

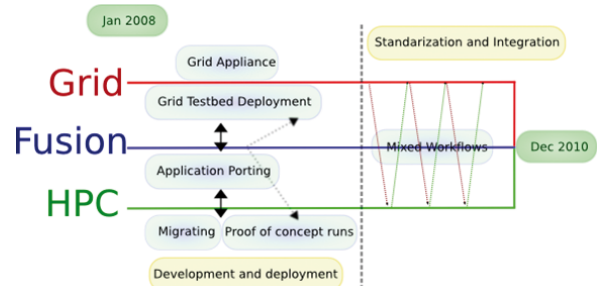
EUFORIA - EU Fusion for ITER Applications

Project objectives

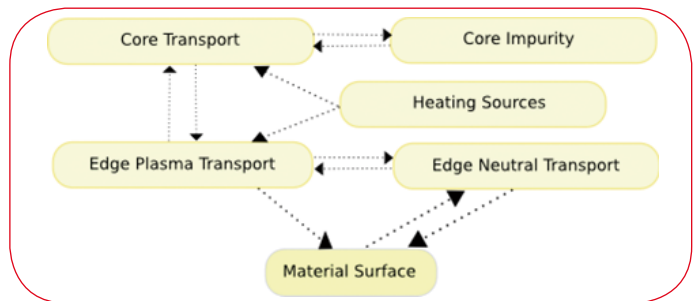
Bringing a comprehensive framework and e-infrastructure to the fusion modelling community oriented to the development of ITER physics needs with particular emphasis on Grid and HPC activities

- Deployment of Grid and HPC infrastructure
 - Resources: Interactive European Grid
- Adaptation and Optimization of Fusion Codes
 - Platform oriented Grid and/or HPC
- Development of advanced tools for
 - Workflow management
 - Visualization tools
 - Data mining

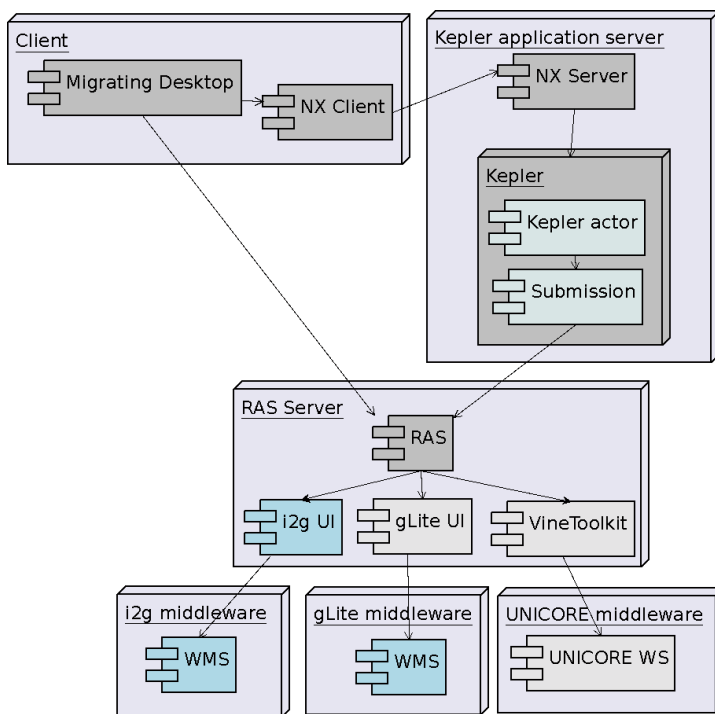
Work plan outline



Fusion Plasma Simulation



Integration Architecture



Promoted Codes

- BIT** (s+p) [Kinetic 1D3V (1D in usual and 3D in velocity space) code for simulation of the plasma edge. Code includes nonlinear model for Coulomb and charged-neutral particle collisions, and simplified linear model of plasma-surface interactions]
- CENTORI** (p) [The CENTORI code is a fully toroidal (arbitrary aspect ratio, arbitrary axis) two-fluid electromagnetic turbulence simulation code. It builds on the well-documented CUTIE code by allowing the computation of turbulence in realistic tokamak geometries and at high beta.]
- COLE** (s+p) [Transport of energy, main ions and impurity ions in the core and the scrape of layer regions]
- EIRENE** (s+p) [EIRENE is a kinetic neutral particle and line radiation transport code.]
- ELMIRE** (p) [gyro-kinetic full-f particle code, with mostly global emphasis.]
- GEN** (s+p) [gyro-kinetic for impurity transport in plasma + following of molecular and atomic processes (providing 3D simulation of densities and plasma light emission) + plasma-surface interaction part including simulation of surface contents]
- ESEL** (p) [Turbulence and profile evolution at the outboard midplane in the SOL using a fluid (ESEL) and gyrofluid (GESEL) approach]
- GEM** (p) [gyrofluid (GEM) is local, GEMX is nonlocal, 6 moment velocity equations for each species, plus fluid equations for 2 potentials (electron, parallel vector); up to three ion species have been run; turbulence and profile solved together; flow and magnetic current equilibrium are necessary part of this]
- GENE** (p) [GENE is a nonlinear gyrokinetic code to investigate plasma turbulence]
- IBDF** (p) [Kinetic theory of transport based on Langmuir Equations; ion-ion and ion-electron collisions included; Navier-Stokes terms (heating and turbulence) are anti-trapped]
- SOLPS** (s+p) [B2-Eirene consists of two codes tightly coupled together: B2 (multi-fluid solving continuity, momentum and energy equations for the plasma component on a cell centered grid; EIRENE (Monte-Carlo neutral code providing sources for B2 based on a plasma background provided by B2)]
- TRIP** (p) [The code simulates 2D multifluid plasma and impurity transport in the tokamak edge including drifts, currents and self-consistent electric field. Solves a set of fluid equations (MHD-equations, equations describing the edge plasma on a 2D grid including SOL, and transition layer]
- TYR** (p) [Drift Alven plasma fluid turbulence and transport in flux-tube geometry]

Country	Institute	Capabilities
SWEDEN:	CHALMERS University of Technology (coordinating)	Fusion, Grid, (CS)
FINLAND:	CSC - Tieteilinien laskenta Oy	HPC, (Grid),
	Åbo Akademi University	Code Optimization & parallelisation, CS
FRANCE:	CEA - Commissariat à l'énergie atomique - Cadarache	Workflow, Fusion, CS
	Université Louis Pasteur - ULP	Visualization, Applied Math
GERMANY:	Forschungszentrum Karlsruhe GmbH - FZK	Grid, Code parallelisation
	Max-Planck-Institut für Plasmaphysik - IPP	Fusion, (HPC, Grid)
ITALY:	ENEA	Fusion, Grid, HPC, GATEWAY
SLOVENIA:	University of Ljubljana - LECAD	Visualization, CS
POLAND:	Poznan Supercomputing and Networking Centre (PSNC)	Grid, Migrating Desktop, CS
SPAIN:	Barcelona Supercomputing Center - Centro Nacional de Supercomputación - BSC	HPC, Code optimization & parallelisation
	Centro de Investigaciones Energéticas Medio Ambientales y Tecnológicas - CIEMAT	Grid, Code parallelization, Fusion, Grid, NA
	Consejo Superior de Investigaciones Científicas - CSIC	Grid, CS, (NA activities)
UNITED KINGDOM:	The University of Edinburgh - EPCC	HPC, Code Optimization & parallelisation, NA, User support, (GRID)

