From Scylla & Charybdis to the Hitchhiker's Guide to the Galaxy; or

Images: www.en.wikipedia.org

Navigating one's way through the Information Universe in the 21st century

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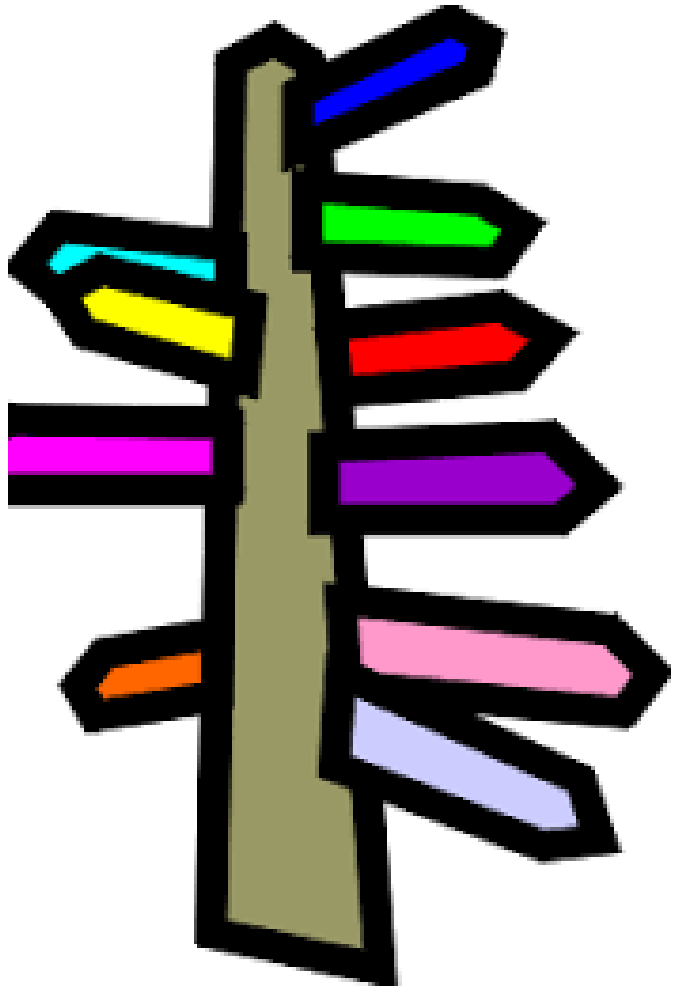
Outline of the presentation

- Navigating Information Literacy (IL)
- Where we were
  - And what we thought we were teaching
- Where we are now
  - And what we think our students need to know
- Where we are going
  - Into a new world of information
  - Reconsidering IL for a new world
  - Some predictions



Clipart from hddfhm.com

Schylla & Charybdis come from the story of *Odysseus* from Homer's Iliad

- Hero Odysseus, had to flee with his men from the clutches of the nymph Circe
- Escape in a small ship through a narrow channel: dangerous rock on one side and a maelstrom on the other.
- Rock Scylla – a six-headed serpent which would devour six men as they tried to pass
- But if they sailed closer to the maelstrom, risk of being sucked in & all would perish
- Odysseus chose to sail past Scylla; he lost six men, but the others survived.

An artist's impression

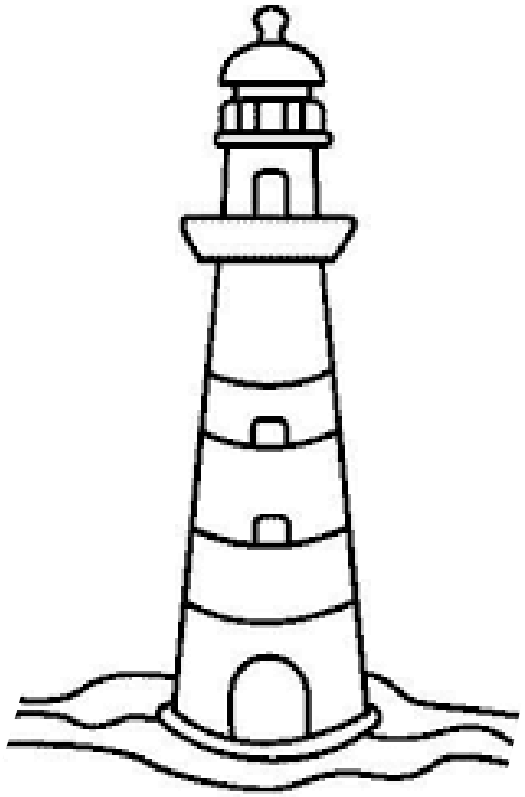
Image:www.pinterest.com

The Hitchhiker's Guide to the Galaxy scifi novel by Douglas Adams, 1979

- Appealed to the young, alienated & often drug-fuelled Generation X
- Found novel hilarious: it shifted perspectives and poked fun at many of the holy cows & scientific 'facts' of the time
- The guide to the galaxy that it presented was a guide to nowhere, or to chaos, - only led to more and more confusion
- One of its main messages : ***Don't panic***

https://www.juno.co.uk/products/the-hitchhikers-guide-to-the-galaxy/690204-01/

Theme of *navigation* present in both stories



www.clipart-library.com

- An image librarians have made their own – noticed it elsewhere in this conference programme too
- Librarians have always prided themselves on their navigation skills
- But modern students no longer so interested in how we find stuff
- They think they know best
- Google & the rest have given them so much confidence
- They don't need *our* skills any longer

Different approaches to exploring IL

Many of us have worked with some or all of the models, e.g.

- *The Big 6*
- *Seven faces of information literacy* – Bruce
- Seven Pillars of Information Literacy (SCONUL)
- ALA *Information Literacy Competency Standards for Higher Education* Association of College & Research Libraries, *Information Literacy Competency Standards for Higher Education* (Chicago, 2000).
- And now also the *Framework for Information Literacy for Higher Education. 2016.* http://www.ala.org/acrl/standards/ilframework

Survey 2011: how much IL taught in SA universities?

All universities taught at least some aspects of IL:

- library orientation/basic library skills (21, i.e. 95.2%)
- using the library online catalogue (100%),
- using electronic databases (21, i.e. 95.2%)
- using the Internet (e.g. Google scholar) (20, i.e. 90.5%)
- referencing and plagiarism (21, i.e. 95.2%)

Other components, e.g. evaluating information, search strategies, identifying keywords & information sources, only taught at 10 institutions (Tiemensma, 2012)

Therefore mainly very basic, library-focused teaching

Students not interested – not perceived as relevant to their needs

Serious IL issues of current concern

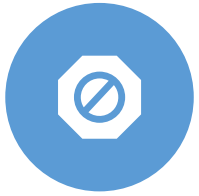
- Lack of understanding of the nature of research and knowledge construction – common misconceptions:
  - Google is sufficient as a research tool
  - Every question has a single 'correct' answer
  - Free internet resources are enough for doing research
  - All internet sources are reliable
  - Research not a compilation of facts, but answering questions (Hinchliffe, Rand & Collier 2018)
- Plagiarism not understood
- No critical awareness or questioning attitude
- Libraries mainly places to work and to find books – in SA also to search Google or to print

Vexed question of the ethical use of information – issue of plagiarism

Often misunderstood

Familiar with cut & paste, remixing and mash-ups

Students don't see such practices as unduly "bad"



Not really concerned with getting caught

Often cannot "say it in their own words"

Puzzled at *Turnitin* results and don't know how to fix what is wrong

Concept of "post-plagiarism"????

Information pollution

- People tend to believe what fits in with their world view: confirmation bias https://libguides.usask.ca/c.php?g=701203&p=4980735
- This can be manipulated to gain credence and support
- Distinguish between
- **Mis-information:** false, but not created with the intention of causing harm
- **Dis-information:** false and deliberately created to harm a person, social group, organization or country
- **Mal-information:** based on reality, used to inflict harm or benefit a person, organization or country https://libguides.usask.ca/c.php?g=701203&p=4980735

https://libguides.usask.ca/c.php?g=701203&p=4980735

IL no longer what it used to be

To be Information Literate now means able to understand and deal with the *entire world* of information

IL requires digital literacy, i.e. a new understanding of how information works, how it is generated, and how it is used in the digital domain

This means an *expanded concept* of what it means to be information literate – beyond the Library

So back to our Hitchhiker on the way through the galaxy

- Where is she going? Signposts?
- What will be found on the way? Landmarks? Whirlpools?
- It is tough to make predictions, especially about the future!
- Destination indeterminate
- Will nevertheless try to look at some *examples* of what seems to be looming in the information future

And we should know about them if we are information literate!

Some signposts for the Hitchhiker

- The 4th Industrial Revolution
- The Internet of Things
- Artificial Intelligence
  - Applications of Artificial intelligence
- Whirlpools & Treacherous places

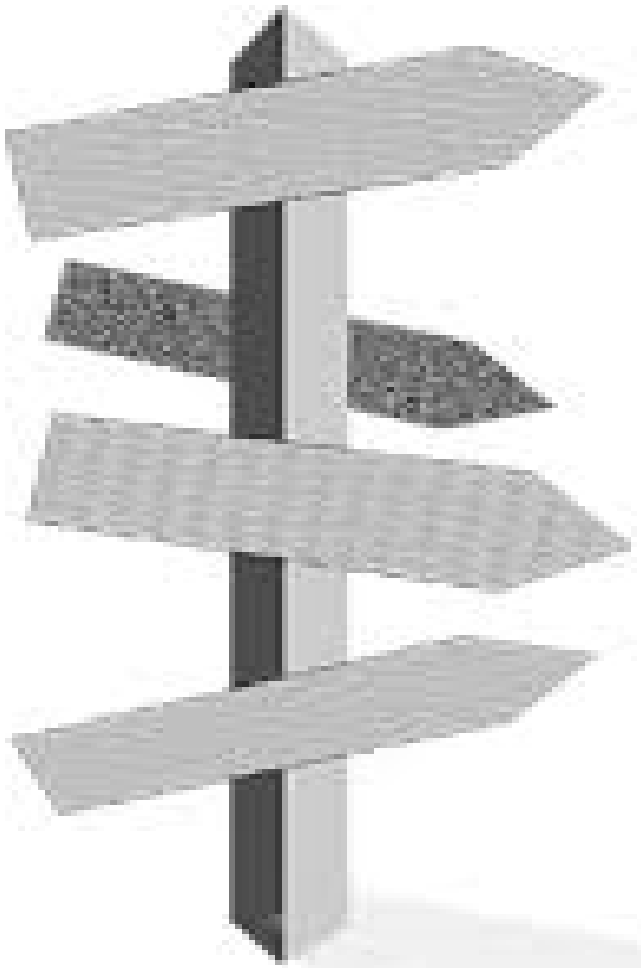
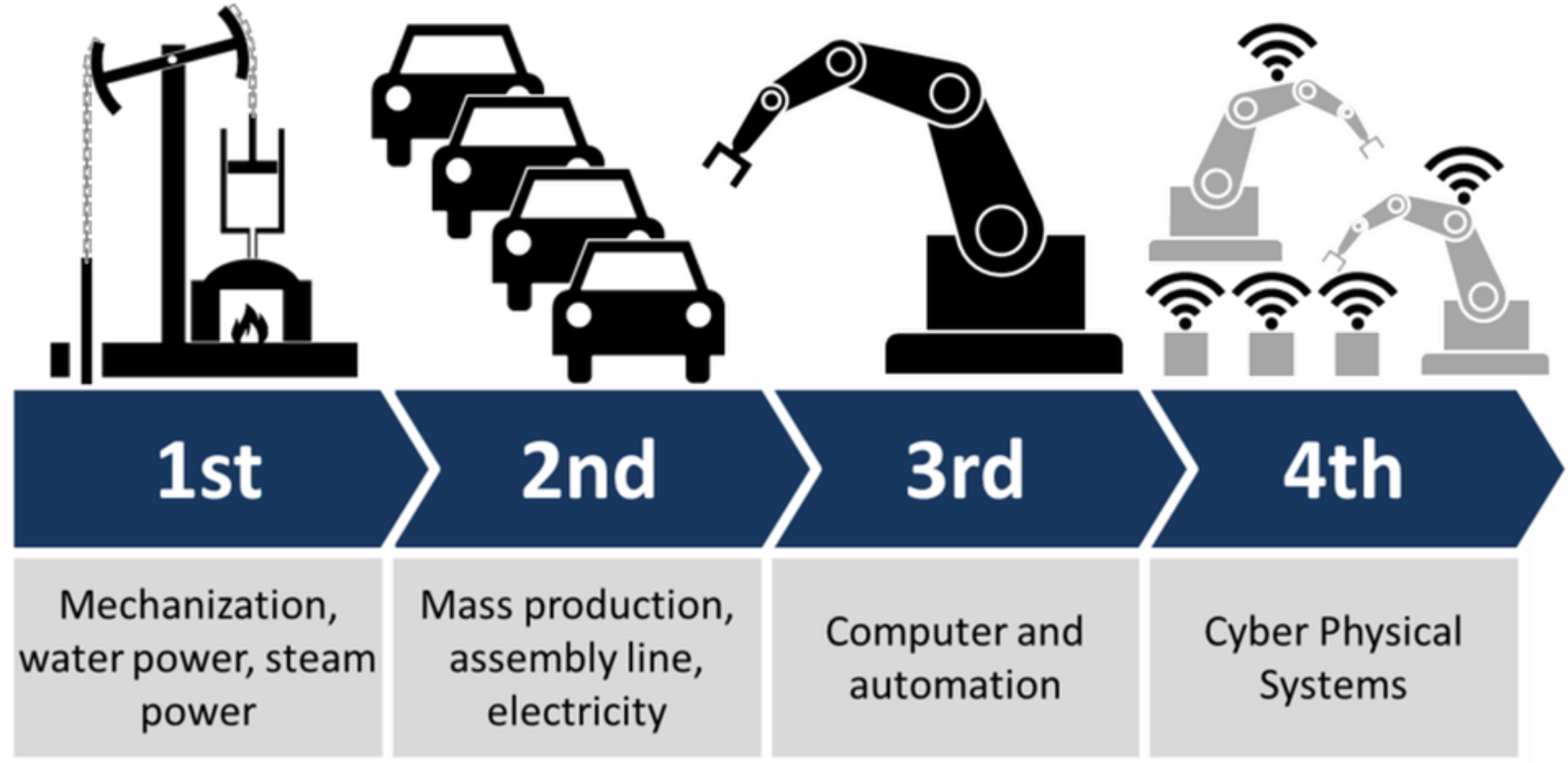


Image from pixabay.com

The Industrial Revolutions



https://www.forbes.com/sites/bernardmarr/2016/04/05/why-everyone-must-get-ready-for-4th-industrial-revolution/#798e83143f90

4th Industrial Revolution

- Disrupting & transforming the world as we know it – at an exponential & no longer linear pace
- Instead of oil, ***data*** now is the world's most valuable resource
- Developed from the confluence of big data, enormous computing power & sophisticated algorithms
- Produced new technologies that can link physical, technical & biological systems (Marr, 2016)

Also known as the 'Internet of Things'

- Systems of things equipped with sensors linked together on the web so that they can communicate with one another
- Smart factories are linked through the web (e.g. to supply chains, order and delivery systems) make indepenent decisions based on information received in real time
- Wide range of applications
- Enabled the development of Artificial Intelligence
- Ethically neutral

https://medium.com/autonomous-agents/laymans-intro-to-ai-and-neural-networks-ce074457d85a

Artificial Intelligence (AI)

- AI the mega-disruptor of the 21st Century!
- AI refers to systems that can learn
- AI systems need LOTS of data – and algorithms to allow training in mining the data to learn from it
- When big data is explored for similarities, overlaps, inconsistencies & irregularities, learning systems may be developed to:
  - Recognise patterns (e.g. face recognition)
  - Detect anomalies (e.g. finding fraud in accounts)
  - Predict outcomes (e.g. weather forecasting) (Preetham)

Development of AI – into the Future

- Artificial narrow intelligence (ANI): built for single situations only – what we have at present
- Artificial general intelligence: (AGI:): human-like, not yet achieved, but some development is this direction evident already
- Artificial super intelligence (ASI); beyond human capabilities; difficult to envisage

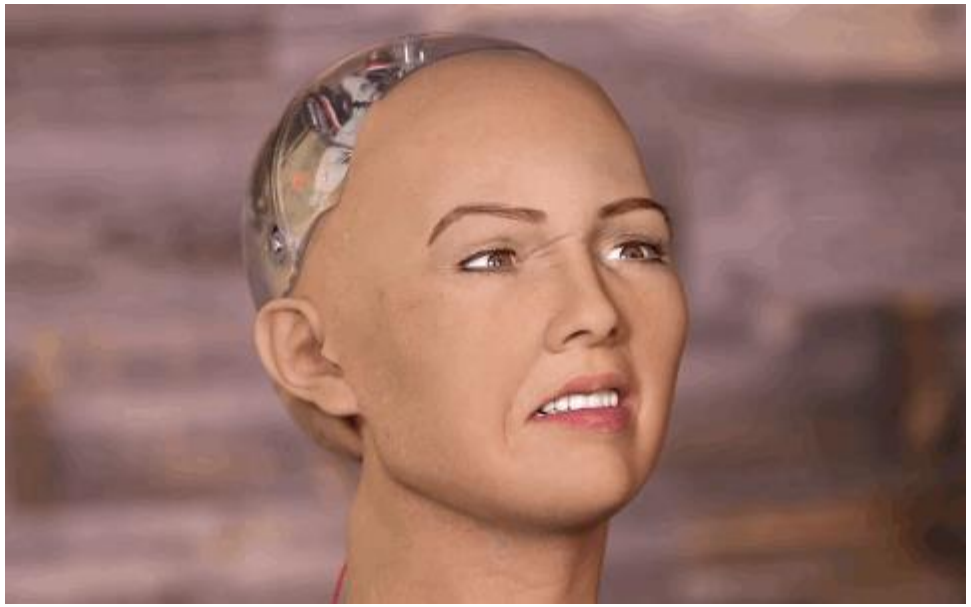
Four types of Artificial Intelligence

- Reactive machines (ANI):
  - Simplest of AI machines
  - No memory, they react to the current situation only
  - *E.g. Deep Blue* was the first AI machine to beat a person at chess (1996-1997)
- Limited memory (still ANI)
  - System "learns" from previously programmed info, stored data, or events
  - E.g. Self-driving cars –combination of observed & pre-programmed knowledge
- Theory of mind (AGI)
  - Mainly still developing; e.g. a machine capable of conversation with a human being
  - Social interaction & awareness of emotions
  - Able to respond rapidly and creatively in different situations
- Self-awareness (ASI)
  - Machines with human-level consciousness – still in the future (Reyonoso)

http://theconversation.com/twenty-years-on-from-deep-blue-vs-kasparov-how-a-chess-match-st

Turing's test

- British computer scientist posed a test to establish whether a machine was intelligent in the 1950's
- Conduct a telephone conversation
- If you cannot detect that the speaker is a computer rather than a human being, the computer may be regarded as 'intelligent'
- Voice assistants are now getting close



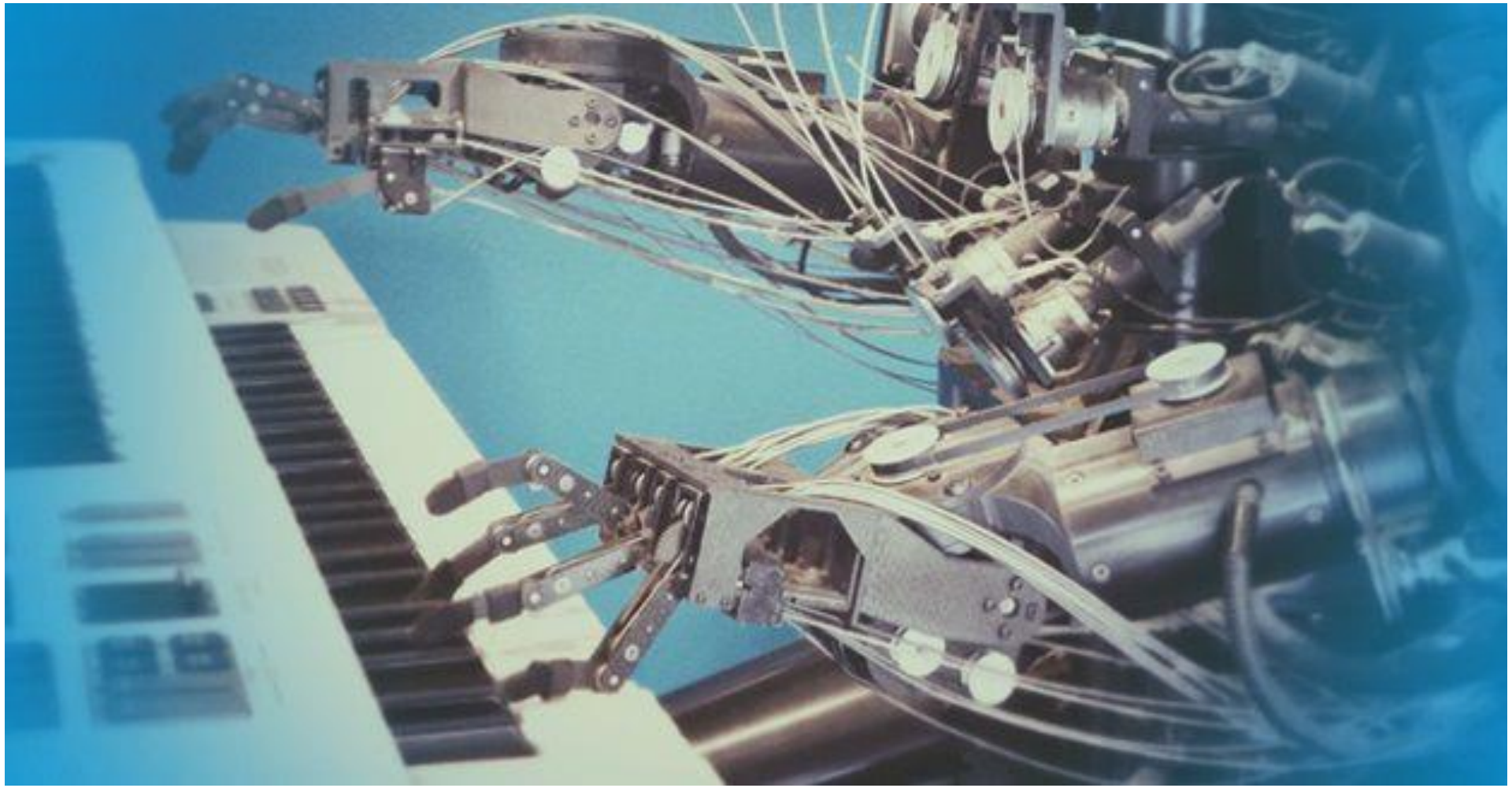
Sophia a humanoid bot created by Hanson Robotics
What distinguishes her from previous robots is her physical likeness to a human being as well as her ability to ‘see’, (or to recognise pre-programmed images) and to respond to interactions with appropriate facial expressions.

https://learn.g2.com/types-of-artificial-intelligence

Kinds of skills that might last for a while?

- Complex Problem Solving
- Critical Thinking
- Creativity
- People Management
- Coordinating with Others
- Emotional Intelligence
- Judgement and Decision Making
- Service Orientation
- Negotiation
- Cognitive Flexibility

Creativity – for how long unique?



https://www.bizcommunity.com/Article/196/831/188218.html

AI Art – after 'teaching' a computer about art

https://time.com/5357221/obvious-artificial-intelligence-art/

Medical Applications of AI

Too many to list; some examples:

- Diagnosis
- Radiology
- Telehealth
- Development of brain-computer interfaces
- Sequencing the genome

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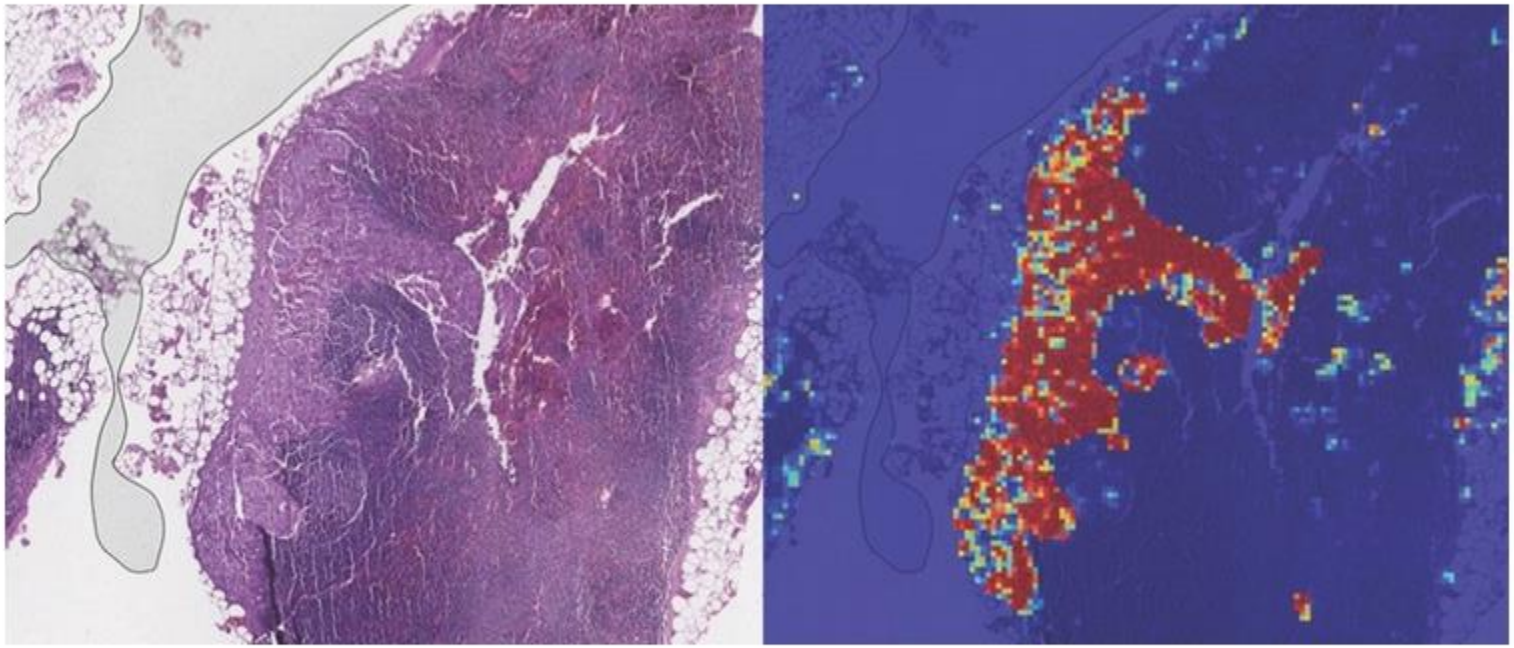


Google AI better than doctors at detecting breast cancer

Google's deep learning AI called LYNA able to correctly identify tumorous regions in lymph nodes 99 per cent of the time.

By Helen Glenny

16th November, 2018 at 00:00

https://www.sciencefocus.com/news/google-ai-better-than-doctors-at-detecting-breast-cancer/

Whirlpools & treacherous places

This is indeed a brave new world that we are entering, but it is not without its very real dangers either; e.g.

- Fake science
- Climate change
- A world without work: the “post-work” society

https://www.economist.com/finance-and-economics/2019/03/28/how-to-solve-southern-italys-unemployment-problem

Fake science

- Not always easy to distinguish; especially at the beginning of an investigation (Husten,2018)
- Simple to understand; makes “sense”
- Tells people what they want to know
- Many scientific discoveries/developments are derided, e.g.
  - Genetically modified crops
  - Climate change
  - Vaccinations should be avoided : measles & polio
- Even if claims based on science are proven to be false or retracted, still used
- Pandemics will change attitudes; but do we really need such draconian solutions?

Climate change

Concept elicits strong emotional reactions & accusations of exaggeration & false news

Nevertheless clear evidence for:

- Polar ice caps melting
- More & fiercer hurricanes & tornados
- More devastating droughts as well as floods
- Spreading deserts
- Possible collapse of the Amazon ecosystem
- Rise in sea levels

All increasingly troubling & pointing to substantial disruption of global climate

Image from climate.nasa.gov

A World without Work

- During this century, much of what we regard as *work* will disappear
- AI increasingly replacing the human workers on many levels
- Jobs that require a high level of repetition and physical effort most at risk
- Outcomes still uncertain:
  - Greater inequality & disruption?
  - A world that runs itself & no longer needs people?
  - Or could AI help us to find new & creative solutions to world's problems???

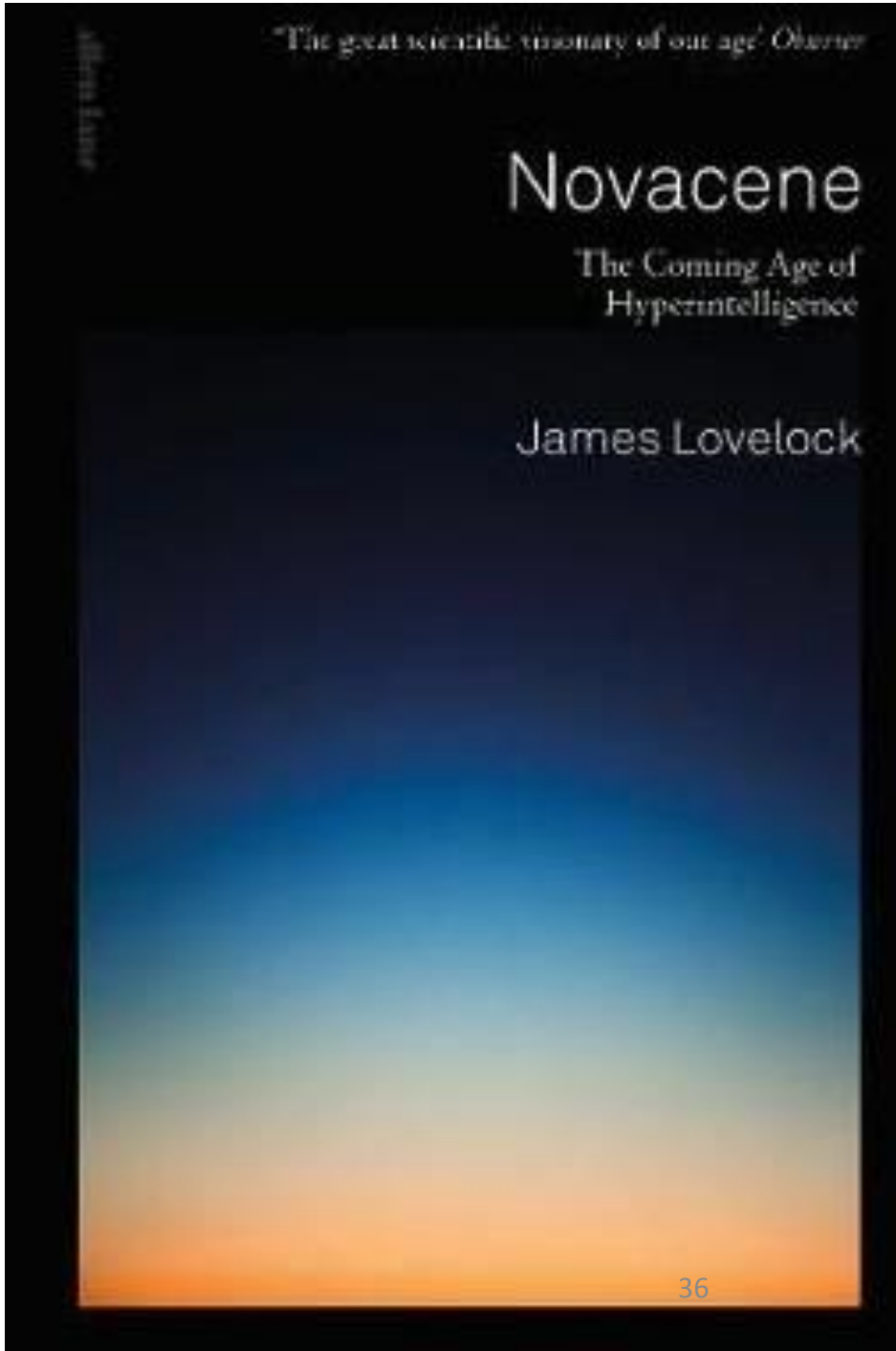
From: Jobs of the future - Surviving the Fourth Industrial Revolution https://www.bizcommunity.com/Article/196/831/188218.html

One suggestion: Universal Basic Income?

- Every member of the population over age 18 receives the same monthly amount for their basic requirements
- No means testing or strings attached
- Different theories as to where the money to pay for the scheme could come from
  - Yang, democratic candidate for next US election, proposes kind of value added tax
  - Or fascinating proposal: scrap all existing taxes income tax, company tax, VAT…
  - Then impose 1% levy on ALL financial transactions to fund UBI?

In closing – could AI come to the rescue??

- *Novacene: The Coming Age of Hyperintelligence* by James Lovelock
- Gaia theory: the entire planet works as a giant organism & needs living creatures to keep the planet cool
- Lovelock proposes that we are now leaving the Anthropocene Age of the last 300 years
- When major impact on the planet was through human intervention
- New age of the Novacene – cyborgs, the creatures of AI, will play a central role



www.loot.co.za

Glimpsing the Novacene?

- Cyborgs: ***eventua***l creatures of AI; capable of "thinking" 10000 times faster than us
- Also capable of reproducing and evolving
- As dependent on the health and future of the planet as we are
- Will need life to keep the planet cool
- Will be in their interests to preserve rather than destroy our planet
- To protect rather than destroy life
- Novacene to be welcomed, not feared
- So our Hitchhiker's message still holds:

DON'T Panic!!!

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Thank you for your attention

Any questions??