

Transparent Assessment Framework (TAF)

Open and Reproducible Stock Assessments

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CAPAM, Wellington
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<http://taf.ices.dk>



Science for sustainable seas

1. TAF overview
2. Key messages for software developers
3. Key messages for stock assessors

1. Transparent Assessment Framework (TAF)



To implement a framework to organize **data**, **methods**, and **results** used in ICES assessments, so they are easy to **find** and **rerun** later with new data.

Relevance to CAPAM workshop



- ▶ ICES handles around 200 stock assessments every year:
data preparation → analysis → peer review → advice
- ▶ Open: data files, model scripts, and results available **online**
- ▶ Reproducible: anyone can browse, download, and **run** the assessment, on their own computer or on the ICES TAF **server** (final run)
- ▶ Assessment repository is private, but becomes **public** after the peer review and advice is released
- ▶ Easy to see exactly **what has changed** in the data or model setup between years
- ▶ Standard sequence of scripts (data, input, model, output) facilitates quality checks and **peer review**

TAF Plan

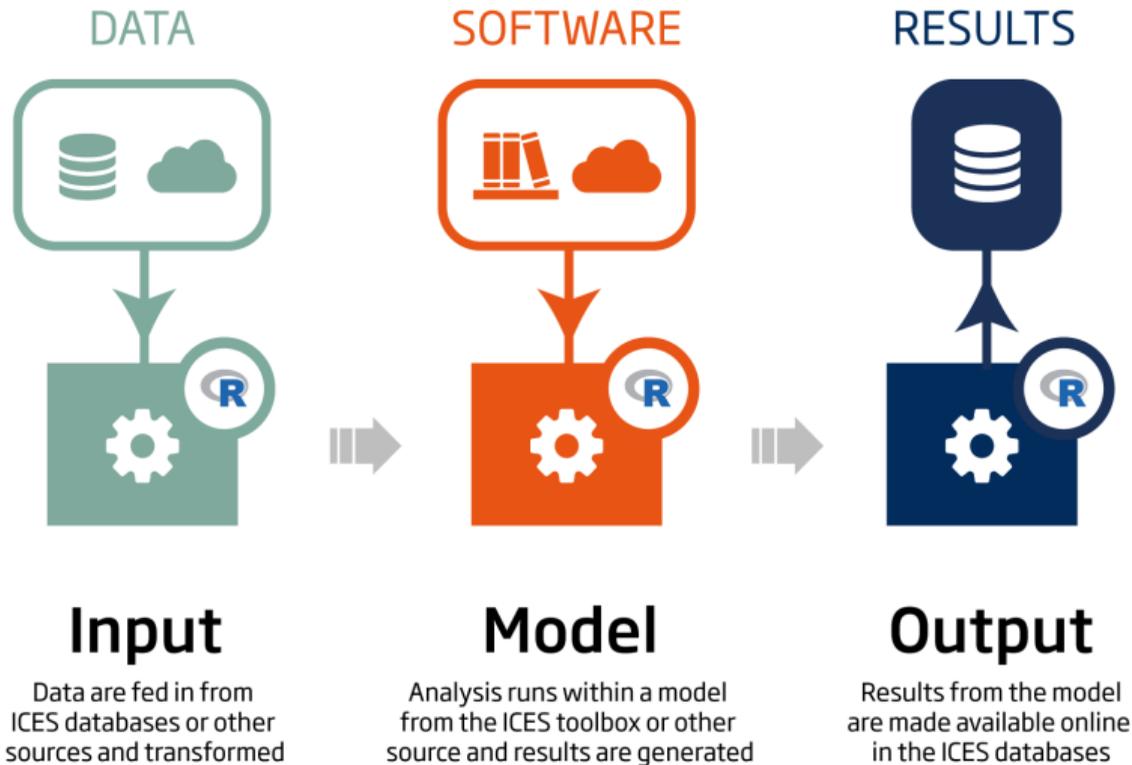


2016–2018

- ▶ Design
 - ✓ *Scientists write standard R scripts that prepare data and run analysis*
- ▶ Implementation
 - ✓ *R packages: work with ICES databases, core TAF functions*
 - ✓ *Web interface where users can browse, modify, and run assessments*
 - ✓ *Example stocks demonstrate workflow: input, model, output*

2018–2020

- ▶ Training
 - ✓ *Introductory videos, user documentation, collaboration with EGs, support*
- ▶ Deployment
 - ✓ *ICES assessments enter TAF gradually, around EG meetings and benchmarks*



Workflow scripts



Core

data.R - Preprocess data, write TAF data tables

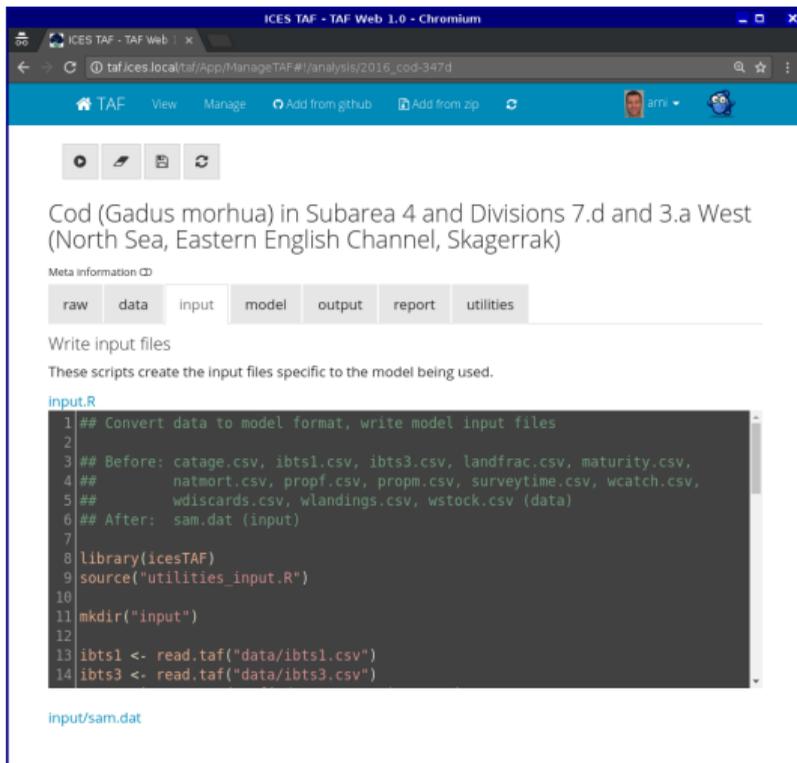
model.R - Run analysis, write model results

output.R - Extract results of interest, write TAF output tables

Also

report.R - Prepare plots and tables for report

View, edit and run R code online



ICES TAF - TAF Web 1.0 - Chromium

taf.ices.local/taf/App/ManageTAF#/analysis/2016_cod-347d

TAF View Manage Add from github Add from zip

input

Cod (*Gadus morhua*) in Subarea 4 and Divisions 7.d and 3.a West (North Sea, Eastern English Channel, Skagerrak)

Meta information

raw data **input** model output report utilities

Write input files

These scripts create the input files specific to the model being used.

[input.R](#)

```
1 ## Convert data to model format, write model input files
2
3 ## Before: catage.csv, ibts1.csv, ibts3.csv, landfrac.csv, maturity.csv,
4 ##         natmort.csv, propf.csv, propm.csv, surveytime.csv, wcatch.csv,
5 ##         wdiscards.csv, wlandings.csv, wstock.csv (data)
6 ## After:  sam.dat (input)
7
8 library(icesTAF)
9 source("utilities_input.R")
10
11 mkdir("input")
12
13 ibts1 <- read.taf("data/ibts1.csv")
14 ibts3 <- read.taf("data/ibts3.csv")
```

[input/sam.dat](#)

Inputs and results available to view or download



The screenshot shows a web browser window with two tabs: "ICES TAF - TAF Web 1.0" and "taf.ices.local/TAF/fs/2015". The address bar displays the URL "taf.ices.local/TAF/fs/2015_had-iceg/report/summary.csv". Below the address bar is a navigation bar with icons for "Apps", "EGs", "TAF", "R", "ICES-pages", "TFS", "dansk", and "ices-pro". The main content area displays a CSV file with the following data:

Year	Rec	B3plus	SSB	Landings	YoverSSB	Fbar
1979	80923	162177	96072	55330	0.576	0.521
1980	37390	192244	116521	51110	0.439	0.398
1981	10426	206988	141628	63558	0.449	0.542
1982	42788	180380	136817	69428	0.507	0.444
1983	29306	148112	112589	65942	0.586	0.508
1984	20574	112797	82961	48282	0.582	0.515
1985	42788	102394	66652	51102	0.767	0.537
1986	86501	96480	59837	48859	0.817	0.739
1987	164036	105395	46298	40760	0.88	0.584
1988	48742	153708	69391	54204	0.781	0.675
1989	29778	168184	99537	62885	0.632	0.676
1990	27094	145507	110745	67198	0.607	0.611
1991	92280	122708	89825	54692	0.609	0.664
1992	175094	106310	66379	47121	0.71	0.728
1993	38137	130161	71000	48123	0.678	0.660

And can be easily read into R

R Console (32-bit)

File Edit Misc Packages Windows Help

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

```
> read.csv("http://taf.ices.local/TAF/fs/2015_had-iceg/report/summary.csv")
```

	Year	Rec	B3plus	SSB	Landings	YoverSSB	Fbar
1	1979	80923	162177	96072	55330	0.576	0.521
2	1980	37390	192244	116521	51110	0.439	0.398
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Published assessments accessible on GitHub



ices-taf / 2015_had-iceg

Unwatch 2 Star 0 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Insights Settings

Icelandic haddock Edit

Add topics

48 commits 2 branches 3 releases 2 contributors

Branch: master New pull request Create new file Upload files Find file Clone or download

colinmillar test change for webhook post Latest commit 985241e 15 days ago

_model	Download model executable from TAF database	3 months ago
_raw	Download catageysa.dat from TAF database -> data, later moved to input	3 months ago
data.R	Use setwd("data") to shorten paths	a month ago
input.R	Sort header files alphabetically	2 months ago
model.R	Sort header files alphabetically	2 months ago
output.R	Extract model results -> Extract results	29 days ago

List code changes between stages or between years



ices-taf / 2015_had-iceg

Unwatch 2

Star 0

Fork 0

Code

Issues 0

Pull requests 0

Projects 0

Wiki

Insights

Settings

Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#).

base: 2.0 ... compare: 2.1

7 commits

5 files changed

0 commit comments

1 contributor

Commits on Sep 13, 2017

	arnima-github	Rename report.R -> report_tables.R	21c7d3f
	arnima-github	Add report_plots.R to demonstrate TAF	fb62492

Commits on Sep 15, 2017

	arnima-github	Download raw data and model executable from github.com/ices-taf/ftp	e5e7093
	arnima-github	Use new download() function	941d8ab

View code changes between stages or between years

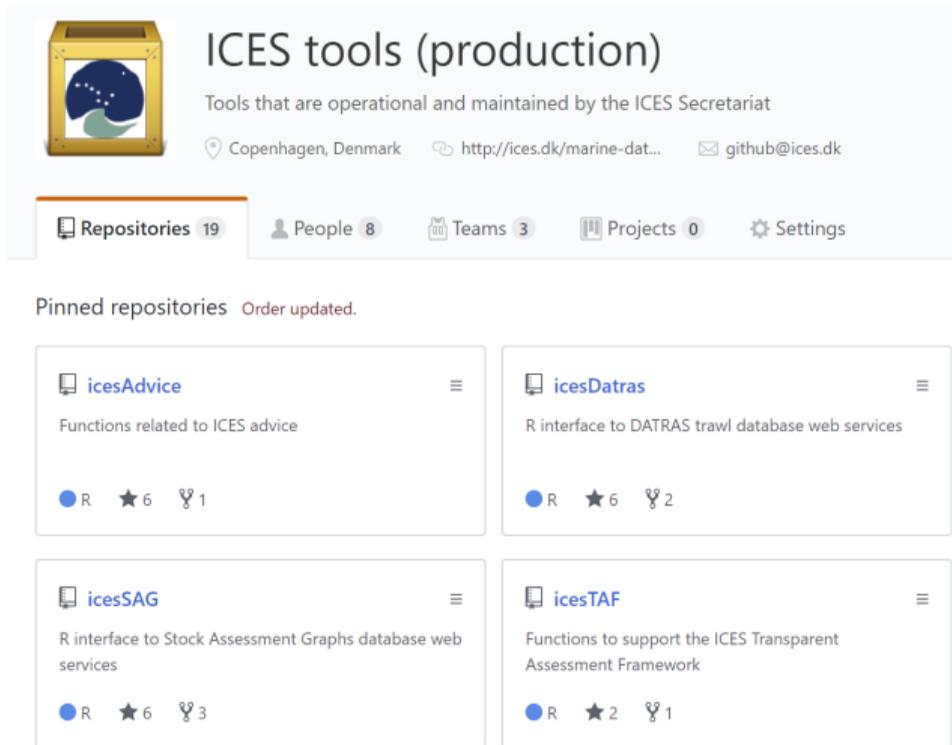


Showing 5 changed files with 86 additions and 10 deletions.

Unified Split

```
2 data.R
@@ -9,7 +9,7 @@ source("utilities.R")
9 9
10 10 mkdir("data")
11 11
12 -url <- "http://taf.ices.local/taf/fs/2015_had-iceg/raw/"
12 +url <- "https://raw.githubusercontent.com/ices-taf/ftp/master/nwwg/2015/had-iceg/raw/"
13 13
14 14 ## Download data, this file will later be moved to input
15 15 download.file(paste0(url,"catageysa.dat"), "data/catageysa.dat", quiet=TRUE)
```

```
5 model.R
@@ -7,12 +7,11 @@ library(icesTAF)
7 7
8 8 mkdir("model")
9 9
10 -url <- "http://taf.ices.local/taf/fs/2015_had-iceg/model/"
```



ICES tools (production)
Tools that are operational and maintained by the ICES Secretariat

Copenhagen, Denmark <http://ices.dk/marine-dat...> github@ices.dk

Repositories 19 People 8 Teams 3 Projects 0 Settings

Pinned repositories Order updated.

- icesAdvice** Functions related to ICES advice
R ★ 6 🍴 1
- icesDatras** R interface to DATRAS trawl database web services
R ★ 6 🍴 2
- icesSAG** R interface to Stock Assessment Graphs database web services
R ★ 6 🍴 3
- icesTAF** Functions to support the ICES Transparent Assessment Framework
R ★ 2 🍴 1

Benefits



- ▶ Easy to **find data and results** from final assessment
- ▶ **Open** and reproducible science, improved **quality control**
- ▶ Easy for scientists around the world to **get ICES data**
- ▶ Easy to run an **update assessment** next year
- ▶ If scientist **changes jobs**, next person can take over
- ▶ Existing and **future tools** can use TAF services

TAF links



Main landing page - <http://taf.ices.dk>

Development page - <https://ices-taf-dev.github.io>

One-page flyer - <https://ices-taf-dev.github.io/pdf/taf-flyer.pdf>

Tutorial

(video) - <https://www.youtube.com/watch?v=FweJbr9hfdY>

(written) - <https://github.com/ices-taf/doc/blob/master/tutorial-1/README.md>

Procedure to get an assessment into TAF

<https://github.com/ices-taf/doc/blob/master/procedure.md>

TAF assessment scripts - <https://github.com/ices-taf>

Key messages for software developers



1. Make it easy to run the model **from R**.
2. Try to make it easy to dump **CSV files** of the main input data and results into text files. For example, catch at age in a standard crosstab format with a header such as Year,1,2,3,4,5,6.
3. Try to make it possible to download and **set up the software from an R script**. For example, this can be an R package that can be installed from CRAN or GitHub, or an executable for Windows, Linux, and Mac that can be downloaded from the web using `download.file()` and possibly `unzip()` if necessary.
4. If the software is distributed as built executables, try to make the corresponding **source code available** for download.
5. If the software is maintained as an R package on GitHub, try to **tag significant releases** with descriptive version number/name, so it's easy to find and fetch the desired version of the software for a given assessment.

Key messages for **stock assessors**



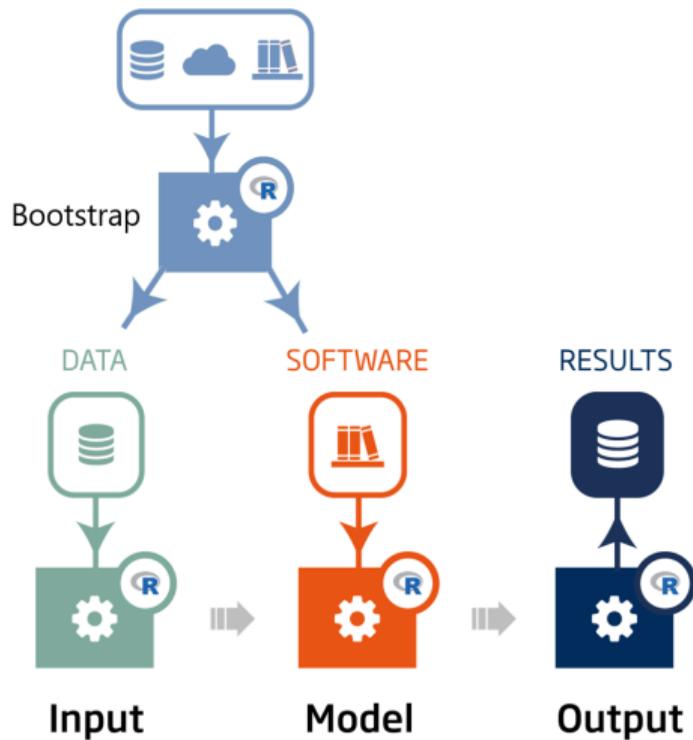
1. Consider writing the stock assessment in **R scripts**.
2. Try to fully **script the entire analysis**, from data preparation to result tables and figures. Scripts are **run sequentially**, each creating input files for next script.
3. Try to write scripts that will **run on any computer**. When reading and writing files, use **relative paths** based on the script location.
4. Consider structuring the scripts as **data.R** → **model.R** → **output.R** → **report.R** with files created at the end of each script. This separates the analysis into steps that are easy to develop, maintain, and review.

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Bootstrap procedure



Thanks!



Questions?

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<https://ices.dk>

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