l'Observatoire de Paris — LESIA
Laboratoire d'Études Spatiales et d'Instrumentation en Astrophysique

Durham University

MICROGATE

PLDA

Green Flash

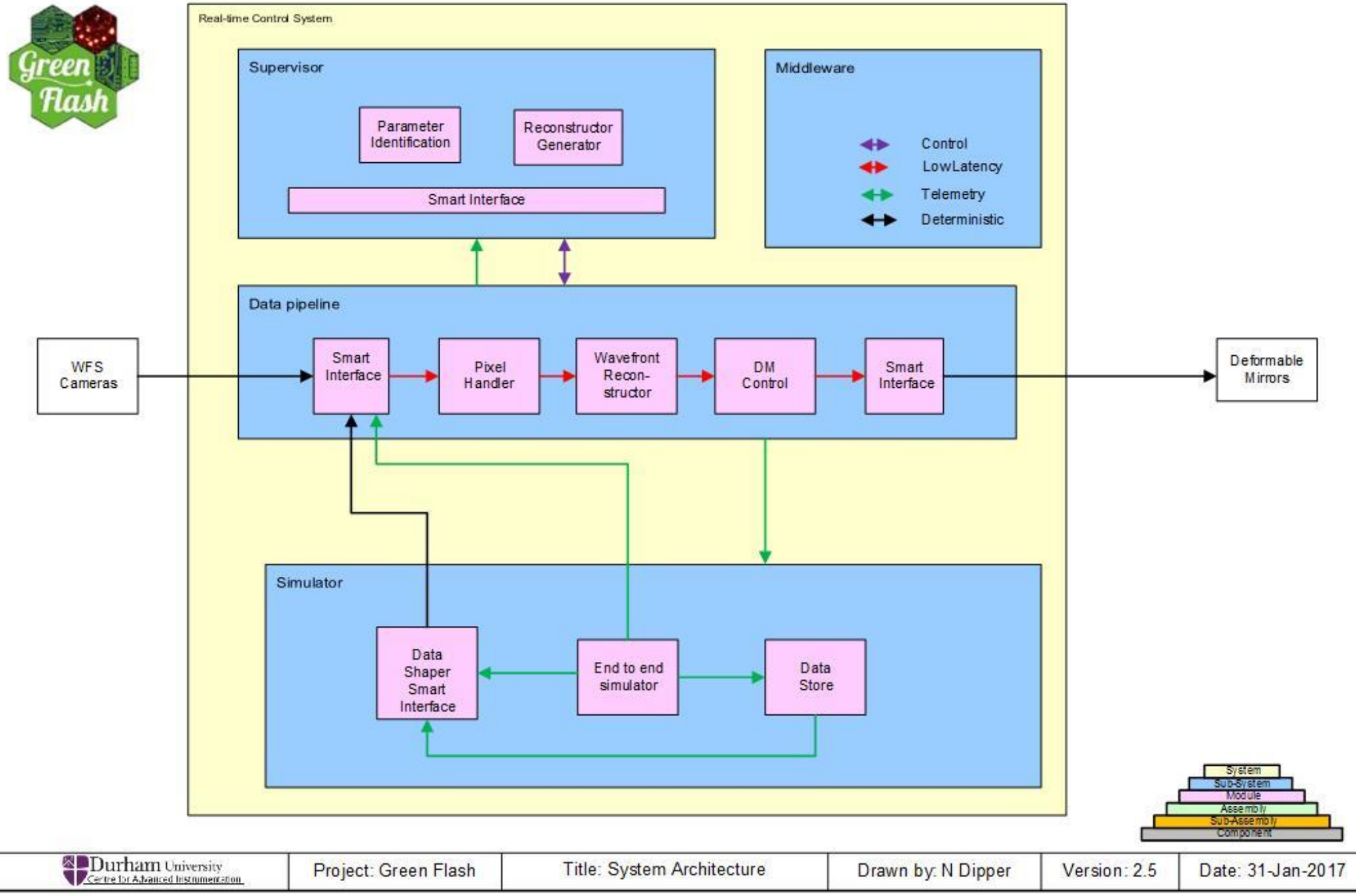
High performance computing for real-time science

Smart Interconnect
Downselect criteria

Mid-Term Review – Meudon Feb. 2017

European Commission

Project #671662 funded by European Commission under program H2020-EU.1.2.2 coordinated in H2020-FETHPC-2014



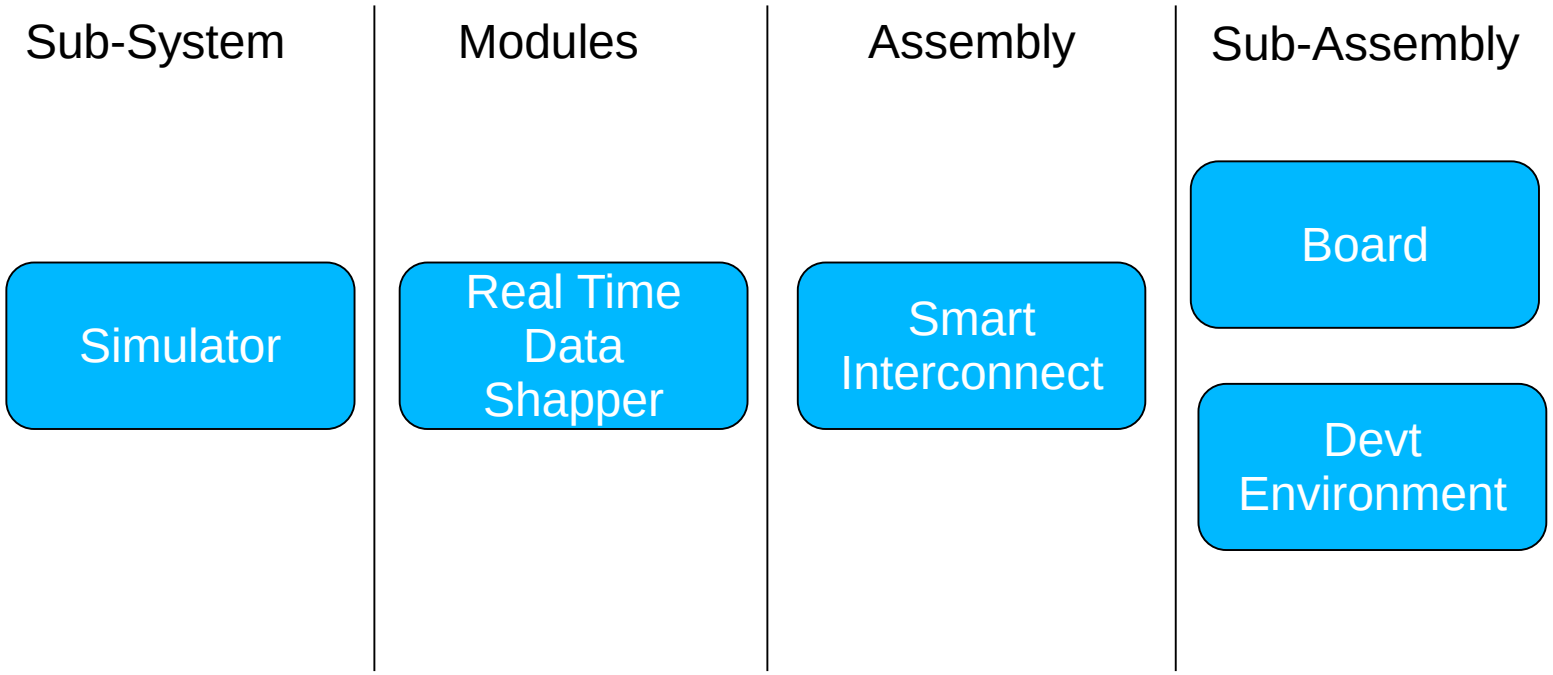
Durham University Centre for Advanced Instrumentation	Project: Green Flash	Title: System Architecture	Drawn by: N Dipper	Version: 2.5	Date: 31-Jan-2017

Smart Interconnect perimeter

- Smart Interconnect :
  - not a sub-system by itself, rather an assembly of interfacing subsystems
  - Depending on sub-system it participates and architectural breakdown of this sub-system, Smart Interconnect can inherit a variable set of requirements.

    Example : if used for Data Pipelining subsystem, Smart Interconnect could :
    - Support variable number of interfaces presented in above diagram
    - Handle (part of) “Pixel Handler” function, or even more (depending on its computational capabilities)

Smart Interconnect Breakdown



- Being in charge of Smart Interconnect delivery, we plan to develop tables of available options, to populate over time, in which sub-systems will be able to pick the most suitable assembly to fulfill their specific requirements

Sub-assemblies

Board	Board Configuration					Performance		Cost	Power (board)
	FPGA	Daughter card	PCIe sub-system	Ethernet sub-system	Memory sub-system	Bandwidth	Computation capability (Y/N)		
XPressKUS	Xilinx Kintex UltraScale 040	Faster Technologies S-14	PCIe x8 gen 3	1 QSFP	2 x 4 GB DDR3		Y		
XpressGX5	Altera Stratix V EA7	N/A	PCIe x8 gen 3	1 QSFP	2 x 4 GB DDR3		Y		
XpressGXA10	Altera Arria10	N/A	PCIe x8 gen 3/4	2 QSFP	? X ? GB DDR4		Y		
Microgate uXComp							Y		
Microgate µXLink (SOC)							Y		
Bittware A10PL4		N/A					Y		
Bittware XUPP3R	Xilinx Virtex UltraScale Plus	N/A					Y		
Mellanox 40G adapter	N/A	N/A					N		

Development Solution	Elements / components						Cost	Obsolescence	Availability of upgrades
	Interface	Features	Modularity	Reprogrammability	Ease of access (API, drivers, language,	Design scalability			
QuickPlay	10G Ethernet subsystem (Ethernet, TCP, UDP) PCIe		BSP on-demand IP & Kernels drop-down	Highest	Custom C++ API	Multi-Board support Single-FPGA Provider agnostic Open to new technologies		QuickPlay "covers" hardware obsolescence issues (vendor & technology agnostic)	
Vendor BSP + propr. IP									
Vendor BSP + custom IP									
Custom BSP + IP									
Standard COTS NIC				N/A					

Assembly

Assembly	Application	Obsolescence	Upgrability	Performance				Cost	Power (board)
				Bandwidth	Latency	Jitter	Computation		
COTS FPGA Board + QuickPlay									
MicroGate Board + QuickPlay									
MicroGate Board + Custom BSP / IP									
Mellanox 40G adapter solution									

➔ Allows to select Smart Interconnect assemblies tuned to their specific usages in GreenFlash