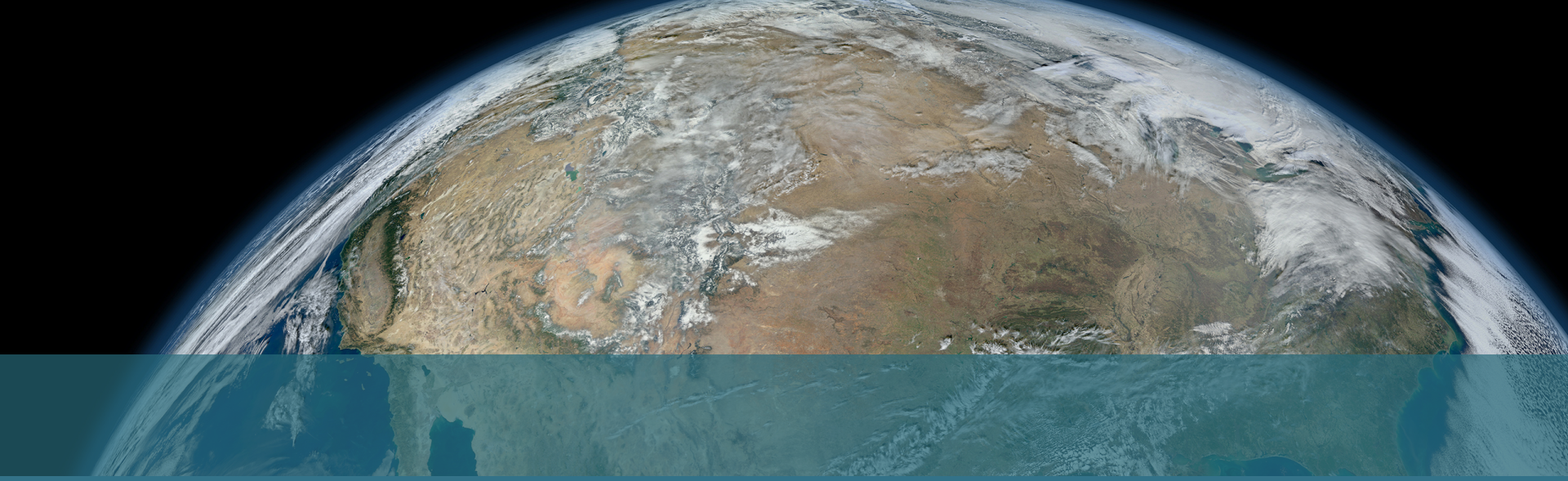


Research to Operations (R2O)
Process, Procedures, and Schedule

Daniel Wunder
R2O Project Manager
Center for Weather and Climate
NOAA's National Centers for Environmental Information

August 4, 2015

Overview

- R2O Purpose
- Integrated Product Team (IPT)
- R2O Process
- Schedule
- Lessons Learned

R2O Purpose

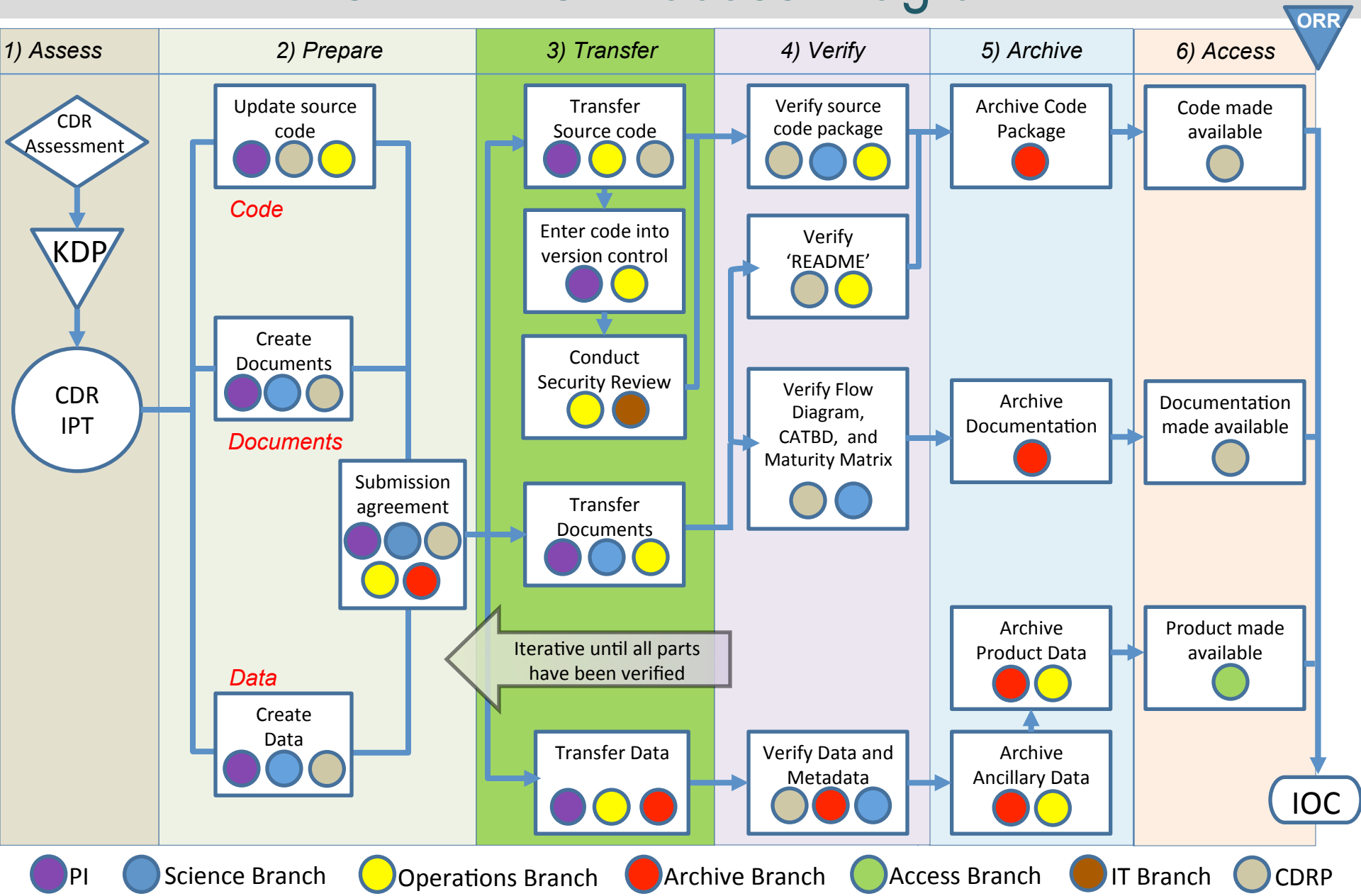
- Goal - To move from the Research and Development of a CDR to Initial Operational Capability (IOC).

- IOC - A CDR development state achieved when a CDR (including the data set, source code and documentation) is scientifically defensible and is archived, maintained, and made publicly available by NOAA. NOAA commits to extending the data set in time as possible.

Integrated Product Team (IPT)

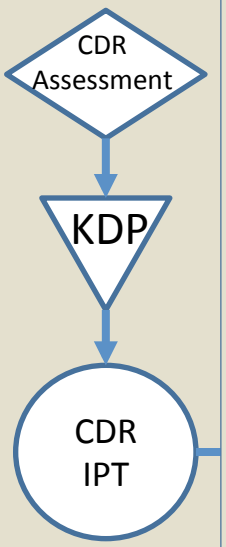
- R2O Transition
  - Not a task the PI does alone, partnership with the IPT
- IPT consists of:
  - PI and any Assistants
  - R2O Project Manager
  - Internal NCEI Scientist
  - Archive Branch representative
  - Operations Branch representative
  - Access Branch representative
  - Additional support from IT, User Engagement, and other CDRP members
- NCEI personnel spend 400-600 hours transitioning each CDR to IOC
- Typical R2O transition takes the team 8-12 months to complete

CDR R2O Process Diagram



Step 1) Assess

1) Assess	2) Prepare	3) Transfer	4) Verify	5) Archive	6) Access

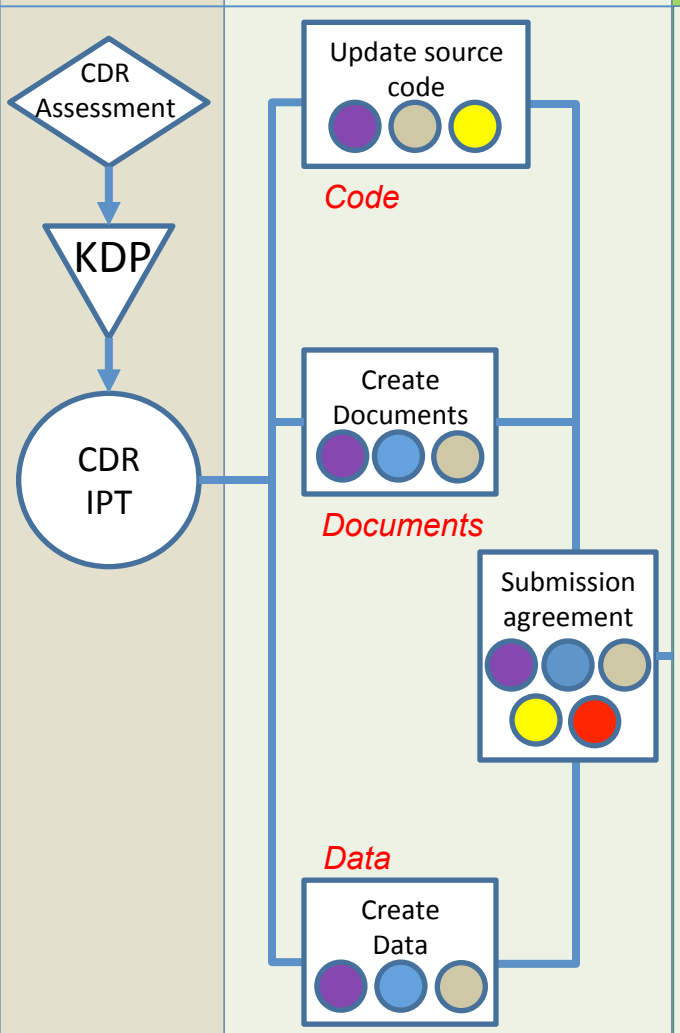


- Assemble IPT
- Assess current data, documentation, source code
- Key Decision Point: Approve for transition
- Develop transition schedule

PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

Step 2) Prepare

1) Assess	2) Prepare	3) Transfer	4) Verify	5) Archive	6) Access



Code

- PI update Source Code to meet CDRP coding standards and creates README

Documentation

- PI creates draft C-ATBD, Flow Chart, and Maturity Matrix

Data

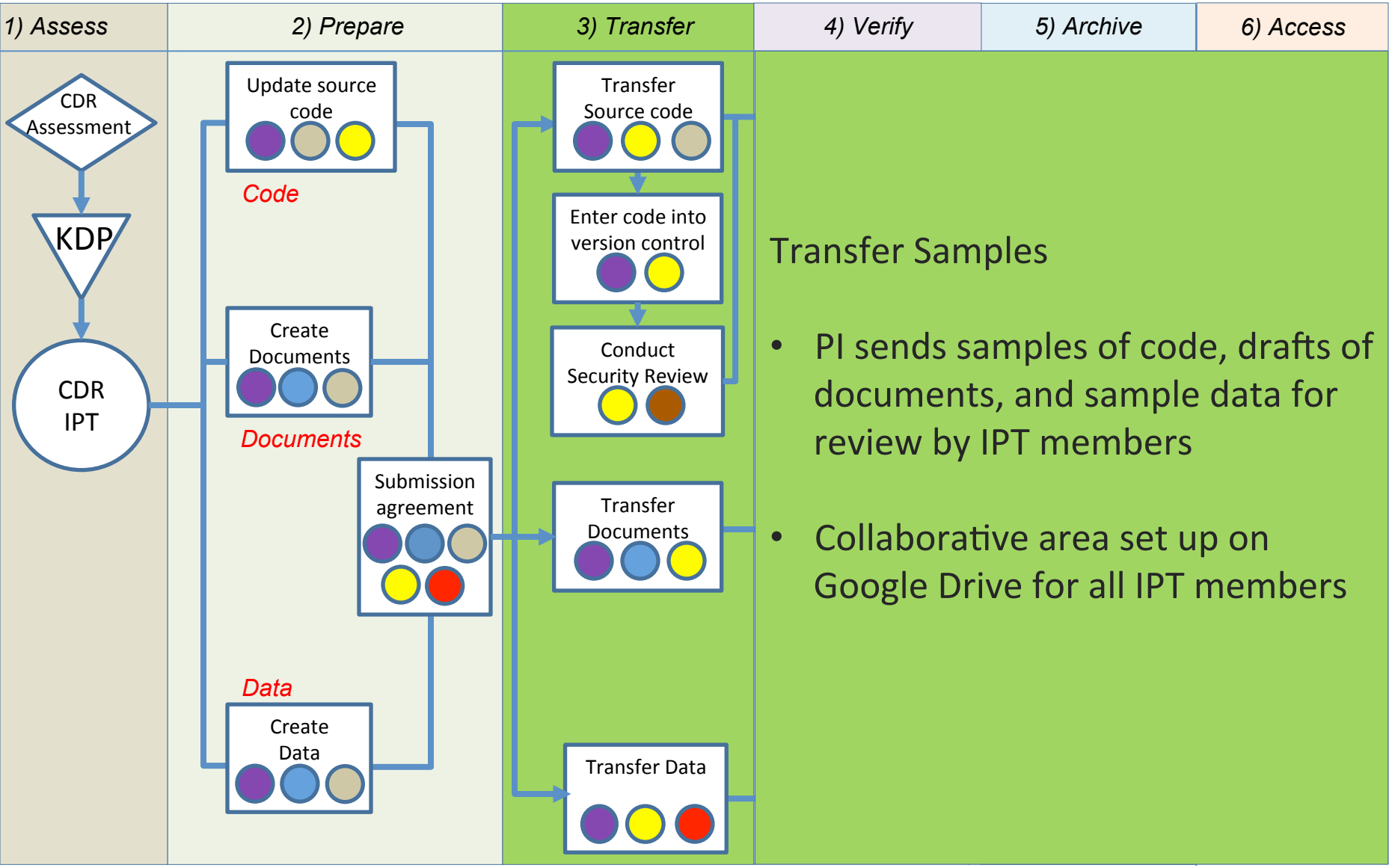
- PI creates sample netCDF data following Climate and Forecast (CF) metadata conventions

Submission Agreement

- PI submits request to archive (online form)
- Archive Branch drafts submission agreement

PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

Step 3) Transfer

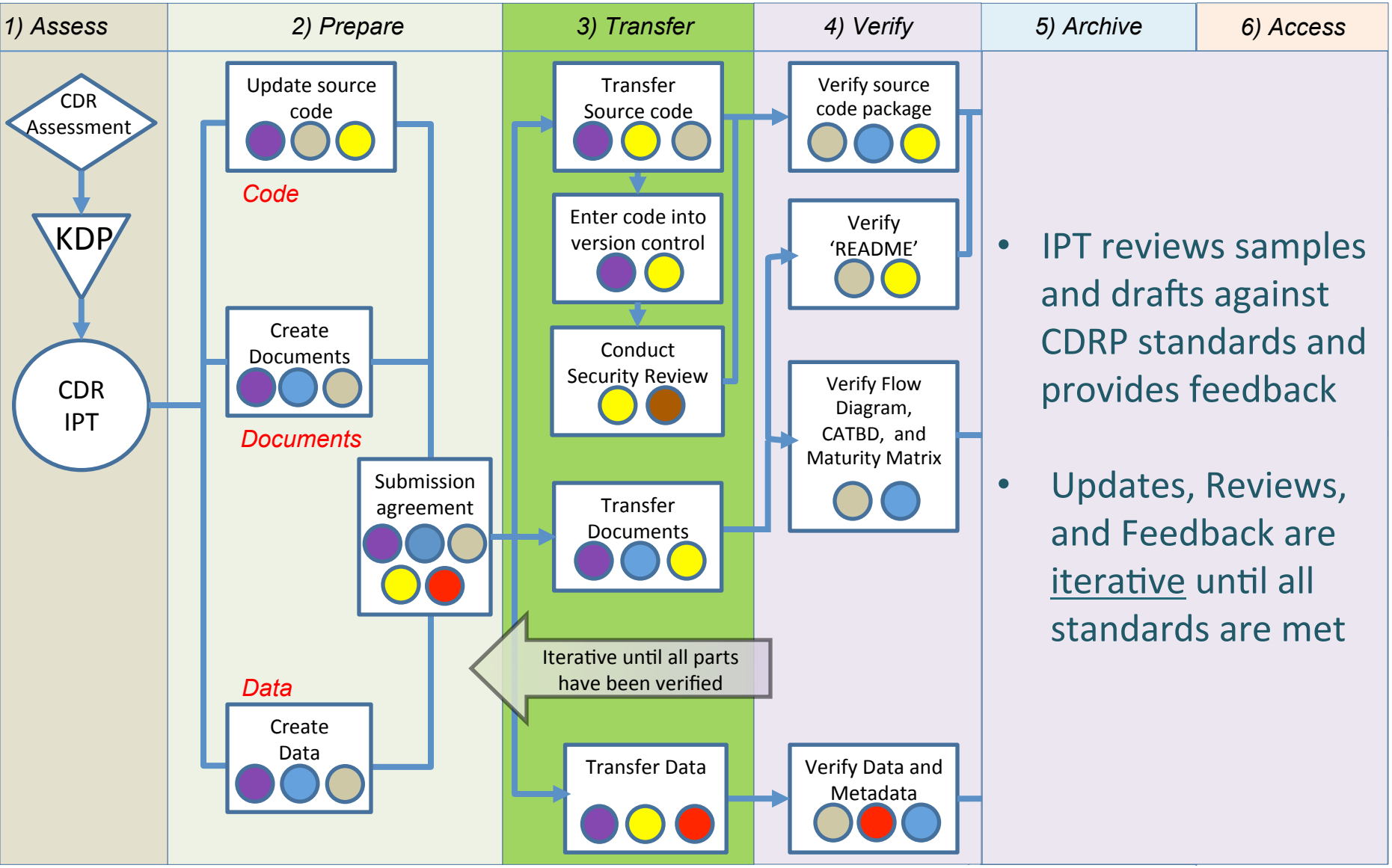


Transfer Samples

- PI sends samples of code, drafts of documents, and sample data for review by IPT members
- Collaborative area set up on Google Drive for all IPT members

PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

Step 4) Verify



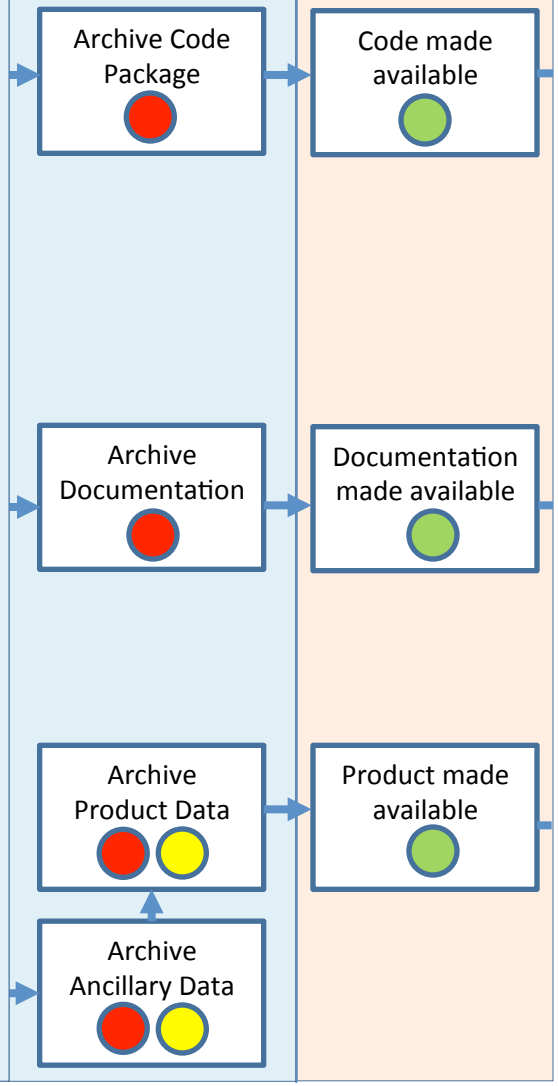
- IPT reviews samples and drafts against CDRP standards and provides feedback
- Updates, Reviews, and Feedback are iterative until all standards are met

PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

Step 5) Archive

1) Assess	2) Prepare	3) Transfer	4) Verify	5) Archive	6) Access

- PI delivers final versions of all code, documents, and data
- Code – Archive complete code package (source code, README, robodoc headers)
- Documents – Archive documentation package (C-ATBD, Flow Diagram, Maturity Matrix)
- Data – Archive full period of record and also any ancillary data (e.g. look up tables, calibration coefficients) used to create the data



PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

Step 6) Access

1) Assess	2) Prepare	3) Transfer	4) Verify	5) Archive	6) Access

ORR

- Archive Branch creates DOI for the CDR dataset
- All codes and documents are published on CDR web site
- Access branch pulls and stages all data for public release
  - Size of data drives access method (ftp, THREDDS, HDSS, CLASS)
- Conduct an Operational Readiness Review (ORR) prior to final release to the public
- NCEI announces new CDR via web story and social media release

Code made available

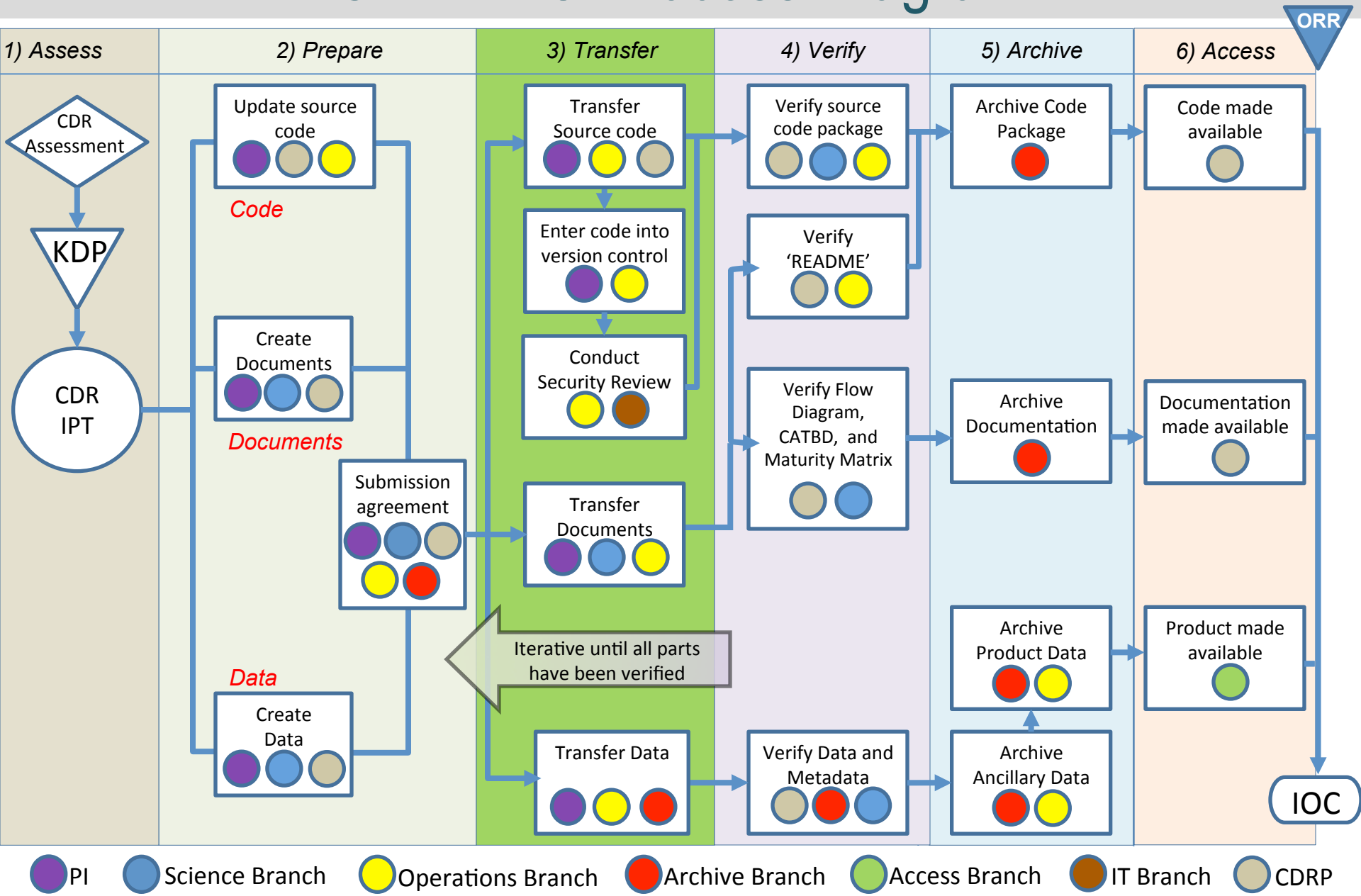
Documentation made available

Product made available

IOC

PI | Science Branch | Operations Branch | Archive Branch | Access Branch | IT Branch | CDRP

CDR R2O Process Diagram



Initial Operational Capability (IOC)

- The R2O Process has evolved and improved over the last 6 years.

2010 - 3 CDRs transitioned (3 total)
2011 - 5 CDRs transitioned (8 total)
2012 - 3 CDRs transitioned (11 total)
2013 - 5 CDRs transitioned (16 total)
2014 - 7 CDRs transitioned (23 total)
2015 - 7 CDRs transitioned (30 total)

R2O Transitions in Progress

CDR	FY	PI	SME	CDR
31	2015	Key	Young	Cryosphere Bundle
32	2015	Minnis	Young	AVHRR FCDR and Cloud Properties
33	2016	Xie	Prat	Precipitation - CMORPH
34	2016	Rossow	Knapp	ISCCP
35	2016	Nelson	Nelson	Precipitation - NEXRAD
36	2016	Adler	Prat	Precipitation - GPCP monthly
37	2016	Ferraro	Nelson	Hydrological Bundle
38	2016	Menzel	Young	Total Precipitable Water and Cloud Top Pressure

Future CDR Transitions

CDR	FY	PI	SME	CDR
39	2016	Fetterer	Peng	Sea Ice Concentration - Daily
40	2016	Callahan	Zhang	Sea Level
41	2016	Ho	Shi	Tropopause Height
42	2016	Lou	Shi	UTH-Related FCDR
43	2017	Matthews	Matthews	Surface Albedo
44	2017	Zhang	Shi	ISCCP Energy Budget
45	2017	Adler	Prat	Precipitation – GPCP daily
46	2017	Long	Young	Ozone - NOAA
47	2017	Xie	Prat	Precipitation – OLR/Gauge Blended
48	2017	Adler	Prat	Precipitation – GPCP pentad
49	2017	Heidinger	Knapp	AVHRR+HIRS Cloud Properties
50	2017	Ralph	Semunegus	Atmospheric Rivers

Available Resources

http://www.ncdc.noaa.gov/cdr/guidelines.html

NOAA NATIONAL CLIMATIC DATA CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Home | Operational CDRs | Developmental CDRs | Opportunities | Library

CLIMATE DATA RECORD PROGRAM

- Serving the Public
- Data
- Development Guidelines
- Contact Us

News

CDR Program Receives DOC Gold Medal Award

New Ocean Surface Bundle CDRs available

CDRP Annual Meeting the week of August 3rd, 2015. Check back for details.

Development Guidelines

Research to Operations (R2O) Guidelines

Climate Algorithm Theoretical Basis Document (C-ATBD) Template
General Software Coding Standards
Implementation Plan Template
Instructions for Using CDR Program Templates
Maturity Matrix Template
NetCDF Metadata Guidelines for IOC NOAA Climate Data Records
Standard CDR Names
Transitioning CDRs from Research to Operations

Operations and Maintenance (O&M) Guidelines

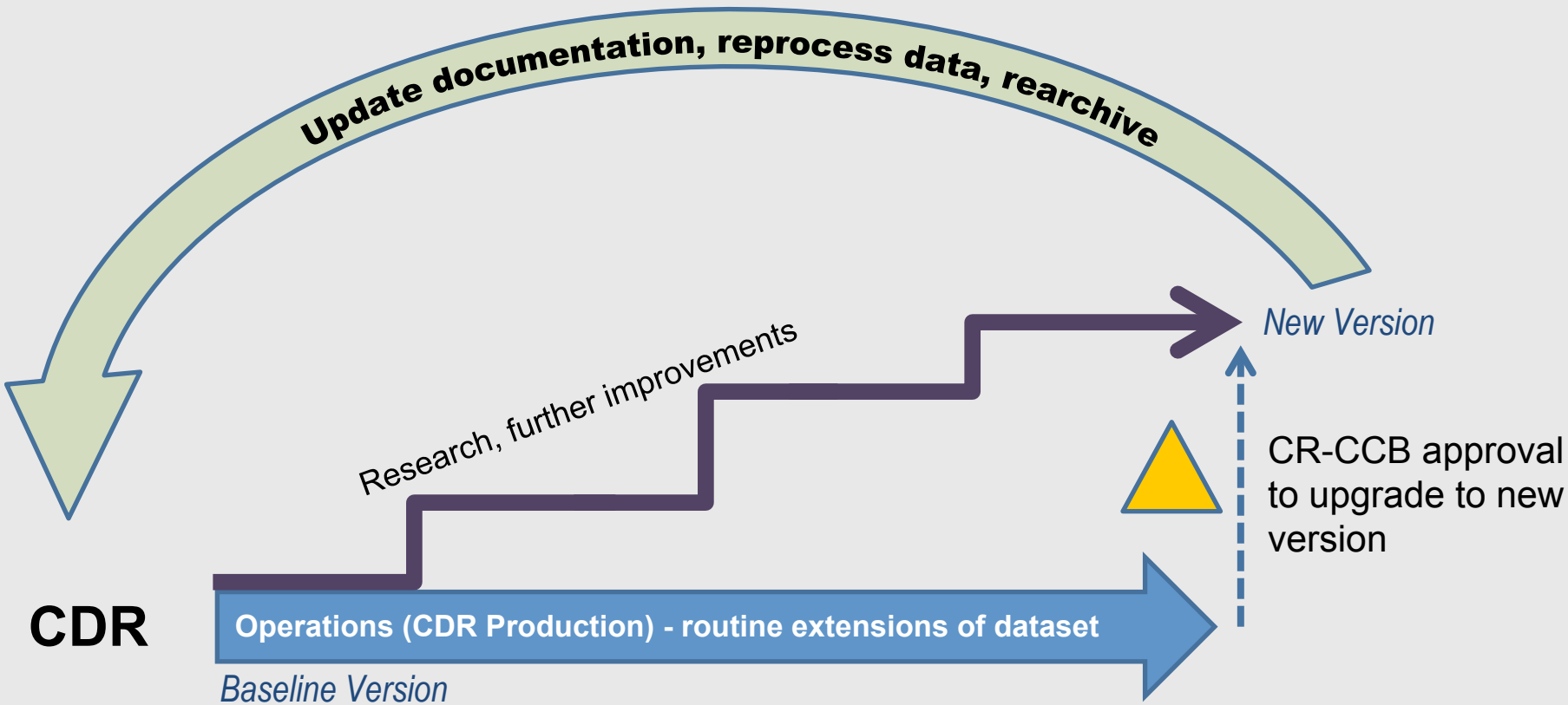
Change Request Process Flow
Climate Algorithm Theoretical Basis Document (C-ATBD) Template
General Software Coding Standards
Implementation Plan Template
Instructions for Using CDR Program Templates
Maturity Matrix Template
Standard CDR Names
Version Description Document

Lessons Learned

- Start the process early
  - Become familiar with the development guidelines on the CDR web page (R2O Guidelines, C-ATBD template, General Programming Standards, NetCDF metadata guidelines)

- Communication is Key
  - The IPTs were established to help maintain open and effective communication between all the area experts
  - Monthly telecons are needed at a minimum
  - Google Drive is an effective collaboration area that all can access
  - SMEs may or may not be an expert in the field, but they will work to fully understand the CDR

After Reaching IOC



Configuration control is necessary for scientific defensibility

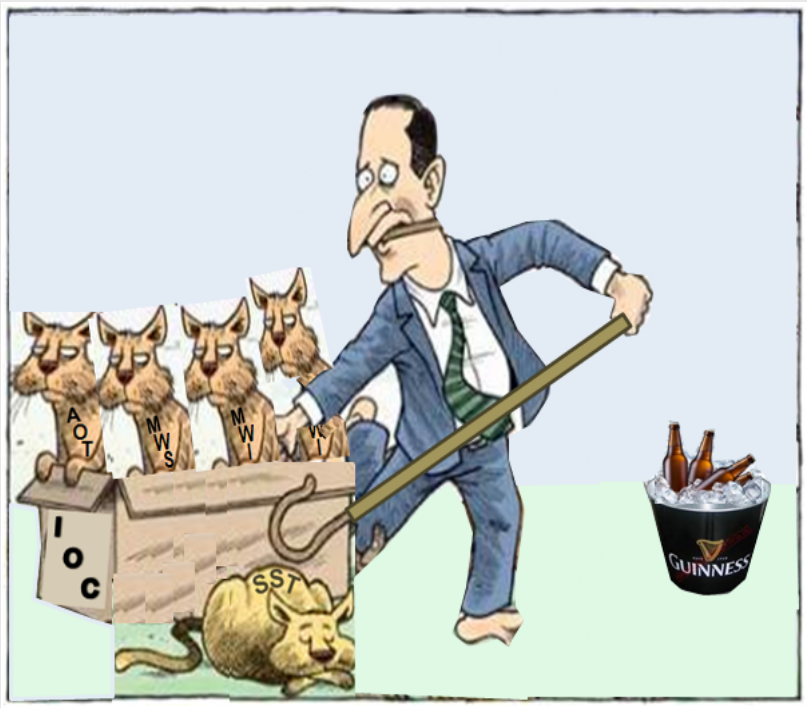
Summary

- R2O is a 6 step process that culminates with an ORR and achieving IOC
- Integrated Product Team (IPT) is comprised of experts in their area and we are here to help
- There are guidelines and templates available on the CDR website to start the process early
- When R2O transition is complete the IOC CDR is baselined (put under version control)

Questions?

daniel.wunder@noaa.gov
(828) 257-3004

R2O



NOAA's National Centers for Environmental Information

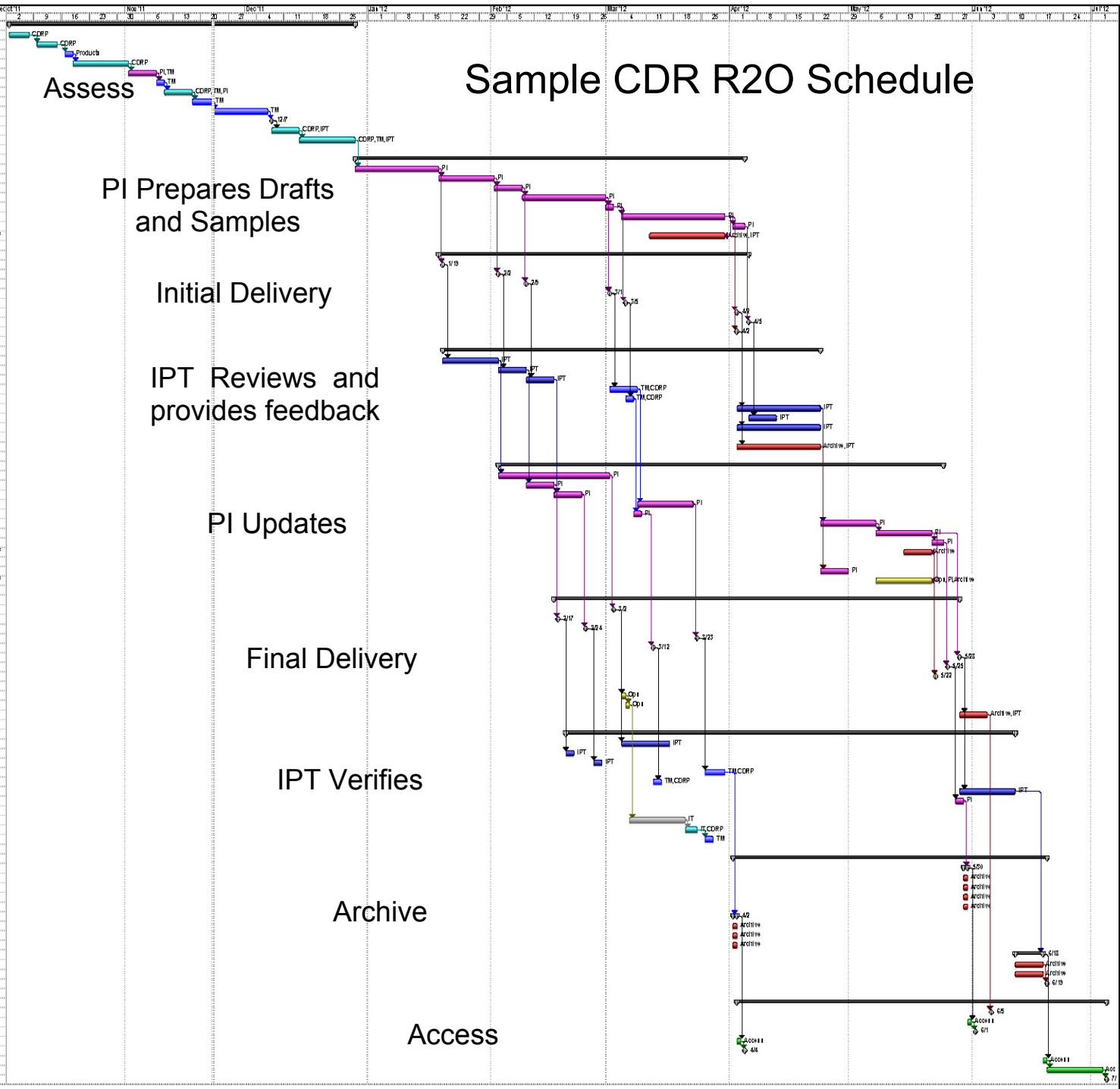
www.ncei.noaa.gov
www.climate.gov

NCEI Climate Facebook: http://www.facebook.com/NOAANCEIclimate
NCEI Ocean & Geophysics Facebook: http://www.facebook.com/NOAANCEIoceangeo
NCEI Climate Twitter (@NOAANCEIclimate): http://www.twitter.com/NOAANCEIclimate
NCEI Ocean & Geophysics Twitter (@NOAANCEIocngeo): http://www.twitter.com/NOAANCEIocngeo

R2O Process

1) Assess	2) Prepare	3) Transfer	4) Verify	5) Archive	6) Access

- Six Phases:
  1) Assess
  2) Prepare
  3) Transfer
  4) Verify
  5) Archive
  6) Access

Sample CDR R2O Schedule

ID	Task Name	Duration	Start	Finish
1	R2O Candidate Selection Process	63 days	Mon 10/3/11	Wed 12/28/11
2	Review/Revise 5 year plan	5 days	Mon 10/3/11	Fri 10/7/11
3	Identify Candidate CDRs	5 days	Mon 10/10/11	Fri 10/14/11
4	Assign TIM	2 days	Mon 10/17/11	Tue 10/18/11
5	Obtain PI commitment	10 days	Wed 10/19/11	Tue 11/1/11
6	Review Transition Guidelines	5 days	Wed 11/2/11	Tue 11/8/11
7	Review PIs proposal	2 days	Wed 11/9/11	Thu 11/10/11
8	Define CDR variables	5 days	Fri 11/11/11	Thu 11/17/11
9	Assemble IPT	3 days	Fri 11/18/11	Tue 11/22/11
10	Perform Assessment	10 days	Wed 11/23/11	Tue 12/6/11
11	KDP: Proceed with Transition?	1 day	Wed 12/7/11	Wed 12/7/11
12	Develop R2O Schedule	5 days	Thu 12/8/11	Wed 12/14/11
13	Create SLAs as needed	10 days	Thu 12/15/11	Wed 12/28/11
14				
15	Preparation	70 days	Thu 12/29/11	Wed 4/4/12
16	Create sample of documented source code	15 days	Thu 12/29/11	Wed 1/18/12
17	Create README Draft	10 days	Thu 1/19/12	Wed 2/1/12
18	Create Flow Diagram Draft	5 days	Thu 2/2/12	Wed 2/8/12
19	Create C-ATBD Draft	15 days	Thu 2/9/12	Wed 2/29/12
20	Create Maturity Matrix Draft	2 days	Thu 3/1/12	Fri 3/2/12
21	Create Sample netCDF dataset	20 days	Mon 3/5/12	Fri 3/30/12
22	Create Production Environment Draft	3 days	Mon 4/2/12	Wed 4/4/12
23	Create Submission Agreement Draft	15 days	Mon 3/12/12	Fri 3/30/12
24				
25	Deliver Samples for Review	54 days	Thu 1/19/12	Thu 4/5/12
26	Deliver documented source code sample	1 day	Thu 1/19/12	Thu 1/19/12
27	Deliver README Draft	1 day	Thu 2/2/12	Thu 2/2/12
28	Deliver Flow Diagram Draft	1 day	Thu 2/9/12	Thu 2/9/12
29	Deliver C-ATBD Draft	1 day	Thu 3/1/12	Thu 3/1/12
30	Deliver Maturity Matrix Draft	1 day	Mon 3/5/12	Mon 3/5/12
31	Deliver Sample netCDF dataset	1 day	Mon 4/2/12	Mon 4/2/12
32	Deliver Production Environment Draft	1 day	Thu 4/5/12	Thu 4/5/12
33	Deliver Submission Agreement Draft	1 day	Mon 4/2/12	Mon 4/2/12
34				
35	Review and Provide Feedback	67 days	Fri 1/20/12	Mon 4/23/12
36	Provide feedback on documented source code sample	10 days	Fri 1/20/12	Thu 2/2/12
37	Provide feedback on README Draft	5 days	Fri 2/3/12	Thu 2/9/12
38	Provide feedback on Flow Diagram Draft	5 days	Fri 2/10/12	Thu 2/16/12
39	Provide feedback on C-ATBD Draft	5 days	Fri 3/2/12	Thu 3/8/12
40	Provide feedback on Maturity Matrix Draft	2 days	Tue 3/6/12	Wed 3/7/12
41	Provide feedback on Sample netCDF dataset	15 days	Tue 4/3/12	Mon 4/23/12
42	Provide feedback on Production Environment Draft	5 days	Thu 4/5/12	Thu 4/12/12
43	Provide feedback on Submission Agreement Draft	15 days	Tue 4/3/12	Mon 4/23/12
44				
45	Create Collection Level Metadata Draft	15 days	Tue 4/3/12	Mon 4/23/12
46				
47	Update CDR elements	39 days	Fri 2/3/12	Thu 3/29/12
48	Update all source code	20 days	Fri 2/3/12	Thu 3/1/12
49	Update README	5 days	Fri 2/10/12	Thu 2/16/12
50	Update Flow Diagram	5 days	Fri 2/17/12	Thu 2/23/12
51	Update C-ATBD	10 days	Fri 3/9/12	Thu 3/22/12
52	Update Maturity Matrix	2 days	Fri 3/9/12	Fri 3/9/12
53	Update netCDF dataset	10 days	Tue 4/24/12	Mon 5/7/12
54	Generate Complete netCDF dataset	10 days	Tue 5/8/12	Mon 5/21/12
55	Update Production Environment Document	3 days	Tue 5/22/12	Thu 5/24/12
56	Update Submission Agreement	5 days	Tue 5/15/12	Mon 5/21/12
57				
58	Review Collection Level Metadata Draft	5 days	Tue 4/24/12	Mon 4/30/12
59	Test and Reconcile any data transfer losses	10 days	Tue 5/8/12	Mon 5/21/12
60				
61	Transfer	72 days	Fri 2/17/12	Mon 5/28/12
62	Deliver final source code	1 day	Fri 3/2/12	Fri 3/2/12
63	Deliver final README	1 day	Fri 2/17/12	Fri 2/17/12
64	Deliver final Flow Diagram	1 day	Fri 2/24/12	Fri 2/24/12
65	Deliver final C-ATBD	1 day	Fri 3/23/12	Fri 3/23/12
66	Deliver final Maturity Matrix	1 day	Mon 3/12/12	Mon 3/12/12
67	Deliver final netCDF dataset	5 days	Tue 5/22/12	Mon 5/28/12
68	Deliver final Production Environment Document	1 day	Fri 5/25/12	Fri 5/25/12
69	Deliver final Submission Agreement	1 day	Tue 5/22/12	Tue 5/22/12
70				
71	Verify control source code	1 day	Mon 3/5/12	Mon 3/5/12
72	Request Security Review	1 day	Tue 3/6/12	Tue 3/6/12
73	Update Collection Level Metadata	5 days	Tue 5/29/12	Mon 6/4/12
74				
75	Verification	81 days	Mon 2/24/12	Mon 6/11/12
76	Verify final source code	10 days	Mon 3/5/12	Fri 3/16/12
77	Verify final README	2 days	Mon 2/27/12	Tue 2/28/12
78	Verify final Flow Diagram	2 days	Mon 2/27/12	Tue 2/28/12
79	Verify final C-ATBD	5 days	Mon 3/26/12	Fri 3/30/12
80	Verify final Maturity Matrix	2 days	Tue 3/13/12	Wed 3/14/12
81	Verify final netCDF dataset	10 days	Tue 5/29/12	Mon 6/11/12
82	Verify final Production Environment Document	2 days	Mon 5/28/12	Tue 5/29/12
83				
84	Conduct Security Review	10 days	Wed 3/7/12	Tue 3/20/12
85	Create Security Report	3 days	Wed 3/21/12	Fri 3/23/12
86	Provide feedback to PIs on any security findings	2 days	Mon 3/26/12	Tue 3/27/12
87				
88	Archive	57 days	Mon 4/2/12	Tue 6/19/12
89	Archive Code Package	1 day	Wed 5/30/12	Wed 5/30/12
90	All source code	1 day	Wed 5/30/12	Wed 5/30/12
91	README	1 day	Wed 5/30/12	Wed 5/30/12
92	Security Report	1 day	Wed 5/30/12	Wed 5/30/12
93	Production Environment	1 day	Wed 5/30/12	Wed 5/30/12
94	Archive Document Package	1 day	Mon 4/2/12	Mon 4/2/12
95	Flow Diagram	1 day	Mon 4/2/12	Mon 4/2/12
96	C-ATBD	1 day	Mon 4/2/12	Mon 4/2/12
97	Maturity Matrix	1 day	Mon 4/2/12	Mon 4/2/12
98	Archive Data Package	5 days	Tue 6/12/12	Mon 6/18/12
99	netCDF dataset	5 days	Tue 6/12/12	Mon 6/18/12
100	Available ancillary data	5 days	Tue 6/12/12	Mon 6/18/12
101	Put Submission Agreement in document library	1 day	Tue 6/19/12	Tue 6/19/12
102				
103	Access	67 days	Tue 4/5/12	Wed 7/4/12
104	Put Collection Level Metadata in web access folder	1 day	Tue 6/5/12	Tue 6/5/12
105	Put source code package on archive	1 day	Thu 5/31/12	Thu 5/31/12
106	Place source code package on CDR access portal	1 day	Fri 6/1/12	Fri 6/1/12
107	Put document package from archive	1 day	Tue 4/3/12	Tue 4/3/12
108	Place document on CDR access portal	1 day	Wed 4/4/12	Wed 4/4/12
109	Put NC DR product dataset from archive	1 day	Tue 6/19/12	Tue 6/19/12
110	Put dataset on THREDDS access server	10 days	Wed 6/20/12	Tue 7/3/12
111	Create link to data on CDR access portal	1 day	Wed 7/4/12	Wed 7/4/12