

## Inclusive Communication | **Tools to learn and play together**



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# Inclusive Communication | **What is inclusive education?**

**"I see inclusion as the final frontier of desegregation"** -Joe Petner, Principal, Beaver Meadow Elem.

**"Every child has a multiple way of learning. It is our job to discover those ways."** -Teacher, Beaver Meadow Elem.

**Full Inlcusion** One special education .....➔ **Meeting Street School** .....➔  
teacher, one regular education  
teacher, one-third of the class has  
special needs, the whole class is  
together all day



**Mainstreaming** Special education .....➔ **Vartan Gregorian Elementary** .....➔  
students spend some of their day  
in a self contained class and some  
included in a regular class



**There is a wide spectrum in between.** If inclusion were implemented broadly, the number of children with special needs in each class would reflect the number in the community

# Inclusive Communication | **Why inclusion?**

## **Everyone has a story to tell**

The goal of inclusion is to teach kids to value each other regardless of race, academic ability, physical ability, appearance, gender, etc.



“Sharing places with others in the community

Promoting positive reputations for people with disabilities

Nurturing relationships with others

Encouraging choices by offering options and opportunities to explore new things

Building competencies that will lead to the highest level of achievement” -Meeting Street Values

**“We really accept people for who they are and what they are. Whether it's one's racial background, one's social or economic background, one's family constellation, or one's ability. Seeing diversity in its fullest sense as an important quality”** -Joe Petner, Principal, Beaver Meadow Elem.



# Inclusive Communication | **Who is involved?**

James, 2<sup>nd</sup> Grade



## Skills

### Communication

- ☒ Sound
- ☒ Gesture
- ☐ Switch
- ☐ Multi-choice
- ☐ Speech

### Social

- ☐ Awareness
- ☒ Parallel Play
- ☐ Social Play
- ☐ Conversation

### Mobility

- ☒ Wheelchair
- ☐ Independent WC
- ☐ Walking

## Why inclusion is important

James performs best when there is activity around him and enjoys being with groups of peers

## Why inclusion is hard

James can have disruptive behavior

## Voice

Vocalizes emotions



# Inclusive Communication | **Who is involved?**

**Daniel, 2<sup>nd</sup> Grade**



## **Skills**

### **Communication**

- ☒ Sound
- ☒ Gesture
- ☒ Switch
- ☐ Multi-choice
- ☐ Speech

### **Social**

- ☒ Awareness
- ☒ Parallel Play
- ☒ Social Play
- ☐ Conversation

### **Mobility**

- ☒ Wheelchair
- ☐ Independent WC
- ☒ Walking

## **Why inclusion is important**

Daniel is motivated to participate with his friends

## **Why inclusion is hard**

Daniel can have disruptive behavior and grab for attention

## **Voice**

Waves for people to come over  
Small sign language vocabulary



# Inclusive Communication | **Who is involved?**

**Marissa, 3<sup>rd</sup> Grade**



## **Why inclusion is important**

Marissa is great fun to have in class and her classmates all adore her.

## **Why inclusion is hard**

She can be stubborn and act out when upset. She has a hard time asserting herself when she wants to be included at times like lunch and recess.

## **Voice**

Verbal

Not always able to convey abstract concepts, such as emotion

## **Skills**

### **Communication**

- ☒ Sound
- ☒ Gesture
- ☐ Switch
- ☐ Multi-choice
- ☒ Speech

### **Social**

- ☒ Awareness
- ☒ Parallel Play
- ☒ Social Play
- ☒ Conversation

### **Mobility**

- ☐ Wheelchair
- ☐ Independent WC
- ☒ Walking

# Inclusive Communication | **Who is involved?**

Elizabeth, 3<sup>rd</sup> Grade



## Skills

### Communication

- ☒ Sound
- ☒ Gesture
- ☒ Switch
- ☐ Multi-choice
- ☐ Speech

### Social

- ☒ Awareness
- ☒ Parallel Play
- ☐ Social Play
- ☐ Conversation

### Mobility

- ☒ Wheelchair
- ☒ Independent WC
- ☐ Walking

## Why inclusion is important

Elizabeth is at grade level in terms of intelligence, but she needs to be with peers to learn social skills

## Why inclusion is hard

Elizabeth needs physical assistance, and can take longer to complete tasks

Not all spaces are accessible to her wheelchair

## Voice

Speaks fluently but her speech is unclear

Does not want to not use a multi-frame device





# Inclusive Communication | **Who is involved?**

**Sarah, kindergarten**



## **Why inclusion is important**

Sarah's parents don't want her to be confused because she was adopted. They are trying to raise her without binaries like race and ability

## **Why inclusion is hard**

Sarah's parents were worried inclusive classes wouldn't be rigorous, but her class at Meeting Street is performing at the top of the state

## **Voice**

Verbal

Sarah can be shy and struggle to speak up in groups

## **Skills**

### **Communication**

- ☒ Sound
- ☒ Gesture
- ☒ Switch
- ☒ Multi-choice
- ☒ Speech

### **Social**

- ☒ Awareness
- ☒ Parallel Play
- ☒ Social Play
- ☒ Conversation

### **Mobility**

- ☐ Wheelchair
- ☐ Independent WC
- ☒ Walking

# Inclusive Communication | **Who is involved?**

**Katie, 2<sup>nd</sup> Grade**



## **Why inclusion is important**

Katie really enjoys being with her friends and the other kids in the class really enjoy her

## **Why inclusion is hard**

Katie tries to get attention in aggressive ways, it can be hard for kids to realize she just wants to play.

## **Voice**

Vocalizes emotions

Limited vocabulary, 2 word phrases

Uses some picture symbols



## **Skills**

### **Communication**

- ☒ Sound
- ☒ Gesture
- ☐ Switch
- ☐ Multi-choice
- ☐ Speech

### **Social**

- ☒ Awareness
- ☒ Parallel Play
- ☒ Social Play
- ☐ Conversation

### **Mobility**

- ☐ Wheelchair
- ☐ Independent WC
- ☒ Walking

# Inclusive Communication | **Why communication?**

## **Everyone has a story to tell**

The goal of inclusion is to teach kids to value each other regardless of race, academic ability, physical ability, appearance, gender, etc.

The best way to do that is to give everyone a voice to tell their story.

## **What does each of these people have to say?**

















## **Technology has advanced, but hasn't been applied to answer this question**





# Inclusive Communication | Existing devices

Unisensory	Audio/ Visual	A/V, Tactile (reinforcement)	A/V, Tactile (conceptual)
<p>Flip books PECS</p>  <p><b>Low Tech, Toys</b></p>	<p>Liquid density toys Fiber optic toys</p>  	<p>Beads, sensory toys Kissin' critters</p>  	<p>Rhyme-cups with figures Representational figures</p> 
<p>Go talk Switches Hip step</p>   <p><b>High tech, Communication</b></p>	<p>Multi-frame</p>  	<p>Vibrate/ texture switches Carousel switch</p>  	<p>Choice 4-communicator Take-or-place Object communicator</p>  



# Inclusive Communication | **Values**

**Language is social.** The inclusive communication device for the classroom will emphasize communicating personality and emotion, as a priority over needs based and academic communication.

**All behavior is communication.** The inclusive communication device will make use of and bring attention to the existing communication abilities of each child.



**The system will utilize and reinforce the child's existing means of communication.**

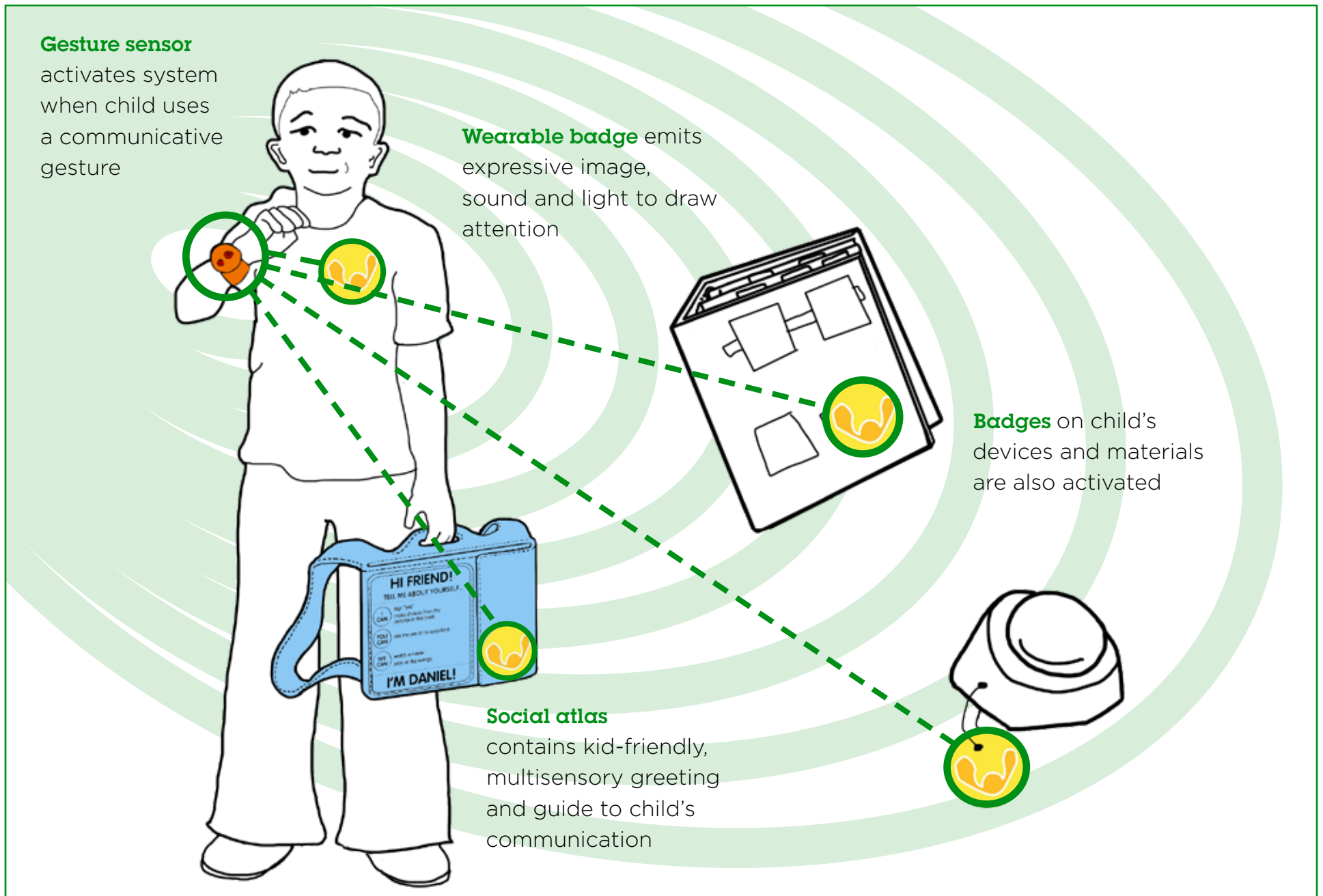


**The system will use emotional communication that is not linguistic to increase the range of expression and add authenticity.**



**The system will empower the child to express their personality and social identity.**

# Inclusive Communication | **Design overview**



## Gesture Sensor | Observations



Because he doesn't speak, this student struggles to get the attention of his teaching assistant.



This student is trying to get the attention of his peer in an inappropriate way because he doesn't have a better means.



This student always waves hello, but people don't always notice and respond to him.



This student begins to show physical signs of anxiety before he is aware of or able to discuss how he feels.

# Gesture Sensor | Interviews



“The resounding point teachers have to know is never to overlook opportunities for communication.” -Principal, Meeting Street

“He’ll bite his shirt, scratch, grab, try to bite. He can’t talk well, so that contributes to behavior. I think it’s mostly behavioral.” -Assistant, Meeting Street

“Eliciting a first response is critical to realizing [communication] can work for you.” -Speech pathologist, Meeting Street

## Interviews conducted

### Principal

Meeting Street  
Vartan Gregorian

### Speech Therapists

5 Meeting Street

### Regular Ed. Teachers

1 Meeting Street  
1 Vartan Gregorian

### Special Ed. Teachers

3 Meeting Street  
2 Vartan Gregorian

### Teaching Assistants

2 Vartan Gregorian  
4 Meeting Street



# Gesture Sensor | **Design precedents**



## **Blendie**

**Kelly Dobson, MIT Media Lab**

Blendie is operated by a user growling to match the sound of the blender.



## **Nintendo Wii**

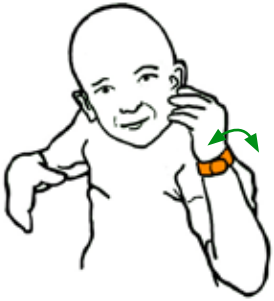
Wii is controlled by natural body movements rather than a controller.



## **Biosensing**

There are many sensors and devices that can be used to read information about the state of the body and control devices.

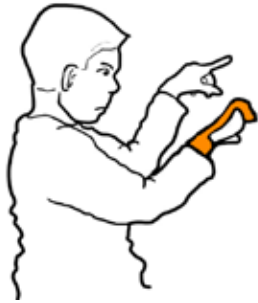
# Gesture Sensor | **Types of gestures**



Daniel waves  
"Hello"



An accelerometer  
on his wrist senses  
the pattern of the  
wave



Arthur begins to  
feel anxious



A pulse or skin  
conductivity sensor  
picks up the signs  
of stress



Katie increases her  
concentration on  
something



A twitch sensor  
on her headband  
senses the tension  
in her temples



Elizabeth says a  
specific word



A microphone with  
voice recognition  
recognizes her  
signal word



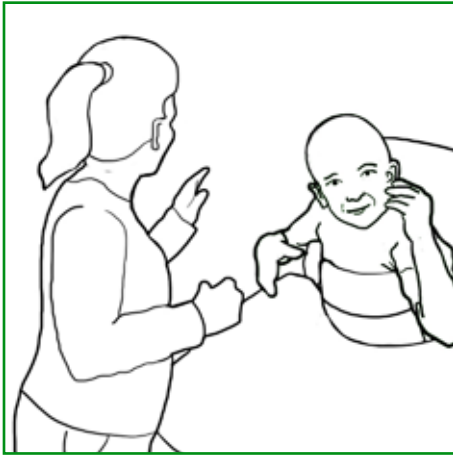
Nathan grabs his  
ears



A light sensor on  
his shoulder falls  
under the shadow of  
his hand

# Gesture Sensor | Storyboard

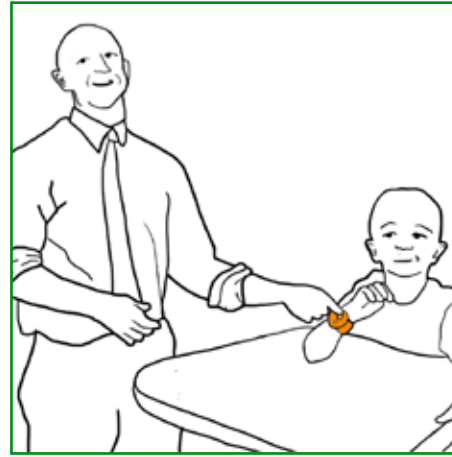
Caregiver and child identify gesture child communicates with



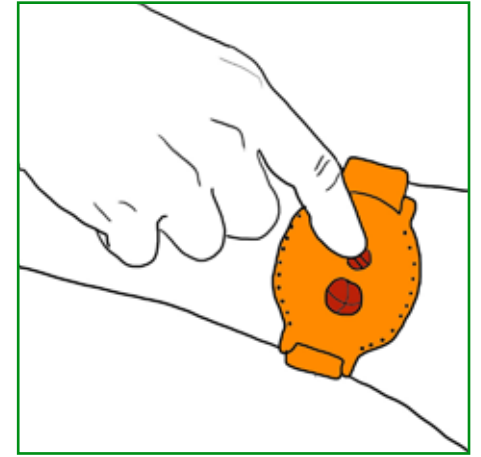
Sensor is recommended to capture it



For a short time, every time child makes gesture caregiver pushes button



When device switched to use mode, it generates a pattern to recognize gesture



From now on, whenever child makes that gesture, system is activated

## Badge | **Observation**



**Authenticity** When a student pushes a switch in someone else's voice it is difficult to believe it is authentic communication from them



**Usability** People often don't listen to devices because they are put off by the robotic voice or because the output quality is poor



## Badge | **Design precedents**



### **Kiss Communicator** **IDEO**

The kiss communicator of a partner lights up when a user blows a kiss on their own device. The pattern is always different and is fleeting, it is not stored.



### **Social Mobile 2** **IDEO**

Social mobiles explore ways to answer and communicate by mobile phone without speaking into the phone. One device allows the user to control the tone of their answer, which is non-linguistic



### **Somiya says** **by Somiya Shabban and Joanna VanDaalen** **Craftspace: Designing for Access**

“The short term utterance is also a long term badge—a label of Somiya’s own devising, to express her individuality and identity, rather than any stereotype associated with her impairment” -Graham Pullin

# Badge | **Performance studies**

## **Performance studies**

“Language is a system we use to communicate that is not personal to us, but it is social. Some people have more control than others over what it is.”

“Who has the power to give someone else a voice?”

“What does it mean to not use spoken words?”

“A device that requires language privileges the ‘text’ over embodied practice.”

“If the child doesn’t have the experience of the words ‘I’m sorry’ but other people need it to continue to interact, is it a concession?”

“When someone uses a translator there is no question that the translator is not their voice.”

## **Subaltern studies**

“When you speak for the silenced you repeat the conditions of the original silencing”

-Lindsay Goss, Performance Studies, Brown University



## Badge | **Excellent non-verbal communicators**



Beeps .....► Utterances sound emotive, but usually require verbal context to interpret  
Squeaks  
Lights



Beeps .....► Often repeats words of others  
Squeaks  
Mumbles  
Facial expressions  
Body language



Beep .....► Wall-E conveys cute, friendly personality by introducing himself to everyone  
Hum  
Rattle  
Say names  
Movement  
Eve has cool, sophisticated sound and body language  
Mo is uptight and irritable



Found lyrics from .....► Relies on verbal language, but not his own radio

## Badge | **Avatar Concept**

Create personalities and allow kids to choose character and expression they identify with

Possible examples of personalities. Each will have its own repertoire of expressive utterances



Sweet, Kind



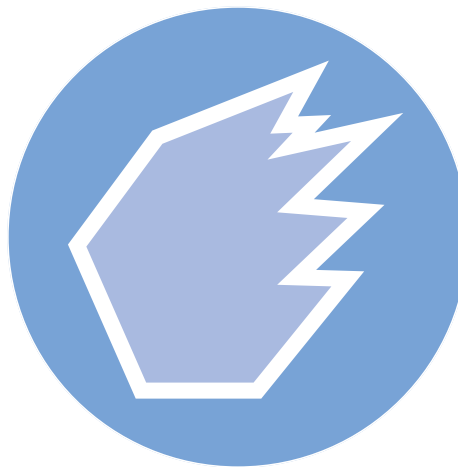
Serious, thoughtful



Grumpy, irritable



Bubbly, excitable



Bad@\$\*, aloof

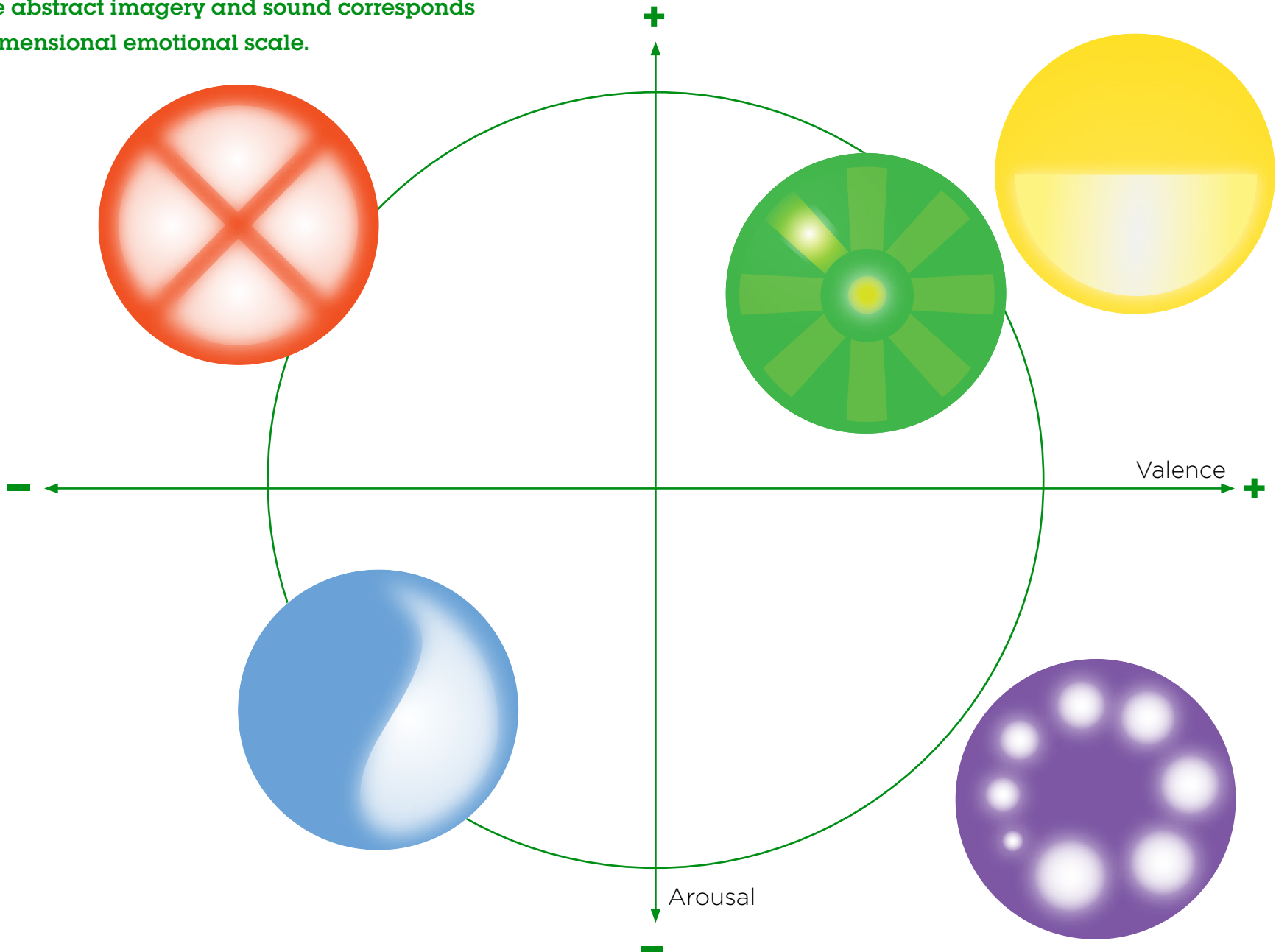


Shy, quiet



## Badge | **Symbol concept**

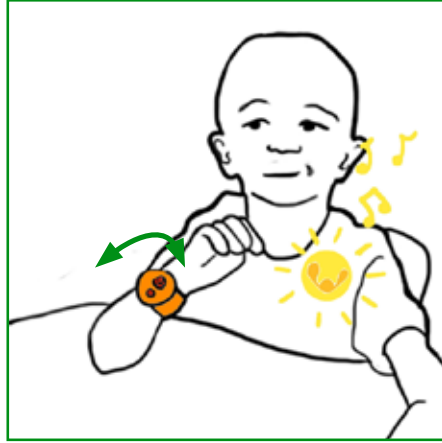
More abstract imagery and sound corresponds to dimensional emotional scale.



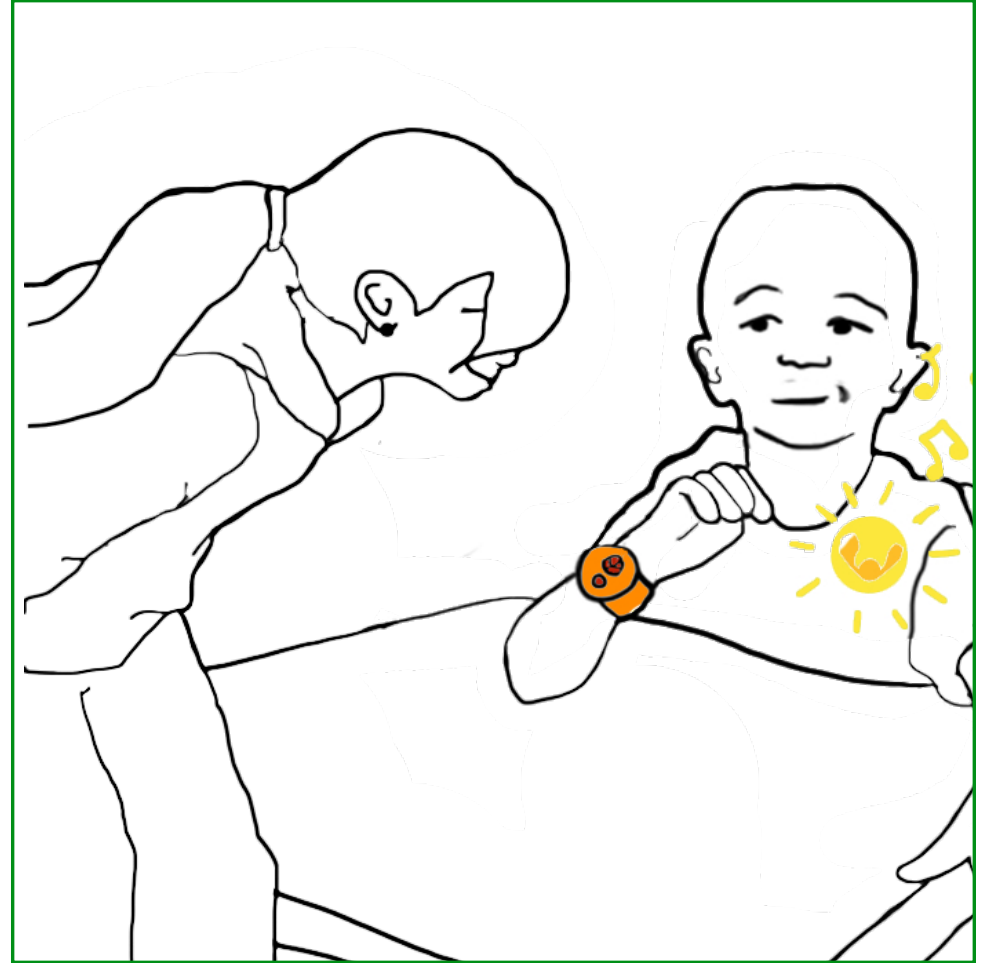
## Badge | Storyboard



Child and caregiver choose a badge and sound that fit their personality and gesture



Child activates badge with gesture, Badge sounds and lights up



Friend notices badge comes over to talk or play. She considers all her friend's behavior for clues to understand the sound and appearance of the badge.

## Social Atlas | Observation and Interviews



**“The focus is skewed from social to academic.  
Development of language starts with play skills. If you  
have trouble with that picking numbers is a big leap”**  
-Speech pathologist, Meeting Street

Too often devices and tools are created for academic purposes and are not social.



These students are great friends but they do not use sign language together even though they have the same vocabulary



When this student's speech is unclear she can use a topic board to clarify. Her friend didn't know that and walked away frustrated.

# Social Atlas | **Precedents**



## **Tango!**

### **BlinkTwice and Dynavox**

Tango! is the first commercially developed device that enables children to express themselves with the added layer of meaning contributed by tone of voice



## **Gestural Dictionary**

Gestural dictionaries are books that explain the way a student communicates. They are used in some schools to help new people get acquainted with the student.



## **The security blanket**

Children naturally like to carry objects with them that make them feel safe.



# Social Atlas | **Inspiration**

To open my mind about what the device might say, I asked a lot of people to tell me:

**What is one thing about your personality you wish others could know when they meet you that isn't obvious right away?**

I am a very  
accepting and  
patient person

I'm shy

That I'm well-meaning  
but terribly insecure.

I don't get any  
pop culture/movie/TV  
references  
(it's not that I don't  
think they're funny!)

I'm not mad!  
Whenever ppl  
first see me they  
think I'm mad -  
don't judge me  
by my look!

I prefer listening to talking, but  
I'm bad at asking prompting  
questions.



# HI FRIEND!

TELL ME ABOUT YOURSELF...

**I  
CAN**

sign "yes"  
make choices from the  
pictures in this book

**YOU  
CAN**

ask me yes or no questions

**WE  
CAN**

watch a movie  
play on the swings

## I'M DANIEL!

# HEY, HOW ARE YOU?

I'D LIKE TO PLAY WITH YOU, PLEASE...

**I  
CAN**

answer with words or  
point to things

**YOU  
CAN**

ask and tell me anything

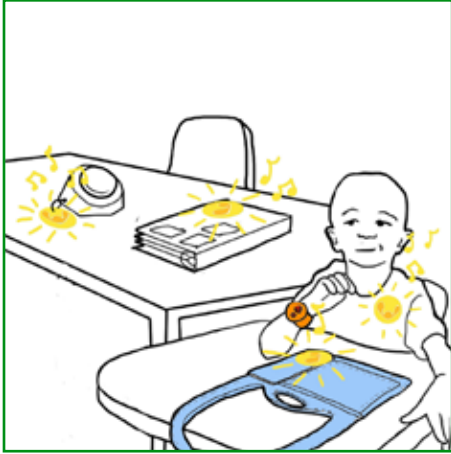
**WE  
CAN**

play with toys  
talk together

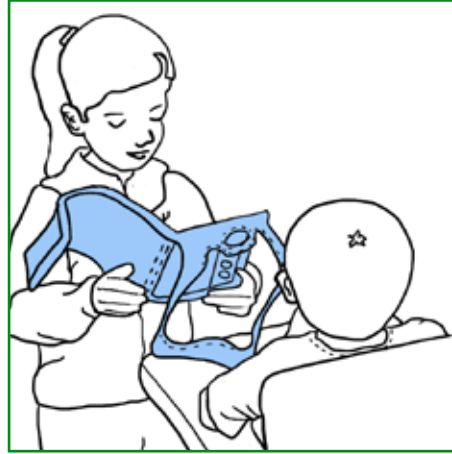
## I'M KATIE!

1. Personalized greeting
2. Statement that expresses personality
3. How can I help us have a conversation?
4. How can you help us have a conversation?
5. What can we enjoy doing together?

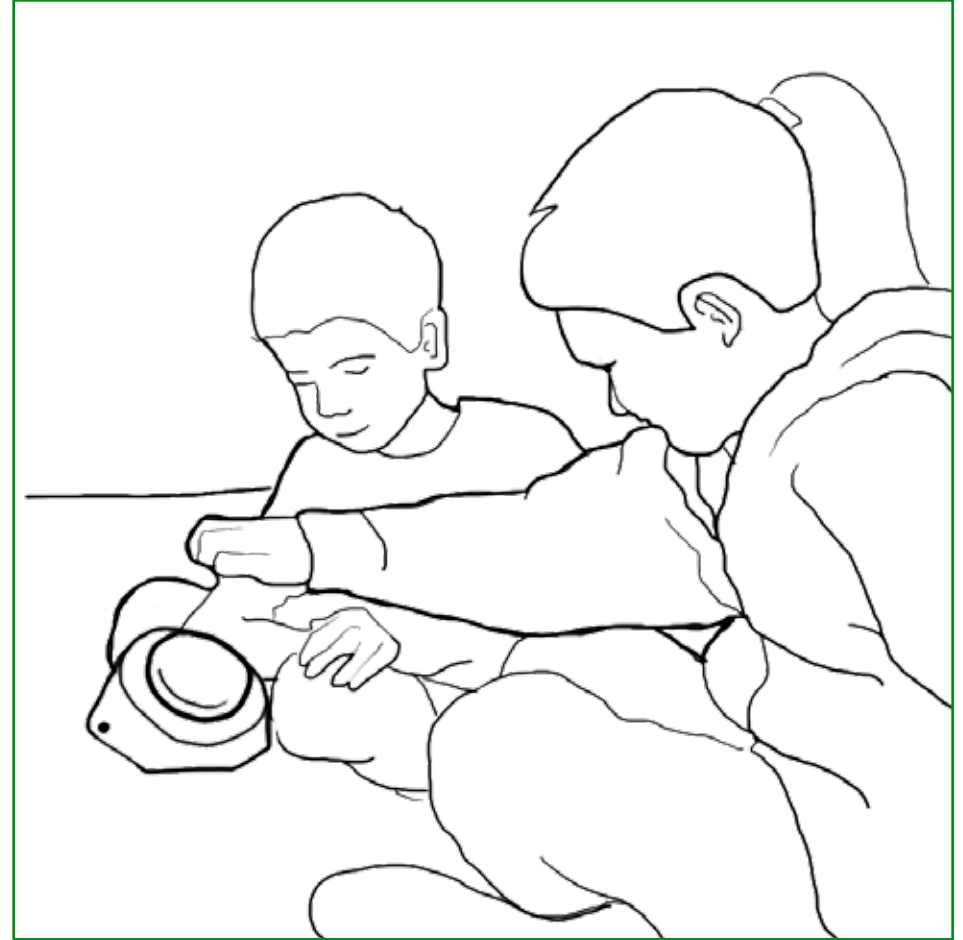
## Social Atlas | Storyboard



Introduction and other devices light up



Friend looks at the Social Atlas and learn about their friend's personality



Children have a more meaningful and fun encounter, because Social Atlas leads friend to understand how to communicate better with and without devices



# Inclusive Communication | **Design overview**

## **Gesture sensor**

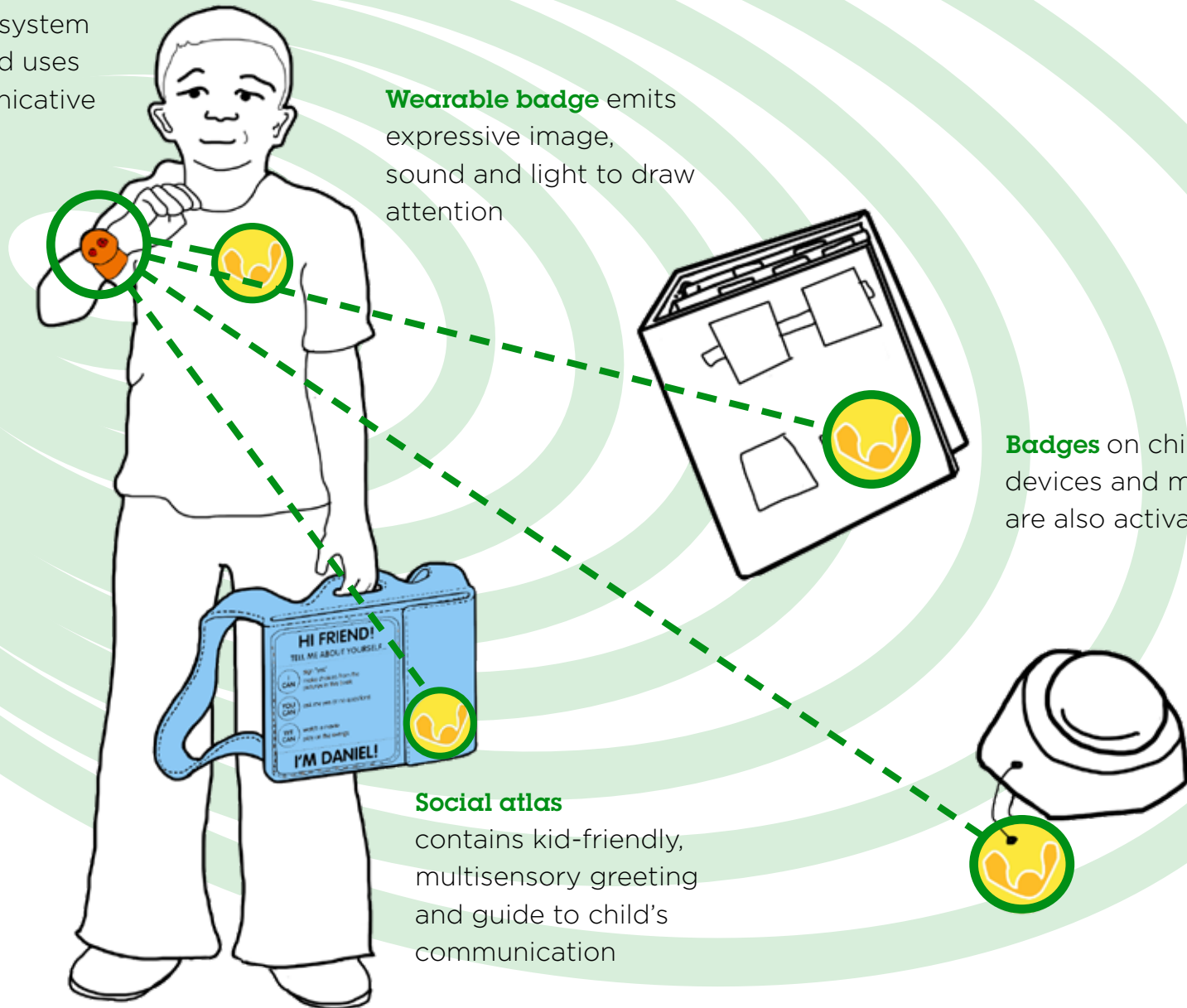
activates system  
when child uses  
a communicative  
gesture

**Wearable badge** emits  
expressive image,  
sound and light to draw  
attention

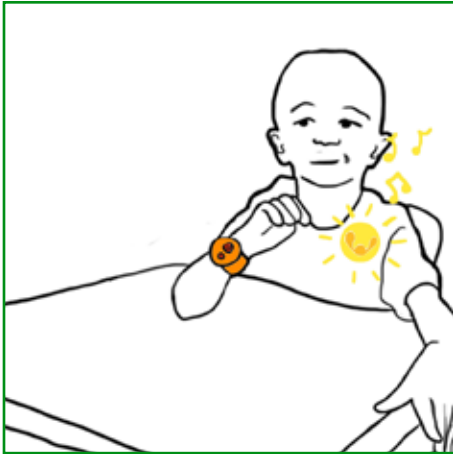
**Badges** on child's  
devices and materials  
are also activated

## **Social atlas**

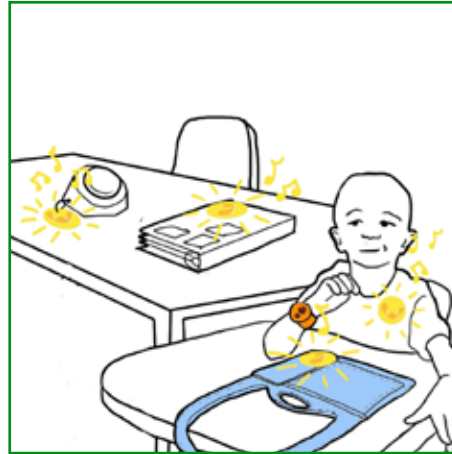
contains kid-friendly,  
multisensory greeting  
and guide to child's  
communication



# Inclusive Communication | **Overview storyboard**



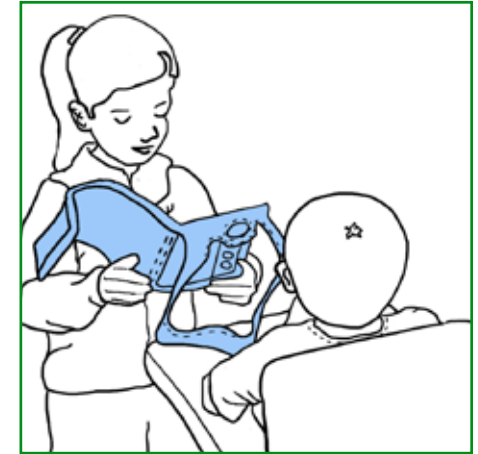
Child activates badge with gesture, Badge sounds and lights up



Badges on child's other communication devices also sound and light up



Friend notices badge and comes over to talk or play



Friend looks at the Social Atlas and listens to the audio

Children have a more meaningful and fun encounter, because Social Atlas leads friend to understand how to communicate better with and without devices.



# Inclusive Communication | **What's next?**

**Design, prototypes, user testing. Here's a start:**



These prototypes were made to explore how the badge is received in the classroom. As predicted, teachers are reluctant to welcome it, but agree the opportunity to reinforce communication by drawing attention to it consistently makes it worthwhile to explore and encourage taking time to adjust.



**What will I be exploring?**

I am interested in how non-verbal expressions differ from the typical approach to devices in terms of how listeners perceive the intelligence and capacity for emotion of the user. Do we automatically assume lesser intelligence in the absence of language and how can that be mitigated by the right sounds and symbols?