

# MONSOON Software Design & Status

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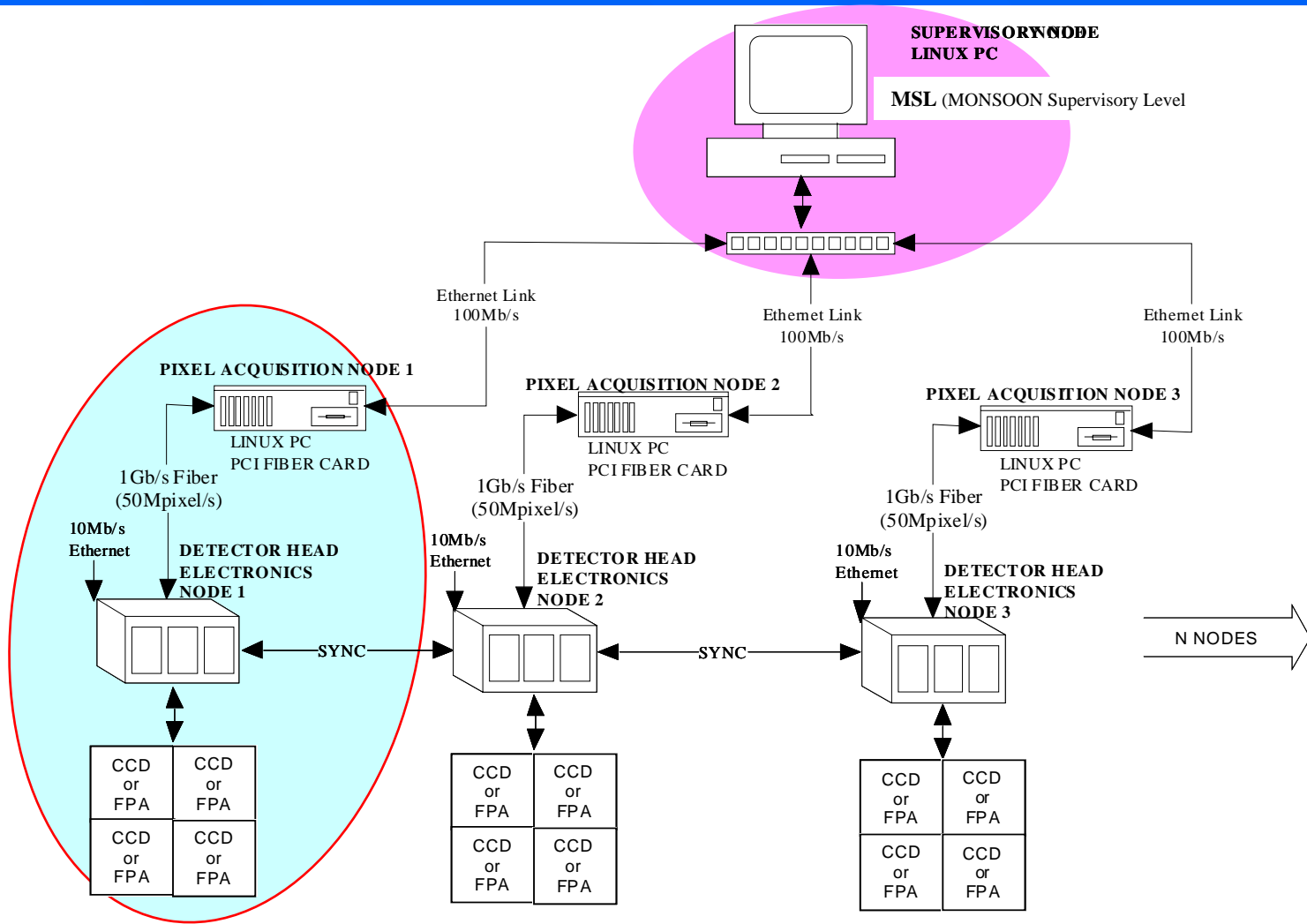
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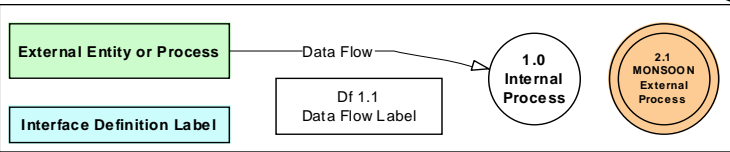
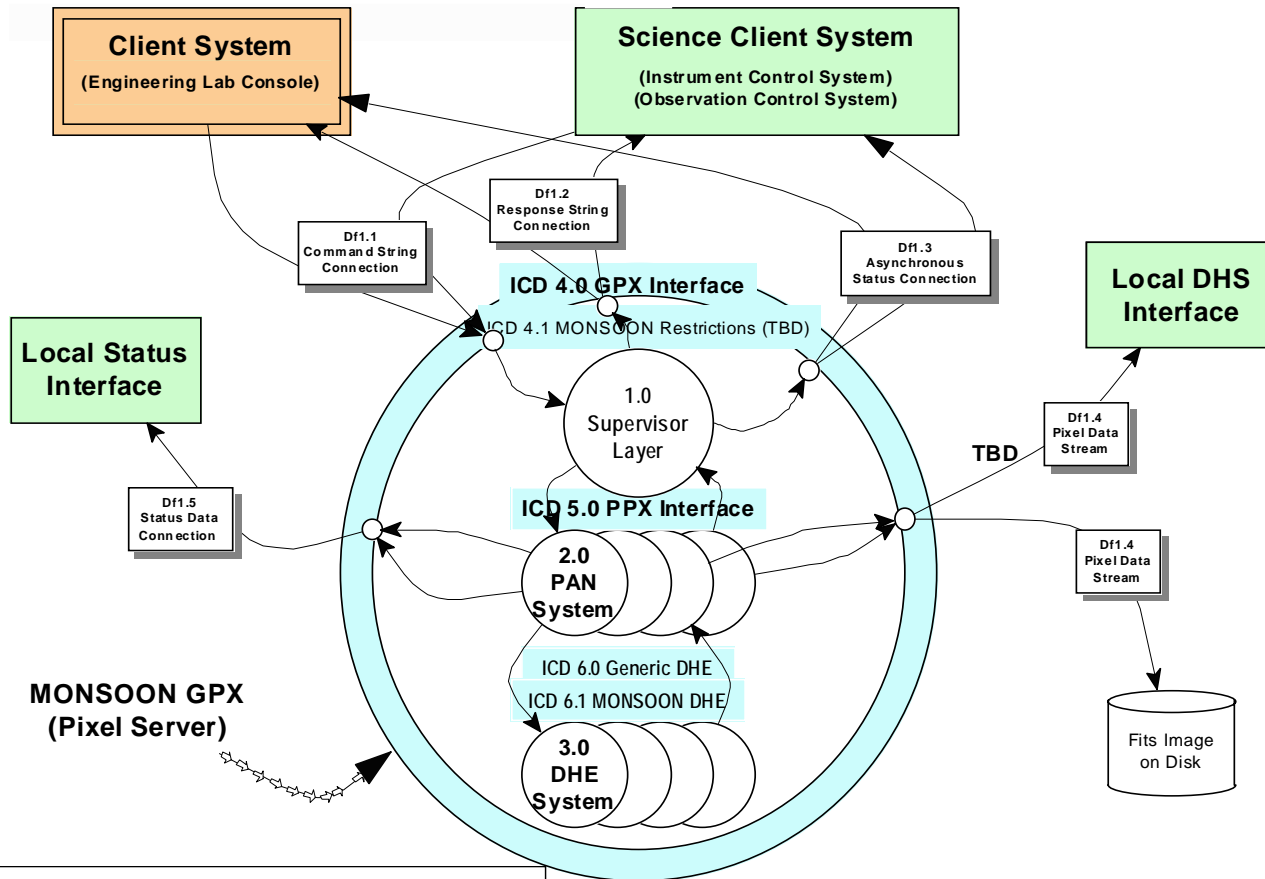
To-Do list for NEWFIRM

# Review of Software System Architecture

# MONSOON Pixel Server



# MONSOON Level 0 Context



# Three Layer System Architecture

1. MONSOON Supervisor (MSL) Layer.
2. Pixel Acquisition Node (PAN) Layer.
3. Detector Head Electronics (DHE) Layer.

# Three Layer System Architecture (cont)

## 1. MONSOON Supervisor Layer. (MSL).

- A command/control Layer, (no pixel data).
- Provides GPX interface to clients.
- Provide single point contact to system.
- Provides client access security.
- Provides multiple client connections.
- Provides error monitoring & recovery.
- Handles Command/response to/from multiple PANs.
- May run remotely or on a PAN.

# Three Layer System Architecture (cont)

## 2. Pixel Acquisition Node (PAN) Layer.

- No knowledge of other PAN-DHE pairs.
- Provides PPX interface to MSL or users.
- Provides run-time configuration of PAN/DHE.
- Provides first level data archiving.
- Provides multiple image processing ‘modes’.
  - » Fowler Sampling, coadds, MSR techniques, OT imaging.
- Provides parameter verification/control/help.
- Deals with IR/OUV/etc. differences.



# Three Layer System Architecture (cont)

## 2. Pixel Acquisition Node (PAN) Layer (cont).

- Handles single exposure sequencing.
- Handles raw data pre-processing.
- Provides interface to DHE hardware.
- Provides DHE sequencer configuration/download.
- Provides PAN error monitoring/reporting/recovery.
- Provides support for ‘speed ROI’.
- Provides support for ‘compression ROI’s’.

# Three Layer System Architecture (cont)

## 3. Detector Head Electronics (DHE) Layer.

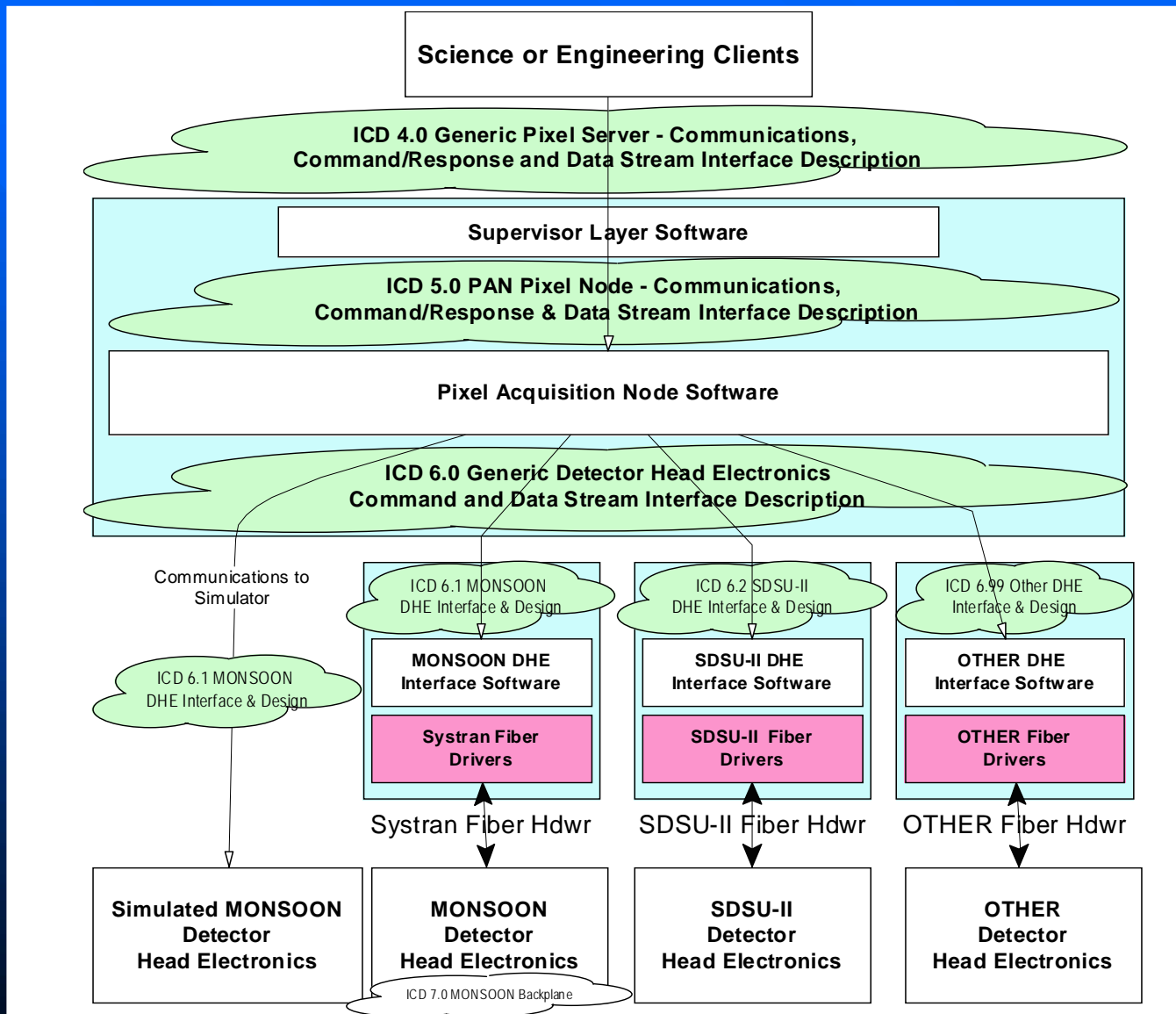
- Handles array hardware control.
  - » Voltage levels, sequencing, monitoring.
- Handles integration timing.
- Handles detector readout sequencing.
- Handles digital averaging.
- Handles shutter control.
- Can handle array temperature control.
- Board Self Identification and Version tracking.

# Interfaces and Libraries

# Interface Definitions

- ❖ Client System to Generic Pixel Server.  
ICD 4.0 Generic Pixel Server - Communications, Command/Response and Data Stream Interface Description. (*GPX*).
  - MONSOON Restrictions on Science Client Access.  
ICD 4.1 MONSOON Command and Parameter Restriction Lists.  
Developed in conjunction with Science Team.
  - ❖ Supervisor Layer to Pixel Acquisition Node.  
ICD 5.0 Generic Pixel Acquisition Node – Communications, Command & Response Description. (*PPX*).
  - ❖ PAN to Generic DHE (Detector Controller).  
ICD 6.0 Generic Detector Head Electronics - Command and Data Stream Interface Description. (*A Command Interface*).
  - ❖ MONSOON PAN to MONSOON DHE.  
NICD 6.1 MONSOON Detector Head Electronics - Command and Data Stream Interface Description. (*Hardware/Software Interface Details*).
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- ❖ Published interface

# Interfaces and Software Layering



# Monsoon Layers and ICD's

MONSOON GPX Image Acquisition system ICD and Software Layer relationship	
Monsoon Supervisory Layer	(ICD 4.0 GPX)
Monsoon PAN Interface Layer	(ICD 5.0 PPX)
<b>Pixel Acquisition Node</b>	
Monsoon DHE Utility Library (libDheUtil)	(ICD 6.0 Generic DHE)
Monsoon DHE Hardware Library (libmonsoon)	(ICD 6.1 MONSOON DHE)
Monsoon Com Utility Library (libComUtil)	(Com Util Library API)
Monsoon Com Hardware Library (libsystran)	(Com Hdw Library API)
Systran SL240 Drivers (libfxslapi)	(FXSL Library API)
<b>Systran SL240 Hardware</b>	
<b>Monsoon DHE (Detector Head Electronics)</b>	

General Status	NEWFIRM Status
Not started	Not Needed
In Testing	In Testing
Complete (in use)	Complete (in use)
Complete (in use)	Complete (in use)
Complete (in use)	Complete (in use)
Complete (in use)	Complete (in use)
Complete (in use)	Complete (in use)
COTS (Complete)	COTS (Complete)
COTS Hardware	COTS Hardware
NOAO/CTIO Hdw	NOAO/CTIO Hdw

Pixel Acquisition Node

# General Functionality Libraries

All complete and either in test or in use now

- `libcmdCfgUtil`- runtime configuration to specific detector.
- `libcliUtil`- command line interface; parse, search & help.
- `libqueUtil` - queue functions; new, add, remove, full, empty.
- `libsemUtil` - semaphore functions; new, init, give, take, release...
- `libshmUtil` - shared memory functions; attach, detach...
- `libsockUtil` - socket functions; new, listen, accept, read, write...
- `libmiscUtil` - a set of routines used by many pan processes.

# Generic Interface Libraries

Complete and in use now (no changes needed for NEWFIRM)

- LibppxUtil - the PAN pixel server interface routines (ICD 5.0)
- LibdheUtil - generic DHE interface routines (ICD 6.0)
- libcomUtil - generic communications link routines
- libpanUtil - shared memory setup & init used by PAN processes



# Hardware Specific Libraries

Complete and in use now (no changes needed for NEWFIRM)

- **libsystan.**

- Implements the SL240 specific interface to the com link

- **libmonsoon.**

- Implements the MONSOON DHE access routines (ICD 6.1)

# Focal Plane Specific Libraries

- libdetCmnds.
  - Implements routines unique to a detector/instrument.
  - Implements OUV, IR, Guider, etc. differences.
  - Integration Time Calculations, ROI checking & setup,
  - Unique Array Initialization & Setup requirements.
  - OTI details, charge/image shift commands, etc.
  - User Function name to 'C' function translation provided.
    - » Same structure as runtime command configuration.
    - » Translation compiled into library.
  - Shared Library loaded at run time.
    - » One Library for each unique detector/instrument combination.
    - » Library loaded from detector/instrument directory.

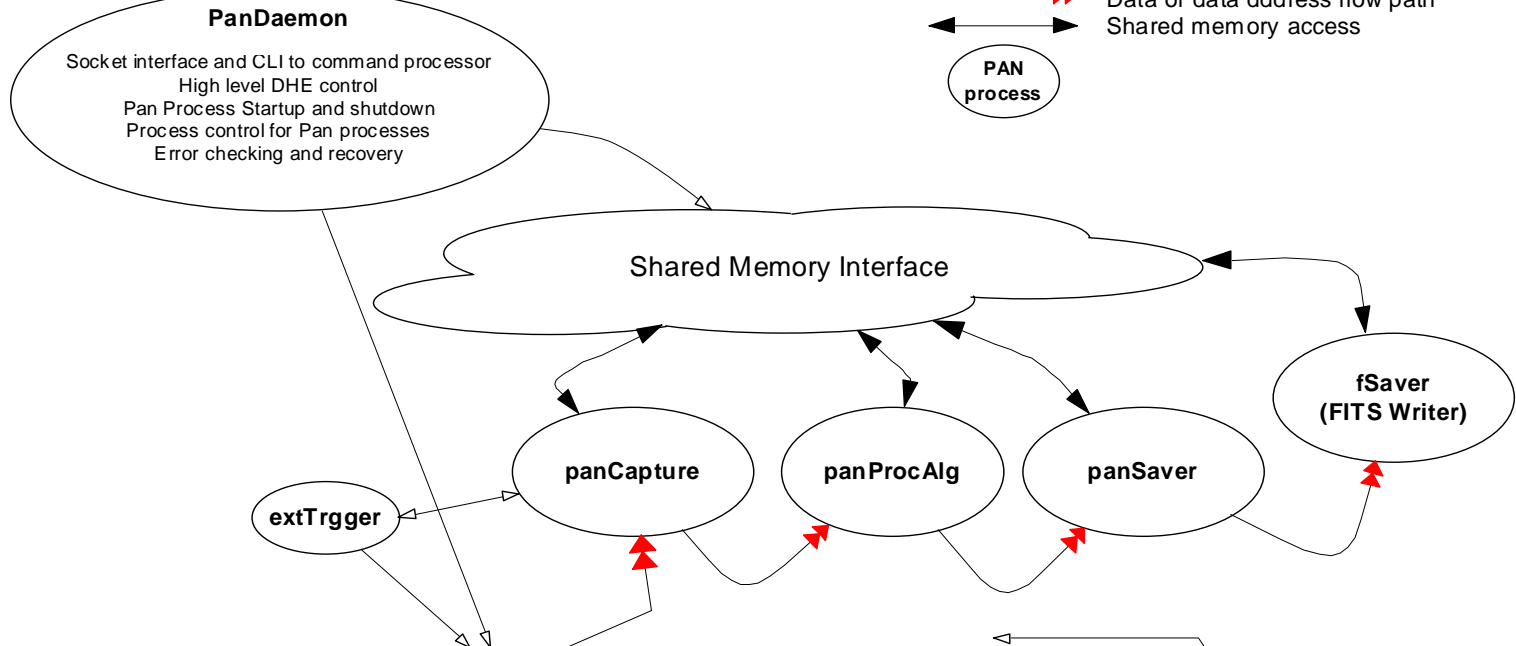
# Focal Plane Specific Library STATUS

- libdetCmnds.
  - libgeneric - version complete and in test.
  - libaladdin\_III - version complete and in use.
  - liborion\_II - version complete and ready for test.
  - liborion\_II\_2x2 - version needed for NEWFIRM in work.
    - » No changes over ORION\_II version foreseen at this time
  - libota - version in design phase.
  - libccd - version for single CCD testing similar to generic

# PAN Process Architecture and Status

# PAN Layered Process Architecture

## libppx - Generic Pan Interface ICD 5.0



## libdheutil - Generic DHE Interface ICD 6.0

## libmonsoon - Monsoon DHE hardware interface ICD6.1

## libcomutil - generic communications link routines

## libsystran - systran versions of communications link interface

## libfxslapi - Systran SI240 Driver

Well defined API's

# Pan Process Status

## ■ panDaemon

- ICD 5.0 - “ppx interface” complete and tested.
- ICD 6.0 - “generic” DHE interface - complete and tested.
- ICD 6.1 - MONSOON DHE interface - complete and tested.
- DHE/PAN Attribute access routines complete and in test.
  - » All currently used routines are tested.
  - » Additional routines may need testing/modification.
  - » Attribute array code complete and in test.
- panDaemon interface to panCapture tested in dheHdwDbg.
- Pan process startup routines still in coding.

# Pan Process Status (cont)

## ■ panCapture

- Data capture interface
  - » ICD 6.0 - “generic” DHE interface - complete and tested.
  - » ICD 6.1 - MONSOON DHE interface - complete and tested.
- DHE/PAN Attribute access routines complete.
- panCapture interface to buffer queues written and in test.
- panCapture data capture routines tested in dheHdwDbg.
- panCapture automated process startup still in coding.

# Pan Process Status (cont)

## ■ panProcAlg

- Data processing interface
  - » ICD 6.0 - “generic” DHE interface - complete and tested.
  - » ICD 6.1 - MONSOON DHE interface - complete and tested.
- DHE/PAN Attribute access routines complete.
- panProcAlg interface to buffer queues written and in test.
- panProcAlg data processing routine tested in dheHdwDbg.
- panProcAlg automated process startup still in coding.



# Pan Process Status (cont)

## ■ panSaver

- DHE/PAN Attribute access routines complete.
- panSaver interface to buffer queues written and in test.
- panSaver image save routine tested in dheHdwDbg.
- panSaver automated process startup still in coding.
- panSaver Header info creation not yet coded.
- Final image publication scheme to NEWFIRM DHS not finalized.

# Software Documentation Status

- System Architecture document in work.
- Software ICD's (4.0, 5.0, 6.0, 6.1) Published.
  - Some modification/rewrite needed to match actual interface.
- Library API Published.
  - Maintained with Source code - Some modification/rewrite will be needed to match recent changes
- Process description documentation begun.
  - Using source code Documentation system for processes.
  - Manually produced text used to detail process interactions.
  - Queues and Semaphores described in added text.

# Test & Verification Status

- General function libraries complete and tested.
  - in individual test program and in panDaemon.
- Generic interface libraries complete and tested.
  - in individual test program and in panDaemon.
  - Many also tested in dheHdwDbg.
- Hardware specific libraries
  - Currently libraries are being used in dheHdwDbg.
    - » ALADDIN\_III library tested with dheHdwDbg on actual array
    - » Generic/CCD library tested with panDaemon.
    - » ORION\_II library tested with panDaemon.
    - » ORION\_II\_2x2 library in coding.

# Test & Verification Status (cont)

- In PAN process system.
  - All Processes verified against functional description.
  - All processes are compiled and in test.
  - Processes being tested against GEMINI DEWAR.
  - Automated Process startup still in coding.

# Schedule & Resources

- Libraries tested & running in dheHdwDbg (May `03)
  - Generic Interface Libraries (DONE)
  - General Utility Libraries (DONE)
  - Hardware Specific Libraries
    - » libsystran, libmonsoon (DONE)
  - Detector Specific Libraries
    - » generic, ALADDIN\_III - (DONE)
    - » ORION\_II - ready for testing
    - » ORION\_II\_2x2 - in coding (same as ORION\_II)
- PAN Interface & processes running DHE (Sept `03)
  - PPX interface Library (DONE)

# Schedule & Resources (cont)

- TCL/TK Engineering Client (Sept. '03)
  - First functionality (DONE)
  - Scripts, auto-configuration, auto GUI setup, etc in work
- Everything Needed for NEWFIRM (Nov `03)
  - libORION\_II - ready for test (Completion Jan 03)
  - libORION\_II\_2x2 - in coding (Completion Jan 03)
  - Configuration files
    - » ORION\_II\_2x2.arr (DONE)
    - » ORION\_II\_2x2.cfg - constructed with hardware in work
    - » ORION\_II\_2x2.ucd - sequencer code file - in work
- Multi-Pan system development starting (Apr '04)

# To-Do List for MONSOON

## ■ Still to be done for General MONSOON

- Pan process coordination testing (3 MW)
- Automated startup routines/scripts (2 MW)
- ROI's, single-Array readout, added Error Handling, added Simulation capabilities, runtime process control (restart, reset, new algorithm load), etc. (?? MW)
- Handling for CCD detector details. (?? MW)
- Complete Engineering Client functionality (4 MW)

# To-Do list for NEWFIRM

- Still to be done for NEWFIRM (assuming a single PAN-DHE pair)
  - Detector specific library testing (2 MW)
  - Detector specific library testing w/arrays (1 MW)
  - Configuration files testing -
    - » ORION\_II\_2x2.arr (DONE)
    - » ORION\_II\_2x2.cfg - constructed with hardware (0.5 MW)
    - » ORION\_II\_2x2.ucd - sequencer code file - (2 MW)
  - Setup & Observing MODE files - Creation and Testing
    - » To be done by NEWFIRM scientists and engineers.
    - » Some recoding may be needed (2 MW)
  - Integration and testing with NEWFIRM Client (2 MW)
  - DHS interface routines (4 MW)