The 12th WRF Users' Workshop
June 23, 2011, Boulder, CO

Community Gridpoint Statistical Interpolation (GSI) System and its role in bridging research and operational data assimilation community

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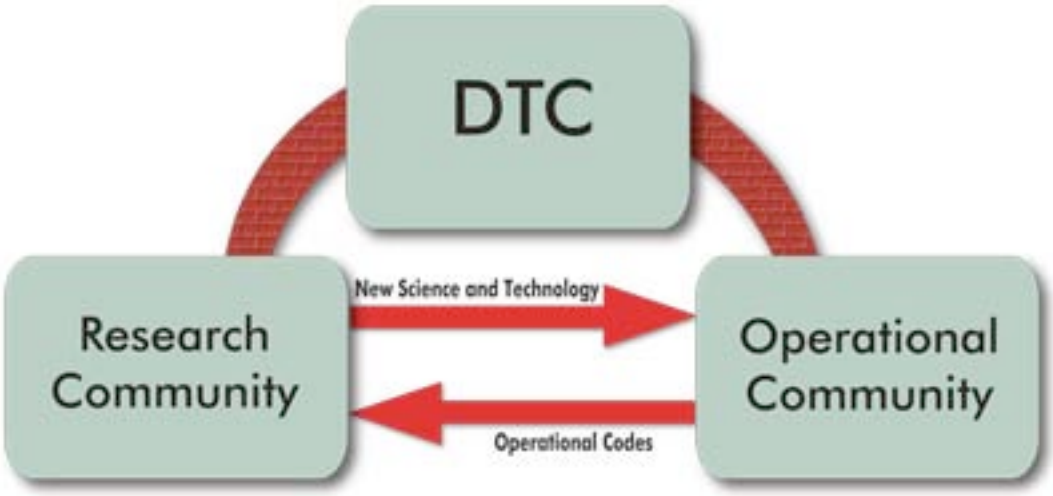
Developmental Testbed Center

NCAR-NOAA/GSD

What is GSI ?

- **G**ridpoint **S**tatistical **I**nterpolation
- Operation data assimilation system for
  - Global (NCEP GFS, part of NASA/GMAO 4DVAR)
  - Regional (NAM/NMMB, RR, RTMA, HWRF,…)
- Developed mainly by NCEP/EMC for operation
- Distributed developers
  - NCEP/EMC, NASA/GMAO, NCAR/MMM, ESRL/GSD, …
- Can be used as 3DVAR, Hybrid
  - observation operator for 4DVAR and EnKF

Who is DTC ?



- Developmental Testbed Center (DTC)
  - http://www.dtcenter.org/
- Bridge between research and operational community
- NWP systems supported by DTC
  - WRF, HWRF, **GSI**, MET, …

Community GSI

- Provide current operation GSI capability to research community (O2R)
- Provide a pathway for research community to contribute operation GSI (R2O)
- Provide a framework to enhance the collaboration from distributed GSI developers
- Provide rational basis to operational centers and research community for enhancement of data assimilation systems

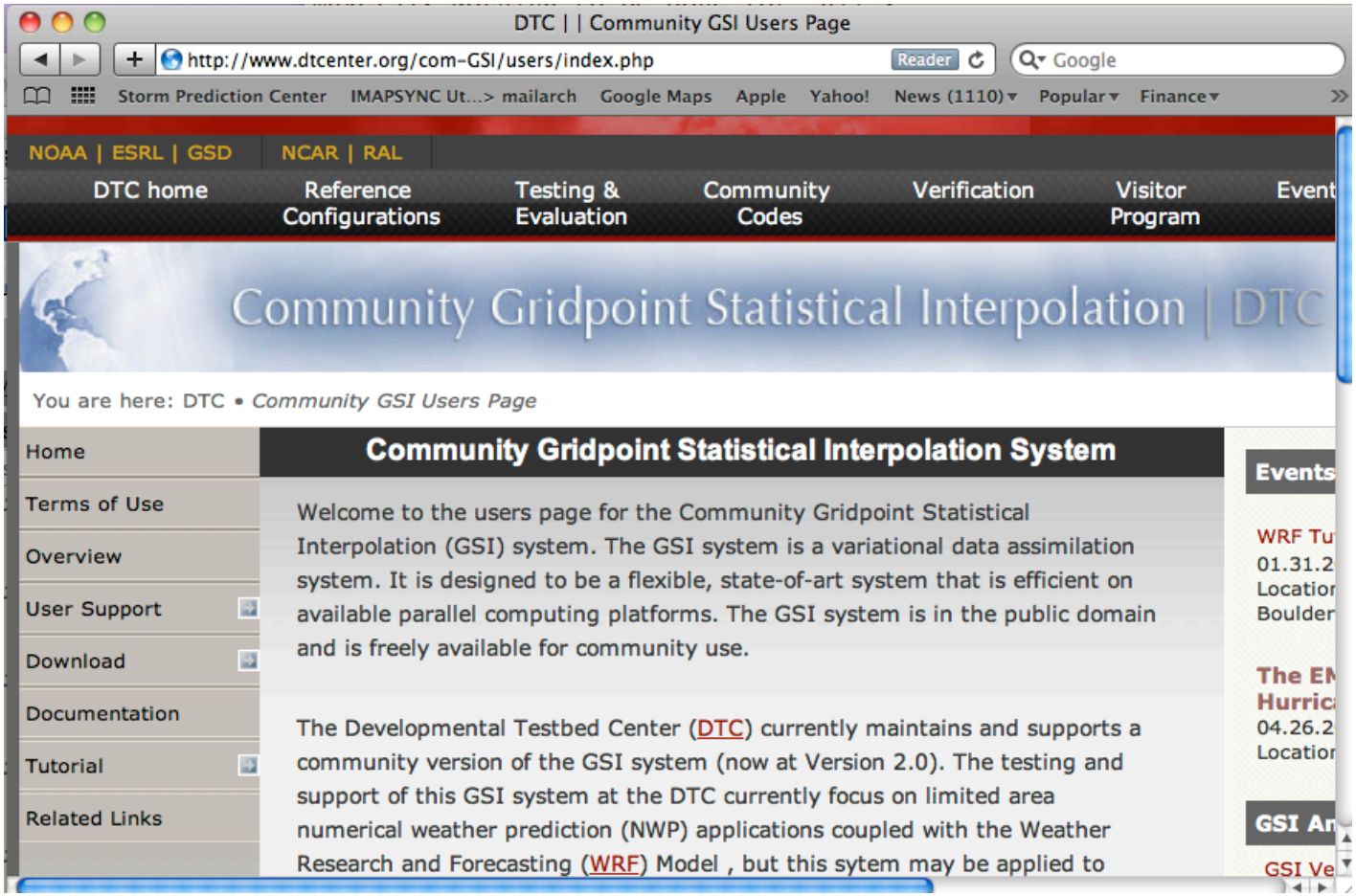
Community Code: O2R

- User's Webpage
- Annual release
- Annual residential tutorial
- Help desk (360 registered users)

Community GSI – User's Page

- Mainly support through User's Page and help desk:

  http://www.dtcenter.org/com-GSI/users/index.php



Community GSI – Annual Release

GSI Downloads

GSI System

You may download the following versions of the GSI system (including GSI source codes, libraries, compiling system, fixed files, and sample run script) from this site.

- Community GSI system Version 3.0: release on 04/29/2011
- Community GSI system Version 2.5 Patch Release: 11/29/2010
- Community GSI system Version 2.0: released on 04/27/2010
- Community GSI system Version 1.0: released on 09/25/2009

Source code and fixed files were based on:
the GSI EMC trunk r12534 (25 Feb 2011)
the community GSI trunk r593

Source code was based on the NCEP Global Implementation: Q1FY09

Source code was based on the NCEP Global Implementation: Q1FY10

With each official release code is a GSI User's Guide and on-line tutorial cases

GSI Documents And Publications

GSI User's Guide

- **GSI version 3.0** comprehensive user documentation: [pdf(5M)]; [ps(75M)]
- **GSI version 2.0** comprehensive user documentation [pdf]
- **GSI version 1.0** comprehensive user documentation [pdf]

GSI Tutorial Presentations

- **Summer 2010 DTC Community GSI Tutorial** (NCAR, Boulder CO) [presentations], [photos]

GSI Tutorials

The GSI On-line Tutorial provides the basic steps to compile the GS and test cases for the code to run.

- Tutorial for community GSI Version 3.0
- Tutorial for community GSI Version 2.0
  - Further exercises from the Summer 2010 Practical
- Tutorial for community GSI Version 1.0

Community GSI – Tutorial

- 2010 summer tutorial:
  - 14 lectures
  - 8-h practice session
- 2011 summer tutorial:
  - 28 June – 1st July
  - 13 Lectures
  - 4-h basic practice
  - Optional advanced practice
    - Full day on 1 July
- GSI Workshop on 28 June

Wednesday, June 29, 2011

8:00	Registration
8:30	Welcome, Background and Participants' Introduction - Hans Huang (NCAR)
9:00	Fundamentals of Data Assimilation - Tom Auligne (MMM/NCAR)
10:00	Coffee Break (Group photo)
10:30	Overview of GSI - John Derber (NCEP/EMC)
11:30	GSI management and collaboration - Hui Shao (DTC/NCAR)
11:45	Lunch (Provided)
1:00	GSI Fundamentals (1): Setup and Compilation - Don Stark (DTC/NCAR)
1:30	GSI Fundamentals (2): Run and Namelist - Ming Hu and Hui Shao (DTC)
2:00	Community Tools (1): PrepBUFR/BUFR: Basic tools, NCEP data tank, and Obsproc –Ruifang Li (MMM/NCAR)
2:45	Introduction to Practice Session - Ming Hu (DTC - NOAA/ESRL/GSD)
3:00	Coffee Break
3:30	Practice session (COMET classroom)
5:30	Adjourn

Thursday, June 30, 2011

8:30	Background and Observation Error Estimation and Tuning – Daryl Kleist (NCEP/EMC)
9:30	Community Tools (2): GEN_BE - Syed Rizvi (MMM/NCAR)
10:00	Coffee Break
10:30	GSI Fundamentals (3): Diagnostics - Chunhua Zhou(NCAR/DTC)
11:00	GSI Fundamentals (4): Applications - Kathryn Newman (DTC/NCAR) and Ming Hu (DTC - NOAA/ESRL/GSD)
11:30	Lunch (Provided)
1:00	Satellite Radiance Assimilation - John Derber (NCEP/EMC)
2:00	GSI Code and Interface - Ricardo Todling (GMAO/NASA)
2:30	GSI/ETKF Regional Hybrid Data Assimilation - Arthur Mizzi (MMM/NCAR)
3:00	Coffee Break
3:30	Practice session (COMET classroom)
5:30	Adjourn

Friday, July 1, 2011

9:00	Optional Practice Session - Advanced topics (COMET classroom)
10:30	Coffee Break
11:00	Optional Practice Session - Advanced topics (COMET classroom)
2:30	Adjourn

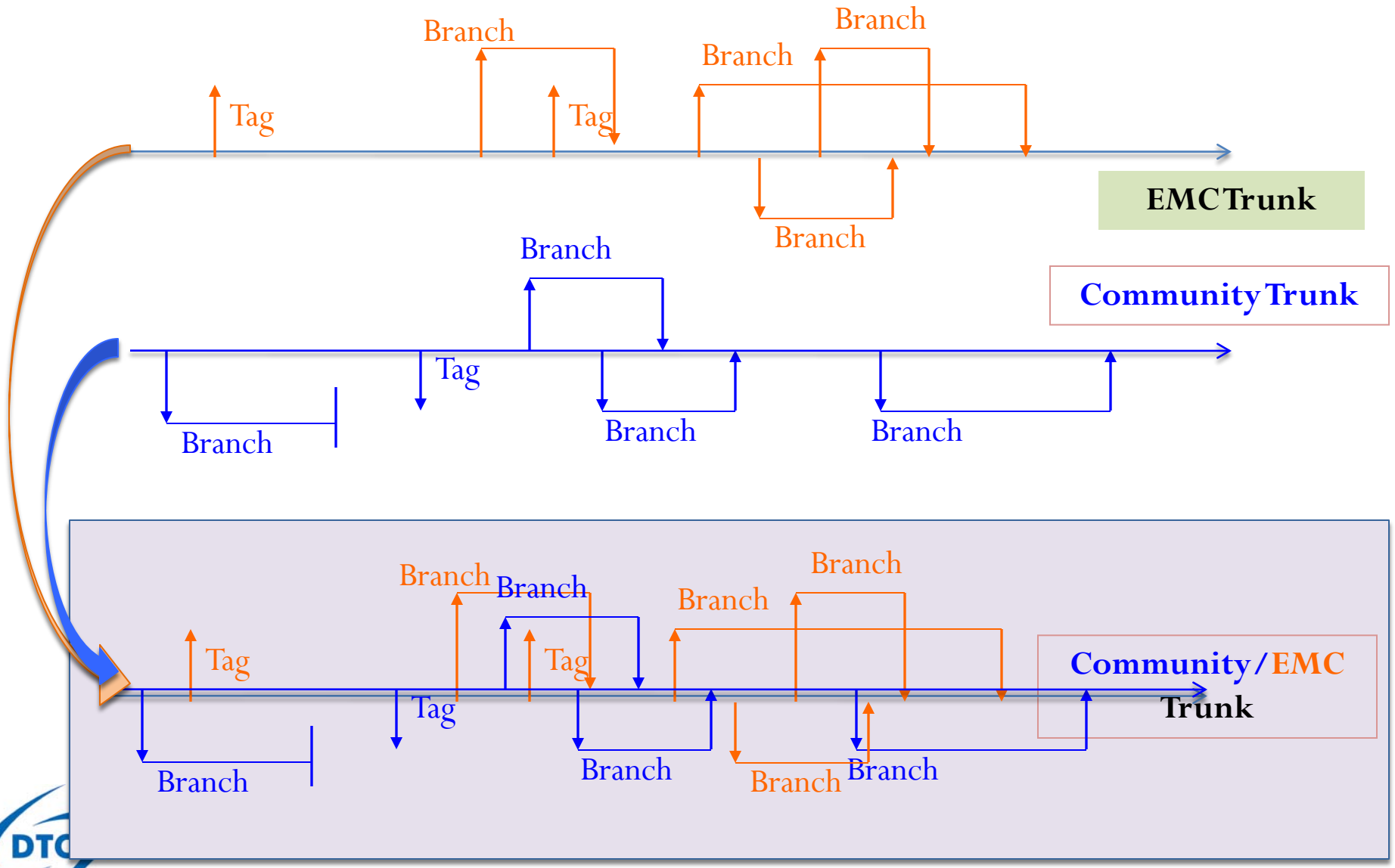
Community GSI - Help desk

- gsi_help@ucar.edu
- Any GSI related questions
- Most of questions were answered by DTC staff
- Forward complex questions to GSI developers

Community GSI: R2O

- Community GSI repository
- GSI review committee
- Commit the community contributions to trunk
- Monthly community GSI developer's meeting
- Help desk

Dual GSI Repository Structure



Community GSI repository

Test on multiple platform monthly

3

- IBM, Linux PGI and ifort, Mac PGI

2

DTC maintains the compiling system, community tools, and supplemental libraries

makefile

clean

configure

compile

util/

arch/

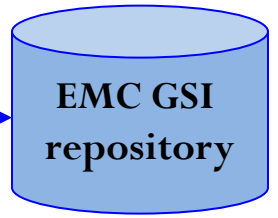
run/

fix/

libs/

src/

main/



Used for

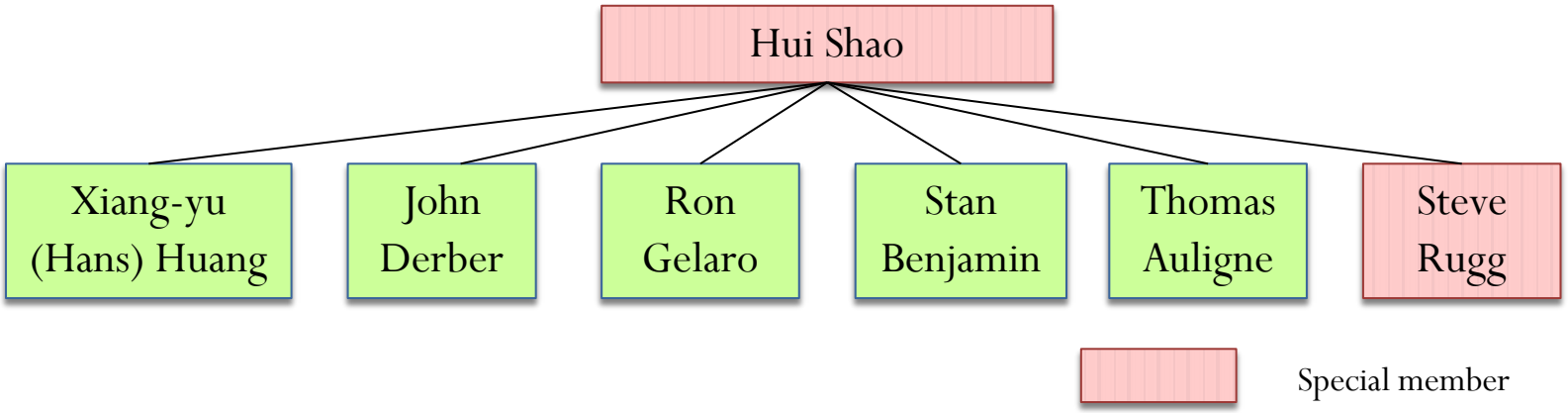
4

- Developers outside NCEP
- Community release

1

Mirror the GSI source code and fix files by syncing source code and fix directory with NCEP trunk weekly

GSI Review Committee (2011)

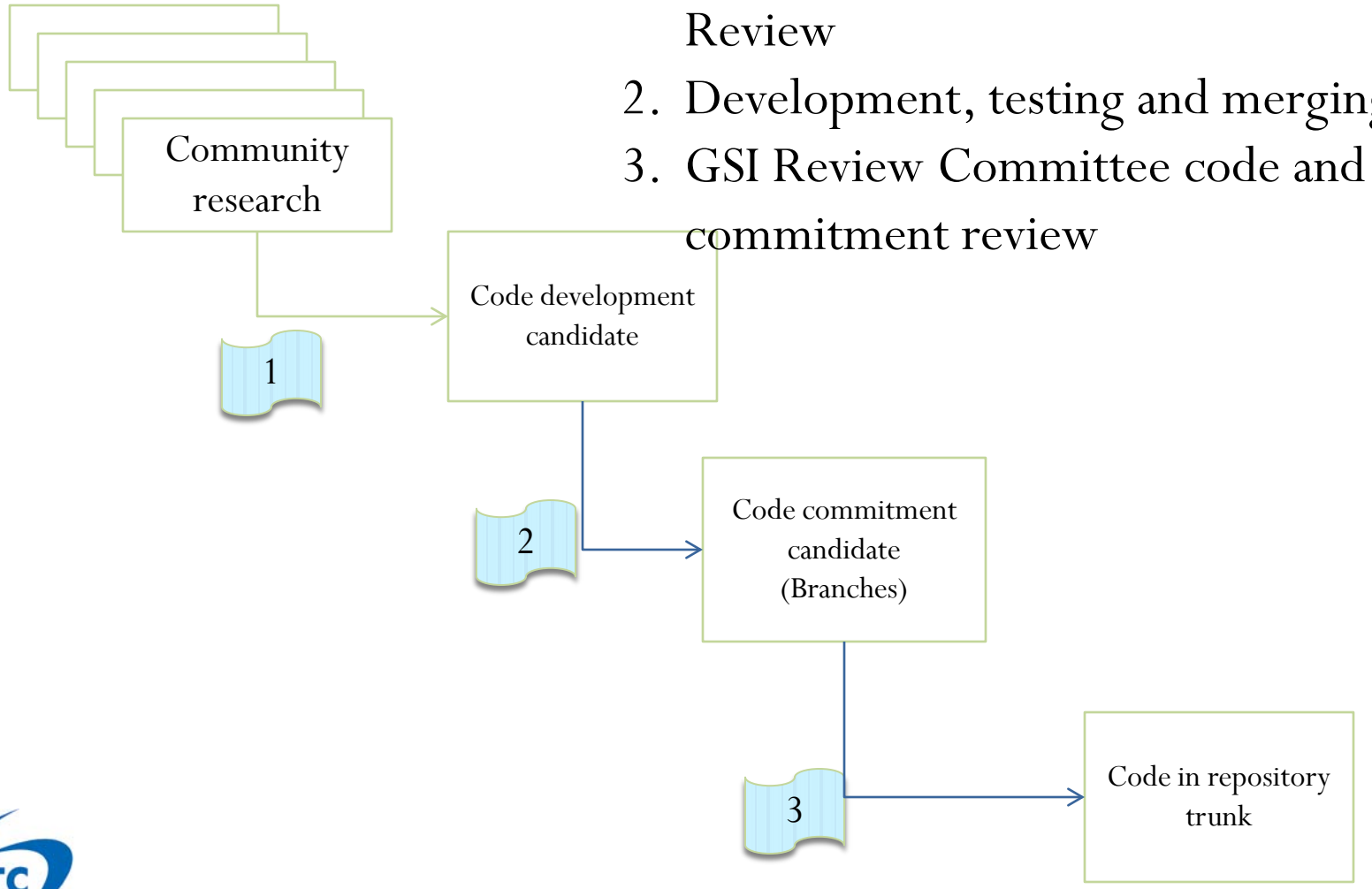


1) Coordination and Advisory (First meeting on Sept 30, 2010)
   - Propose and shepherd new development
   - Coordinate on-going and new development
   - Process management
   - Community support recommendation

2) GSI Code Review (First trial on Nov 10, 2010)
   - Establish and manage a unified GSI coding standard
   - Establish and manage a process for proposal and commitment of new developments to the GSI repository.
   - Review proposed modifications to the code trunk.
   - Make a decision on whether code change proposals are accepted or denied.

GSI R2O Transition Procedure

(2011 Implementation)



1. GSI Review Committee Scientific Review
2. Development, testing and merging
3. GSI Review Committee code and commitment review

Summary

- DTC works with NCEP/EMC to provide current operation GSI capability to research community (O2R)
- DTC also works with researchers to bring research community contributions back to the GSI operation repository (O2R)
- Send your questions to gsi_help@ucar.edu