



Trustworthy Machine Information Behaviour and Open Research Repositories



forward together
sonke siya phambili
saam vorentoe



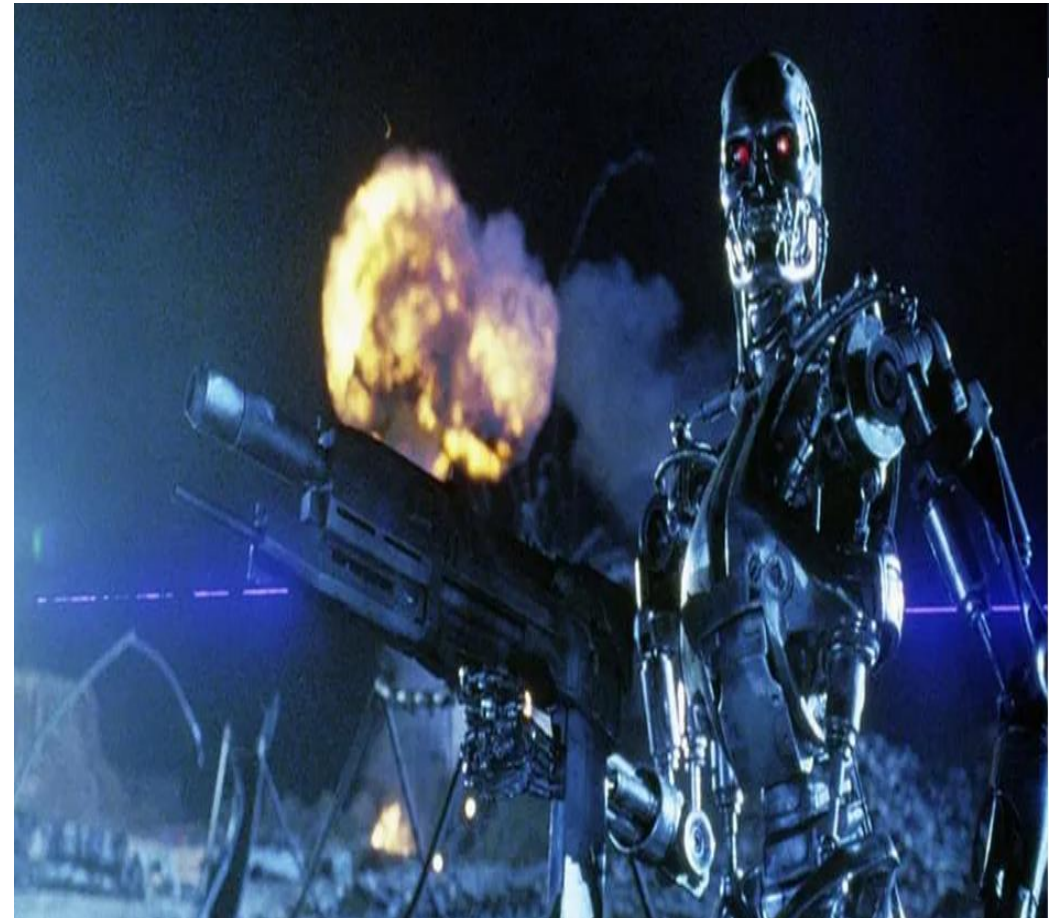
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14th June 2023



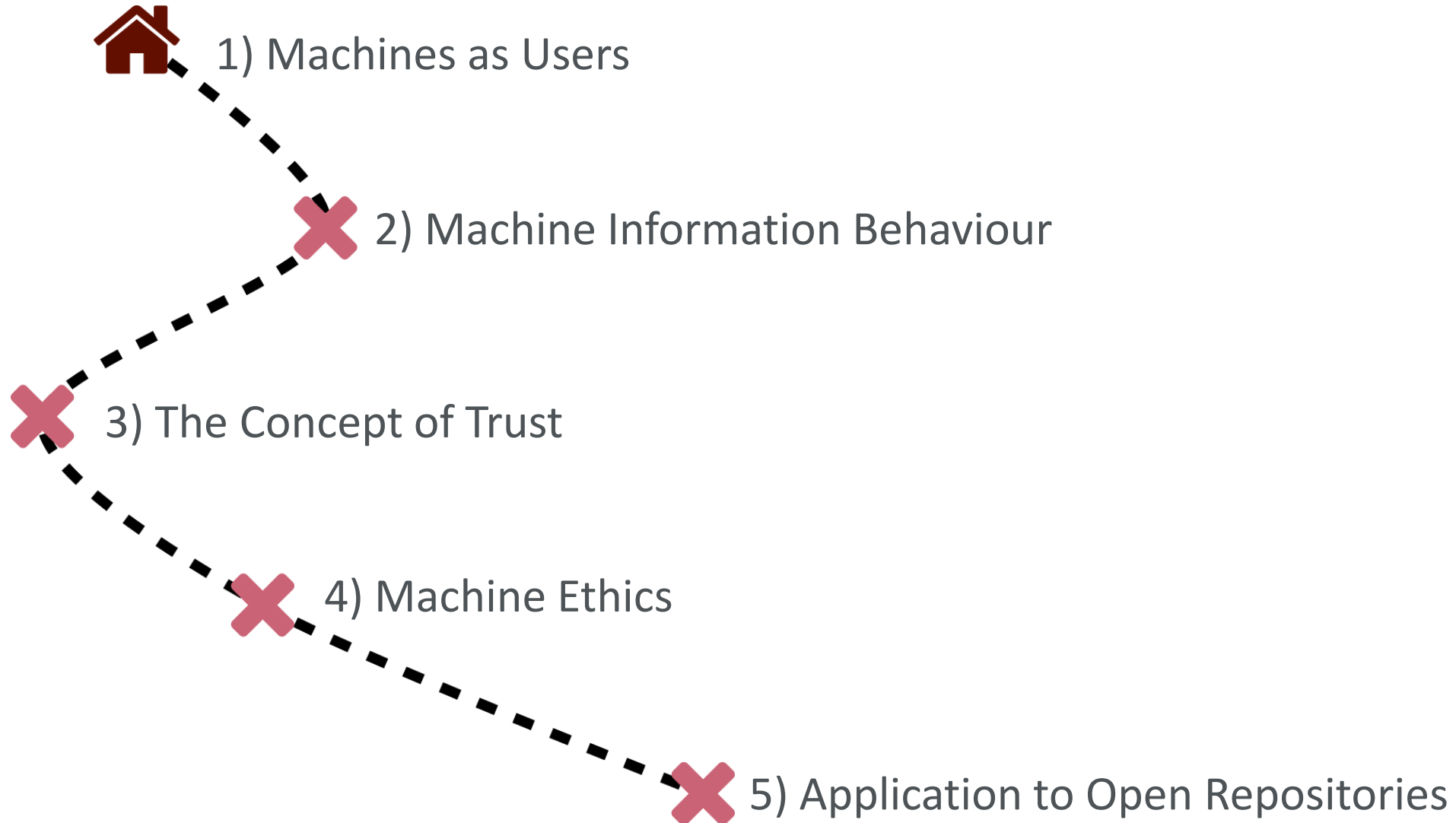
DISCLAIMER

Question to keep on your minds?

What kind of machine users do we want to have?

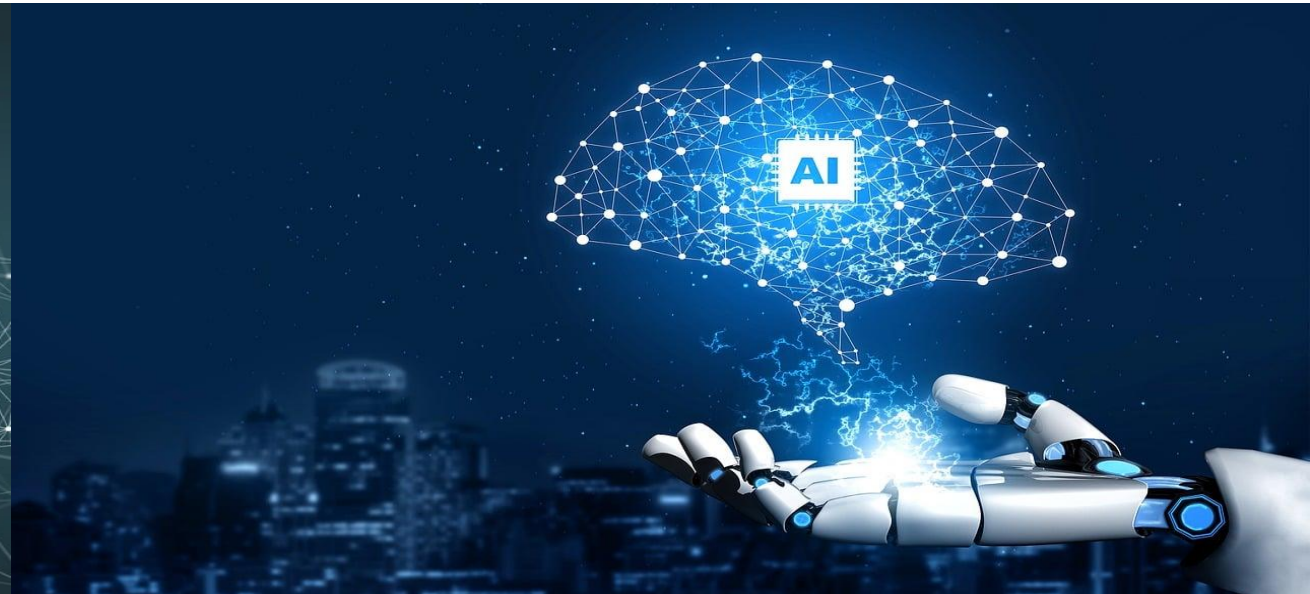


Presentation Overview



(1) Machines as Users

Recent Technological Advancements



Impact on libraries:

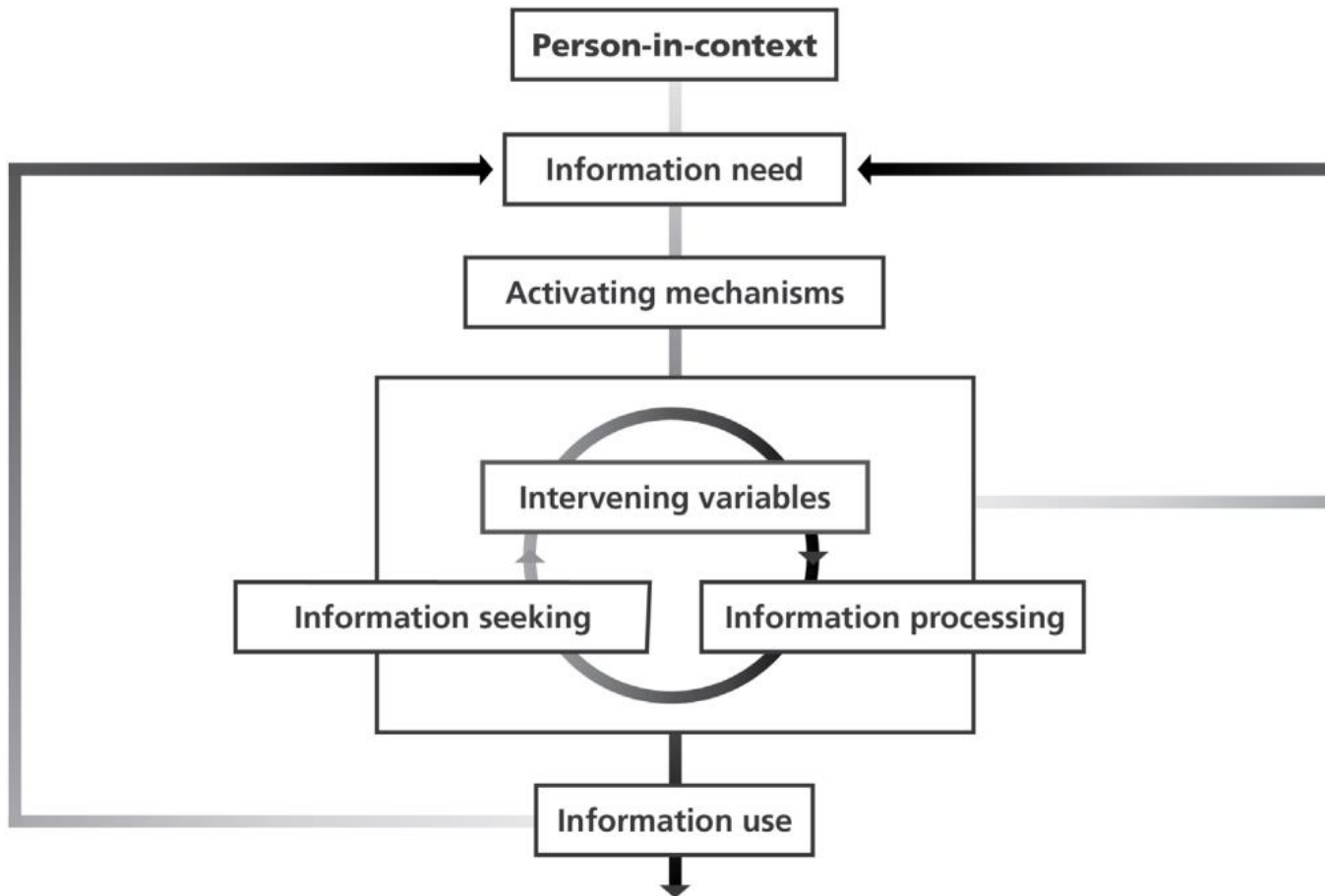
1. Assisting users (both machines and humans)
2. Making collections accessible
3. Preserving data sets and the products of research



(2) Machine Information Behaviour

From Human Information Behaviour to Machine Information Behaviour

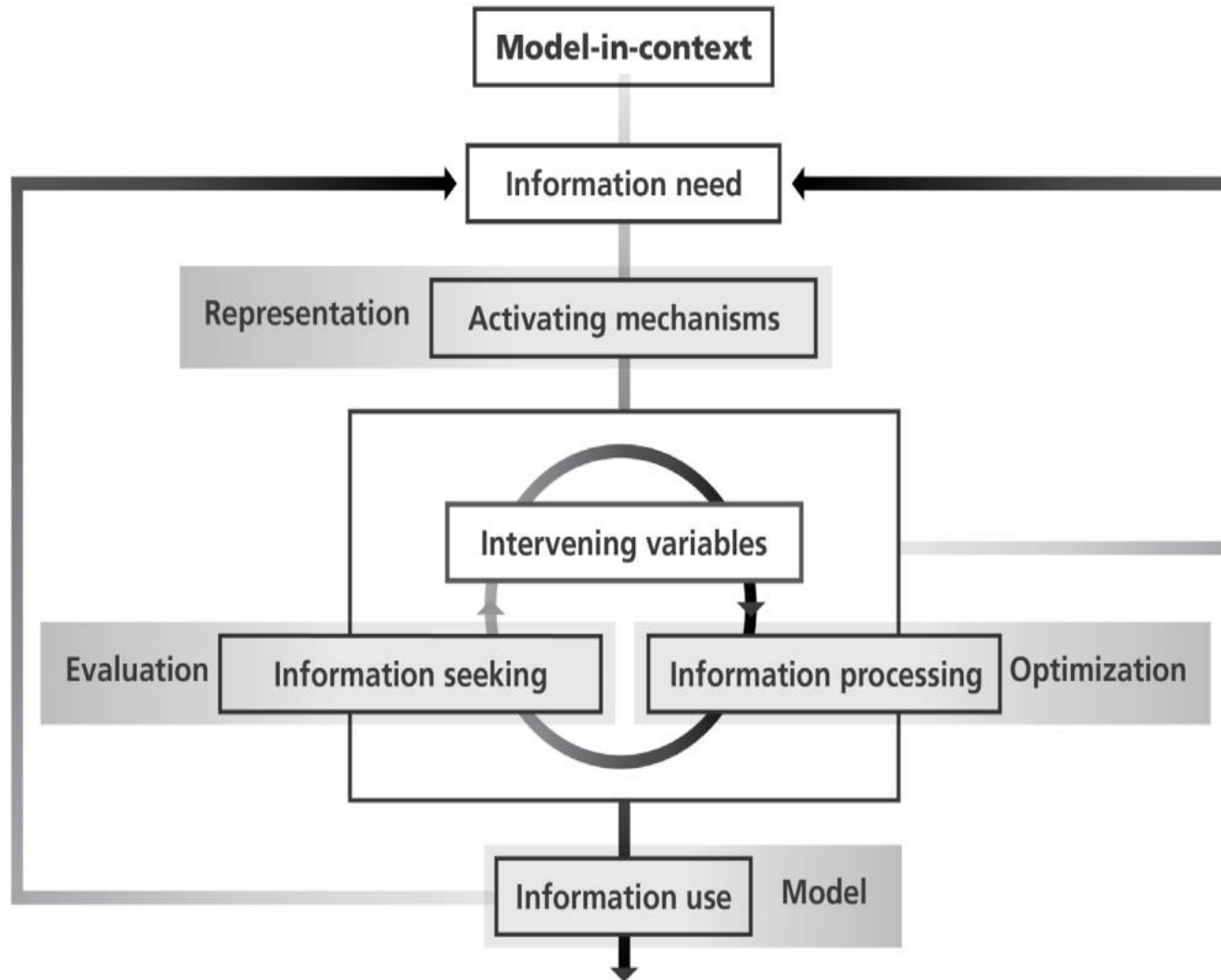
Wilson's General Theory of Information Behaviour (Wilson: 2016)



Machine Learning Model (Ridley: 2022)



Machine Information Behaviour Model



The roles that Machines Users can perform:

1. Information seeking
2. Information processing
3. Information using

A positive outcome = If machine users employ machine information behaviour that is **trustworthy** in nature.

(3) The Concept of Trust

What is Trust?

Trust as a relationship

- **Trust** = The willingness of an entity (i.e the trustor) to become vulnerable to another entity (i.e the trustee).

Trustor



Trustee

From Trust to Ethical Behaviour

- The trustee's actions are outside of the trustor's control
- Trust is based on a trustee's trustworthiness
- Trust relies on two core traits exhibited by a trustee:
 - Transparency
 - Honesty
- A relationship exists between trust and ethical behavior
- Trust can be encouraged through the following:
 - Ethical behavior
 - Accountability



(4) Machine Ethics

The Ethics of Machine Users

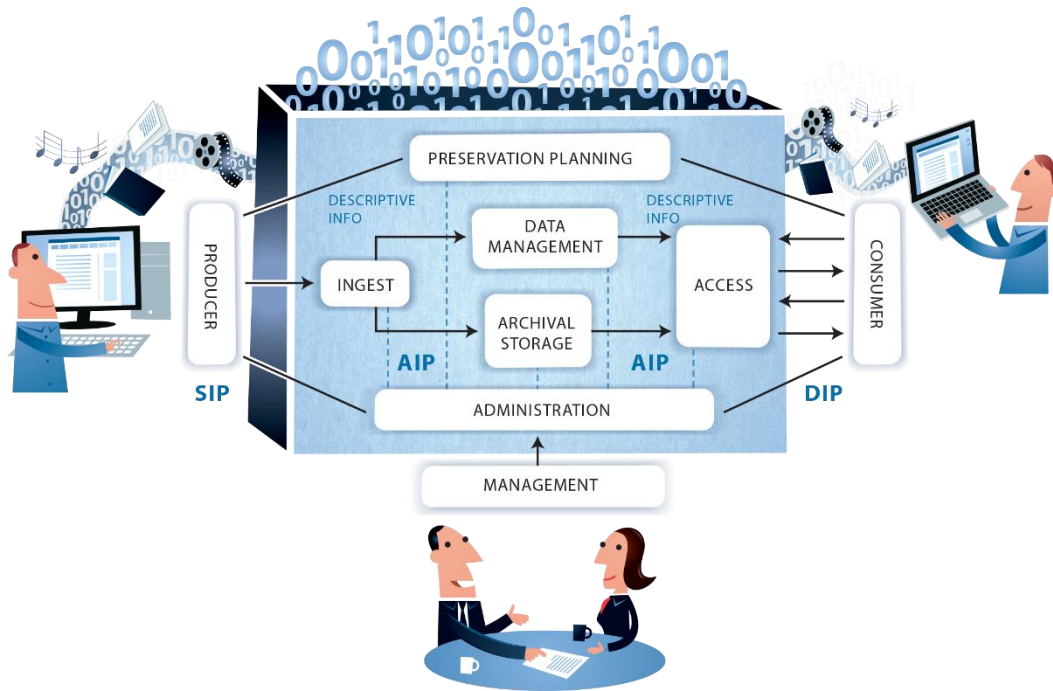
	Symbolic Machine Ethics	Soft Machine Ethics
Moral aspects	Operational morality	Functional morality
Approach	Top-down	Bottom-up
Normative ethics	Deontological (non-consequential) and teleological (consequential)	Deontological (non-consequential) and teleological (consequential)
Enquiry: nature of conduct	Is the conduct ethical?	Is the conduct ethical?
Enquiry: nature of consequence	Is the consequence ethical?	Is the consequence ethical?
Possible outcomes	Machine user is ethical or unethical	Machine user is ethical or unethical

How can we evaluate the degree to which machine users are ethical?

- This issue can be addressed by using **specification**, **verification** and **validation** measures
- **Specification:** Specify what a system is expected to do
- **Verification:** Verify that the system actually does what is expected
- **Validation:** Validate that the set-out requirements are what the end-users wanted

(5) Application to Open Repositories

Artificial Intelligence and Discovery via Open Repositories



Role of Machine Users

Dual-Role of Machine Users

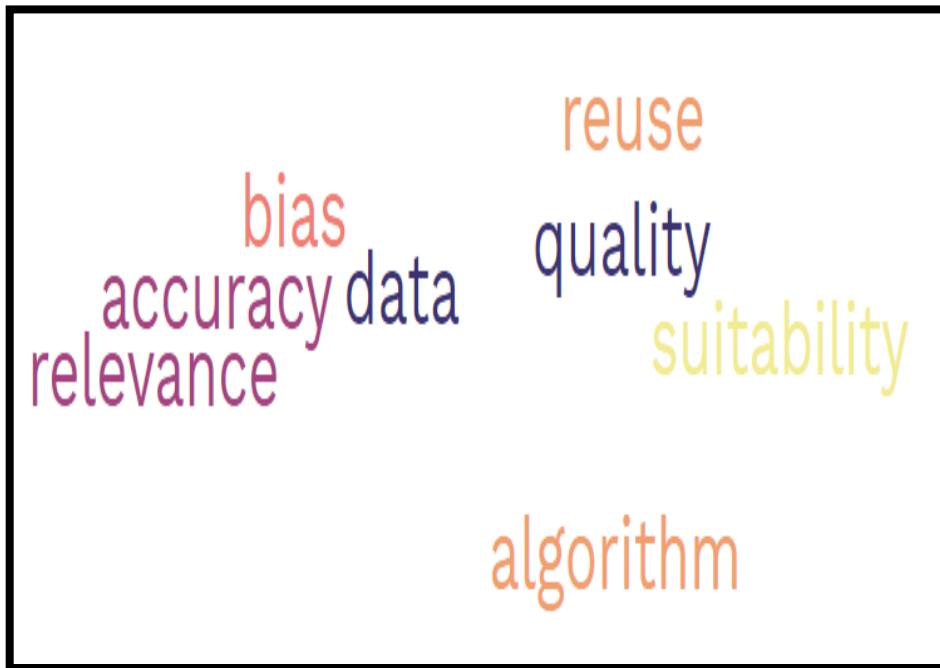
**Machine Users
as Producers**



**Machine Users
as Consumers**

Considerations Regarding Trustworthiness

Considerations when machines are used as production tools:



Considerations when machines are consumers of repository content:

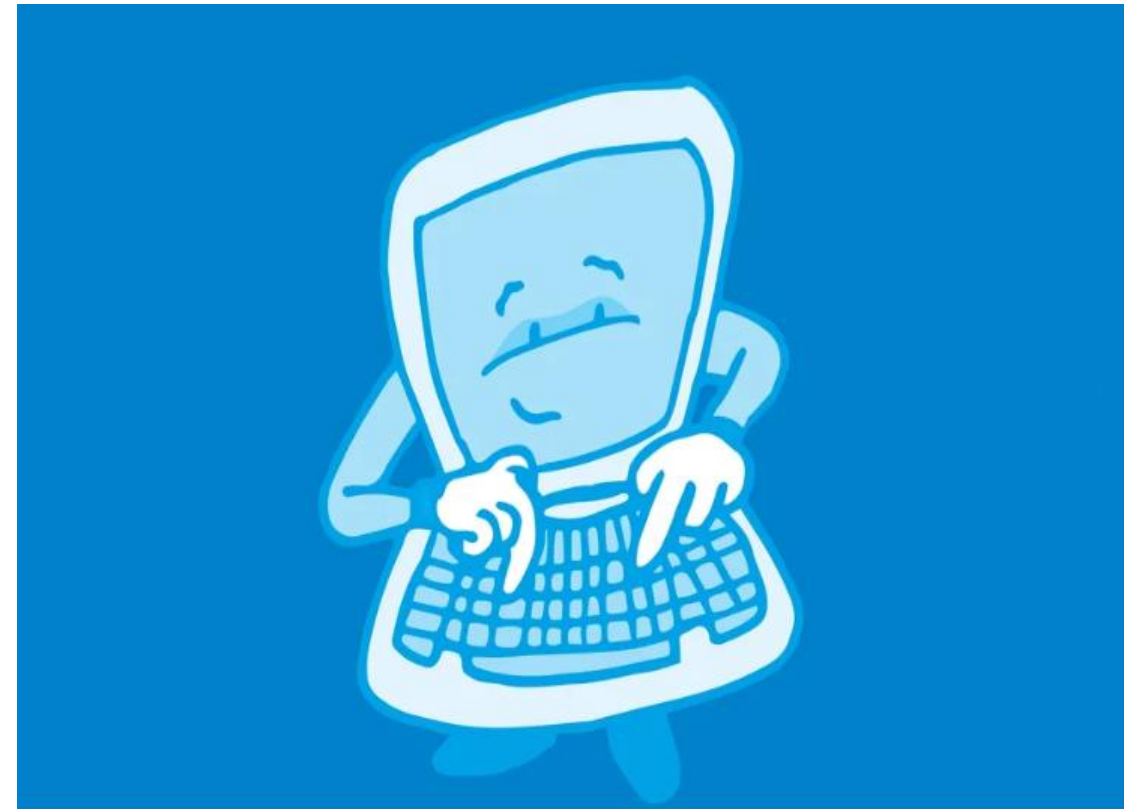


Computer Programming

Hard-Coded Machines



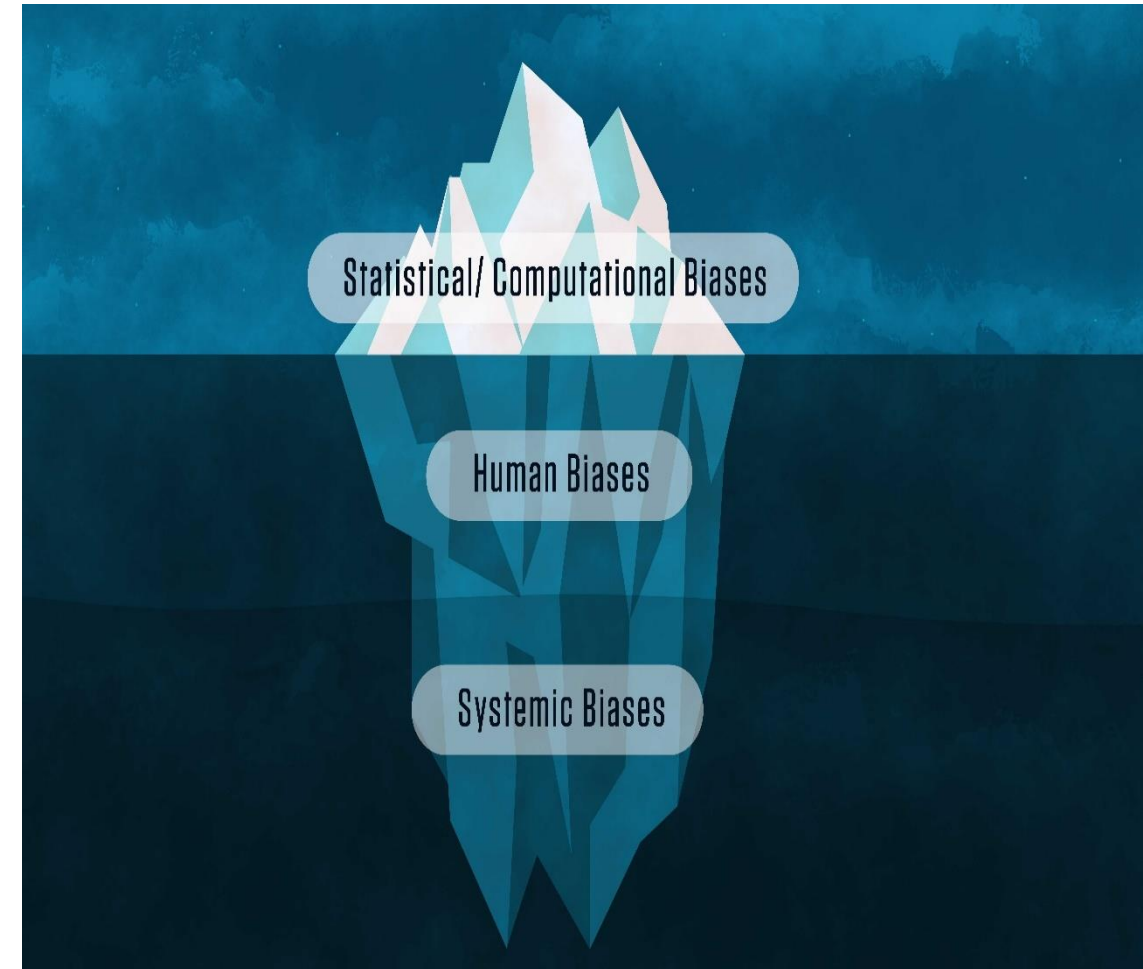
Self-Learning Machines



Algorithm Bias

Algorithm bias management system

The process entails systematically associating a quantitative metric to the results produced by an Information Retrieval system in response to a set of user queries.



Considerations of Developers of Machine Users



PROGRAMMING

Auditing and Monitoring



Considerations for Open Repositories

Data Governance



Machine Actionable Policy Templates

The Challenge:

Data repositories need to publish their policies & procedures to build trust in their operation.

What is the solution?

The Practical Policy Working Group produced a document describing best practices and a set of machine actionable policy templates covering 11 highly relevant policy areas including contextual metadata extraction, data access control, data backup, data formal control, data retention, disposition, integrity (incl. replication), notification, restricted searching, storage cost reports, and use agreements.



Produced by: **Practical Policy (PP) WG**

<https://rd-alliance.org/groups/practical-policy-wg.html>

Data Privacy Protection



Attribution



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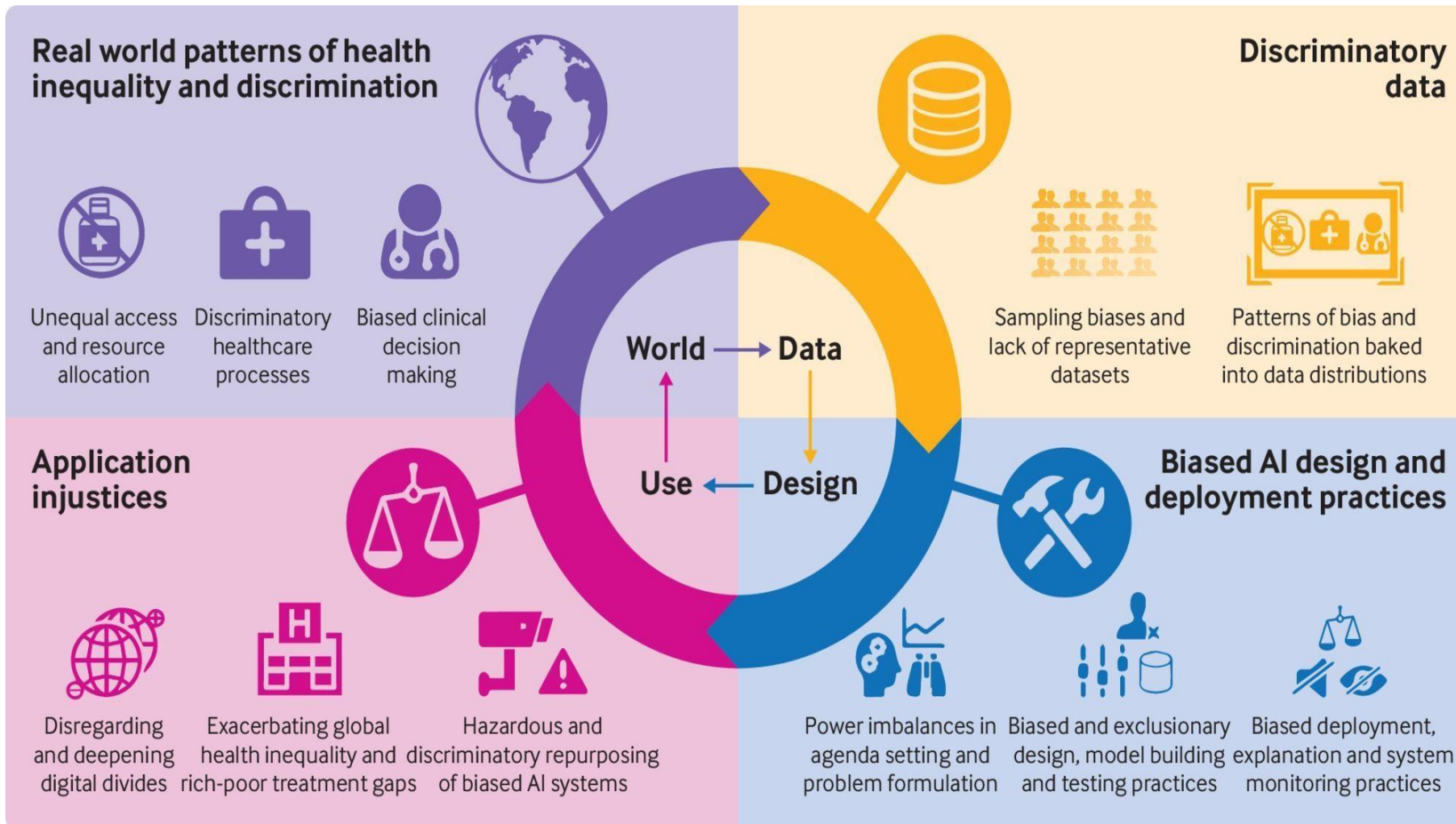
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Considerations for Open Repositories

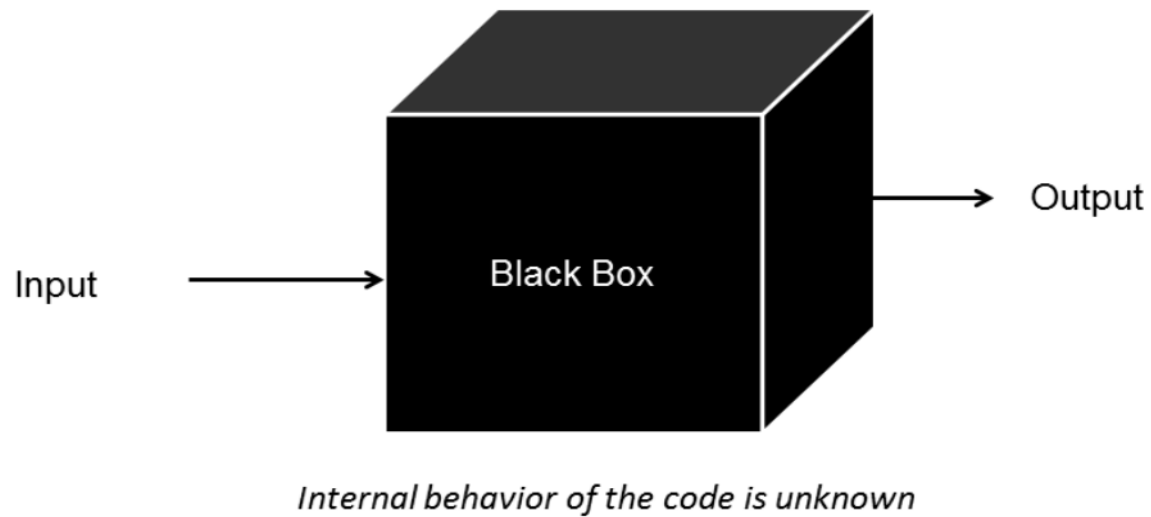
Algorithm Bias



Auditing and Monitoring

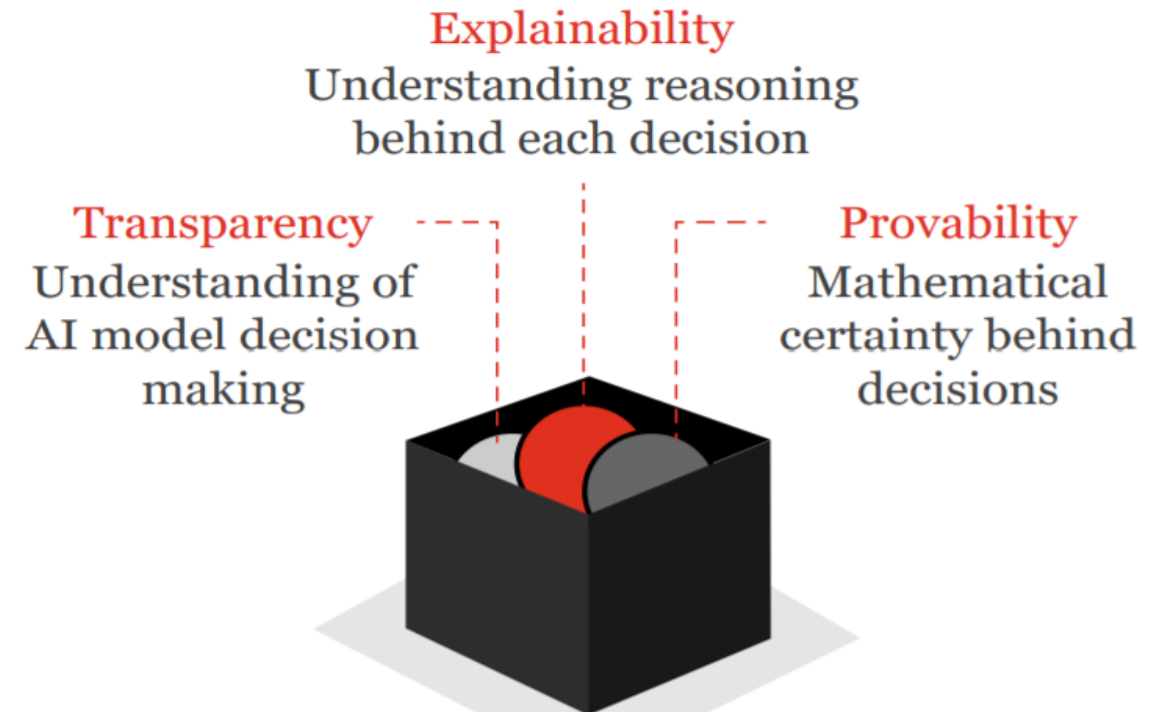


Lack of Algorithm Transparency



It can be difficult to understand where the output really comes from.

What it means to look inside AI's black box



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Ethical Evaluation of Machine Users of Open Repositories

	Discovery Process		
	Nature of Machine Ethics	Algorithm Transparency	Data Security
Specification	Yes	Yes	Yes
Verification	?	?	Yes
Validation	?	?	Yes

Ethical Evaluation of Machine Users of Open Repositories

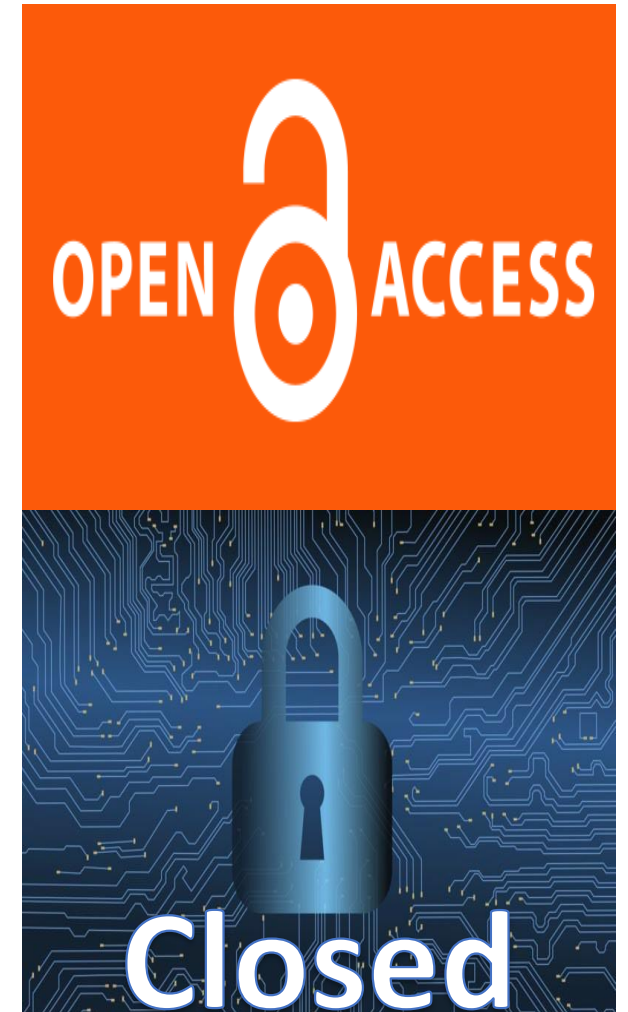
	Discovery Process			Ethical Reuse		
	Nature of Machine Ethics	Algorithm Transparency	Data Security	Data Privacy	Algorithm Bias	Attribution
Specification	Yes	Yes	Yes	Yes	Yes	Yes
Verification	?	?	Yes	?	?	?
Validation	?	?	Yes	?	?	?

Some Observations

1. The level of trust placed in machine users is dependent on:
 - The algorithms and software used for programming such machine users
 - The actions of humans who make use of or rely on such machine users
2. In making use of open repositories machine users exhibit a form of machine information behavior.
3. In order for trust in machine users of open repositories to exist, the machine information behavior employed by machine users should adhere to certain ethical principles.
4. Such behavior would be deemed trustworthy machine information behavior.
5. It may be possible to evaluate the degree to which the behaviour exhibited by machine users of Open Repositories is ethical and therefore trustworthy.
6. However, this task appears to be limited by some practical challenges.

Question to keep on your minds?

What should happen if a machine user turns out to be untrustworthy?





**Thank you
Enkosi
Dankie**



Photo by Stefan Els



Questions and Answers



Photo by Stefan Els