Introduction to SBOL Visual
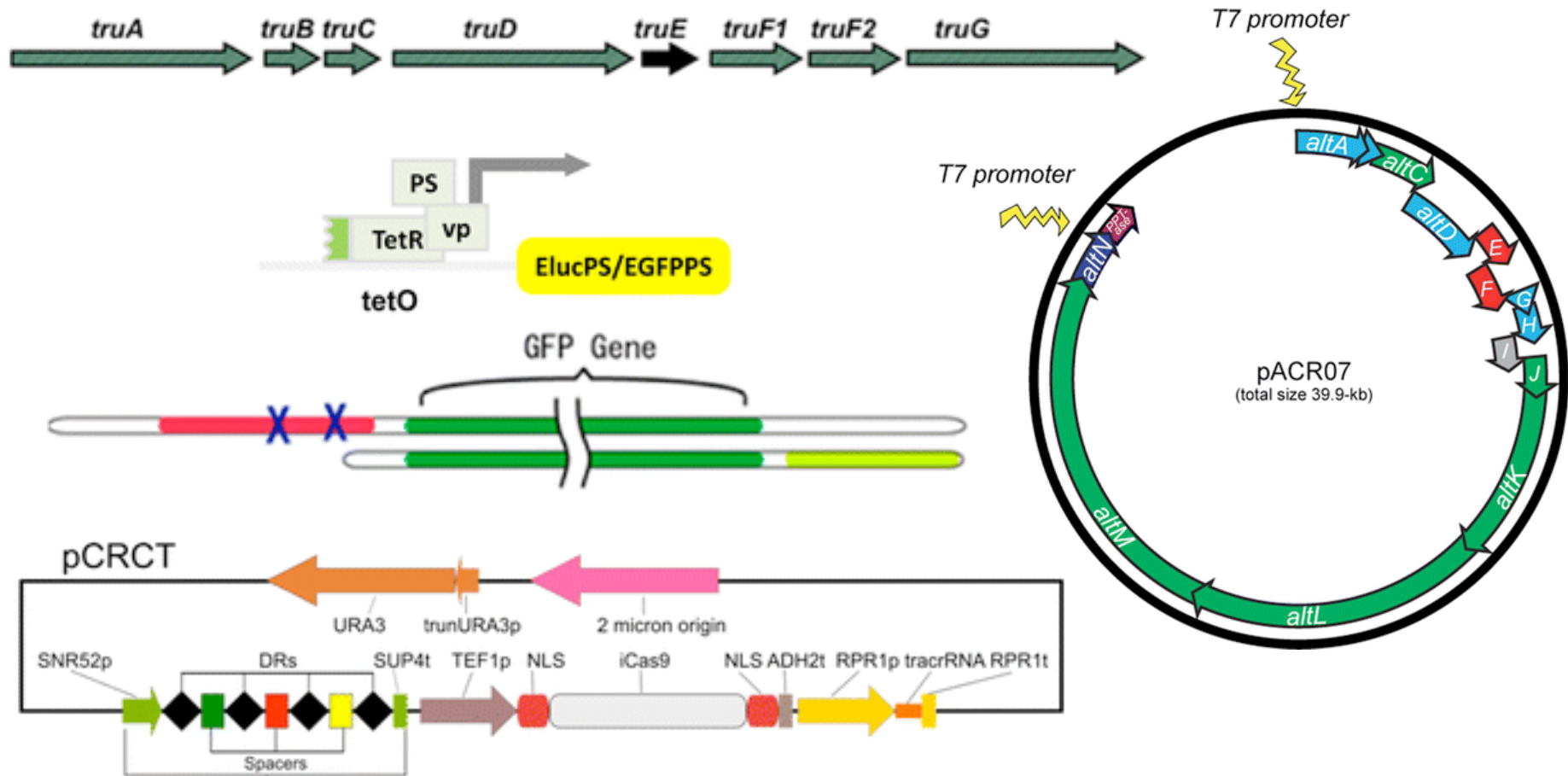
SBOL Visual Community

Last revised: September 2016

Problem: Communicating Gene Constructs
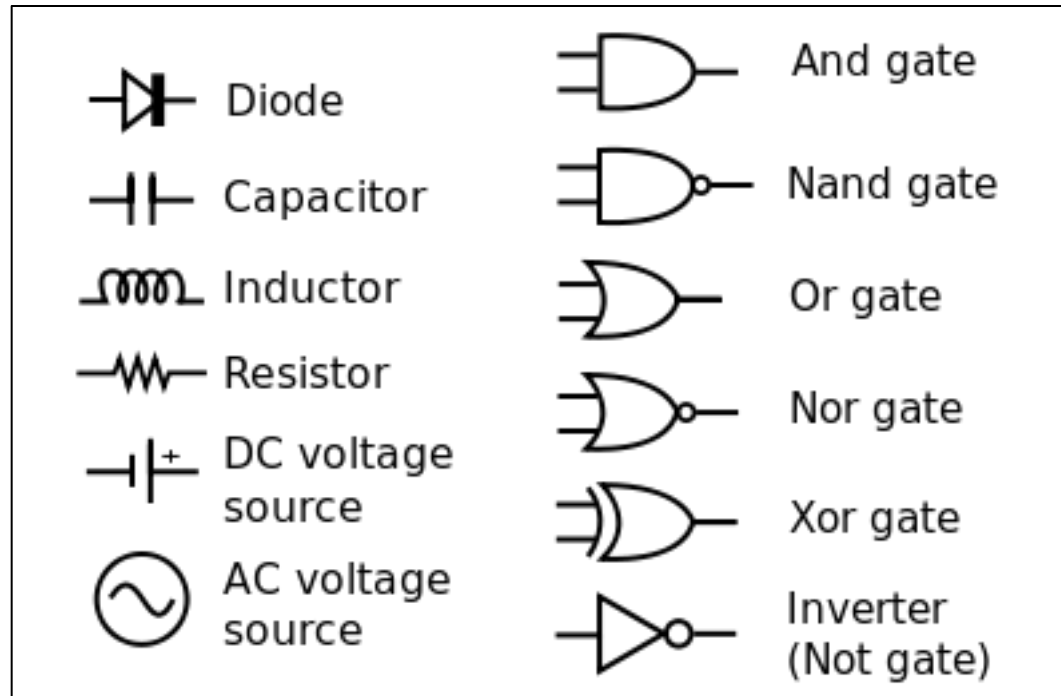
Construct diagrams from some recent ACS Syn.Bio. papers:

Well, they're sort of similar…
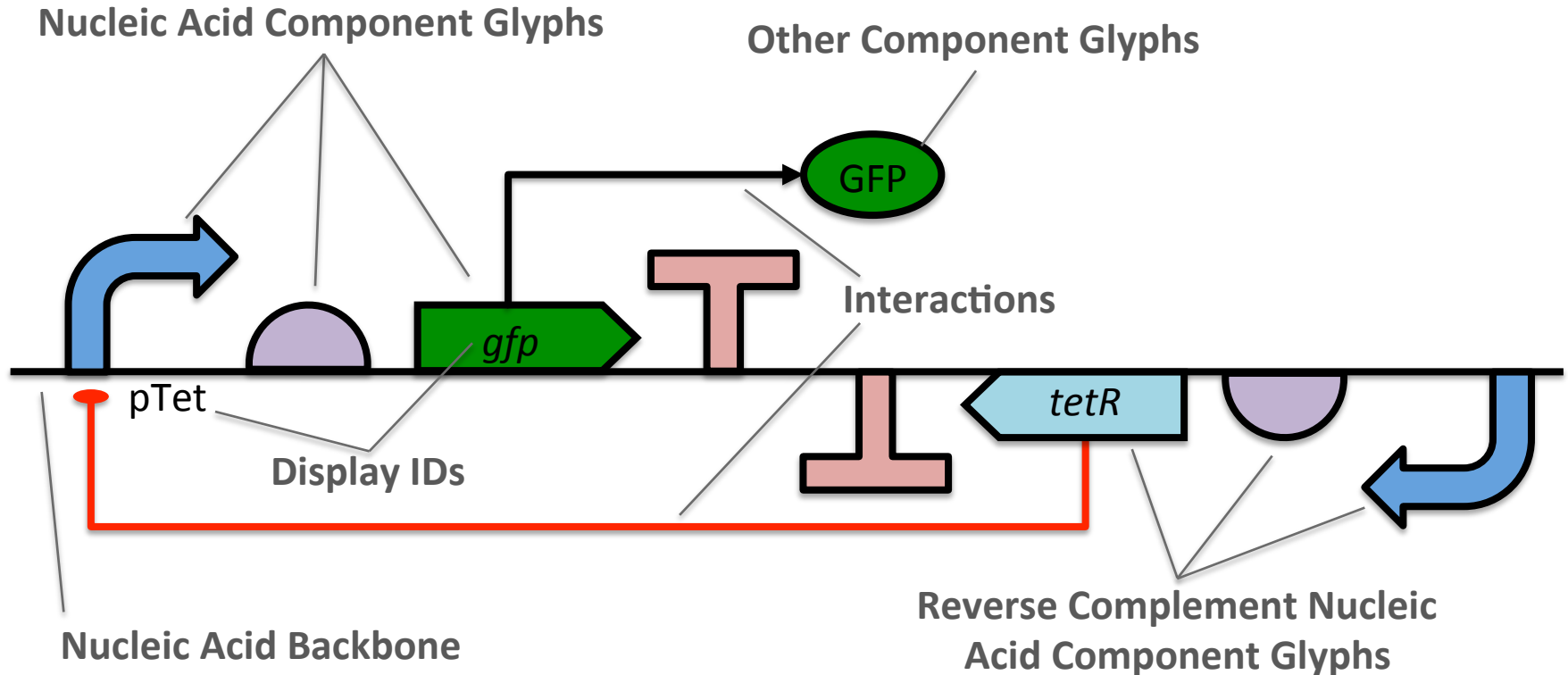
Standards simplify communication

Inspiration: Standard Electronic Symbols:

... and many others in IEEE Std. 91/91a; IEEE Std. 315

What is the equivalent for synthetic biology?

Elements of SBOL Visual:

Nucleic Acid Component Glyphs

Other Component Glyphs

GFP

gfp

pTet

tetR

Interactions

Display IDs

Nucleic Acid Backbone

Reverse Complement Nucleic Acid Component Glyphs

Synthetic Biology Open Language - Visual
Community standards in development since 2008
SBOL Visual 1.0: BBF RFC #93 doi: 1721.1/78249
SBOL Visual 2.0: https://github.com/SynBioDex/SBOL-visual

Current SBOLv Symbols:

|			
⌐→	promoter	⟶	primer binding site
▷	cds	|	restriction site
⌒	ribosome entry site	][	blunt restriction site
⊤	terminator	⌐	5' sticky restriction site
□	operator	⌐	3' sticky restriction site
▣	insulator	=	5' overhang
✗	ribonuclease site	=	3' overhang
○	rna stability element	=	assembly scar
✗	protease site	⊠	signature
○	protein stability element	▭	user defined
○	origin of replication		

New symbols, variants added by community consensus
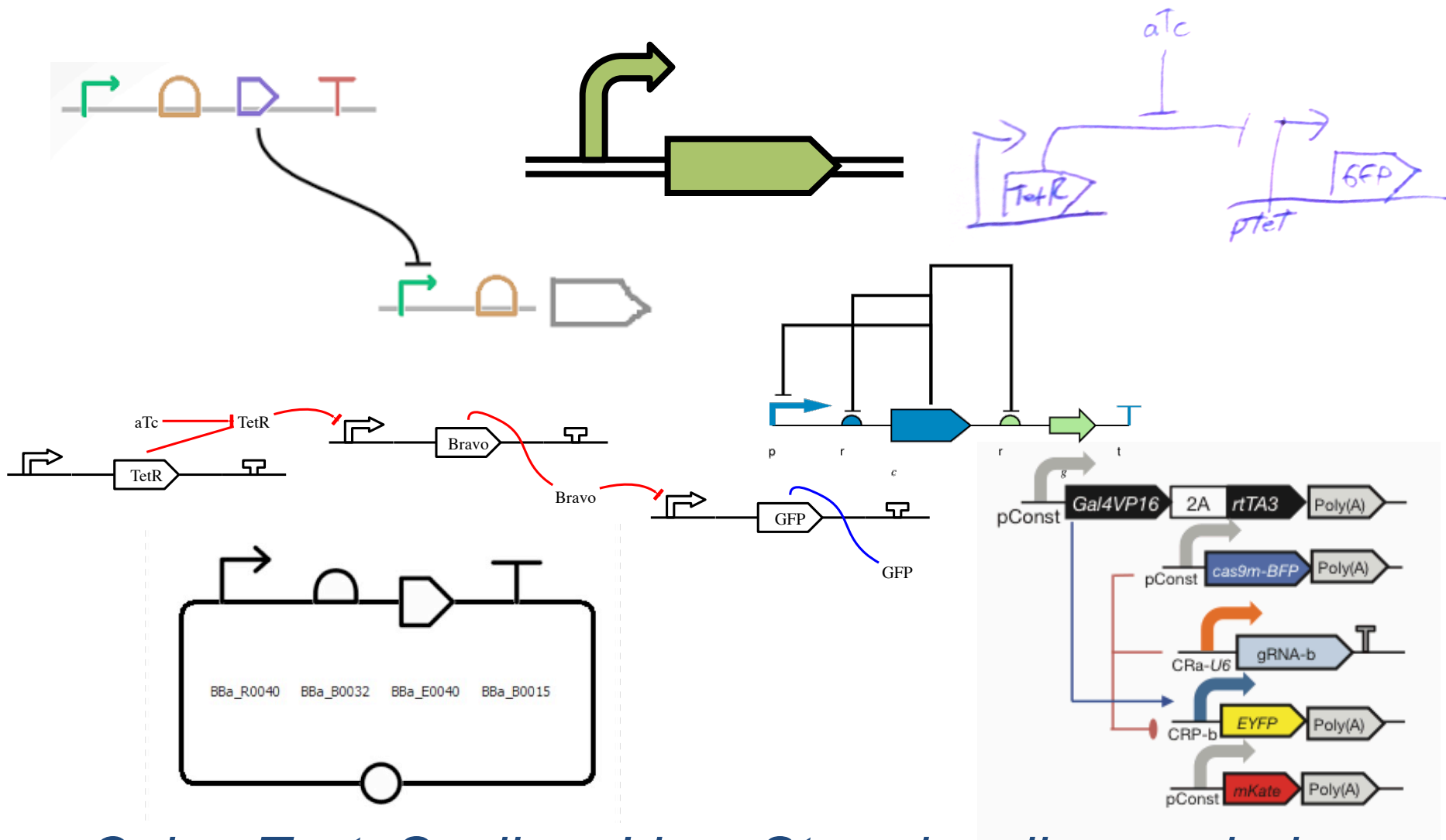
Standardized styles aid comparison

- Three similar circuits are easier to compare with consistent symbology
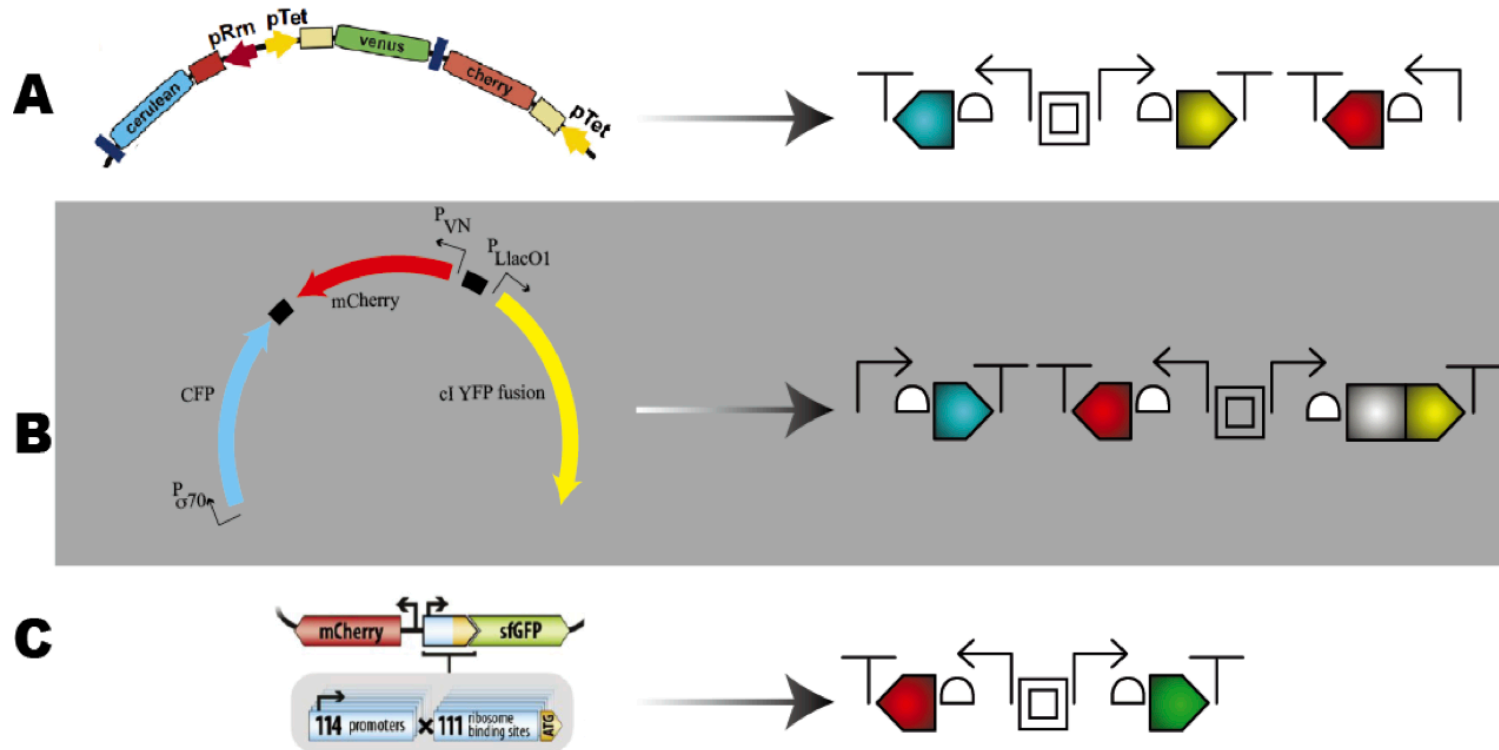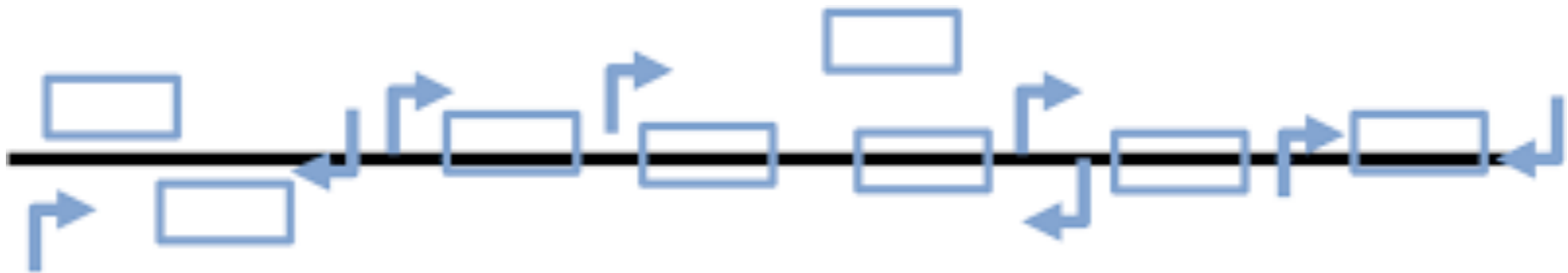
Backing by Formal Semantics
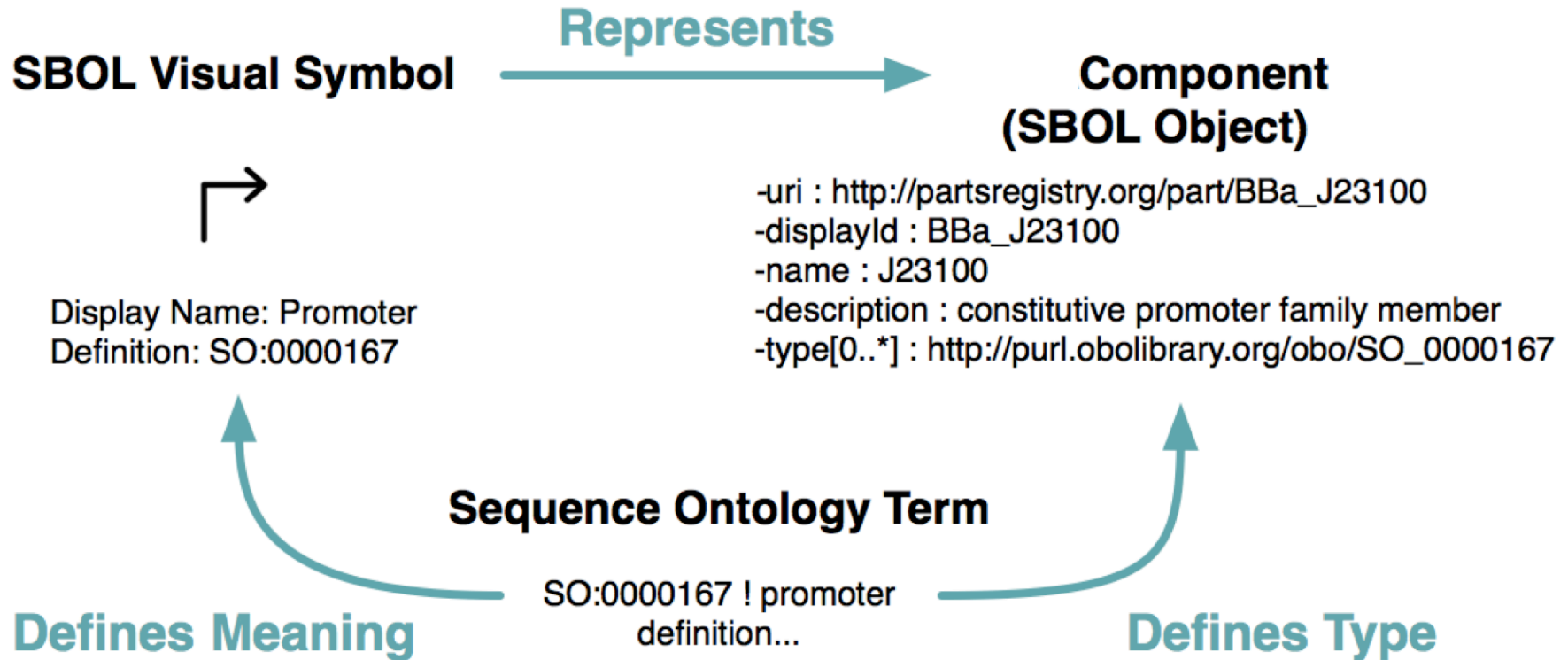
Flexibility of Style

Color, Text, Scaling, Line, Strands: all your choice

Is anything prohibited?
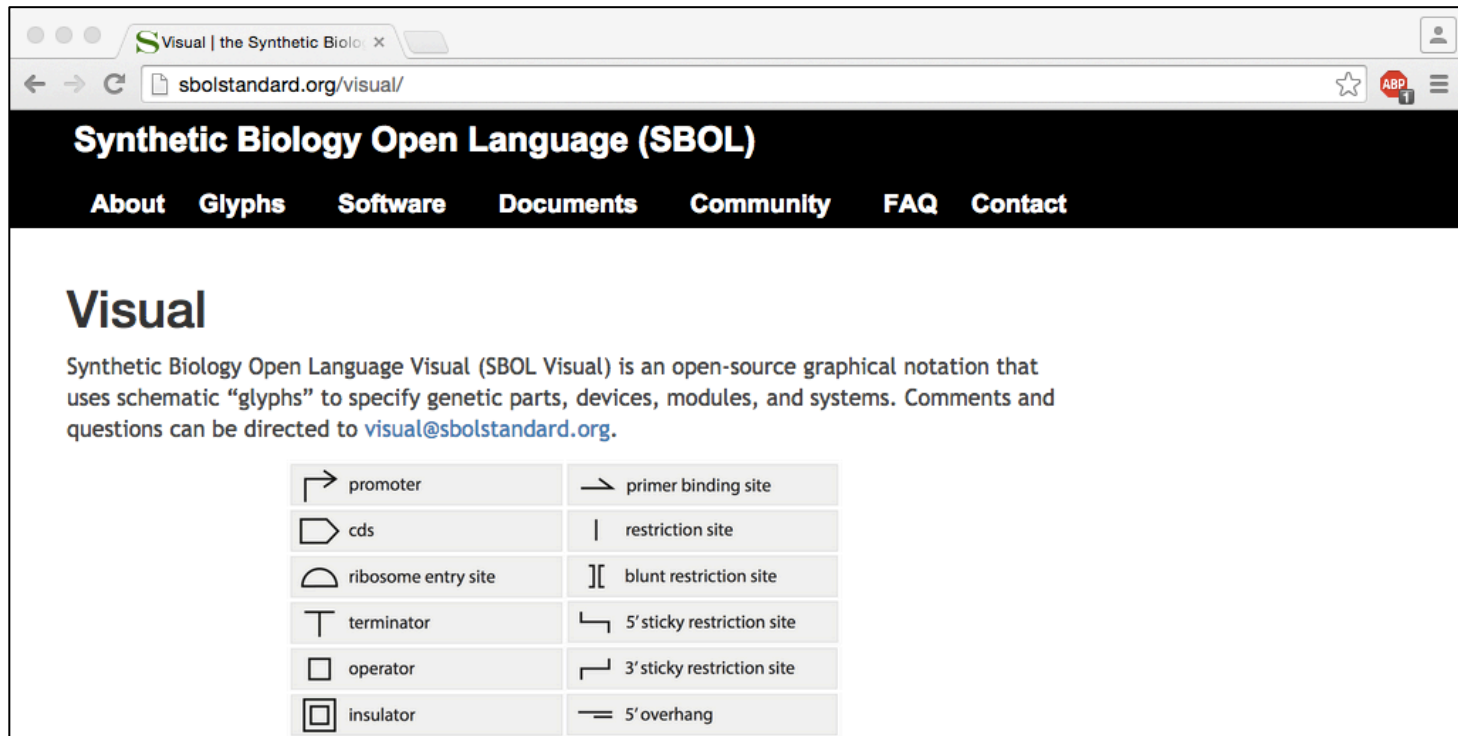
Yes.

Making SBOL Visual Diagrams

- Using your favorite graphics editor:
    - Many icons can be drawn directly
    - Icons available from: http://sbolstandard.org/visual/

- Specialized visualization tools:
    - Pigeon: http://pigeoncad.org/
    - VisBOL: http://visbol.org/design/
    - GraphViz: http://www.graphviz.org/
    - DNAPlotLib: https://github.com/VoigtLab/dnaplotlib

`http://sbolstandard.org`

- ## Use the symbols in your papers & talks

- ## Contribute opinions, use cases, new symbols

- ## Community is open for anyone to join

Tool examples

- VisBOL: generate SBOL Visual figures from genetic design files

- http://visbol.org/

- SBOLDesigner: visually draw SBOL designs and produce sequence designs

- http://www.async.ece.utah.edu/SBOLDesigner