

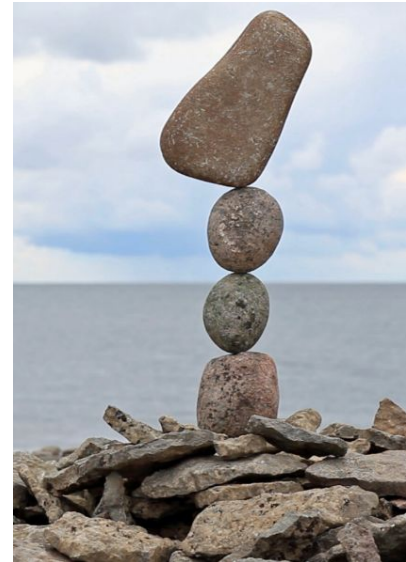
PPRP Proposal

SWIFT-HEP

(Finalising the proposal)

07 July 2020

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06-July-2020

4. Other essential scientific activities for particle physics

Computing and software infrastructure

- There is a need for strong community-wide coordination for computing and software R&D activities, and for the development of common coordinating structures that will promote coherence in these activities, long-term planning and effective means of exploiting synergies with other disciplines and industry
- A significant role for artificial intelligence is emerging in detector design, detector operation, online data processing and data analysis
- Computing and software are profound R&D topics in their own right and are essential to sustain and enhance particle physics research capabilities
- More experts need to be trained to address the essential needs, especially with the increased data volume and complexity in the upcoming HL-LHC era, and will also help in experiments in adjacent fields.

d) Large-scale data-intensive software and computing infrastructures are an essential ingredient to particle physics research programmes. The community faces major challenges in this area, notably with a view to the HL-LHC. As a result, the software and computing models used in particle physics research must evolve to meet the future needs of the field.

The community must vigorously pursue common, coordinated R&D efforts in collaboration with other fields of science and industry to develop software and computing infrastructures that exploit recent advances in information technology and data science. Further development of internal policies on open data and data preservation should be encouraged, and an adequate level of resources invested in their implementation.

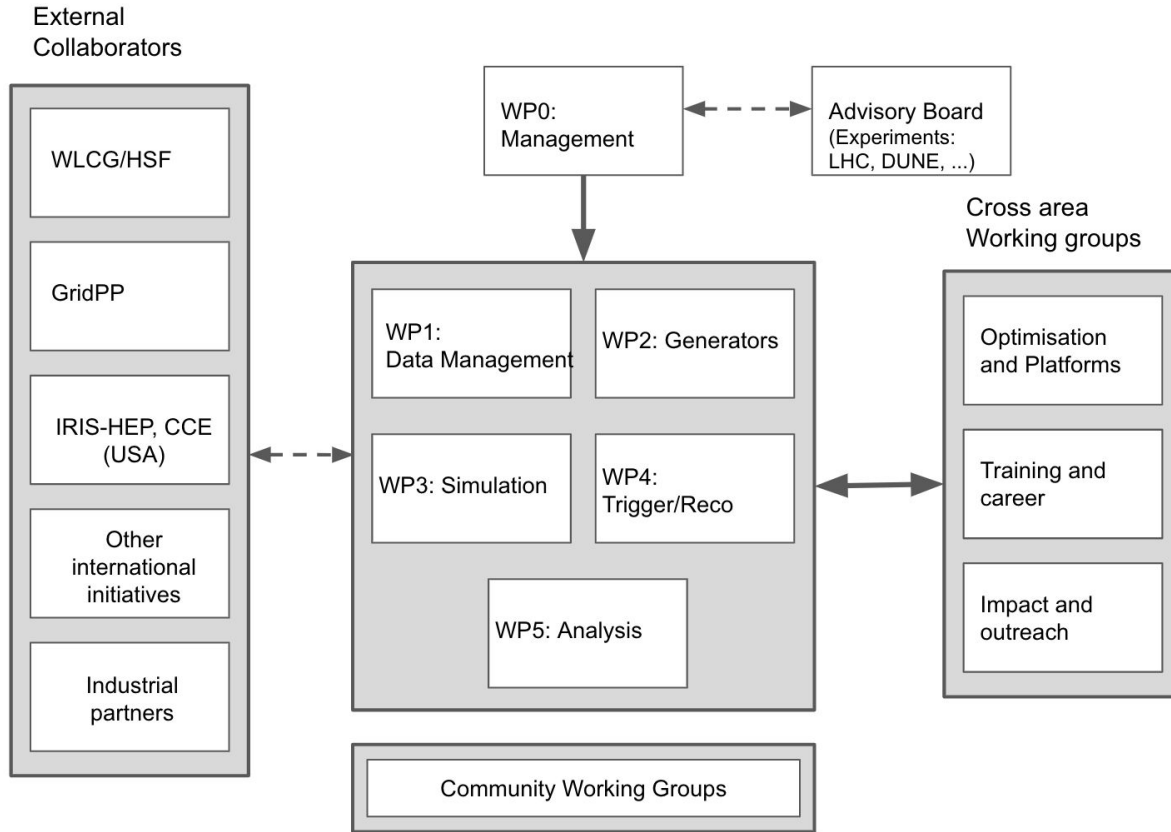
Where does this fit?

LHCC Review;

“One area of concern shared by the experiments and WLCG is finding means to ensure that the highly skilled personnel essential for R&D in computing and storage have meaningful career paths within the LHC community to provide for sustainability and the need for continual evolution over the lifetime of HL-LHC. “

Layer	Domain	Experiment 1	Experiment 2	Experiment 3	
6	Physicists	Analysis code	
5	Experiment Physicists programmer and software engineers	Analysis framework. Simulation, Reconstruction, Calibration Code	Moving Software down the stack ↓
4	Experiment Software Engineers	Software Frameworks	
3	Common Software HSF / SWIFT-HEP	Common software components (Data management, Generators, Geant4, Accelerator integration)			
2	GridPP / WLCG	Middleware infrastructure for Distributed Computing			
1	GridPP / WLCG	Physical Hardware			

Organisation



ECHEP areas, indicated as “Community Working Groups”

The intention is for such WGs to continue as it is now

Phase-2 proposal will see these as WP managers

Timeline

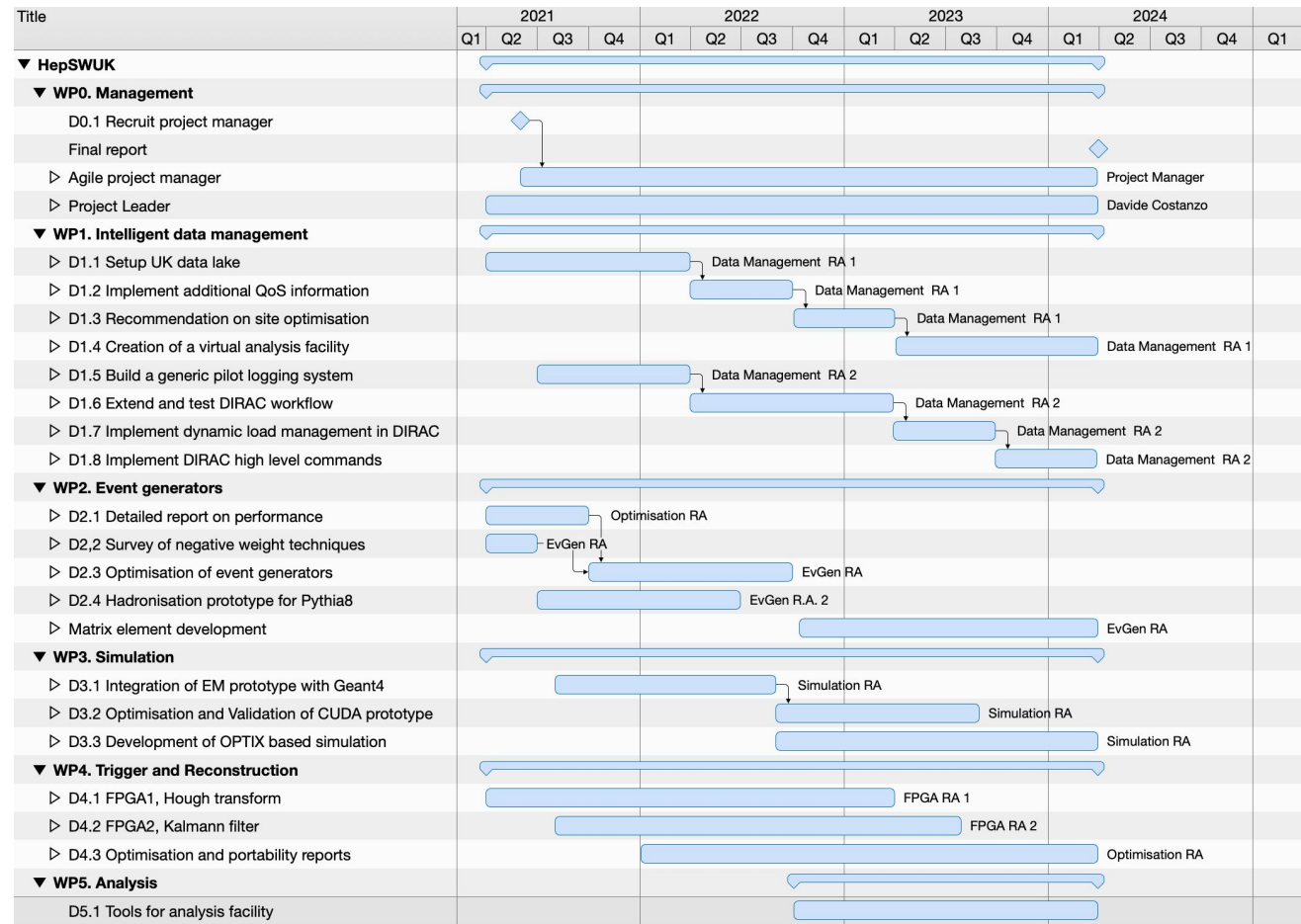
- Proposal draft growing at [\(link\)](#)
- Deadline for submission: **22 July**
- Note, this is the initial phase of what we wish to be a larger programme

	Entity	Scope	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Infrastructure	LHC	Global	Run-2	LS2		Run-3			LS3	Run-4			
	WLCG	Global	Global coordination of requirements, resources, policies, networking, security, etc.										
	GridPP	UK	GridPP5		GridPP6			?					
	IRIS-UK	UK	UKTO	IRIS 4yr x £4m			Support of non-LHC STFC communities?						
Experiments	ATLAS-CMS	Global	S&C Conceptual Design		S&C Technical Design			S&C deployment		Operation			
	LHCb	Global	S&C TDR	S&C deployment		Operation and Upgrade 2 preparation							
	DUNE	Global	Protodune	[Timeline bars]			[Timeline bars]				Operation		
	Others	Global	Experiments common software infrastructure design and development (neutrino, dark matter, etc)										
Software	HSF	Global	HEP Software Forum: White Paper --> Working Groups --> Community Meetings --->										
	IRIS-HEP	USA	S212	IRIS-HEP: 5yr x 5m USD				?					
	ECHEP	UK	£50k		ECHEP								
	Excalibur	UK	£240k		Excalibur		?						
	HSUK	UK				SWIFTHEP-1: 3 x £400k			SWIFTHEP-2: n x £2m?				

Proposal details (current thinking)

- WP1 (data and workflow management)
 - WP1.1 18 Person-months. Create a data lake move towards analysis facility
 - WP1.2 15 person-months. Generic system for users job submission
- WP2 (Event generators)
 - WP2.1 6 person-months. Technical code improvements / negative weights reduction
 - WP2.2 15 person-months. Matrix element calculation prototyping. Some work on (re)hadronisation (4 person-months??)
- WP3 (Simulation)
 - WP3.1 (16 person-months) Participation to Geant4 R&D. EM prototype to be used on accelerators
 - WP3.2 (6 person-months) Work on OPTIX as part of this? (or on top of this)
- WP4 (Reconstruction)
 - Prototype of tracking algorithms to run on accelerators (GPUs, FPGAs) using high-level languages
- WP5 (Analysis)
 - WP5.1 6 person-months. Caching of intermediate analysis results. Exploit WP1 infrastructure
 - WP5.2 6 person-months. Portability of analysis code

Initial Gantt chart --- Needs updating



Effort required per WP

		FY 21	FY 22	FY 23	Total
WP0	PM				10
	k£				
WP1	PM				33
	k£				
WP2	PM				22
	k£				
WP3	PM				23
	k£				
WP4	PM				32
	k£				
WP5	PM				10
	k£				
TOTAL	PM				123
Travel	k£	20	20	20	60
Training	k£				30??
W. A.	k£				??
Equipment	k£				50??

- This number will change once we inject realism into the proposal
- Probably overcommitted
- Separate section on further activities for which we don't request funding, as requested by STFC
- Travel and training budgets to be held centrally as with experiment's budgets
 - One of main goals is to provide a platform for exchange of ideas
- Equipment towards a development facility at RAL
 - Compile and run small jobs interactively
 - Provide access to e.g. GPUs or FPGAs

Process going forward

- In the Sol we said that we would look into funding part-posts to have staff working on common Software and A.N. Other experiment
- We invited interest to bid for the effort currently indicated from institutes
 - This was done with a deadline of **Wed 24** June at 4pm
 - After discussion with the AB we agreed on the effort levels going forward
 - Overall estimated cost is slightly (2-3%) above intended envelope
 - Proposal is now in its final drafting phase.
 - Language needs to be strengthened, especially Section 3
 - Diagrams and tables need to be completed
- A draft could be circulated for comments this week
 - Still a significant amount of work to be done

And finally....

The name! Thanks for those who voted
SWIFT-HEP was the chosen name

This is the beginning of a new collaboration.
We want to maintain our community spirit
Community building was the main goal of the past 6 months

The choice of projects going forward and institute allocations was a difficult one!
Indication of the interest across the UK in this initiative
Let's get this off the ground. There is more to come later
Thanks to all those involved so far