Technology Landscape

**ARTIFICIAL INTELLIGENCE**

- **NEURAL NETWORKS**
- **PATTERN RECOGNITION**
- **NATURAL LANGUAGE PROCESSING**
- **CHATBOTS**
- **REAL TIME EMOTION ANALYTICS**
- **VIRTUAL COMPANIONS**
- **REAL TIME UNIVERSAL TRANSLATION**
- **THOUGHT CONTROLLED GAMING**
- **NEXT GEN CLOUD ROBOTICS**
- **AUTONOMOUS SURGICAL ROBOTICS**
- **ROBOTIC PERSONAL ASSISTANTS**
- **COGNITIVE CYBER SECURITY**
- **NEUROMORPHIC COMPUTING**
- **AUTONOMOUS SYSTEMS**
- **MACHINE LEARNING**
- **DEEP LEARNING**

**Technology Readiness**
- NOW
- 1-2 YEARS
- 2-4 YEARS
- >4 YEARS

Important technology for NZ business to be exploring

**Sources:**
- Frost & Sullivan “Artificial Intelligence - R&D and Applications Road Map” (Dec 2016)
- Harvard Business Review - The competitive landscape for Machine Intelligence (Nov 2016)
- Shivon Zilis and James Chan “The State of Machine Intelligence, 2016” (2016)
- Stanford University: “Artificial Intelligence and Life in 2030” (2016)
Artificial Intelligence is computer systems that exhibit human-like intelligence. It is a group of science fields and technologies concerned with creating machines that take intelligent actions based on inputs.

**MACHINE LEARNING**
Algorithms that can learn from and make predictions on data. Overlaps with Computational Statistics. Overlaps with Bayesian Statistics. Underpins Predictive Analytics. Underpins Data Mining.

Three subgroups:
• Supervised learning: the system is presented with example inputs and known desired outputs and learns how to map inputs to outputs
• Unsupervised learning: the system finds patterns without requiring example inputs and outputs
• Reinforcement learning: the system is "rewarded" when it gets something right and learns as a result.

**EXAMPLES:**
- Recommender systems (like NZ's own MOVIX which recommends movies)
- Xero uses Machine Learning for automated processes (like automated cost-coding)
- WEKA at the University of Waikato
- Jv between Goat Ventures and Winter Ellison for legal AI

**PATTERN RECOGNITION**
A branch of Machine Learning and Deep Learning which focuses on recognition of patterns in data.

**EXAMPLES:**
- DeepFace, Facebook

**THOUGHT CONTROLLED GAMING**
The application of AI, wearable technology, and brain computing interface technology to enable seamless interaction with social gaming environments in real-time, through avatars without the need for joystick type devices.

**EXAMPLES:**
- Emotiv, Games Research Lab (Columbia Uni)

**REAL TIME EMOTION ANALYTICS**
The application of AI to analyse brain signals, voice and facial expression to detect human emotions.

**EXAMPLES:**
- Emotiv

**REAL TIME UNIVERSAL TRANSLATION**
The application of Natural Language Processing to enable two humans (with no common language) to understand each other in real-time.

**EXAMPLES:**
- Microsoft Translator

**COGNITIVE CYBER SECURITY**
Cloud-based AI systems trained on historical cyber threat data, capable of mitigating real-time cyber threats.

**EXAMPLES:**
- Deep Instinct

**ROBOTIC PERSONAL ASSISTANTS**
Cloud based AI learns from Big Data to enable human-like social robots that can perform usefully as personal assistants.

**EXAMPLES:**
- Kuka Robotics

**VIRTUAL COMPANIONS**
Cloud connected, Virtual Reality based avatars powered by AI engines that can behave and interact just as a human would.

**EXAMPLES:**
- Digital companions that provide caregiving companionship for the elderly.

**NEURAL NETWORKS**
Computing systems that organise the computing elements in a layered way that is loosely modelled on the human brain. Enables Deep Learning.

**EXAMPLES:**
- The computing system that sits behind Baby X at Auckland Uni
- NZ's Professor Kasabov at AUT (Neucube)

**AUTONOMOUS SURGICAL ROBOTICS**
Future generation computing hardware that mimics the function of the brain in silicon chips.

**EXAMPLES:**
- The Human Brain Project
- IBM's TrueNorth processor chip
- NZ's Professor Simon Brown at University of Canterbury

**CHATBOTS**
A software robot that interacts with humans online, receiving and sending conversational text with the aim of simulating the way a human communicates. An example of Natural Language Processing.

**EXAMPLES:**
- Kiwi start-up Jude ai (an AI based financial advisor)
- Kiwi company Wine Searcher

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