

# AI with a Human Touch

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## AI application to Network Performance

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- How will Next-gen networks expand this universe?
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# How fast and how deep is AI being applied to Network Performance?

# Introduction

Where are we today?

“Small-scale”  
zero-touch  
possible

Large-scale zero-touch  
could be scaled

Recognition	Comprehension	Abstraction
		
Identifying people or things i.e. sensing	Understanding how things relate; gaining and applying insight based on observed data	Conception of new ideas or thoughts outside observed inputs or ‘training data’.



We are here

Artificial General  
Intelligence/ “True” AI  
(2030 or beyond?)

The AI Continuum

## Elisa Corporation

Elisa has developed several in-house automation solutions to improve quality and optimise costs



Case Elisa: 10+ years of experience in network automation to reach zero person NOC

**2008** *Elisa begins to automate network operations*

**2010** *Physical NOC is replaced by Virtual NOC at Elisa*

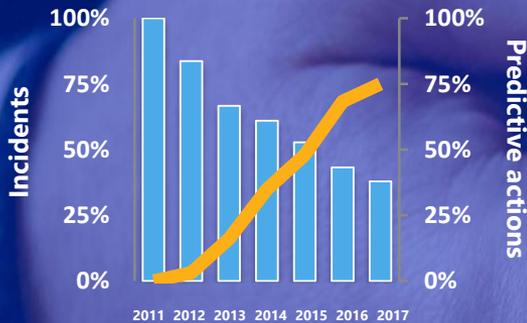
**60+** *Network automation use cases*

**zero** *People operating Elisa's Virtual NOC*

# Improvements versus classic SON – some examples

# Virtual NOC leads to higher customer satisfaction and efficiency gains through automation

Fewer incidents



**-70%**  
Incidents since 2011

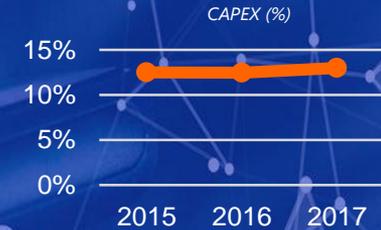
Happy customers

**75%**  
of all faults solved before they are visible to the customer

**-15%**  
Customer calls

**79%**  
Faster resolution time

Flat CAPEX & OPEX



Production OPEX (index)



- Who & Where
  - 50 people, 100% growth in 12 months
  - Bellevue (Tupl Inc) – Malaga (Tupl Spain) – Tokyo (Tupl Japan GK)
  - Experts in Networks, Software and AI
  - Backgrounds from mobile operators, Big OEMs, other startups
- What we do
  - IPA - Intelligent Process Automation by AI
    - Our AI Engine adapts to existing processes
    - and creates new value not possible before
    - Focus on mobile operators, new verticals in 2018
- Field-proven value to our operator partners
  - **4x** improvement in accuracy
  - **25x** faster responses to customer issues
  - Automating **90%** of repetitive engineering work \*1
  - **100%** consistent for fact-based decision making

\*1 IPA in finance: 70% automation (Source: McKinsey)



# Zero touch Vs Human touch

# Current levels of human interaction in network AI applications

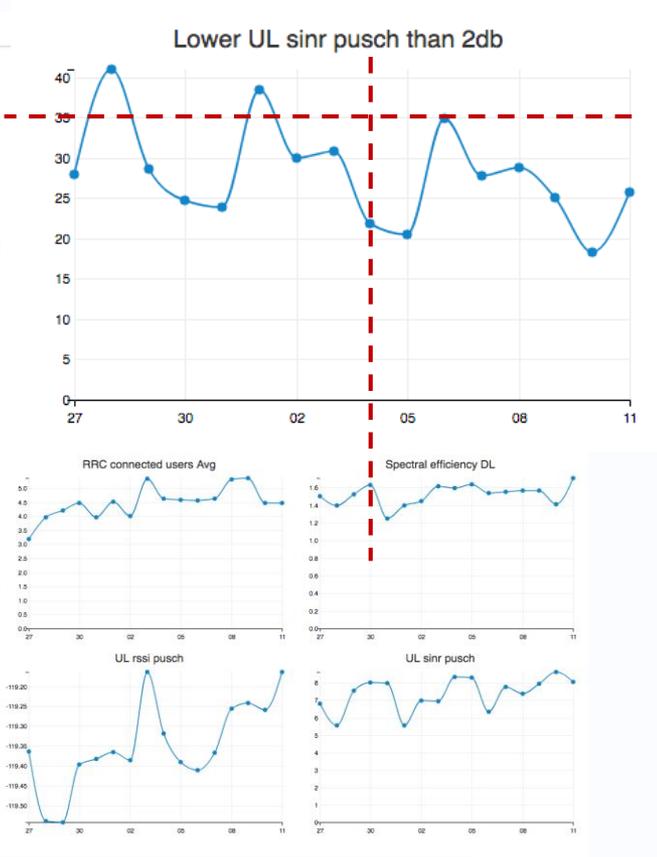
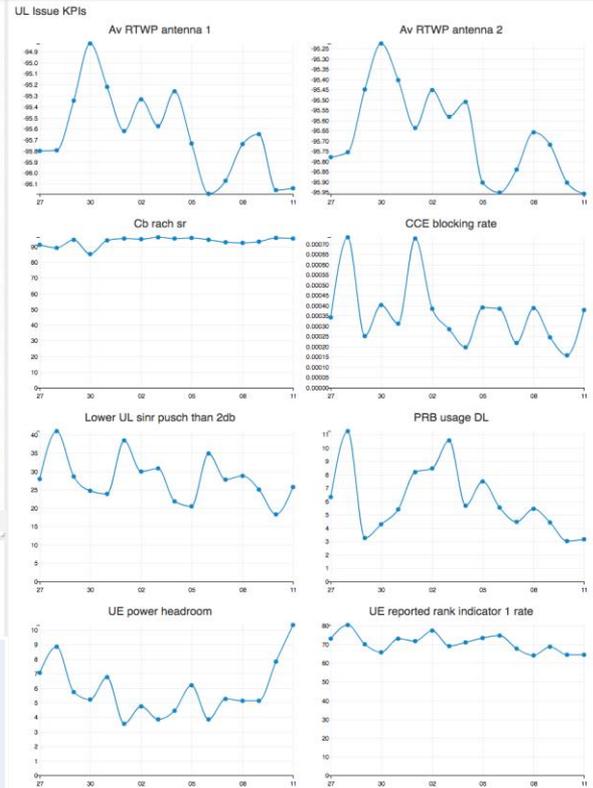
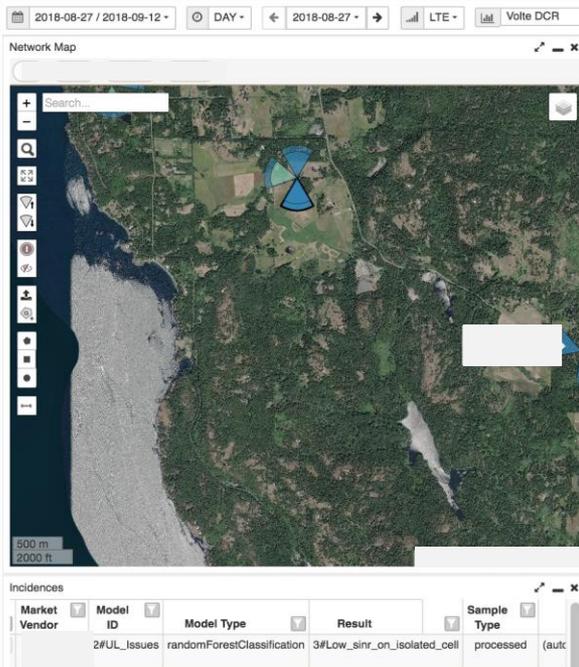
Today, AI-based systems can **Think** with varying levels of intelligence and a limited scope

AI system Class	Human-in-the loop	Examples
Automated Intelligence	✘	Routine tasks: e.g. site lock-down, automatic parameter configuration
Augmented Intelligence	✔	None-routine tasks: e.g. antenna tilt changes
Autonomous Intelligence	✔	Non-routine tasks: autonomous network capacity management, network slicing

**Automation based on AI can eliminate human error: this is still the case of a significant proportion of Network Issues**

**For more complex issues: risk of instability in closed feedback loop causing a meltdown**

# Example: Low Coverage, Tilt Change



Improvement in bad UL SINR samples and Avg. UL SINR after downtilt on 09/04. All other KPIs are maintained

# Checklist for building a zero-touch network

- Small scale networks (1000-2000) easier to automate
- No or limited legacy equipment
- Full E2E network visibility and control (limited or carefully managed outsourcing)
- Very stable and high-quality network statistic flow
- Clean internal data and inventory
- Homogenous configurations
- Structured knowledge database
- Highly-Skilled human engineering staff for setup and pilot phase

# What do Next-gen networks bring?

## Challenges and opportunities for next-gen networks

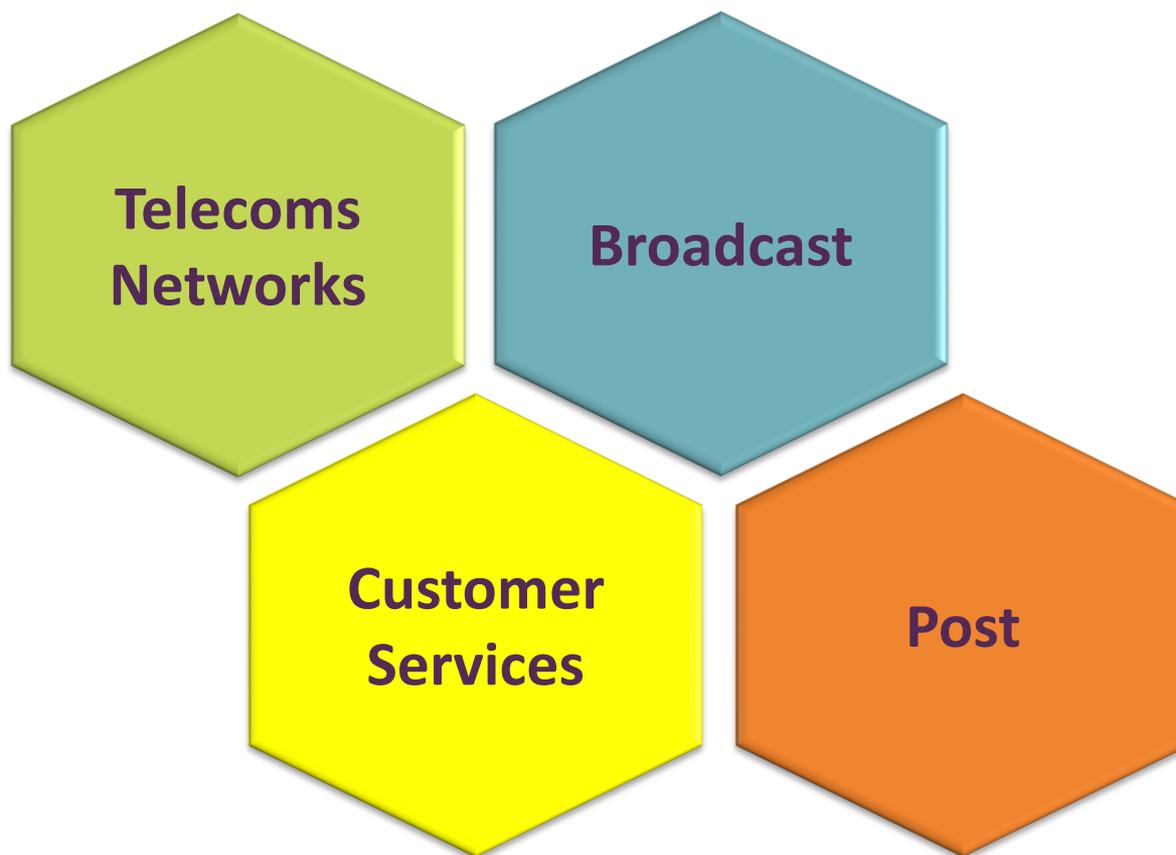
5G and other new technologies bring a huge increase in complexity, add real-time requirements and a new dimension to security with NFV: beyond the scope of human capabilities

- Spectrum variety, Dynamic allocation and sharing
- vRAN dynamic reconfiguration based on real-time usage
- Multihost networks –dynamic capacity reallocation based on real-time load
- 3-D beamforming, beamsteering, beamshaping
- Rapid NFV intruder / anomaly detection and seclusion
- Automated network slicing, slice reconfiguration
- Programmable networks – edge-core application fluidity
- Ultra-resiliency trade-off with Ultra-security
- We can imagine many more .....

# Ofcom and AI for networks

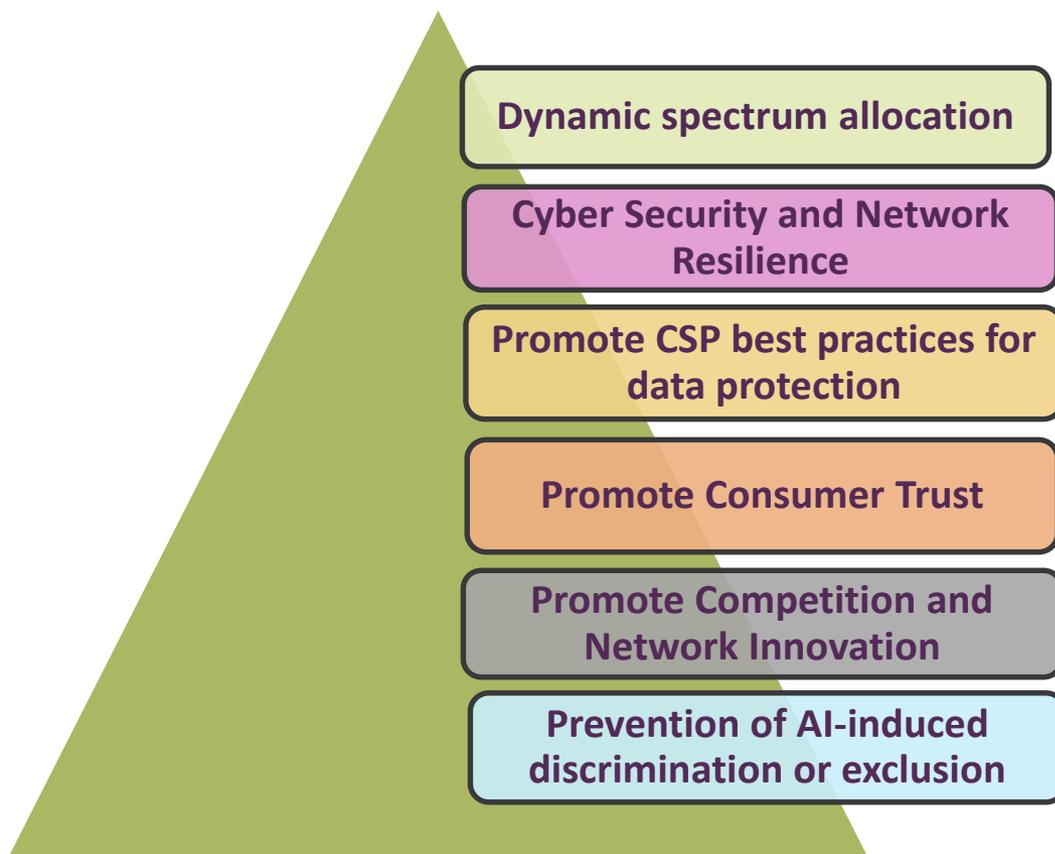
# AI Opportunities

## AI application areas directly relevant to Ofcom



## Ofcom and AI

### Facilitating the benefits of AI and preventing potential harm to UK citizens and consumers



# Conclusions

# Outlook for Humans in the Machine

- Current status of AI allows limited scale zero-touch automation of repetitive tasks
- Human engineers can be freed to move up (to system expertise and supervision) or sideways (to focus on long tail of customer experience cases)
- When true AI is achieved (2030+?) full E2E large scale zero-touch could be achieved
- Zero-touch networks can be designed earlier but with specific characteristics
- Roughly 8 years to develop automated processes based on 4G
- Some 5G enablers require AI-automation up-front – but knowledge base for full E2E 5G will take 5-8 years
- Full AI applied to networks should be implemented in a twin approach (for cross-checking and resilience)