Waveform viewer requirements

1. 5 plots per page. Each plot contains data for a given signal for all of the cavities for which data exists in the event directory. {Frequently there are less than 8 cavities per event.}
2. Default signals when program launched are: GMES, CRFP, DETA2 GASK, PMES with vertical scaling of 0 to 22, 0 to 14, +/-60, 0 to 12 and +200 to -200 respectively.
3. Default horizontal scale is auto when program is launched.
4. Ability to deal with events that do not have data for all of the cavities. Ideally keep the same colors for the same cavities just show less graphs but have a clear indication of which cavities have data and which do not. Make it easy to see that less than 8 cavities have data. {Maybe just have a 1 to 8 indicator of how many plots are present for this event.}
5. Display of the date, time and zone for the selected event. {Please avoid using M, N, 0, P, Q rather use 0L04, 1L22, 1L23, etc.}
6. Ability to select a signal on each graph, e.g. one graph or 8 plots of GMES, one for each cavity, another plot for Forward Power of all 8, third plot for DETA2 for all 8 cavities.
7. Labels for the plots are cavity numbers. Heading for the graph, or vertical axis label is the selected signal. Alternately the signal selector box could be located above each of the plots.
8. Ability to hide traces on each plot, e.g. hide cavities 1 and 5, show all others with one set of controls. If waveforms hidden they stay hidden until you (a) select a different zone, (b) restart the viewer or (c) choose to unhide them. Select to hide a cavity makes it hidden on all graphs.
9. Lines for traces are on the order of the width of the third from the top on the standard Maya plot tools (pretty bold). Each cavity has its’ own color none of which are so light that they are difficult to see.
10. Control the horizontal scale using a single control.
    1. Synchronize horizontal zoom across all graphs.
    2. Has an auto scale option.
    3. Selecting a new event does not change the horizontal scale unless it is in auto-scale.
11. Control the vertical scale on each graph independently.
    1. Selecting a new event does not change the vertical scales unless that graph is in auto mode.
    2. Selecting a new signal does not change the vertical scales unless that graph is in auto mode.
12. Cursor (vertical line) on all graphs controlled by a cursor on one of the graphs. {This helps to determine what happens on each graph when things go wrong.}
    1. On launch the cursor is moved to the middle of the graphs.
    2. If the horizontal scale is changed such that the cursor is off scale it is moved to the middle of the new scale.
    3. If the horizontal scale is changed and the cursor is not off scale then it remains at the same time position as before the change.
    4. The cursor position is controlled by dragging it with the mouse.
13. Ability to scroll through events for a particular zone
    1. Select the zone (selecting a new zone takes you to the newest event)
    2. Select a random event for that zone (pull down or by number where 0 is the most recent event and largest number is the oldest event or maybe by the date/time of the event.)
    3. Have a next or last button so that the user can scroll through events one at a time.
    4. Auto scroll (forward or back?) with a delay on each event so that the user can quickly view the events for the last day or two and stop when they see something interesting.
    5. When scrolling the selected signals stay as they were on the last viewed event, e.g. if you set it up for PMES rather than DETA2 as you scroll through the events it is always PMES.
14. Has a tab (or something) that allows you to review the list of event times for the selected zone. {This might be part of the random selection feature.}
15. Save a screen shot of the graphs as an image file.
    1. Elog from the app (?bonus)
16. Has a potential for future upgrades
    1. determine which cavity became unstable first in x% cases
    2. determine a most probable cause of instability or a trip using “gold models” of different types of trips
    3. display prompts for the ops to turn down a cavity based on background analysis of the trips