



Galaxy-SynBioCAD: tools and automated pipelines for Synthetic Biology Design and Metabolic Engineering

Thomas Duigou, Joan Hérissou, Melchior Du Lac, Kenza Bazi-Kabbaj, Mahnaz Sabeti Azad, Gizem Buldum, Olivier Telle, Yorgo El-Moubayed, Pablo Carbonell, Neil Swainston, et al.

► To cite this version:

Thomas Duigou, Joan Hérissou, Melchior Du Lac, Kenza Bazi-Kabbaj, Mahnaz Sabeti Azad, et al.. Galaxy-SynBioCAD: tools and automated pipelines for Synthetic Biology Design and Metabolic Engineering. BioSynSys 2022, Sep 2022, Paris, France. . hal-04302912

HAL Id: hal-04302912

<https://hal.inrae.fr/hal-04302912>

Submitted on 23 Nov 2023

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.



Distributed under a Creative Commons Attribution 4.0 International License



Galaxy-SynBioCAD: tools and automated pipelines for Synthetic Biology Design and Metabolic Engineering

Équipe BioRetroSynth



T. Duigou¹, J. Hérisson², M. du Lac^{1,3}, K. Bazi Kabbaj¹, M. Sabeti Azad¹, G. Buldum⁴, O. Telle¹, Y. El Moubayed¹, P. Carbonell^{5,6}, N. Swainston^{5,7}, V. Zulkower⁸, M. Kushwaha¹, G. Baldwin⁴, J.-L. Faulon^{1,2,5}

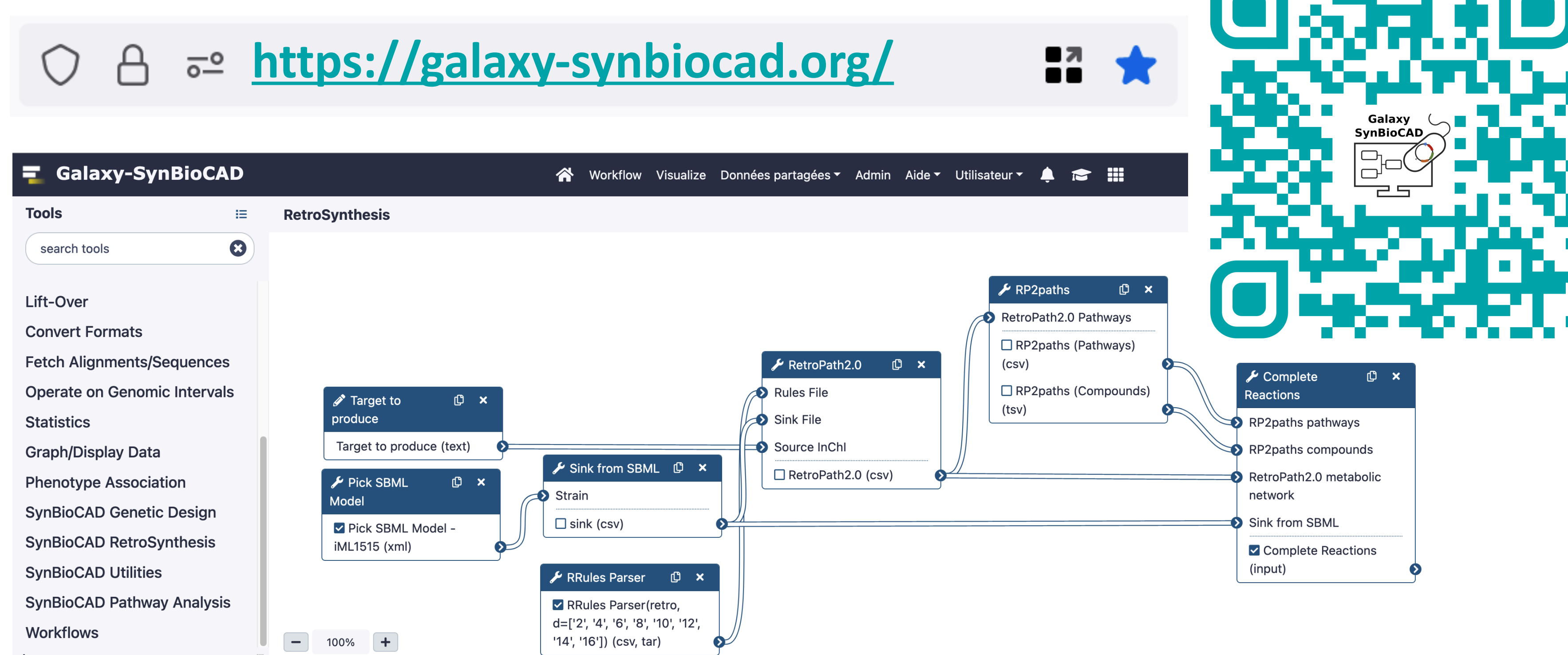


1 — Context

- Many tools, but **few** interoperability
- The (in-)**accessibility** of command line interface
- Not everyone owns a **computing cluster** “at home”

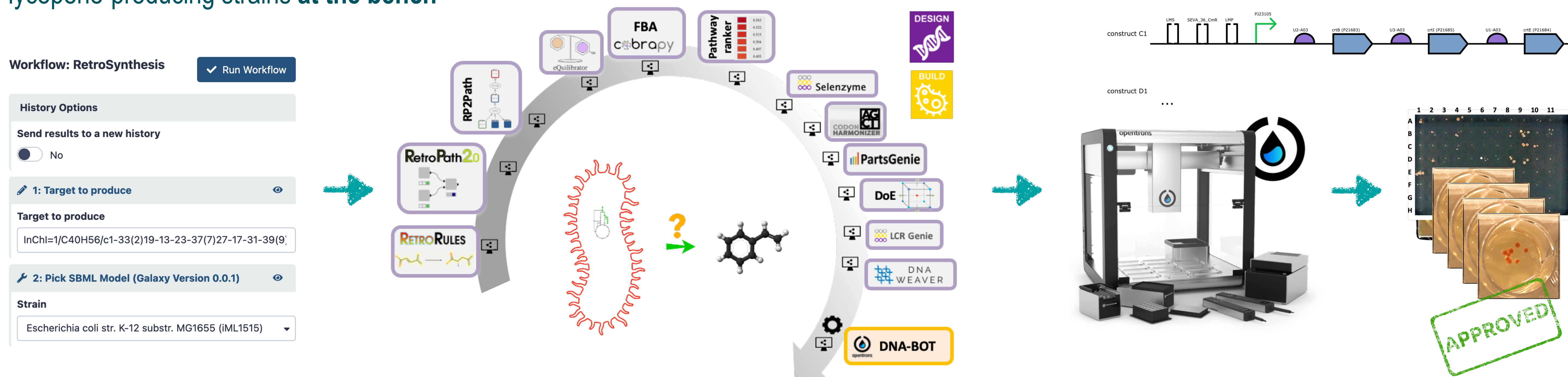
2 — The Galaxy-SynBioCAD portal

- Collection of **Galaxy-ready** tools and workflows
- **Interoperable** and **standardized** input / output:
 - SBML (metabolic pathways)
 - SBOL (genetic constructs)
- Use case workflows released so far:
 - **biosynthesis** pathway design
 - **pathway analysis** and scoring
 - genetic / **plasmid design**
 - **sensing-enabling** pathway design



3 — From specification to bio-producing strains

- Showcase: **automate** design and construction of lycopene-producing strains **at the bench**



4 — Under the hood: CI/CD integration process



- Git commits trigger **GitHub** actions
- Tools released as **conda** packages
- **Wrappers** validated with Planemo
- Tools available from the **Galaxy ToolShed**
- Integration with the **IUC** repo in progress



Centre
Île-de-France – Jouy-en-Josas – Antony

1. Université Paris-Saclay, INRAE, AgroParisTech, Micalis Institute, 78352 Jouy-en-Josas, France
2. Genomics Metabolics, Genoscope, François Jacob Institute, CEA, CNRS, Evry University, Paris-Saclay University, 91057 Evry, France
3. Amyris Inc, Emeryville, CA, 94608-2405, US
4. Imperial College Centre for Synthetic Biology, Department of Life Sciences, Imperial College, London, SW7 2AZ, UK
5. Manchester Institute of Biotechnology, SYNBIOCHEM center, School of Chemistry, University of Manchester, Manchester M1 7DN, UK
6. Institute of Industrial Control Systems and Computing (ai2), Universitat Politècnica de València, 46022 Valencia, Spain
7. Institute of Systems, Molecular and Integrative Biology, University of Liverpool, Liverpool L69 7ZB, UK
8. Edinburgh Genome Foundry, Synthesis, School of Biological Sciences, University of Edinburgh, EH93BF Edinburgh, UK



Domaine de Vilvert
78 352 Jouy-en-Josas
Cedex contact :
thomas.duigou@inrae.fr
www.inrae.fr