



Sharing Data and Image Processing Pipelines: The Information Analysis & Management initiative

Michel Dojat, Bénédicte Batrancourt, Yann Cointepas, Olivier Coulon, Tristan Glatard, Fabrice Heitz, Michael Kain, Christian Barillot

► To cite this version:

Michel Dojat, Bénédicte Batrancourt, Yann Cointepas, Olivier Coulon, Tristan Glatard, et al.. Sharing Data and Image Processing Pipelines: The Information Analysis & Management initiative. OHBM 2016 - 22nd Annual Meeting of the Organization for Human Brain Mapping, Jun 2016, Geneve, Suisse. hal-01488230

HAL Id: hal-01488230

<https://amu.hal.science/hal-01488230>

Submitted on 27 Mar 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Sharing Data and Image Processing Pipelines: The Information Analysis & Management initiative

Presented During: Poster Session

Tuesday, June 28, 2016: 12:45 PM - 02:45 PM

Stand-By Time

Tuesday, June 28, 2016: 12:45 PM - 2:45 PM

Poster Number:

1849

Submission Type:

Abstract Submission

On Display:

Monday, June 27 & Tuesday, June 28

Authors:

Michel Dojat¹, Bénédicte Batrancourt², Yann Cointepas³, Olivier Coulon⁴, Tristan Glatard⁵, Fabrice Heitz⁶, Michael Kain⁷, Christian Barillot⁷

Institutions:

¹INSERM U1216, Grenoble, France, ²INSERM, ICM, UMR_S 1127, Paris, France, ³CEA, NeuroSpin, Orsay, France, ⁴Aix-Marseille University, CNRS, LISIS, UMR 7296, Marseille, France, ⁵CNRS, CREATIS, Lyon, France, ⁶CNRS, ICUBE, UMR 7357, Strasbourg, France, ⁷Inria, VisAGeS Project-Team, Rennes, France

E-Poster

Introduction:

The Information Analysis and Management (FLI-IAM) initiative, supported by the France Life Imaging national project in France (ANR-11-INBS-006), is designed to promote data management and information processing support for population imaging. The aim is to provide an infrastructure (hardware and software), accessible to in-vivo imaging users, composed of software components to store, manage and process large clinical and preclinical in vivo imaging datasets and their associated metadata. The purpose of the first stage of the project (2013-2016) is to build image analysis and data management components allowing the interoperability between heterogeneous and distributed storage solutions implementing raw and meta-data indexing, through the use of semantic models or ontologies. Three existing solutions were selected for data management: Cati-DB (Paris-Sud, FR), Shanoir (Rennes, FR) and Archimed (Nancy, FR), and three image processing management solutions: VIP (CNRS, Lyon), BrainVisa (CEA Paris Sud, FR) and MedInria (Inria, FR). All of these components are currently ready to action. In a second stage, after 2016, we will be working towards the exploitation of our interoperability layer.

Methods:

After a survey of the end-users needs, from physicists to clinicians, we defined three scenarios for using our infrastructure: 1) Software as a Service (SaaS) for clinical and preclinical distributed research, where the user searches either for an outsourcing solution (turnkey service) or an hosting-type service, in which mono or multi-center datasets are controlled, stored and processed following users specifications and final results can be provided (typical users: clinician or PI of a cohort study), 2) Platform as a Service (PaaS) i.e. an open resource for professionals that provides housing of data (DaasS) and processing pipelines solutions defined for the needs of a large and open community of users (typical users: organizer of image processing challenges, PI aiming to disseminate collected data) and 3) Storage and Computing as a service (SCaaS) i.e. basic cloud hosting solutions for storage, processing and exchange (typical users: researcher for data management with a small group of collaborators).

Results:

The three described scenarios are supported by the architecture developed (see Figure 1). Collaborative engineering work has been performed to ensure interoperability between Shanoir, Cati-DB, and Archimed databases on the one hand, and VIP, BrainVisa and MedInria on the other hand. OntoNeurolog [Batrancourt 2015, Temal 2008] and OntoCati [Edward 2013] ontologies used in Shanoir and Cati-DB respectively for Human neuroimaging data have been aligned and extended to deal with preclinical imaging data as well. Dedicated workflows (e.g. automatic sulci segmentation in T1-weighted human structural images, or T1 and T2 parametric maps for mouse brains) can be executed locally (via BrainVisa or MedInria) or on distributed architectures (VIP [Glatard 2013] or CATI capsul). Access to high performance computing (HPC, i.e.) is then facilitated. The IAM web portal (see Figure 2) proposes a common public meta-data catalogue to assess the different repositories federated through Apache Solr. A Common API for Research Medical Imaging Network

(CARMIN) [Glatard 2015] is used for pipeline execution on the web that allows a greater integration between image data repositories and image processing workflows for both Push and Pull data streams.

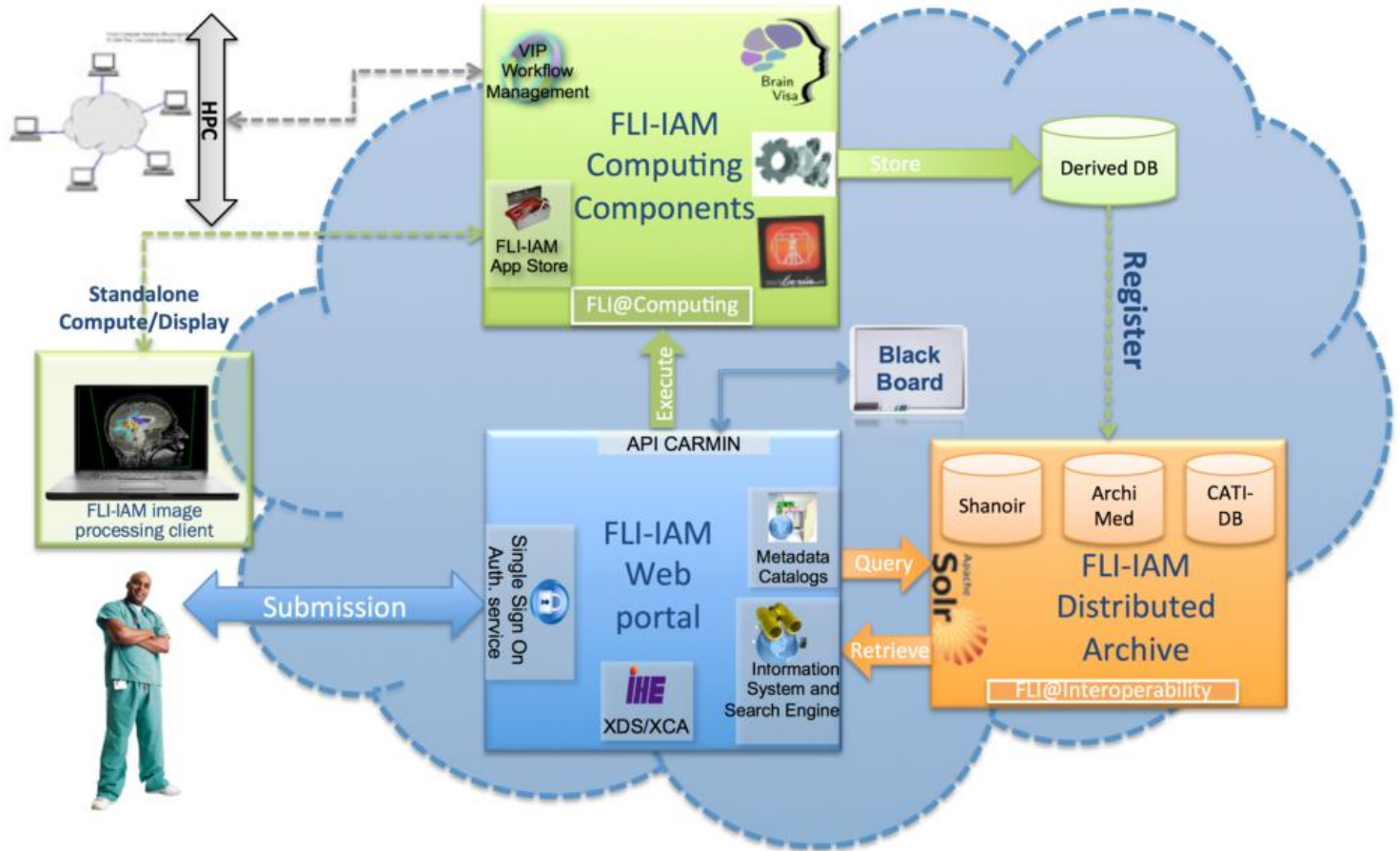


Figure 1: FLI-IAM architecture for data storage and image processing pipelines definition and execution

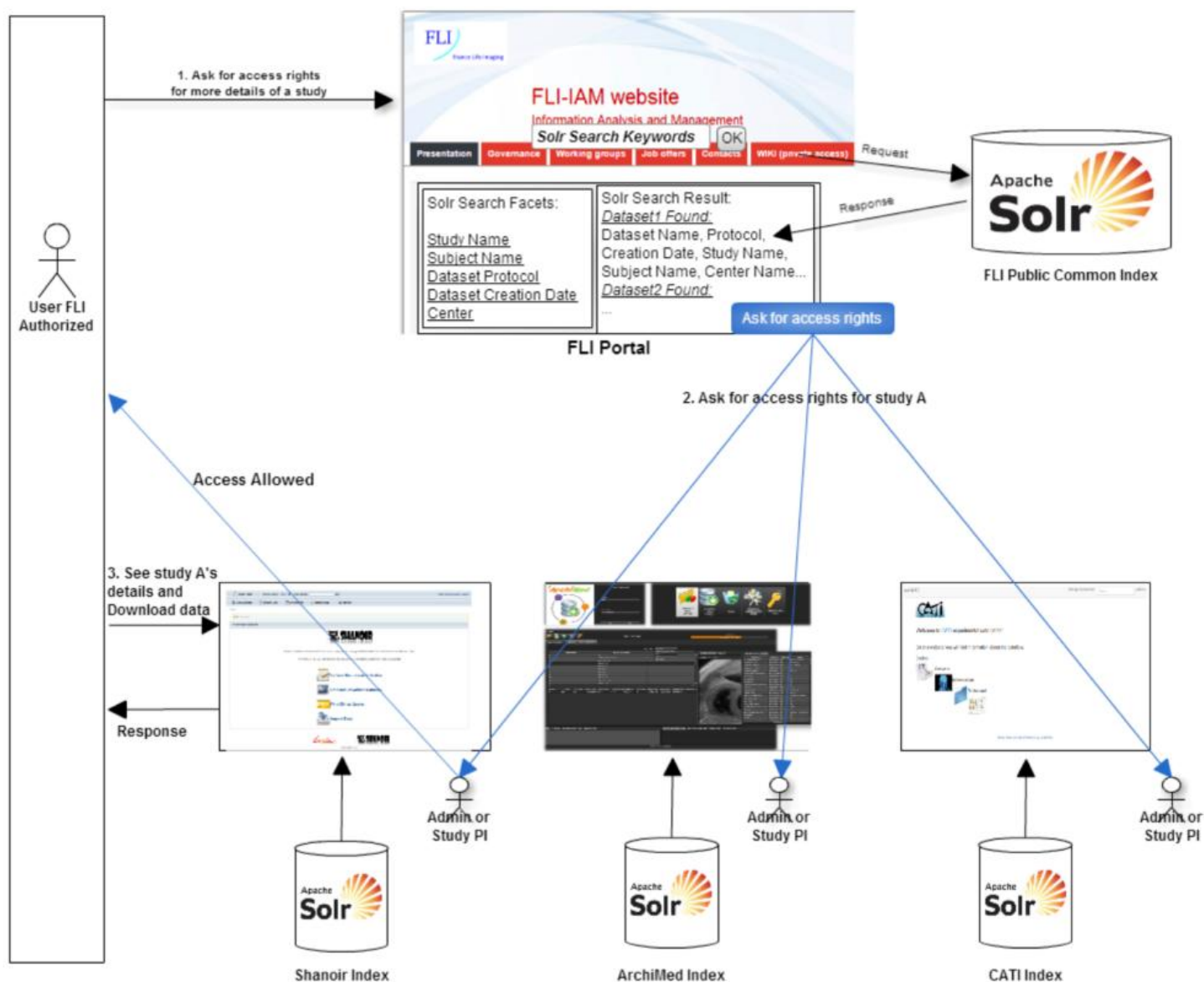


Figure 2: FLI-IAM portal for end-users assess to the three neuroimaging repositories via a common data catalog.

Conclusions:

FLI-IAM, built over ready to use software components, offers a unique architecture for sharing data and image processing pipelines with local or distributed execution. We are involved in several actions for sharing expertise in complementary domains and to define interoperability with other existing platforms (e.g. NSG, CBRAIN, LORIS or XNAT).

Informatics:

Databasing and Data Sharing ¹
Workflows ²

Poster Session:

Poster Session - Tuesday

Keywords:

Computing
Data Organization
Informatics
Workflows

¹²Indicates the priority used for review

Would you accept an oral presentation if your abstract is selected for an oral session?

Yes

I would be willing to discuss my abstract with members of the press should my abstract be marked newsworthy:

Yes

Please indicate below if your study was a "resting state" or "task-activation" study.

Other

Healthy subjects only or patients (note that patient studies may also involve healthy subjects):

Patients

Internal Review Board (IRB) or Animal Use and Care Committee (AUCC) Approval. Please indicate approval below. Please note: Failure to have IRB or AUCC approval, if applicable will lead to automatic rejection of abstract.

Yes, I have IRB or AUCC approval

Please indicate which methods were used in your research:

Other, Please specify - software engineering

Provide references in author date format

Batrancourt et al. (2015), 'A multilayer ontology of instruments for neurological, behavioral and cognitive assessments', Neuroinformatics, vol.3, pp. 93-110
Edward et al. (2013), 'OntoCATI: Towards an ontology of neuroimaging measures in the CATI Platform', Front. Neuroinform. Conference Abstract: Neuroinformatics
Temal et al. (2008), 'Towards an ontology for sharing medical images and regions of interest in neuroimaging', J Biomed Inform, vol. 41, pp. 766-778
Glatard, T. (2013) 'A Virtual Imaging Platform for multi-modality medical image simulation', IEEE Transactions on Medical Imaging, vol. 32, no. 1, pp. 110-118.
Glatard T et al. (2015), 'CARMIN: a common web API for remote pipeline execution', Front. Neurosci. Conference Abstract: Neuroinformatics