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Experience and lessons learned building up the Virtual Imaging Platform



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CREATIS; CNRS (UMR 5220); Inserm (U1294); INSA Lyon; Université de Lyon

The Virtual Imaging Platform

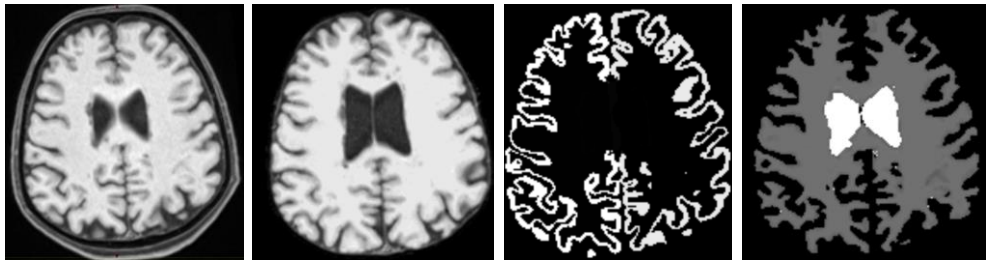
- Scientific applications as a Service
  - More than 25 applications publicly available
  - https://vip.creatis.insa-lyon.fr/home.html
- Transparent access to computing resources
  - 50 CPU years (EGI biomed VO) used in the last 12 months
- Open and reproducible science
  - Zenodo, DOIs, Containers, Boutiques
- Large community
  - More than 1500 registered users
  - 81 publications with results obtained on VIP

VIRTUAL IMAGING PLATFORM
https://vip.creatis.insa-lyon.fr

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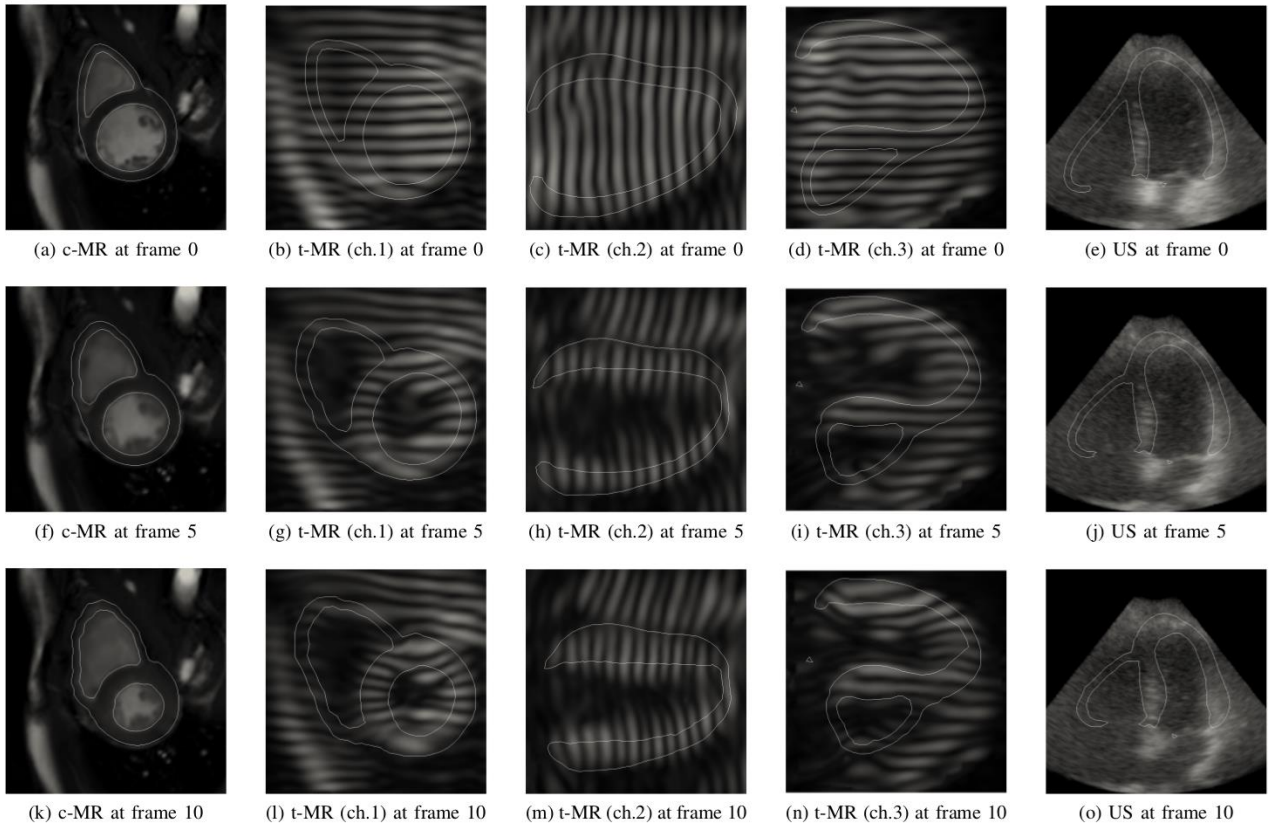
Example of white/grey matter brain segmentation with Freesurfer on VIP
Credits : Berardino Barile and Dominique Sappey-Marinier, Creatis

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Example of VIP success stories

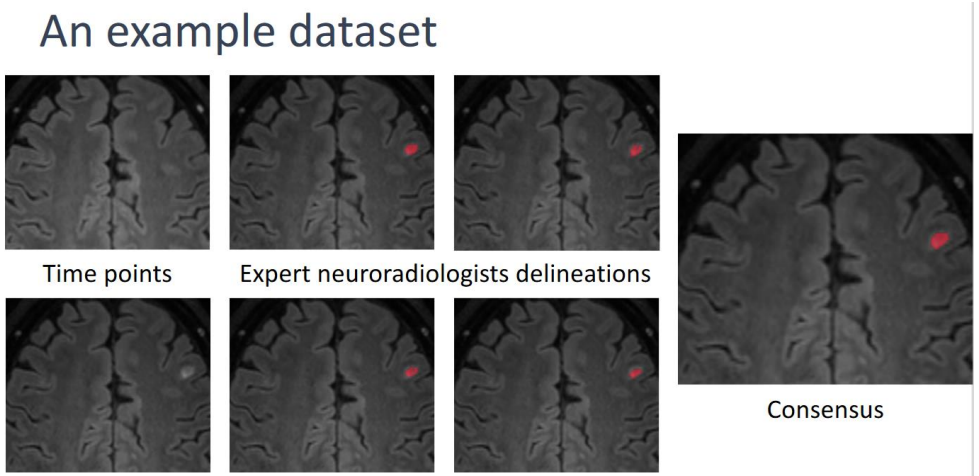
- Generate virtual ultrasound and magnetic resonance images
  - Reference: Bernard et al. 2018. IEEE Transactions on Medical Imaging

- MRI simulator integrated into VIP
- Catalogue of 18 virtual patients
  - 2700 image volumes
  - Benchmarked myocardial motion for validation purposes
- The generation of one full 3D sequence took 6 hours on VIP
  - It would have taken over 280 hours on a personal laptop


(a) c-MR at frame 0 (b) t-MR (ch.1) at frame 0 (c) t-MR (ch.2) at frame 0 (d) t-MR (ch.3) at frame 0 (e) US at frame 0
(f) c-MR at frame 5 (g) t-MR (ch.1) at frame 5 (h) t-MR (ch.2) at frame 5 (i) t-MR (ch.3) at frame 5 (j) US at frame 5
(k) c-MR at frame 10 (l) t-MR (ch.1) at frame 10 (m) t-MR (ch.2) at frame 10 (n) t-MR (ch.3) at frame 10 (o) US at frame 10

MICCAI Challenges

- A scientific challenge
  - Research teams work on solving a common scientific hard problem
  - Their solutions are evaluated on a given set of data according to guidelines
- VIP was the execution platform for challenges organized at MICCAI 2016, 2021, 2025
  - International Conference on Medical Image Computing and Computer Assisted Intervention
- MSSEG
  - Multiple Sclerosis (MS) Segmentation (Seg)
  - Automatic segmentation of lesions in MRI brain scans
  - Parteners: FLI, OFSEP, Empenn
  - VIP support: Dirac, EGI



Why VIP?

- Back in 2009…
  - Obtain a personal Grid certificate and convert it to the right format…
  - Write your JDL and submit your jobs (Yes! :-))
  - Check their status… and (Oh, no!...) resubmit…

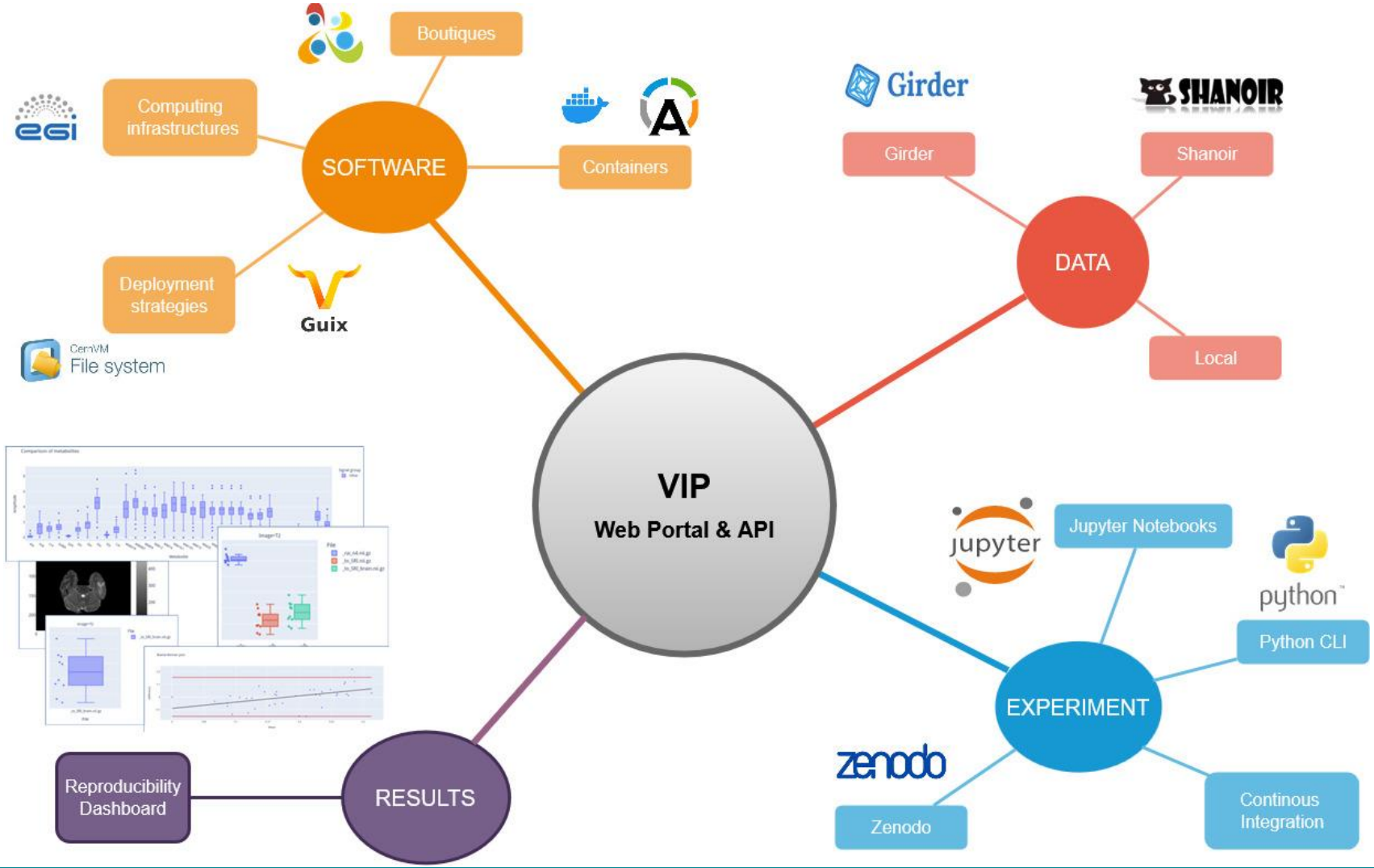


=> Need for completely transparent access to resources

- Today: Applications as a Service
  - Login into a web portal
  - Click to launch your favourite application
  - Click to retrieve your results

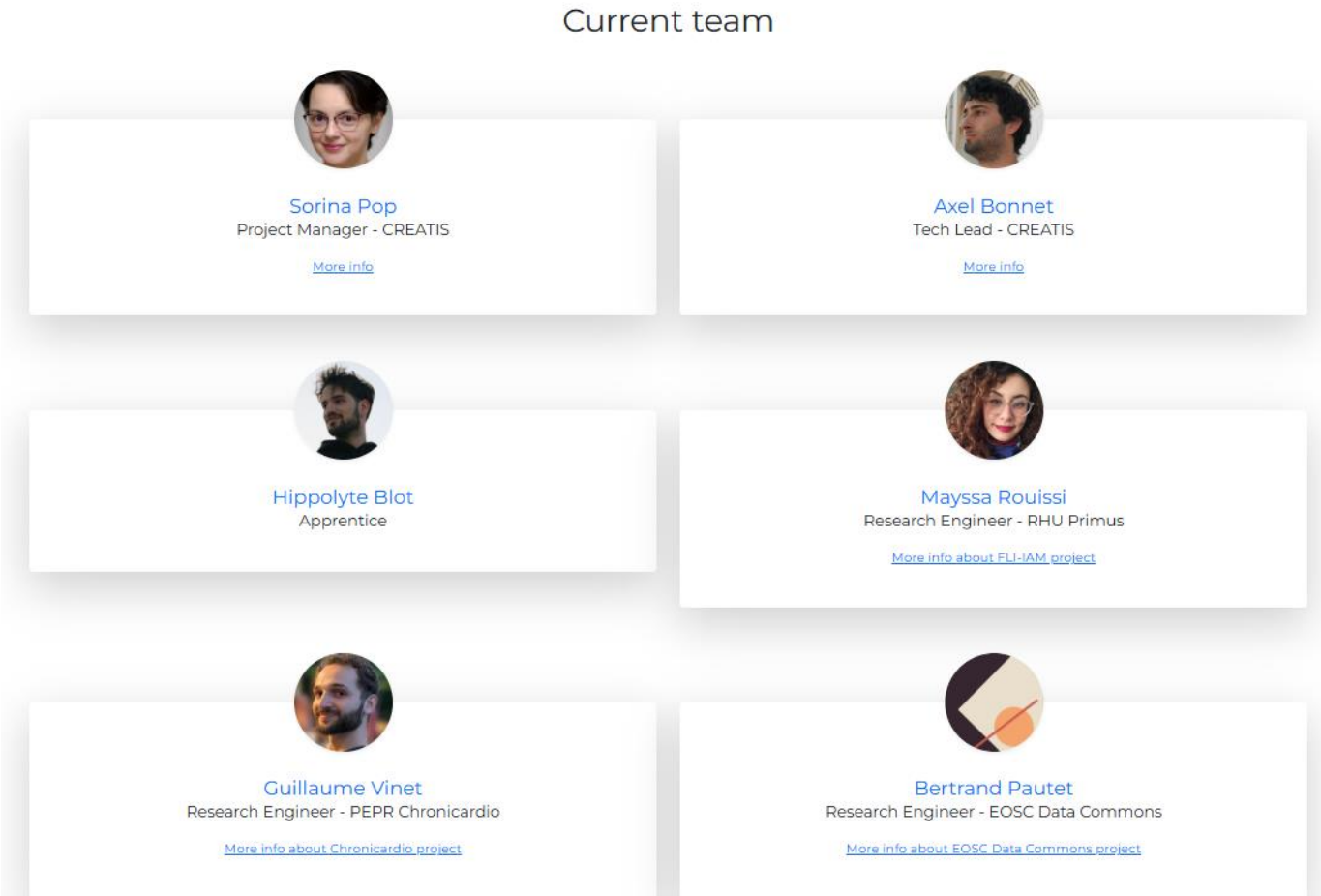


Going further: reproducibility



Structure and organization

- Platform at CREATIS
  - 2 “permanent” CNRS engineers
- Many collaborations
  - French national level: FLI-IAM, PEPR Chronicardio, RHU Primus, Labex Primes, France Grilles
  - EU level: EGI, EU projects EGI ACE, EUCAIM, EOSC Data Commons, ENSURE



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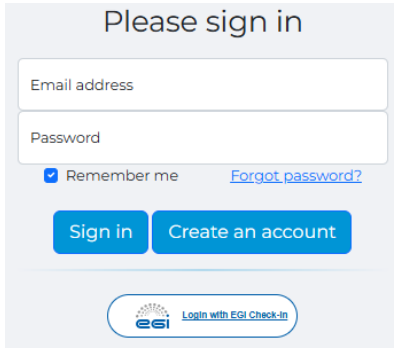
Community building and support

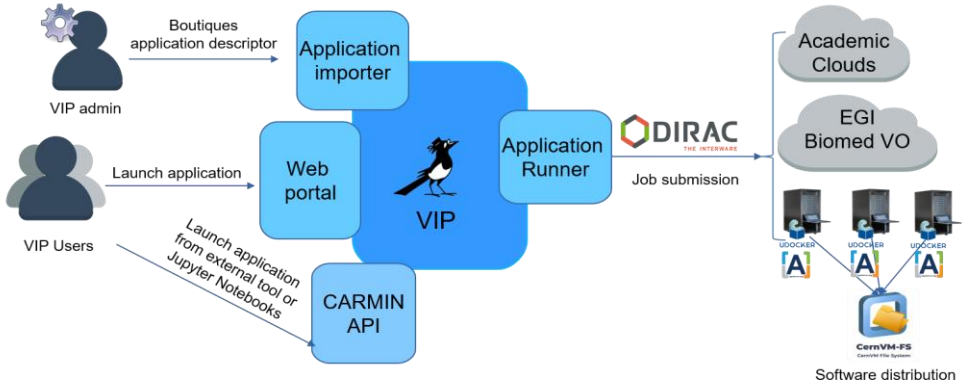
- Use-cases supported through EU and French national projects
  - Free at the point of use
  - Technical support and QoS
  - Meet the community's needs

- Communication
  - User workshops (local)
  - Mailing list and "experiencing problems" contact form
  - Conferences (EGI conferences and previous user forums, medical imaging-related conferences)

EOSC Node | EGI Data, Computing & Digital

- VIP is part of the EGI Node portfolio
- VIP provides applications as a service and reproducibility features
- Integration
  - EGI Checkin support
  - Dirac interware
- EOSC Federation
  - Communities
  - Access to distributed compute and storage resources, interoperable data management capabilities and cross-node orchestration mechanisms

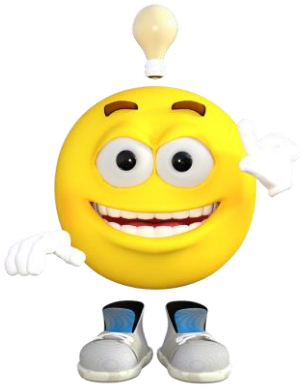




VIP architecture overview

Conclusions

- Achievements
  - Transparent access to distributed computing resources
  - Scientific applications as a service
- Lessons learnt
  - Do not neglect community support
  - Collaboration and tool “re-use”
- Looking to the future
  - Support and sustainability
  - Open and reproducible science





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Thank you for your attention!
Questions?...