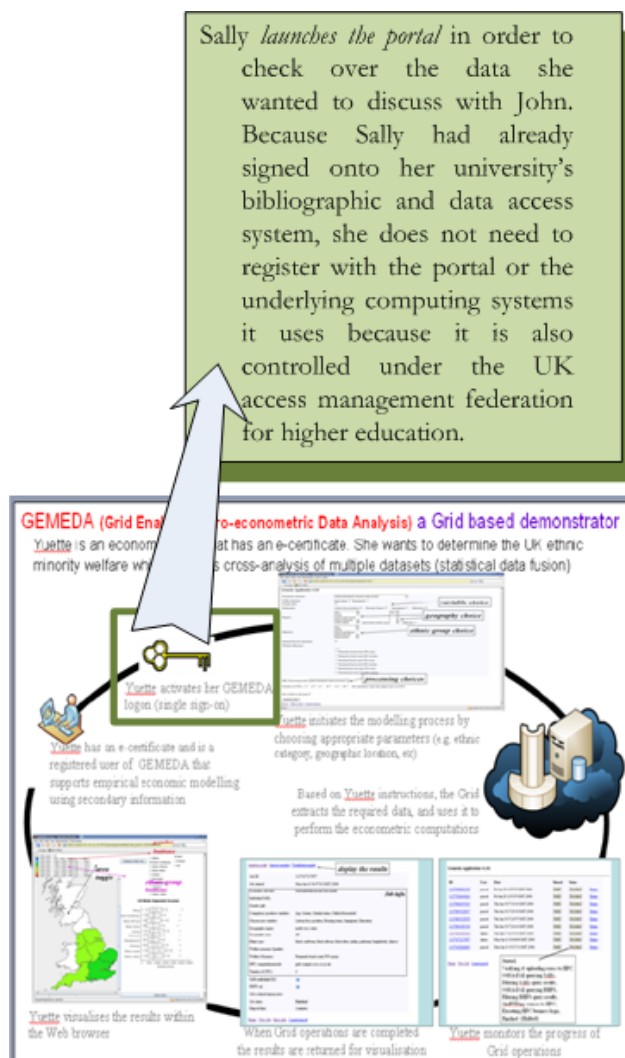


Version & Status	Date	Author	Current affiliation	Project
V 2.2 Initial Draft	June 2008	M. Argüello Casteleiro	ESRC National Centre for e-Social Science (NCeSS), University of Manchester, UK	JISC-funded e-Infrastructure Use Cases and Service Usage Models (eIUS) project
		Pascal Ekin	ESRC National Centre for e-Social Science (NCeSS), University of Manchester, UK	Grid Enabled Microeconomic Data Analysis (GEMEDA)
		Simon Peters	School of Social Sciences, University of Manchester, UK	Grid Enabled Microeconomic Data Analysis (GEMEDA)

Linkage between long eIUS Use Case and short eIUS Use Case



The long eIUS Use Case for GEMEDA appears in [1] and some of the images and text used here are from [2]:
 [1] Mascord, M., Argüello, M., Fraser, M., Voss, A., Procter, R., Halfpenny, P. and Jirotko, M. (2007): 'eIUS Scoping e-Infrastructure Usage. Interim Report', <http://www.eius.ac.uk/scoping/>
 [2] Argüello, M., Ekin, P., Peters, S., Fraser, M., Halfpenny, P., Mascord, M.: A case study about how e-Infrastructure is used within the Social Sciences. 4th International Conference on e-Social Science, Manchester, UK, June 2008

Short eIUS Use Case

GEMEDA (Grid Enabled Micro-econometric Data Analysis) a Grid based demonstrator

Yvette is an econometrician that has an e-certificate. She wants to determine the UK ethnic minority welfare which requires cross-analysis of multiple datasets (statistical data fusion)

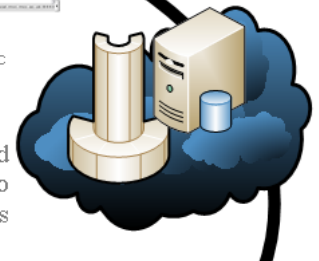
Yvette activates her GEMEDA logon (single sign-on)

Yvette has an e-certificate and is a registered user of GEMEDA that supports empirical economic modelling using secondary information

variable choice
geography choice
ethnic group choice
processing choices

Yvette initiates the modelling process by choosing appropriate parameters (e.g. ethnic category, geographic location, etc)

Based on Yvette instructions, the Grid extracts the required data, and uses it to perform the econometric computations



gender buttons
area toggle
ethnic-group buttons
UK Male Impoverished Income

Yvette visualises the results within the Web browser

display the results

Job ID: 117417217997
Job started: Mon Jan 16 18:47:03 GMT 2006

Job info:

- Economic outcome: total individual income last month
- Individual skills: [empty]
- Gender split: [empty]
- Compulsory predictor variables: Age, Gender, Market status, Child in Household
- Chosen core variables: Labor force position, Housing tenure, Immigration, Education
- Geographic region: north west, north
- Geographic area: all
- Ethnic type: black caribbean, black african, black other african, polynesian, bangladeshi, chinese
- Walker measure Quotient: [empty]
- Walker Measure: Parametric head count 50% series
- HPC computational mode: grid-compute exec on all
- Number of CPUs: 1
- SARs individual SOC: [empty]
- SHPS up: [empty]
- Job is shared among users: [empty]
- Job status: Finished
- Elapsed time: 2 seconds

When Grid operations are completed the results are returned for visualisation

Grids Application v1.0.1

ID	User	Date	Status	Notes
117275930134	period	Fri Jan 20 13:57:51 GMT 2006	Failed	Exec failed
117276048404	period	Fri Jan 20 12:53:51 GMT 2006	Failed	Exec failed
117296010133	period	Thu Jan 19 17:53:44 GMT 2006	Failed	Exec failed
117296010202	period	Thu Jan 19 17:53:39 GMT 2006	Failed	Exec failed
117296010270	period	Thu Jan 19 17:54:07 GMT 2006	Failed	Exec failed
117296010338	period	Thu Jan 19 17:54:04 GMT 2006	Failed	Exec failed
117296010398	done	Thu Jan 19 18:55:50 GMT 2006	Failed	Exec failed
117296010787	done	Mon Jan 16 18:48:08 GMT 2006	Failed	Exec failed
117296020801	period	Mon Jan 16 18:27:33 GMT 2006	Failed	Exec failed

Started.
Verifying & uploading execs to HPC.
OGSA-DAI querying SARs.
Filtering SARs query results.
OGSA-DAI querying BHPs.
Filtering BHPs query results.
OGMETting sources to HPC.
Executing HPC business logic.
Finished (Failed)

Yvette monitors the progress of Grid operations

GEMEDA Business Processes overview

- Single sign-on login into GEMEDA portal
- Authentication and Authorization
- Set-up and Launch a Job (allows to submit jobs to grid environments)
- Job execution - In GEMEDA the jobs imply empirical economic modelling using secondary information.
- Job monitoring (monitor the progress of Grid operations – Show Jobs status).
- Access jobs (GEMEDA archives past jobs so they can be analysed or viewed a later stage)
- Analysing the results (Result Presentation or Visualisation)

The short eIUS Use Case uses a selection of Business Processes

GEMEDA (Grid Enabled Micro-economic Data Analysis) a Grid based demonstrator



GEMEDA Business Processes

Peters, S., Clark, K., Ekin, P., Le Blanc, A. and Pickles, S. (2007): 'Grid Enabling Empirical Economics: A Microdata Application', Springer Journal of Computational Economics, vol 30, num 4, pp. 349-370

Peters, S., Ekin, P., Le Blanc, A., Clark, K. and Pickles, S. (2006): 'Grid Enabled Data Fusion for Calculating Poverty Measures', Proceedings of the UK e-Science All Hands Meeting

Based on the above-mentioned papers and other relevant documentation and interviews material, the following business processes can be distinguished in GEMEDA:

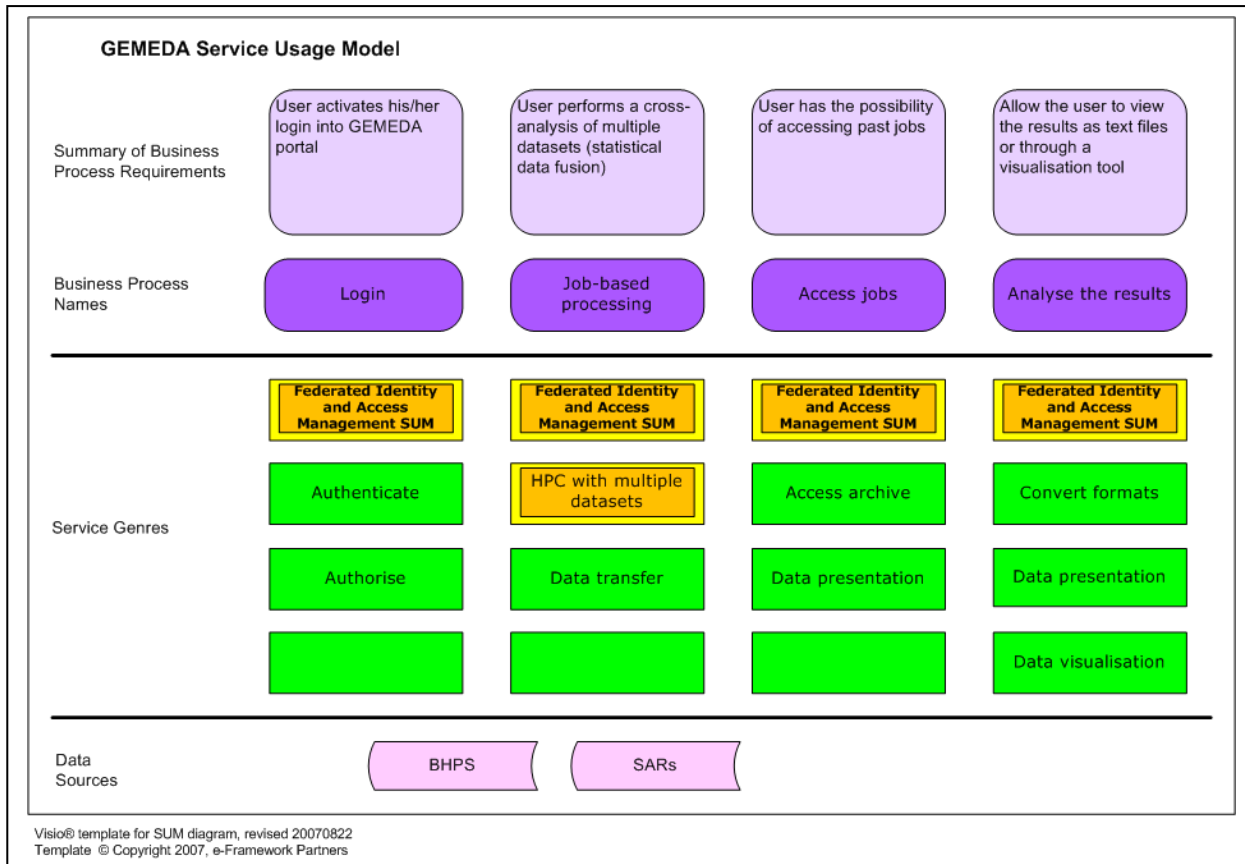
- Single sign-on login into GEMEDA portal
- Authentication and Authorization
 - Certification
 - Allowance
 - Access to data
 - Access to computational resource
- Set-up and Launch a Job (allows to submit jobs to grid environments), which implies to
 - Select the data parameters
 - *Select the economic variables for the analysis*
 - *Select the geographic areas*
 - *Select the ethnic minority groups*
 - Select the algorithm parameters (econometric algorithm)
 - *Select the welfare measure to estimate*
 - Select the parameters specific to the computer resources (HPC)
 - *Select the HPC node and the number of processors to use*
- Job execution - In GEMEDA the jobs imply **empirical economic modelling using secondary information**. GEMEDA provides the functionality required to:
 - Extract and manipulates the required data
 - Execute a static workflow
 - Manage the required resources
 - Perform econometric computation
- Job monitoring (monitor the progress of Grid operations – Show Job Status). Once a job has been launched, the user receive notifications about:
 - How the algorithm is being processed, i.e. about the code execution
 - The underlying infrastructure (i.e. the Grid) where the job is running
- Access jobs (GEMEDA archives past jobs so they can be analysed or viewed a later stage)
- Analysing the results (Result Presentation or Visualisation)
 - View the results as text files
 - Launch a GIS visualisation tool (Java applet) which may imply a data transformation (convert formats) stage

GEMEDA Functionality

- Single sign-on login into GEMEDA portal:
 - Users enter their user name & password. First time users, or users whose credentials need updating, will be redirected to the user's credentials page i.e. Athens credentials and the National Grid Service UK (NGS) MyProxy credentials (user chosen login name and pass-phrase).
- Authentication and Authorization :
 - Athens authentication and authorization is carried out for each session on the user's behalf.
 - GEMEDA employs MyProxy certificates throughout, by which means it can orchestrate a grid workflow.
- Set-up and Launch a Job:
 - Users enter job parameters through various menus, lists & bullet points.
 - Users select HPC machine (NGS core nodes) and the number of processors where the processing job will be carried out.
- Job Execution - Once a user has initiated a job run, the GEMEDA carries the following processes:
 - GEMEDA generates the necessary SQL to query databases - data results are uploaded to the user's NGS account by means of the OGSA-DAI middle-ware using the GridFTP protocol.
 - GEMEDA verifies the compiled Fortran executable resides on the user's account and uploads the executable file if it does not exist.
 - GEMEDA generates a job specification file and uploads it to user's account space.
 - GEMEDA launches MPI job run through the Globus job broker.
- Job Monitoring
 - The status of a job is accessible by the user through the use of Ajax technology (dynamic loading of content on the web page).
- Access jobs:
 - Job parameters and results are archived by the GEMEDA and can be made public for other GEMEDA users to consult.
- Analyzing the results (Result Presentation or Visualization):
 - Job results can be viewed and downloaded in text format or visualized, and further analysed, by means of an integrated GIS applet.

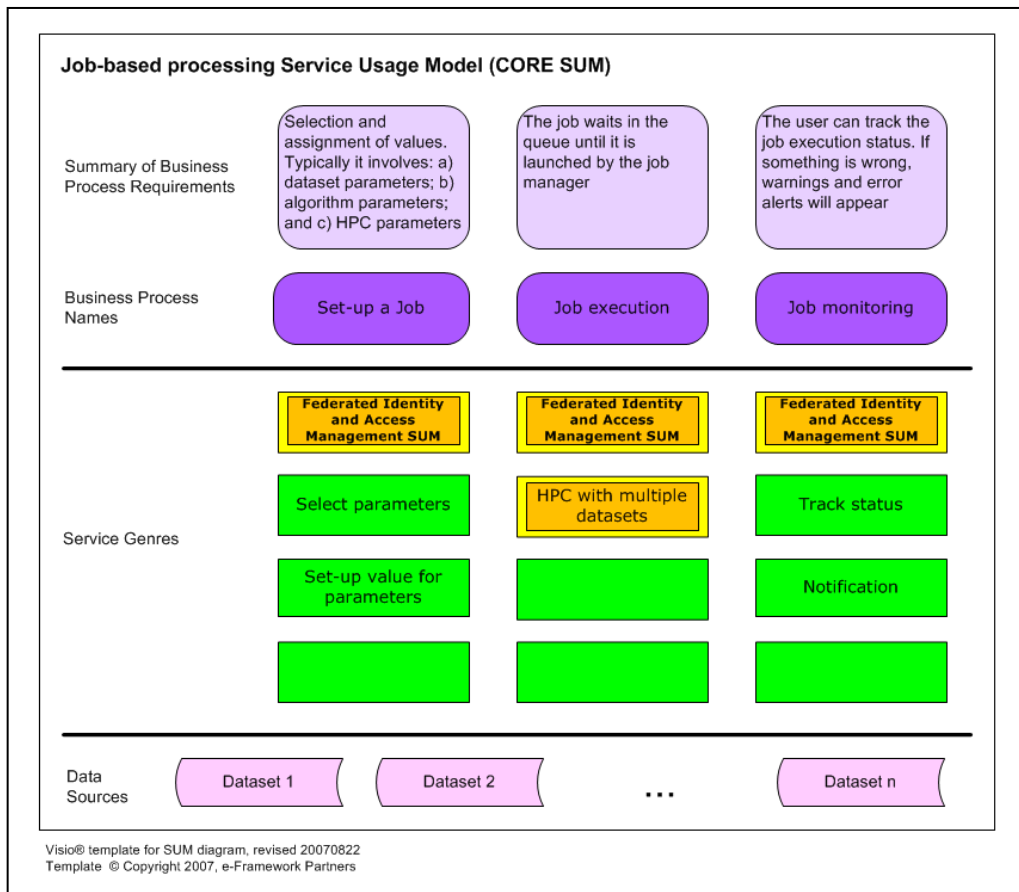


e-Framework SUM diagram¹



¹ Generic SUM diagram, <http://www.e-framework.org/Default.aspx?tabid=760>

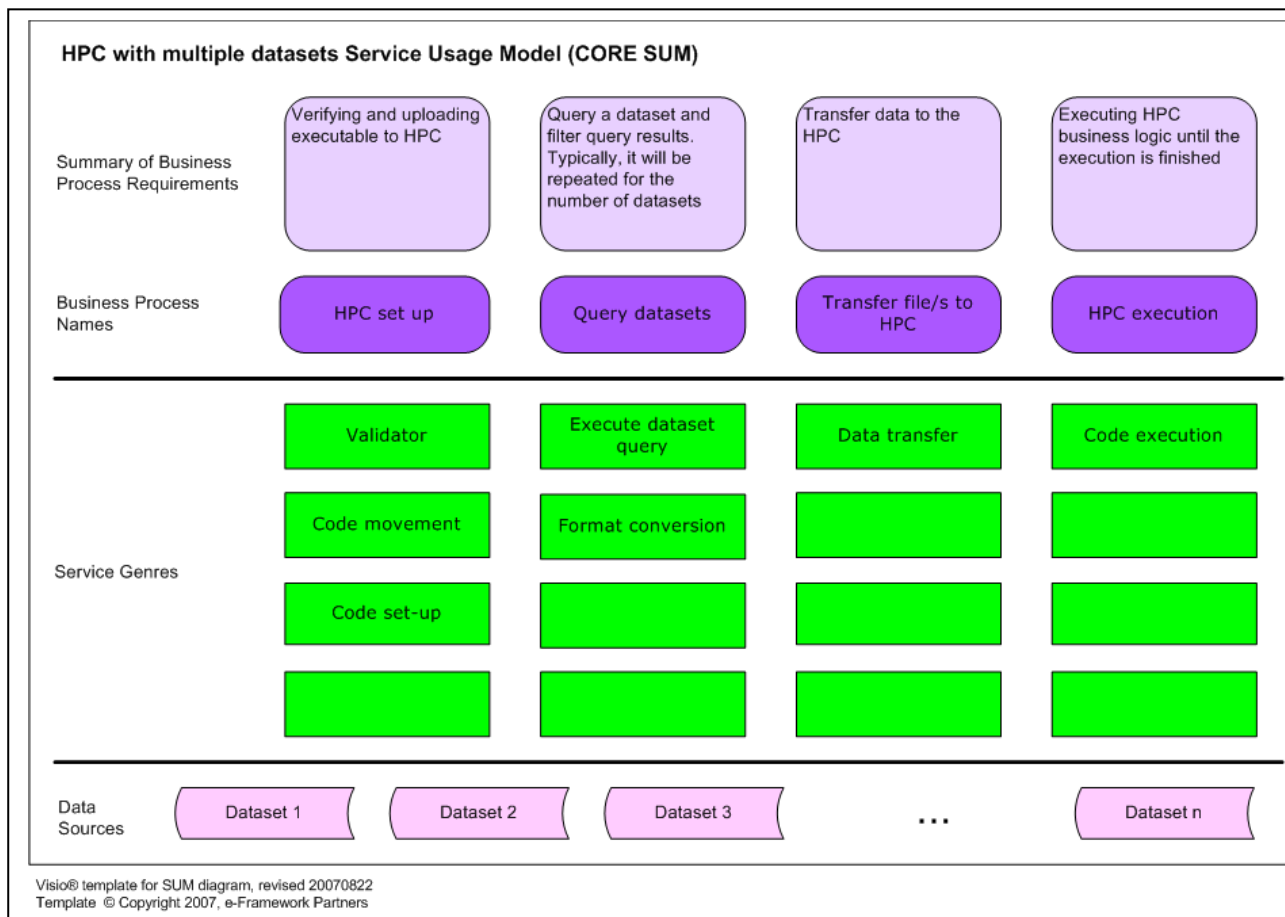
e-Framework CORE SUM diagram²



² e-Framework CORE SUM, <http://www.e-framework.org/Default.aspx?tabid=646>



e-Framework CORE SUM diagram³



³ e-Framework CORE SUM, <http://www.e-framework.org/Default.aspx?tabid=646>