GSI: Code Management and Transitions between Research and Operations

Hui Shao

Developmental Testbed Center

2011 Summer Community GSI Tutorial, June 29-July 1, 2011, Boulder, Colorado

- Developmental Testbed Center (DTC):
  - Xiang-Yu (Hans) Huang, Hui Shao, Ming Hu, Don Stark
  - Kathryn Newman, Chunhua Zhou
- NOAA/National Center for Environmental Prediction (NCEP):
  - John Derber, Michael Lueken
- NASA/Global Modeling and Assimilation Office (GMAO):
  - Ron Gelaro, Ricardo Todling
- NOAA/Earth System Research Laboratory (ESRL):
  - Stan Benjamin, Ming Hu
- National Center for Atmospheric Science (NCAR):
  - Thomas Auligne
- Air Force Weather Agency (AFWA):
  - Steve Rugg, Jason Martinelli

Gridpoint Statistical Interpolation (GSI)

- ✓ Unified variational data assimilation (DA) system
  - Global and regional applications
  - Weather and climate
- ✓ Operational system being used by
  - NOAA (GFS, NAMS, RTMA, HWRF, RR…)
  - NASA (GMAO global)

  and to be used by
  - AFWA
- ✓ Distributed development:
  NCEP/EMC, NASA/GMAO, NOAA/ESRL, NCAR/MMM, …

- ✓ A community research model
  - Supported by DTC

"History"

2007: New Hire 0.5 FTE (scientist): GSI User's Guide and Code Porting

2008: EMC-DTC meeting

2009:

- New Hire1 FTE (scientist) in NCEP, 0.5FTE (software engineer)
- Created GSI community (Boulder) repository
- EMC-DTC meeting (Camp Springs, Maryland)
- First GSI release V1.0 on September 30 (with user support)

2010:

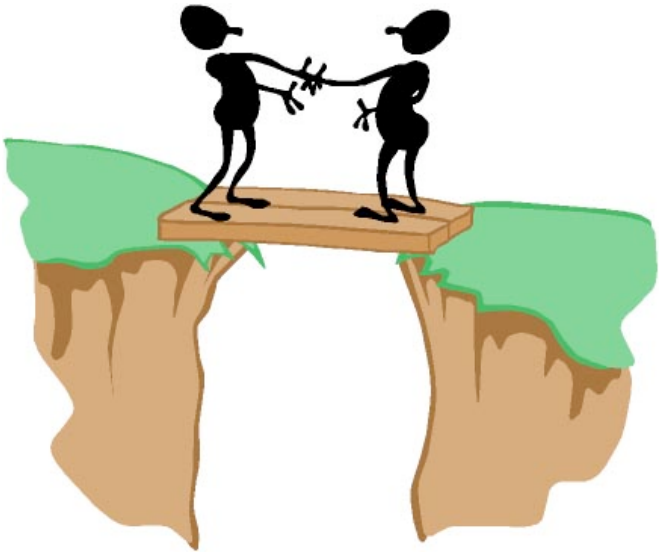
- DTC-EMC meeting (Boulder, Colorado) on February 8-12
- Planning meeting for the GSI Review Committee on June 28
- First Community GSI Tutorial on June 28-30
- First GSI Review Committee meeting on September 30
- First GSI code review ticket on November 10, 2011
- R2O transition procedure try-out starting from November
- Syncing of the trunks of GSI community (Boulder) and NCEP/EMC GSI repositories

2011:

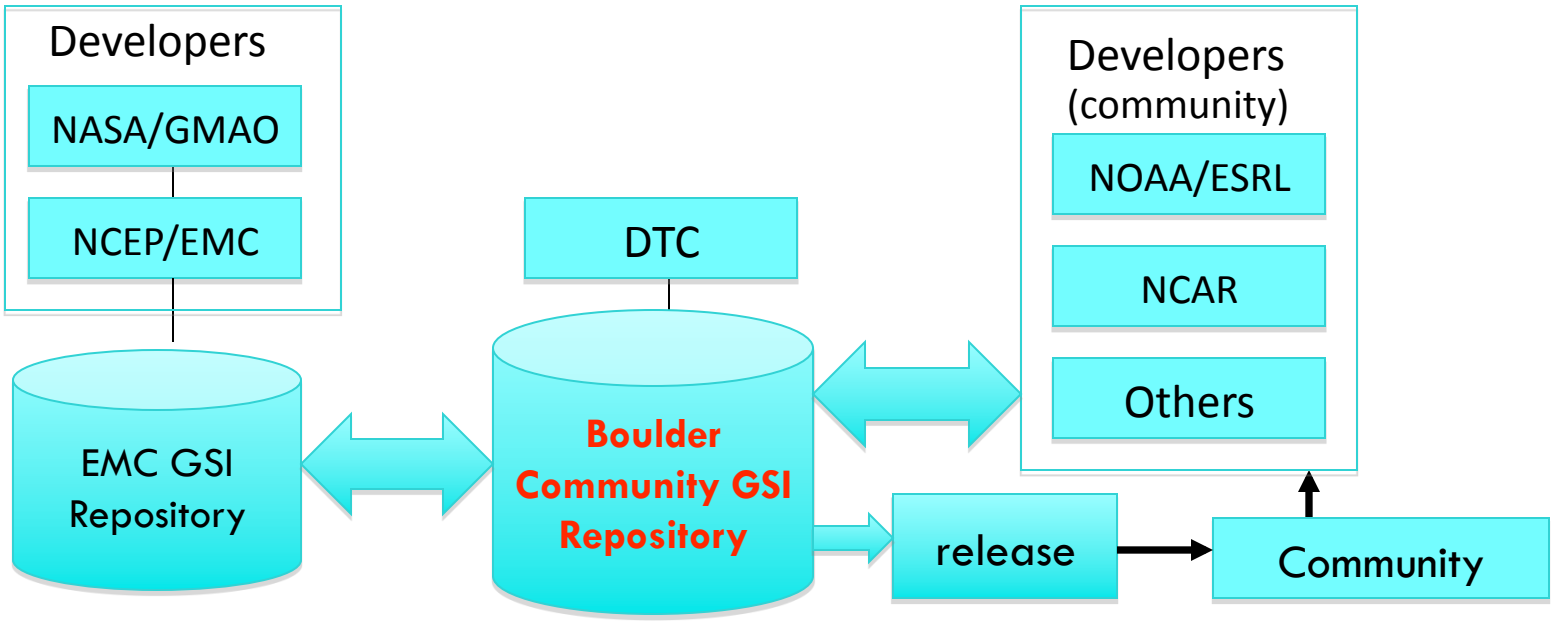
- First Community GSI Workshop on June 28

Goals of Community GSI Efforts

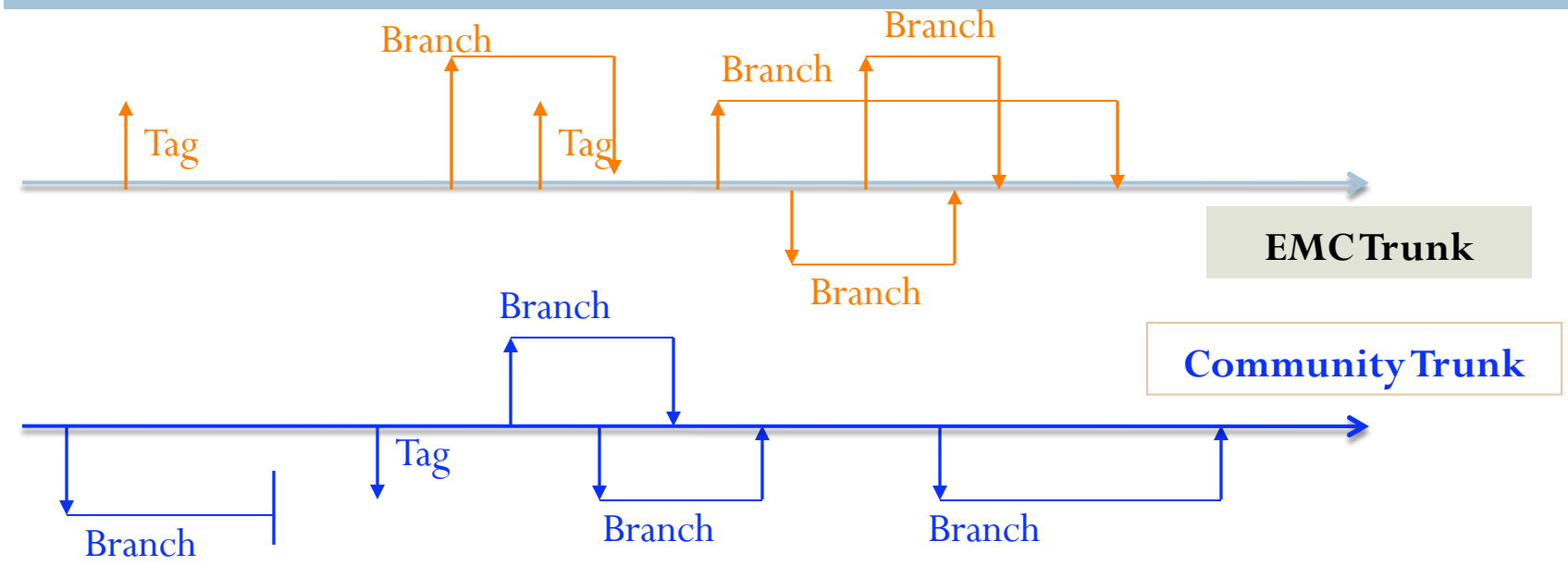
- Provide current operational GSI capabilities to the research community (O2R)
- Provide a framework for distributed development of new capabilities & advances in data assimilation
- Provide a pathway for data assimilation research to operations process (R2O)
- Provide rational basis to operational centers and research community for enhancement of data assimilation systems



Community GSI Code Management



Dual GSI Code Repository Structure (2011)



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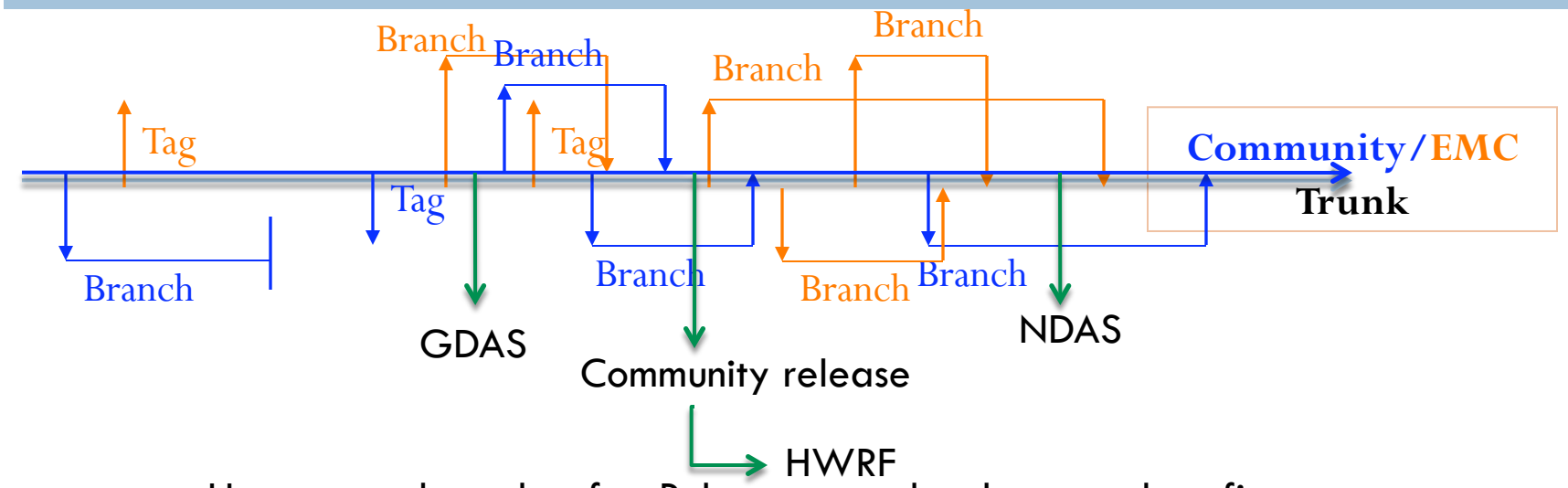


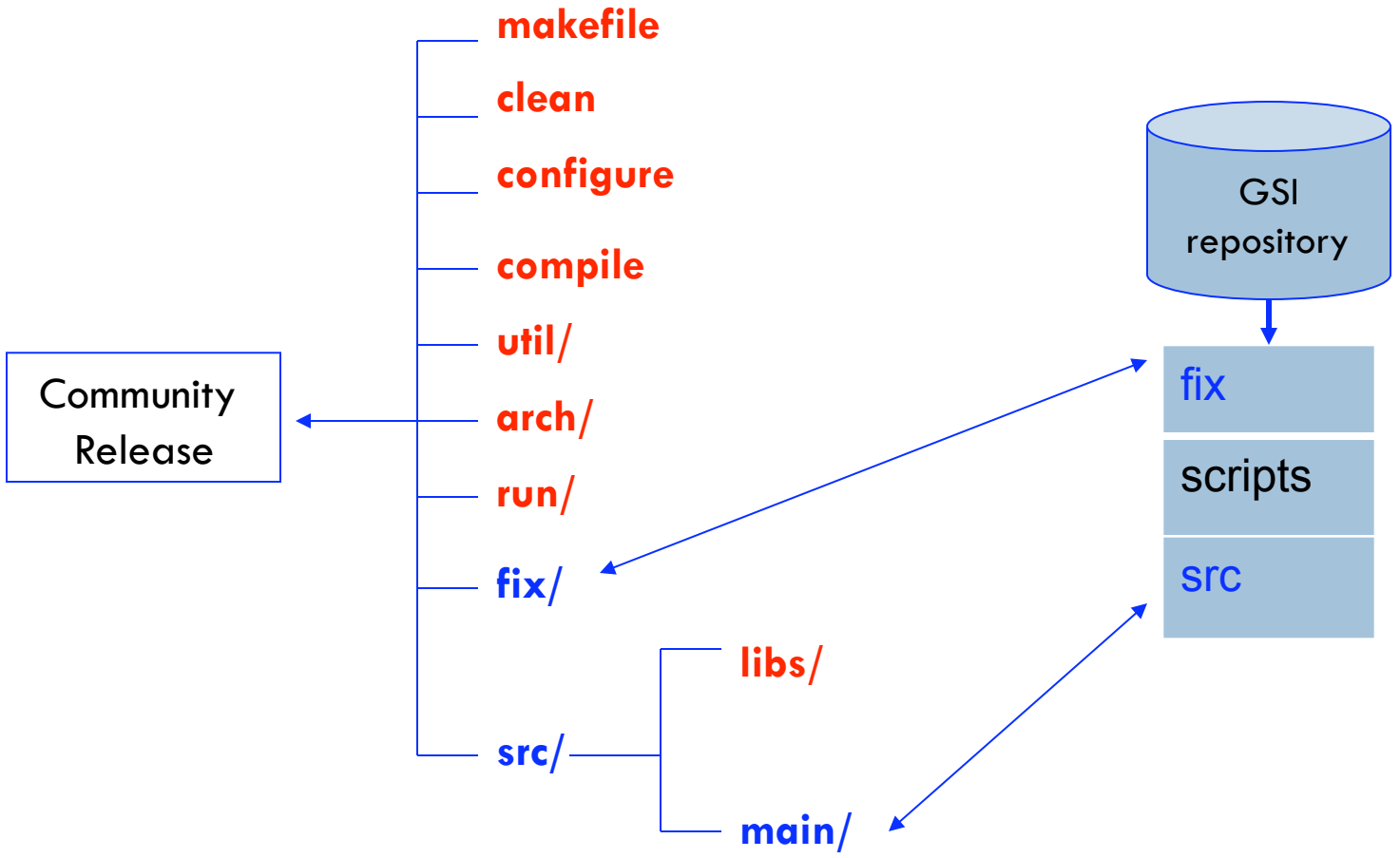
- Use tags or branches for: Release, new development, bug fix …
- Applications may use different revisions in the trunk ("snapshot").
- ✓ Which GSI should I use ?
  There is no "DTC GSI", "EMC GSI" or "global GSI". There is only one GSI! For a researcher, community release should be sufficient to use. If you are interested in getting new development back to the GSI trunk, contact GSI helpdesk (gsi_help@ucar.edu) get access to the developmental version of GSI.

Community GSI Release

Release Version	GSI Tag/ Revision	Release Time	Documentation	Tutorial	Helpdesk
Beta release v1.0	Com-r41 EMC-Q1FY09	Jun, 2009	No	No	No
Official release v1.0	Com-r41+ EMC-Q1FY09	Sep, 2009	Yes	Yes	Yes
Beta release v2.0	Com-r101 EMC-Q1FY10	Feb, 2010	No	No	No
Official release v2.0	Com-r101+ EMC-Q1FY10,	Apr, 2010	Yes	Yes	Yes
Beta release v3.0	Com-r593 EMC-r12534	Feb, 2011	No	No	No
Official release v3.0	Com-r593+ EMC-r12534+ (EMC)	Apr, 2011	Yes. New chapters "**BUFR and PrepBUFR**" and "**GSI Applications**"	**June 29-July 1, 2011** Lectures and hands-on practical sessions	Yes

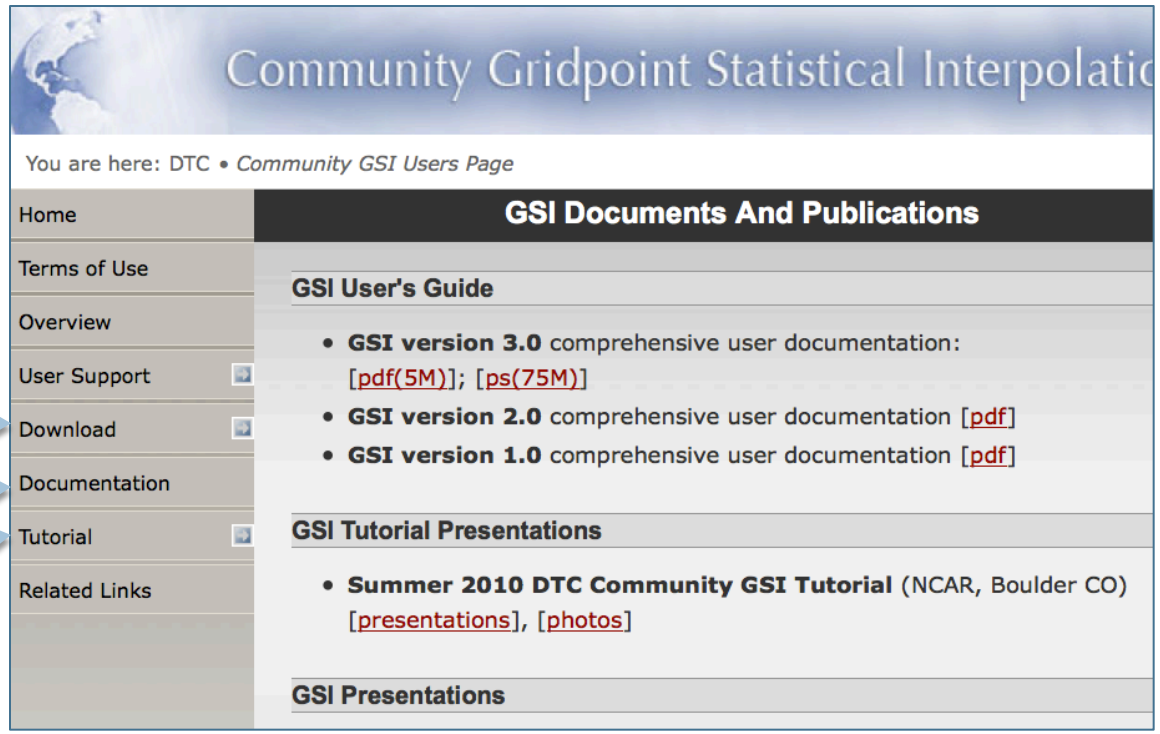
GSI helpdesk: gsi_help@ucar.edu

GSI Core and Extra Community

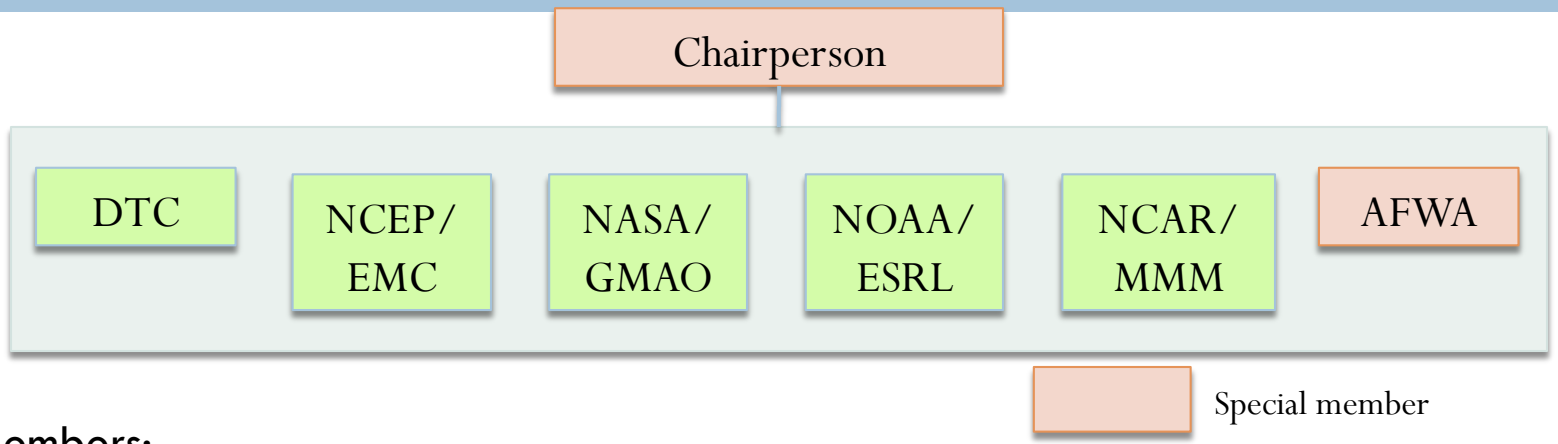


GSI Outreach and Support

- Community GSI Workshop
- Annual Community GSI Tutorial
- GSI webpage
  - Download
  - Documentation
  - Online tutorial
- GSI helpdesk gsi_help@ucar.edu
- GSI email list gsi_users@ucar.edu (~360 registered users)



GSI Review Committee



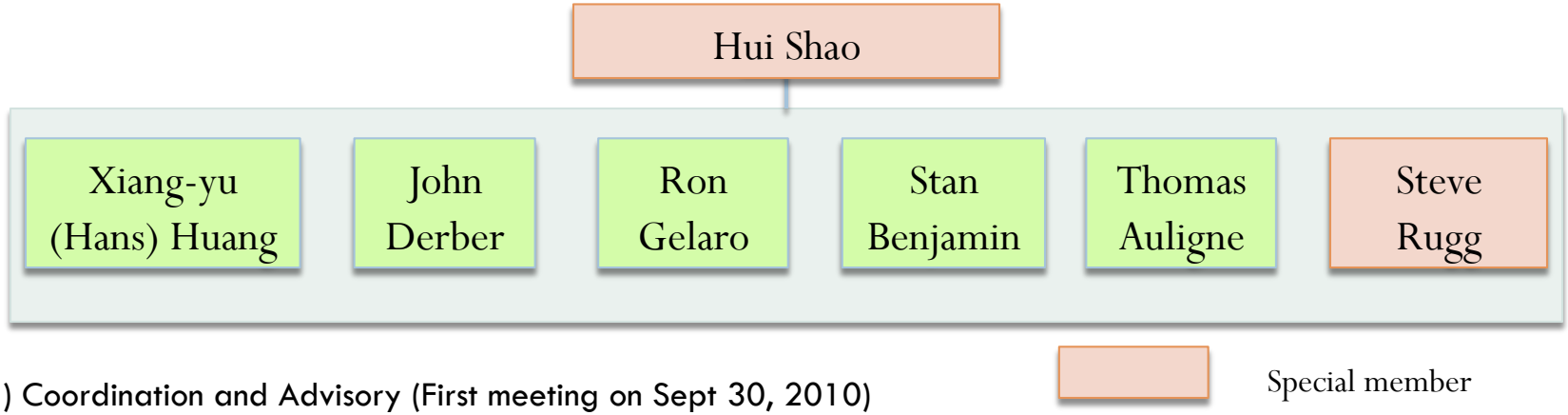
Members:

- actively involved in the GSI development and support work;
- commit time and effort to being involved in full functions of the committee.
- Each member group has only one formal representative (committee member) in the Committee and one valid vote regarding GSI related issues.

Special members:

- Those who are or will be actively involved in GSI efforts but do not match the criteria for the full membership;
- Do not have veto power but can participate in Review Committee meetings regularly.
- ✓ Due to its users' support duty, DTC represents general community users/developers.

GSI Review Committee (2011)



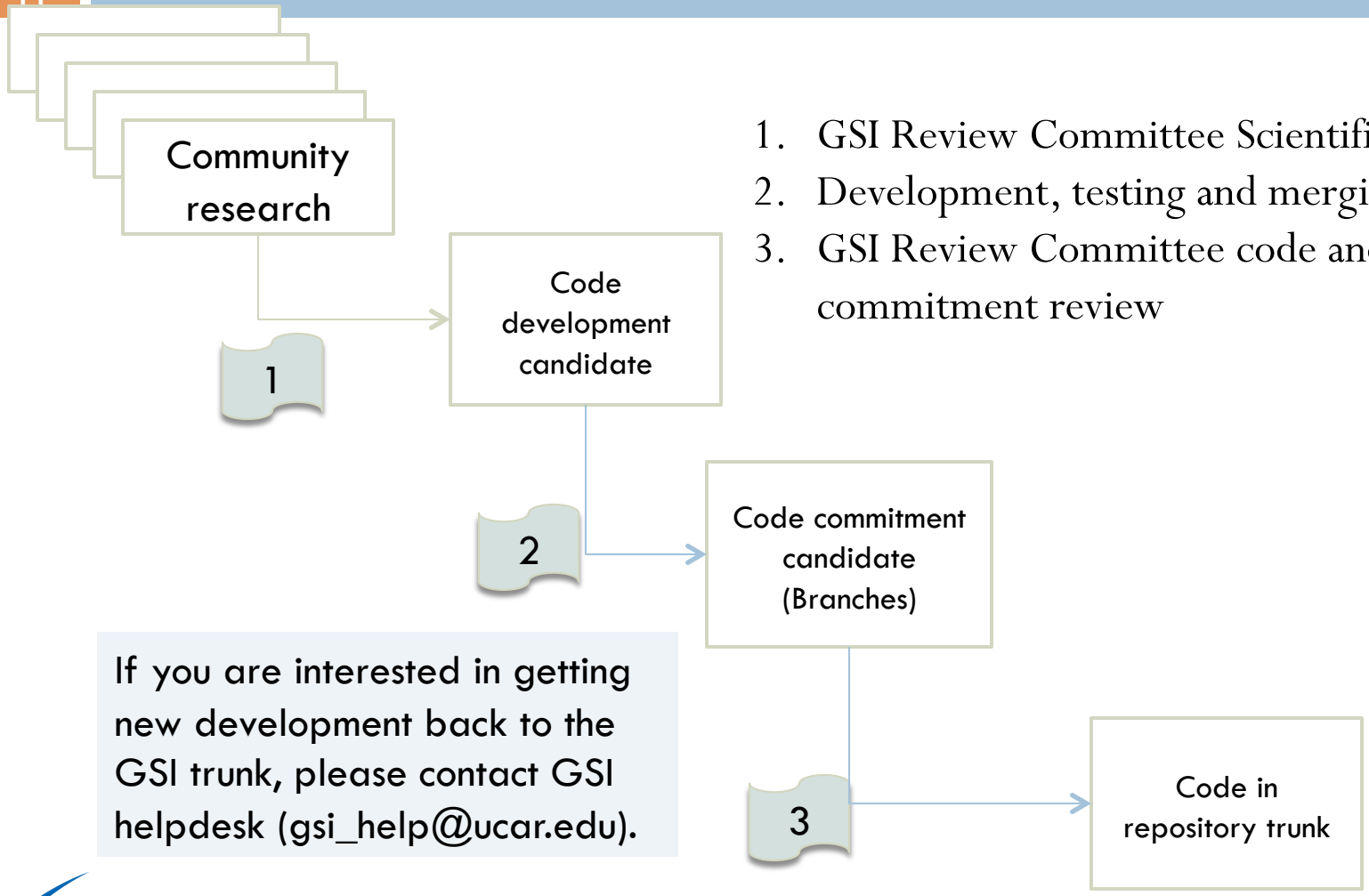
1) Coordination and Advisory (First meeting on Sept 30, 2010)

- 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

If you are interested in getting new development back to the GSI trunk, please contact GSI helpdesk (gsi_help@ucar.edu).

GSI Review Ticket: Example

Subject: GSI review committee-code review request-due on June 1
From: Hui Shao <Hui.Shao@noaa.gov>
Date: Fri, 27 May 2011 08:28:44 -0400
To: gsi_review_committee@rap.ucar.edu

This is a review request from EMC to the GSI review committee.
Brief description:Assimilation of NOAA P3 Tail Doppler Radar data.
Location: EMC trac system under ticket #160 (https://svnemc.ncep.noaa.gov/trac/gsi/ticket/160)
Developer: Mingjing Tong (Mingjing.tong@noaa.gov)
Ticket created by: EMC (Mingjing.tong@noaa.gov)
Due on: June 1, 2011
Notes:
The GSI code has been modified to include the ability to assimilate NOAA P3 Tail Doppler Radar data. This should not impact anyone not using TDR data.
The relevant branch is https://svnemc.ncep.noaa.gov/projects/gsi/branches/mtong_tdr.
The relevant revision number is r14058
Then changes made by this request are to the following scripts and routines:
read_radar.f90 (modified) (17 diffs)
setuprw.f90 (modified) (10 diffs)
read_prepbufr.f90 (modified) (2 diffs)
convthin.f90 (modified) (3 diffs)
read_obs.F90 (modified) (9 diffs)
This request can be viewed on the DTC GSI Review Committee wiki at https://wiki.ucar.edu/display/dtcgsi/GSI+Review+Committee.

Review tickets should be submitted through the committee members.

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wiki.ucar.edu › DTC Community GSI › ... › GSI Review Committee › GSI Code Review Request Ticket Brows

Since Nov., 2010, 6 out of 21 review tickets were from non-EMC developers

GSI Code Review Request Ticket

Added by huishao, last edited by huishao on May 10, 2011 (view change)

- GSI review ticket 05022011: ticket #176 due on **May 11, 2011**. radiance bias correction spin-up of new instruments
- GSI review ticket 04192011: ticket #176 due on **April 25, 2011**. Hybrid ensemble/variational code updates.
- GSI review ticket 04112011: ticket #178 due on **April 19, 2011**. GMAO development merging request
- GSI review ticket 04072011: ticket #175 due on **Apr. 16, 2011**.Limit the use of level 2.5 superobs.
- GSI review ticket 04062011: ticket #164 due on **Apr. 13, 2011**.Modify regional wind information in diagnostic file
- GSI review ticket 04012011: ticket #171 due on **Apr. 7, 2011**.Bug fixes from DTC and GSD on March 2011 trunk.
- GSI review ticket 03162011: ticket #157 due on **Mar. 21, 2011**.Create regression test for NEMSIO and optimize nemsio.
- GSI review ticket 03042011: ticket #152 due on **Mar. 9, 2011**. Fix to Generalise the rungsi_globalprod.sh script
- GSI review ticket 03022011: ticket #40 due on **Mar. 9, 2011**. Moving towards unified makefile
- GSI review ticket 02282011: Ticket #155 due on **Mar 7, 2011**. MLS zone mixing ratio bufr data assimilation.
- GSI review ticket 02172011: Ticket #159 due on **Feb 22, 2011**. Compile and Test GSI trunk (Feb, 2011) on multiple platforms (Second Part) from DTC
- GSI review ticket 02102011: Ticket #159 due on **Feb 14, 2011**. Compile and Test GSI trunk (Feb, 2011) on multiple platforms from DTC
- GSI review ticket 02082011: Ticket #153 due on **Feb 15, 2011**. tlapmean for new radiance channels.
- GSI review ticket 01262011: Ticket #148 due on **Jan 31, 2011**. GSI NEMSIO capability for NEMS/GFS.
- GSI review ticket 01212011: Ticket #92 due on **Jan 31, 2011**. GPS RO bending angle.

Future Plan

- Collaborations and coordination
- Community Repository
- Community support
- T&E
- Feedback from research community
- O2R and R2O transitions