



# **NCAS**

# **Unified Model Introduction**

## **Part 4: FCM and the UM**

University of Reading, 16-18 December 2015



- Flexible Configuration Management system
  - Written by the Met Office.
  - A set of tools for managing and building source code.
  - Uses subversion for code management
    - Defines a common process and naming convention
    - Adds a layer on top of subversion



- FCM system consists of 3 components:
  - Integrated Configuration Management, wiki and issue tracking system
  - Extract system
  - Build system

- Integrated wiki and issue tracker
  - can be used for project documentation
  - keep track of bugs, development, etc
- Browser for subversion repository
- Timeline view of issues, wiki pages and subversion repository
- <https://puma.nerc.ac.uk/trac/UM>

## Purpose:

- Extracts source code from the repository ready for the build system

## Features:

- Combines code from a number of branches
  - Only if the modified files do not overlap
- Mirrors code to a remote system (e.g. ARCHER)
- Generates a configuration file for the build system

## Purpose:

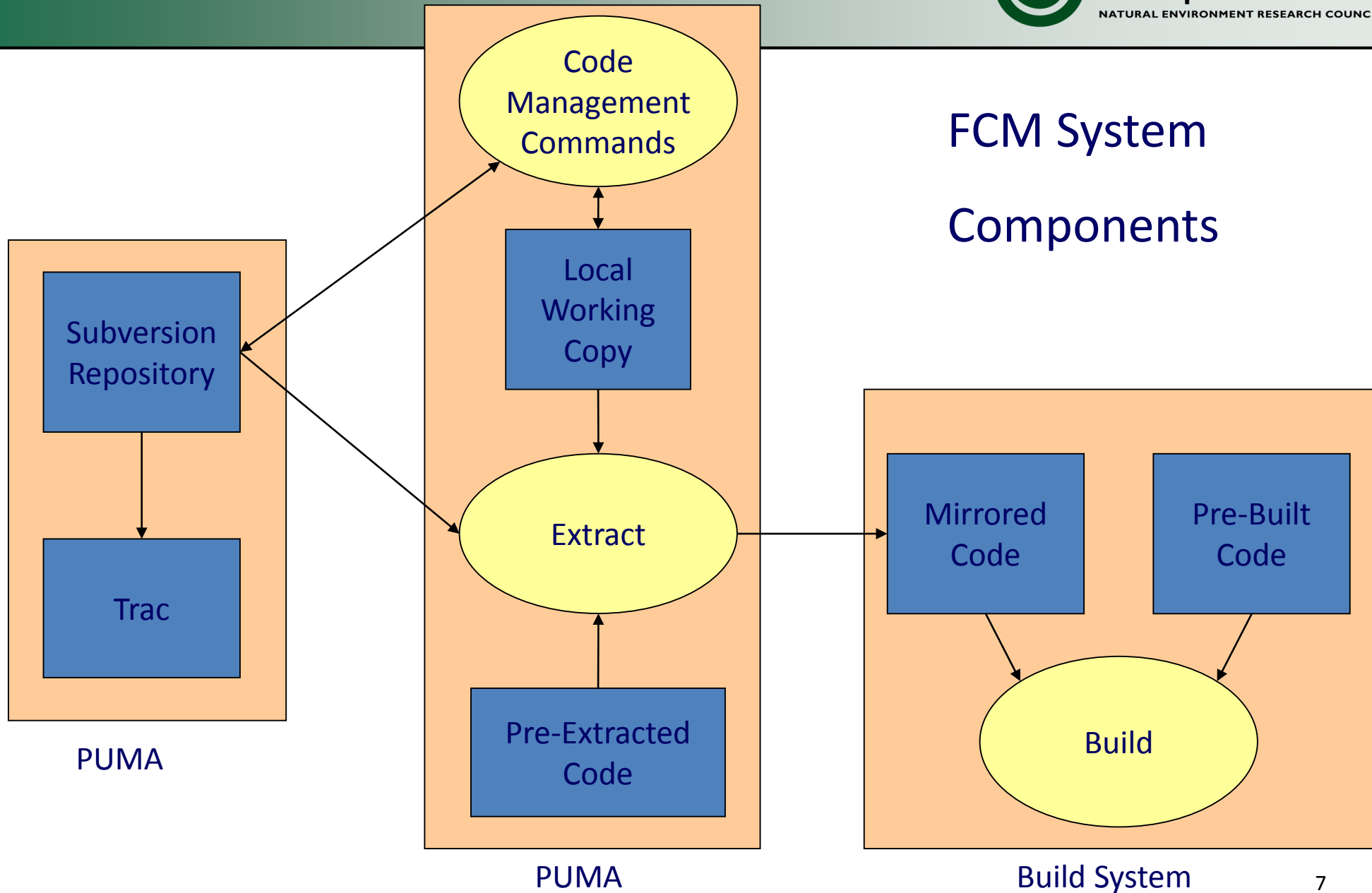
- Builds the code assembled by the extract system and creates the model executable.

## Features:

- Parallel build
- Incremental build
- Build dependency analysis



# FCM System Components





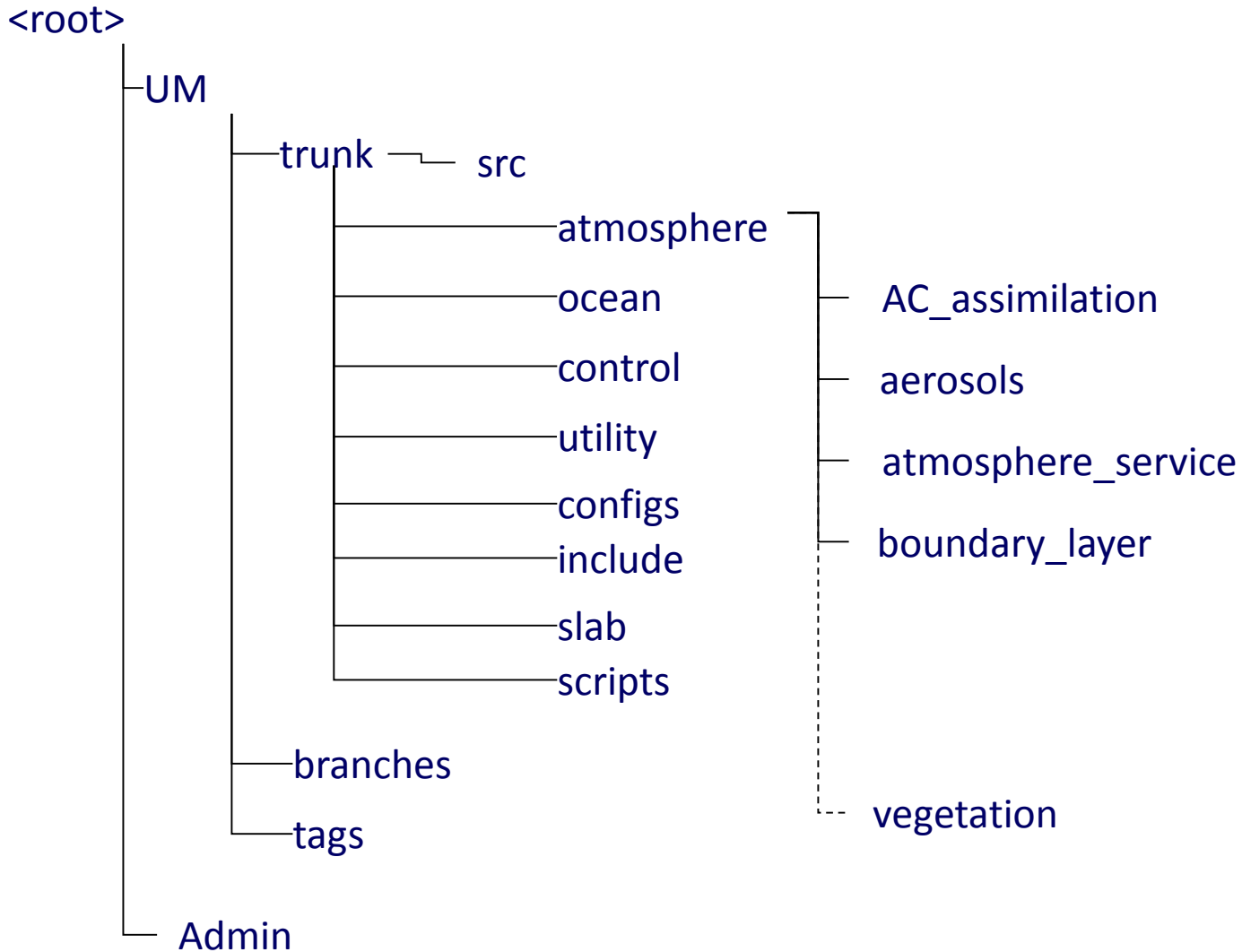
- Full history of source file
  - Accessible on the web via Trac
- Edit source code directly on PUMA
- Version control of directory tree
  - Copy, rename, add, delete files and directories
- Atomic commits
  - All or nothing is committed to the repository
  - Sequential changesets





- Access to all functions is via the *fcm* command
  - FCM command syntax is simple and easy to use
  - Simple GUI wrapper to the subversion CM commands
  - CM commands used only on PUMA
  - Build system is installed on ARCHER, MONSooN, etc
- Comprehensive User Guide
  - [http://cms.ncas.ac.uk/chrome/site/FCM/user\\_guide/index.html](http://cms.ncas.ac.uk/chrome/site/FCM/user_guide/index.html)
- Used by many other projects
  - NEMO, CICE, JULES, MONC, ...

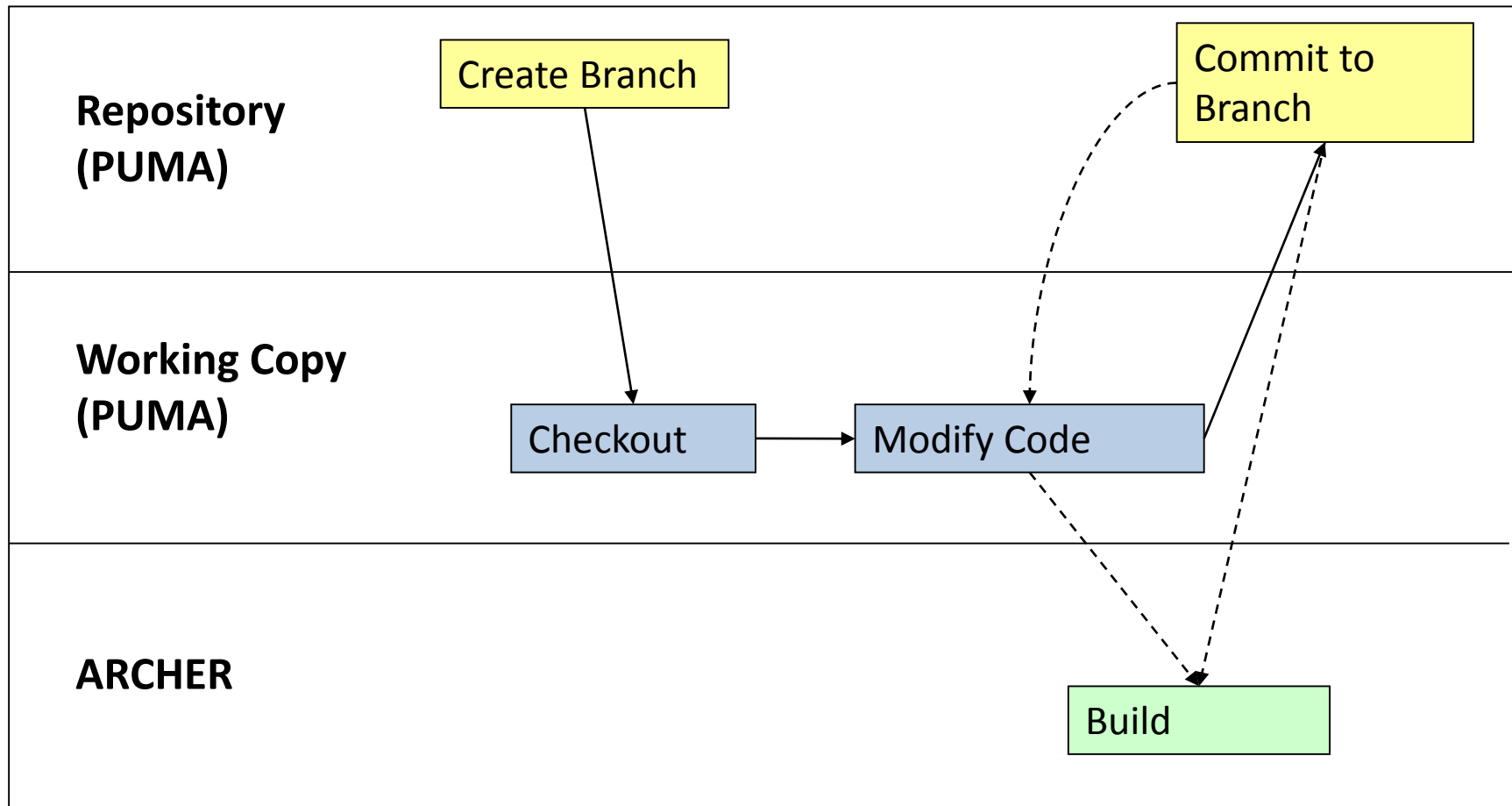
# Repository Design





- The UM code is held in a ***subversion repository***
- The ***trunk*** is the consolidated code from the Met Office
- A ***release*** is a specified revision of the trunk (identified by a revision keyword)
- ***Branches*** are the method of making and tracking changes – held in the repository
- A ***working copy*** is a local copy of a branch (possibly with changes to it)
- An ***fcm patch*** is the mechanism by which code changes are exchanged with the Met Office.

# Typical Workflow





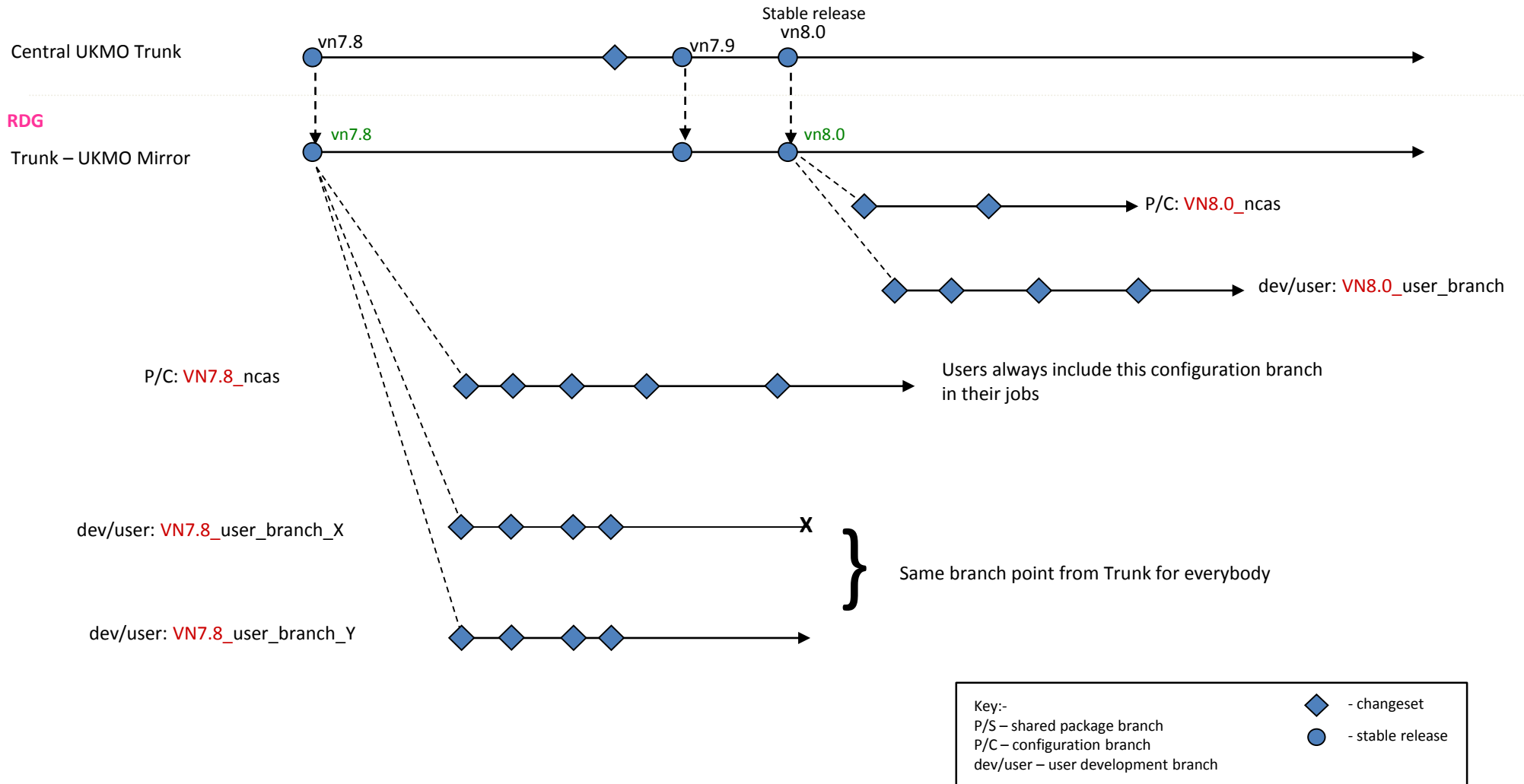
- FCM URLs are cumbersome
- Keywords provide a shortcut
- Specified with the `fcM:` prefix

Keyword	Value
<code>um</code>	<code>svn://puma/UM_svn/UM</code>
<code>um_tr</code> (or <code>um-tr</code> )	<code>svn://puma/UM_svn/UM/trunk</code>
<code>um_br</code> (or <code>um-br</code> )	<code>svn://puma/UM_svn/UM/branches</code>

In a similar way *revision* keywords are used, so that you don't have to remember the specific revision number that relates to a UM version. E.g. The revision keyword `hg6.6.3` denotes the revision of the repository that is UM version 6.6.3, in this instance r2580.

# UM Repository Diagram

EXETER





For HadGEM2 (hg6.6.3):

- To create a branch use the script:
  - `/usr/local/bin/create_HG2_branch`
- Make sure the standard branch is included in the job
  - `fcm:um_br/pkg/Config/HG6.6.3_ncas`

For all other UM Versions (vn7.x,vn8.x):

- Use the 'fcm gui' or 'fcm' command line to create a branch
- Include the standard branch in the job
  - `fcm:um_br/pkg/Config/vnx.y_ncas`



- Use own version of the trunk

User's own version of the trunk

- Include modifications from branches

User Modifications			
No	Branch location	Revision	Use Y/N
1	fcu:um_br/dev/Share/HG6.6.3_6c_reconf_fix_ukmo/src	6165	Y
2	fcu:um_br/dev/Share/HG6.6.3_AR5_ocean_iron_diag_ukmo/src	6203	Y
3	fcu:um_br/dev/Share/HG6.6.3_CCL0_uniform_ukmo/src	6206	Y
4	fcu:um_br/dev/Share/HG6.6.3_adv_uto.opti_ukmo/src	6208	Y
5	fcu:um_br/dev/Share/HG6.6.3_age_new_ukmo/src	6213	Y
Inert	Edit	Edit	Edit
Sort			

- Use central script modifications

Central Script Modifications		
No	Script location	Use Y/N
1		
2		
3		
4		
5		
Inert	Inert	Inert
Sort		

- Include modifications from user working copy

User working copy location

*window: sub-model independent -> FCM configuration -> FCM configuration optional modifications*





## DO:

- Regularly commit your working copy changes to your branch at appropriate intervals. This means you can recover to a previous state easily.

## DON'T:

- Copy another user's working copy, either in whole or part. A working copy contains hidden subversion files which, if edited or moved, will cause problems.
- Copy sub-directories around within working copies, this can also lead to problems, for the same reason as above.



- Setup `SVN_EDITOR` if you don't want to use defaults for setting up commit messages.
- Ensure that you have set up ssh-agent to allow login from PUMA to the remote machine (E.g. ARCHER) without the need to enter a password.  
(Instructions are available on the UM Tutorial Trac Wiki – see link below)
- UM FCM Tutorial:  
[https://puma.nerc.ac.uk/trac/UM\\_TUTORIAL](https://puma.nerc.ac.uk/trac/UM_TUTORIAL)



- The essential sub-commands are:
  - Checkout
  - Commit
  - Diff
  - Status
  - Branch
  - Merge
- Help is available for all sub-commands:

```
fcms help <sub-command>
```

- Check out a working copy from the repository
- URLs and revisions can be specified using keywords

```
ros@puma$ fcm checkout fcm:um_tr trunk_wc
=> svn checkout svn://puma/UM_svn/UM/trunk trunk_wc
A   trunk_wc/COPYRIGHT.txt
A   trunk_wc/CodeOwners.txt
A   trunk_wc/src
A   trunk_wc/src/control
A   trunk_wc/src/control/coupling
...
A   trunk_wc/src/land/modules/params/c_vkman.F90
A   trunk_wc/src/land/modules/params/nvegparm.F90
A   trunk_wc/src/land/modules/params/c_surf.F90
Checked out revision 6719.
```

- Inspect the status of working copy files & directories
- See subversion handbook for status codes

```
fcm status
-> svn status
?      src/control/misc/um_paint_the_walls.F90
!      src/script/archiving/archfail
A +    src/ocean/mixed_layer/mixset_new.F90
D      src/ocean/mixed_layer/mixset2.F90
M      src/atmosphere/dynamics_solver/gcr_k-gcrk2a.F90
D      src/configs/machines/cray-t3e/machine.cfg
A      src/configs/machines/cray-t3e/overrides128.cfg
```



- Used to show changes you've made to any file in your working copy, or relative to the base of the branch from which it came
- Specify the option `--graphical` or `-g` to use the tool `xxdiff` to display the differences

- Sends changes from working copy to the repository
- All changes in your working copy are committed.
  - All or nothing – you can't specify which files to commit
- You will be prompted to enter a log message
  - Add your message above the delimiter line:  
`--Add your commit message ABOVE - do not alter this line  
or those below--`
  - Do not alter this delimiter line. Your changes will be ignored if you do.

- Hands-on UM Tutorial

[https://puma.nerc.ac.uk/trac/UM\\_TUTORIAL](https://puma.nerc.ac.uk/trac/UM_TUTORIAL)

**Important:** This is based on UM8.2.

(All methods described are the same for HG6.6.3 **EXCEPT** branch creation.

Remember to use the *create\_HG2\_branch* script when working with HG6.6.3)

- FCM User Guide

- Available from NCAS CMS website

- FAQ

- Available from the UM Trac Wiki along with links to other documents