**Automatic error check (AEC) for WILIAM**

ISSUE TO ADDRESS

* The model is very large and with many interactions. It is impossible to validate in each integration the new developments by hand

OBJECTIVE

* Automatize detection of bugs in the whole model

METHOD

* Scan the most relevant variables from each module at their maximum level of detail (ie., all the elements of all the dimensions of the arrays)
* Structure identification of errors by module to facilitate the correction process
* Method to count for the number of errors in each variable (with IF THEN ELSE(logic\_condition\_error, 1, 0 ) ), which are added up by module and finally for the whole model.
* SUM and PROD functions seem to be equally fast in Vensim 9 (in Vensim 7 SUM functions were x3 faster!)
* 1 new view has been created ‘intermodule\_consistency-automatic\_error\_check’ (see below comparison with creating a linked submodel to avoid increasing computational time). Status (at 13th April 2023):
  + Modules covered: demography, society, economy, finance, energy, land\_and\_water
  + Modules not covered: climate, materials
* This view will be deleted before the public release of the model

USE AND REPORTING

* Every modeller should check, before Merge Request, that the included changes do not create issues in his/her module.
* Periodic reporting from technical coordination: we will communicate the list of errors to module coordinators during integrations (since it may happen that the linkage of different changes may create new issues unforeseen).

Appendix: Comparison with creating a linked submodel to avoid increasing computational time:

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|  | ADVANTAGES | DISADVANTAGES |
| Include a new view in WILIAM | * More practical for doing checks. * If the name of an output variable changes we do not need to change anything * Easy to delete when releasing the model | * Increase computation time (~ +7% only including variables from economy, energy and materials)1 |
| Create a submodel | * Does not increase computation time * Not need to do anything when releasing the model | * Less practical for doing checks. * If the name of an output variable changes we need to adapt the submodel |

1the automatic checks for the rest of modules were included in subsequent commits which also included code optimization changes.

Should we create a folder /validation/ in gitlab???