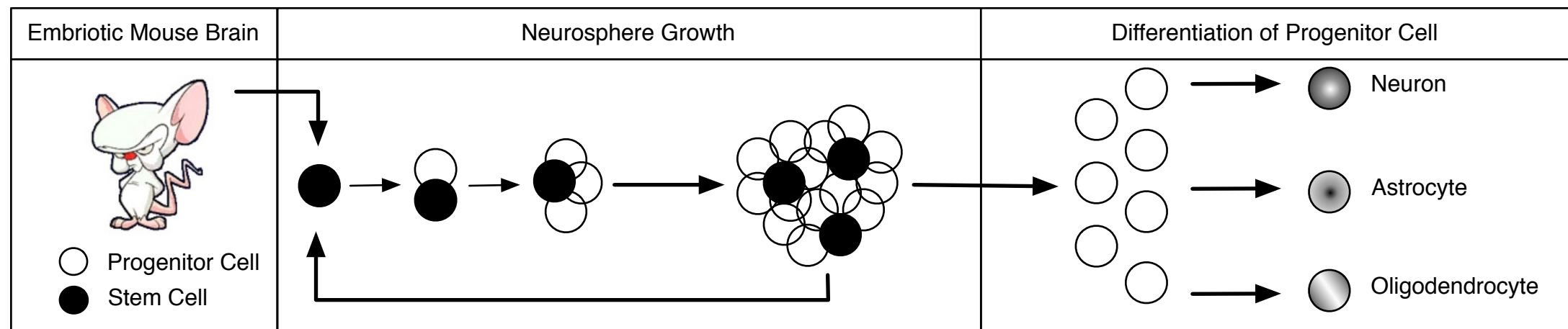


Shape and texture prior for 2D/3D analysis/
synthesis of neural stem cells for fate prediction
2D differentiation and 3D reconstruction



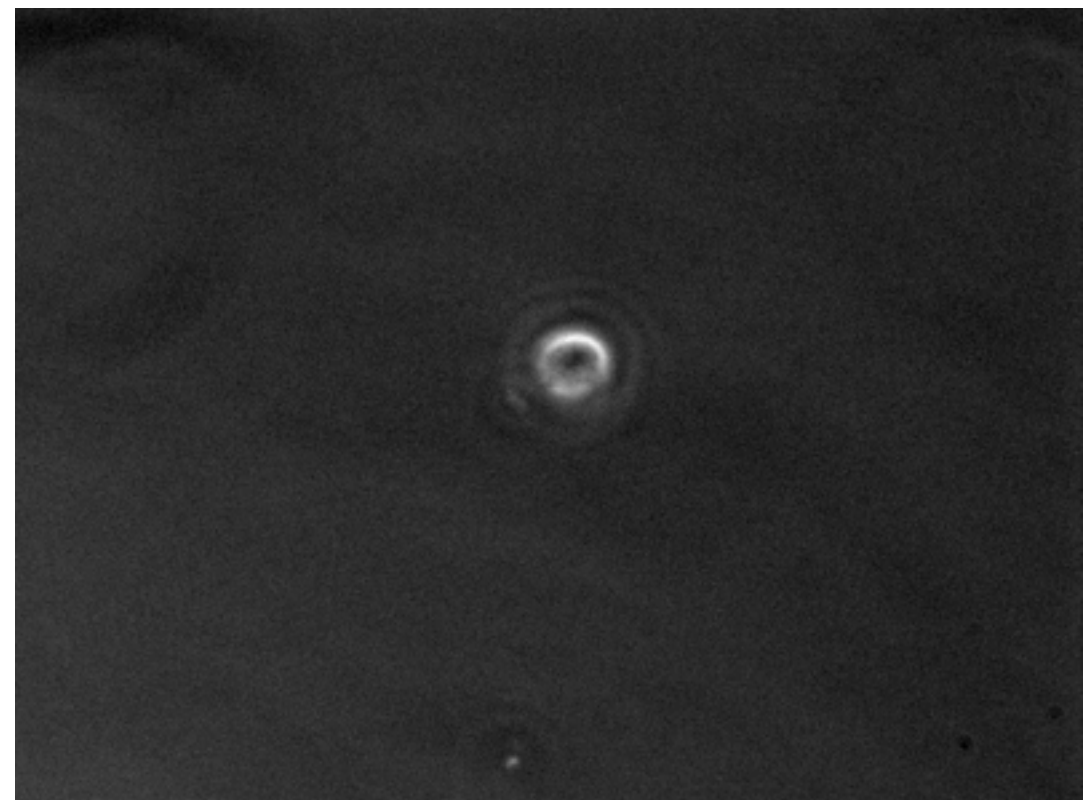
www.ipal.cnrs.fr



- ▶ Culture and purification “*in vitro*” of neural stem cell [1].
- ▶ Identify “*proliferation*” and “*multi-potency*”.
- ▶ No tracks of the origin cell & low survivability.
- ▶ Three dimension proliferation & two dimension differentiation.

[1] S.Ahmed. The culture of neural stem cells. Journal of cellular biochemistry, 2009.

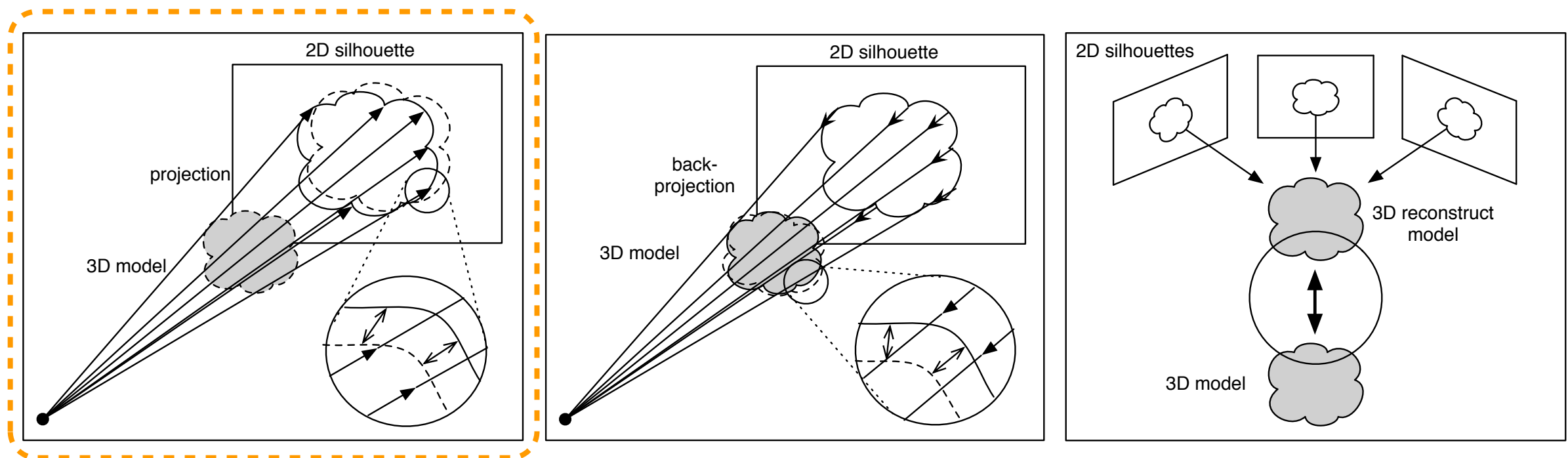
- ▶ Phase contrast time lapse sequence of 2D images.
- ▶ 40x magnification with 3x3 binning.
- ▶ 464 × 346 spatial resolution & 20 min time resolution.
- ▶ Online microscope tracking [2]



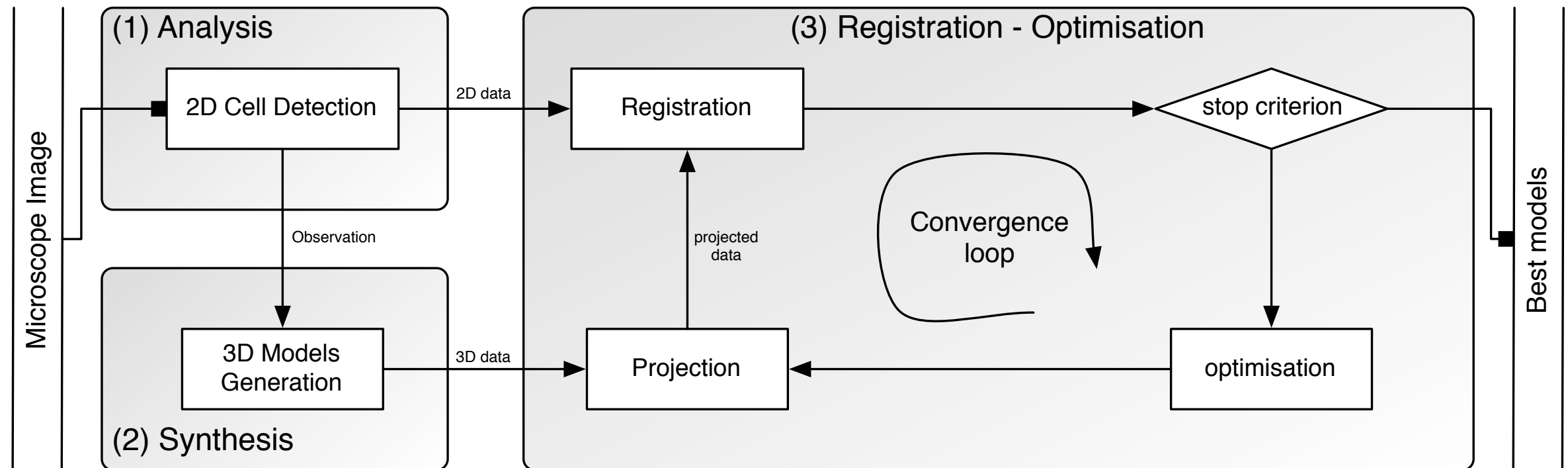
[2] C.-H. Huang, S. Sankaran, D. Racocceanu, S. Hariharan, and S. Ahmed. Online 3-d tracking of suspension cells imaged with phase-contrast microscopy. IEEE Transactions on Biomedical Engineering, 2012.

► Review: [3]

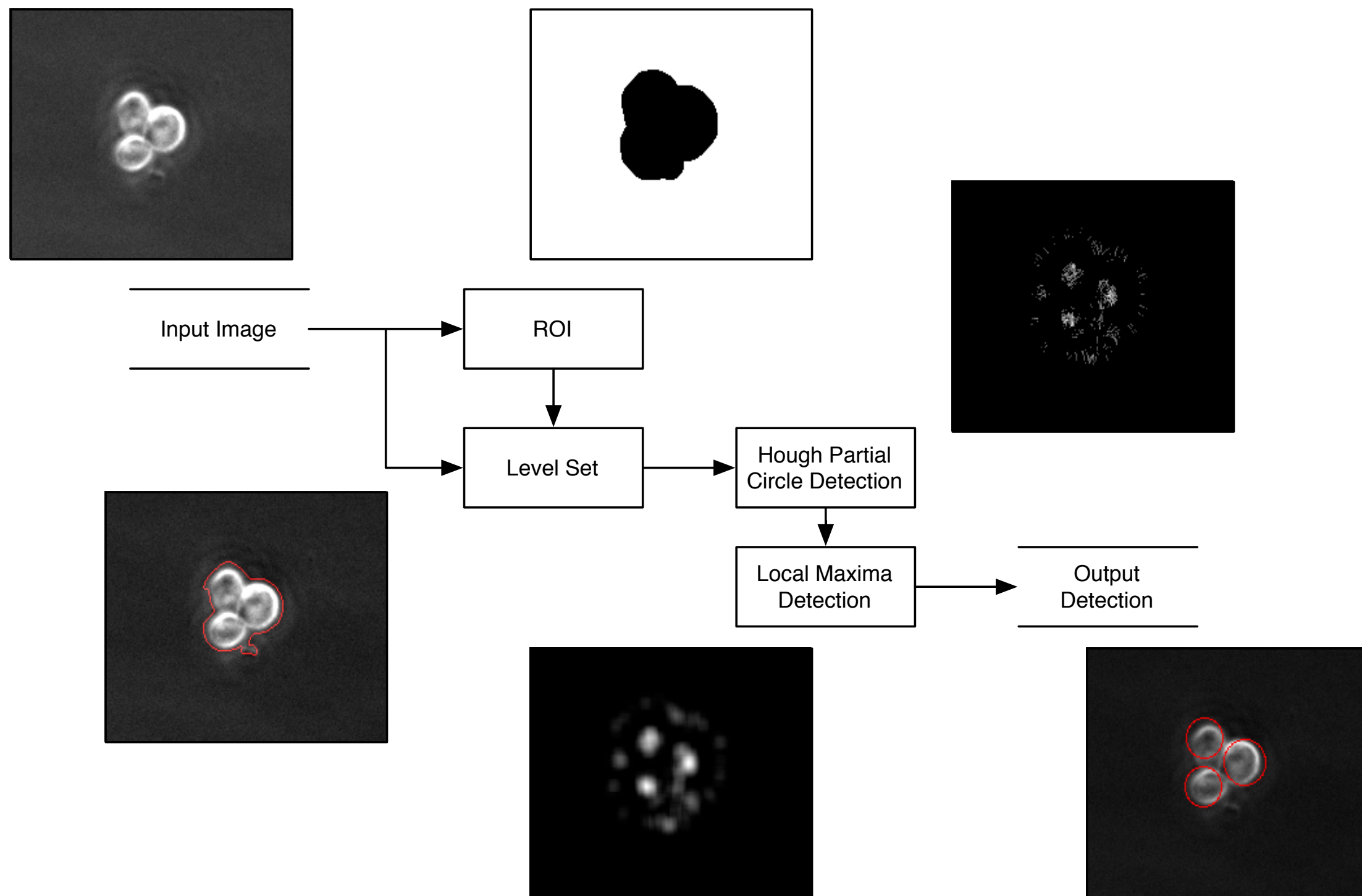
- Dimensionality problematic: projection, back-projection & reconstruction.



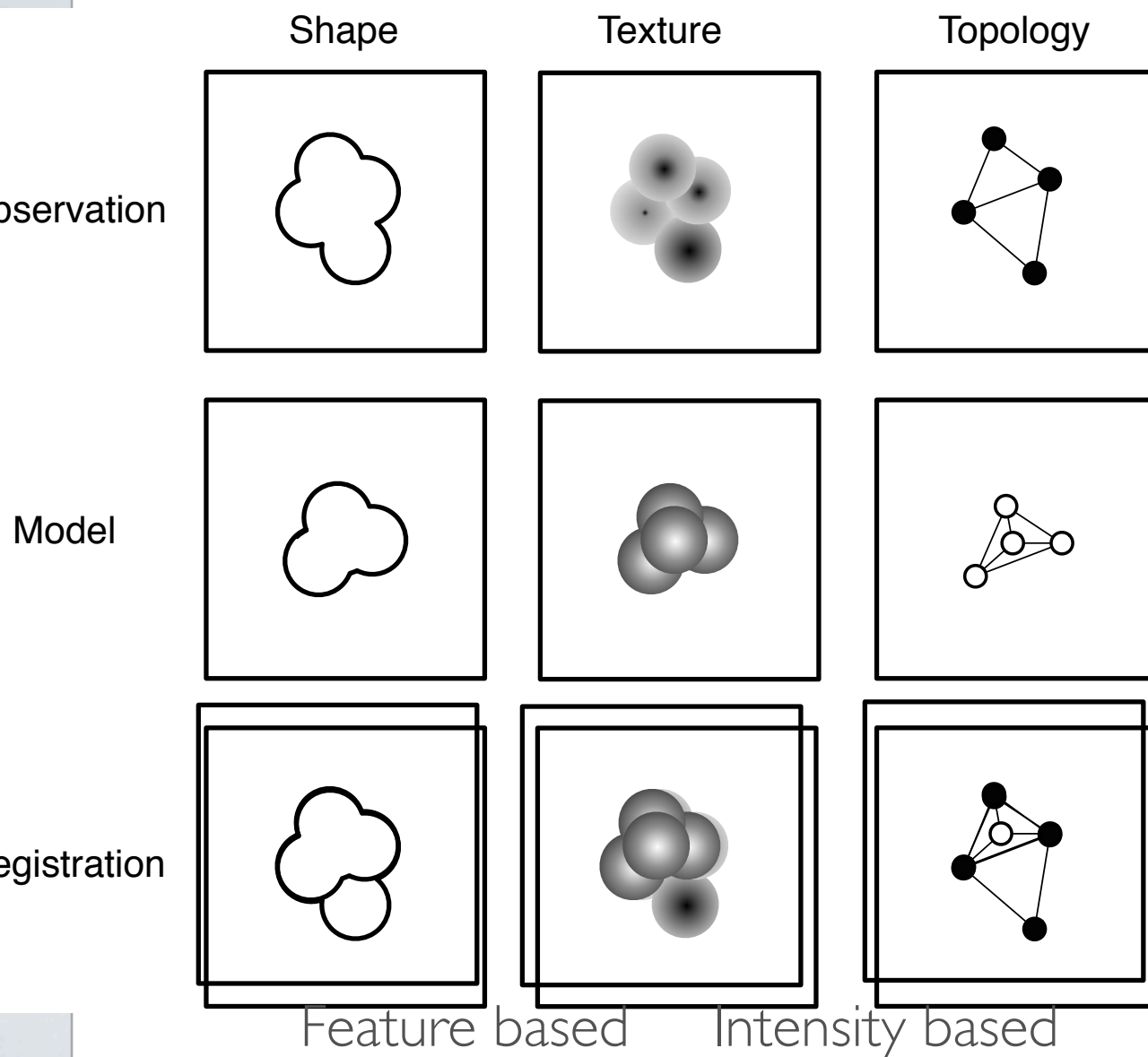
[3] P. Markelj, D. Tomževič, B. Likar, and F. Pernuš. A review of 3d/2d registration methods for image-guided interventions. Medical Image Analysis, 2012.



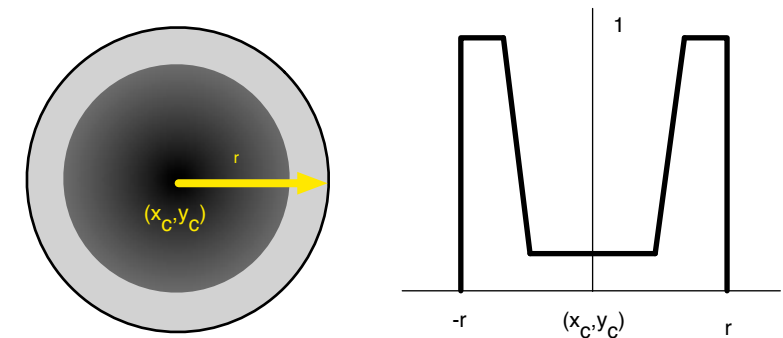
- ▶ Analysis - cell detection
- ▶ Synthesis - model generation
- ▶ Registration / Optimisation - rank & optimise selected model

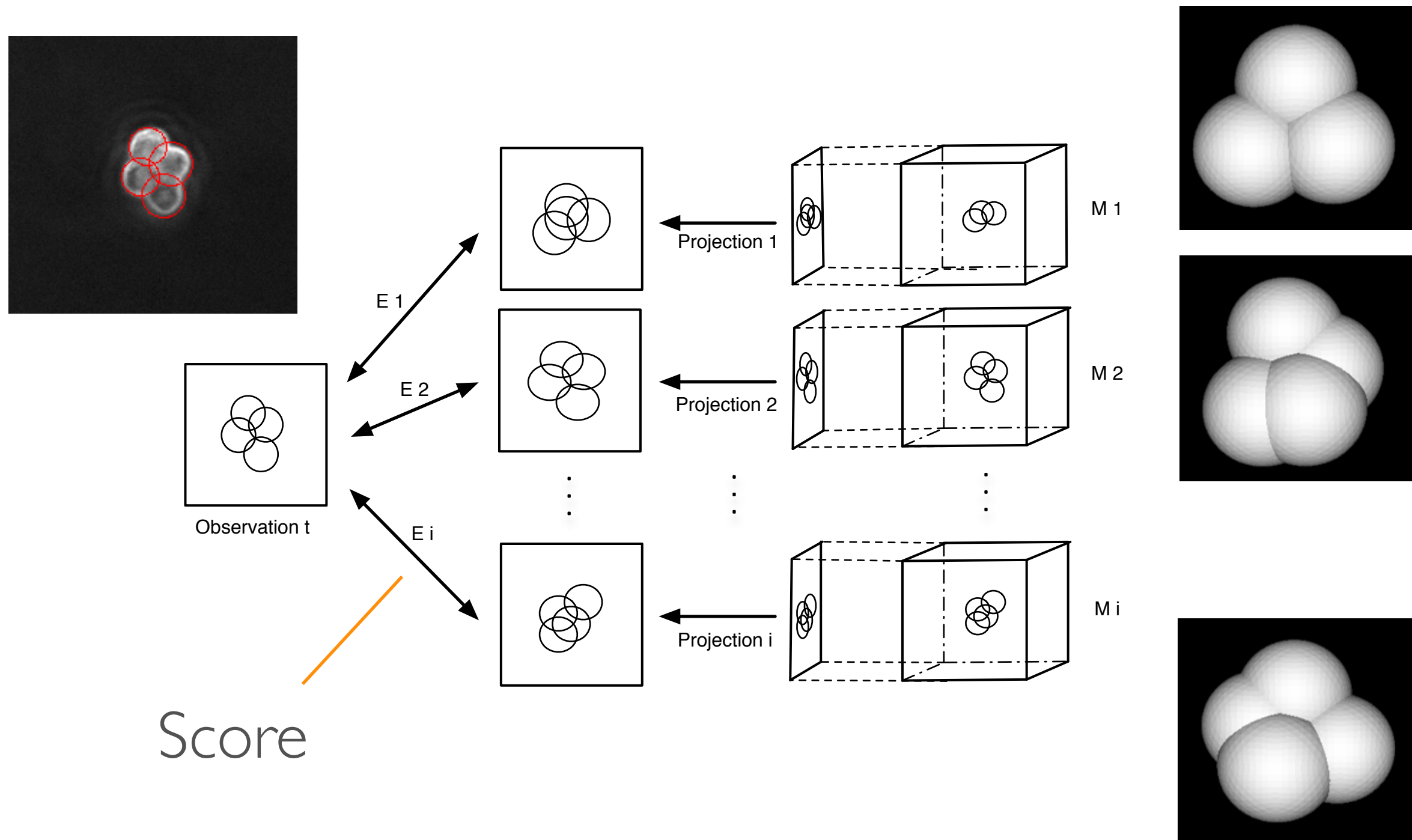


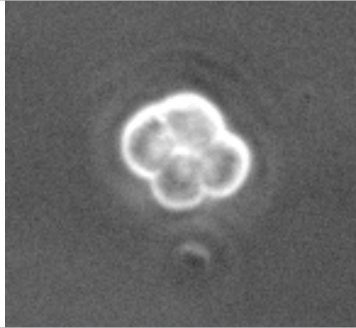
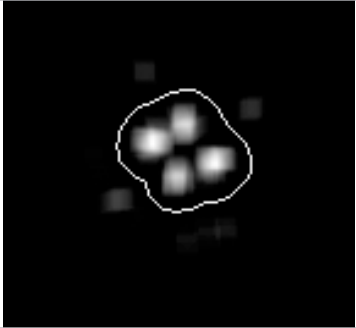
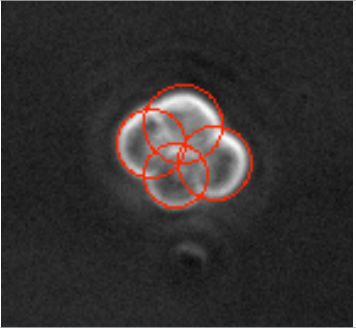
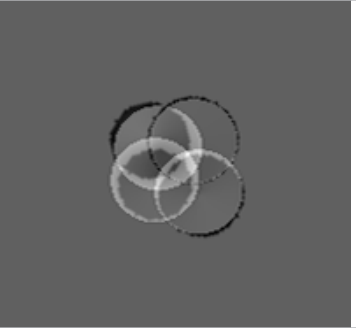
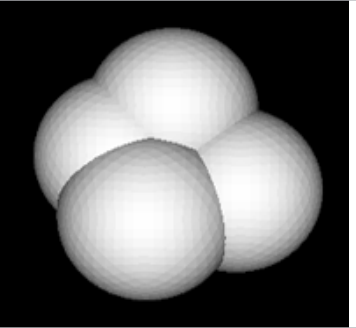

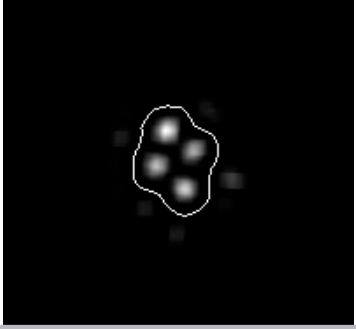
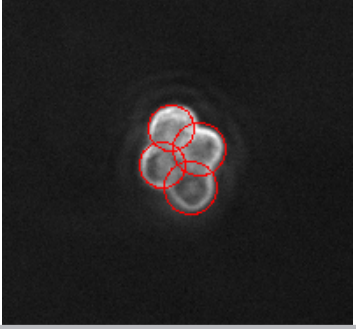
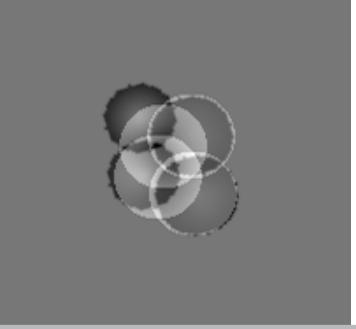
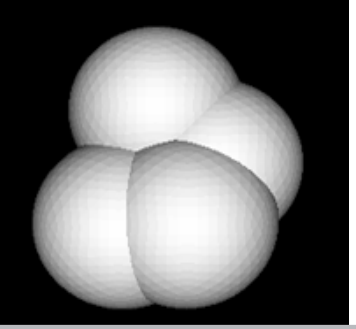

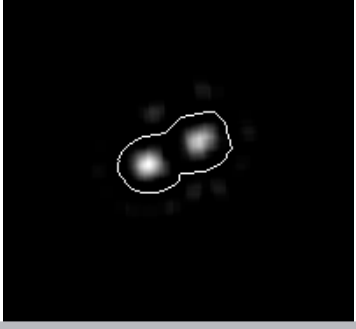
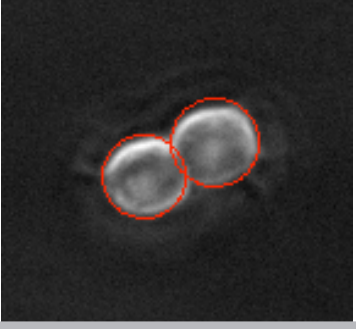

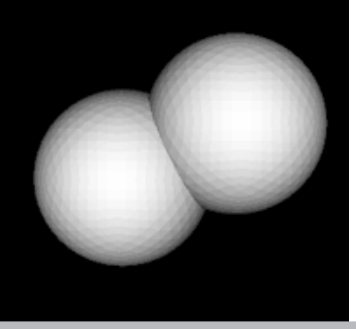
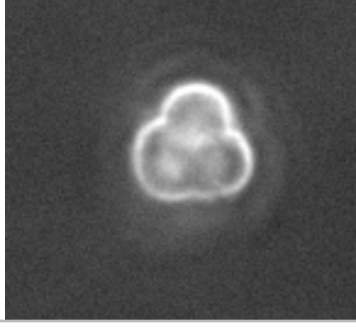
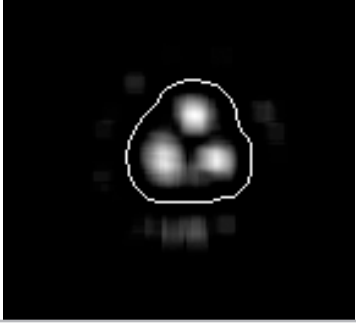
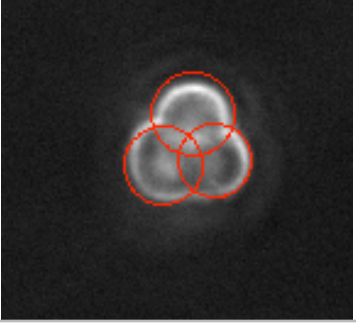
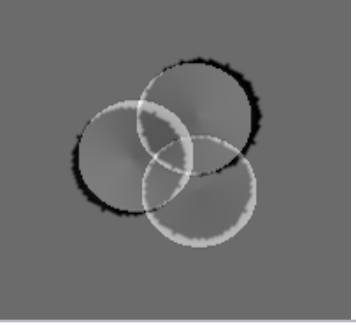
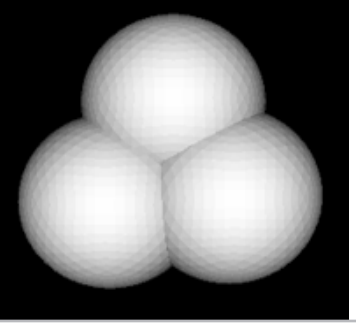
► Criteria

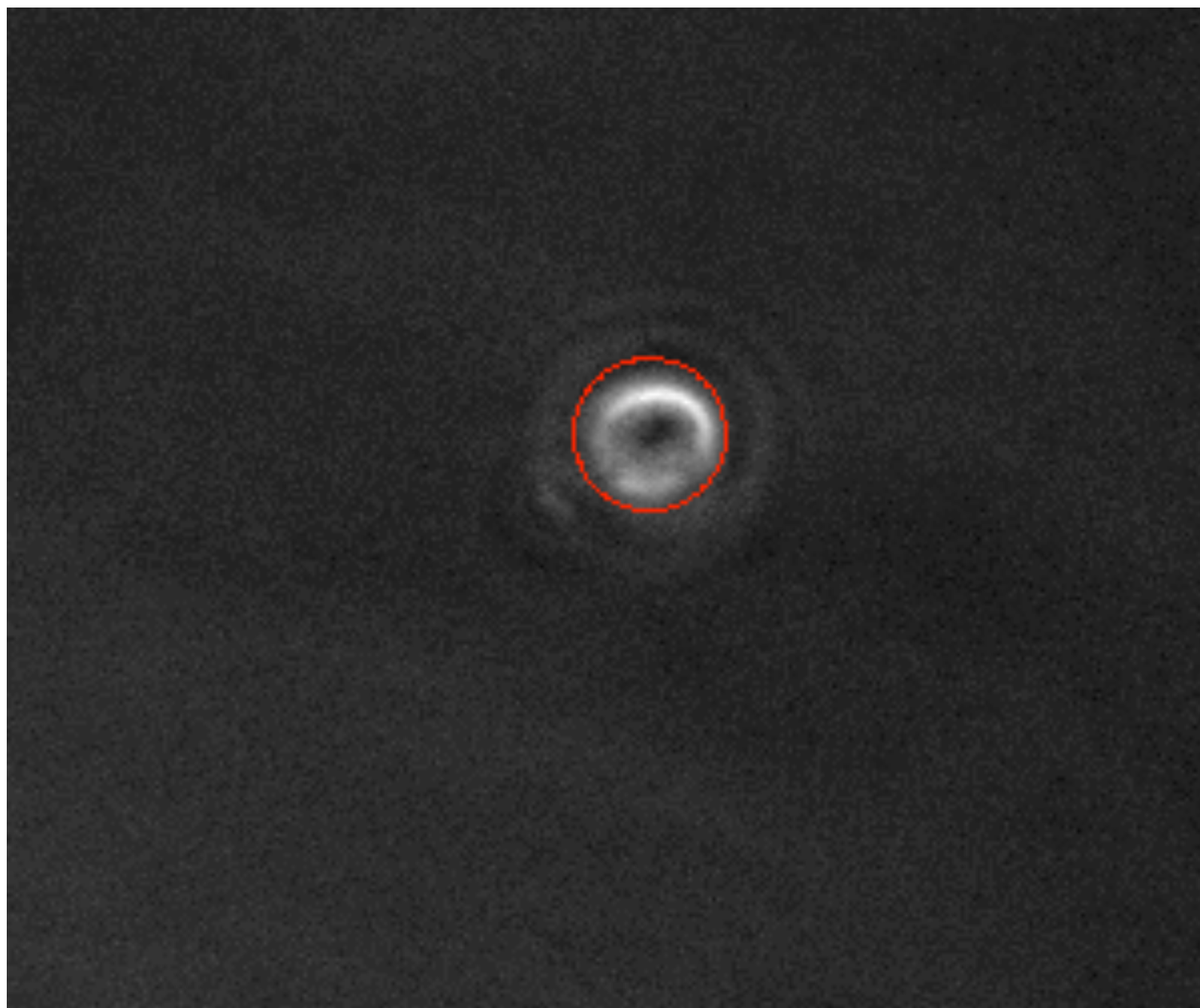


Texture modelisation

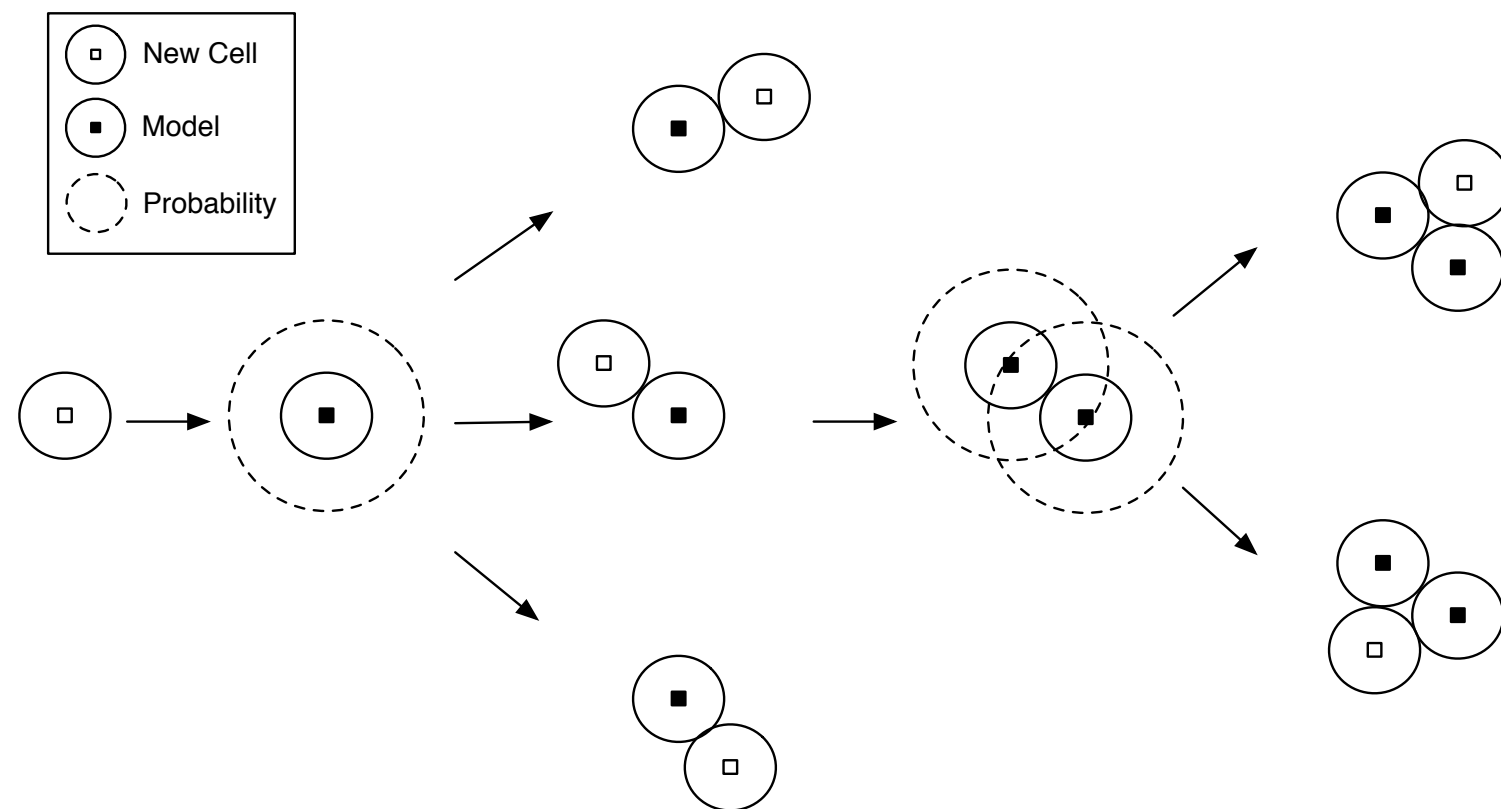




Raw	Temporary	Detection results	Registration error	Model selected
				
				
				
				



- Model generation
 - Integrate a dynamic generation.



- ▶ From animal to human stem cells (skin)
- ▶ A suite of integrated microscopy systems for imaging anatomies of complex 3D+T (4D) cell culture systems
- ▶ Drug testing platform for biologists using high-throughput imaging
- ▶ Next generation of neurodegenerative diseases treatments

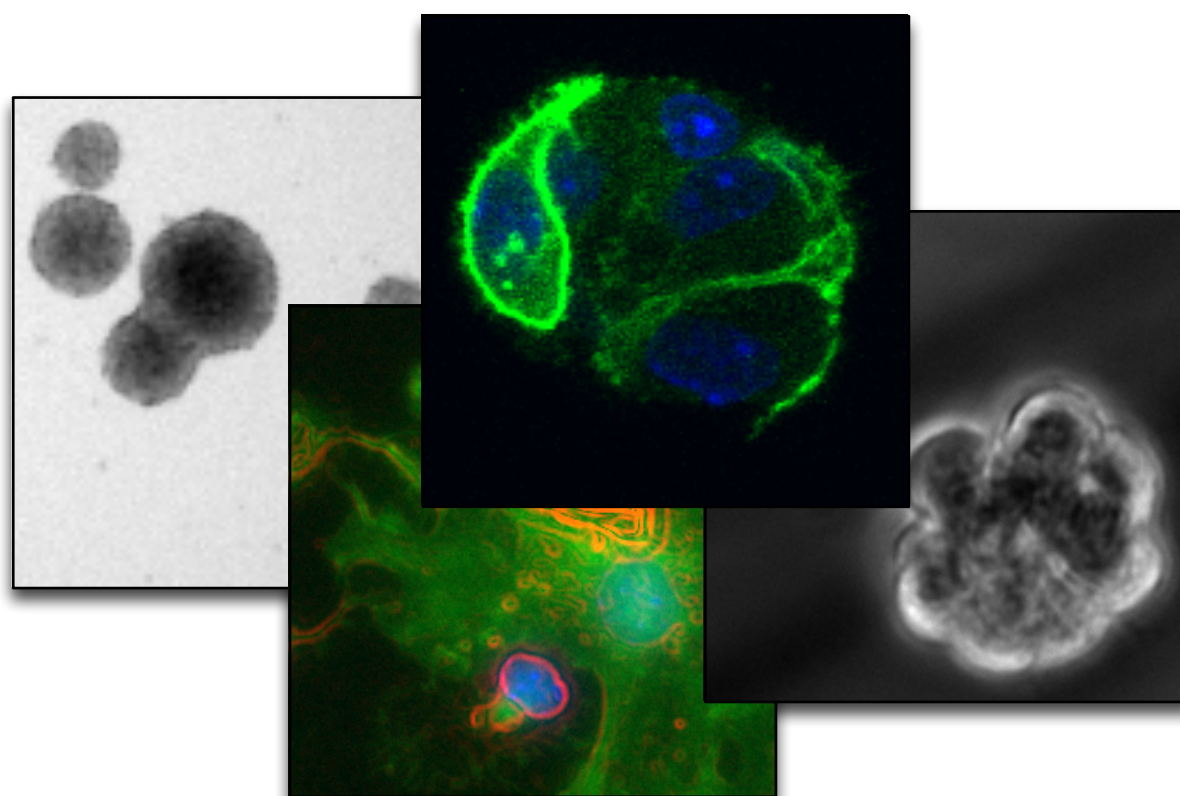


Image & Pervasive Access Lab

International joint research unit - UMI CNRS 2955

www.ipal.cnrs.fr