Shadows and Light with AI: Play and Learning in the Digital Age

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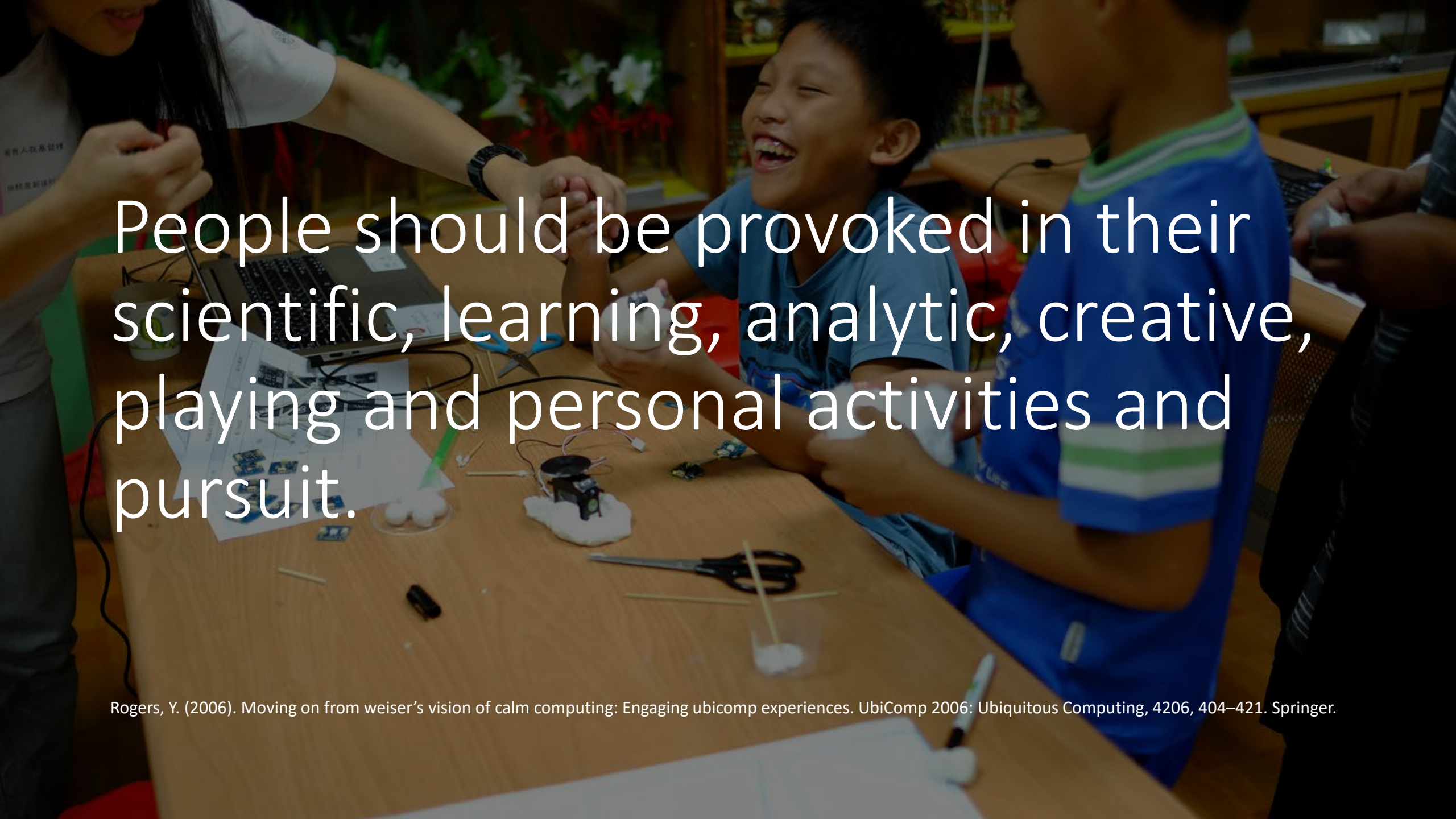
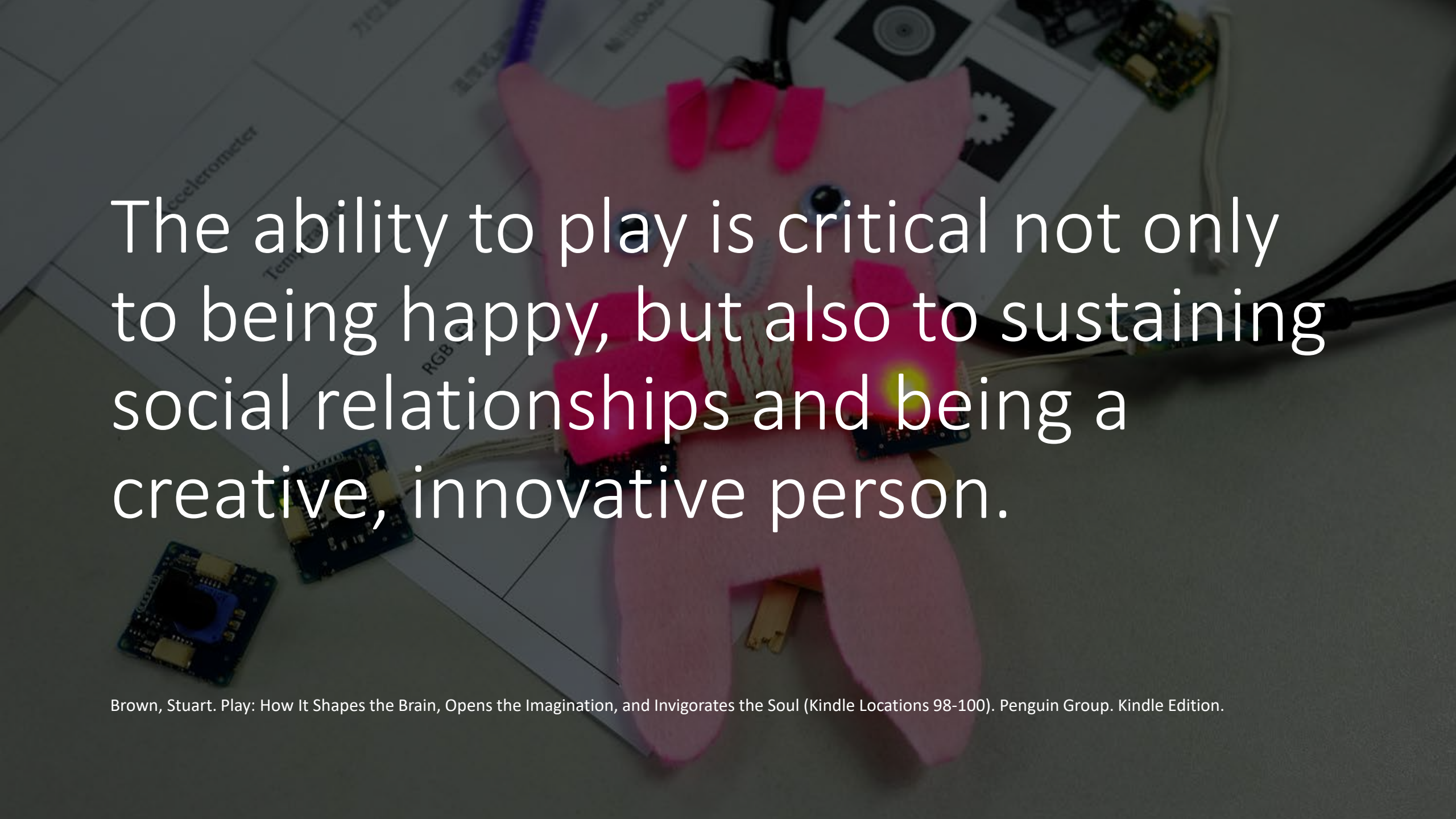


People should be provoked in their scientific, learning, analytic, creative, playing and personal activities and pursuit.

Rogers, Y. (2006). Moving on from weiser's vision of calm computing: Engaging ubicomp experiences. UbiComp 2006: Ubiquitous Computing, 4206, 404–421. Springer.



The ability to play is critical not only to being happy, but also to sustaining social relationships and being a creative, innovative person.

Brown, Stuart. Play: How It Shapes the Brain, Opens the Imagination, and Invigorates the Soul (Kindle Locations 98-100). Penguin Group. Kindle Edition.

How do we design to provoke people to explore, play and learn?

Learning LOGO turtle

Learning analytics is the **measurement**, **collection**, **analysis** and reporting of **data** about **learners** and their **contexts**, for purposes of **understanding** and optimising **learning** and the **environments** in which it occurs.

Society of Learning Analytics Research - https://solaresearch.org/

Problems with Learning Analytics

- Strong focus on online learning
- e.g. Click Stream data
- Learning at Scale (EDM and AIED)
- Generally at higher education
- Focused less on collaboration

Where Learning and Play happen

- How can we approach the human (complex and messy) learning from a Learning Analytics perspective?
- In the real world humans communicate and leave traces across multiple modalities
- Measure, collect, analyse, and report to understand and improve
- Capture these learning traces from the real world

Modalities

- What we see
- What we hear
- How we move
- How we write
- How we blink
- Our pulse
- Brain activity?
- Our hormones?
- Future things?

Boto, E., Holmes, N., Leggett, J., Roberts, G., Shah, V., Meyer, S. S., … Brookes, M. J. (2018). Moving magnetoencephalography towards real-world applications with a wearable system. *Nature*, *555*(7698), 657–661. http://doi.org/10.1038/nature26147

Practice Based Learning Analytics for Research and Support (PELARS)

- What new types of learning analytics can be derived from the hands-on learning of STEM and STEAM subjects?
- How can we use this data to understanding and provide avenues for formative assessment constructivist and practice-based learning?
- How can we better understand how the design of physical space and furniture influence learning interventions?

Key Collaborators

- Mutlu Cukurova, UCL Knowledge Lab, United Kingdom
- Emanuele Ruffaldi, Giacomo Dabisias & Lorenzo Landolfi, Scuola Superiore Sant'Anna, Italy
- David Cuartielles, Ardunio Verkstad, Sweden
- Bato Vogel, Malmö University, Sweden
- Donal Healion & Sam Russell, National College of Art and Design, Ireland
- Eva-Sophie Katterfedlt, Bremen University, Germany
- Nina Valkanova, Copenhagen Institute for Interaction Design, Denmark
- Simon Denehey and Phil Hamilton, PERCH, Ireland

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Different Approach for Learning Analytics

- Less intrusive data collection - Multimodal Learning Analytics (MMLA)
- Focus on non-verbal interactions between people and objects
- Collect data in real-world settings
- Explore different techniques for data analysis
- Explore how to design environments for improved collaboration

What we did…

- LAS system for collecting diverse traces (data):
  - Computer vision systems for capturing and analyzing “collaboration”
  - Mobile and Web-based tools for student self-documentation and research on-the fly coding
  - Visual Programming Platform including sensors and actuators
  - Sentiment feedback devices
- Learning Analytics
  - Logic and Reasoning based on the data collected
  - Visualizations
  - Specially designed furniture

What the groups did – the interventions

- Focus on groups of 3 students
  - open-ended design task
  - 57 minutes (mean of each session)
- Specially developed learning scenarios
  - Interactive toy
  - Color sorter
  - Autonomous vehicle

Data Collected

MMLA FEATURES (Independent)

FLS - Number of faces looking at screen
DBF - Mean distance between faces
DBH - Mean distance between hands
HMS - Mean hand movement speed
AUD - Mean audio level
HP - Mean hand positions
ACA - Mean Arduino components activity
DEC - Number of connected Arduino components
SB - Sentiment Buttons
PWR - Student Work Phases

Approach

1. Data Processing
2. Clustering
3. Regression
4. Variable refinement
5. Regression
6. Deep Learning

How do these features affect the student out-puts of collaboration patterns(Dependent)

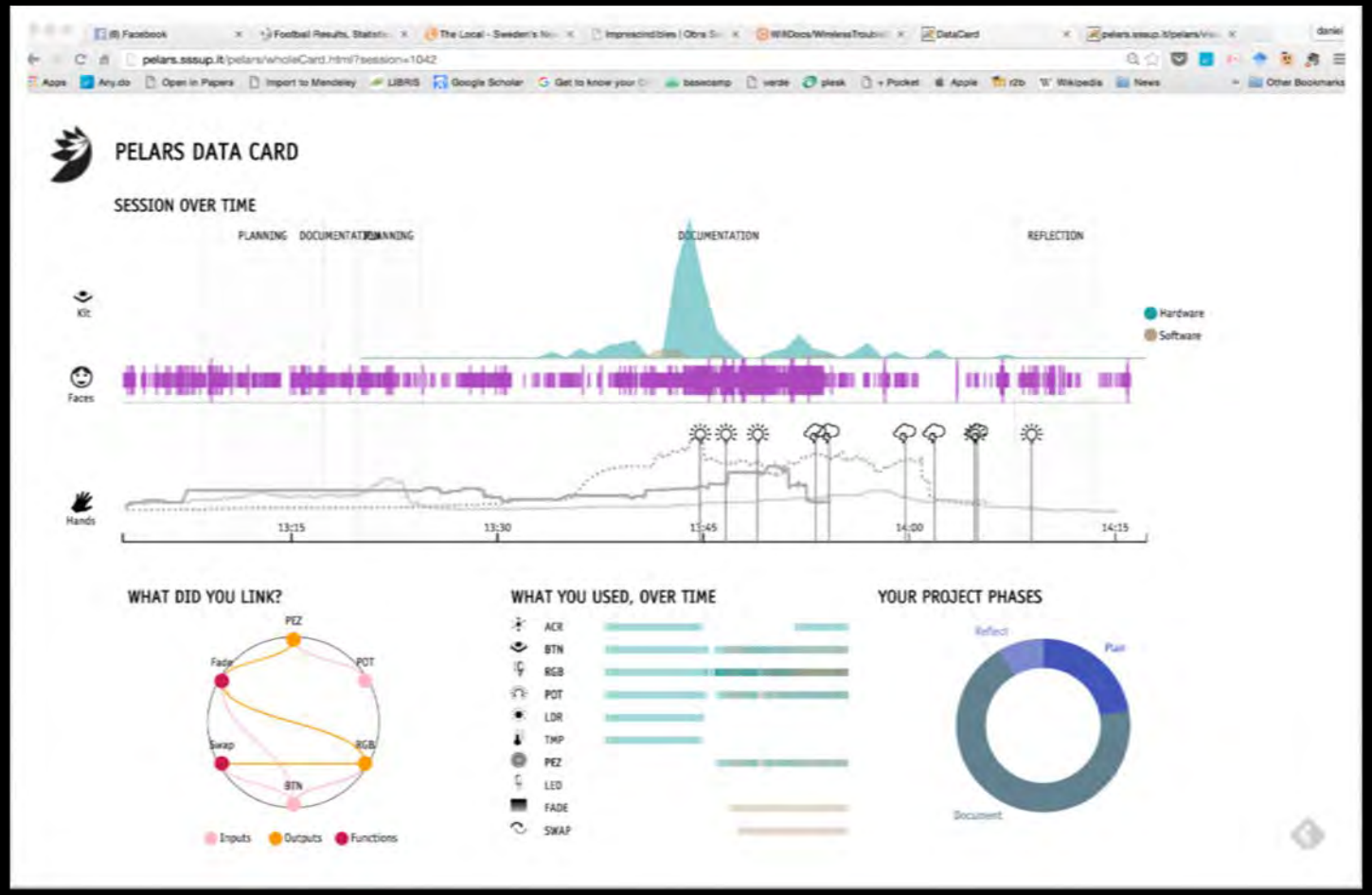
ASQ- Artefact grade
CPS - Score IA, PE & IPV

Briefly the Results

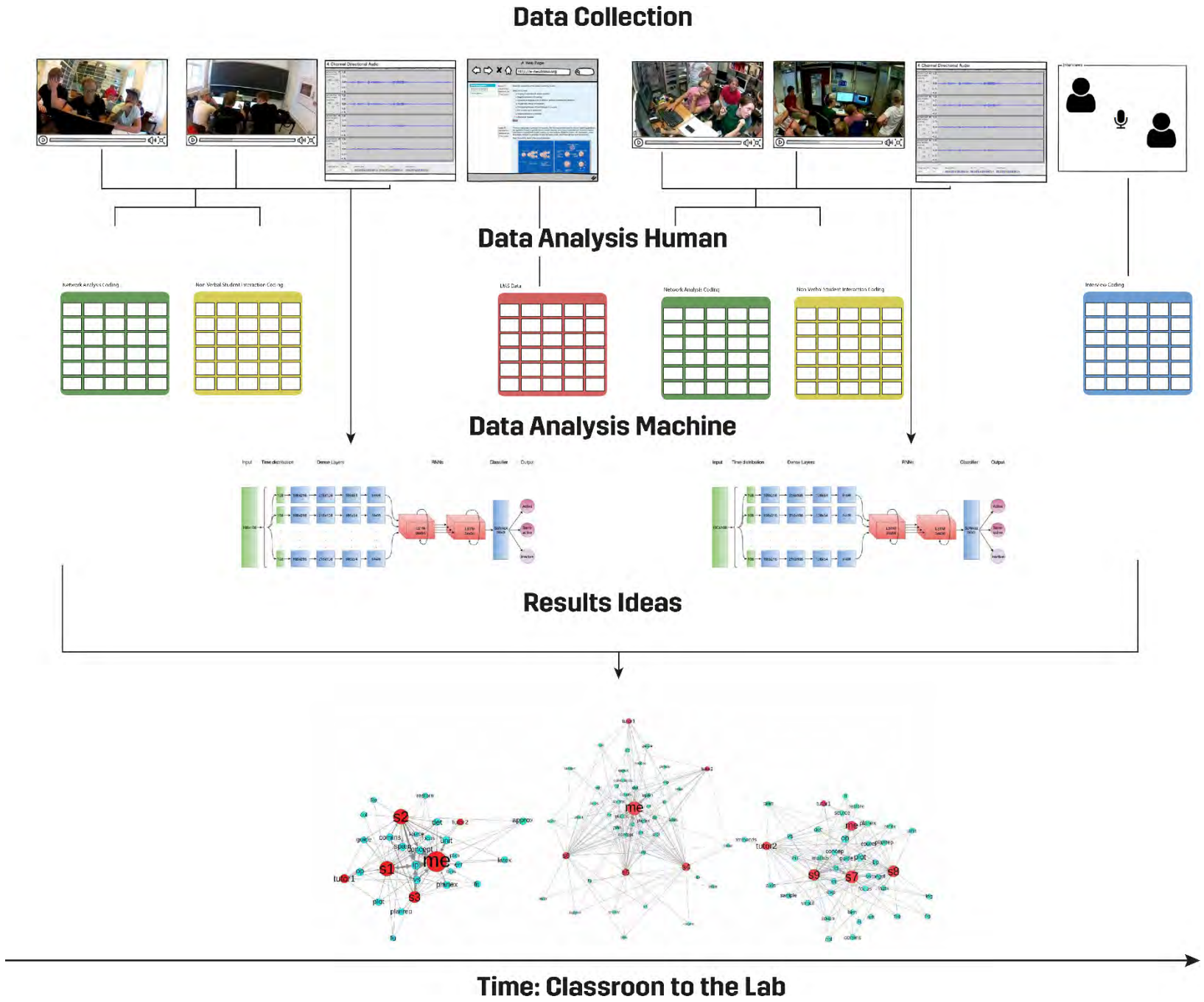
- Artefact solution (What the groups created)
  - Dependent variables – score of the solution
    - Features Distance between Hands, (DBH), Distance between Learners (DBL), and Audio (AUD) can predict after 30 minutes

- Collaborative Problem Solving Framework (How the groups worked together)
  - Dependent variables - Individual Accountability, Physical Engagement, and Synchronicity
    - Individual Accountability (IA) and Synchrony (SYN) are strong features for prediction with Distance between hands (DBH)
    - Synchronicity - DBH is an important feature with Faces Looking at Screen (FLS)
    - Physical Engagement (PE) is a strong feature for Hand Distance (DBH)

Visualizations



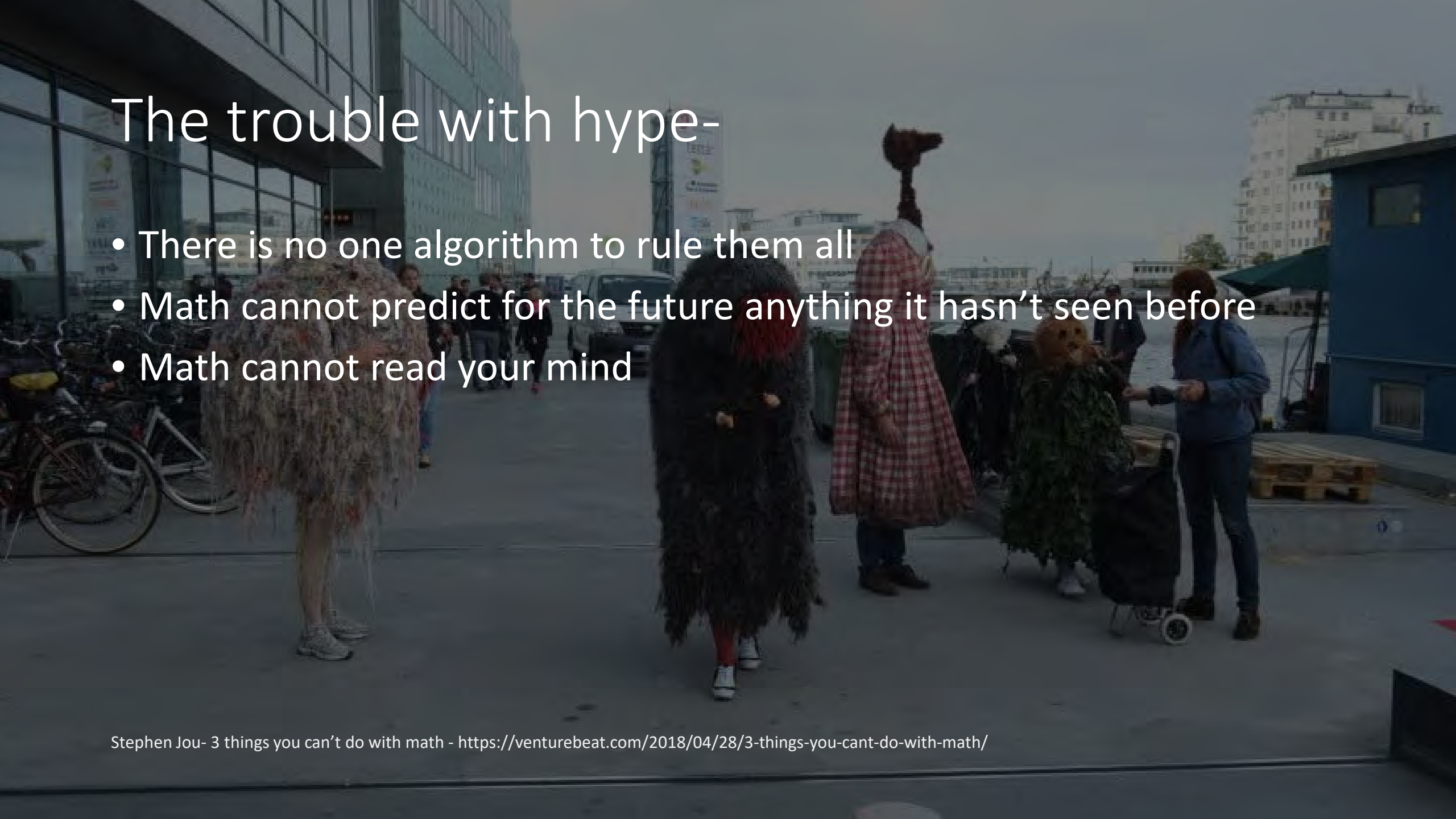
Future work


Data Collection
Data Analysis Human
Data Analysis Machine
Results Ideas
Time: Classroon to the Lab


Shadows and Light

The trouble with hype-

- There is no one algorithm to rule them all
- Math cannot predict for the future anything it hasn’t seen before
- Math cannot read your mind



Stephen Jou- 3 things you can’t do with math - https://venturebeat.com/2018/04/28/3-things-you-cant-do-with-math/

The value of play in learning the digital age

- Is **Social** - the Internet of Things and People
- The Internet of Everything - people using machines
- Technology should be used to augment social interaction and collaboration to provoke people into playing and learning together.
- The moral of this story is to make technology stupid (less smart) which allows us to inspire the future.

Light

- Predictive understanding in specific contexts
- Personalization – adaptive feedback
- Social Recommendation systems
- Larger tools for societal reflection

Shadows

- Performance only learning
- Panopticon Environment
- lockdown of learning (lack of creativity)
- lack of socio-cultural aspects of education
- role of teacher
- manipulation (priming and bias)

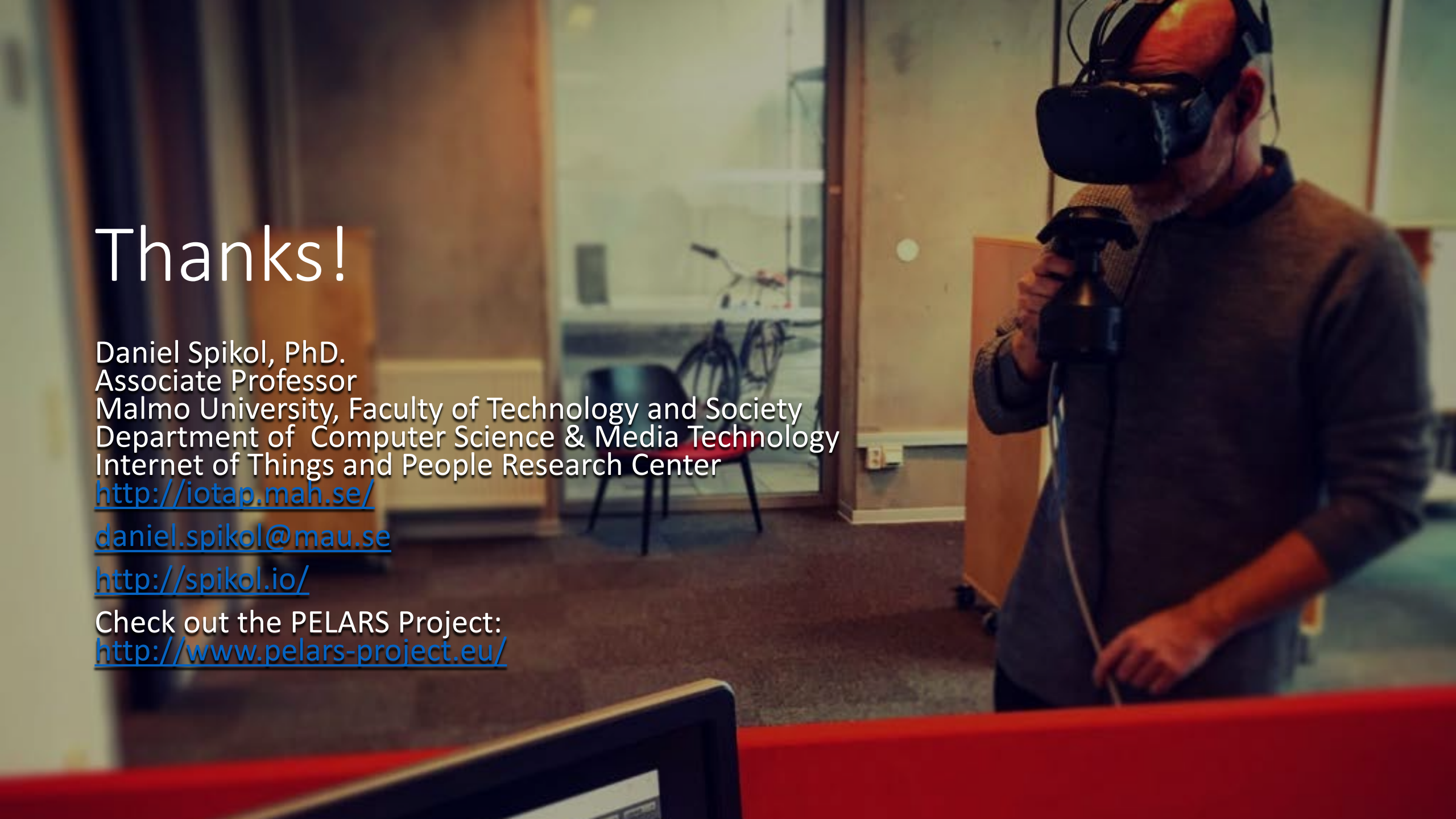
Next Steps

- nudge devices
- group context
- fast and slow thinking

Play and Learning happen, design or no design. And yet there are few more urgent tasks than to design social infrastructure that foster play and learning…”

–Adapted from Wenger, Etienne (1998). Communities of practice: learning, meaning, and identity. Cambridge: Cambridge University Press

Rohingya children hold objects they use as toys to play with in refugee camps in Bangladesh’s Cox’s Bazar. (Ed Jones/AFP/Getty Images) from https://www.washingtonpost.com/news/in-sight/wp/2017/12/05/the-unexpected-toys-rohingya-children-cherish-in-exile



Thanks!

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http://www.pelars-project.eu/

THE COPENHAGEN LETTER

Copenhagen, 2017

To everyone
who shapes technology today

We live in a world where technology is consuming society, ethics, and our core existence.

It is time to take responsibility for the world we are creating. Time to put humans before business. Time to replace the empty rhetoric of "building a better world" with a commitment to real action. It is time to organize, and to hold each other accountable.

Tech is not above us. It should be governed by all of us, by our democratic institutions. It should play by the rules of our societies. It should serve our needs, both individual and collective, as much as our wants.

Progress is more than innovation. We are builders at heart. Let us create a new Renaissance. We will open and nourish honest public conversation about the power of technology. We are ready to serve our societies. We will apply the means at our disposal to move our societies and their institutions forward.

Let us build from trust. Let us build for true transparency. We need digital citizens, not mere consumers. We all depend on transparency to understand how technology shapes us, which data we share, and who has access to it. Treating each other as commodities from which to extract maximum economic value is bad, not only for society as a complex, interconnected whole but for each and every one of us.

Design open to scrutiny. We must encourage a continuous, public, and critical reflection on our definition of success as it defines how we build and design for others. We must seek to design with those for whom we are designing. We will not tolerate design for addiction, deception, or control. We must design tools that we would love our loved ones to use. We must question our intent and listen to our hearts.

Let us move from human-centered design to humanity-centered design.
We are a community that exerts great influence. We must protect and nurture the potential to do good with it. We must do this with attention to inequality, with humility, and with love. In the end, our reward will be to know that we have done everything in our power to leave our garden patch a little greener than we found it.

We who have signed this letter will hold ourselves and each other accountable for putting these ideas into practice. That is our commitment.

DESIGNING *for* CHILDREN GUIDE

Integrating children's rights & ethics into the design process

LEARN MORE

Integrating children's rights and ethics into the heart of the design process

The Designing for Children Guide was created by 70+ heroes – designers, psychologists, neuroscientists, health care specialists, educators, and children's rights experts – during Talkoot, a 48-hour collaborative event in Helsinki 19-21.01.2018.

The aim of this evolving guide is to refine a new standard for both design and businesses and direct the development towards products and services that have ethics and children's best interests at their core.

Intro

What impact are designers, businesses and technologists creating in the world of children today?

Principles

The 10+ commandments of designing for children. The principles are guiding to design more ethically and

Methods

Hands-on methods and practices on the good-old double diamond with ethics and children's rights