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# Facilitating Consumer Involvement in Design

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# Presentation Outline

- What is Computer Aided Consumer Design?
- CaCODE Software Development
- User Trial
- Results
- Conclusions & next steps

What is...

# COMPUTER AIDED CONSUMER DESIGN

...refers to products whose conception and/or specification and/or design and/or manufacture may occur with direct consumer input

*for*

## ADDITIVE MANUFACTURING / 3D PRINTING PRODUCTS

...a process of joining materials, usually layer upon layer, to make objects from 3D model data (ASTM).

# How could it work?

## Computer Aided Consumer Design for Additive Manufacturing



**Software:  
CaCODE**

3D models  
as an input →



Origo 3D Printer/Artur Tchoukanov/ sponsored by: iMaterialise

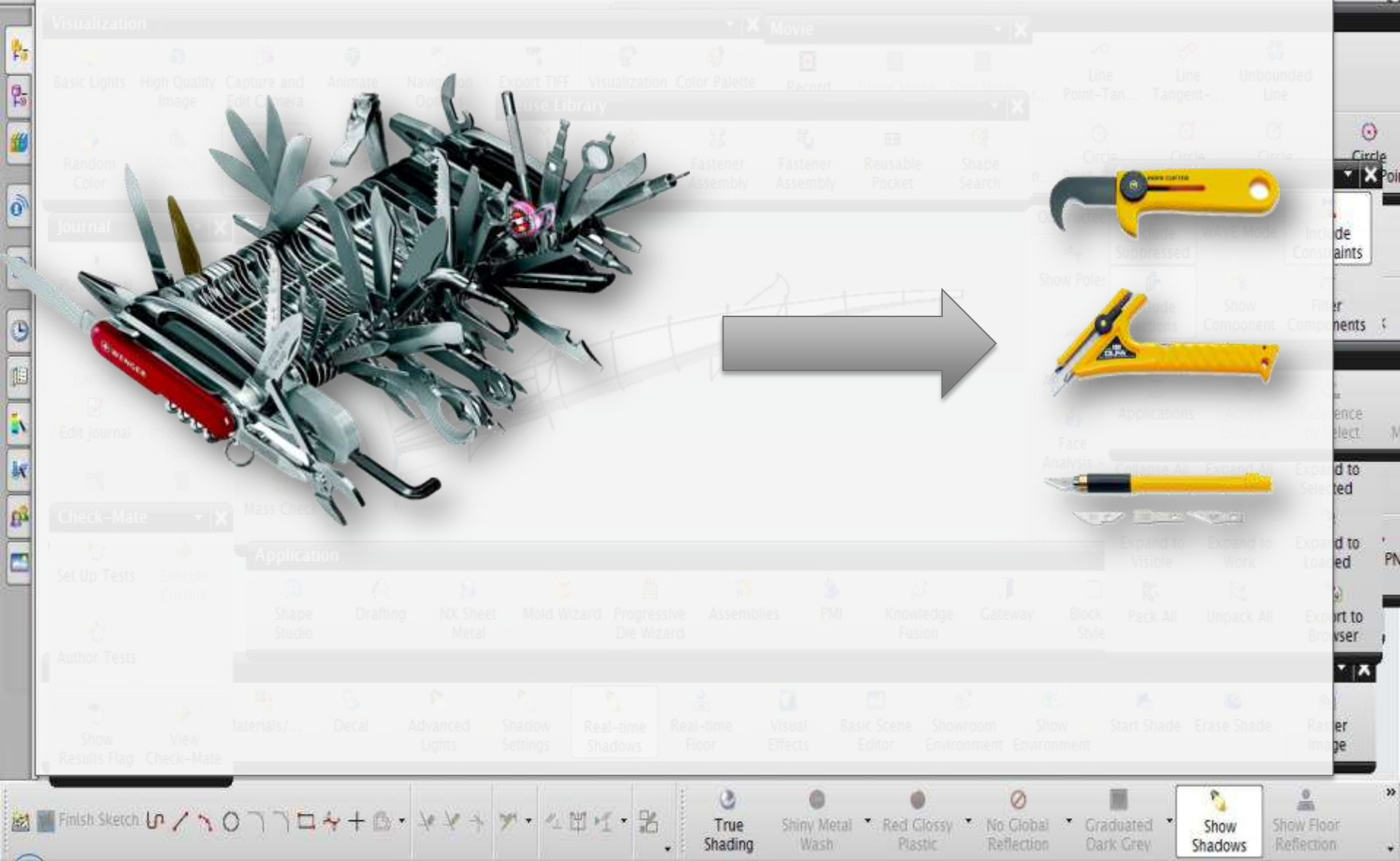
**Hardware:  
3D printing**

**CONSUMERS**



# What needs to happen?

## Simplifying the Computer Aided Design tools/software



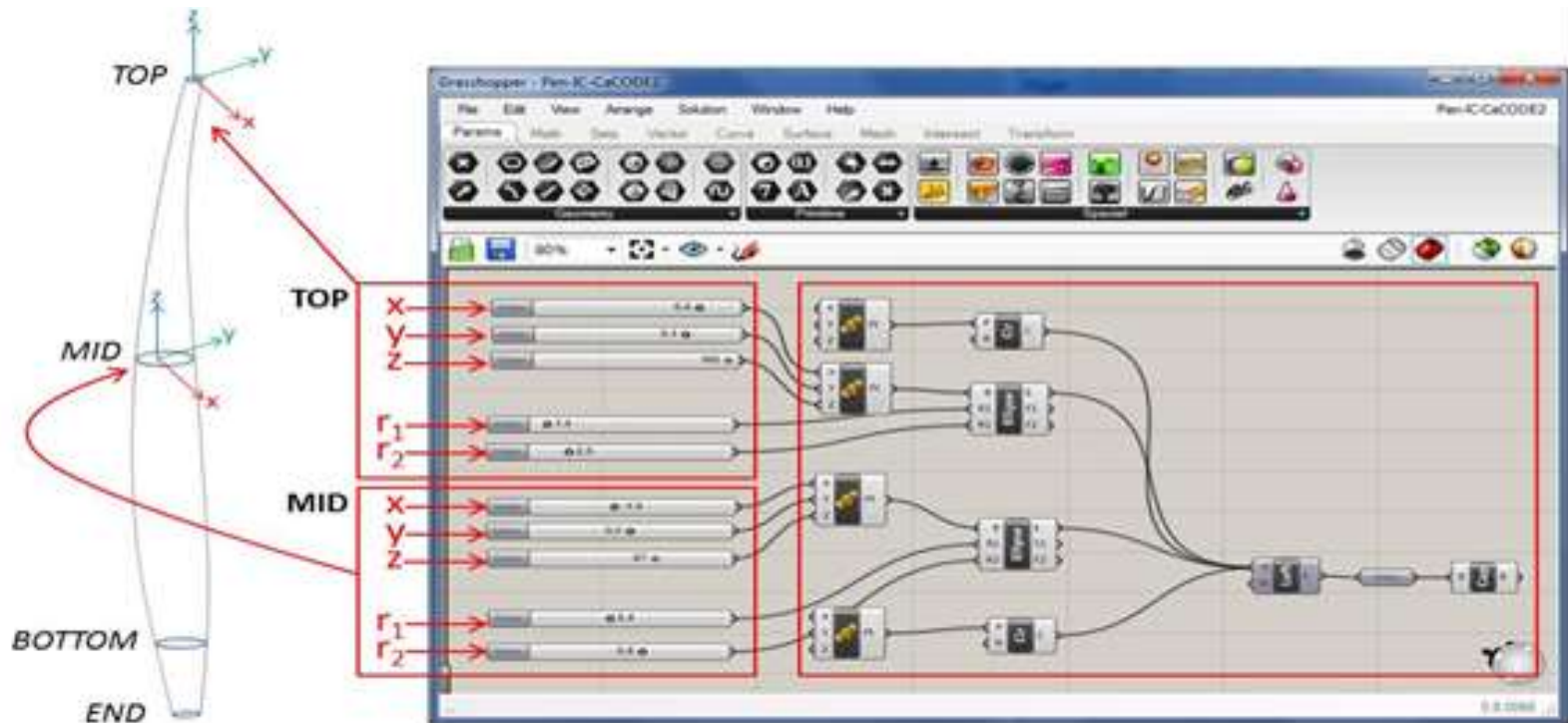
# Selecting a Development Platform

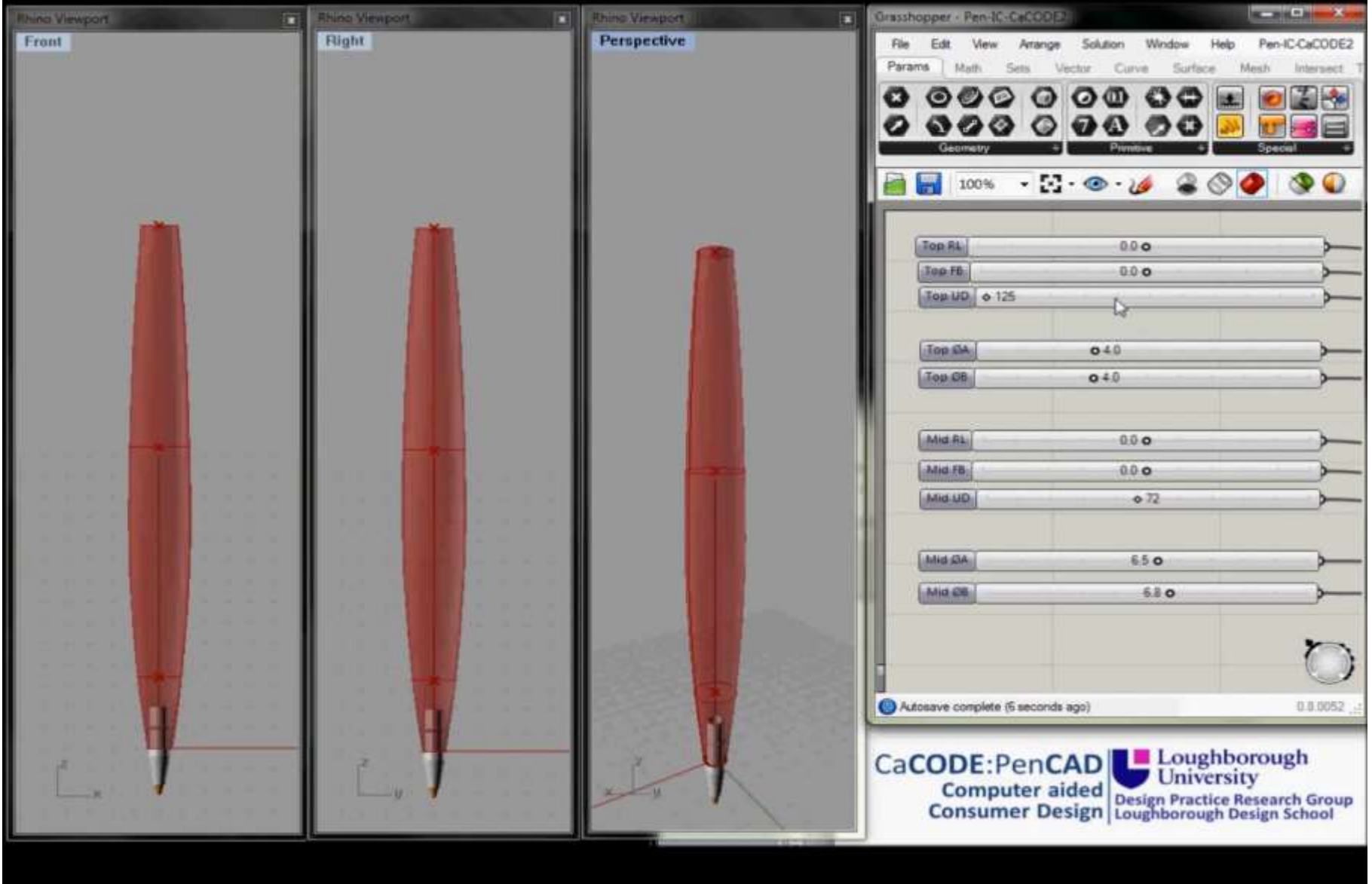
b) Conventional CAD plus user-interface application

- e.g. Rhino plus Grasshopper

# What did we do?

Developed an easy to use Computer Aided Consumer Design software for pen design, known as *CaCODE: Pen*  
*Created using Rhino with Grasshopper*

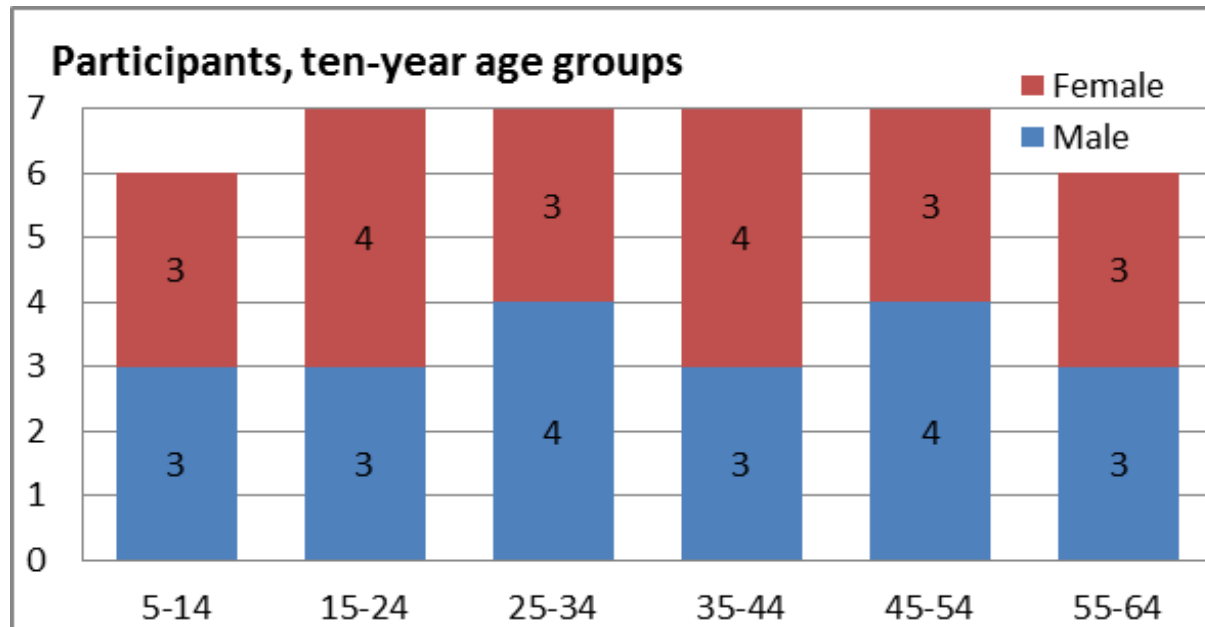






# User Trial - participants

- 40 participants – all were non-CAD users
- Equal split between genders
- Wide age range – pre-teens to over sixties
- Diverse backgrounds – researchers to homemakers



# User Trial - procedure

- Participants were first asked about their desire to design their own product
  - Group 1 - 8 participants (20%) had at some time wanted to design a consumer product and then actually went on to design one
  - Group 2 - 11 participants (27%) had at some time wanted to design a consumer product but had never actually done so
  - Group 3 - 21 participants (53%) had never wanted to design a consumer product
- Then asked to design their own pen using CaCODE
- Two versions used – slider bars, on-screen click and drag
- Questionnaire used to obtain feedback

**Questionnaire procedure:**

**Step 1**

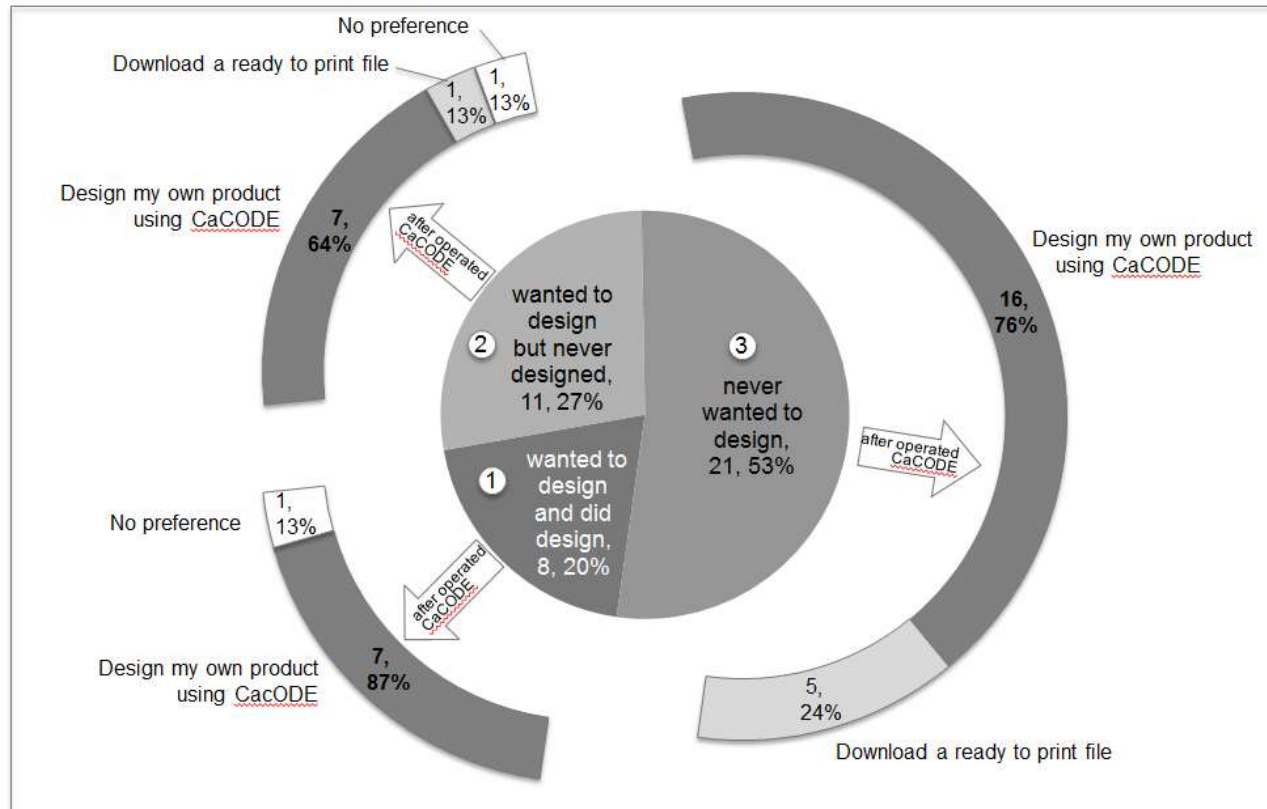
Participants were asked their intention in "design a consumer product", **BEFORE** operated the CaCODE

**Step 2**

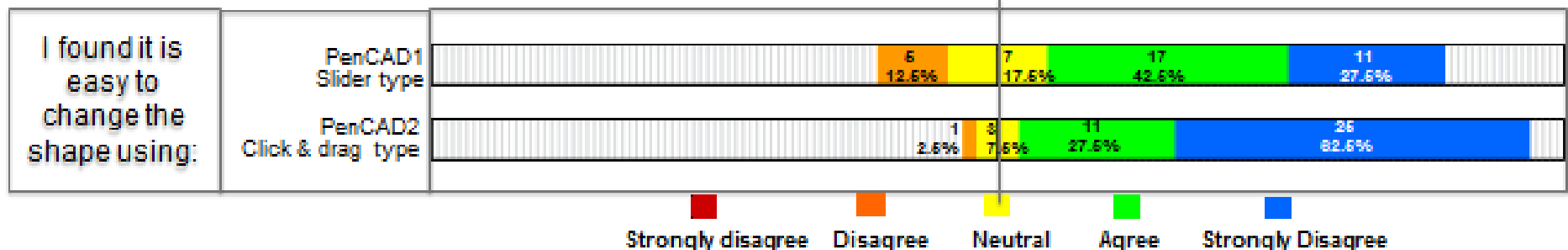
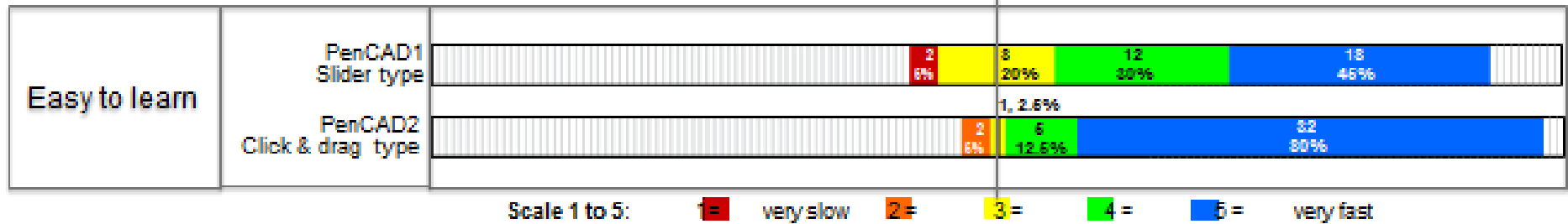
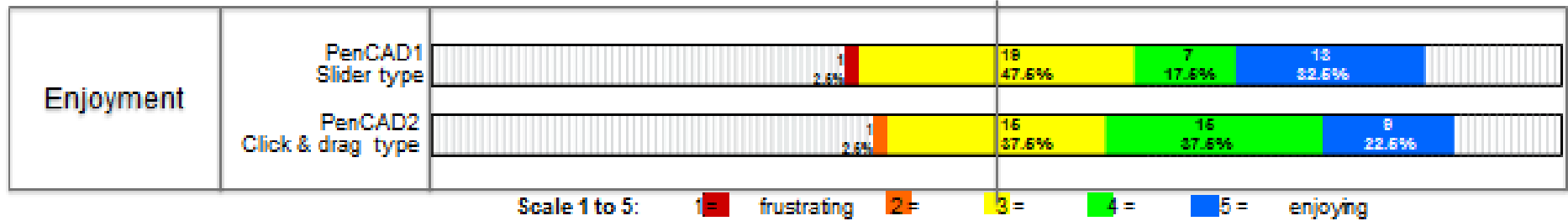
Introduced CaCODE and asked participants to design

**Step 3**

Participants were asked their intention in "design a consumer product", **AFTER** operated the CaCODE

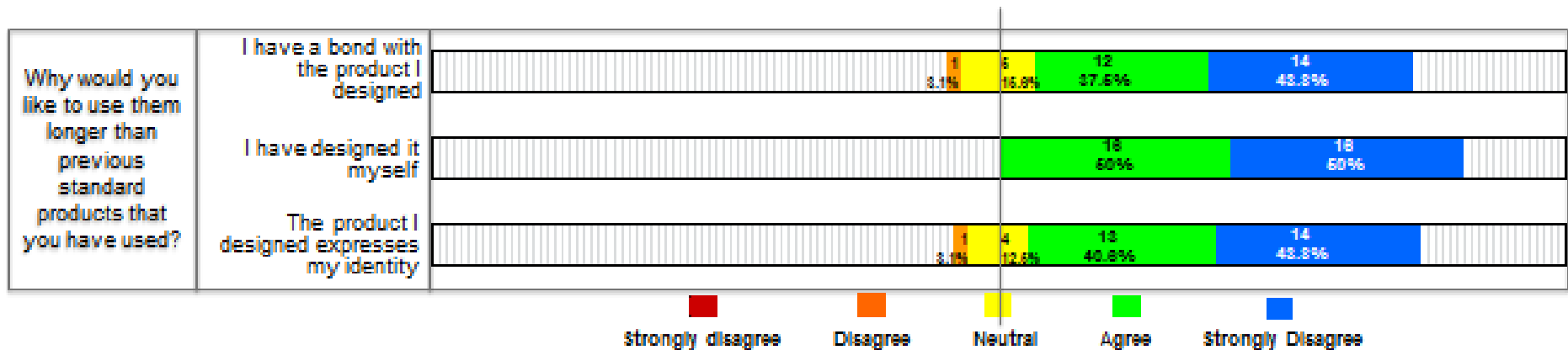
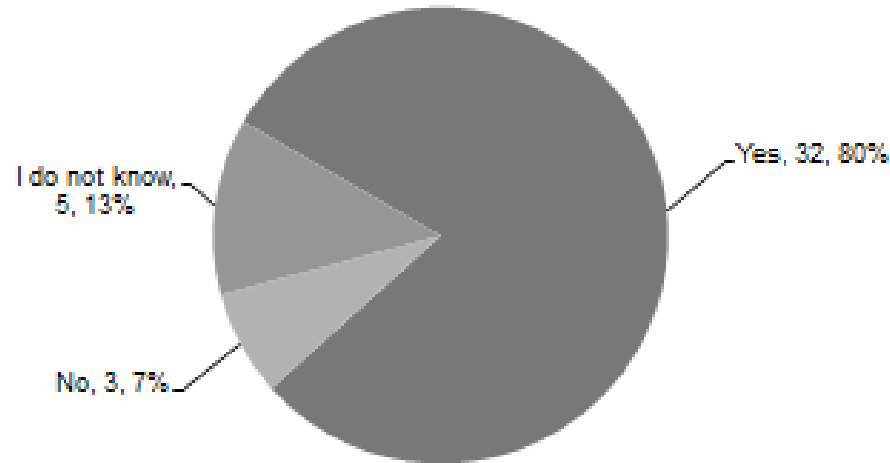


# Consumers' interaction with CaCODE



# CaCODE and sustainability

If you could design and/or print products for yourself, would you like to use them longer than previous standard products that you have used?

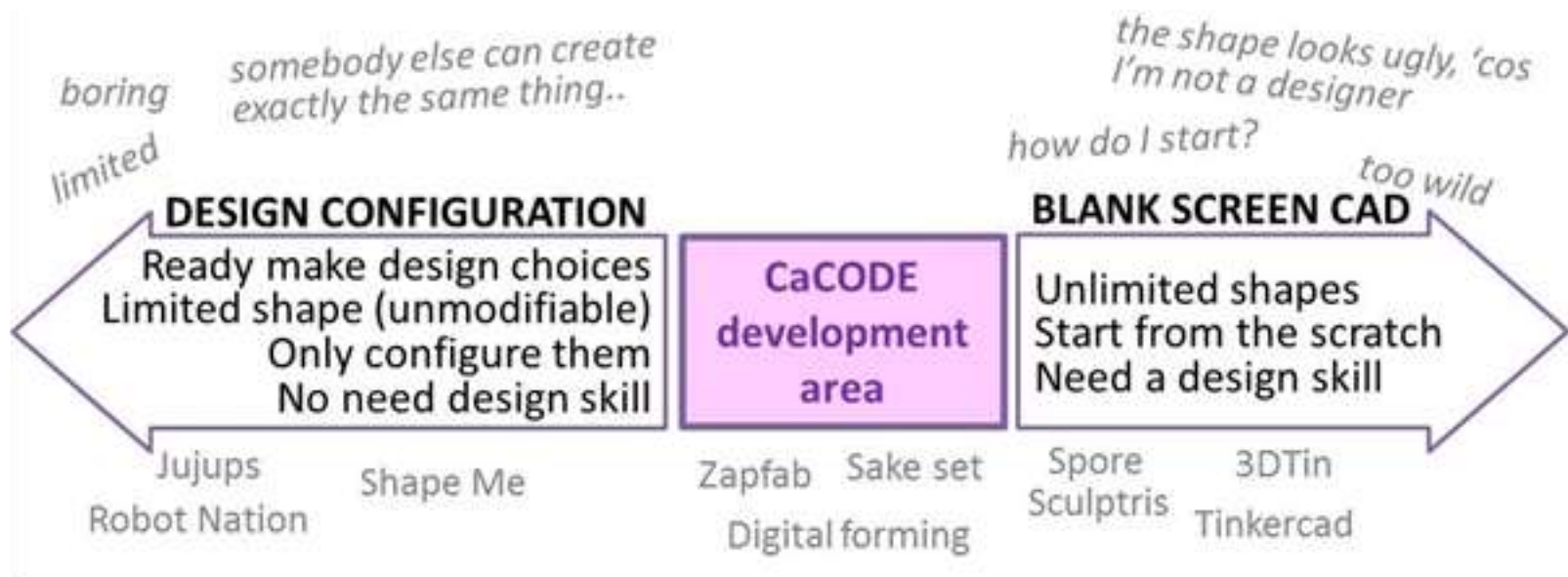


# Conclusions

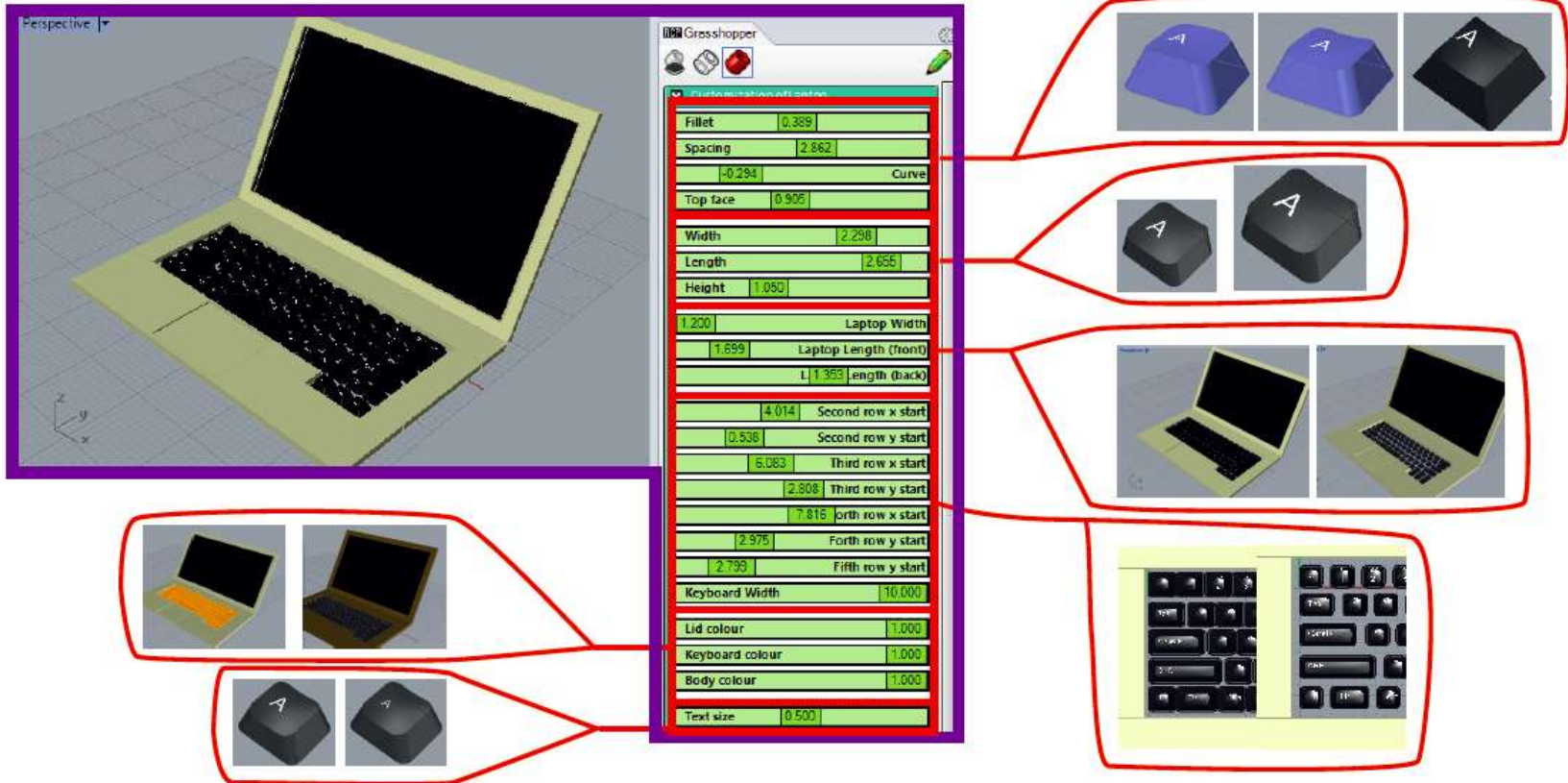
- Many consumers suffer from “blank screen syndrome”
- An “unfinished design” must be presented to them
- A user-friendly CaCODE system has been developed
- Click and drag interface was preferred by most
- Consumer design could make a useful contribution towards sustainability
- Product function and safety must be protected

# Where does Computer Aided Consumer Design fit in?

Between “configurators” and “easy-CAD”



# Recent work done by Hesam Yavari on Mass Customisation (MC) Toolkits





Body



Keyboard



Keys



# Web-based capability

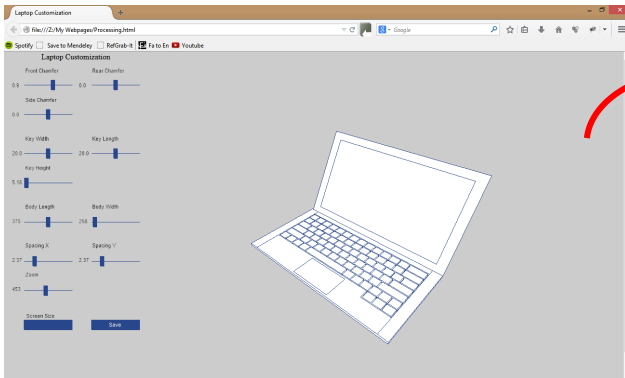
The screenshot displays a web browser window titled "Laptop Customization" with the address bar showing "file:///Z:/My Webpages/Processing.html". The browser's toolbar includes navigation buttons, a search bar with "Google", and several utility icons. Below the browser window, the "Laptop Customization" interface is visible, featuring a grid of sliders and buttons for adjusting various parameters of a 3D laptop model. The parameters and their current values are as follows:

Parameter	Value
Front Chamfer	0.9
Rear Chamfer	0.0
Side Chamfer	0.0
Key Width	20.0
Key Length	20.0
Key Height	5.16
Body Length	375
Body Width	258
Spacing X	2.37
Spacing Y	2.37
Zoom	453

At the bottom left of the customization interface, there is a "Screen Size" button and a "Save" button. On the right side, a 3D wireframe model of a laptop is shown, illustrating the current configuration of the parameters.

# Communication capability (for 3D printing of the result)

Customer's side (Website)



Producer's side (CAD)



Excel office (VBA)

# Future Research Questions

- What capabilities should a MC Toolkit should?
- How can functionality and safety be protected?
- How can MC Toolkits be used to increase the value of products through personalisation?
- What impact will consumer-led design changes have upon brand protection?

Thank you for your attention

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