

# Selectivity through target-based management and regulatory measures

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$$M2_i = \frac{\sum_j \frac{dR}{dt} N_j \frac{\varphi_{ji}}{\varphi_j}}{N_i \omega_i}$$

$\Delta \int_a^b \epsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$   
 $\infty$   
 $\chi^2$   
 $\Sigma$   
 $\sqrt{17}$   
 $\int$   
 $\delta$   
 $e^{i\pi}$   
 $\{2.7182818284\}$   
 $\chi^2$   
 $\Sigma$   
 $\int$   
 $\delta$   
 $e^{i\pi}$   
 $\{2.7182818284\}$



# OUTLINE

**I. Technical Measures: Do we have a problem?**

**II. Target-based management : does selectivity matter?**

**III. Moving away from Technical Measures: what are our options?**

**IV. Target- (/results) - based management : what are the policy implications?**

**V. Conclusions**



# I. Technical Measures: Do we have a problem?

## 1. not all technical measures make sense

Reg	Area	Article	Gear specification other than mesh size	Scientific basis
850/98	All EU-area except Baltic and Med.	6	For CMS 90-119 mm: CC $\leq$ 100 meshes CC must non increase	CC has documented effect on selectivity Ballooning effect - unclear basis
		7	SMP position SMP size SMP material	SMP position and size have documented effect on selectivity SMP material - unclear basis
		8	TTS $\leq$ 8 mm TTM sum $\leq$ 12 mm	TT has documented effect on selectivity
		9	SM or DM only	unclear basis
		Annex XIVA	Nephrops grid specifications: CC $\leq$ 100 meshes bar spacing $\leq$ 35 mm	CC and bar spacing - affects selectivity guiding funnel - unclear basis

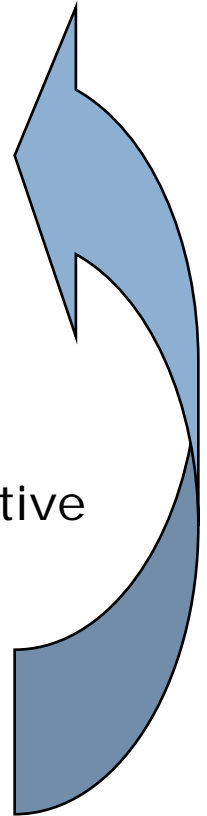
*STECF EWG 15-01 : review of the scientific basis for technical measures.  
Focus on gear specification rather than on desired outcome*



# I. Technical Measures: Do we have a problem?

## *2. the negative micromanagement spiral*

- A conservation objective is identified
- Technical measures to achieve this are put in place
- The industry experiences losses of catch value or fishing opportunities
- Industry makes technological adaptations which nullifies negative economic effects of regulation
- These adaptations nullify conservation effect in the process
- Conservation outcomes not achieved



***-> Legislative "arms race" – cumulative growth of TCM***

# I. Technical Measures: Do we have a problem?

## 3. inconsistencies with landings obligation

Target species	Mesh size range (millimetres)	
	40 to 54	≥ 55
	Minimum percentage of target species	
	60 % (!)	None
Grey mullets ( <i>Mugilidae</i> )	×	×
Sea breams ( <i>Sparidae</i> )	×	×
Red mullets ( <i>Mullidae</i> )	×	×
Gurnards ( <i>Triglidae</i> )	×	×
Weevers ( <i>Trachinidae</i> )	×	×
Wrasses ( <i>Labridae</i> )	×	×
Forkbeard ( <i>Phycis</i> spp.)	×	×
Wedge sole ( <i>Dicologlossa cuneata</i> )	×	×
Spotted flounder ( <i>Citharus linguatula</i> )	×	×
Conger ( <i>Conger conger</i> )	×	×
Mantis shrimp ( <i>Squilla mantis</i> )	×	×
Shrimps ( <i>Parapenaeus longirostris</i> , <i>Pandalus</i> spp.)	×	×
Squids ( <i>Ommastrephidae</i> , <i>Loliginidae</i> <i>Alloteuthis</i> spp.)	×	×
Octopus ( <i>Octopus vulgaris</i> )	×	×
Cuttlefish ( <i>Sepia</i> spp.)	×	×
Mackerel ( <i>Scomber</i> spp.)	×	×

The Catch Composition rule incentivises discarding of unwanted species to increase percentage of target species...

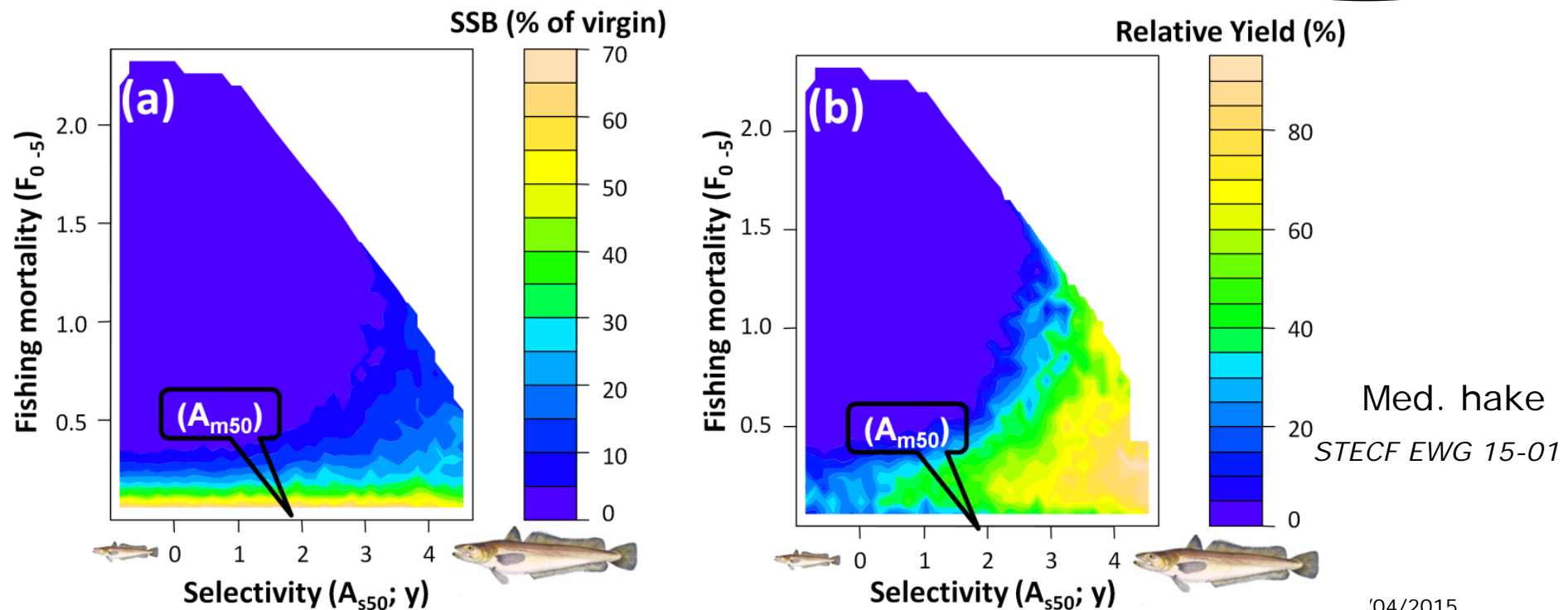
Rule neutralised in Omnibus

# II. Target-based management : does selectivity matter?

## 1. The selectivity paradigm is being looked at

- Is protecting juveniles compatible with maximum yield?
- What is the role of populations' age structure?
- Are MLS/MCRS appropriate? (MLS < L50%mat)

Low F with MCRS is an acceptable start



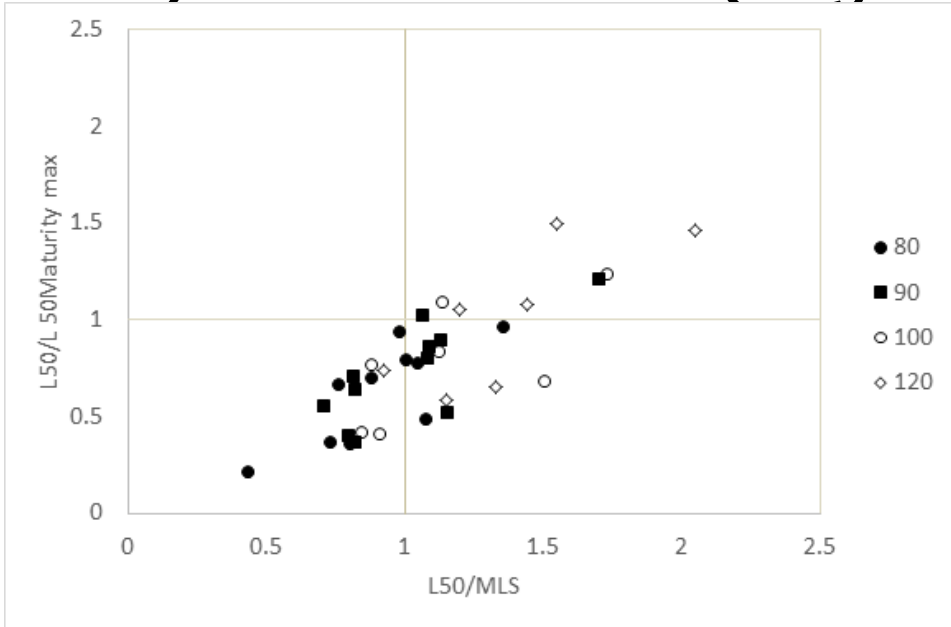
Med. hake  
STECF EWG 15-01



# II. Target-based management : does selectivity matter?

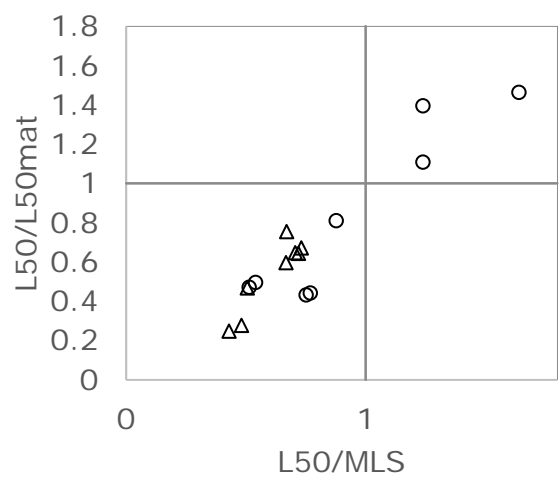
## 2. Selectivity and MCRS/Lmat (single species)

STECF EWG 15-01

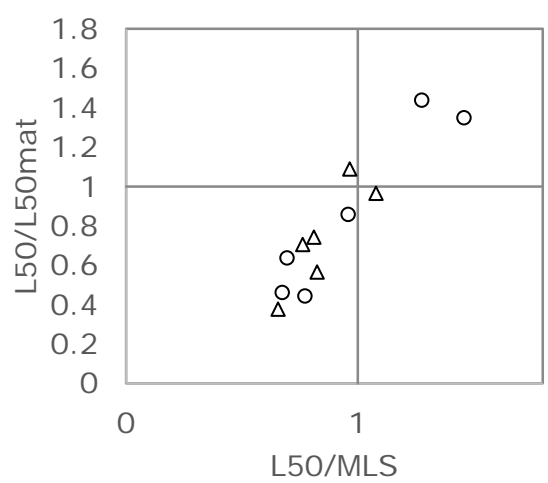


Mesh size matters...

... selective devices matter too



- △ Standard 90
- SMC 70

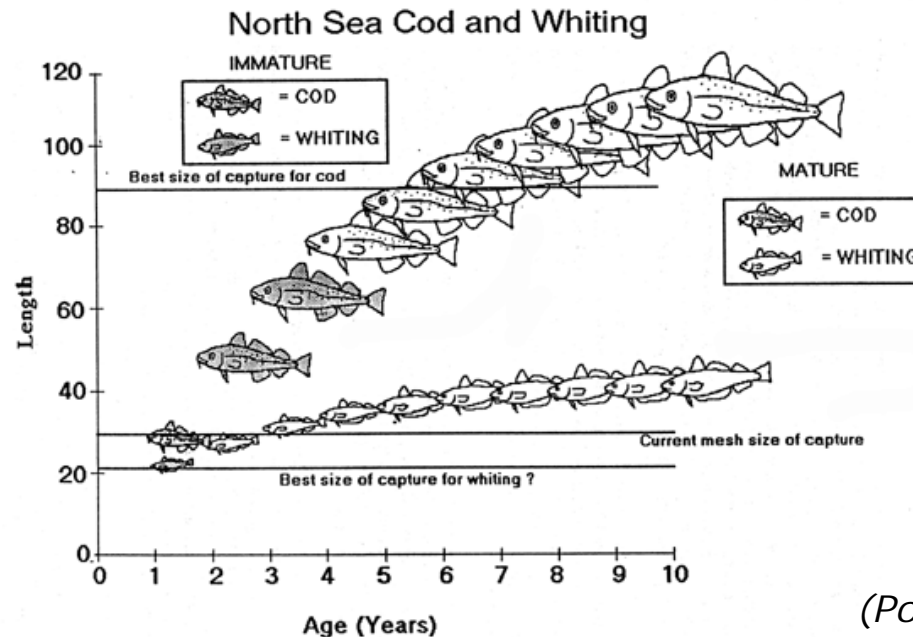


- △ Standard 90
- SMP 120

# II. Target-based management : does selectivity matter?

## 3. Mixed fisheries

- Different species have different optimal exploitation patterns. Selectivity in mixed-fisheries is a trade-off
- Without TM, the equilibrium selectivity would be lower
- Issues are likely different with other gears than trawl
- Selectivity is also about species composition and not only size



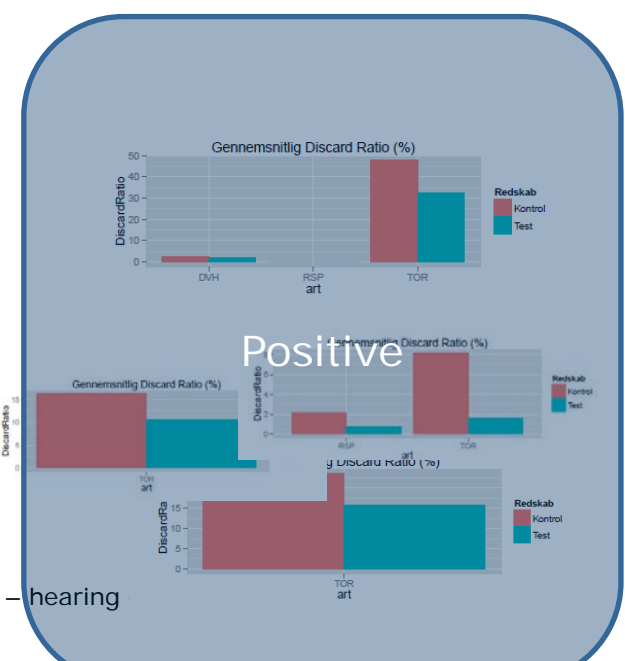
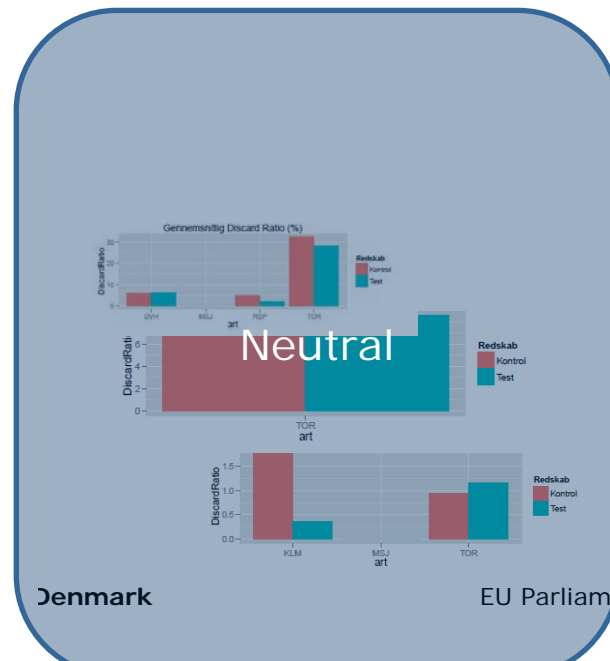
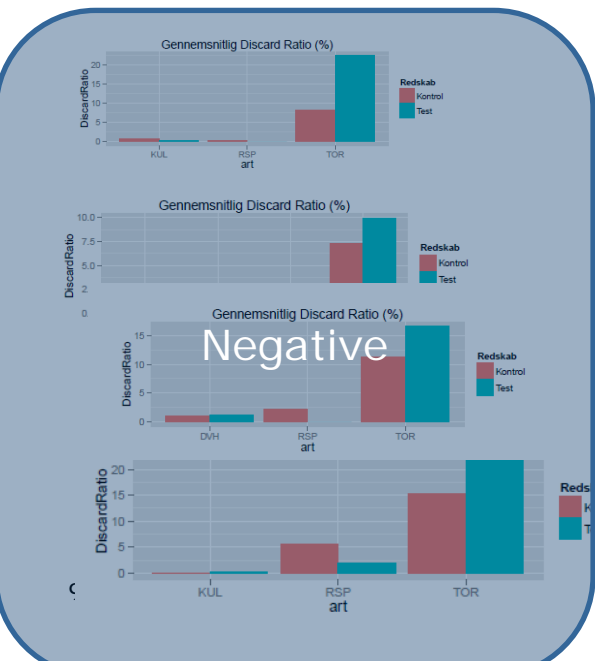
(Pope, 1993)



# III. Moving away from TM: what are our options?

## 1. In a perfect world with perfect LO implementation

- Full documentation of catches
- All catches count against the quota, stop fishing when quota exhausted
- Low price for fish < MCRS
  - Economic incentives would drive the fishery away from juveniles
  - It will though take some time to adapt and explore optimal fishing patterns (ex – Danish MiniDisc trial, 14 vessels)





# III. Moving away from TM: what are our options?

## 2. *If the world is not perfect – What may happen?*

- The removal of catch composition rule will remove the only mechanism forcing minimum mesh size
- Selectivity *will* deteriorate
- This will become worse if the LO is enforced fishery-by-fishery, with target fisheries first (incentives to move to smaller mesh sizes in transition period, increased discarding)
- Many stocks are in fragile recovery and can likely not sustain much "trial-and-error policy" – we need to prevent risks!

# III. Moving away from TM: what are our options?

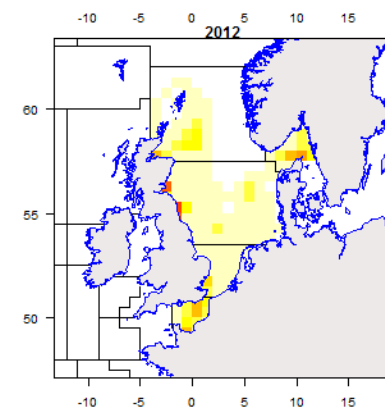
## 3. *Achieving selectivity with catch targets*

- "in the spirit of Article 13 of the cod plan" : Setting size-based targets by fleet segment, for example
  - Catch
  - Catch per Unit of Effort
  - Partial fishing mortality
  - Catchability
- Advantages :
  - direct linkage to the biological target and to the objective of the LO
  - Harness technical skills from industry.
- Disadvantages :
  - Fishing mortality and catchability are not tangible (assessment-based)
  - Catch and CPUE are population-dependent (variability of recruitment) and thus predicted with uncertainty
  - **requires the same catch control as in the perfect world!**

# III. Moving away from TM: what are our options?

## 4. *Maintaining selectivity with regulatory safeguards*

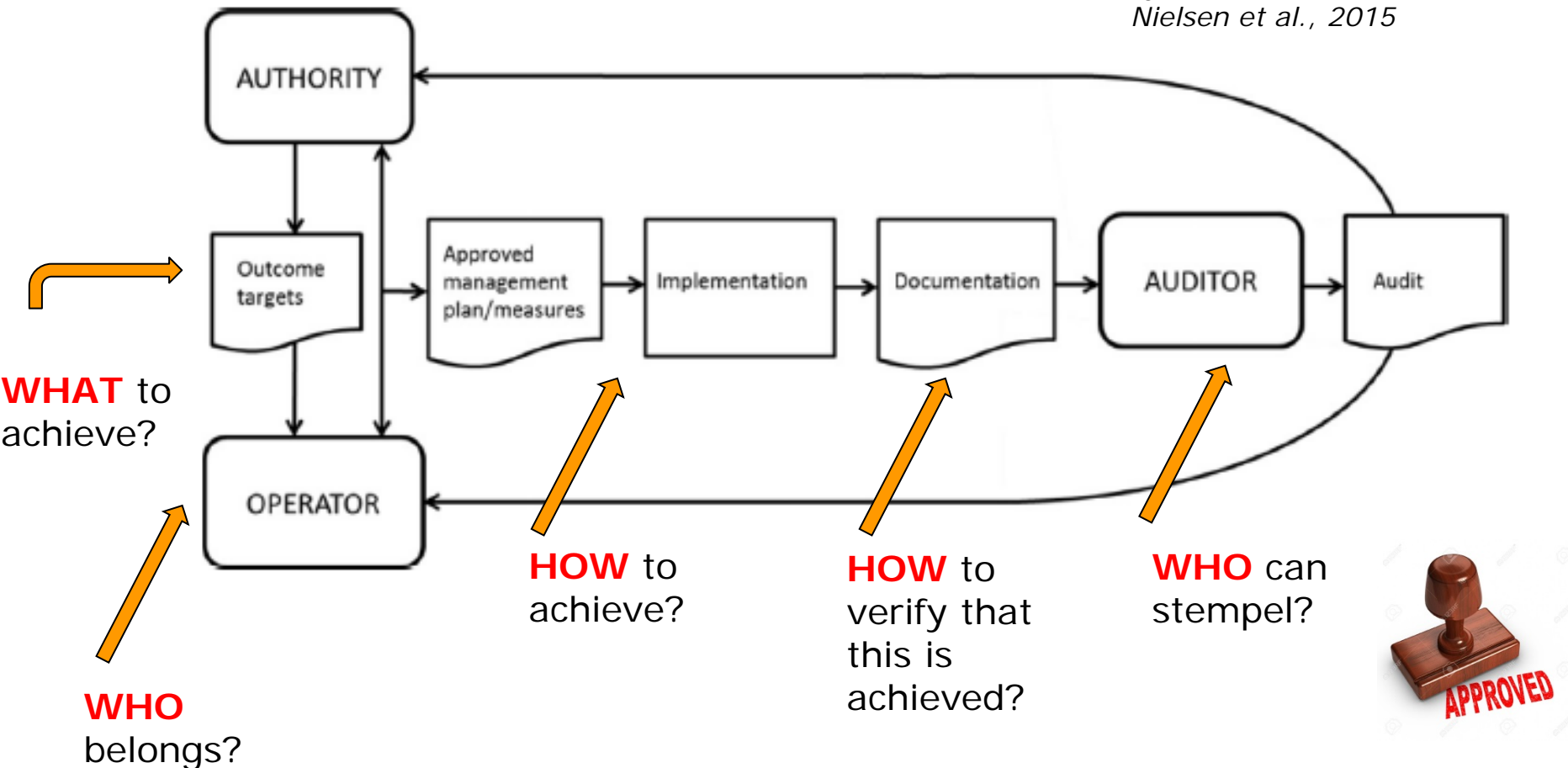
- In the transition to the full implementation of the LO, maintain minimum selectivity standards for example through (*From STECF 15-01*):
  1. Obligation for fishermen to use the same mesh size as before, or to demonstrate equivalent selectivity...
  2. Maintaining current effort ceilings by gear groups (TR1, BT2 etc)...
  3. Linking mesh size to fishing opportunities: e.g. cannot sell cod caught with 80 mm mesh size unless there is documentation of appropriate selective device...
  4. Minimum mesh size based on spatial considerations (fixed or real-time)



# IV. Targets- based management : what are the policy implications?

## 1. Defining actors and roles

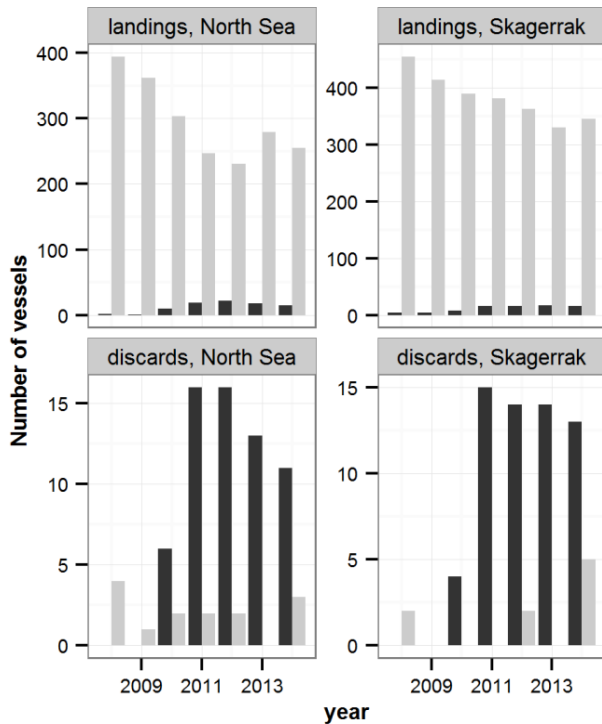
A generic results-based system  
*Nielsen et al., 2015*



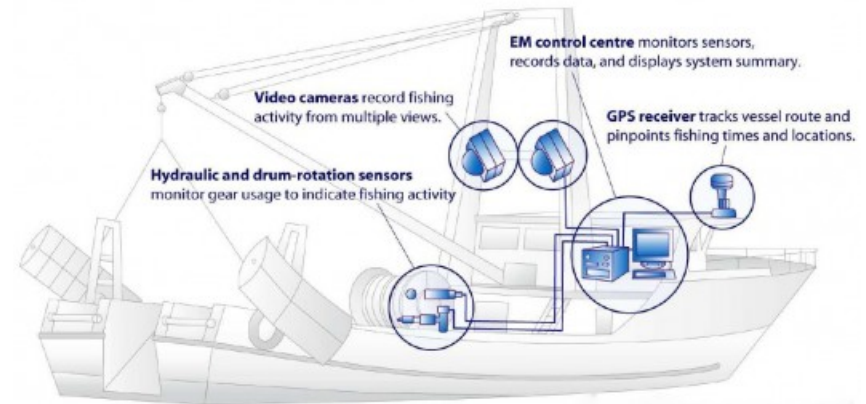
# IV. Targets- based management : what are the policy implications?

## 2. Proper documentation of (all) catch is key

- Responsibility to the skipper to declare catches (Burden of proof) - LogBooks
- Effective control to document that the declaration is reliable (Fully Documented Fisheries)
  - Electronic Monitoring with Catch Quota delivers results



Grey : non- FDF vessels  
 Black : FDF vessels



Ulrich et al., 2015

## V. Conclusions – take home messages

- Technical measures have some perverse effects and are not compatible with LO– **BUT** they have created a frame for minimum selectivity and are controllable
- Selectivity matters. Current selectivity with MCRS is broadly in line with CFP objectives, status quo as a minimum standard.
- Moving to target-based management is a paradigm shift with appealing advantages in theory but important implementation hurdles in practice
  - Often multiple and unclear objectives (*What? Why? Which thresholds? Which indicators? Which species?*)
  - No target-based management without reliable control of the target!
    - *How is the target monitored*
    - *what happens when the target is reached*
  - target-based management no cheaper than TM– but potentially more efficient
- **If well enforced**, the LO with MCRS will create a target-based management with minimum selectivity. Encouraging trials in several countries
- It **will** go wrong if we remove all barriers at once without robust safeguards. Special attention must be given to the transition period (introduce the carrot **BUT** keep the stick)... . Devil is in the details (and in the exemptions...)

**Thank you for your attention!**





## References

- Scientific, Technical and Economic Committee for Fisheries (STECF), 2015. Technical Measures part III (STECF-15-01)
- Nielsen, K. N., Holm, P., & Aschan, M. (2015). Results based management in fisheries: Delegating responsibility to resource users. *Marine Policy*, 51, 442-451.
- Ulrich, C., Olesen, H. J., Bergsson, H., Egekvist, J., Håkansson, K. B., Dalskov, J., & Storr-Paulsen, M. (2015). Discarding of cod in the Danish Fully Documented Fisheries trials. *ICES Journal of Marine Science: Journal du Conseil*, fsv028.