1. **Internal Software Design Recommendation**

When implementing FESA device software a few issues should be considered to help ease testing the software from the beginning on and from different points of views.

Application developers desire permanent access to FESA devices to be able to adjust and test their applications. FESA device installations should be offered permanently in an environment well separated from the accelerator to the applications developers. Since providing dedicated equipment for testing the applications would be too costly, the FESA classes should run without equipment hardware on central servers. This implies that timing information will not be available on these FESA devices. These FESA devices should be permanently installed in a test environment that is clearly separated from the productive accelerator installation.

The idea is to offer FESA device software as mockup devices. These mockup devices should offer the same set of properties and a partially similar behavior as the productive version which is installed in the accelerator. This does not imply to develop the FESA software twice. Ideally the same FESA class implementation runs together with hardware equipment and within the test environment.

It is generally recommended to

* Never directly access the hardware components in the FESA actions but use an intermediate software layer that encapsulates the API of the hardware components. E.g. provide a function ‘setGain(float gain)’ which encapsulates writing to the gain-register of the hardware component. Inside this method the decision of using the real hardware or a simulation can be made
* Make use of the timing simulation in the test environment (application-argument “-timsim”) in order to simulate the real timing.

To distinguish productive devices from the ones in the test environment, the names of devices running in the test environment should be suffixed with “Test”.

A full device simulation will not be easily realized and is therefore not expected. However a partial simulation of the main properties will help to test FESA device software at an early stage and to develop application software in parallel.

The finalThe recommendation for development of FESA device software is:

1. Define the main properties and actions which will be used by the operations applications together with the application-team
2. mplement a Imockup adapter to simulate the hardware equipment
3. Deploy the mockup FESA device software in the test environment and inform the application-team, so they can start using it
4. Refine the FESA class, add real hardware-interaction, enhance the adapters, implement other properties