

Biomaterial Battle

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Ready to join the biomaterial battle between BioTech enterprises? Follow the instructions below.

Scan the QR code to learn more about synthetic biology before you start helps you win the game. To understand the game rules, you could either read this guide book or scan the QR code for the online manual (video ver.)



Background

In the past few decades, the field of biomaterials has notably expanded. With the new Ubx platform, all the biotechnology companies are using it to develop multi-functional biomaterials through collaboration and competition. Meanwhile, all the companies are also bidding for Mr. Rabbie's funds for mass production.

Object of the game

Players should utilize 5 genes to produce a biomaterial. The production of biomaterials may increase or decrease the assets of the companies. In the end of the game, the company with the nearest asset value to Mr. Rabbie's demand wins.

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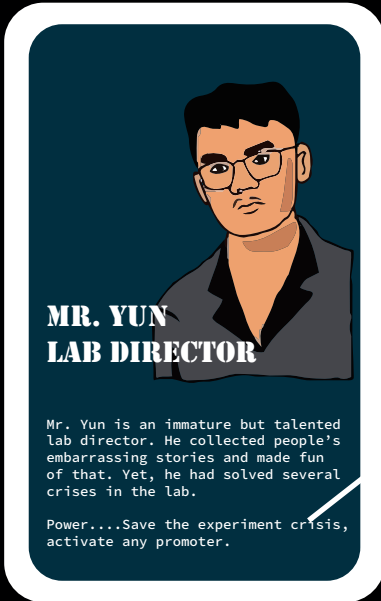
Components

- A. game board x1
- B. character card x16
- C. mr. Rabbie card x8
- D. gene card x50
- E. function card x20
- F. chance card x10
- G. value card x12



Card Overview

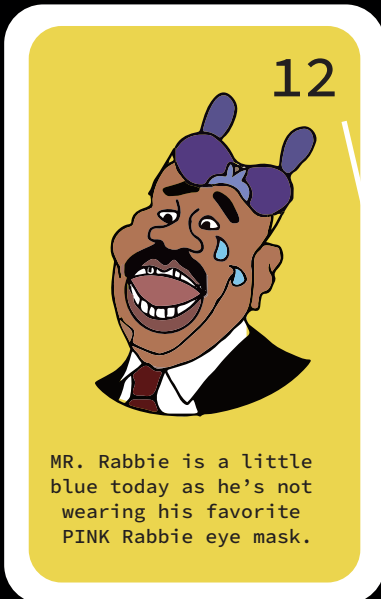
A. Character Card



Each character has unique traits and a special power. Characters belong to different biotechnology companies with different assets.

Character's special power. It can be used at anytime but only once in a game.

B. Mr. Rabbie card

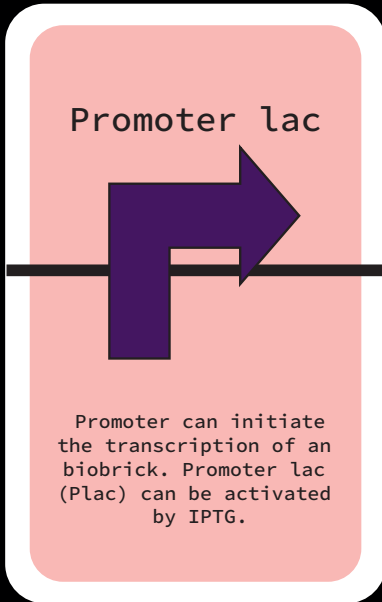


Mr. Rabbie is the investor. All the companies have to bid for his fund for mass production.

The bid price is determined by Mr. Rabbie's emotion of the day. The players have to increase or decrease the company asset to meet Mr. Rabbie's bid price.

The bid price

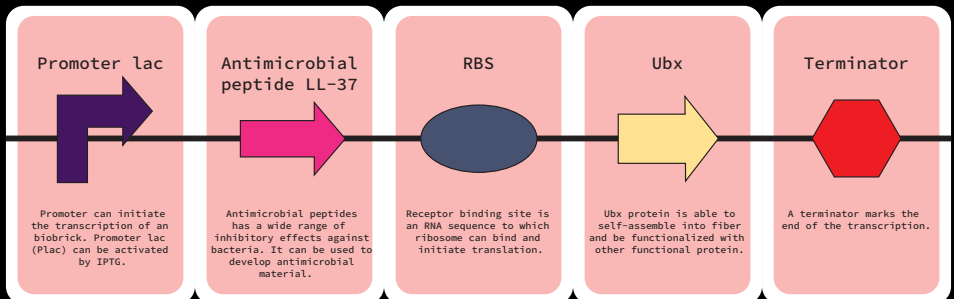
Card Overview



C. Gene card

Players have to use 5 different gene cards to form a biobrick. The players can decide the type of gene cards. A biobrick must contains 5 gene cards below.

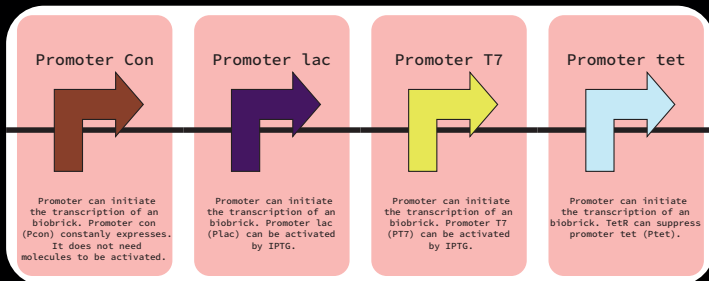
- promoter (4 types)
- functional protein (6 types)
- RBS
- UBX
- terminator



Card Overview

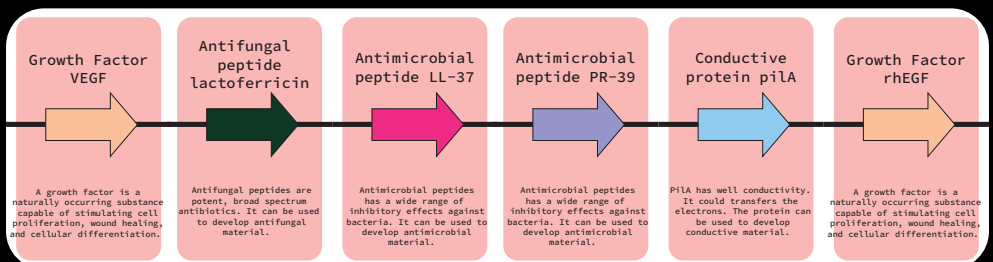
There are 4 types of promoters with different condition. The activation/ suppression of the promoter requires the presence of the molecules on “function card”

- Pcon: Constantly activated.
- Ptet: Constantly activated. Will be suppressed by tetR.
- PT7: Constantly suppressed. Will be activated by IPTG.
- Plac: Constantly suppressed. Will be activated by IPTG.



There are 6 types of functional proteins. With each, you can develop biomaterial by fusing it with Ubx platform.

- Growth factor VEGF/ rhEGF
- Antimicrobial peptide LL-37/ PR-39
- Antifungal peptide lactoferricin
- Conductive protein p1A



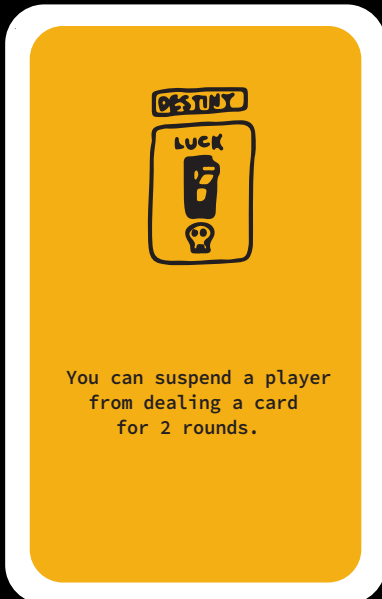
Card Overview



D. Function card

Players with function cards are able to buy, exchange ...etc. the cards with the competitor. Each card also presents a type of molecule to activate the promoter on the game board.

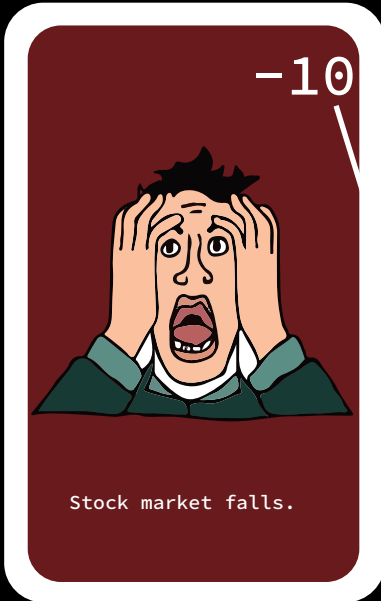
The matched promoter that can be activated by this molecule.



E. Chance card

Use the chance card to reverse your fortune.

Card Overview



F. Value card

The value card evaluates the biomaterial you produce. Players should draw a value card after a biobrick is activated.

The value increases/ decreases the company assets of yours/ other company's.

The value.

Game Rule

The players should utilize 5 genes to produce a biomaterial. The production of biomaterials may increase or decrease the assets of the companies. In the end of the game, the company with the nearest asset value to Mr. Rabbie's demand wins.

1. Basic Rules

- 1-1 Players should not reveal their own character until the use of special power. The company is allowed to be revealed.
- 1-2 The game is over until the last gene card is drawn.
- 1-3 A round means all players have dealt a card. A game means from the start to the end of the game.
- 1-4 The player can use the special power any time before the last gene card was drawn. It will be the player's turn after the player uses the special power.

2. Get Ready

- 2-1 Put all piles of cards on the gameboard.
- 2-2 Draw 4 character cards from 2 companies. There should be two players in each company. Do not reveal your character.
- 2-3 Draw a Mr. Rabbie card and lay it face-up on the gameboard.
- 2-4 Each player draws 3 gene cards and 2 function cards. Do not reveal your cards to any player.

3. Get Started

- 3-1 Players take turn to deal a gene card/ a function card in a round. (1 card in a round)
- 3-2 Players should draw a card after dealing a card. You should deal/ draw the same type of card.
- 3-3 The gene card you dealt on the gameboard should not be revealed before you form a complete biobrick. (5 gene cards)

Game Rule

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3-4 Players should form a biobrick with 5 gene cards:

promoter, functional protein, RBS, UBX and terminator.

3-5 After forming a biobrick, a player should open the face-down gene cards except for the “promoter”.

3-6 A player should wait for the activation of the biobrick by the matched function card of own/ other players.

3-7 After the activation of the biobrick, a player should look up “The Biomaterial List” in the manual (p.17) to find a matched biomaterial.

3-8 Draw a value card to evaluate the biomaterial you develop.

3-9 Choose to use your value card on either your company or other company to increase/ decrease the company asset.

3-10 After rounds, the game ends when all the gene cards are drawn. The company with the the nearest asset to Mr. Rabbie’s card wins.

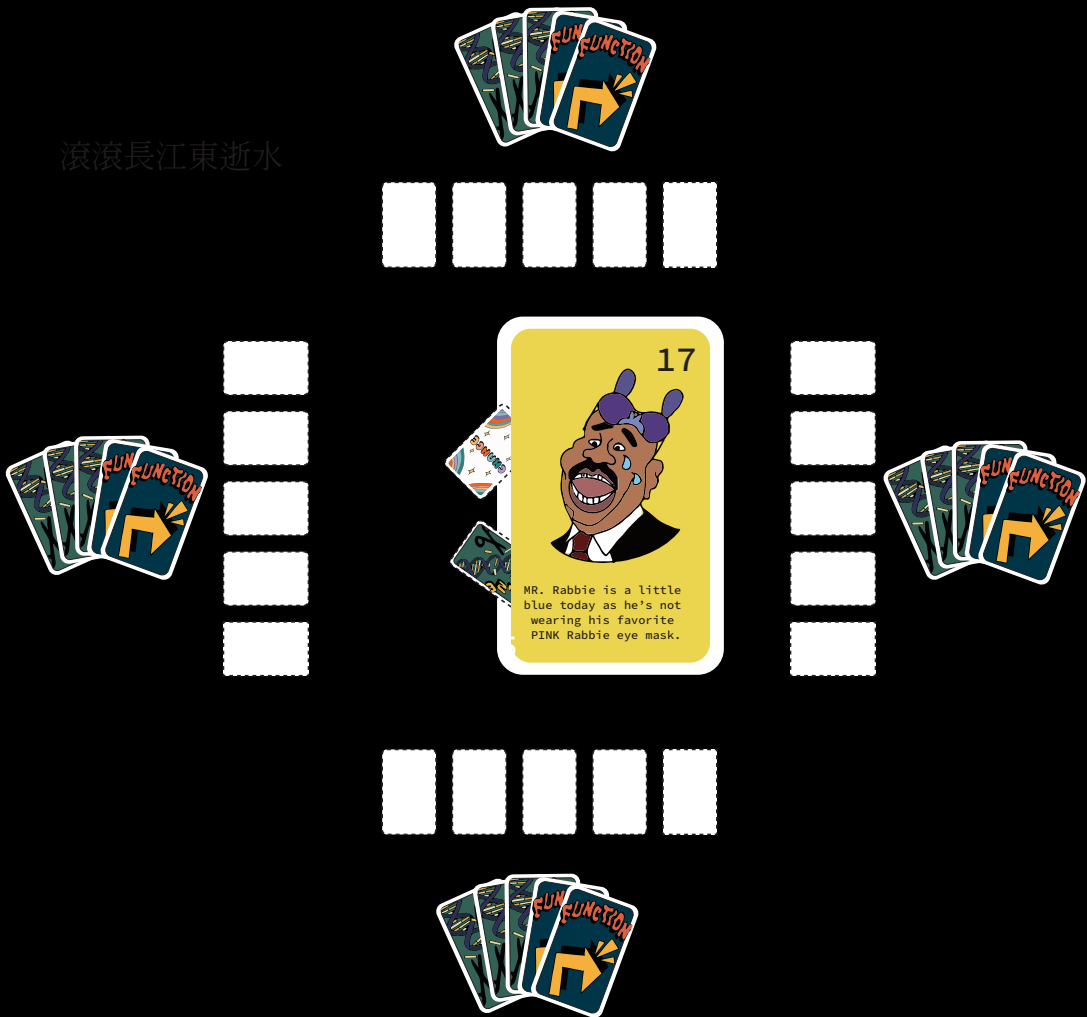
4. The end of the game

4-1 The game ends when all the gene cards are drawn.

4-2 A player loses the game if a player does not possess any function card or gene card.

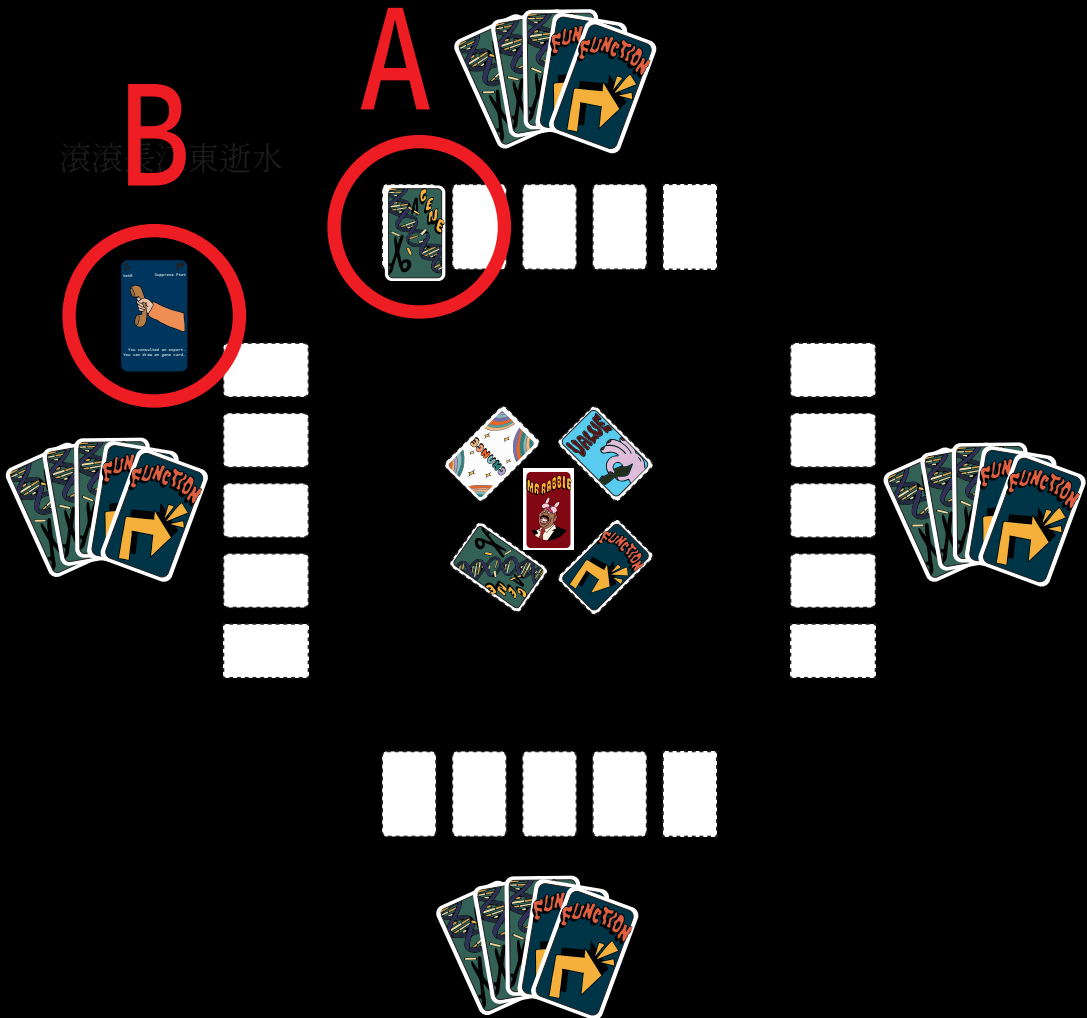
Game Flow

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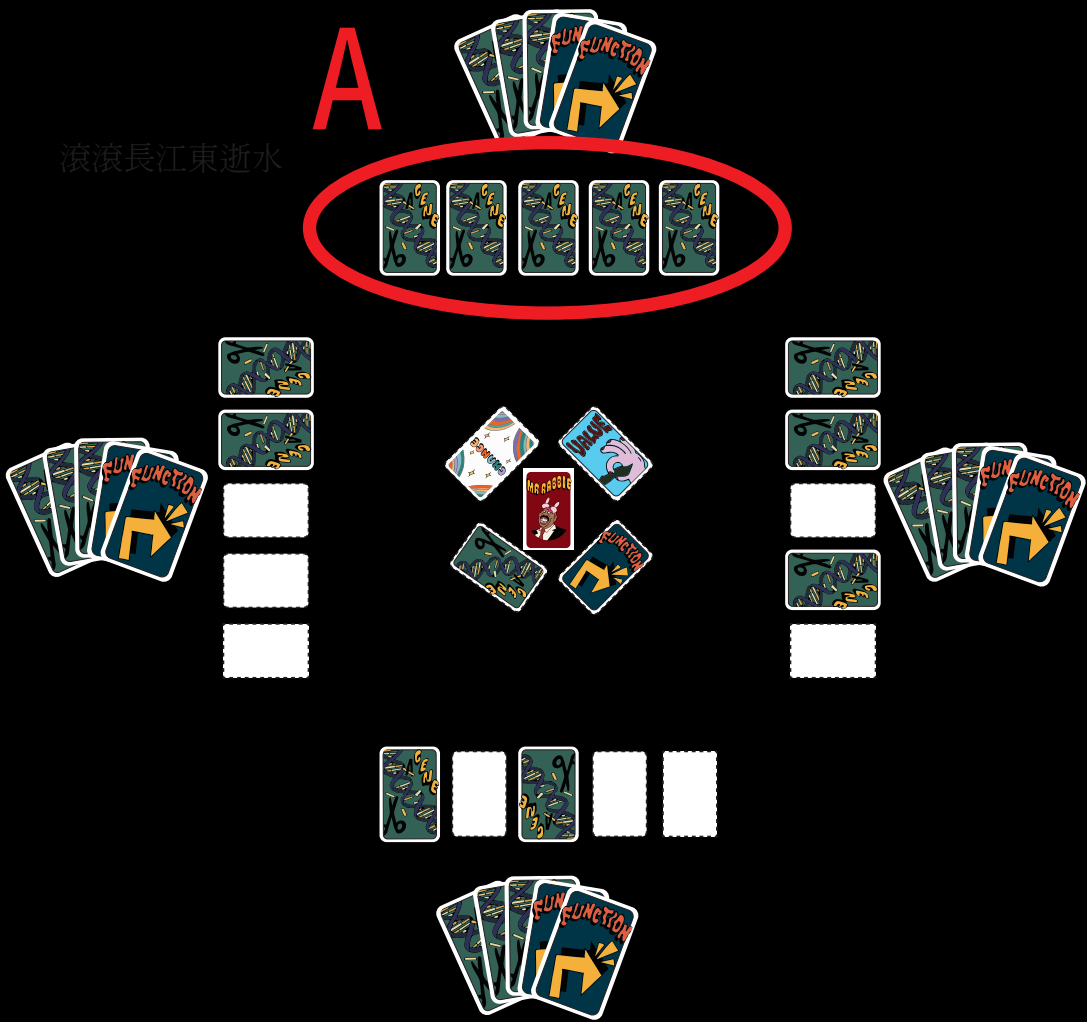
1. Pick a character. Draw a Mr. Rabbe card, turn it face-up and put it in the middle of the gameboard.
2. All players draw 3 gene cards and 2 function cards.

Game Flow



- 3. Player takes turn to deal a gene card (face-down) or a function card. Draw a card of same type after you deal a card.
- 4. In this round, player A has dealt a gene card. Player B has dealt a function card.

Game Flow

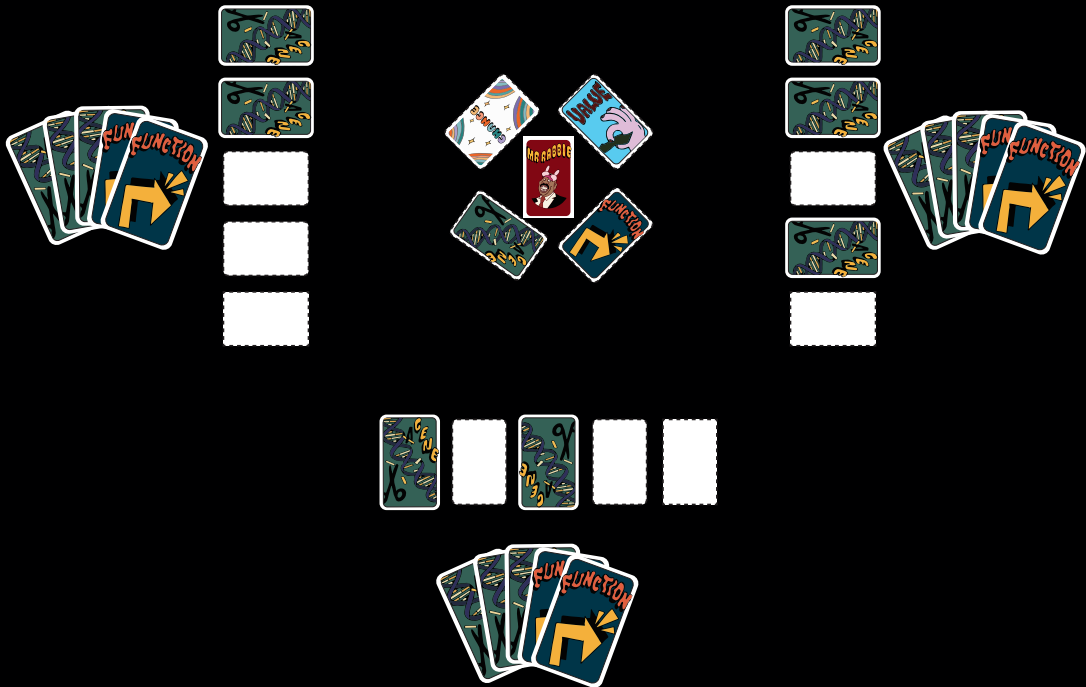


5. After rounds, player A has dealt 5 gene cards, successfully forming a biobrick. The player now has to wait for the activation of the biobrick.

Game Flow

A

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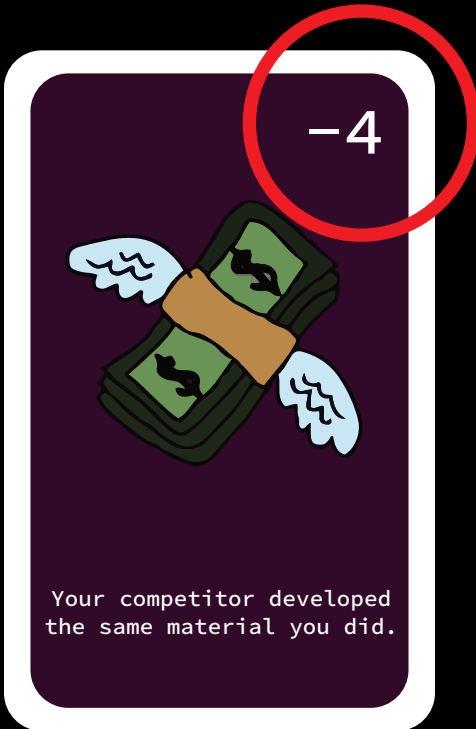
5. After rounds, player A has dealt 5 gene cards, successfully forming a biobrick. The player should open the gene cards except for the promoter.
6. The player now has to wait for the activation of the biobrick. If the biobrick contains Pcon, it can be automatically activated. If the biobrick contains Ptet, the biobrick can be automatically activated in the next round with the absence of molecule tetR.

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8. Player A activates the biobrick, and look up the matched material in the manual “Material”.

Game Flow

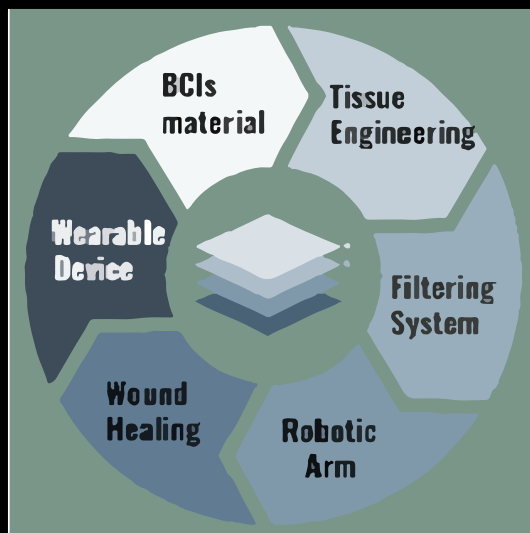


9. Player A draw a value card. The player can decide to use on which company. The number on the value card will alter the company asset.
10. The company with the closest number (Company asset) to the number on Mr. Rabbie's card (Bid price) wins.

Biomaterial

Use 5 gene cards to produce the biomaterial below.
The list shows the gene cards you need in the production.
The picture shows the potential applications of those biomaterial. To further develops, companies have to get the fund from Mr. Rabbie.

- A. Antimicrobial material
promoter/ antimicrobial peptides/ RBS/ UBX/ terminator
- B. Antifungal material
promoter/ antifungal peptides/ RBS/ UBX/ terminator
- C. Conductive material
promoter/ conductive protein pilA/ RBS/ UBX/ terminator
- D. Functional material (Growth factor)
promoter/ growth factor/ RBS/ UBX/ terminator



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