Requirement questionnaire for new global atmospheric dynamic core in NEMS/ESMF

Interface
Subroutinize model as an ESMF7 NUOPC component inside NEMS with a “cap” layer
Break into init, run, and finalize steps, with multiple phases for each
Ensure model grid in decomposed domain is represented in ESMF grid
Communicate model information to NEMS such as grid navigation
Represent output and exchanged fields as ESMF fields
Import required fields from NEMS such as land-sea mask and sea surface temperature
Export required fields to NEMS such as wind stresses and 2-meter temperature
Accept from NEMS as subroutine arguments control parameters such as forecast length

Control
Accept run-time parameters not specified by NEMS
Enable key run-time science parameters such as resolution, physics
Enable key run-time control parameters such as write frequency, restart frequency
Enable irregular write frequency control
Enable changing resolution during forecast
Enable incremental analysis update (IAU)
Enable adiabatic (no physics) mode

Physics
Call physics via a unified physics driver
Ensure physics and dynamics only exchange data through argument list
Enable options to invoke standard GFS physics
Make clear where land and hydrology processes run
Enable stochastic physics

Quilt
Gather model data to designated quilt nodes for further processing
Let model proceed on model nodes after gather step
Enable model input and output on quilt nodes
Enable post processing on quilt nodes
Enable multiple quilt groups each of which may have multiple nodes
Make clear if quilt nodes may require horizontal interpolation

Formats
Keep initial conditions files in NEMSIO
Keep restart files in NEMSIO
Keep history files in NEMSIO
Enable unified post to run on quilt, which would write GRIB2

Build
Make clear which parallel strategy is needed, e.g. MPI and OpenMP
Make clear which external libraries and utilities are needed
Make clear which languages and compilers are needed
Make clear which platforms can run model
Make clear how build process works.
Make clear how workflow process work.