

Buddy Blocks

Design Specification

MHCID 2017 Capstone | Seattle Children's Hospital

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Overview

Pediatric hemodialysis patients at Seattle Children's Hospital must spend three to five hours, three to five times a week at the dialysis unit to compensate for their lost kidney function due to end-stage renal (kidney) failure. When receiving dialysis treatment, patients must remain seated for the whole treatment while being physically connected to the dialysis machine. The environment within the dialysis unit doesn't allow children to interact during treatment. The reason for this separation is to control the spread of infection and the physical constraints created by the treatment.

Through our research we identified that there was a well established community, however, patients interact very little during treatment. We feel that building on this community, facilitating social interaction, and empowering patients during treatment was worth exploring that could yield a design intervention that directly focused on the patients' experience. Current techniques to improve experience and consume the time spent waiting for dialysis treatment to complete are shallow distractions. One such distraction are the unit-provided iPads for each patient. Many patients expressed that they get bored of playing games on the iPad and like to build or create through hands-on activities with others. Many parents also expressed that they also wanted less screen time for their child while on dialysis.

Patients can use Buddy Blocks to build creations to share with other patients using their own set of blocks. Each block in the set has a separate function and can be connected through magnets to form a creation. There are four types of blocks: sound

block, display block, camera block, and light block. A total set includes 27 blocks; 20 light blocks, 4 display blocks, 2 sound block, and 1 camera block. Buddy Blocks promotes inter-patient interactions, by allowing patients to send creations to others or share with the entire unit by posting to the gallery through a companion iPad application. Creations must be reassembled by the recipients using their own blocks. The application helps them build the creation by showing instructions. Buddy Blocks provides a new way for children in the pediatric dialysis unit to engage in social play, while fitting into the constrained medical setting.

About this Specification

This specification is for the development team to have a clear understanding of both the physical and digital aspects of Buddy Blocks.

Further Reference

[Interface Sketch File](#)

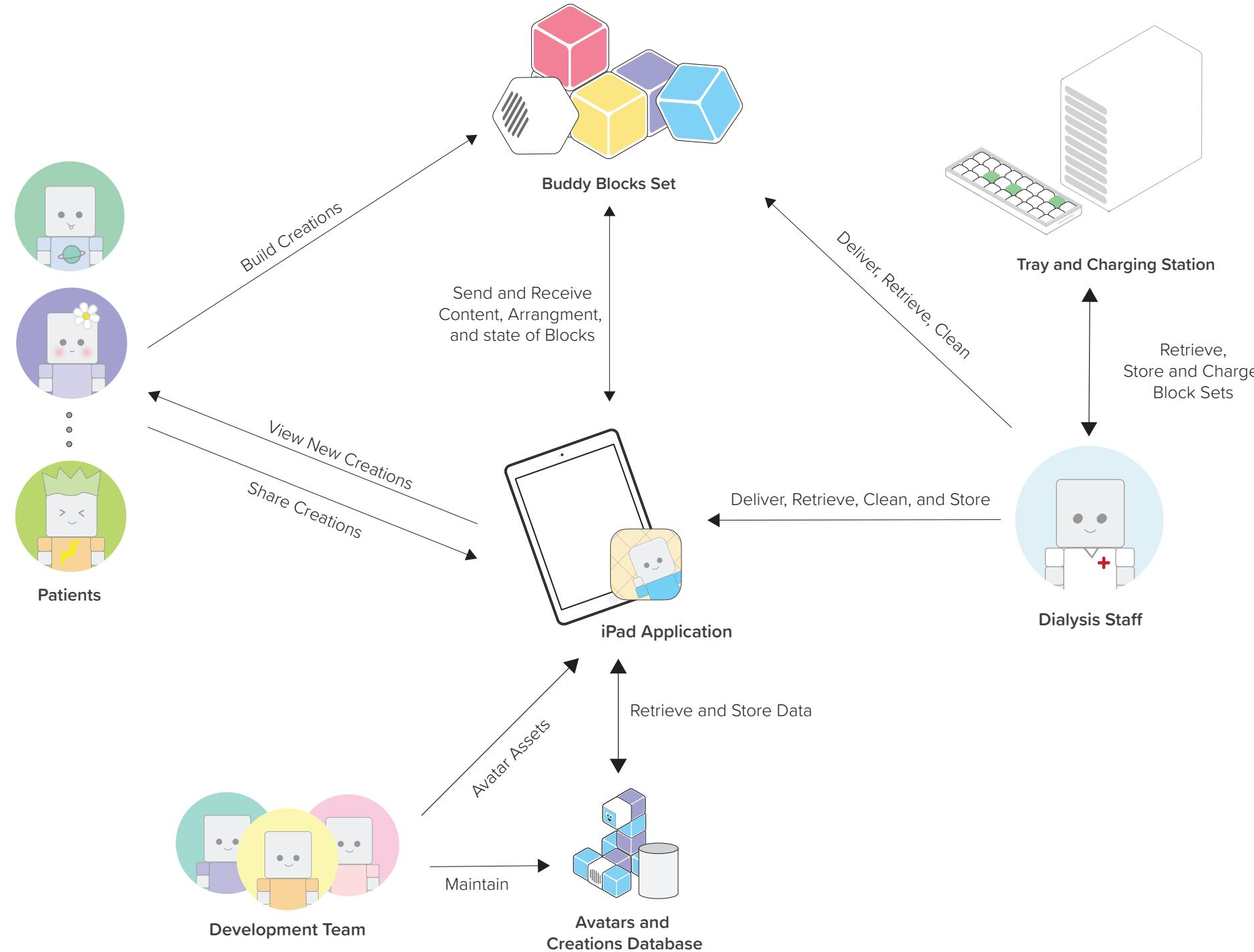
[Design System Sketch File](#)

[Physical Block Prototypes](#)

[Interactive Interface Principle Prototype](#)

[User Research Readout](#)

System Diagram

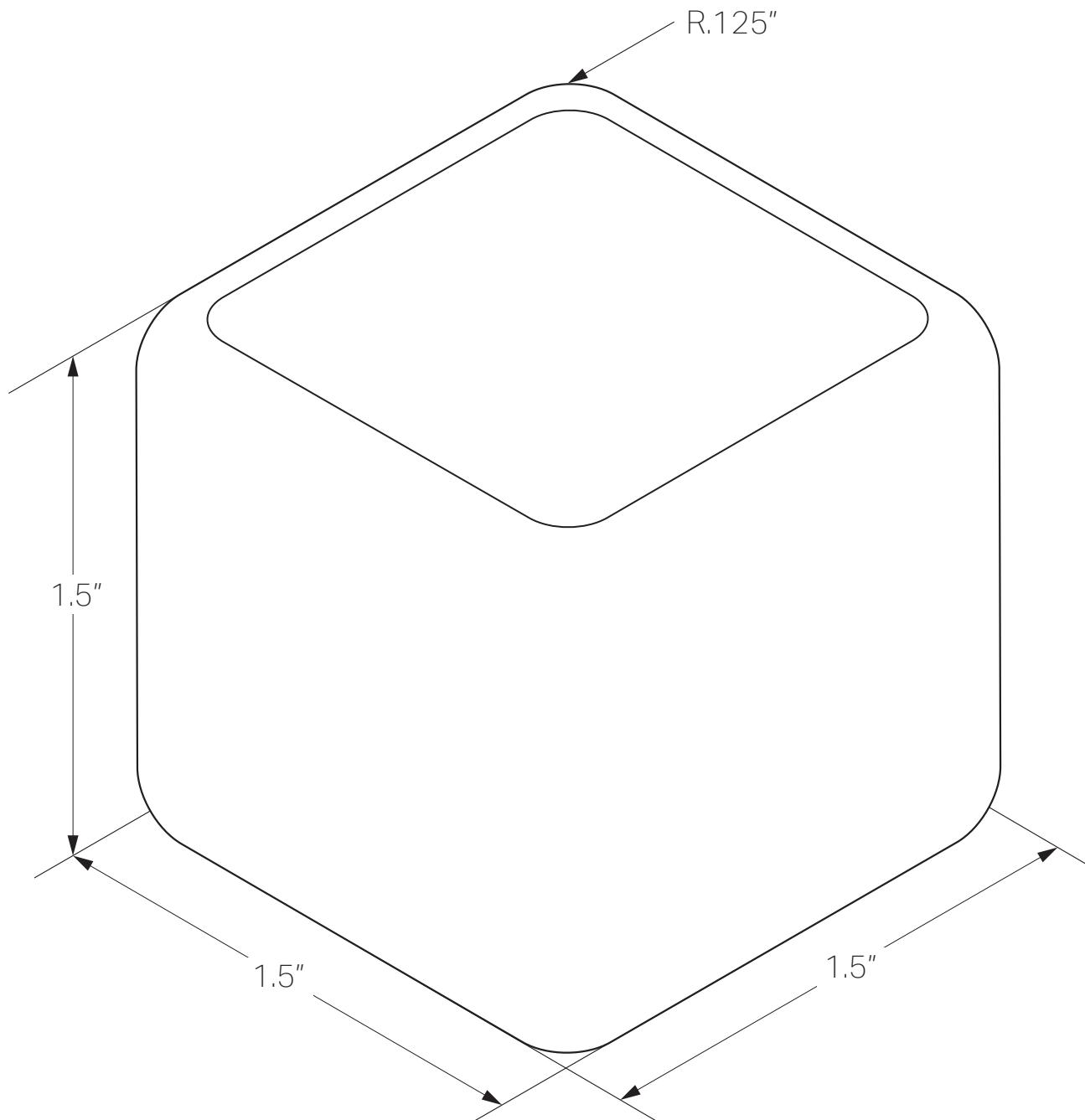


Buddy Blocks is a physical-digital experience that is comprised of a set of 27 interactive magnetic blocks and a mobile iPad application that allows patients to build block creations and share them with other patients to rebuild.

Block Design Specification

All aspects of the physical, digital, interactive, and relational properties of the blocks can be found in this section. Each block is described and the overarching interaction language is explained.

Block's General Physical Characteristics

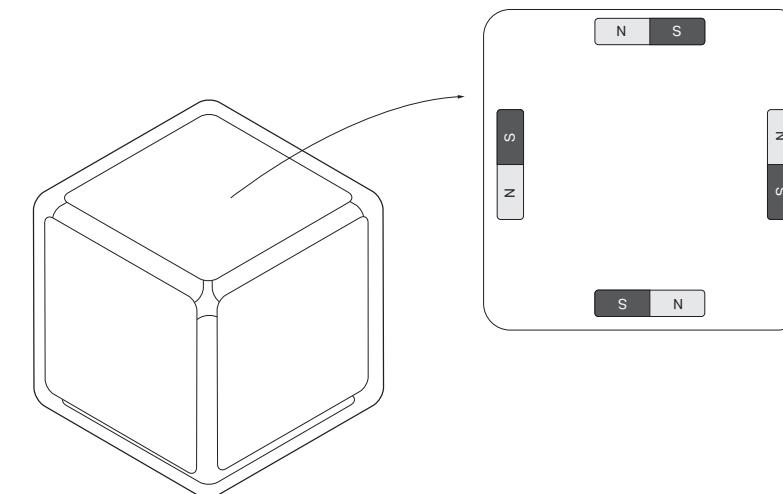


Material

White acrylonitrile butadiene styrene (ABS) plastic is used for the internal support structure and a translucent ABS plastic is used for the faces of the block. White translucent silicone rubber is used as a soft external shell to cover the block. This allows the blocks sides to be pressed, while providing a soft exterior, a material to diffuse the internal lights, and a surface that can be sanitized and cleaned.

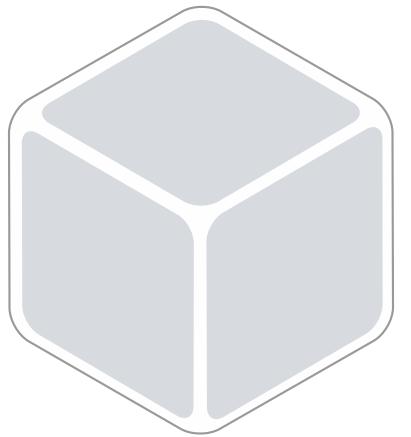
General Magnetic Properties

All blocks are magnetic and arrangement is critical to a seamless and enjoyable experience. Described here is the magnetic layout for any magnetic face of a block. Not all blocks have magnets on all faces, this is discussed on the individual block type descriptions. See pages 12, 14, 16, 18.



Bar magnets are arranged in a circle with the north pole of each magnet pointed in a counter-clockwise orientation. Though the direction is arbitrary, it must be consistent on all blocks for every magnetic face. This allows any block face to connect with any other block face. This should be consistent across sets as well to provided the opportunity for increasing the number of blocks a user can play with.

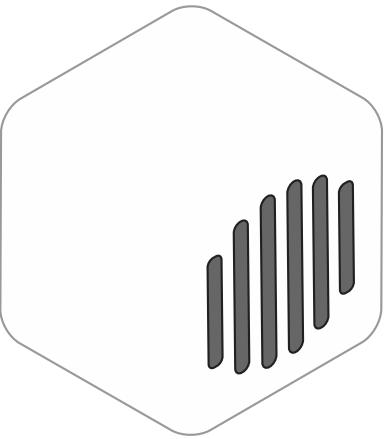
Block Types



Light

This block emits different colors of light.

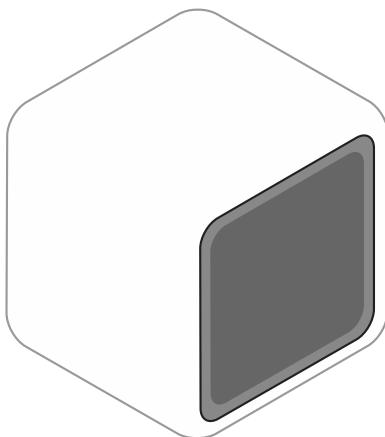
Quantity in Kit: 20 blocks



Sound

This block records audio with a maximum length of 20 seconds. Audio can be played back on this block.

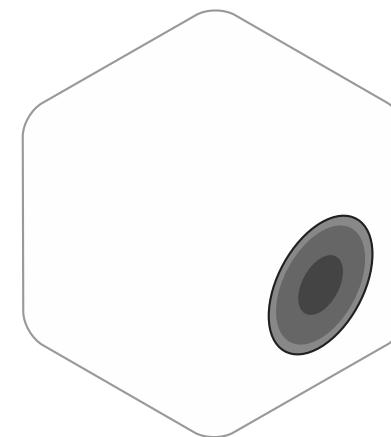
Quantity in Kit: 2 blocks



Display

This block contains one side with a screen. This is used to display images and video.

Quantity in Kit: 4 blocks



Camera

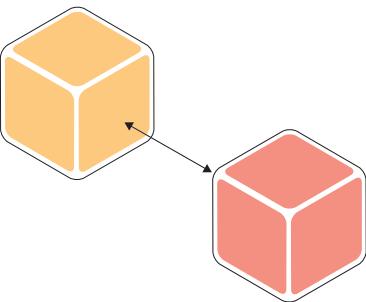
This block is used to capture pictures and record video. Only short audio-less video clips are recorded with a maximum length of 20 seconds.

Quantity in Kit: 1 block

Technical Description

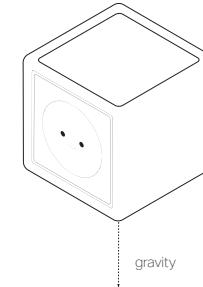
Though this is by no means an exhaustive specification and no schematics or specific electrical components are reference, this should serve as a starting point for engineering requirements and potential technologies that can be used to realize these blocks. The true technical design should be left to the discretion of the engineers in consultation with the design team to craft the desired experience. These recommendations are based off of a paper done in the area of Sensor Network User Interfaces and Tangible User Interfaces (Merrill et al., 2007).

David Merrill, Jeevan Kalanithi, and Pattie Maes. 2007. Siftables: towards sensor network user interfaces. In *Proceedings of the 1st international conference on Tangible and embedded interaction (TEI '07)*. ACM, New York, NY, USA, 75-78. DOI=<http://dx.doi.org/10.1145/1226969.1226984>



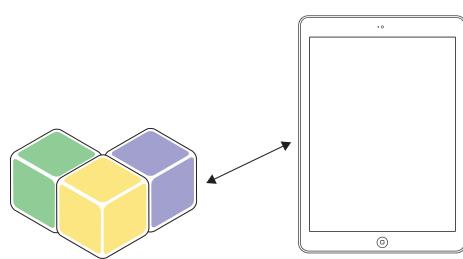
Inter-Block Communication

Blocks need to communicate to other blocks in a creation to detect presence, block type, and unique identification. This information is vital to crafting the building instructions for a creation. Blocks must detect the presence of blocks on all faces. The design team recommends the use of short range infrared transceivers located on all faces to communicate this information.



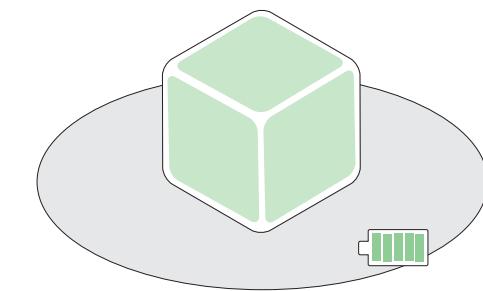
Orientation

Detecting orientation is vital to the shake interaction and the display blocks function. The design team recommends the use of an accelerometer or a collection of components that can measure motion and determine the direction of gravity.



Block-iPad Communication

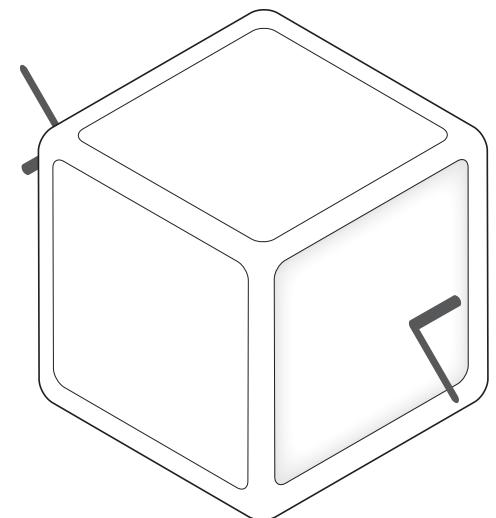
The blocks need to transfer captured data (images, audio, and video) and send block configurations to the iPad. The iPad must also be able to communicate with the block to change the state of a block. The design team recommends that a radio transceiver dongle be used to send data over radio frequency from the iPad to the blocks. This also requires all blocks to have a medium range radio transceiver to communicate bi-directionally with the iPad.



Charging

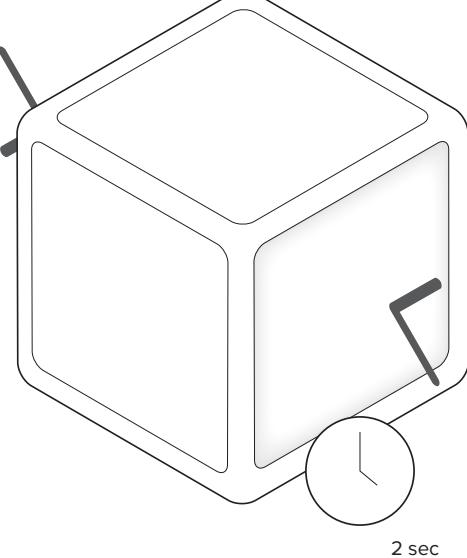
The design team recommends that charging be completed through the use of inductive charging. The blocks are designed to fit one layer high in a case that has a charging coil in the bottom. This case can then be slid into the charging cabinet to accommodate multiple sets of blocks in one location. See page 20.

Interaction Language



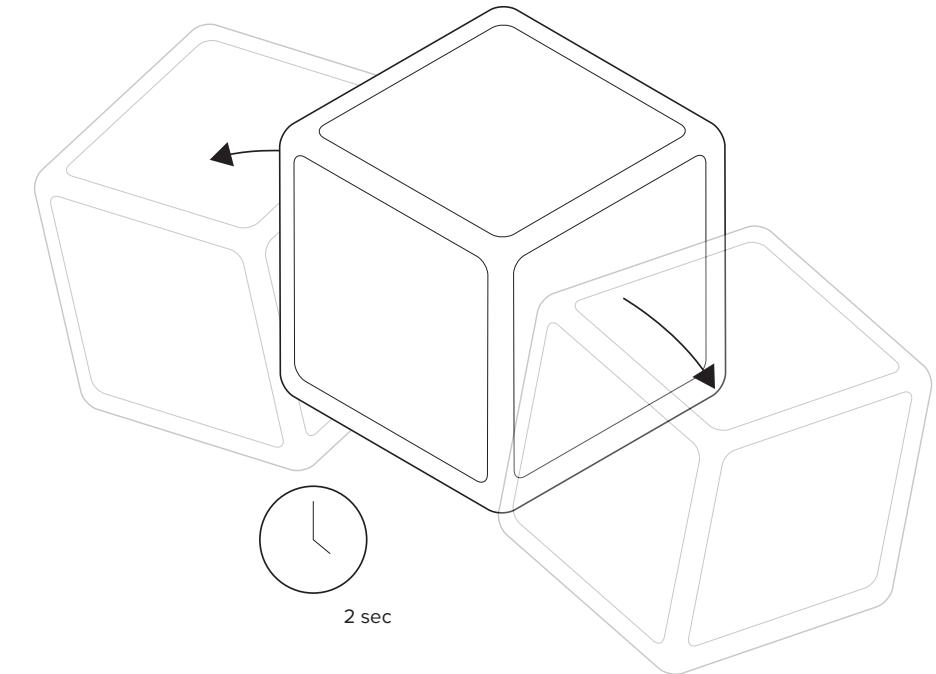
Press

Pressing or squeezing any face or combination of faces is reserved for any discrete change or action to the block. All faces can be pressed except for those that contain a content collection or playback component (i.e. camera, display, microphone and speaker).



Press and Hold

Pressing or squeezing for an extended period of time on any face or combination of faces is reserved for any continuous change or long term action to the block. The action is initiated after two seconds. The action doesn't end until the faces are released or the actions maximum duration has elapsed. All faces can be pressed and held except for those that contain an external content collection or playback component (i.e. camera, display, microphone and speaker).



Shake

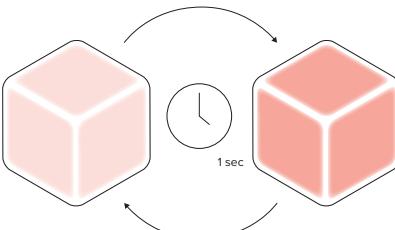
Shaking a block removes the content stored on that block or resets the block to a default state. All blocks can be shaken. The reset takes effect after the block stops shaking after at least 2 seconds of moderate shaking.

Use of Light and Sound as Feedback

Light

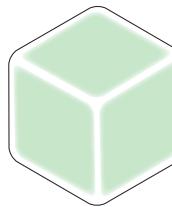
Low Battery

Users are alerted of a low battery through a 1 second pulsating red light loop on all the faces of the block. Once in contact with the charging surface the light turns off.



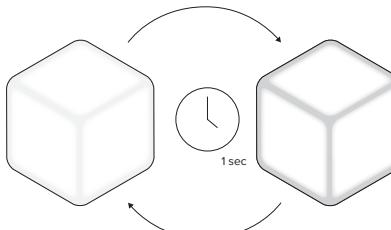
Fully Charged

Charging is complete when the faces of the block emits a solid green light. Once removed from the charging surface or if the charging surface is unplugged the light turns off.



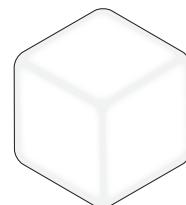
Capturing Content

Capturing content is shown through 1 second pulsating cool white light loop on all the faces of the block. This is triggered after a press and hold event on any capture block (camera and speaker) and stops when the capture ends.



Contains Content

A blocks shows it has content when it emits a solid cool white light on all the faces of the block. This is triggered when a block has content stored in memory. This is removed on shake when the block is cleared.



Sound

Capturing Content

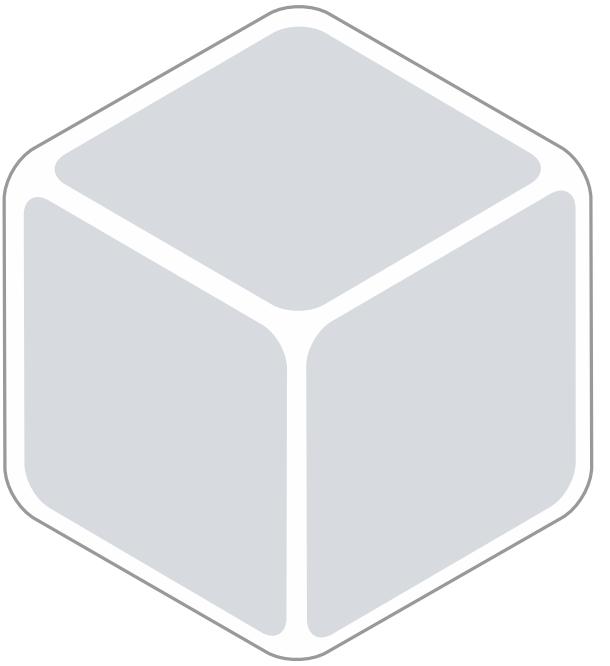
A single short tone is triggered after a press and hold event on any capture block (camera and speaker). On the release or when the capturing has exceeded its maximum limit, a double short tone is played to mark the end of the recording. A shutter sound is played on the camera block when a press event has occurred.

Block Relationship Matrix

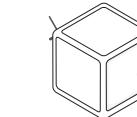
| | If one has color and the other does not, transfer color. | X | X | X |
|--|--|---|---|--|
| | | X | Synchronize video and audio recording. Link event listeners. If in the same creation and display has video, link audio and video playback if audio exists. | |
| | | | X | Transfer image or video to display. If camera is empty, show live feed of camera view. Link event listeners. |
| | | | | Transfer content and scale across displays. |

Table 1 | High-level description of what occurs when different block come into contact with each other.

Light Block

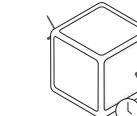


Events



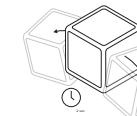
On Press

The color of the block changes to the next color in the color cycle.



On Press
and Hold

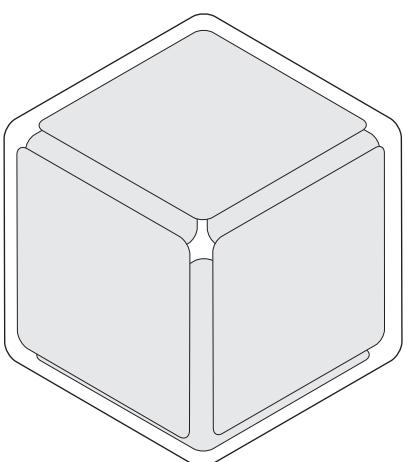
The color of the block changes and cycles through the color cycle at a rate of one color per second. When released the current color is retained.



On Shake

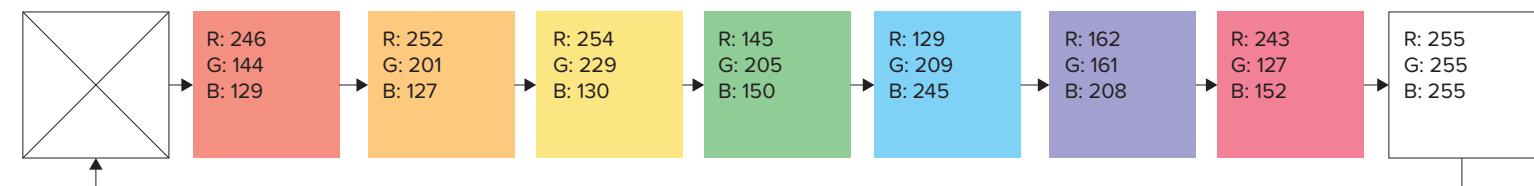
Current color fades away.

Magnetic Properties and Press Surfaces



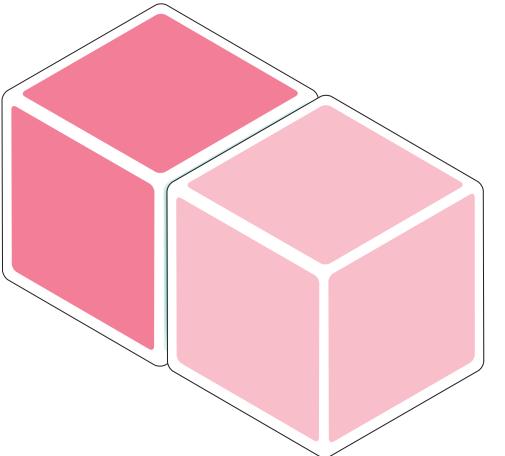
- Not Pressable or Magnetic
- Pressable and Magnetic

Color Cycle

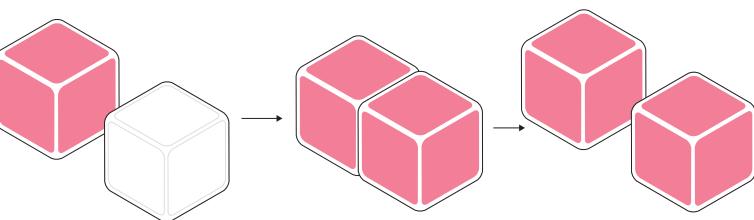


Light Block

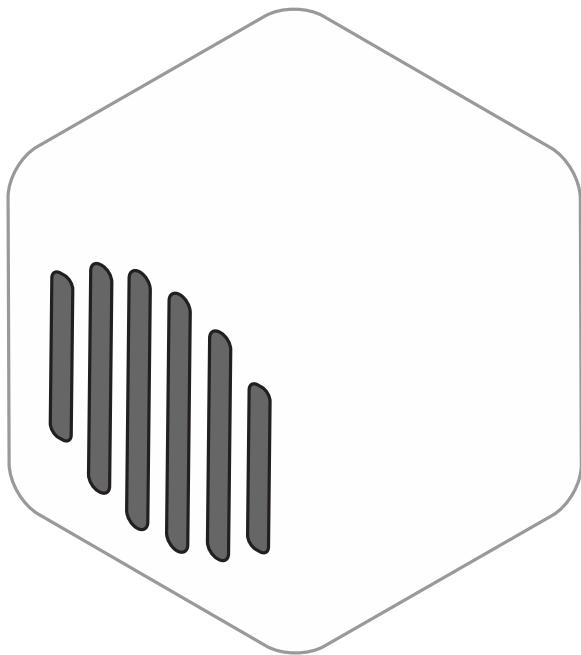
Interactions with other Blocks



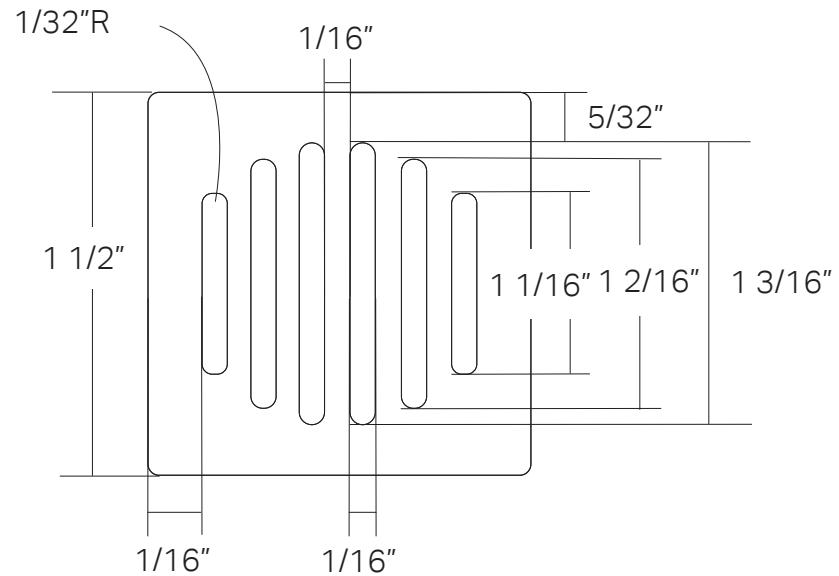
When a blank light block comes in contact with a colored block, it automatically takes on that color. When separated the color remains.



Sound Block

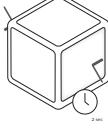
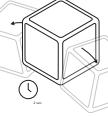


Dimensions for the Component Face

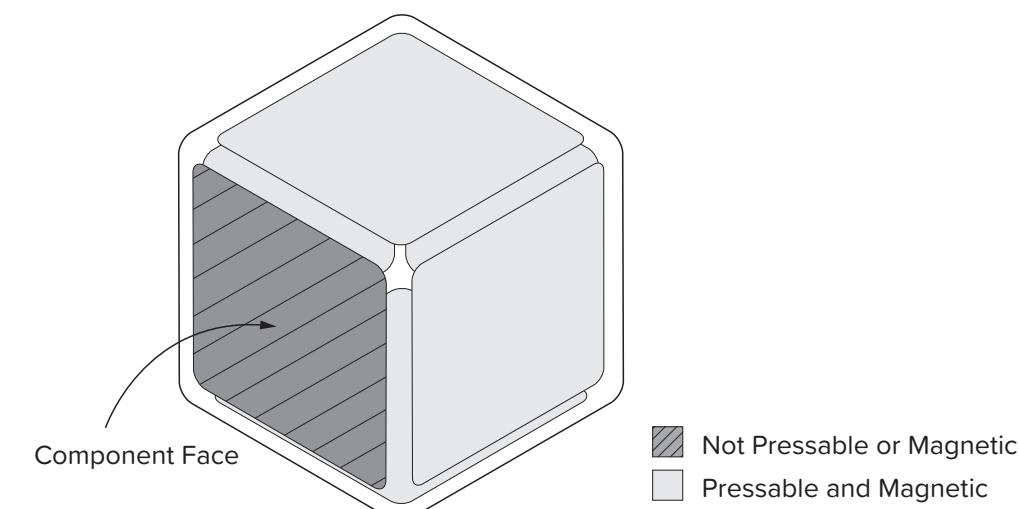


Not Drawn to Scale

Events

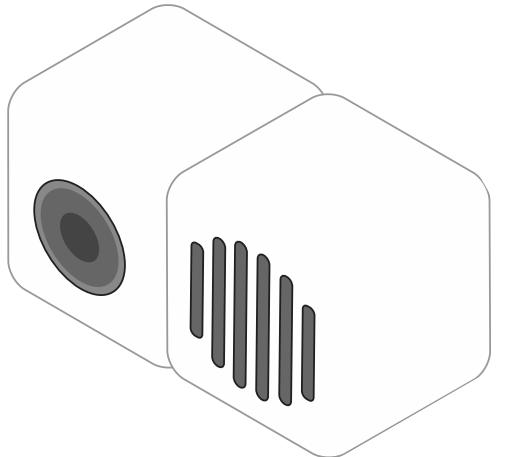
| | | |
|--|-------------------|--|
|  | On Press | Toggle audio playback between play and pause. |
|  | On Press and Hold | A short audio clip starts to be recorded. After 20 seconds or on release, the audio clip is saved. |
|  | On Shake | Current stored audio is removed. |

Magnetic Properties and Press Surfaces

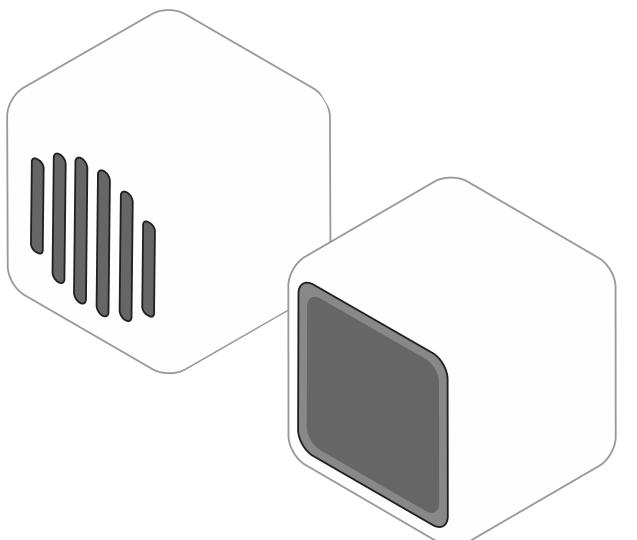


Sound Block

Interactions with other Blocks

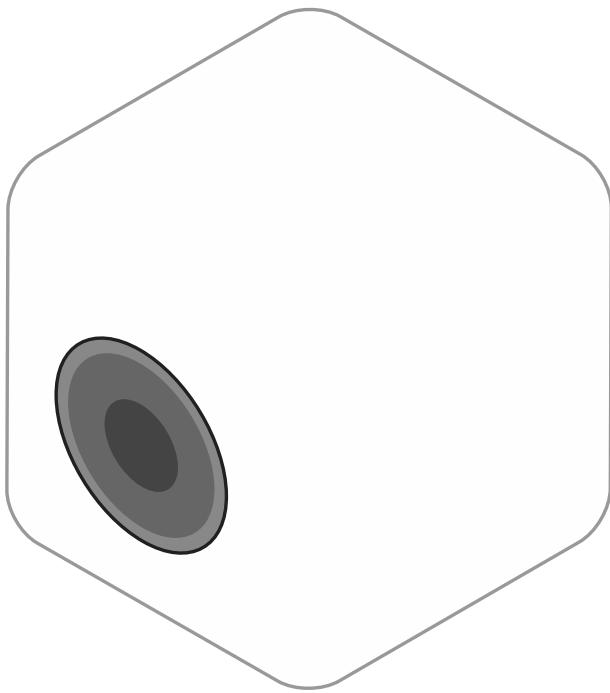


When connected with a camera block, the sound and camera blocks become linked and any event that happens on the sound or camera block is shared with the other block. For example, pressing and holding the sound block would start the recording on both blocks. The content is also linked, this synchronizes audio and video playback for use within a creation.

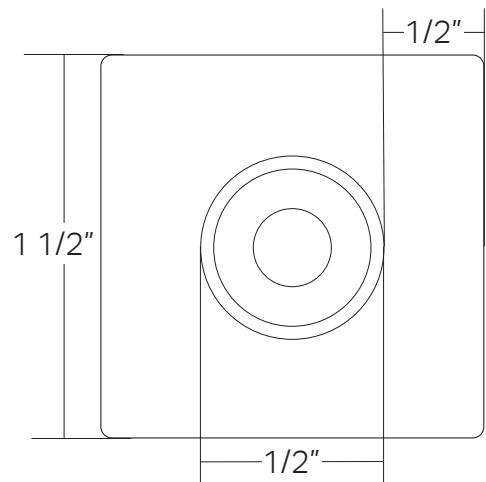


With a display block, regardless of whether they are touching or not, if the audio is linked to the visual content on the display, the speaker will play in sync with the video on the display block.

Camera Block

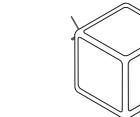


Dimensions for the Component Face



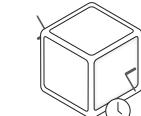
Not Drawn to Scale

Events



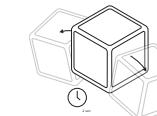
On Press

Current view from camera is saved as an image.



On Press
and Hold

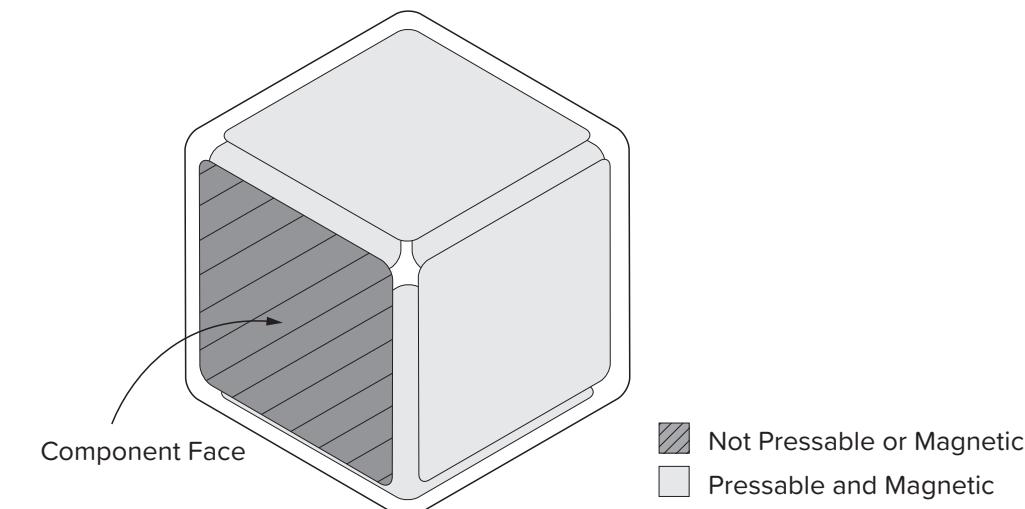
A short video clip starts to be recorded. After 20 seconds or on release, the video clip is saved.



On Shake

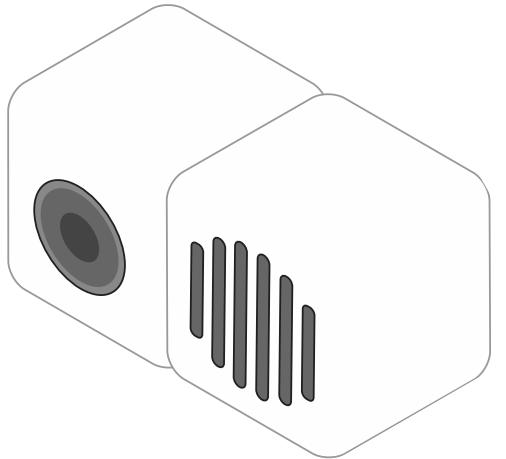
Current stored clip is removed.

Magnetic Properties and Press Surfaces

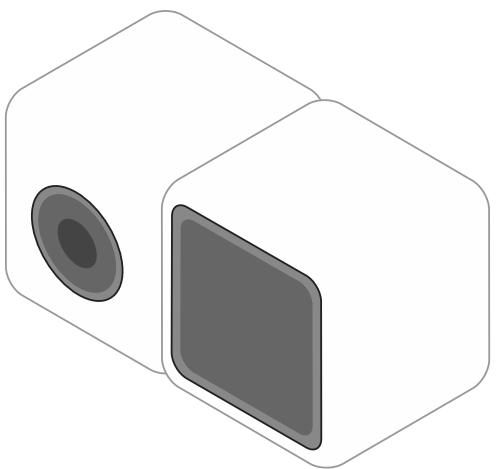


Camera Block

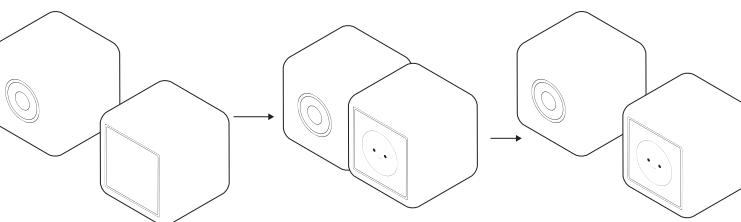
Interactions with other Blocks



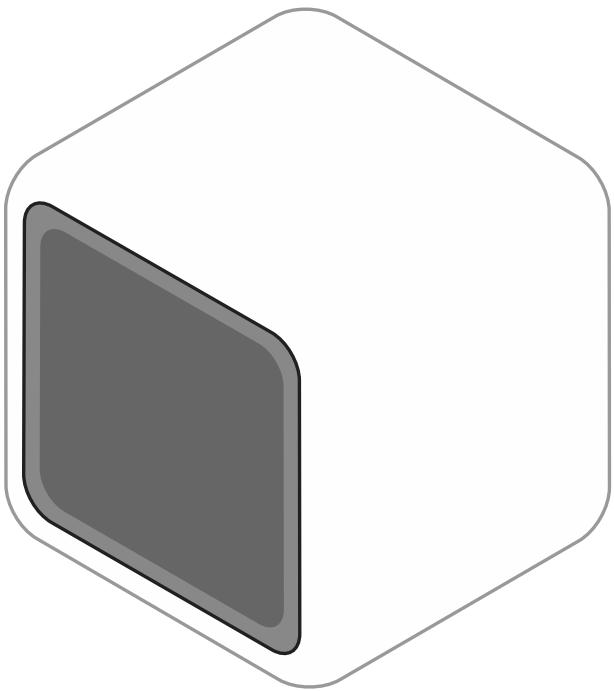
When connected with a sound block, the camera and sound blocks become linked and any event that happens on the sound or camera block is shared with the other block. For example, pressing and holding the camera block would start the recording on both blocks. The content is also linked, this synchronizes audio and video playback for use within a creation. In this later case, the two do not need to be in contact.



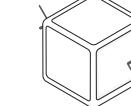
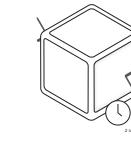
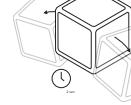
When connected with a display block, the camera block transmits a live view to the display. Once an image or short video clip is recorded, the image is saved or the video is looped on the display block. When separated this content remains on the display and the camera is cleared.



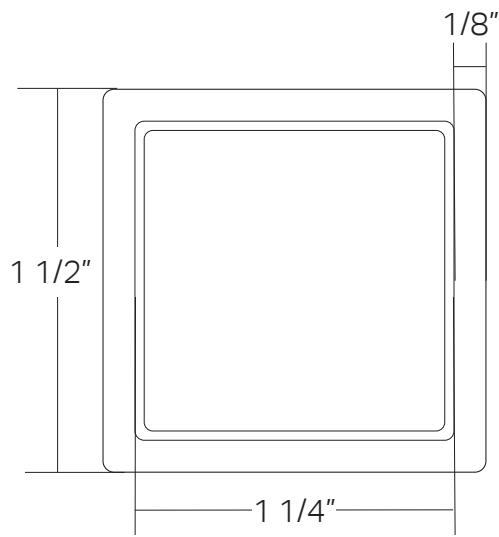
Display Block



Events

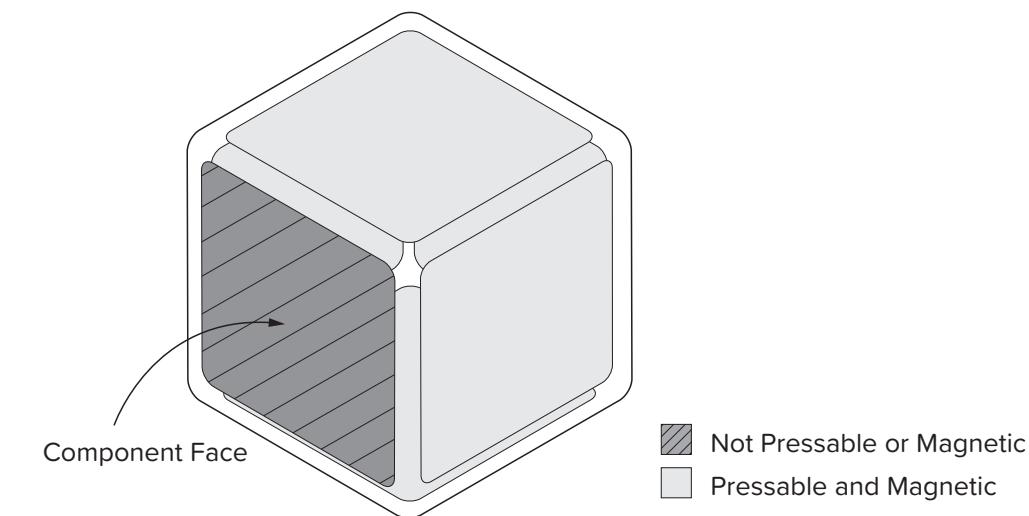
| | | |
|--|-------------------|---|
|  | On Press | Toggles video playback between play and pause. |
|  | On Press and Hold | N/A |
|  | On Shake | Current stored image or video clip fades away and block is cleared. |

Dimensions for the Component Face



Not Drawn to Scale

Magnetic Properties and Press Surfaces

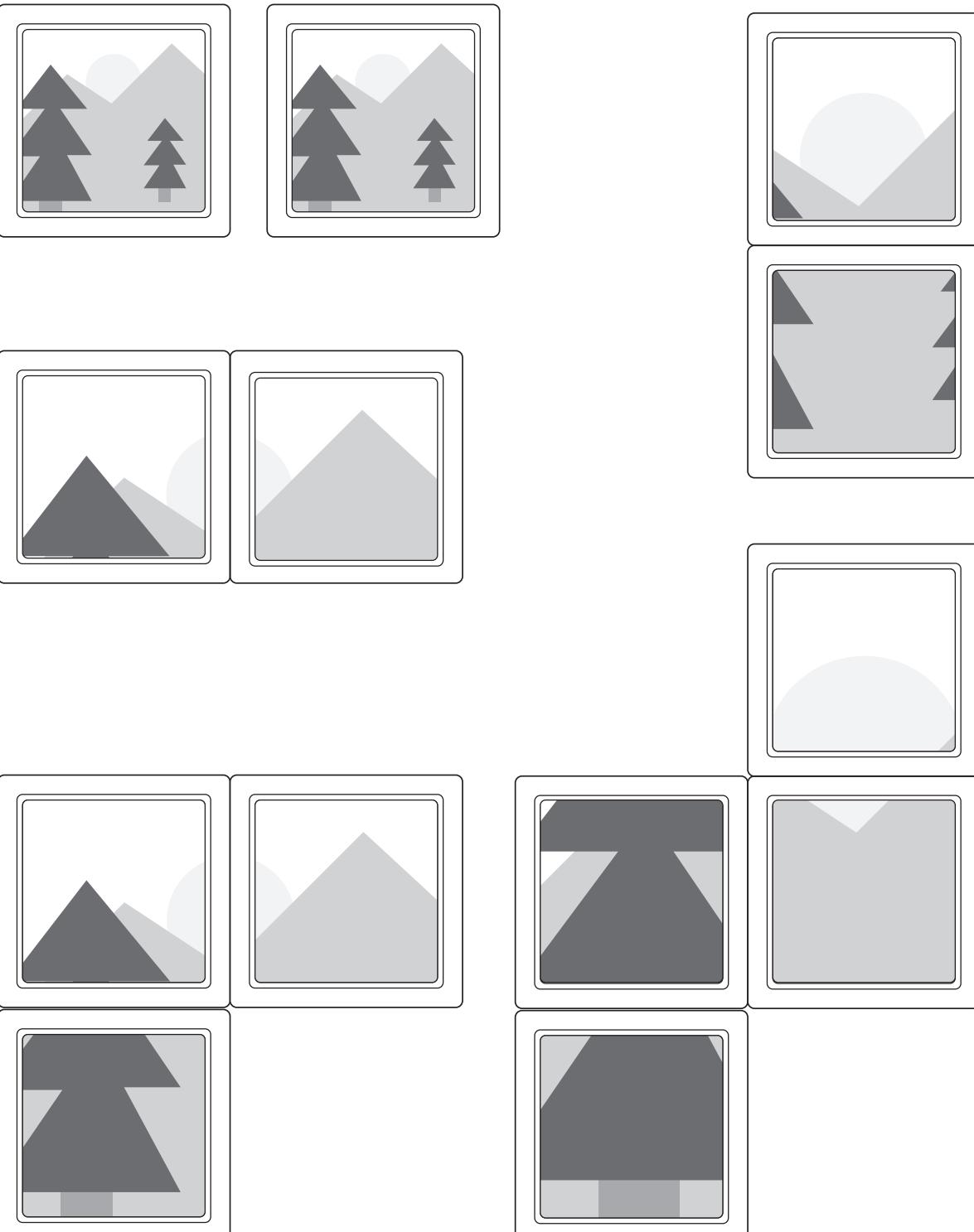
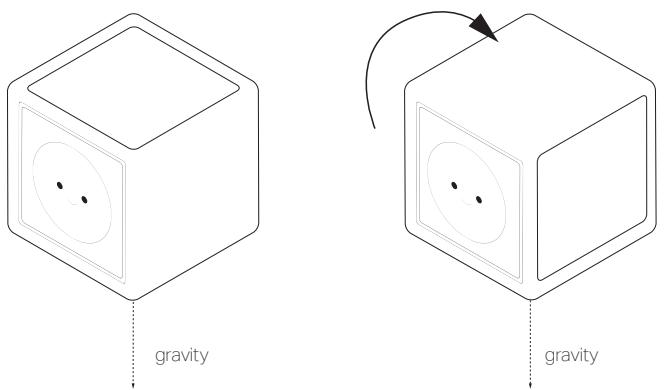


- Not Pressable or Magnetic
- Pressable and Magnetic

Multi-Display Interactions and Image Orientation

Image Orientation

Images are always displayed with the bottom of the image in the direction of gravity. The image does not follow the rotation of the block.

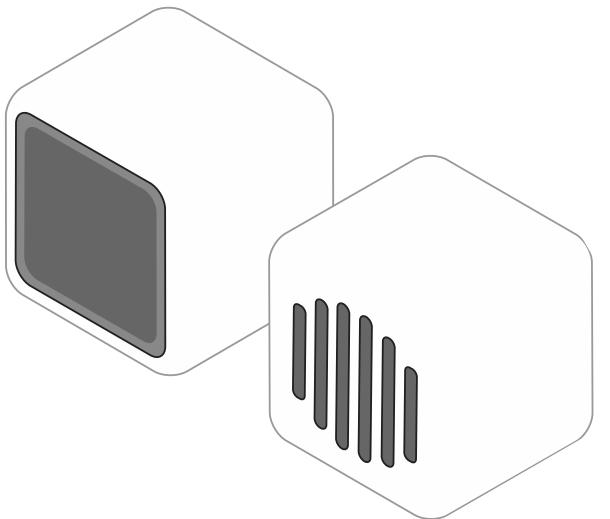


Multi-Display Interactions

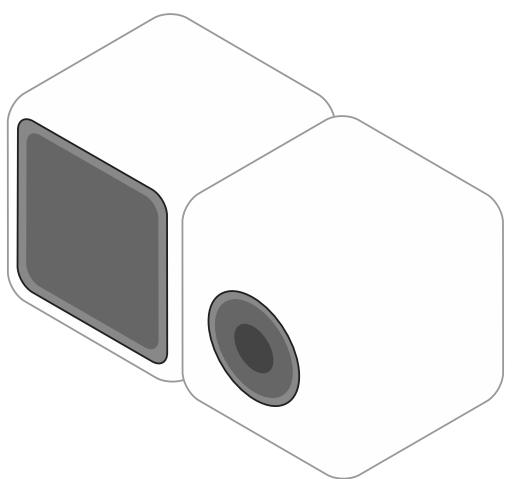
As blank display blocks are added to another display with any visual content, the content scales to fill the multiple displays. This does not effect displays that have visual content of their own. This behavior continues for any number of display blocks in any formation. If a display is separated from the group, the image remains on that display in the smallest scale until shaken or combined with other displays.

Display Block

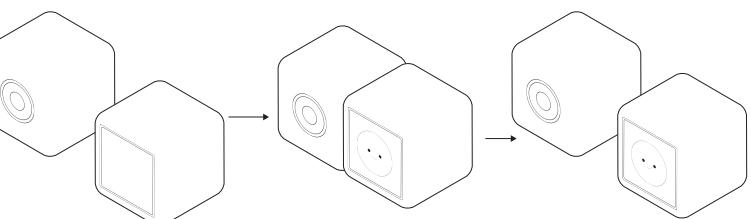
Interactions with other Blocks



With a sound block, regardless of whether they are touching or not, if the audio is linked to the visual content on the display, the speaker will play in sync with the video on the display block.



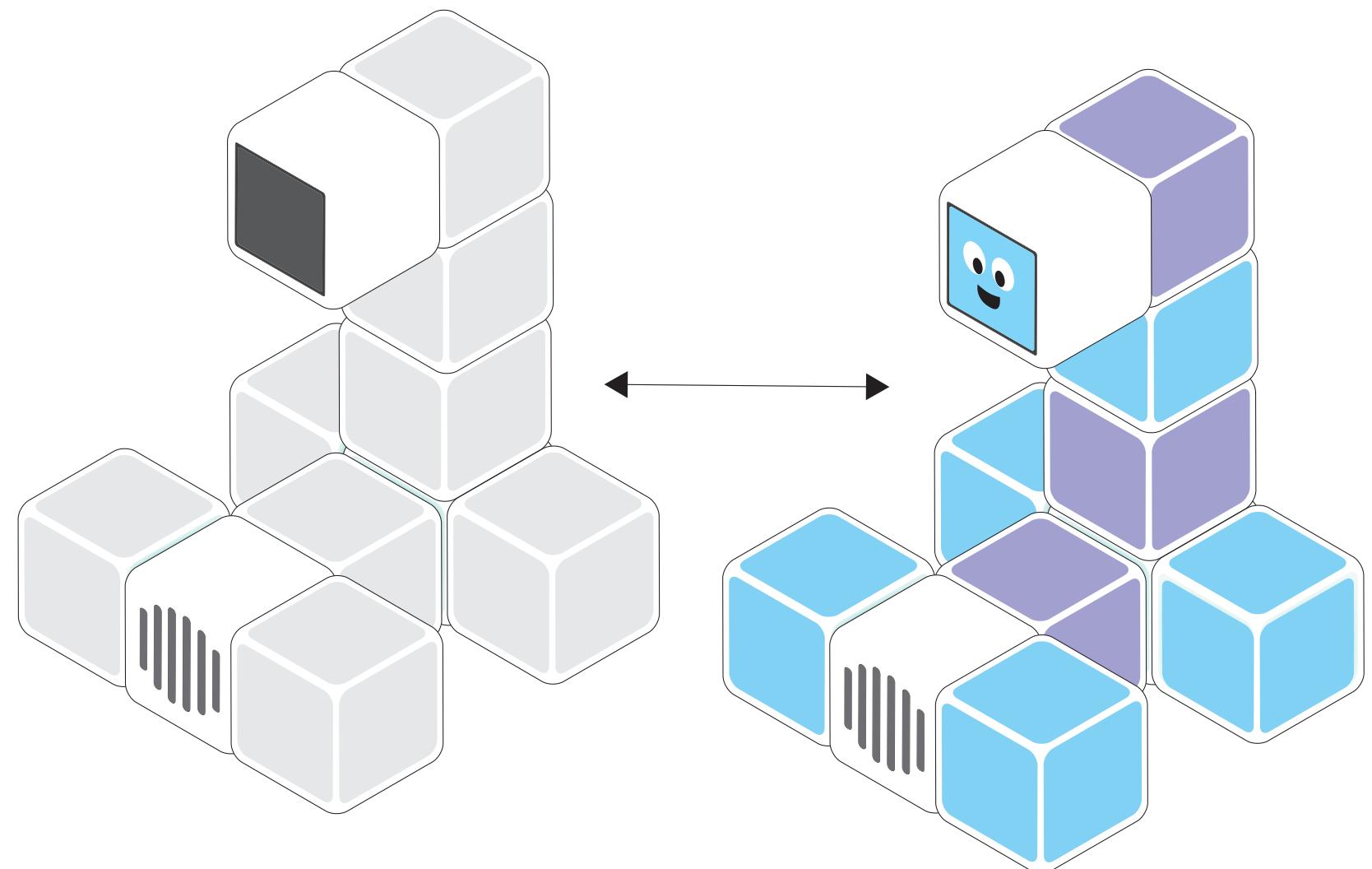
When connected with a camera block, the display block receives a live view from the camera. Once an image or short video clip is recorded, the image is saved or the video is looped on the display block. When separated this content remains on the display and the camera is cleared.



Creation Unveiling and Media Playback After Assembly

A special moment occurs when one user has completed building another user's creation with their blocks. Until this moment, the user only sees blank blocks on the iPad instruction screen as well as, blank blocks in the physical world. Once assembly is complete, the creation comes to life with light, video, images, and audio.

While videos will continue to loop until cleared, the audio playback plays through once until the user presses the block to play it again.



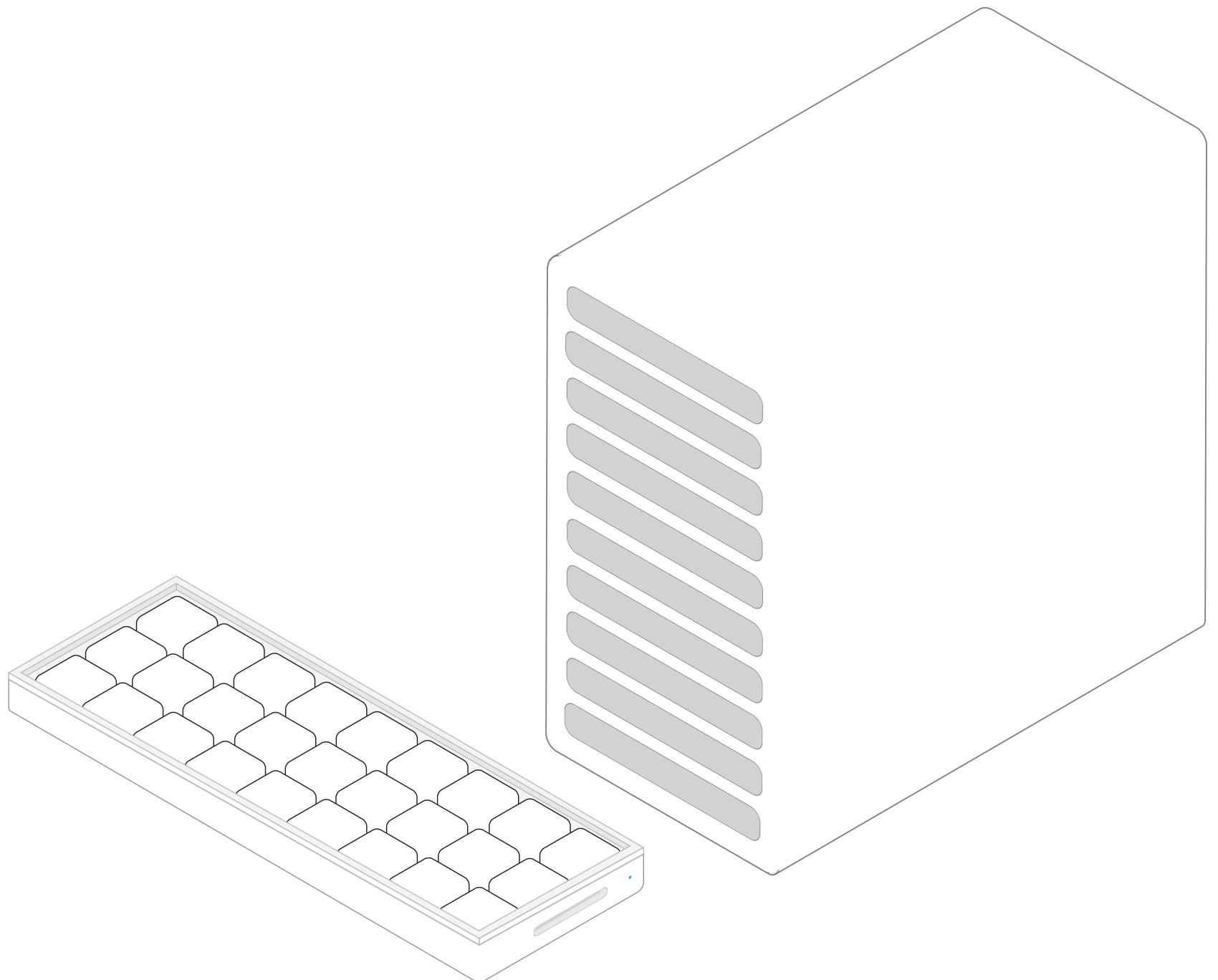
Holding Case and Charging Station

Holding Case

27 blocks come in a standard Buddy Block set. The holding case is used as a charging container with a charging coil in the base. The case holds the blocks one layer high. It can be plugged-in to charge individually or be inserted into the charging station.

Charging Station

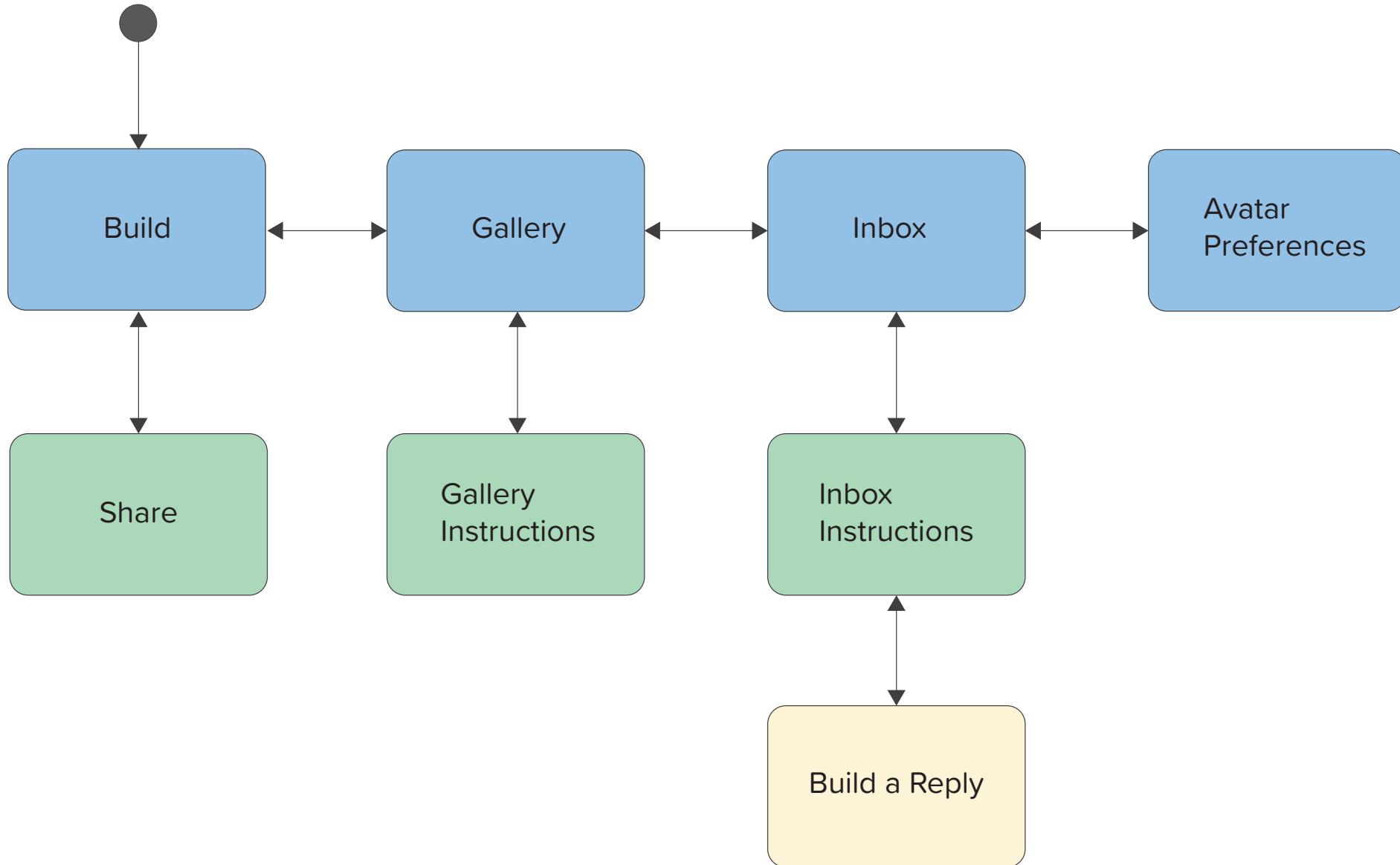
The charging station houses and charges multiple cases. Cases slide into the charging station and the charging port receives the power connector located in inside back of each of the shelves of the station. The charging station is then plugged into a standard power outlet.



Mobile Application Design Specification

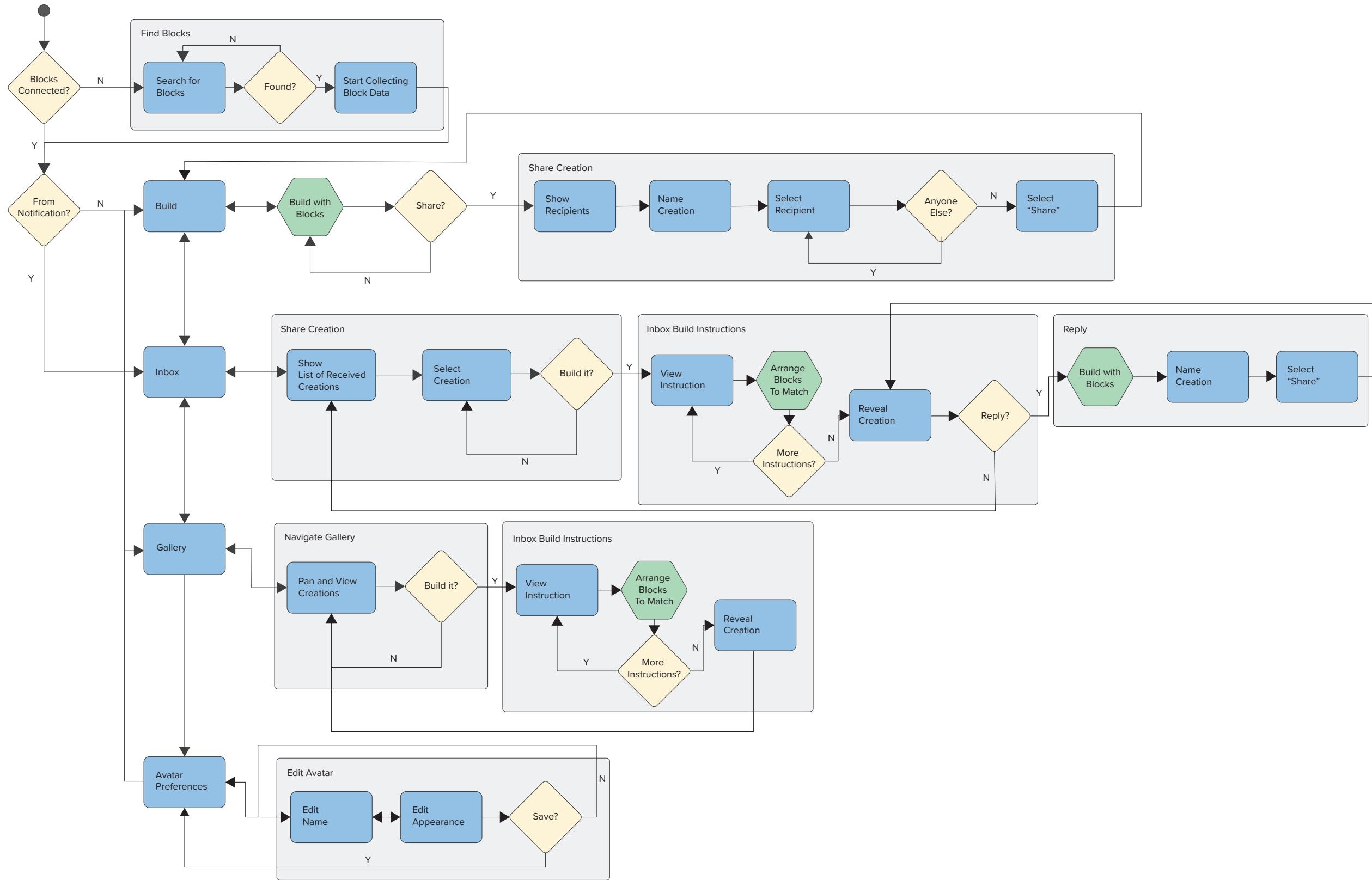
All aspects of the digital component of the experience are discussed in this section. From high level application architecture to detailed interface component specification.

Application Screen Hierarchy



The mobile application is designed to be auxiliary to the physical experience with the block. However, it is critical to the overall goal of Buddy Blocks. The application's main purpose is to facilitate the sharing and receiving of creations from other patients. This is done digitally since physically sharing the blocks is not allowed in the dialysis unit due to infection control. The application also allows for viewing and building creations that have been shared with everyone in the gallery.

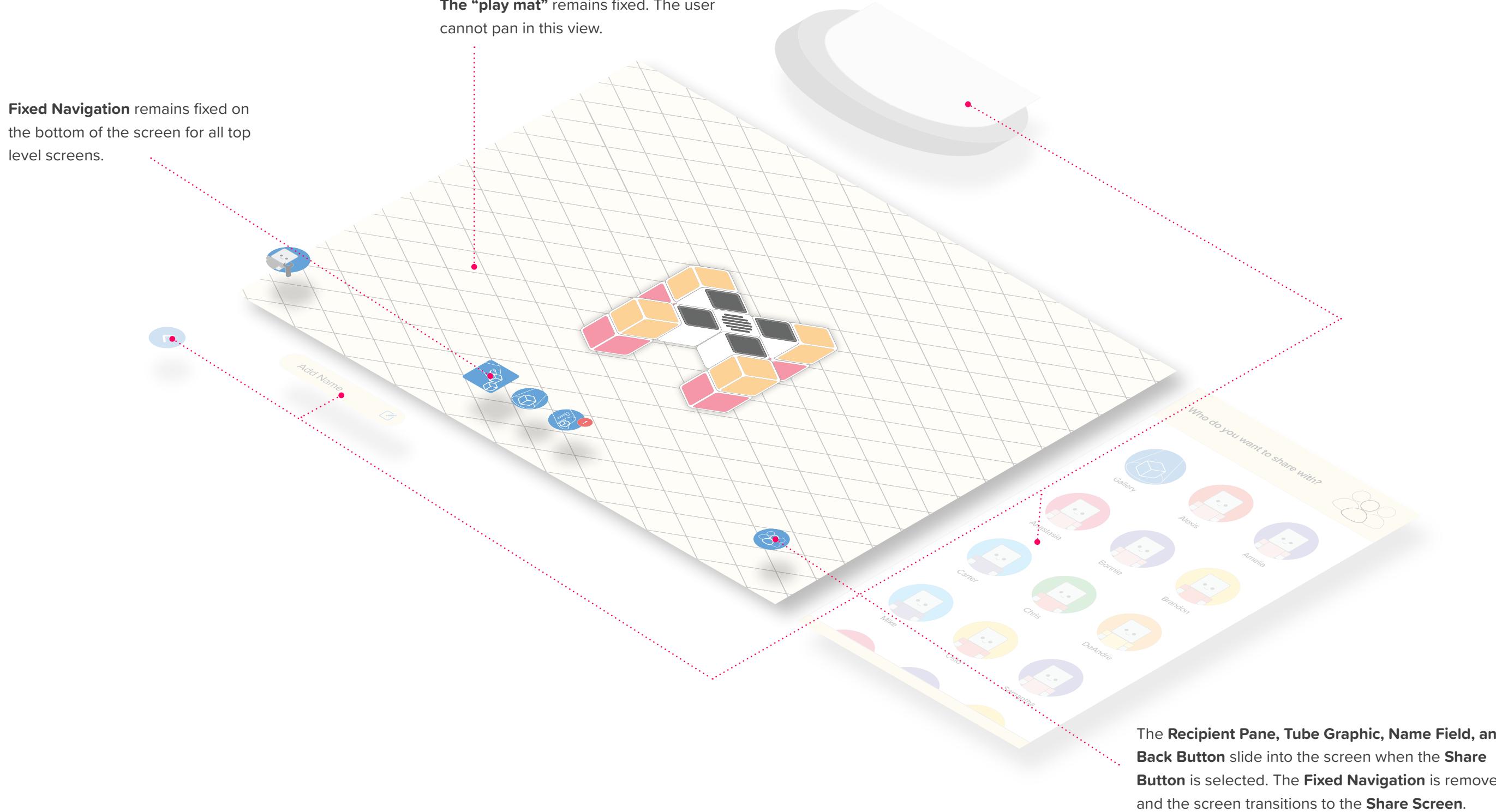
Interaction Flow



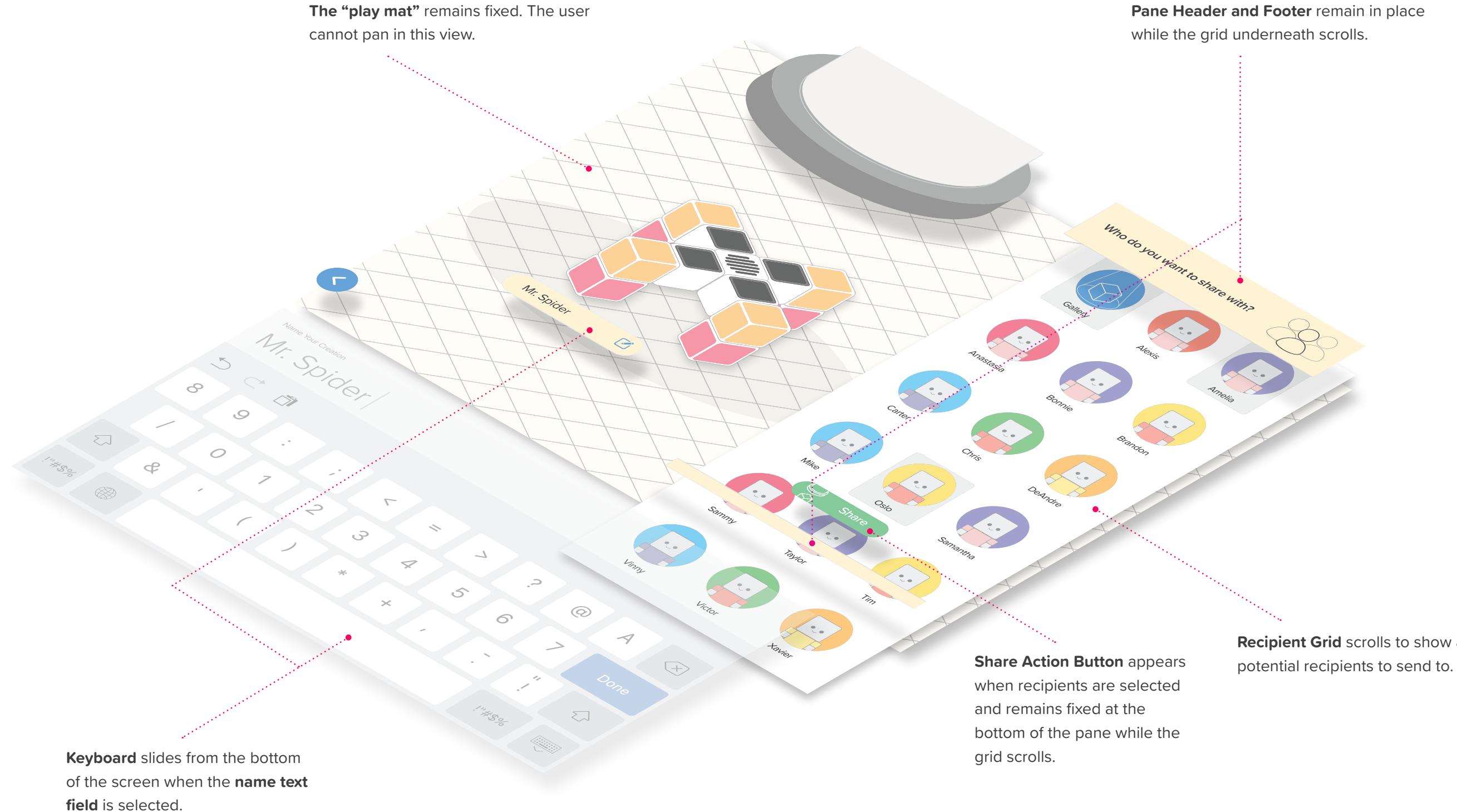
Interaction Model

The four main screens; the build, share, gallery, and inbox screens are discussed here. The interface elements are layered and expanded. Desired interactions with the components are described.

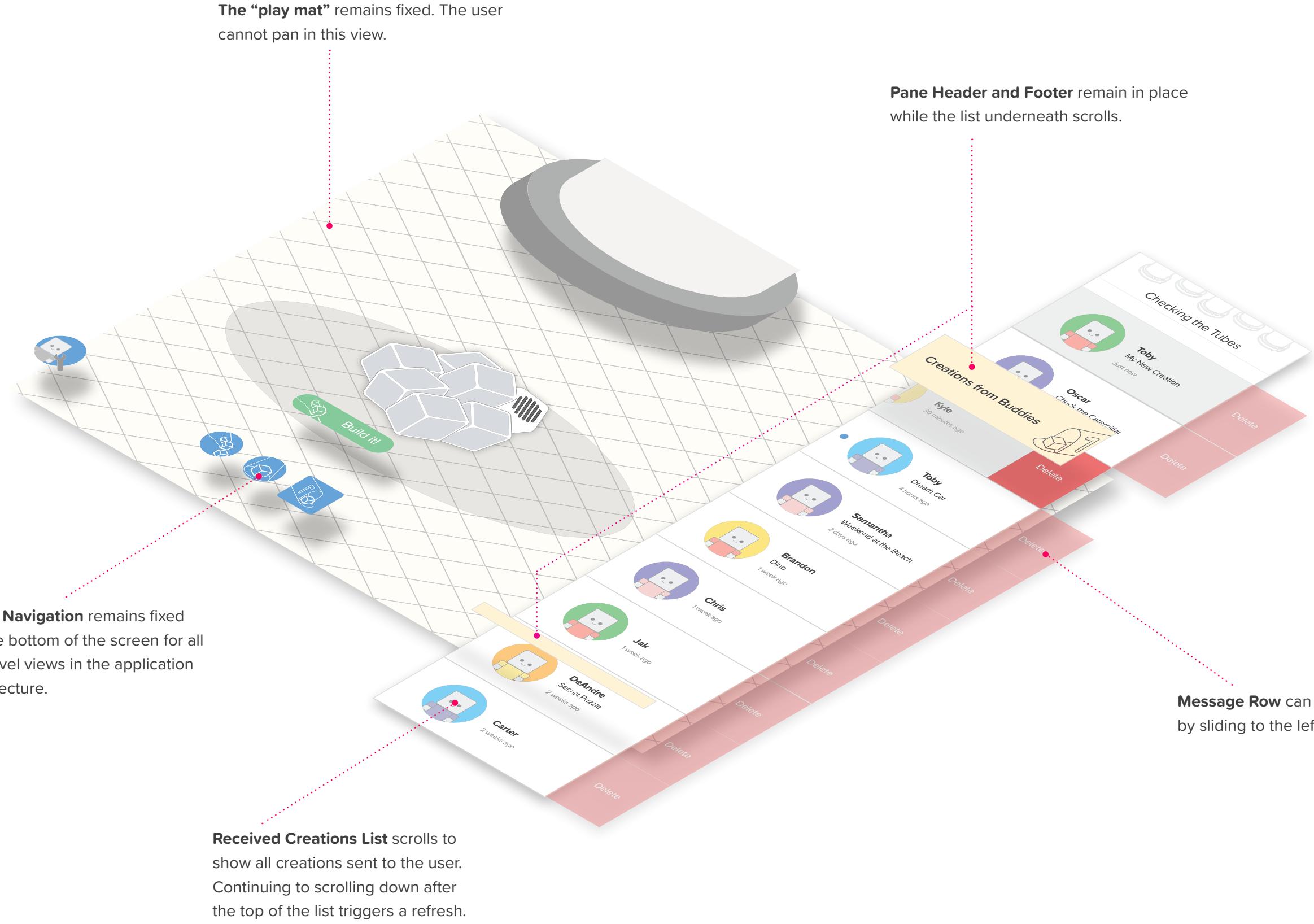
Build



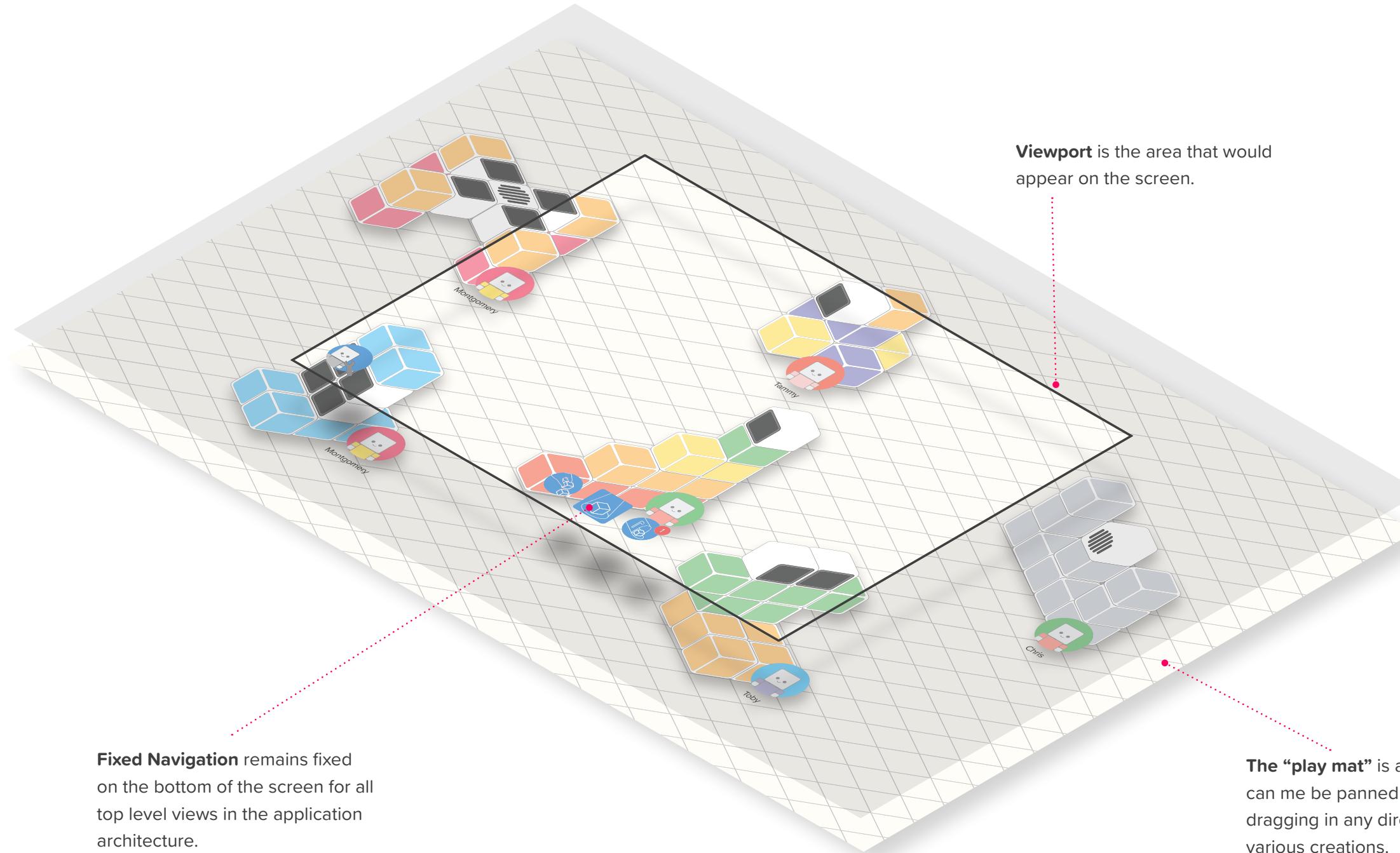
Share



Inbox



Gallery



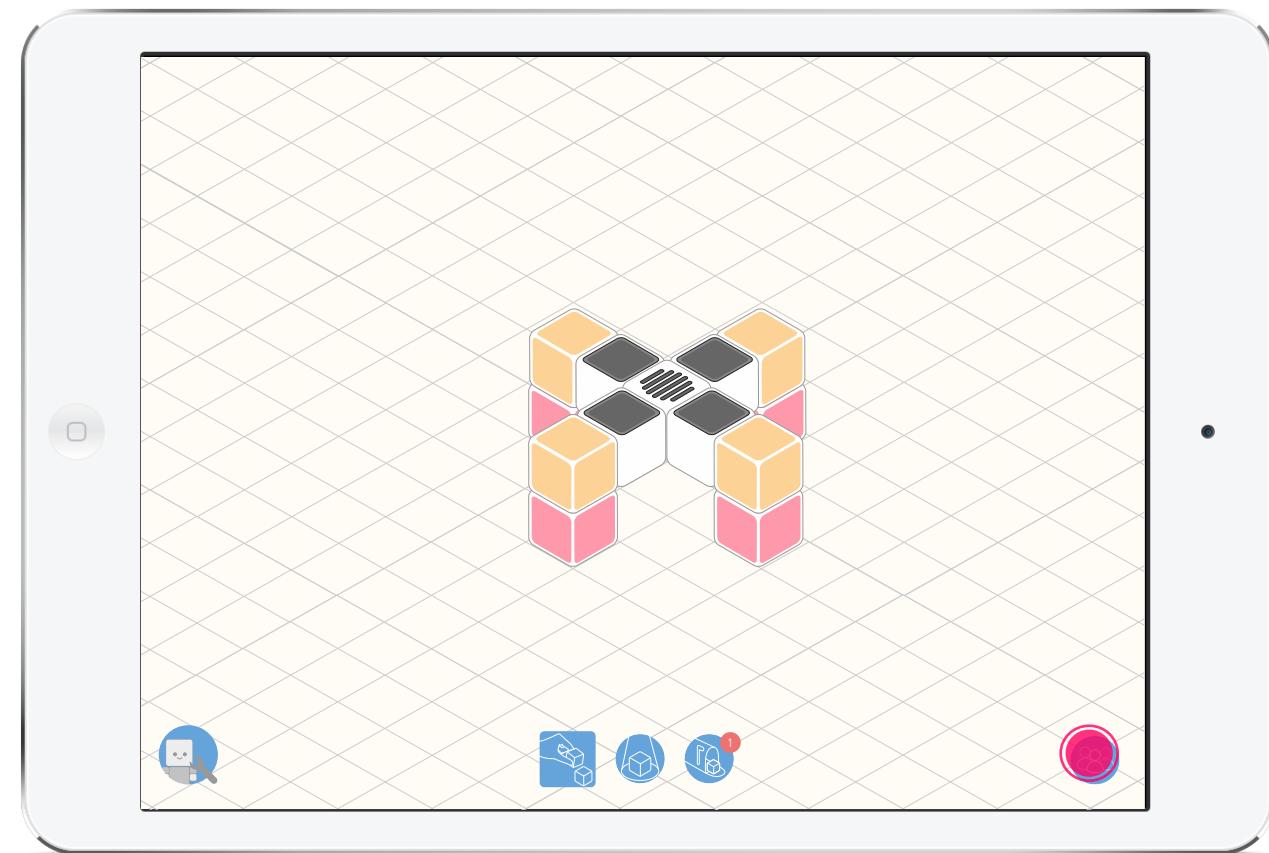
Hero Flows

The three main use cases are explored using interface mock-ups to show the standard flow. These use cases are building to share, exploring other creations to build, and receiving and building creations from others.

Flow 1 — Create and Share

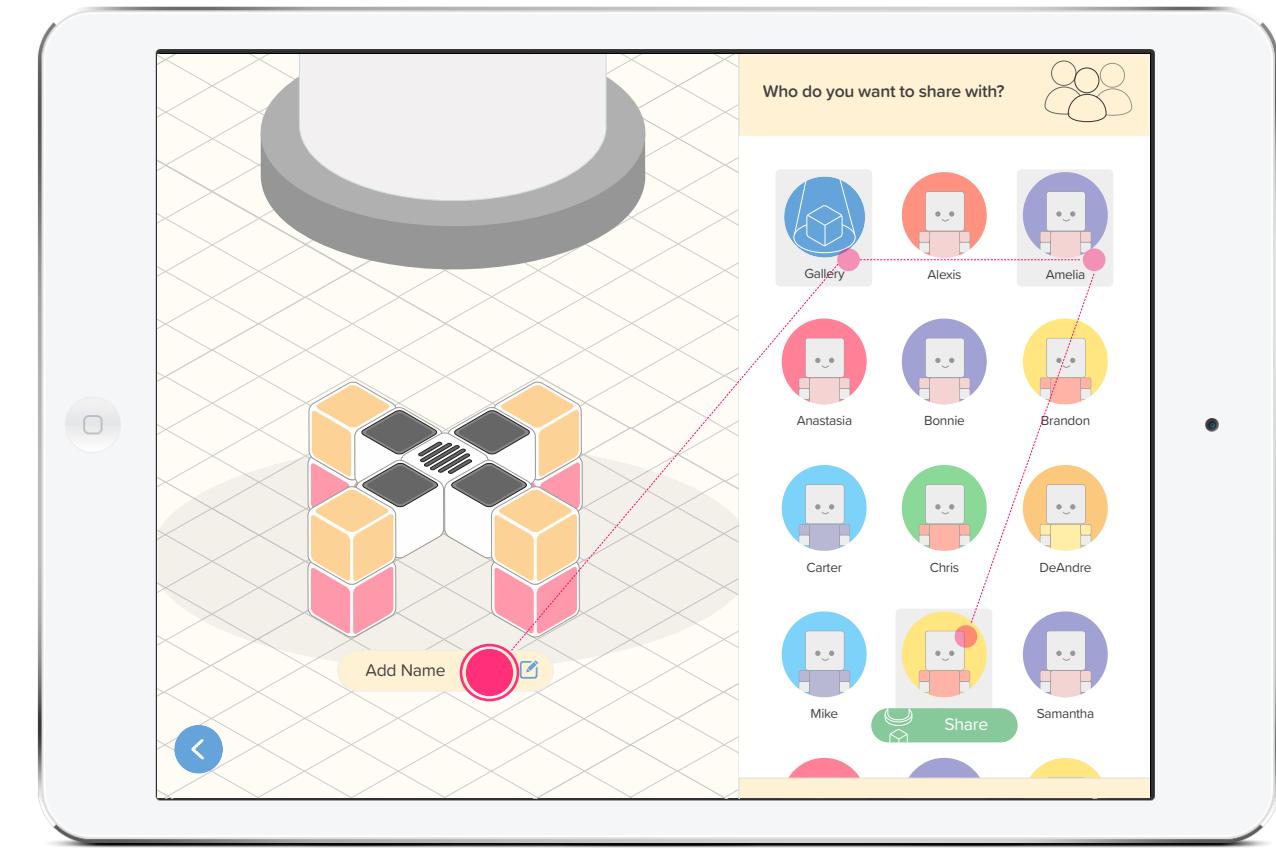
1.1 | Starting in Build and Sharing

Opening the application lands on the build screen, showing the user's current creation in the physical world. Once satisfied with the creation the user selects share



1.2 | Selecting Recipients

The user selects who they would like to have receive their creation. The user then goes to edit the name of the creation.



Flow 1 — Create and Share

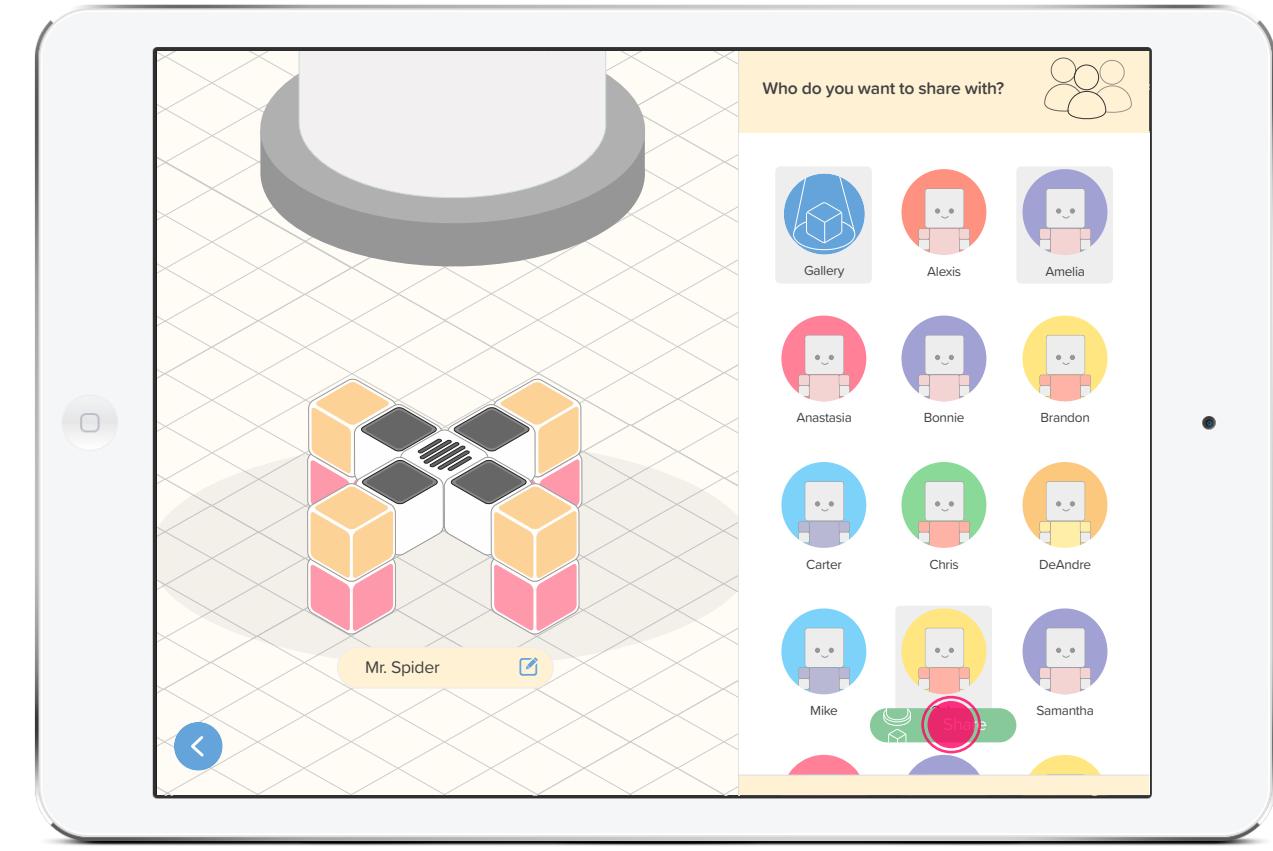
1.3 | Edit Name of Creation

The user changes the name and selects “Done”



1.4 | Share Creation

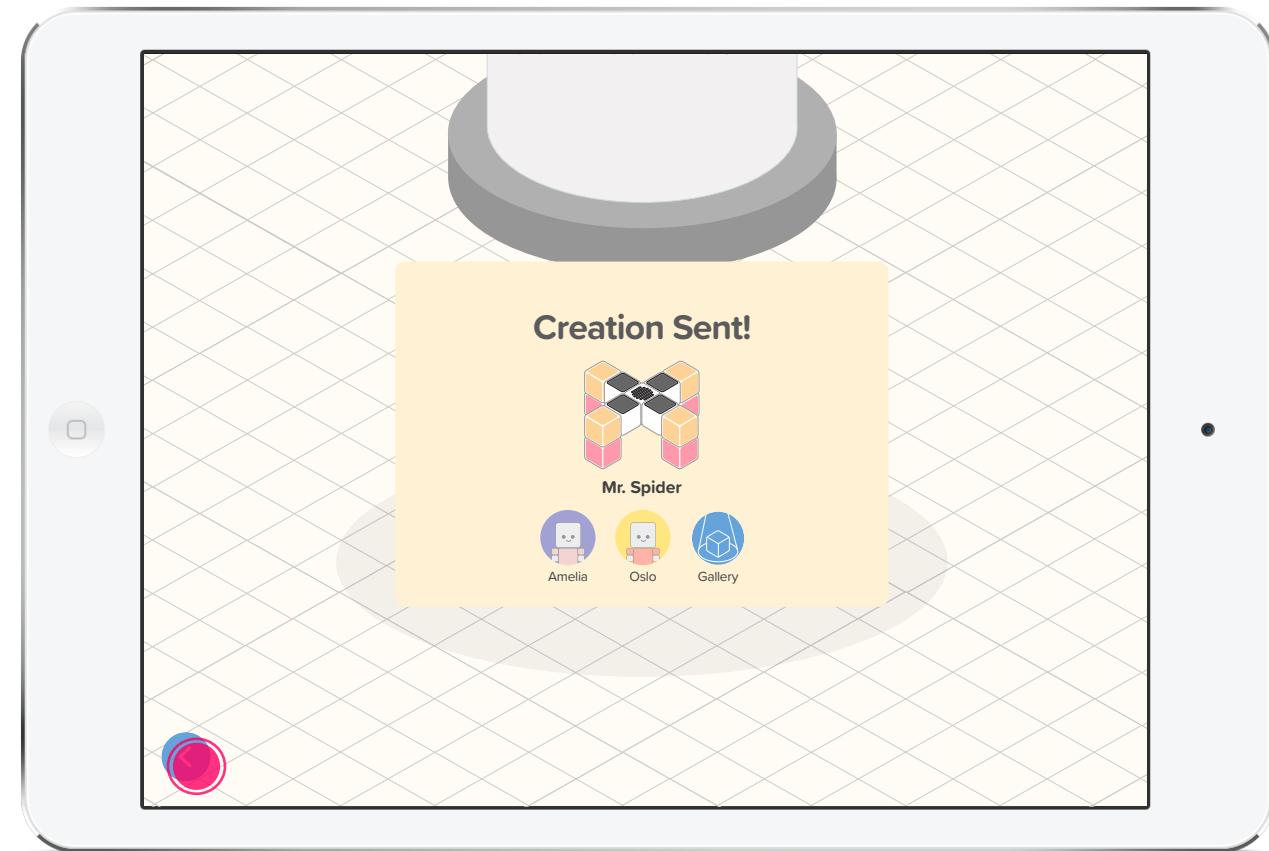
The user taps “Share” to send each recipient the creation.



Flow 1 — Create and Share

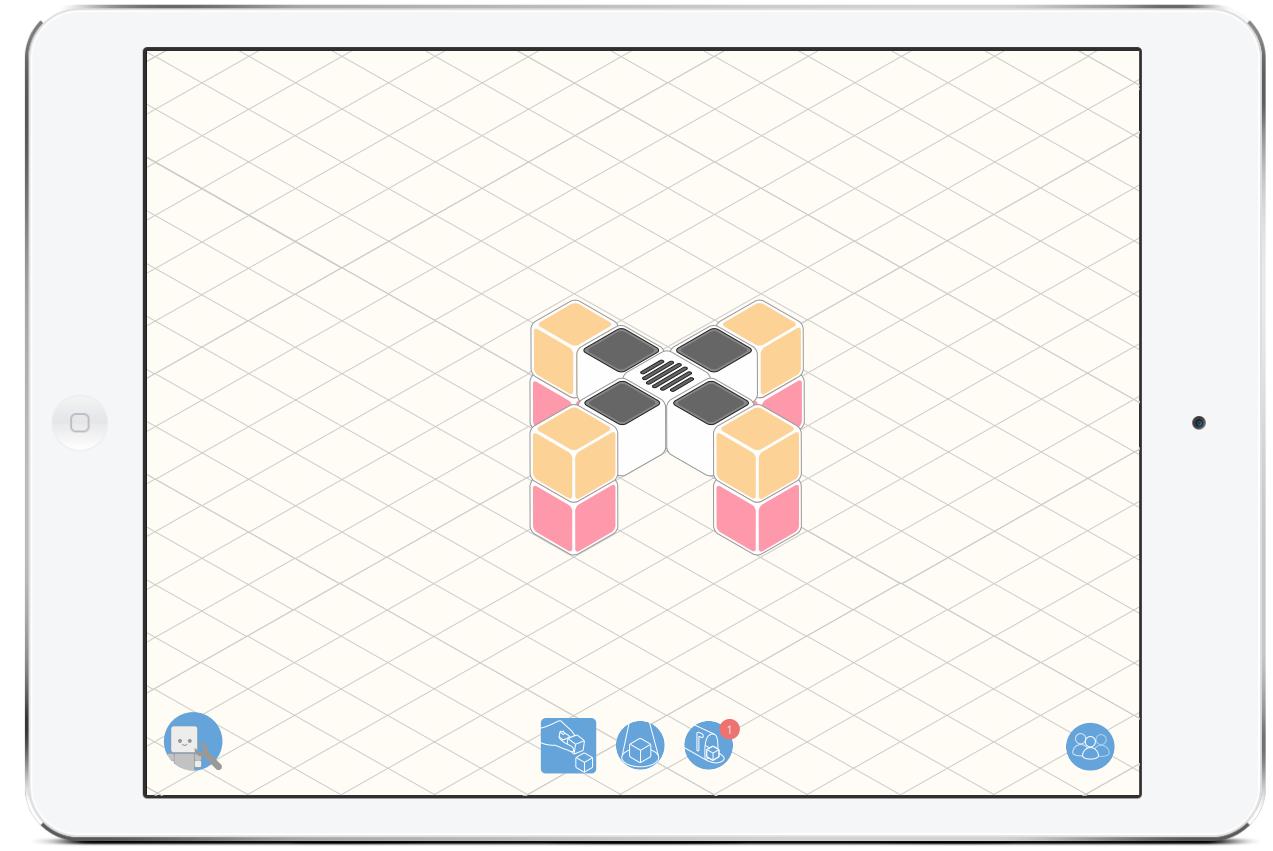
1.5 | Share Confirmation

The user is shown a thumbnail of the creation they built, its name, and the recipient(s) of the creation. They are automatically brought to the next screen or they can press the back button.



1.6 | Continue Creating

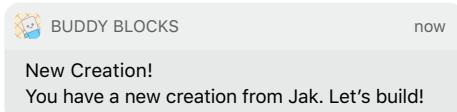
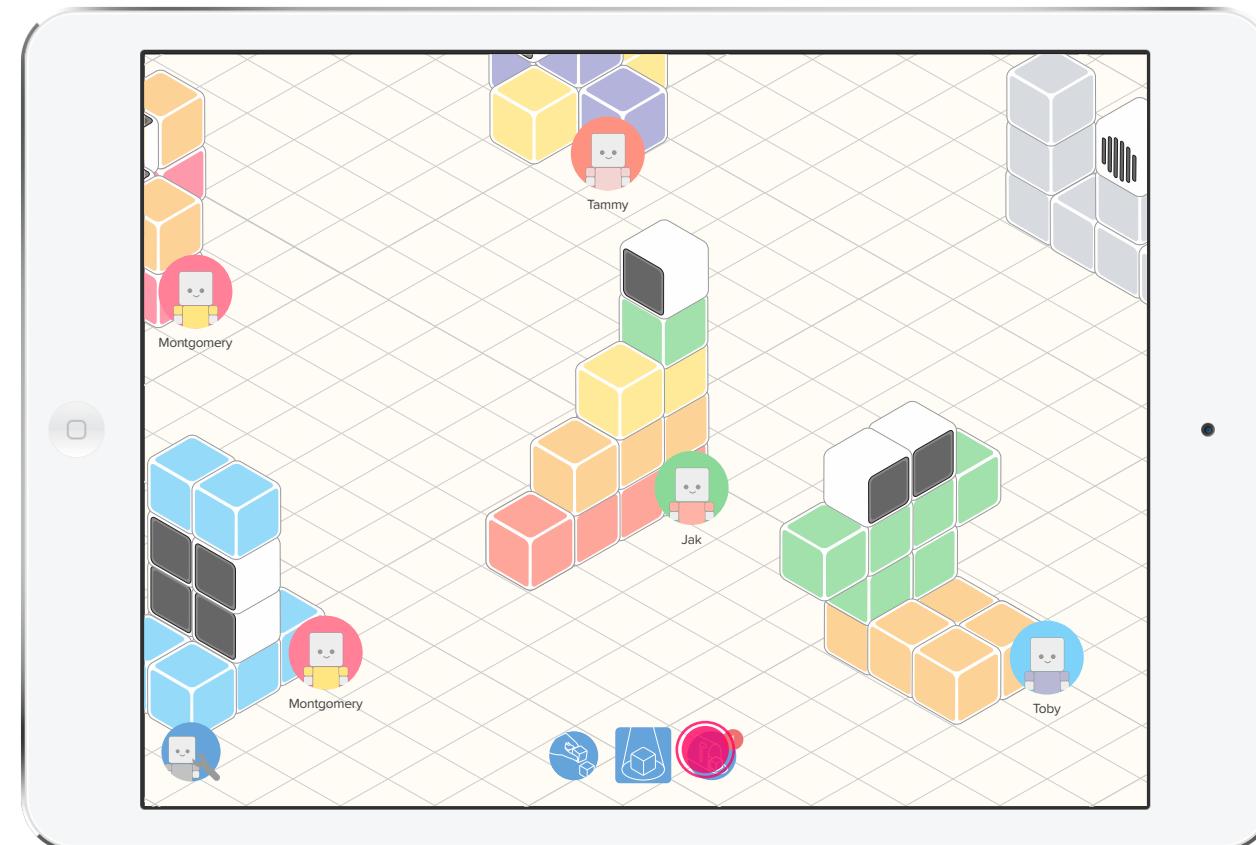
The user is brought back to the build screen.



Flow 2 — Receive and Build

2.1 | Notification

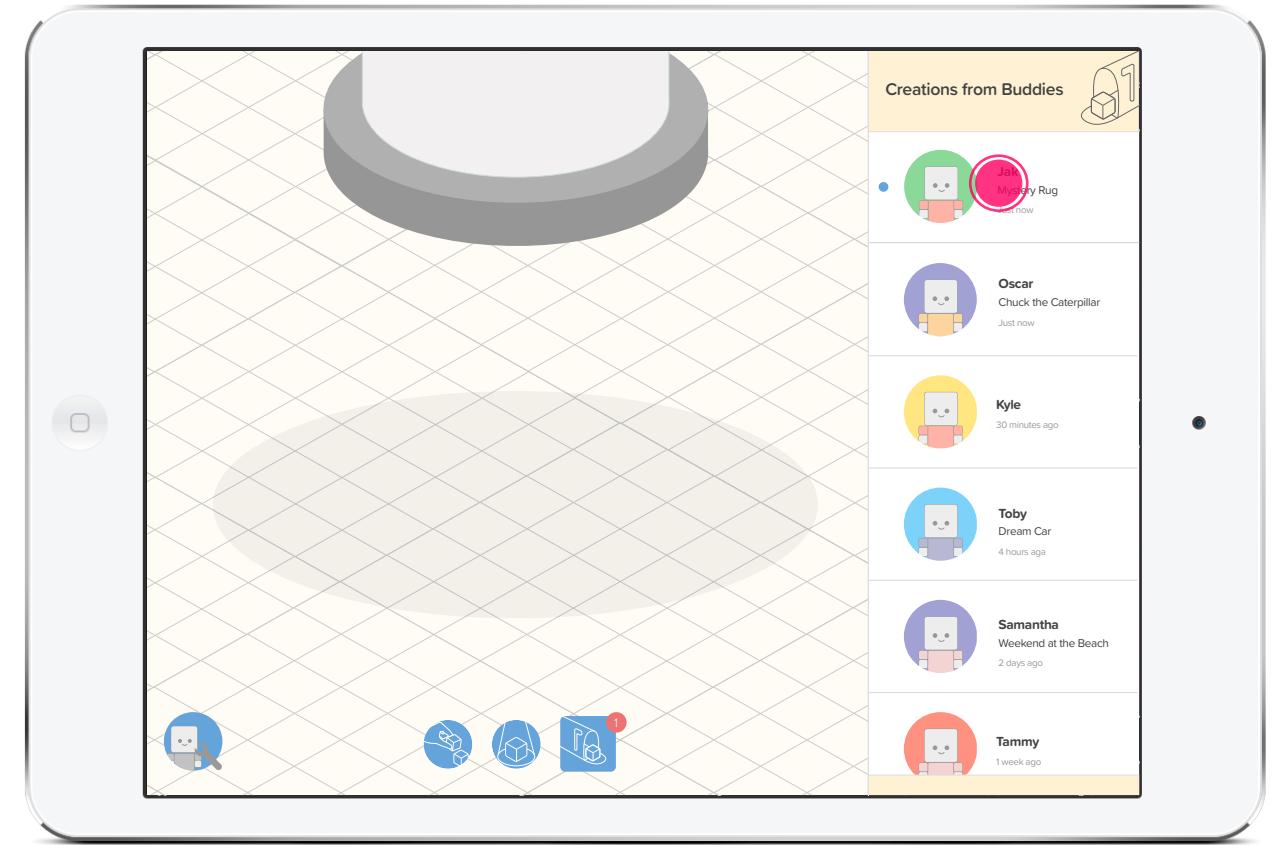
In either the build or gallery screen, the user notices a notification on the inbox icon and taps it to view their new message.



A system level notification would bring the user directly to inbox screen, if selected.

2.2 | Selecting Unread Message

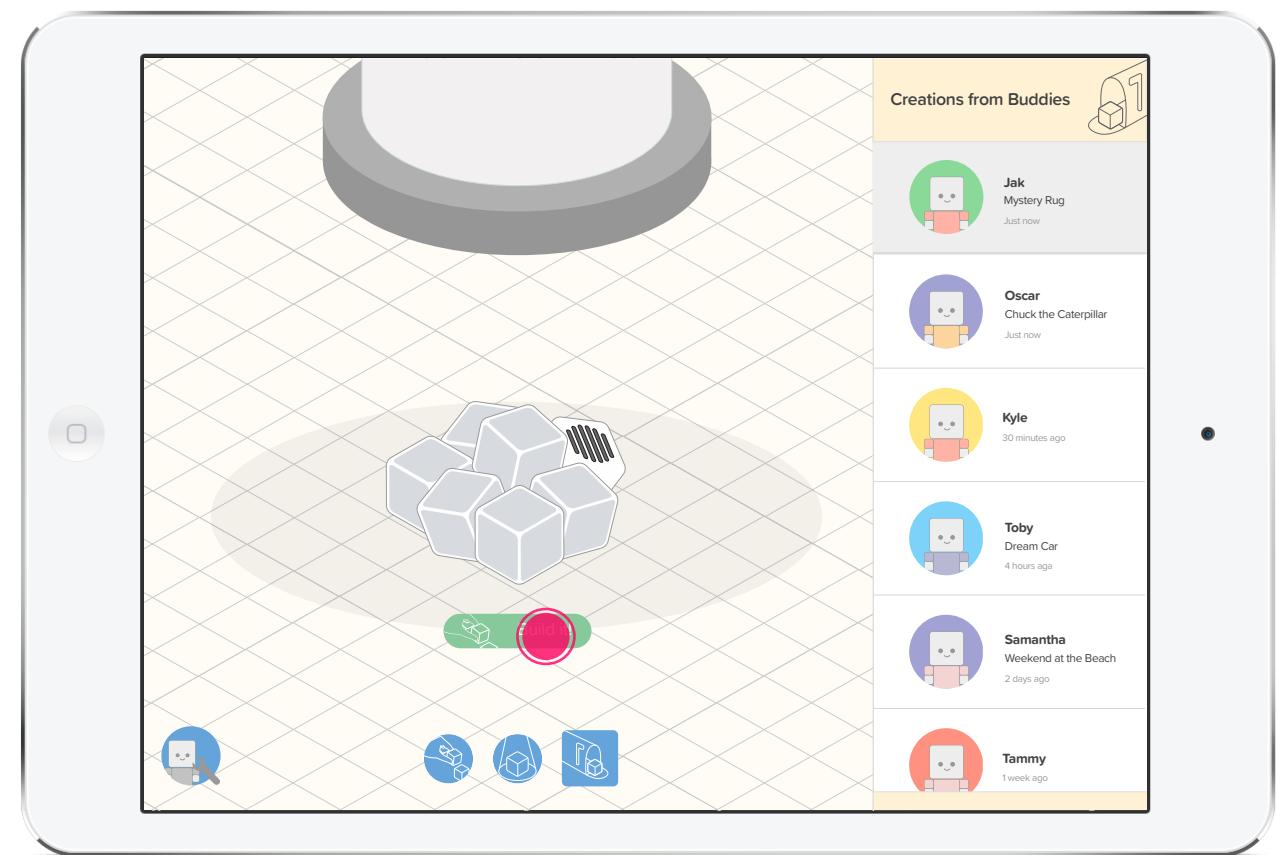
The user selects the unread creation, by tapping on the list entry.



Flow 2 — Receive and Build

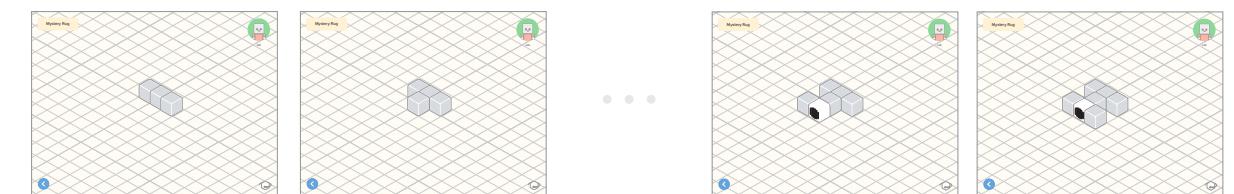
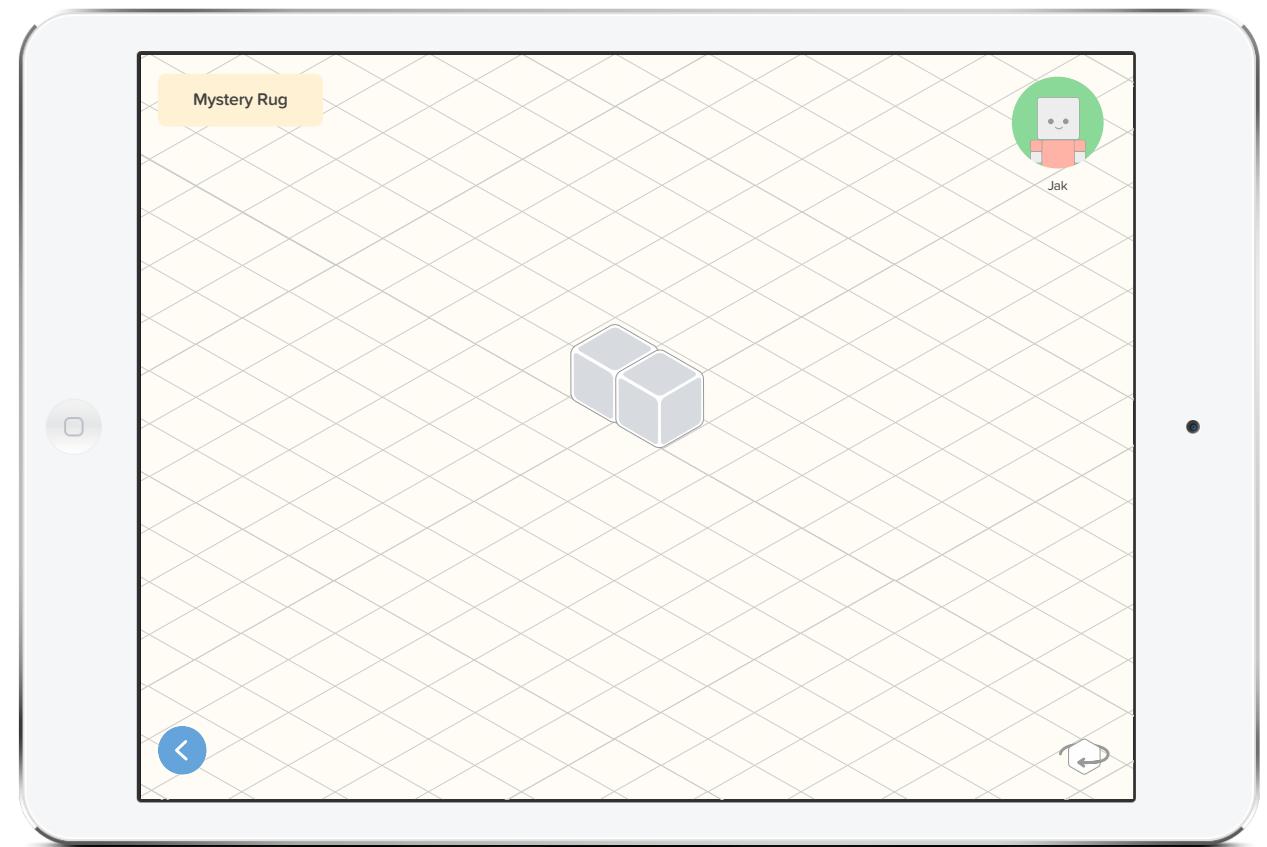
2.3 | Decide to Build

The user decides to build the creation and taps the “Built It!” action button. This takes the user to the instructions for that creation.



2.4 | Piece-by-Piece Instructions

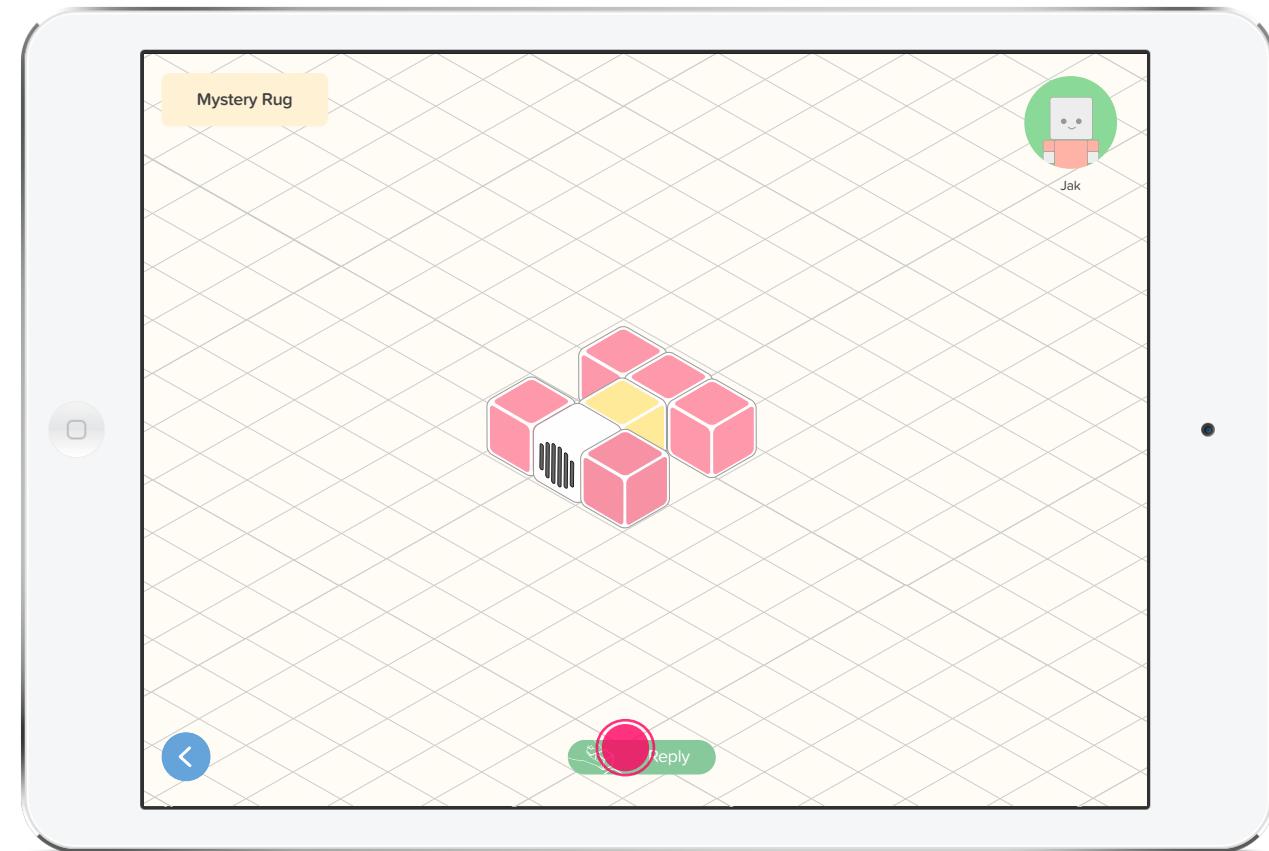
The user gets the first piece-by-piece instruction. The application automatically advances as the correct blocks in the real world connect. Users can rotate the view by tapping the rotate icon (bottom-right).



Flow 2 — Receive and Build

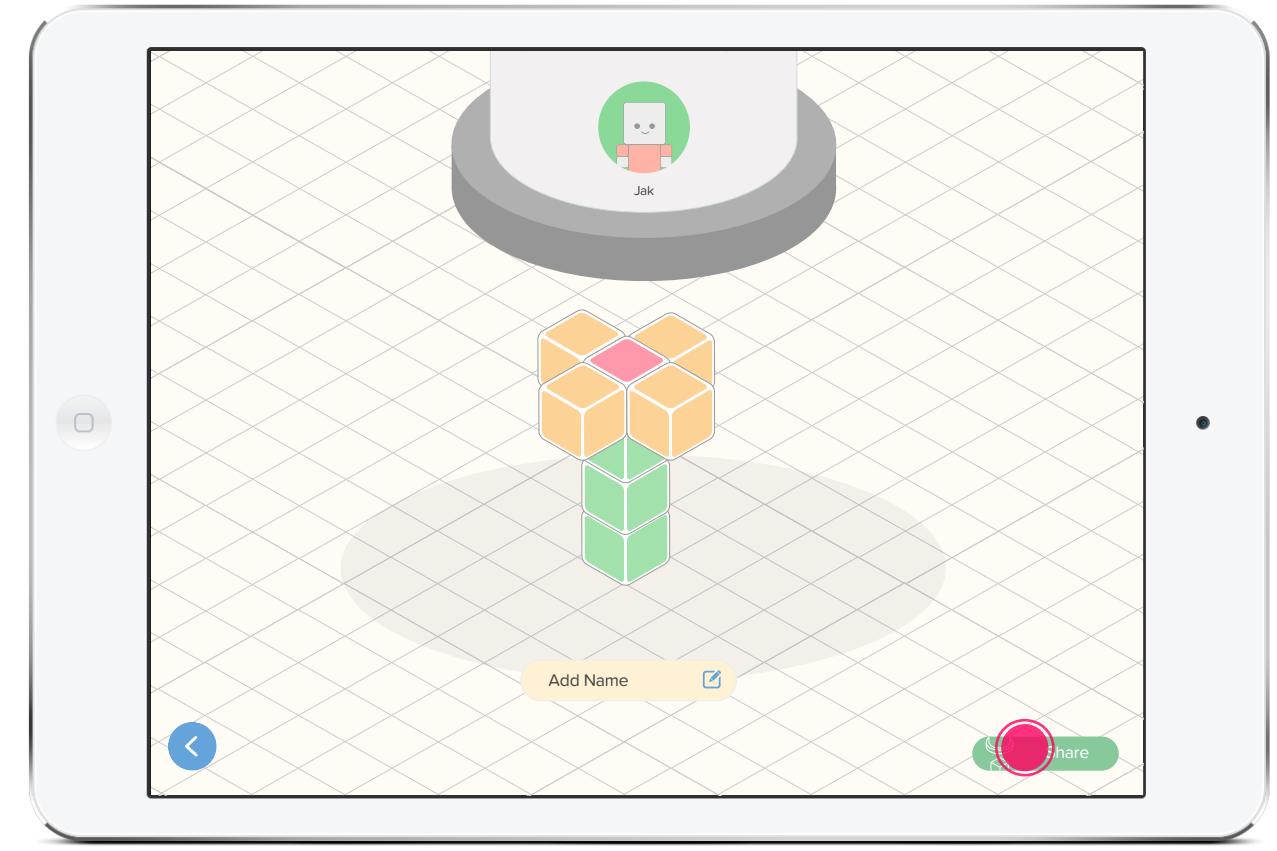
2.5 | Reply

Once assembled, the user sees the creation color and a new option appears allowing them to send a creation in response. The user selects the “Reply” and is brought to a special build screen that has a preselected recipient.



2.6 | Build

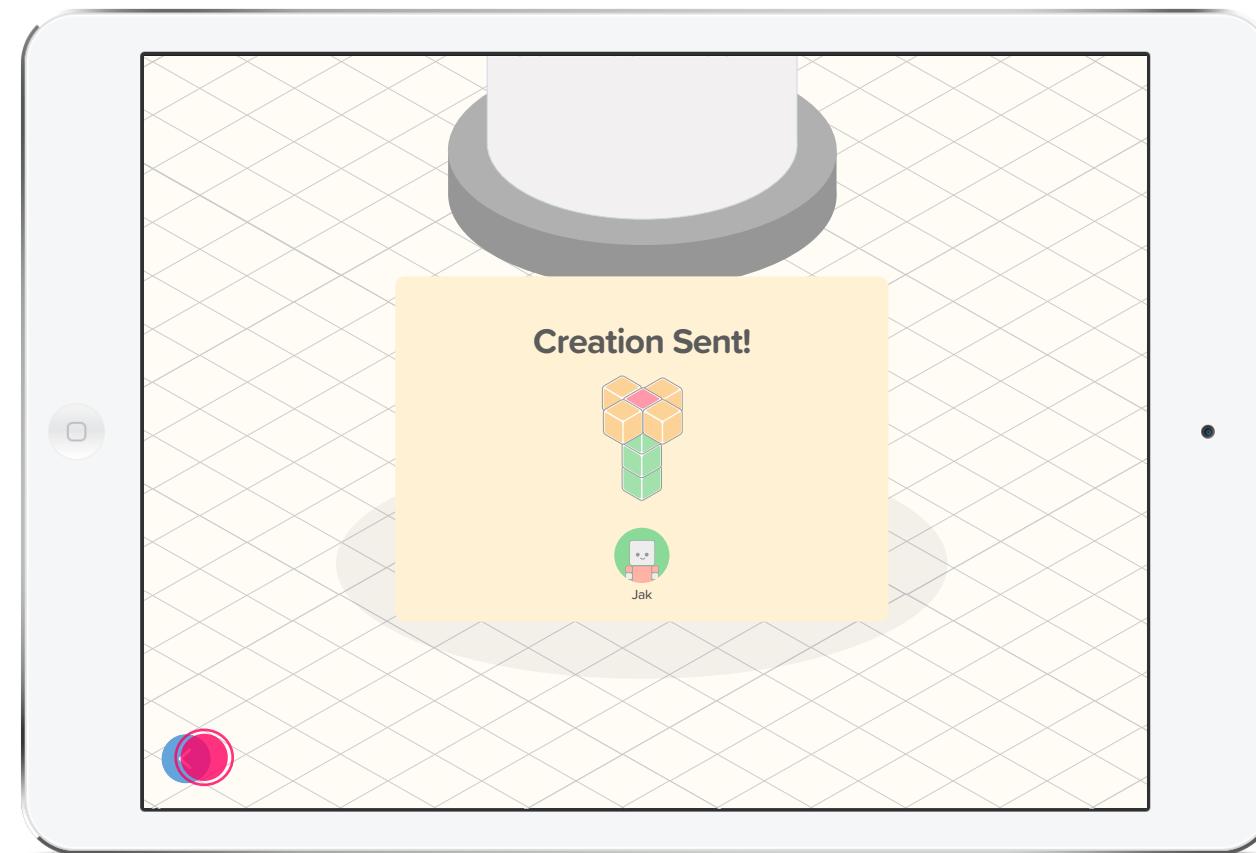
The user sees the recipient on the tube and builds a creation with their blocks. They tap “Share” when they are done.



Flow 2 — Receive and Build

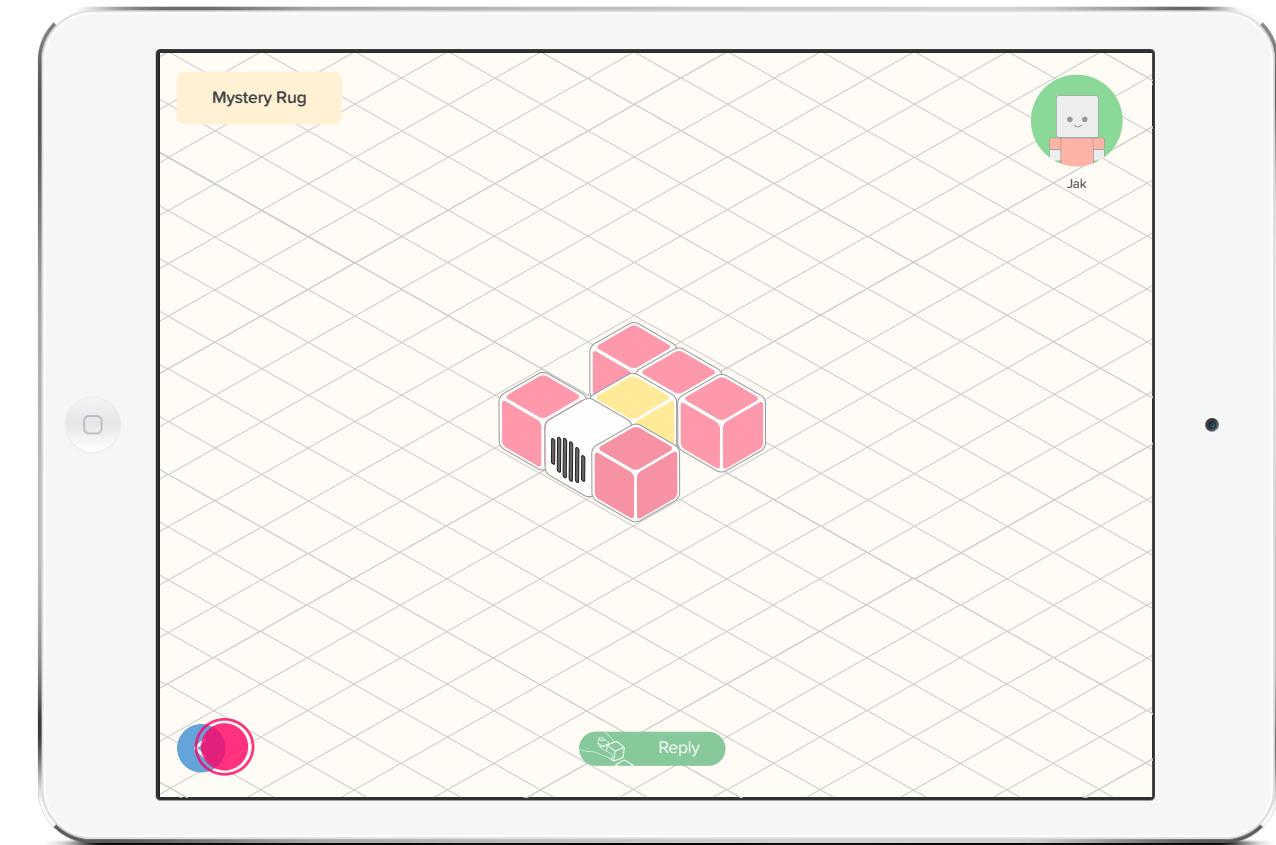
2.7 | Share Confirmation

A confirmation is shown with a thumbnail of the creation, the creation name, if it exists, and the recipient. The user is automatically brought back to the last step in the creation that prompted the reply.



2.8 | Return to Final Instruction

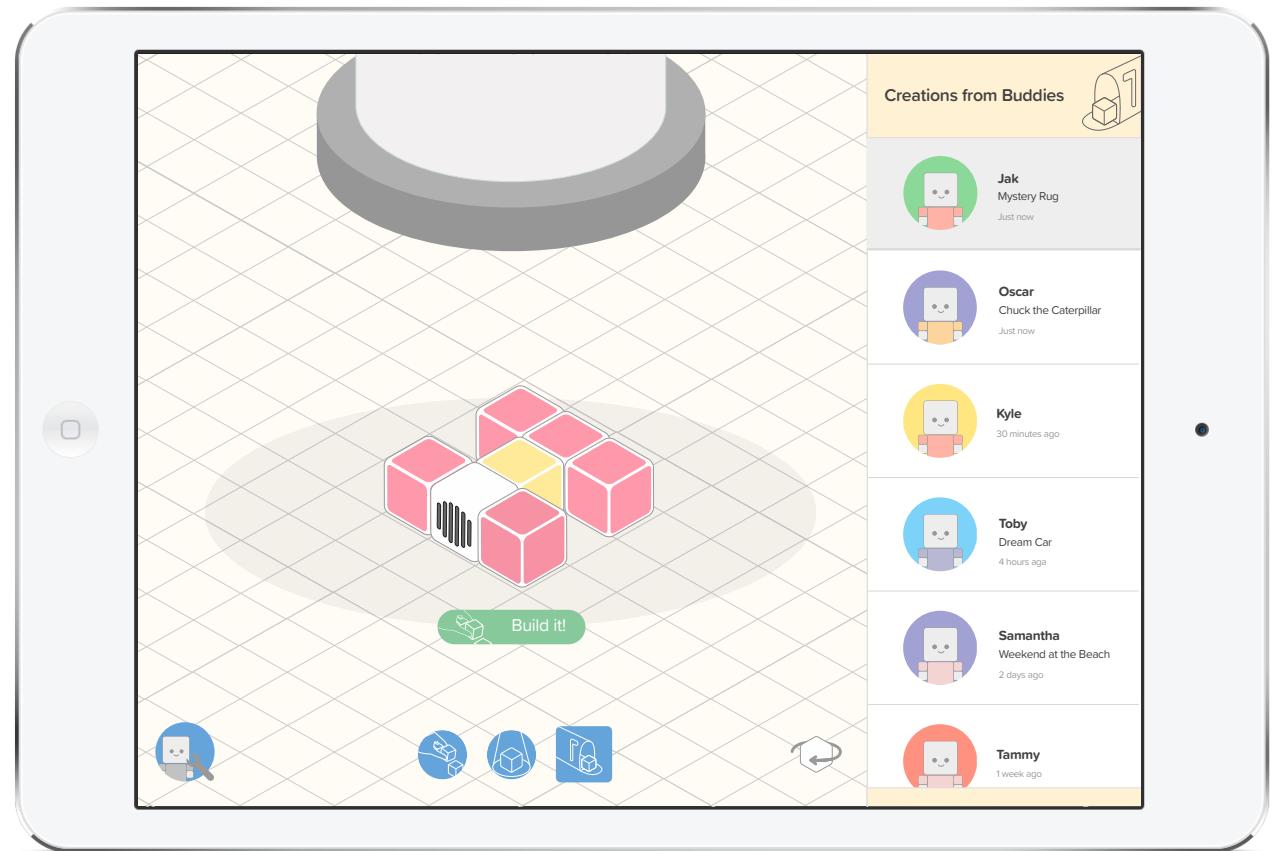
The user selects the back arrow to return to the inbox.



Flow 2 — Receive and Build

2.9 | View other Creations in Inbox

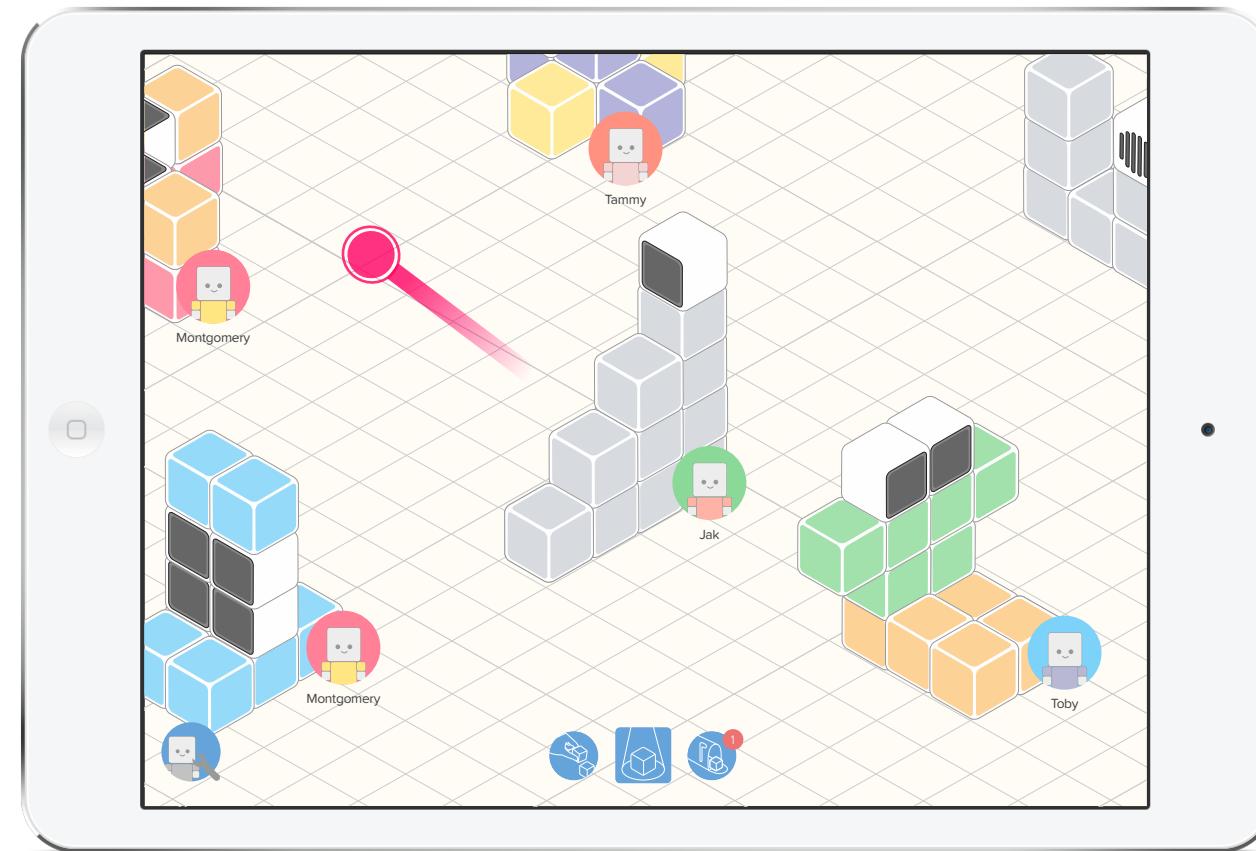
The user returns to the inbox and sees the creation assembled and colored. The user can then select other creations to build or clean up their inbox.



Flow 3 — Explore and Build

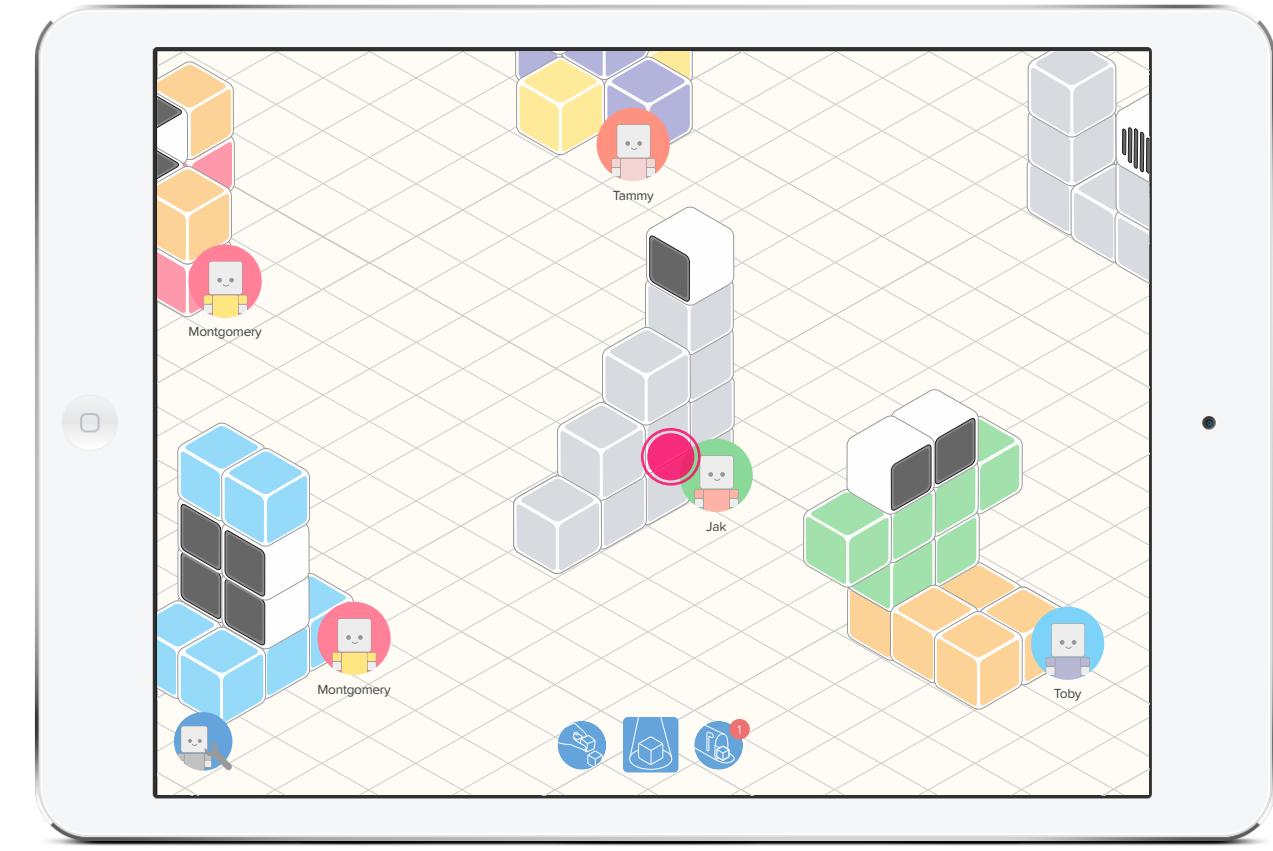
3.1 | Navigating the Gallery

The user can drag around the gallery to view different creations.



3.2 | Selecting a Creation to Build

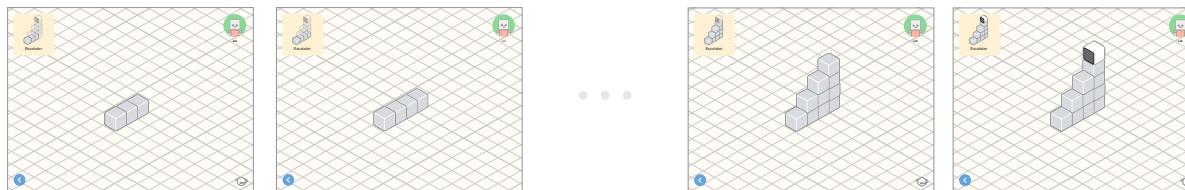
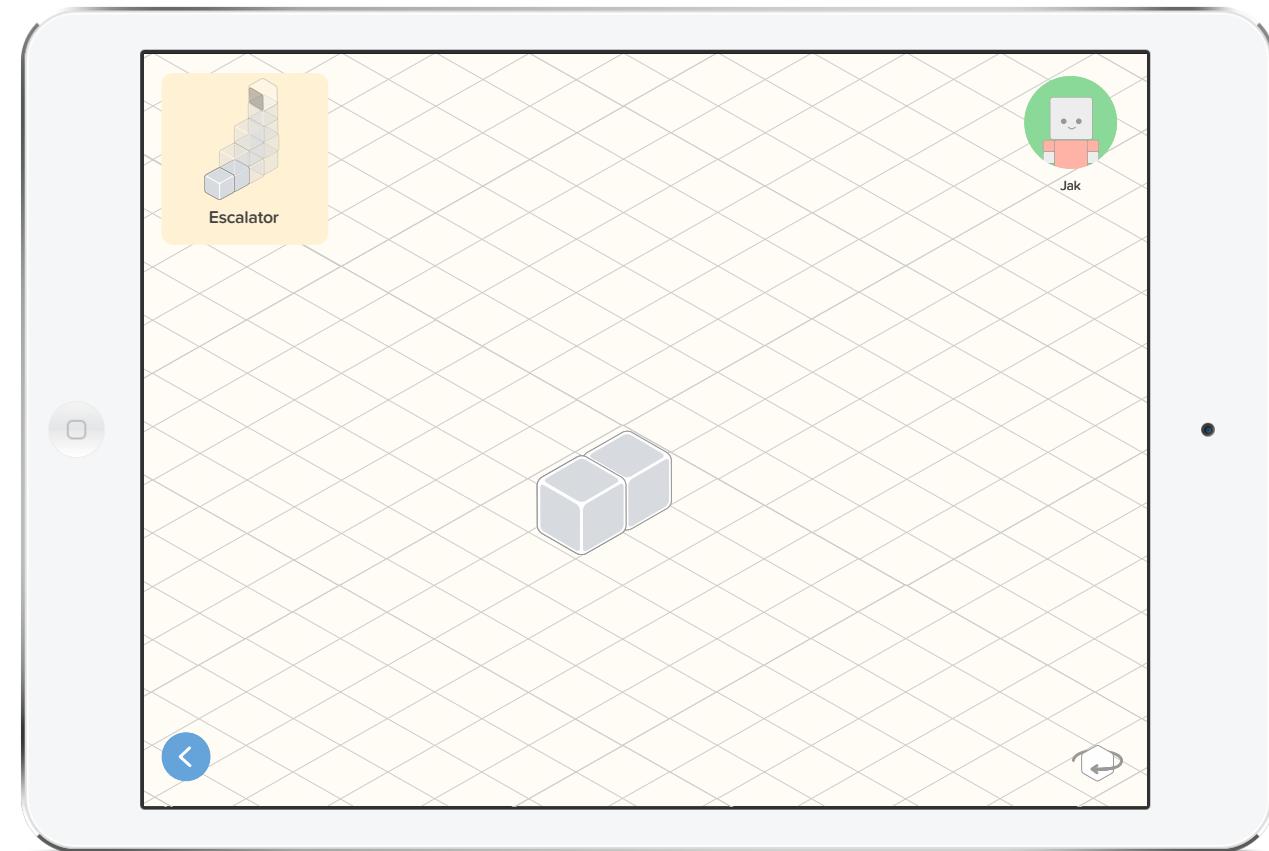
The user taps on one of the unbuilt creations to get the instructions.



Flow 3 — Explore and Build

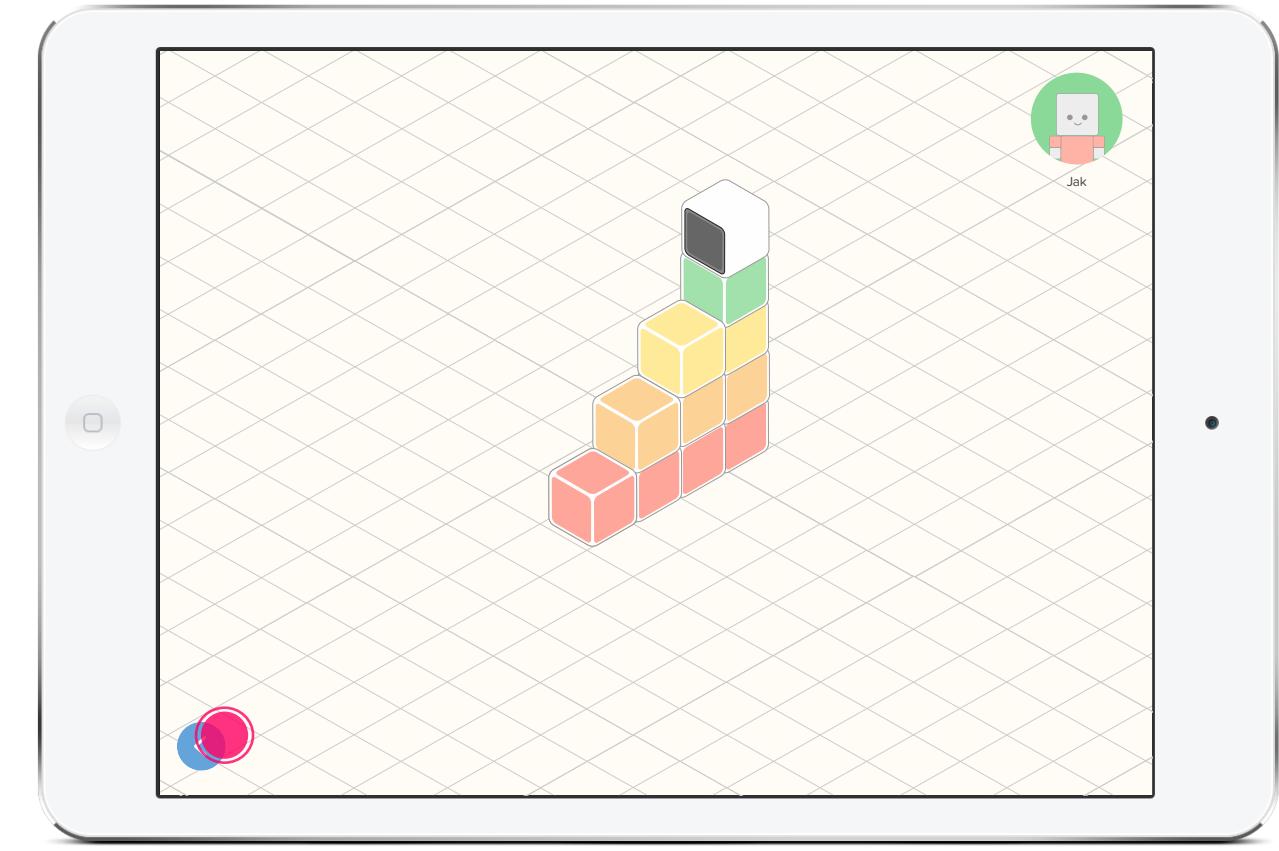
3.3 | Piece-by-Piece Instructions

The user gets the first piece-by-piece instruction. The application automatically advances as the correct blocks in the real world connect. Users can rotate the view by tapping the rotate icon (bottom-right).



3.4 | Unveiling

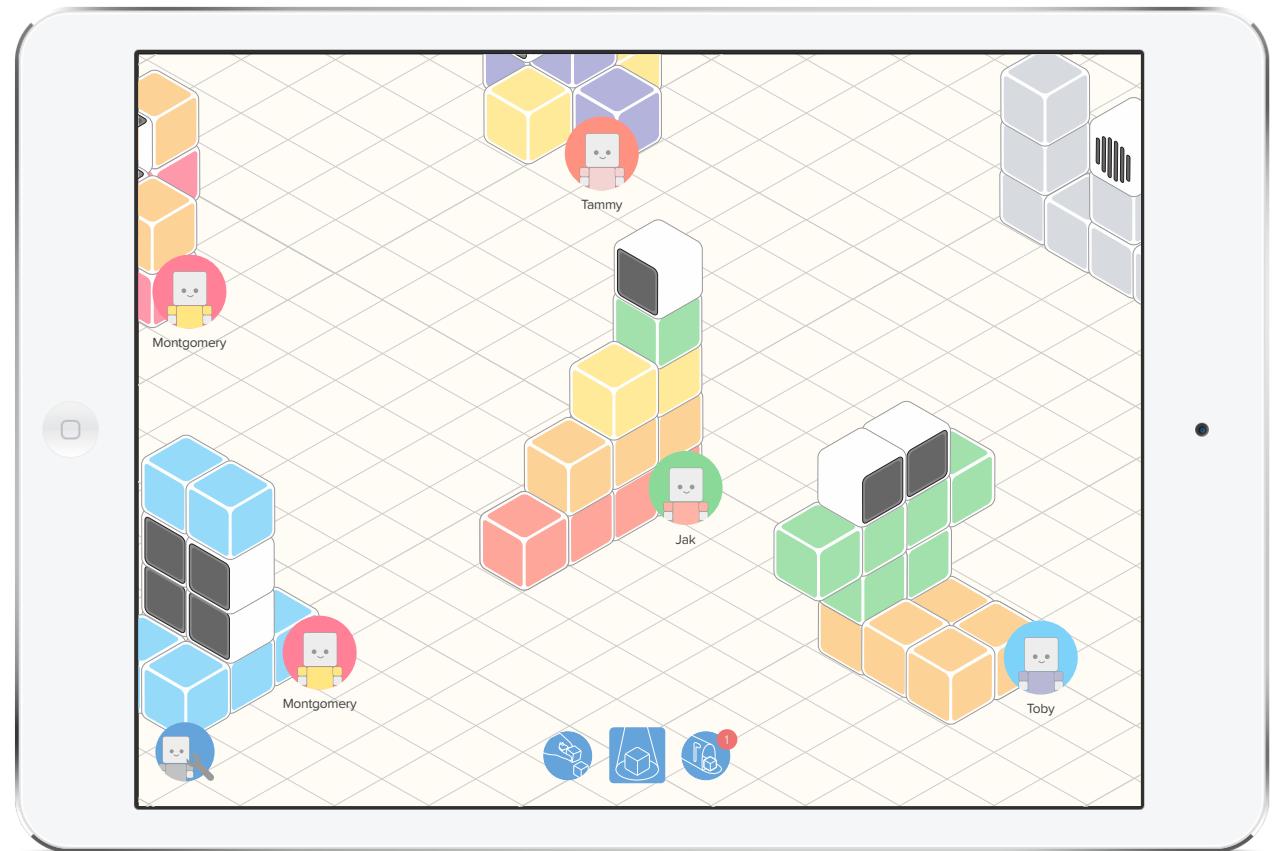
After completing the steps, the user sees the real world creation come to life with light, images, and sound. The digital representation also becomes colored. The user taps the back arrow to return to the Gallery.



Flow 3 — Explore and Build

3.5 | Continue to Explore

The user returns to the gallery, with the previously unbuilt creation now colored.



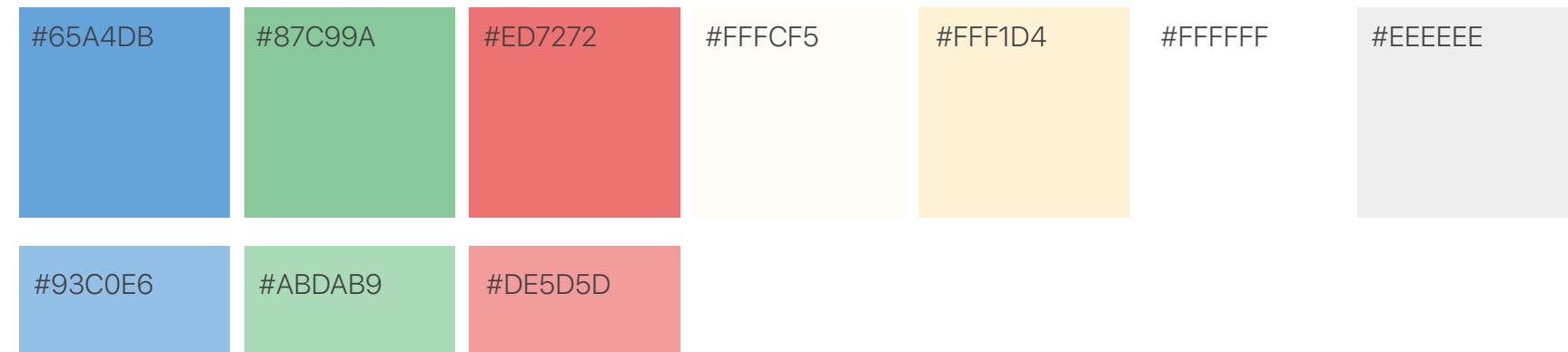
Visual System

The three main use cases are explored using interfaces mock-ups to show the standard flow. These use cases are building to share, exploring other creations to build, and receiving and building creations from others.

Color Palette

The application is not to distract from the core of the experience, building with the physical blocks. The color palette provides a warm and comforting collection of colors that serve as the backdrop to the playful colors that are used in the creations and avatars.

APPLICATION COLORS



BLOCK LIGHT/AVATAR COLOR PALLETE



Typography

Looking to maintain a clean yet playful feel, Proxima Soft serves the application as its sole typeface. With its rounded corners, it fits into the overall “soft” and rounded aesthetic.

T1 - LOGO TEXT

Proxima Soft Extrabold 48pt #333333

T2 - LIGHT HEADER

Proxima Soft Light 48pt #333333

T3 - HEADER

Proxima Soft Bold 36pt #333333

T4 - SUBHEADER

Proxima Soft Bold 24pt #333333

T5 - TITLE BAR TEXT

Proxima Soft Semibold 18pt #333333

T6 - BUTTON TEXT

Proxima Soft Medium 18pt #333333

T7 - LABEL TEXT

Proxima Soft Regular 14pt #333333

T8 - LABEL BOLD TEXT

Proxima Bold Regular 14pt #333333

T9 - SUBLABEL TEXT

Proxima Bold Regular 12pt #333333

T10 - LABEL DETAIL TEXT

Proxima Soft Regular 10pt #999999

T11 - BODY TEXT

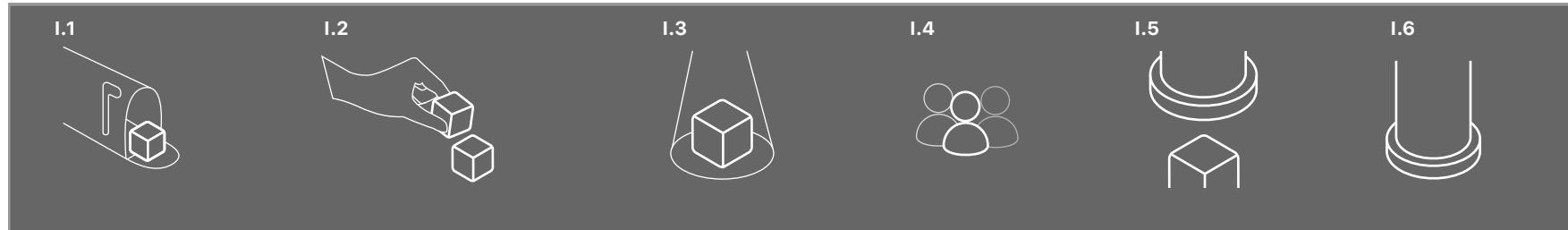
Proxima Soft Regular 11pt. Line 16pt. Paragraph 8pt. #999999 So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid), whether the pleasure of making a daisy-chain would be worth the trouble of getting up and picking the daisies, when suddenly a White Rabbit with pink eyes ran close by her.

There was nothing so very remarkable in that; nor did Alice think it so very much out of the way to hear the Rabbit say to itself, ‘Oh dear! Oh dear! I shall be late!’ (when she thought it over afterwards, it occurred to her that she ought to have wondered at this, but at the time it all seemed quite natural).

#333333

#999999

Iconography



DEFAULT STATE

I.7 I.8 I.9 I.10 I.11 I.12

37px 10px 20px #87C99A
20px 20px #65A4DB
20px 60px
60px
60px

PRESSED STATE 70% Opacity of Default State

I.7 P I.8 P I.9 P I.10 P I.11 P I.12 P

TSHIRT BACKGROUND FACE HAIR ACCESSORIES

Unselected I.13.1 I.14.1 I.15.1 I.16.1 I.17.1

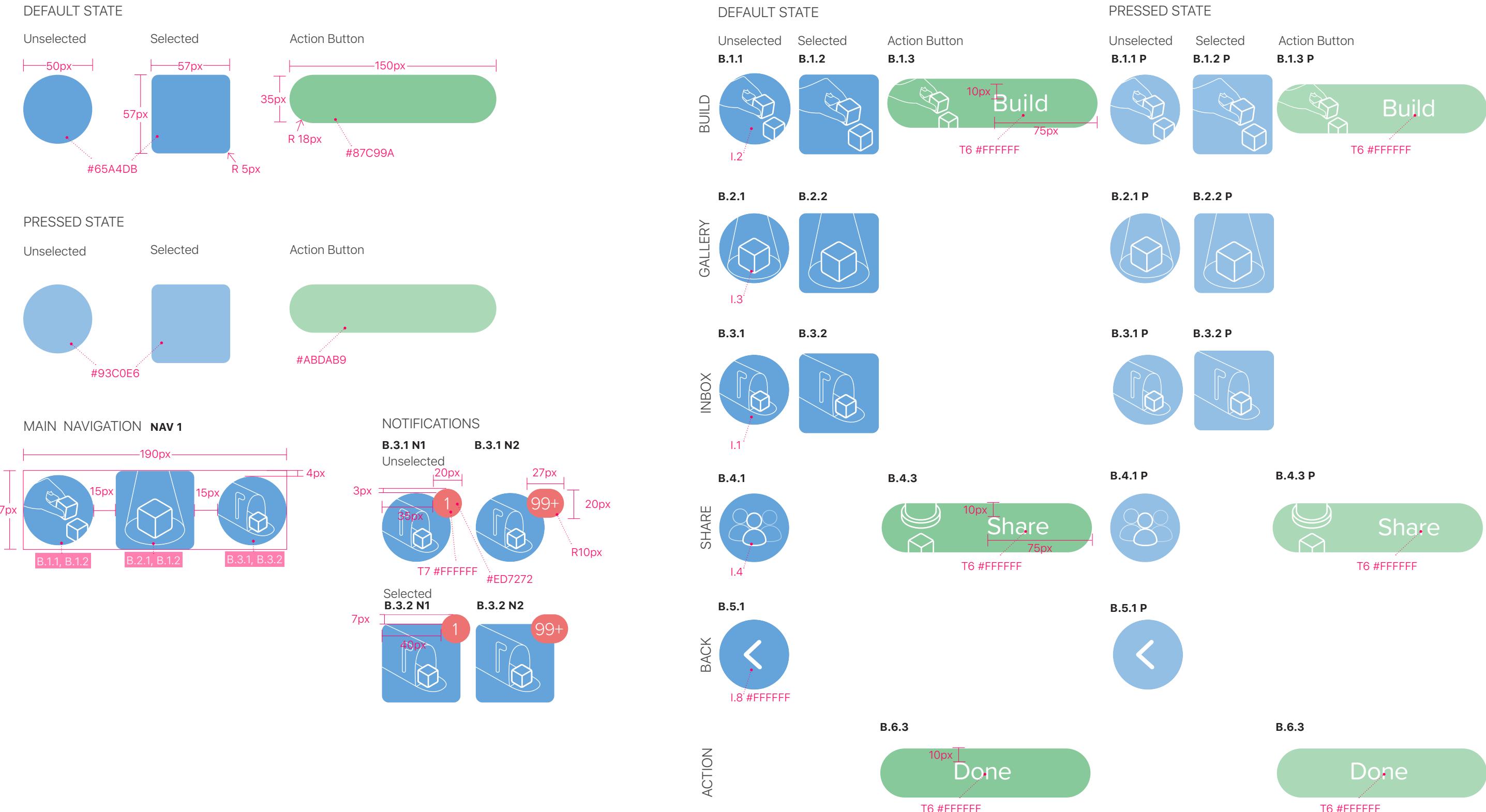
70px 70px

Selected I.13.2 I.14.2 I.15.2 I.16.2 I.17.2

R5px #EEEEEE

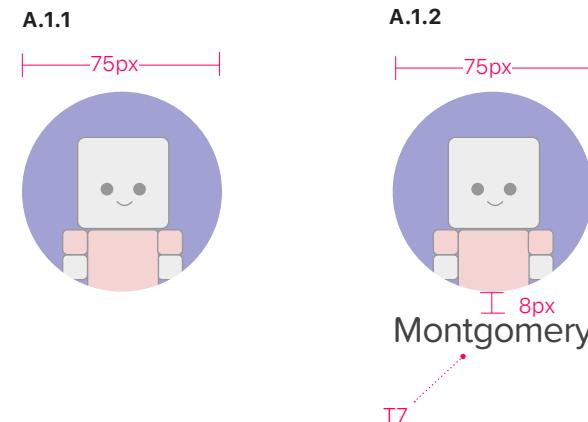
Detailed description: This section displays icon specifications. It starts with a row of six icons (I.7-I.12) in their default state, followed by their pressed states at 70% opacity. Below this is a grid of five categories: TSHIRT, BACKGROUND, FACE, HAIR, and ACCESSORIES. Each category has two rows: 'Unselected' and 'Selected'. The TSHIRT icons show a blue t-shirt with a small pocket and a button. The BACKGROUND icons show a color wheel. The FACE icons show a smiling face with a yellow outline. The HAIR icons show a yellow and grey striped hairdo. The ACCESSORIES icons show a red cap. Dimensions and colors are specified for the unselected states.

Buttons

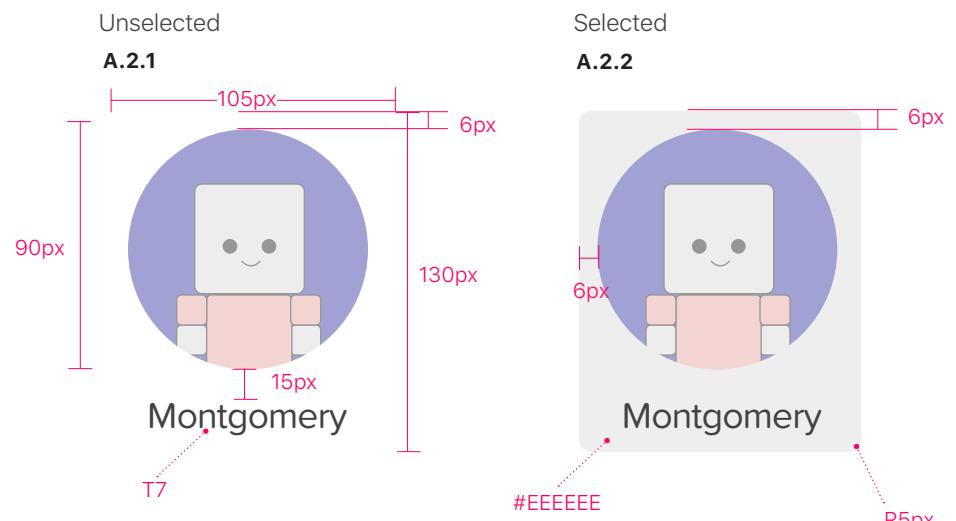


Avatars

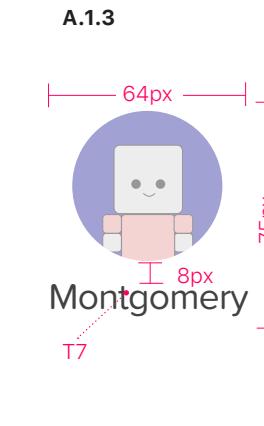
DEFAULT AVATAR



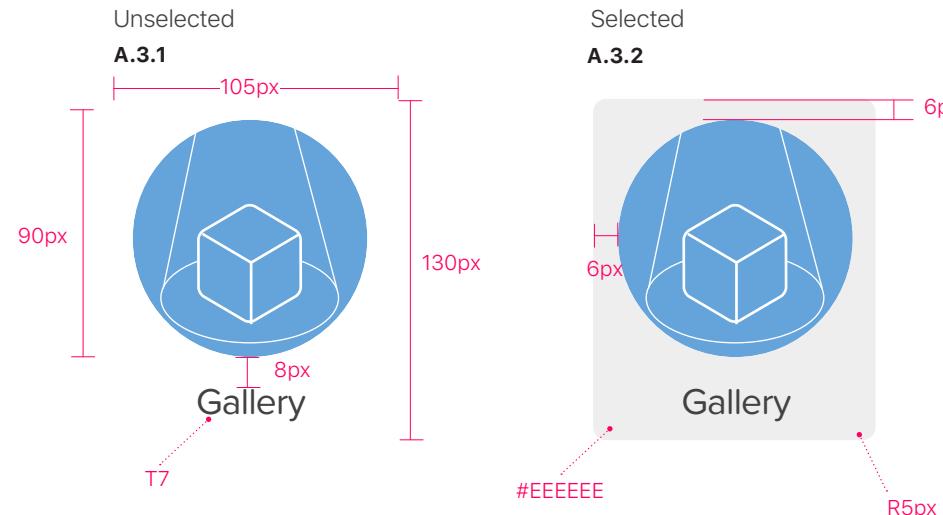
SELECTION TILE



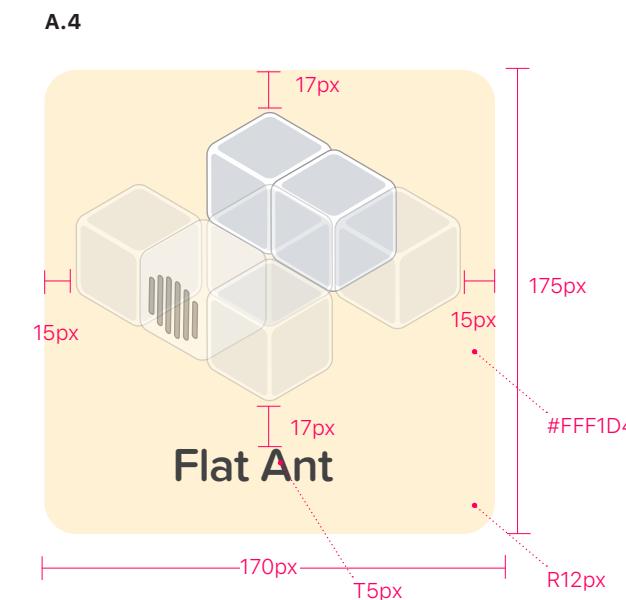
SMALL AVATAR



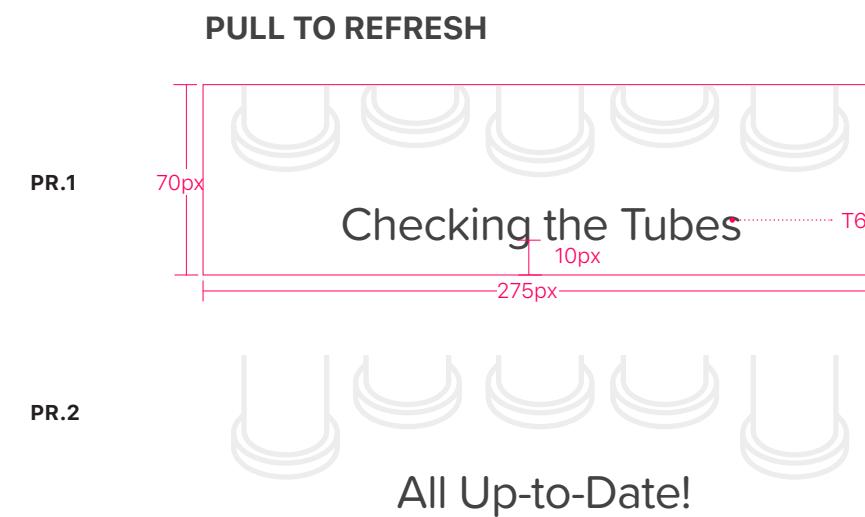
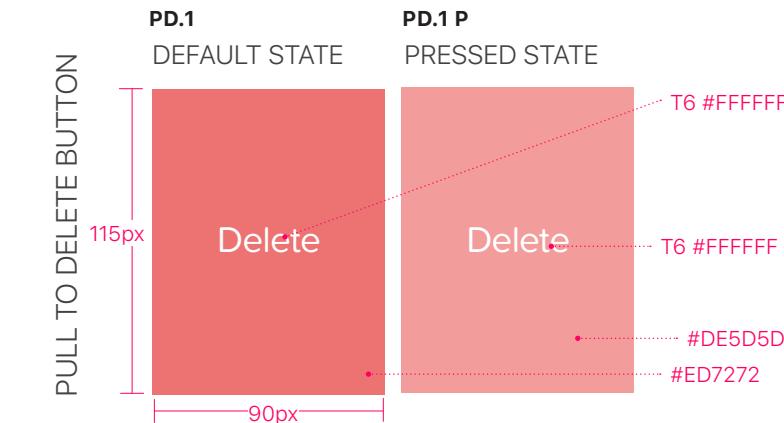
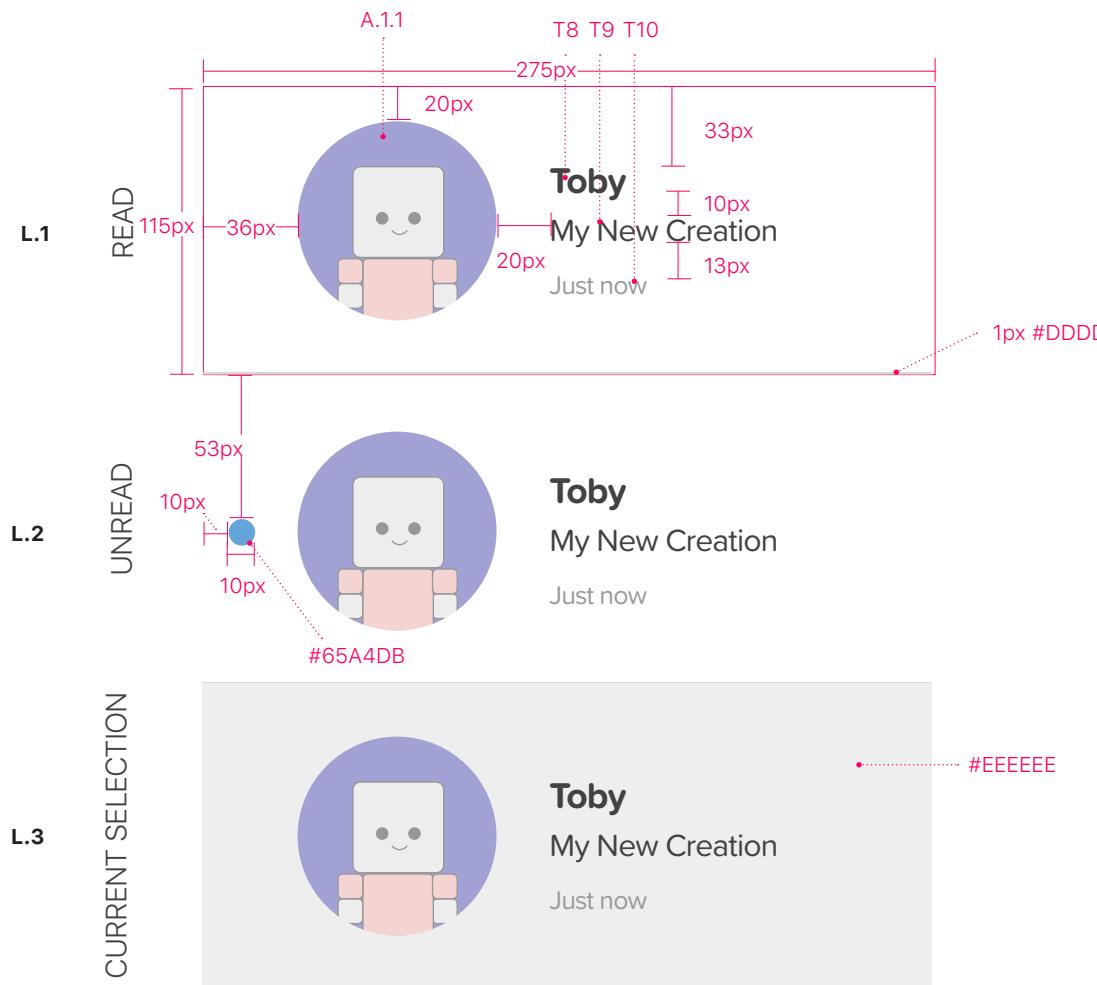
SELECTION TILE



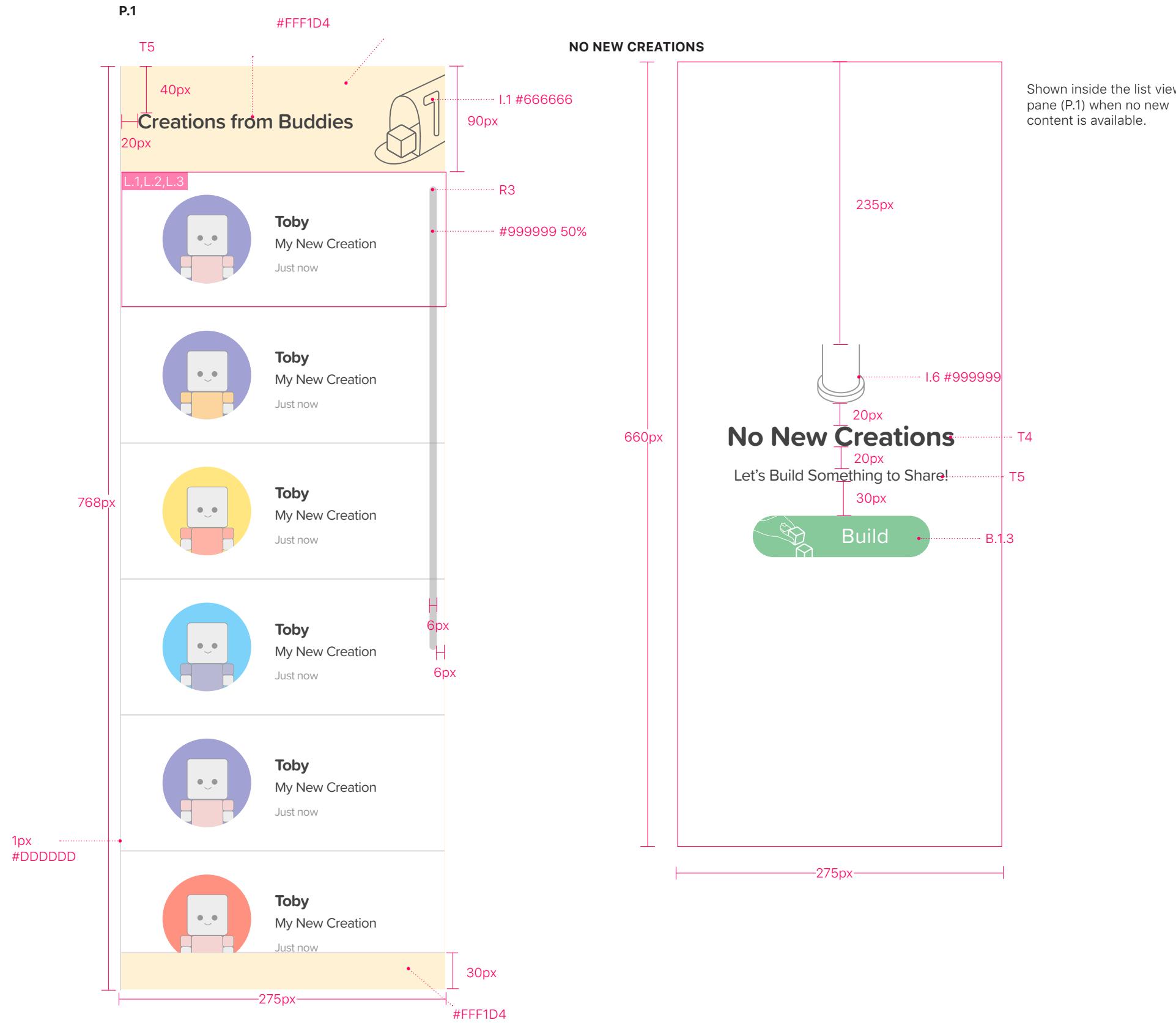
CREATION PROGRESS



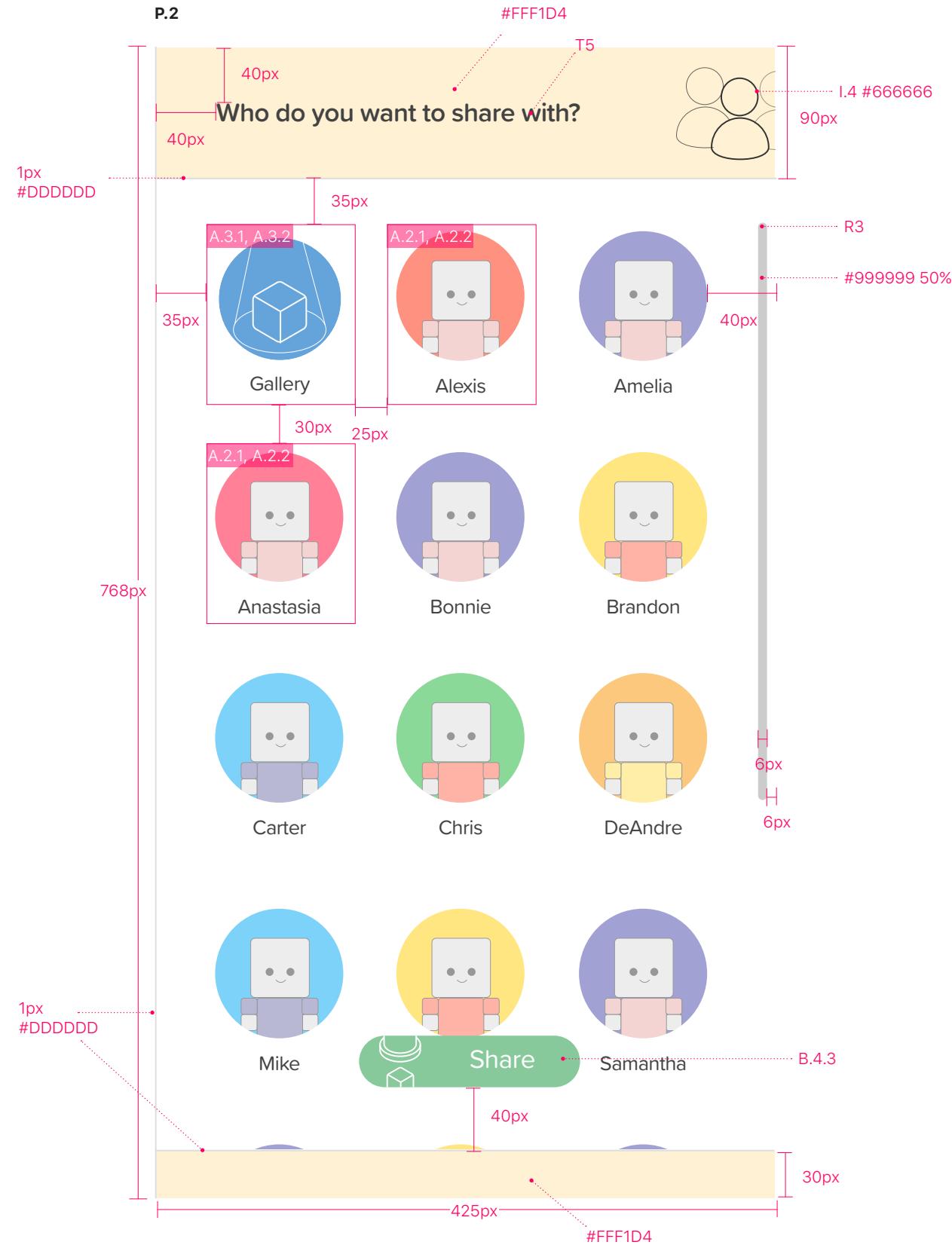
Inbox Components



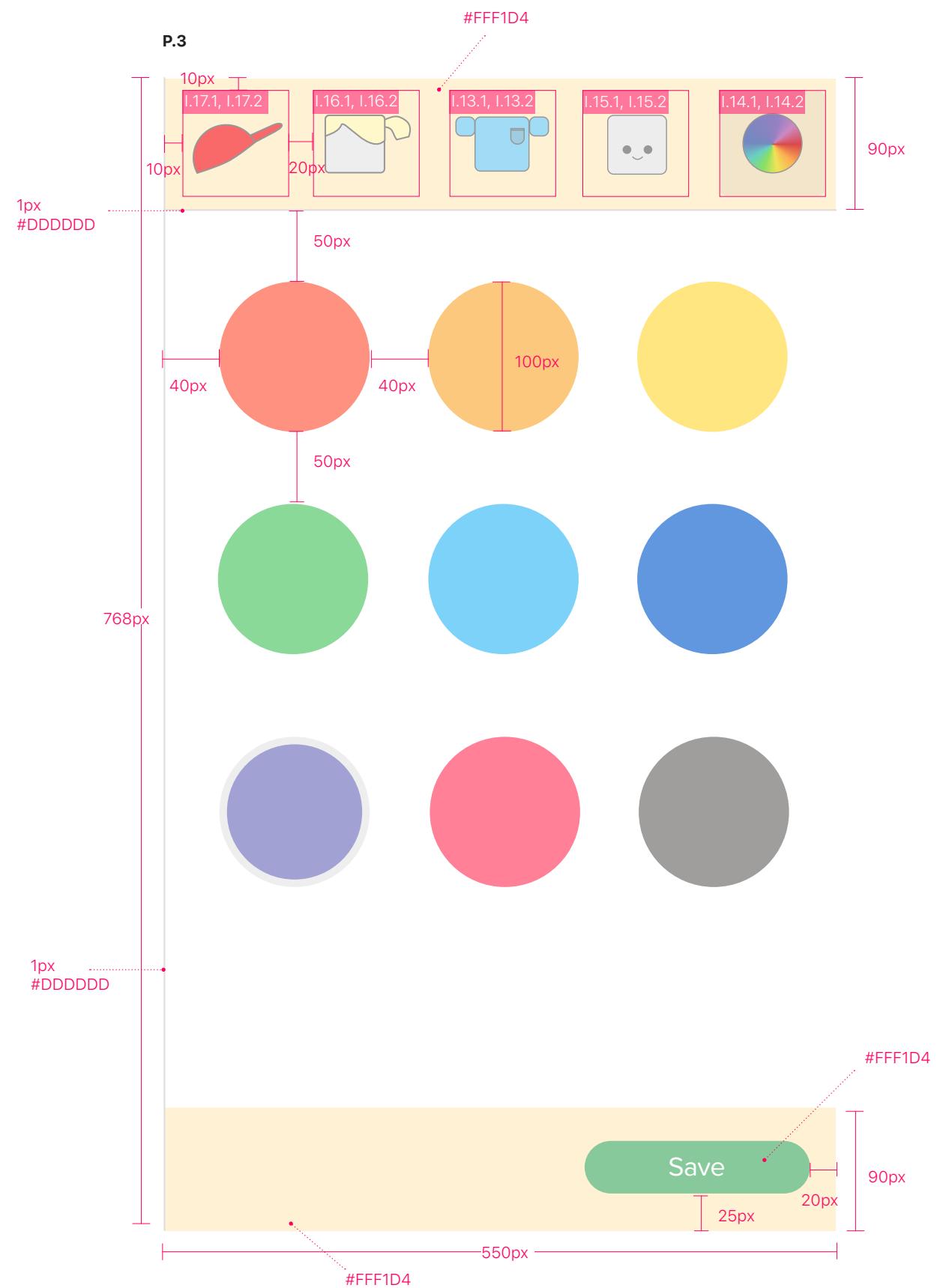
List View Pane



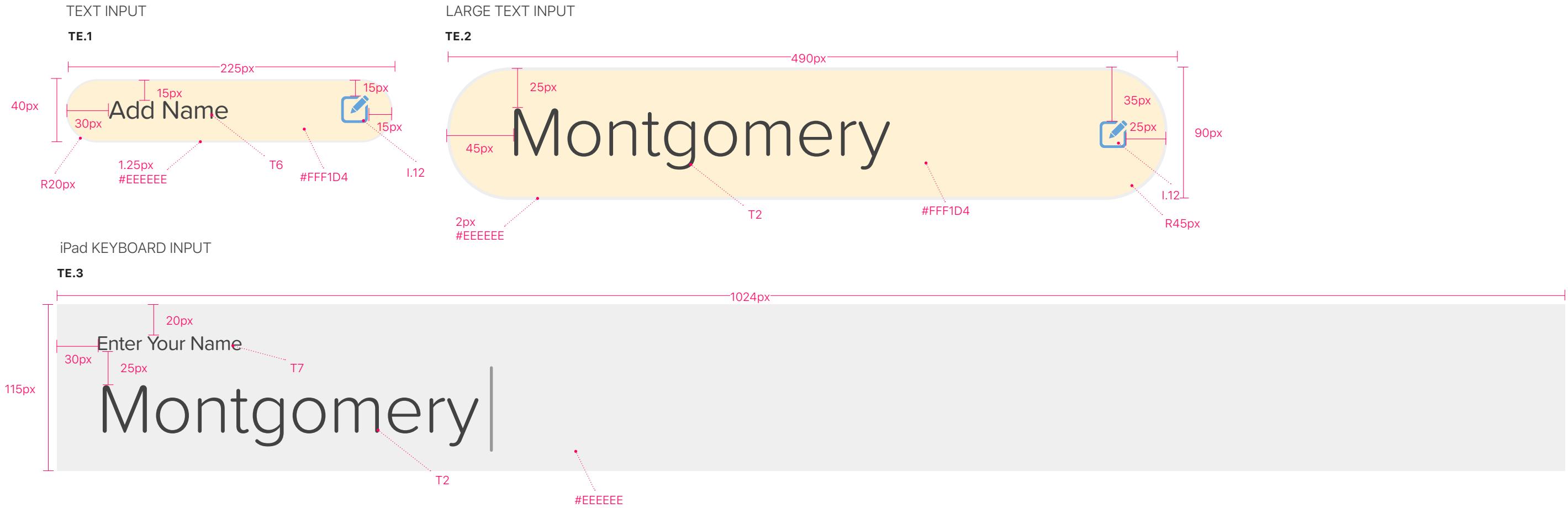
Grid View Pane



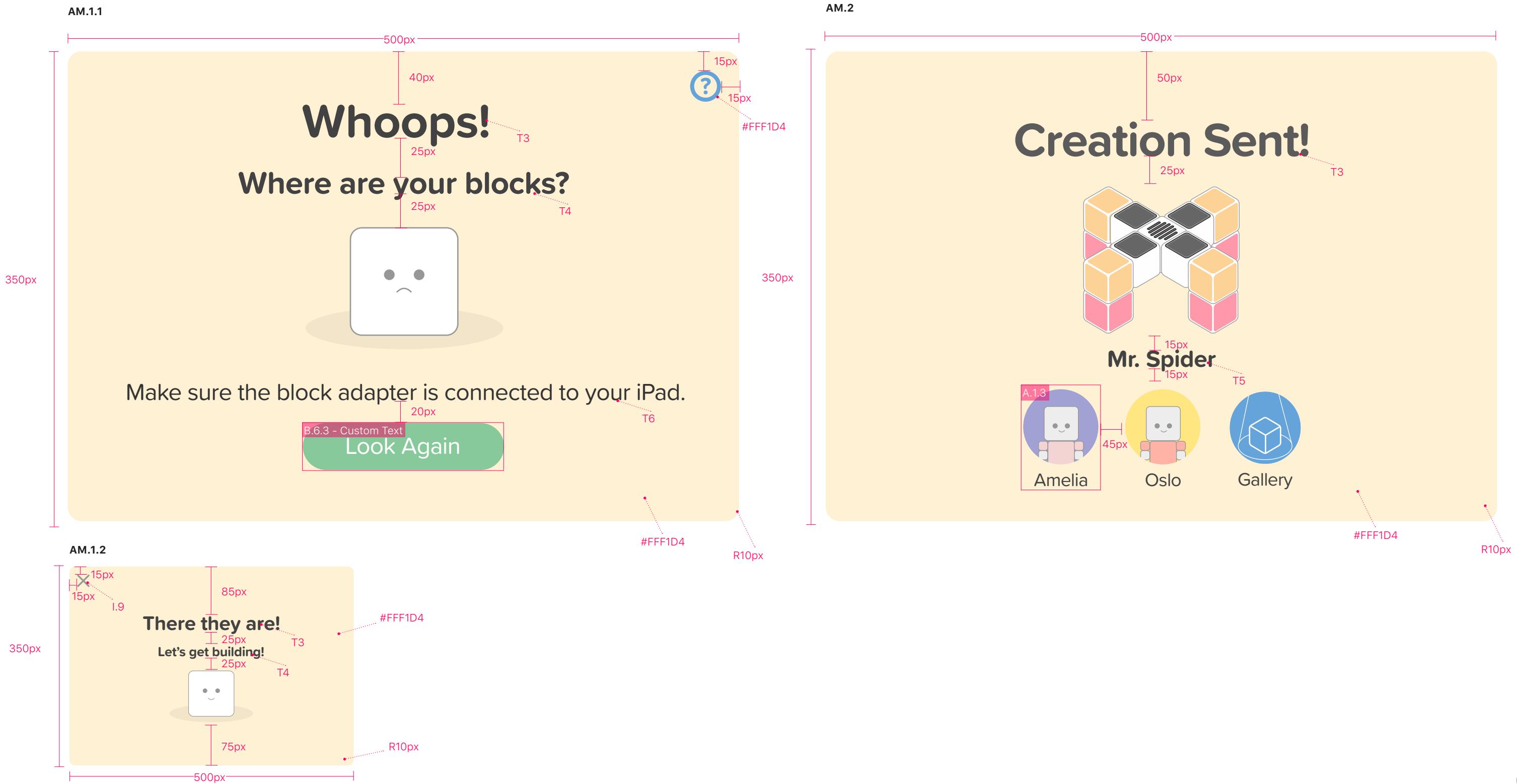
Avatar Customization Pane



Text Entry

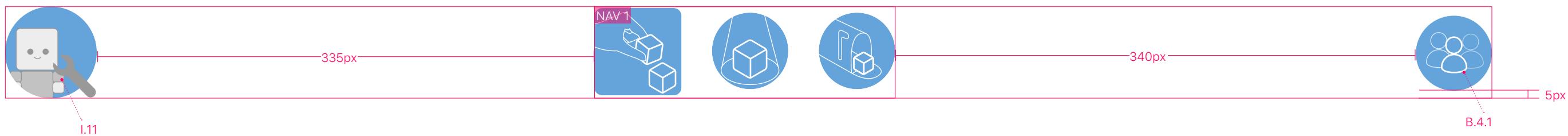


Alert Message

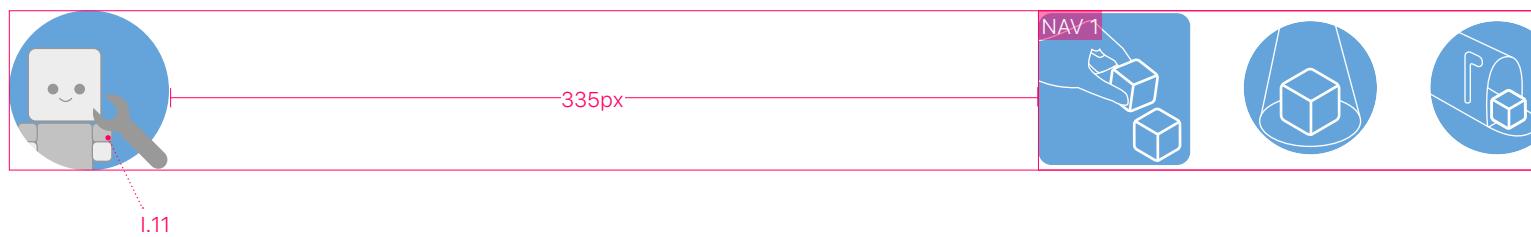


Navigation

NAV A



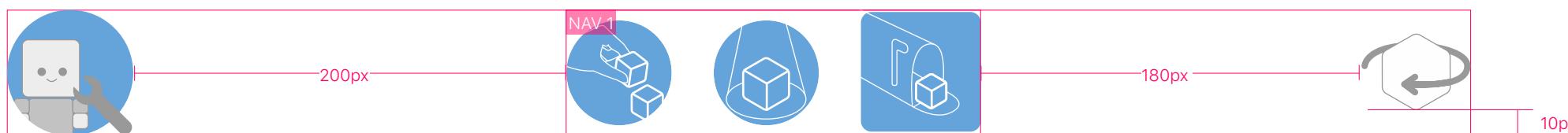
NAV B



NAV C



NAV C



Animation Description

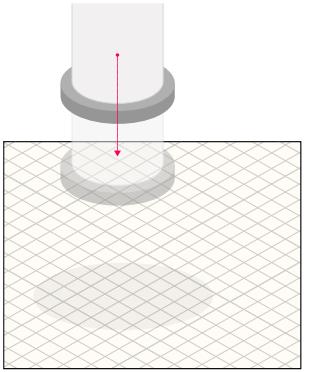
This section is dedicated to describing the major animations for specific elements and the transition sequences found in the application.

For viewing all animations in motion and context, please reference the Interactive Principle Prototype.

Component Motion

M.1 – TUBE

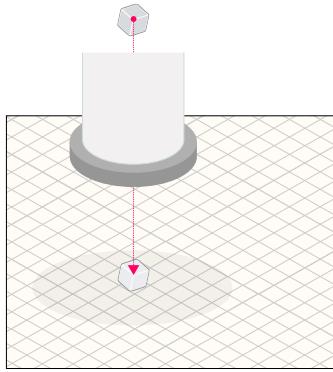
M.1 IN



.75sec cubic-bezier(.42,0,.58,1)

M.2 – BLOCK

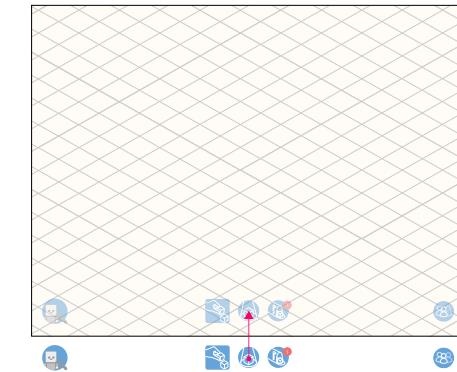
M.2 IN



.3sec cubic-bezier(0,0,.58,1)

M.2 – NAVIGATION

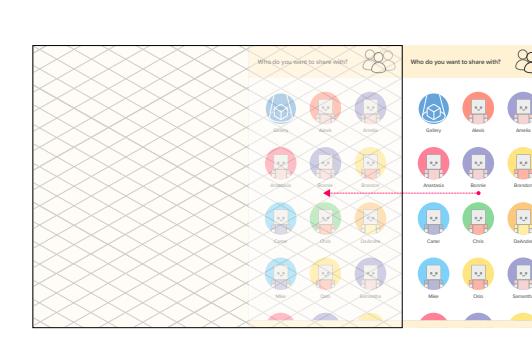
M.3 IN



.3sec cubic-bezier(.25,1,.25,1)

M.4 – PANE

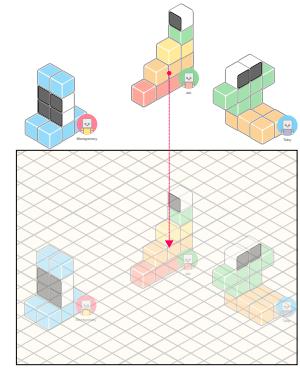
M.4 IN



.75sec cubic-bezier(.25,1,.25,1)

M.2 – CREATIONS

M.5 IN

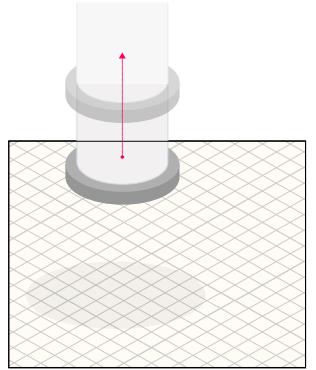


.75sec cubic-bezier(.42,0,.1,1)

M.6 IN – SHADOW

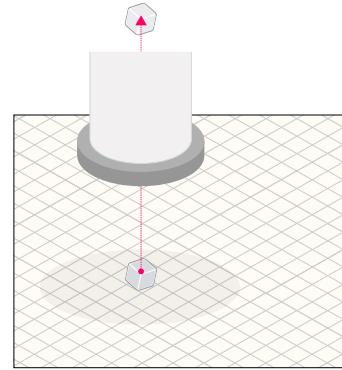
.5sec fadeIn

M.1 OUT



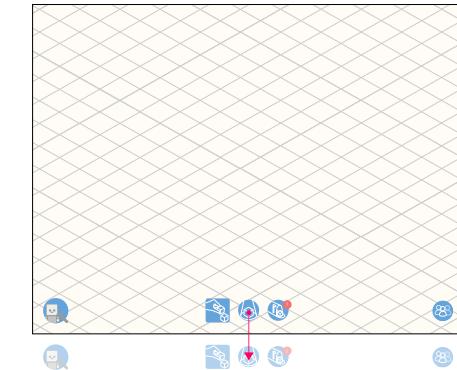
.75sec cubic-bezier(.42,0,.58,1)

M.2 OUT



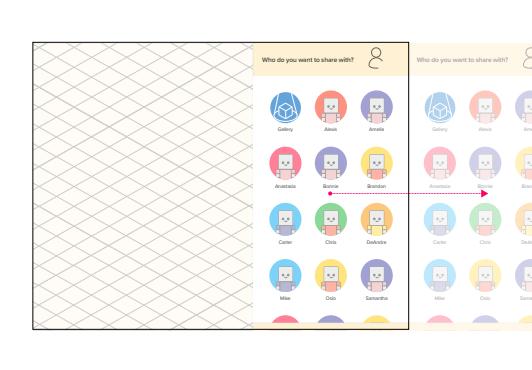
.3sec cubic-bezier(.25,1,.25,1)

M.3 OUT



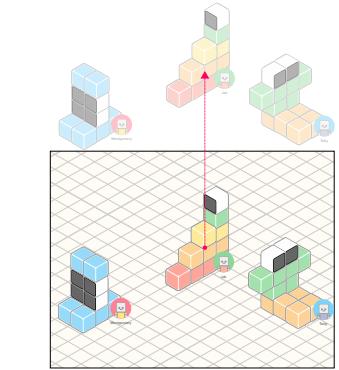
.75sec cubic-bezier(.25,1,.25,1)

M.4 OUT



.75sec cubic-bezier(.25,1,.25,1)

M.5 OUT



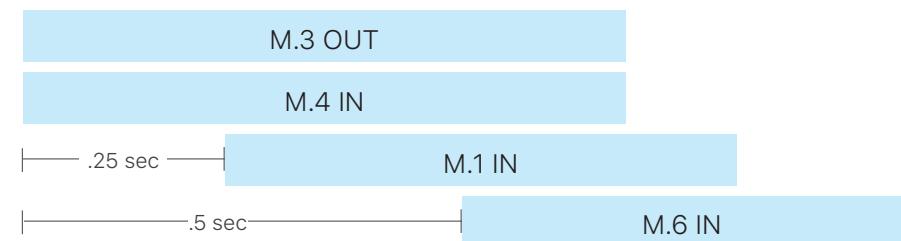
.3sec cubic-bezier(.25,1,.25,1)

M.6 OUT – SHADOW

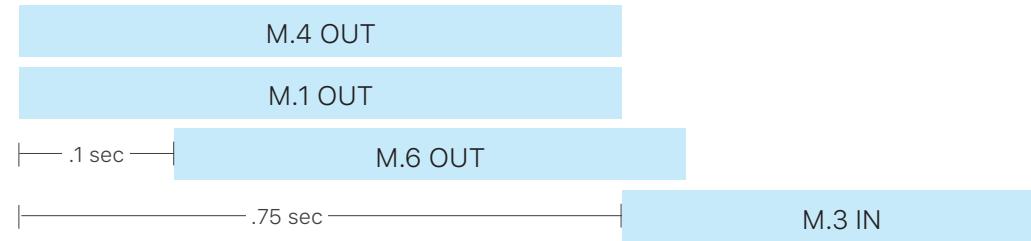
.3sec fadeOut

Transition Sequences

TS.1 IN – S.1 BUILD TO S.1.1 SHARE



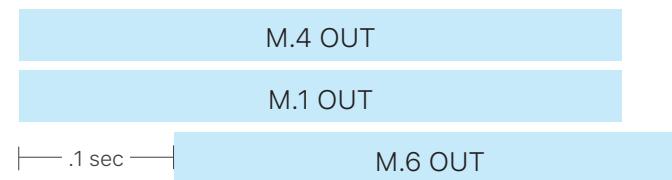
TS.1 OUT – S.1.1 SHARE TO S.1 BUILD



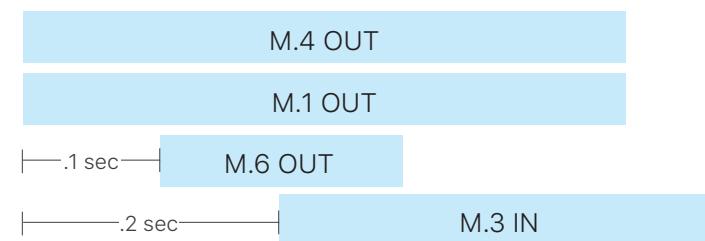
TS.2 IN – S.1 BUILD TO S.3 INBOX



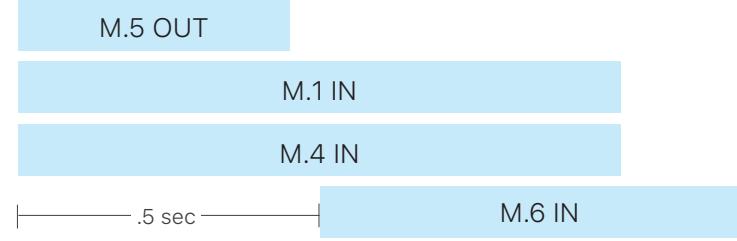
TS.2 OUT – S.3 INBOX TO S.1 BUILD



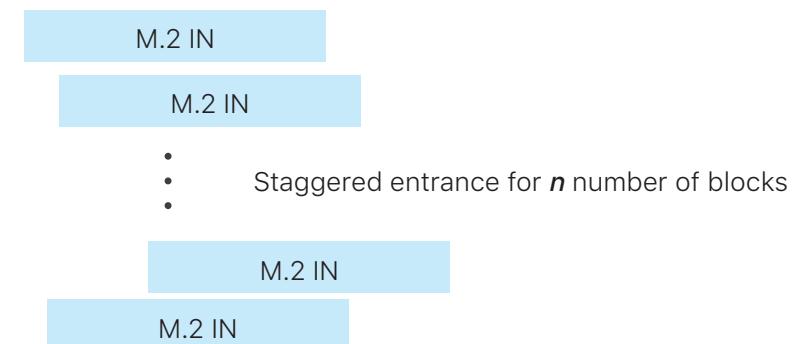
TS.3 – S.3 INBOX TO S.2 GALLERY



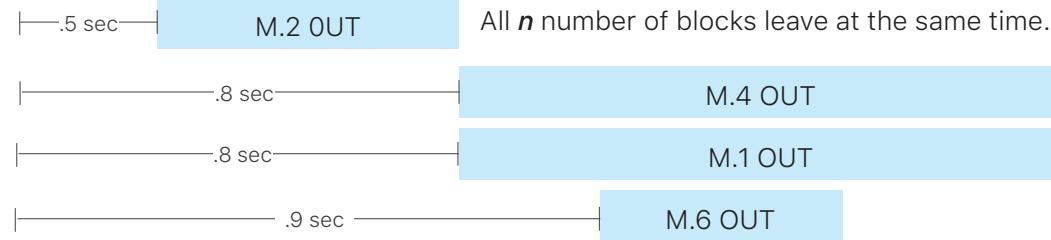
TS.3 OUT – S.2 GALLERY TO S.3 INBOX



TS.4 – RECEIVE BLOCK



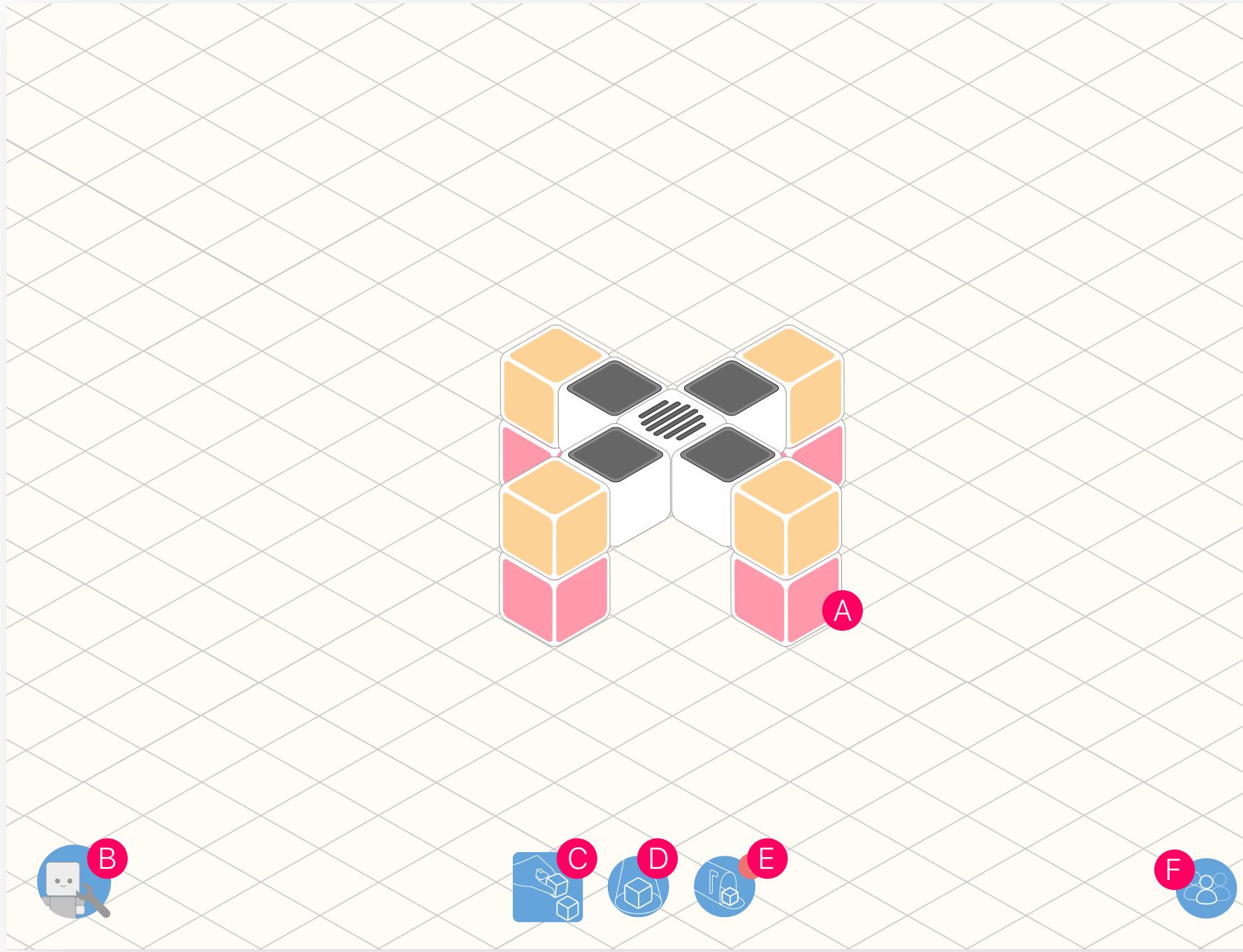
TS.5 – SEND BLOCKS



Screen Layout and Descriptions

Each screen is individually annotated and layout dimensions are overlaid on high fidelity mock-ups. The main screens have a brief overview description.

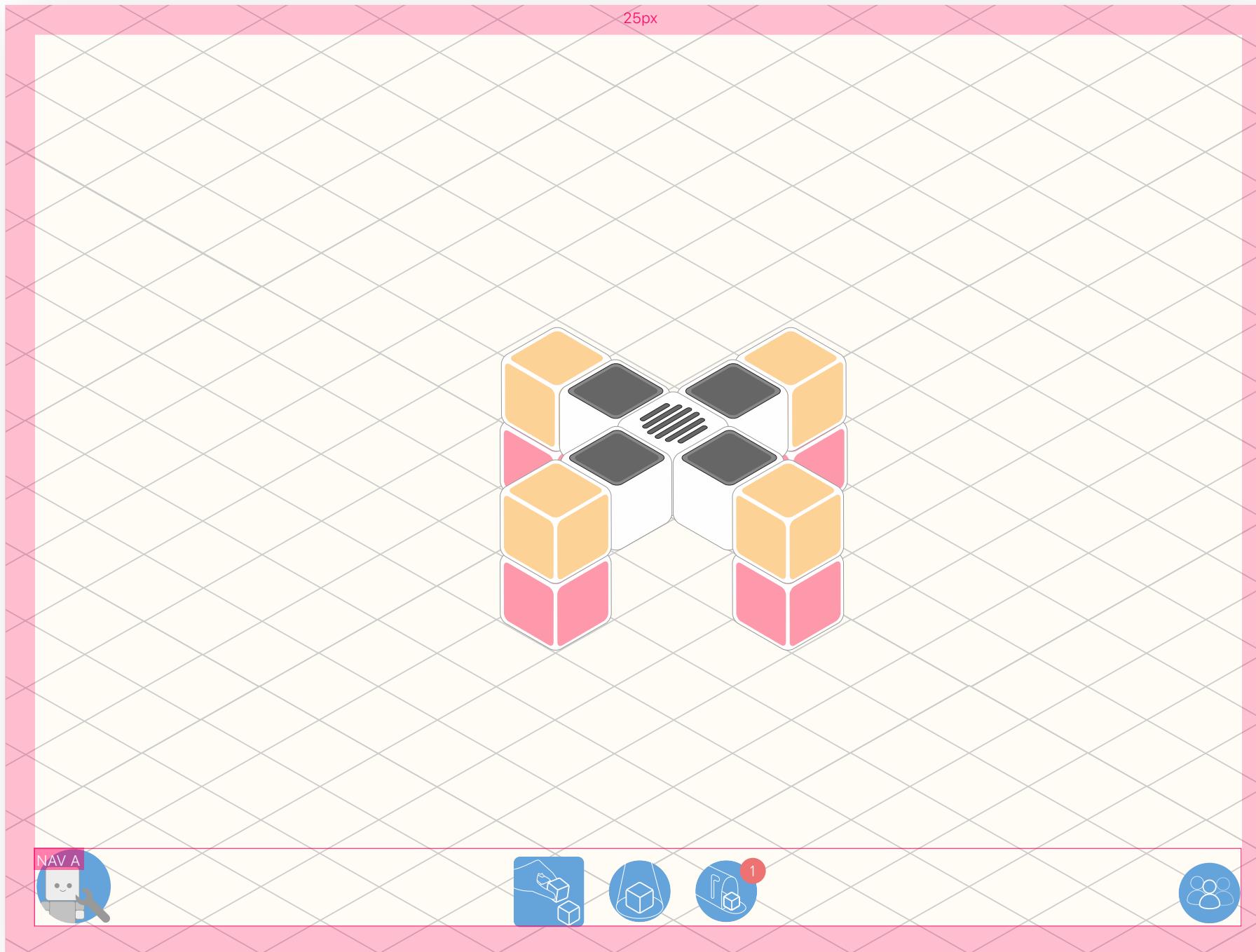
S.1 Build — Screen Description



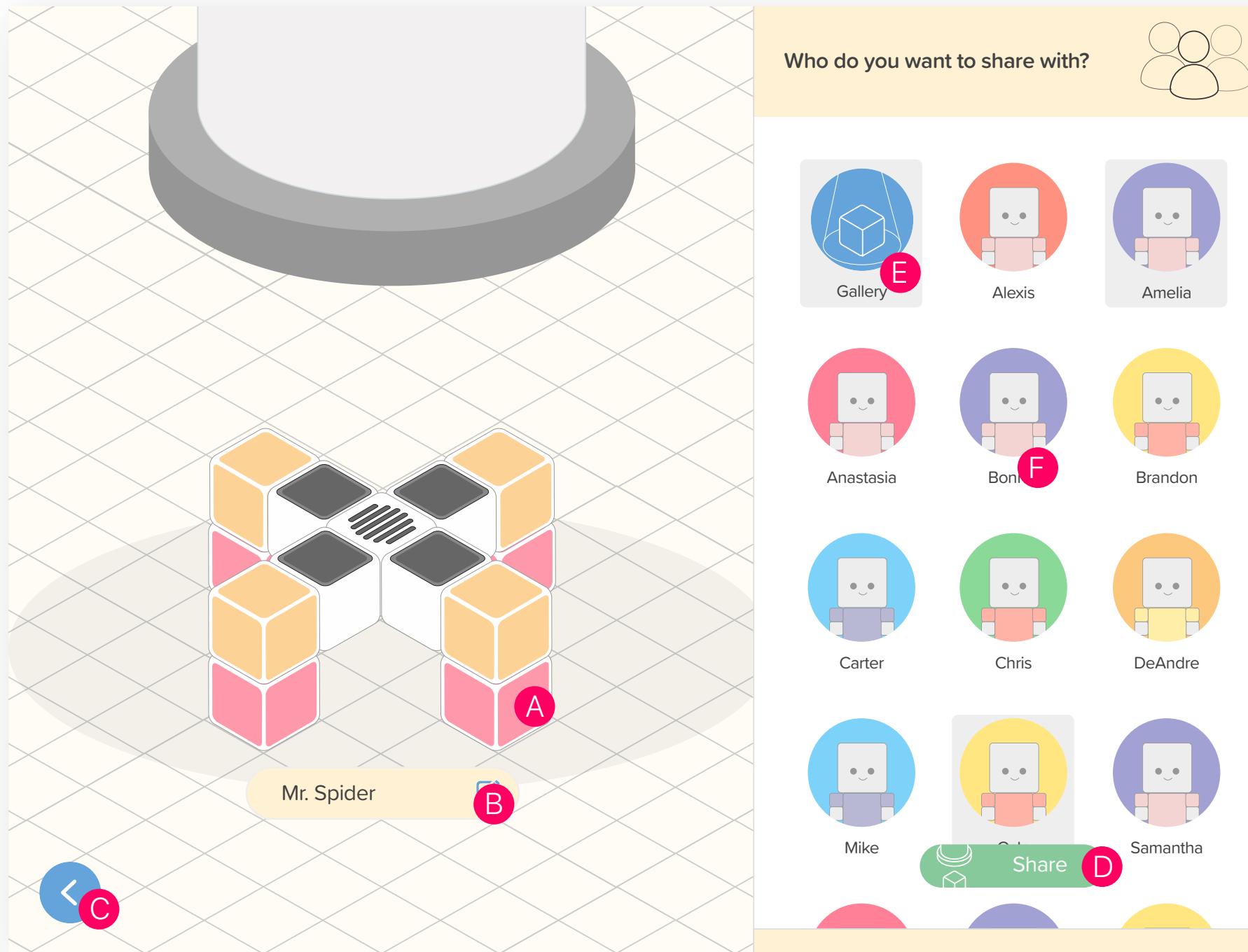
The application opens to this screen. It shows a digital representation of the user's current creation. Select the share button (F) to share the creation with a friend. Navigate to other sections of the application from this screen.

- A This is the digital representation of the current physical creation the user is building with their blocks.
- B Tapping this icon takes the user to the Avatar Preferences S.4 to customize their avatar.
- C This is the current selected view.
- D Tapping this icon takes the user to the Gallery S.2.
- E Tapping this icon takes the user to the Inbox S.3. This icon currently shows one new creation in the inbox.
- F Tapping this icon reveals the share pane and creation naming field. See S.1.1.

S.1 Build — Screen Layout



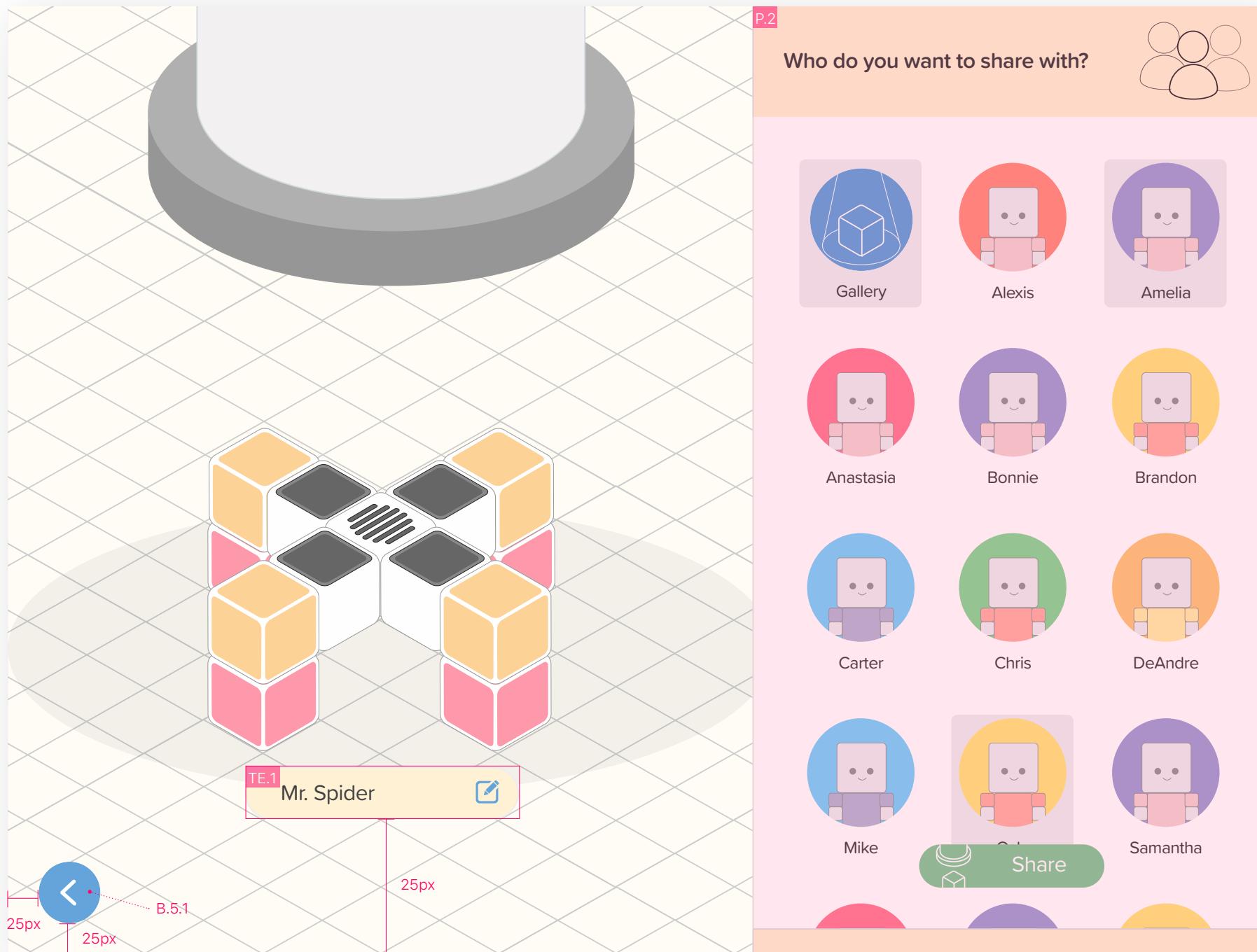
S.1.1 Share — Screen Description



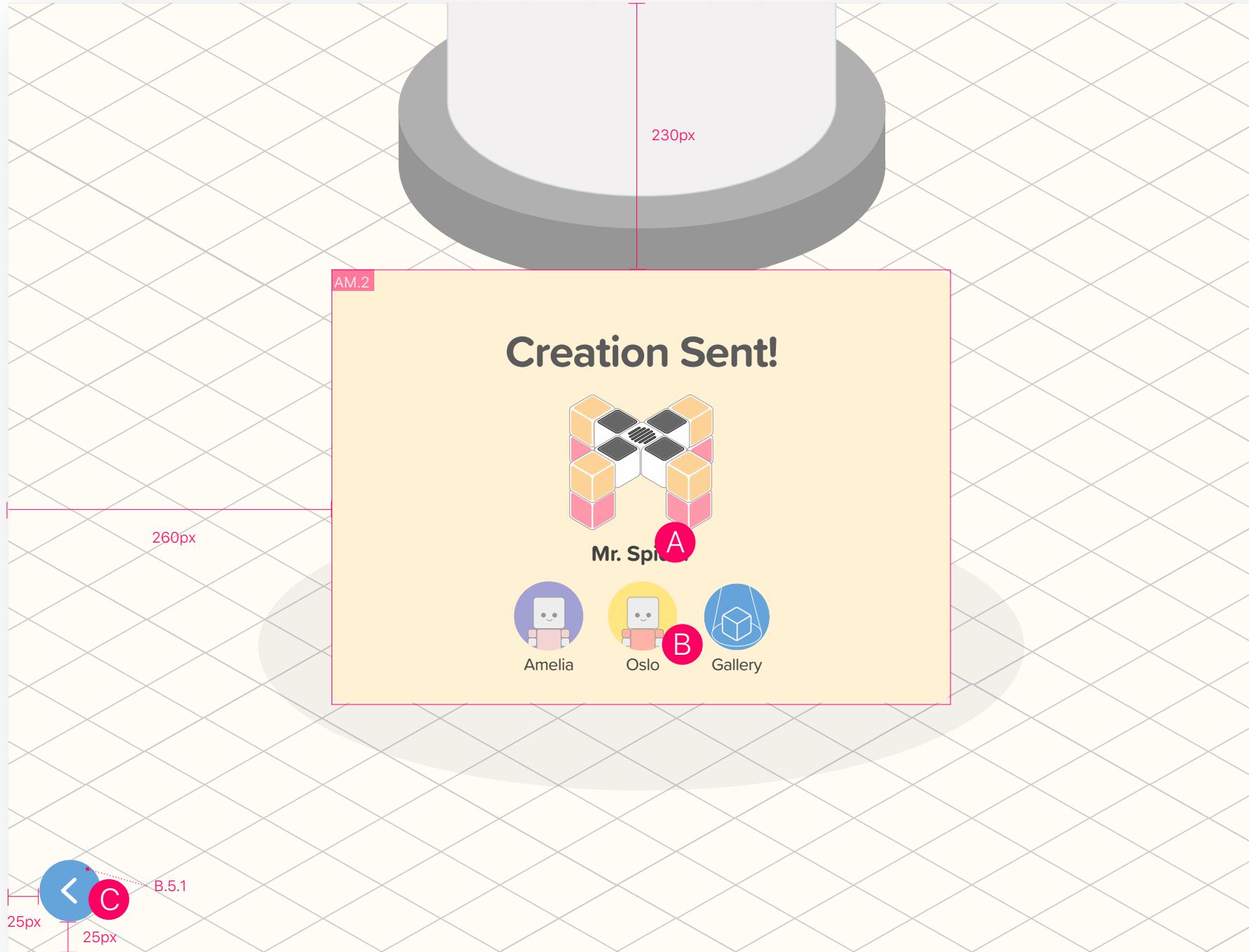
The user can select who they want to share their creation with. This can be a multi-selection and also includes sharing to the gallery for everyone to enjoy. Naming the creation can also be done on this screen.

- (A) This is the digital representation of the current physical creation the user is building with their blocks.
- (B) This is the creation naming field. Tapping on this field reveals the system keyboard.
- (C) Tapping this icon will take the user back to the Build screen S.1.
- (D) Tapping this icon will share the creation with the selected recipients.
- (E) This is a currently selected recipient.
- (F) This is a currently unselected recipient.

S.1.1 Share — Screen Layout

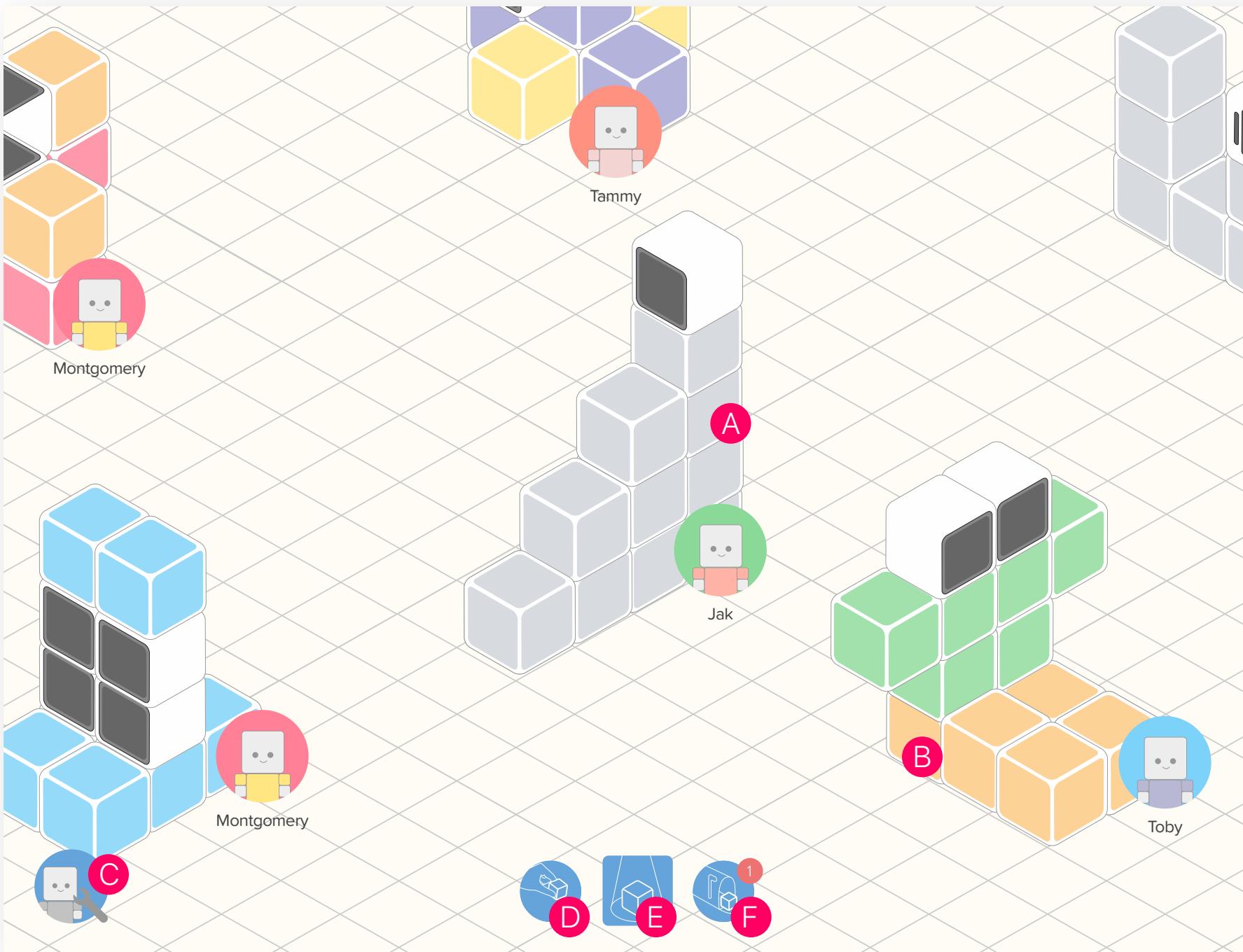


S.1.1.1 Share — Creation Sent Confirmation Description and Layout



- A This is the digital representation of the creation that was sent. The name of the creation is shown below the creation thumbnail image.
- B This is a list of the recipients of the creation. Recipients' avatars and names are shown in this view. For large collections of the recipients, this field is scrollable.
- C Tapping this icon will take the user back to the Build screen S.1.

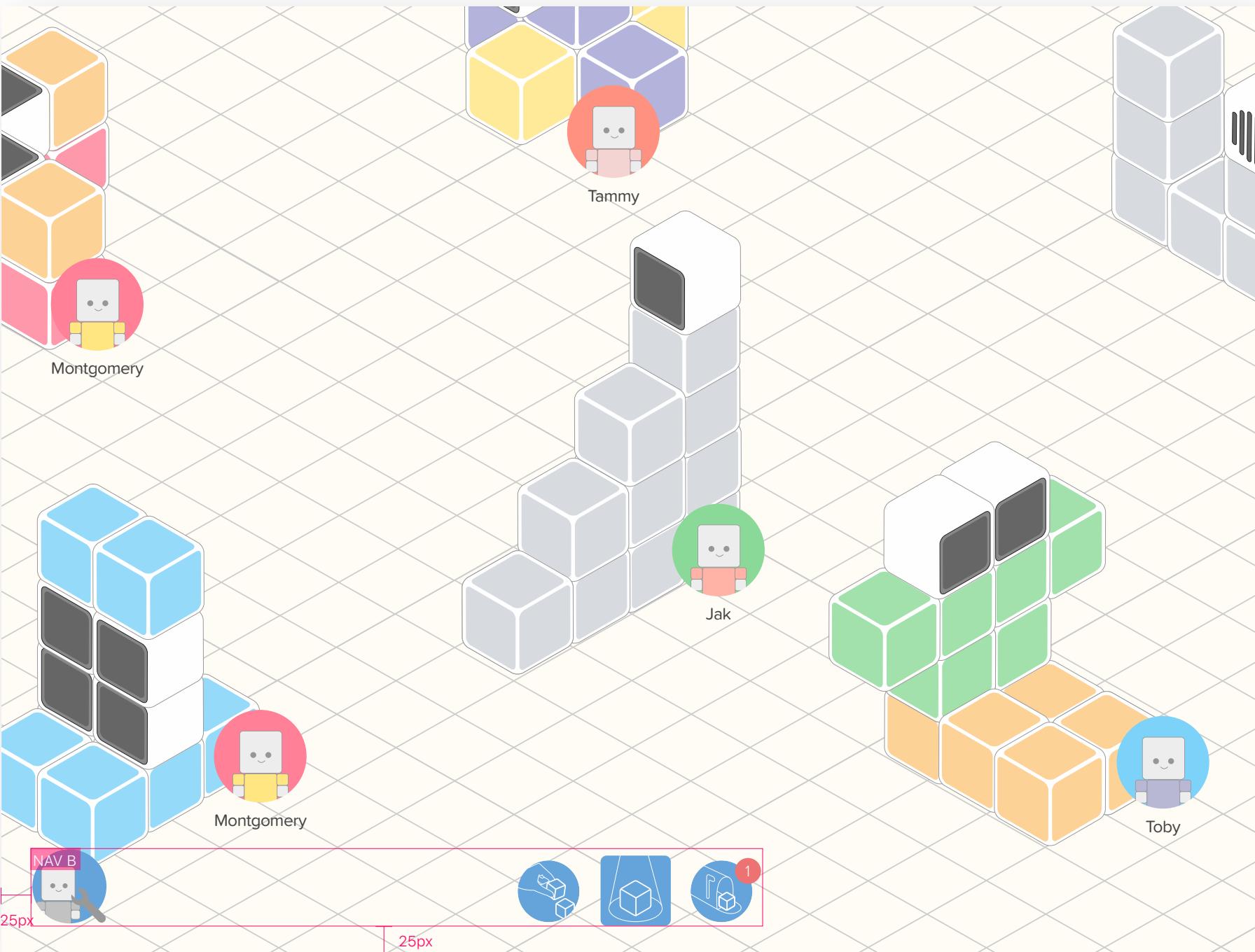
S.2 Gallery — Screen Description



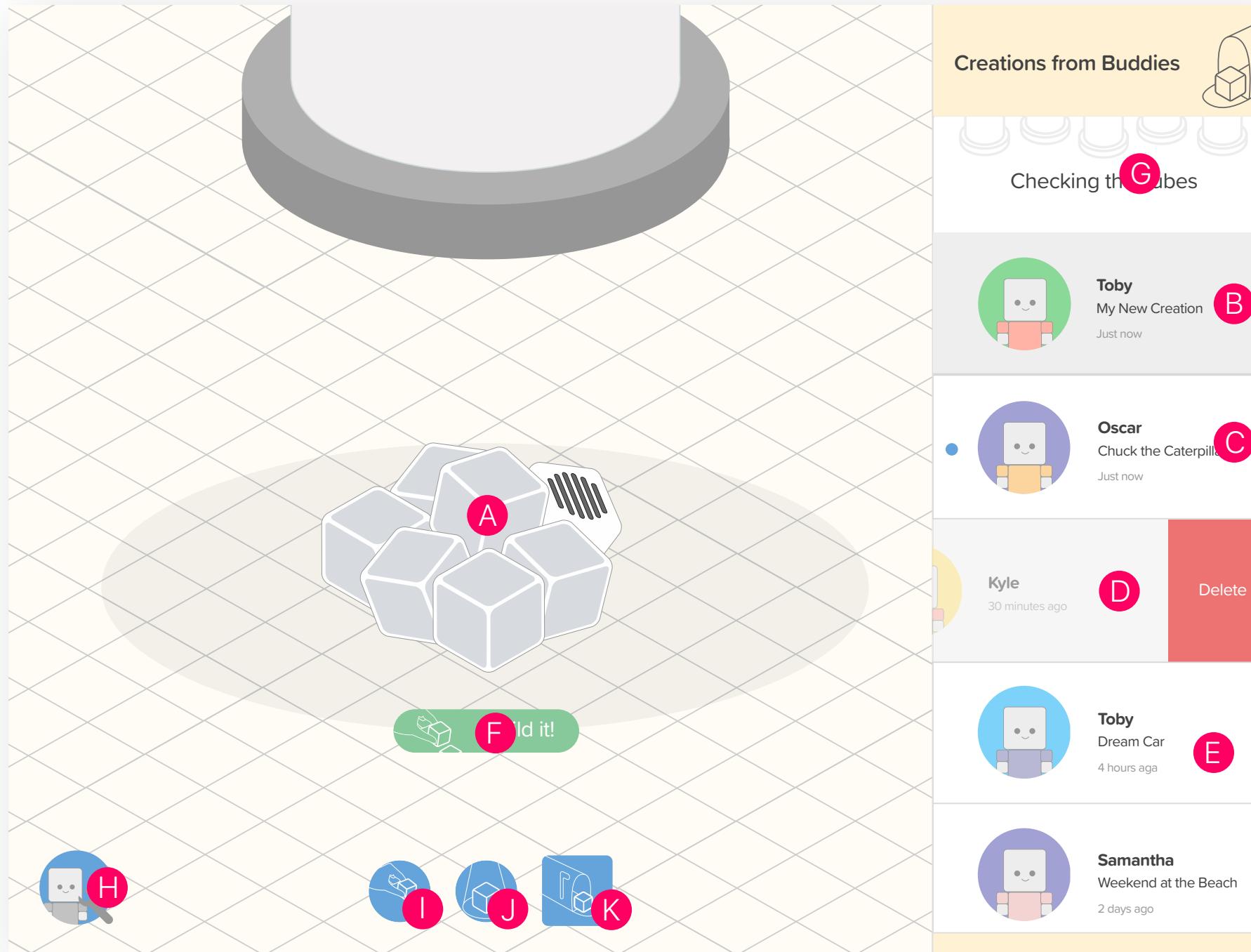
View creations others have made. See ones that have already been built (the colored creations) and rebuild them or build new creations in the gallery (the gray-scale creations). Navigate to other sections of the application.

- A** This gray-scale creation is unbuilt. The creator's avatar is shown on top of the creation. Tapping on the creation brings the user to the build instructions for that creation.
- B** This colored creation was previously built. The creator's avatar is shown on top of this creation.
- C** Tapping this icon takes the user to the Avatar Preference screen S.4.
- D** Tapping this icon takes the user to the Build screen S.1.
- E** This is the current selected view.
- F** Tapping this icon takes the user to the Inbox S.3. This icon currently shows one new creation in the inbox.

S.2 Gallery — Screen Layout



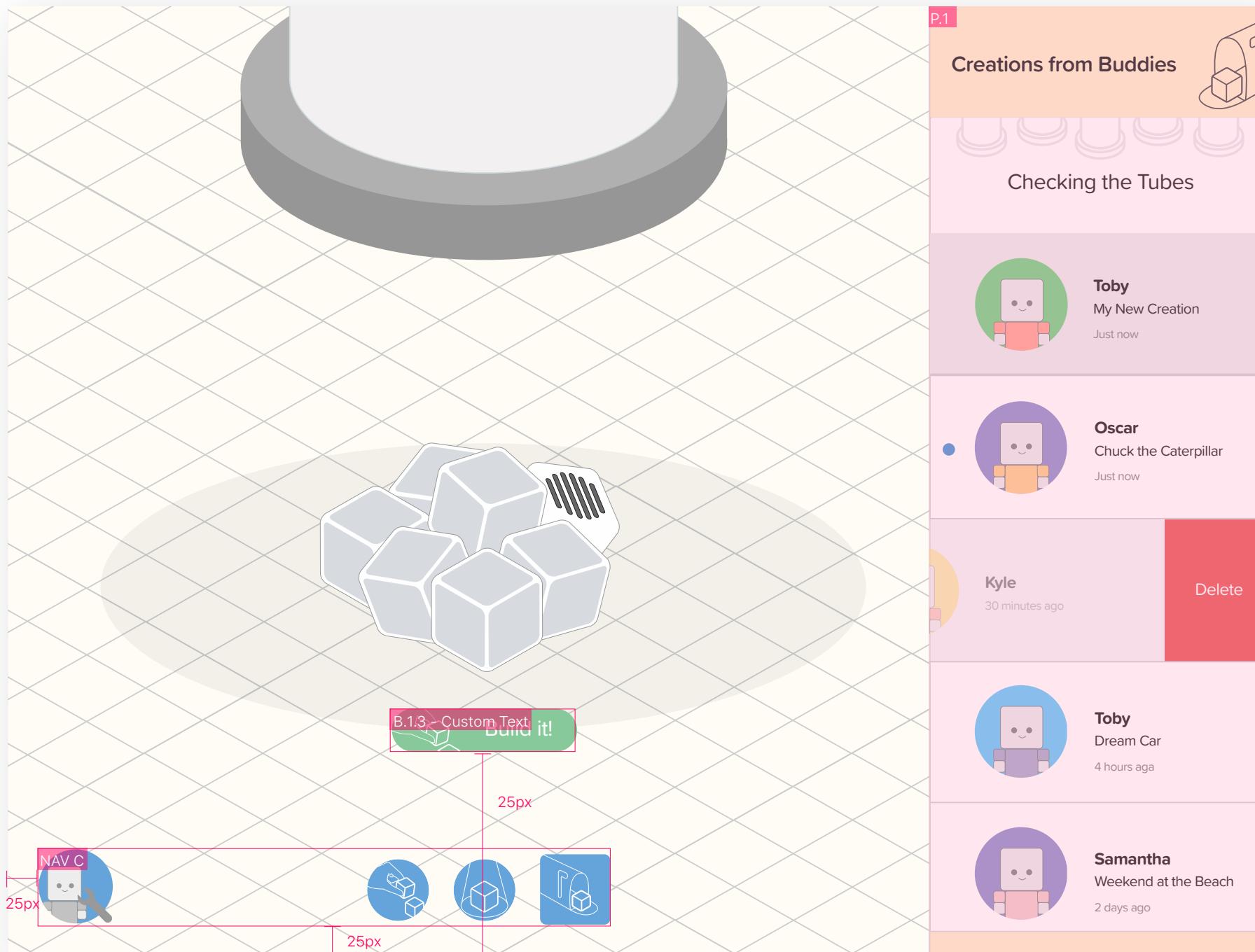
S.3 Inbox — Screen Description



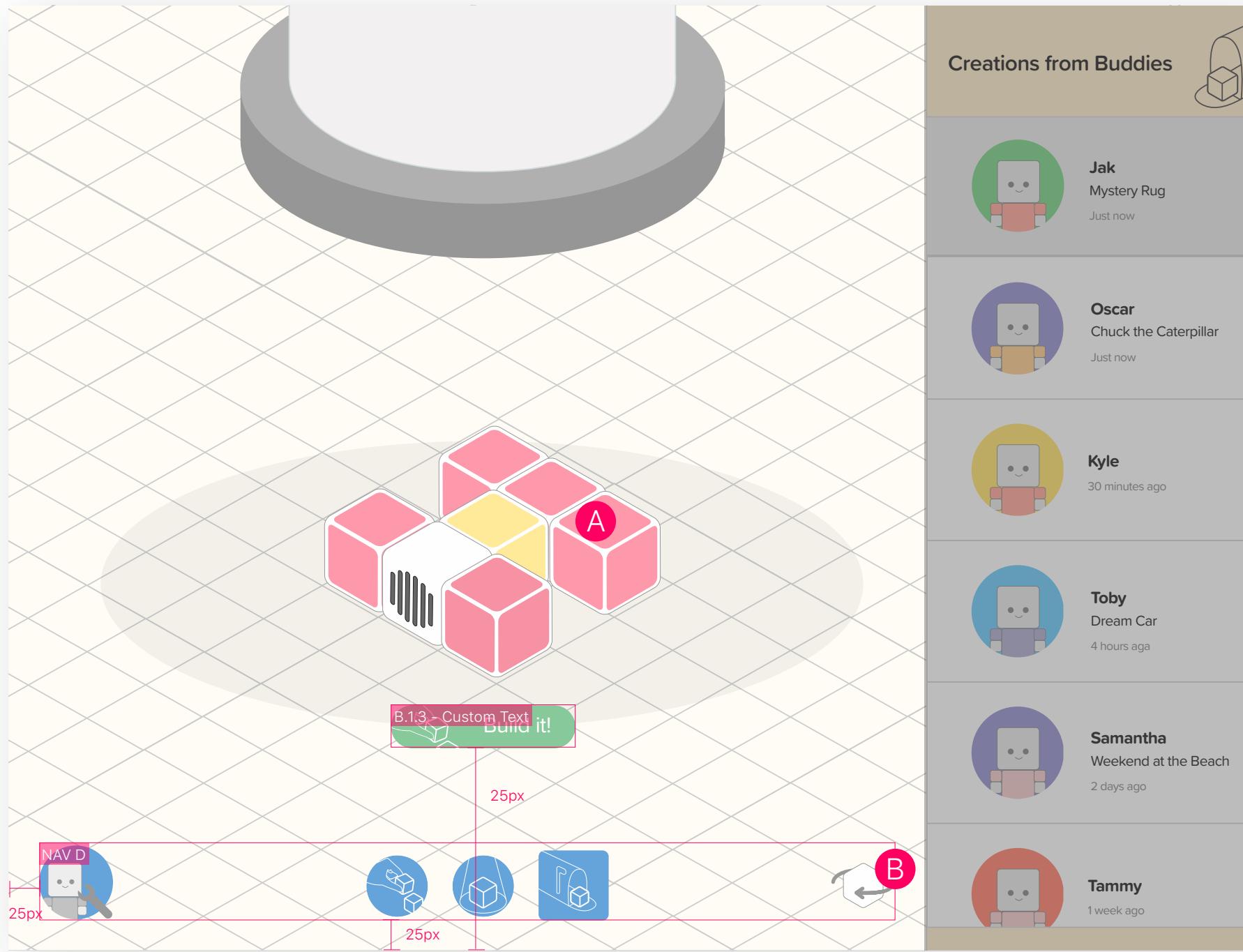
View creations that others have sent for the user to build.

- A This gray-scale creation is unbuilt. This is the creation of the current selected message.
- B This is the current selected message. Showing the sender's avatar, name, creation name, and time since it was sent.
- C This is an unread message. Tapping this row brings the creation into the content view on the left.
- D Messages can be deleted through a left drag. Tapping on the delete button or continuing the drag will delete the message.
- E This is a read message. Tapping this row brings the creation into the content view on the left.
- F Tapping this button takes the user to the Inbox Build Instructions screen S.3.1
- G When the user scrolls the content down, a refresh animation is shown at the top of the list view.
- H Tapping this icon takes the user to the Avatar Preference screen S.4.
- I Tapping this icon takes the user to the Build screen S.1.
- J Tapping this icon takes the user to the Gallery screen S.2.
- K This is the current selected view. This icon should still show the current number of unread messages until all messages are read.

S.3 Inbox — Screen Layout

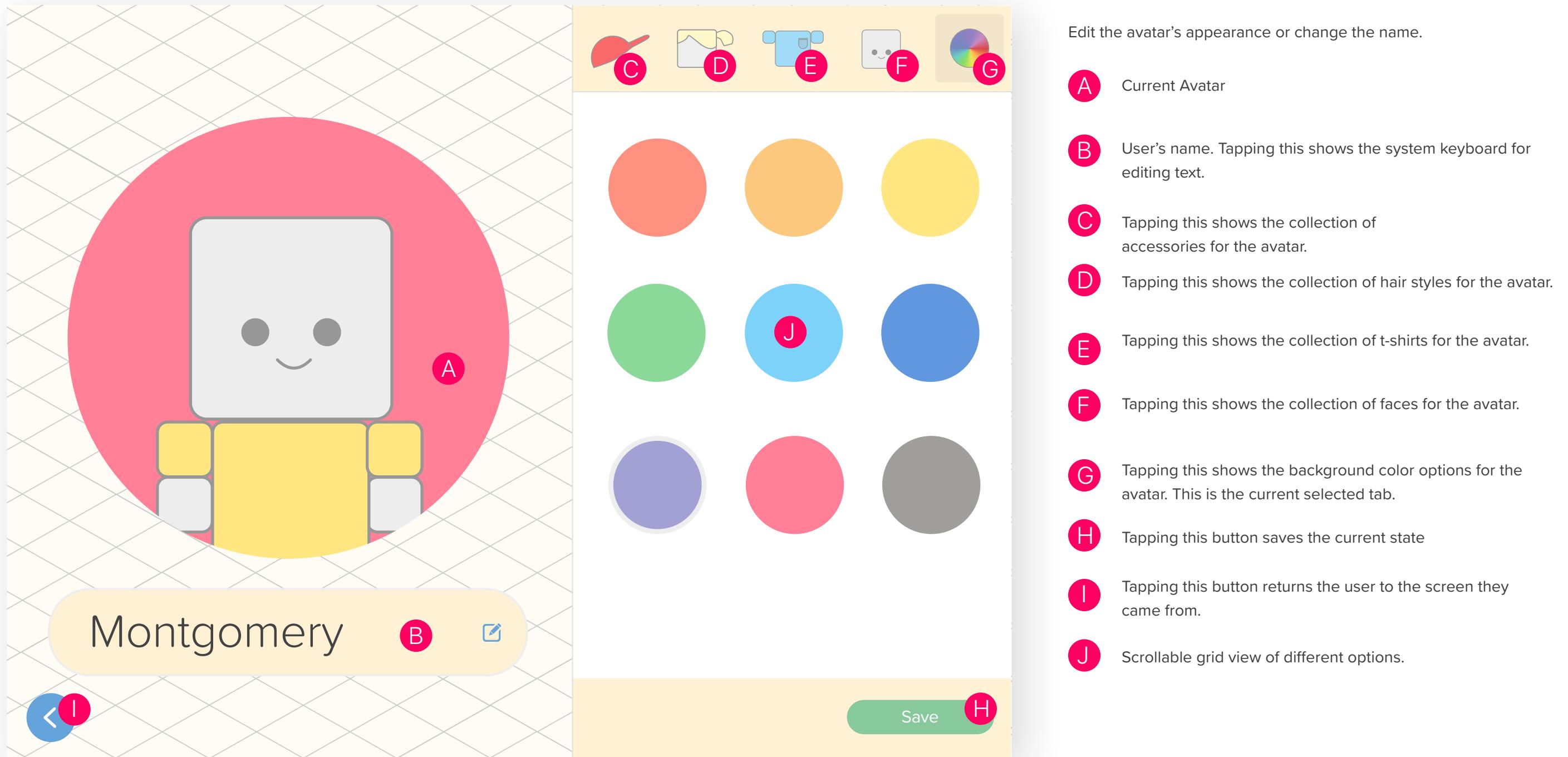


S.3 Inbox — Creation Built Description and Layout

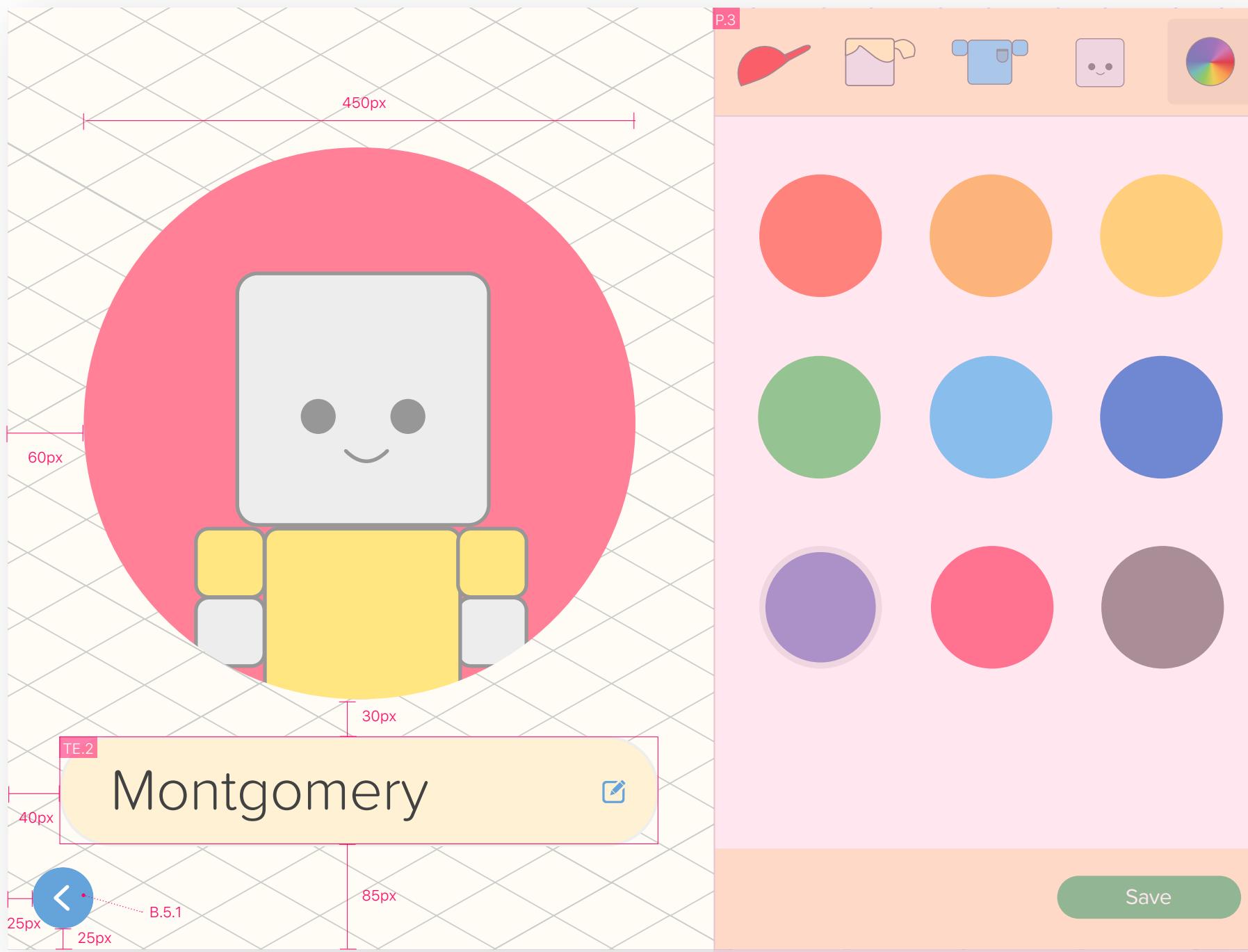


- A This colored creation has been built. This is the creation of the current selected message.
- B Tapping this icon rotates the model 90 degrees clock-wise in isometric space.

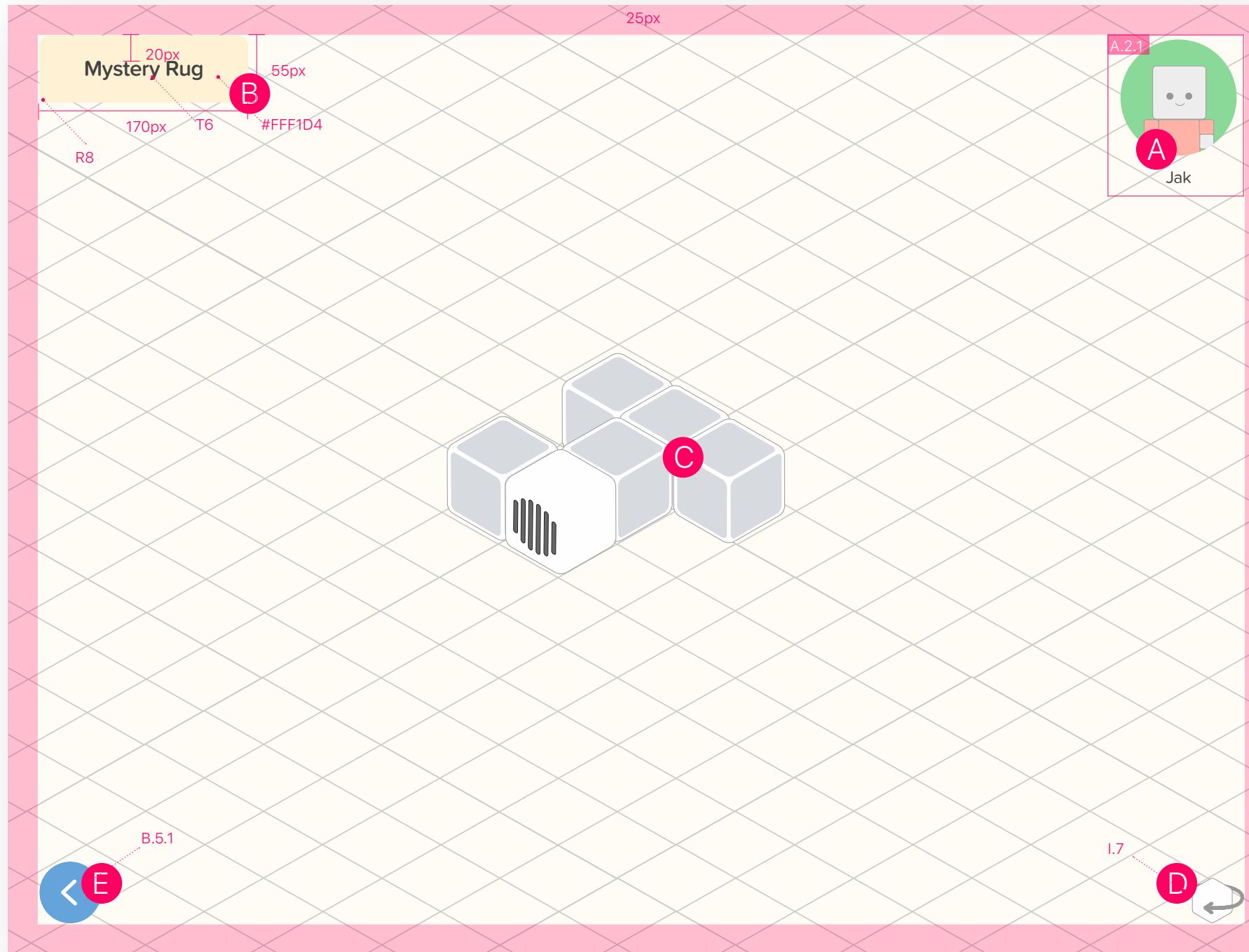
S.4 Avatar Preferences — Screen Description



S.4 Avatar Preferences — Screen Layout

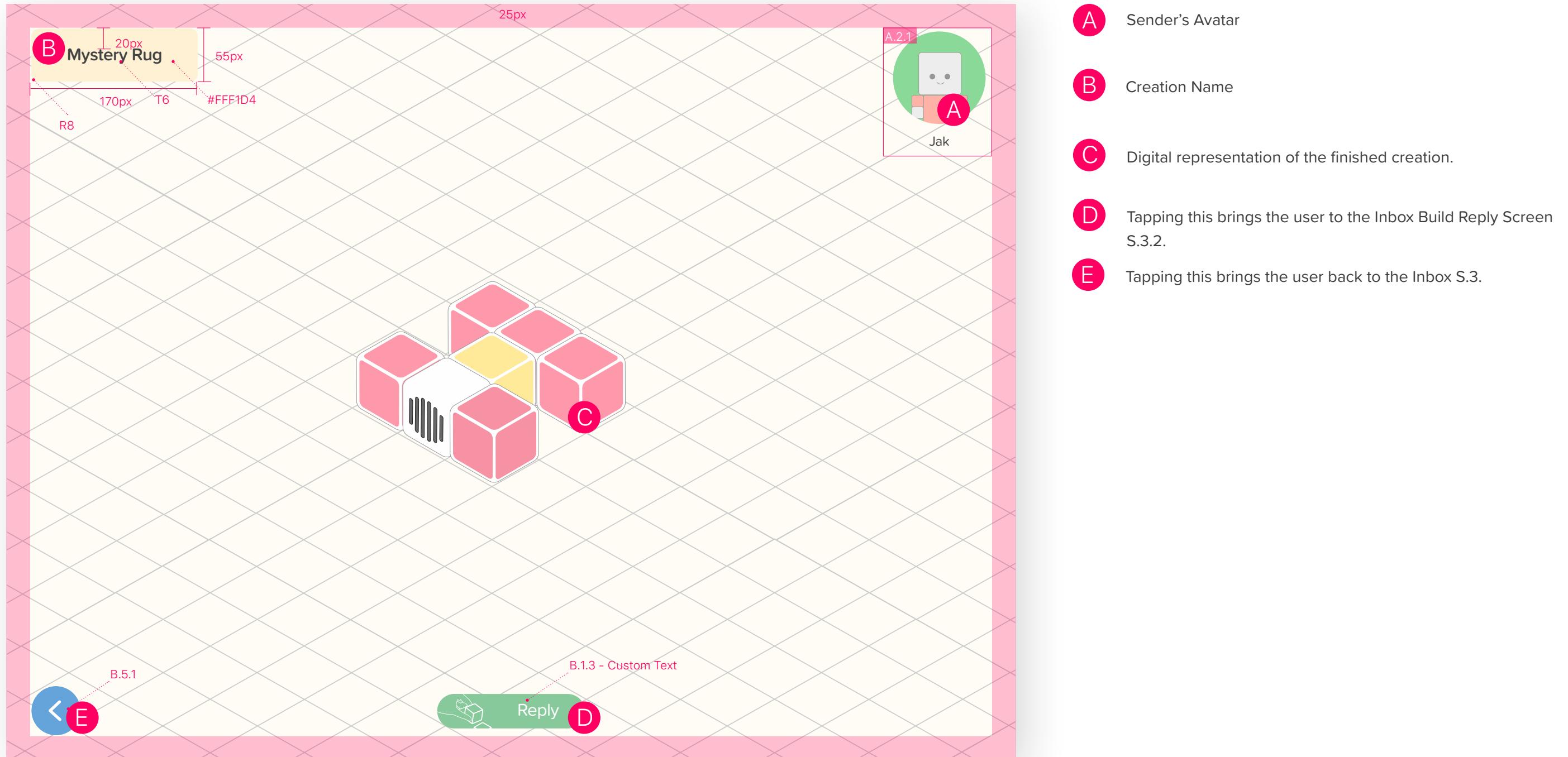


S.3.1 Inbox Instructions — Screen Description and Layout



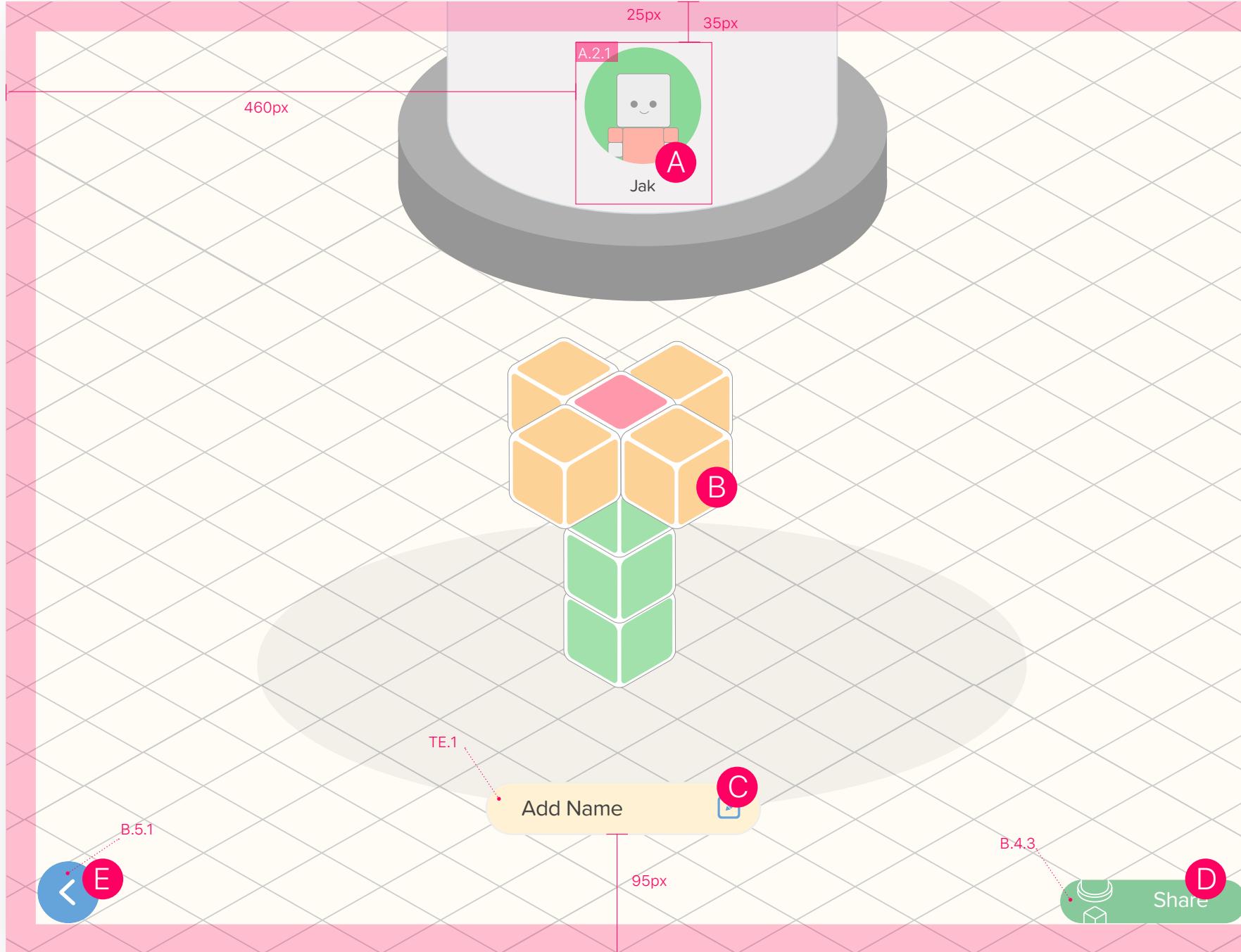
- A Sender's Avatar
- B Creation Name
- C Digital representation of the next step in instructions.
- D Tapping this rotates the creation 90 degrees clockwise in isometric space.
- E Tapping this brings the user back to the inbox.

S.3.1 Inbox Instructions — Creation Complete Description and Layout



- A Sender's Avatar
- B Creation Name
- C Digital representation of the finished creation.
- D Tapping this brings the user to the Inbox Build Reply Screen S.3.2.
- E Tapping this brings the user back to the Inbox S.3.

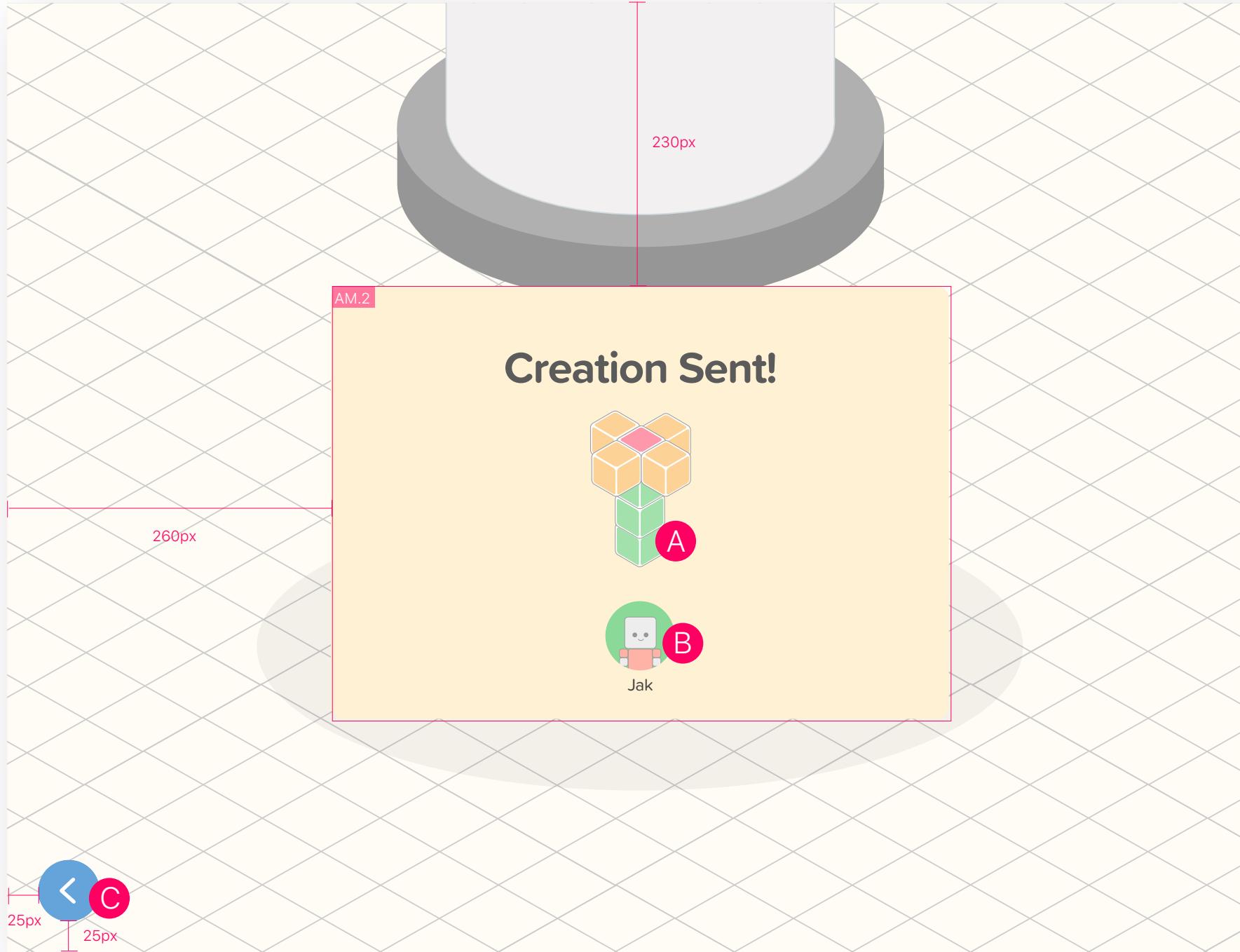
S.3.2 Inbox Build Reply — Screen Description and Layout



Send a direct reply to the sender after completing their creation. Name the creation and share.

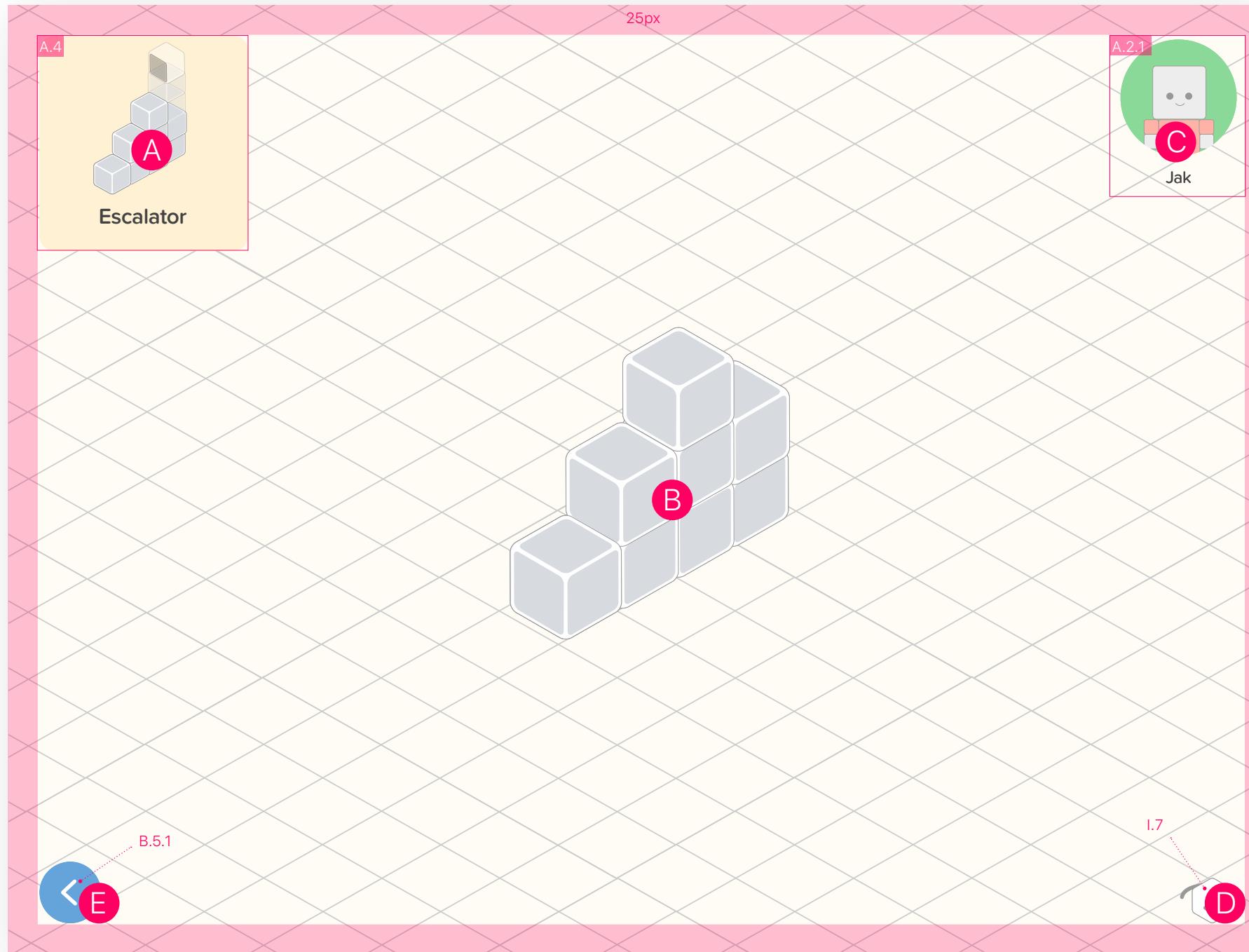
- A The auto-selected recipient's avatar.
- B Current Creation
- C Tapping this brings up the system keyboard to enter in the creation's name.
- D Tapping this shares the creation with the recipient and a confirmation is shown.
- E Tapping this bring the user back to the last step in the instructions.

S.3.2.1 Inbox Build Reply — Creation Sent Confirmation Description and Layout



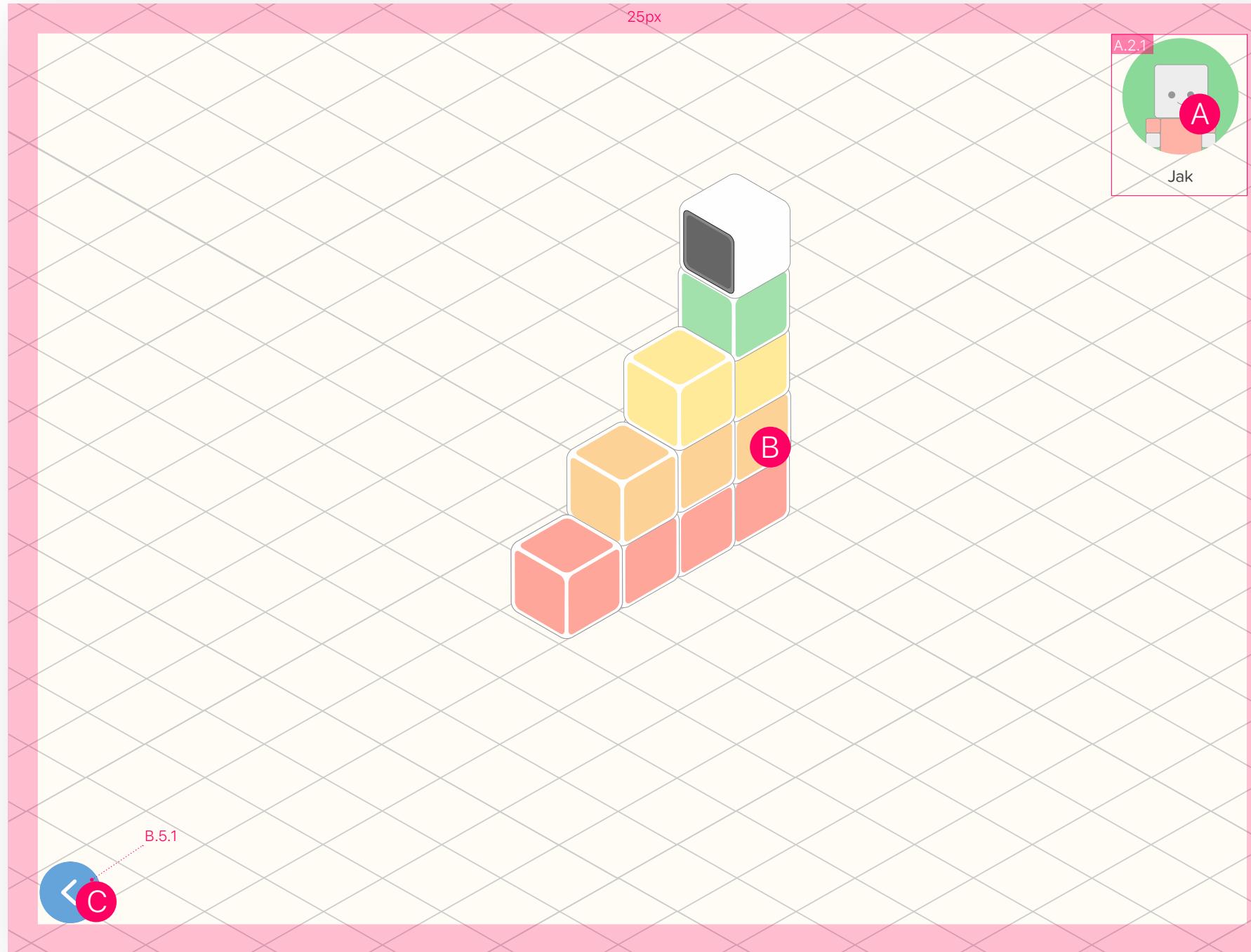
- A This is the digital representation of the creation that was sent. The name of the creation is shown below the creation thumbnail image, if it exists.
- B Recipient's avatar and name are shown.
- C Tapping this icon will take the user back to the Build screen S.1.

S.2.1 Gallery Build Instructions — Screen Description and Layout



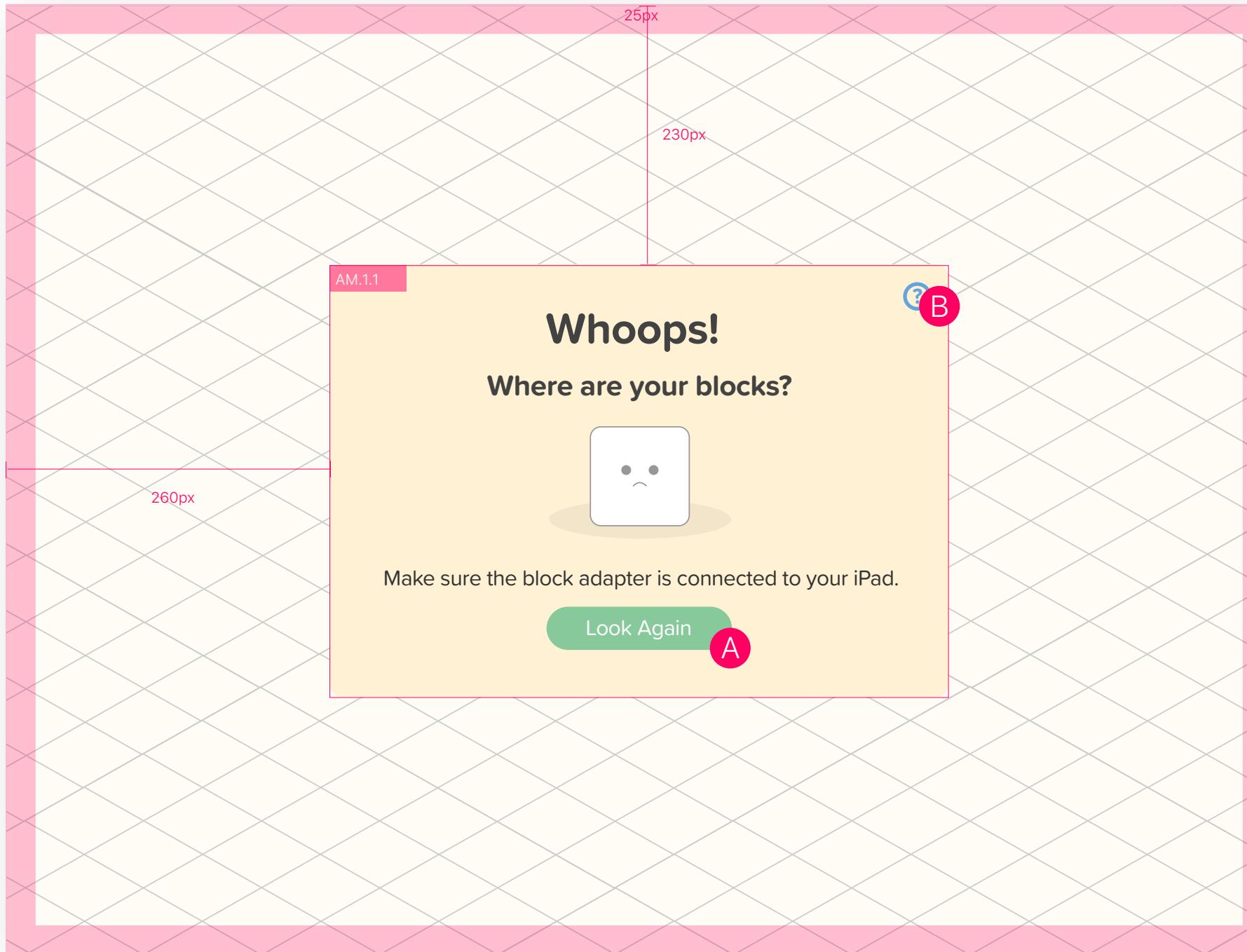
- A This is the overview of the creation. Progress towards the completion of the build is shown through the lowered opacity of the remaining blocks. The name of the creation is included.
- B Next step in the instructions.
- C The sender's avatar and name.
- D Tapping this rotates the creation 90 degrees clockwise in isometric space.
- E Tapping this brings the user back to the Gallery S.2.

S.2.1 Gallery Build Instructions — Completed Build Screen Description and Layout



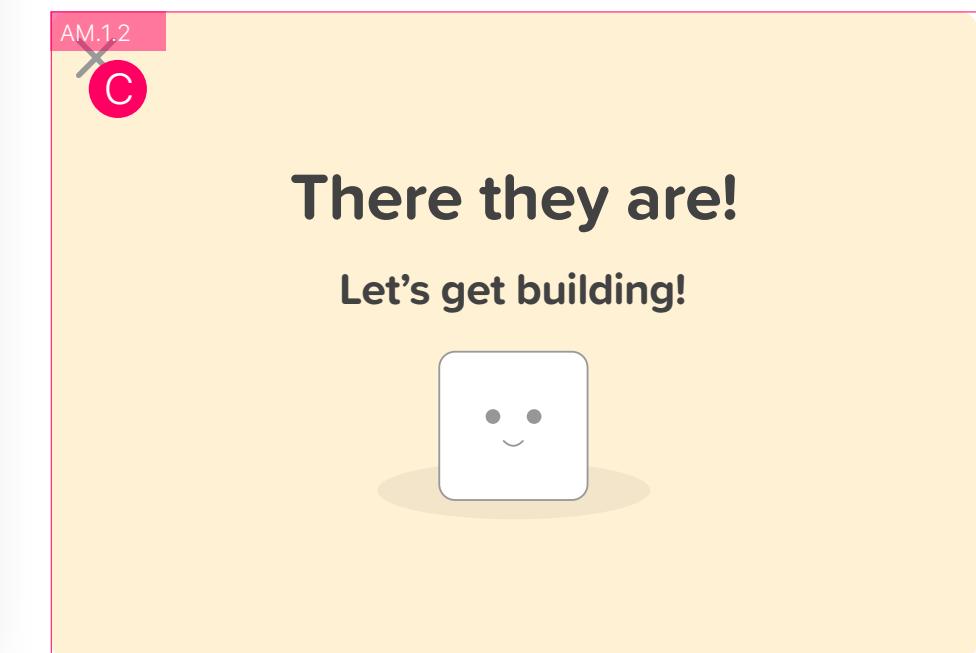
- A Avatar and name of the creator.
- B This full color creation represents the final step of the instructions and shows the completed creation.
- C Tapping this brings the user back to the Gallery S.2.

S.7 Lost Block Connection — Screen Description and Layout



- A Tapping this triggers the iPad to look for blocks using the radio adapter connected in the lighting port.
- B Tapping this brings the user to a help guide (not specified in this document) on how to connect the adapter and other trouble shooting steps.
- C This message replaces AM.1.1 when a connection is established. User can tap the "X" to close the message.

NOTE: A block connection is needed before entering the build mode and before building any creation from the gallery or the inbox. This message can appear on any of those screens.

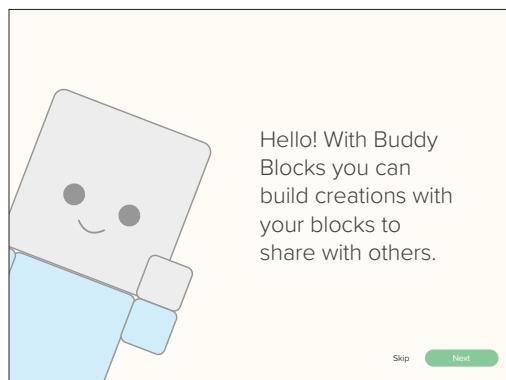


Mobile Application On-boarding Experience

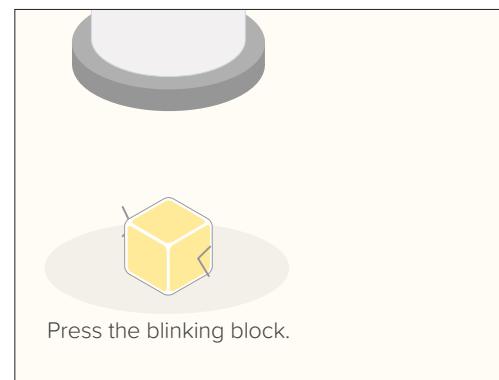
The general flow of the interactive on-boarding experience is discussed in this section. The experience is more of a video than it is an interface to interact with, therefore this section has been included to describe this video and the few screen interfaces.

On-boarding Flow

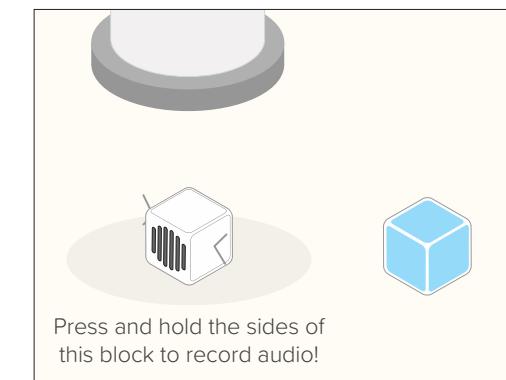
The goal of the on-boarding experience is to introduce the user to the three interactions with the blocks and to create an avatar. Though the user can skip the block tutorial all users must create an avatar. Moving through the tutorial is facilitated by the blocks. Once the blocks tell the application that the action has been performed the next step is shown.



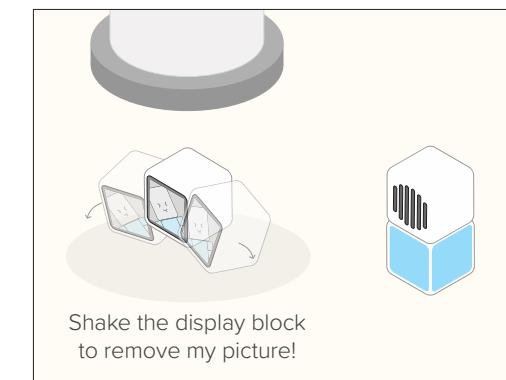
Skippy, a block buddy, welcomes the user and gives a brief statement about Buddy Blocks. The user can “Skip” to the avatar creation page continue by tapping “Next”.



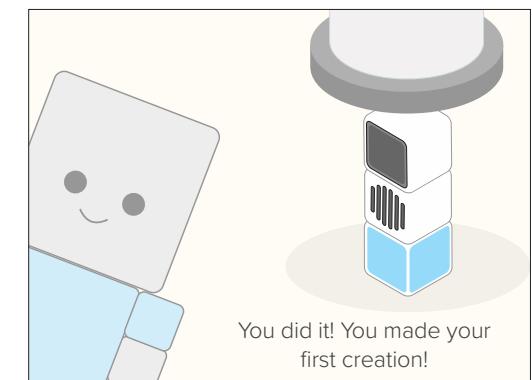
The user learns how to press a block through interacting with the light block.



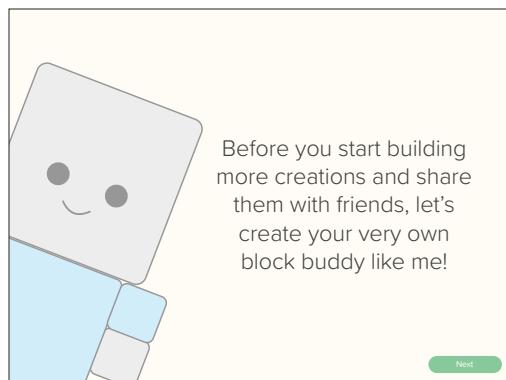
The user learns about the functionality of the sound block, and more importantly the press and hold interaction.



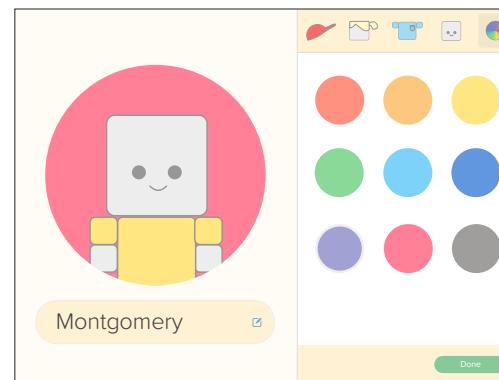
The user learns how to clear a block through shaking the display block that has an image on it.



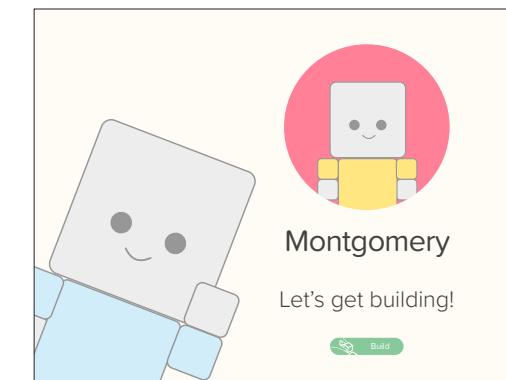
The user is congratulated on their first creation.



The user is prompted to create an avatar. Selecting “Next” moves the user to the avatar editor.



The user customizes the appearance and fills in their name. The user selects “Done” when complete.



The avatar is put on display and the user is prompted to start building. Press the build button brings them to the application build screen.

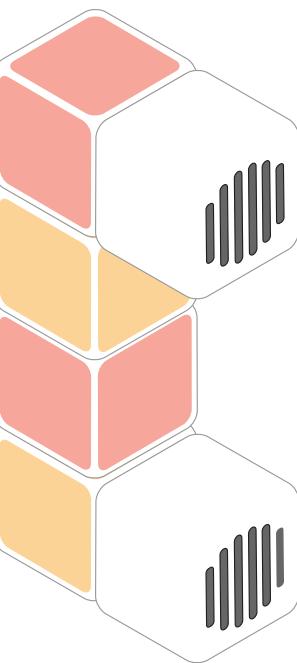
Expanding the Experience

Buddy Blocks in its current state excels at providing a flexible platform for users to create, share, and build. Preliminary specifications for further opportunities to expand on the collaborative and synchronous communication aspects are discussed here.

Recipes

Similar to how a collection of ingredients in different proportions yield a flavorful dish, *Recipes* use combinations of blocks to create special creations. A *Recipe* is a specified combination or arrangement of blocks that unlock certain pieces of functionality within the physical and digital space. Whether they unlock a feature in the application or cause physical change to the blocks is up for future discussion and exploration. However, designers should consider modeling after real world objects (i.e. musical instruments, other electronic devices, or household appliances or objects) to make these recipes more intuitive and easier to remember. Lastly, a *Recipe* should never impose on the creative direction of the user and they must choose to activate the special recipe functionality; it should not be triggered automatically.

One highly recommend addition that uses *Recipes* looks at improving the synchronous communication aspect of Buddy Blocks. Two such *Recipes* in this case might be a telephone or a two-way video chat camera. When assembled, these unlock a new feature in the application on the Build screen that allows the user to initiate a phone call or video chat. Once selected the block functions are changed to meet the needs of the new form created and a special creation notification is sent to the recipient. Shown to the right are the two *Recipes* and example interface changes can be seen on the next page.



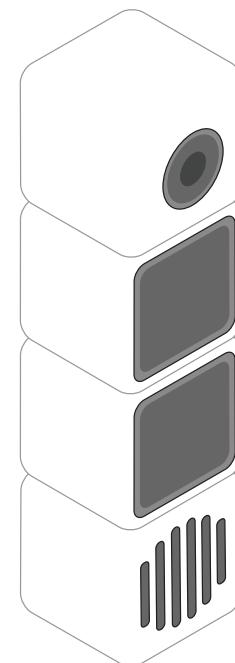
Telephone

Recipe

- 2 Cleared Sound Blocks
- 4 Light Blocks (Any Color)

Changed Functionality

The bottom sound block only captures audio and the top sound block plays back audio from the callee.



Two-Way Video Chat

Recipe

- 2 Cleared Display Blocks
- 1 Cleared Speaker Block
- 1 Cleared Camera Block

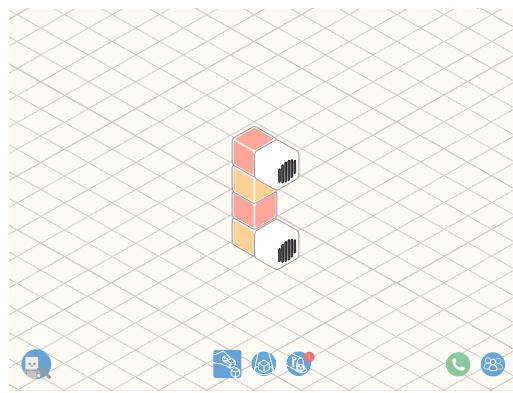
Changed Functionality

The bottom display block shows a live feed of the video caller and the top display block shows the callee.

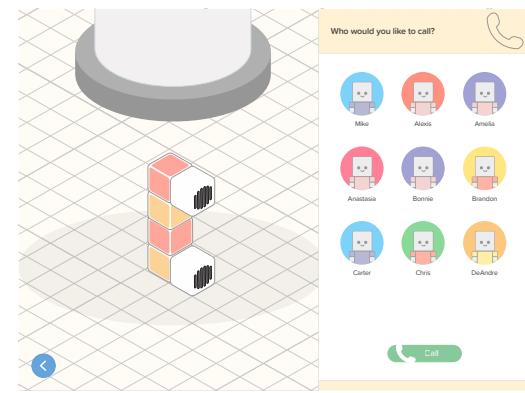
Recipes — Potential Interface Flow

Telephone

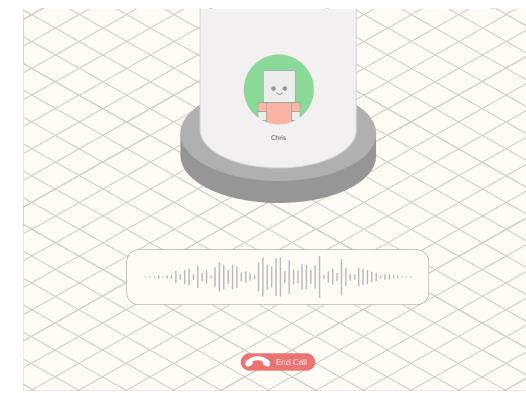
Caller Flow



The user builds a creation that matches the telephone recipe. A green call action button appears next to the share. Notice that the user must select this to start the call.

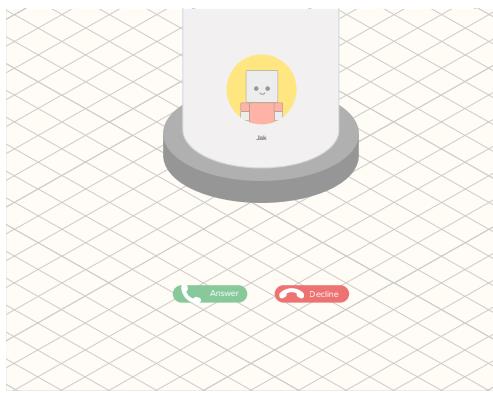


User selects from a list of current users of the application to call.



The call is initiated and the user is notified while the callee accepts and builds the phone. The user can end the call by pressing the red action "End Call" button.

Callee Flow



A special tube drops down and the user is asked to accept the call or decline. Similar to a cellphone call.



The callee sees the phone to create and the necessary blocks automatically light up. Once they assemble the phone, the call starts.

Two-Way Video Chat

This would be similar to the telephone flow. However, it would be triggered by the two-way video chat recipe and use iconography and language matching that of a video chat, for example, a camera icon or "Start/End Chat".

Buddy Build

Collaborative real-time building is also an interesting opportunity to explore. One approach to achieve this is called *Buddy Build*. This would be similar to a live chat which is initiated by one patient and joined by the other. The two patients would alternate turns adding a select number of blocks to the creation, each time updating their builds to match the other's before adding their contribution. They would see the other individual's contribution on the Buddy Block application screen, similar to the instruction screen. Shown to the right might be the different steps in a *Buddy Build* session. At the end of the session the two participants have the same creation with the same media content. *Buddy Build* sessions might even be possible with more than just two builders.

