

# Plan of Work 2025: Graphics

Stephan Hageboeck  
25/09/2024

ROOT

Data Analysis Framework

<https://root.cern>

# What does "Graphics" mean?

What the user might want:

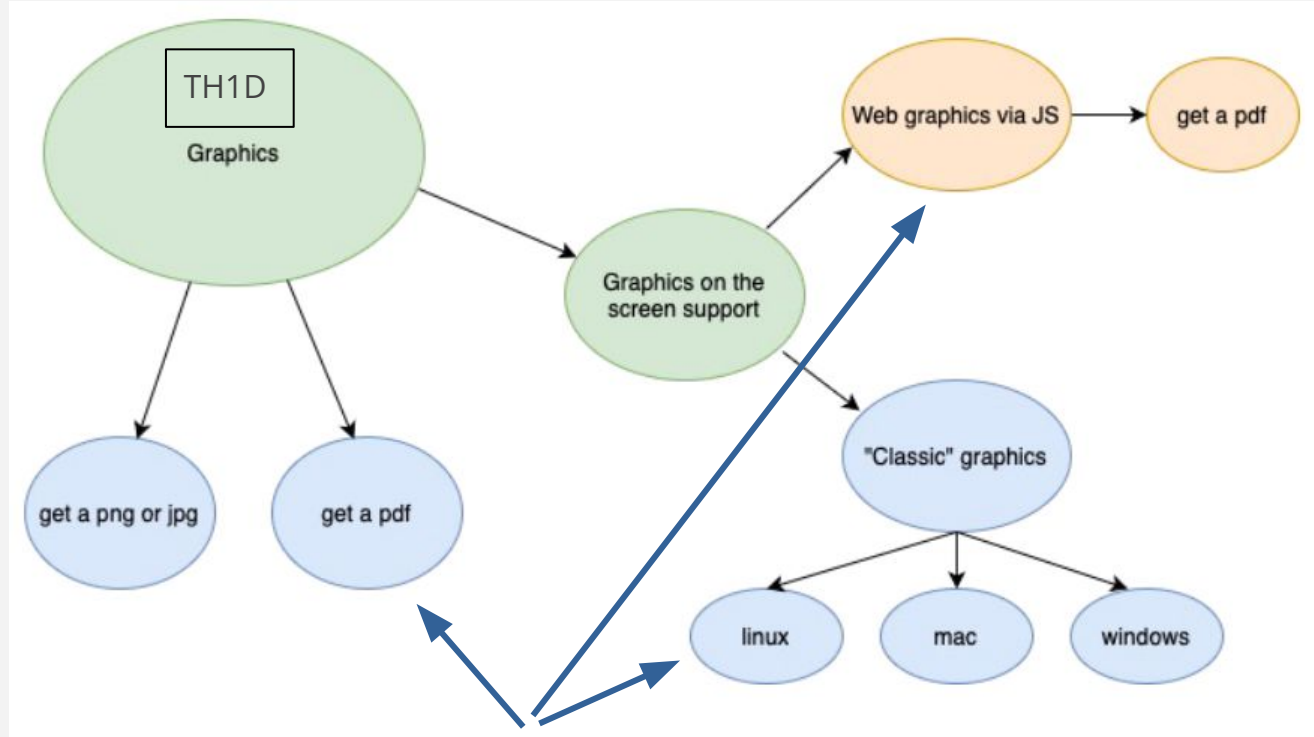
1. Need a **stable** plot for a publication
  - I will write plotting code for this, and rerun it with new data
  - Code might be cumbersome, lots of tuning ...
  - **This might run in batch without browser, and should be very fast**
2. Need to interactively view some data:
  - ROOT session in notebook / browser / natively on my computer
  - Have to be able to quickly rebin, zoom, turn it around (3D)
  - During data processing, preview plots could update automatically
3. Need to view a detector geometry/event → TEve / REve
4. Have an UI that's based on ROOT / interacts with ROOT



# ROOT's Graphics Support

Three different backends!

- ▶ Creating a plot
- ▶ On-screen interactive graphics (OS-specific)
- ▶ Web graphics



User:  
"The plots doesn't look the same"

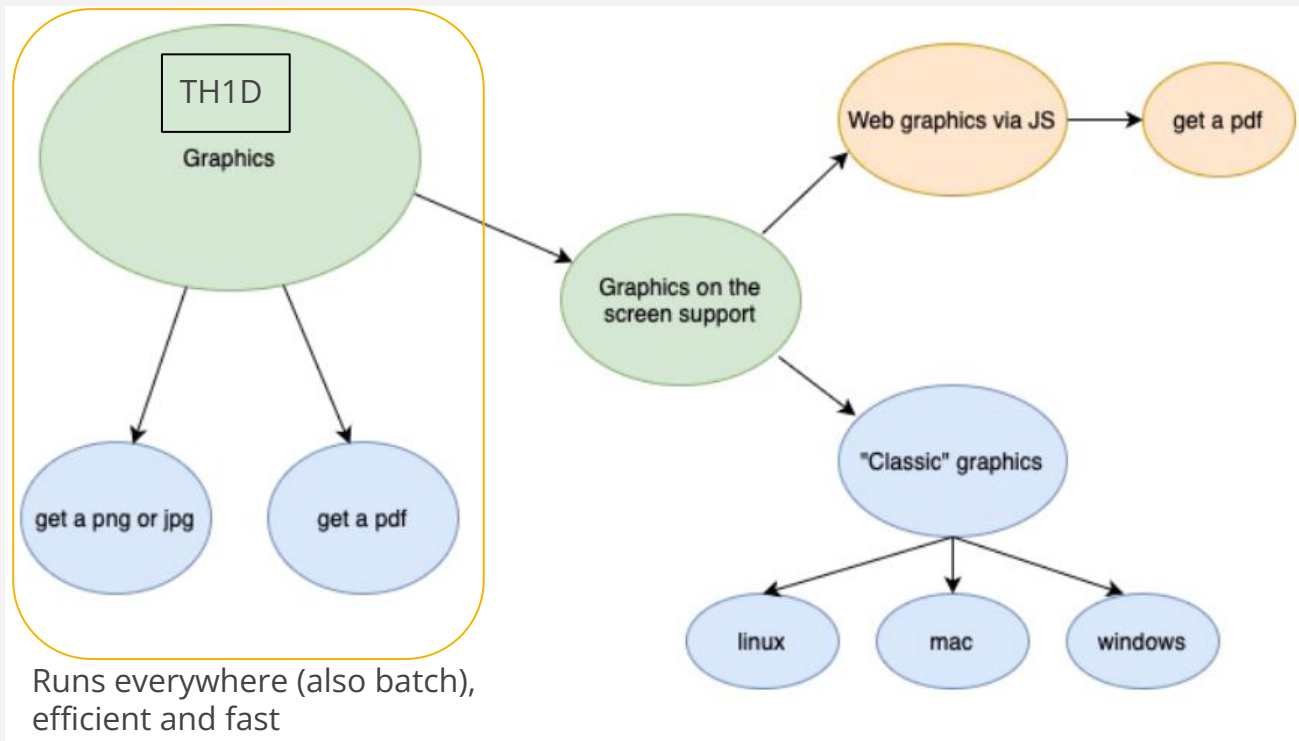
Thanks, Marta!  
<https://indico.cern.ch/event/1340650/>



# ROOT's Graphics Support

Three different backends!

- ▶ **Creating a plot**
- ▶ On-screen interactive graphics (OS-specific)
- ▶ Web graphics



Thanks, Marta!

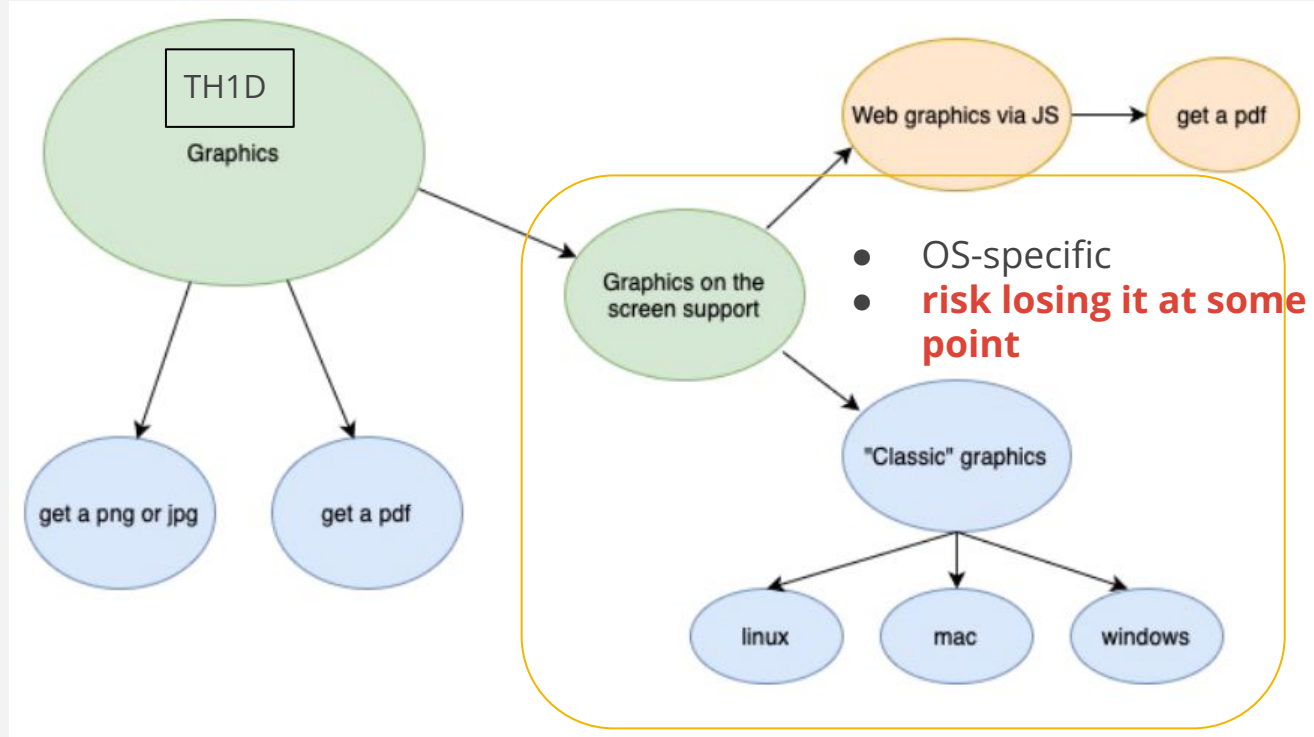
<https://indico.cern.ch/event/1340650/>



# ROOT's Graphics Support

Three different backends!

- ▶ Creating a plot
- ▶ **On-screen interactive graphics** (OS-specific)
- ▶ Web graphics



Thanks, Marta!

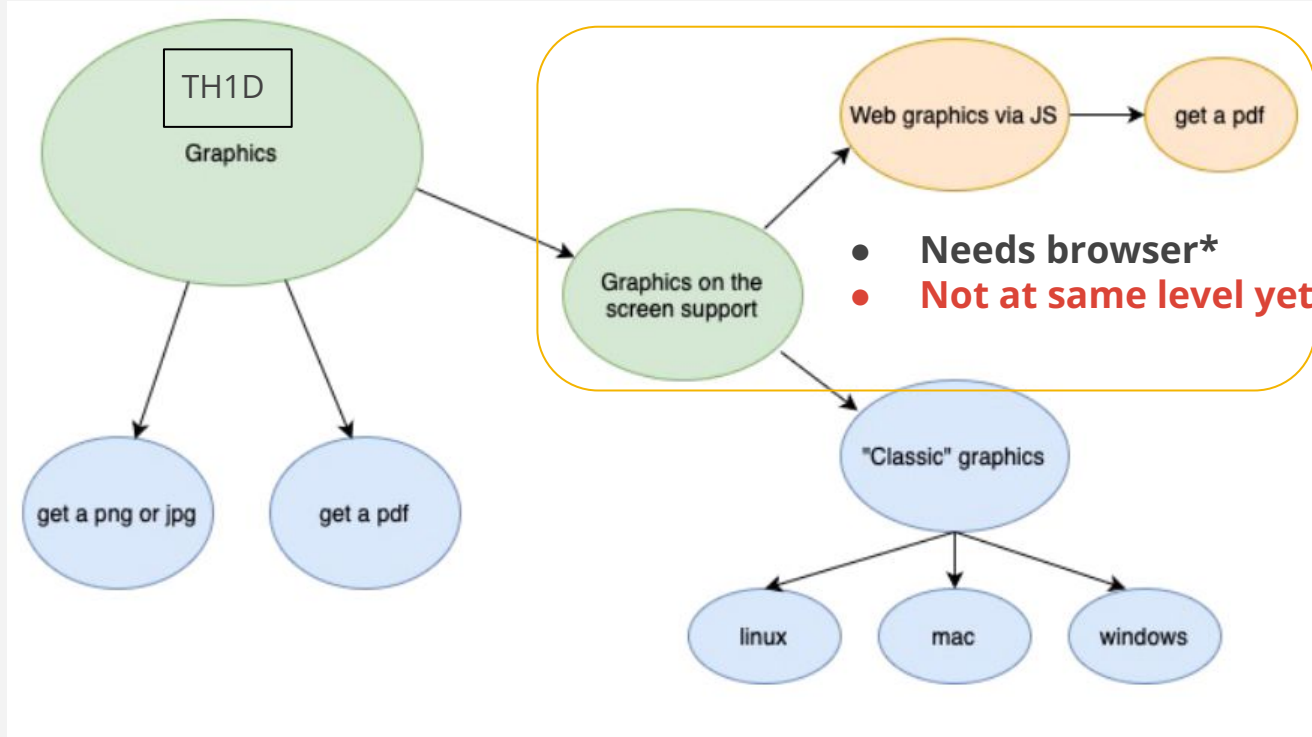
<https://indico.cern.ch/event/1340650/>



# ROOT's Graphics Support

Three different backends!

- ▶ Creating a plot
- ▶ On-screen interactive graphics (OS-specific)
- ▶ **Web graphics**



Thanks, Marta!

<https://indico.cern.ch/event/1340650/>



# This Year's POW

1	Automated placement/tune of plot elements, "Auto Style"	1	0		
2	Add missing features of classic graphics to the web-based one	1	1		
3	Automate web-based graphics test suite	1	1		
4	Add residual missing TEve features to REve, e.g. digit visualisation and text elements overlay	1	0.5		
5	Visualization of flat ntuples using predefined visual summary data structures	1	0.5		
6	Improve REve window manager and browser, polish render engine	2	0.25	54 %	

- ▶ Auto placement not done because could be part of "New graphics", so requirements might be different
- ▶ Web-based feature set grew, its testing as well
  - Unavoidable problem: "Looks different"
  - Performance problems for batch usage
- ▶ I don't have enough insights (sorry!):
  - Event display works
  - Visualisation of flat ntuples





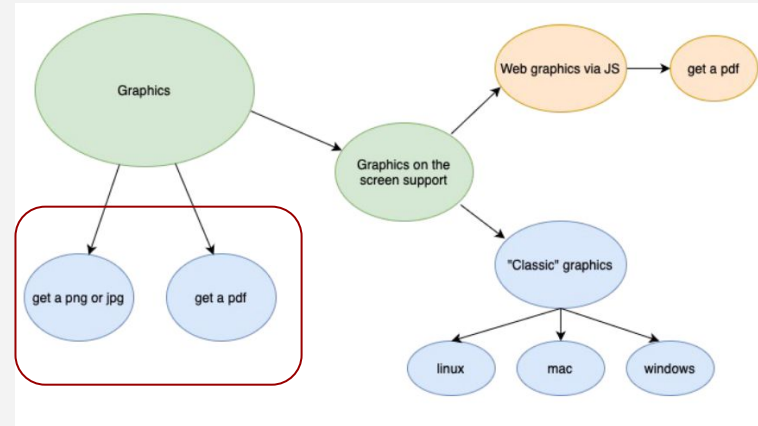
Where are we going in 2025+?



# Graphics in 2025+

- ▶ We will lose the "classic graphics" at some point, **so a way out is needed for making plots *and* interactive preview**
- ▶ Web graphics has its place in
  - Notebooks
  - Interactive view of data and files
- ▶ **Does web graphics cover the "batch case"?**
  - Browserless environments
  - Rapid production of many plots in scripts
  - Reproducible
- ▶ REve: Continue the good work
- ▶ What to do about ROOT-based GUIs?

See notes of Web Graphics discussion:  
<https://indico.cern.ch/event/1452786/>



# Some Ideas for POW Items

Who proposed?	What?	Comments
Webgraphics discussion	Extensive monkeytesting of web graphics functionality. <b>Careful</b> deployment to users!	
Olivier	Web graphics should look as close to "classic style" as possible	Or: "Batch plots" made to look like webgr.
Sergey	Improve batch image production with web graphics	
Sergey	Better documentation of TWebCanvas and RWebWindow classes	
Sergey	Switch to TWebCanvas (mostly) all tutorials shown in doxygen	
Stephan	Decide on way forward for browserless environments. Will the direct creation of plots without GUI stay?	What about browserless JS?
Olivier	<a href="#">TScatter2D</a> : Extension of TScatter (4-dim visualisation) to 5-dim	





# Appendix

# The Case of GUIs

## This is Bonn's "ShowMulti"

(-ple samples)

Reads 10s of samples from files, rebins, scales, and stacks them

Select histograms using regex

Built-in diff plots already in 2012

