

Distributed User Support and Troubleshooting for an e-Infrastructure for Bioscience Research

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Collaborative Network Systems

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Summary

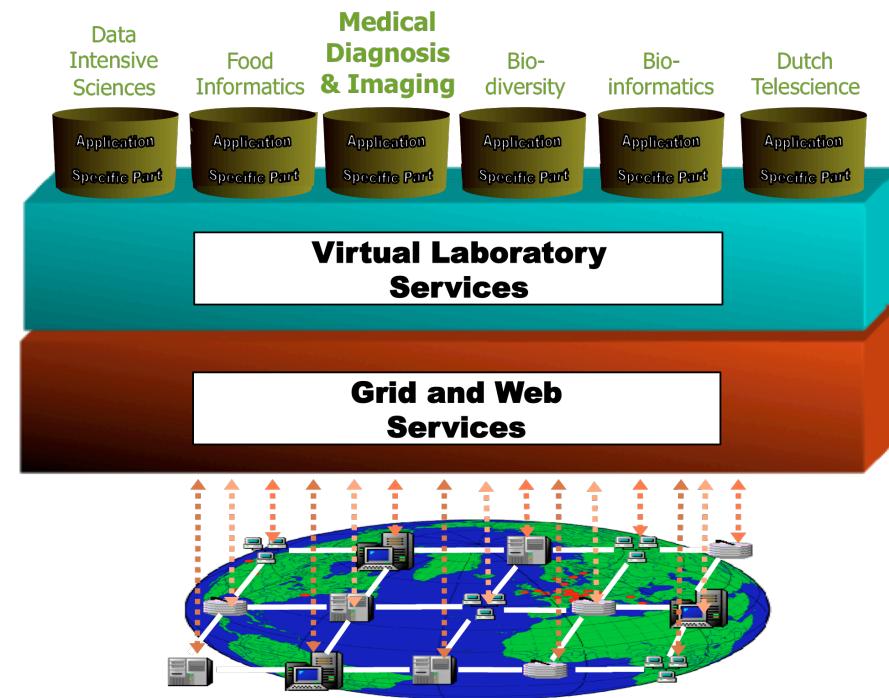
- Context
- Problem
- Approach
- Pilot
- Final remarks



Virtual Laboratory for e-Science

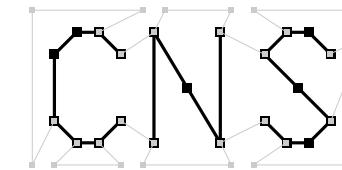


This work is supported by a BSIK grant of the Dutch Ministry of Education, Culture and Science and is part of the ICT innovation programme of the Dutch Ministry of Economic Affairs



CNS @ Logica

- Collaborative Network Systems
- Expertise team to set collaboration between organizations with IT solutions
 - Agent technology
 - Semantic reasoning
 - Self-organization



e-Bioscience Group @ AMC

- AMC:
 - hospital
 - medical (informatics) school
 - research institutes
 - spin-off

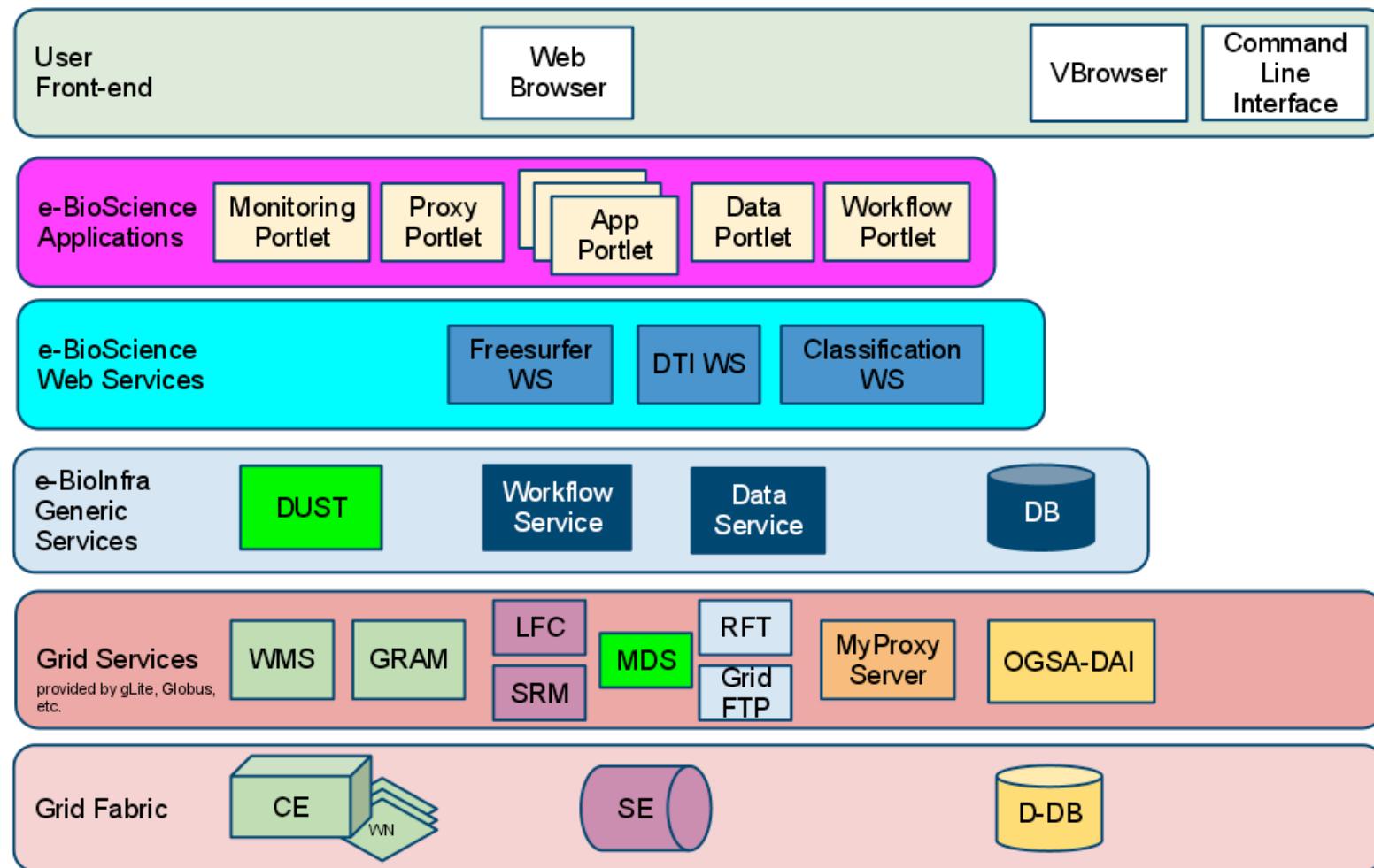


- e-Science for Biomedical research
- e-infrastructure for biomedical research
 - e-BioInfra
 - Dutch NGI (BiG Grid)



e-BioInfra: Layered Architecture

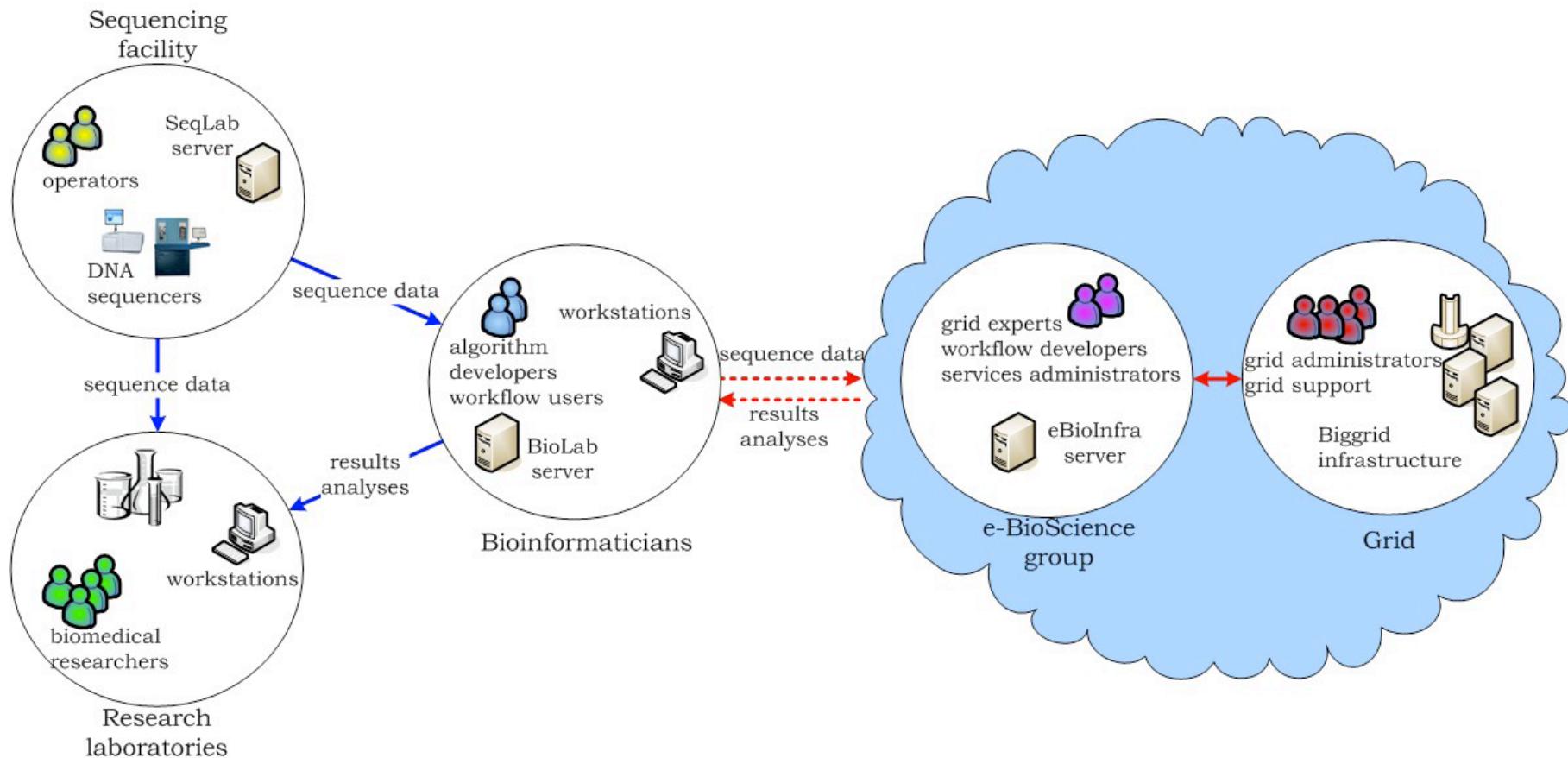
Property of Bioinformatics Laboratory, KEEB, www.amc.uva.nl



e-BioInfra: Usage

- Supported by eBioscience group
 - Application porting, workflows, experiment monitoring
- Applications
 - Neuroimaging
 - MRI and functional MRI
 - Diffusion Tensor Imaging (DTI)
 - CT Angiography
 - Bioinformatics
 - DNA next generation sequencing
 - Proteomics
 - Metabolomics

e-BioInfra: Actors

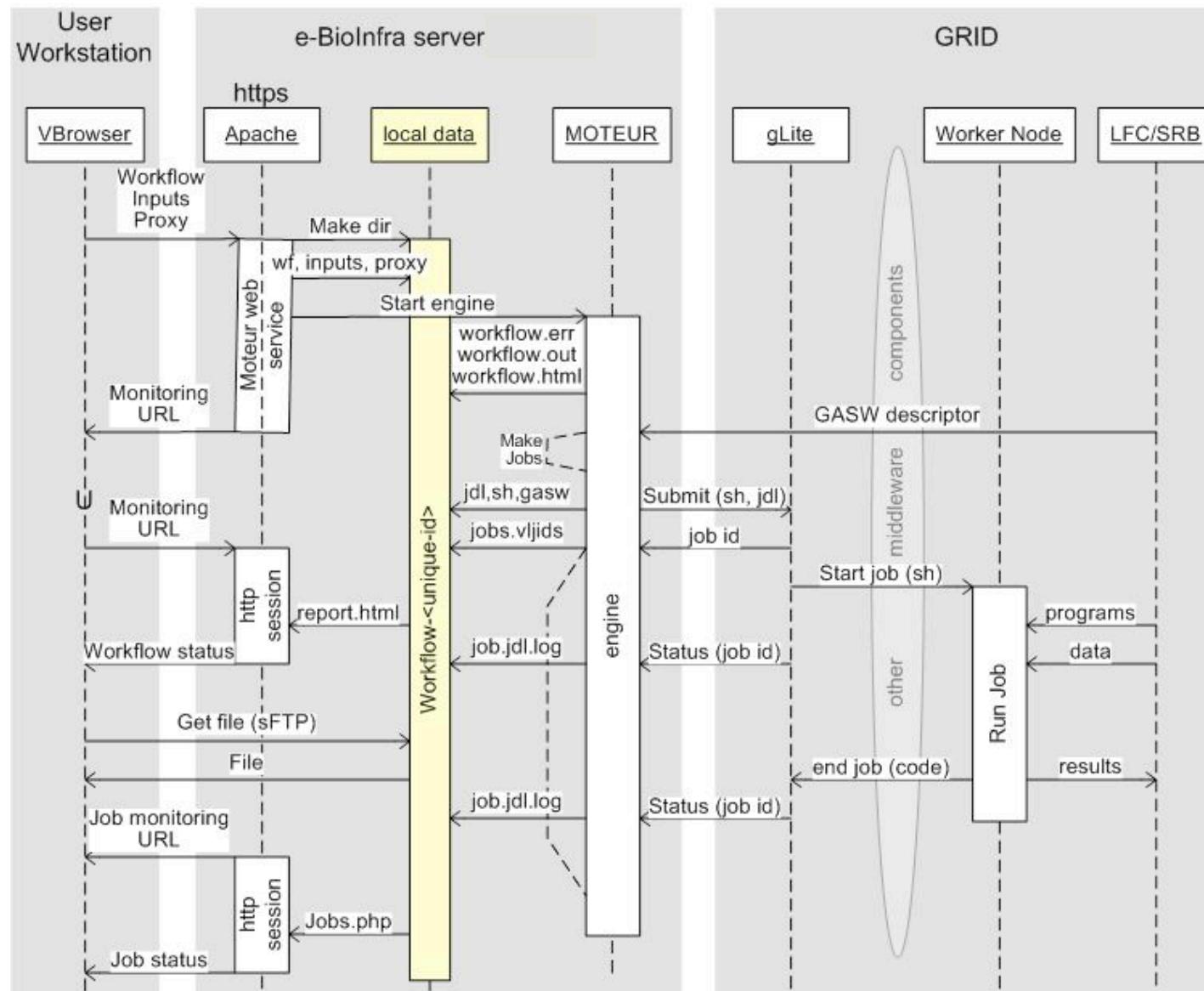


*From DNA Sequencing Platform
Schaik, Luif et al, EGEE UF 2010*

Problem: monitor large experiments

- Grid-related errors...
 - Span multiple domains
 - Span multiple 3rd-party software components
 - Are often indicated or detected in log files
- Troubleshooting is difficult...
 - Requires much manual intervention
 - Knowledge is distributed
 - Consumes significant amount of man power
 - Workflow vs. job level

Grid workflow execution



Opportunity: Agents



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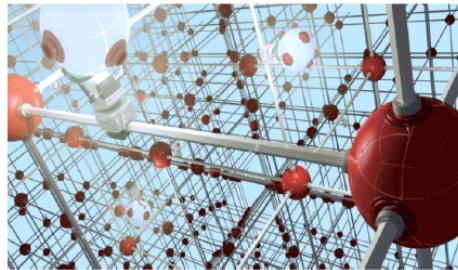
Grid Management Support by Means of Collaborative Learning Agents

Click to add subtitle

From GMAC 2009



Agents improve grids



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From EGEE TF 2009

14 September 2010



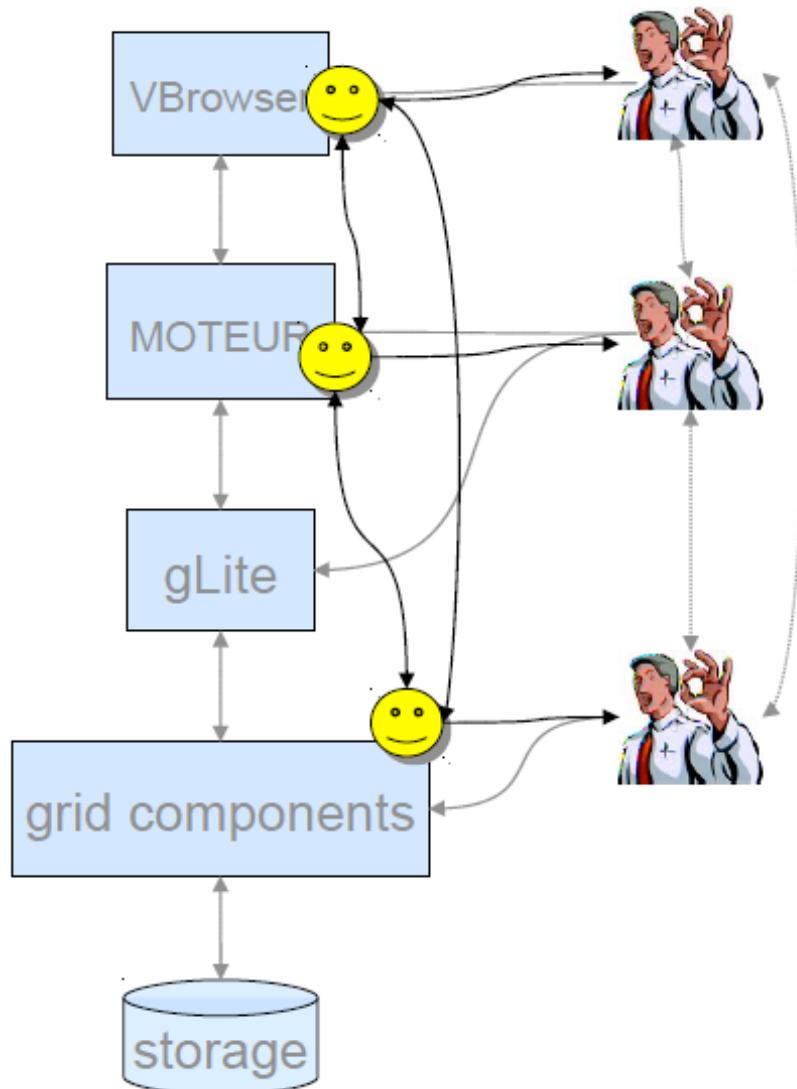
EGI Tech Forum 2010

11

Approach

- Agent framework
 - Autonomous elements
 - Independent, loosely coupled layer
 - Communication across domains
 - Intelligence
- DUST
 - Distributed User Support and Troubleshooting
 - Pilot project

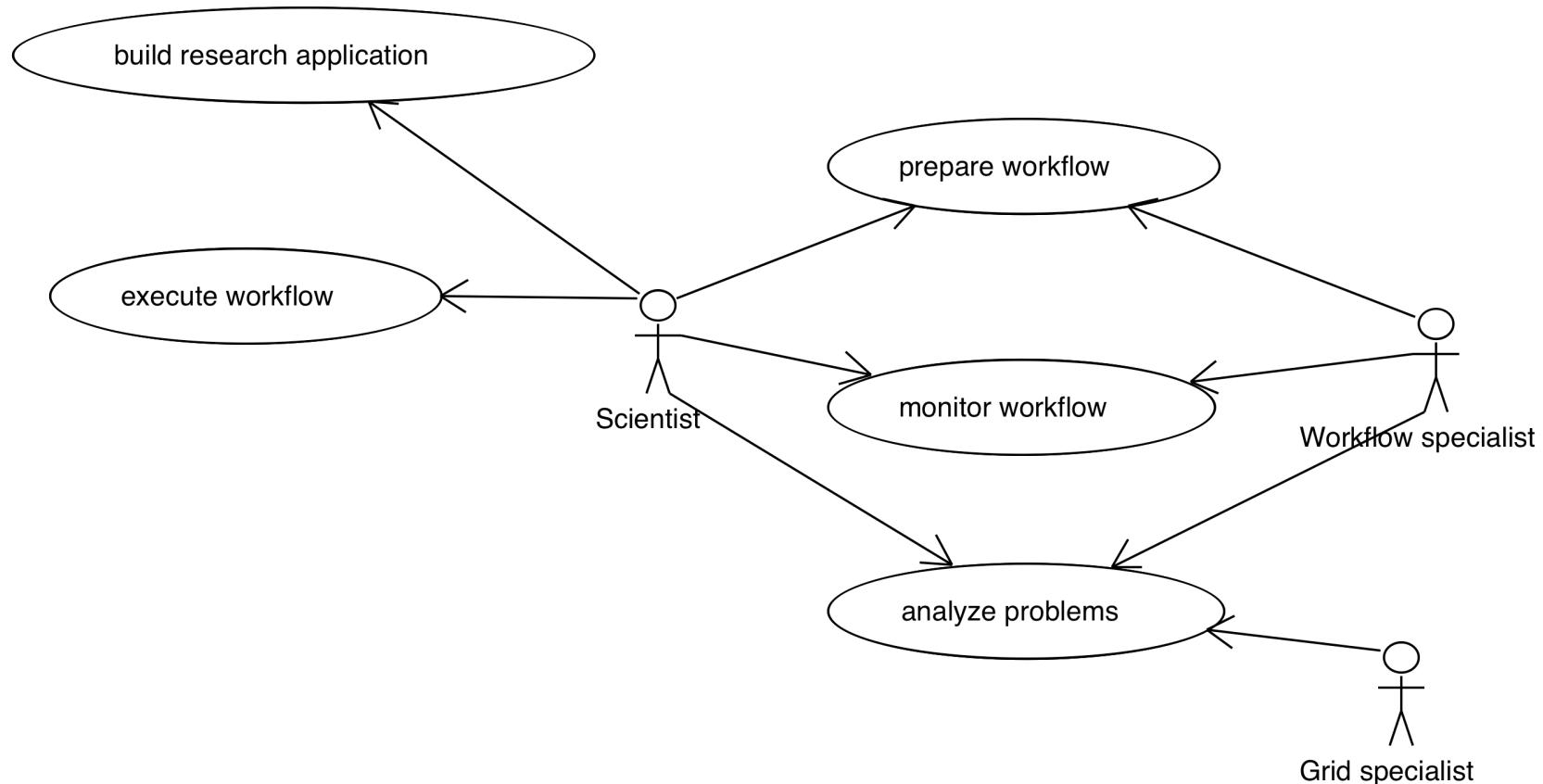
Pilot Project



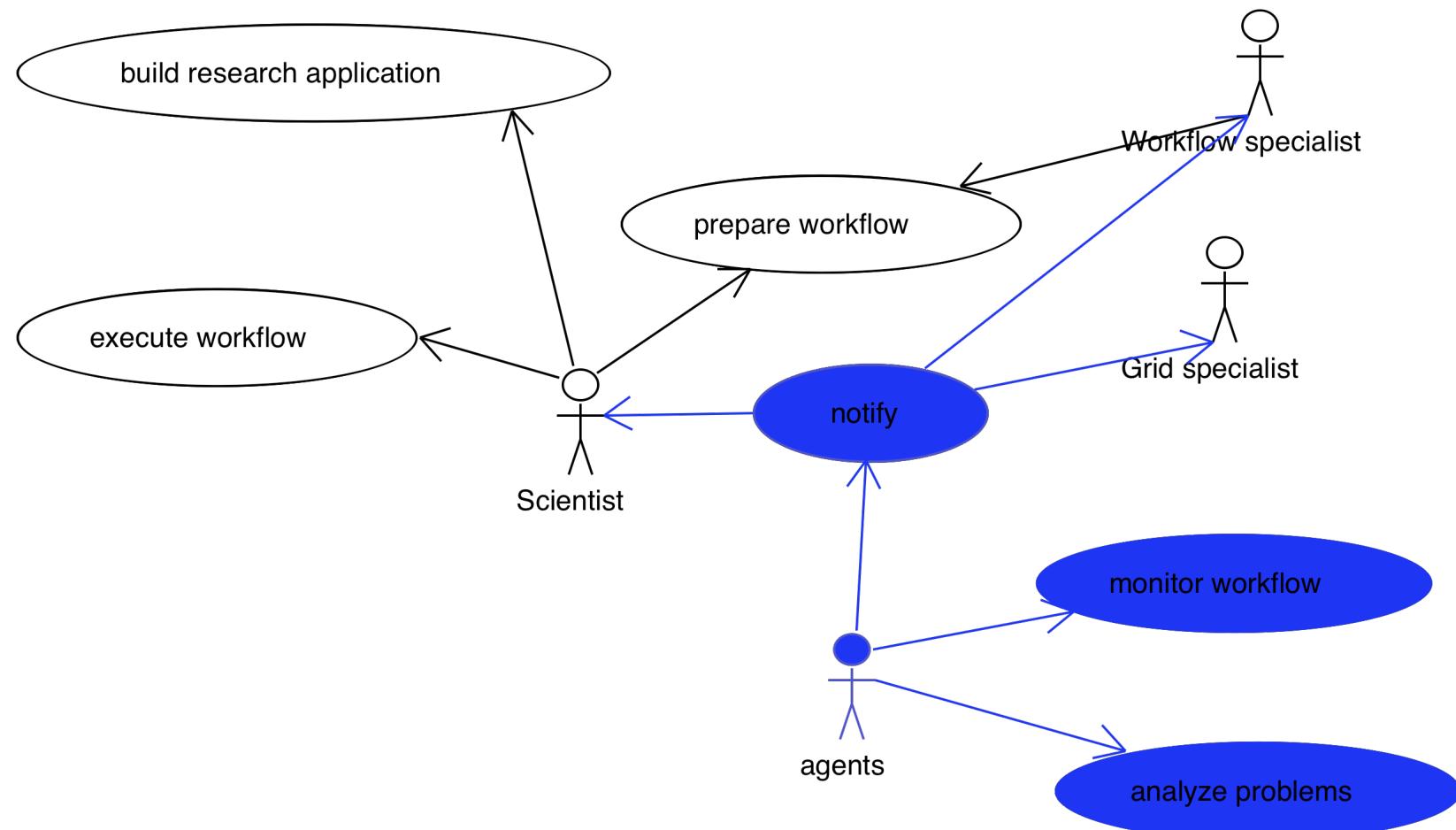
Develop intelligent assistants to (semi) autonomously monitor the execution of workflows on the grid using MOTEUR.

Monitor logs on the server (and grid) side,
Detect (relevant) events and
Notify the user and support team

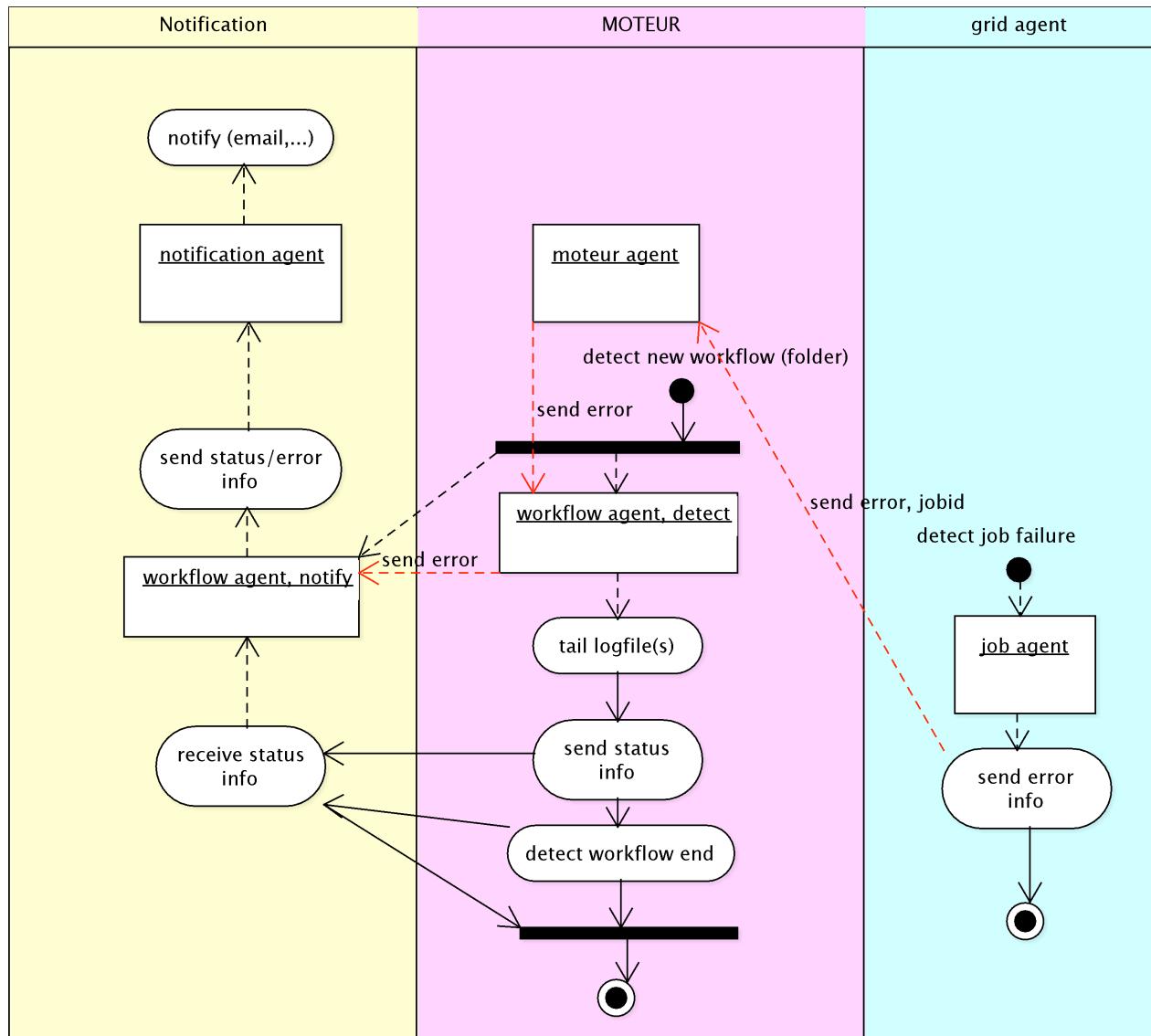
Current Situation



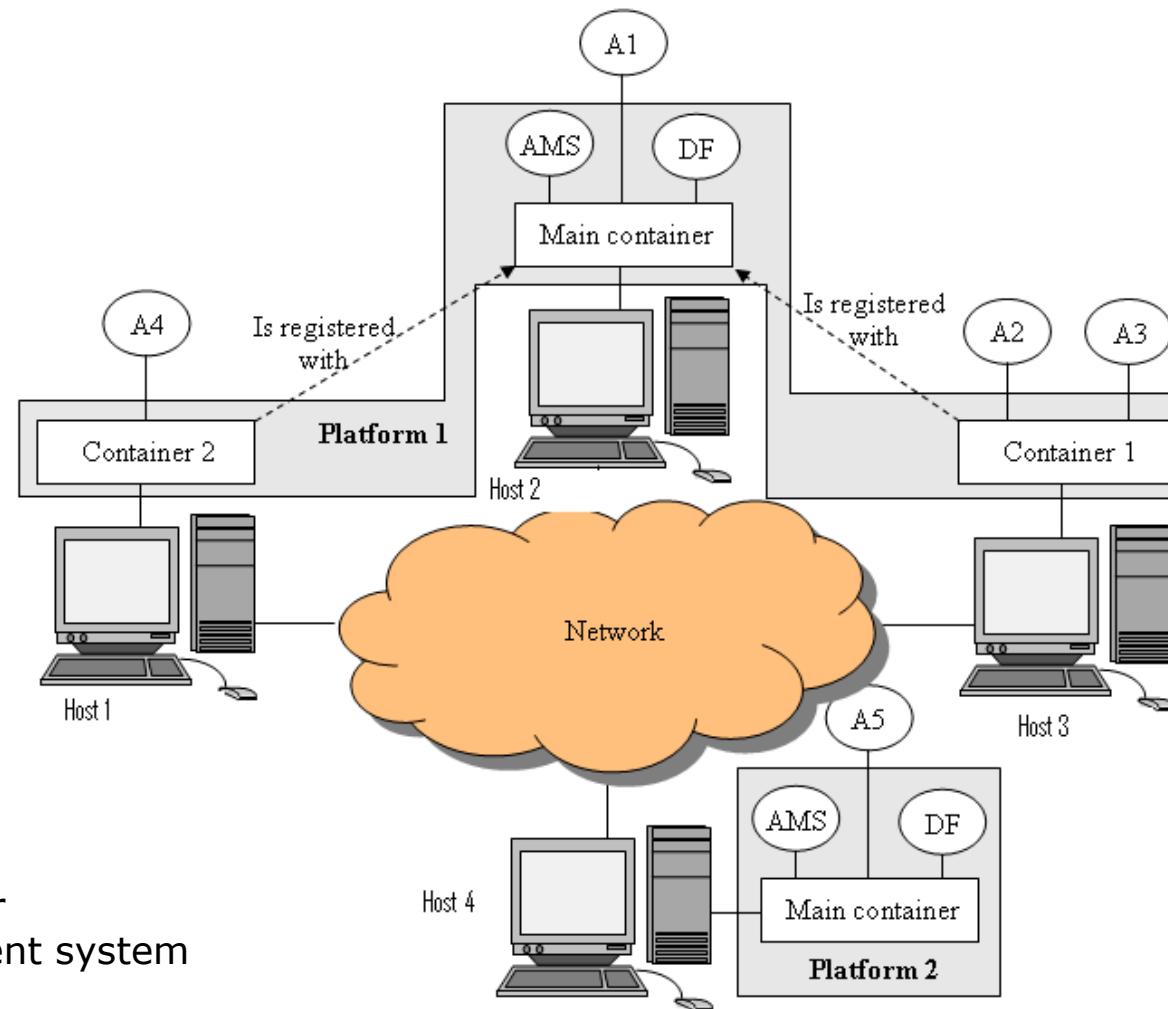
Target Situation



Technical Implementation



FIPA



DS: Directory facilitator

AMS: Agent management system
(JADE implementation)

pilot: console

```
Nov 30, 2009 10:46:48 PM com.logica.amc.moteur.DirectoryPollBehavior handleChanges
INFO: detected start of workflow: workflow-3v67Yt
Nov 30, 2009 10:46:50 PM org.logica.ctis.generic.JadeHelper createAgent
INFO: cid found: AMC@146.50.22.140
Nov 30, 2009 10:46:52 PM org.logica.ctis.generic.JadeHelper createAgent
INFO: cid found: AMC@146.50.22.140
Nov 30, 2009 10:46:52 PM org.logica.ctis.generic.CTISAgent handlePredicate
WARNING: not dealing with results: [Main-Container@146.50.22.140, AMC@146.50.22.140] for jade.domain.JADEAg
ryPlatformLocationsAction@cf8796
Nov 30, 2009 10:46:52 PM com.logica.amc.moteur.MOTEURAgent handlePredicate
INFO: created: AMCWorkflow-3v67Yt_AMC, notifying workflow-3v67Yt
Nov 30, 2009 10:46:52 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617609173 [RUN] Launching the Workflow...
Nov 30, 2009 10:46:52 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617611688 [RUN] Submitting job agent-task0
Nov 30, 2009 10:47:10 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617628861 [RUN] agent has submitted task 0
Nov 30, 2009 10:47:10 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617630484 [RUN] Status of job https://wmslb2.grid.sara.nl:9000/x5frZYoVnLpRcdjaKhMyfw is WAITING
Nov 30, 2009 10:47:20 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617640495 [RUN] Status of job https://wmslb2.grid.sara.nl:9000/x5frZYoVnLpRcdjaKhMyfw is READY
Nov 30, 2009 10:47:40 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617660508 [RUN] Status of job https://wmslb2.grid.sara.nl:9000/x5frZYoVnLpRcdjaKhMyfw is QUEUED
Nov 30, 2009 10:49:21 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259617760603 [RUN] Status of job https://wmslb2.grid.sara.nl:9000/x5frZYoVnLpRcdjaKhMyfw is RUNNING

Nov 30, 2009 11:09:48 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259618987962 [RUN] Status of job https://wmslb2.grid.sara.nl:9000/x5frZYoVnLpRcdjaKhMyfw is ERROR
Nov 30, 2009 11:09:48 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259618987963 [RUN] 3 remaining trials: submitting the job again
Nov 30, 2009 11:09:48 PM com.logica.amc.user.NotificationAgent handleStatus
INFO: 1259618987963 [RUN] Submitting job agent-task0
```

pilot: notification

Van: euard@alegre.science.uva.nl
[eduard@alegre.science.uva.nl] Verzonden: ma 30-11-2009 23:11
Aan: Drent, Eduard
CC:
Onderwerp: error notification
Bijlagen:

[Weergeven als webpagina](#)

```
exit status: 1
workflow: workflow-3v67Yt
job: https://wmslb2.grid.sara.nl:9000/7A2ScejfmJinnAy0X-RsjA
details:
failure in job-shell./agent.sh: line 3: r: No such file or directoryNov 30, 2009 11:17:31 PM
com.logica.amc.workernode.WorkerNodeAgent mainWARNING: problem setting shell status, keeping
default (1)java.lang.IllegalArgumentException: key not found: shellstatus at
org.logica.ctis.generic.JadeHelper.getProperty(JadeHelper.java:57) at
com.logica.amc.workernode.WorkerNodeAgent.main(WorkerNodeAgent.java:46)Nov 30, 2009
11:17:31 PM jade.imtp.leap.JICP.BIFEDispatcher createBackEndINFOCreating BackEnd on
jicp://alegre.science.uva.nl:1099Nov 30, 2009 11:17:31 PM jade.imtp.leap.JICP.JICPSConnection
constructJICPSConnectionNoAuthWARNING: Creating JICPSConnection with NO-AUTHENTICATION
(only confidentiality).Nov 30, 2009 11:17:31 PM jade.imtp.leap.JICP.BIFEDispatcher
createBackEndINFO: BackEnd OK: mediator-id = https://wmslb2.grid.sara.nl_9000
/7A2ScejfmJinnAy0X-RsjANov 30, 2009 11:17:31 PM
jade.imtp.leap.JICP.BIFEDispatcher$InputManager runINFO: IM-0 startedNov 30, 2009 11:17:31 PM
jade.imtp.leap.JICP.BIFEDispatcher connectInpINFO: Connecting to alegre.science.uva.nl:1099 0
(INP)Nov 30, 2009 11:17:31 PM jade.imtp.leap.JICP.JICPSConnection
constructJICPSConnectionNoAuthWARNING: Creating JICPSConnection with NO-AUTHENTICATION
(only confidentiality).Nov 30, 2009 11:17:31 PM jade.core.FrontEndContainer <init>INFO:
-----Agent container https://wmslb2.grid.sara.nl_9000/7A2ScejfmJinnAy0X-RsjA
is ready.-----Nov 30, 2009 11:17:31 PM jade.imtp.leap.JICP.BIFEDispatcher
connectInpINFO: Connect OK (INP)Nov 30, 2009 11:17:31 PM
com.logica.amc.workernode.WorkerNodeAgent setupWARNING: problem setting maxlines, keeping
default (200)java.lang.IllegalArgumentException: key not found: maxlines at
org.logica.ctis.generic.JadeHelper.getProperty(JadeHelper.java:57) at
```

Preliminary evaluation

- Proof-of-concept
 - Agents take care of communication
 - Simple functionality (job status, error notification)
 - Flexible implementation
 - Minimally invasive
- Need to assess:
 - Scalability
 - Complexity
 - Practical value

Discussion

- Engineering grid applications is challenging
- System complexity is bound to increase
- Problems are bound to occur in such dynamic and complex systems
- Information and expertise is bound to remain distributed (in production grids)
- Troubleshooting needs to be approached properly (which framework?)
 - Application vs. grid level
 - Pilot job frameworks

Thanks for listening!

