

SCIENCE MEETS LIFE

TOWARDS OPEN DATA IN CELL MIGRATION RESEARCH

 @pcmasuzzo

paola.masuzzo@vib-ugent.be

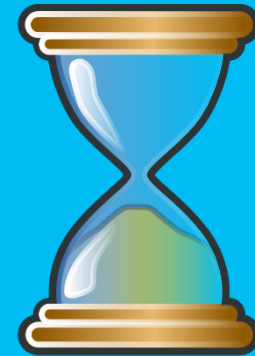


STATISTICS SAY I HAVE

60

SECONDS

*to capture your
attention*





So what's your idea
of a perfect date?

YYYY-MM-DD

I find other
formats a bit
confusing



Diversity and complexity of cell migration data

CMSO: community standards for cell migration research

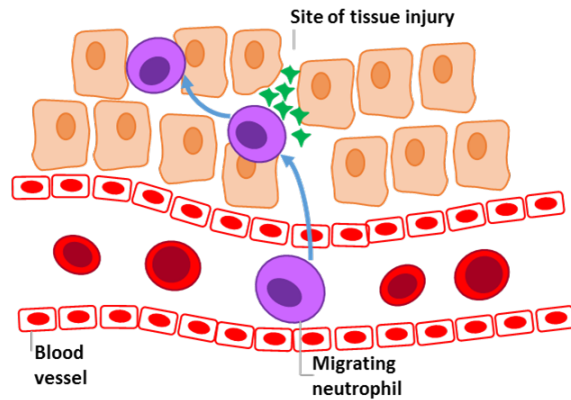
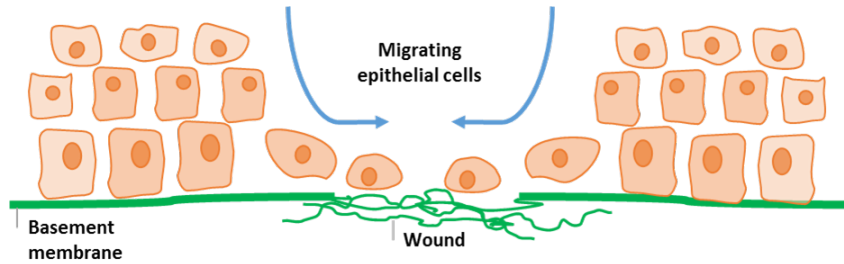
biotracks: a standard format for cell tracking data

Diversity and complexity of cell migration data

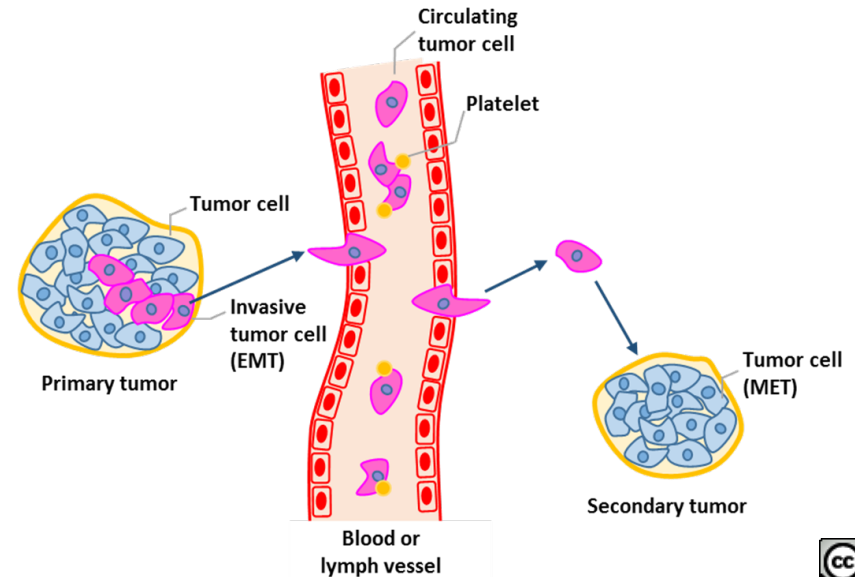
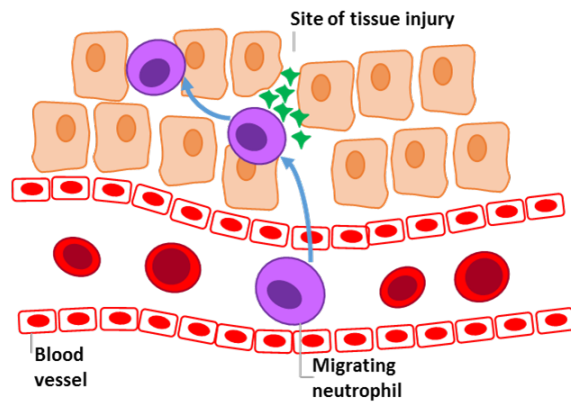
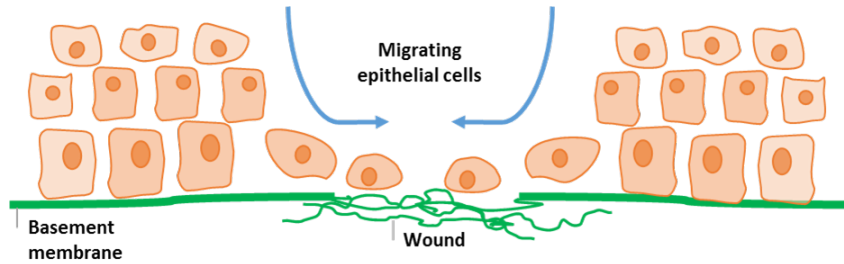
CMSO: community standards for cell migration research

biotracks: a standard format for cell tracking data

Cell migration is involved in many processes

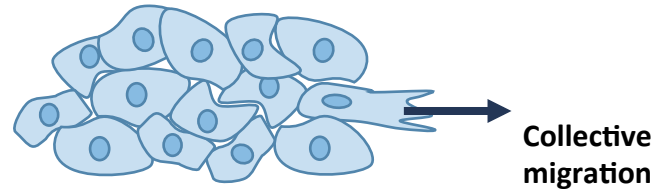
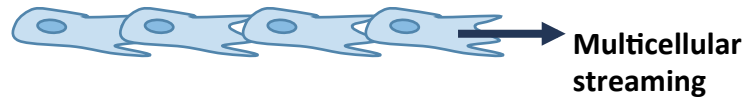


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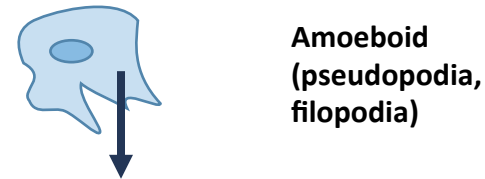


Cells are able to move following many and diverse strategies

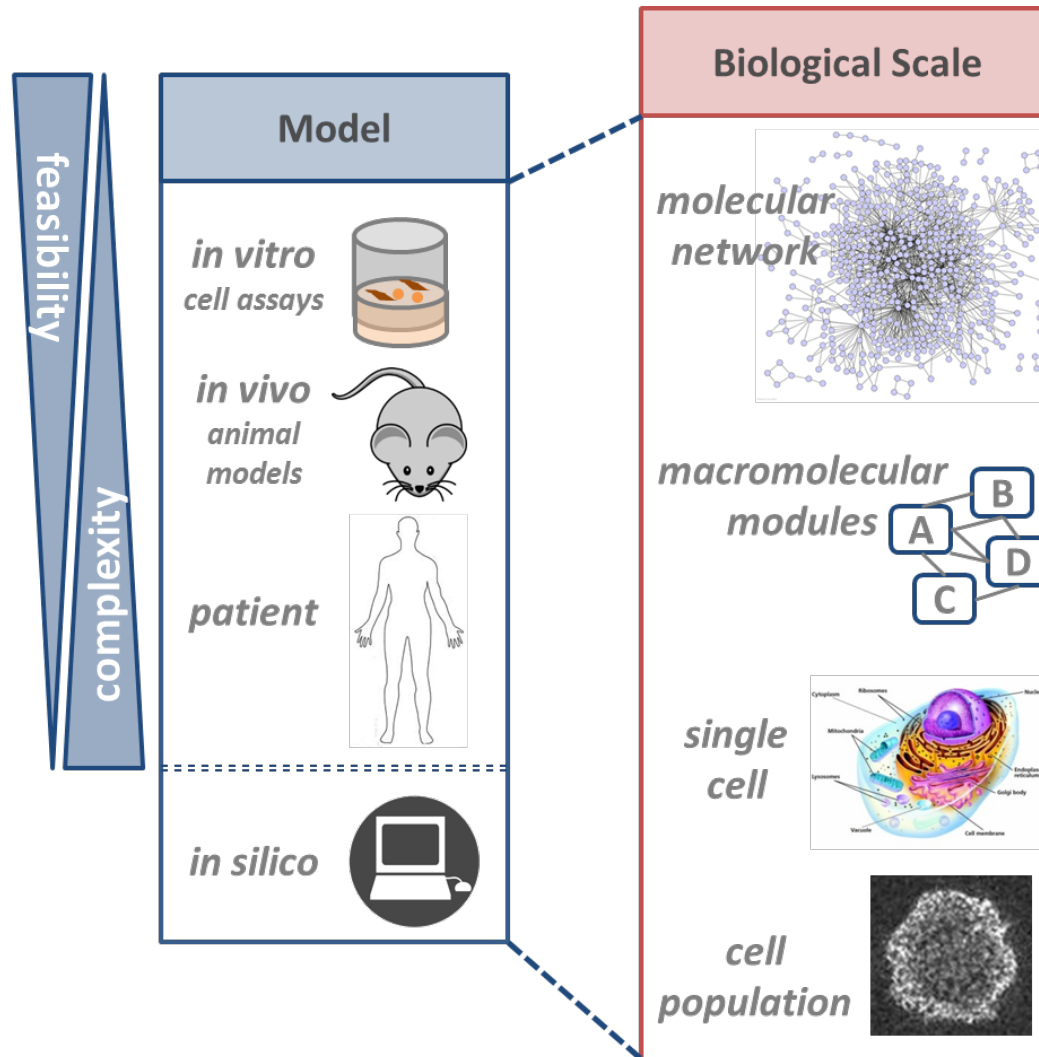
COLLECTIVE MIGRATION



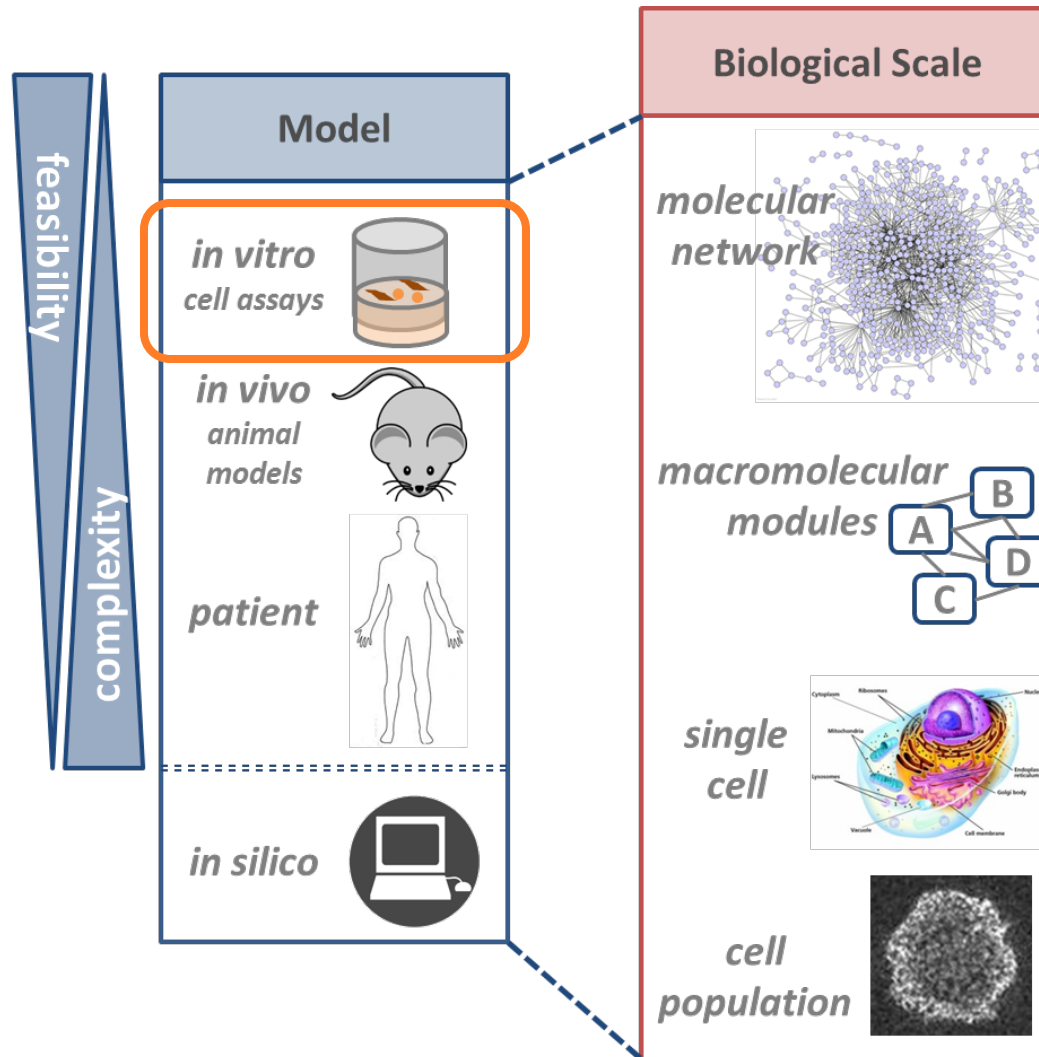
INDIVIDUAL MIGRATION



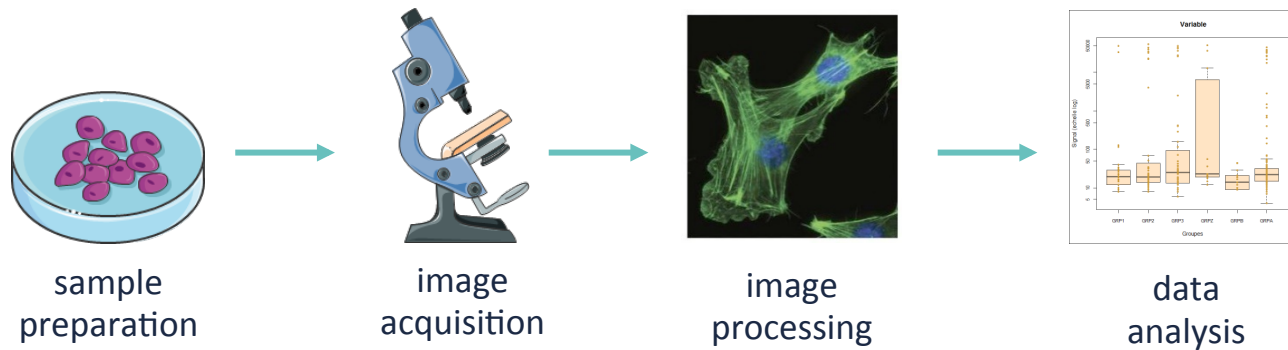
Many study models are used to elucidate the complex mechanisms behind cell movement



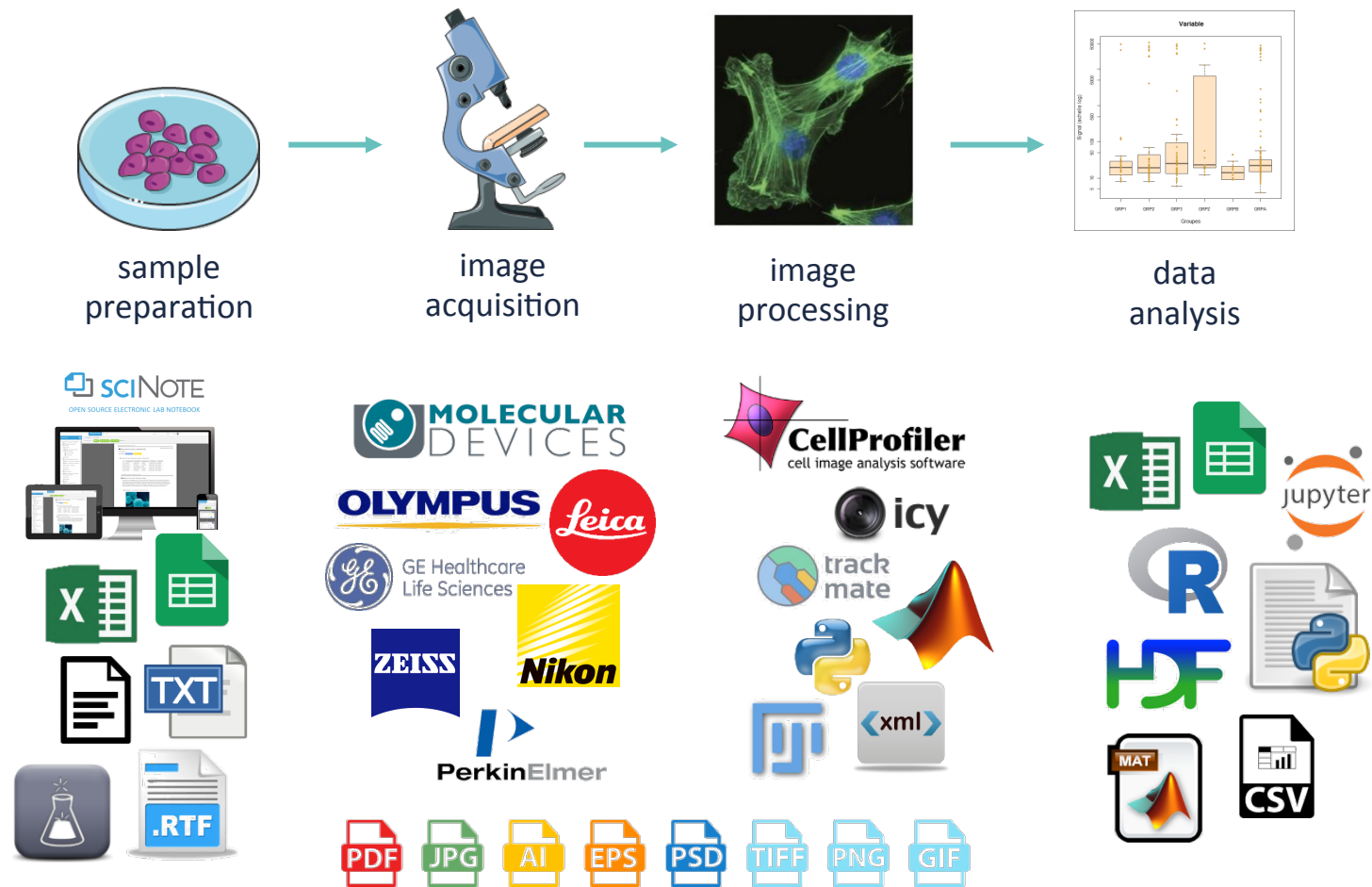
Many study models are used to elucidate the complex mechanisms behind cell movement



An imaging-based cell migration experimental workflow has diverse steps



These steps produce rich data sets represented in various file formats



Servier Medical Art, CC-BY 3.0; Cell Image Library, CC-BY 3.0;

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Breaking down technical barriers means facilitating data sharing

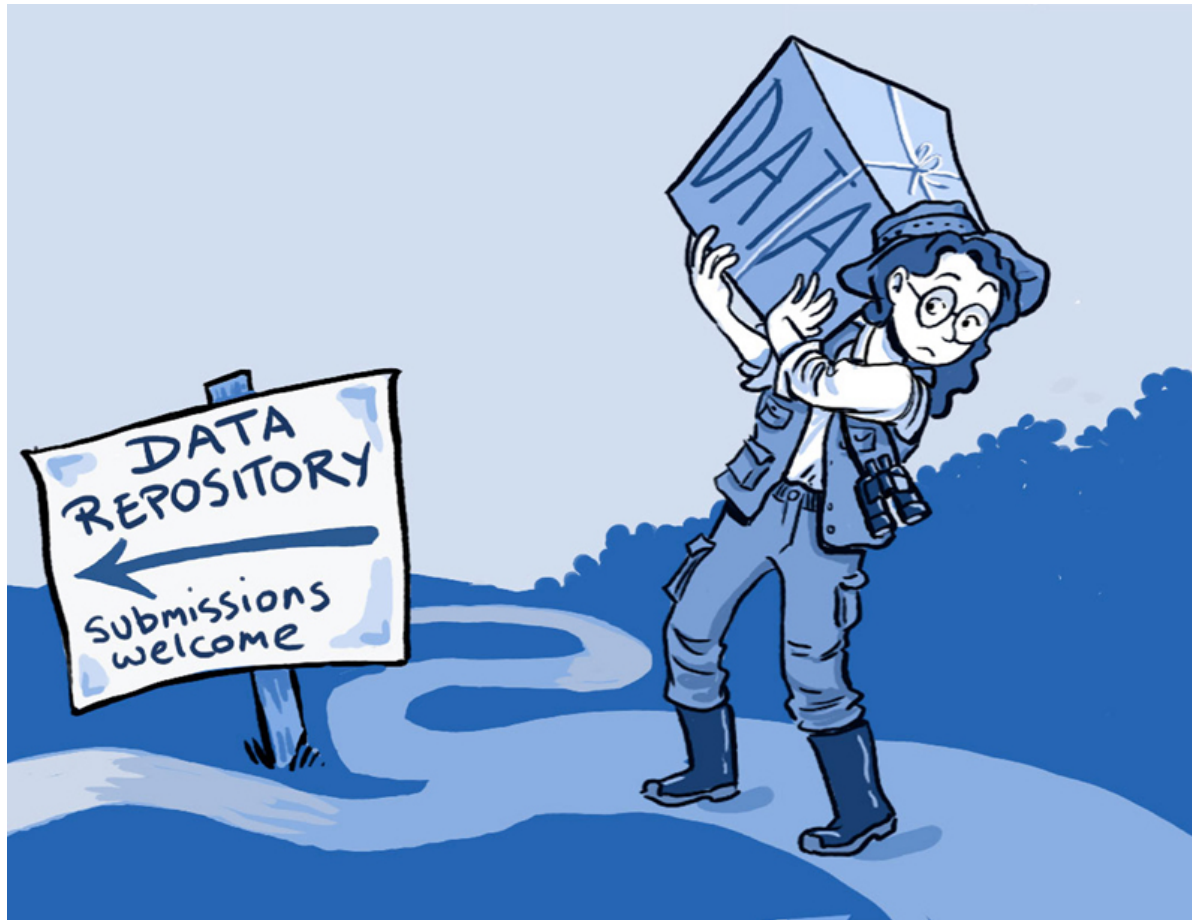
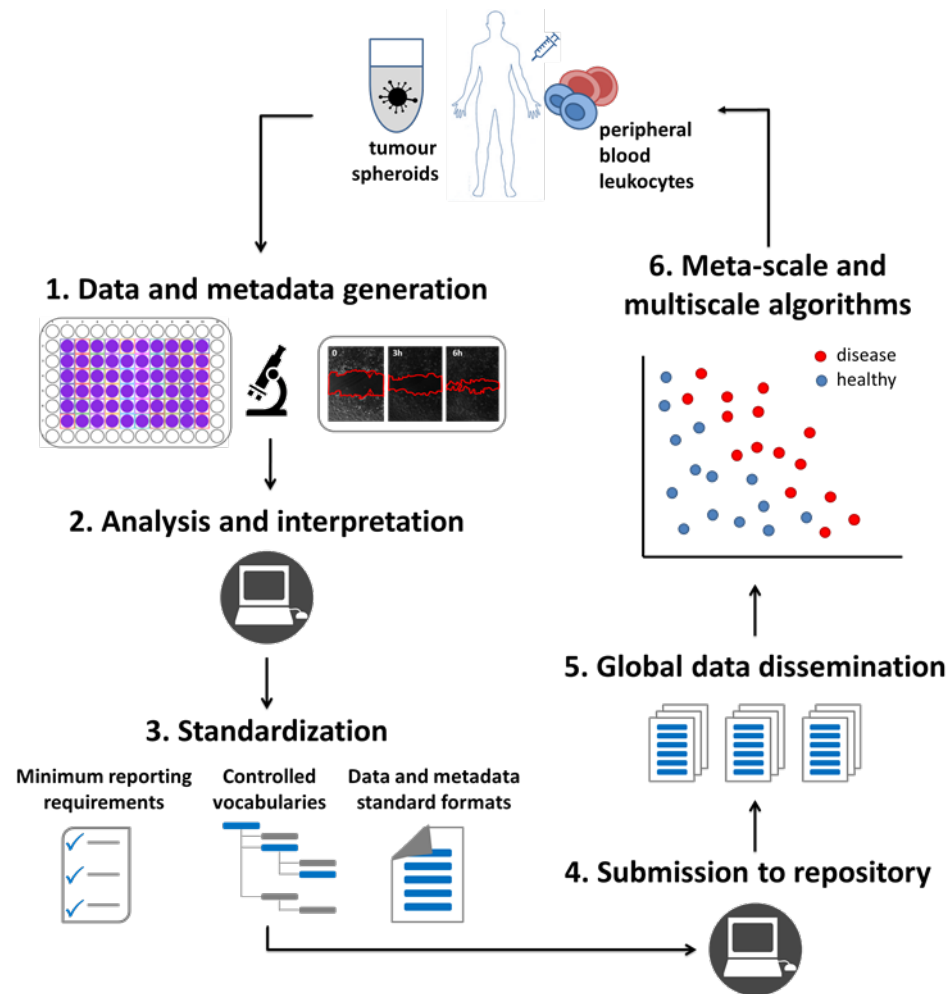


Image credit: Ainsley Seago, PLoS Biology

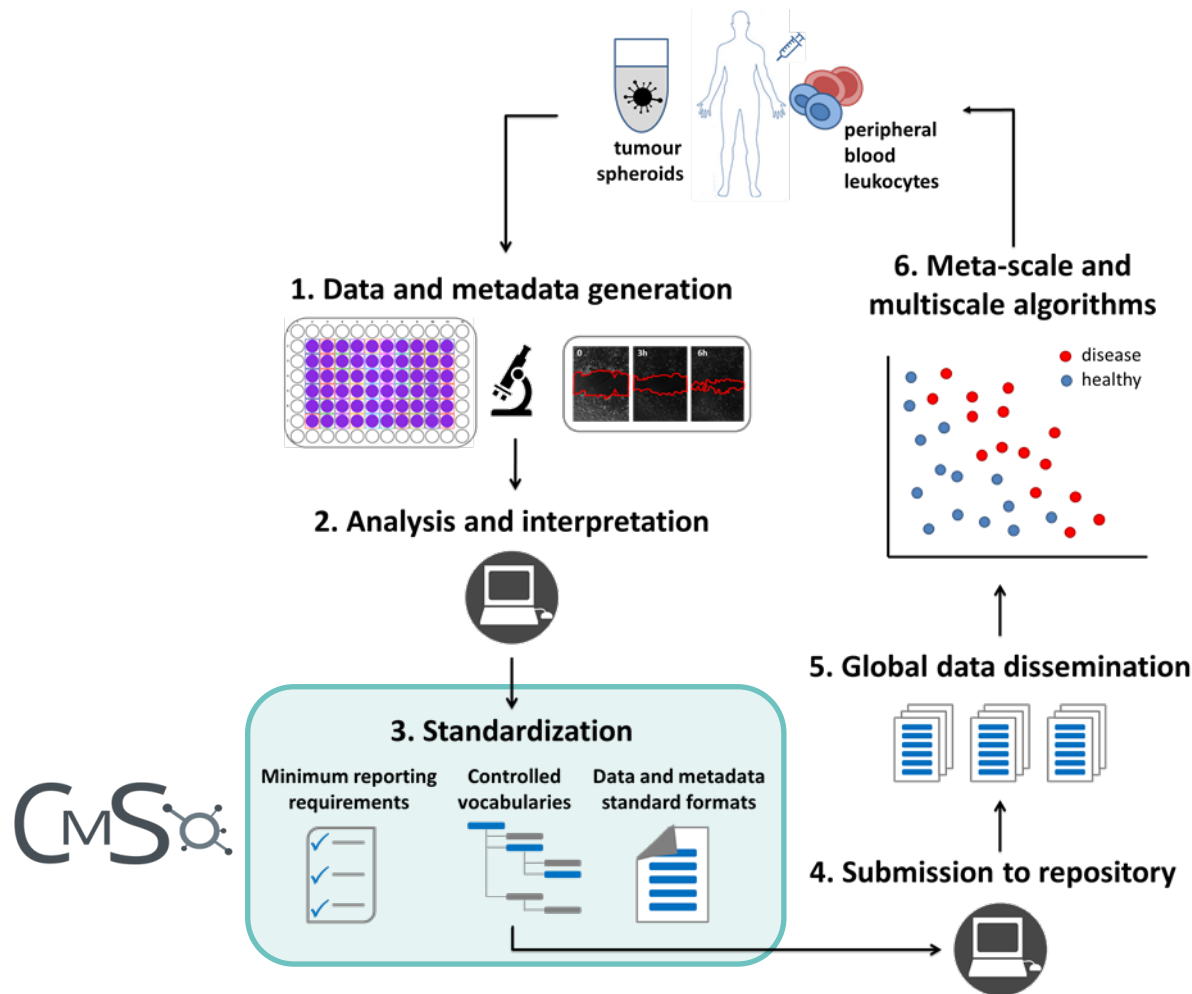


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Data sharing in turn means more analytical possibilities



The first step towards data sharing is standardization



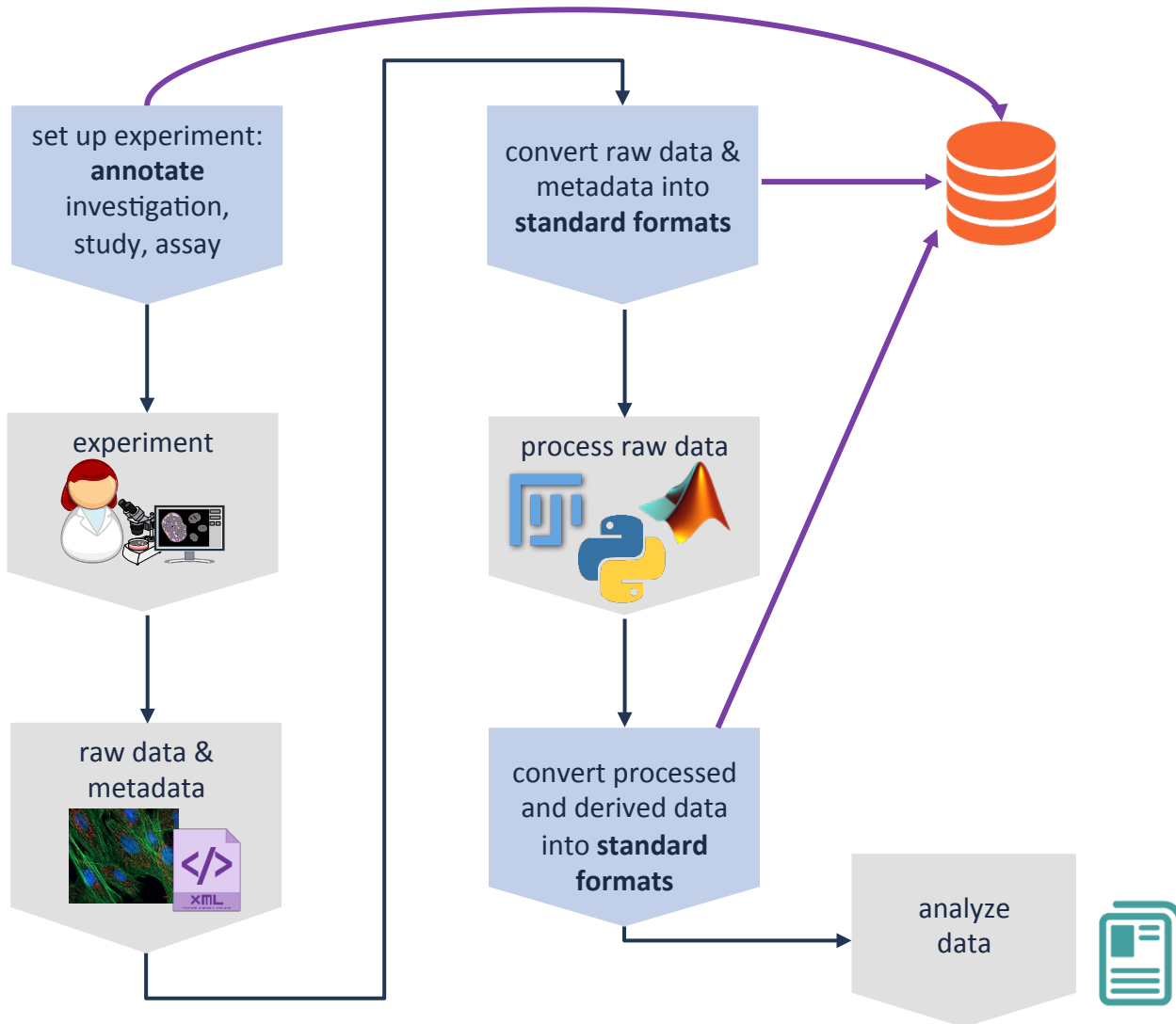


Diversity and complexity of cell migration data

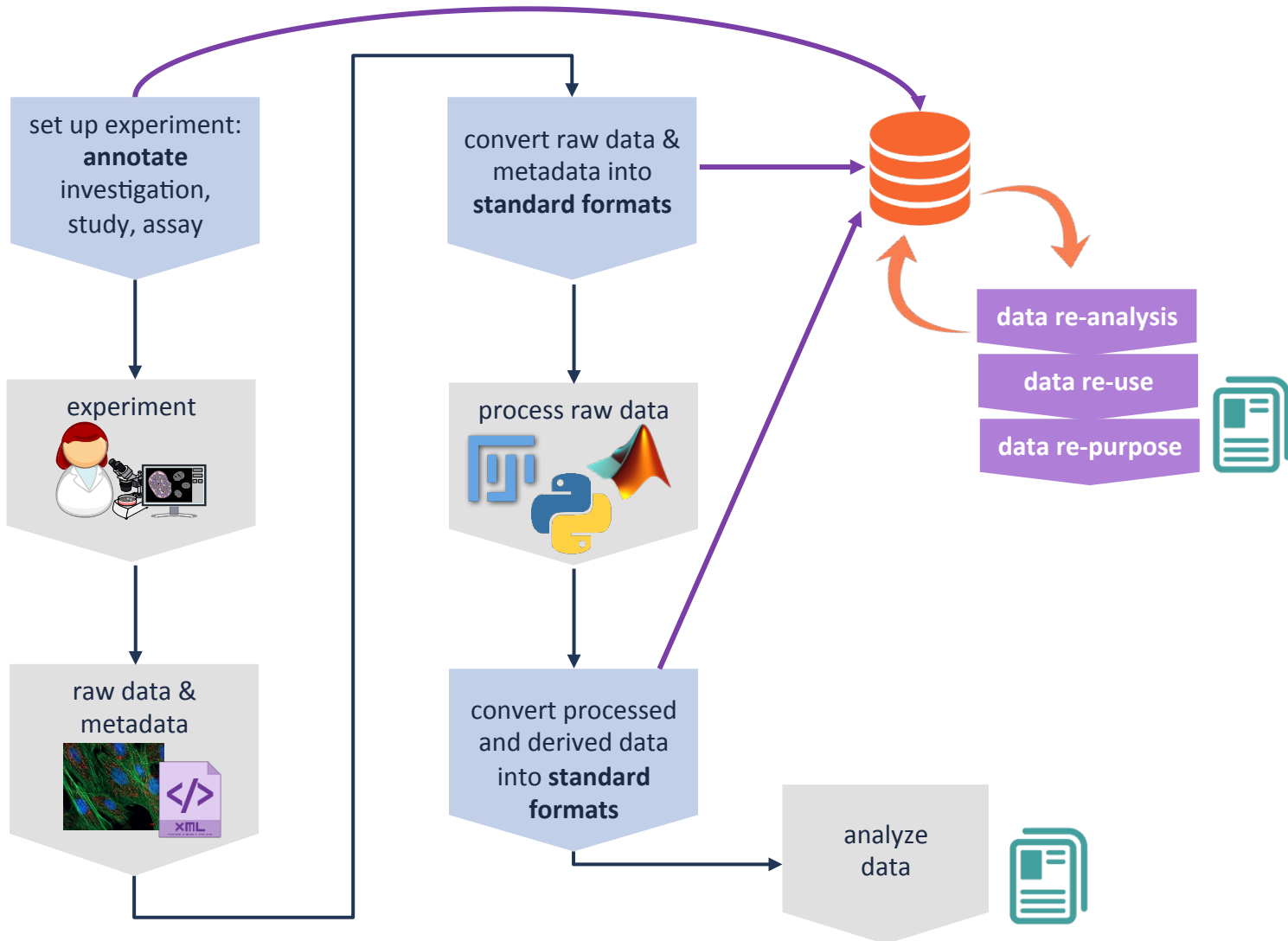
CMSO: community standards for cell migration research

biotracks: a standard format for cell tracking data

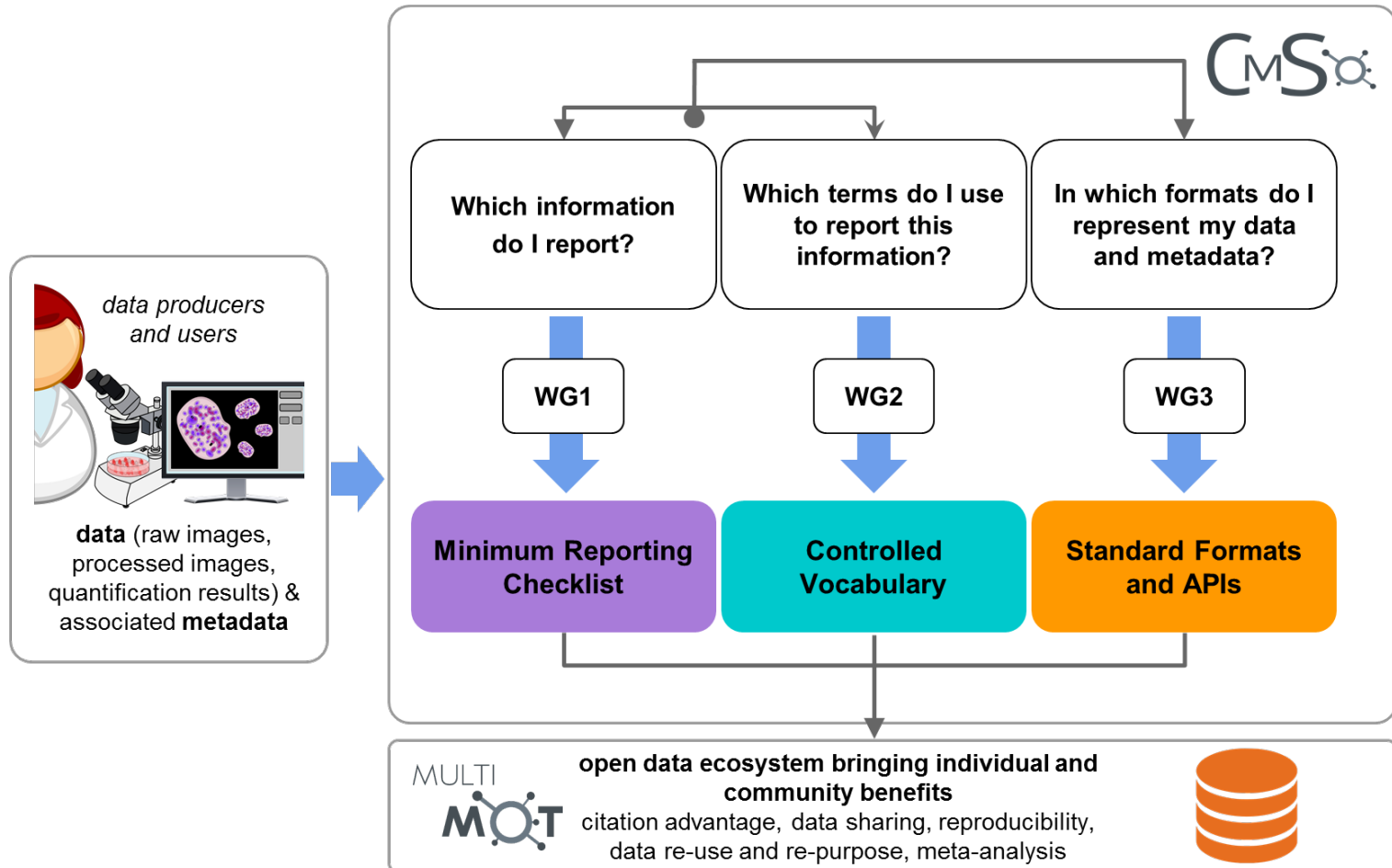
Different information units require specific standardization tasks



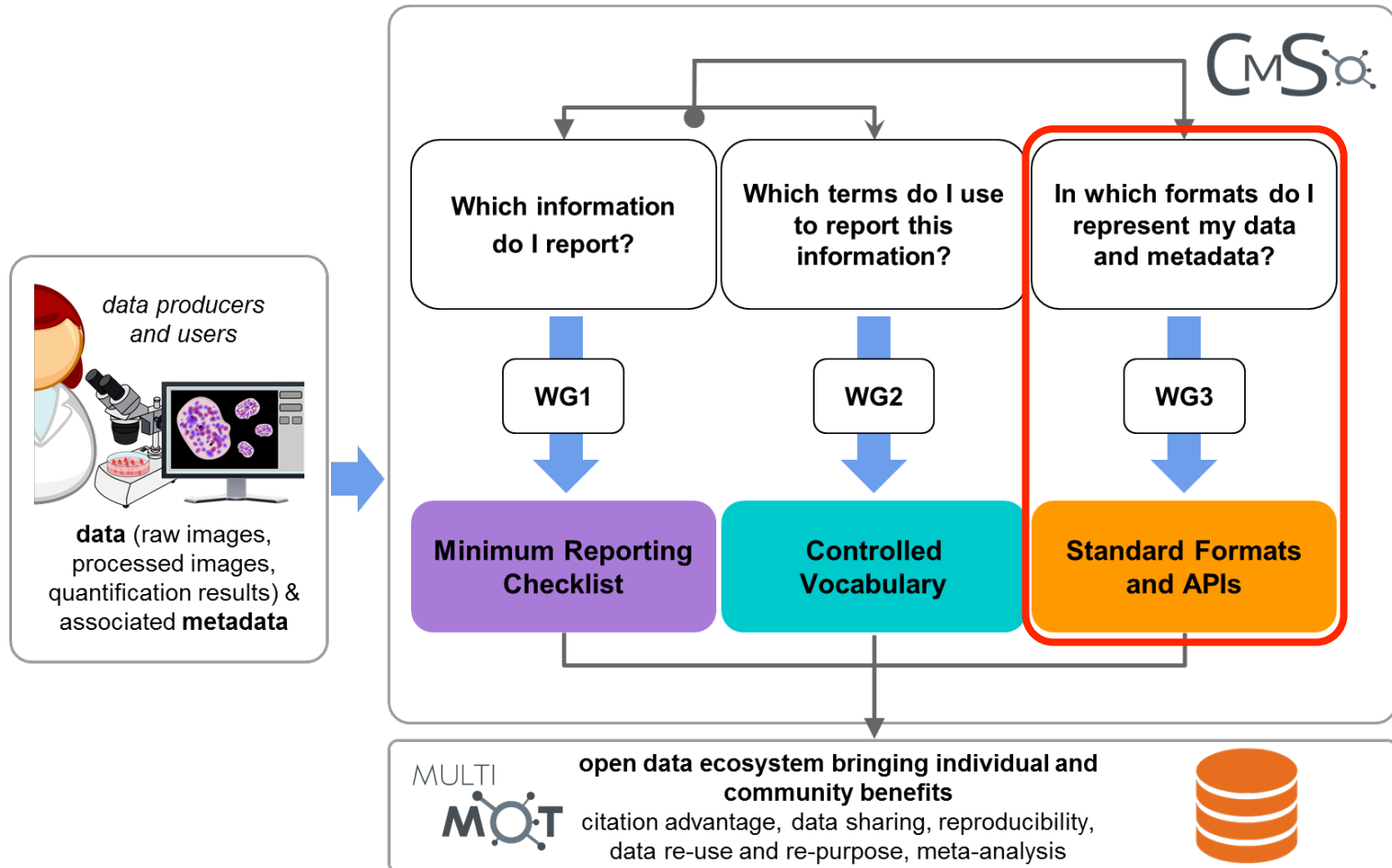
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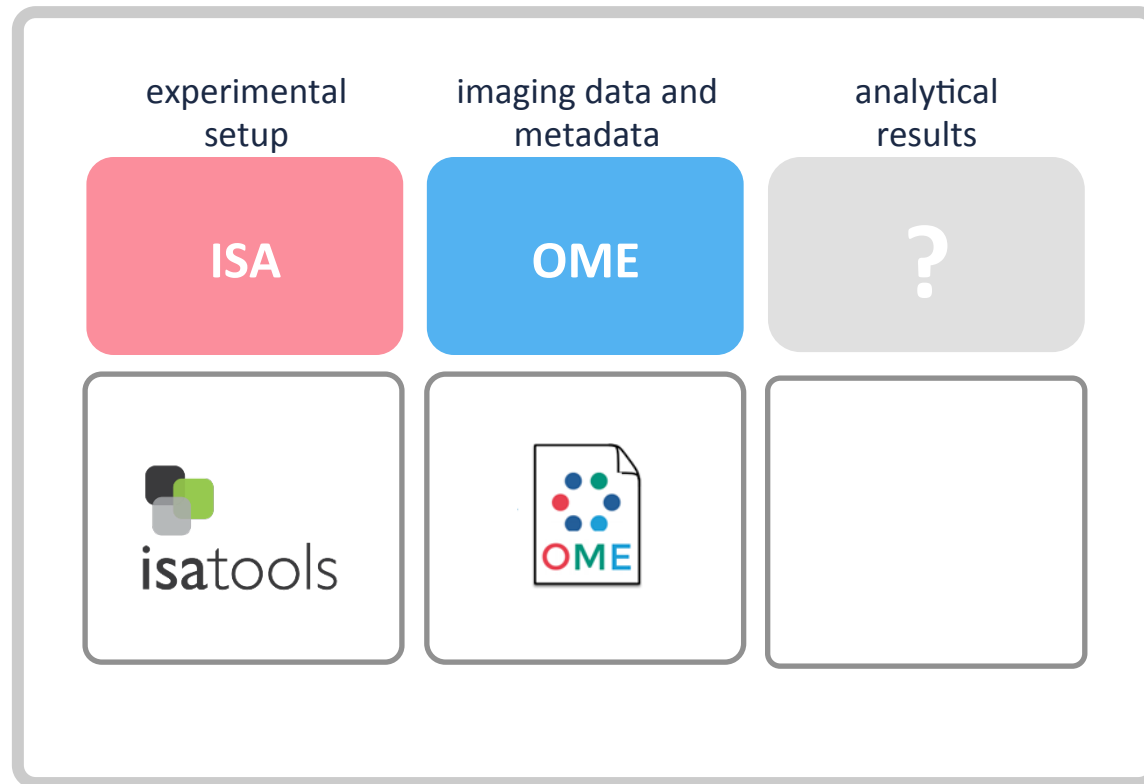
CMSO is a young community developing standards for cell migration research



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CMSO is re-using and adapting some of the standards available in the community



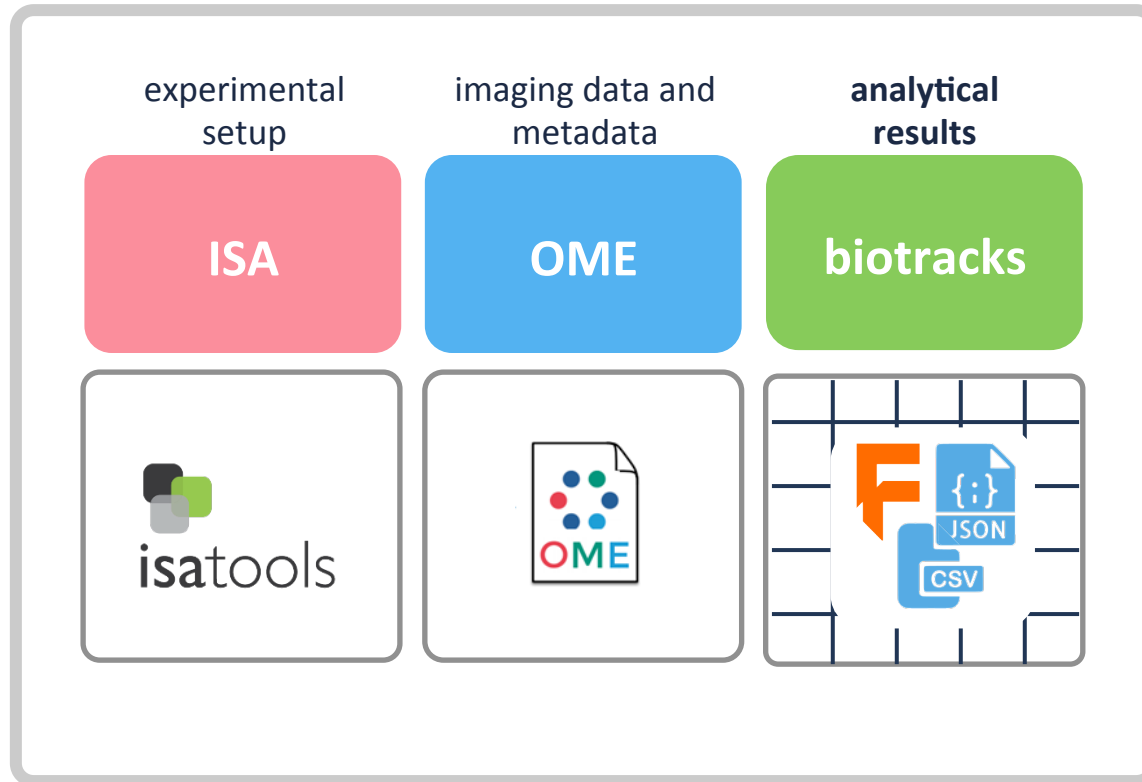
<http://isa-tools.org/>

<http://www.openmicroscopy.org/site>



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And it is developing new standards for cell migration-specific information



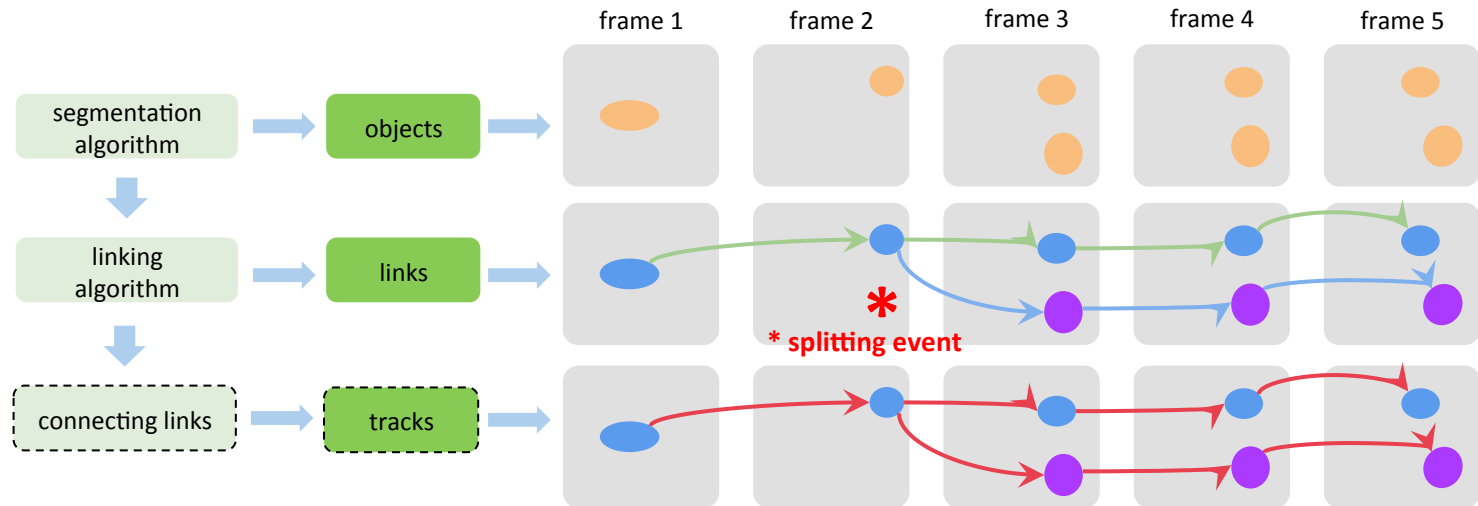


Diversity and complexity of cell migration
data

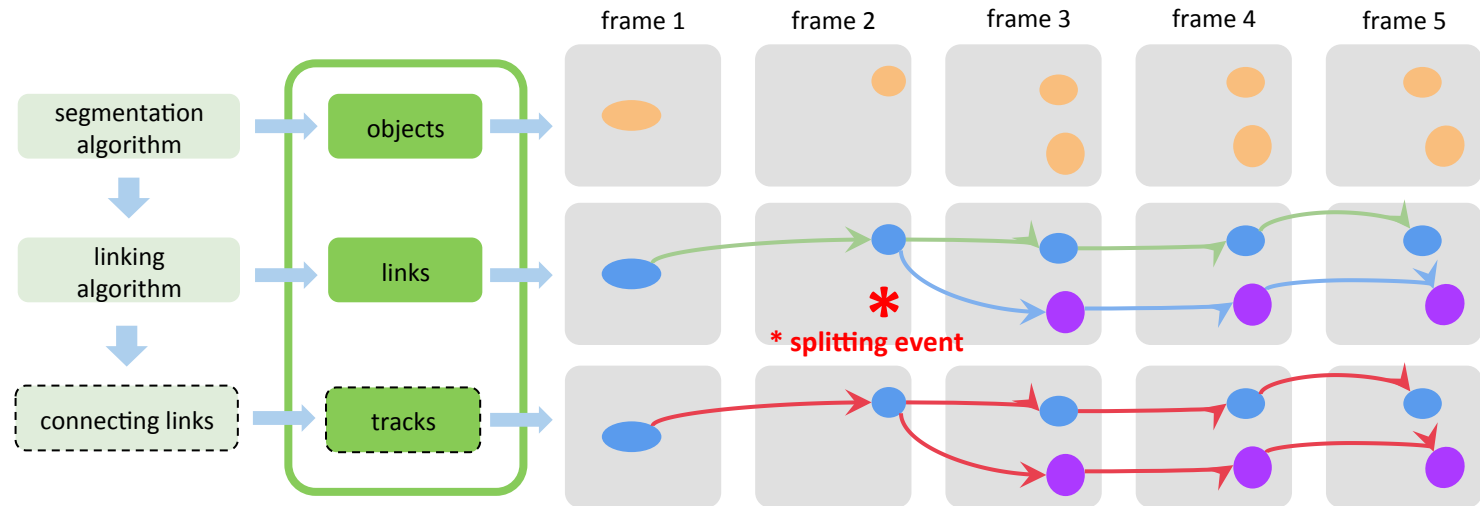
CMSO: community standards for cell
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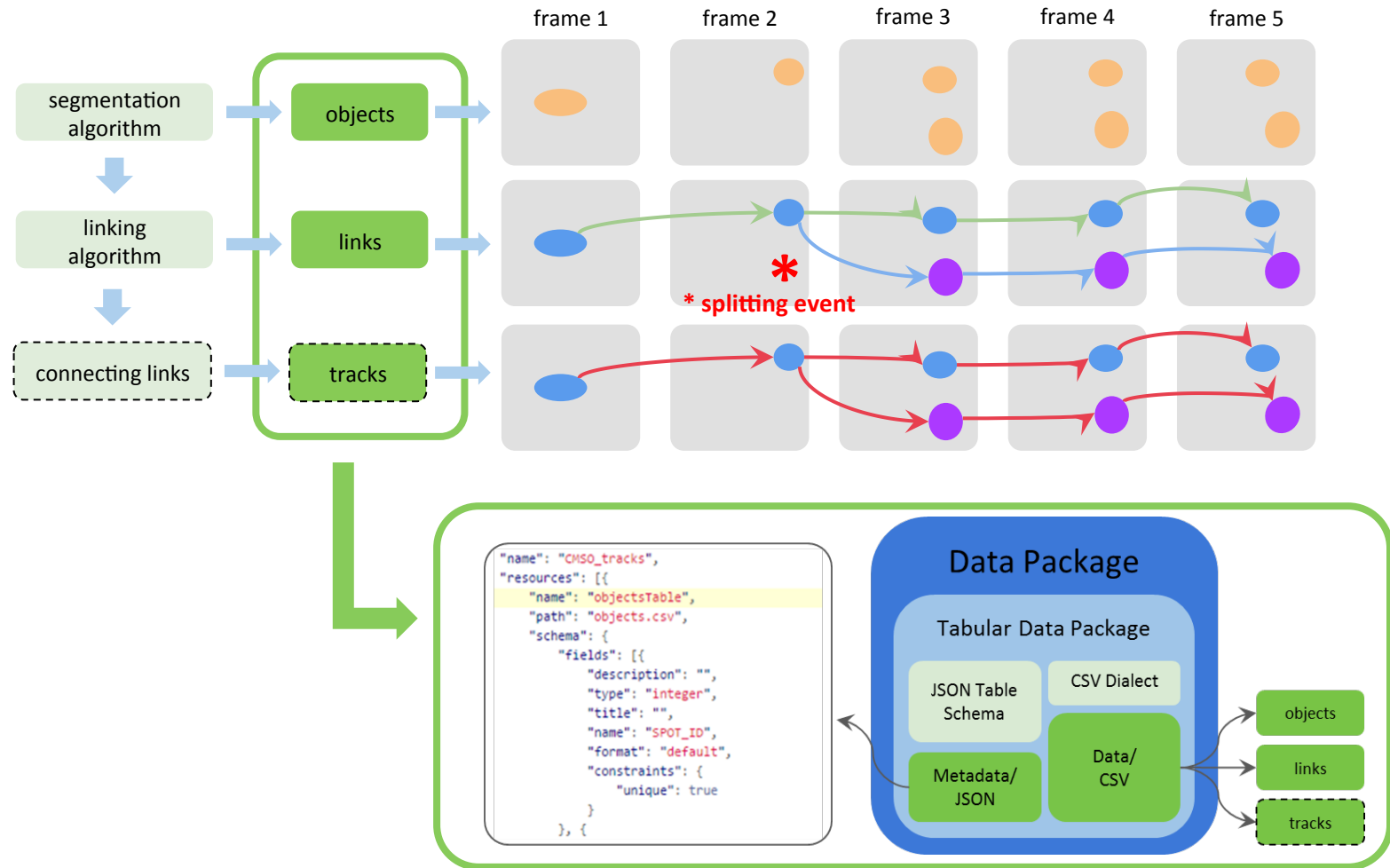
biotracks: tabular data packages for cell tracking files



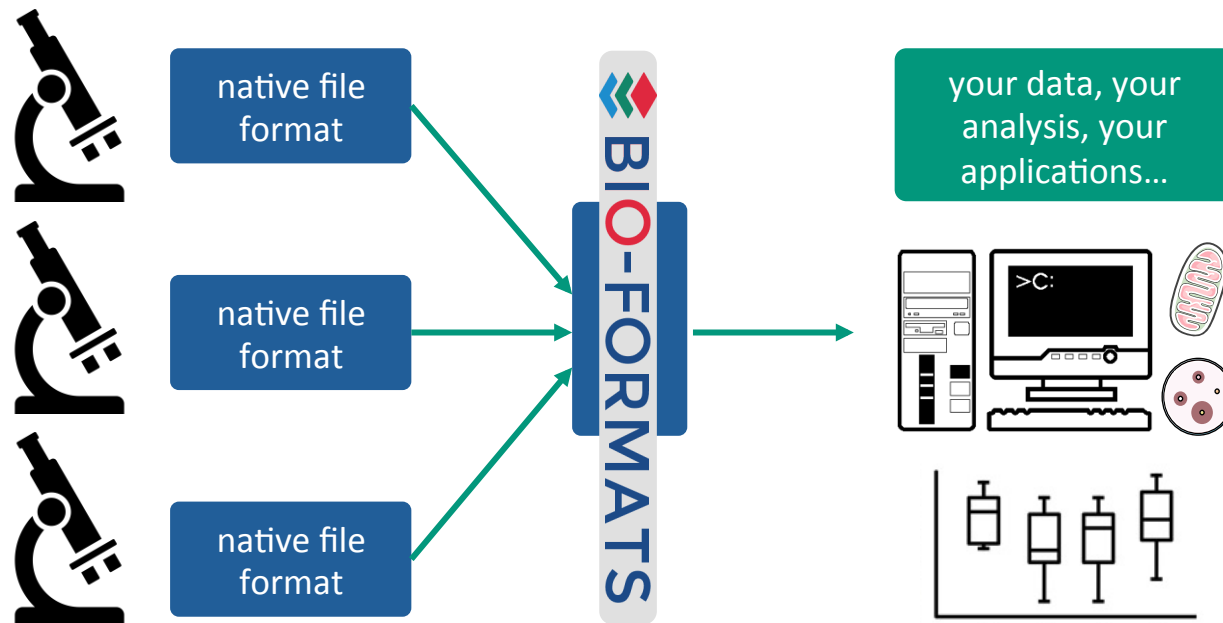
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bioTracks aims to be for cell tracking data what Bio-Formats is for imaging data



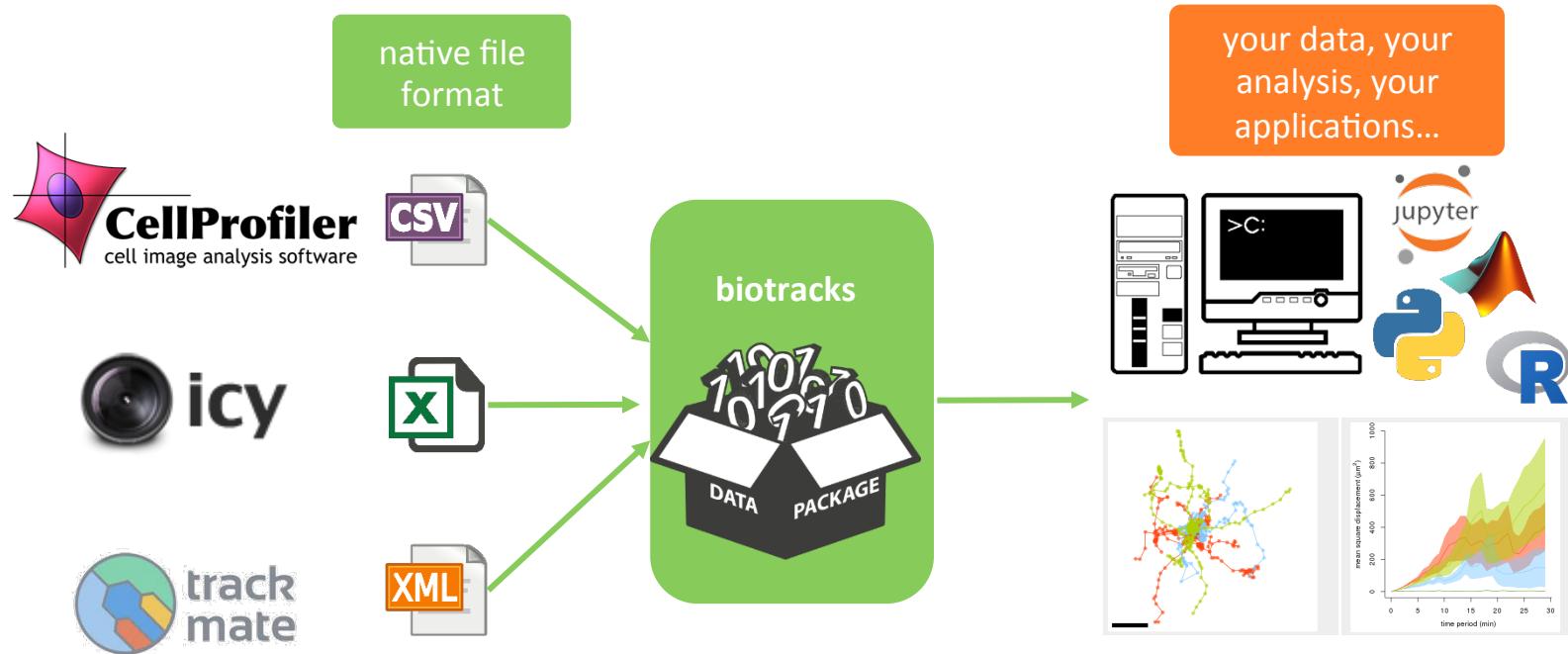
<https://commons.wikimedia.org/>

<http://www.openmicroscopy.org/site/products/bio-formats>



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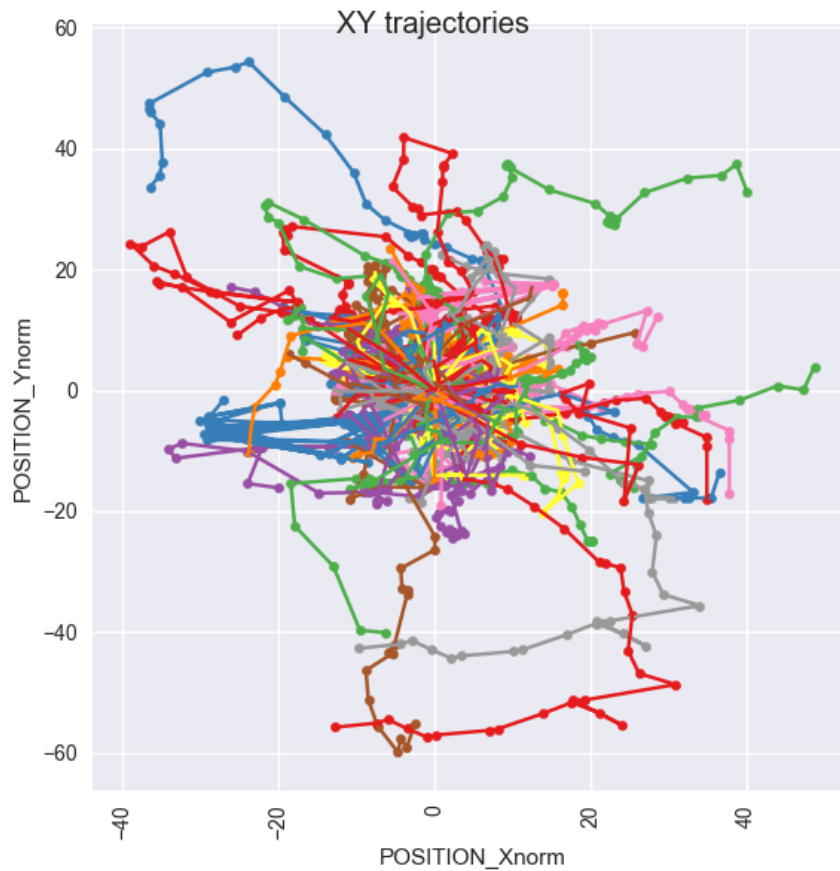
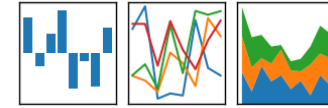
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biotracks integration with pandas enables analysis and visualization routines

pandas

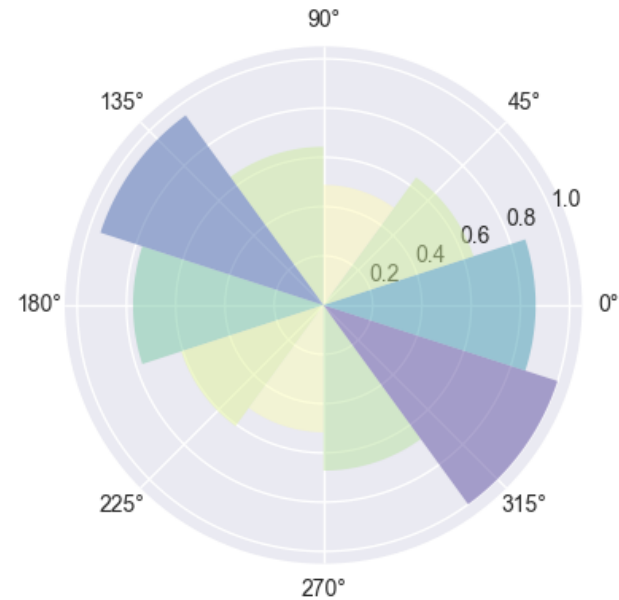
$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



ImageJ/Fiji TrackMate

DoG detector + LAP tracking

163 tracks

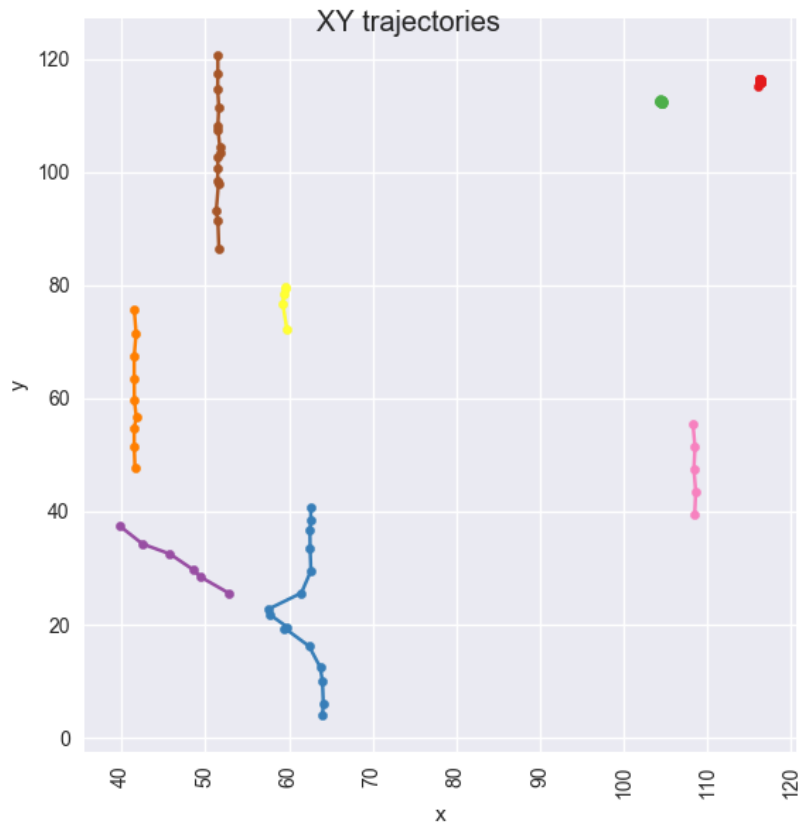


Data: Marleen Van Troys, UGent

A common data format enables quick comparison of tracking algorithms

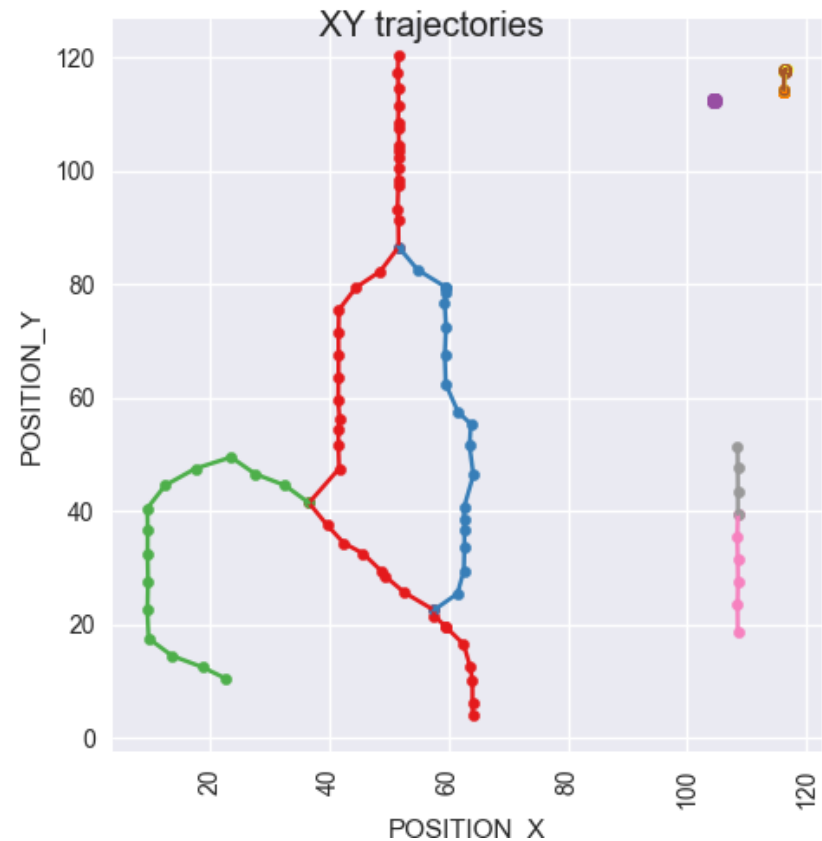
ICY spot tracking plugin

Spot detector + *Multiple Hypothesis Tracking*



ImageJ/Fiji TrackMate

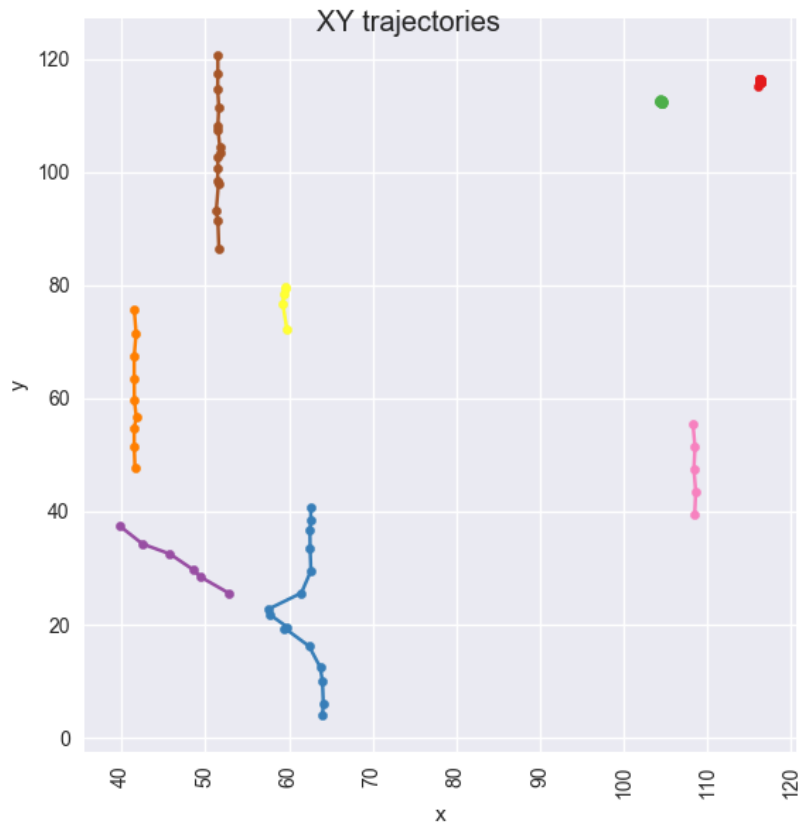
DoG detector + *complex LAP tracking*



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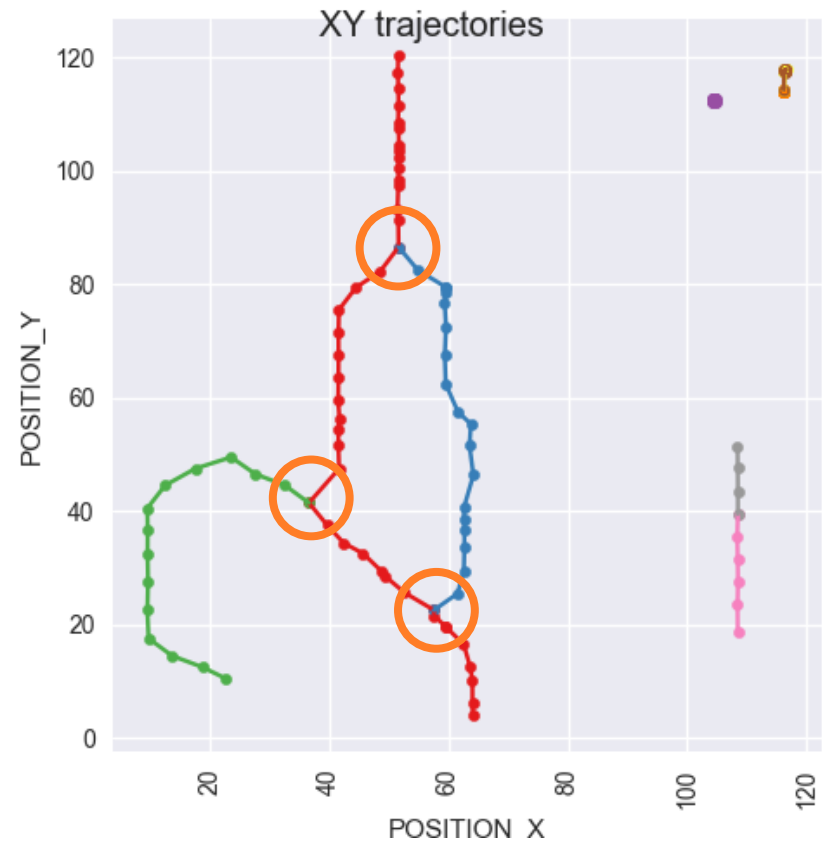
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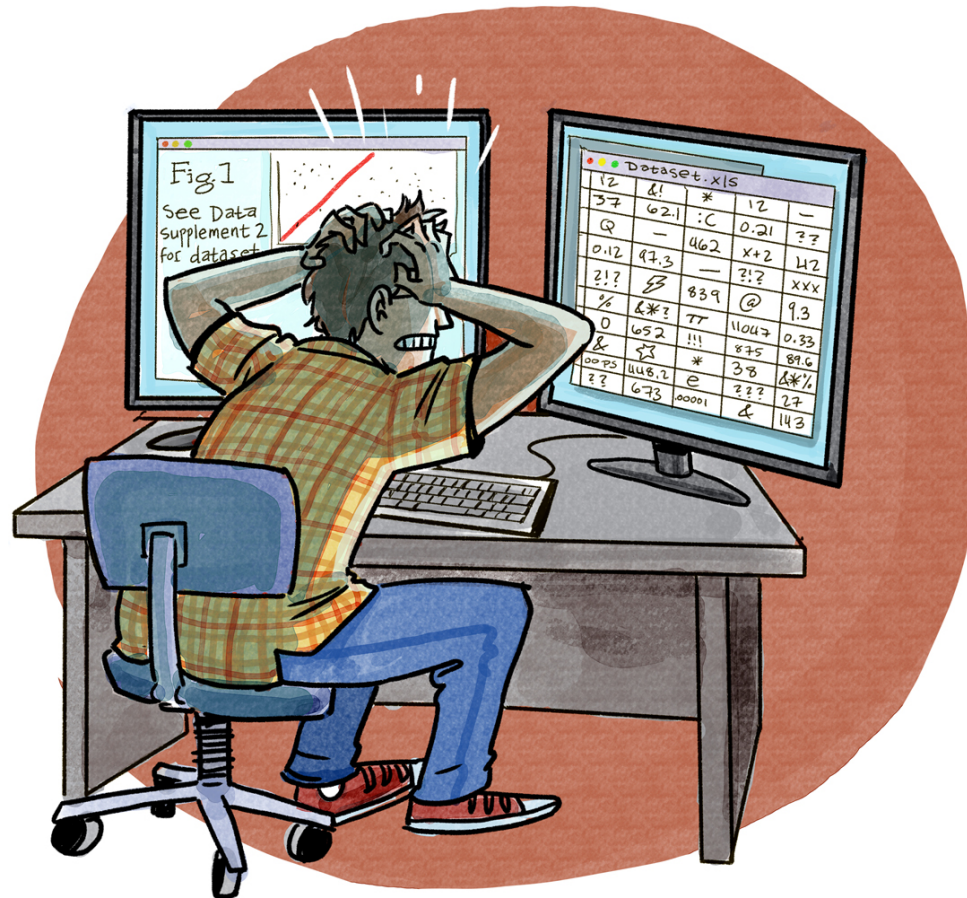


ImageJ/Fiji TrackMate

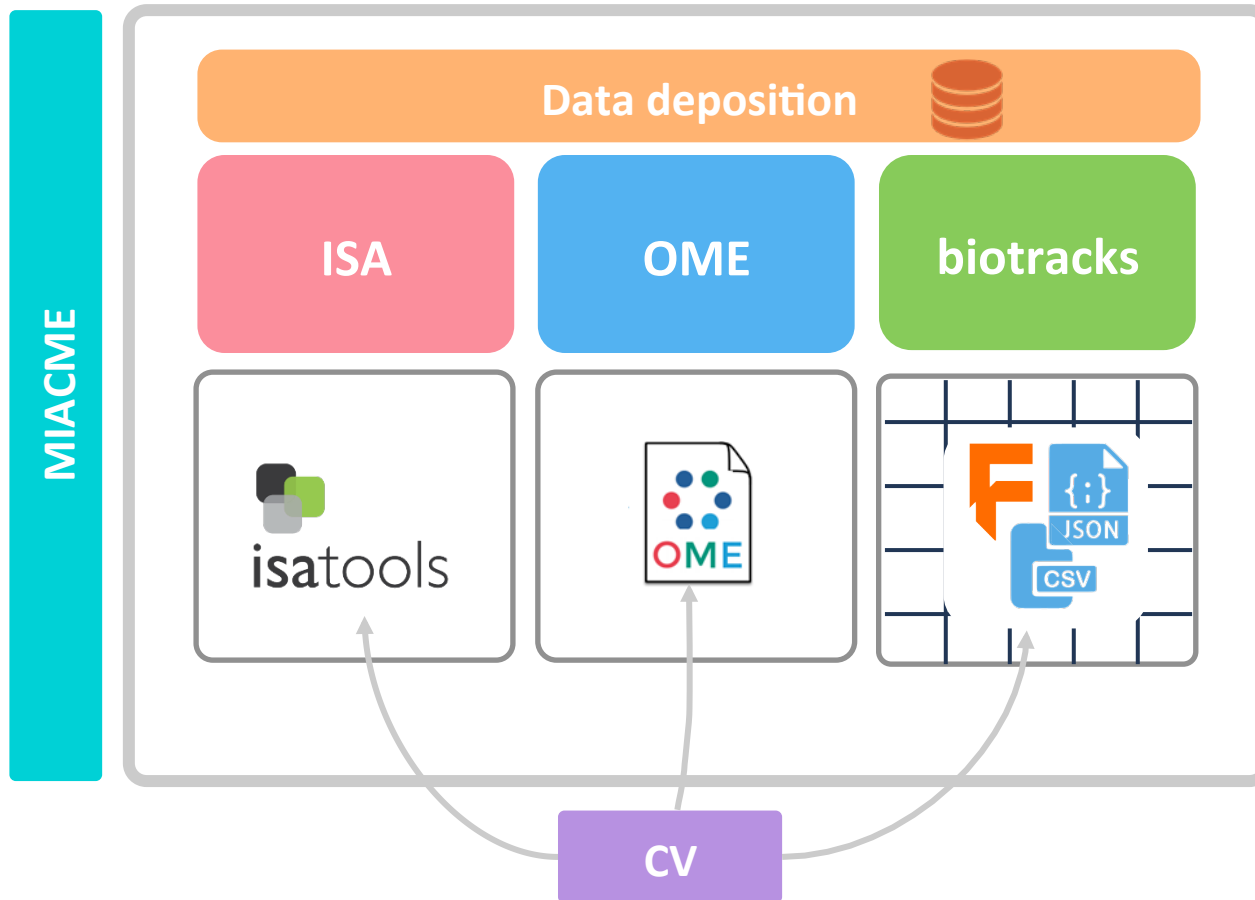
DoG detector + *complex LAP tracking*



Standard data formats alone are not enough



Minimum reporting requirements and CVs improve data verification and accessibility



An open data ecosystem for cell migration research: what are the benefits?

- standardization of data and metadata is essential for reproducibility and unambiguous interpretation of experiments
- data exchange = faster and easier access to results
+ quality control
+ integration with *in silico* modeling
- open data = opportunities for knowledge discovery, data mining, data re-use
- formulation of new hypotheses/principles

CMSO needs community engagement

CMSO workshop in Essen, Germany, 19 and 20 June 2017



The third official **CMSO workshop** will take place in Essen, Germany, the **19th and 20th of June 2017**. The workshop will be hosted by the lab of Prof. Matthias Gunzer.

The three working groups of CMSO will present their progress, and working sessions will take place to advance the activities of the community.

Participation to the workshop is free for all attendees, but that participants will have to pay for their own transport and accommodation. Please note that the accommodation costs at the venue for the *first 10 PhD students and postdocs* will be covered by the organization!

<https://cmso.science/cmso-workshop-in-essen-germany-19-and-20-june-2017/>
<https://goo.gl/forms/eMs4m8YGZOmWOv0s1>



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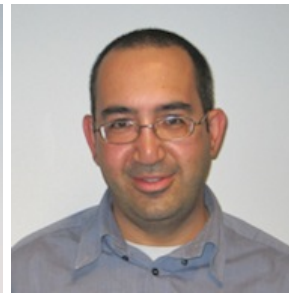
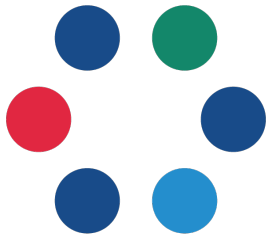
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CMS 

Comp 
omics

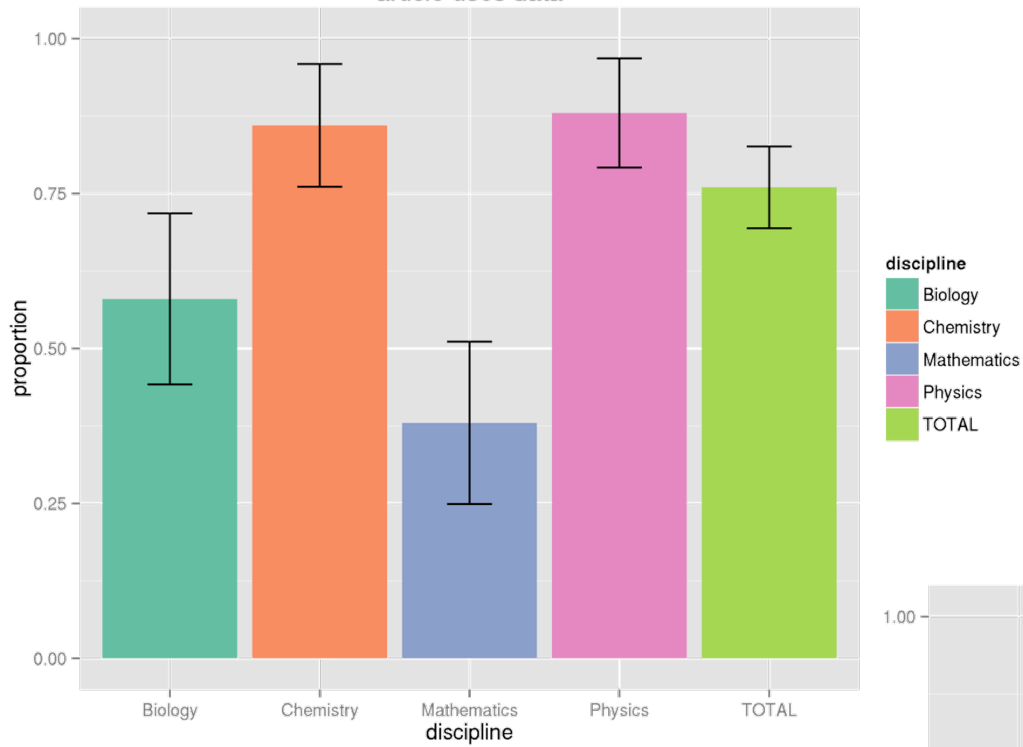


MULTI
MOT 



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article uses data



available data (shared)

