Graphics@RUW

Sarajevo, 13th September 2018

UI5: SAP's (open source) JavaScript UI library and its evolution

- Strong commitment from SAP (150 developers!) to the open source ‘heart’ of their commercial UI library.
- Good to rely on UI5 for ROOT7 graphics? What happens when we need a feature that is not there?

ROOT Graphics (Olivier)

- Support for anti-aliasing on windows? What will happen in the future?
- ChangeLabel argument list -- private or public?

The grammar of graphics and ROOT (Xavi)

- Proposal: adding a declarative layer (based on the grammar of graphics) on top of ROOT’s (new?) graphics API to make common operations simple.

New tools for web-based graphics (Sergei)

- Markus worried about introducing UI, web dependencies in software framework that does not need them
- Why not matplotlib? Because we need interactivity and communication protocols
- How to configure using .rootrc instead of custom scripts

ROOT 7 Graphics (Olivier)

- Eddy: **how much of the quirks of v6 are brought into v7?** (v6 sucks in particular for time series, multi-graph and very verbose and lots of odd unexplained/not-understandable solution)?
  Axel answer: we are starting from scratch without backward compatibility burden. Eddy insist that the time-series has been broken for a long time and it is very frustrating.
- **Axel proposed to have “usable” and user-friendly defaults**
- Attila: **Should there be a naming convention to distinguish abstract classes?**
  Axel: we probably should do it.
- **I like TObject::Draw why do we do Draw(object) instead?**
  Axel: because we need to have the direction. Moving to RPad::Draw allows to remove need for generic base class (TObject) and simply interface (overload and template functions)
- Jochen: **Did you measure performance?** How low level do you decided to go down.

ROOT 7 Graphics (Olivier) 2

- Sergei: performance is not as good but we can do the heavy weight on the server/C++ side. We are actually flexible in the degree of abstraction that is passed around.
- Somebody: screen representation of plot is not equivalent to what you print
- Relevant comment from a later talk: performance is actually very important for DQM, where many histograms need to be continually rendered on a page.
- Observation: Need templated version of ConvertToJSON

ROOT 7 Fit Panel (Iliana)

- Attila: **was this just to test the water of the tools because a real implementation would need to be more complex?** Axel: Yes, this is a simple example that touch all the things we need to solved. One of the important point is that this was done ‘outside’ of ROOT proper because we really do not want to be owning this part.
- Attila: **JavaScript vs Jupyter notebook? Would need to ‘save’ the state (both visual and semantic) of the UI elements in some way.**
- Answer: In the context of JupyterLab we have some elements that answer this challenge.

ROOT Documentation (Olivier)

- Need to tag older doc with link to newer version of docs. Need to fill-out the ‘google form’ to indicate the pattern of obsoleted docs.
- For example in reference guides (e.g. TH1) is missing link to tutorials
- What about O'reilly book?
- Is the User Guide updated enough?
- We are missing a fast link to current master documentation in the documentation for old versions (similar to CMake’s)

Interactive docs for RooFit (Vince)

ROOT Gallery (Jakob)

- Idea to have a repository of example for nice plots
- Jim: the useful part is the code sample, if it is not too complex.

ATLAS analysis feedback

- It is not simple to make a nice looking plot in ROOT
- Margins, positions and sizes should not depend on the pad/canvas size
- It is hard to make nice ratio plots
- Impossible to create a global TStyle. (overlapping pads, different size values).
- The width of a legend affects the width of the plot representation.
- It is not possible to get the width of a label (TLatex) to avoid overlap.

User feedback from LHCb (Hans D.)

- Frustration with “GetXaxis” vs “GetXAxis” naming

Perceived strengths of ROOT:

- Low-level tools (TChain, TH1D, etc.) as popular as high-level tools
- ROOT graphics/plotting

Experience and views with ROOT (Wolf)

- **Improve default style of plots**
- Time axing is not working properly
- Exported png’s of low quality
- Automatic scaling of font sizes and spacing – use case: increase canvas size and axis but want to keep labels the same size
- GUI: widgets don’t fit to modern Qt / Gtk / Windows desktop look
- Selecting all text in a TGTextEntry and pressing backspace does not remove the whole text; text longer than window width behaves strangely
- Long bin labels: better automatic rotation

ROOT in CMS (David Lange)

- Recent increase in interest towards 2-dimensional histograms and profiles that are driven by a flexible geometry description
    - For example: histograms used to visualize detector geometry driven configurations

CMS DQM (Marcel Schneider)

- Need advanced visualization **without server-side state, and scalable storage. Need performance.**
- Move to a non-ROOT, e.g. compressed JSON, histogram representation?

SHIP (Oliver Lantwin)

- Building an event display (or just displaying geometry) with TEve / TGLViewer very cumbersome, extremely slow! Geometry hard to optimise for this use
  → Looking forward to web-based new graphics, VecGeom
- **TMultiGraph** is full of little quirks
- **matplotlib**, tikz used instead of ROOT

Conclusions

- ROOT7 has to **get defaults right**, people are annoyed with many small things that won’t be fixed in 6, expect us to get them right in 7 (need as much early feedback as possible!)
- **API** also expected to be **“right this time”**: too similar to v6 and it will have the same issues, too different and it might lack features or confuse…can have both?
- Where do we stand with respect to **other packages**? what features are a must? how do we **let users know**? e.g. support for drawing in jupyter widgets, interactivity, batch…
- Must focus on well-working basics, then polishing details

Our discussion

- RCanvas::Draw(hpx) -- but what about lifetimes?
- Novice forum section (where people feel less threatened to ask seemingly stupid questions, and where it's okay to delete their post to remove possible future humiliation). And / or novice MM channel?
- improve / modernize the tutorials
- RDF template monster: template params is seen as part of the template. Include example invocation for each public method
- Revisit v7 graphics C++ side, to see whether we should open up WebGraphics/GUI for v6 objects because v7 is too late