

The Boston University Center of Synthetic Biology (CoSBI) ICE Repository

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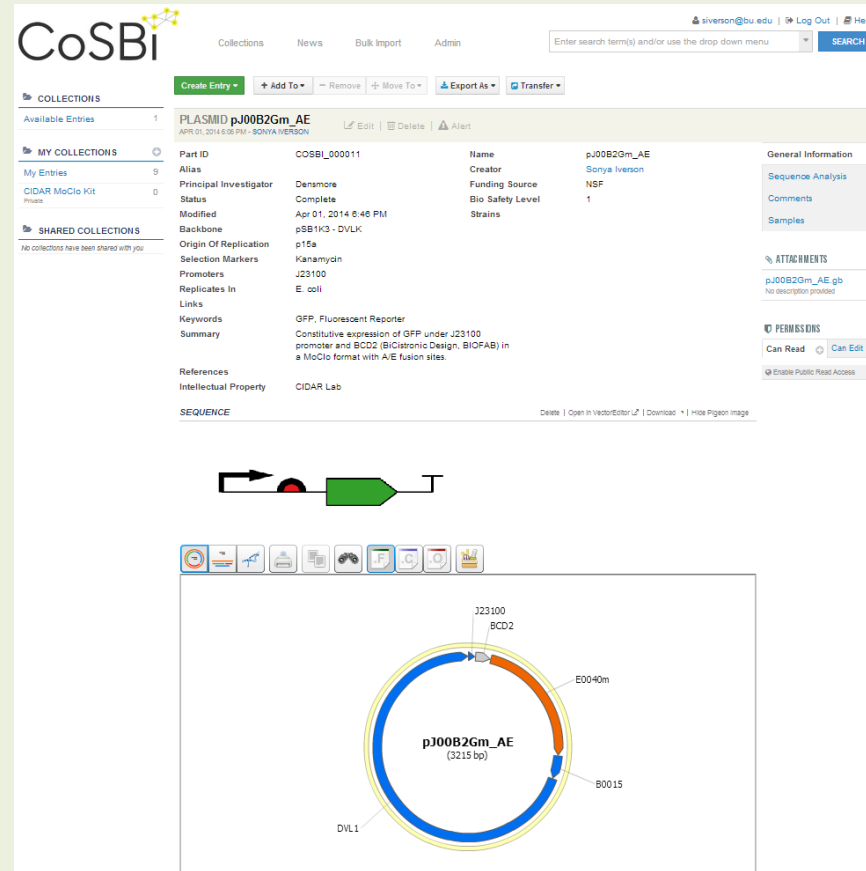


Abstract

Synthetic Biology as a discipline is witnessing the emergence of numerous repositories of biological "Parts". Organizations hosting such services include the International Genetically Engineered Machine Competition (iGEM) (partsregistry.org), the Joint BioEnergy Institute (JBEI) (public-registry.jbei.org), the Joint Genome Institute (JGI) (jgi.doe.gov), the Synthetic Biology Engineering Research Center (SynBERC) (registry.synberc.org), and Cambridge University (plantfab.org).

As a result, a "web of registries" concept has emerged which would allow locally curated registries to be "linked" so that information exchange is facilitated more easily and standards are established. Moreover this would send a strong message to the community that interacting registries based around similar technologies represent not only a means to quickly deploying registries but more importantly a step in the unification of the space.

We present our deployment of a repository based on the Inventory of Composable Elements (ICE) architecture here at the Boston University Center of Synthetic Biology (CoSBI ICE). CoSBI ICE will serve as the outward facing parts repository for the core faculty of CoSBI (Jim Collins, Douglas Densmore, Ahmad Khalil, and Wilson Wong) as well as many of the numerous affiliated faculty members in bioinformatics, physics, and molecular cell biology and biochemistry. It will be used by over 50 undergraduate, graduate, and postdoctoral researchers and in projects funded by the National Science Foundation (NSF), Office of Naval Research (ONR), and the Defense Advanced Research Projects Agency (DARPA).



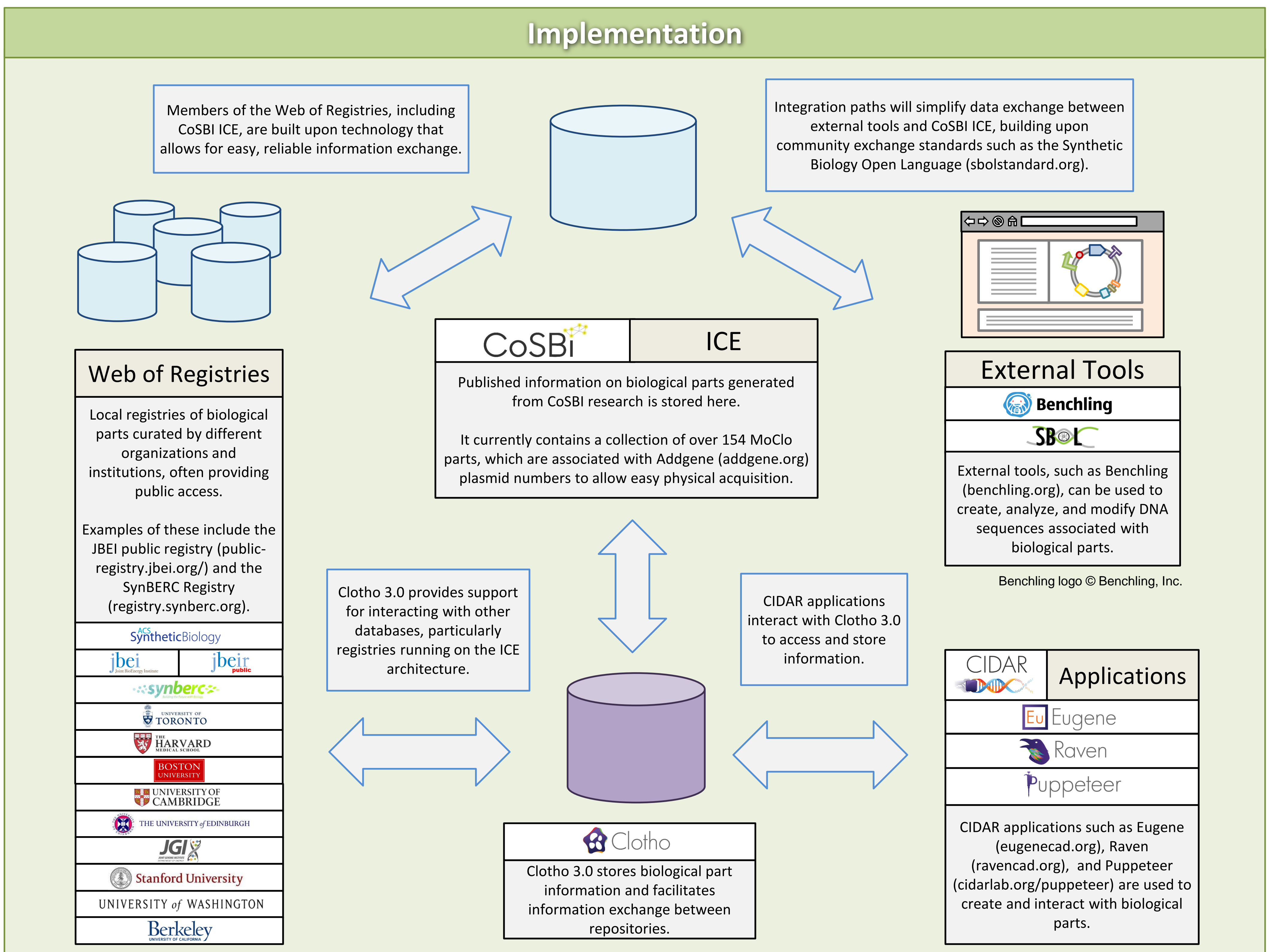
Repository Contents

The CoSBI ICE Repository currently contains parts from the CIDAR MoClo Library, which has been developed to provide researchers with access to a range of parts commonly used in the construction of synthetic biological circuits. These parts are provided with several MoClo-format overhangs, allowing for quick and easy assembly.

Backbones		Terminators & RBS	
Part	Overhangs	Part	Overhangs
J23100	AB,EB,FB,GB	B0015	DE,DF,DG,DH
J23102	AB,EB,FB,GB	B0032m	BC
J23103	AB,EB,FB,GB	B0033m	BC
J23106	AB,EB,FB,GB	B0034m	BC
J23107	AB,EB,FB,GB	BCD2	BC
J23116	AB,EB,FB,GB	BCD8	BC
		BCD12	BC

Coding Sequences					
Part	Overhangs	Part	Overhangs	Part	Overhangs
C0012	CD	E0030	CD	R0063	AB,EB,FB,GB
C0040	CD	E0040m	CD	I13453	AB,FB,GB,HB
C0062	CD	E1010m	CD	DVLK	AE,AF,EF,FG,GH
C0080	CD	mCitrine	CD		AB,AE,AF,AG,
cre	CD	mOrange	CD		AH,BC,CD,DE,DF,
CyPet	CD	R0010	AB,EB,FB,GB	DVLA	DG,DH,EB,EF,EG,
DsRed	CD	R0040	AB,EB,FB,GB		EH,FB,GB

Implementation



References

- Appleton, E., et al., *Interactive Assembly Algorithms for Molecular Cloning*. Nature Methods, 2014.
- Bilichenko L, Liu A, Cheung S, Weeding E, Xia B, et al. Eugene--a domain specific language for specifying and constraining synthetic biological parts, devices, and systems. PLoS One 6: e18882.
- Ham TS, Dmytriv Z, Plahar H, Chen J, Hillson NJ, et al. Design, implementation and practice of JBEI-ICE: an open source biological part registry platform and tools. Nucleic Acids Res 40: e141.
- Peccoud J, Blauvelt MF, Cai Y, Cooper KL, Crasta O, et al. (2008) Targeted Development of Registries of Biological Parts. PLoS ONE 3(7): e2671. doi:10.1371/journal.pone.0002671
- Quinn, J., et al., *Synthetic Biology Open Language Visual (SBOL Visual)*. BioBricks RFC 93, 2013. Version 1.0.0.
- Weber E, Engler C, Gruetzner R, Werner S, Marillonnet S (2011) A Modular Cloning System for Standardized Assembly of Multigene Constructs. PLoS ONE 6(2): e16765. doi:10.1371/journal.pone.0016765

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