

## 40 Years of I.T. and A.I. and What It Means for the Next 20 Years

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[{.html, .pdf}](http://www.rogerclarke.com/EC/AIYV)

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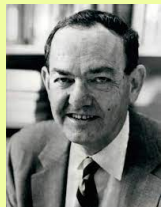
## The Original Conception of Artificial Intelligence (AI Old)



- Based on "the **conjecture** that every aspect of **learning** or any other feature of **intelligence** can in principle be so precisely described that a **machine can be made to simulate it**"
- "The **hypothesis** is that a physical symbol system [of a particular kind] has the necessary and sufficient means for **general intelligent action**"

McCarthy et al. (1955)  
Simon (1958, 1969, 1975; 1996, p.23)

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## From Conjecture and Hypothesis To Belief

"Within the very near future - **much less than twenty-five years** - we shall have the technical capability of **substituting machines for any and all human functions** in organisations.

"**Duplicating problem-solving and information-handling capabilities of the brain** is not far off ... surprising if it were not accomplished **within the next decade**" (1960)

"**By the end of the 2020s** [computers will have] intelligence indistinguishable to biological humans" (2005)

Simon (1960)  
Kurzweil (2005, p.25)

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## How to Recognise 'an AI'

*Intelligence is exhibited by an artefact if it:*

- (1) *evidences **perception and cognition** of relevant aspects of its environment*
  - (2) *has **goals**; and*
  - (3) ***formulates actions** towards the achievement of those goals*
- and?*
- (4) ***implements those actions***

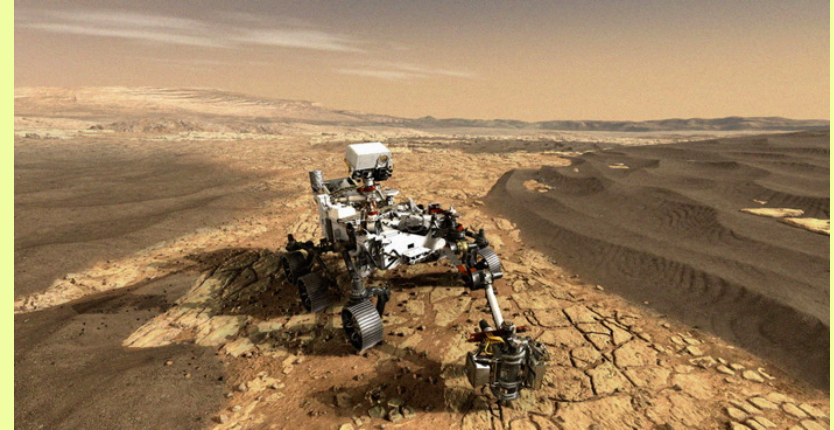
esp. Albus 1991, Russell & Norvig 2009, McCarthy 2007

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## Embodiments of AI

- **Computers**
- **Robots**  
'A Computer that Does' &  
'A Machine that Computes'
- **Humanoid Robots**  
Androids Gynoids  
Fembots
- **Vehicles**  
Terrestrial (Road, Rail),  
Airborne, Water-borne,  
Submerged
- **Bus-Stops**  
And other everyday Things
- **Cyborgs**  
A Human whose natural  
capabilities have been enhanced  
by technological means  
A Hybrid of a human and one  
or more associated, attached or  
embedded artefacts

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Aug 2021 – <https://futurism.com/the-byte/nasas-mars-rover-took-selfie-beautiful>

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## But Intelligence also requires Second-Order Intellect or Insight

- Values-Driven Formulation of Goals
- Common-Sense Understanding of Context
- Detection of Changes of Relevance
- Ongoing Re-Evaluation of Values
- Ongoing Adaptation of Goals

Dreyfus H.L. (1972)  
Weizenbaum J. (1976)

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## AI Sceptics are in Good Company



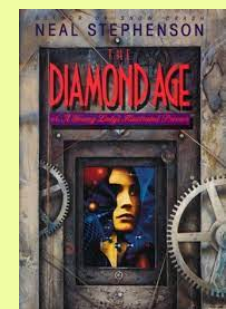
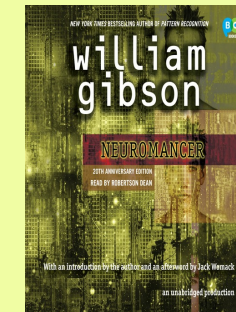
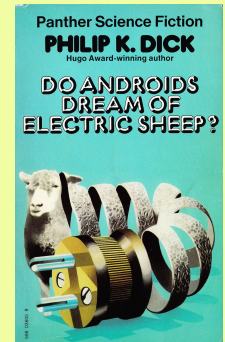
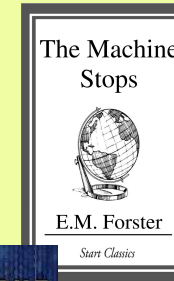
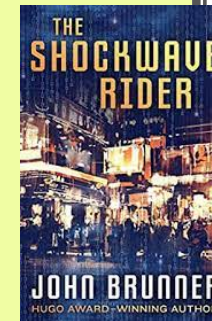
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## Degrees of Autonomy

		Function of the Artefact	Function of the Human
	0	<b>NIL</b>	<b>Analyse, Decide, Act</b>
Decision Support System	1	Analyse Options	<b>Analyse, Decide, Act</b>
	2	Advise re Options	<b>Analyse, Decide, Act</b>
	3	Recommend Act	<b>Analyse, Approve/Reject Act</b>
Decision System	4	<b>Notify Impending Act</b>	Override/Veto Impending Act
	5	<b>Act and Inform</b>	Interrupt/Suspend/Cancel an Act
	6	<b>Act</b>	<b>NIL</b>

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## Science Fiction Anticipates Reality

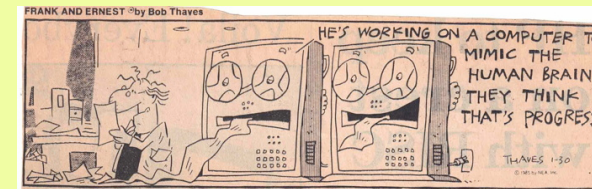


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## Social Impacts and Implications

- **People-Replacement**  
Effect on Income Distribution
- **De Facto Delegation**  
'The computer says no'
- **Unexplainability**  
Accountability Undermined
- **Unfair Decisions, Actions**  
Discriminatory Behaviour
- **Economic, Social Scoring**  
Non-Conformist Victimisation
- **Undefendable Accusations**  
Power, Information Asymmetry
- **Denial of Services, Movement and Identity**  
Public Resentment, Violence
- **'Predestination'**  
Predictive Policing

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## Artefact Intelligence

### What We Want From It

- Do things well that humans do poorly, or cannot do at all:
  - Dull, Dirty, Dangerous
  - Precise, Fast, ...
- Perform functions within systems that include both humans and artefacts
- Interface effectively, efficiently, adaptably with humans, other artefacts

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Human Intelligence & Artefact 'Intelligence' → Augmented Intelligence  
 AI New #1 AI New #2

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Effectors & Actuators → Capability



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Human Intelligence & Artefact 'Intelligence' → Augmented Intelligence  
 & & &  
 Effectors & Actuators → Capability  
 ↓ ↓ ↓  
 Human Capability & Artefact Capability → Augmented Capability

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## My Challenge to You

*Compare smart technology  
 not against old AI, but against new AI and AC*

- What is the nature of its Artefact Intelligence?
- Can the artefact explain its rationale?
- Does it replace or augment Human Intelligence?
- Does it include any actuators?
- Does it replace or augment Human Capability?

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