

BioBricks Foundation

Request for Comments (BBF RFC)

TITLE:

PROPOSED CONCEPTUAL GUIDELINES
FOR THE DESIGN OF A BIOBRICK GRAPHICAL LANGUAGE
AND AN EXECUTIONAL EXAMPLE OF THOSE DESIGN PRINCIPLES.

AUTHOR LIST:

This document is authored by Eric Fernandez (efern211@gmail.com), but uses direction and insights from the BioBrick Open Graphical Language discussion on OpenWetWare.org. Key input was provided by many members including: Reshma Shetty (rshetty@ginkgobioworks.com), Cesar Rodriguez (cesar.rodriguez@stanford.edu), Barry Canton (barry@ginkgobioworks.com), Jason Kelly (jason@ginkgobioworks.com), Drew Endy, and Herbert Sauro (hsauro@u.washington.edu).

PURPOSE:

As we update the current BioBrick symbols we have an opportunity to look at the end users of a BioBrick Graphical language and develop design guidelines so that the new symbols best suit their needs. This document explores those needs, looks at the design principles necessary to meet them, and puts those principles into practice by showing an example of a new set of BioBrick symbols.

RELATED REQUESTS FOR COMMENTS:

EXTENDS BBF RFC 16: BioBrick Open Graphical Language (BOGL)

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OUTLINE

THE BIOBRICK VISUAL
DESIGN CHALLENGE

ADDRESSING THE
CHALLENGE

EXAMPLES OF USE

THE BIOBRICK LIBRARY

What's the objective?

Design a standard BioBrick Visual Language that will (a) make it easier for professionals, educators, and students to share their ideas, (b) foster enthusiasm and interest, (c) lower learning curves and barriers by making BioBricks more intuitive and natural to use.

Who is the target? Who uses BioBrick Visuals?

BioBricks are used by two main groups: Professionals and Students.

What's the insight? What do they need from a BioBrick Visual Standard?

These two groups of BioBrick users have very unique needs:

PROFESSIONALS

Professionals need a visual communication standard that is incredibly versatile and efficient. It must have an ability to be shared both in color and in black and white on presentations, the internet, emails, academic papers, and printed pages. It also must have the ability to be easily and efficiently hand drawn so that professionals can quickly share their ideas with one another and with their students via notes, whiteboards, napkins, etc.

STUDENTS

Students are the future of Synth Bio, but they are overcoming a learning curve when they begin studying BioBricks. To become professionals they need to understand the functions of each BioBrick and its place within the BioBrick universe. They want to use a BioBrick visual language that will help make the learning process more intuitive and more fun.

How can a BioBrick Visual Language reach both groups?

BioBricks need to have standard universal symbols so that everyone is speaking the same language. However, as long as the symbols are standardized, the format they are presented in can change based on the abstraction needs of its users. Using this principle we can outline the steps to designing a BioBrick Visual Language:

Step 1:

Design a universal standard of BioBrick visuals that have a high level of usage versatility and abstraction.

Step 2:

Use this standard to design formats that meet (a) the versatility needs of professionals and (b) the educational needs of students.

THE ASSIGNMENT

ADDRESSING THE CHALLENGE

Step 1:

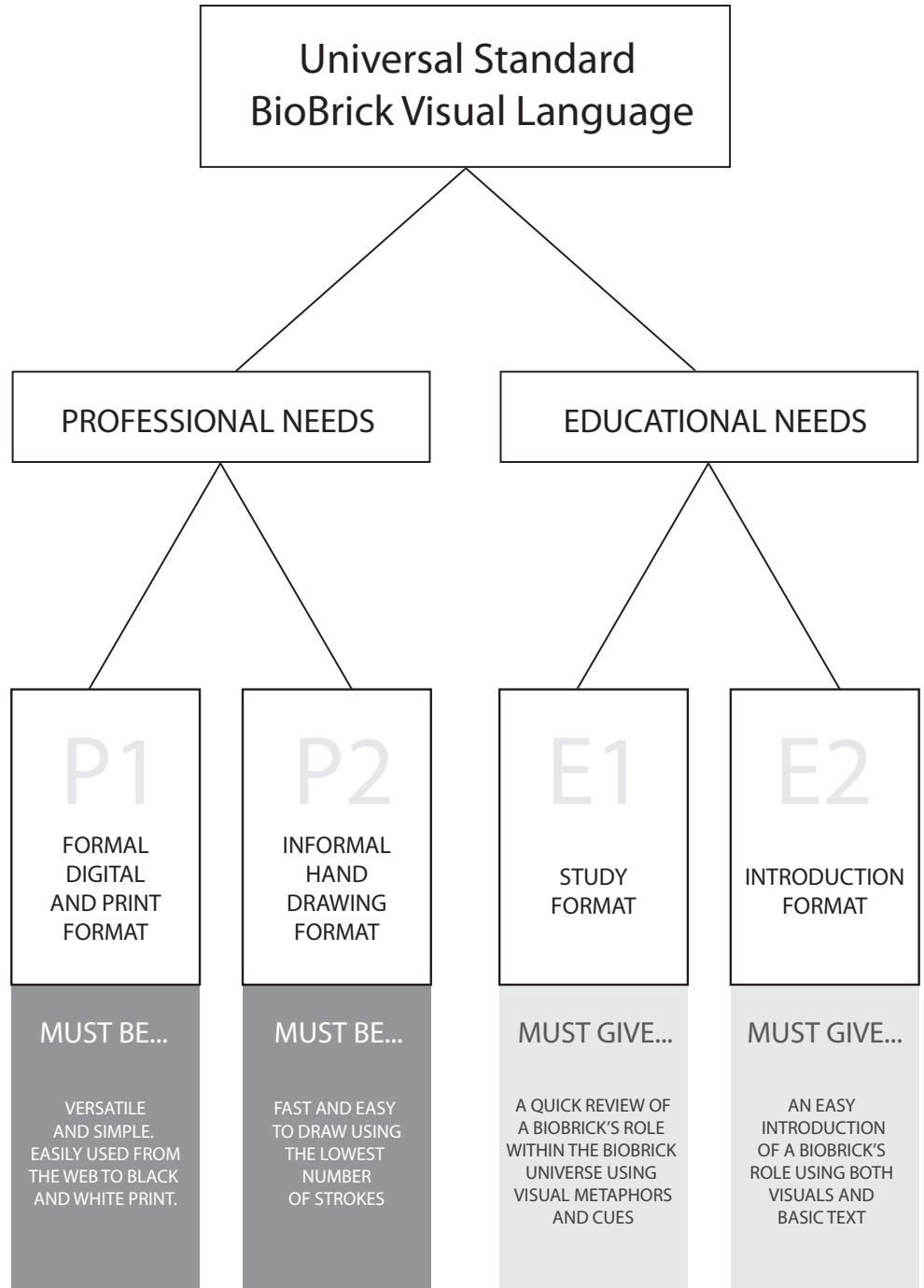
Design a universal standard of BioBrick visuals that have a high level of usage versatility and abstraction.

Step 2:

Use this standard to design formats that meet:

(a) the versatility needs of professionals

(b) the educational needs of students.



1 STANDARD VISUAL LANGUAGE IS USED TO CREATE 4 USAGE FORMATS

ADDRESSING THE CHALLENGE

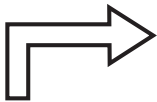
CREATIVE DEVELOPMENT

Universal Standard
BioBrick Visual Language

PROFESSIONAL

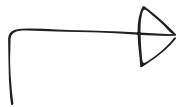
EDUCATIONAL

BIOBRICK
STANDARD
TILES

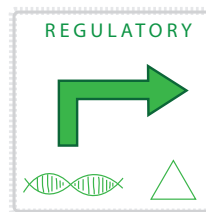


"Universal Standard
BioBrick Visual Language"

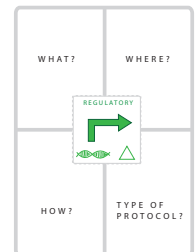
BIOBRICK
DRAWING
FORMAT



STUDY
FORMAT



INTRODUCTION
FORMAT

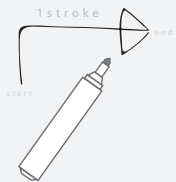


HOW IS IT SHARED?



.SVG VECTOR DIGITAL FILES
WITH STANDARD DIMENSIONS

HOW IS IT SHARED?



STROKES ARE PRESENTED

HOW DOES IT HELP
STUDENTS?

Colors and symbols quickly show what type of action the BioBrick carries out, where this action takes place, the complexity of the part and its properties.


HOW DOES IT HELP
STUDENTS?

Serves as a primer for students learning about each BioBrick type. It can be used as a flash card or to create trading card educational games. It contains a verbal and text description explaining the type of action each BioBrick carries out, where this action takes place, and it's basic protocol.

EXAMPLES

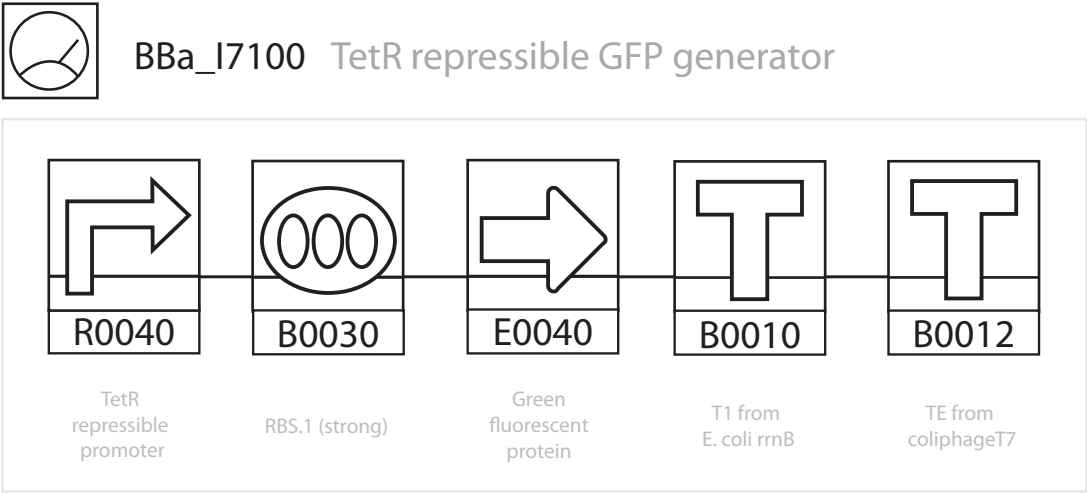
EXAMPLES OF USE

BIOBRICK STANDARD TILES




BIOBRICK TILE FILE.SVG

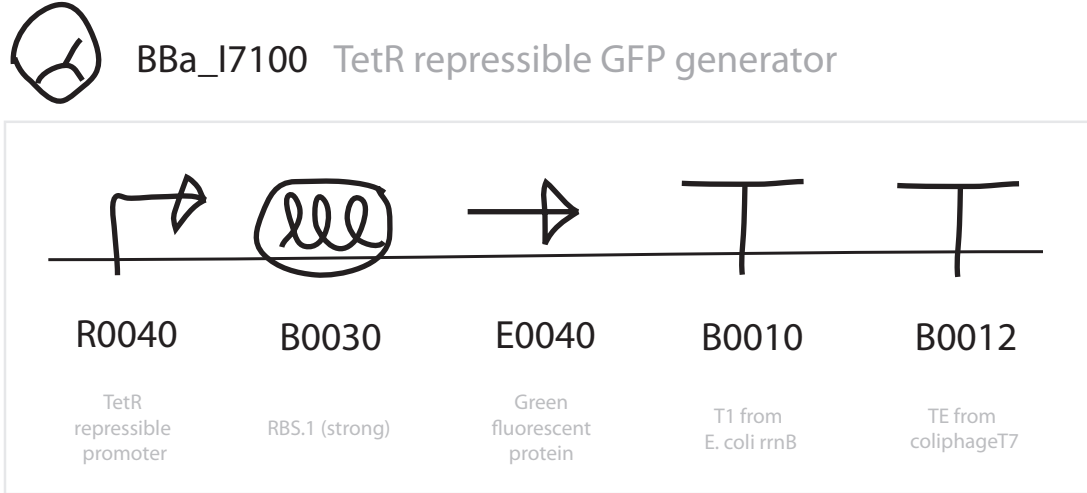
FORMAL



INFORMAL



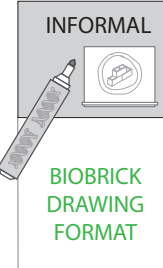
BIOBRICK DRAWING FORMAT



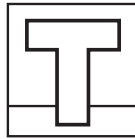
NOTE: THE EDUCATIONAL FORMATS ARE CURRENTLY UNDER DEVELOPMENT AND ARE NOT SHOWN AT THIS TIME.

THE BIO BRICK
LIBRARY

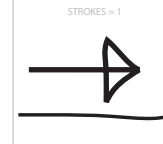
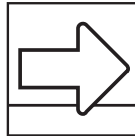
THE LIBRARY



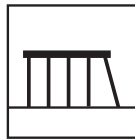
Terminator



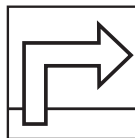
Protein Coding



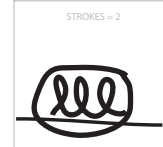
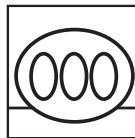
RNA



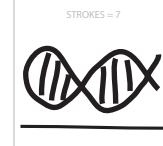
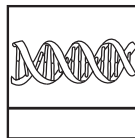
Transcription Regulator



Ribosome Binding Site

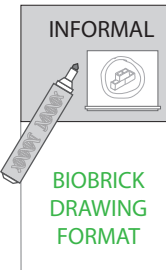
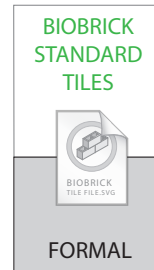


DNA

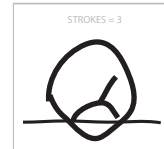
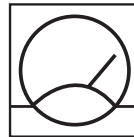


THE BIOBRICK
LIBRARY

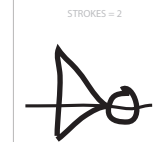
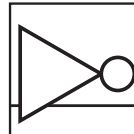
THE LIBRARY



Measurement



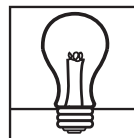
Inverter



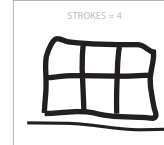
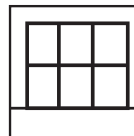
Protein Generator



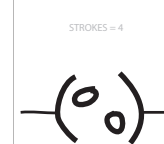
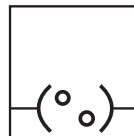
Reporter



Composite Part



Signal Sender/Receiver



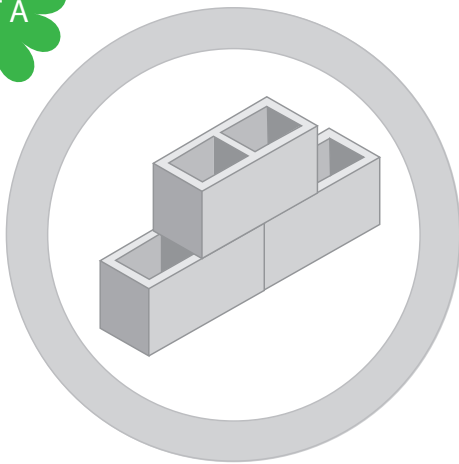
PUBLIC DISTRIBUTION

THE FINAL BIOBRICK VISUAL DESIGNS CAN BE SHARED WITH THE PUBLIC THROUGH THE RELEASE OF A BIOBRICK VISUALIZATION KIT WHICH SHOULD CONTAIN: VECTOR .SVG GRAPHIC FILES, A BIOBRICK FONT, DIAGRAMS FOR CORRECT HAND DRAWINGS, AND A "CORRECT USAGE AND GUIDELINES" DOCUMENT.

ALSO, TO HELP MARKET THE KIT AND PROMOTE ITS USE, A NAME SHOULD BE CHOSEN THAT CAN BE EASILY USED IN LANGUAGE. ONE EXAMPLE WOULD BE TO SHORTEN VISUALIZATION KIT TO "VISKIT". THEN IT WOULD BE EASY TO PROMOTE COMPLIANCE BY SAYING, "DON'T FORGET TO USE THE VISKIT."

VERSION NUMBERS WOULD ALLOW THE SYMBOLS TO CHANGE IN SUBTLE WAYS AS SYNTH BIO EVOLVES BY ENSURING COMPLIANCE WITH THE LATEST VERSION.

A MOCK UP EXAMPLE IS SHOWN BELOW.



BIOBRICKTM
VISKIT

THE BIOBRICK STANDARD VISUALIZATION KIT
FOR THE BIOBRICK OPEN GRAPHICAL LANGUAGE