REVEALING DESIGN
Data physicalization for the 21st-century
We thank everyone who has contributed to the realization of the Revealing Design project, particularly Amsterdam University of Applied Sciences, HBO-ICT, Dop Terlingen, Marianne Bossema, Digital life, Joey van der Bie, Monique Schaule-Jullens, Makerslab, Loes Bogers, Shirley Niemans, Cees Boschman, Maarten Rottschafer, SW-DQ, VFKRRO, Dieneke Blikslager, Jan Bakker, Karin van Soest, Mirthe Stevens, Suzanne Timmer, Sophie de Vreeze, Sietse Greiner, Anne Brouwer, Makerslab, Mariëlle Lens, Vera Lentjes, Karen van der Moolen, Merel Boes, Christine van der Horn, Robin van Westen, and all others, namely Eva Hilhorst and the participants of the dataphysicalization workshops.

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Can you touch and experience data? The Amsterdam University of Applied Sciences, Waag and the teachers and students from the St. Jan school collaboratively investigated and created fun and interesting data physicalizations: physical representations of (big) data, that you can actively see and touch.

Data is all around us. Yet, we increasingly live in an invisible world of data. Societal and technological developments, such as the rise of pervasive and digital techniques and small intelligent devices have contributed to a world that can be characterized by virtual products and invisible, complex data transactions in which data and its usage is increasingly invisible. With the advent of 'Big data' and computing intelligence, information is and can be increasingly produced, collected, analyzed, shared and used. However, (big) data and its implications are not always clearly seen, accessible, understood, communicated or discussed with the lay, general public. Moreover, the growing collection of ‘big’ data and other technological means does not necessarily and directly lead to more knowledge, insights and skills.

The goal of the project 'Revealing Design' (Zichtbaar slimmer) is to do practice-based research into the potential of data physicalization –making data tangible– as a vehicle to support data literacy and the 21st-century skills creativity, collaboration and critical thinking. Data physicalization goes one step further than data visualization, in that it deals with designing and creating tangible representations of data, for sharing and discussing knowledge.

The aim is to uncover and demonstrate the potential of data physicalization in educational settings as a way to support such 21st-century skills for a wide group of people.

On the 26th of April, we celebrated the kick-off of the project Revealing design: Data physicalisation for 21st century skills -with critical making and pie! Please see here for the detailed report: [http://www.digitallifecentre.nl/nieuws/kick-off-zichtbaar-slimmer]

On the 14th of June, there was a Data Physicalization workshop @ Waag=Open that was open to everyone! Please see this site [http://www.digitallifecentre.nl/agenda/open-workshop-data-fysicalisatie] for details, and here [http://www.digitallifecentre.nl/nieuws/openbaar-publiek-maakt-data-tastbaar-tijdens-uitverkochte-workshop] for the workshop findings.

On September 19, we held a design session with the primary St Janschool teachers. This was an important part of the co-creation process in which the project partners collaboratively worked towards a successful teaching format for data physicalization & 21st century skills.

In the following weeks, nearly 100 children and teachers from primary school St Jan actively worked on data physicalizations, within the school project theme of Friendship. The pupils from group 7 and 8 made their own collected data tangible for experiencing data in a different way. On October 19, 2018, the children proudly presented their data physicalizations to their parents, teachers, and younger classes. Please also see this news item: [http://www.digitallifecentre.nl/nieuws/datafysicalisatie-met-st-janschool-een-sucess]

After that, we continued with the data physicalization workshops, such as for HvA Master students in Teaching economics, primary school teachers in Maker education and library professionals.

Project lead: dr Marije Kanis, Amsterdam University of Applied Sciences
Contact: m.kanis@hva.nl  |  Duration: April 15, 2018 - April 14, 2019
The project "Revealing Design" aims to do practice-based research into the potential of data physicalization – making tangible representations of data and abstract information – as a vehicle to support data literacy & 21st Century skills:
- Creativity
- Critical thinking
- Collaboration
WORKSHOPS

SEMI) EXPERTS KICK - OFF
GENERAL PUBLIC WAAG=OPEN
PRIMARY SCHOOL TEACHERS SINT JAN
PUPILS SINT JAN
MASTER STUDENTS TEACHING ECONOMICS

(n=6)  (n>30)  (n=6)  (n=90)  (n=11)

Total: (N>130)  >50 Physicalizations
Exploring the potential of data physicalization.
(Semi) professionals answered questions about data physicalization (their experience, interests, and what kind of data, materials and tools to use).

All kinds of stock
- Wooden blocks
- Lego (characters and tape)
- Wool
- Tooth-picks
- Rubber bands
- Plastic cups
- Colored tokens
- Balloons
- 3Doodler
- Pegs

“Making the invisible visible.” Imagining a toolbox for data physicalization, that also thinks “outside the box”.

Physicalization helps with translating goals and ideas to others.

Data physicalization is not the end, but the beginning of new discussion and understanding.
Rapid physicalizations by (semi) experts, including the use of 3Doodler pen for live interactive data collection.

EXPLORING DATA PHYSICALIZATION
“I like interactive things with electronics. How can you make simple dataphys with this?”

“At this moment there are too many packages in which data is just loaded and visualized. In this process, there is TOO LITTLE thinking. With this 'technique' I hope to create added value.”

“I am interested in how and when dataphys becomes more than a visual aid to explain something. Are children able to do this themselves? Or is that too complicated?”

“I am interested in the extent to which physicalizations can lead to (critical) conversation. Question with regard to this is how to make this meaningful to all pupils.”

“How can we let make students and pupils dataphys themselves? Which handles are needed? How can we do this in such a way for new knowledge and understanding?”

“What is the goal? Making sure that dataphys is not the end-goal, provide room for sense-making.”

“How to apply dataphys in education? In what ways can you make data more accessible and intuitive?”

“Questions from professionals during the kick-off”
## WORKSHOP FORMAT

**GENERAL PUBLIC, WAAG=OPEN WORKSHOP (N>30)**

<table>
<thead>
<tr>
<th>INTRODUCTION</th>
<th>CHOICE OF DATA/ COLLECTING DATA</th>
<th>MATERIALS &amp; TOOLS</th>
<th>CREATING</th>
<th>PRESENTING</th>
<th>REFLECTION &amp; RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Introduction" /></td>
<td><img src="image2" alt="Choice of Data/Collecting Data" /></td>
<td><img src="image3" alt="Materials &amp; Tools" /></td>
<td><img src="image4" alt="Creating" /></td>
<td><img src="image5" alt="Presenting" /></td>
<td><img src="image6" alt="Reflection &amp; Results" /></td>
</tr>
</tbody>
</table>

A lot of explanation and examples.

- The data was prepared in data cards. [http://www.digitallifecentre.nl/redactie/resources/data-kaartjesvoor-datafysicalisatiezichtbaar.pdf](http://www.digitallifecentre.nl/redactie/resources/data-kaartjesvoor-datafysicalisatiezichtbaar.pdf)

- Presenting and discussing solutions.
Many different participants (ranging from young to old, from graphic designer and data analyst, to pensioner) enthusiastically participated in making data physical in groups of six.
Pyhicalization of data on toilets for men and women in Amsterdam.
Physical prototype for a mobile toilet on demand, made by an older adult during the open physicalization workshop.

Some participants used recycled material from the laser cutter.
Data physicalizations of Loneliness in Amsterdam by adults during the open workshop.

PHYSICALIZATION OF LONELINESS IN AMSTERDAM
PHYSICALIZATION OF LONELINESS IN AMSTERDAM
Data physicalization during the Open workshop, concerning hayfever medicine intake (with interactive lighting enabled by LittleBits).

Data physicalization performance during the Open workshop, creatively combining data on Loneliness with Domestic waste.
WORKSHOP FORMAT
TEACHERS SINT JAN | PRIMARY SCHOOL (N=6)

INTRODUCTION

CHOICE OF DATA/ COLLECTING DATA

The data was prepared in data cards.
http://www.digitallifecentre.nl/redactie/resources/datakaartenvooraftekeningjesvoordatafysicalisatiezichtbaarlijmmer.pdf

MATERIALS & TOOLS

Conscious with materials.

CREATING

In groups of two, in an afternoon.

PRESENTING

Small groups, making it easy to present to each other.

REFLECTION & RESULTS

 Creativity
 Critical thinking
 Collaboration

"I quickly had an idea what we could make."

"I enjoyed working with a colleague."
Goal: Designing an educational format for data physicalization with primary school teachers in Amsterdam.

WORKSHOP PRIMARY SCHOOL TEACHERS
- ST JAN SCHOOL
The primary school teachers discussing their data physicalizations, such as data on Loneliness.
# WORKSHOP FORMAT

**PUPILS SINT JAN | PRIMARY SCHOOL GROUP 7 AND 8 (N=90)**

<table>
<thead>
<tr>
<th>INTRODUCTION</th>
<th>CHOICE OF DATA/ COLLECTING DATA</th>
<th>MATERIALS AND TOOLS</th>
<th>CREATING</th>
<th>PRESENTING</th>
<th>REFLECTION AND RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explaining with examples and lego XL.</td>
<td>Pupils collected data around the theme of friendship.</td>
<td>All out with materials (recycled material).</td>
<td>Many pupils (in groups of three), freely working on their project.</td>
<td>Presenting for the camera, for another project group.</td>
<td>The results were presented in one big final presentation to the parents, teachers, researchers and younger pupils from the other classes.</td>
</tr>
</tbody>
</table>

“Also 3Doodler, little bits, MaKeyMaKey and vinyl printer.”

---

https://nl.pinterest.com/mekanisa/information-physicalization
"Are you happier with a large or small group of friends?"

The children had one week to formulate questions themselves and to collect data, under the supervision of teachers. The theme within these sessions was friendship.

Then, they started to physicalize the data.
Children discussing their data and how to physicalize it, also with recycled material from the laser cutter.
The pupils used the 3Doodler pen for decorating and annotating their data physicalizations.
The ninety children (in groups of three) made 30 data physicalizations in total.
3Dimensional data physicalizations of the children moving away from the 2Dimensional screen and creatively thinking outside the box.
Two groups of pupils (girls and boys) demonstrated their data with a mystery grab box, but in different ways.
Physicalization of the question: "How many friends do you need to be happy?"

Creations with the 3Doodler pen were incorporated in the design.
Physicalization by primary school students of the results to the question: "How many best friends do you have?"

The visualization of the question itself was made with the vinyl cutter.
Physicalization by children using liquids and Little Bits for interactively displaying preferences of playing out- or inside with friends.

Physicalization made by the children dealing with question around the perceived importance of being honest.
Physicalization by primary school students on whether they prefer to use the phone or WhatsApp. They searched on the Internet to find a picture for learning how to design the old-skool rotary telephone.

The pupils succeeded in adding interactive ring tones with a MaKey MaKey.
Different groups of pupils demonstrated different physical representations around the question of what they preferred to do with their friends such as playing in- or outside.
The pupils used the Little Bits for an interactive count-down curtain display for revealing their physicalization. They physicalized how the new pupils felt about their new school.
"At first, I had no idea what I wanted to create. I grabbed some material that I liked, and then my result became more clear during the process."
During class...

This happened because...

I became creative

“you are free to come up with everything yourself”

“nice assignment”

‘BECAME CREATIVE’

This happened because...

“I became creative”

“I made something cool”
RESULTS
PUPILS - SINT JAN SCHOOL

During class...

This happened because...
Started to think more critically

“I became sharper”

“STARTED TO THINK MORE CRITICALLY”
This happened because...

“More ideas came to mind”

“My new ideas”
I was able to communicate well during class.

This happened because...

Everyone listened to each other.

Everybody was able to understand me.

‘I WAS ABLE TO COMMUNICATE WELL’

This happened because...

“Crafting together with my group”

The commitment of the people I work with.
I thought it was a nice class  
I was able to work well together  
I became creative  
I could understand the data better  
I am proud of what I have made  
I could explain my idea to someone else  
I got some new ideas  
I have learned from the lesson  
I started thinking more  
I could come up with a solution

RESULTS
Neutral Disagree Strongly disagree Agree Strongly Agree

I thought it was a nice class  
I was able to work well together  
I became creative  
I could understand the data better  
I am proud of what I have made  
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Neutral Disagree Strongly disagree Agree Strongly Agree

I thought it was a nice class  
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I could explain my idea to someone else  
I got some new ideas  
I have learned from the lesson  
I started thinking more  
I could come up with a solution

RESULTS
Neutral Disagree Strongly disagree Agree Strongly Agree
RESULTS

PUPILS SINT JAN SCHOOL

(N=31)

Questions
I was able to work well together 4.4
I could understand the data better 4.3
I thought it was a nice class 4.2
I became creative 4.1
I could explain my idea to someone else 3.8
I got some new ideas 3.8
I was proud of what I’ve made 3.8
I have learned from the lesson 3.7
I could come up with a solution 3.6
I started thinking more 3.4

(N=16)

Questions
I thought it was a nice class 4.6
I became creative 4.5
I could understand the data better 4.4
I am proud of what I have made 4.3
I was able to work well together 4.2
I could explain my idea to someone else 4.1
I got some new ideas 3.8
I have learned from the lesson 3.6
I started thinking more 3.4
I could come up with a solution 3.0
RESULTS
PUPILS SINT JAN SCHOOL (N=47)
During class...

"I thought it was a nice class"
"I got some new ideas"
"I was able to work well together"
"I was able to understand the data better"
"I got some new ideas"
"I thought it was a nice class"
"I have learned from the lesson"
"I was able to explain my idea to someone else"
"I am proud of what I have made"
"I started thinking more"
"I could come up with a solution"
"I YCU CDNG Vo understand the data better"
THIS IS WHAT I HAVE LEARNED

PUPILS - ST JAN SCHOOL

- Data is everywhere
- That friendship is important
- Data is information
- To think creatively
- How to craft things
- That it doesn't need to be super tidy
- To bring data to life
- How to collect data easily
- That you can make things in a fast way
- What data physicalization is
- Doing research
- Working together, and listening to each other
- To bring things from paper to life
- You have to add a bit of humor to the project or it gets boring
- How to come up with good ideas
- That you can use data in a fun way
- Working together, and listening to each other
I AM PROUD OF WHAT I HAVE MADE
I AM PROUD OF WHAT I HAVE MADE
RESULTS

GENERAL PUBLIC WAAG = OPEN

During class...

“BECAME CREATIVE”

This happened because...

“I became creative
During class...
GENERAL PUBLIC WAAG = OPEN
This happened because...

“Thinking in a group makes you playful”

‘BECAME CREATIVE’

This happened because...

“Finding different ways to visualize certain data types.”

“I became enthusiastic and I started to explore things.”
RESULTS
GENERAL PUBLIC  WAAG = OPEN

During class...

This happened because...

Started to think more critically

“I became aware of the proportions”

“I wanted to measure facts”

‘STARTED TO THINK MORE CRITICALLY’

This happened because...

“First I started to have good look at the data”

Numbers on its own do not say anything

Graph: Started to think more critically

- Number of participants
- Started to think more critically
RESULTS
GENERAL PUBLIC  WAAG = OPEN

During class...

I was able to communicate well

This happened because...

I was able to communicate well

‘I WAS ABLE TO COMMUNICATE WELL’

More contact with other crafting participants”

‘Different approaches to visualizing.”

This happened because...

“Three people know more than one.”
RESULTS

GENERAL PUBLIC WAAG = OPEN (N=15)

STATEMENTS
During class....
- I became creative (M=3.7)
- I started to think critically (M=3.5)
- I was able to communicate well (M=3.0)

RESULTS

[Chart showing positive and negative percentages for agreement levels]
- Neutral
- Disagree
- Strongly disagree
- Agree
- Strongly Agree
RESULTS
PRIMARY SCHOOL TEACHERS - SINT JAN SCHOOL

During class...

“I quickly had an idea what we could make”

“Using different materials”

‘BECAME CREATIVE’

This happened because...

“We wanted to visualize the data and we wanted to craft the objects”

I became creative

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>Eens</th>
<th>Helmaal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RESULTS
PRIMARY SCHOOL TEACHERS - SINT JAN

During class...

Started to think more critically

Number of teachers

0 1 2 3 4 5 6 7

Eens

“Viewing charts and background data.”

“Analyzing the graphs”

‘STARTED TO THINK MORE CRITICALLY’

This happened because...

“Reading critically and consulting”
RESULTS
PRIMARY SCHOOL TEACHERS - SINT JAN

During class...

"I enjoyed working together with a colleague that I normally don’t work with”

‘I WAS ABLE TO COMMUNICATE WELL’

This happened because...

"A lot of discussion”

"Nice to have someone that complements your weaknesses"
# RESULTS

**PRIMARY SCHOOL TEACHERS - SINT JAN SCHOOL (N=6)**

<table>
<thead>
<tr>
<th>STATEMENTS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>During class....</td>
<td><img src="image" alt="Bar Chart" /></td>
</tr>
<tr>
<td>I was able to communicate well</td>
<td><img src="image" alt="Bar Chart" /></td>
</tr>
<tr>
<td>I became creative</td>
<td><img src="image" alt="Bar Chart" /></td>
</tr>
<tr>
<td>I started to think critically</td>
<td><img src="image" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>

**STREETMENTS**

- During class....
- I was able to communicate well
- I became creative
- I started to think critically

**RESULTS**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was able to communicate well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I became creative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I started to think critically</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**M**

(1-5 likert scale, 5 = Strongly Agree)
RESULTS
MASTER STUDENTS - TEACHER ECONOMY

During class...

This happened because...

I became creative

“I got creative ideas”

“I am not that creative, I need more time for that.”

‘BECAME CREATIVE’

This happened because...

“I always thought I wasn’t creative”
RESULTS
MASTER STUDENTS - TEACHER ECONOMY

During class...

Started to think more critically

“Because of the questions from fellow students, I started to think more about my research”

“Converting numbers into visible images”

‘STARTED TO THINK MORE CRITTICALLY’

This happened because...

“Looking at data in a different way”
RESULTS
MASTER STUDENTS - TEACHER ECONOMY

During class...

“I WAS ABLE TO COMMUNICATE WELL”

“This happened because...

“The majority was able to communicate well, during the workshop”

‘I WAS ABLE TO COMMUNICATE WELL’

This happened because...

“Collaboratively looking at the results”

“I was able to communicate well”

“Back to the basics”

(Number of teachers)
I was able to communicate well

Oneens Neutraal Eens Helemaal eens

0 1 2 3 4 5 6 7
RESULTS

MASTER STUDENTS - TEACHING ECONOMICS (N=11)

STATEMENTS
During class....
I started to think critically
I was able to communicate well
I became creative

RESULTS

<table>
<thead>
<tr>
<th>Statement</th>
<th>M</th>
<th>(1-5 likert scale, 5 = Strongly Agree)</th>
<th>Negative percentages</th>
<th>Positive percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>I started to think critically</td>
<td>3,9</td>
<td>Neutral</td>
<td>0%</td>
<td>80%</td>
</tr>
<tr>
<td>I was able to communicate well</td>
<td>3,6</td>
<td>Disagree</td>
<td>10%</td>
<td>70%</td>
</tr>
<tr>
<td>I became creative</td>
<td>3,6</td>
<td>Strongly disagree</td>
<td>20%</td>
<td>60%</td>
</tr>
</tbody>
</table>
RESULTS

TOTAL OF ALL PARTICIPANTS THAT COMPLETED THE QUESTIONNAIRES (N=79)

PRIMARY SCHOOL PUPILS ST JAN SCHOOL (n=47)
PRIMARY SCHOOL TEACHERS ST JAN SCHOOL (n=6)
GENERAL PUBLIC WAAG (n=15)
MASTER STUDENTS TEACHING ECONOMICS (n=11)

DURING CLASS...

"I became creative" 4,1
"I started thinking (critically)" 3,8
"I was able to communicate/collaborate well" 4,0

M = Average
1 = Strongly Disagree  2 = Disagree  3 = Neutral  4 = Agree  5 = Strongly Agree
### What makes a good physicalization?

What -according to you- are the ingredients, that lead to a successful physicalization? Feel free to adjust this and fill in this form.

---

### Goal (function)
- Usable
- Fitting
- Useful

---

### Materials
- Aesthetic
- Structure
- Appearance
- Sensory
- Big

---

### Physical form
- Dynamic
- Behavior
- Amusing
- Presentation
- Technical ingenuity
- Discussion/Thought provoking

---

### Information (data)
- Objective
- Self-collected
- Reliable
- Accurate
- Transparent

---

### Interactive
- Usable
- Interesting
- Relevant
- New
- Meaningful
- Surprising
- Dynamic
- Behavior
- Amusing
- Presentation
- Technical ingenuity
- Discussion/Thought provoking

---

### Story (concept)
- Usable
- Interesting
- Relevant
- New
- Meaningful
- Surprising

---

### Successful physicalization

Place your 10x15 photo of physicalization here

---
What makes a good data physicalization class?....

- Explaining with (Lego) examples.
- Preparing data on data cards or self-collect.
- Conscious with materials and tools.
- In groups of two.
- Presenting to each other.

**WORKSHOP FORMAT**

**INTRODUCTION**

**CHOICE OF DATA/ COLLECTING DATA**

**MATERIALS & TOOLS**

**CREATING**

**PRESENTING**

**REFLECTION & RESULTS**

- Creativity
- Critical thinking
- Collaboration
PHYSICALIZATION PROCESS

STEP 1
Have data prepared.

STEP 2
Work out what to make in text.

STEP 3
2D (visualize on paper).

STEP 4
3D with Lego.

STEP 5
Introduce the material and tools.

STEP 6
3D physicalization with materials.

STEP 7
Introduce Technology! So not to be instantly blinded by (the coolness of) the tech tool.
The process of data physicalization contributes to 21st-century skills.
EXAMPLES

DATA PHYSICALIZATION

SEE ALSO

The Pinterest bord datafysicalisatie (https://www.pinterest.com/wissendenken/data-physicalisation-graffiti)
the specially made Information Physicalisation bord (https://www.pinterest.com/mekanis/information-physicalization) and Dataphys (http://dataphys.org/list)
2D → 3D

CAKE IN EDUCATION
EXPLAINING FRACTIONS. EDUCATIONAL PURPOSE

Credits: Findystoys
KEYBOARD FREQUENCY

SCULPTURE

Credits: Mike Knuepfel
KNOW YOUR POOP

PHYSICAL REPRESENTATION OF CONTENTS

Credits: Various graphics - Raj
STUDIO DRIFT
HOW MANY MATERIAL DOES AN OBJECT CONTAIN?

@Stedelijk: MATERIALISM | Photo credits: Marije Kanis
HOW MUCH SUGAR IS IN YOUR FOOD?

Credits: Sugar stack
3D PRINTED REWARD
BASED ON WORK-OUT DATA | WITH DIGITAL FABRICATION & INTERACTIVE TECHNIQUES

Credits: Rohit Ashok Khot
GAME OF THRONES

LEFT: EVERY DEATH IN THE GAME OF THRONES NOVELS, BOOKMARKED
RIGHT: BRAIDED HAIR IS A REPRESENTATION OF BATTLES WON

Credits: Waterstonesdork
EXAMPLES
PHYSICALIZATION

SEE ALSO
the specially made [Information Physicalisation bord](https://www.pinterest.com/mekanis/information-physicalization) (https://www.pinterest.com/mekanis/information-physicalization) and
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