

# Lucretia - Floodland

Flight Simulator for ATF2

Glen White

SLAC

ATF2 Project Meeting Dec 2007

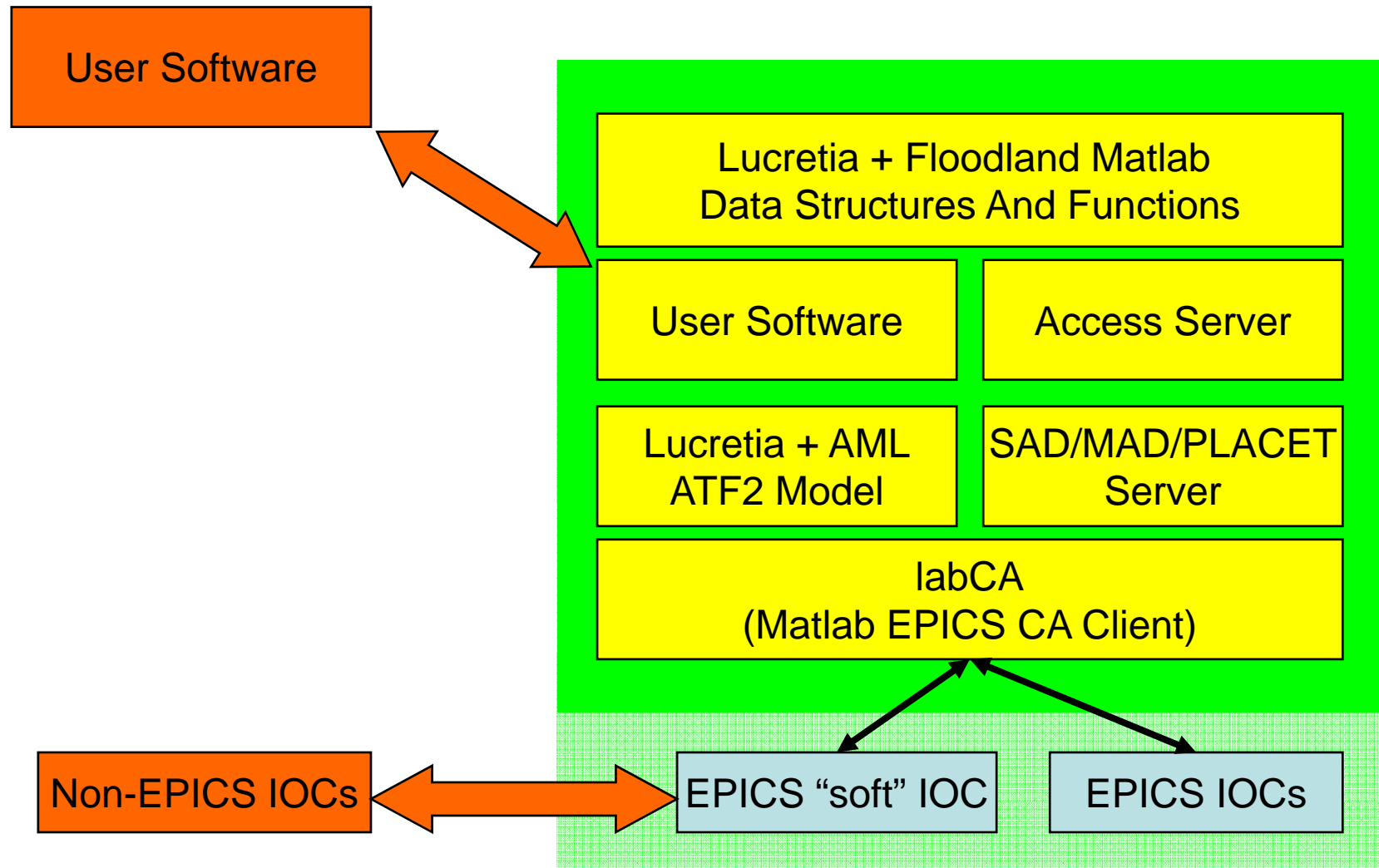
# Flight Simulator Requirements

- Safe, controlled access to ATF2 hardware controls from a familiar programming environment.
- Allow easy offsite development
  - Portable core software
  - Easy interface
  - Easy transition from simulated to control system environments (and reverse)
- Allow multiple tracking/simulation environments
  - Lucretia, MAD, SAD, PLACET
  - Common data structures in AML

# Floodland

- Module for Lucretia that extends core functionality to provide Flight Simulator software.
- Based on Matlab GUI and event-driven callback infrastructure.
- Compilable, although more flexible if implemented in Matlab environment.
- Talks to EPICS CA through “labCA” client (built on EZCA), as used by many other Accelerator facilities using MML: very well tested and robust.
- Uses native Matlab udp socket server/client software provided by the Instrument Control Toolbox.
  - CA access security protocol
  - Synchronisation with other toolboxes (SAD, PLACET, MAD)

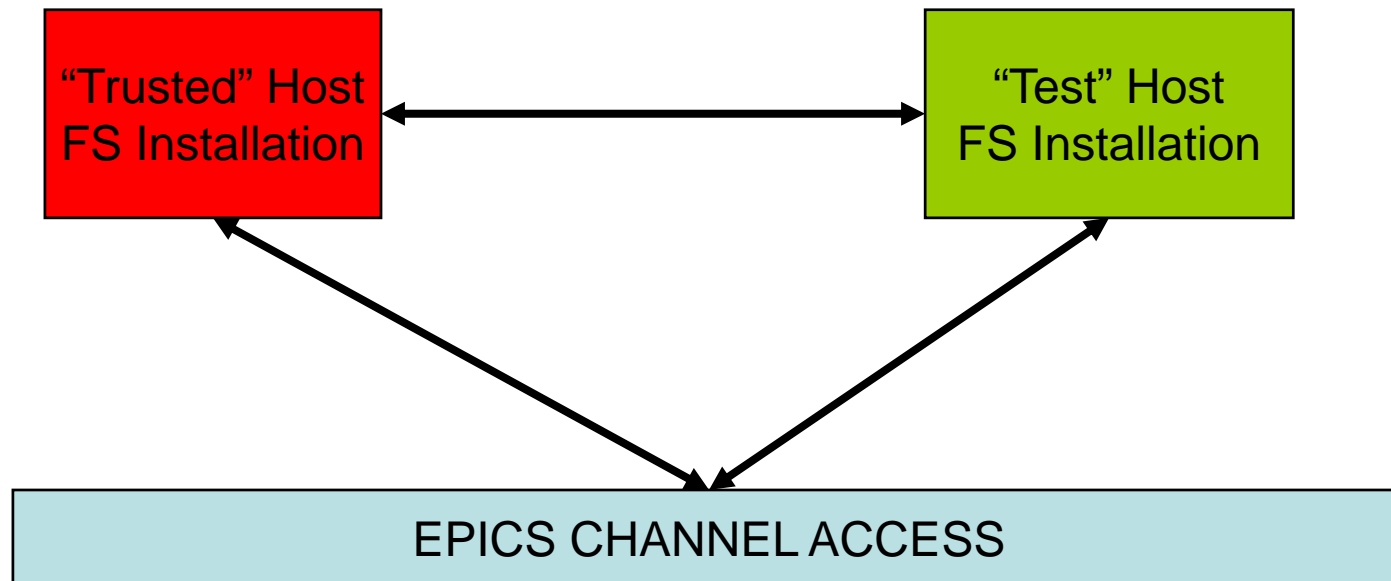
# Lucretia – Floodland Flight Simulator



# Flight Simulator Installation on ATF2 Control System

- Trusted (Host,User)
- Full r+w access to all EPICS CA records
- Initially only runs Access Sever App
- When trust tested user apps -> migrate here

- Test (Host,User)
- Default: no r or w access to any CA records
- Runs user apps (beam dynamics algorithms)
- Requests CA access privs from Access Server



# Access Security

- All EPICS records have an ASG (Access Security Group) field.
  - Gives read/write access to those records to usernames + hostnames defined in access security database file.
- Two ASG's defined in database
  - Hostname+username of "trusted" installation
  - Hostname+username of "test" installation
- Default settings for all records on IOC boot is to give r+w permissions to "trusted" and no access to any other hostname and username.
- "trusted" can change the ASG field of any record to allow (only) "test" read or read+write access to that record.
- Flight Simulator software can start in 3 modes internally determined through hostname, username and MAC address information:
  - "trusted mode" which runs Access Security Server on a control room PC and any trusted algorithms
  - "test mode" which runs user code on a different control room PC
  - "simulation mode" which runs standalone on a users own computer (runs local simulated versions of EPICS IOCs) and cannot connect to ATF2 CA.

# Example EPICS Access Control Database File

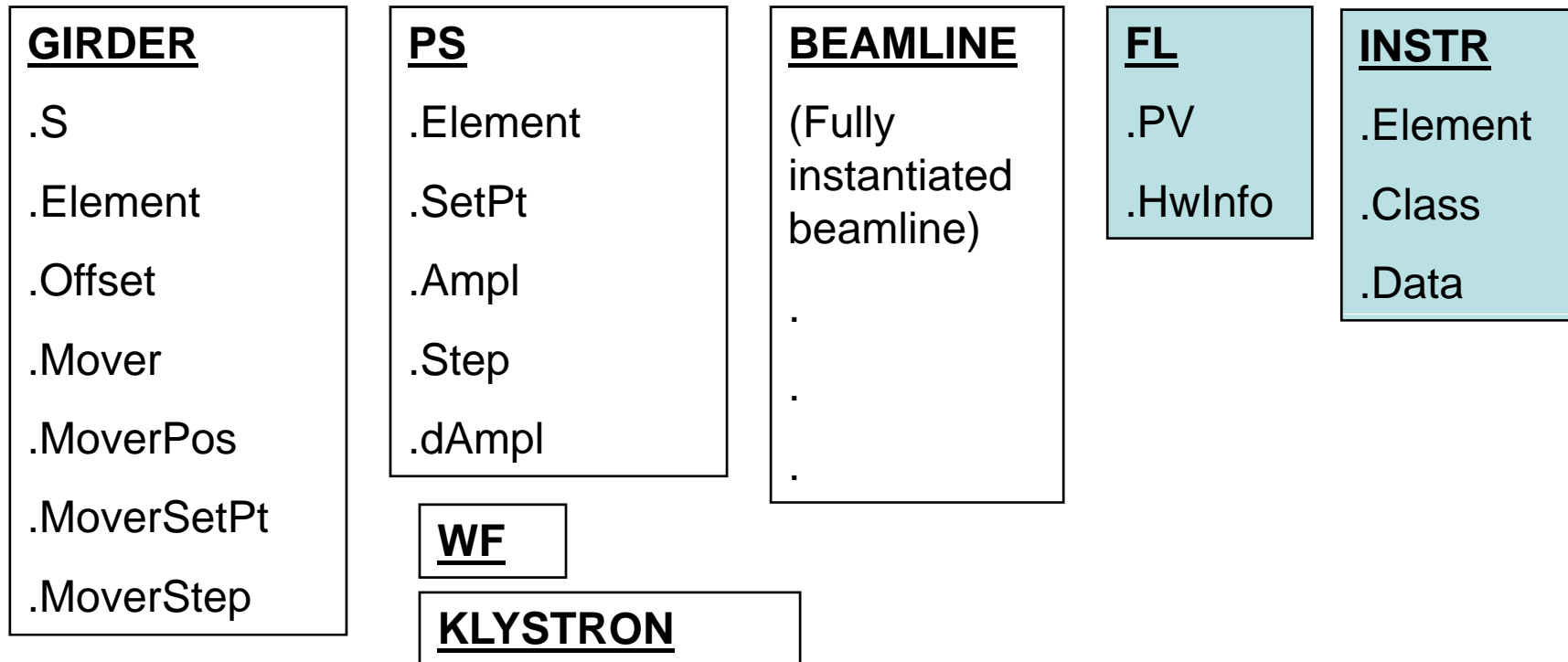
```
UAG(control) {whitegr}
UAG(user1) {Glen}
HAG(control-host) {whitelp2}
HAG(user1-host) {whitelp1}
.
.
.
```

```
ASG(DEFAULT) {
  RULE(1,NONE) {
    UAG(user1)
    HAG(user1-host)
  }
  RULE(1,WRITE) {
    UAG(control)
    HAG(control-host)
  }
}
.
.
.
```

```
ASG(user1-read) {
  RULE(1,READ) {
    UAG(user1)
    HAG(user1-host)
  }
  RULE(1,WRITE) {
    UAG(control)
    HAG(control-host)
  }
}
.
.
.
```

```
ASG(user1-write) {
  RULE(1,WRITE) {
    UAG(user1)
    HAG(user1-host)
  }
  RULE(1,WRITE) {
    UAG(control)
    HAG(control-host)
  }
}
}
```

# Lucretia – Floodland Data Structures



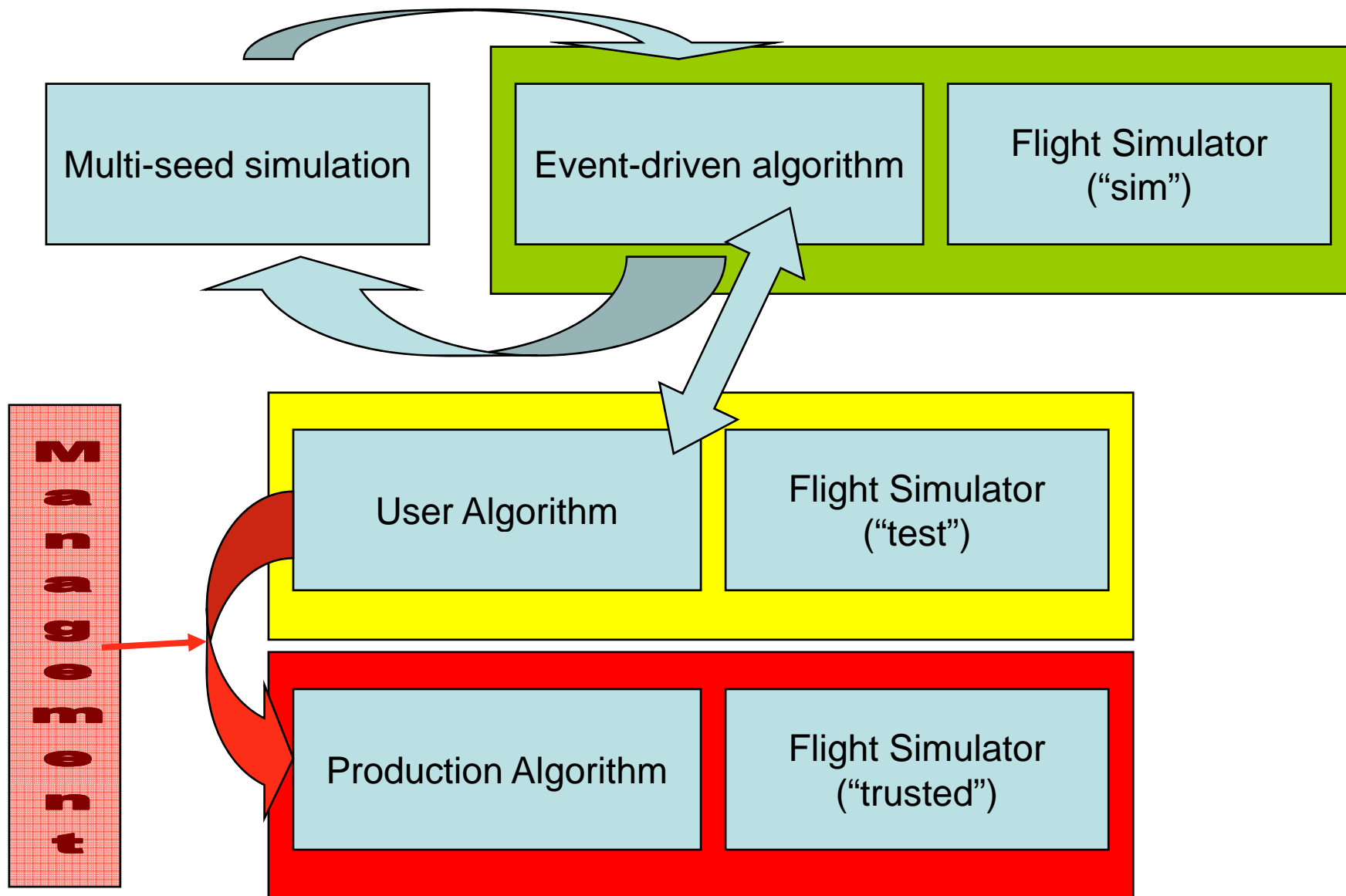
- INSTR and FL added structures for Floodland
- Mirror in AML



# Lucretia – Floodland Functions

- Changing PS's and Movers same functionality as in Lucretia
  - Change PS(i).SetPt / GIRDER{i}.MoverSetPT then:
  - PSTRim( PS LIST )
  - MoverTrim( GIRDER LIST )
- Unique Floodland functions include
  - Floodland keeps data structures synced with EPICS or can force at any time with “FIUpdate” command
  - AccessRequest( INSTR | PS | GIRDER List)
  - FISave/FILoad: ATF2 lattice + model data to/from .mat and .aml
- Floodland server allows access to “test” installation to alter data structures or use functions from outside Matlab (SAD/PLACET).

# Software Flow



# Demonstration...



“ And what if I gave you the key  
To the doors of your design... “

- “Torch”, Floodland, Sisters of Mercy.