



BiolmageXD – new software for visualizing and analyzing nanoparticles in living cells

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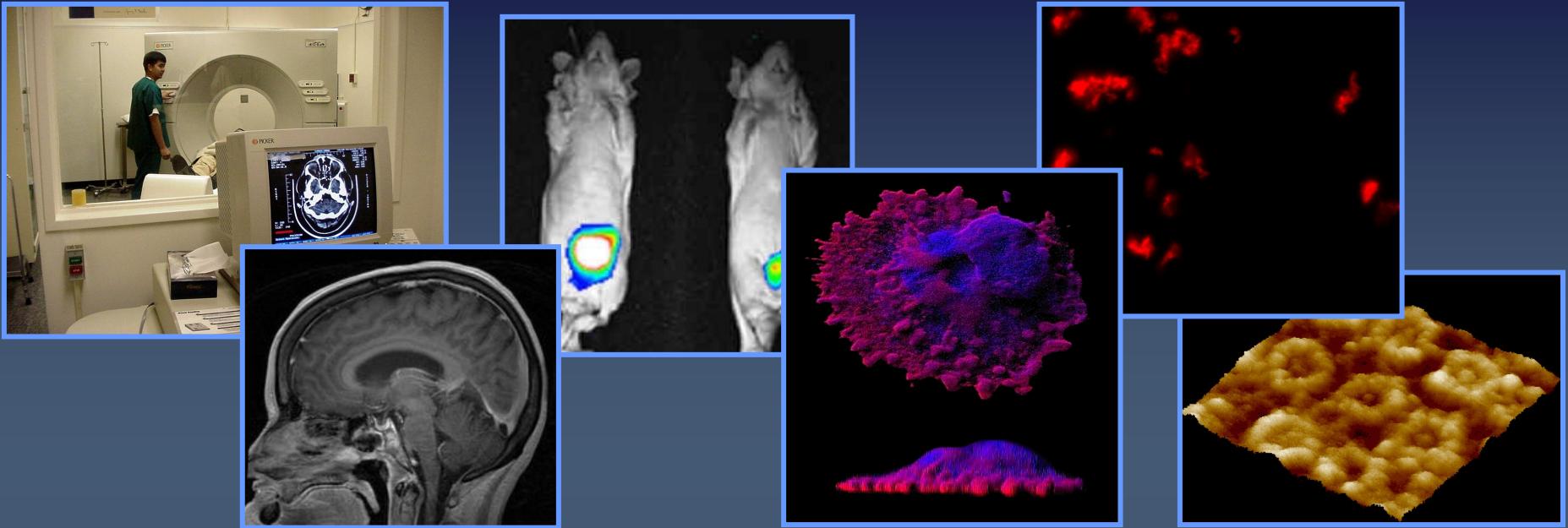
Contents

1. Modern bioimaging in nanoscience
2. What is BioImageXD
3. Using BioImageXD in nanoparticle development
4. Conclusion

Contents

- 1. Modern bioimaging in nanoscience**
2. What is BiolImageXD
3. Using BiolImageXD in nanoparticle development
4. Conclusion

Modern bioimaging in nanoscience



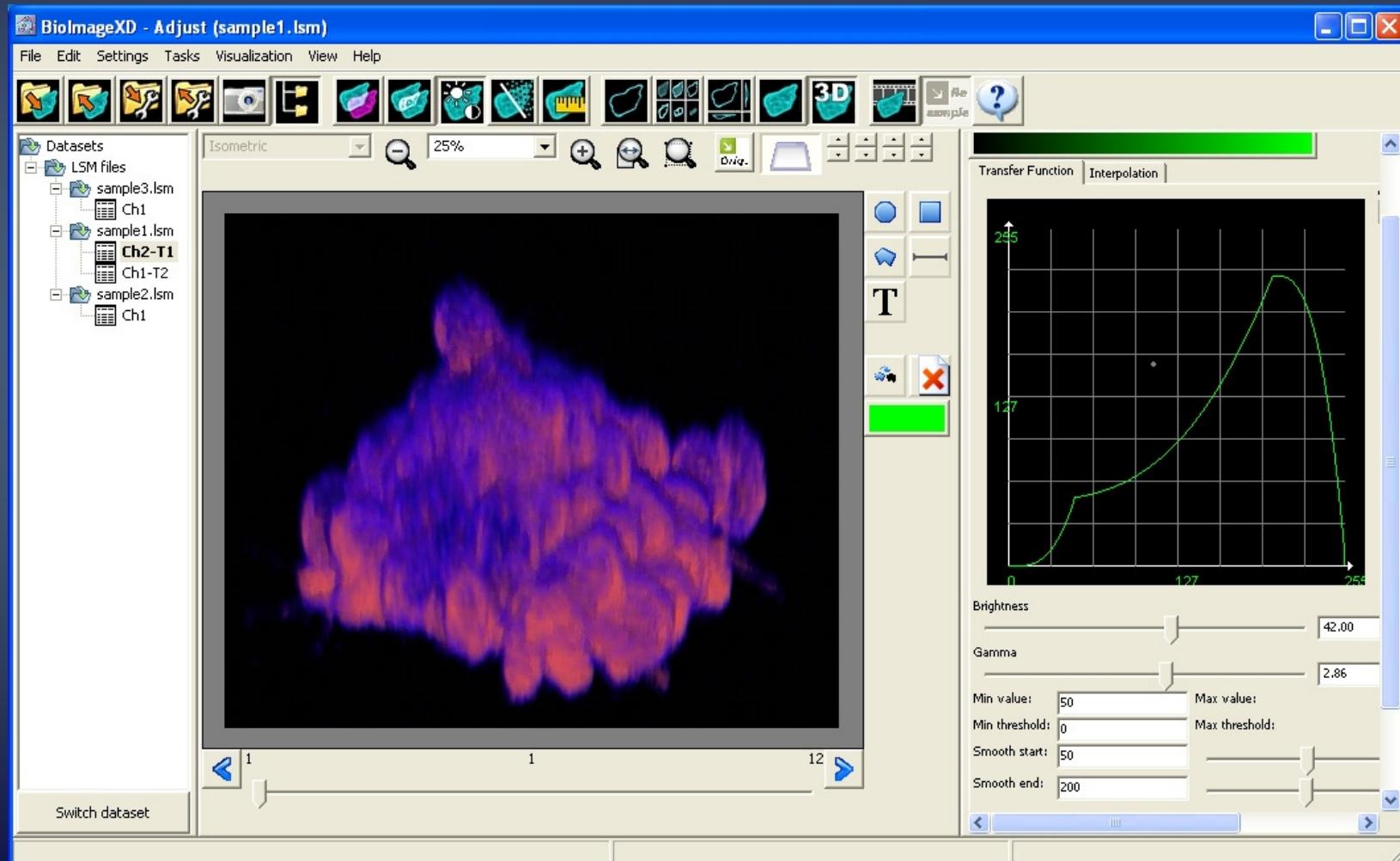
- Modern bioimaging techniques are incredibly popular, and more and more targeted towards nanoscale imaging
- Imaging (fluorescent) nanoparticles in living cells is important
- All imaging techniques share a common bottleneck: lack of good software for visualizing and analyzing the results
→ we have developed **BioImageXD** as a solution

Contents

1. Modern bioimaging in nanoscience
2. What is BioImageXD
3. Using BioImageXD in nanoparticle development
4. Conclusion

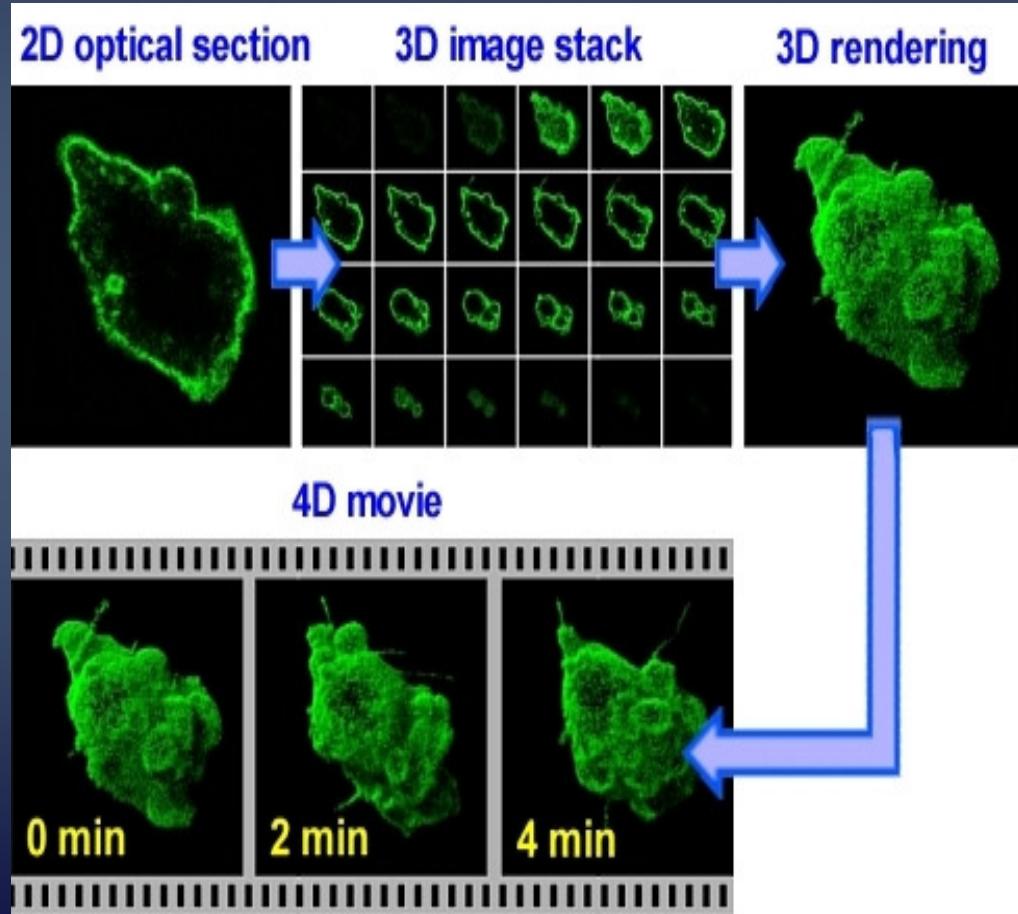
What is BioImageXD

Free, open source software for visualizing and analyzing multidimensional bioimaging data

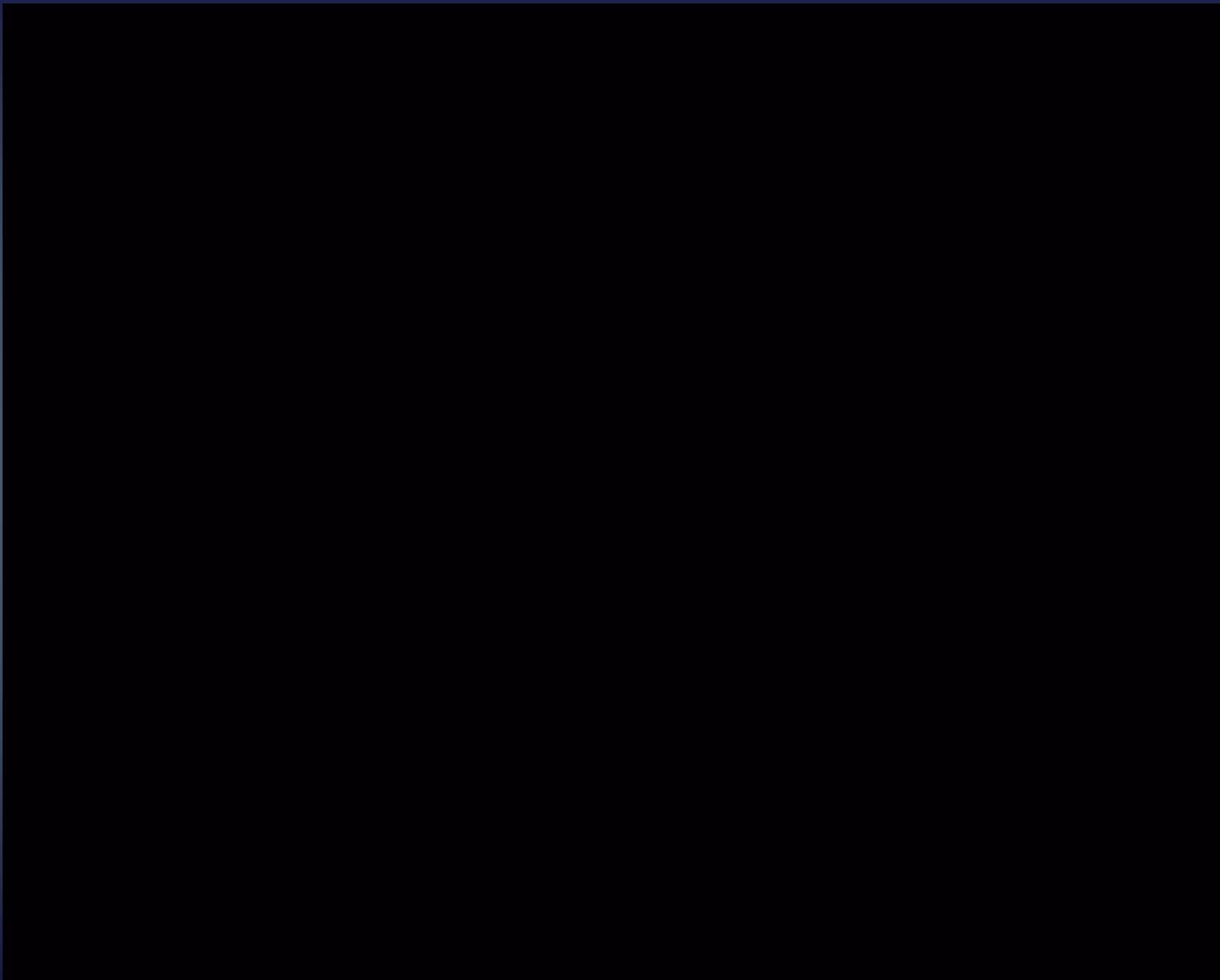


What is BiolimageXD

BiolimageXD is suitable for virtually any imaging technique, but tailored to the needs of fluorescent nanoparticle imaging (4D laser scanning confocal microscopy)



What is BiolimageXD



Contents

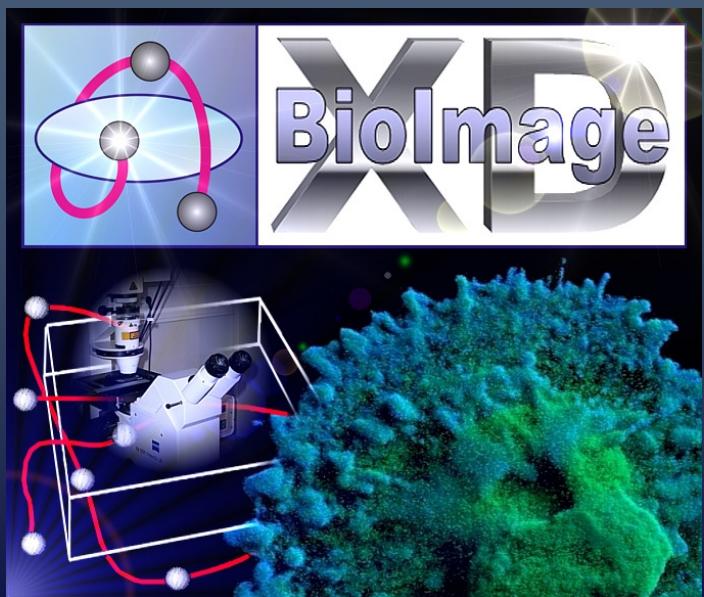
1. Modern bioimaging in nanoscience
2. What is BioImageXD
- 3. Using BioImageXD in nanoparticle development**
4. Conclusion

Using BiolImageXD in nanoparticle development

For 6 years we have used advanced multidimensional bioimaging to study the cellular internalization process of biological nanoparticles such as viruses

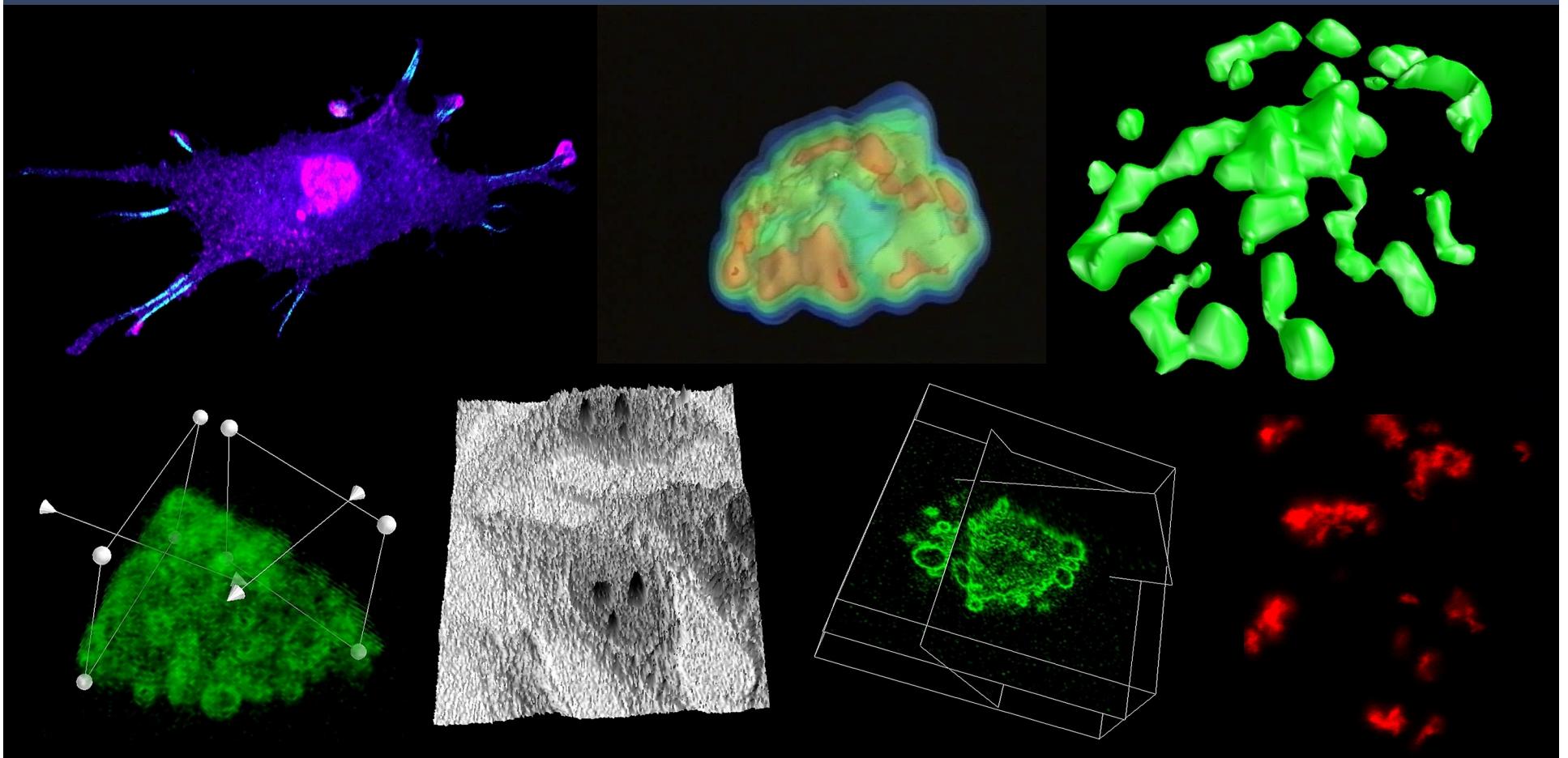
We have recently started a project to use this information to develop artificial drug delivering nanoparticles

Before human studies, the particles and their internalization into living target cells need to be analyzed
→ 4D confocal microscopy & BiolImageXD



Using BioImageXD in nanoparticle development

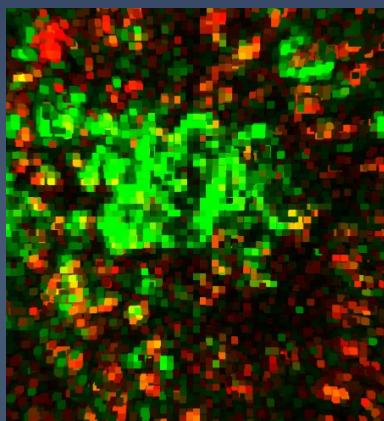
BioImageXD enables proper 3D/4D visualizations and animations of living cells and nanoparticles interacting with them



Using BioImageXD in nanoparticle development

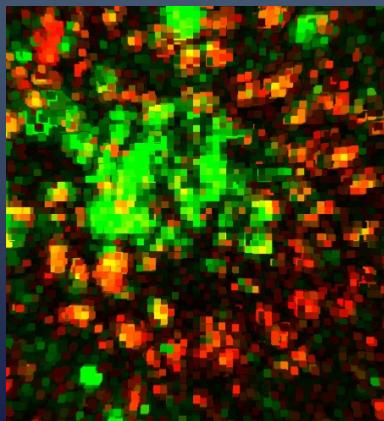
BioImageXD offers one of the most versatile colocalization analysis tools, example:
Nanoparticle targeting to **intracellular structures**

10 min



32% of particles
colocalized
coincidence
probability
100%

20 min



39% of particles
colocalized
coincidence
probability
0%

Using BioImageXD in nanoparticle development

BioImageXD is a good platform for easily adding, changing and developing algorithms and features for new research situations

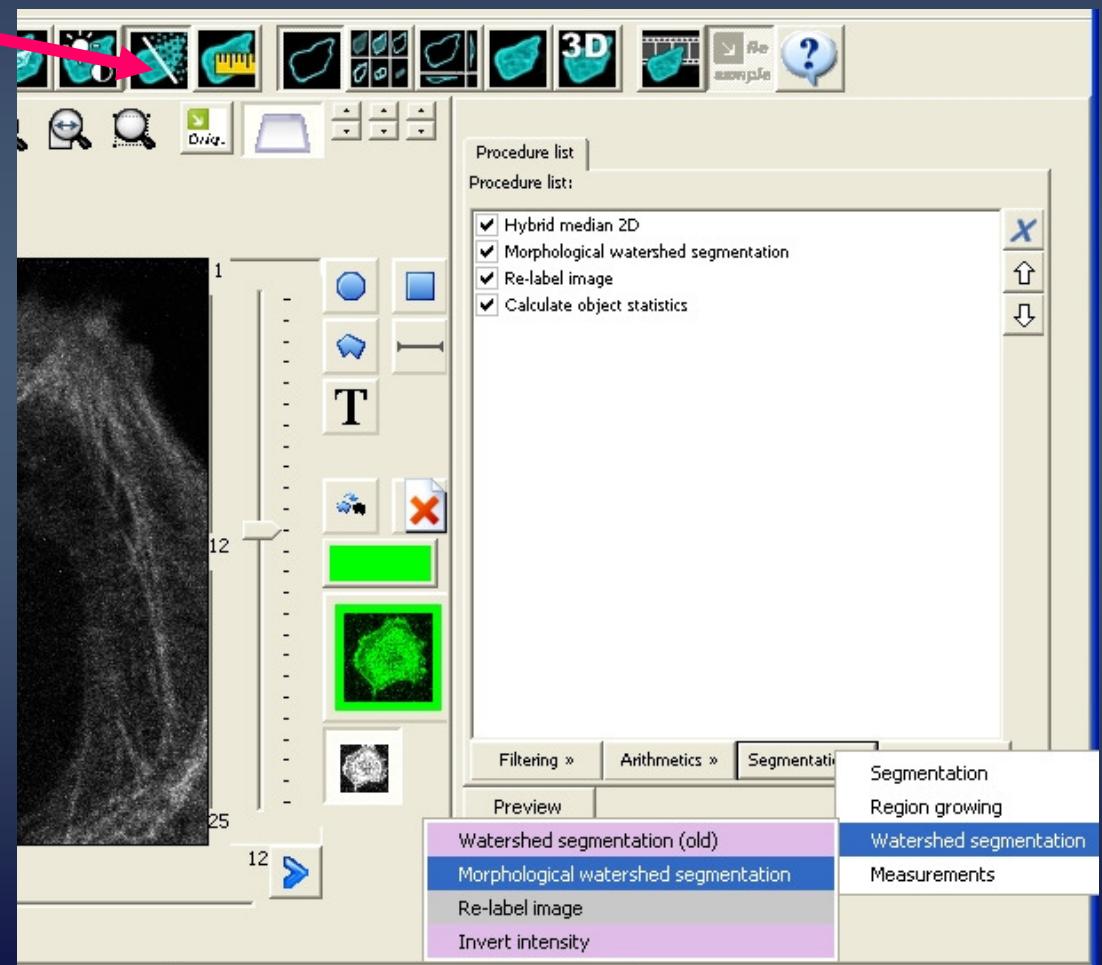
*New, versatile
"Process" task*

Set up a "Procedure list" from 50 commands in 4 categories:

- filtering
- arithmetics
- segmentation
- tracking

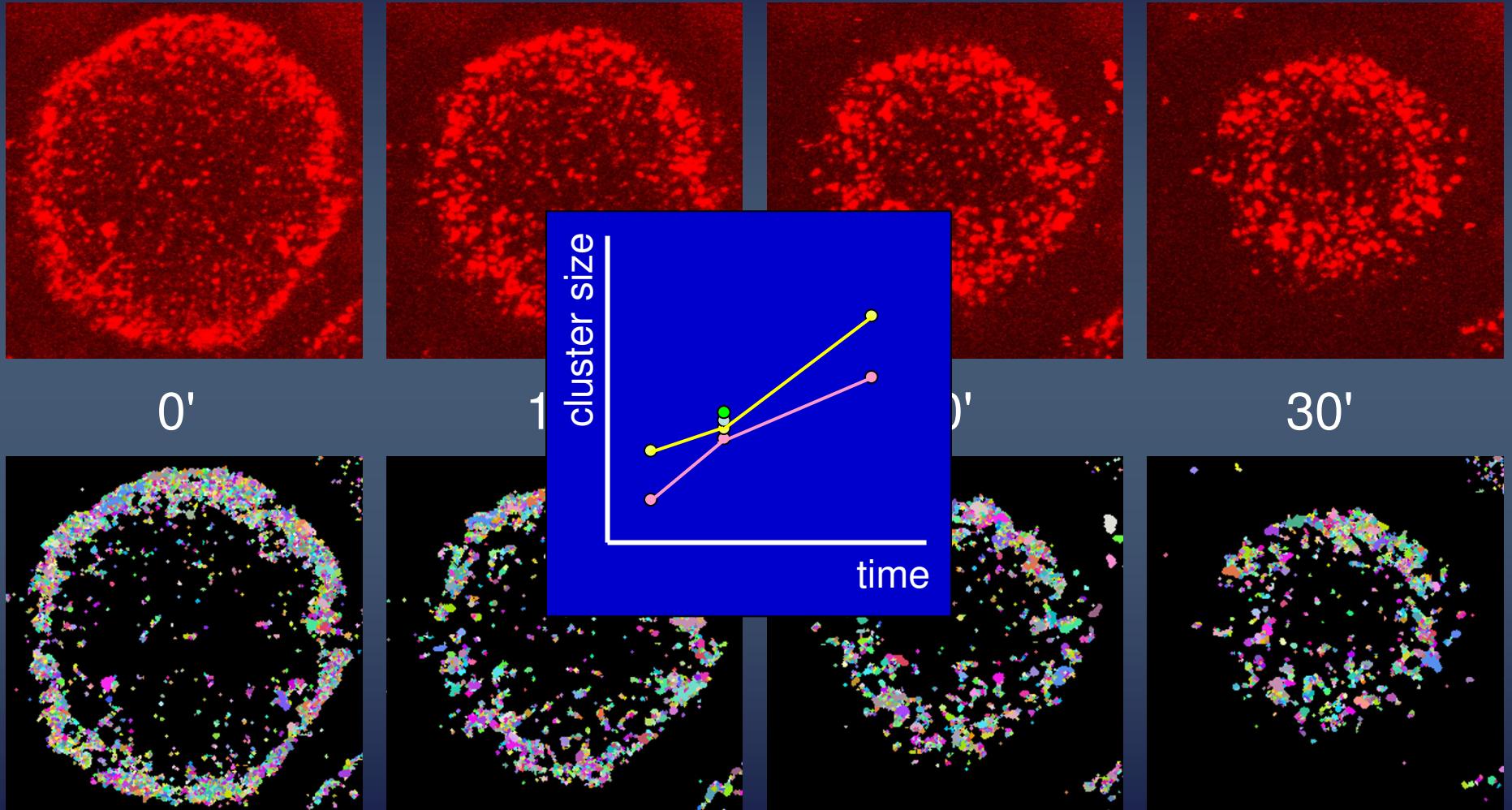
Procedures include:

- noise filtering
- cutting
- mathematical and logical processing
- measuring ROIs
- feature detection
- 3 segmentation methods
- tracking analysis



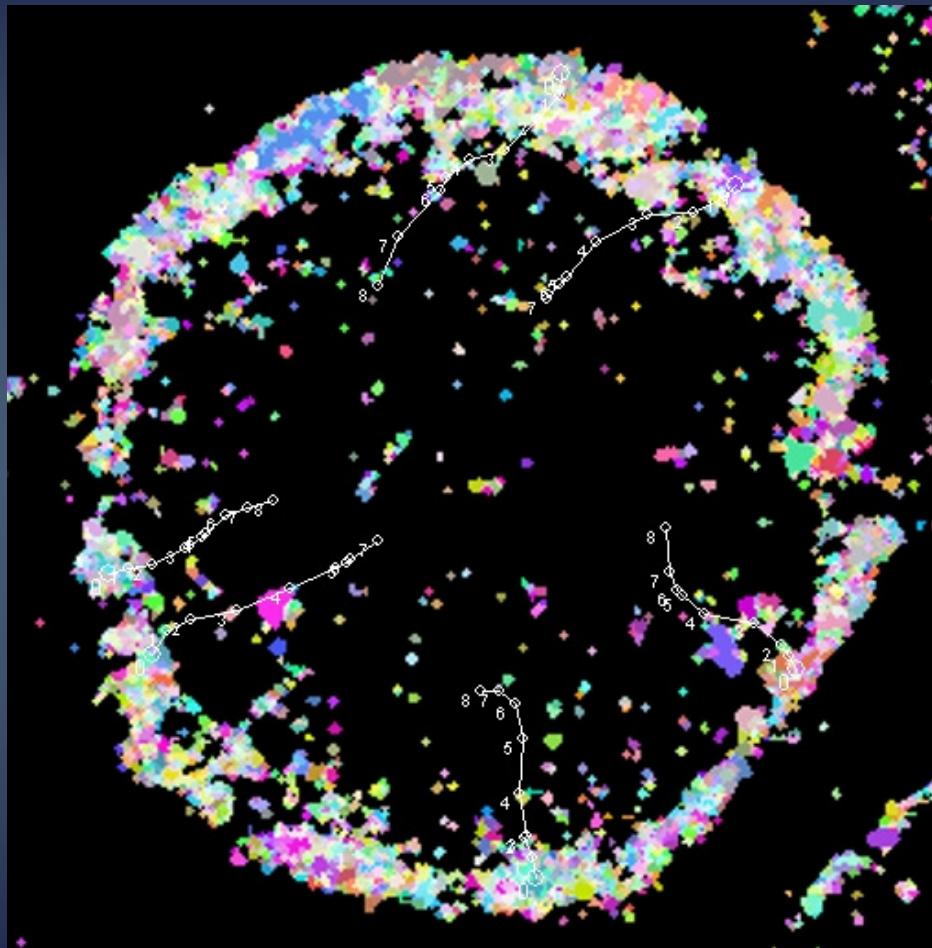
Using BioImageXD in nanoparticle development

Segmenting and tracking nanoparticles from 4D live cell data

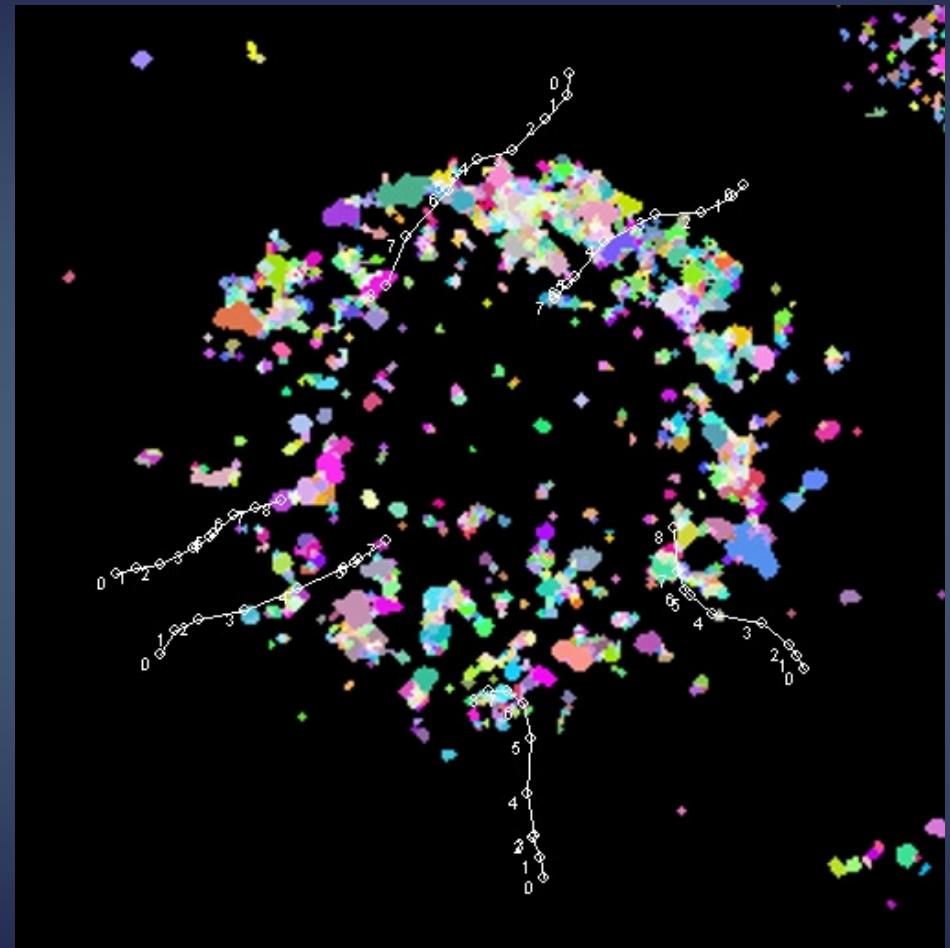


Using BioImageXD in nanoparticle development

Segmenting and tracking nanoparticles from 4D live cell data



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Contents

1. Modern bioimaging in nanoscience
2. What is BioImageXD
3. Using BioImageXD in nanoparticle development
4. Conclusion

Conclusion

BiolmageXD

- Thousands of downloads
- Next beta with new features released soon
- Development team rapidly growing
(6 new programmers this year)
- Anyone is welcome to join the BiolmageXD community!

Applying BiolmageXD

- Top-level visualization and analysis functions
- With new features applicable for many types of quantitative analyses of fluorescent nanoparticles
- A crucial tool in imaging nanoparticles in living cells

*Consider paying a programmer
in stead of buying a software license!*

Conclusion

Turku is one of the leading bioimaging sites in Northern Europe



Acknowledgements

BioImageXD main development team (Turku, Jyväskylä & Dresden):

Software design lead **Pasi Kankaanpää** (University of Turku)

Programming lead **Kalle Pahajoki** (University of Turku)

Science coordinator **Varpu Marjomäki** (University of Jyväskylä)

IT coordinator **Daniel White** (Max Planck Institute)

Project supervisor **Jyrki Heino** (University of Turku)

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