music for interactivity

Instrument

Structures of Music

Interactivity

Mobile Sound Design

Case: RHYME project

Anders-Petter Andersson, anders.p.andersson@ntnu.no, University of Oslo 12th October 20165n7

Mobile Sound Design

Mobile Sound Design in Cars

Mobile Sound Design in Music

Mobile Sound Design in RHYME

Send the composition to a physical interface

what I do

- Sound Designer MusicalFieldsForever.com, in group for interactive art installations since 2000
- Teacher and Associate Professor at NTNU Norwegian University of Science and Technology
- Dr. in Musicology from University of Gothenburg, Sweden
- Working on Universal Design and Design For All projects for persons with disabilities since 2005
- In the RHYME project (2011-2016) together with Jo Herstad, Harald Holone (ifi/UiO), Birgitta Cappelen, Fredrik Olofsson at Interaction Design/The Oslo School of Architecture and Design (AHO), Even Ruud, Karette Stensæth at Sentre for Music and Health/Norwegian Academy of Music (NMH)

Multi-Sensorial Interaction Design for Health

Anders-Petter Andersson: Assoc. Prof. NTNU in Interaction Design, Internet of Things, Sound Design

Persons with dementia, multi-sensorial interactive arenas

Children with severe disabilities, RHYME.no

Multi-Sensorial Interaction Design for Health

Anders-Petter Andersson: Assoc. Prof. NTNU in Interaction Design, Internet of Things, Sound Design

Design of:

- Health and welfare technology increasing activity, social relations, creativity and mastery

With:

- **Elderly persons with dementia**, HELSEVEL NFR/NTNU, Diakonhjemmet Univ. College/VID, Postdoc/Kristianstad Univ.
- **Children with severe disabilities** and families, **RHYME.no** NFR/AHO/UiO/ NMH/Arts Council Norway, iFields Lund University/Arvsfonden

Through:

- “Musicking” that motivates communication, mastery, co-creation with physically, rhythmically, musically and visually mediated interaction

And:

- User-Oriented Action Research, Participatory Design, Research-by-Design, Universal Design

overview

- What do we listen to in music?
- What is the materials of music? What is it made of?
- What are the structures of music?
- How can we use music when designing interactivity?
- Case: RHYME project and the Polly Ocean interactive mobile musical and multi-sensorial environment (RHYME.no)
- Discussions

what do we listen to in music?

- Do I know the song?
- Do I like it?
- Why?
- Why not?
- What do I do when listening to the song?

what do we listen to in music?

what do we listen to in music?

- What are the instruments playing?
- Has the song a rhythmic beat or not?
- Who is singing? What do they sing about?

what do we listen to in music?

- Can you expect what will happen next in the music?
- How is that possible?

what do we listen to in music?

- How is the song structured over time?

what do we listen to in music?

- What is a genre?
- Socially and culturally negotiated

instrument

- How is the sound produced?
- What instruments are playing?

instrument

- Idiophones
  - Xylophone, Mbira, produce sound by vibrating themselves
  - Sachs-Hornbostel musical instrument classification system, 1914

instrument

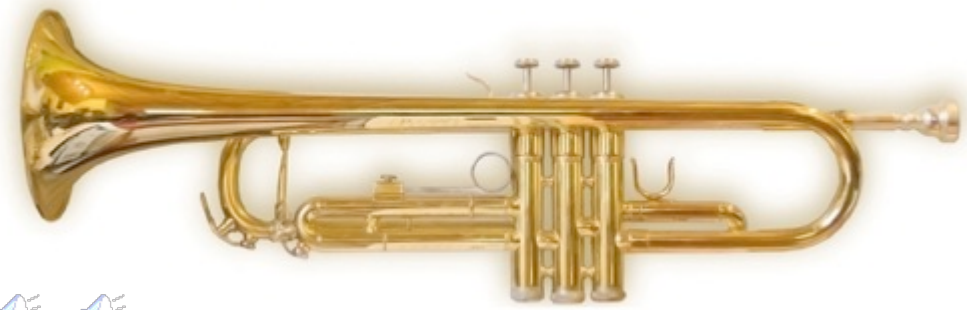
- Membranophones
  - ·Drums or kazoos, produce sound by a vibrating membrane

instrument

- Chordophones
  - ·Piano, hurdy gurdy, guitar, which produce sound by vibrating strings. Pluck, bow, struck, blow (Aeolian harp)

instrument

- Aerophones
  - ·Pipe organ or oboe, produce sound by vibrating columns of air. Wind, Brass, Free (bull roar).



instrument

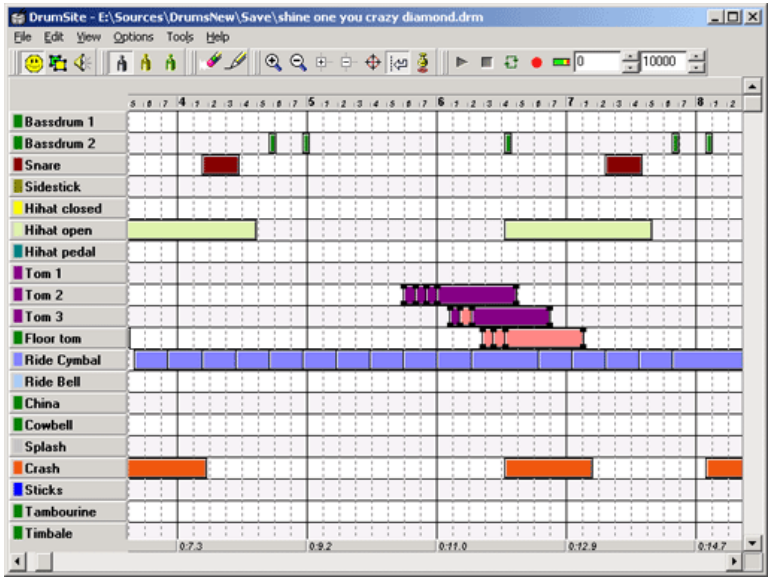
- Electrophones

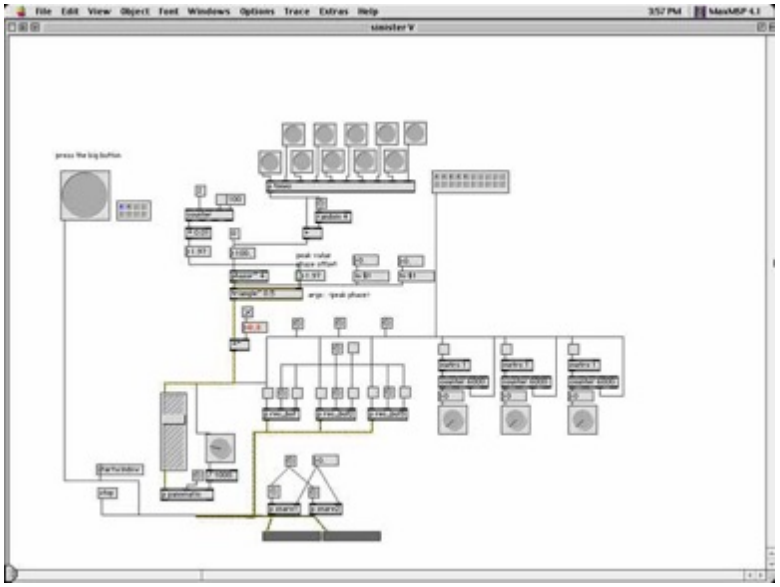
  ·Electric actions, Electric amplification, Radio electric oscillation in synthesisers, Theremines, Computer programme circuts

filtreringer.dk

instrument

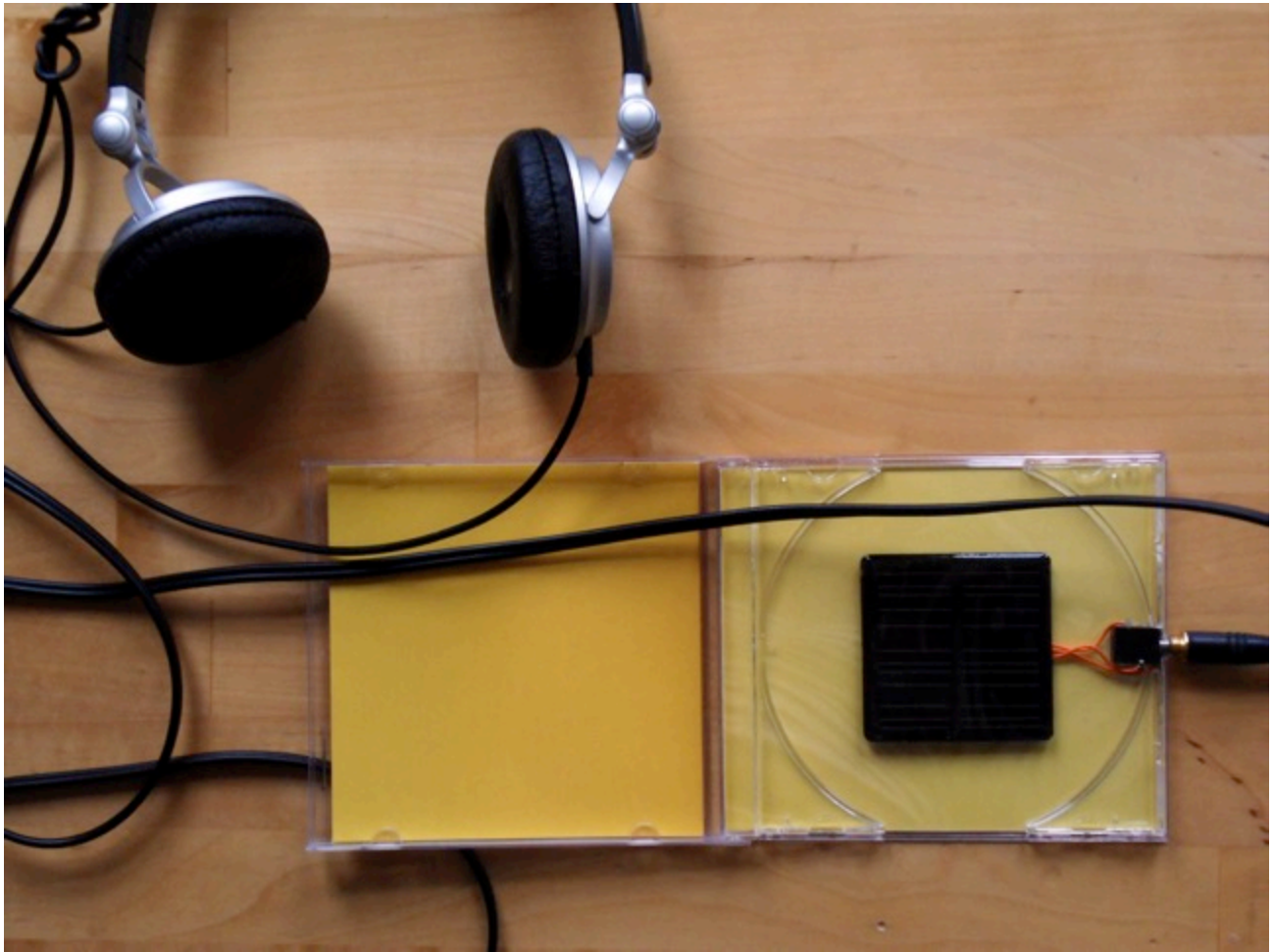
- Electrophones
  - ·Sequencer, drum machines, step sequencers, interactive environments Max/msp





instrument

- Electrophones
  - Sound of the sun, Mats Björk, 2009



instrument

- Musical gestures

iterative

sustained

impulsive

complex

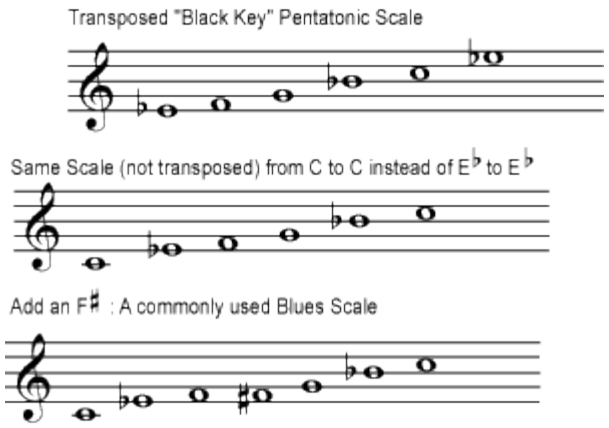
instrument

- Ensemble
  - ·Rhythm section, Accompaniment, drums, base
  - ·Solist
  - ·Chord instrument (piano, guitar, horns, choir)

  - ·Register
  - ·Soprano, alto, tenor, base

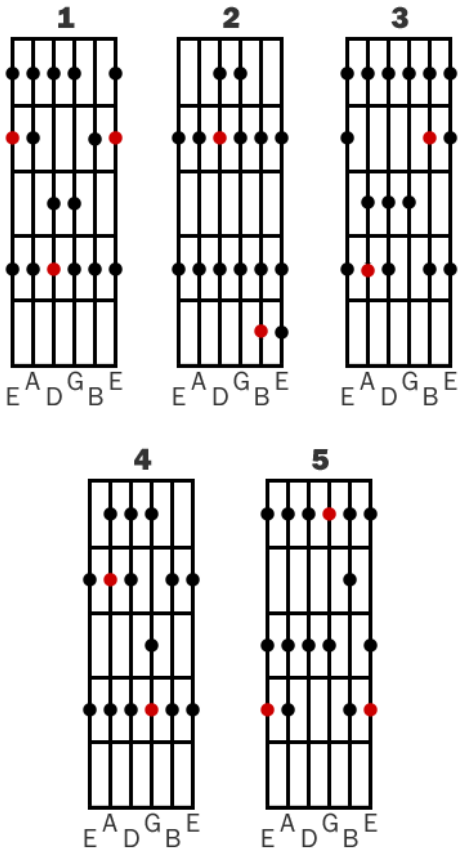
structures of music

- Fundamentals
  - ·Attack, sounding body, ending
  - ·Melody, melodic theme, figure, riff, beat
  - ·Scale, Mode/Modality



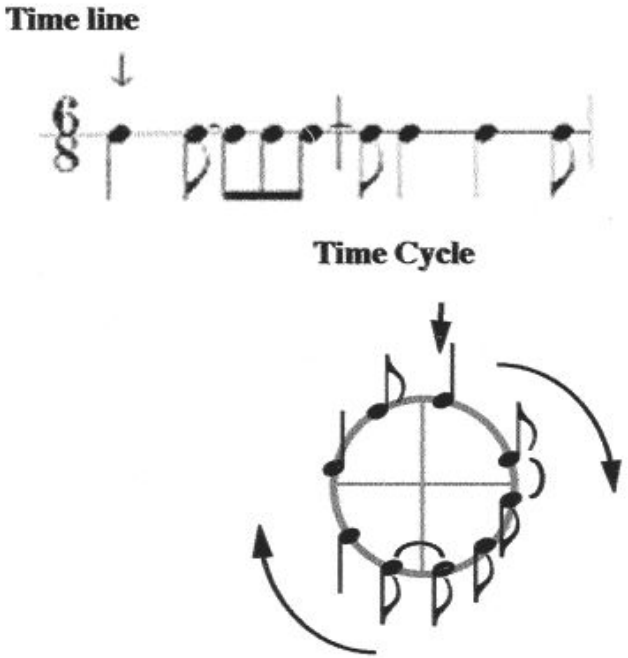
structures of music

- Fundamentals
  - Harmony, Chords, Modality



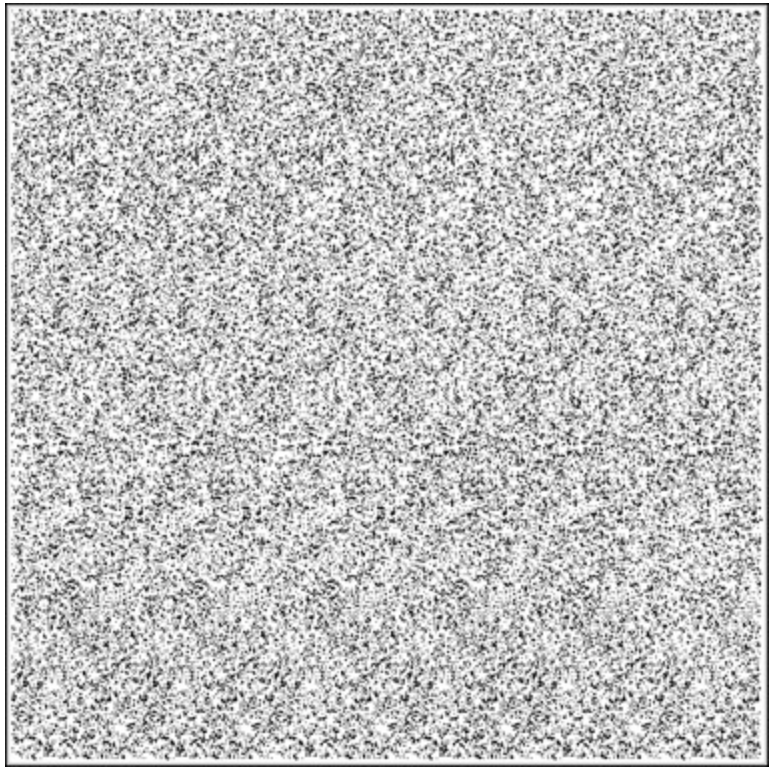
structures of music

- Fundamentals
  - ·Rhythm patterns, repeated beats and metrics/time Matrix



structures of music

- Fundamentals
  - Sound, tone color, timbre
  - Effects, reverb, echo, distortion, synthesis, resynthesis, cycle~,noise~



structures of music

- Fundamentals
  - ·Genre, Socially constructed, cultural
  - ·Style in music
  - ·pop, folkmusik, techno, jazz, Bach, Mozart +++

structures of music

- Songlines - singing the land
  - ·Dreamtime
  - ·Language = singing
  - ·singing = walking

structures of music

- Nomad foot bells, Namibia
  - Music instrument, dance, status/identity, mobile money
  - Music = Social everyday life = Culture

the

RHYME

project

(2011-2016)

Arkitektur- og designhøgskolen i Oslo

The Oslo School of Architecture and Design

NORGESMUSIKKHØGSKOLE

Norwegian Academy of Music

Method and approaches

Ecological and Humanistic Health approach (Blaxter, 2010)

Everyday use of music (DeNora 2000, Ruud 2006)

Research by design (Schön, 1983) and User-centred design

Art and design perspectives on technology

Multidisciplinary

(Industrial Design, Interaction Design, Universal Design, HCI, Music Therapy, Music&Health, , Musicology, Art,)

Action research, 4 generations of prototypes

4 actions of every generation, 6 families

Video observations, multidisciplinary discussions ,

Interviews, Focus group

Goal

co-creation with tangible,
spatial, **cross-media**

by communicative, **musical** and **narrative**
principles (aesthetical)

to **improve health** and well-being
for people with severe **disabilities**

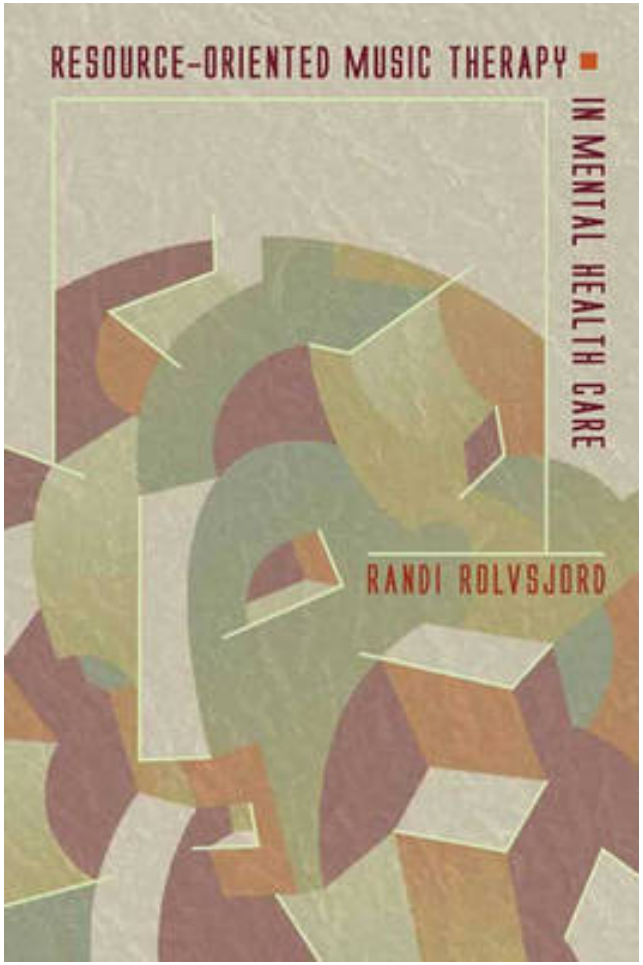
Health categories

reduce passivity and isolation

vitality and self expression,
action
community, relation and participation,
meaning and mastery

from Music Therapy
and Music and Health

Resource-orientation Therapy as Empowerment



Music and Health

Even Ruud

Antonovsky (salutogenese)

Bandura (self-efficacy)

Seligmann

Daniel Stern

Design Challenge

Resource and Empowerment orientation

Focus on the **persons strengths** and abilities, **not** their special needs, **weaknesses** and diagnosis

offer:

- **positive** experiences, **no wrongs** or failing
- many ways to vitality and **self-expression**
- many ways **to act** and build competence (mastering)
- many ways to strengthen **mutual social relations**
- many ways to **share** and **participate**

they play, evoke emotions, communicate and experience music together

our Musicking Tangibles

Motivate musicking,

- **Reduce isolation** and **passivity** (our health goal)

Open to **many ways**

- **Interpretations** (instrument, co-musicians, ambient landscape)
- **interaction forms**
- **activity levels**
- Relations
- **Musicking**

Simultaneously

Develops over **time**

4 Generations of tangibles and finings

1th Generation ORFI

ORFI

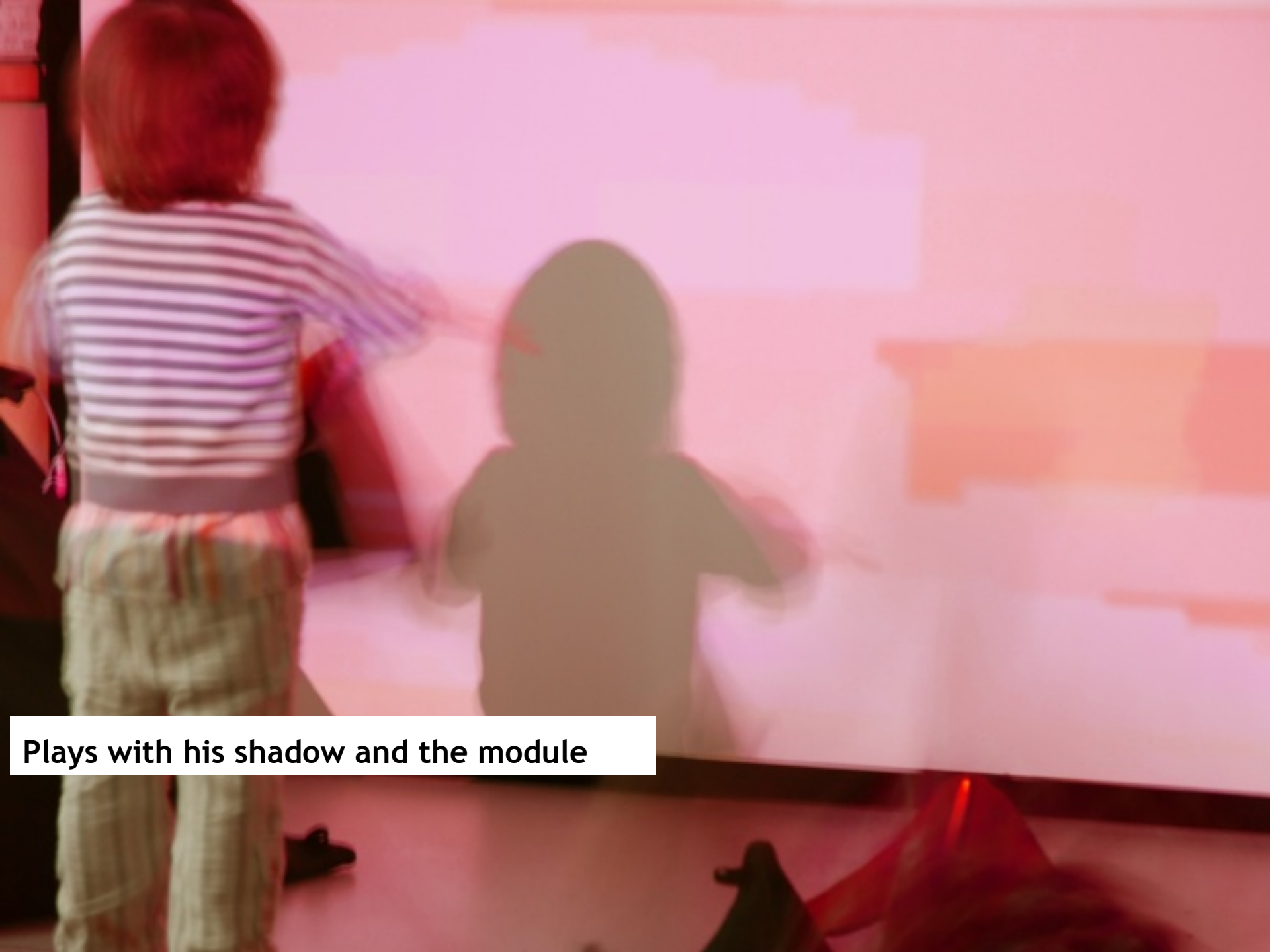
8 musical genres

creating music and sensorial experiences together

open to many forms of interaction and activity levels

personificate by physical and auditive inscription (tag)

motivating to change, distribute and restructure over time



Plays with his shadow and the module

they roll and throw

he climbs

he hits !

ORFI - observations and findings

new ways of musicking compared to traditional instruments.

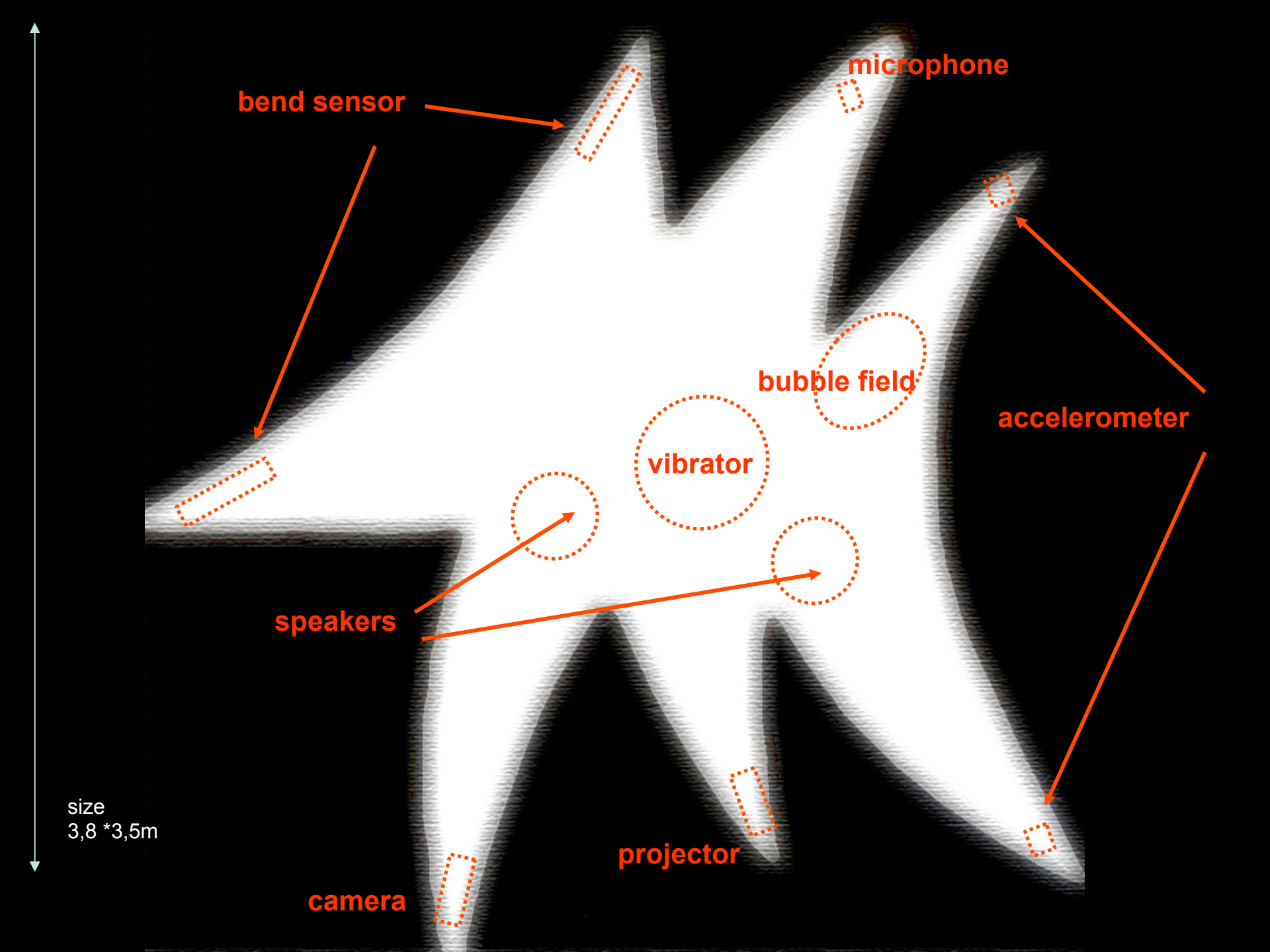
The users:

- played and treated them as **characters** and actors
- said “goodbye” when they left
- relaxed on them as in a **furniture**
- threw and built with them as **toys** like soft Lego bricks
- played on them as on **instruments**, or **synthesisers**
- used them as a **stereo** to put on **ambience in music and visuals**
- waited with excitement on their answer as **communication partners**
- played with them as improvising co-musicians

Problems

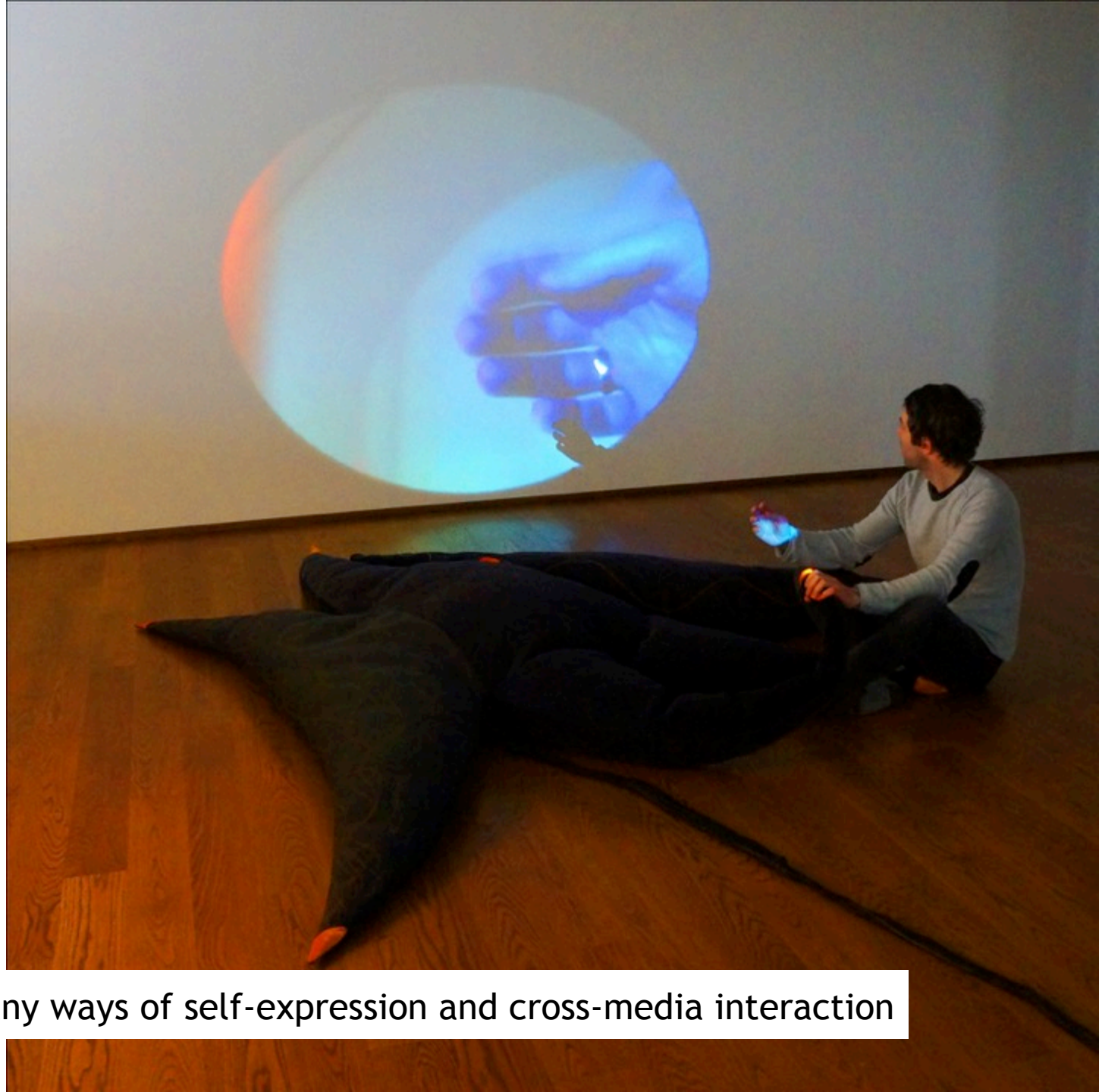
- **sensors** too hard for some, wants more sensors
- **closeness** between light and interaction place

2th Generation Wave


bend sensor
microphone
bubble field
accelerometer
vibrator
speakers
projector
camera
size
3,8 *3,5m

glowing microphone and sensors when interacting

cross-media interaction



offer many ways of self-expression and cross-media interaction

offer many ways of self-expression

offer many roles to take, many musicking actions to make

Wave

Many ways to express one-self, act, master over time, build social relations, share and participate in the musicking experience

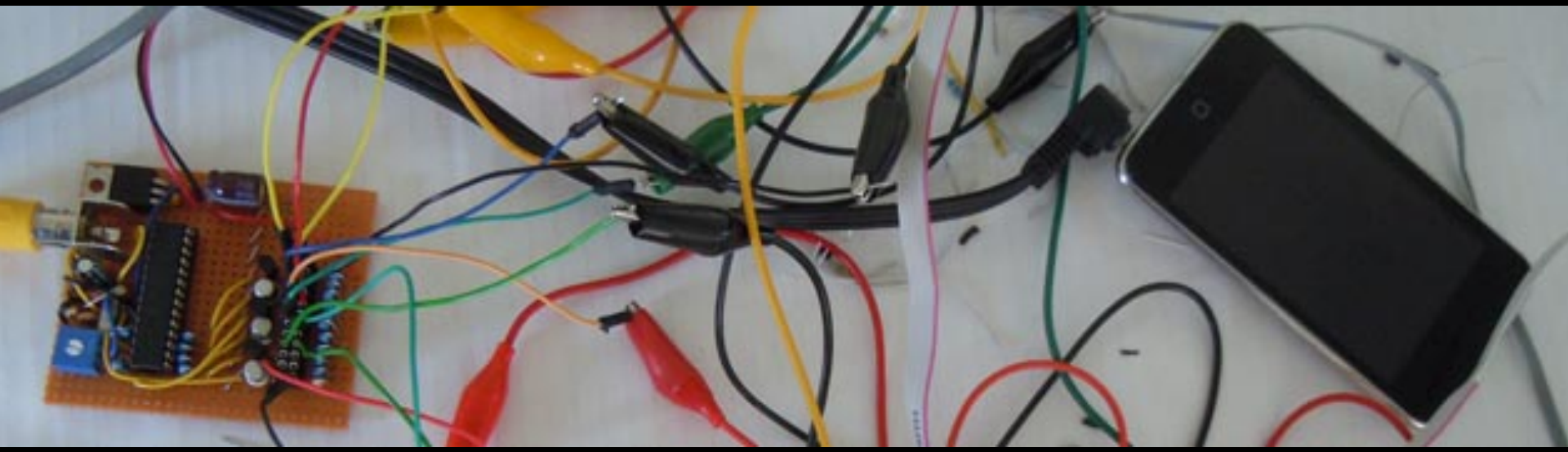
- Soft and **accessible** on the floor,
- Invites to **different actions,**
- **social relations (gameplay, bodily closeness)**
- bigger and smaller **differently manageable** parts, multitudes of interaction possibilities,
- **feasible** and sensitive sensor interaction invites to different activity levels,
- challenging on different ability levels

- But too heavy and big, hard to hold for some

aesthetically consistent and challenging musical response

Girl interacting with Wave Carpets bubble field

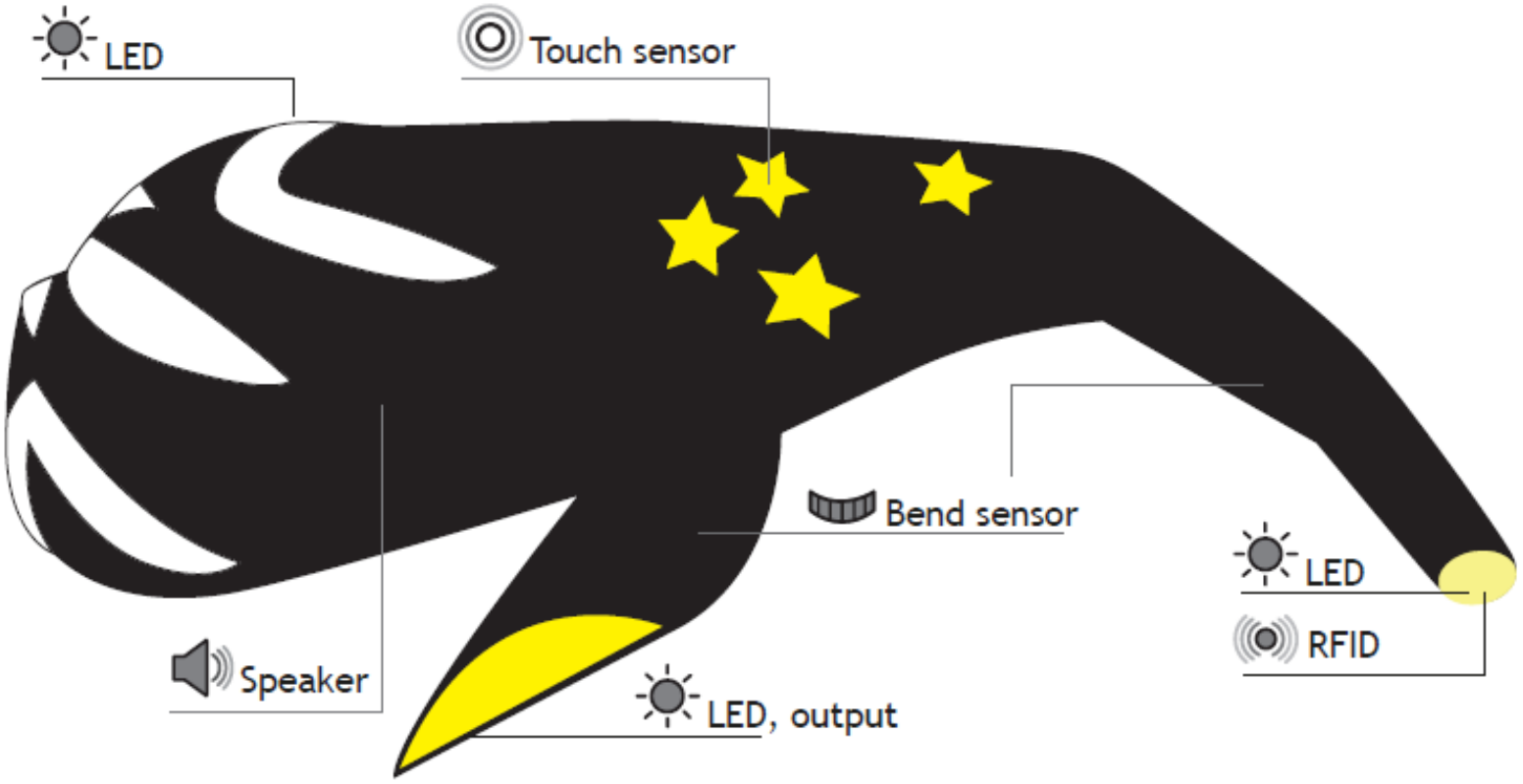
3th Generation Mobile



3th Generation Orange

3th Generation Reflect

choose music and sound with the glowing trunch (rfid)

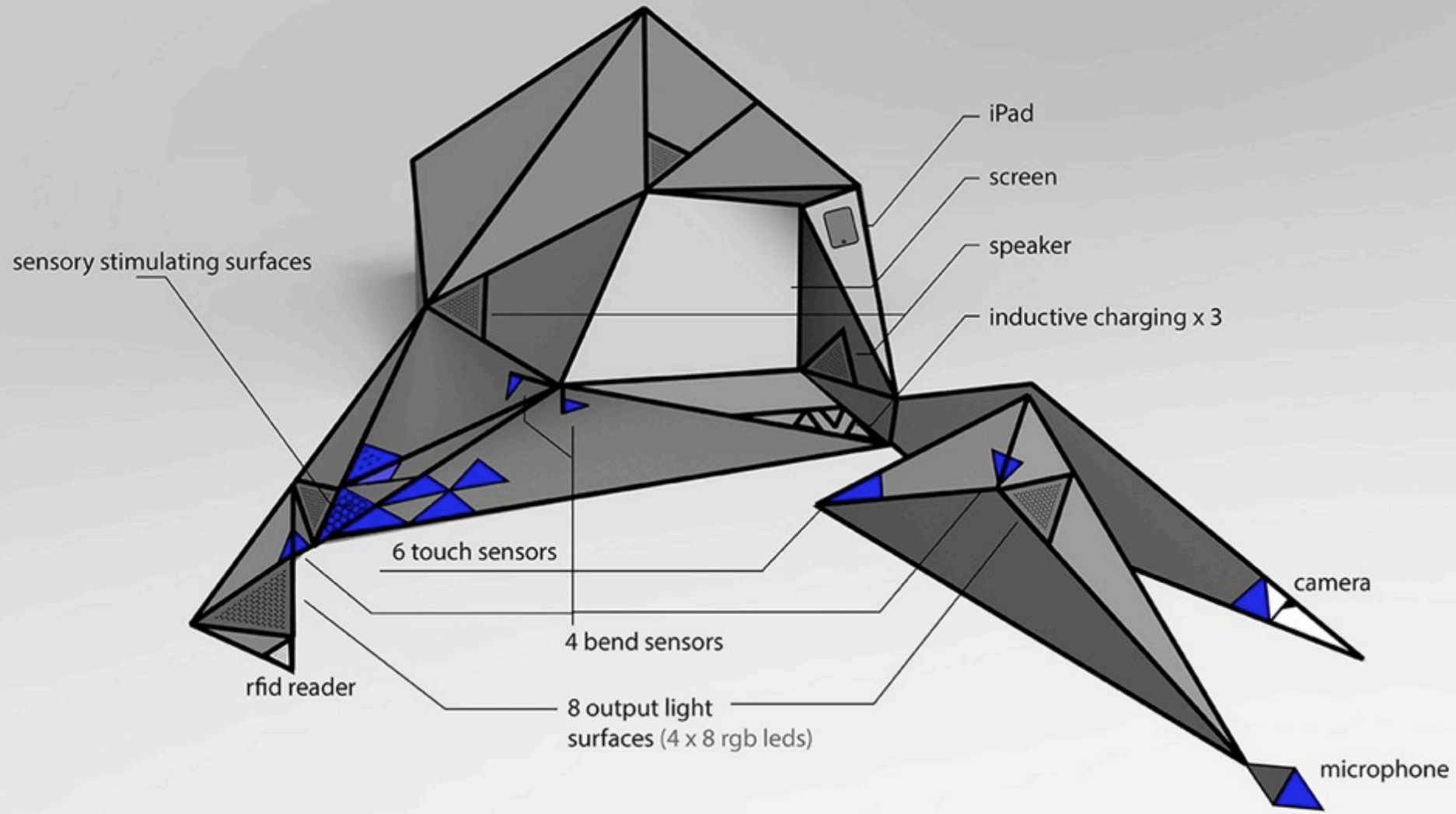

LED
Touch sensor
Bend sensor
LED
RFID
Speaker
LED, output

a soft lighting, sounding «head» to hold and lean into

play with RFID tagged things

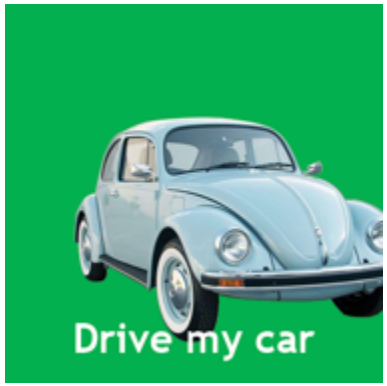
play more with star shaped glowing velvet touch sensors

4th Generation Polly

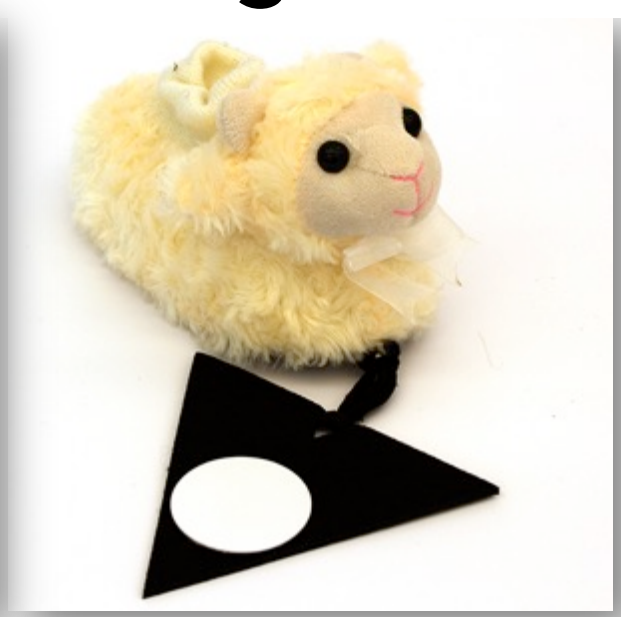

iPad
screen
speaker
inductive charging x 3
sensory stimulating surfaces
6 touch sensors
camera
4 bend sensors
rfid reader
8 output light
surfaces (4 x 8 rgb leds)
microphone

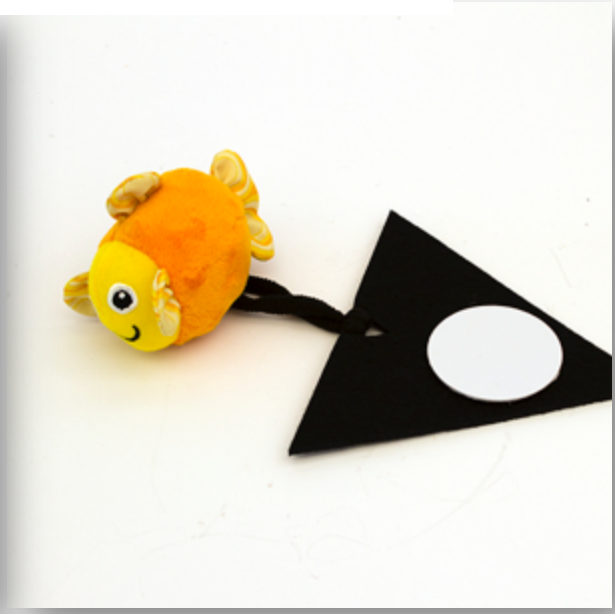
Choose your music with Scene Card (RFIID)

Scenes (tagged - to choose music and visual expression)



Include their things (to create and conduct a choir)





microphone shaping

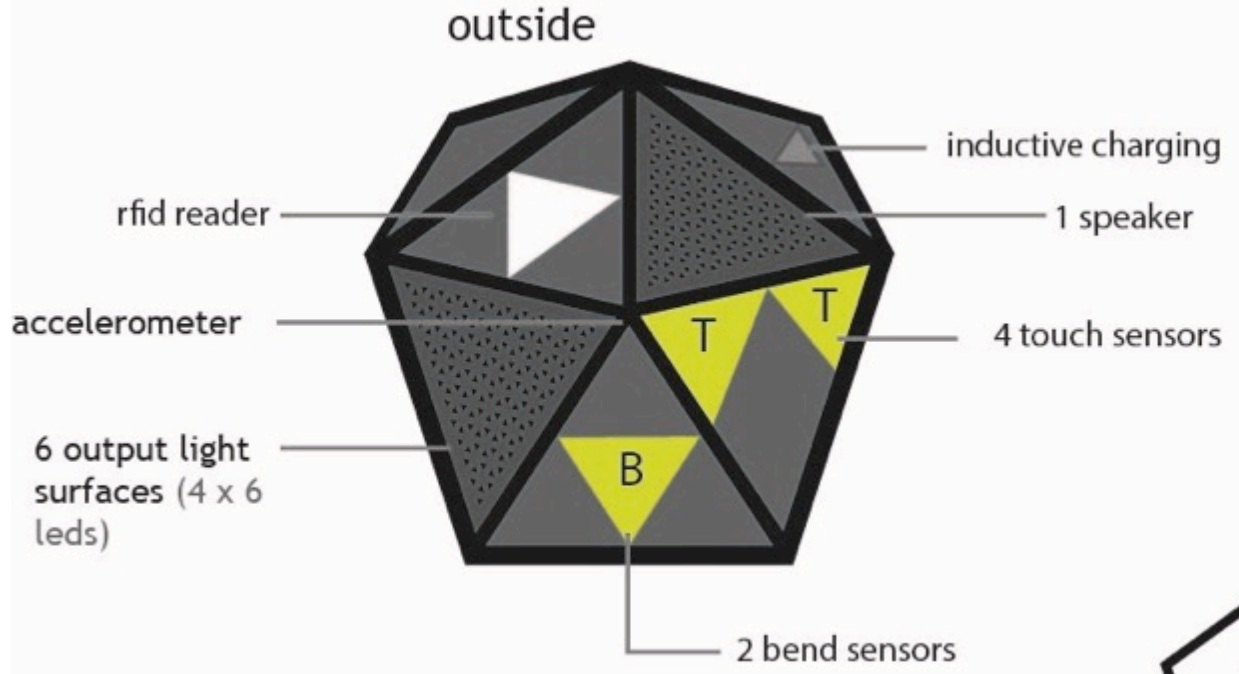
1 Generation Microphone

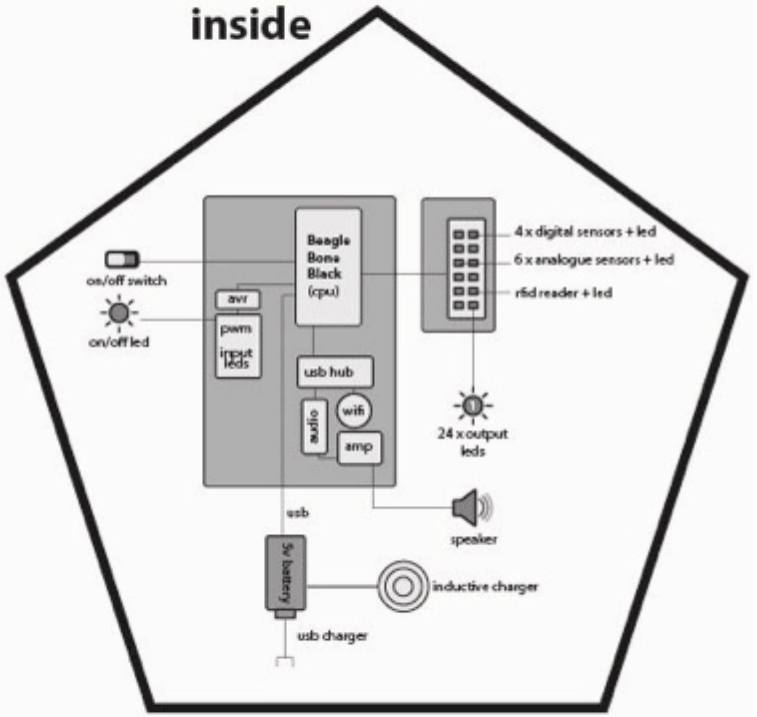
2 Generation Microphone

3 Generation Microphone

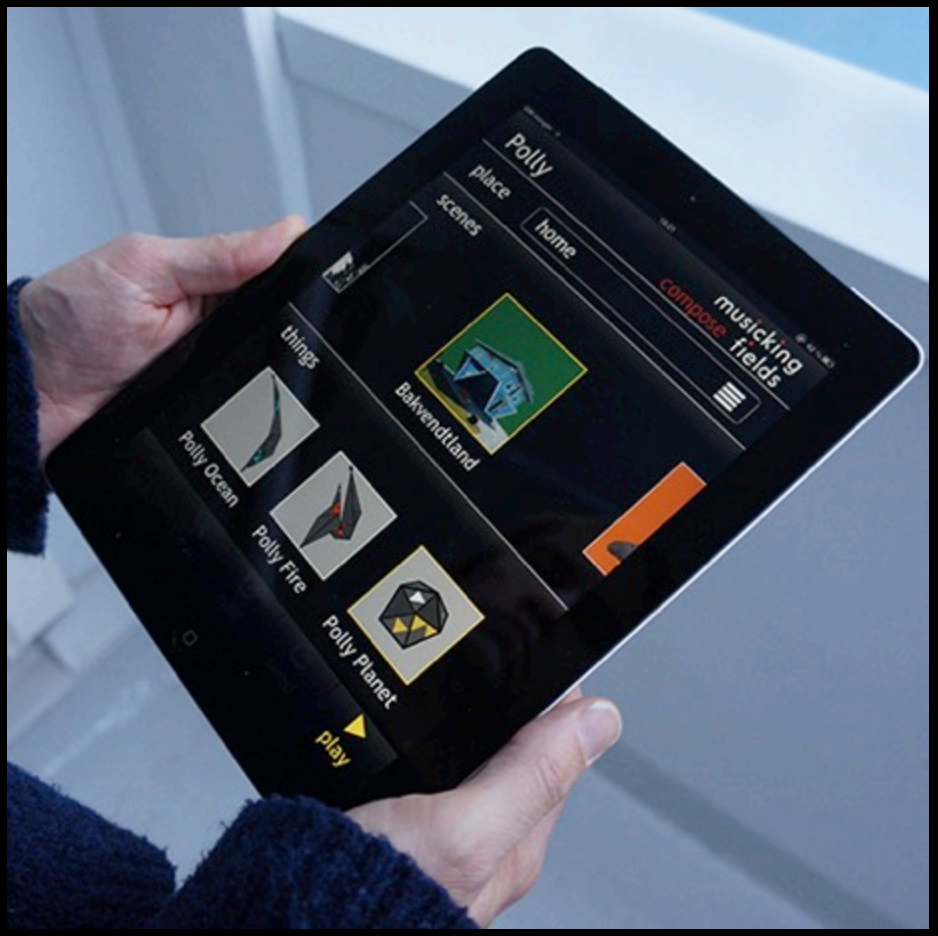
Interactive Things

(mobile things to play on)



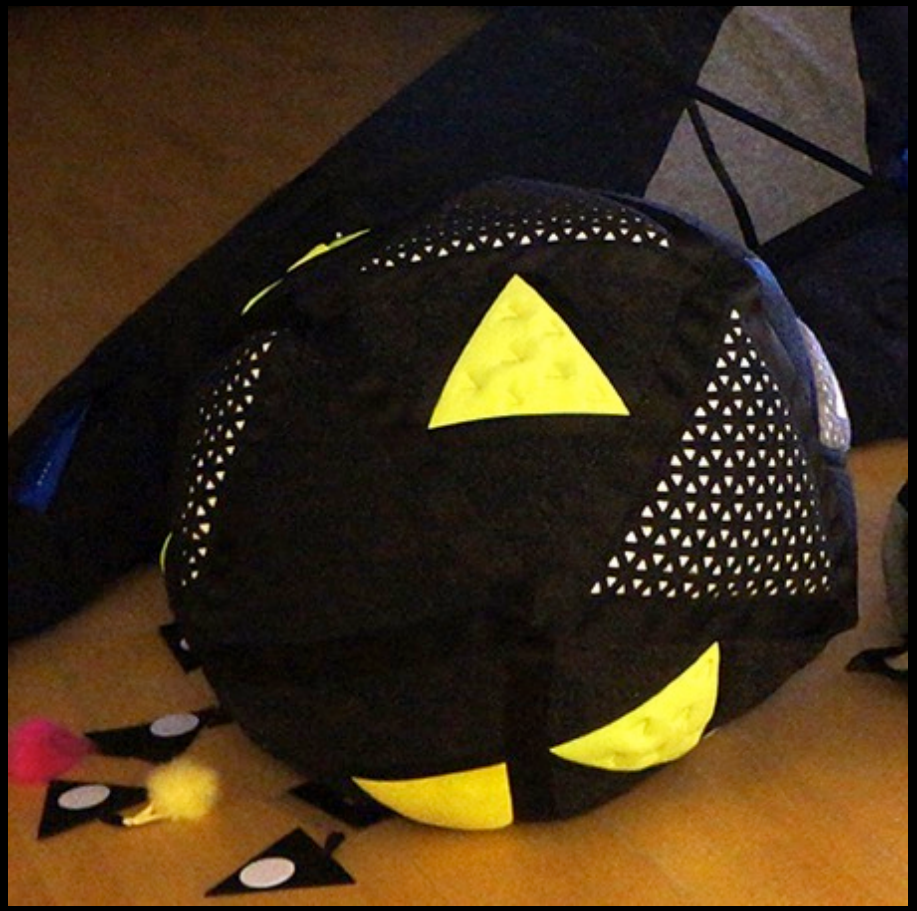


Technical drawing, Polly Planet


Polly
place
scenes
home
compose
musicking fields
things
Bakwendtland
Polly Ocean
Polly Fire
Polly Planet
play

Polly
composition
actions
name
compose
musicking fields
wave1
bend1
bend2
how
fast
slow
back
fade
rush
repeat
soft
edit
send
wild
hold
play
hit2
hit3
hit4

Polly Control



video

RHYME.no

Our conclusion so far…

Musicking, co-creative tangibles, MusickingFields

Should have 4 qualities to be empowering and health improving:

1. Evoke interest and **positive emotions** relevant to diverse people's **interpretation** of the tangibles and the **situation**.

2. Dynamically offer **many roles** to take, **many musicking actions** to make and **many ways** of self-expression.

3. Offer aesthetically **consistent** response and build relevant cross-media **expectations** and challenges over time and space, consistent with their **character**.

4. Offer **many relations** to make: to people, things, experiences, events and places.

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