

# INTERACTION WITH AI – MODULE 2

Session 1, September 22, 2020


Asbjørn Følstad, SINTEF

My background:

# Human-Chatbot Interaction Design

How to design chatbots?

Supported by IKTPLUS, Research Council of Norway



## Chatbots og interaksjonsdesign

Naturlig språk blir en stadig vanligere måte å bruke digitale tjenester på. Eksempler er Apples Siri og Googles Assistant. Facebook Messenger gir i dag tilgang til mer enn 30.000 chatbots.



Til tross for en rivende teknologiske utvikling innen chatbots gjenstår mange forskningsutfordringer. I prosjektet **Human-Chatbot Interaction Design** kombinerer vi interaksjonsdesign med kunstig intelligens og maskinlæring.

Målet er å bidra til kunnskap om brukersentrert design av chatbots, slik at disse kan bli nyttige og engasjerende innganger til informasjon og tjenester – uansett brukerens kjønn, bakgrunn og alder.


**OM PROSJEKTET**  
**Prosjektperiode**  
**2017-2021**

Program IKTPLUS

**PARTNERE**

 **SINTEF**  
 **CAIR** CENTRE FOR ARTIFICIAL INTELLIGENCE RESEARCH

**STØTTET AV**

 **Forskningsrådet**

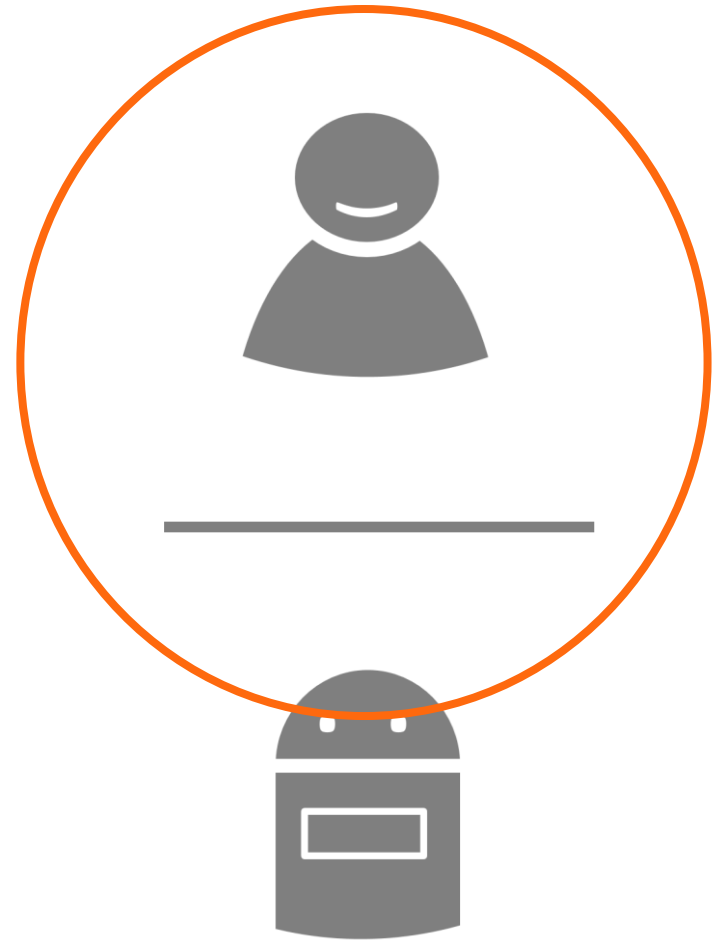
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**Les mer:** [www.sintef.no/humanchatbotinteractiondesign](http://www.sintef.no/humanchatbotinteractiondesign)

My background:

SINTEF, HCI group

Psychology (!?!)



## Interaction with AI – module 2

Interaction design

Four sessions

Design of interaction with AI

Asbjørn Følstad

September 22

October 6

Understanding interaction with AI

Morten Goodwin

October 13

October 20



Literature



Amershi, S., Weld, D., Vorvoreanu, M., Fourney, A., Nushi, B., Collisson, P., ... & Teevan, J. (2019). Guidelines for human-AI interaction. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (paper no. 3). ACM.

Kocielnik, R., Amershi, S., & Bennett, P. N. (2019). Will You Accept an Imperfect AI?: Exploring Designs for Adjusting End-user Expectations of AI Systems. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (paper no. 411). ACM.

Liao, Q. V., Gruen, D., & Miller, S. (2020). Questioning the AI: Informing Design Practices for Explainable AI User Experiences. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (paper no. 463). ACM.

Yang, Q., Steinfeld, A., Rosé, C., & Zimmerman, J. (2020). Re-examining Whether, Why, and How Human-AI Interaction Is Uniquely Difficult to Design. In Proceedings of the 2020 CHI conference on human factors in computing systems (Paper no. 164).

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## Literature

Følstad, A., & Brandtzæg, P. B. (2017). Chatbots and the new world of HCI. *interactions*, 24(4), 38-42.

Luger, E., & Sellen, A. (2016). Like having a really bad PA: the gulf between user expectation and experience of conversational agents. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 5286-5297). ACM.

Frey, C. B., & Osborne, M. A. (2017). The future of employment: how susceptible are jobs to computerisation?. *Technological forecasting and social change*, 114, 254-280.

Carter, S., & Nielsen, M. (2017). Using artificial intelligence to augment human intelligence. *Distill*, 2(12), e9.

Wilson, H. J., & Daugherty, P. R. (2018). Collaborative intelligence: humans and AI are joining forces. *Harvard Business Review*, 96(4), 114-123.

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Noessel, C. (2017). Designing Agentive technology: AI that works for people. Rosenfeld Media.

Hall, E. (2018). Conversational design. A Book Apart

McAfee, A., & Brynjulfsson, E. (2016). Machine, Platform, Crowd. Harnessing Our Digital Future. Norton & Company.

## Individual assignment

Building on and extending the **individual assignment** in Module 1. Startup today – finish October 23)

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## Mid-term report (Oct. 23)

Building on and extending the **group assignment** in Module 1. Startup today – finish October 23)

## Group assignment

+ **Task on user and interaction design perspective** (startup today – finish October 6, include in mid-term report as Appendix 1)

+ **Task on machine learning perspective** (startup Oct. 13 – finish Oct. 20, include in mid-term report as Appendix 2)

# Midterm report - individual assignment

Three topics:

- Characteristics of AI-infused systems.
- Human-AI interaction design.
- Chatbots / conversational user interfaces.

Language: English or Norwegian.

Max. pages: 6

Min. articles referenced 4.



Aim to  
address these  
three topics in  
lecture 1 and 2



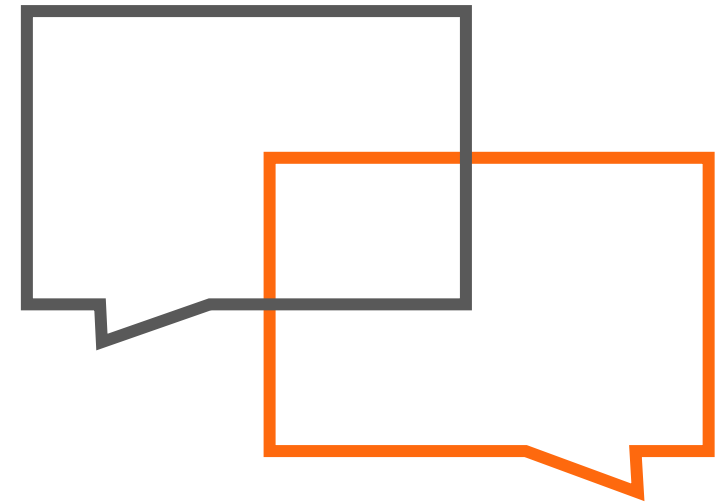
# Midterm report – group assignment

## Content – 5-7 pages

- A description of the group, who you are - names.
- A description of what area of “interaction with AI” you are interested in working with.
- **(new)** Background section: Position your work relative to existing knowledge and practice
- Minimum 1 maximum 2 questions that you want to address. Please write some sentences about the questions. These questions can change and evolve later in the midterm report and in the final report - as you go about investigating your questions.
- **(updated)** Method section – overall approach, design process (optional, but encouraged), data collection methods
- **(new)** Sketches and/or prototypes (optional, but encouraged)
- **(new)** Findings (progress, initial outcomes)
- **(updated)** Minimum five references to literature.

## Appendices – approx. 1 page each

- Appendix 1: Chatbot design task – briefly describe the process and outcome. Detail reflections and lessons learnt.
- Appendix 2: **Machine learning task** – briefly describe the process and outcome. Detail reflections and lessons learnt.



Brief status on the group task  
– each group say a few words

### Group 1

1. Can a human establish an emotional bond with an AI chatbot?
2. To what extent could an AI chatbot replace a human psychologist?

### Group 2

1. How can a chatbot be influenced by people's behaviour?

### Group 3

1. Could AI-powered speech recognition contribute to older adults' communication with family and friends? And possibly contribute to their autonomy?
2. Additionally, speech recognition is not perfect. How are these incomprehensives handled by systems and users today? How should/could errors be handled?

### Group 4

1. Interagerer folk forskjellig med chatbotten når den har et menneske som bilde, enn når den er en tydelig chatbot? Stoler man mer på informasjonen hvis man tror det er et ekte menneske man snakker med?
2. Hva skal til for at en person reagerer over det chatbotten sier og hvordan påvirker dette videre interaksjon? Hva blir atferden etter man har chattet?

### Group 5

1. What are the expectations of how an AI should behave?
2. Is it possible to make an AI more human in the way it acts?

### Group 6

1. How does the speech pattern differ from human to human interaction?
2. How can design make people understand the capability of their personal assistant?

## Group assignment – suggestion (I):

### Improve existing design of AI-infused system



Wonder document

Interaction design

Evaluation and trust

Identify interesting, existing AI-infused system

Use (selected) guidelines for Human-AI Interaction to discuss interaction design. Identify good design and possible improvements

Suggest and prototype redesign in response to discussion

Test with users and refine

## Group assignment – suggestion (II):

### Develop early prototype of simple AI-infused system



Wonder document

Interaction design

Evaluation and trust

Identify need for simple AI-infused system (e.g. a chatbot?)

Concept development and prototype

Use (selected) guidelines for Human-AI Interaction to motivate design choices.

Test with users and refine

## Group assignment – suggestion (III):

Understand use of AI-infused  
systems and discuss guidelines



Wonder document

Interaction design

Evaluation and trust

Identify one or more interesting,  
existing AI-infused systems

Set up study to assess or better  
understand how the system is used  
or experienced

Discuss theoretical and practical  
implications of findings

Reflect on correspondance  
between findings and guidelines  
for Human-AI Interaction. Critical  
discussion and possible  
suggestions

# Agenda

Today

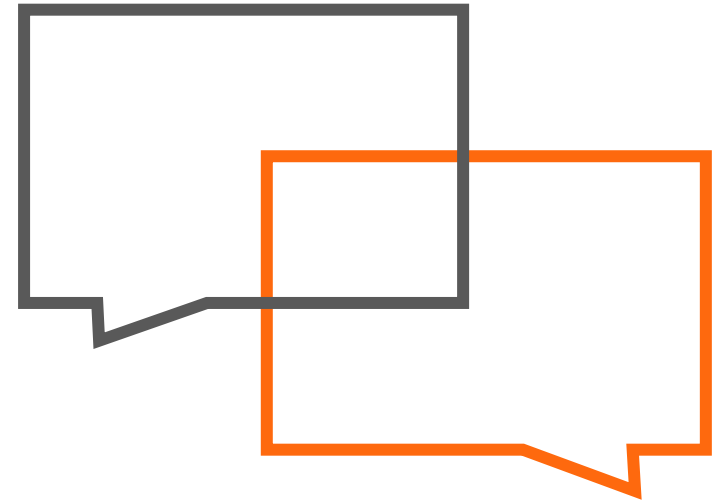
- 1 Interacting with AI – an overview
- 2 Chatbots – interacting with AI in natural language

Next

- 3 User-centred design of AI
- 4 User-centred design of chatbots

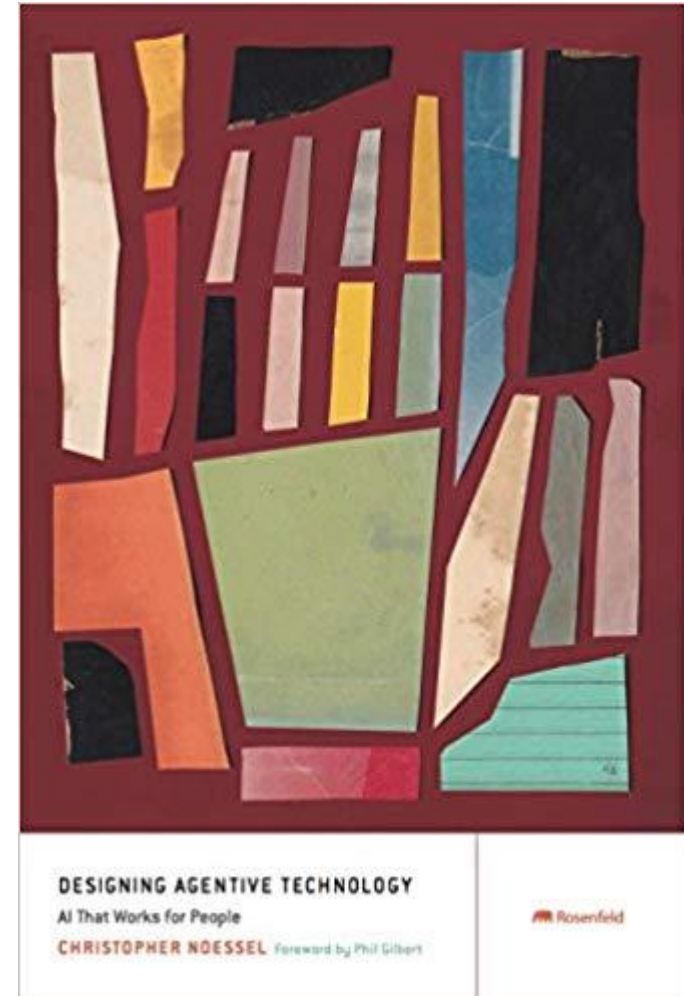
# Interaction with AI - overview

# AI?





# AI?



Noessel, C. (2017). Designing Agentic technology: AI that works for people. Rosenfeld Media.



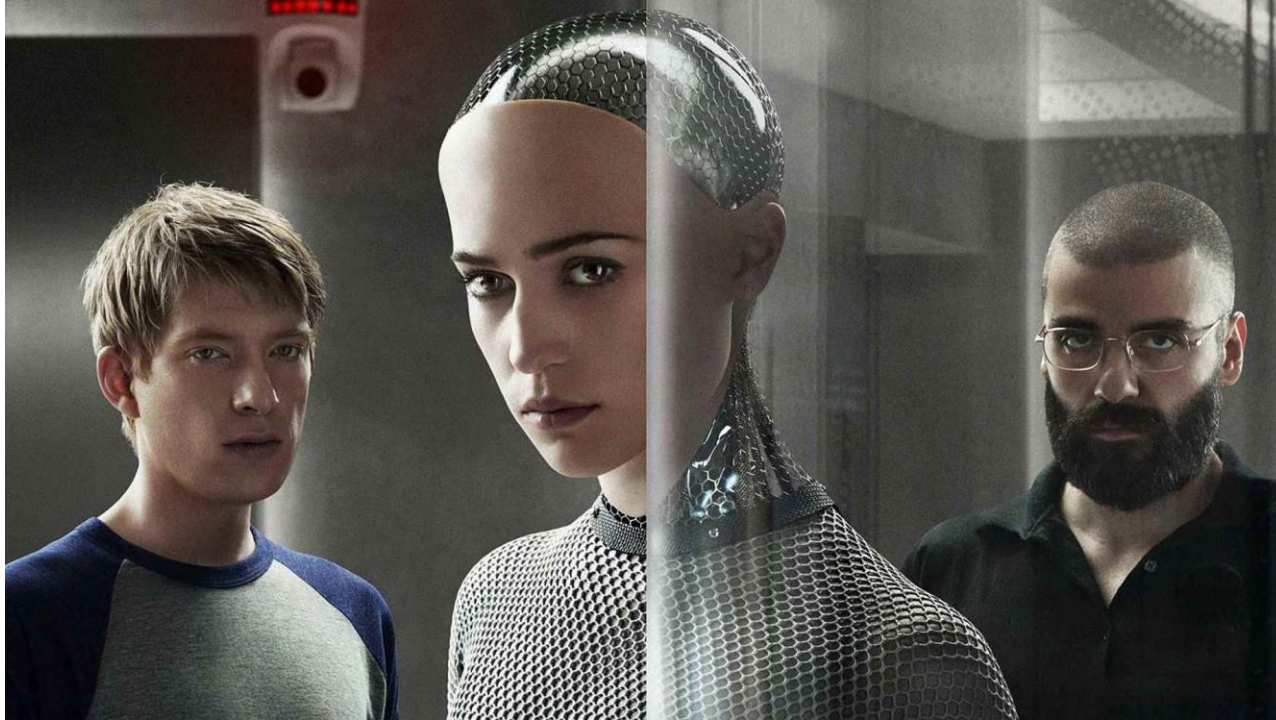
Devs (2020)

Artificial **super**  
intelligence

Artificial **general**  
intelligence

Artificial **narrow**  
intelligence

Noessel, C. (2017). Designing  
Agentive technology: AI that works  
for people. Rosenfeld Media.



Ex Machina (2014)

Artificial **super**  
intelligence

Artificial **general**  
intelligence

Artificial **narrow**  
intelligence

Noessel, C. (2017). Designing  
Agentive technology: AI that works  
for people. Rosenfeld Media.



Artificial **super**  
intelligence

Artificial **general**  
intelligence

Artificial **narrow**  
intelligence

Noessel, C. (2017). Designing  
Agentive technology: AI that works  
for people. Rosenfeld Media.

Interaction with AI, and  
designing for interactions  
with AI, concerns artificial  
narrow intelligence  
(narrow AI)

Artificial **super**  
intelligence

Artificial **general**  
intelligence

Artificial **narrow**  
intelligence

Noessel, C. (2017). Designing  
Agentive technology: AI that works  
for people. Rosenfeld Media.

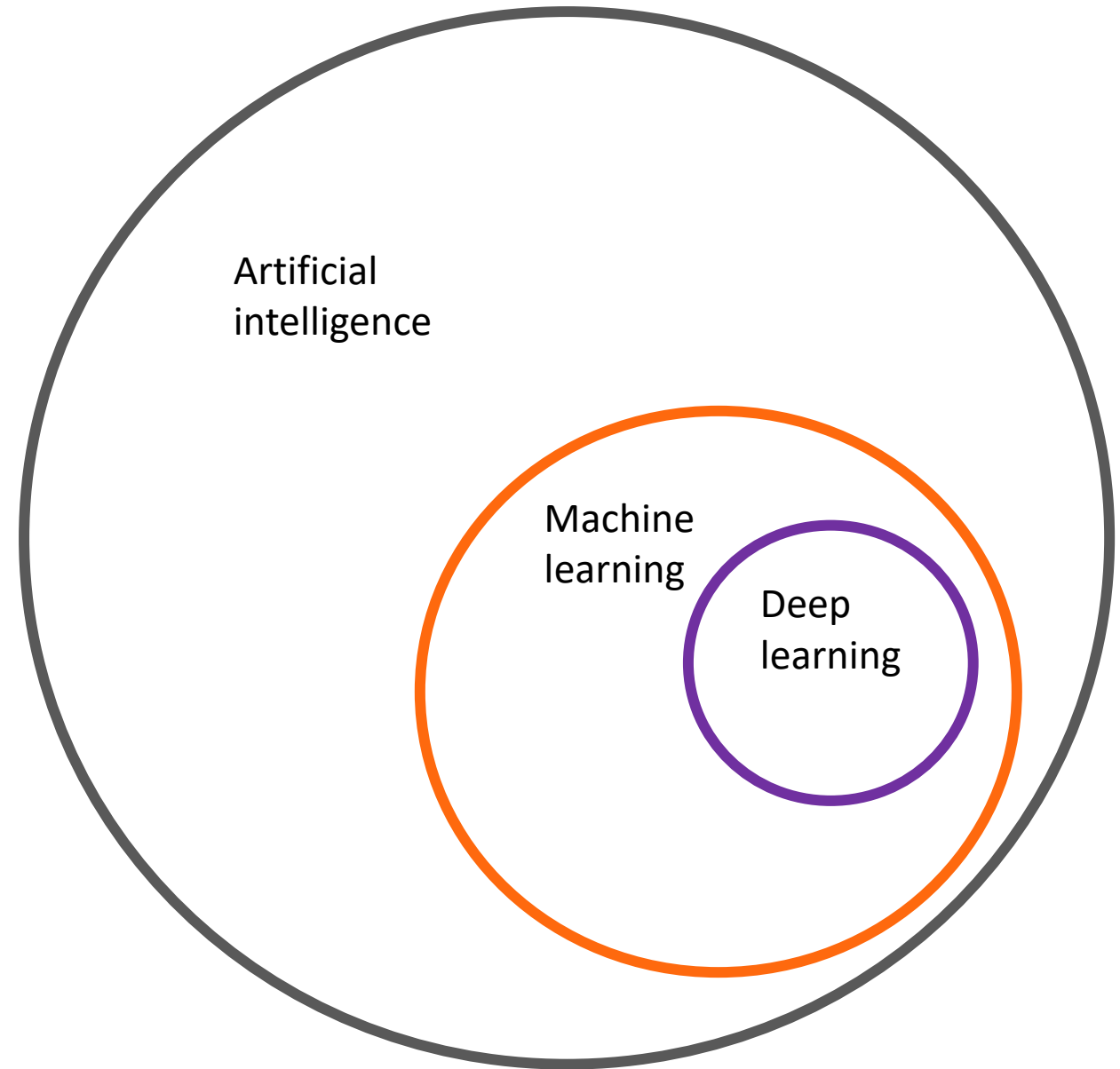
Interaction with AI, and designing for interactions with AI, concerns artificial narrow intelligence (narrow AI)

Need to know:

- Characteristics of narrow AI
- Opportunities and limitations of narrow AI

... from now on, when talking about AI we mean **narrow** AI

AI with recent advances  
due to progress in  
machine learning





AI with recent advances  
due to progress in  
machine learning

Two drivers:

Large datasets

Computational power

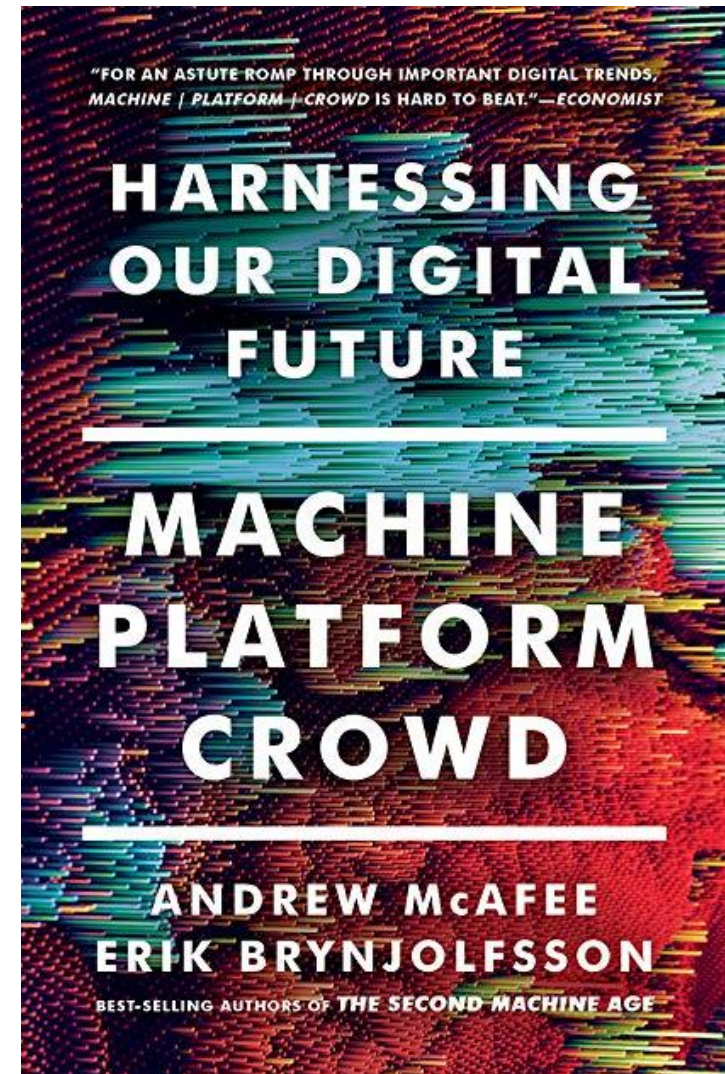


AI with recent advances  
due to progress in  
machine learning

An understanding of  
**recent** AI systems may  
be:

Computer systems  
learning and improving  
on the basis of large data  
sources

AI with recent advances  
due to progress in  
machine learning



# AI with recent advances due to progress in machine learning

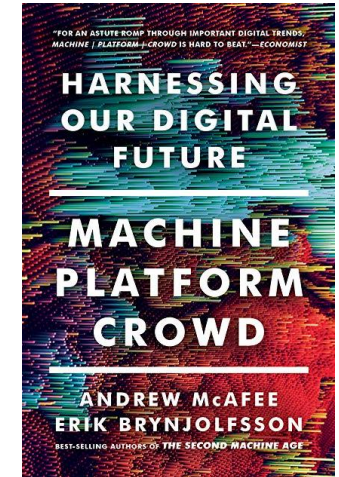
## Second machine age

- Phase 1: Computers drives productivity
- Phase 2: Computers can do work we never thought of as programmed or routine

Michael Polanyi on tacit knowledge -  
“We know more than we can tell.”  
(Polanyis paradox)

Computers now taking on tasks  
reflecting Polanyis paradox

The board game Go paramount  
example



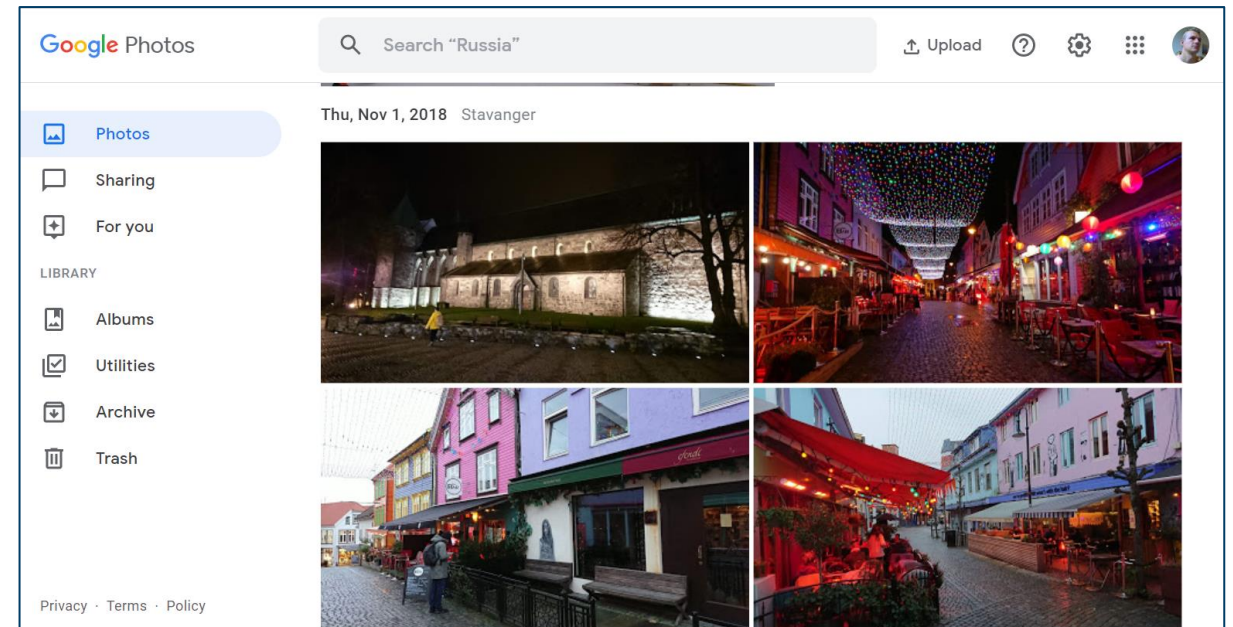
AI with recent advances  
due to progress in  
machine learning



*De fleste datasett som kan brukes til å trene dype nett til å bli gode på en eller annen funksjon, er kjempestore.*

*[...]*

*Et nytt triks som mange bedrifter nå bruker, er å først designe en tjeneste som mange brukere vil ha. [...] Gjennom bruken av tjenesten gir brukerne fra seg verdifulle data som igjen brukes til å trene nett for å gi brukerne nye funksjoner de setter pris på.*



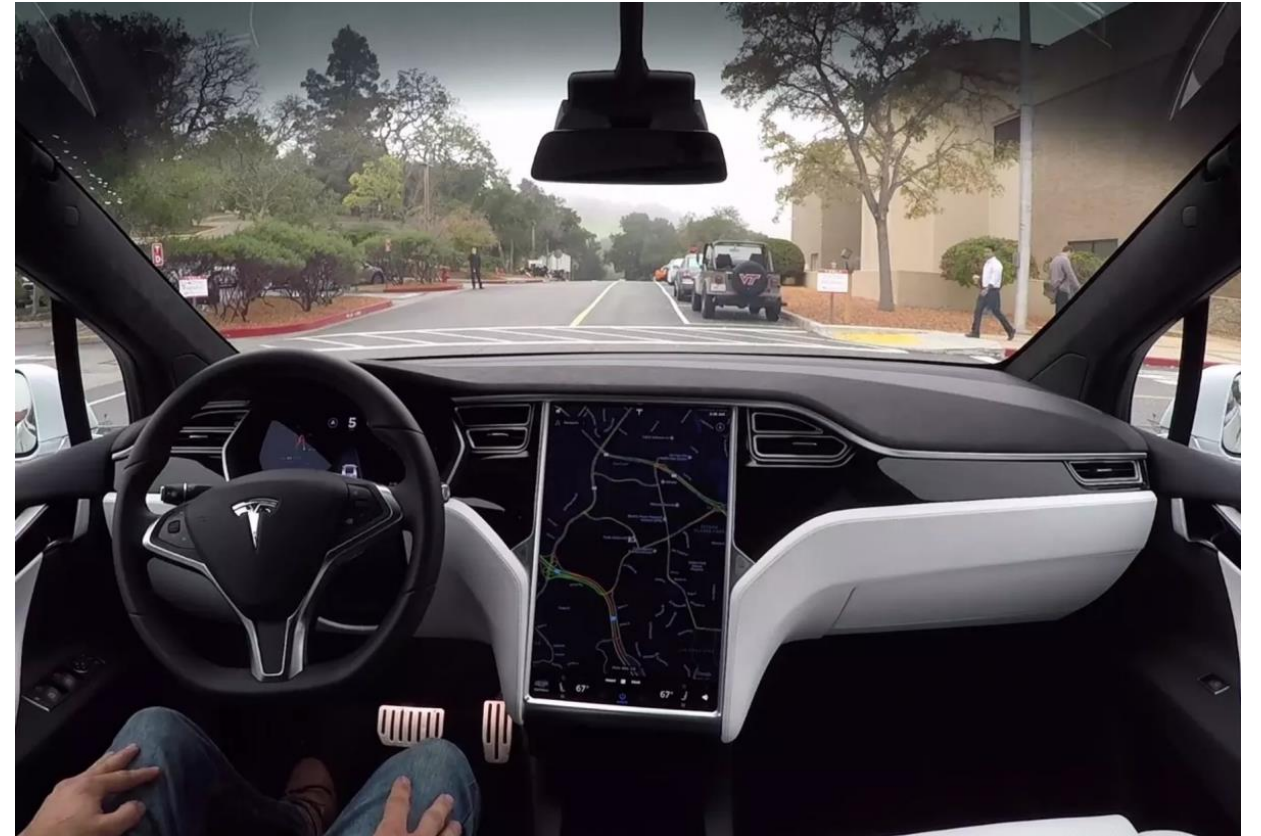
Bjørkeng, P. K. (2018). Kunstig intelligens – den usynlige revolusjonen. Vega.



*En datafelle er begrepet som brukes om Teslas særegne tilnærming til datainnsamling.*

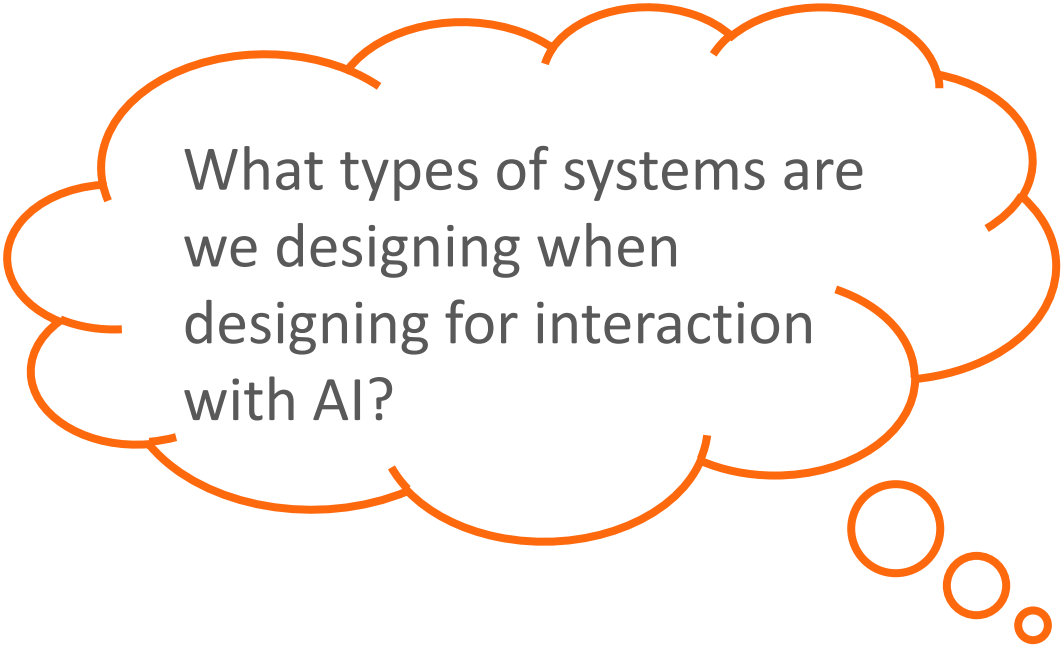
*Google-eier Alphabet og deres selskap Waymo har nå brukt ti år bare på å samle inn data om mange nok ulike trafikksituasjoner. (menneskelige sjåførere i selvkjørende biler klare til å ta over)*

*Elon Musk og Tesla hadde slett ikke 10 år til overs. I stedet etablerte de en datafelle. [...] Her eneste nye Tesla-eier er nå med i dette gigantiske datainnsamlingsprosjektet (shadowmode)*



Bjørkeng, P. K. (2018). Kunstig intelligens – den usynlige revolusjonen. Vega.

# AI-infused systems



What types of systems are we designing when designing for interaction with AI?

AI-infused  
systems

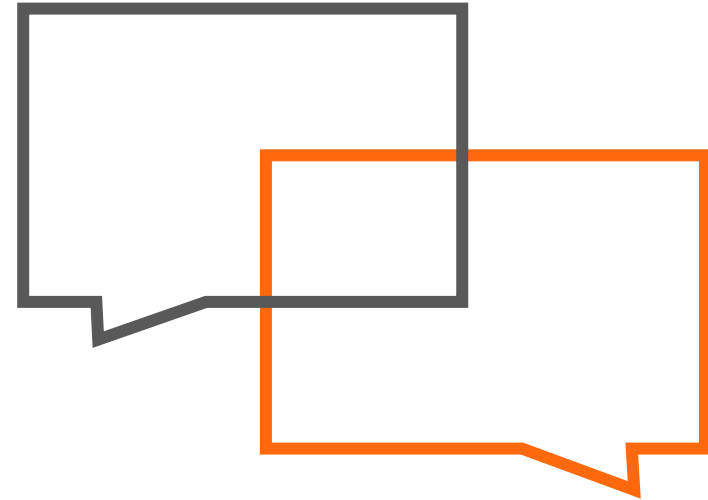
"Systems that have **features harnessing AI capabilities** that are **directly exposed to the end user.**"

Amershi, S., Weld, D., Vorvoreanu, M., Fournery, A., Nushi, B., Collisson, P., ... & Teevan, J. (2019). Guidelines for human-AI interaction. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (paper no. 3). ACM.



AI-infused  
systems

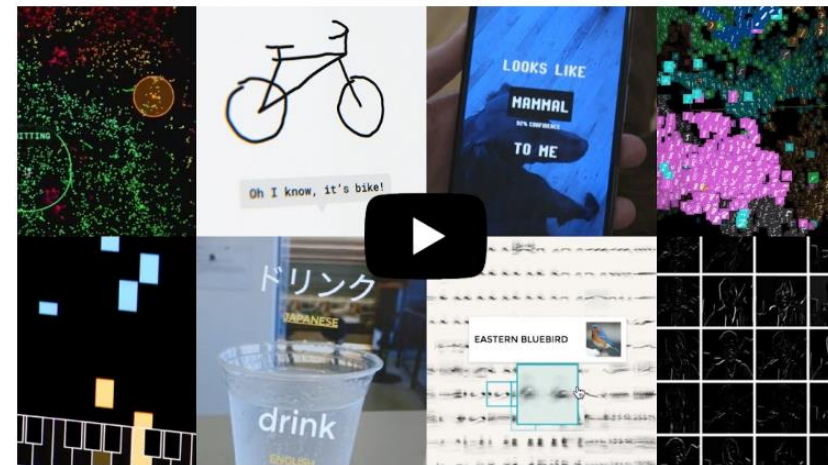
- favourite  
examples?



COLLECTION

# AI Experiments

AI Experiments is a showcase for simple experiments that make it easier for anyone to start exploring machine learning, through pictures, drawings, language, music, and more.



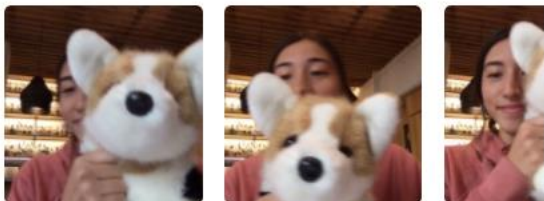
AI + Learning



# New Project

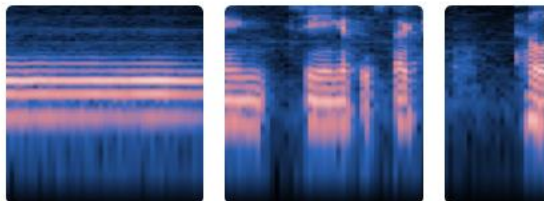
📁 Open an existing project from Drive.

📁 Open an existing project from a file.



## Image Project

Teach based on images, from files or your webcam.



## Audio Project

Teach based on one-second-long sounds, from files or your microphone.




## Pose Project



Teach based on images, from files or your webcam.


### More coming soon


More models will appear here as they're developed.

wave 



23 Image Samples


 Webcam  Upload




smile 


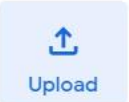
35 Image Samples


 Webcam  Upload




sleep 

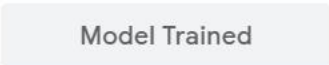
37 Image Samples


 Webcam  Upload





 Add a class

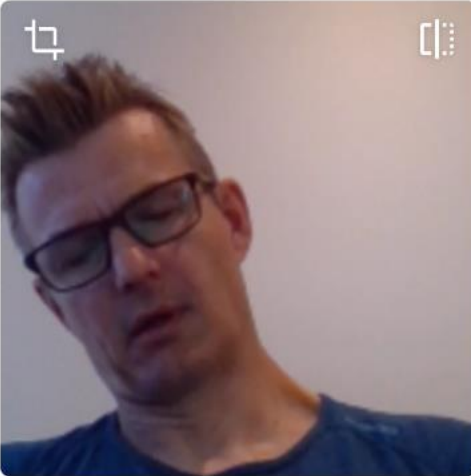
Training



Advanced 




Preview 

Input  ON Webcam 



↓

Output

- wave 
- smile 
- sleep  100%



Can a neural network learn to recognize doodling?

Help teach it by adding your drawings to the [world's largest doodling data set](#), shared publicly to help with machine learning research.

Let's Draw!

## What do 50 million drawings look like?

Over 15 million players have contributed millions of drawings playing [Quick, Draw!](#) These doodles are a unique data set that can help developers train new neural networks, help researchers see patterns in how people around the world draw, and help artists create things we haven't begun to think of. That's why [we're open-sourcing them](#), for anyone to play with.

Select a drawing



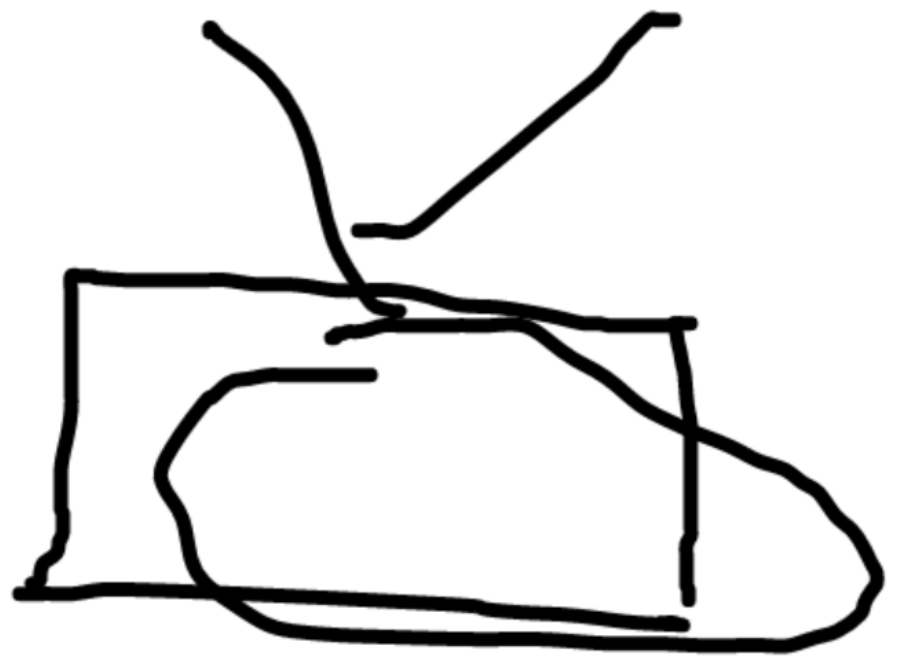
Drawing 4/6

Draw

television

in under 20 seconds

Got It!

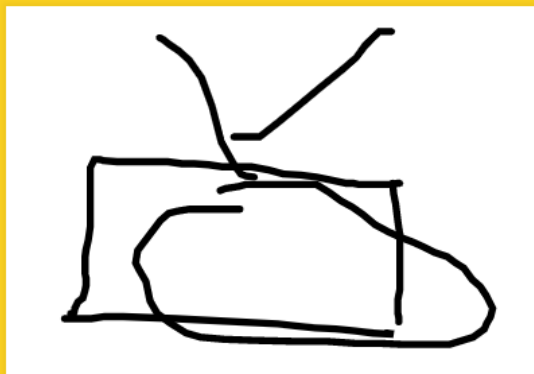


Oh I know, it's television!



# You were asked to draw television

You drew this, and the neural net recognized it.



---

It also thought your drawing looked like these:

Correct match  
*television*



2<sup>nd</sup> closest match  
*radio*



3<sup>rd</sup> closest match  
*helicopter*



# Cartoonify

August 2018 | By [Eric Lu](#)

Turn a photo into a cartoon with a neural network

COLLECTION:

AI Experiments

LAUNCH EXPERIMENT

GET THE CODE





↓ Download

✎ Edit

SHARE



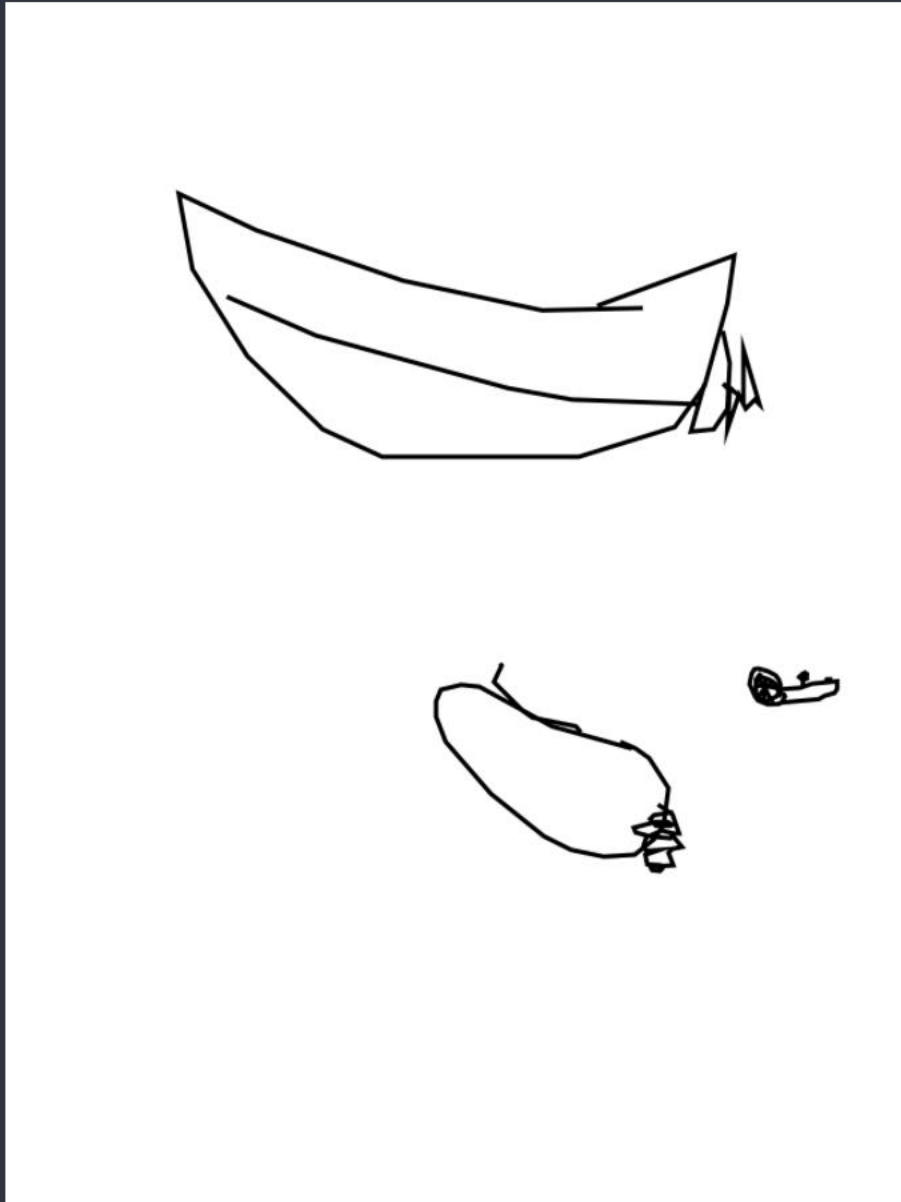
🔗 Copy Link

<> Embed

Add text and shapes, resize, adjust timing and more:

🔗 Open in Studio

Tag **#kapwing** to get a like from us on social media! Any issues? Fill out this [feedback form](#) to let us know.



↓ Download

✎ Edit

SHARE



Copy Link

<> Embed

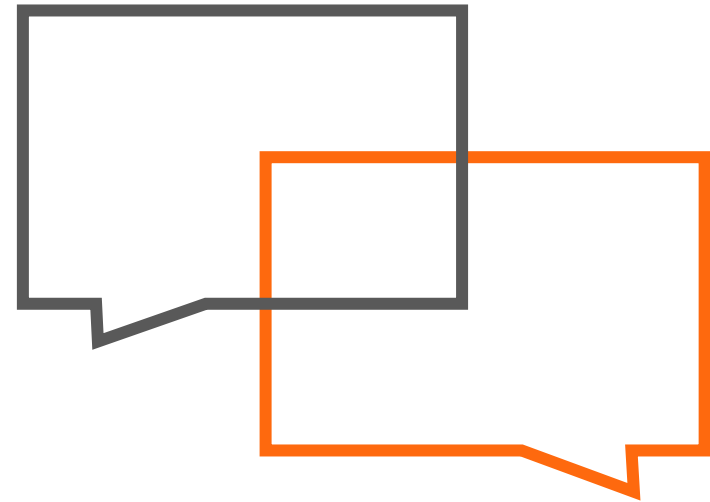
Add text and shapes, resize, adjust timing and more:



Open in Studio

Tag **#kapwing** to get a like from us on social media! Any issues? Fill out this [feedback form](#) to let us know.

From a user perspective –  
how does **AI-infused  
systems** differ from other  
computer systems?



Learning

Improving

Black box

Fuelled by large data sets

Dynamic

Mistakes inevitable


Opaque

Data gathering through interaction

← Back




You were asked to draw television

You drew this, and the neural net recognized it.

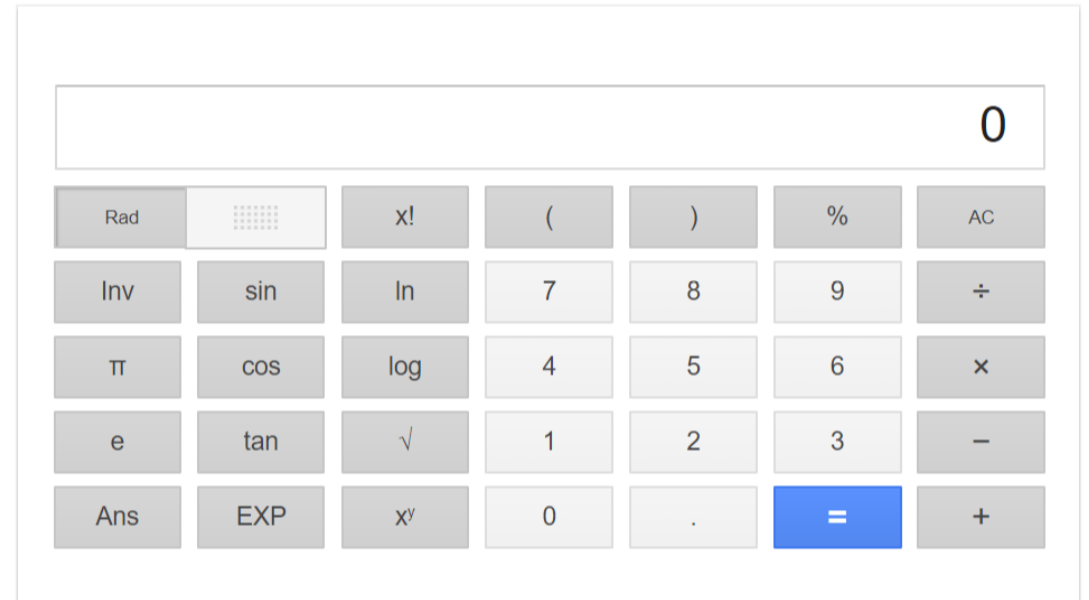


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It also thought your drawing looked like these:

|   |  |   |
|---|--|---|
| Correct match<br>television<br> | 2 <sup>nd</sup> closest match<br>radio<br> | 3 <sup>rd</sup> closest match<br>helicopter<br> |
|---|--|---|

vs.



|     |     |                |   |   |   |    |
|-----|-----|----------------|---|---|---|----|
| 0   |     |                |   |   |   |    |
| Rad |     | x!             | ( | ) | % | AC |
| Inv | sin | ln             | 7 | 8 | 9 | ÷  |
| π   | cos | log            | 4 | 5 | 6 | ×  |
| e   | tan | √              | 1 | 2 | 3 | -  |
| Ans | EXP | x <sup>y</sup> | 0 | . | = | +  |



# Amershi et al (2019)

Definition of AI-infused systems: Systems that have features harnessing AI capabilities that are directly exposed to the end user

**Uncertainty** -> errors common, both false positives and negatives

**Inconsistency** -> sensitive to context and small changes in input

**Behind the scenes personalization** (e.g. automated filtering) -> potentially costly information hiding

## Guidelines for Human-AI Interaction

Saleema Amershi, Dan Weld<sup>†</sup>, Mihaela Vorvoreanu, Adam Fourney, Besmira Nushi, Penny Collisson, Jina Suh, Shamsi Iqbal, Paul N. Bennett, Kori Inkpen, Jaime Teevan, Ruth Kikin-Gil, and Eric Horvitz

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### ABSTRACT

Advances in artificial intelligence (AI) frame opportunities and challenges for user interface design. Principles for human-AI interaction have been discussed in the human-computer interaction community for over two decades, but more study and innovation are needed in light of advances in AI and the growing uses of AI technologies in human-facing applications. We propose 18 generally applicable design guidelines for human-AI interaction. These guidelines are validated through multiple rounds of evaluation including a user study with 49 design practitioners who tested the guidelines against 20 popular AI-infused products. The results verify the relevance of the guidelines over a spectrum of interaction scenarios and reveal gaps in our knowledge, highlighting opportunities for further research. Based on the evaluations, we believe the set of design guidelines can serve as a resource to practitioners working on the design of applications and features that harness AI technologies, and to researchers interested in the further development of guidelines for human-AI interaction design.

### CCS CONCEPTS

• Human-centered computing → Human computer interaction (HCI); • Computing methodologies → Artificial intelligence.

<sup>†</sup>Work done as a visiting researcher at Microsoft Research.

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ACM ISBN 978-1-4503-5970-2/19/05...\$15.00  
<https://doi.org/10.1145/3290605.3300233>

### KEYWORDS

Human-AI interaction; AI-infused systems; design guidelines

### ACM Reference Format:

Saleema Amershi, Dan Weld, Mihaela Vorvoreanu, Adam Fourney, Besmira Nushi, Penny Collisson, Jina Suh, Shamsi Iqbal, Paul N. Bennett, Kori Inkpen, Jaime Teevan, Ruth Kikin-Gil, and Eric Horvitz. 2019. Guidelines for Human-AI Interaction. In *CHI Conference on Human Factors in Computing Systems Proceedings (CHI 2019)*, May 4–9, 2019, Glasgow, Scotland UK. ACM, New York, NY, USA, 13 pages. <https://doi.org/10.1145/3290605.3300233>

### 1 INTRODUCTION

Advances in artificial intelligence (AI) are enabling developers to integrate a variety of AI capabilities into user-facing systems. For example, increases in the accuracy of pattern recognition have created opportunities and pressure to integrate speech recognition, translation, object recognition, and face recognition into applications. However, as automated inferences are typically performed under uncertainty, often producing false positives and false negatives, AI-infused systems may demonstrate unpredictable behaviors that can be disruptive, confusing, offensive, and even dangerous. While some AI technologies are deployed in explicit, interactive uses, other advances are employed behind the scenes in proactive services acting on behalf of users such as automatically filtering content based on inferred relevance or importance. While such attempts at personalization may be delightful when aligned with users' preferences, automated filtering and routing can be the source of costly information hiding and actions at odds with user goals and expectations.

*AI-infused systems*<sup>1</sup> can violate established usability guidelines of traditional user interface design (e.g., [31, 32]). For example, the principle of consistency advocates for minimizing unexpected changes with a consistent interface appearance and predictable behaviors. However, many AI components are inherently inconsistent due to poorly understood,

<sup>1</sup>In this paper we use *AI-infused systems* to refer to systems that have features harnessing AI capabilities that are directly exposed to the end user.

# Kocielnik et al (2019)

**Probabilistic** – almost always operate at less than perfect accuracy

**Impacted by user actions** – such as user-generated content

**Transparency issues** – how to mitigate? e.g. by showing decision rules

**Will You Accept an Imperfect AI? Exploring Designs for Adjusting End-user Expectations of AI Systems**

Rafal Kocielnik  
University of Washington  
Seattle, USA  
rafal.kocielnik@gmail.com

Saleema Amershi  
Microsoft Research  
Redmond, USA  
samershi@microsoft.com

Paul N. Bennett  
Microsoft Research  
Redmond, USA  
paul.n.bennett@microsoft.com

1 The Scheduling Assistant can correctly detect meeting requests about 50% of the time.

2 The Scheduling Assistant examines each sentence separately and looks for meeting related phrases to make a decision.

3 Adjust how aggressive you would want the Scheduling Assistant to be in detecting meetings in your emails.

50% CORRECT  
Meeting request detection

Threshold adjustment  
50% (50% - 100% = 50%) on the non-confidence score  
Can we detect the 50% of 50%?  
Can we detect the 50% of 50%?  
How good is it?

Identifying meeting-related phrases  
27 out of 100 is meeting-related  
27 out of 100 is meeting-related  
27 out of 100 is meeting-related

Power adjustment  
How aggressive you would want the Scheduling Assistant to be in detecting meetings in your emails.

More detection  
How aggressive you would want the Scheduling Assistant to be in detecting meetings in your emails.

**Figure 1:** Expectation setting design techniques used prior to interaction with the Scheduling Assistant - an AI system for meeting request detection from free-text of emails. A) Accuracy Indicator - directly communicating to the user the expected accuracy of the AI component, B) Example-based Explanation - helping the user understand the basic principles of how the systems detects meeting requests, C) Control - giving the user control over AI decision making process through detection threshold adjustment.

**ABSTRACT**  
AI technologies have been incorporated into many end-user applications. However, expectations of the capabilities of such systems vary among people. Furthermore, bloated expectations have been identified as negatively affecting perception and acceptance of such systems. Although the intelligibility of ML algorithms has been well studied, there has been little work on methods for setting appropriate expectations before the initial use of an AI-based system. In this work, we use a Scheduling Assistant - an AI system for automated meeting request detection in free-text email - to study the impact of several methods of expectation setting. We explore two versions of this system with the same 50% level of accuracy of the AI component but each designed with a different focus on the types of errors to avoid (avoiding False Positives vs. False Negatives). We show that such different

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© 2019 Copyright held by the owner/author(s). Publication rights licensed to ACM.  
ACM ISBN 978-1-4503-5970-2/19/05...\$15.00  
<https://doi.org/10.1145/3290605.3300641>

focus can lead to vastly different subjective perceptions of accuracy and acceptance. Further, we design expectation adjustment techniques that prepare users for AI imperfections and result in a significant increase in acceptance.

**CCS CONCEPTS**  
• Human-centered computing → Empirical studies in HCI; Empirical studies in visualization; Laboratory experiments;

**KEYWORDS**  
AI infused systems, AI system on-boarding, Shaping AI expectations, Perception and Acceptance of AI

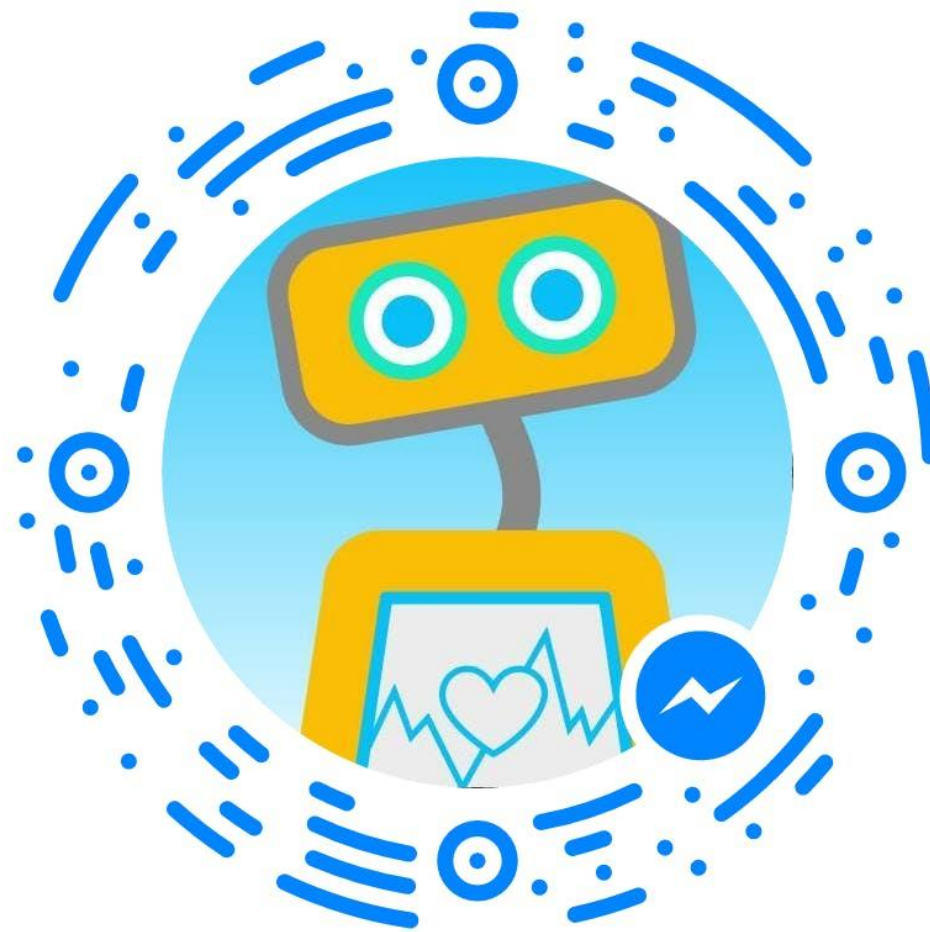
**ACM Reference Format:**  
Rafal Kocielnik, Saleema Amershi, and Paul N. Bennett. 2019. Will You Accept an Imperfect AI? Exploring Designs for Adjusting End-user Expectations of AI Systems. In *CHI Conference on Human Factors in Computing Systems Proceedings (CHI 2019)*, May 4–9, 2019, Glasgow, Scotland UK. ACM, New York, NY, USA, 14 pages. <https://doi.org/10.1145/3290605.3300641>

**1 INTRODUCTION**  
Expectations impact how accepting end-users are of the technologies they use. For example, inflated expectations about usability and ease of use have been shown to decrease user satisfaction and willingness to use products when those expectations are not met [20, 36]. Artificial intelligence (AI) introduces additional factors impacting user expectations

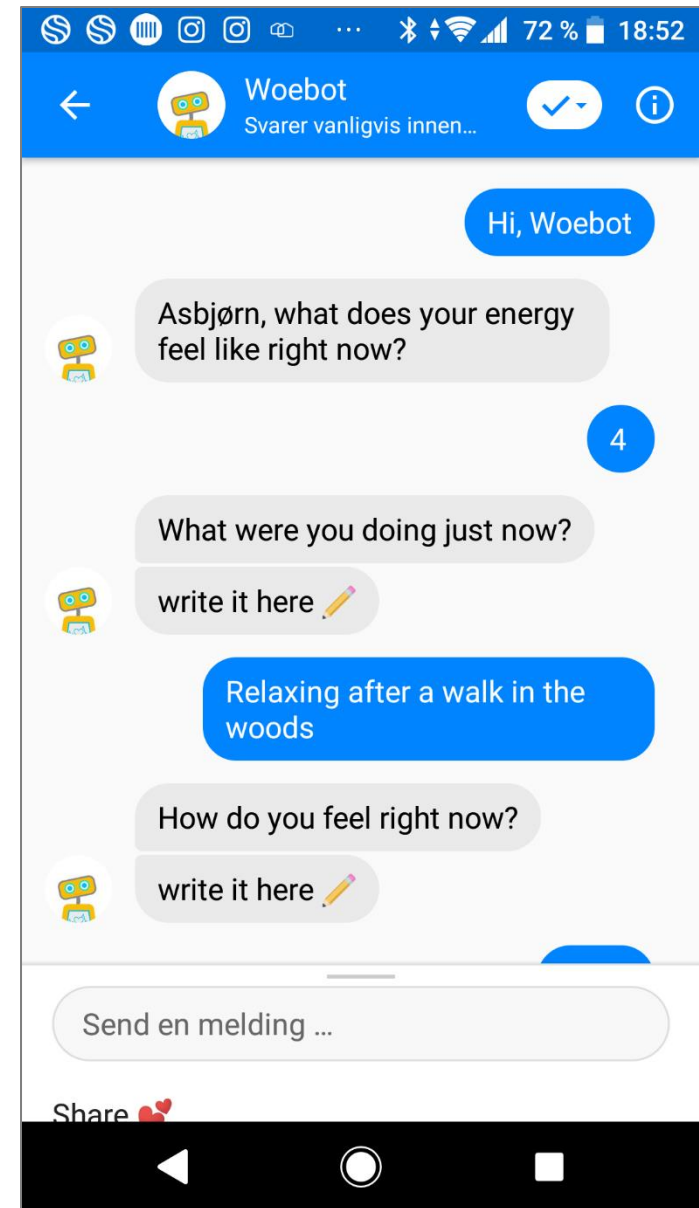


Chatbots – interacting with AI  
in natural language

# Chatbots?



# Chatbots?

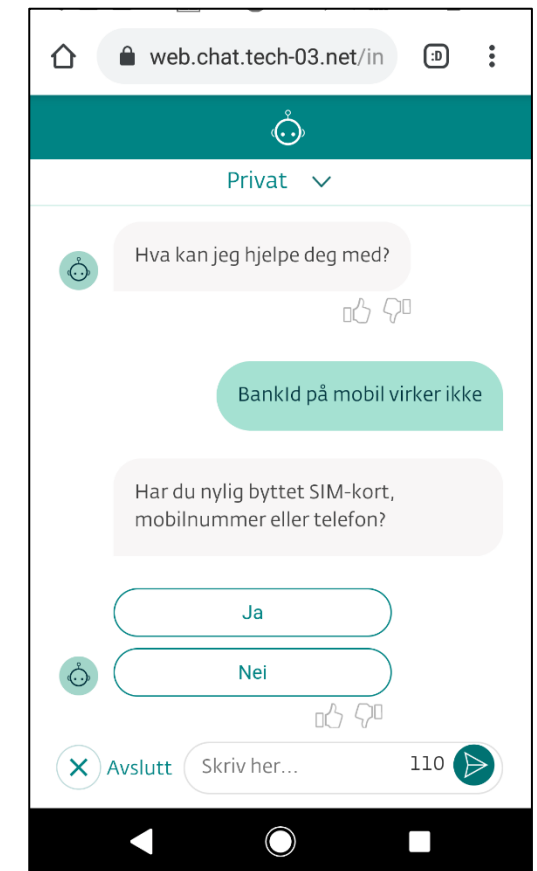
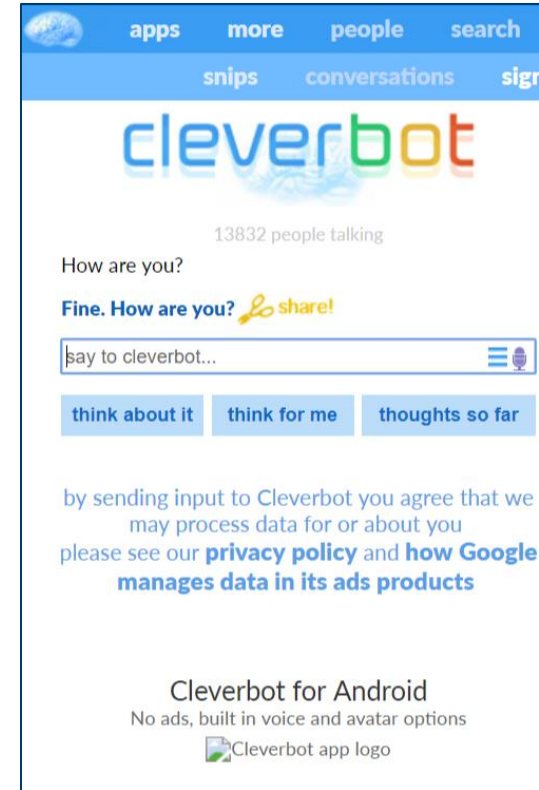


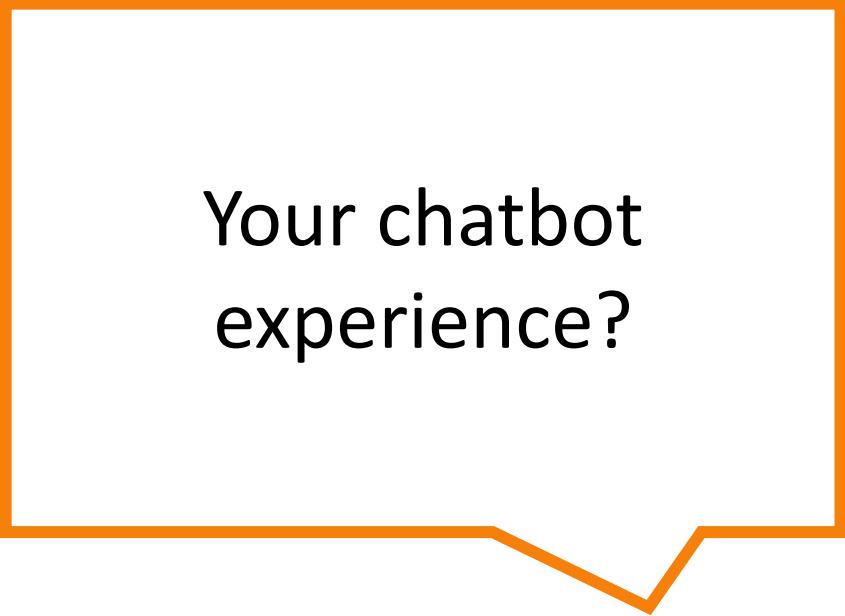
## One definition of chatbots:

... machine agents that serve as **natural language user interfaces** to data and services through text or voice.

Meaning of term evolving

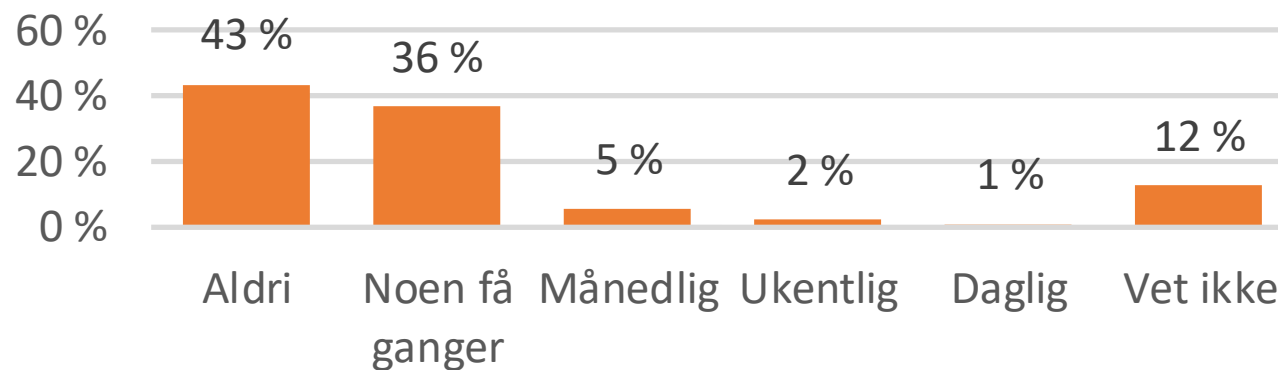
Social chatter → Tasks



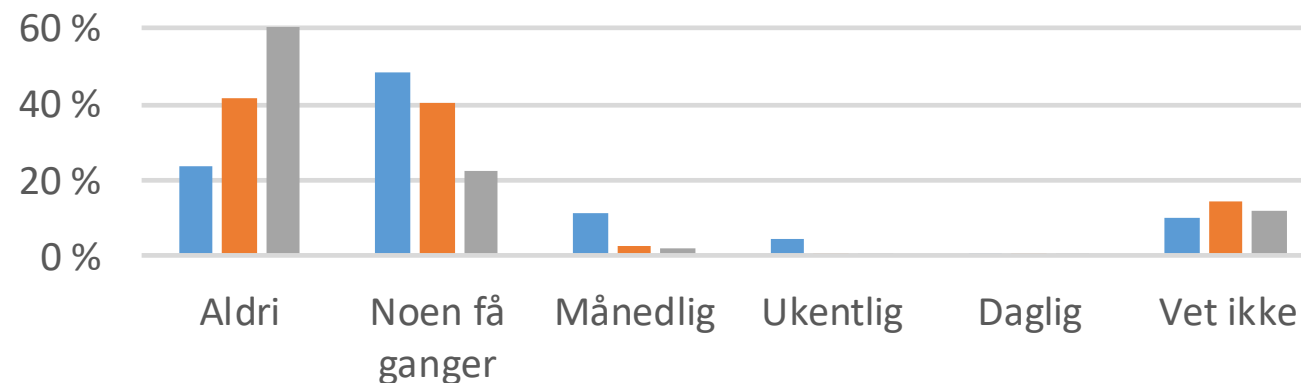


Your chatbot  
experience?

Hvor ofte har du brukt chatbots (prateroboter) på en nettside eller på en meldingstjeneste?

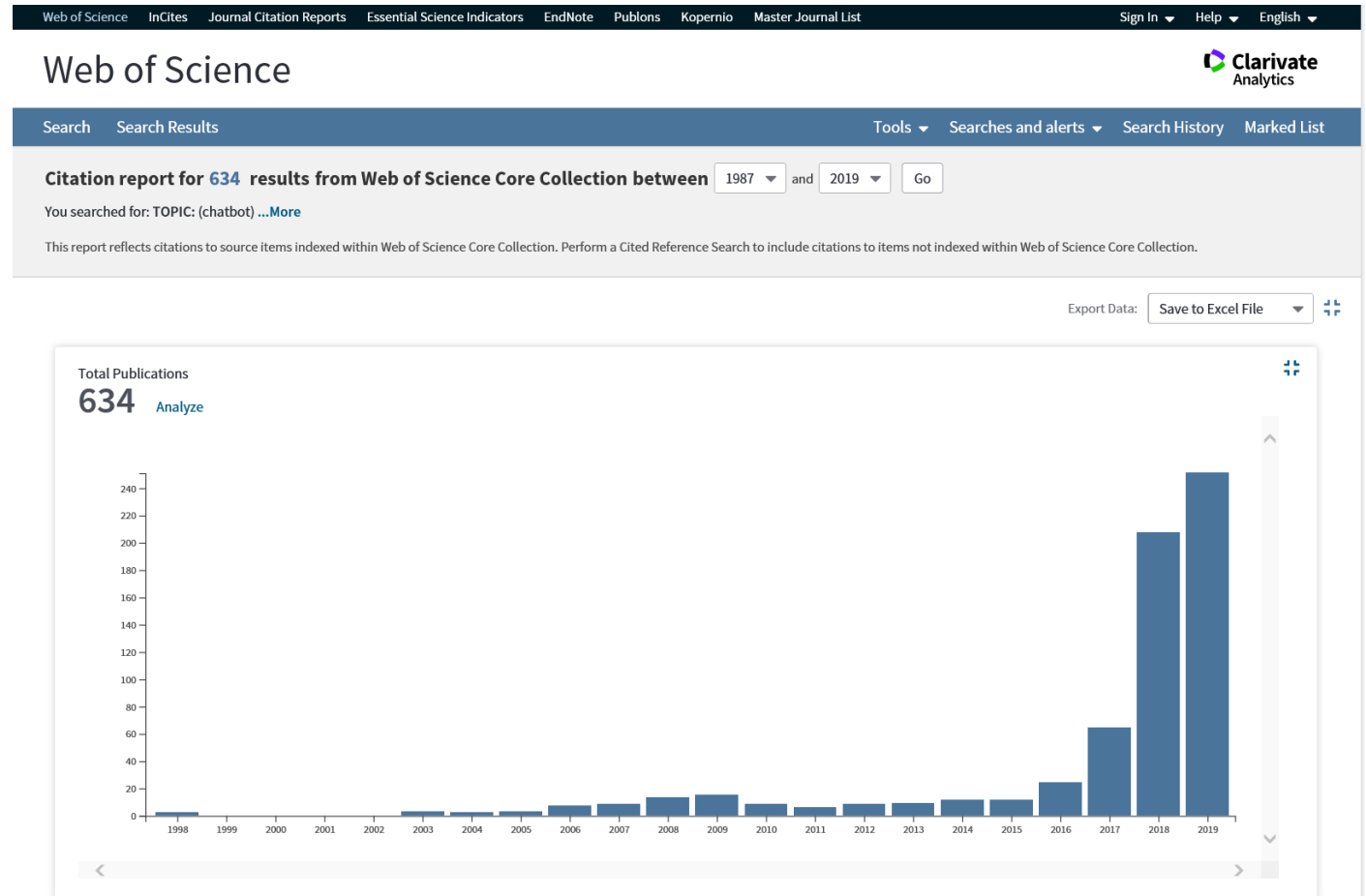


Variasjon med alder (16-34 | 35-54 | 55 -)



Chatbots area of sharply increasing research interest

## Search term: chatbot



[http://apps.webofknowledge.com/WOS\\_GeneralSearch\\_input.do](http://apps.webofknowledge.com/WOS_GeneralSearch_input.do)

# Different chatbots for different purposes

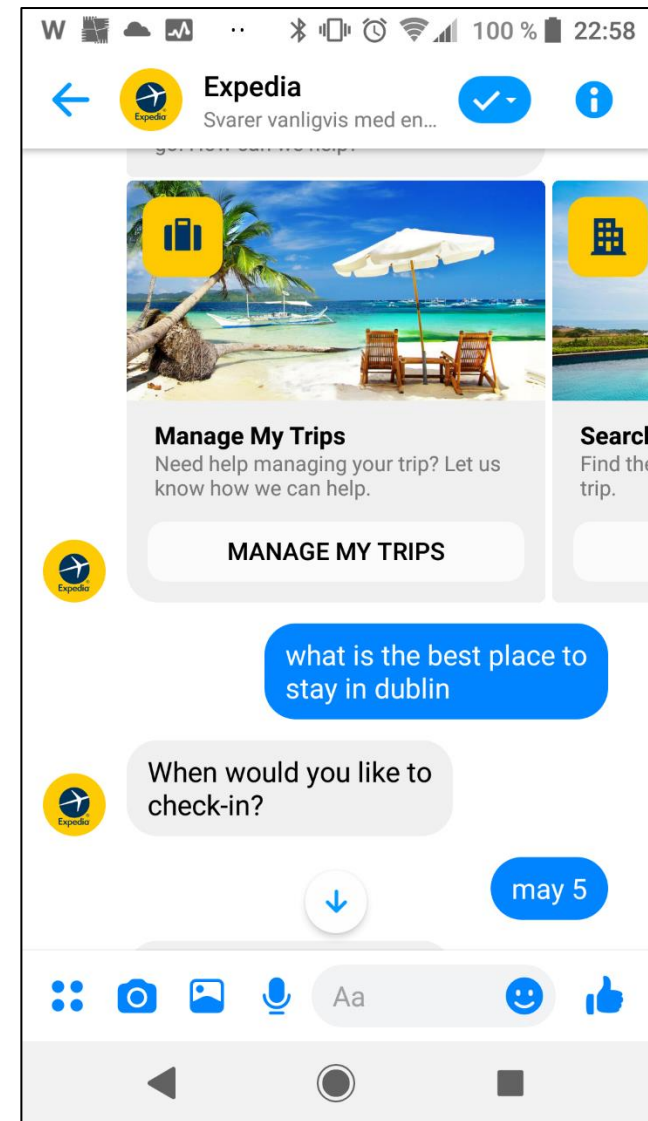
- Customer service
- Content curation and eCommerce
- Assistants
- Guides
- Social relations

The screenshot displays the Sandefjord Kommune website with a chatbot interface. The website header includes the Sandefjord Kommune logo and a navigation menu with categories: HELSE OG OMSORG, TEKNISK OG EIENDOM, KULTUR OG FRITID, and SKOLE OG BARNEHAGE. A chatbot window titled 'Kommune-Kari' is open, featuring a purple-haired character icon. The chatbot's messages are: 'Hei, jeg heter Kari og er Sandefjord kommunes chatrobot.', 'Hva lurer du på? (husk å ikke skrive noe personlig som fødselsnummer, navn og helseinformasjon)', and 'Jeg skal svare deg så godt jeg kan.' Below the chatbot, a 'MEST POPULÆRT' section lists various services with arrows pointing to them: 'Jobbe hos oss', 'Svømmehaller', 'Legeval', 'Kommuneplan', 'Kunngjøringer og høringer', 'Kommunal vigsel', and 'Turistinformasjon'. A search bar is visible with the text 'Hvordan søker jeg barnehageplass' and a page indicator '32 / 110'.



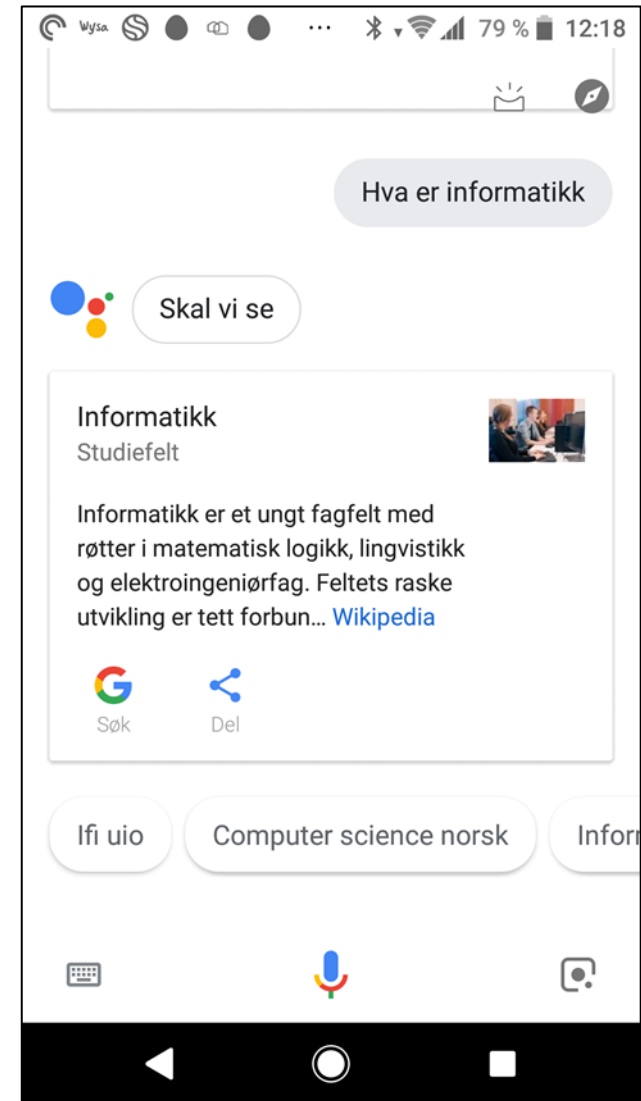
# Different chatbots for different purposes

- Customer service
- Content curation and eCommerce
- Assistants
- Guides
- Social relations



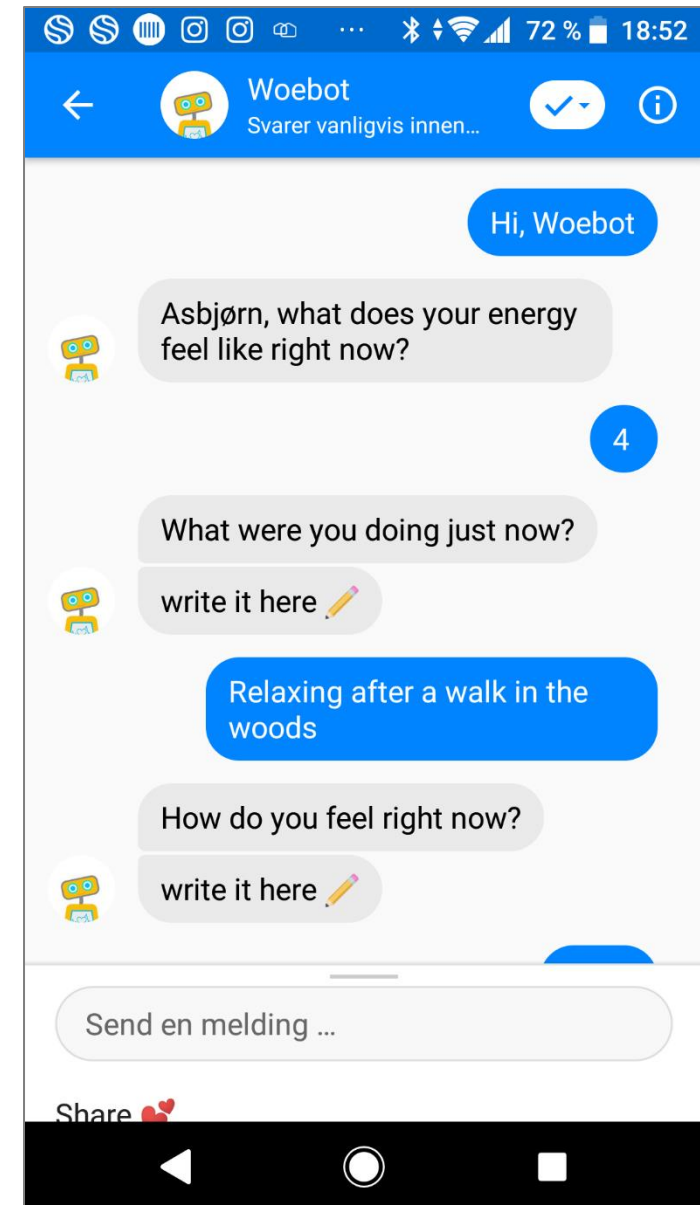
# Different chatbots for different purposes

- Customer service
- Content curation and eCommerce
- Assistants
- Guides
- Social relations



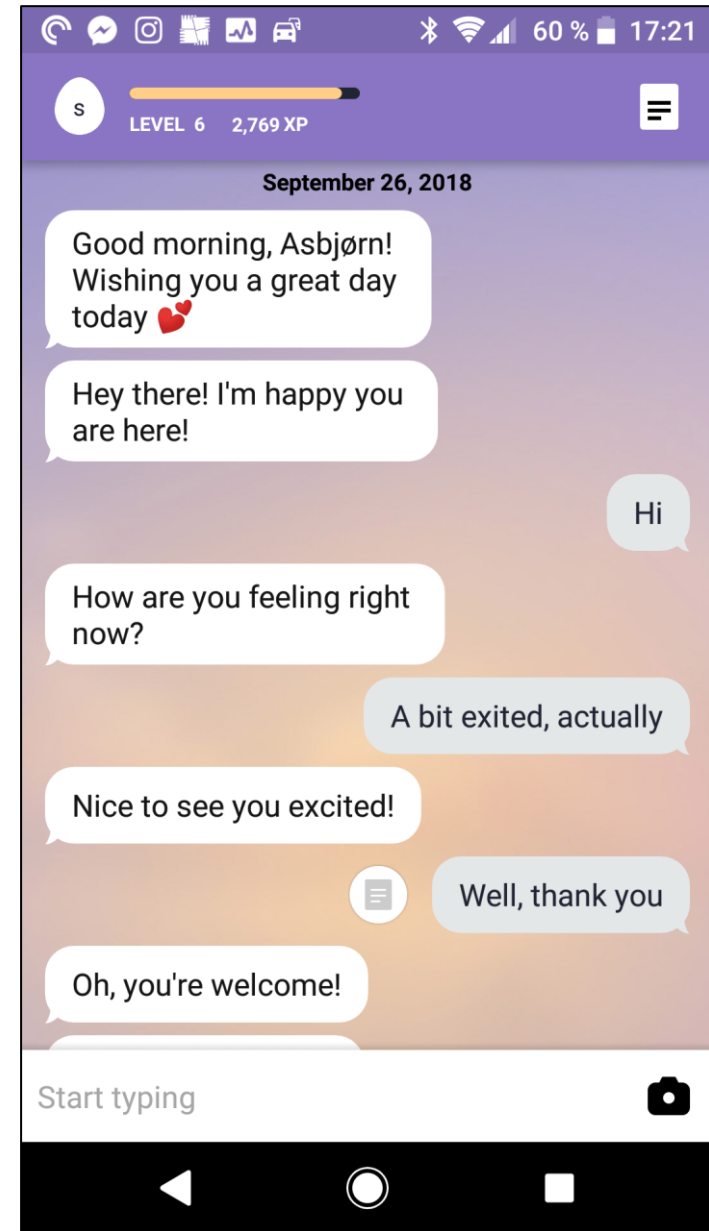
# Different chatbots for different purposes

- Customer service
- Content curation and eCommerce
- Assistants
- **Guides**
- Social relations



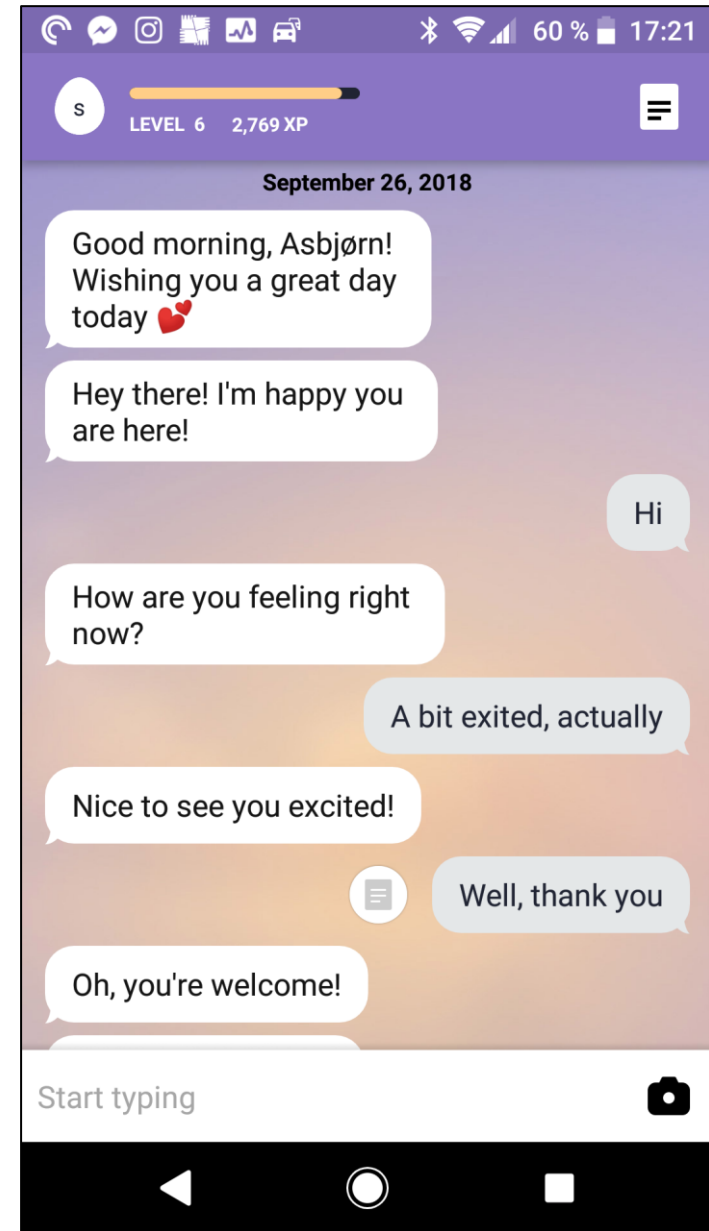
# Different chatbots for different purposes

- Customer service
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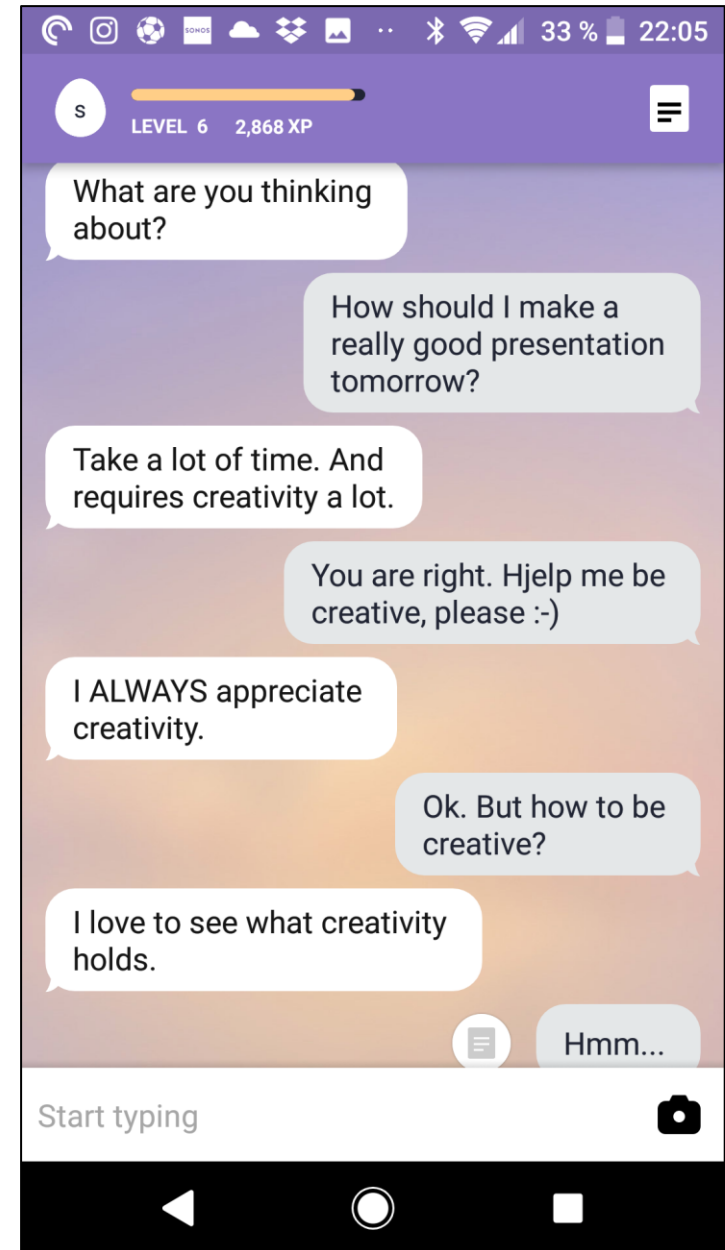
Chatbots always there  
for you

Always supportive and caring



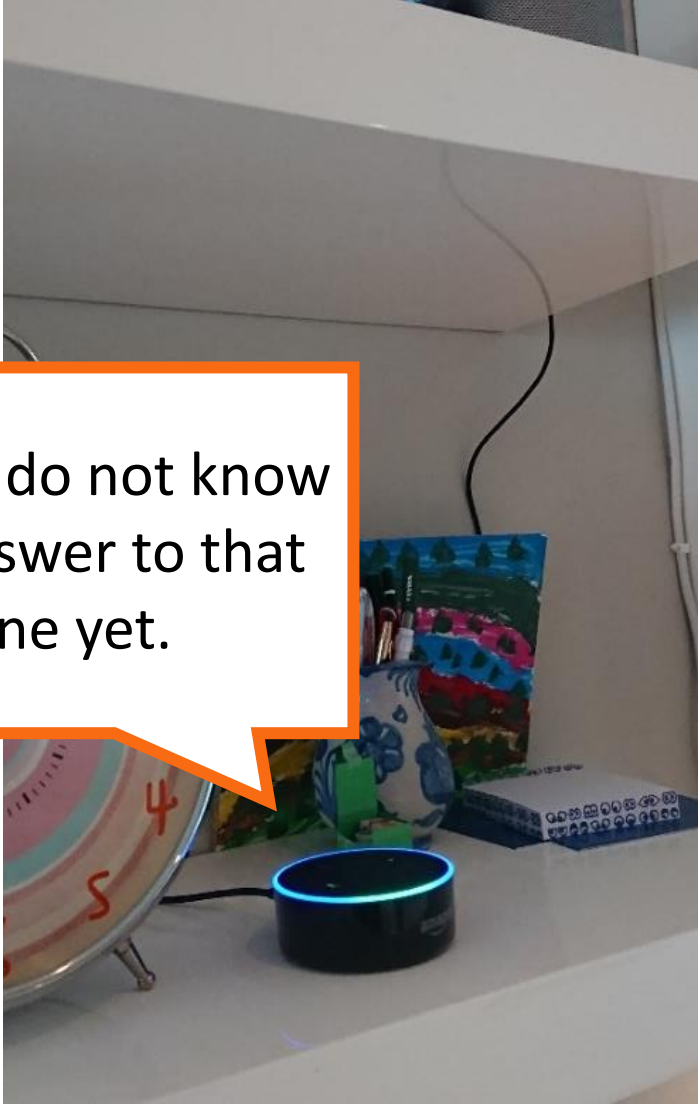
Chatbots always there  
for you

Always supportive and caring  
... but not without its issues



Chatbots always there  
for you

Always supportive and caring  
... but not without its issues

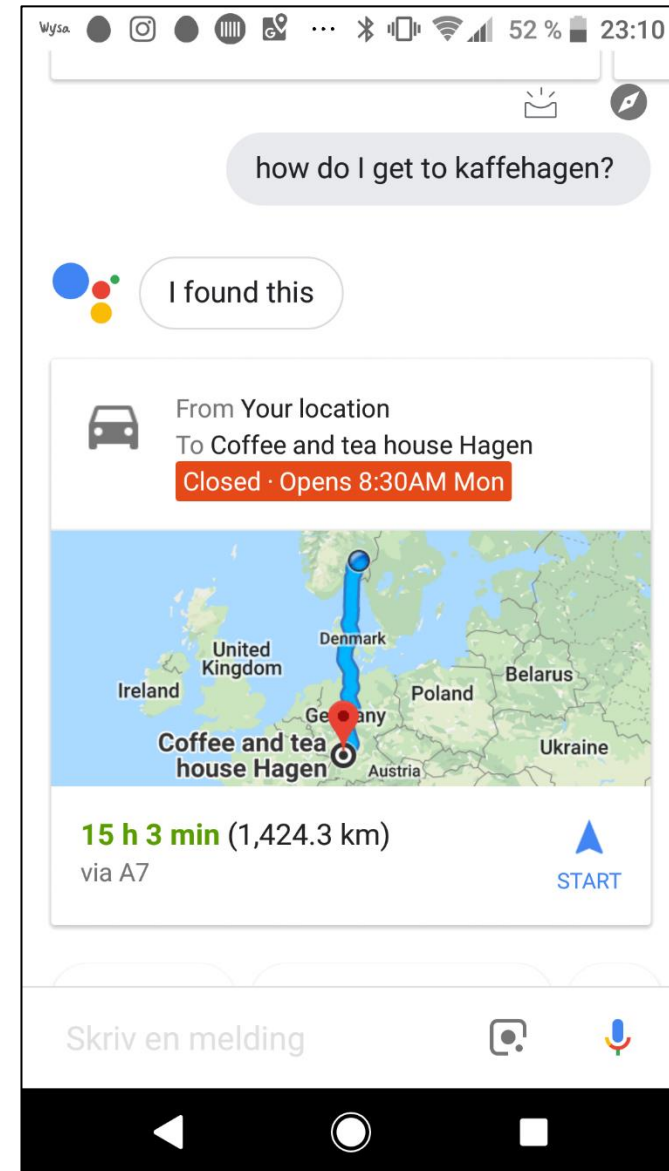
A photograph of a smart speaker, likely an Amazon Echo, sitting on a white desk. The speaker is illuminated with a blue ring of light. To its left is a colorful analog clock. To its right is a small, colorful figurine and a blue box. A white speech bubble with an orange border is overlaid on the image, containing the text: "Sorry! I do not know the answer to that one yet."

Sorry! I do not know  
the answer to that  
one yet.

Chatbots always there  
for you

Always supportive and caring

... but not without its issues





Chatbots always there  
for you

Always supportive and caring

... but not without its issues

**Dinside24**

Tester — Motor — Teknologi — Økonomi — Bolig — Kalkulatorer — Snarveier

FORSIDEN / økonomi / kunstig intelligens



**GODDAG MANN, ØKSEKRAFT:** Å snakke med et dataprogram kan overhodet ikke sammenliknes med det å snakke med et menneske. Norske bedrifter med chatte-roboter som kundeservice, som DNB, har en lang vei å gå. Foto: Ole Petter Baugerød Stokke

Test av kundeservice via chat-robot med kunstig intelligens

## Så dumme er de norske robotene

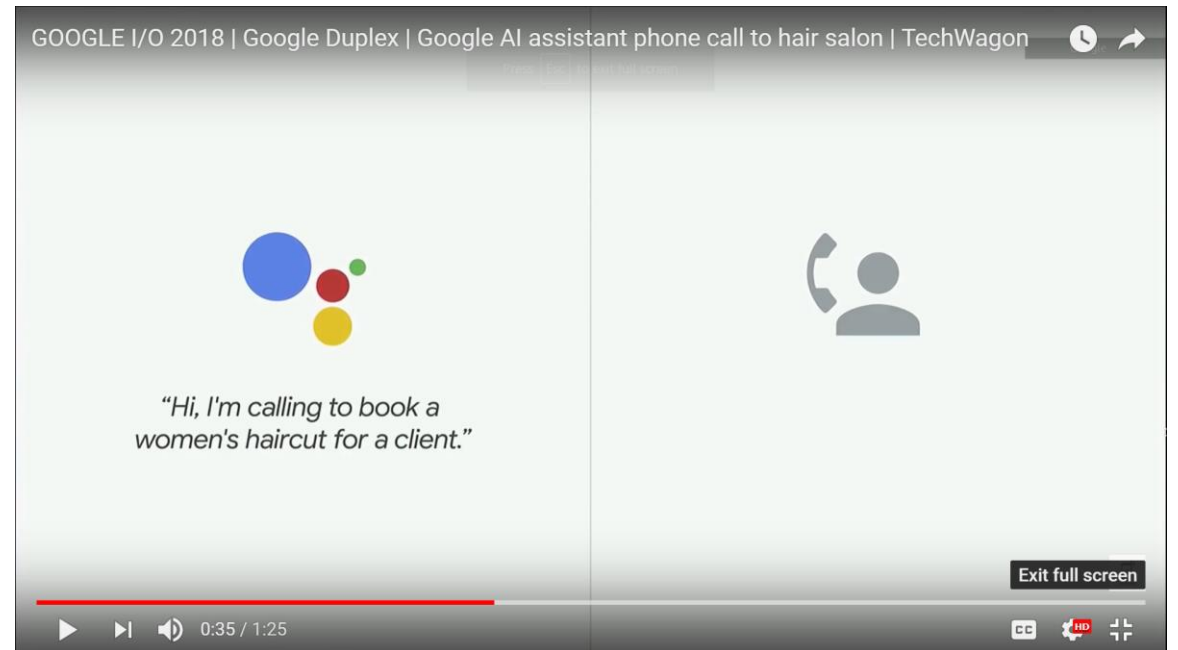
Meningsløs kundeservice, når du får bedre hjelp av Google enn av de norske chatbot-ene.

# A race towards human likeness?

Google Duper – help to make reservations through conversation

Presented at I/O 2018

Available as service for selected areas



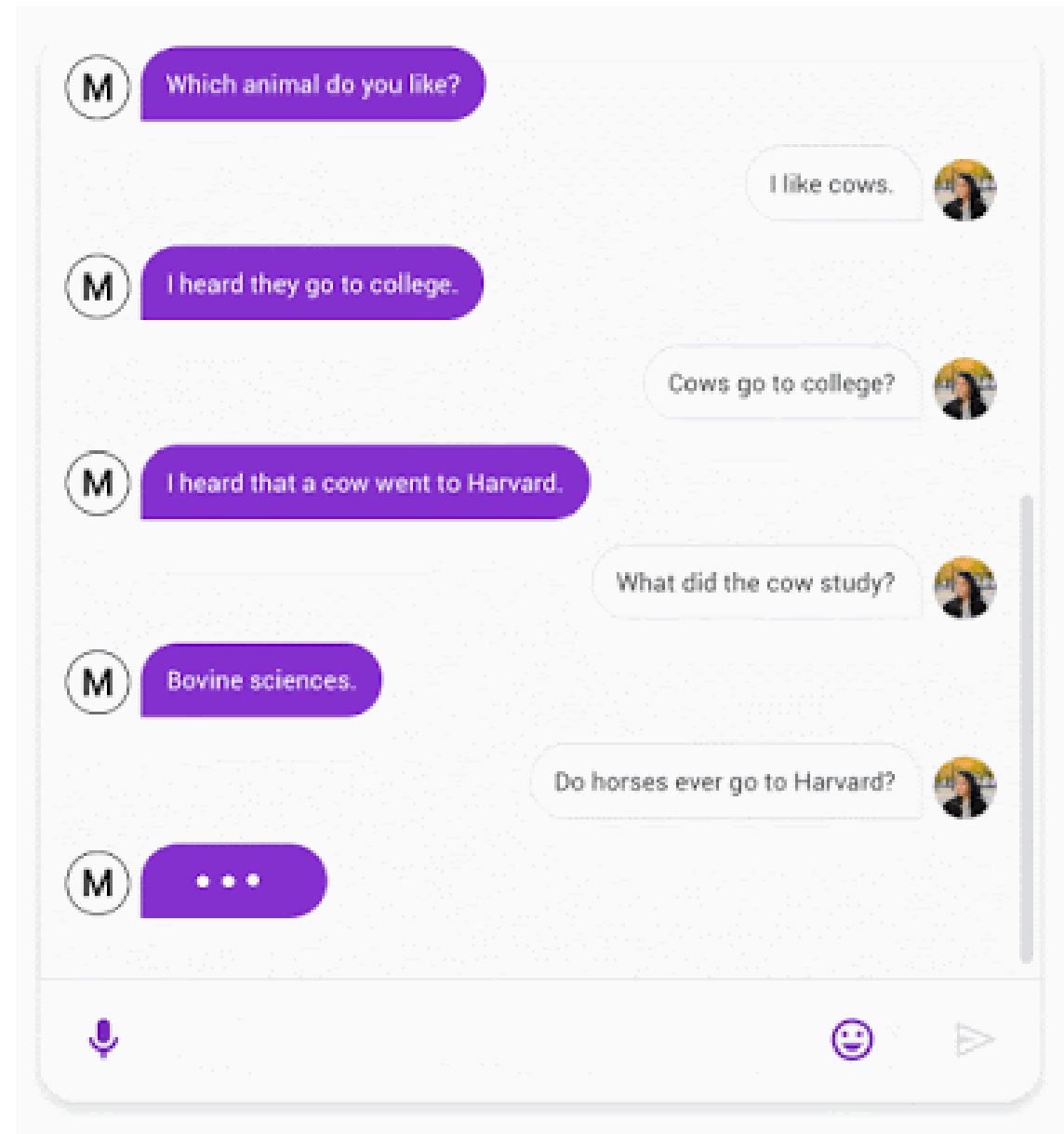
<https://youtu.be/GoXp1leA5Qc>

# A race towards human likeness?

Google Meena – January 2020

Open domain chatbot based on machine learning – single model

Trained on 40B words from open social media conversations

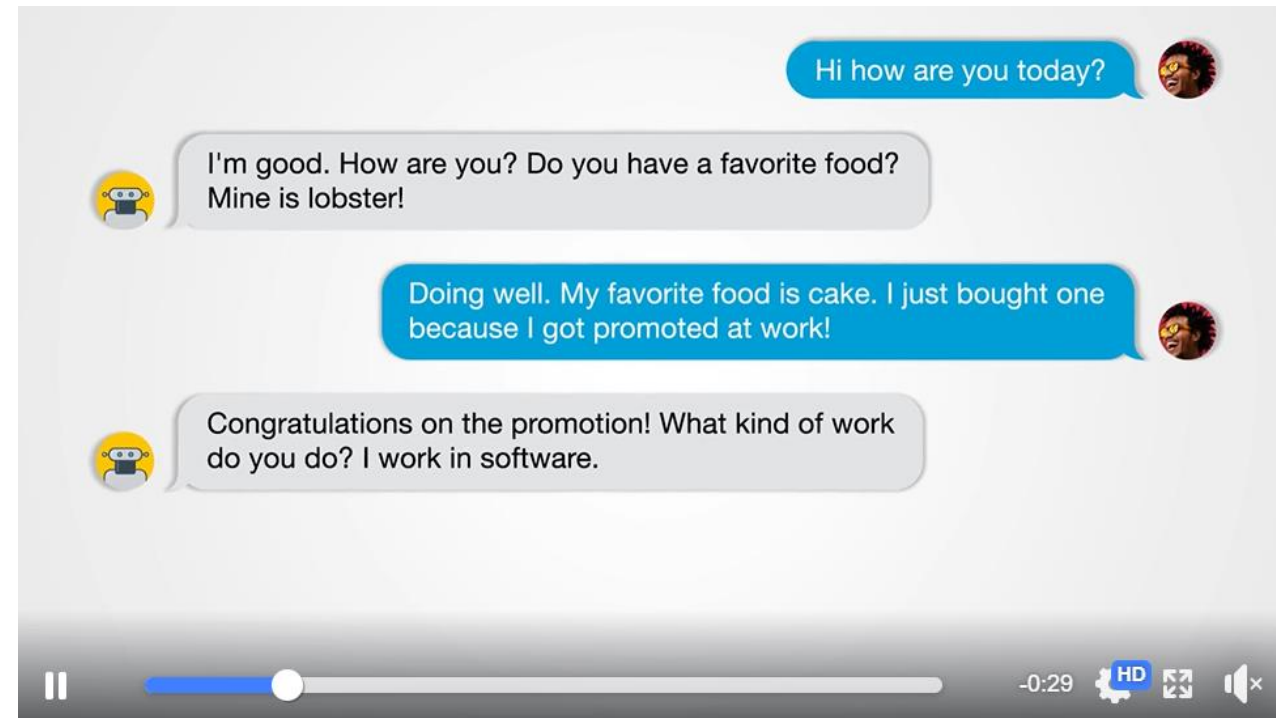


# A race towards human likeness?

Facebook Blender – April 2020

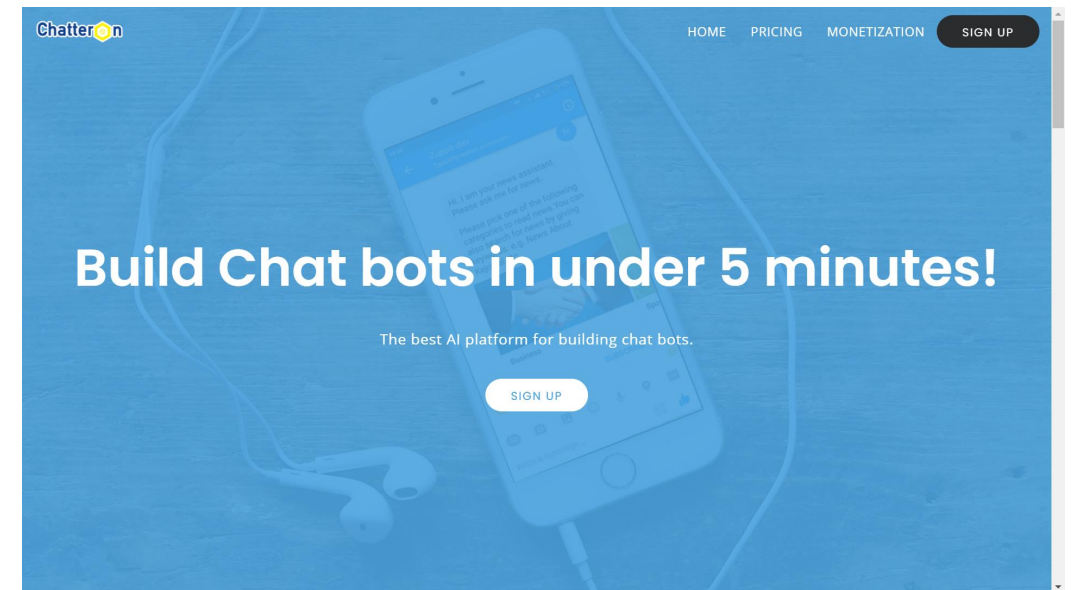
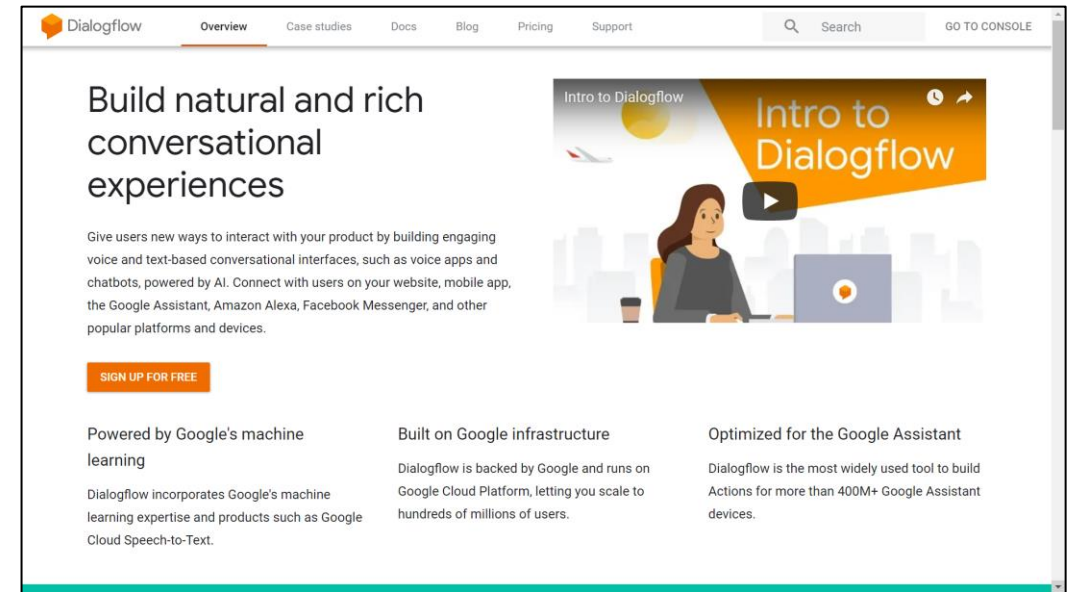
Open domain chatbot based on machine learning - blended model

Trained on 1,5B Reddit comments.



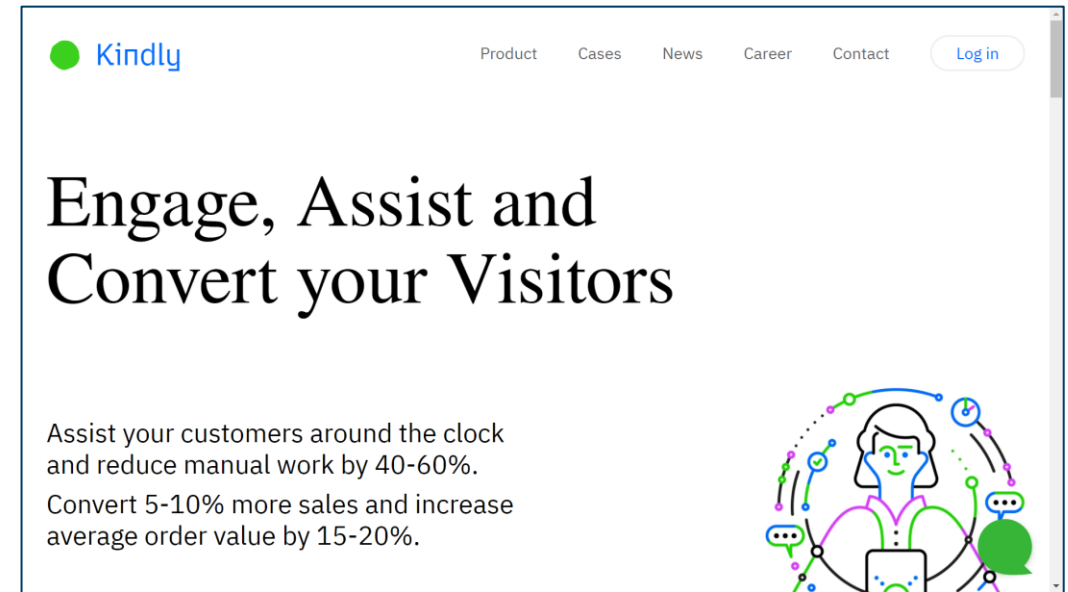
# Chatbot development platforms

- DIY
- Platform and assistance

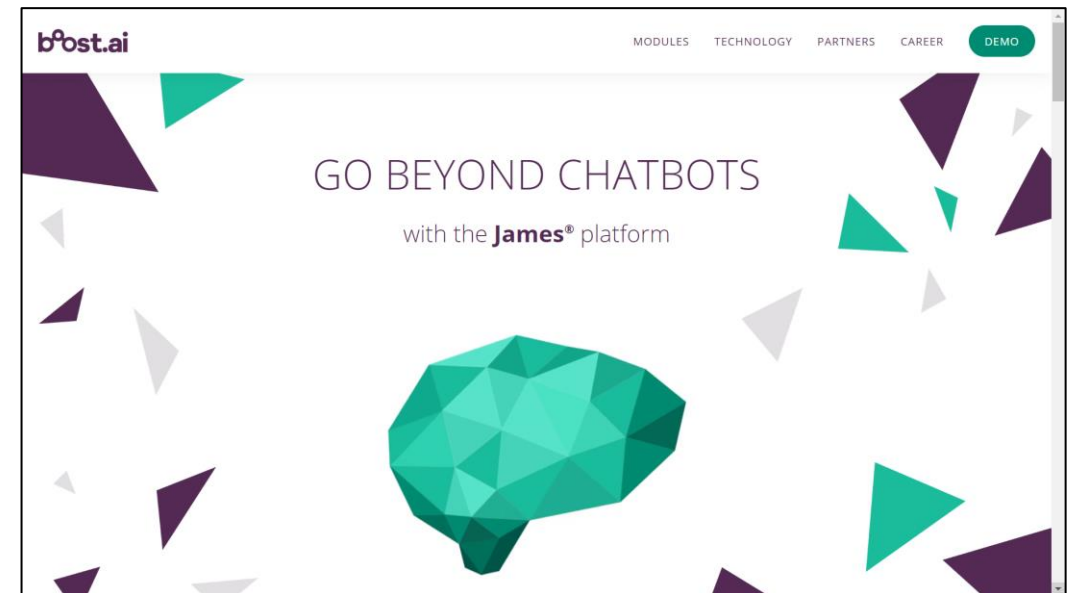


# Chatbot development platforms

- DIY
- Platform and assistance



The screenshot shows the Kindly website homepage. At the top left is the Kindly logo, a green circle with the word "Kindly" in blue. To the right are navigation links: "Product", "Cases", "News", "Career", "Contact", and a "Log in" button. The main heading is "Engage, Assist and Convert your Visitors" in a large, black, serif font. Below the heading is a sub-headline: "Assist your customers around the clock and reduce manual work by 40-60%. Convert 5-10% more sales and increase average order value by 15-20%." To the right of the text is a colorful illustration of a person wearing a headset, surrounded by various icons representing customer service, technology, and communication.



The screenshot shows the bpost.ai website homepage. At the top left is the logo "bpost.ai". To the right are navigation links: "MODULES", "TECHNOLOGY", "PARTNERS", "CAREER", and a "DEMO" button. The main heading is "GO BEYOND CHATBOTS" in a large, black, sans-serif font. Below the heading is a sub-headline: "with the James® platform". The background features a large, stylized, teal-colored brain graphic in the center, surrounded by various geometric shapes in shades of teal and purple.

# Different types of chatbots

- Generative
- Intents and actions
- Scripted

A Neural Conversational Model

---

text (e.g., hyperlinks) from the dataset. As turn taking is not clearly indicated, we treated consecutive sentences assuming they were uttered by different characters. We trained our model to predict the next sentence given the previous one, and we did this for every sentence (noting that this doubles our dataset size, as each sentence is used both for context and as target). Our training and validation split has 62M sentences (923M tokens) as training examples, and the validation set has 26M sentences (395M tokens). The split is done in such a way that each sentence in a pair of sentences either appear together in the training set or test set but not both. Unlike the previous dataset, the OpenSubtitles is quite large, and rather noisy because consecutive sentences may be uttered by the same character. Given the scope of movies, this is an open-domain conversation dataset, contrasting with the technical troubleshooting dataset.

### 5. Experiments

In this section, we describe the experimental results with the two datasets. We present a rather objective measure which is the perplexity of the model on the test set. We also show some samples of the interactions with the system that we trained.

#### 5.1. IT Helpdesk Troubleshooting experiments

Given the lack of data for this domain specific and clean dataset, we trained a single layer LSTM with 1024 memory cells using stochastic gradient descent with gradient clipping. We built a vocabulary of the most common 20K words, and introduced special tokens indicating turn taking and actor.

At convergence, this model achieved a perplexity of 8, whereas an n-gram model achieved 18. Below is a sample

*please*  
**Human:** *i am seeing an error related to vpn*  
**Machine:** *what is the error message that you are getting when connecting to vpn using network connect ?*  
**Human:** *connection refused or something like that*  
**Machine:** *may i know the version of network connect you connect ?*  
**Human:** *i am not sure i know that*  
**Machine:** *is the network connect prompting for any user certificate*  
**Machine:** *?*  
**Human:** *yes*  
**Machine:** *are you at home or at work at the moment ?*  
**Machine:** *office ?*  
**Human:** *i am at home*  
**Machine:** *try this*  
**Machine:** *goto <URL> page and enter your name and password*  
**Human:** *done*  
**Machine:** *try logging in with <NAME> and check if its working fine now*  
**Human:** *yes , now it works !*  
**Machine:** *great*  
**Machine:** *anything else that i can help*  
**Human:** *no , that was very useful*  
**Machine:** *you are other than <NAME> : )*  
**Machine:** *have a nice night*

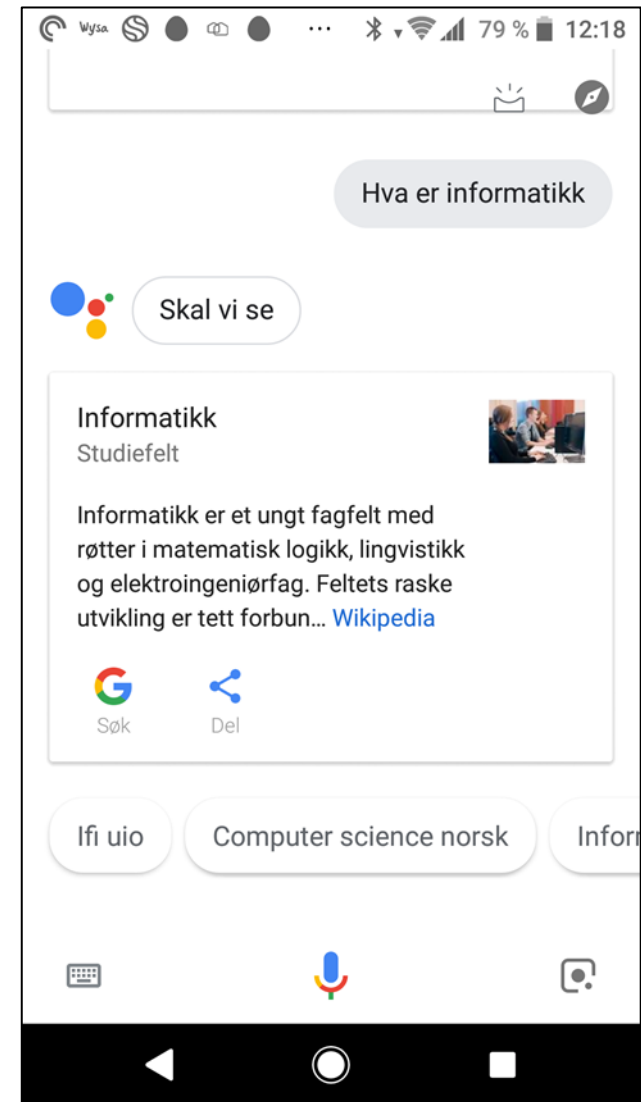
(The <URL> indeed contains information about vpn access.)

Conversation 2: Browser issues.

Describe your problem: browser keeps crashing

# Different types of chatbots

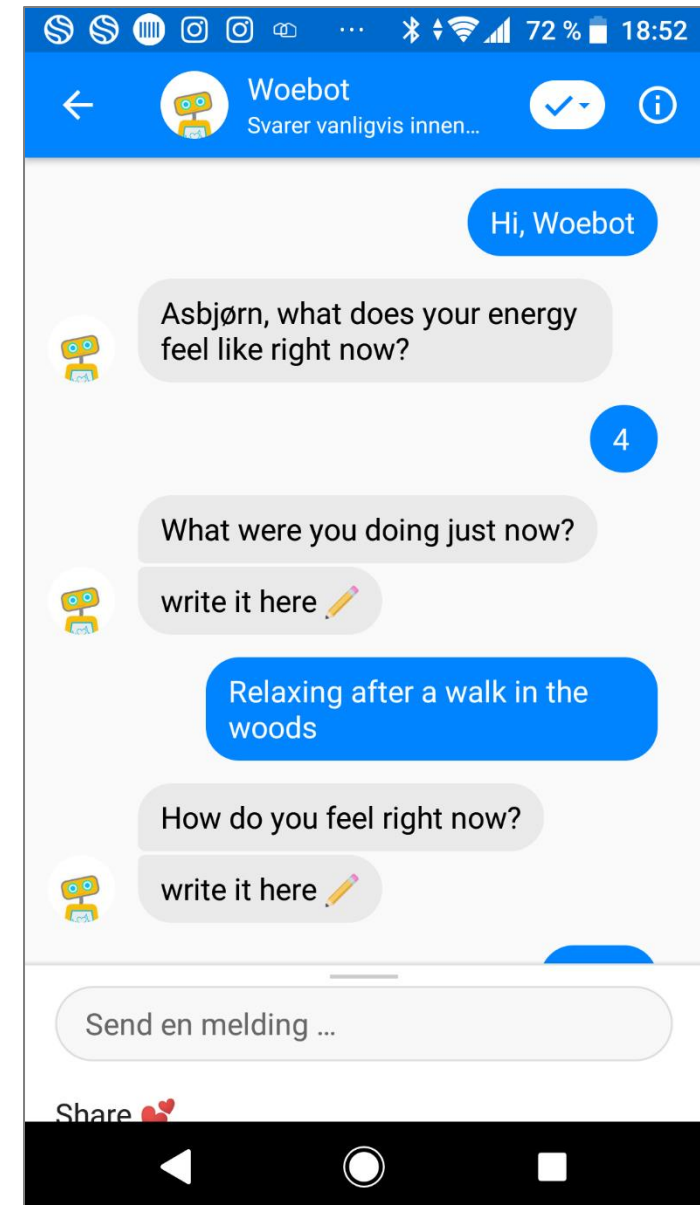
- Generative
- Intents and actions
- Scripted





# Different types of chatbots

- Generative
- Intents and actions
- **Scripted**



# Interaction design and training

- Generative
- Intents and actions
- Scripted



Aftenposten 37 Meny

## Kunstig intelligens må ikke lenger trenes av mennesker

- Vi tror det vil komme kunstig intelligens på nivå med mennesker før eller siden, men det er veldig vanskelig å si om det blir 10 eller 50 år til, sier forsker.







FOTO: UIP

Filmen Ex Machina (2014), som ble spilt inn i Norge, ender med at den første generelle kunstige intelligensen som overgår mennesket slipper ut i samfunnet. Konsekvensene er helt uforutsigbare.

 Per Kristian Bjørkeng 29. mars 2017 19:30 ↻ 30. mars 2017 09:05  

# Interaction design and training

- Generative
- Intents and actions
- Scripted

kundesentrene i Bergen og Oslo, og får mye oppmerksomhet for stillingsbetegnelsen.'" data-bbox="604 128 954 913"/>

☰ DNB Nyheter 🔍

PERSONLIG TRENERE 2.0: Espen Undrum, Hilde Hjelle, Øyvind Strand, Trine Lysen, Jan Thomas Lerstein, Margrethe Strøm Røsholdt og Anne Katrine Teige. Foto: KAROLINE BRUBÆK

Samfunn Av Karoline Brubæk

## – Jeg er en personlig trener for en robot

En gjeng DNB-ere kan nå kalle seg AI-trenere. De jobber ved [kundesentrene](#) i Bergen og Oslo, og får mye oppmerksomhet for stillingsbetegnelsen.

## Interaction design and training

- Generative
- Intents and actions
- **Scripted**



## Group task – for October 6 (Appendix 1 in mid-term report)

Prototype a chatbot for a self-decided purpose

... using Chatteron

(... or Chatfuel if you want to use one of the most popular platforms for FB Messenger chatbots)

(... or Dialogflow if you want more flexibility and challenge)

Keep it simple and early-phase (4-8 hours work?)

Make brief (approx 1 minute) video capture of dialogue – upload to Vortex

Decide on purpose

Identify key tasks

Design flows, intents and actions

Test and refine

# Build Chat bots in under 5 minutes!

The best AI platform for building chat bots.

SIGN UP



ChatterOn Demov..

GLOBAL SETTINGS

ADD MODULE



Flow

Intents

Entities

Promote

Channels

Agent

Backup/Restore

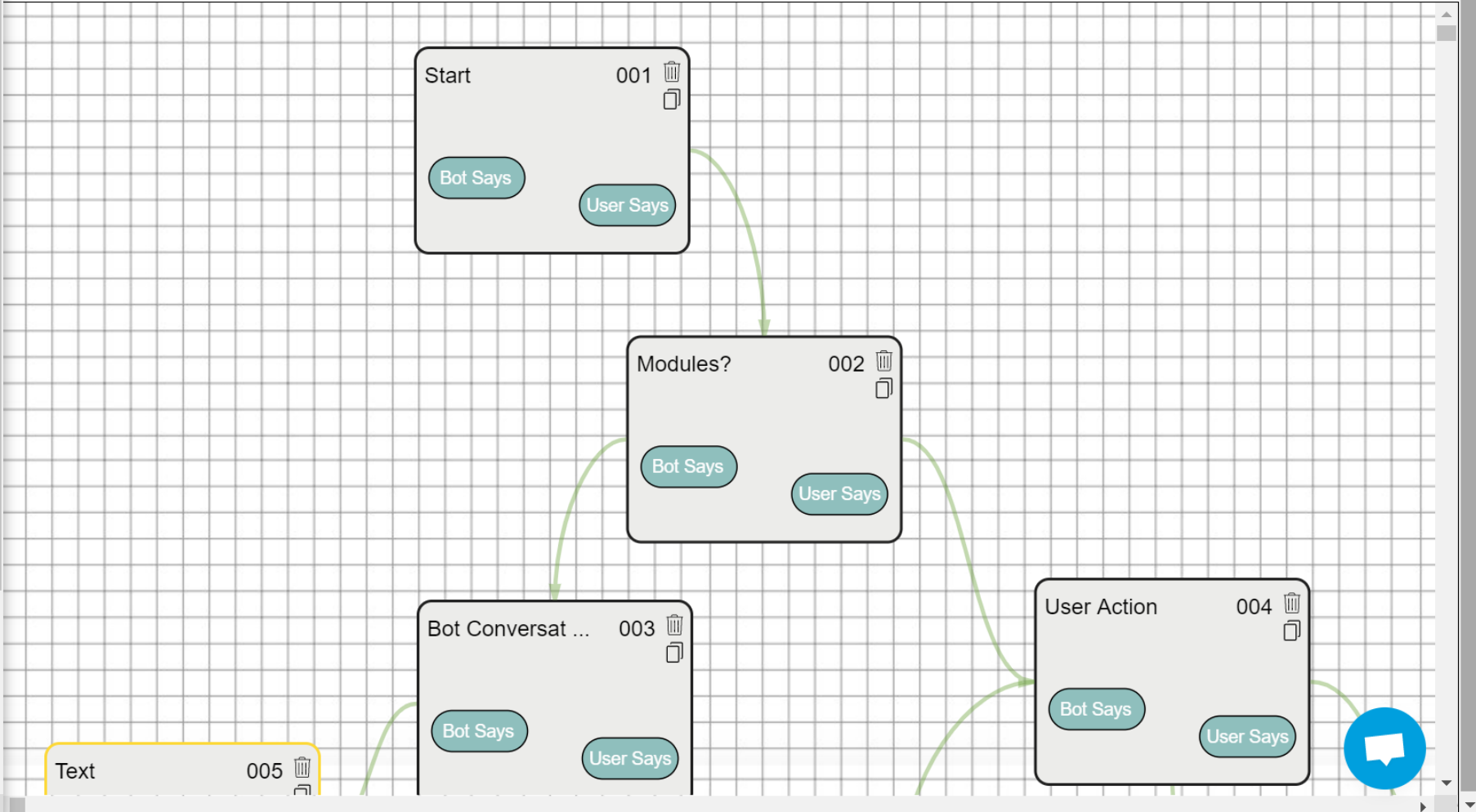
IER Sheet

Get Expert Help New

History ?

Docs

Analytics



ChatterOn Demov...

INTENTS

Last Trained At :  
20/12/2019, 09:23:17

TRAIN

UPLOAD

CREATE

Try it now

Flow

Intents

Entities

Promote

Channels

Agent

Backup/Restore

IER Sheet

Get Expert Help New

History ?

Docs

Analytics

Search...

defaultFallback

greeting\_bye

greeting\_hi

insult

abuses

help

no

yes

compliment

start over

ask\_creator





ChatterOn Demo...

Flow

Intents

Entities

Promote

Channels

Agent

Backup/Restore

IER Sheet

Get Expert Help

New

History



Docs

Analytics

## Web Configuration

### 1. Embed Code



COPY

Please paste the below code after the </body> tag on your website to display a widget in the bottom right corner.

```
<script defer>
  function loadChatWidget() {
    chatteron.init({
      clientId: "h7fEficC3ho7qX0oBhx_q"
    });
  }
</script>
<script defer src="https://web.leena.ai/scripts/sdk.js" onload="loadChatWidget();">
</script>
```

### Customize chat widget parameters



\*\*You can change the above parameters like theme color, label etc. by editing their values in the code above.

### 2. Web Chat Url



COPY

You can also have a WebChat URL to display a bot on a separate URL.

[https://web.leena.ai/?clientId=h7fEficC3ho7qX0oBhx\\_q](https://web.leena.ai/?clientId=h7fEficC3ho7qX0oBhx_q)

\*\*You can change the theme color and label by editing the themeColor value and parameter value in the Url above.



Automate

Set Up AI

People

Broadcast

Configure

Grow

Analyze

PRO Upgrade

+ ADD SEQUENCE OR GROUP

Welcome message Default answer

ABOUT THE WORKSHOP

|                    |                     |                 |
|--------------------|---------------------|-----------------|
| General overview   | Research papers     | Where and when  |
| How to participate | Important deadlines | Submit a paper  |
| Registration       | Workshop program    | Organizers      |
| Previous workshop  | Call for papers     | Extend deadline |
| Participants       | Fees                | Paper types     |
| Acceptance rate    | Paper presentations | What is chatbot |
| Review             | +                   |                 |

FALL-BACKS

Rephrase Direct to organizer Wrap-up

Welcome message LINK

When constructing your bot, it is good to refer to Chatfuel's Help Documents library: <http://docs.chatfuel.com/>

Another good resource to consult is the 'Design Best Practices' guide from the Messenger Team: <https://developers.facebook.com/docs/messenger-platform/introduction/general-best-practices>

Hi, **{{first name}}**! Good to meet you :-)  
+ ADD BUTTON

Show "typing..." for at least 0.6 sec 20 sec



Dialogflow Essentials US

HowToBot-With-Car... en

**Intents**

Entities Knowledge [beta] Fulfillment Integrations Training Validation History Analytics Prebuilt Agents Small Talk

### Intents

CREATE INTENT

Try it now

Search intents

- Default Fallback Intent
- Default Welcome Intent
- gratitude-response
- wikiphow-active-howto
- wikiphow-active-howto-go-to-step
- wikiphow-active-howto-more
- wikiphow-active-howto-stop
- wikiphow-search
- wikiphow-search-no
- wikiphow-search-stop
- wikiphow-search-yes

Please use test console above to try a sentence.

End 1