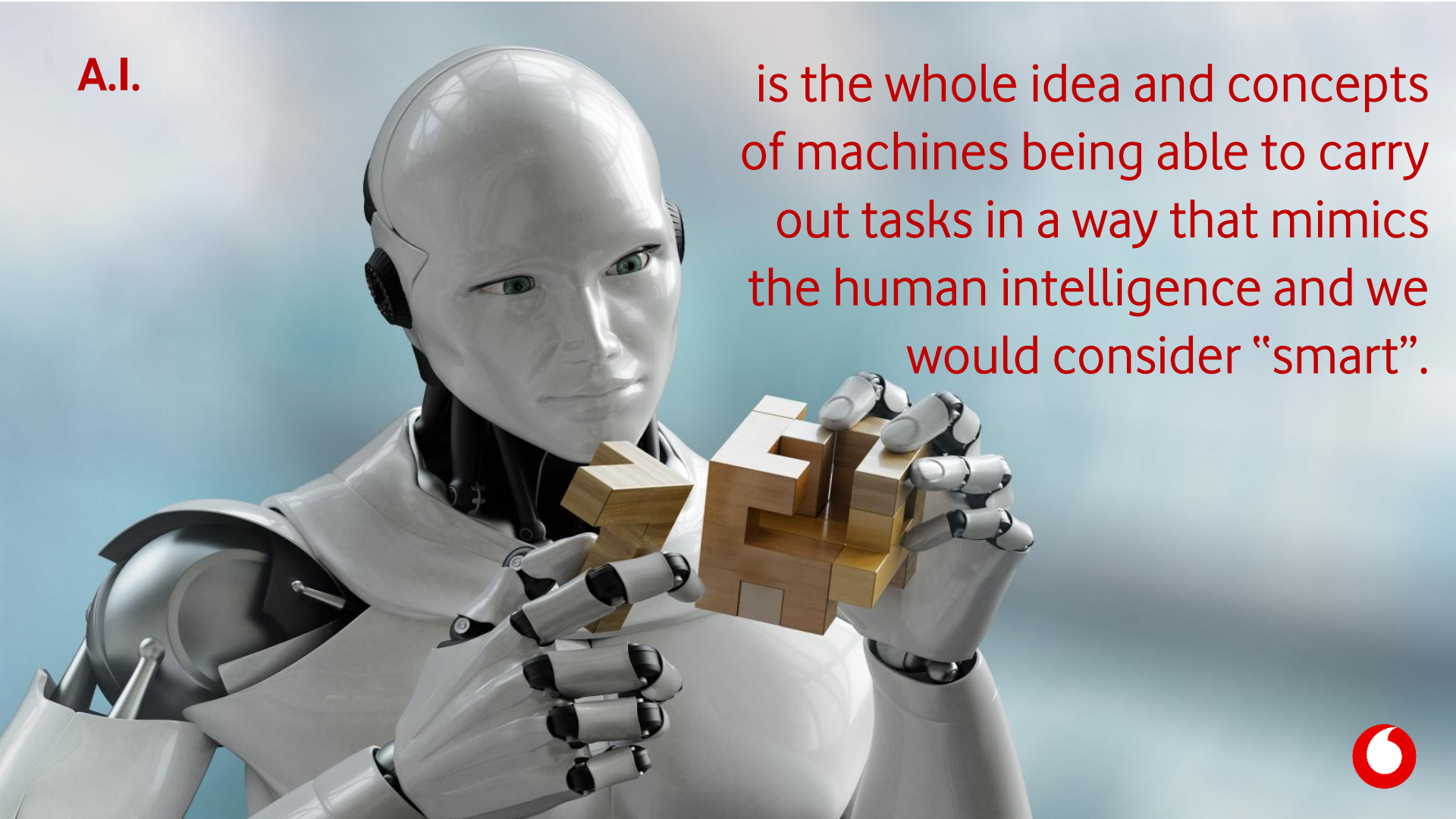
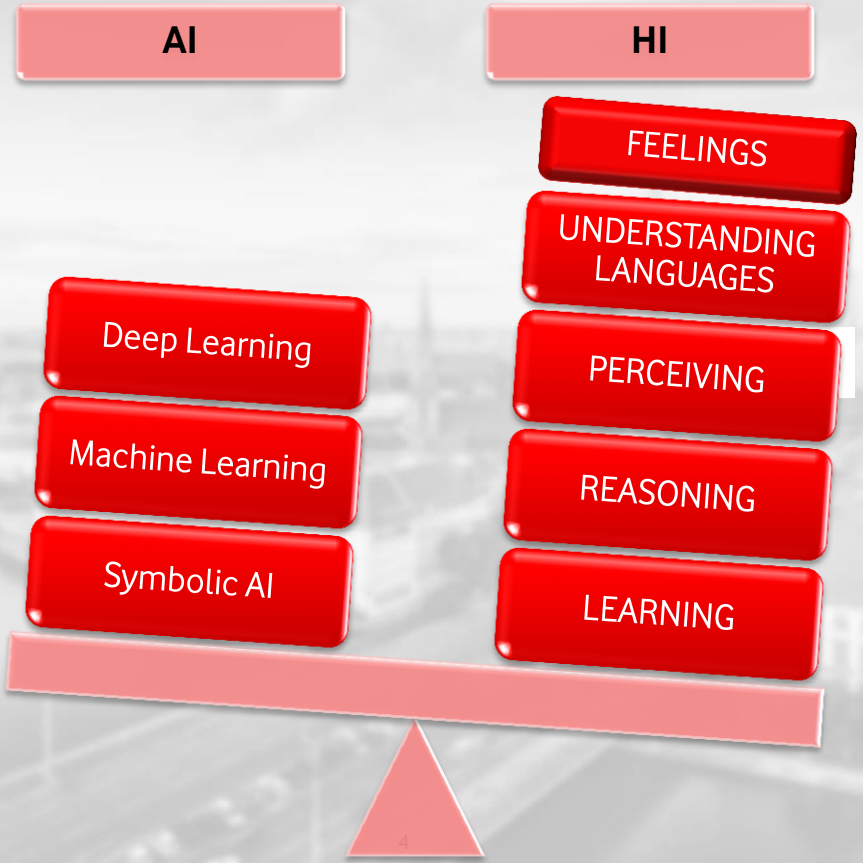

Vodafone AI and ML
toward the future

Agenda

- Definition
- Concept Illustration
- Vodafone Use cases
- Q&A


A.I.
is the whole idea and concepts of machines being able to carry out tasks in a way that mimics the human intelligence and we would consider “smart”.

Human Intelligence Vs Artificial Intelligence

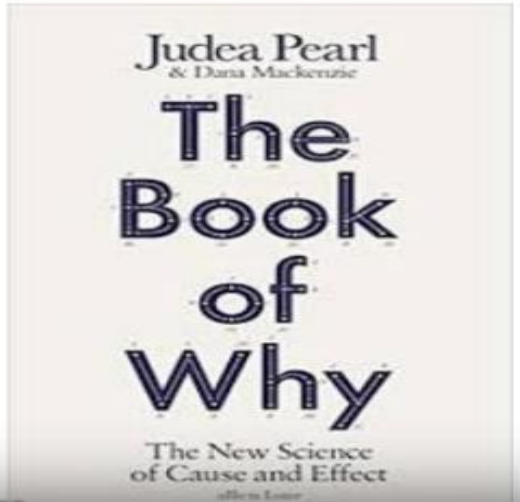


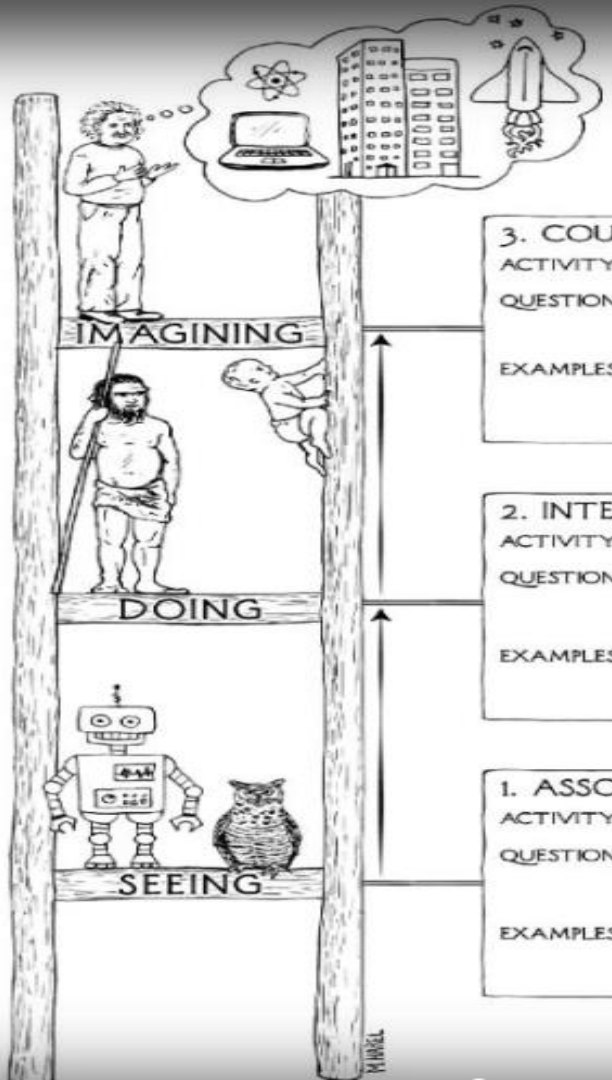
CAUSAL INFERENCE IN STATISTICS

A Primer

Judea Pearl
Madelyn Glymour
Nicholas P. Jewell

WILEY





3. COUNTERFACTUALS

ACTIVITY: Imagining, Retrospection, Understanding

QUESTIONS: *What if I had done ...? Why?* (Was it X that caused Y? What if X had not occurred? What if I had acted differently?)

EXAMPLES: Was it the aspirin that stopped my headache? Would Kennedy be alive if Oswald had not killed him? What if I had not smoked for the last 2 years?

2. INTERVENTION

ACTIVITY: Doing, Intervening

QUESTIONS: *What if I do ...? How?* (What would Y be if I do X? How can I make Y happen?)

EXAMPLES: If I take aspirin, will my headache be cured? What if we ban cigarettes?

1. ASSOCIATION

ACTIVITY: Seeing, Observing

QUESTIONS: *What if I see ...?* (How are the variables related? How would seeing X change my belief in Y?)

EXAMPLES: What does a symptom tell me about a disease? What does a survey tell us about the election results?

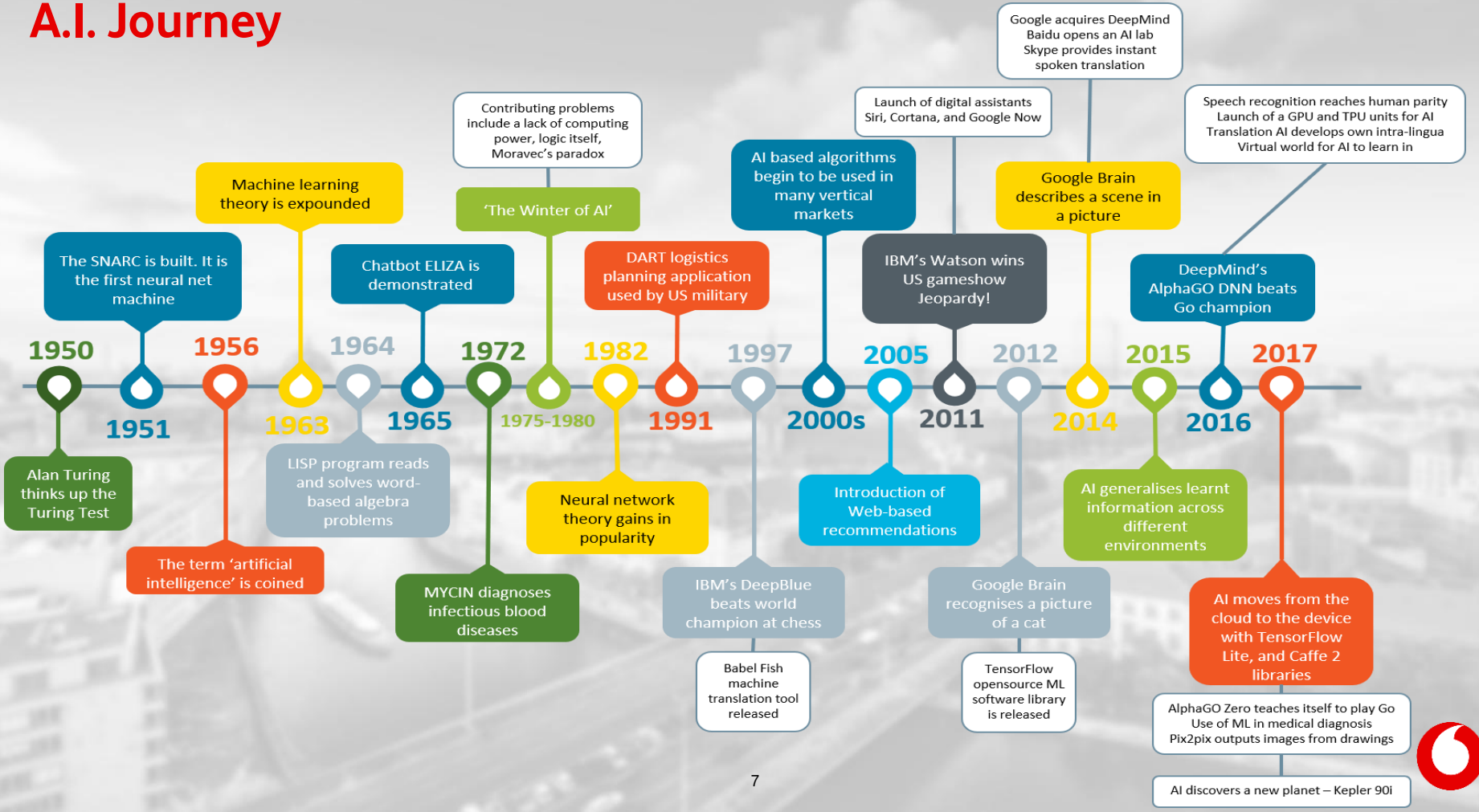
Type of Artificial Intelligence?

Artificial Narrow Intelligence (ANI): Machine intelligence that equals or exceeds human intelligence or efficiency at a specific task.

Artificial General Intelligence (AGI): A machine with the ability to apply intelligence to any problem, rather than just one specific problem *(human-level intelligence)*.

Artificial Superintelligence (ASI): An intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills.

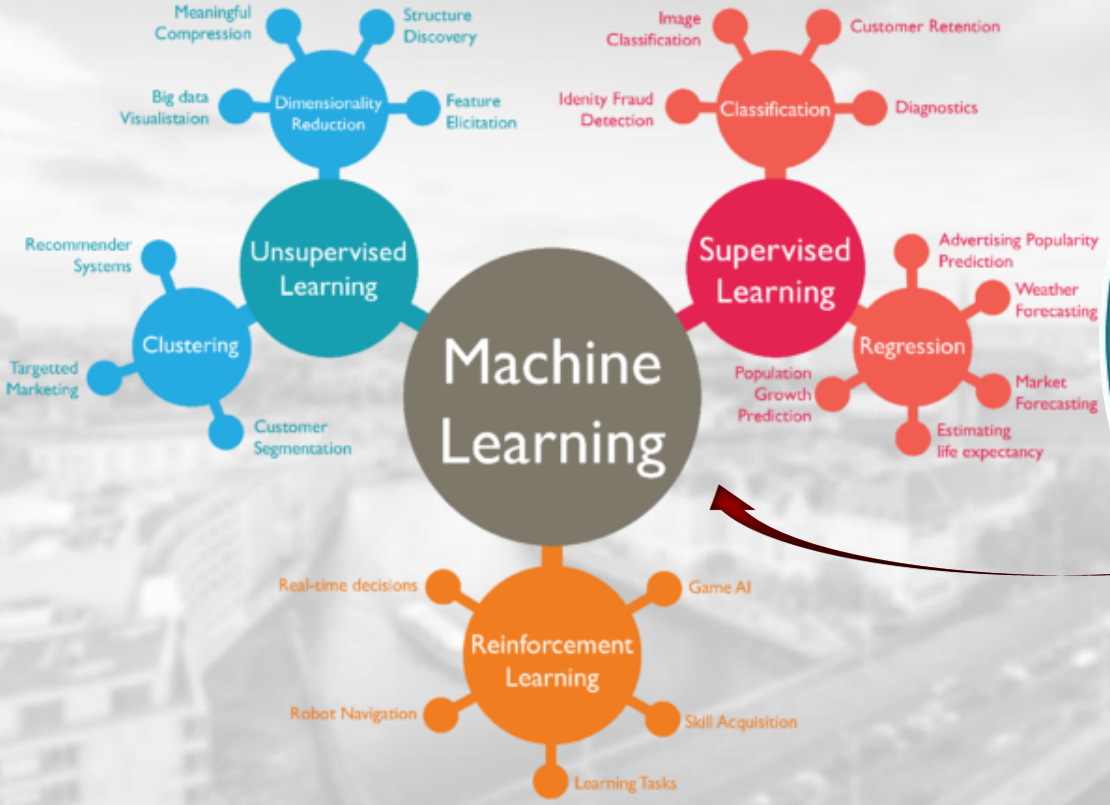
A.I. Journey

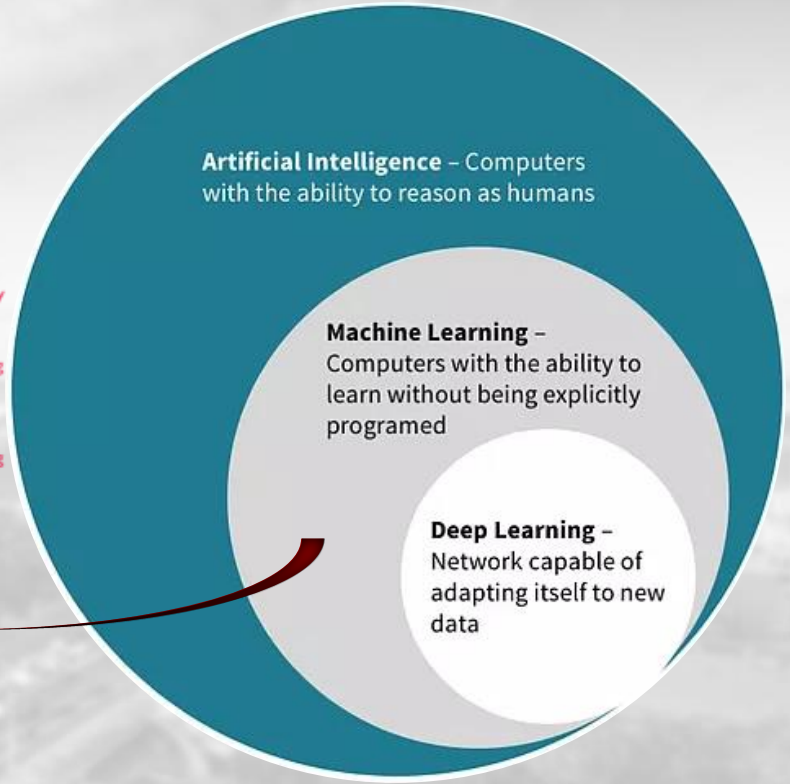

Google acquires DeepMind
Baidu opens an AI lab
Skype provides instant spoken translation
Launch of digital assistants Siri, Cortana, and Google Now
Speech recognition reaches human parity
Launch of a GPU and TPU units for AI
Translation AI develops own intra-lingua
Virtual world for AI to learn in
Contributing problems include a lack of computing power, logic itself, Moravec's paradox
Machine learning theory is expounded
'The Winter of AI'
AI based algorithms begin to be used in many vertical markets
Google Brain describes a scene in a picture
The SNARC is built. It is the first neural net machine
Chatbot ELIZA is demonstrated
DART logistics planning application used by US military
IBM's Watson wins US gameshow Jeopardy!
DeepMind's AlphaGO DNN beats Go champion
1950
1951
1956
1963
1964
1965
1972
1975-1980
1982
1991
1997
2000s
2005
2011
2012
2014
2015
2016
2017
Alan Turing thinks up the Turing Test
The term 'artificial intelligence' is coined
LISP program reads and solves word-based algebra problems
MYCIN diagnoses infectious blood diseases
Neural network theory gains in popularity
IBM's DeepBlue beats world champion at chess
Babel Fish machine translation tool released
Introduction of Web-based recommendations
Google Brain recognises a picture of a cat
TensorFlow opensource ML software library is released
AI generalises learnt information across different environments
AI moves from the cloud to the device with TensorFlow Lite, and Caffe 2 libraries
AlphaGO Zero teaches itself to play Go
Use of ML in medical diagnosis
Pix2pix outputs images from drawings
AI discovers a new planet – Kepler 90i

Cradle of AI

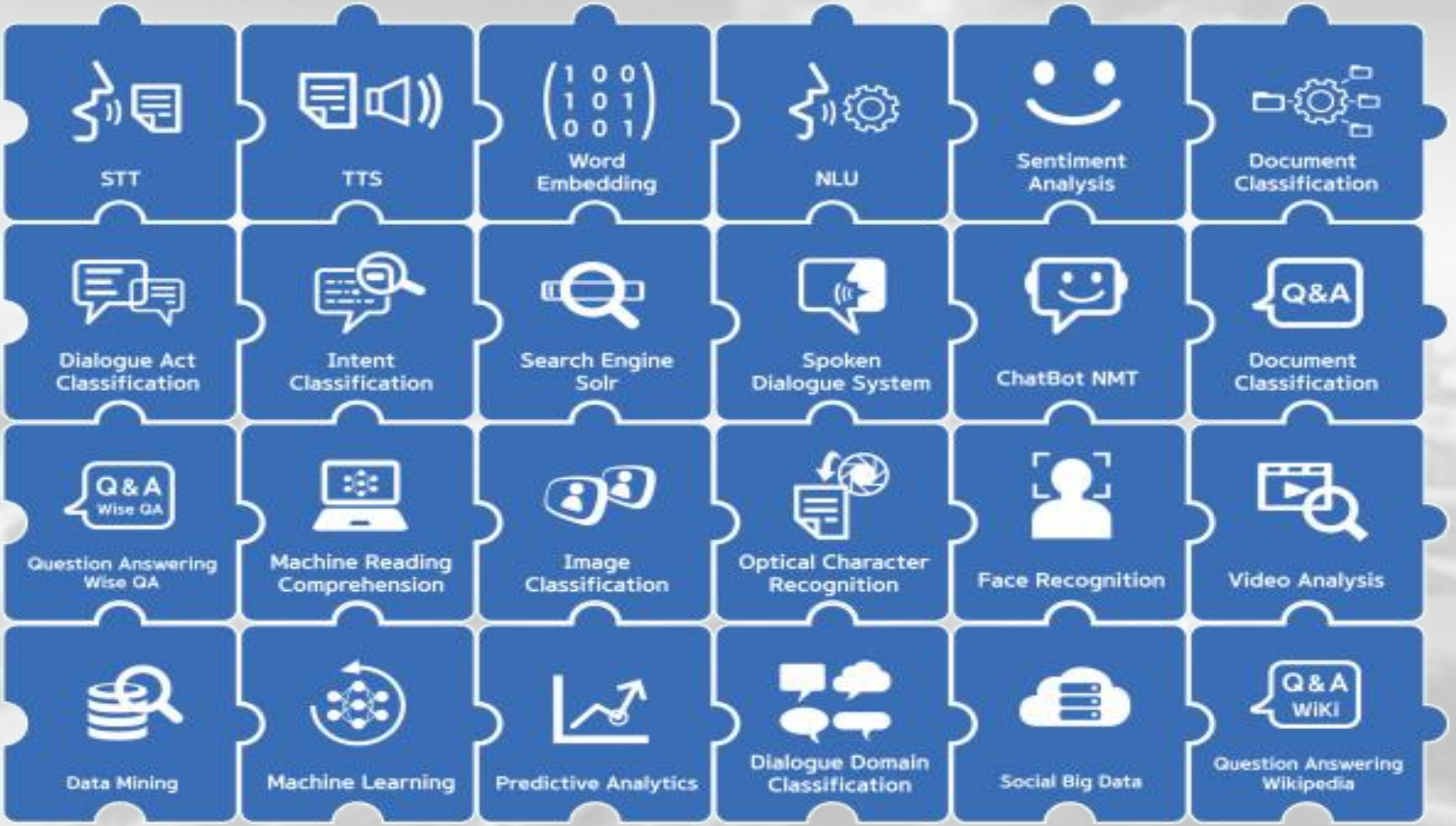
1941:DEVELOPMENT OF THE ELECTRONIC COMPUTER.
1949: First Commercial, Stored Program Computer.
1956: Dartmouth Conference.
1963: Start of DoD's. Advanced Research Projects (US Vs USSR).
1970: First Expert System.
1986: AI-Based Hardware Sells. $425 Million to Companies (GM, Boing, etc..), Rise of ML
1995: AI as Science.
2006: face recognition software available in consumer cameras, where 2003-2007: Robot driving vehicle.
2014: ANN introduction.
2017: Deep Neural Networks.

Type of AI and Machine Learning

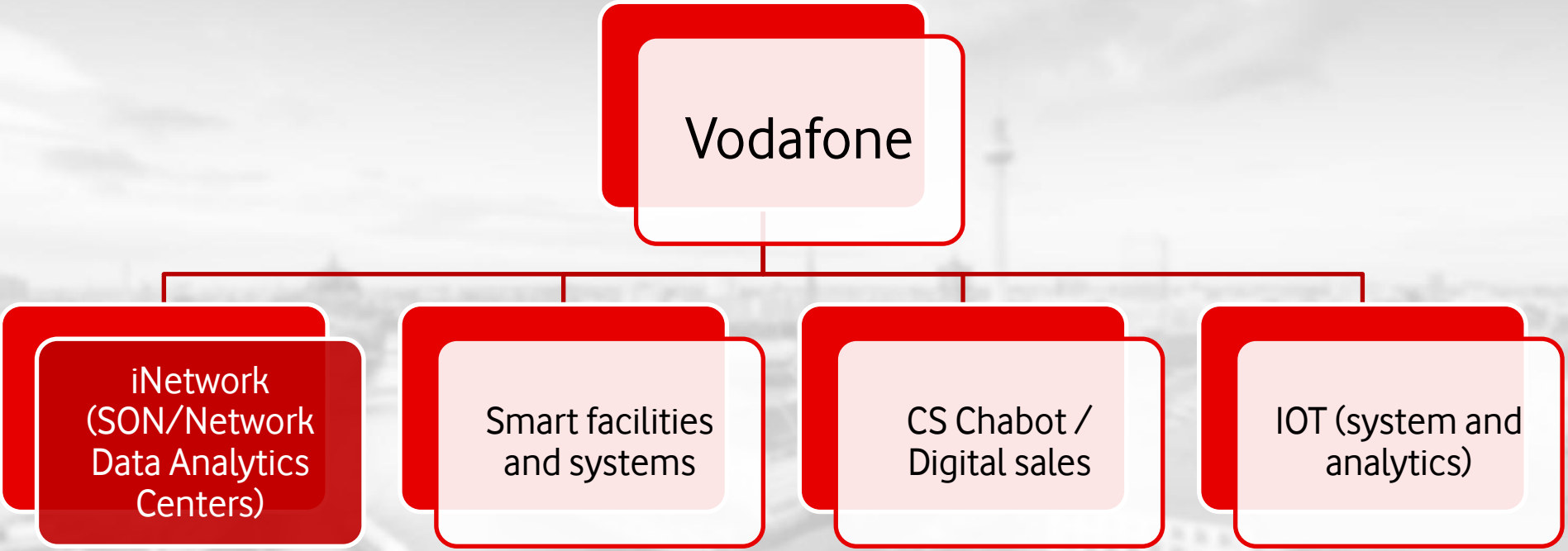




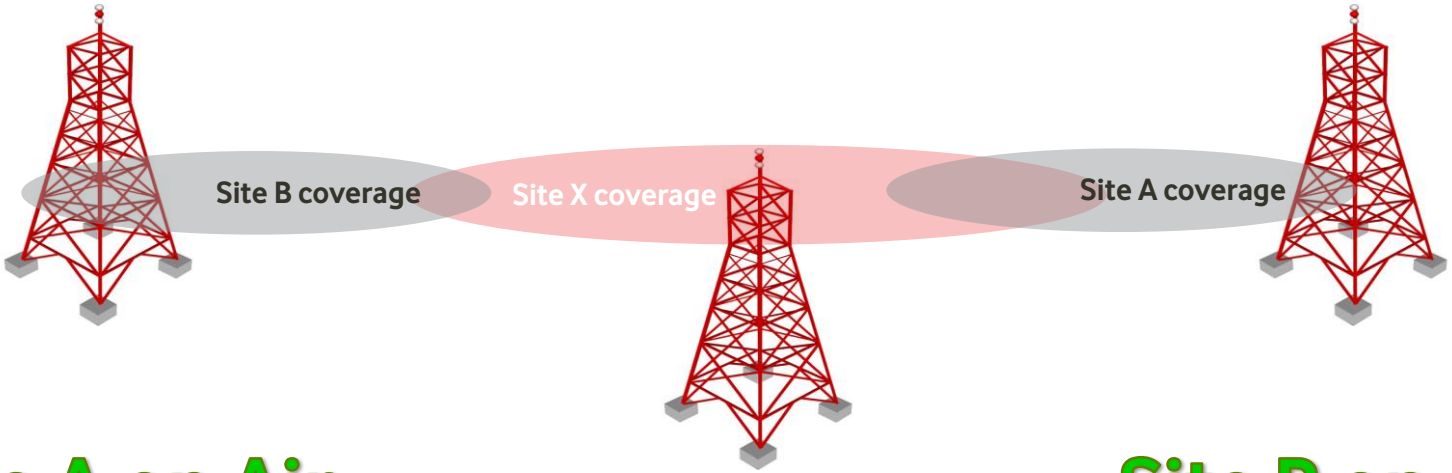
AI Applications Examples



Vodafone of AI and Machine Learning



ML RAN Self-Healing

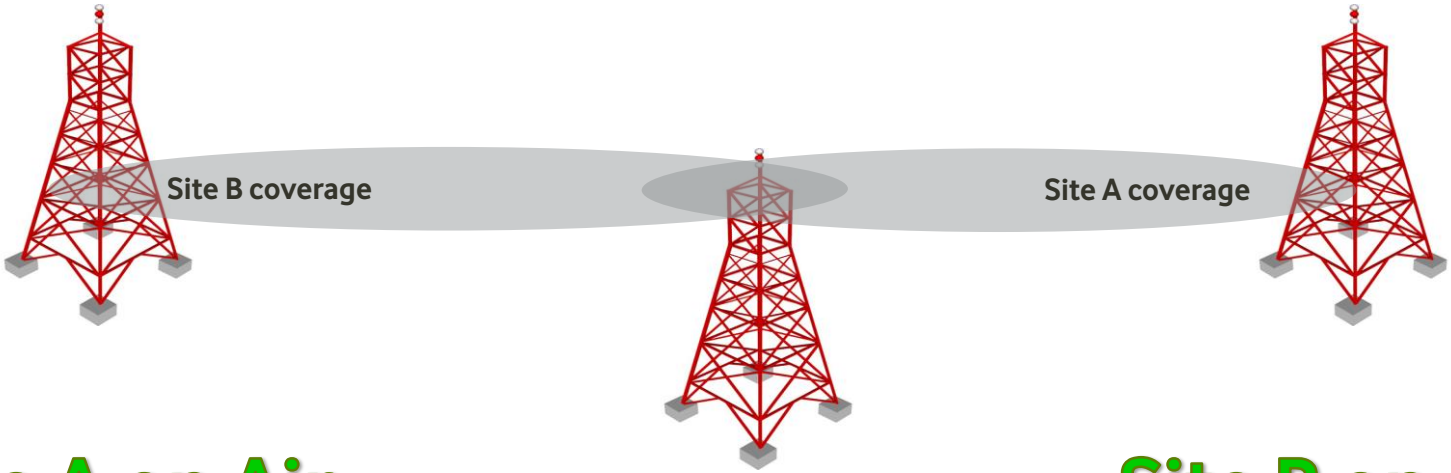


Site A on Air

Site B on Air

Site X on Air

ML RAN Self-Healing

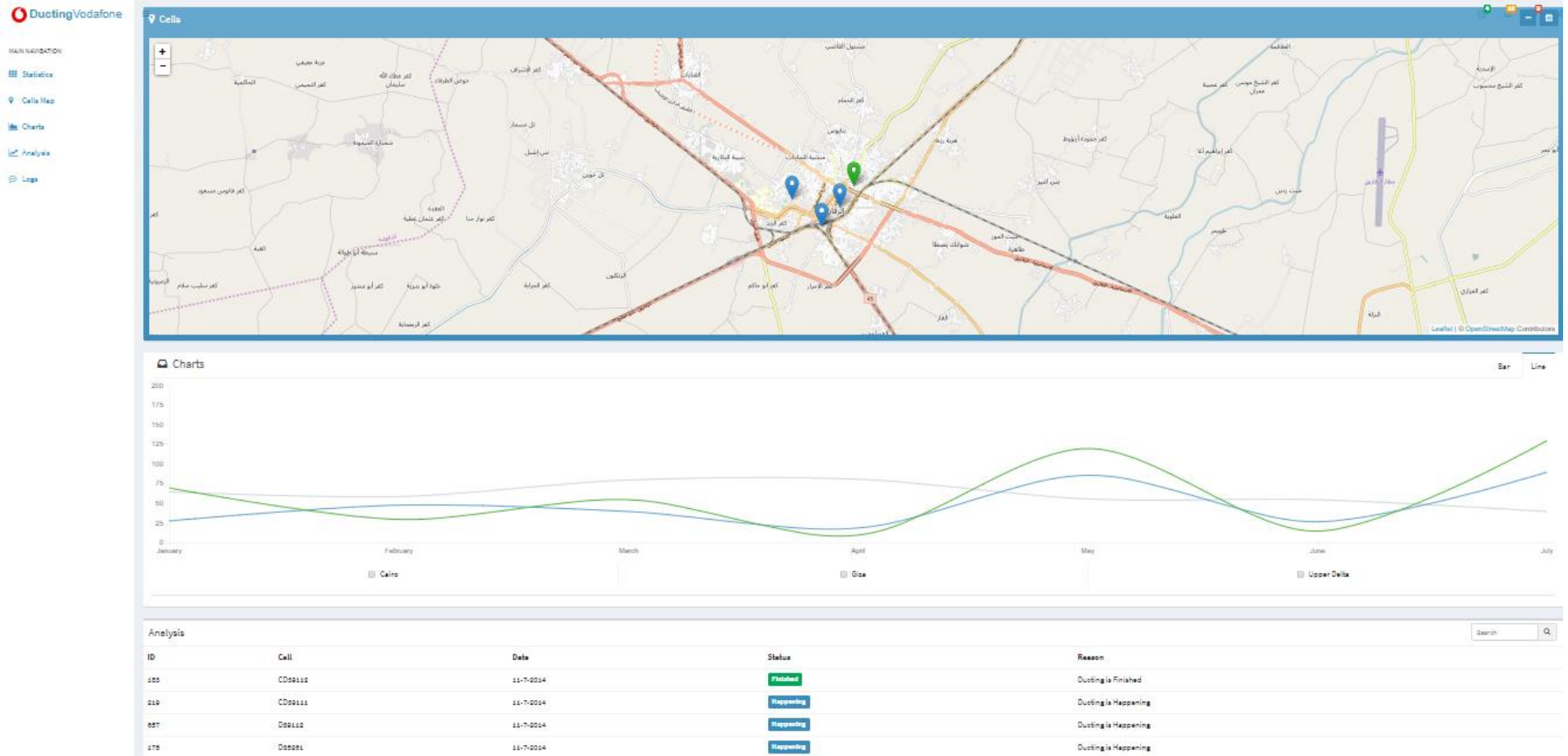


Site A on Air

Site B on Air

Site X Down

Managing Tropospheric Ducting Effect in Mobile Networks using Unsupervised Machine Learning



Vodafone Dream Lab

DreamLab

Charge. Sleep. Fight Cancer.

#SleepLikeAHero

Vodafone Foundation

Vodafone Foundation, UK Registered charity number 1089625

Vodafone Lead AI in ITU

FG-ML5G

The ITU-T Focus Group on Machine Learning for Future Networks including 5G was established by ITU-T Study Group 13 at its meeting in Geneva, 6-17 November 2017.

The Focus Group will draft technical reports and specifications for machine learning (ML) for future networks, including interfaces, network architectures, protocols, algorithms and data formats.

Vodafone Lead AI in ETSI

Experiential Networked Intelligence (ENI)

Our Experiential Networked Intelligence Industry Specification Group (ENI ISG) is defining a Cognitive Network Management architecture, using Artificial Intelligence (AI) techniques and context-aware policies to adjust offered services based on changes in user needs, environmental conditions and business goals.

The use of Artificial Intelligence techniques in the network management system should solve some of the problems of future network deployment and operation.