

# IN5480 Individual assignment fall 2019

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# 1 Concepts, definition and history of interaction with AI.

## 1.1 How AI came about

The term Artificial intelligence was first used by the American mathematician and logician John McCarthy in 1956. He brought together a group of researchers from different disciplines to a workshop at Dartmouth College. From the workshop a paper was published where the definition was written.

## 1.2 Definitions

### 1.2.1 Definition 1

*AI is the science and engineering of making intelligent machines especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable. (McCarthy, 1998)*

This definition was written by John McCarthy in the paper from the workshop held in 1956. This is the first definition of the term “artificial intelligence”

### 1.2.2 Definition 2

*The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages..*

This is the definition from The Oxford English Dictionary (OED). Here the term is presented as a theory. The definition focuses on the technology's ability to do human-like tasks.

### 1.2.3 Definition 3

*Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.*

This definition is the start of an article written for the encyclopedia Britannica. This definition also focuses on the technology's ability to do tasks, but classifies the tasks as commonly performed by “intelligent being” rather than just “humans”.

### 1.3 My definition

*AI is software and compute systems that is able to perform human-like tasks on its own.*

This definition was made by combining the other definitions to my own.

### 1.4 Company that work with AI

Grammarly is a technology company that provides different ai powered products like text editors and browsers extensions for grammar. Grammarly present AI clearly in their main tagline on their website: Compose bold, clear, mistake-free writing with Grammarly's AI-powered writing assistant. In the explanations of their services on their page the word “AI” is often used as well as talking about their “powerful algorithms”. In their blog post: “How We Use AI to Enhance Your Writing” They explain how is used and why they chose this approach as well as the technology behind grammarly with advanced system that combines rules, patterns, and artificial intelligence techniques like machine learning, deep learning, and natural language processing.

## 1.5 The us of AI in entertainment

Humans is a tv series from 2015 set in a parallel present where highly functional human-like robots exist. These robots are used for several purposes like being servants in homes to being used in illegal fighting rings. The characters struggle with dealing with robots and how to act towards them. The series explores themes like ai and the social impact of anthropomorphic robots with some humans building emotional relationships to the robots while others treat them like machines. It also explores the science fiction theme: what if the robots gain consciousness. This fits well with the series tagline: Made in our image. Out of our control.

## 2 Robots and AI systems

### 2.1 The word “robot”

The word *robot* comes from the old church Slavonic word “robota”, meaning “servitude” or “forced labor”. This originates from the central European system in which rent was paid by a tenant by forced labor or service. Karel Čapek introduced the variation “robot”, from the latin root for labour “labori”, in his play R.U.R Rossum's Universal Robots, 1920) where a company mass produces workers made from chemistry, that perform the mundane tasks that humans don't want to do.

### 2.2 Definitions

#### 2.2.1 Definition 1

*A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer. (The Oxford Dictionary)*

This definition focuses on the automation of the machine. The Oxford Dictionary has another definition that focuses more on robots in science fiction with the robots resembling human beings.

### 2.2.2 Definition 2

*Robots are machines that can be used to do jobs. Some robots can do work by themselves. Other robots must always have a person telling them what to do. (NASA, 2009).*

This definition define robots by their use. Then the definition is split into independent and dependent.

### 2.3 My definition

*A robot is an artifact made by humans designed to perform a spesific task automatically.*

This definition was made based on my knowledge acquired throughout this course.

### 2.4 The relation between AI and Robots

While a robot is an artifact designed and programmed to perform specific tasks, AI can be software. A robot can be powered by AI, but AI does not have to be a part of a robot

### 2.5 A specific robot

When thinking about commercial robots that we use in everyday life, the robotic lawn mowers comes to mind. These robots uses sensor to detect obstacles. These robots have one specific task: moving the lawn. They follow preprogrammed instructions, but also a certain amount of ai to figure out what to do and how. Many people that buy these lawn mowers might think that all of their work is over, but that is not the case. To make sure the robot functions you have to facilitate its use by setting up the perimeter and make sure that there are no obstacles in the grass regularly.

## 3 Universal Design and AI systems

### 3.1 Definition

*An approach to the design of products, buildings, and public spaces that enables the participation of all members of society, (The Oxford Dictionary)*

Universal design focuses on inclusion. It is about designing for all people regardless of their abilities and disabilities, including all and meeting the needs of everyone who wishes to use the design. Universal design was driven forward by the social changes within our society in respect to civil and human rights in the 20th century, with a focus on equal rights and anti-discrimination.

### 3.2 The potential of AI

1. With respect to human perception, human movement and human cognition/emotions.

AI can be extremely useful in including users with disabilities both cognitive and physical, having a robot that respects a persons difficulties. Robots like the seal “Poro” is being used to treat elder with dementia by acting as a something displaying emotions that they can take care of

2. For including and excluding people.

AI can easily be used to exclude people even without the designers doing it on purpose. AI is made from humans “teaching” the AI with the use of dataset. If these datasets are not include the AI won't be either. An example of this is facial recognition software where the ai is not able to detect all races because the dataset dit not have enough inclusion. This can be looked at the other way where the AI is

designed to be inclusive and then creating a software that everyone can feel represented in and be able to use.

## Module 2

### Characteristics of AI-infused systems

The key characteristics that are identified in the first lecture of Module 2 is: learning, improving, black box and fuelled by large data sets.

#### **Learning**

An AI-infused system is a system that is being dynamic by constantly changing while learning from the user's behaviour. The system is constantly using the input to provoke procedures and behaviours.

#### **Improving**

The system is able to improve over time by interacting with the users of the system. This comes from user input, feedback, and from making mistakes. Incorporating this data making it more accurate over time.

#### **Black box**

AI-systems can be seen as "black boxes" by their way of not giving the users insight into the system behind the interaction. The processes that goes on "behind the curtain" is not shown to the outside users.

#### **Fuelled by large data sets**

The knowledge of the AI comes from the datasets that power it. These datasets is how the system learns and improved over time to become better at its task. The datasets used by the AI will differ based on both user input, and the input being provide by the initial designers of the system.



## Swiftkey Keyboard as an AI-infused system

I have chosen *SwiftKey keyboard*. This is an application that uses a blend of different artificial intelligence technologies to predict the next word that the user is going to type. This application definitely embodies the characteristic *Learning* and *improving*. The system learns from usage and improves the predictions over time. This function is what makes these users want this application instead of the keyboard that is already implemented on the phone. The improvements the system makes over time from the usage is not 8synlig) for the user. The user can only see the suggestions getting better but there is no information of when this happens and how. This fits well with the characteristic *black box* as the users have no insight into the process. The last characteristic *fuelled by large datasets* is how the system learns and improves. The datasets that the user provides can be seen as quality sets as this data is provided directly from the users that are going to use the suggestions later. The users are particularly affected by the *learn* and *improve* characteristics. This is what makes the application desirable and better over time.

## Human-AI interaction design

### Guidelines for human-AI interaction

In the article (Amershi et al. 2019) they propose 18 generally applicable guidelines for the Design of human-ai interaction. The guidelines are categorized into these 4 different parts of the something - Initially, drug interaction, when wrong and over time. They validated the guidelines by going through multiple rounds of evaluating them, including a use study with 40 design practitioners that went through the guidelines against 20 different AI-infused products. The guidelines were made in the hope that applying these will result in better systems and that they will “serve as a resource for designers working with AI and will facilitate future research into the refinement and development of principles for human-AI interaction”.

## Will You Accept an Imperfect AI?

In this paper they investigate the relation between the expectations of users and their acceptance of the AI systems, and different design techniques for adjusting the expectations, The present five hypotheses. One of them is rejected, one is partially supported, and three are supported. The three techniques for expectation adjustment are: accuracy indicator, example-based explanation and control slider (Kocielnik et al. 2019). They conclude that their findings “open the way to shaping expectations as an effective way of improving user acceptance of AI technologies” (Kocielnik et al. 2019)

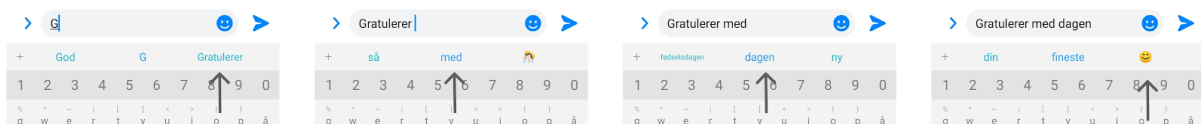
## Swiftkey Keyboard relating to the design guidelines

The guidelines I have chosen to discuss in regards to the SwiftKey keyboard is from the category “over time” and from .

### Learn from user behaviour

*Personalize the user's experience by learning from their actions over time.*

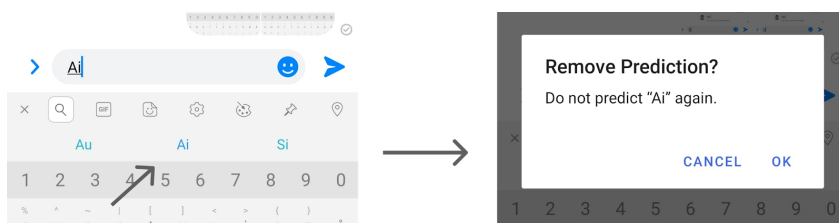
The main reason that I use this keyboard is the predictive keyboard feature that suggest words based on what I am starting to type. This keyboard's ability to learn from my behaviour over time is very good. It can “guess” the word I am typing and it also has the ability to create sentences based on the previous word that I wrote.



**Support efficient dismissal.**

*Make it easy to dismiss or ignore undesired AI system services. Example applications:*

When pressing the suggested words for a longer period of time it triggers the pop-up “remove prediction”. This allows for the user to remove the suggested word so that the keyboard does not predict it again. This feature is not obvious to the user as it only appears when pressing the suggestion for a longer time. I only found this feature myself as a mistake. This could definitely be improved by making the option more clear and maybe have it in the settings menu for the application.



## Chatbots/conversational user interfaces

### Key challenges

Luger and Sellen (2016) write about the challenge when the users expectations exceeding the systems and how this makes worsens the user experience. When the users don't know what the system can and can't do it makes them feel “overwhelmed by the unknown potential, or led them to assume that the tasks they accomplished were highly limited” (Luger et al. 2016).

Føstad and Brandtzæg (2017) talk about the biases in the datasets. The ASI-infused systems are based on the datasets, so if that is biased the resulting system will be to. This poses a challenge in creating inclusive and open technology. They talk about the importance of making chatbots that fits all and including diversity among users by

making it possible to communicate with users of all genders, age language and preferences (Følstad et al. 2017)

## Using the guidelines to resolve the key challenges

### **G1 make clear what the system can do**

*Help the user understand what the AI system is capable of doing*

One of the challenges mentioned in (?) is that the expectation of the users is central to their experience. When using chatbots there is a big difference in how developed and capable they are. As a user it can be hard to perceive how well the chatbot is able to answer without testing it. This can create bad user experiences if the expectations turns out to be disappointed. If the system makes it clear to the user what the system is capable of doing before hand, the users expectations is also managed.

### **G2 Make clear how well the system can do what it can do**

*Help the user understand how often the AI system may make mistakes*

This also applies to the managing of expectations. When interacting with chatbots the users .....A system can apply this by making it clear that mistakes will occur and that the product will be better over time by user input. This entails that the user does not expect the AI to always get it right.

## 4 References

Grudin, Jonathan. (Sept 18, 2009) *AI and HCI: Two Fields Divided by a Common Focus*. AI magazine 30, no 4

Oxford Reference (n.d.) *Artificial Intelligence*. Retrieved from:

<https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095426960>

Nasa (nov 9, 2009) *What is robotics*. Retrieved from

[https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what\\_is\\_robotics\\_k4.html](https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what_is_robotics_k4.html)

Markel, H. (May 22, 2019) *The origin of the word 'Robot'*. Retrieved from:

<https://www.sciencefriday.com/segments/the-origin-of-the-word-robot/>

Copeland, B. (n.d.) *Artificial Intelligence*. Retrieved from:

<https://www.britannica.com/technology/artificial-intelligence/Alan-Turing-and-the-beginning-of-AI>

Amershi, S., Weld, D., Vorvoreanu, M., Fournay, 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.

<https://www.microsoft.com/enus/research/uploads/prod/2019/01/Guidelines-for-Human-AI-Interaction-camera-ready.pdf>

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.

([https://www.microsoft.com/enus/research/uploads/prod/2019/01/chi19\\_kocielnik\\_et\\_al.pdf](https://www.microsoft.com/enus/research/uploads/prod/2019/01/chi19_kocielnik_et_al.pdf))

Følstad, A., & Brandtzæg, P. B. (2017). Chatbots and the new world of HCI.

interactions, 24(4), 38-42. (<https://dl.acm.org/citation.cfm?id=3085558>)

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.

(<https://www.microsoft.com/en-us/research/wpcontent/uploads/2016/08/p5286-luger.pdf>)

## Appendix

### Changes based on the feedback

I took the feedback into consideration when writing my answers for module 2. I corrected some mistakes made in iteration 1 and filled out where i got feedback on my writing.