

SUMMER STUDENT PROGRAMME @CERN

Maria Iliadi

BE - BI - SW



BEAMS + BE / BI Group

BEAMS: Hosts the Groups responsible for the beam generation, acceleration, diagnostics, controls and performance optimization for the whole CERN accelerator complex

Beam Instrumentation Group: is responsible the diagnostic systems that allow observation of the particle beams and the measurement of related parameters for all CERN accelerators and transfer lines.

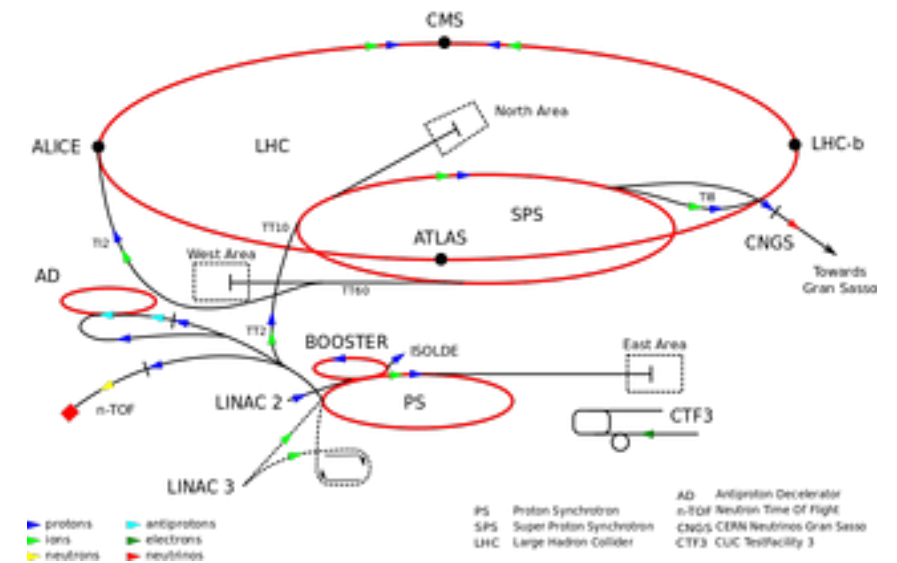
BE / BI Group

LHC	PS LINAC
PS BOOSTER	PS
EA NORTH	REX ISOLDE
ISOLDE	SPS
LEIR	

BE - BI Software Section

Responsible for the software of all the diagnostic systems that give information to the instruments produced by the BI Group

- Develop **Real Time Front End Software** for the instruments including the remote control communication interface.
- Develop **Expert Graphical User Interfaces [GUI]** for the instruments
- Develop tools to allow the HW specialists to build their own test programs.

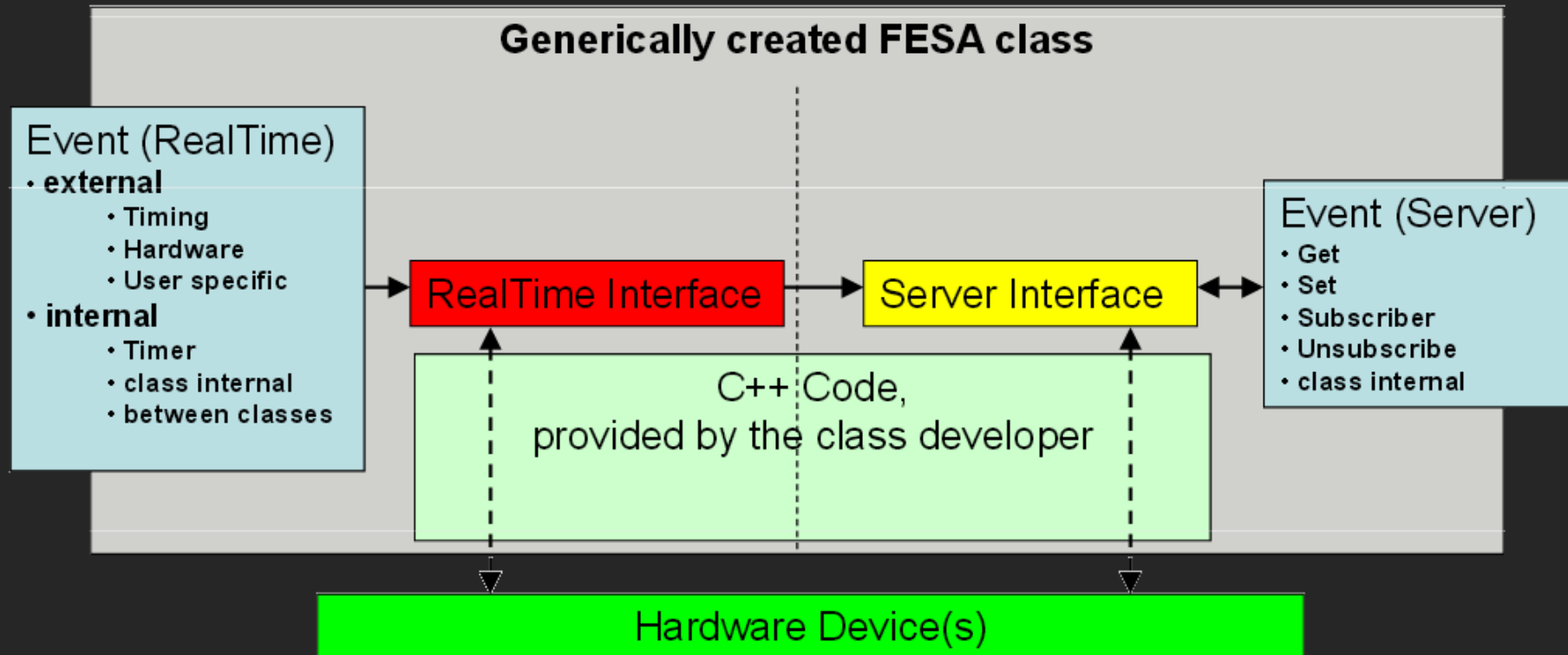




About FESA...

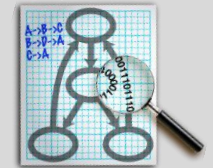
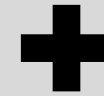
Front-End Software Architecture framework

A complete environment to design, develop, test and deploy real-time control software for front-end computers



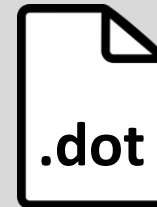
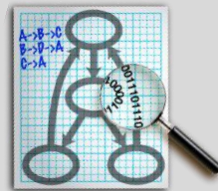
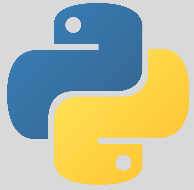
Fesa Graph

- A simple FESA Class Control Flow graph generator
B.Bielawski - BE-CO-FE
Python 2.7+ & Graphviz



Fesa Graph

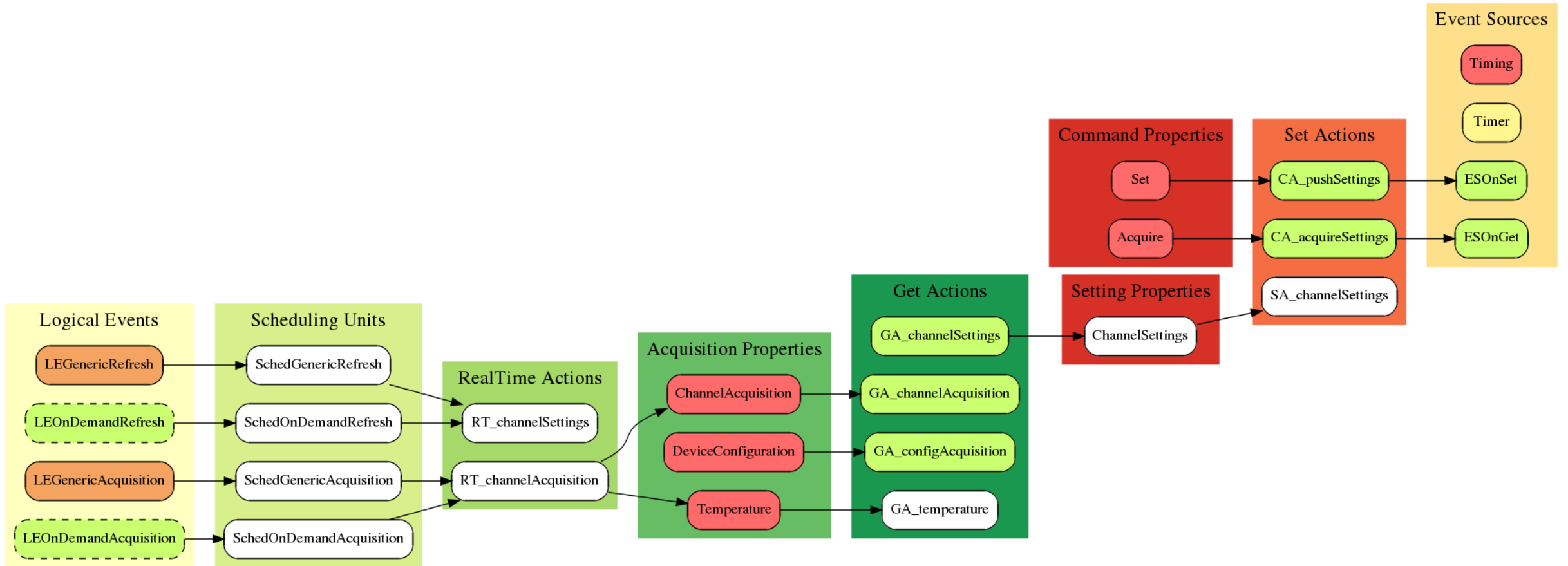
- A simple FESA Class Control Flow graph generator
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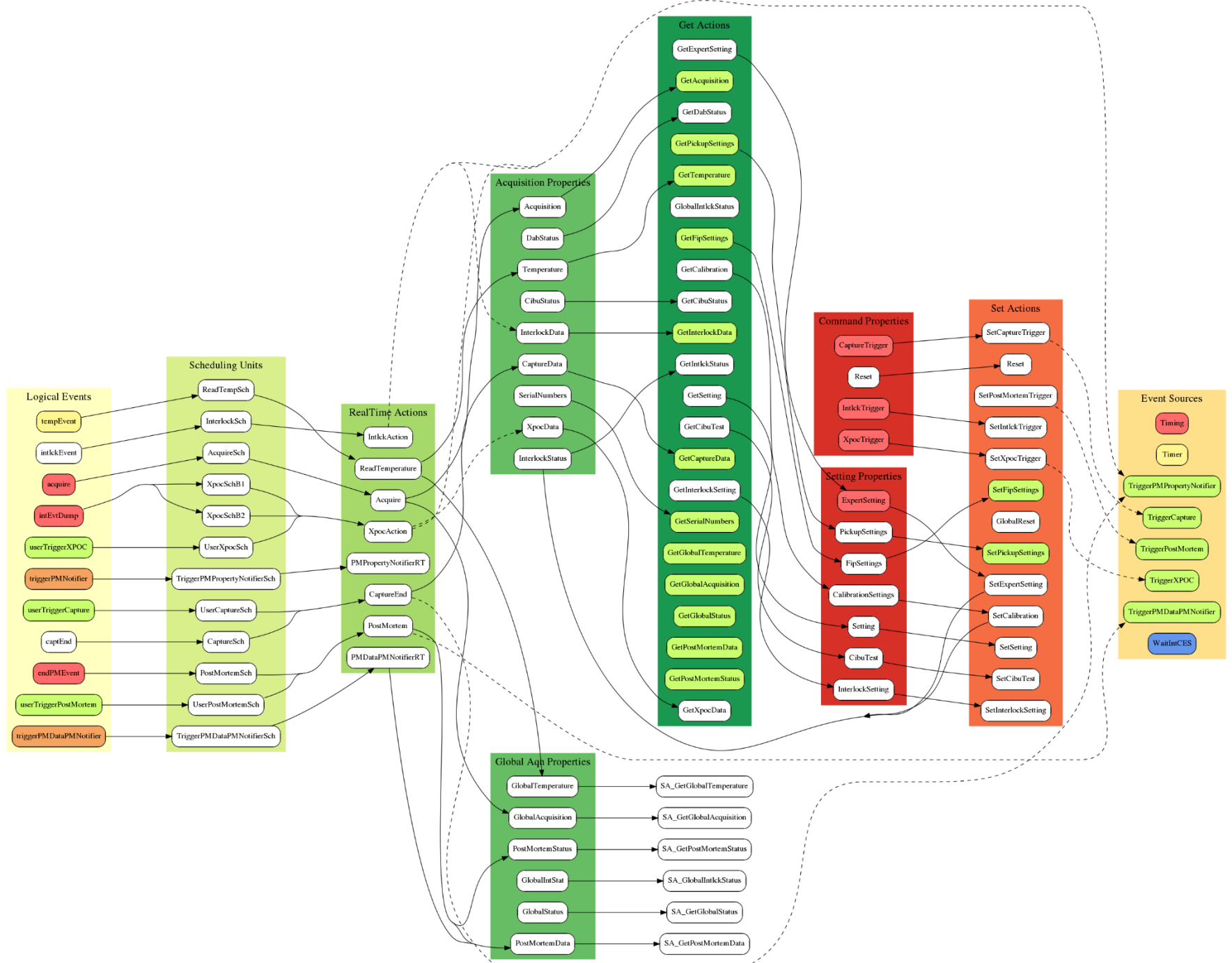


Fesa Graph

- ★ Identifying errors and enhancements
- ★ A nice picture of the implementation
- ★ Distinguish differences between the model and the respective implementation
- ★ Macro processors for generating different diagrams

Node	Content
?? xml	version="1.0" encoding="UTF-8"
equipment-model	(xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance, xsi:noNamespaceSchemaLocation=file:/nfs/cs-ccr-nfs1
xmlns:xsi	http://www.w3.org/2001/XMLSchema-instance
xsi:noNamespaceSchemaLocation	file:/nfs/cs-ccr-nfs1/vol30/local/share/fesa/fesa-model-cern/2.3.0/xml/design/design-cern.xsd
information	BPMSPS 2.0.1 FESA 2.3.0
ownership	BE/BI
interface	SerialLinkSetting, LogAmpSetting, OrbitSetting, ExpertSetting, CaptureSetting, TrajectorySetting, OrbitDiagSetting
device-interface	SerialLinkSetting, LogAmpSetting, OrbitSetting, ExpertSetting, CaptureSetting, TrajectorySetting, OrbitDiagSetting
setting	SerialLinkSetting, LogAmpSetting, OrbitSetting, ExpertSetting, CaptureSetting, TrajectorySetting, OrbitDiagSetting
acquisition	FECConfiguration, ExpertAcquisition, GlobalOrbit, CaptureData, TrajectoryData, OrbitDiagnosticsData
acquisition-property	(FECConfiguration: multiplexed=false, on-change=true, subscribable=true, visibility=operational)
acquisition-property	(CaptureData: multiplexed=false, on-change=true, subscribable=true, visibility=operational)
acquisition-property	(TrajectoryData: multiplexed=true, on-change=true, subscribable=true, visibility=operational)
acquisition-property	(OrbitDiagnosticsData: multiplexed=true, on-change=true, subscribable=true, visibility=operational)
global-interface	DiagnosticSetting
custom-types	NOTIFICATION_UPDATE, DIAG_FWK_TOPIC, DIAG_TOPIC, OPERATION, BANDWIDTH, FILTER_TIME_CONSTANT, FRA
data	VFCCounter, VFCNames, BPMCounter, BPMNames, channelCounter, channelNames, BPMNameSL, hasExpertSetti
actions	SetOrbitSetting, GetOrbitSetting, SetExpertSetting, GetExpertSetting, SetCaptSetting, GetCaptSetting, SetTrajecto
events	Timing, Timer, ReadTrajectory, ReadCapt, PrepareEvt, StartEvt, StartOrbDiagEvt, StartCaptEvt, StopEvt, ReadOrbit
sources	Timing, Timer, ReadTrajectory, ReadCapt
timing-event-source	(Timing)
timer-event-source	(Timer)
on-demand-event-source	(ReadTrajectory)
on-demand-event-source	(ReadCapt)
logical-events	PrepareEvt, StartEvt, StartOrbDiagEvt, StartCaptEvt, StopEvt, ReadOrbitEvt, ReadCaptureEvt, ReadTrajectoryEvt
logical-event	(StartOrbDiagEvt: use=required, type=timing)
logical-event	(StartCaptEvt: use=required, type=generic)
logical-event	(StopEvt: use=required, type=generic)
logical-event	(ReadOrbitEvt: type=generic, use=required)
logical-event	(ReadCaptureEvt: type=on-demand, use=required)
logical-event	(ReadTrajectoryEvt: type=on-demand, use=required)
scheduling-units	PrepareSU, StartSU, StartOrbDiagSU, StartCaptSU, StopSU, ReadOrbitSU, ReadCaptureSU, ReadTrajectorySU





- Clear, easy to read
- Less nodes
- Keep the important attributes only
- Understand with a quick look



My goals

- ★ Retain only useful information
- ★ Remove trivial attributes
- ★ Improve the process of generating flowcharts



Basic Steps

1

Understand the basic concept behind FESA

2

Study DOT language and Graphviz documentation

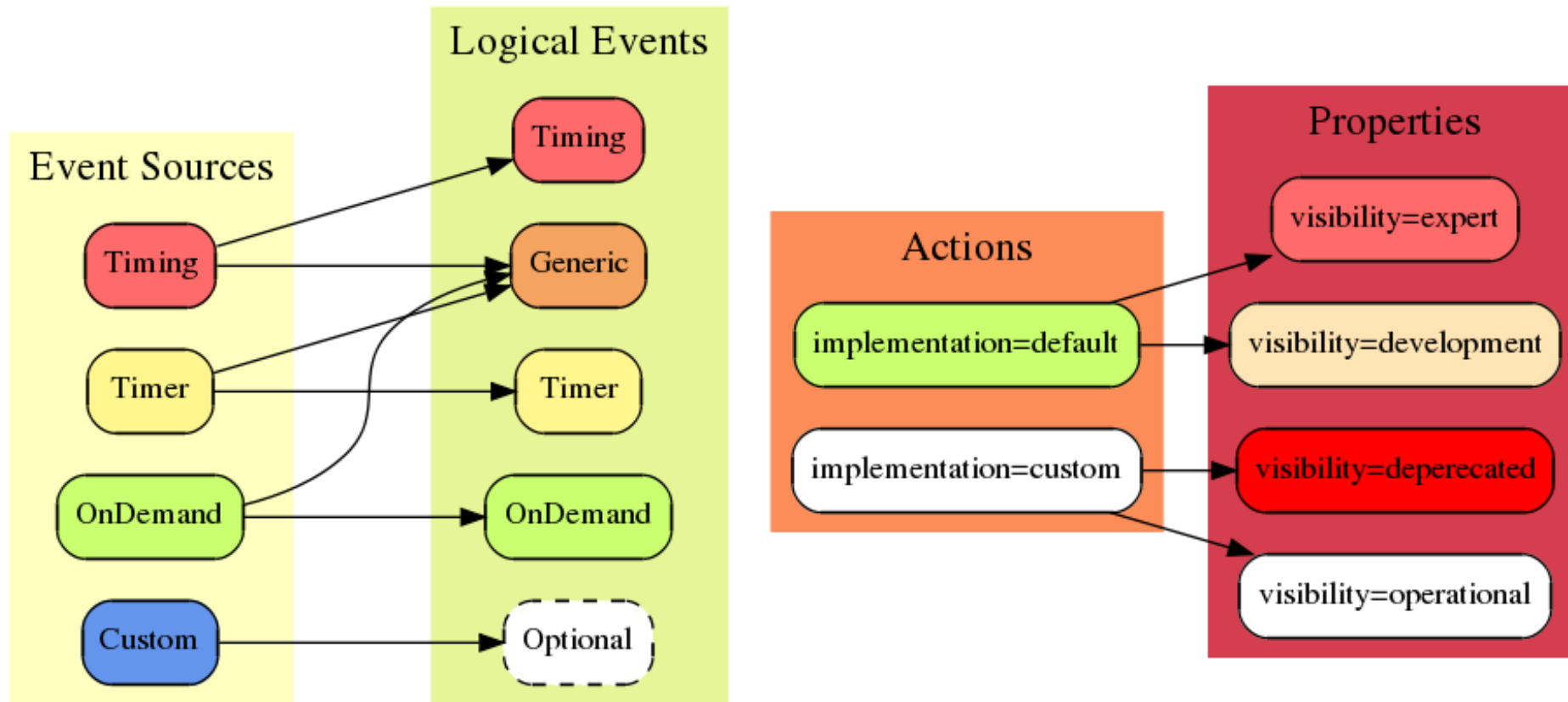
3

Understand the existing code and test it

4

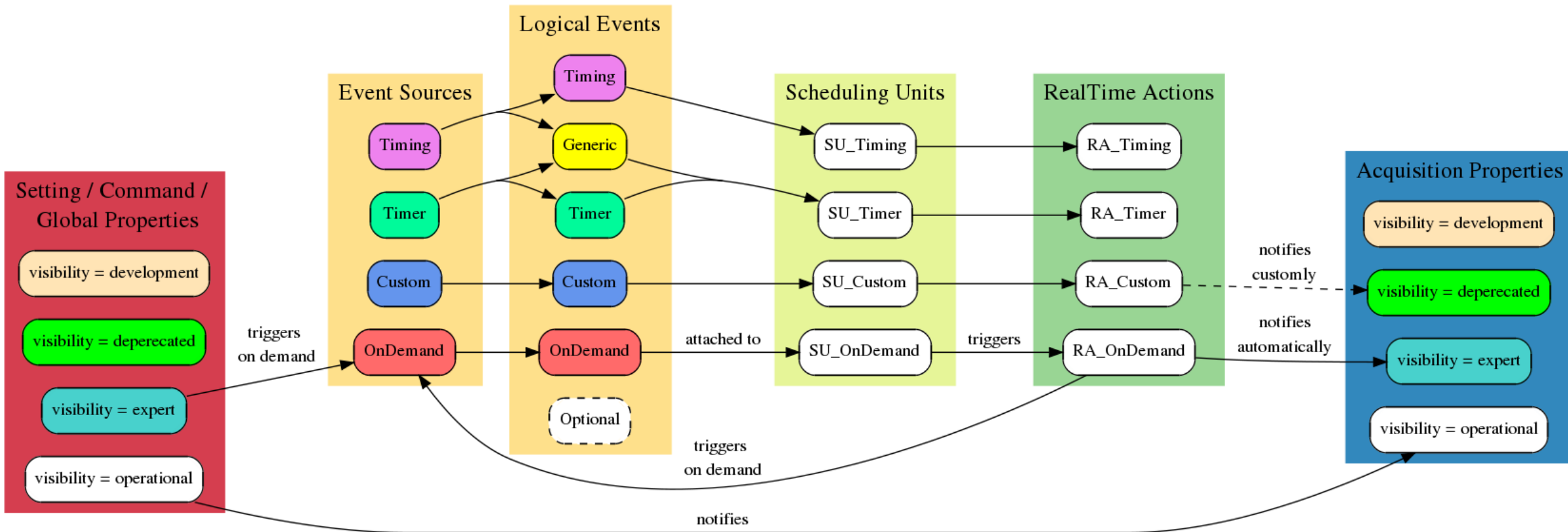
Improvements, implementation & feedback

FESAGraph Legend

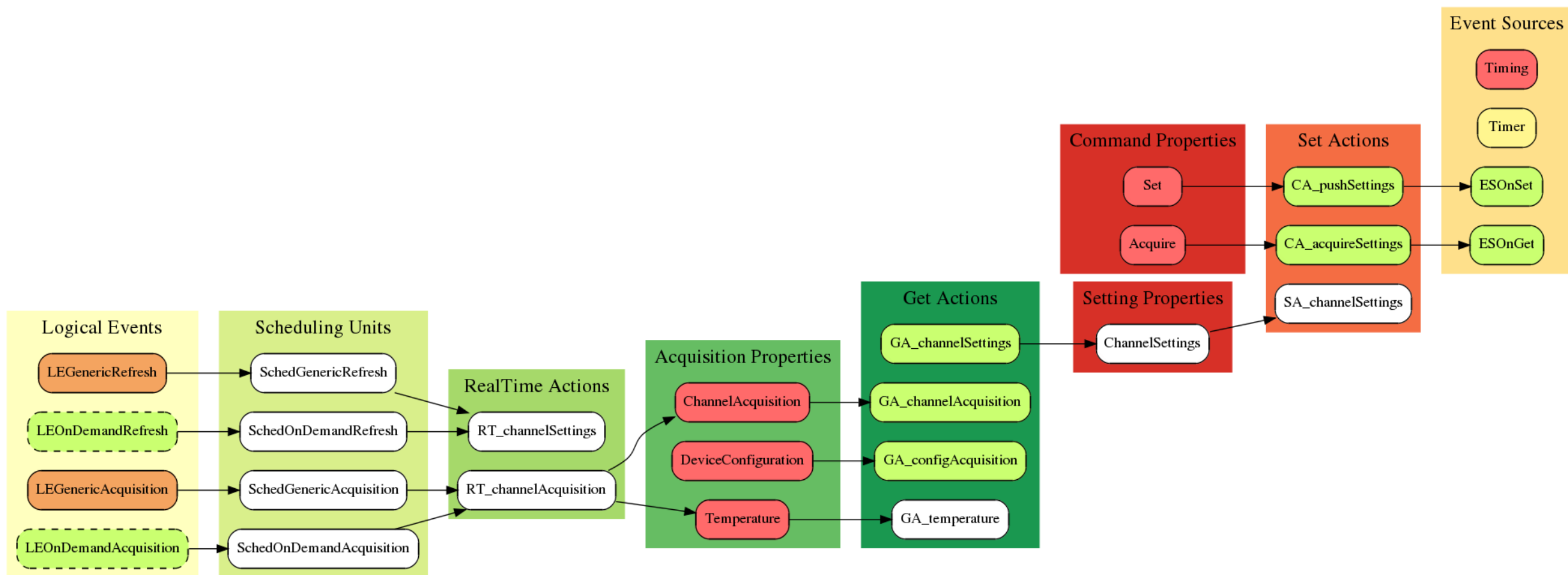


FESAGraph Legend

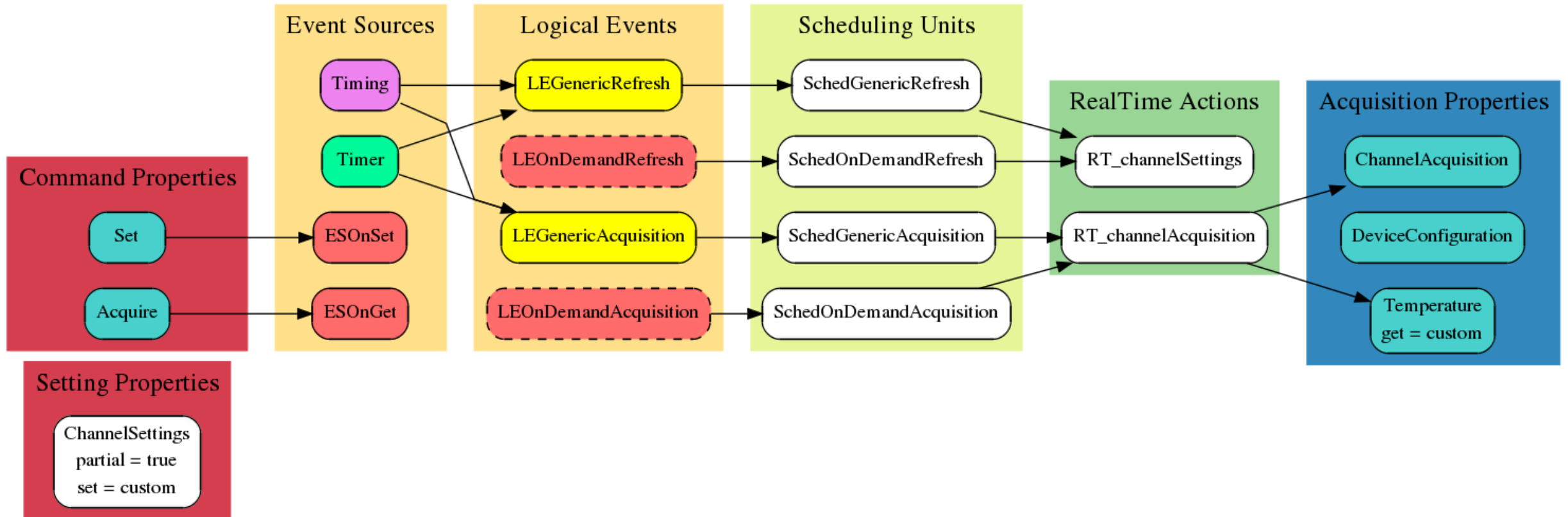
Arrows are just for demonstration purposes

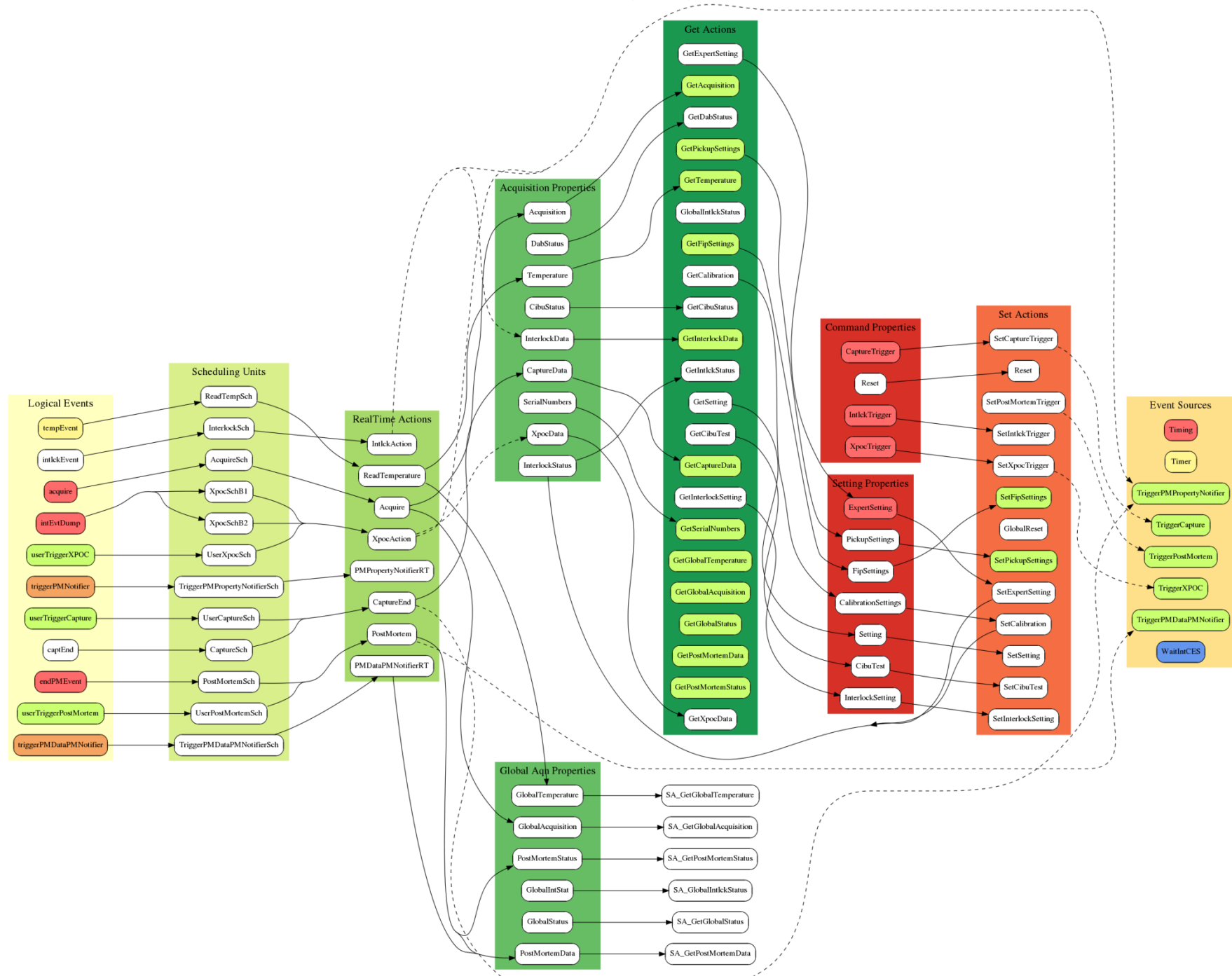


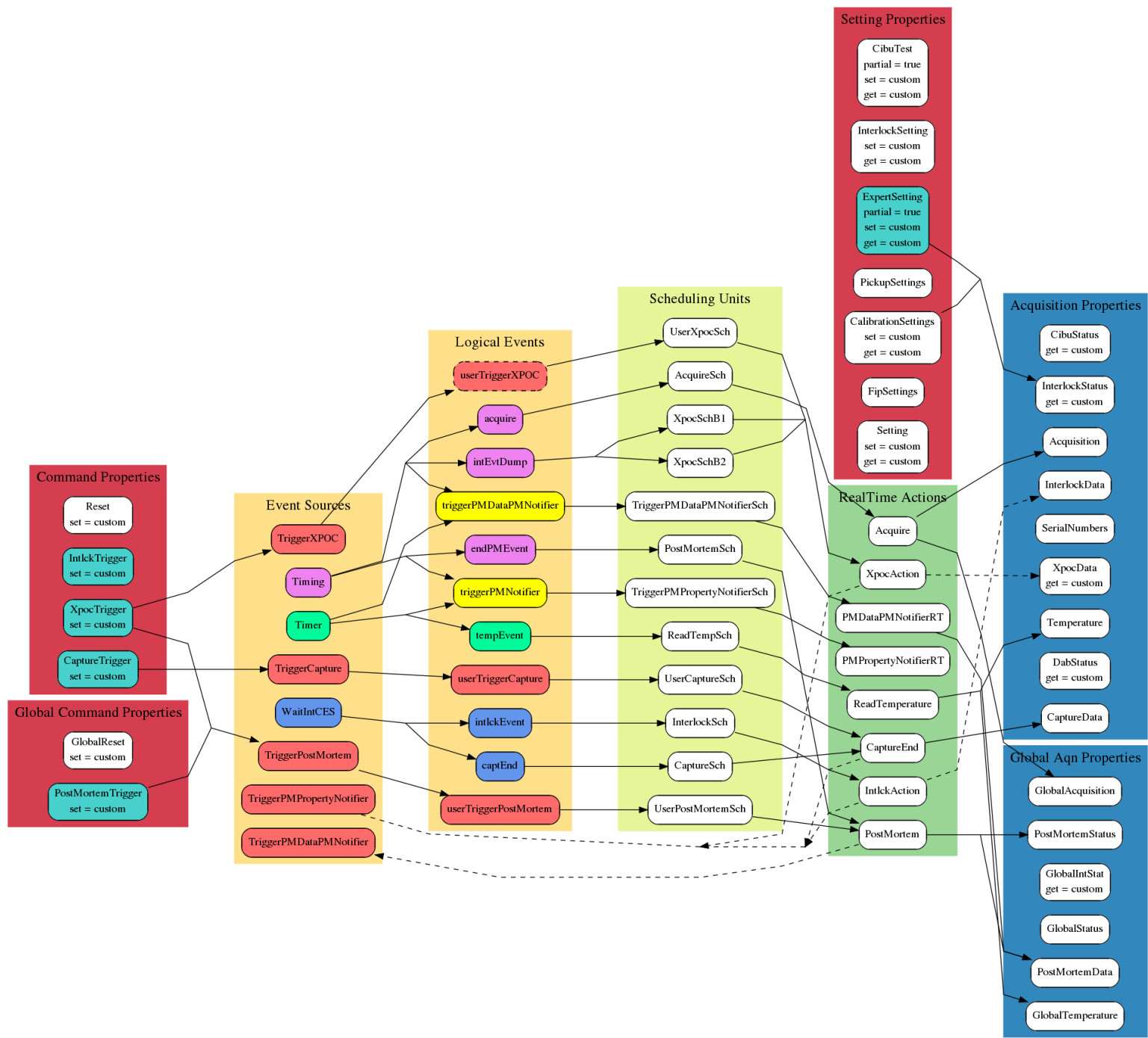
CGTDEL 2.0.6 (FESA3 2.0.0)



CGTDEL 2.0.6 (FESA3 2.0.0)







- ★ Less nodesets – easy to read
- ★ A clear flowchart
- ★ More logical
- ★ No trivial attributes
- ★ Works on every class



Achievements

Next Steps

- ★ Check for other improvements
- ★ **GUI** (including the LEGEND)



