Towards a Regional Database and Estimation System for Fisheries

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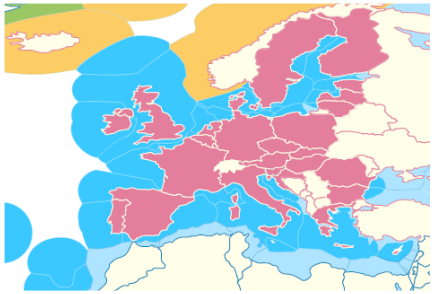
Introduction

- EU Common Fisheries Policy (CFP) aims to ensure that fishing and aquaculture are environmentally, economically and socially **sustainable**, and provide a source of healthy food.
  - Foster a dynamic fishing industry
- **Data collection is essential for the implementation of the CFP**.
  - Evaluate the state of fish stocks, profitability, and effects on the ecosystem.
- Fisheries scientists want to calculate the size of fish stocks and the fishing pressure they are under.
  - Combine census data about commercial fishing activity with biological samples (Length/Weight/Age/Sex/Maturity).
  - Other data such as surveys also used.
- **The scope of the existing Regional Database (RDB) and the new Regional Database & estimation System (RDBES) is currently limited to commercial fisheries data.**
  - Sampled Biological data.
  - Census data on landings and effort.



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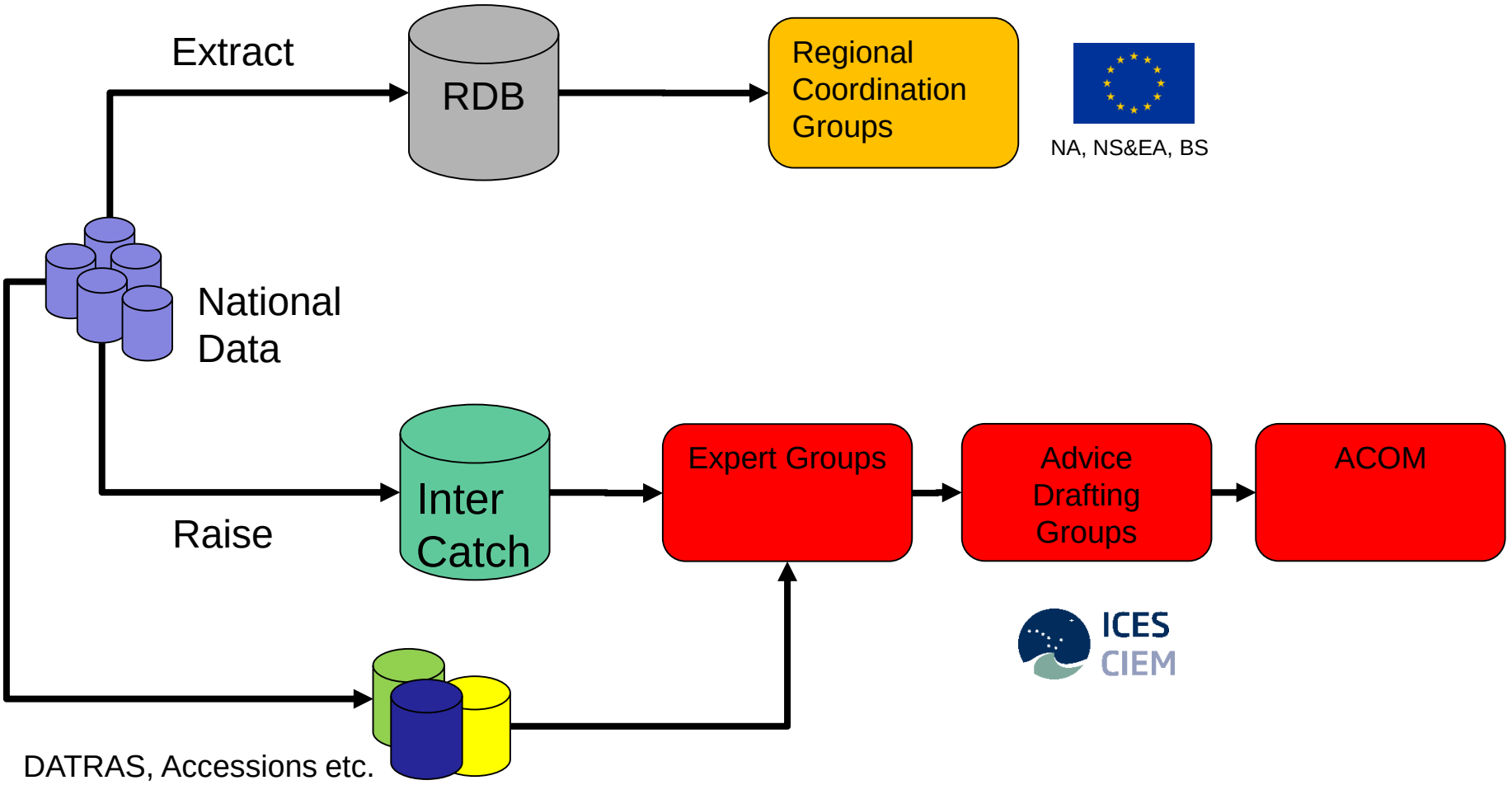
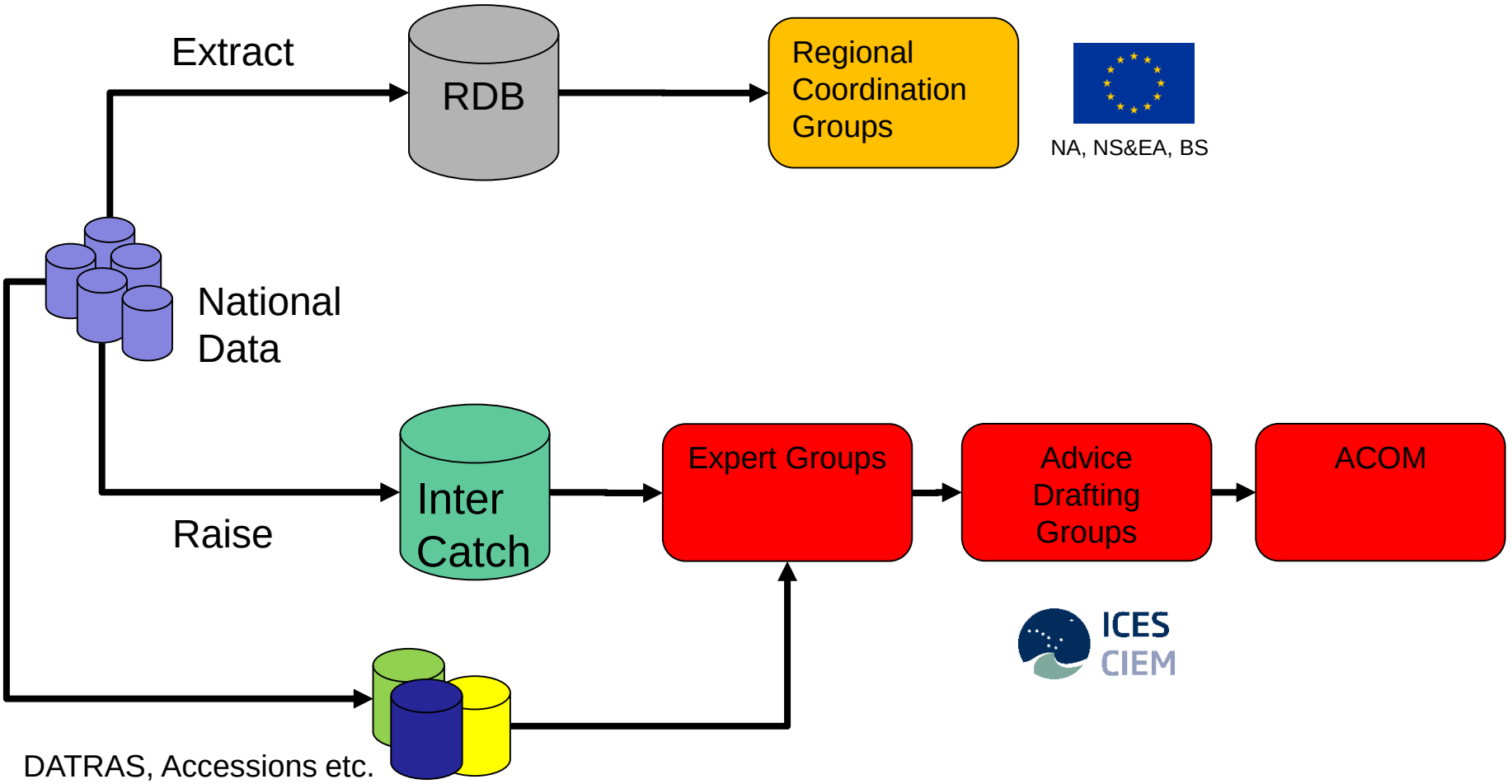
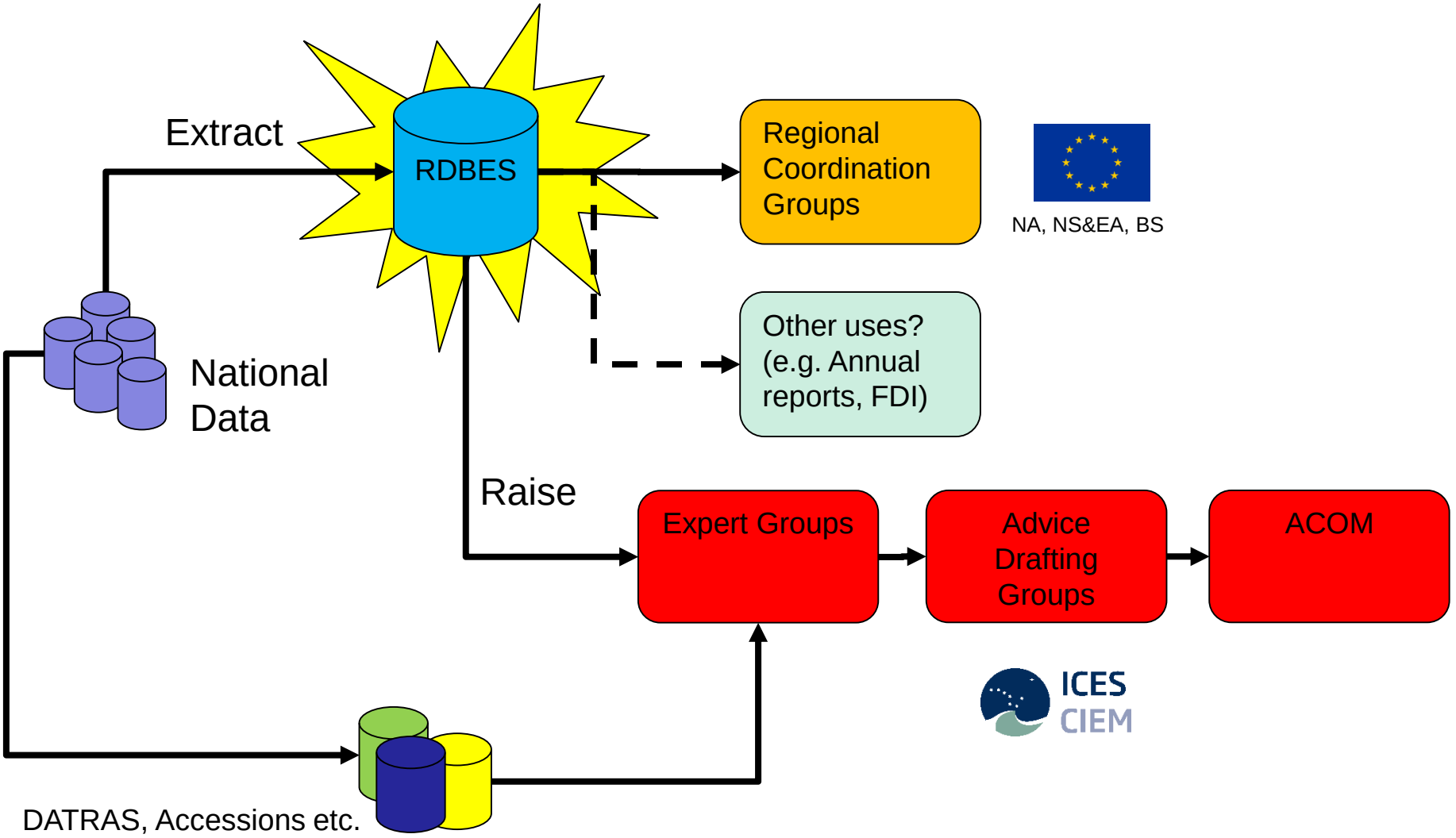

Extract
RDB
Regional Coordination Groups
NA, NS&EA, BS
National Data
Raise
Inter Catch
Expert Groups
Advice Drafting Groups
ACOM
ICES CIEM
DATRAS, Accessions etc.

Problems:

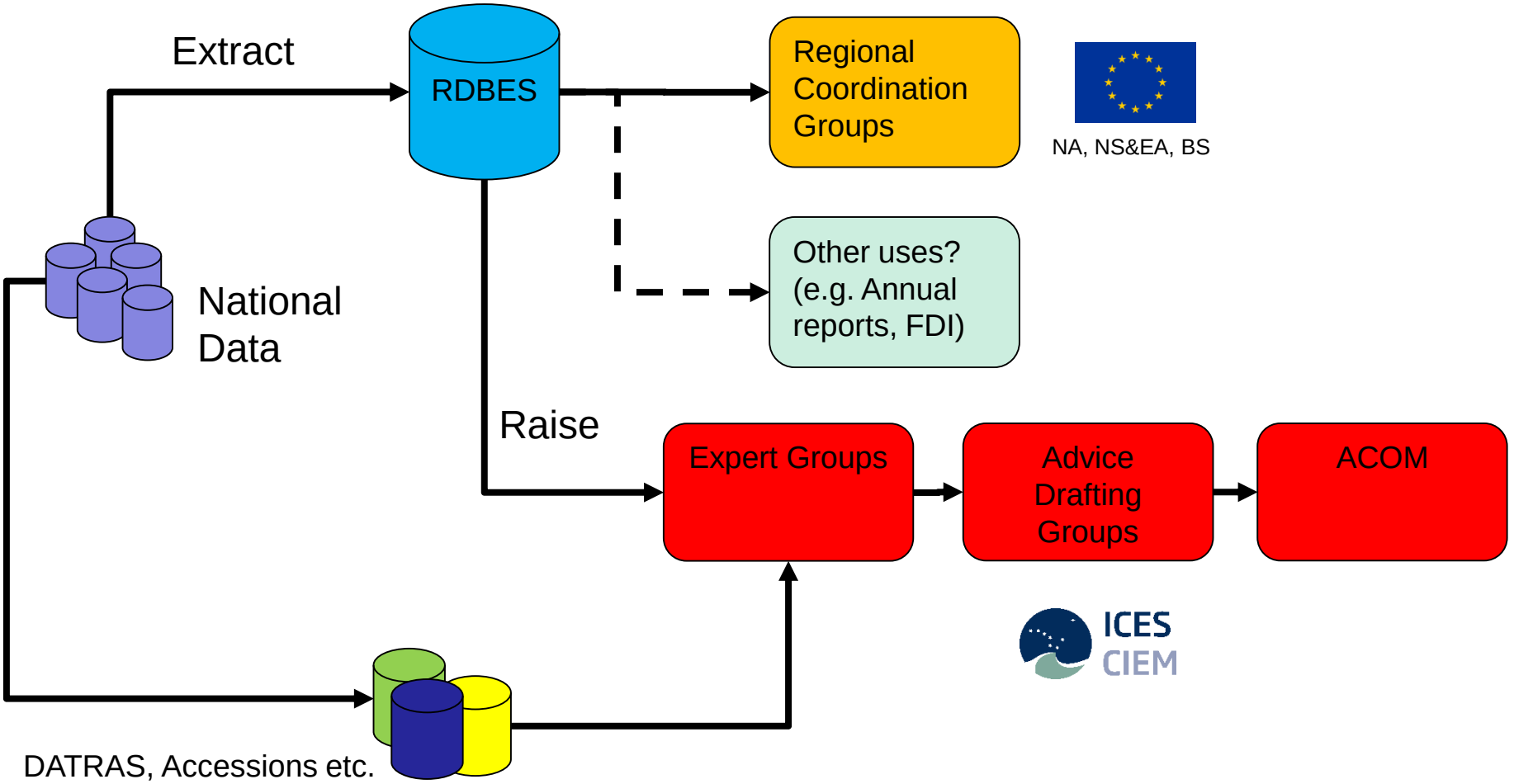
- Lack of transparency
- Duplication of effort
- Lack of consistency
- Lack of data quality indicators




Extract
RDBES
Regional Coordination Groups
NA, NS&EA, BS
Other uses? (e.g. Annual reports, FDI)
National Data
Raise
Expert Groups
Advice Drafting Groups
ACOM
ICES CIEM
DATRAS, Accessions etc.

Aims of the RDBES:

1. Make data available for the RCGs
2. Provide a regional estimation system for ICES stock assessments
3. To increase the data quality, documentation of data, and the use of approved methods
4. To facilitate the production of fisheries management advice and reports,
5. To increase the awareness of fisheries data collected and the overall usage of these data.



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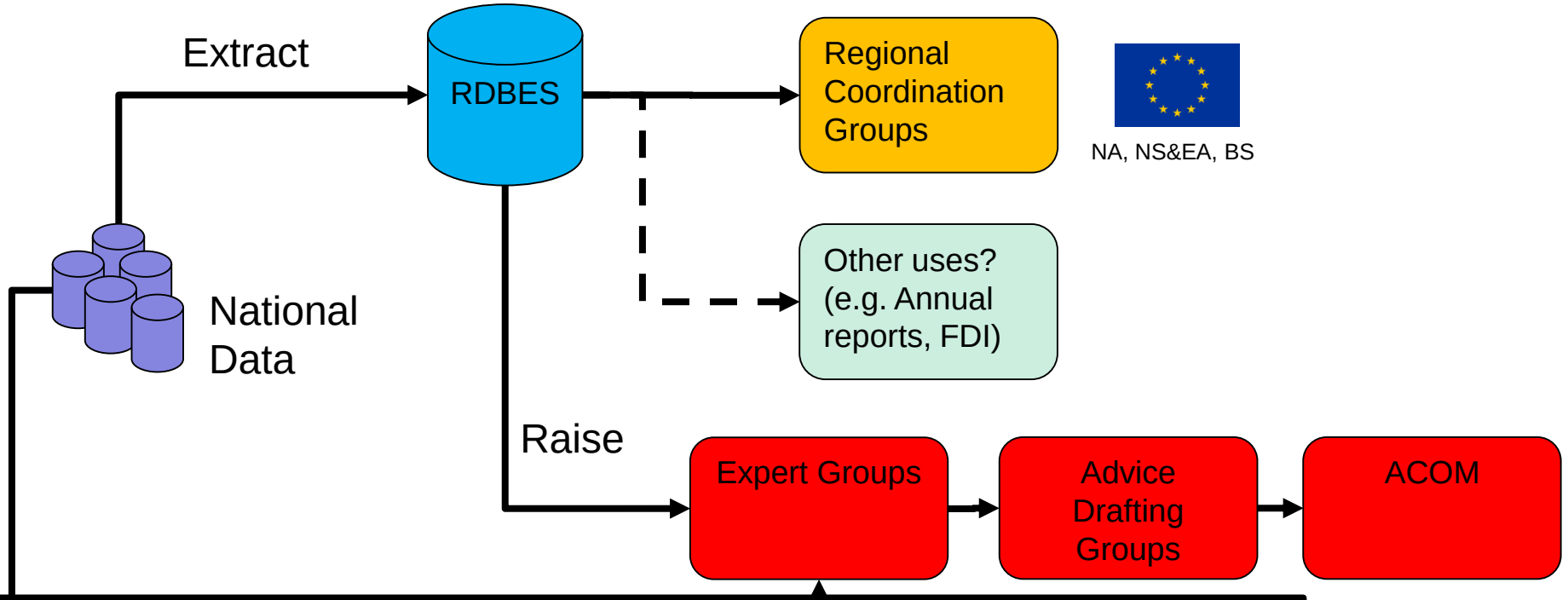
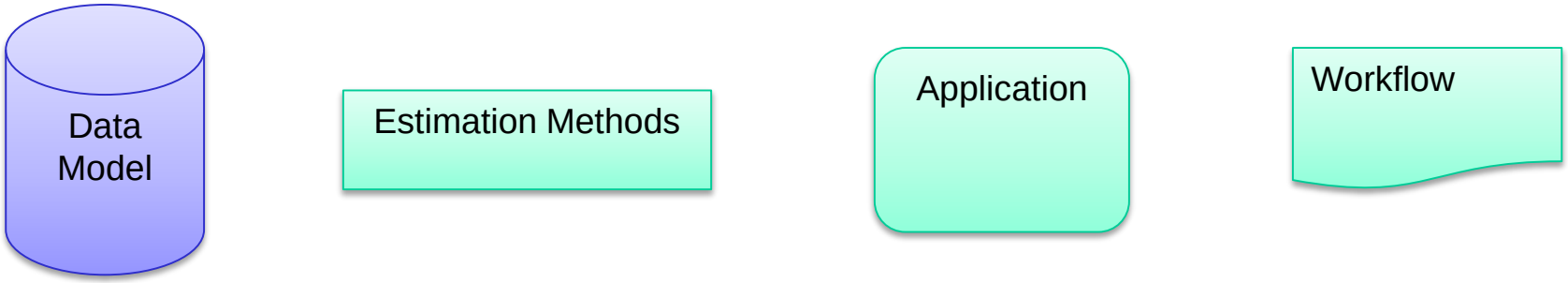


The RDBES should be seen as part of the movements towards:

1. Statistically Sound Sampling Schemes (4S),
2. Greater regional coordination
3. Transparent Assessment Framework (TAF),
4. Improved estimates to ICES stock assessments and advice.

RDBES Components



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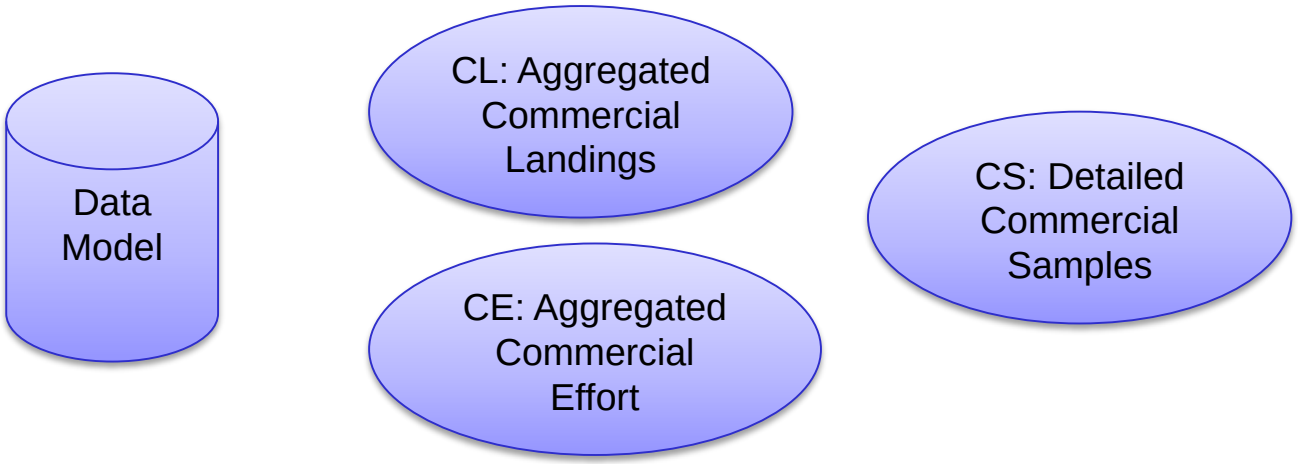
Data Model



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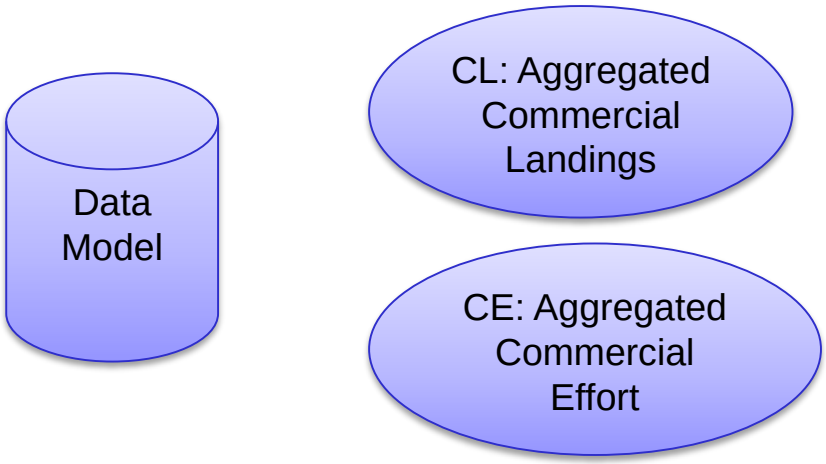
Data Model: CL & CE



- CL – Commercial landings whole weight and value aggregated by
  - Country, Month, ICES Statistical Rectangle (30‘ x 1°), Species, Size Category, Landing Port, Vessel Length Category, and Metier.
- CE – Commercial Fishing Effort (number of trips, fishing time, Kw-days, GT-days, days at sea) aggregated by
  - Country, Month, ICES Statistical Rectangle (30‘ x 1°), Landing Port, Vessel Length Category, and Metier.

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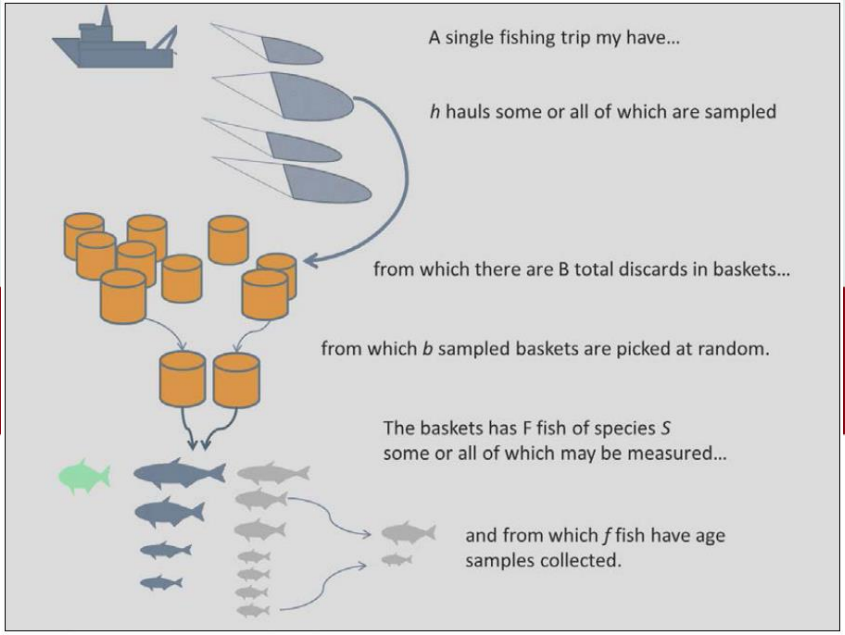
Data Model: CS



ICES. 2014. Report of the third Workshop on Practical Implementation of Statistical Sound Catch Sampling Programmes, 19-22 November 2013, ICES HQ, Copenhagen, Denmark. ICES CM2013/ACOM:54. 109 pp.

- The RDBES Data Model is strongly based on the actual design of fisheries sampling programmes.
- The designs used in the sampling of commercial fisheries in European waters are usually **multi-stage**.
    - In multi-stage designs the final sample (e.g., the fish sampled) is selected through a set of stages where the sampling units at each stage are sampled from the units chosen at the previous stage.
- Some of the sampling stages will be **stratified**
- Selection at each stage can be **probabilistic** (e.g. random) or **non- probabilistic** (e.g. expert judgement, quotas)
- There is no single sampling design – different programmes use a variety of different designs
- Other considerations including recording refusals and non-responses, and clustering

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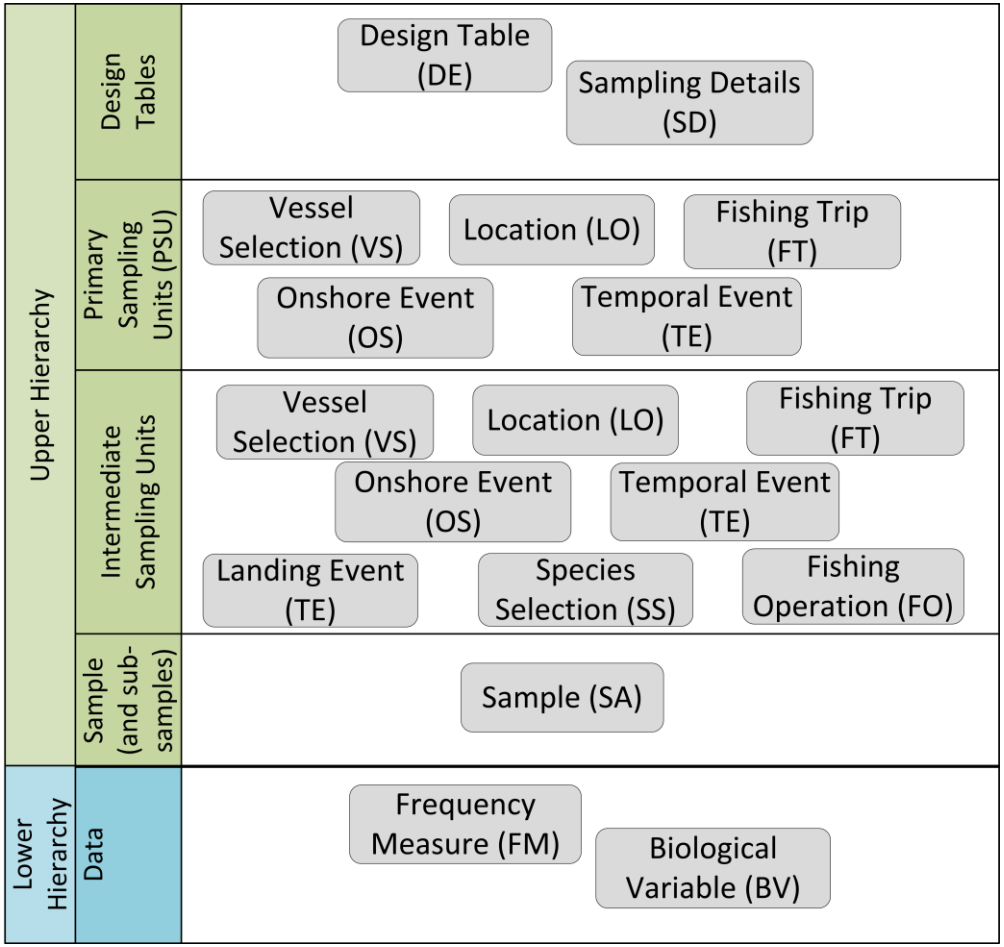
Data Model: CS



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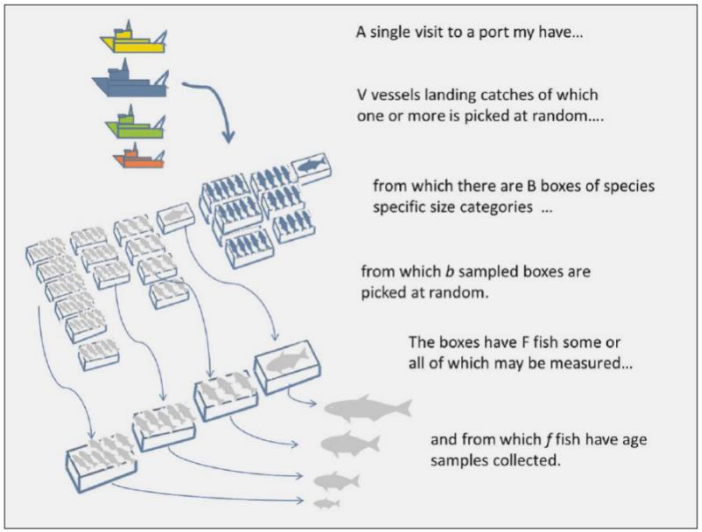

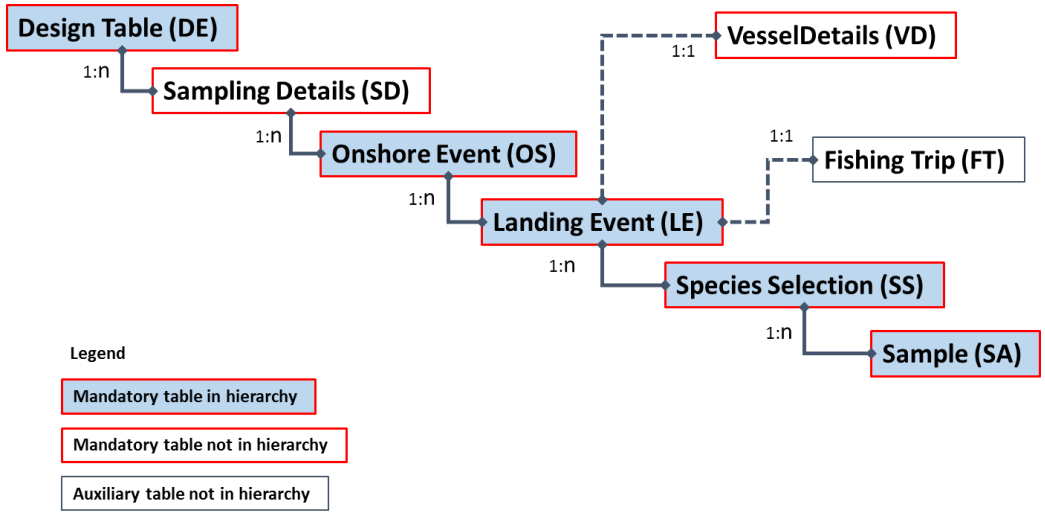

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Data Model: CS

At-sea sampling

On-shore sampling

	Hierarchy 1	Hierarchy 2	Hierarchy 3	Hierarchy 4	Hierarchy 5	Hierarchy 6	Hierarchy 7	Hierarchy 8
Tables in the upper hierarchy	Design	Design	Design	Design	Design	Design	Design	Design
	Sampling Details	Sampling Details	Sampling Details	Sampling Details	Sampling Details	Sampling Details	Sampling details	Sampling details
	Vessel	Fishing Trip	Temporal Event	On-shore	On-shore	On-shore	On-shore	Temporal Event
	Fishing Trip	Fishing Operation	Vessel	Fishing Trip	Landing Event	Fishing Trip	Species Selection	Vessel
	Fishing Operation	Species Selection	Fishing Trip	Landing Event	Species Selection	Species Selection	Sample	Landing Event
	Species Selection	Sample	Fishing Operation	Species Selection	Sample	Sample		Species selection
	Sample		Species Selection	Sample				Sample
			Sample					

	Lower Hierarchy A	Lower Hierarchy B	Lower Hierarchy C	Lower Hierarchy D
Tables in the lower hierarchy	Frequency Measure	Frequency Measure	Biological Variable	
	Biological Variable			

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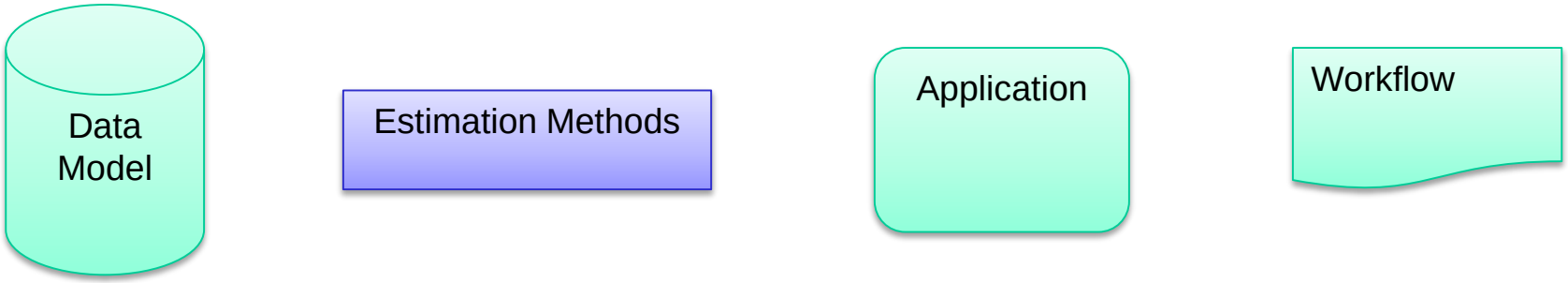
Data Model: CS

- The **quality** of the sampling programme is described using “Design Variables” in each level of hierarchy:

Stratification	Indicator of presence (Y) or absence (N) of stratification of units of that sampling level
Stratum	National stratum name, 'U' for 'unstratified'
Total number of units	Total number of unique items in this stratum
Number of units sampled	The number of item sampled in this stratum
Inclusion probability	(For equal probability selection this can be left blank)
Selection method	The method of selecting items for sampling
Reason for not sampling	Reason for not sampling

RDBES Components



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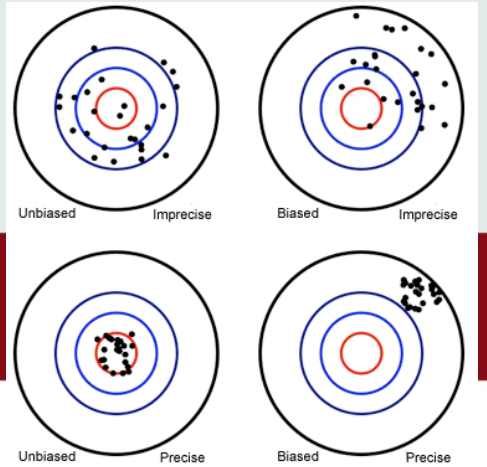
Estimation Methods (aka Raising)



- In the ICES community, the term “raising” refers to the use of weighted estimators
  - For example where estimates from a weighted ratio estimator (e.g. mean discard or ratio of discard to total catch) based on a sample is expanded to the total target population (e.g. fleet wide catch).
- Encapsulate approved estimation methods within a common repository of R packages.
  - Document the techniques used
  - Increase the transparency of the process
  - Reduce duplication
  - Reduce errors
  - Improve data quality
- The RDBES should be able to support estimation methods that are currently widely used (e.g. ALK, ratio estimators) as well as design based estimation.

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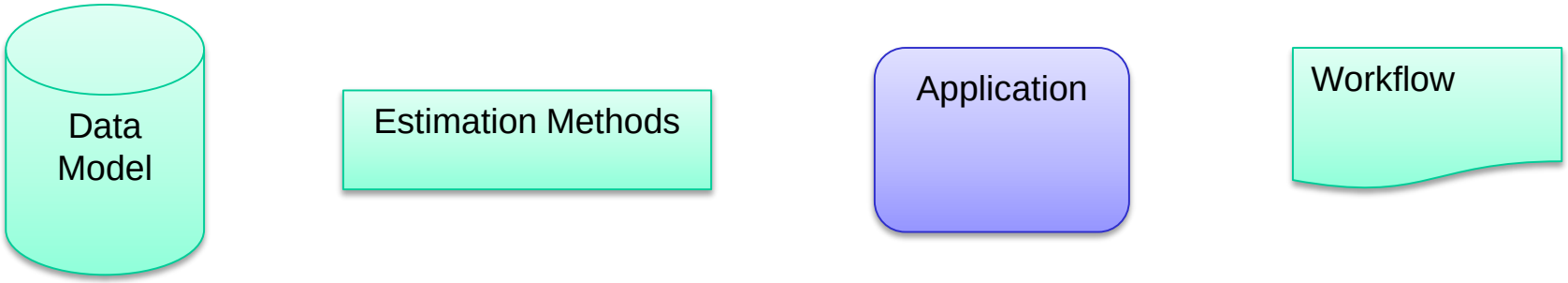
RDBES Components



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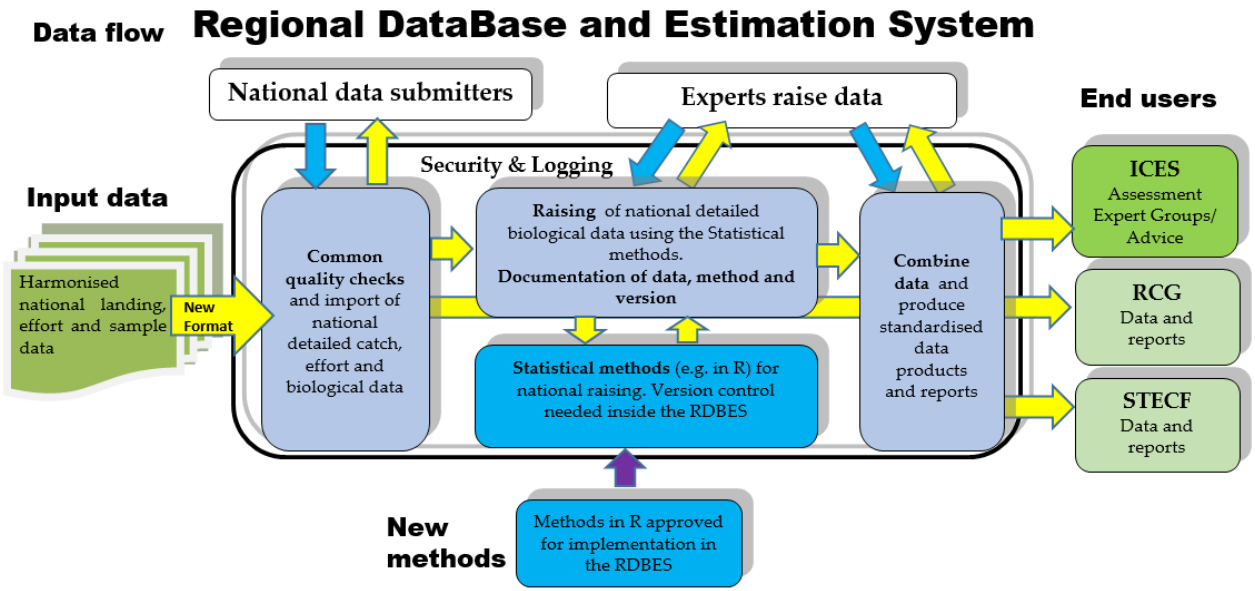
ICES Application Development



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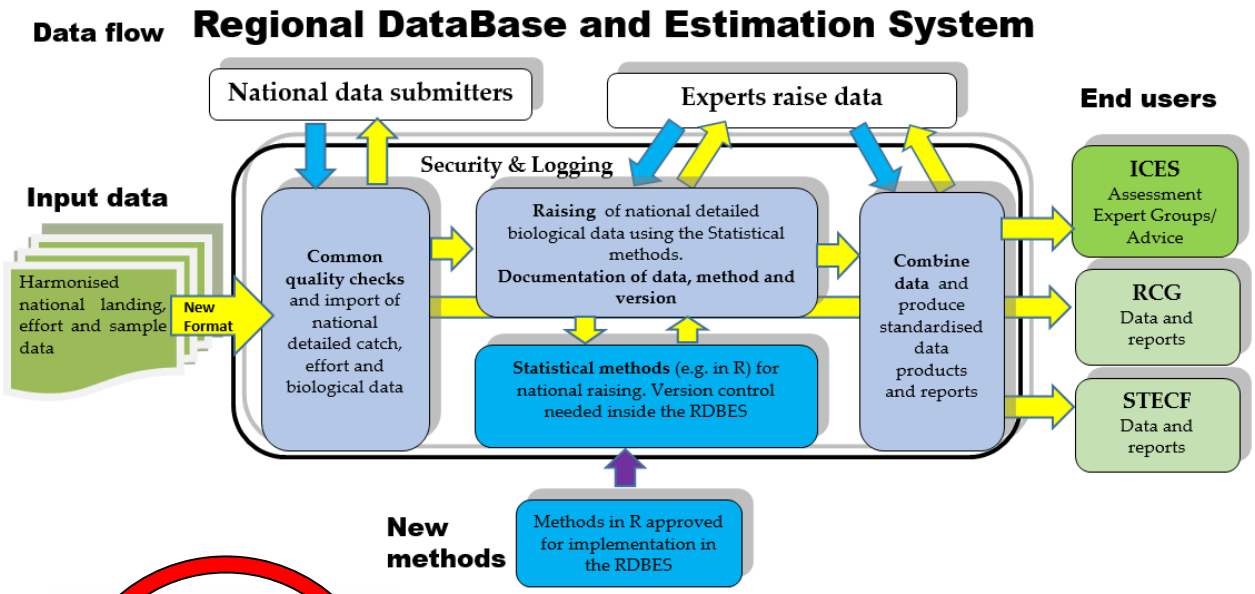

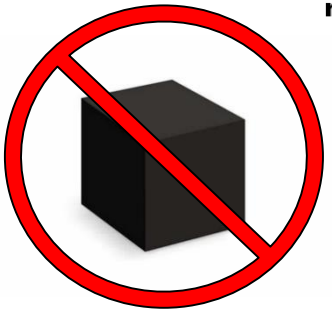

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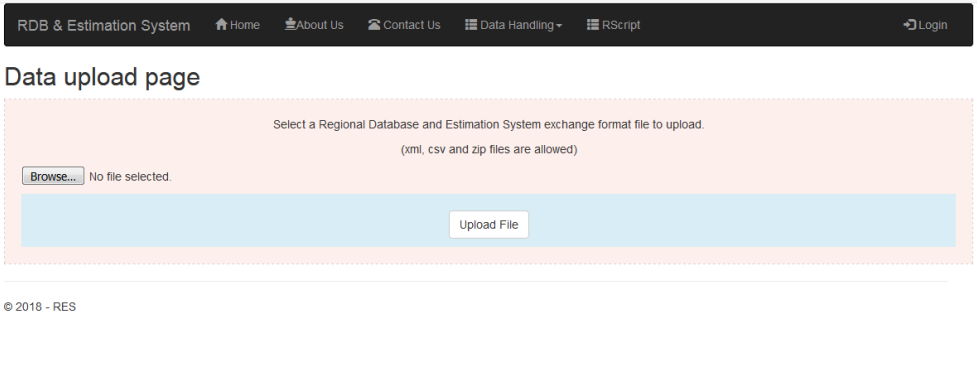
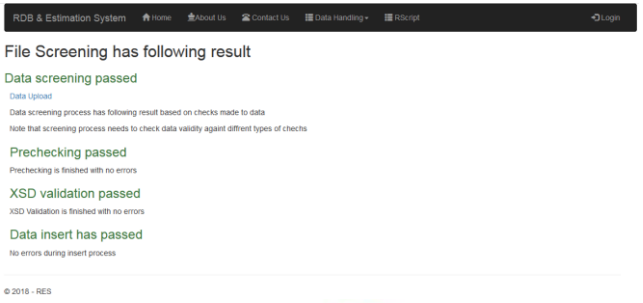
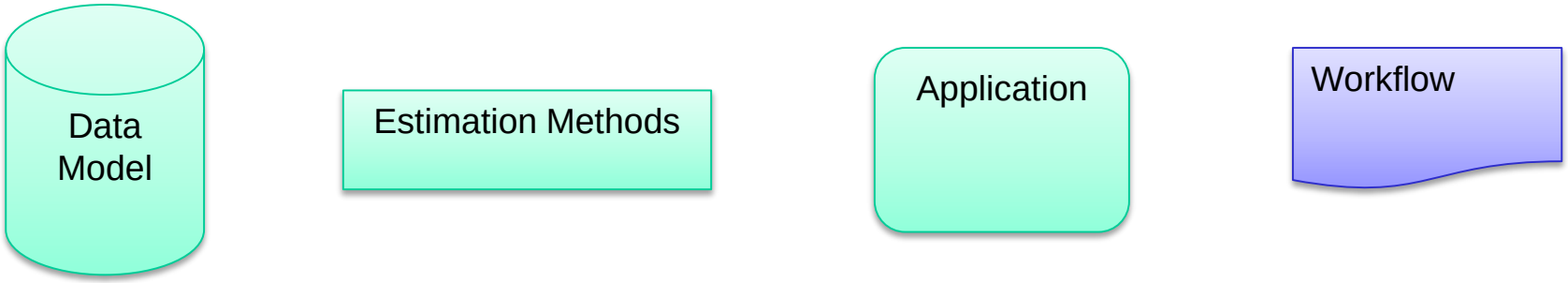
ICES Application Development

- ICES currently concentrating on developing the import and validation functions
  - All import tables with fields and relations created in the test RDBES database using the model in the entity framework
  - Adapt the generic CSV to XML converter to the actual data model
  - Successfully uploaded and inserted a test file hierarchy number 1D through the RDBES upload interface.
  - Working on generic method to generate/update XSD files for all hierarchies in one go
  - Working on importing data files from all hierarchies
  - Coming work - test with real data





RDBES Components



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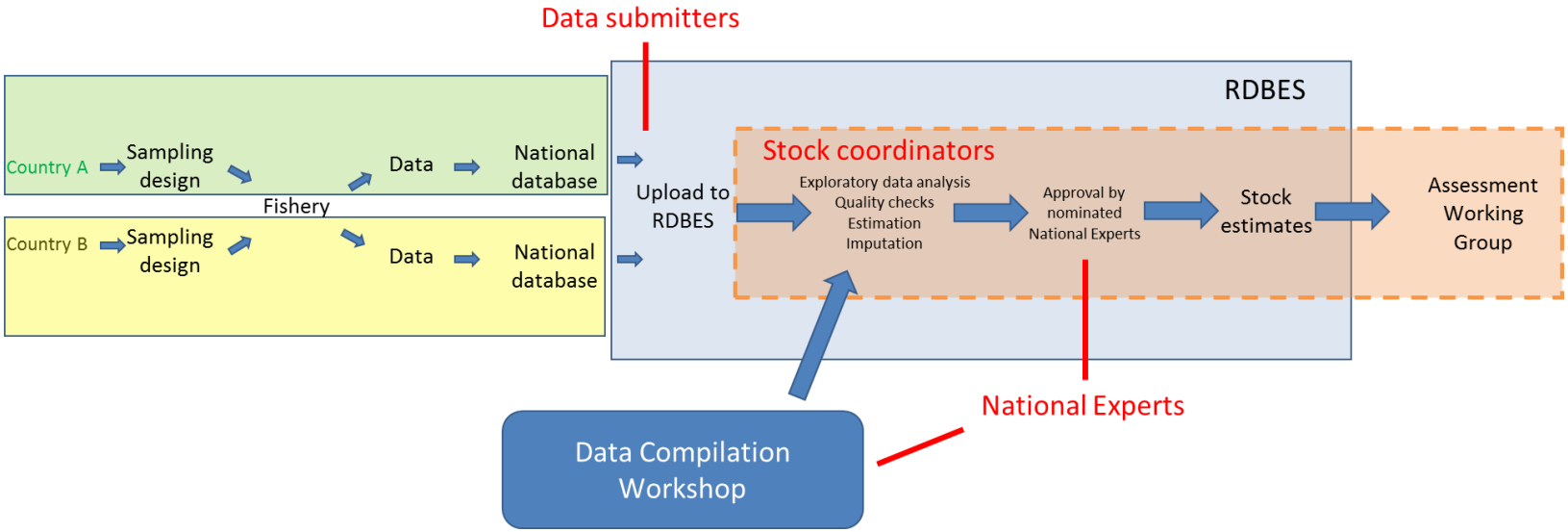
Workflow?

- Currently each country raises their own data.
- RDBES will allow the same model, or raising of all data by a single stock coordinator, or a hybrid/mixed model
  - Different models for different stocks could be used
- Possible centralised workflow:



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Next steps

Year	Current Regional Database (RDB)	Regional Database & Estimation System (RDBES)
2017	Data call	In development
2018	Data call	In development
2019	Data call	In development and test data call
2020	No data call. Database frozen.	Data call.
2021	No data call. Database frozen.	Data call. Data used for estimation and assessment of **selected** stocks.
2022	No data call. Database frozen.	Data call. Data used for estimation and assessment.

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Next steps

- **ICES Workshops**
  - WKRDB-POP Feb 2019
    - Hands-on workshop to help countries learn how to populate the data model
  - WKRDB-EST Oct/Nov 2019
    - Hands-on workshop to develop estimation scripts

- **Funding**
  - Existing RDB maintenance and hosting funded by European Commission under an administrative agreement with ICES
  - Initial development of RDBES funded by ICES, along with MS contributing experts' time and T&S

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Questions?