

Big Questions - Any Answers?

Giving a Christian perspective on topical science issues

website

bigquestions-anyanswers.org

email

bigquestions2017@gmail.com

Facebook

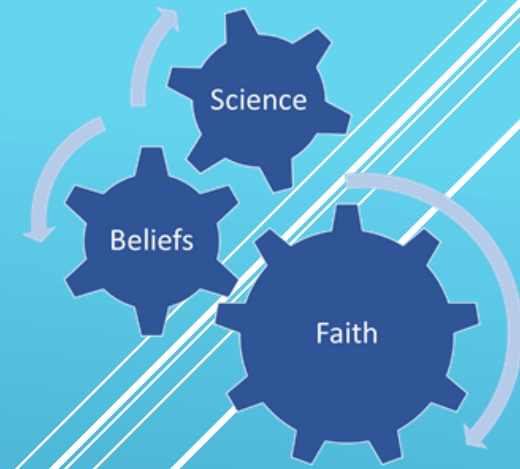
[bigQuestions2017](https://www.facebook.com/bigQuestions2017)

Twitter

[@tynebigq](https://twitter.com/tynebigq)



'RISE OF THE INTELLIGENT MACHINES – FUTURE BATTLEGROUND?'



Re:Think Worcester

<http://rethinkworchester.co.uk/>

07:00 pm, 8th November 2017

Dr Kim Stansfield, C.Eng., MIET, MINCOSE

Senior Teaching Fellow,

Systems Engineering

Warwick University WMG

The views and opinions expressed in this presentation are those of the presenter and do not necessarily reflect in anyway those of Warwick University or any other institution to which he is affiliated.



Courtesy of IBM IoT

SCIENTISTS IN CONGREGATIONS

<http://rethinkworchester.co.uk/>



SCIENTISTS IN CONGREGATIONS SUPPORT



Bible and Science Worcester, affiliated to Christians in Science, would like to thank Durham University's 'Scientists in Congregations' programme for funding the 'ReThink Worcester' Initiative to encourage 16 to 25 year olds to think about and engage in the science & faith debate.

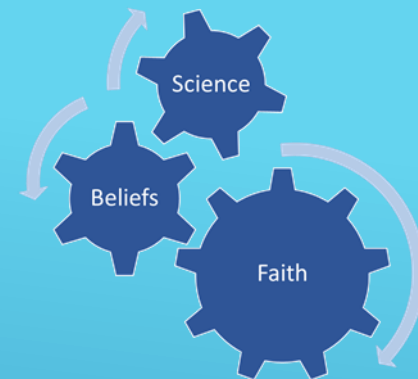
<http://rethinkworcester.co.uk/>

Re:think is a group of people, many of them scientists, who want to help you think about science, beliefs and faith, and how they can fit together.

<http://rethinkworcester.co.uk/>



SCIENTISTS IN CONGREGATIONS



TALK TODAY

- ▶ Kim & Science
- ▶ Natural Intelligence
- ▶ Artificial Intelligence
- ▶ Faith & the future



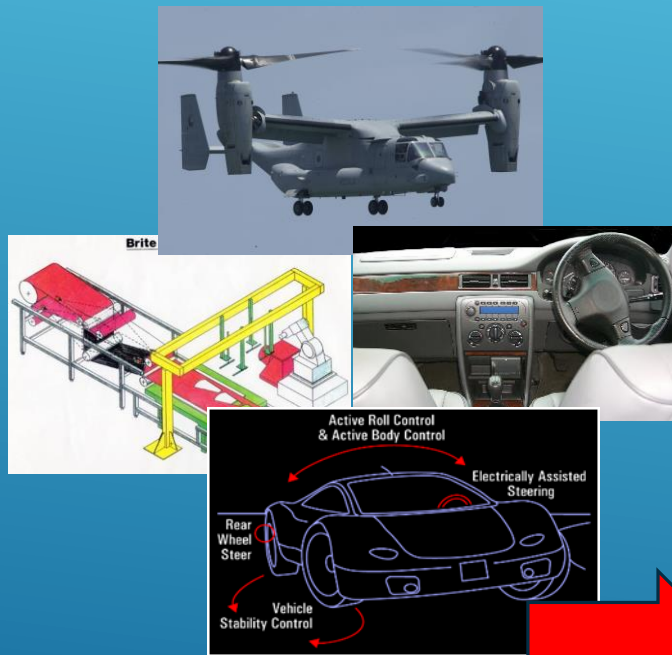
SCIENTISTS IN CONGREGATIONS

KIM STANSFIELD – SCIENCE & FAITH

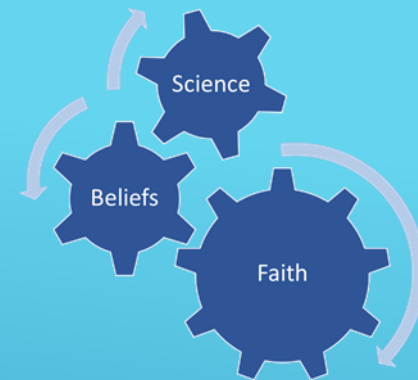
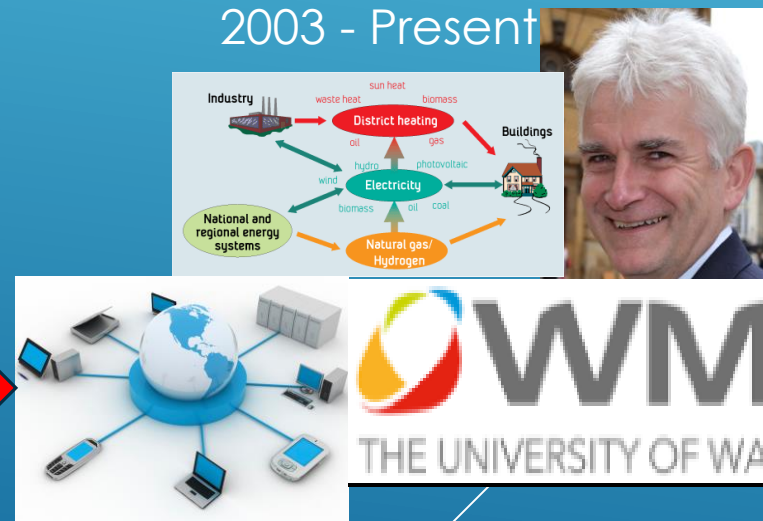
BSc, MSc, PhD
Materials 1970s-1980s



C.Eng.
Manufacturing &
Product Systems
1990 - 2003



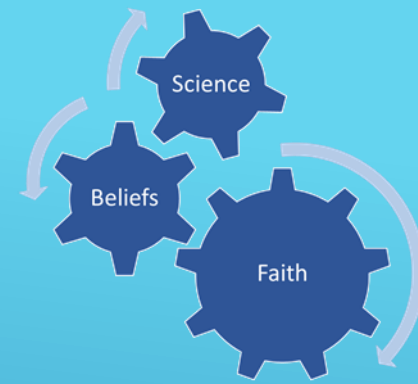
Systems Eng. –
Information, Energy,
Education
2003 - Present



SCIENTISTS IN CONGREGATIONS

KIM'S BIG QUESTION

What's the best thing
in the world I can do
for Siôn???



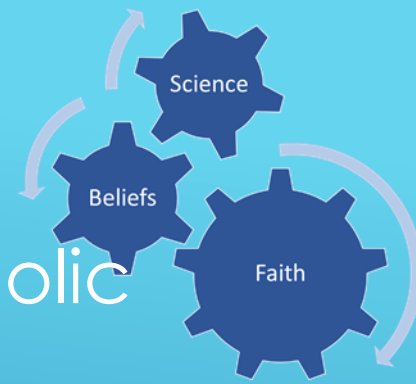
January
1986



The
answer –
Wow!

SCIENTISTS IN CONGREGATIONS

THINKING ABOUT THINKING AND IDENTITY

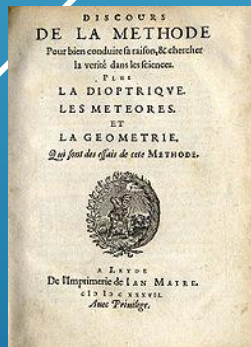


- Philosopher, Mathematician, Scientist & devout Catholic
- Founded algebraic geometry, Cartesian coordinate system
- Father of Western Rationalist Philosophy
- Reduce complex systems to simplest understandable components to understand those systemshmmmm



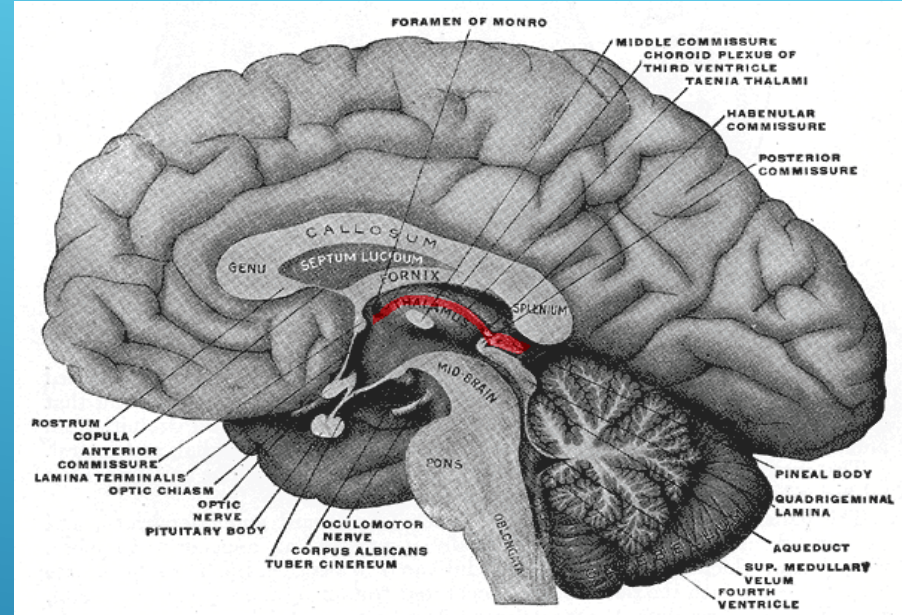
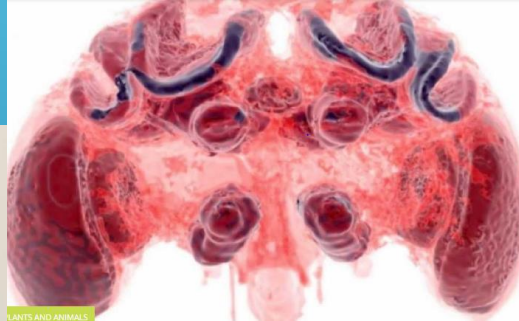
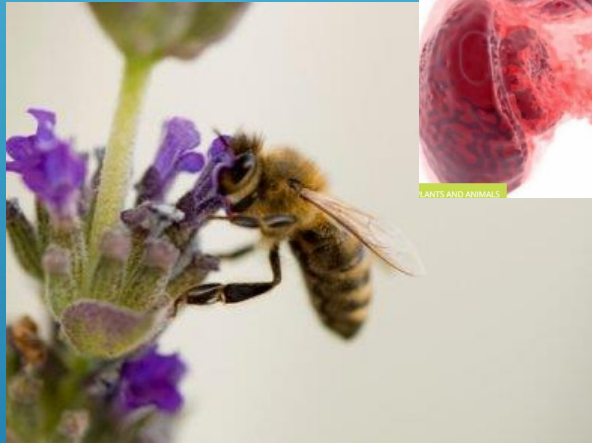
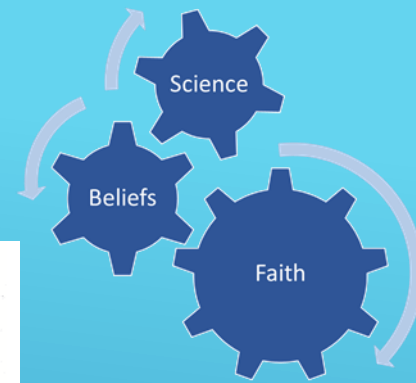
“Cogito ergo sum”
“ I think, therefore I am”.

René Descartes
(1596 – 1650)
Discourse on the
Method, 1637.



SCIENTISTS IN CONGREGATIONS

THE SEAT OF THINKING – THE BRAIN



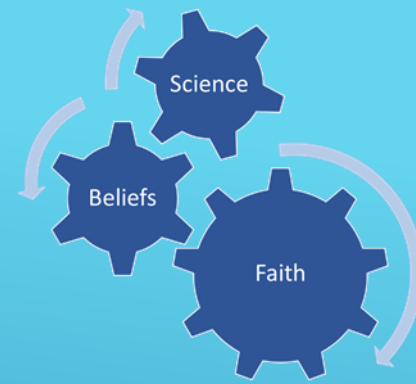
Honey Bees Have A Very Complex Brain And Language System containing 960,000 neurons

A Human Brain
- 10,000 million Brain Cells

The most complex subsystem in the universe?

SCIENTISTS IN CONGREGATIONS

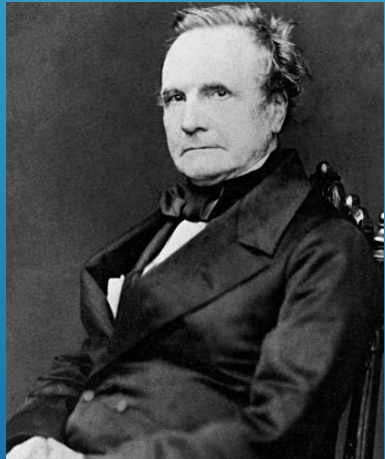
KEY CONCEPTS IN THINKING MACHINES



Jacquard
'Programmable'
Loom 1804



Mechanical
Programmable
Computing



Charles Babbage
1791 - 1879

Mother of
Computer
Programming



Ada Lovelace
1815 - 1852

Father of Theoretical
Computer Science and
Artificial Intelligence

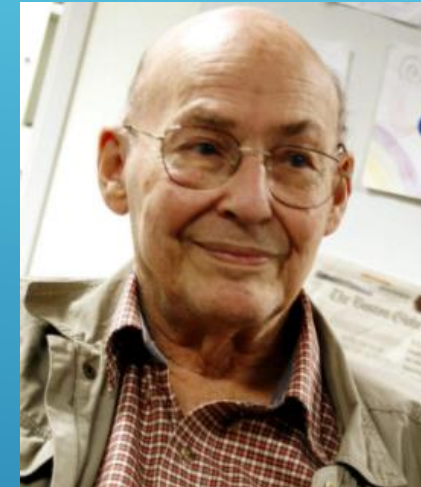


Alan Turing
1912 - 1954



The Turing Test

Father of
Neural Networks &
Cognitive AI



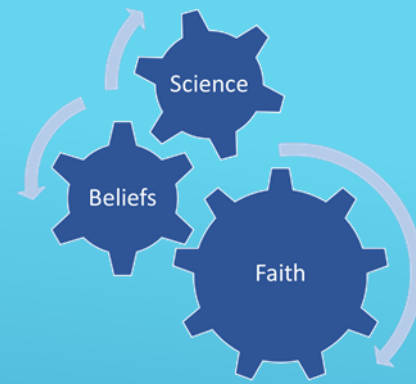
Marvin Minsky
1927 - 2016

<http://rethinkworchester.co.uk/>



SCIENTISTS IN CONGREGATIONS

AI QUESTION?



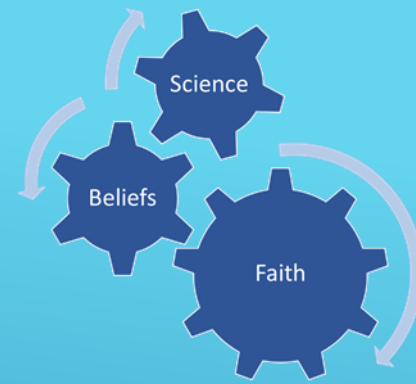
How much
(in either \$ or £) did Google pay
for UK artificial intelligence
start up 'DeepMind' in 2014?

<http://rethinkworchester.co.uk/>



SCIENTISTS IN CONGREGATIONS

WATCH THE WAGGLE DANCE



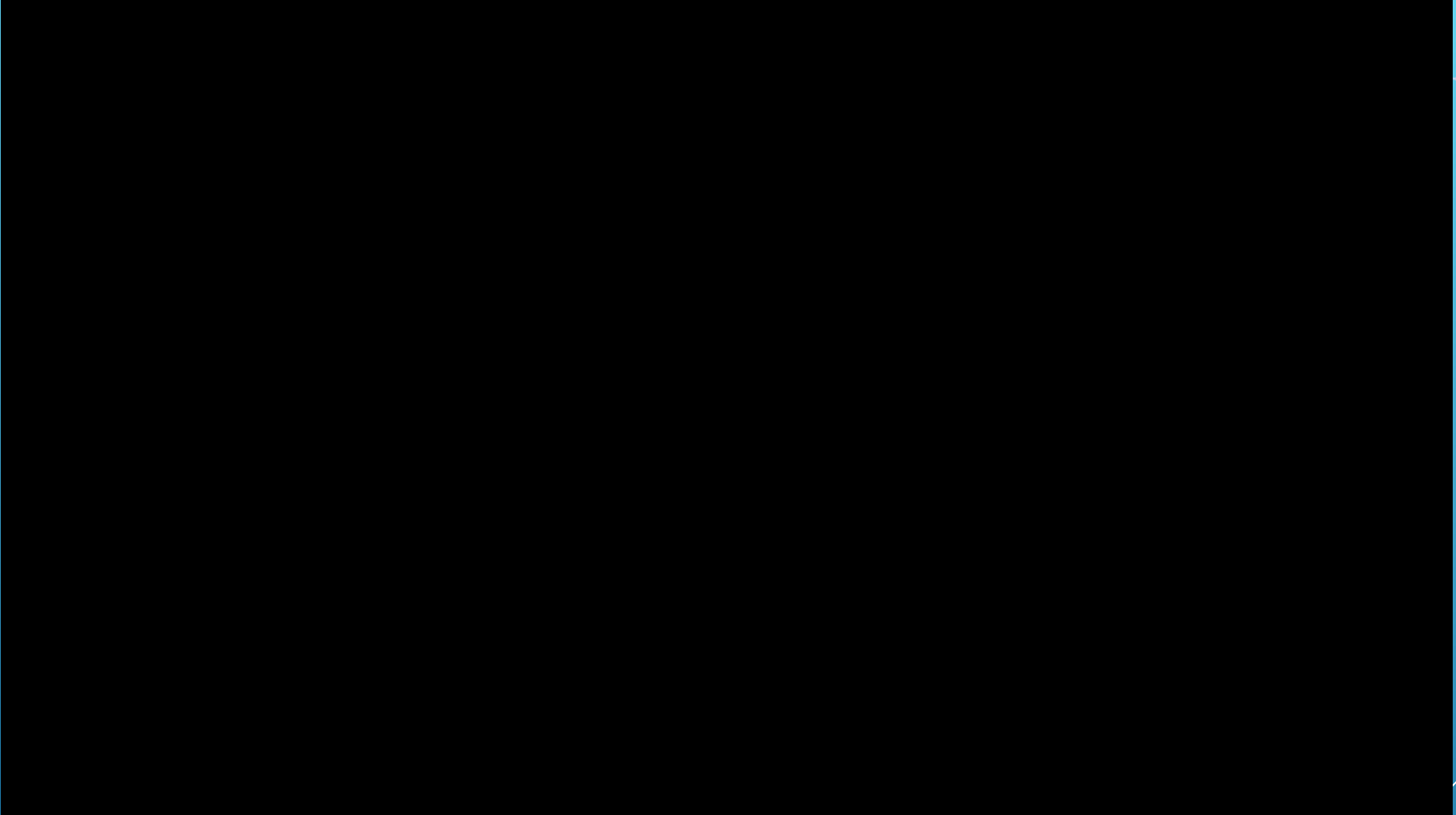
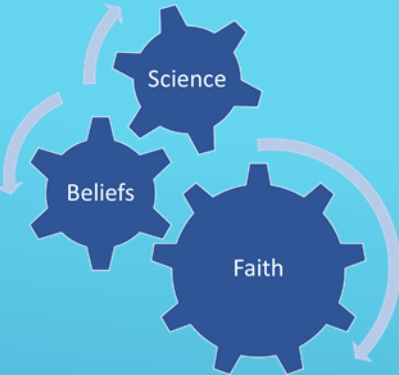
- Swarms demonstrate 'Emergent Behaviour'
- Self Organising to achieve 'Community Goals'
 - Complex Language

College of Computing, Georgia Tech.

<https://www.youtube.com/watch?v=bFDGPgXtK-U>

SCIENTISTS IN CONGREGATIONS

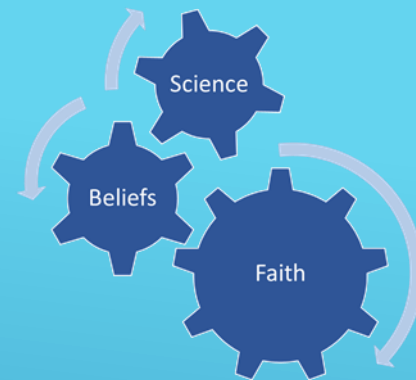
SELF DRIVING CARS



In US: Today

Truck Drivers	3.50 million
Bus Drivers	0.65 million
Taxi Drivers	0.23 million





WHICH IS MORE INTELLIGENT?

Bees



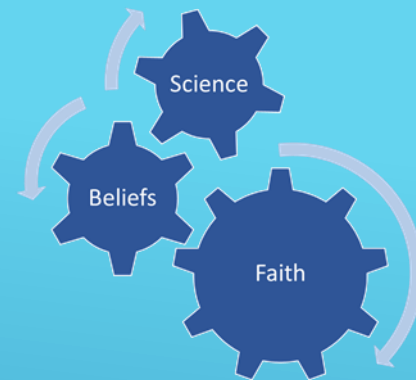
Stand up & Buzz for Britain

Cars



Stand up & Beep for Britain

SCIENTISTS IN CONGREGATIONS



WHICH IS MORE INTELLIGENT?

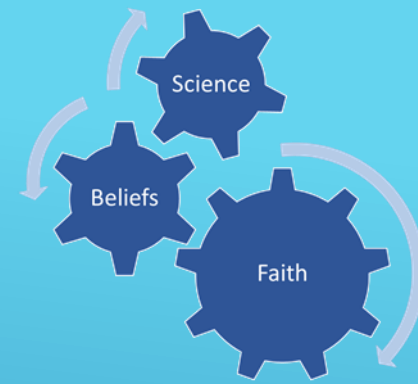
Why
Bees?



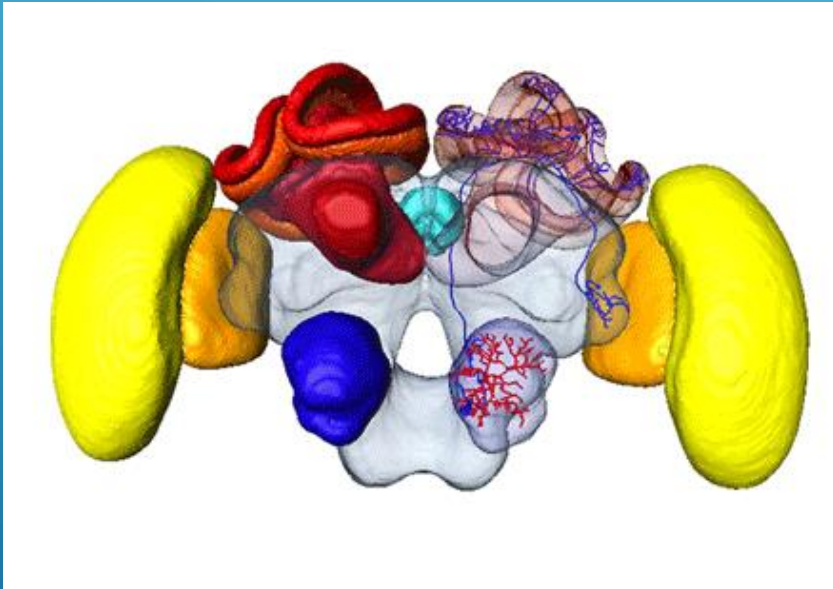
Why
Cars?



SCIENTISTS IN CONGREGATIONS



BIOLOGICAL DATA PROCESSORS



At present bee brains work at a far superior rate to many highly advanced computers. The most advanced computers can easily figure out 16 billion computations in one second. The honey bee brain can figure out about 10 trillion in a second, which is 625 times greater than most advanced computers can do.

<http://rethinkworchester.co.uk/>

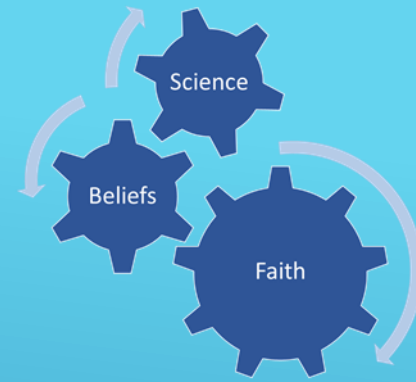


SCIENTISTS IN CONGREGATIONS

BELIEF, DESIRE, INTENTION (BDI) MODEL

► Belief, Desire, Intention

- B: knowledge about the environment **senses**
- D: the need to satisfy some objective **goals**
- I: the ability to command some action(s) **acts**



‘Reactive Agents’

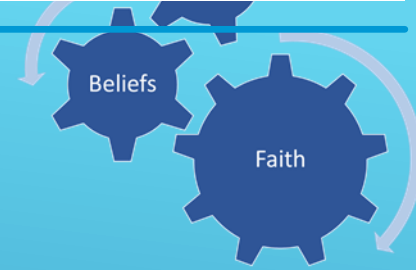
- they react
- they don't deliberate

Machine Goals: Programmed i.e. set by woman

SCIENTISTS IN CONGREGATIONS

Copyright Warwick University © 2017
Used with permission

SELF ORGANISING DRONES



Micro-drones –
modelled on bees,
AI deployed for mid-
exercise re-planning

**Who
programmes
the drones?**

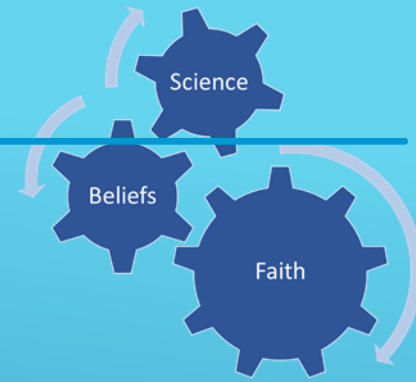


<https://www.youtube.com/watch?v=5NGgHyfPGU0>

<http://rethinkworchester.co.uk/>

DELIBERATIVE AGENTS

- ▶ These extend the BDI model to include:
 - ▶ a symbolic model of the external environment
 - ▶ Data, relationships
 - ▶ memory
 - ▶ the ability to plan: create new intentions
 - ▶ the ability to choose between alternatives



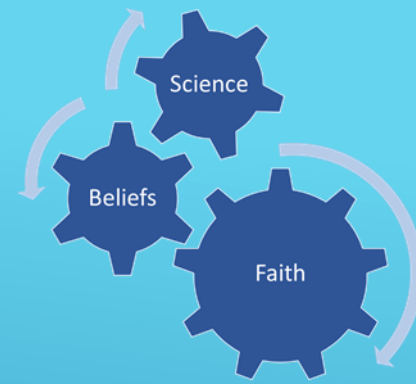
Is this Intelligence?



Artificial agents are man-made; they serve a defined need & have their limits

Copyright Warwick University © 2017
Used with permission

QUITE ELEMENTARY MY DEAR WATSONCOGNITIVE AI EMERGING



Exploits **Cognitive computing:**

- self-learning systems that use
- data mining,
- pattern recognition and
- natural language processing

to mimic the way the human brain works

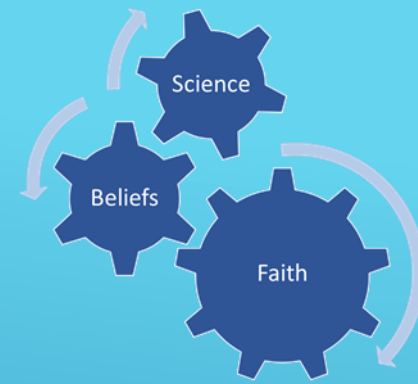
<https://www.youtube.com/watch?v=P18EdAKuC1U>

SCIENTISTS IN CONGREGATIONS

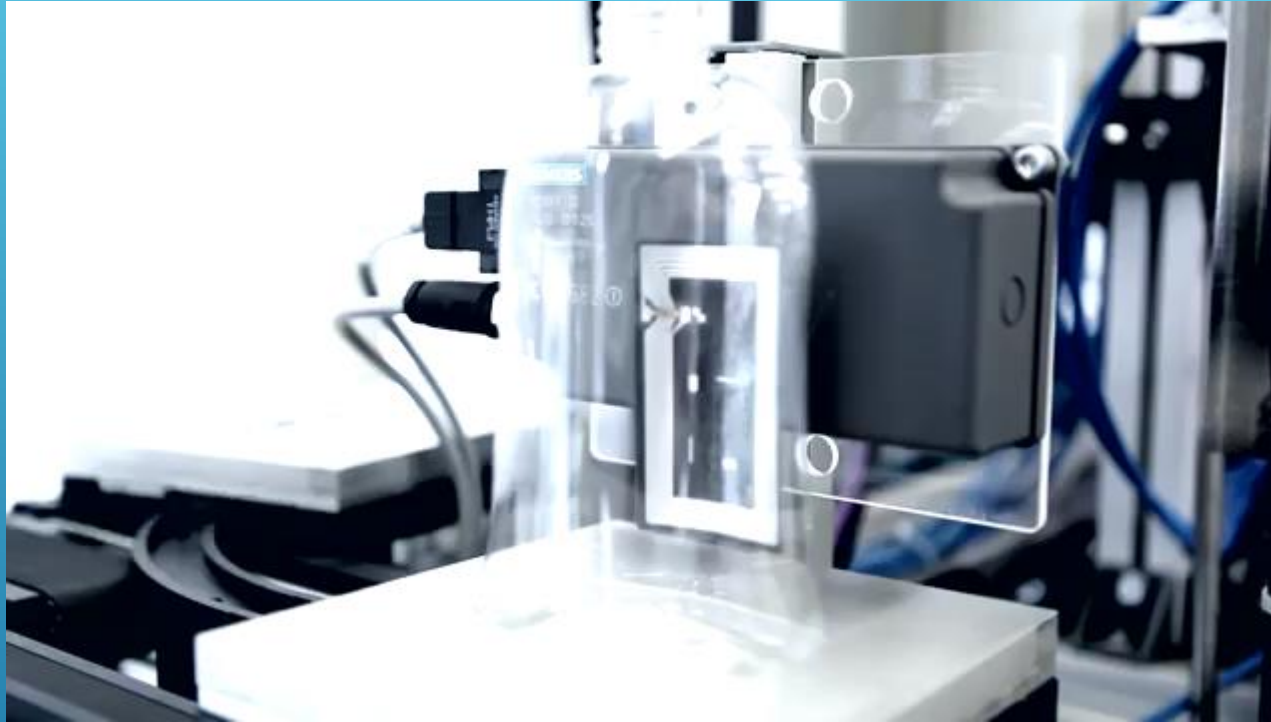
<http://rethinkworchester.co.uk/>



THE 'INTELLIGENT' FACTORY OF TOMORROW....



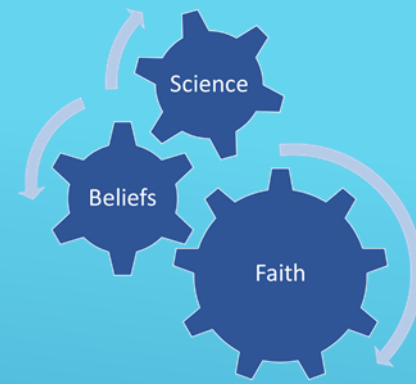
What will the worker roles be in future?



- ▶ Industry 4.0, 'the 4th Industrial Revolution' ... 'Smart Factory'
 - ▶ German Government high-tech strategy (2011).
 - ▶ Collaborative, decentralised, internet-based, open

SCIENTISTS IN CONGREGATIONS

COGNITIVE AI AND HEALTHCARE



For the just in case moments

Not sure whether you need to see a doctor? Get instant medical advice and recommendations on what to do next - all in less than 60 seconds.

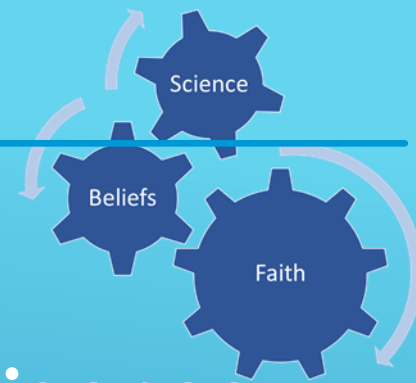
[Download the app](#)

What will doctors roles be in future?

https://www.youtube.com/watch?v=4Om_IDS_RJM

SCIENTISTS IN CONGREGATIONS

AI VS ARTIFICIAL GENERAL INTELLIGENCE (AGI)



Majority of AI developments to date  **Narrow AI**

- ▶ AI algorithms focused on solving specific types of problem
- ▶ Big impact on jobs

(graphic illustration from
thinkprogress.org)



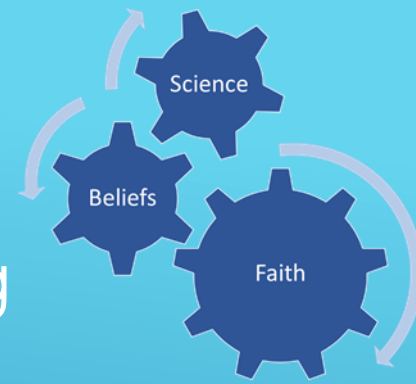
Artificial General Intelligence (AGI) developments aim: develop breadth of capabilities of human brain – approaches:

- ▶ Whole brain emulation
- ▶ Building on narrow AI
- ▶ A comprehensive theory of mind

What about consciousness??

AI AUTOMATING OFFICE JOBS TODAY

- ▶ Search Engines
- ▶ Digital Assistants – Voice Recognition, Diary Planning
- ▶ Image Recognition
- ▶ Spam Filtering/ Advertising Targeting
- ▶ Natural Language Understanding
- ▶ Translation
- ▶ Trend Prediction
- ▶ Strategic planning
- ▶ Big Data analysis, Etc.

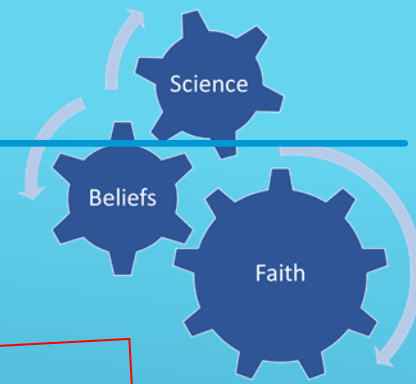


<http://rethinkworchester.co.uk/>



SCIENTISTS IN CONGREGATIONS

BUT WHAT NEW 'AI' JOBS??



Privacy &
Security
Guardian

3D Printing
Construction
Engineers

Smart Home
Designers &
Technicians

What new job Roles?

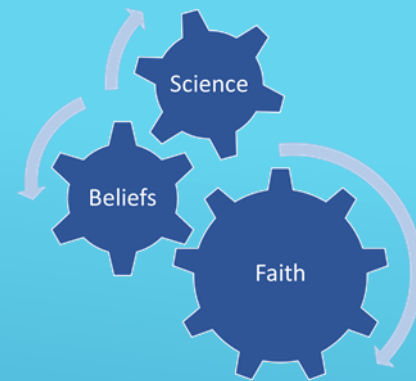
Smart
Clothing
Consultant

Drone
Developers &
Maintainers

How do we
support the
unemployed?

<http://rethinkworchester.co.uk/>





AI ANSWER?

How much

(in either \$ or £) did Google
pay for UK artificial
intelligence start up
'DeepMind' in 2014?

= \$400 million/
£263 million

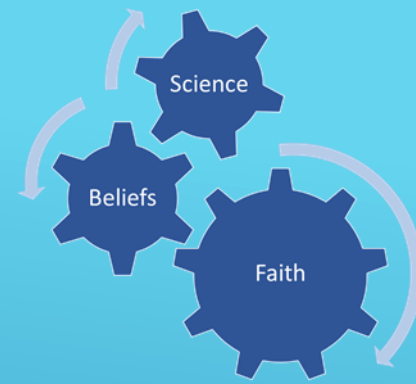
<http://rethinkworchester.co.uk/>



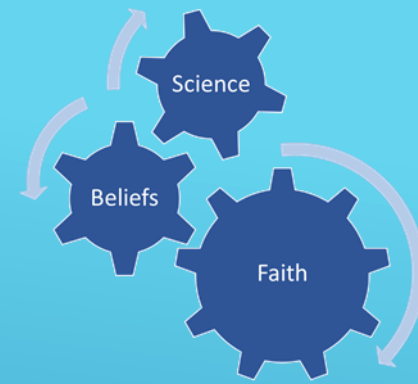
SCIENTISTS IN CONGREGATIONS

SO – WHAT ARE CHALLENGES?

- Intelligent machines & systems are with us
- Currently – goals are set by human ‘programmers’. What are their **goals, ethics and moral compasses?**
- They conduct high speed and high volume data processing faster than humans in narrow areas..., don’t get bored or go to sleep!
- Will Artificial General Intelligence ‘emerge’ – will machines become conscious?
- Will they start setting their own goals?
- The scope of what can be automated growing rapidly - employment
- There are many things that humans can do that machines cannot do as well ...yet!
 - Care and compassion
 - Imagination, Creativity & Invention
 - Community spirit & social orientation



THE ANSWER THAT CHANGED EVERYTHING



What's the best thing
in the world I can do
for Siôn???

February
1986



The Instant
Answer
From the
unknown God

'Follow
Jesus'

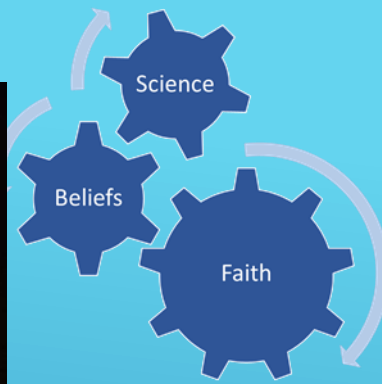
SCIENTISTS IN CONGREGATIONS

“God most high, creator of Heaven and earth”

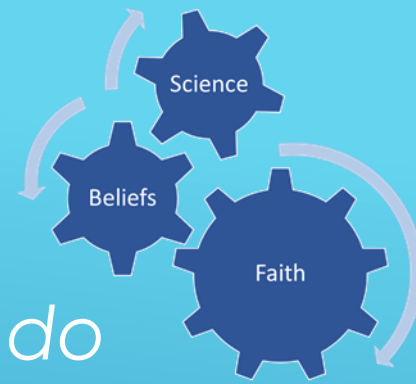
- Genesis 14:2c

“**139:13** Certainly you made my mind and heart; you wove me together in my mother’s womb.**14** I will give you thanks because your deeds are awesome and amazing. You knew me thoroughly; **15** my bones were not hidden from you, when I was made in secret and sewed together in the depths of the earth. **16** Your eyes saw me when I was inside the womb. All the days ordained for me were recorded in your scroll before one of them came into existence.”

- Psalm 139:13-15



SCIENTISTS IN CONGREGATIONS



13 If I speak in the tongues of men or of angels, but do not have love, I am only a resounding gong or a clanging cymbal.

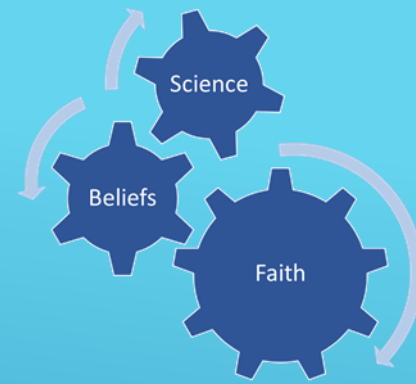
² If I have the gift of **prophecy and can fathom all mysteries and all knowledge**, and if I have a faith that can move mountains, but do not have love, I am nothing. ³ If I give all I possess to the poor and give over my body to hardship that I may boast,^[a] but do not have love, I gain nothing.

- 1 Corinthians 13:1-3

MY CONCLUSIONS

My unique capabilities are
given by God, my creator
He knitted me together in my
mother's womb

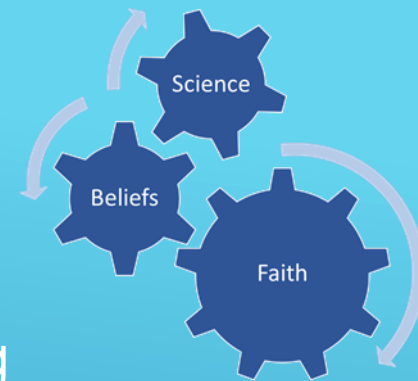
He cares for and loves nature
that He Created – even me
He has a plan for me and how I
will contribute to communities
and society. He provides my
mission, my moral compass
and my identity



<http://rethinkworchester.co.uk/>



SCIENTISTS IN CONGREGATIONS



Werner Heisenberg
'Heisenberg Uncertainty Principle'
Awarded 1932 Nobel Prize in Physics
for laying foundation for Quantum
Mechanics

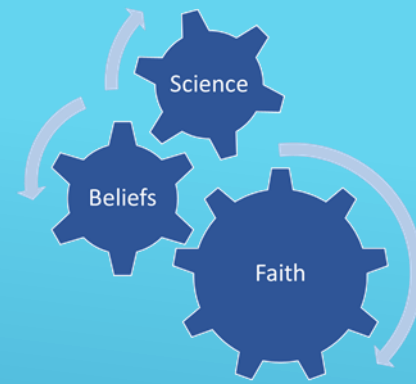
“The first gulp from the glass of natural sciences will turn you into an atheist, but at the bottom of the glass God is waiting for you.”

Further Reading:

Brynjolfsson, Erik and McAfee, Andrew (2011), 'Race Against The Machine', Digital Frontier Press

Chase, Callum (2015), 'Surviving AI – The Promise & Peril of Artificial Intelligence', Three Cs Publishing

Kurzweil, Ray (1999), 'The Age of Spiritual Machines', Penguin Putnam



Big Questions - Any Answers?

Giving a Christian perspective on topical science issues

website

bigquestions-anyanswers.org

email

bigquestions2017@gmail.com

Facebook

[bigQuestions2017](https://www.facebook.com/bigQuestions2017)

Twitter

[@tynebigq](https://twitter.com/tynebigq)

