The FLR platform and the a4a initiative

FLR Team
Maritime Affairs Unit - IPSC
EC Joint Research Center

Why, oh why?

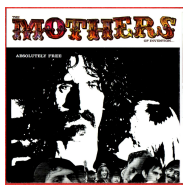
Schnute *et al.* (2007 and 1998) compared the number of software tools and languages currently available for stock assessments with the Babel tower myth and concluded that: "The cosmic plan for **confounding software languages** seems to be working remarkably well among the community of quantitative fishery scientists!"

A brief history of FLR

- Started by FEMS FP5, COMMIT & EFIMAS FP6
- Beta ICES WG Methods 2004
- FLCore version 1.0 - 2005

- FLCore version 1.4 *The Golden Jackal* - 2007

- FLCore version 2.2 *Swordfish Polka* - 2010



- FLR 2.4 *The Duke of Prawns* - 2011

LE CHEF-D'ŒUVRE DE FRANCIS FORD COPPOLA DANS SA VERSION DÉFINITIVE
THIS IS THE END...
MARLON BRANDO
ROBERT DUVALL
MARTIN SHEEN
APOCALYPSE NOW
UN FILM DE
FRANCIS FORD COPPOLA

Current

- FLR 2.5.*, in continuous development
- Main packages are stable
- Keep track of versions you used: local copies, github or packrat

- FLR 2.6 - *Black Swan*

FLR development

- Collaborative development
- Informal team
- Indirect funding
- Open Source

GNU project (http://gnu.org)

Free software is a matter of liberty, not price

free = free speech

free != free beer

Mission statement

The FLR project provides a **platform for quantitative fisheries science** based on the R statistical language. The guiding principles of FLR are:

- **openness** - through community involvement and the open source ethos
- **flexibility** - through a design that does not constrain the user to a given paradigm
- **extendibility** - through the provision of tools that are ready to be personalized and adapted.

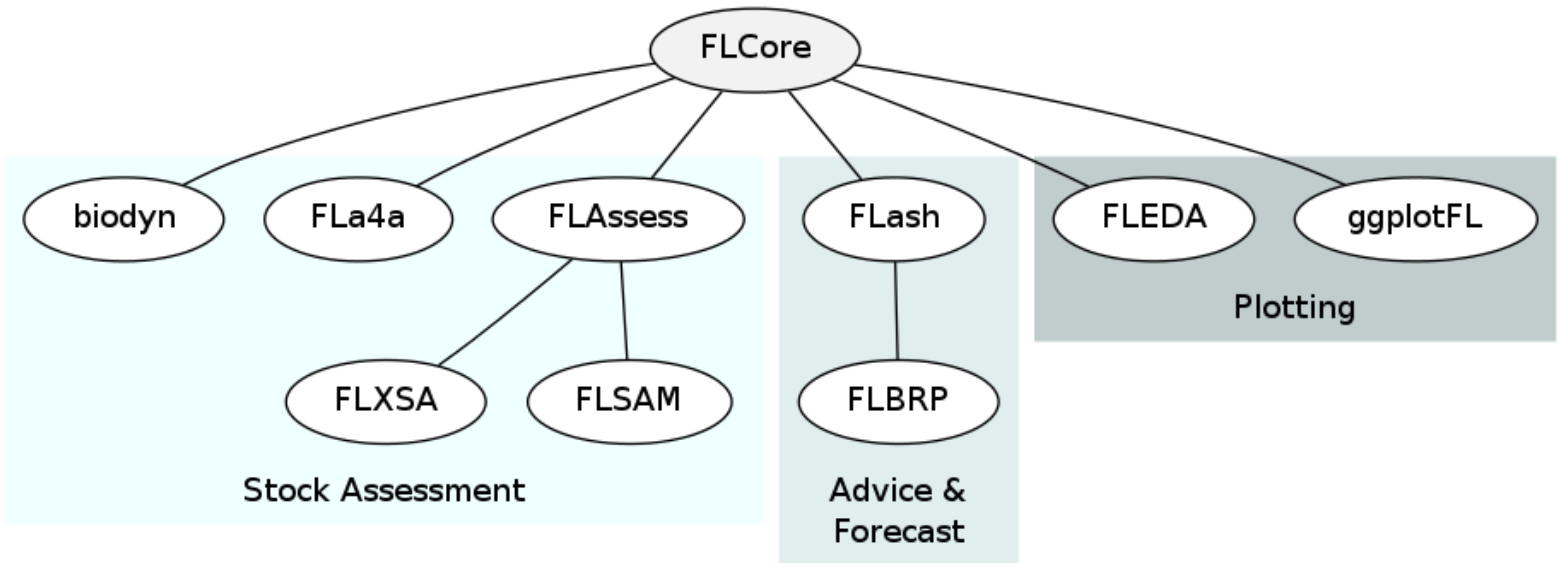
Really, what is FLR?

- Extendable toolbox for implementing bio-economic simulation models of fishery systems
- Tools used by managers (hopefully) as well as scientists
- With many applications including:
  - Fit stock-recruitment relationships,
  - Model fleet dynamics (including economics),
  - Simulate and evaluate management procedures and HCRs,
  - More than just stock assessment (VPA, XSA, ICES uptake)
- A software platform for quantitative fisheries science
- A collection of R packages
- A team of devoted developers
- A community of active users

Design principles

- OOP - S4
- Classes: elements in system
  - `FLStock`, fish stock
    - `FLBRP` inputs for BRP calc
- Methods: link objects
- Mid-steepenes learning curve

Packages


FLCore
biodyn
FLa4a
FLAssess
FLash
FLEDA
ggplotFL
Plotting
FLXSA
FLSAM
FLBRP
Stock Assessment
Advice &
Forecast

a4a - Assessment for All

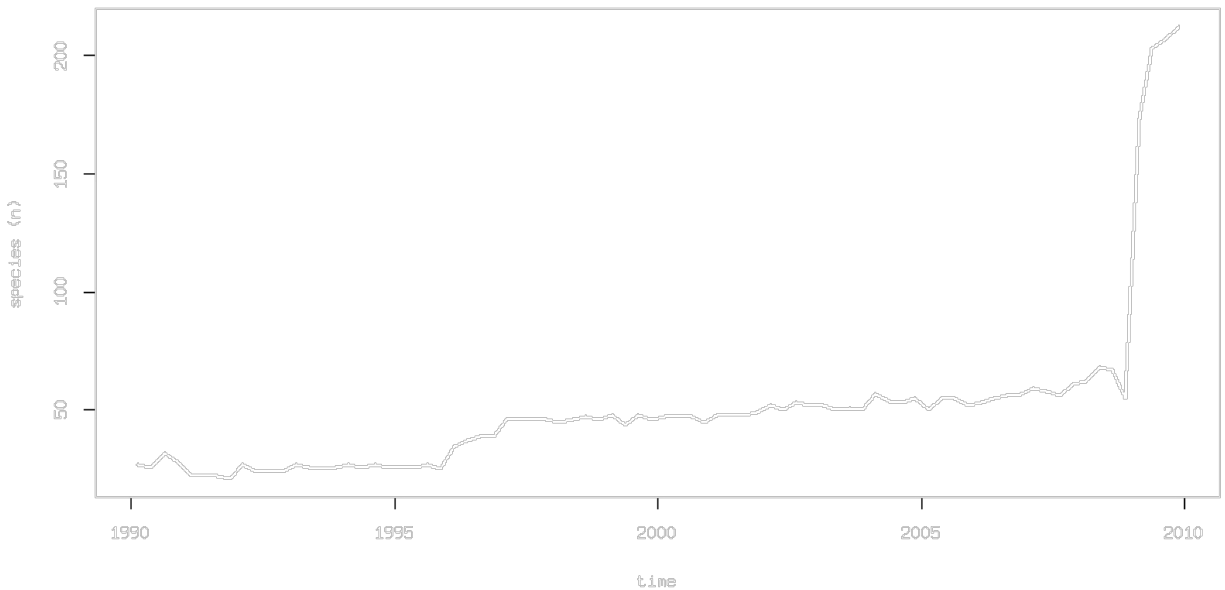
Long term vision

- Standard methods to apply rapidly to a large number of stocks
- No strong statistical technical background
- Using technical knowledge on the fisheries, stocks and ecosystem

Why

- Demand for abundance and exploitation estimates
- Large investments in collecting information
- Scientific advice for fisheries management.

a4a - Sampled species (PT)



What if we have to assess hundreds of stocks?

Estimate what you know, simulate what you don't

a4a Initiative EC JRC

1. Develop a4a SA method
2. Discussion on *massive* stock assessment
3. Capacity building (this course)

`https://fishreg.jrc.ec.europa.eu/web/a4a`

a4a SA model

- *Moderate* data stock (Catch, Survey/CPUE, little bio)
- NL CaA model, R/FLR/ADMB
- *Simple* syntax

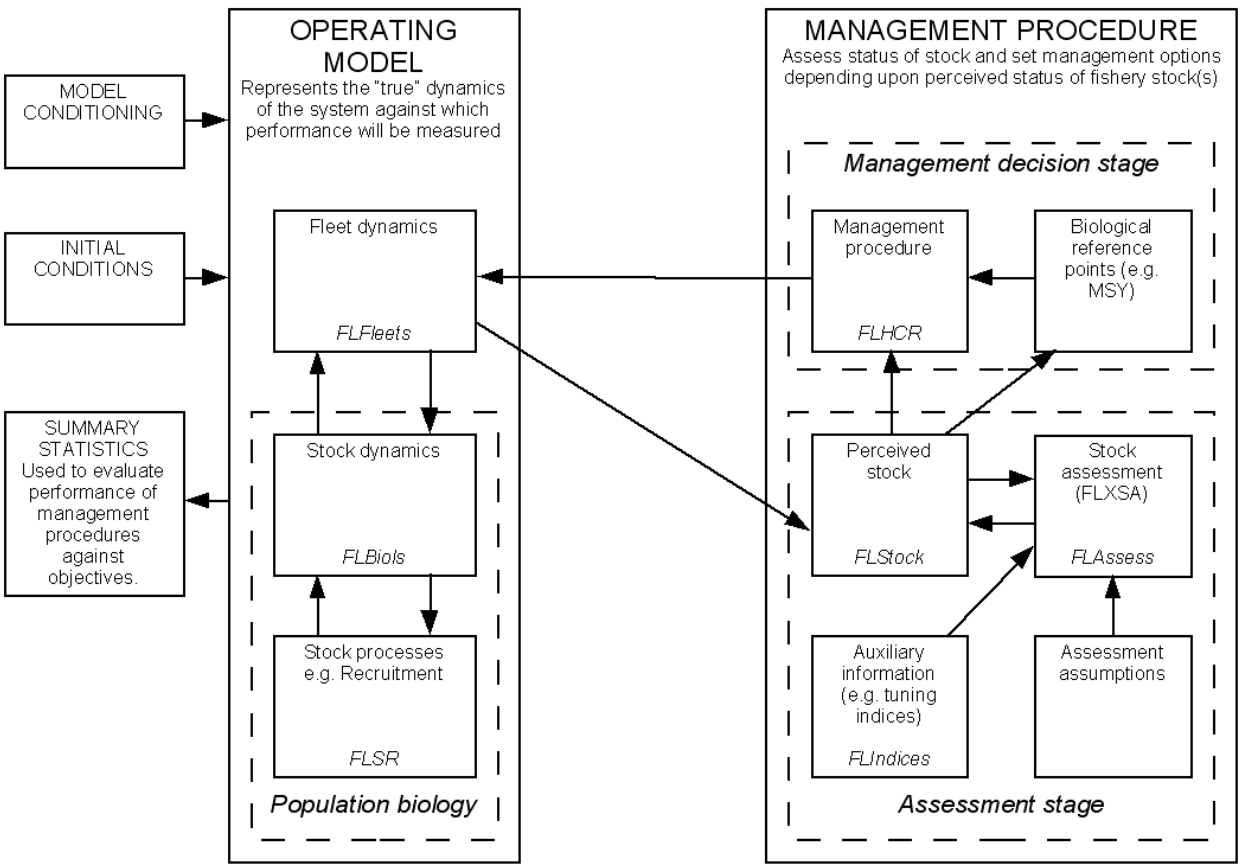
```
> fmodel = separable()
> qmodel = trawl(techcreep=0.03)
> rmodel = beverton(a=s(NAO))
```

a4a MSE

Building an STANDARD MSE

1. OM uncertainty in growth, S/R and selectivity
2. HCRs based on catch, surveys, assessments
3. Assessment models of increasing complexity
4. OE for catch and index
5. IE in F or catch

MSE - The Lego block approach



More information

- FLR Project @ http://flr-project.org
- Source code @ http://github.com/flr/
- a4a Initiative @ https://fishreg.jrc.ec.europa.eu/web/a4a

KEEP
CALM
AND
CODE
FLR