openbio.eu: A Social Workflow Management System and Research Object Repository for open and reproducible bioinformatics

Alexandros Kanterakis[1], Galateia Iatraki[1], Leuteris Koumakis[1], Konstantina Pitianou[1], Manolis Koutoulakis[1], Nikos Kanakaris[2], Nikos Karacapilidis[2], George Potamias[1]

[1]CBML, Institute of Computer Science, 70013 Heraklion, Crete, Greece
[2]IMIS Lab, MEAD, University of Patras, 26500 Patras, Greece

Today there is a plethora of Open Source Workflow Management Systems (WMS) aiming at organizing research, automating analysis, discovering valuable Research Objects (ROs) and, ultimately, battling the reproducibility crisis. Despite the technical maturity of these systems and the eminent efforts from open science societies to advocate their use, we can roughly estimate that less than 1% of the published analysis that combine multiple ROs use any WMS. This has detrimental consequences on the open and reproducible status of the conducted research in genetics and computational biology. The low penetrance of WMS can be attributed on some important features that are in the best case partially supported by existing WMSs, thus limiting their applicability. In brief, these features are: (i) steep learning curve from non-IT experts, (ii) custom Domain Specific Languages, (iii) requirement for local installation, (iv) inability to cooperate with other WMS, (v) lack of rewarding to scientists that add content, (vi) lack of a single, browsable repository with easily downloadable and executable ROs that also contains usage statistics and resource requirements, and (vii) inability to rate and comment existing ROs. To remedy these issues, we present the first version of OpenBio.eu, an online WMS, workflow composer, RO repository, and Q&A site, targeting all science enthusiasts. It requires no IT knowledge and supports RO import and export from a variety of existing WMS. For tool description it uses the BASH commands that install and validate a tool. This satisfies the following conditions: (i) native support in modern POSIX environments, (ii) no need to "wrap" the installation instructions in any language and (iii) easy import and export to other WMSs. Moreover workflows are composed by simply dragging and dropping tools and other workflows in an online graph editor. OpenBio.eu is coupled with a bibliographic reference manager, a user profile builder and an online workflow execution monitor. Each Research Object is executable, downloadable, commentable and rateable. Finally, OpenBio.eu, employs a discourse visualization and analysis environment. Comments are displayed so that their contributing value (positive or negative) is clearly visible.

Keywords: FAIR, open science, reproducible science, research objects, workflow management system, web, Q&A

Availability: https://www.openbio.eu
Source code: https://github.com/kantale/arkalos
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