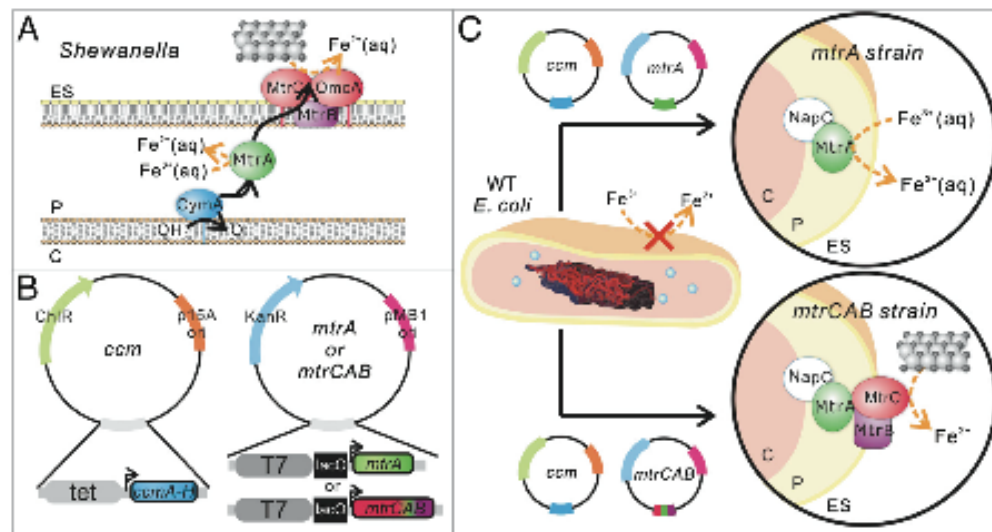
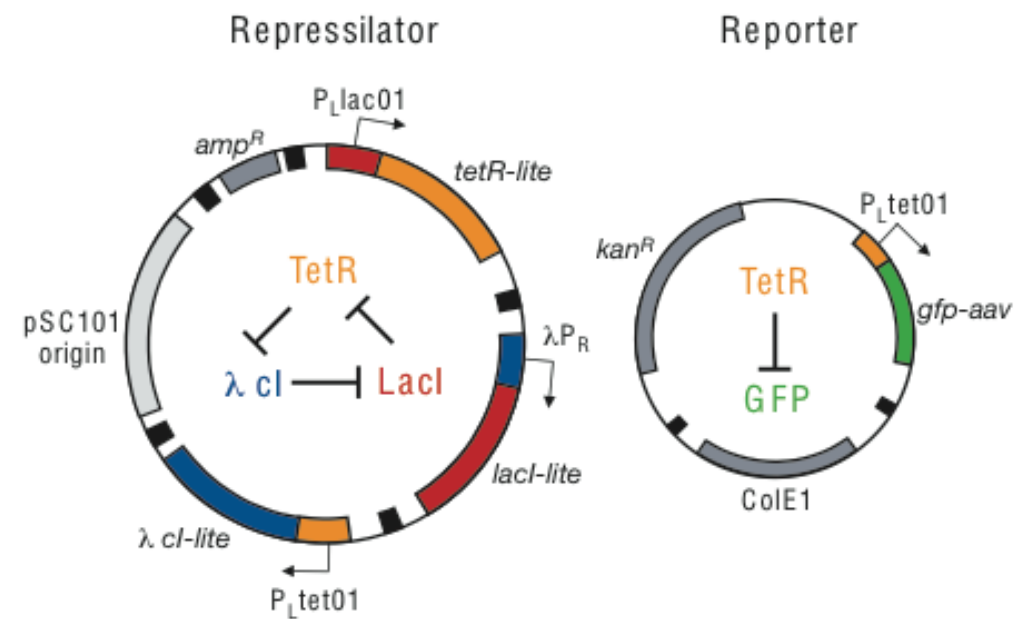
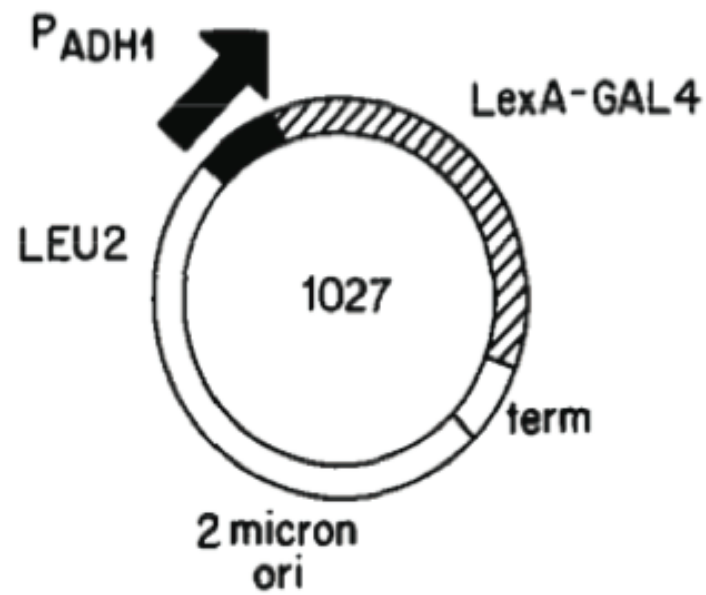


Synthetic Biology Open Language Visual

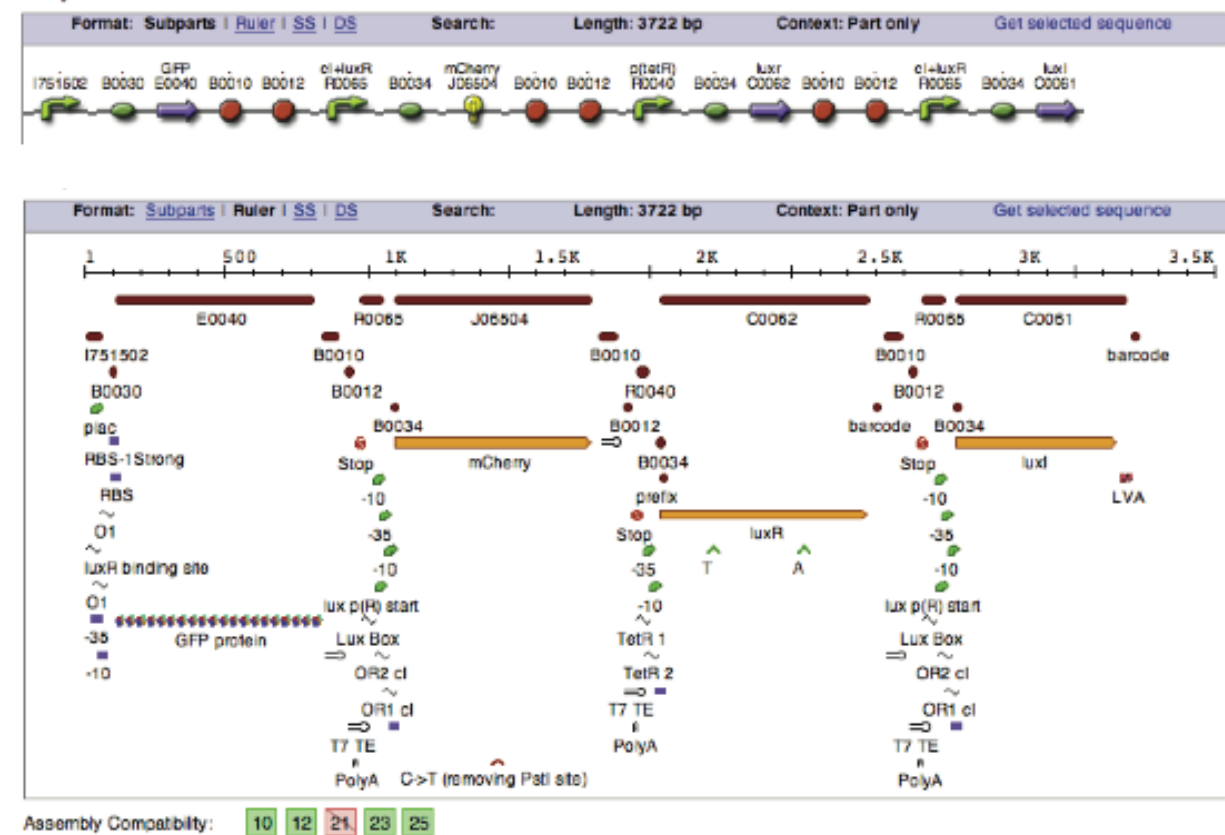
Graphical notation for forward engineering of biology

Jackie Quinn
COMBINE - August 19, 2014

SBOL and SBOL Visual (the basics)

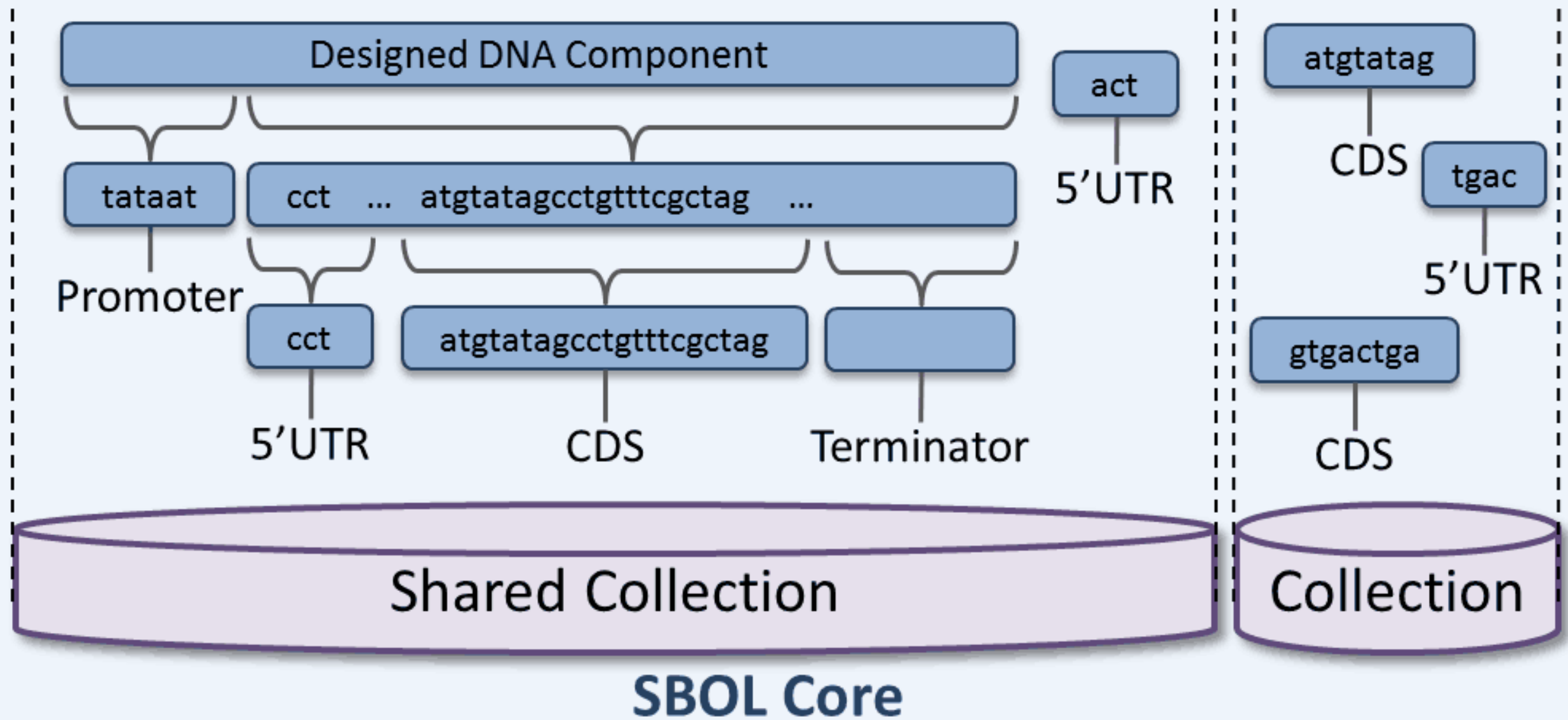


Sequence and Features



visual representation of genetic design


















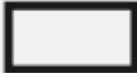

SBOL Visual



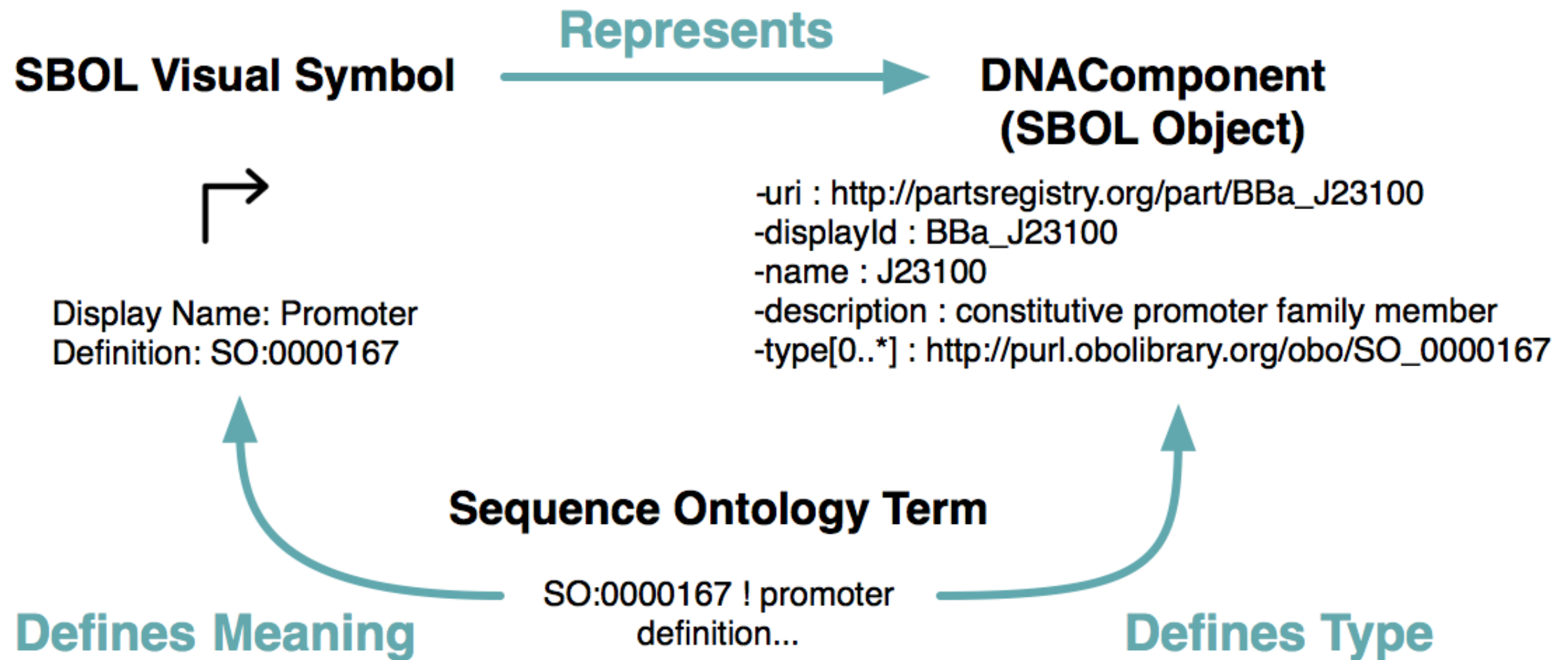
Symbol Design

(what we focus on)

- Compatibility with current practice
- Flexibility
- Ease of use

 promoter	 origin of replication
 cds	 primer binding site
 ribosome entry site	 blunt restriction site
 terminator	 sticky restriction site
 operator	 5' overhang
 insulator	 3' overhang
 ribonuclease site	 assembly scar
 rna stability element	 signature
 protease site	 user defined
 protein stability element	

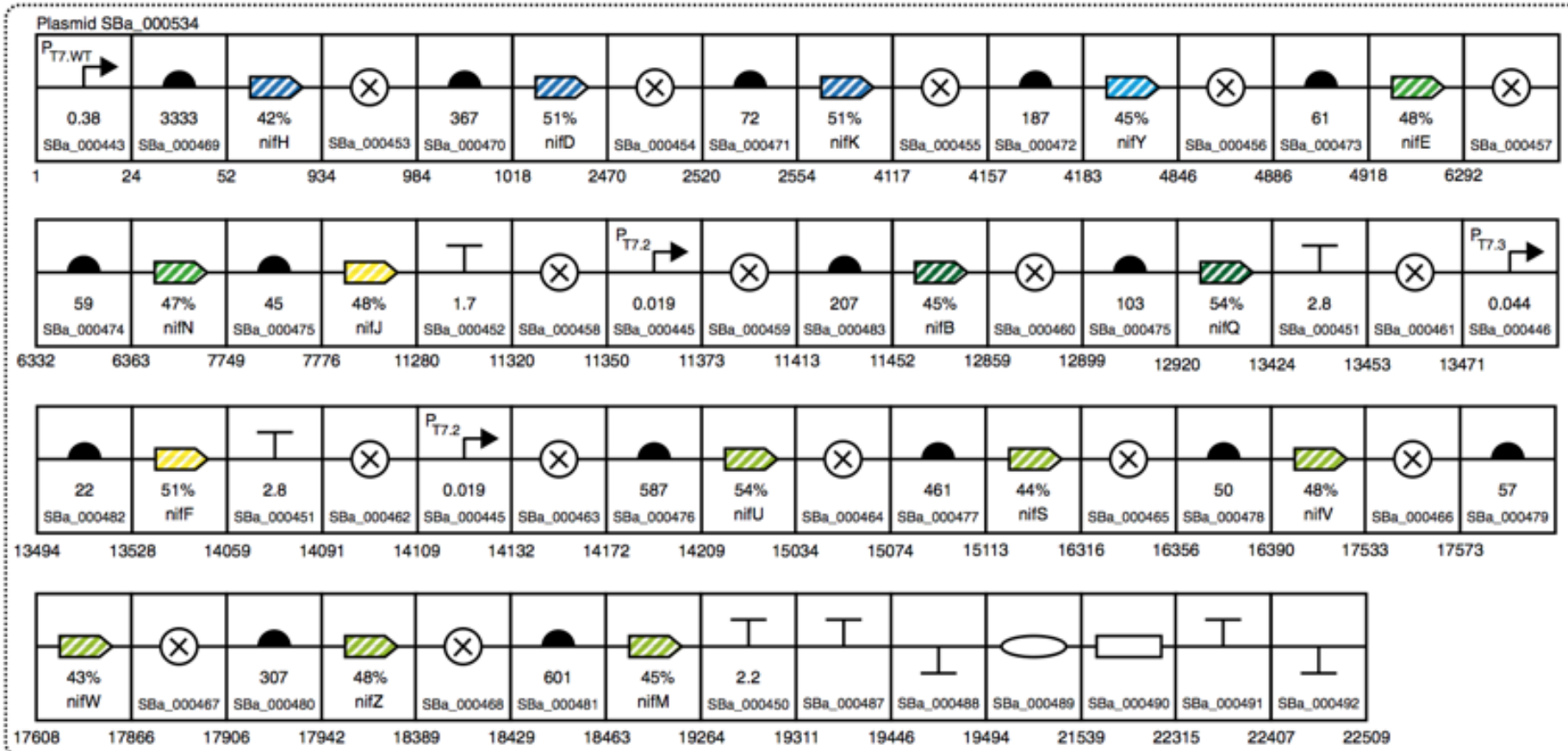
symbol set



relationship to SBOL

use in various contexts

Refactored Gene Cluster



Controller

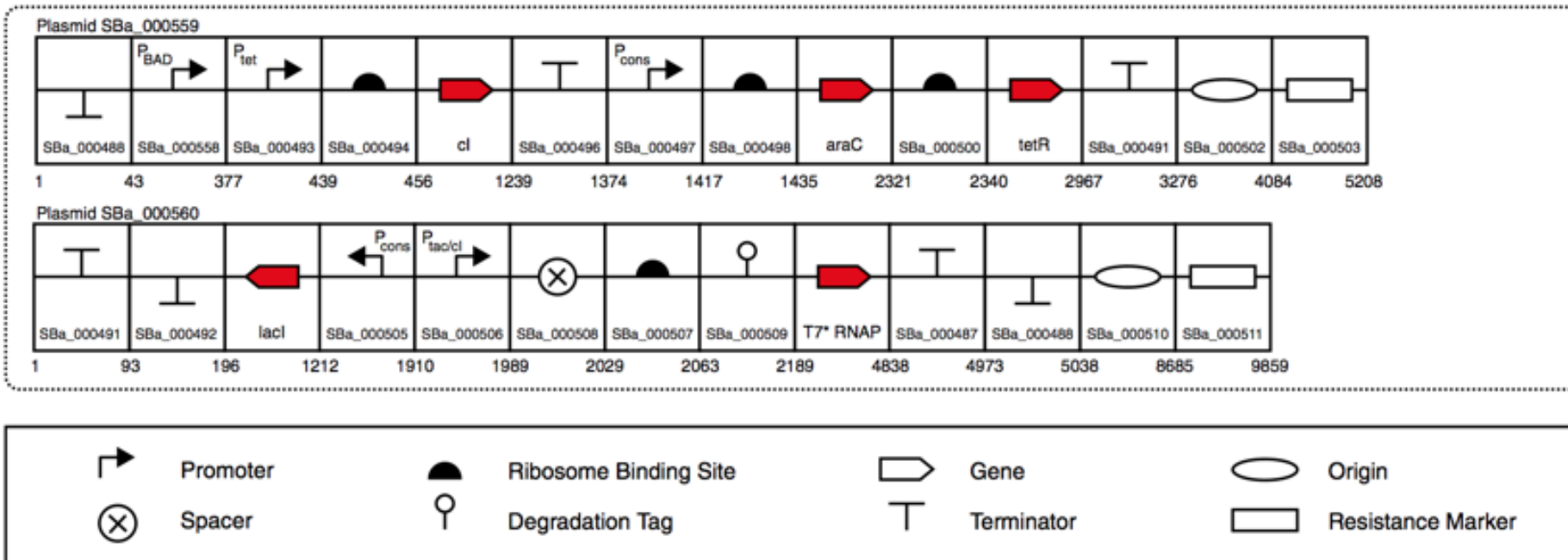


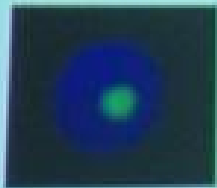
Fig. 4. Comprehensive schematic illustration for the complete refactored gene cluster and controller. Each of the 89 parts is represented according to the Synthetic Biology Open Language visual standard (www.sbolstandard.org), and the SynBERC Registry part number (registry.synberc.org) and part activity are shown. The full sequences of each plasmid have been deposited in GenBank (SBa_000534, JQ903614; SBa_000559, JQ903615; SBa_000560, JQ903616). The T7 promoter strengths are measured with monomeric red fluorescent protein and reported in *Materials and Methods*. Terminator strengths are measured in a reporter plasmid and reported as the fold reduction in monomeric red fluorescent protein expression compared with a plasmid without a terminator. The RBS strength is reported in as arbitrary units of expression from the induced P_{tac} promoter (1 mM IPTG) and a fusion gene between the first 90 nt of the gene and RFP. The nucleotide numbers for the plasmids containing the refactored cluster and controller are shown. The codon identity of each recoded gene compared with WT is shown as a percentage.



Using MiCodes in a zipper assay

When you see this
MiCode...

...you know you're
assaying this zipper pair

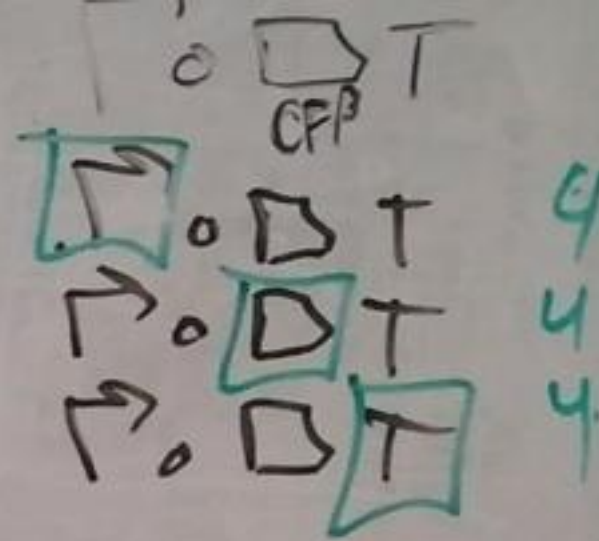
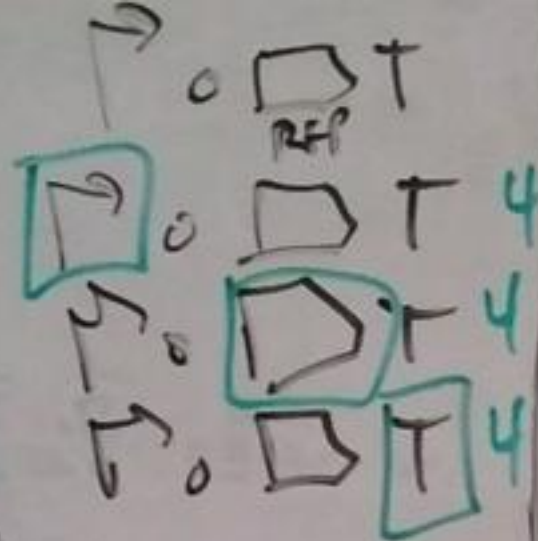
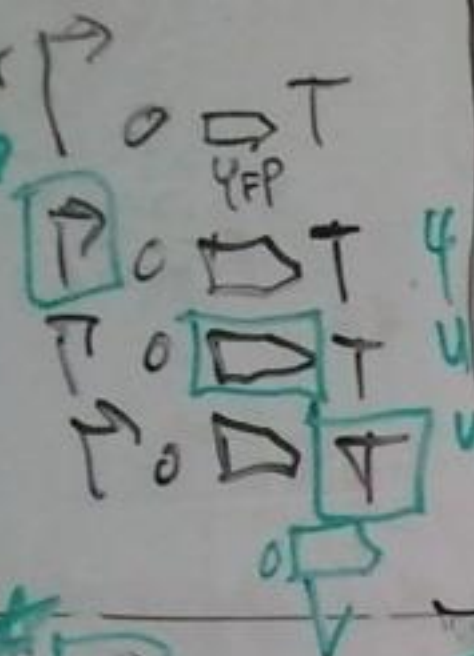


Strong zipper pair



MiCodes

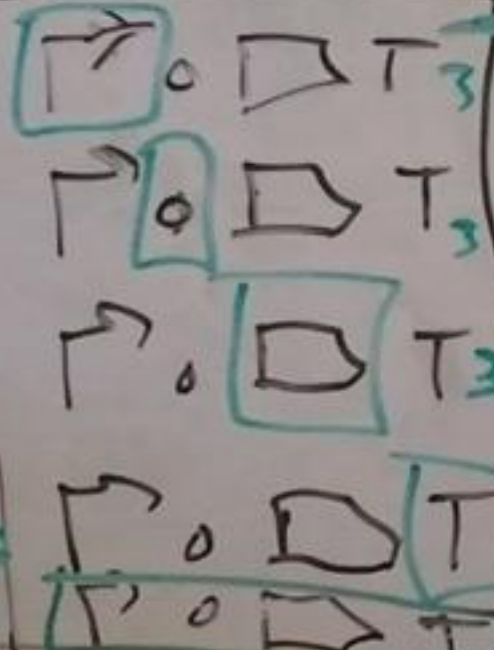
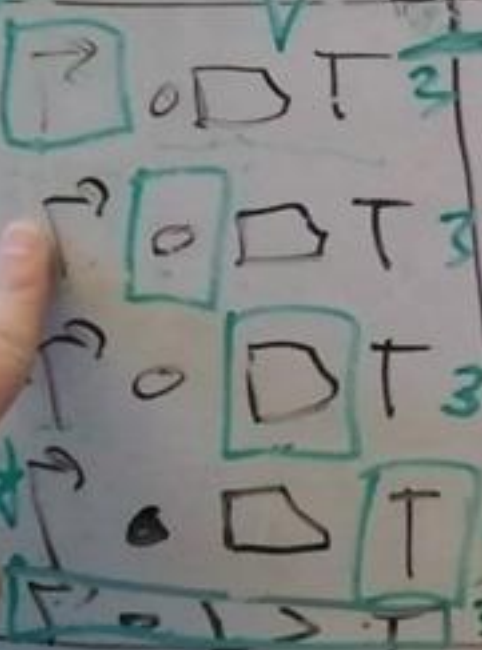
5th.
circuit
1:V
OPT.



	1	2	3
1:1	4	5	6
5:1	7	8	9
10:1	10	11	12

36

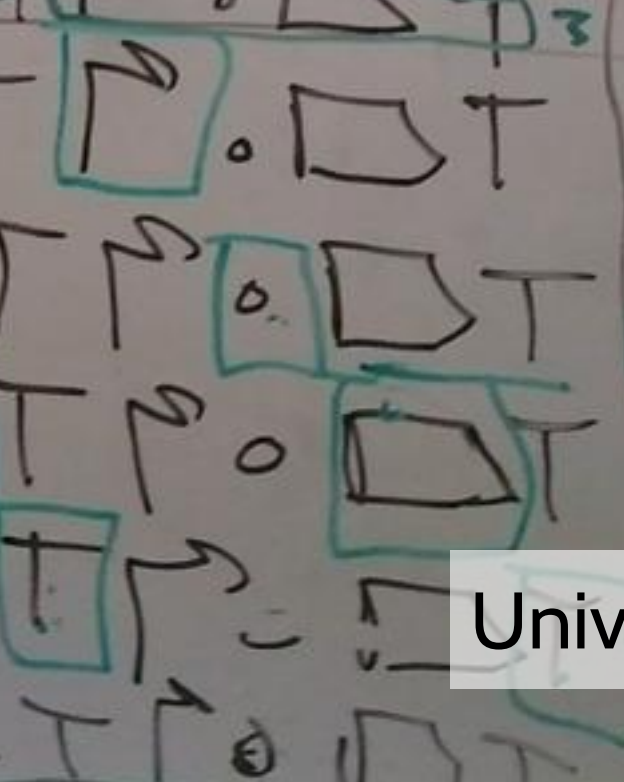
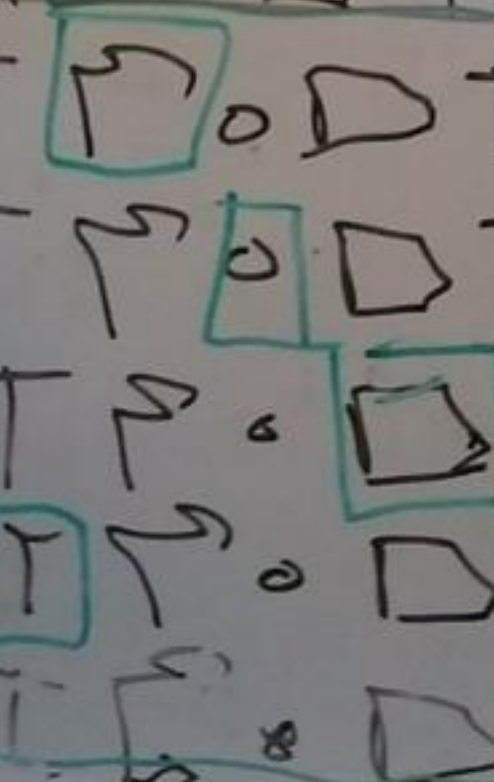
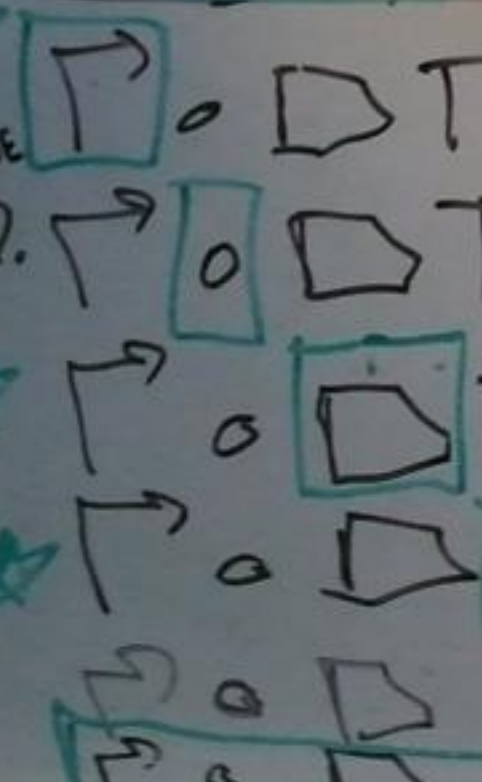
1-GENE
RAND.



	1	2	3	4	5
1:1	6	7	8	9	10
5:1	11	12	13	14	15

45

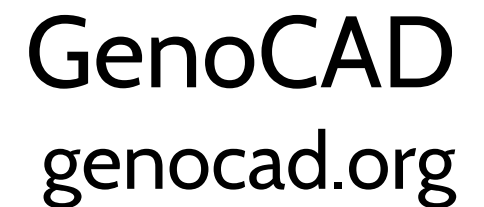
3-GENE
RAND.

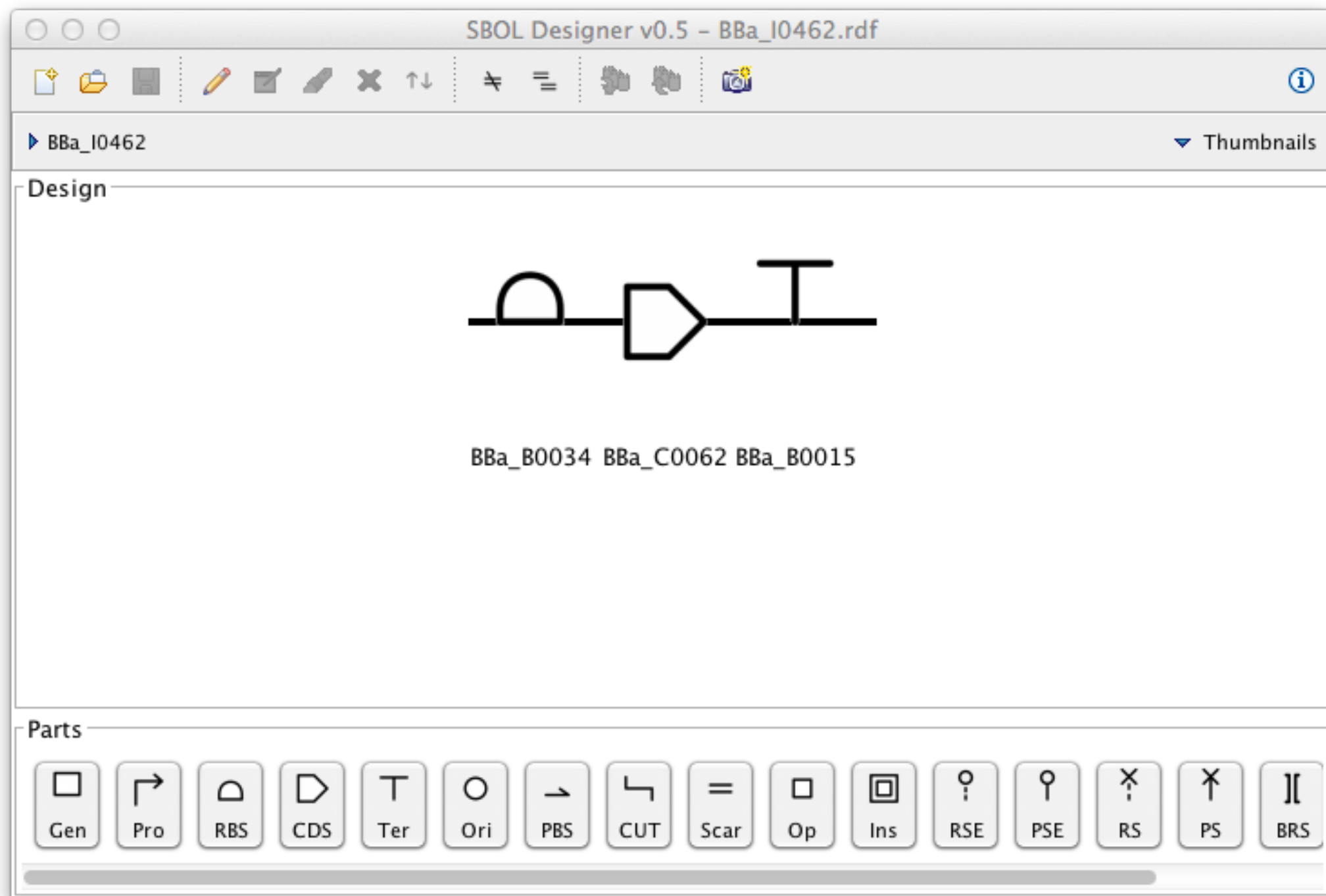


	1	2	3	4	5	6
1:1	7	8	9	10	11	12
5:1	13	14	15	16	17	18

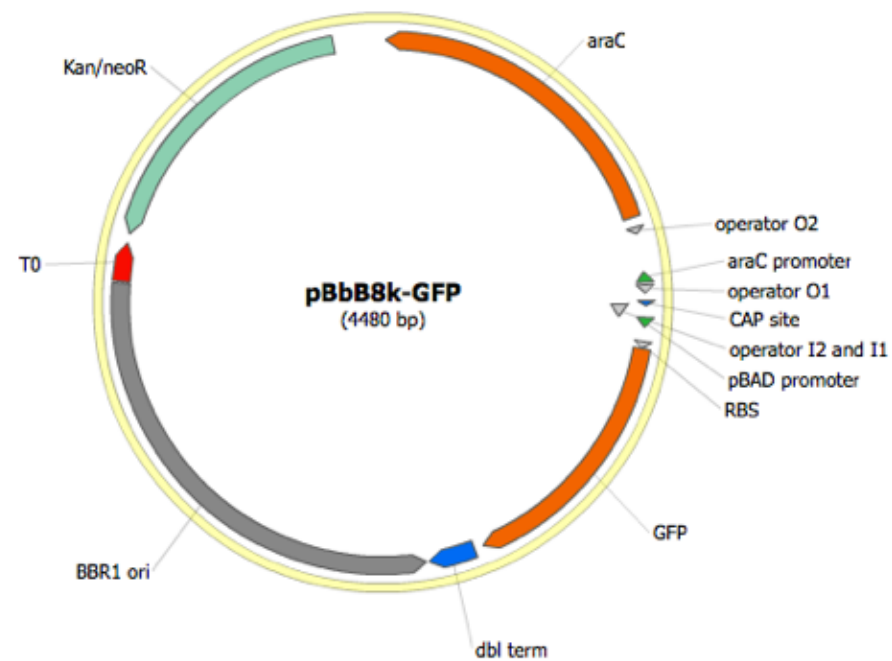
x3

software





SBOL Designer
<http://clarkparsia.github.io/sbol/>



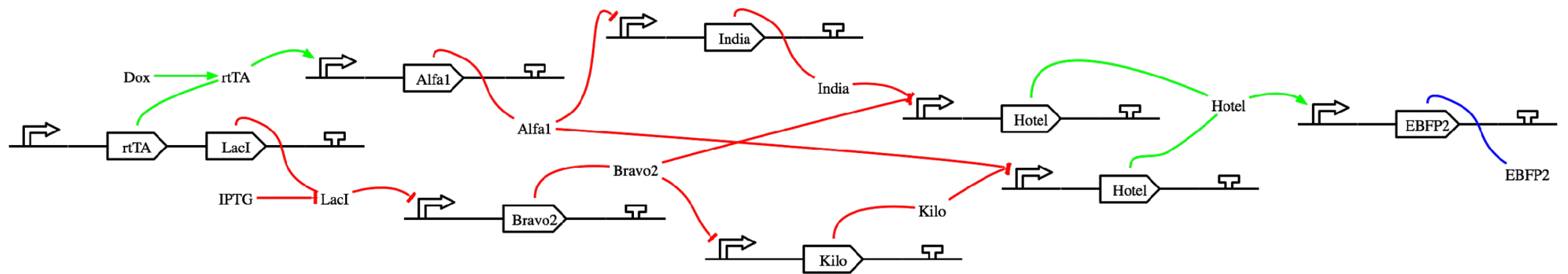
Done

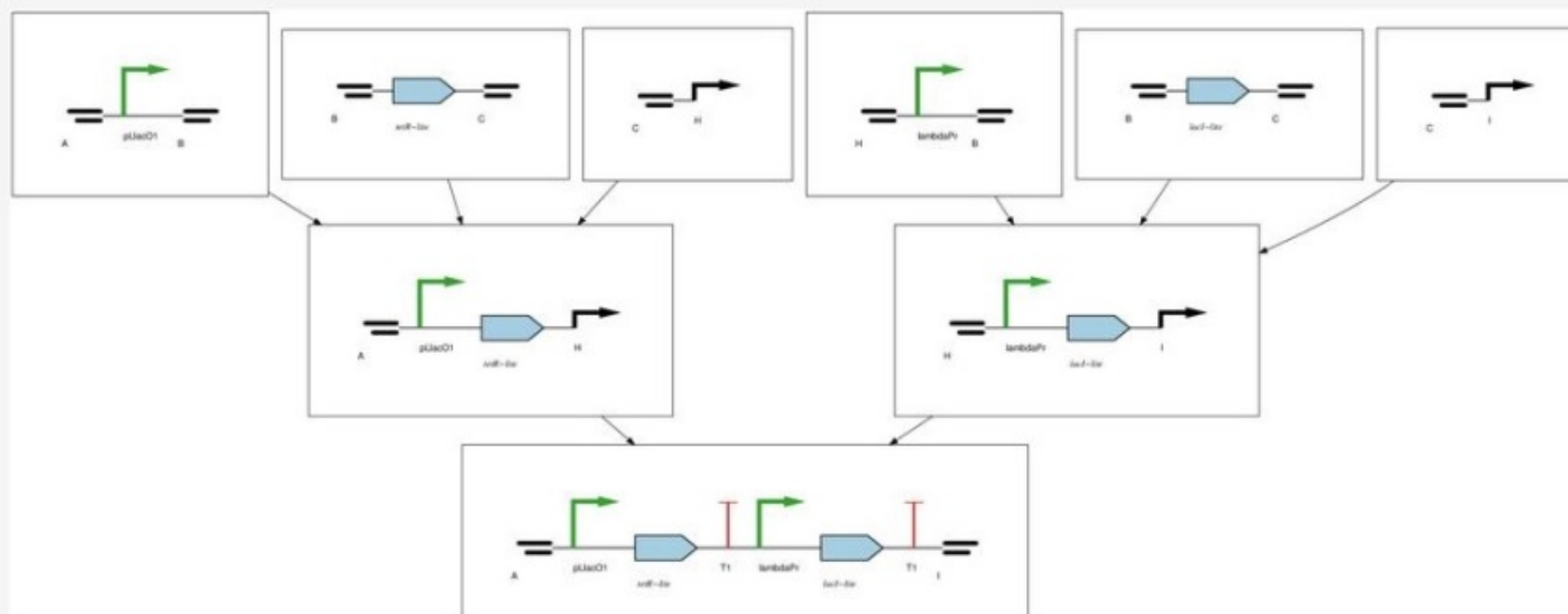
Read only

- : -

4480

JBEI-ICE, Pigeon
public-registry.jbei.org, pigeoncad.org



[Image](#)[Instructions](#)[Parts List](#)[Summary](#)[Discard Design](#)

Assembly Statistics Graph structure verified!

Number of Goal Parts	1
Number of Assembly Steps	3
Number of Assembly Stages	2
Number of Reactions	12
Number of Recommended Parts	0
Number of Discouraged Parts	0
Assembly Efficiency	1.0
Parts Shared	0

[Submit as Example](#)[Save to working library](#)

Download Options

Please use right-click, then save as to download the files

[Download Graph Image](#)[Download Instructions](#)[Download Parts/Vectors List](#)[Download Pigeon File](#)[Download Puppeteer Arcs File](#)

Vector NTI Express Designer - Molecule Editor

File Edit Curate Discover Design Confirm Tools Help

Properties

General Description

DNA 'pUC18'

ATCC 37253: very usable general purpose vect

Author: Kevin Clancy. Original author: NCBI En

Created: 1996-01-01 12:00:00.281

Last Modified: 2013-07-22 13:57:27.984

Length: 2686 bp

Storage Type: Basic

Form: Circular

Descendants

Hexokinase_PUC18

Standard Fields

Keywords: ATCC

Modification Date in the Original DB: 26-AUG-2

Accession Number: pUC18

References

Author

NCBI Entrez

National Center for Biotechnology Information

National Library of Medicine

Building 38A, Room 8N805

Bethesda, MD 20894, U.S.A.

TEL: (301)496-2475

FAX: (301)480-9241

EMAIL: info@ncbi.nlm.nih.gov

Original Author

NCBI Entrez

National Center for Biotechnology Information

National Library of Medicine

Building 38A, Room 8N805

Bethesda, MD 20894, U.S.A.

TEL: (301)496-2475

FAX: (301)480-9241

EMAIL: info@ncbi.nlm.nih.gov

Properties

Feature Map

Analysis Results

pUC18

2686bp

P(BLA)

AP(R)

BglI (1820)

BglI (252)

ALPHA

HindIII (400)

EcoRI (451)

P(LAC)

SmaI (437)

PstI (416)

XbaI (424)

BamHI (430)

Vector NTI Express Designer - Designer Canvas

File Edit Curate Discover Design Confirm Tools Help

Generic Parts

Regulation

Promoter - Constitutive

Promoter - Inducible

Insulator

Promoter

Origin of Replication

Promoter - Repressive

Ribosome binding site

RNA stabilizing element

Terminator

Ribozyme

-10 signal

-35 element

ORF

Coding Sequence

Protease

enzyme

ORF + Construction

Construction

Generic Parts

My Freezer

My Favourites

Library

pUC Project

IPG

beta Galactosidase

P(LAC)_47... 101bp

ALPHA_14... 321bp

Beta lactamase Cloning cassette...

ORI_817_9... 101bp

pUC18 ORI (101...

RNA Polymerase

beta Lactamase

P(BLA)_24... 101bp

AP(R)_162... 858bp

Ampicillin Resistance cassette (9...

Project Properties Characterization Truth Table Rules/Auto Design Variants Job

Circuit: Circuit_1

Core

Name Circuit_1

Sequence 1482bp

Description

Reagents

Classification

Source

Intellectual Property

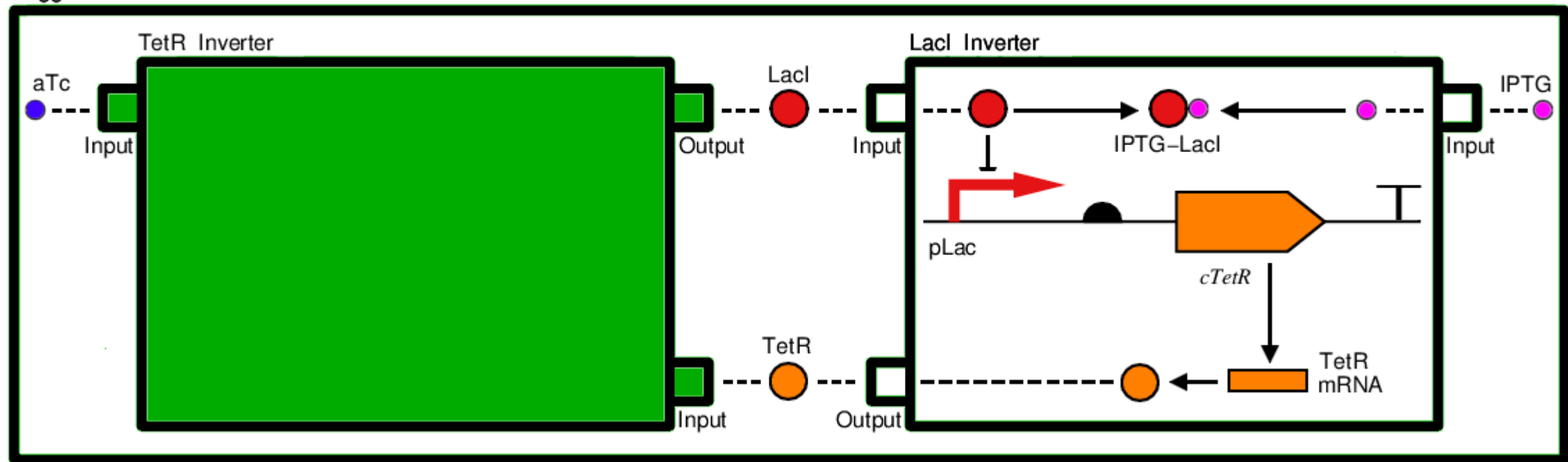
Alternatives...

Save As...

Remove

VectorNTI Express Designer

Toggle Switch



SBOL Visual 2.0?



+



SBOL Visual Working



Aaron Adler

Jacob Beal

Swapnil Bhatia

Patrick Cai

Joanna Chen

Kevin Clancy

Robert Sidney Cox III

Michal Galdzicki

Nathan Hillson

Cory Li

Chris Myers

Umesh P

Matthew Pocock

Jackie Quinn

Cesar Rodriguez

Herbert Sauro

Larisa Soldatova

Guy-Bart Stan

Grimaldo Urena

Alan Villalobos

Mandy Wilson

Thank You!

www.sbolstandard.org/visual
visual@sbolstandard.org