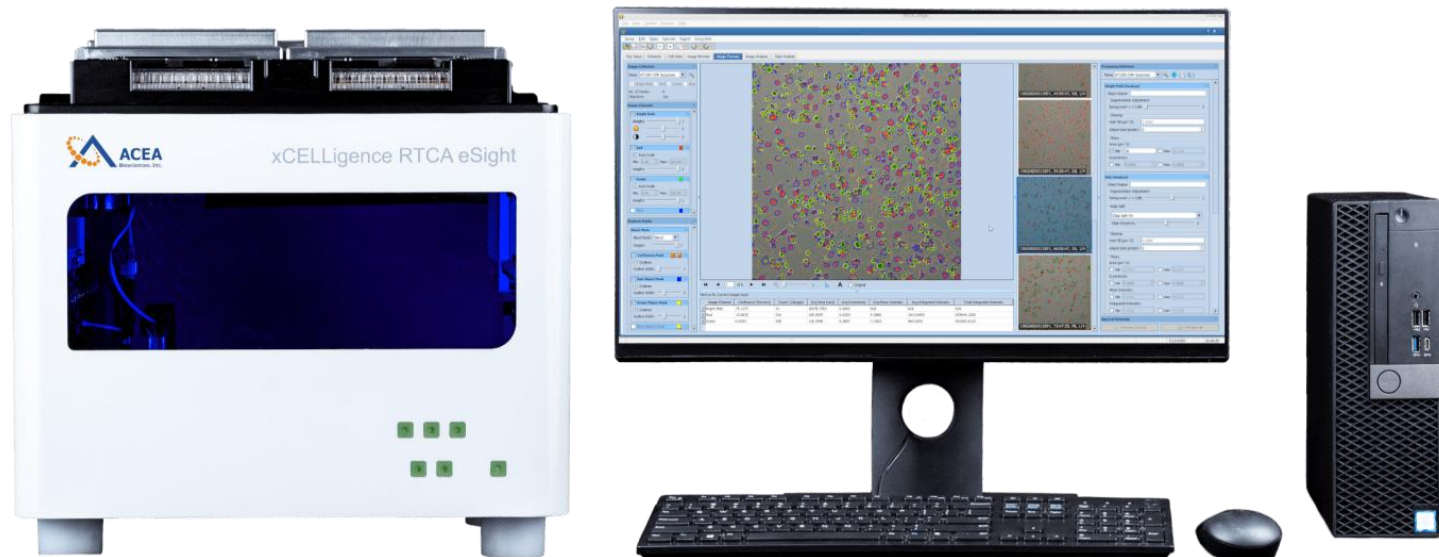
# Tracking growth in an incubator

- Impedance measurements



# Tracking growth in an incubator

- Impedance measurements



# Autonomous boxes

- Leica Mica, Nikon Eclipse Ji, Evident APX100, Andor BC43



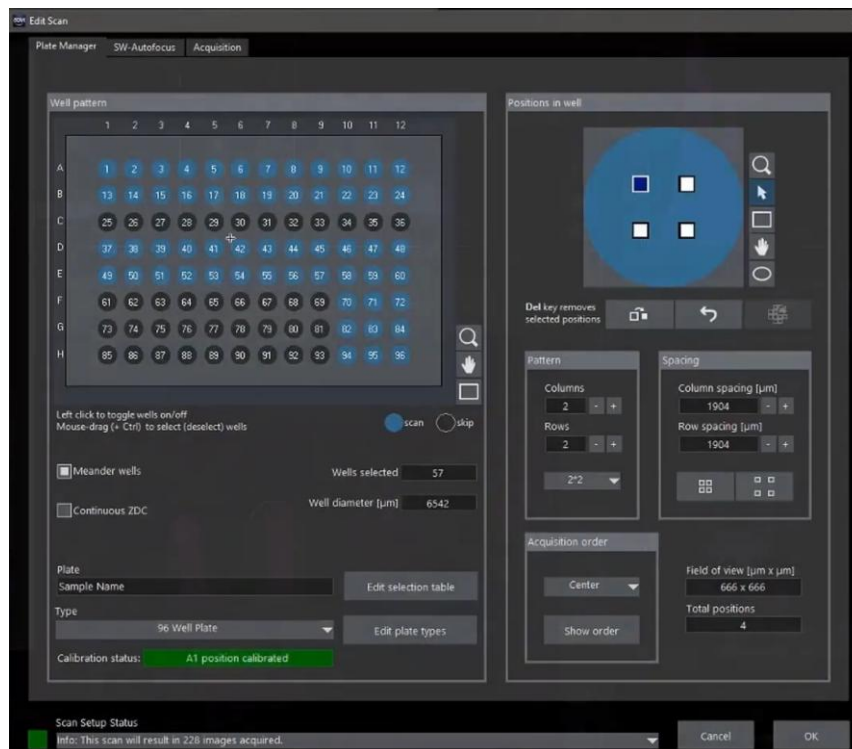


# Autonomous boxes

- Widefield or confocal
- Automatic sample finding and focusing
- Automatic parameter detection
- Low control over the microscopy parameters

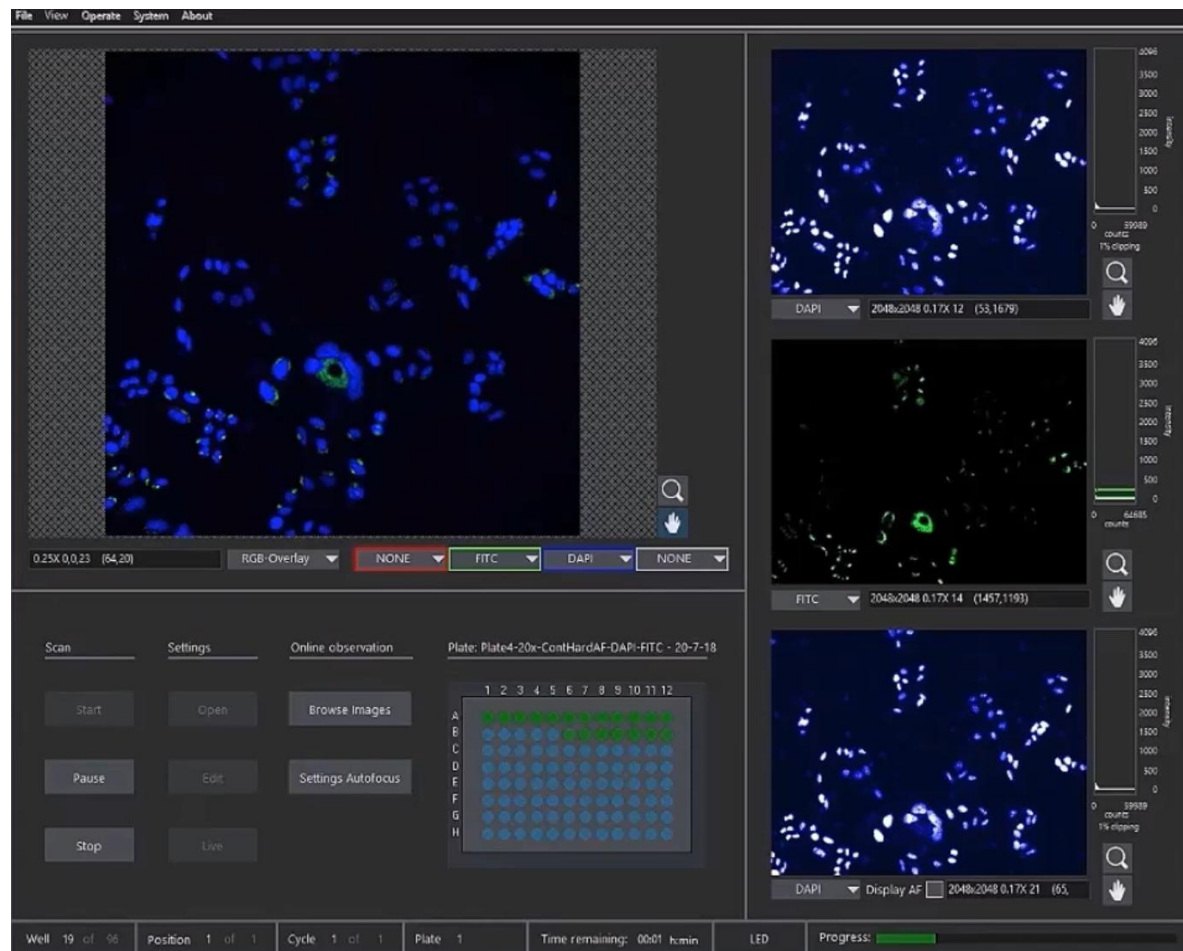
# High-content imaging

- Evident ScanR
  - Widefield – 2D
  - Confocal – 3D



# Evident ScanR

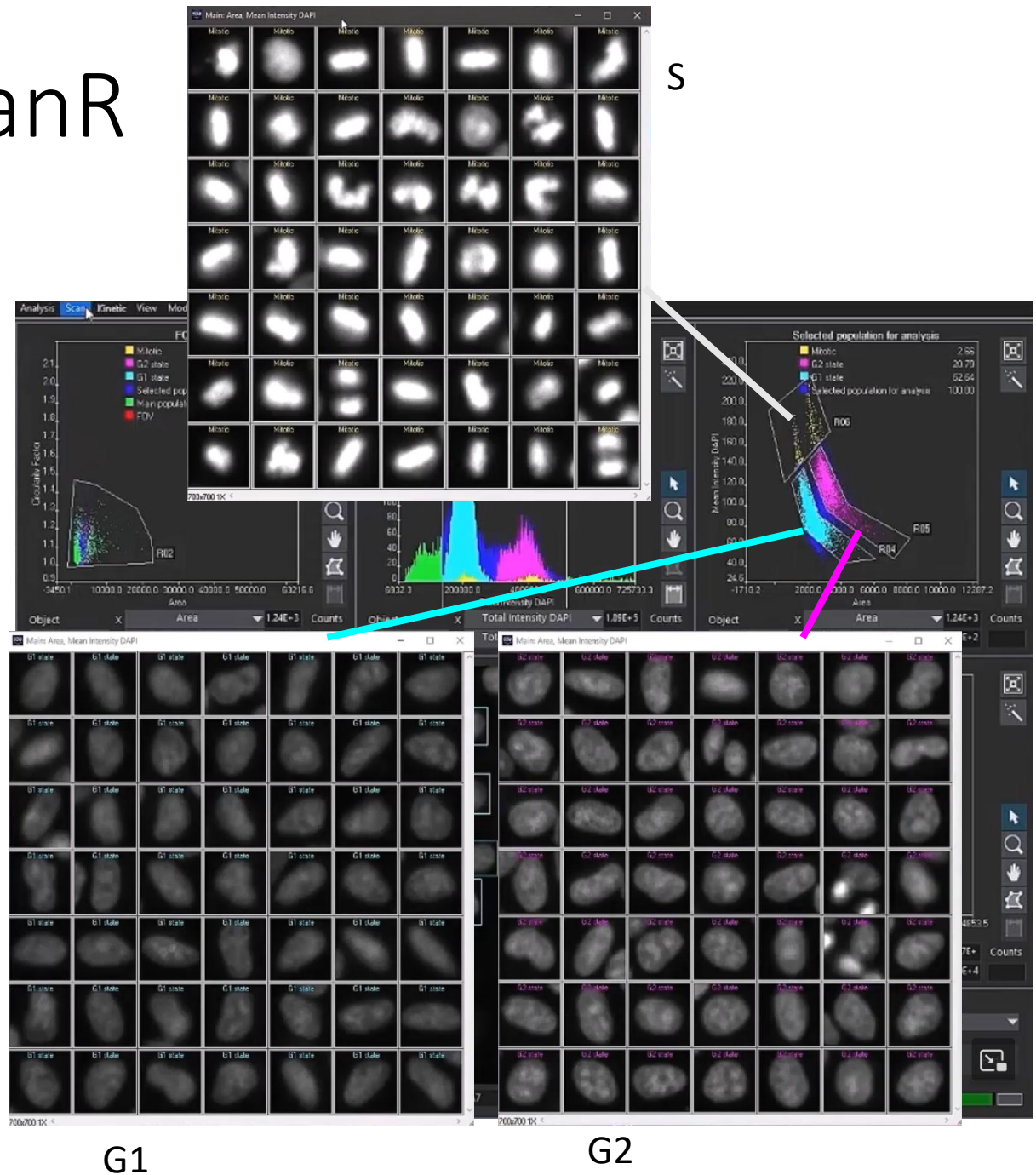
- Acquisition





# Evident ScanR

- Analysis
  - Gating
  - Virtual channels
  - Machine learning
  - Objects and subobjects



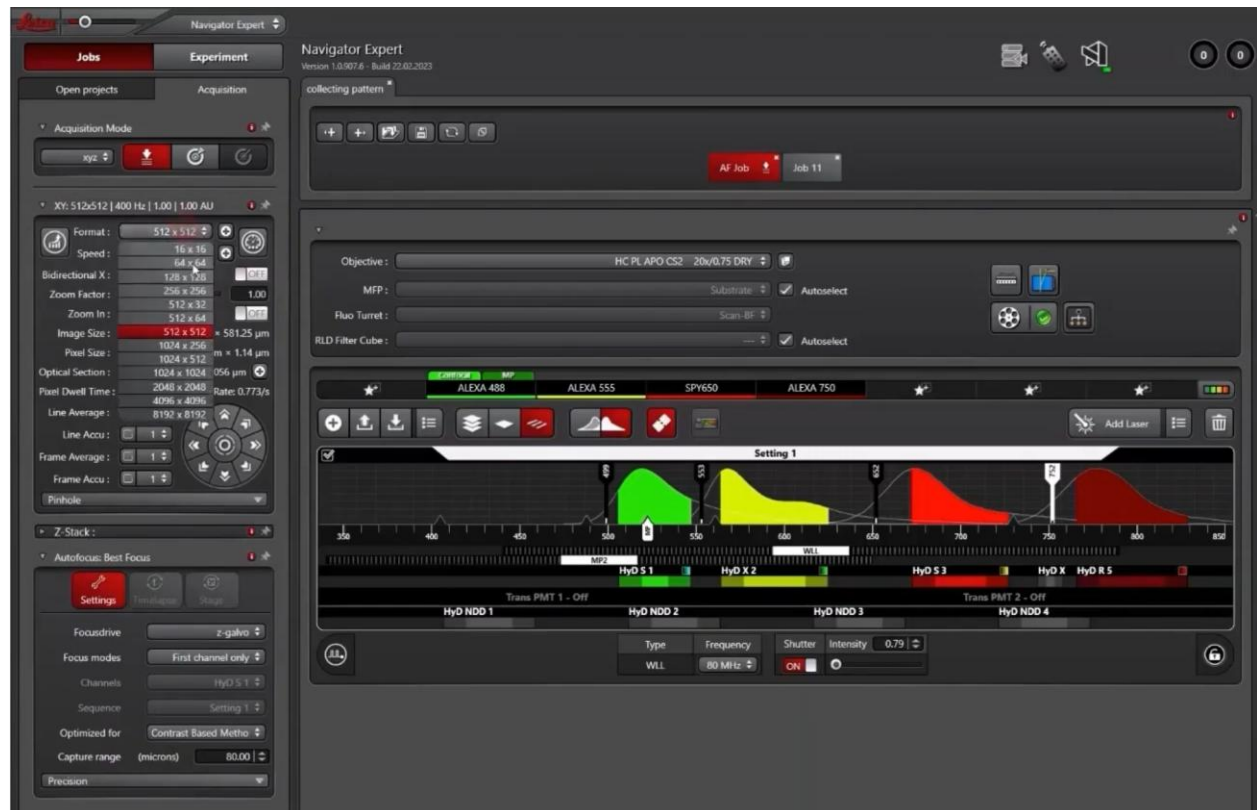
# Semi-autonomous microscopy

- Leica Navigator Expert – rare event detection
- 3 steps
  - Get overview image
  - Find interesting regions
  - Image them

# Rare event detection

## 1) Set up 3 acquisitions

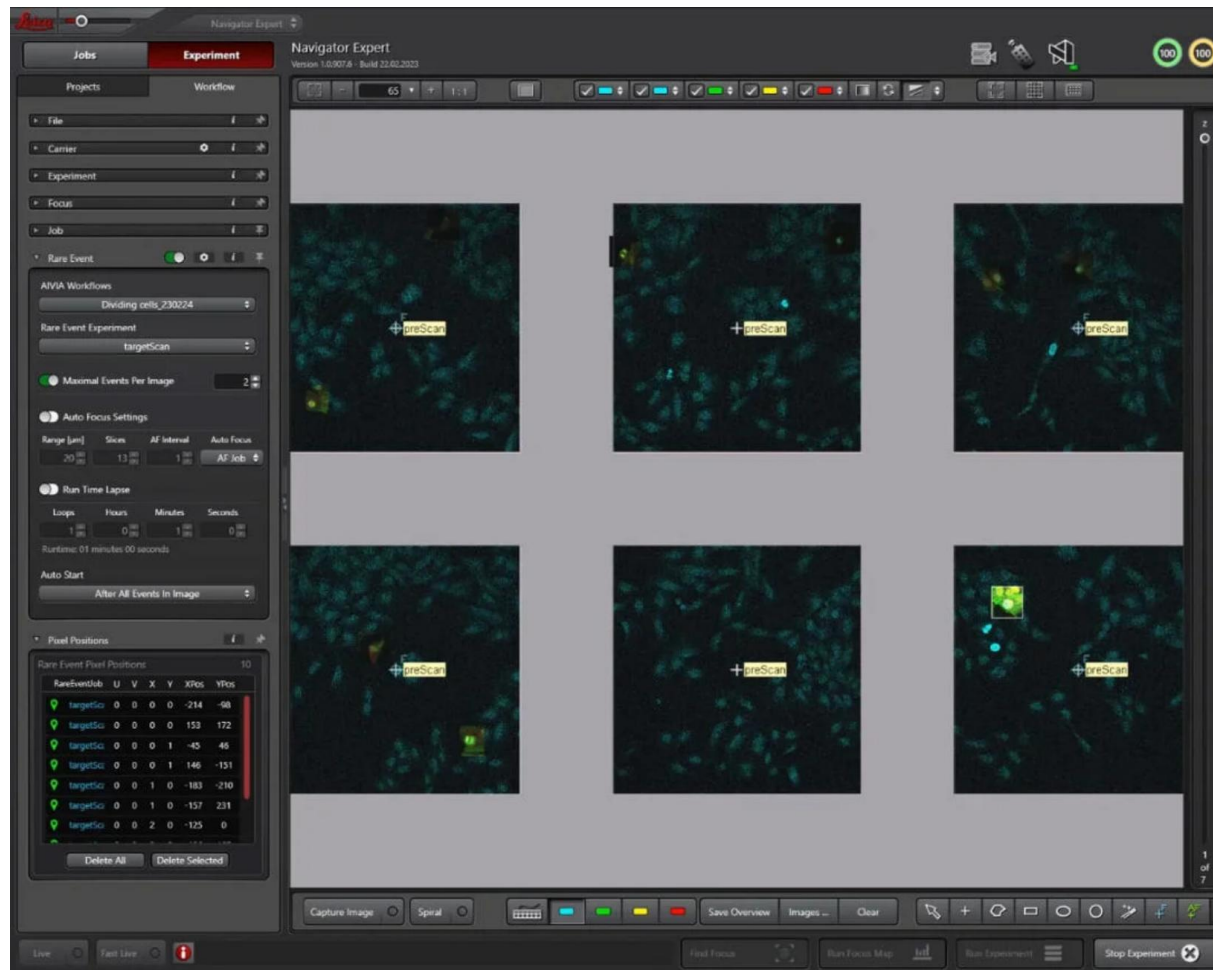
- Autofocus
- Low-res overview
- High-res detailed image





# Rare event detection

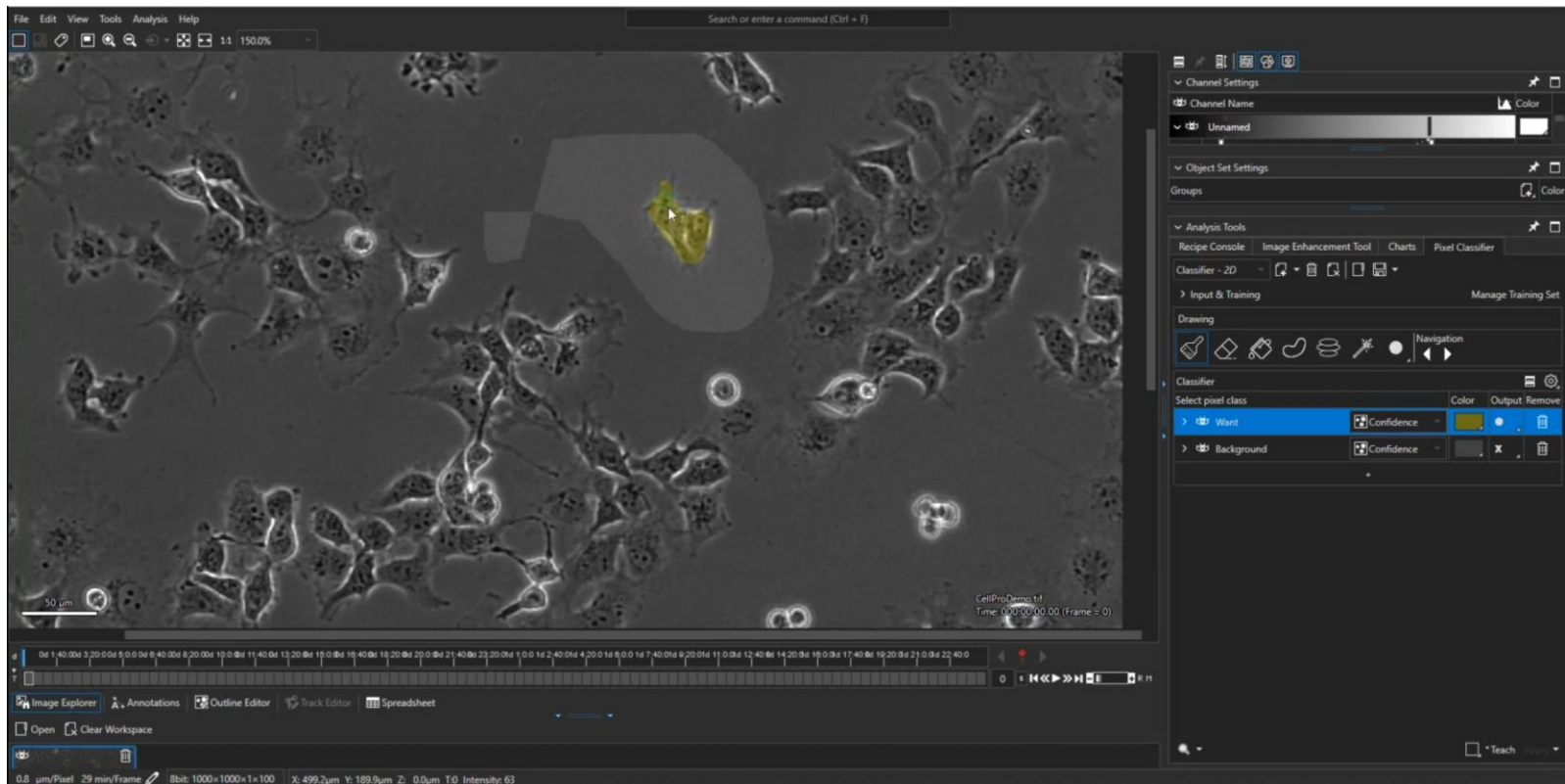
## 2) Get overview image



# Rare event detection

## 3) Find interesting regions

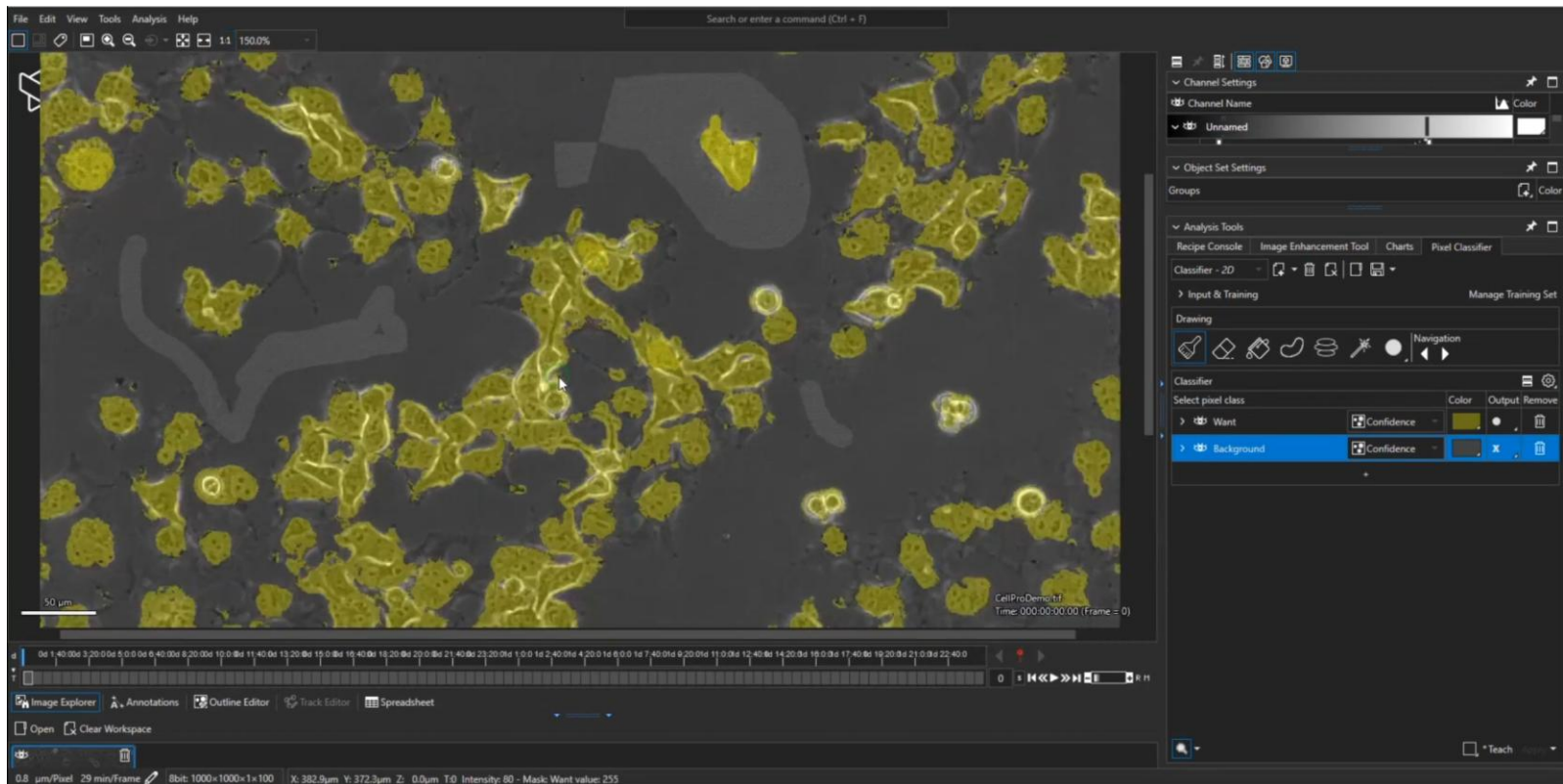
- machine learning model (Aivia)



# Rare event detection

## 3) Find interesting regions

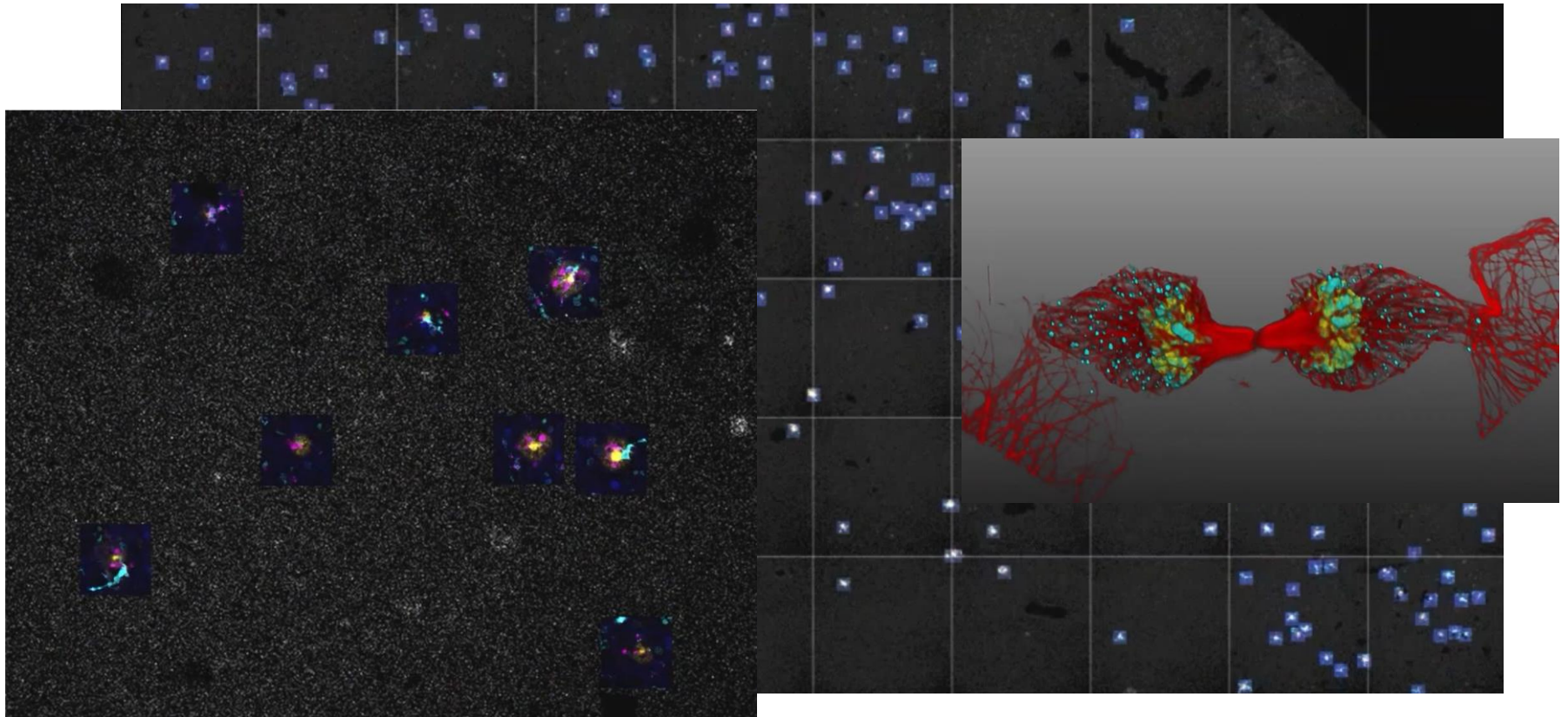
- machine learning model (Aivia)





# Rare event detection

4) Return positions and image them in high resolution



# Fully autonomous microscopy

- AI-based
- Not yet commercially available
- Proofs of concepts



Thank you for your  
attention!