

# The a4a Initiative



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# Long term vision

*To have a group of **standard methods** that can be applied **rapidly** to a large number of stocks, **without requiring** a strong statistical technical background, but **making use** of the technical knowledge on the fisheries, stocks and ecosystem characteristics.*

*Why ?*

Increasing demand for abundance and exploitation estimates.

CFP, EAFM, MSFD, UN CBD, UN Millenium assessment, etc

DCR/F/MAP collecting lots of information, piling somewhere.

# Setting the scene

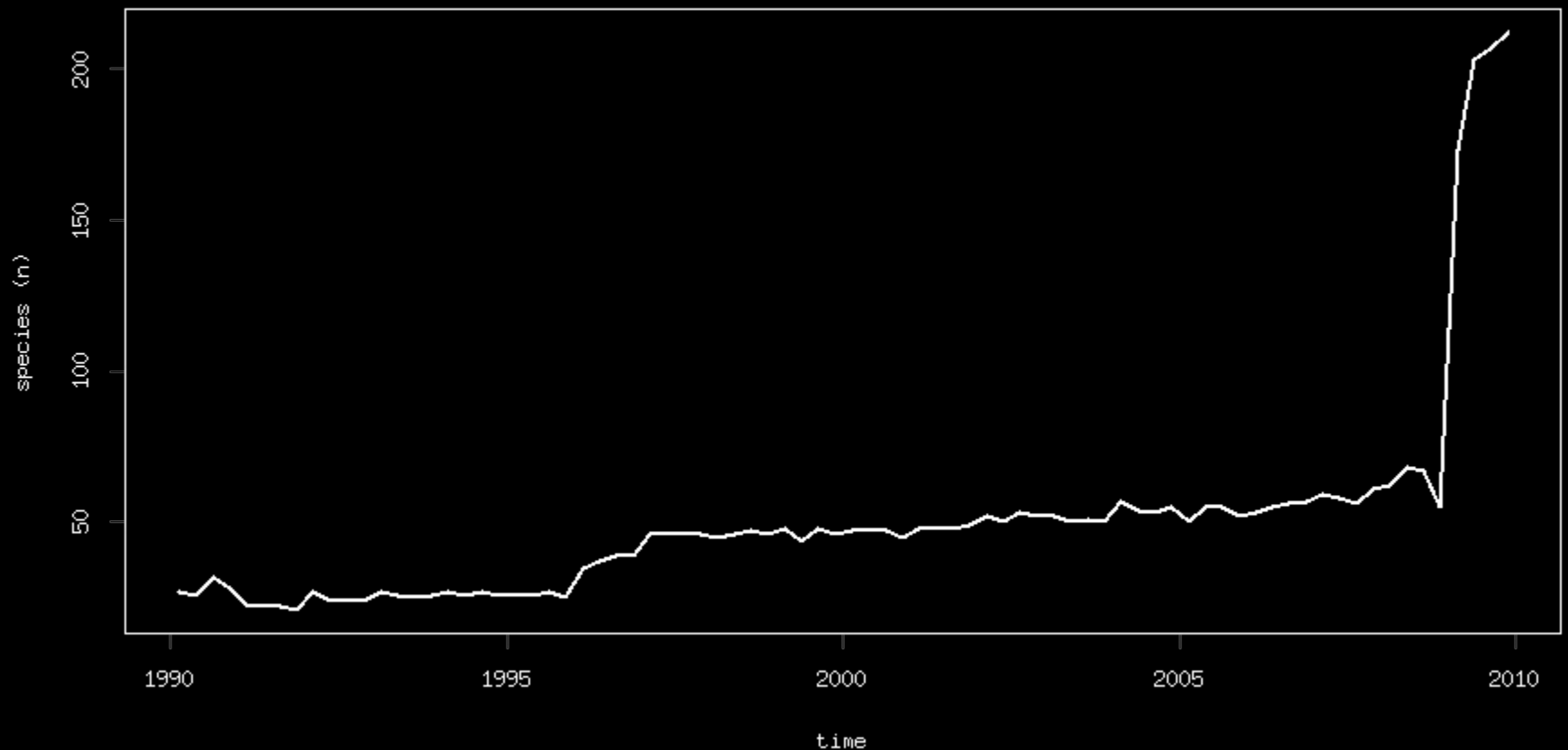
- Biological parameters (growth & reproduction) are being collected for **250+** stocks in waters where European fleets operate.
- DCF's “**concurrent sampling**” concept<sup>(\*\*)</sup> requires *sampling all or a predefined assemblage of species, simultaneously in a vessel's catches or landings*
- DCF & Advice budget 2007-2013 is ~360m€<sup>(\*)</sup>

(\*) SEC(2011) 1417 final (\*\*) 2008/949/EC, Annex, Chapter I, 1.b

# Setting the scene

- The DCF reports make it difficult to evaluate the number of species each Member State is sampling, but it should be **hundreds**.

# *e.g.* PT sampled species (lengths)



# Setting the scene worldwide

- US law requires **all federal fisheries** to come up with **annual catch limits**, including appropriate buffers to account for scientific and management uncertainties.



# However ...

- Beddington et.al (2007) show that intermediate data stocks that are not being assessed make up for 30% in the USA, 78% in New Zealand, 48% in Australia, 61% in the North-East Atlantic.

# So what ? (Miles *dixit*)

*What if ~2020 EU fisheries scientists are asked  
to assess hundreds of stocks, and justify  
~1bn€ spent in data collection ?*

# So what ? (Miles *dixit*)

*These are not data-poor stocks !!*



# Solution !?

*Standardize and enter automatic mode !!*

# Solution !?

*Estimate what you know,  
MSE<sup>(\*)</sup> what you don't,  
and keep it simple !!*

(\*) Management Strategies Evaluation (kell et.al, 2007)

# a4a initiative

- (a) develop an assessment method targeting stocks that have a reduced knowledge base on biology and moderate time series on exploitation and abundance;
- (b) trigger the discussion about the problem of massive stock assessment.
- (c) capacity building

# How ?

- (1) **Define** a moderate data stock (entry level)
- (2) **Develop** a stock assessment framework
- (3) **Develop** a forecasting algorithm based on MSE
- (4) Make it **intuitive**



## ***(1) The “moderate data stock”***

### **(a) Exploitation**

- Nominal effort
- Volume (L, D)
- Length frequencies

### **(b) Biology**

- Information based knife edge mat ogive
- Indications for growth model
- Length – weight relationship

### **(c) Index of abundance**

## *(2) The stock assessment ~~model~~ framework*

- Non-Linear Mixed model implemented in R/FLR<sup>(\*)</sup>/ADMB that can be applied rapidly to a wide range of situations with low parametrization requirements

(\*) <http://flr-project.org>

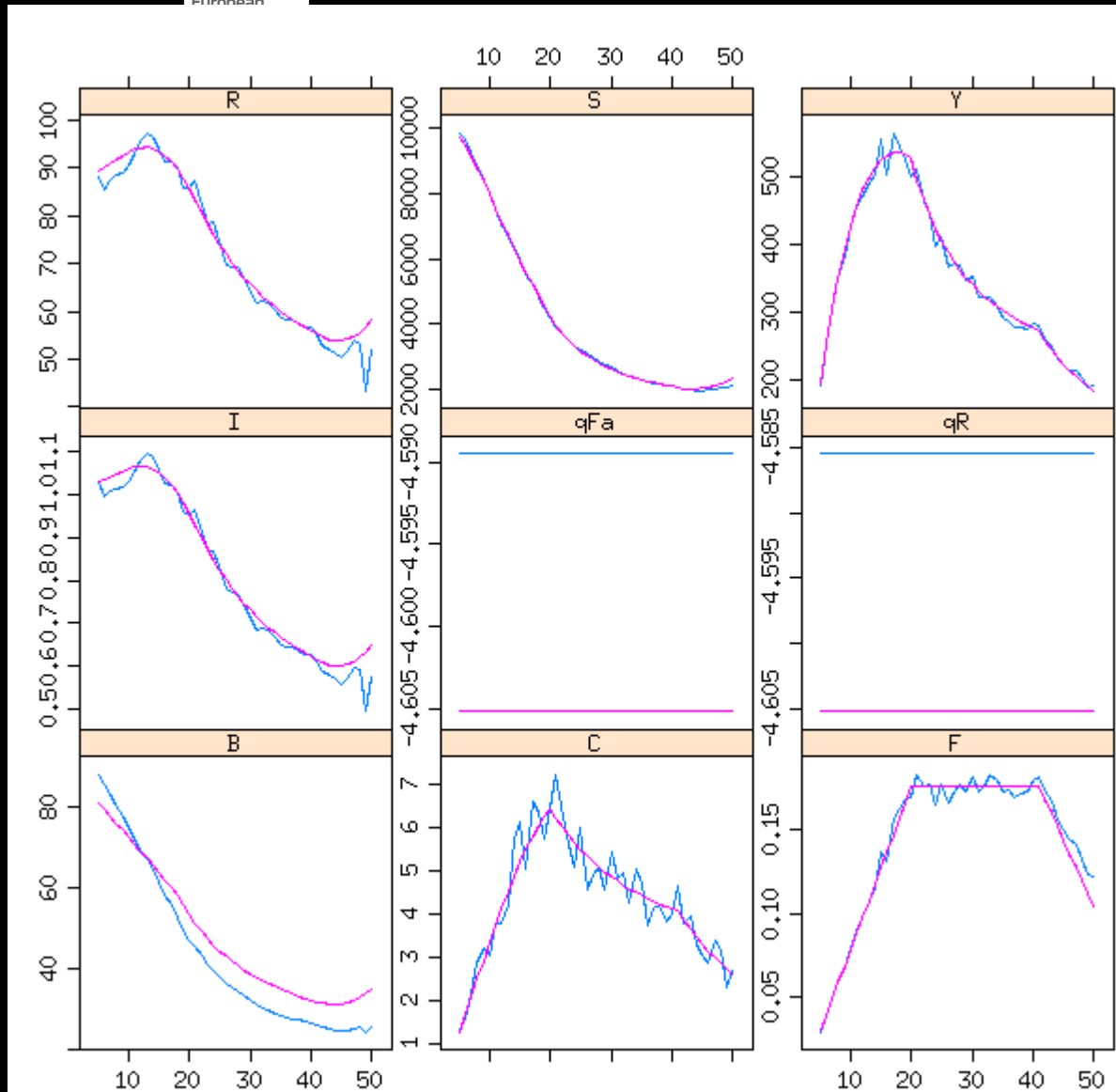
- As simple as a linear regression !?

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

*Testing, 1,2 ...*

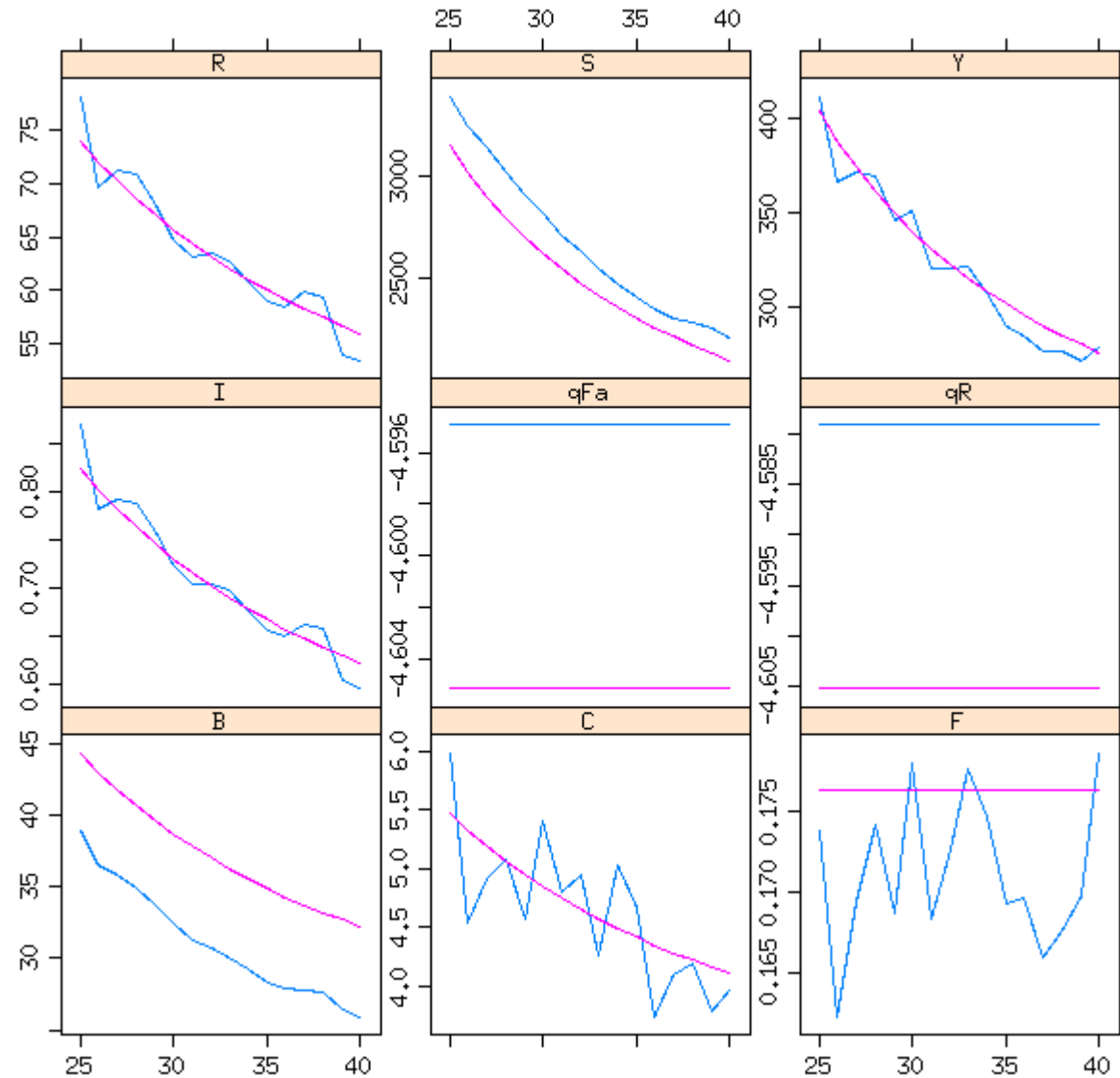
*WKLIFE stocks*

*Fishbase stocks<sup>(\*)</sup>*



(\*) <http://fishnet-dev.jrc.it/web/guest/a4a>

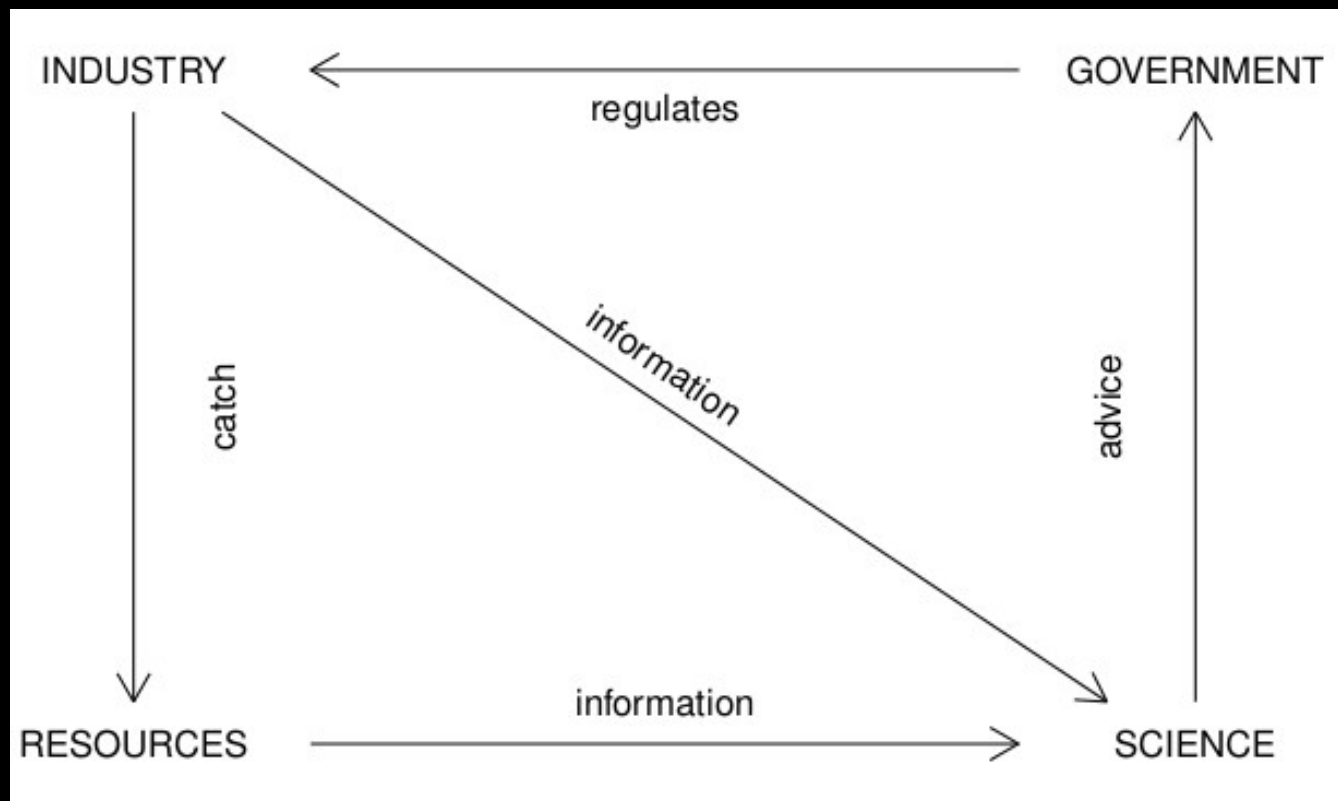
# Testing, 1,2 ...



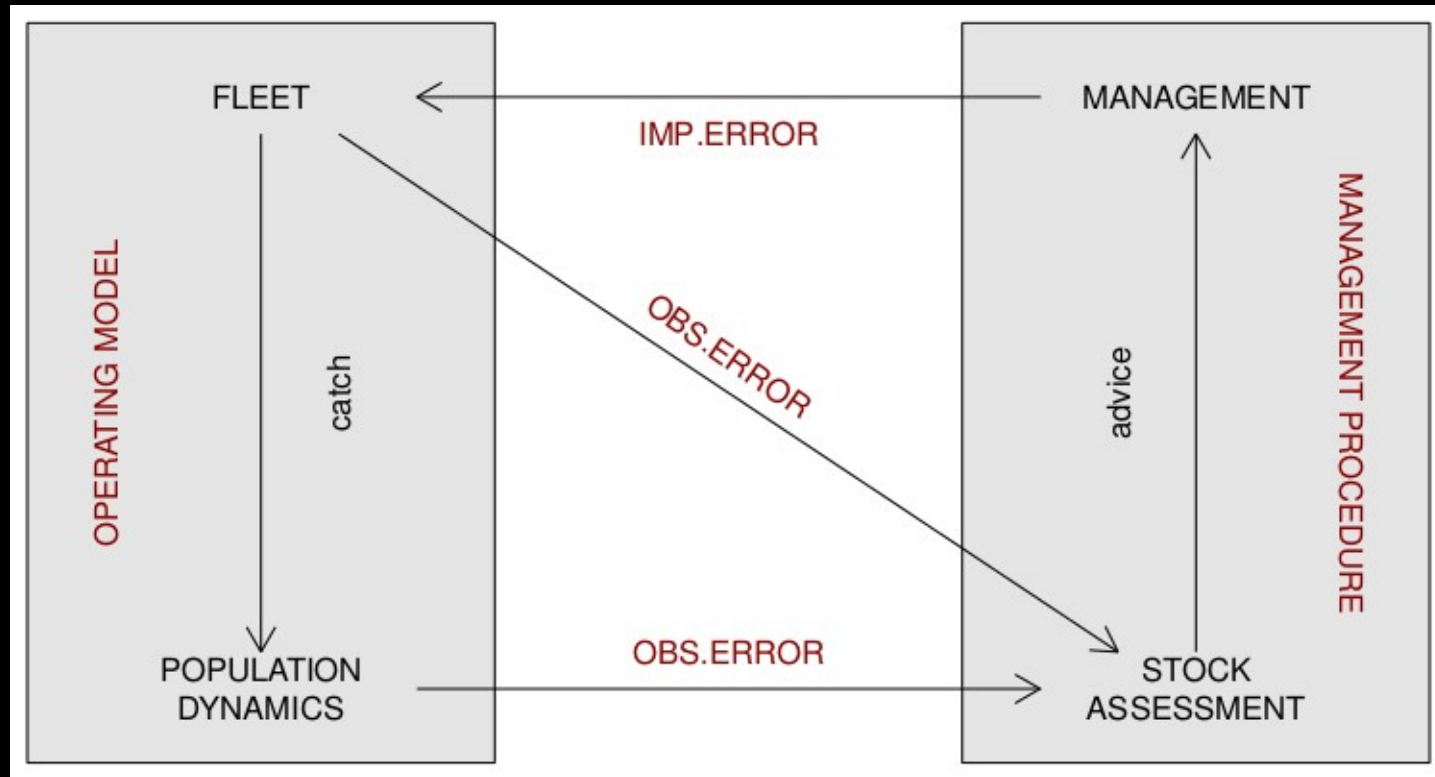
### ***(3) MSE in the context of a4a***

A sophisticated **forecasting** algorithm that takes into account **structural uncertainty** about stock dynamics (growth, recruitment, maturity) and on exploitation by commercial fleets (selectivity), embedding the framework of **decision making**.

# *Fisheries Management Cycle*



# *Management Strategies Evaluation (MSE)*



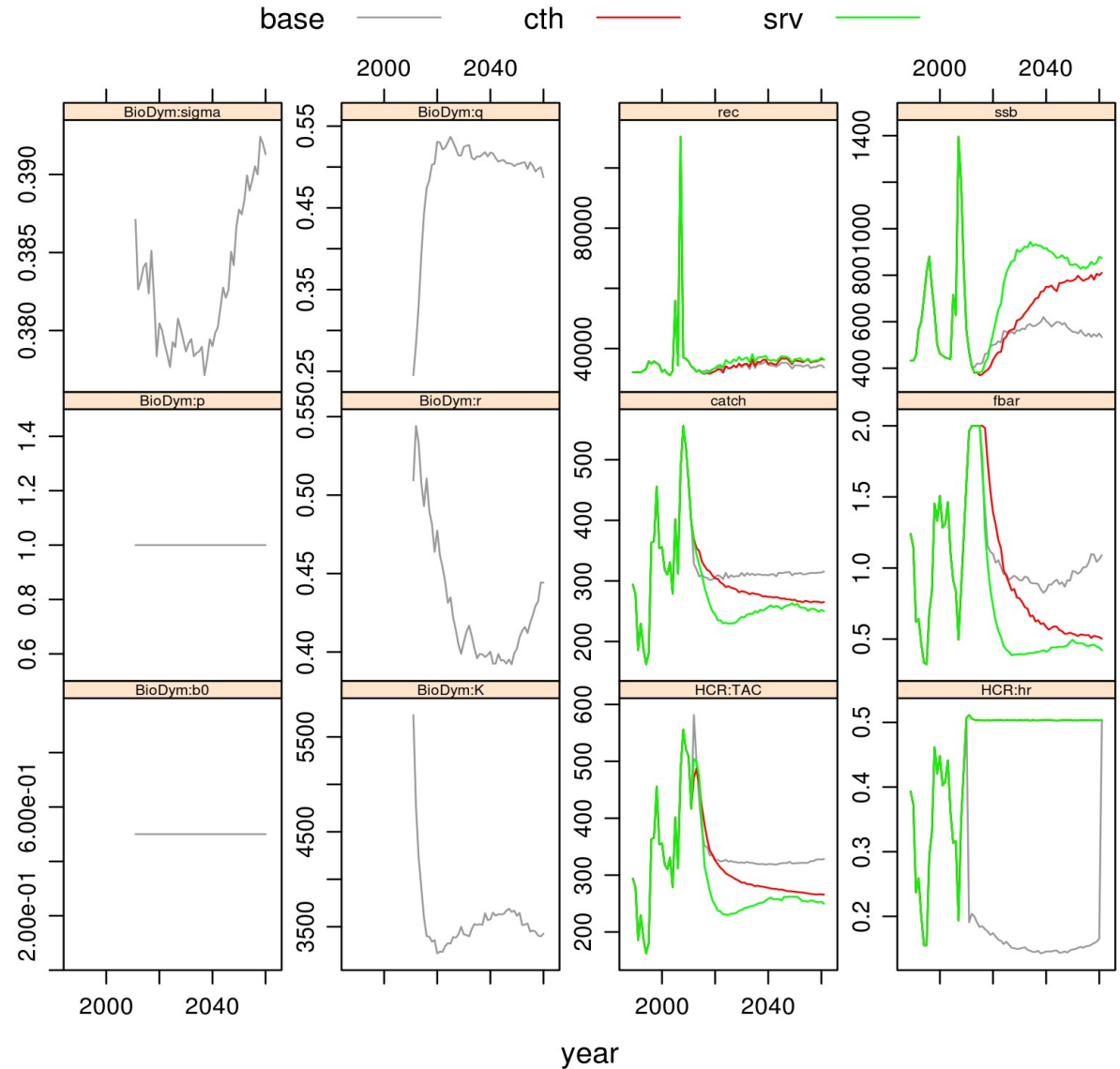


## *The standard MSE*

- OM uncertainty in growth, S/R and selectivity
- 3 HCR based on:  
catch, surveys, assessments
- 3 assessment models  
biodyn , simple and complex SCA
- OE for catch and index
- IE in F or catch

# MSE example

(loosely based on *S.aurita* in Northwest Africa)



## ***(4) Intuitive***

- Methods should be implemented in a way that it doesn't require a highly specialized statistician to use them.
- Parametrization must have a biological meaning:  
*trawl(catchability="linear")*  
*s(age, 4) + factor(year) + year*
- Courses and dissemination/demonstration actions

# Wrapping up

*a4a aims to provide standard methods for stock assessment and forecasting that can be applied rapidly to a large number (all ?) stocks in a sea basin.*

# Wrapping up

Standardize and constraint stock assessment and forecast so that **numerical** issues don't get on the way and scientists can move their focus to more **interesting** subjects, like ecosystem, population or fleet dynamics.

***Thank you for your  
attention !***

**(<https://fishreg.jrc.ec.europa.eu/web/a4a>)**

## *Let me call your attention to:*

- JRC course *“Introduction to R”*  
*October 2013, Ispra, Italy*  
*(funding for non-EU countries)*  
*(<colin.millar@jrc.ec.europa.eu>)*
- World Conference on Stock Assessment Methods  
*15-19 July 2013, Boston, USA*  
*(<http://ices.dk/iceswork/symposia/wcsam.asp>)*