Operating Models

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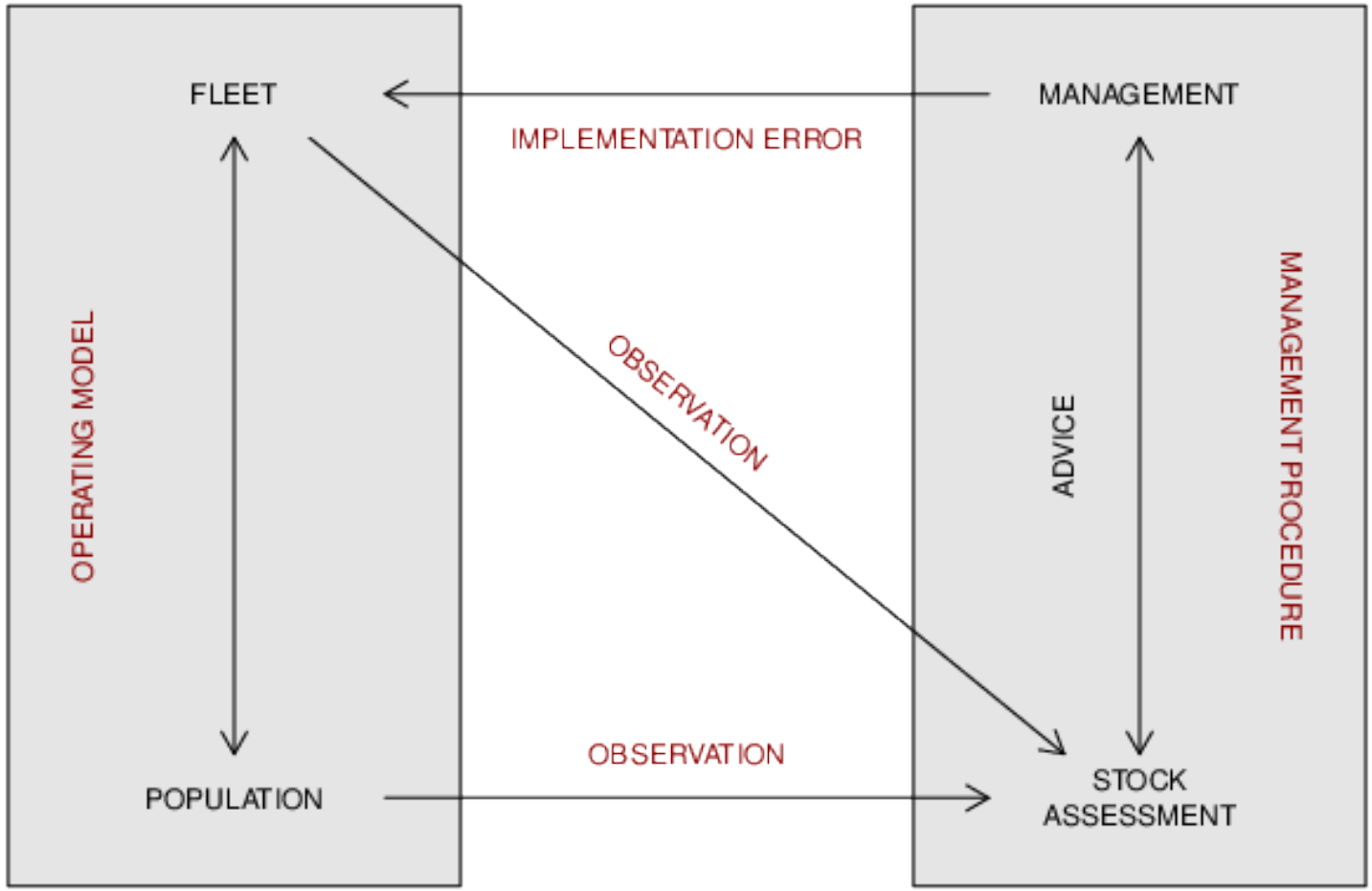
100years
1918 — 2018

What is an Operating Model?

A core component of the management strategy evaluation (MSE) process that represents the true underlying status and dynamics of the population, fishery and monitoring regime. There will be a number of OMs considered so as to capture the full range of uncertainties applying to the resource and fishery. Often two sets of OMs are used: a reference set of the most plausible scenarios/hypotheses with the greatest impact on outcomes, and a robustness set of unlikely, but still possible scenarios/hypotheses.[1]

[1] https://iss-foundation.org/glossary/operating-model/

Biological and fleet components, plus environment



Conditioning

- Fitting to data, but more relaxed.
- Include additional knowledge.
- It is mostly about the uncertainty.

What uncertainties to consider

- Estimation error
- Structural uncertainty
- Observation error
- But do not overdue it

Estimation uncertainty

- FLa4a::sca(fit = ‘‘MCMC’’), ADMB -mcmc
- TMB mcmc(), tmbstan()
- Bootstrap

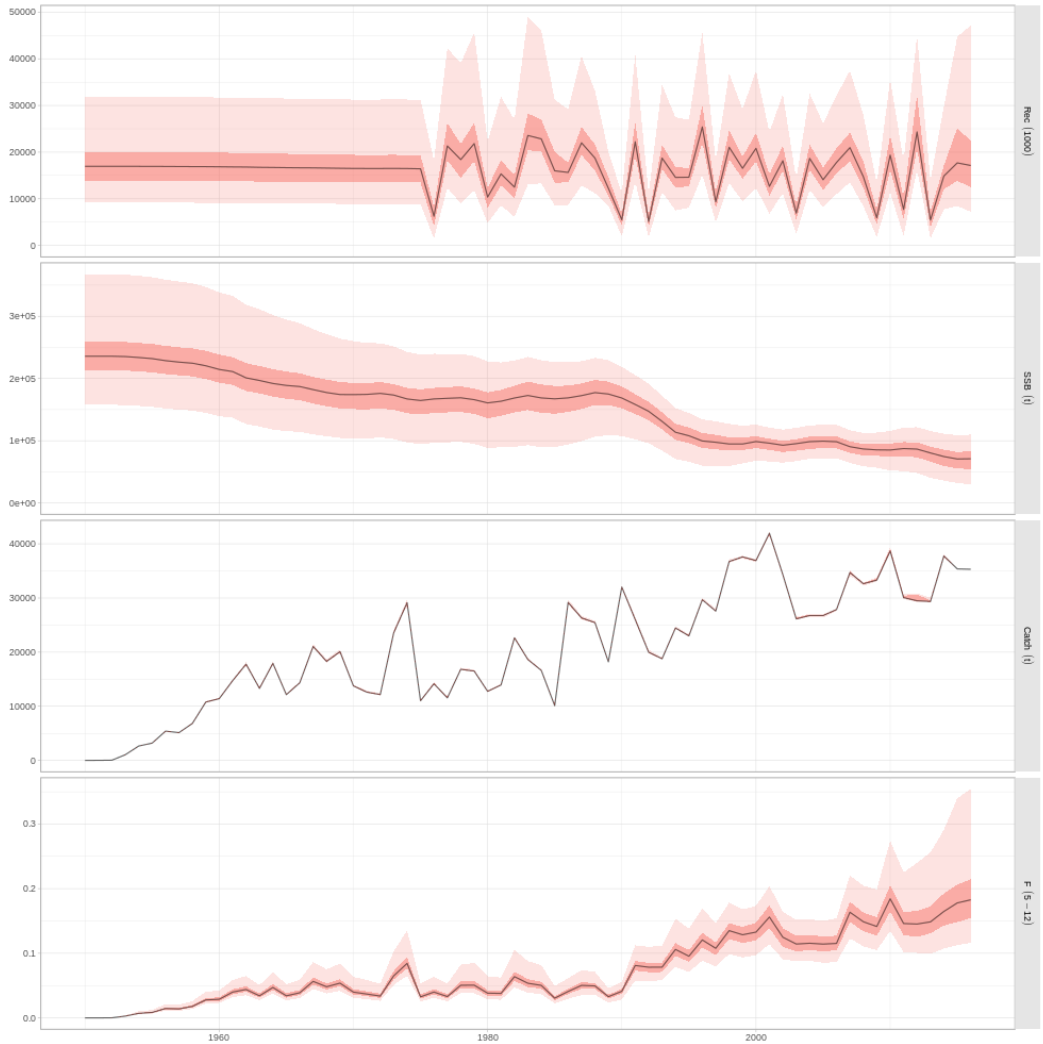
Structural uncertainty: model grids

- Grid of alternative model formulations.
- SS3, Multifan-CL.
- Equally weighted, weighted by likelihood or priors.

IOTC ALB OM grid

- M: 0.2, 0.3, 0.4, 0.4-0.3, 0.4-0.2
- sigmaR: 0.4, 0.6
- h: 0.7, 0.7, 0.9
- CV(CPUE): 0.2, 0.3, 0.4, 0.5
- ESS: 20, 50, 100
- LL CPUE Q delta: 0%, 1%/year
- LL CPUE selectivity: Logistic, Double normal
- 5 * 2 * 3 * 4 * 3 * 2 * 2 = 1,440 SS3 runs, 1 h each

IOTC ALB OM



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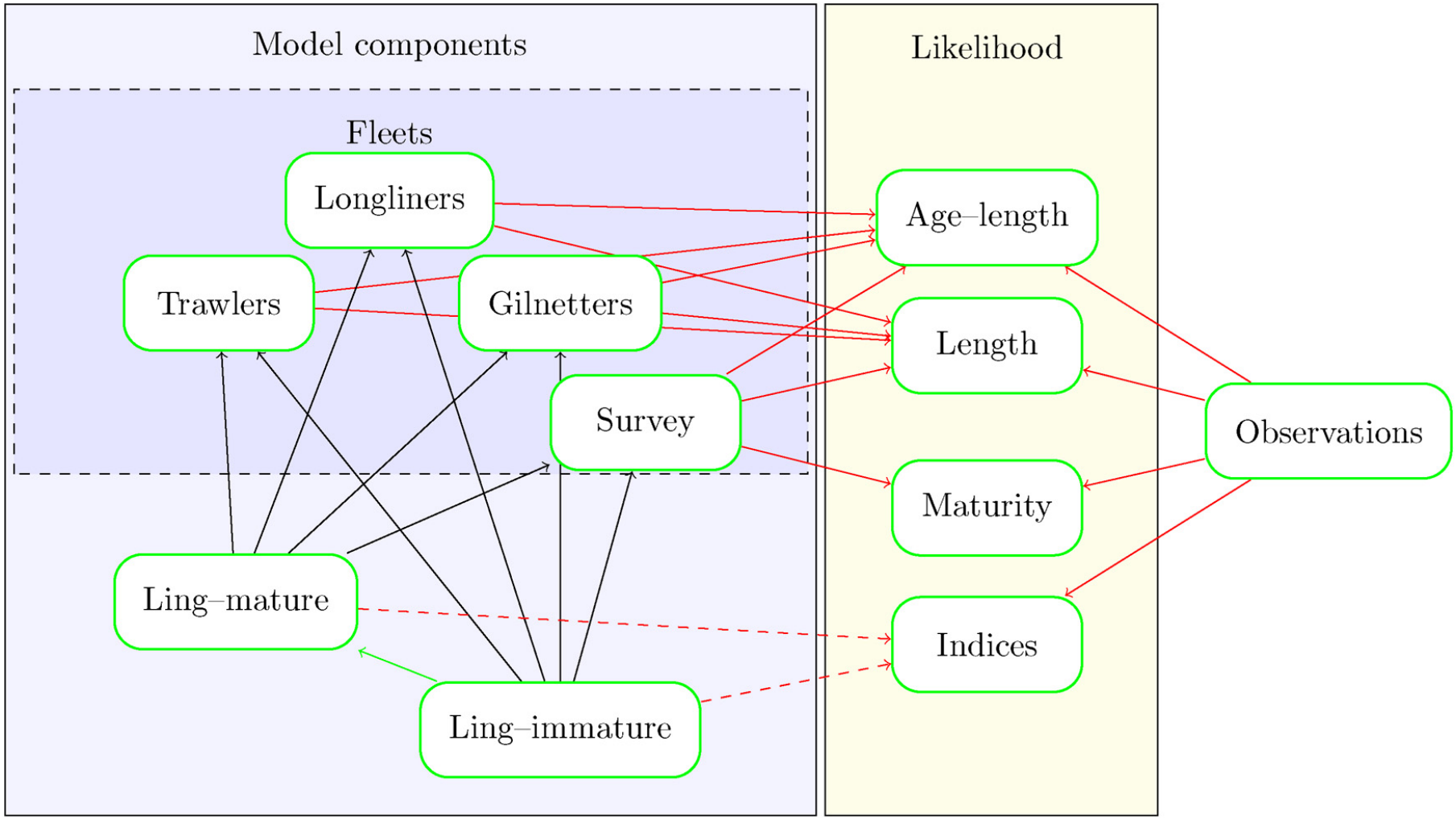
Multispecies: Gadget



- https://github.com/dgoto2/flr-gadget

Data limited

- Life history-based OM (FLife)
- Biomass dynamics OM + MP (mpb)

OM dimensionality in FLR

- Limited (more or less) by forecasting package.

FLash

- Single stock, one fleet, yearly, no areas.

FLasher

- Multiple stock, multiple fleets.
- Seasonal, multiple spawning, genders.
- TODO: areas, density-dependence.
- TODO: To be integrated into *mse*.

Operating Models

Base case OM

- Fully conditioned on data, future reflects the past

Alternative OM(s)

- Other sources of information
- Possible dangerous cases to guard against

Robustness cases

- Extreme scenarios to be prepared for
- Test limits of MP

Some final considerations

- Ensure consistency past and future OM, except when not.
- Continuous formulations of alternative options.
- Integrate over equally plausible scenarios.
- More data should lead to lower risk, but not always.
- Implementation review of OM (5-10 years)