

Long-Term Strategy for NGGPS Physics Management (A Proposal for discussion)

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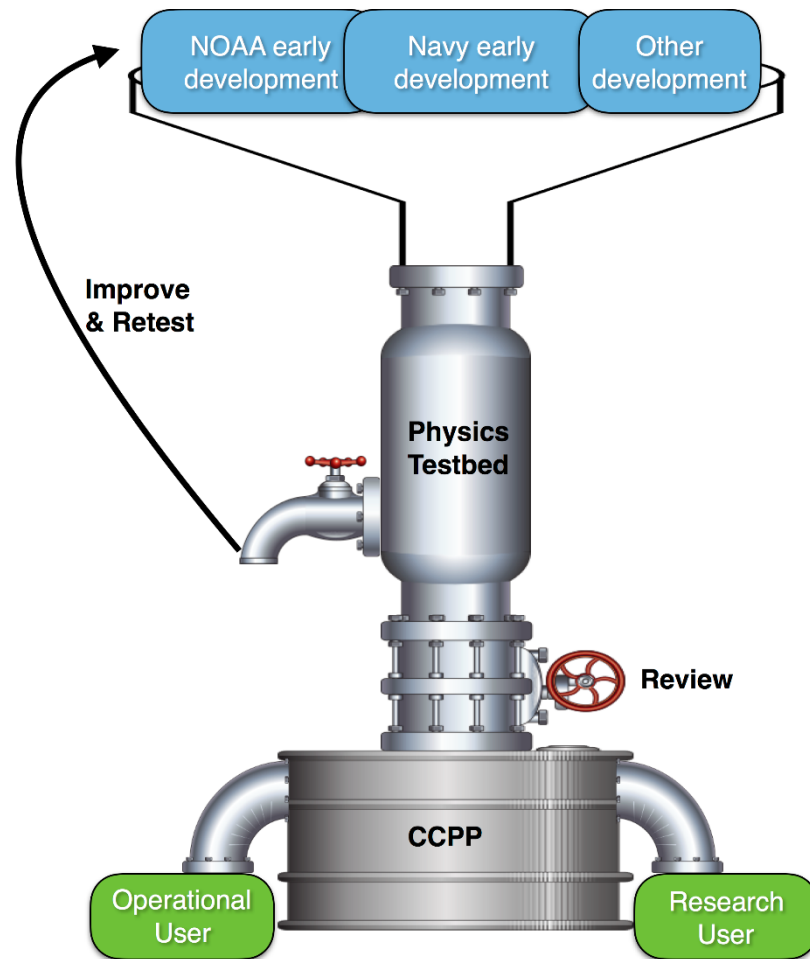
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Proposed Vision for Driver & CCPP

- A model agnostic, vetted, collection of codes containing atmospheric physical parameterizations for use in numerical weather prediction
- Why: a manifestation of the key strategy for engaging the breadth of U.S. talent needed to meet the challenge of NGGPS physics
- Goal: Have a system that supports both operations and R&D with community involvement, and stimulate development of the priorities listed in the [NGGPS Physics Team Plan](#), with initial focus on recommendations from [NGGPS Physics Workshop](#)

CCPP as a resource for O & R



Developers from various agencies contribute innovations to the CCPP

Testing is conducted in collaboration with GMTB

Contributions are evaluated based on transparent and well established criteria

CCPP is entry point for R & D and operational consideration

Criteria for inclusion in CCPP

- GFS operational suite (baseline) is grandfathered in along with a few new developments supported by NGGPS & CPT
- New physics is proposed by the developer, has to meet criteria, such as
 - Follows the Governance process described in this document
 - Meets the CCPP requirements ([listed here](#))
 - Is sufficiently different from other schemes already in CCPP
 - Works with Physics Driver (see J. Dudhia's talk)
 - Meets technical standards, such as timing performance, coding standards, does no harm, passes regression tests etc.
 - Demonstrates merit as a mature development that address known deficiencies, including comparison with existing scheme(s)

CCPP Governance

- **Scientific Review**

- Set strategic guidelines for physics development, testing, and evaluation
- Review test results for scientific merit

- **Technical Review**

- Set technical guidelines for physics development, such as code standards, efficiency, and code management
- Review proposed code(s) and suitability for IPD and CCPP

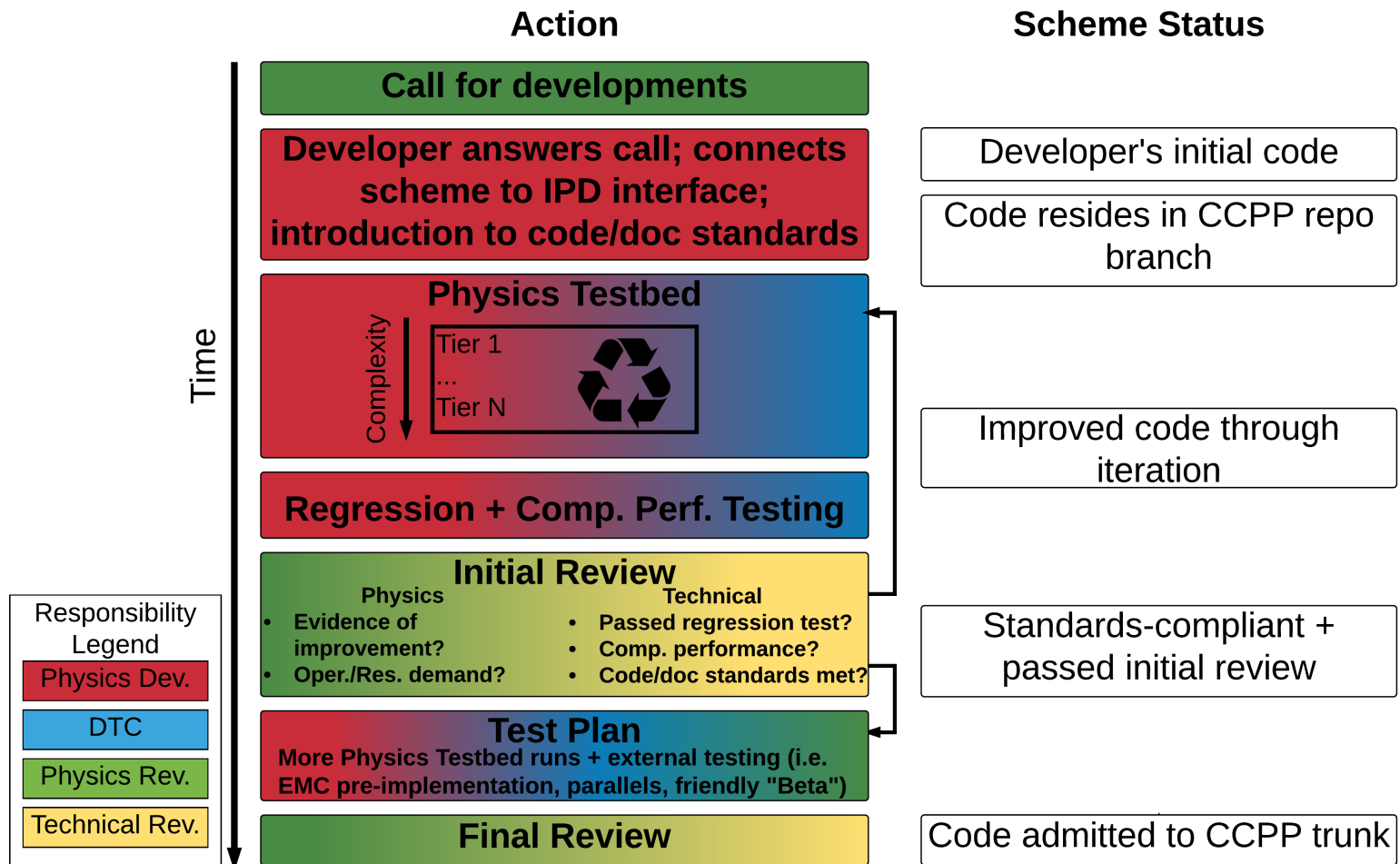
- **Reviewers**

- Work cohesively and are integrated in broader NGGPS/EMC governance
- Use open and transparent procedures supporting evidence based decision making process

Testing and Evaluation

- A comprehensive test facility is in place (see G. Firl's talk)
- Standard procedures used, with additional diagnostics added as needed
- Example of aspects to consider in a test plan
 - Motivation/Background/What is being tested/Deficiencies being addressed (hypothesis)
 - Source code origin (repository, branch/trunk, revision)
 - Test configuration: single column model, global, resolution, etc.
 - Input datasets; Forecast period(s) and length
 - Timelines for T&E; Procedure for evaluation
 - Computational resources
 - Roles and Responsibilities of parties involved
- T&E plan vetted through scientific and technical review

Workflow for Physics Development

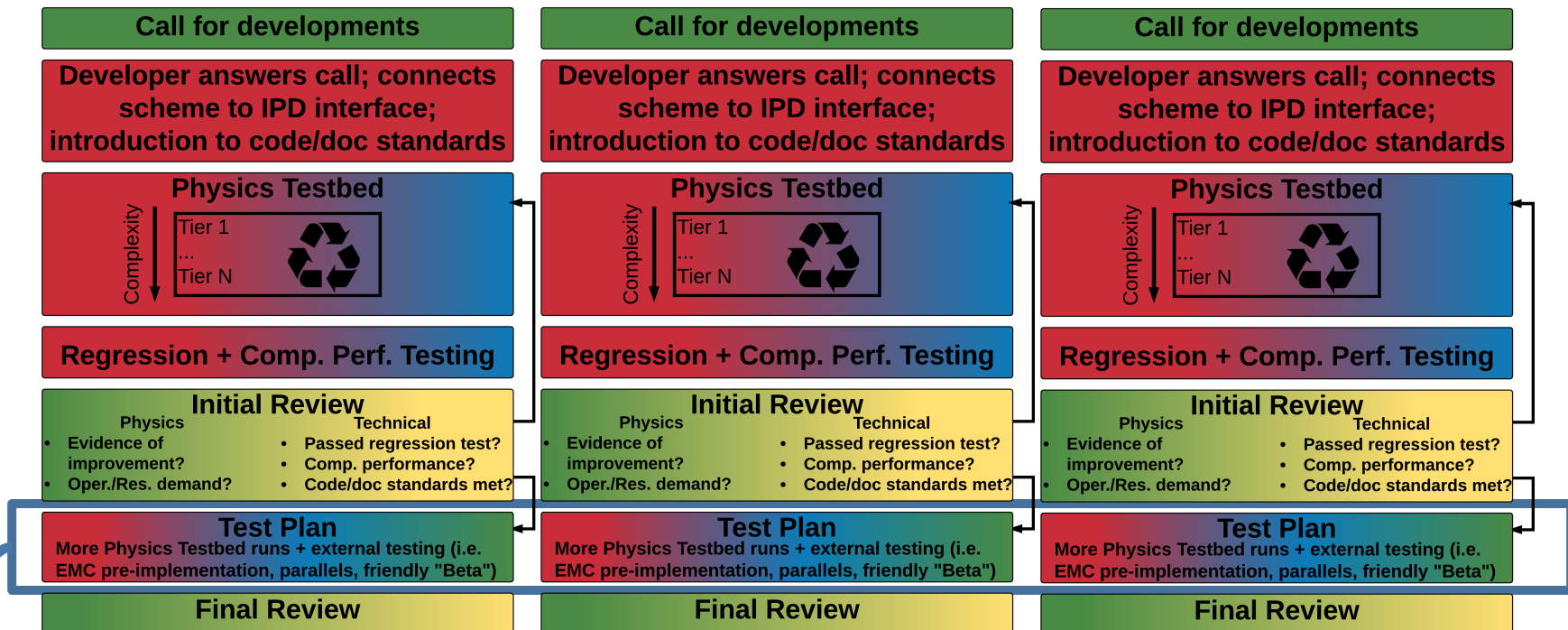


Workflow for Suite Development

Scheme 1

Scheme 2

Scheme 3



A Test Plan may involve testing several new developments as a suite

GMTB Timeline

		2017				
		1-Jan	1-Apr	1-Jul	1-Oct	1-Jan
IPD/CCPP Development	IPD design final	*	*	*		
	IPD/CCPP implementation plan	*	*	*		
	IPD/CCPP capability	*	*	*	*	
Governance	Define reviewers	*				
	Define sci/tech criteria for CCPP		*			
	Define CCPP code management		*			
	Implement CCPP code management			*		
	Create documentation strategy		*			
Testbed	Initial parameterization simulator	*	*	*		
	Enhance SCM capabilities (ongoing)					
	Enhance workflow capabilities (ongoing)					
	Demonstrate capability	*	*	*	*	*
Evaluation	Physics Testing					

Roles & Responsibilities -developer

- Provide implementation plan along with suggested testing and evaluation plan
- Place code in CCPP branch and connect code to Physics Driver
- Interface with GMTB and other partners to review scientific and technical aspects of code
- Conduct tier-1 testing (single column model, small sample of low resolution global runs)
- Participate in evaluation of results
- Document code and make it comply with coding standards
- Document known issues, dependencies and potential interactions with other physics schemes

Roles & Responsibilities - GMTB

- Maintain clear and transparent CCPP governance
- Establish guidelines for science and technical review
- Host the CCPP code repository (containing Driver)
- Provide information (and support) to developers for adding their code to CCPP and connecting it with Driver
- Maintain and augment testbed for experimentation, including access to codes, workflow and information
- Conduct a selected set of experiments in collaboration with developers; inspect preliminary results to identify any issues, engage with developer if needed
- Participate (lead?) evaluation of results
- Make test results publicly available

Roles & Responsibilities – Operational Center

- Participate in reviews
- Interface with GMTB to establish testbed in a way that is consistent with EMC procedures (all tests relevant for operational consideration)
- Conduct tests that are beyond the developer and GMTB means, (full scale pre-implementation tests for selected application)
- Participate in evaluation of results
- Conduct further full-scale evaluation for operational decision with inputs and feedback from the field and stakeholders
- Identify “advanced suite” of physics that is mature for transition to operations
- Transition codes to operations

Steps toward CCPP implementation

- The following steps have been undertaken
 - [Requirements for CCPP and Driver](#)
 - [Design for the IPD](#)
 - [Coding standards for the CCPP and Driver](#)
 - [Preliminary code management plan for the CCPP and Driver](#)
 - [Documentation requirements](#)
 - [Design and development plan for testbed](#)
 - [Documentation of GFS operational physics](#)
 - [Documentation of IPD](#)
- Next steps
 - Establish Scientific and Technical Review process
 - Define criteria for inclusion in CCPP
 - Setup code repository
 - Transition IPD from EMC to CCPP repository