



**KING'S**  
*College*  
**LONDON**

# Internet of Skills

*Where IoT, 5G, AI & Robotics meet*

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Director, Centre for Telecom Research

Chair Professor, King's College London

Cofounder, Worldsensing

Sao Paulo Smart City School

24 & 25 July 2017



Spotify



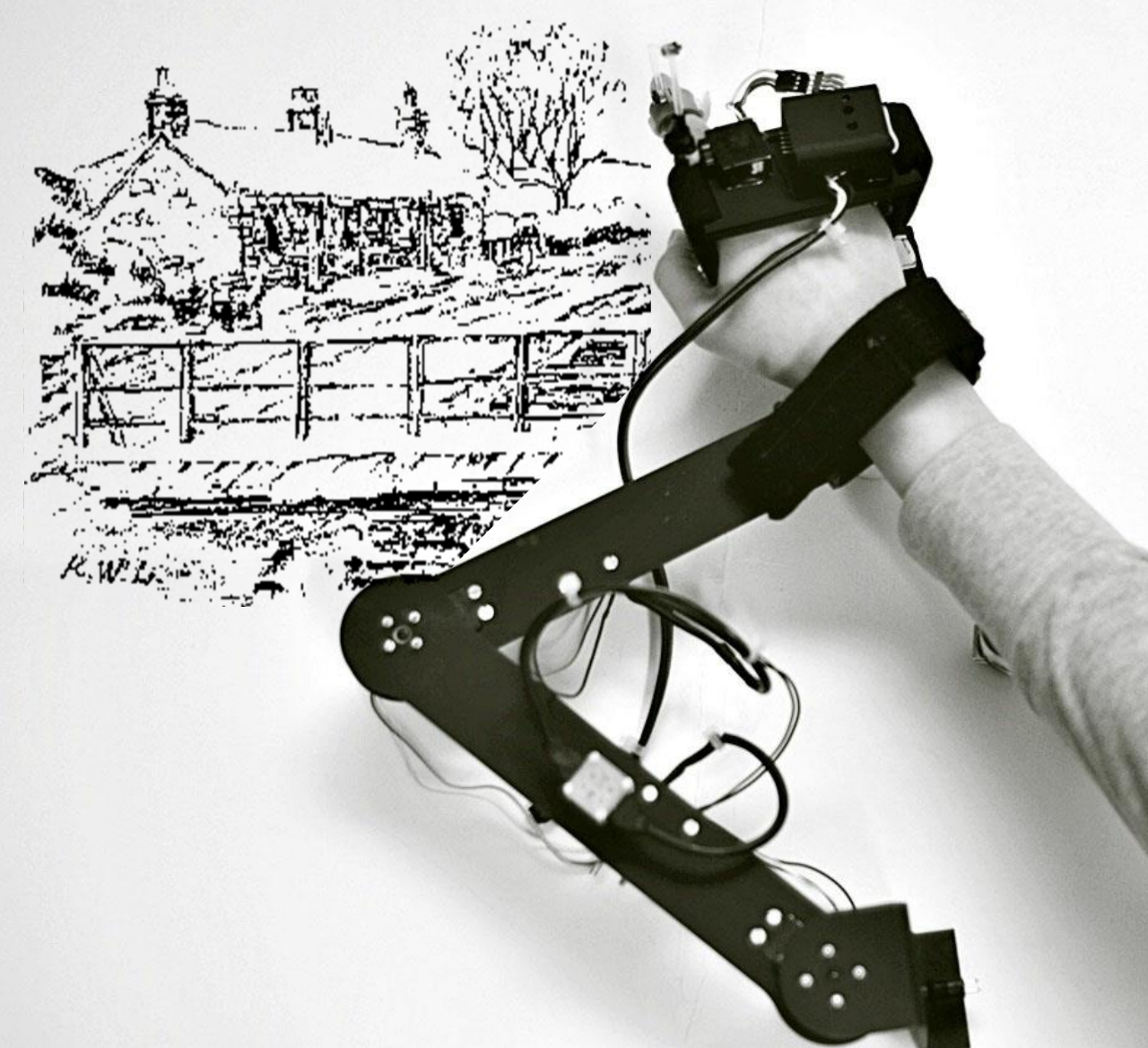
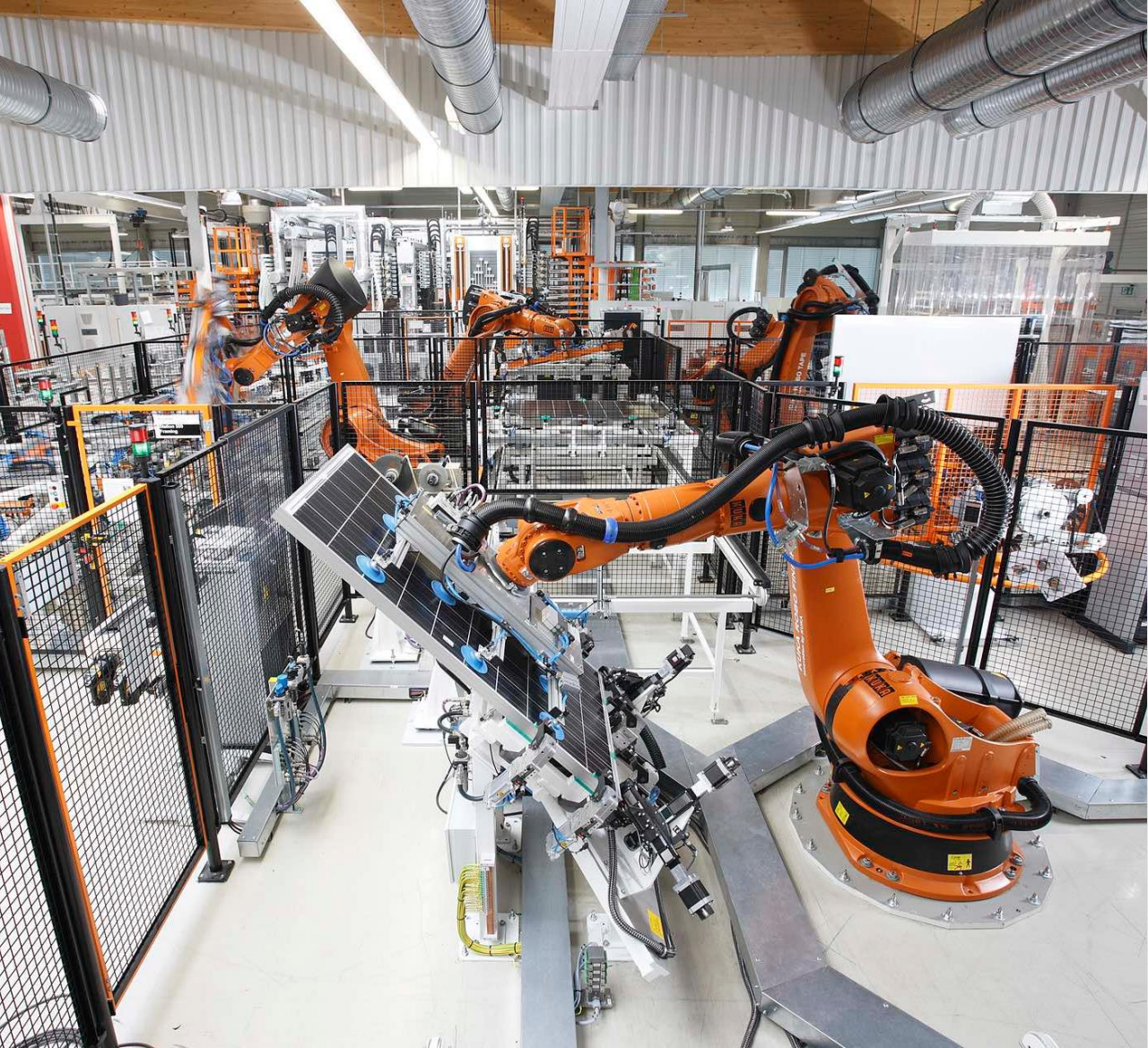
Google Play



iTunes







# LAN of Machines vs Internet of Skills

“Industry 4.0”

“Human 4.0”





Yesterday's

**Innovation & Standards:**

network technologies, audio and video codecs



**Proprietary Circuit-Switched  
Audio & Video Technologies**

**Standardized Packet-Switched  
Internet, enabling Economy of Scale**



Today's

**Innovation & Standards:**

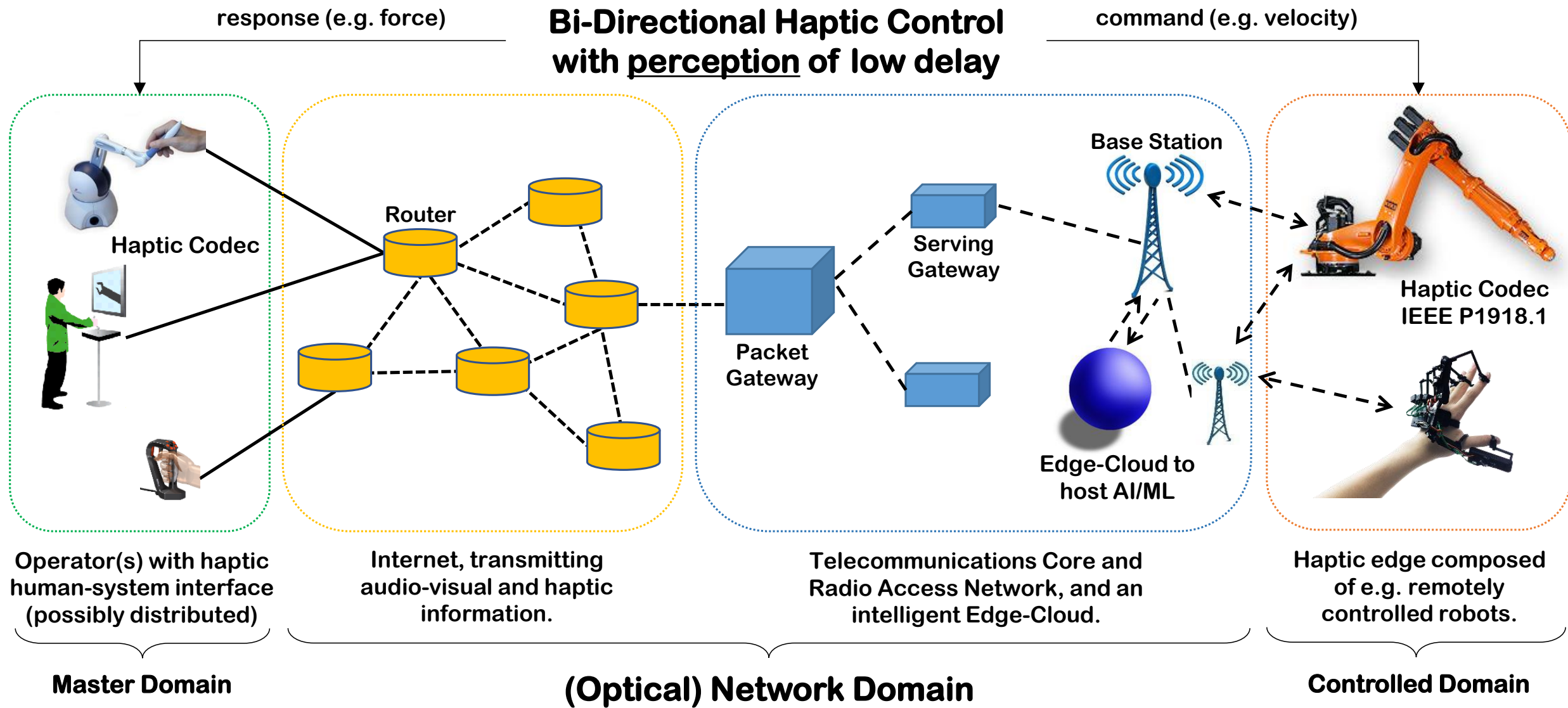
low-latency optical & wireless networks, intelligence, tactile codecs



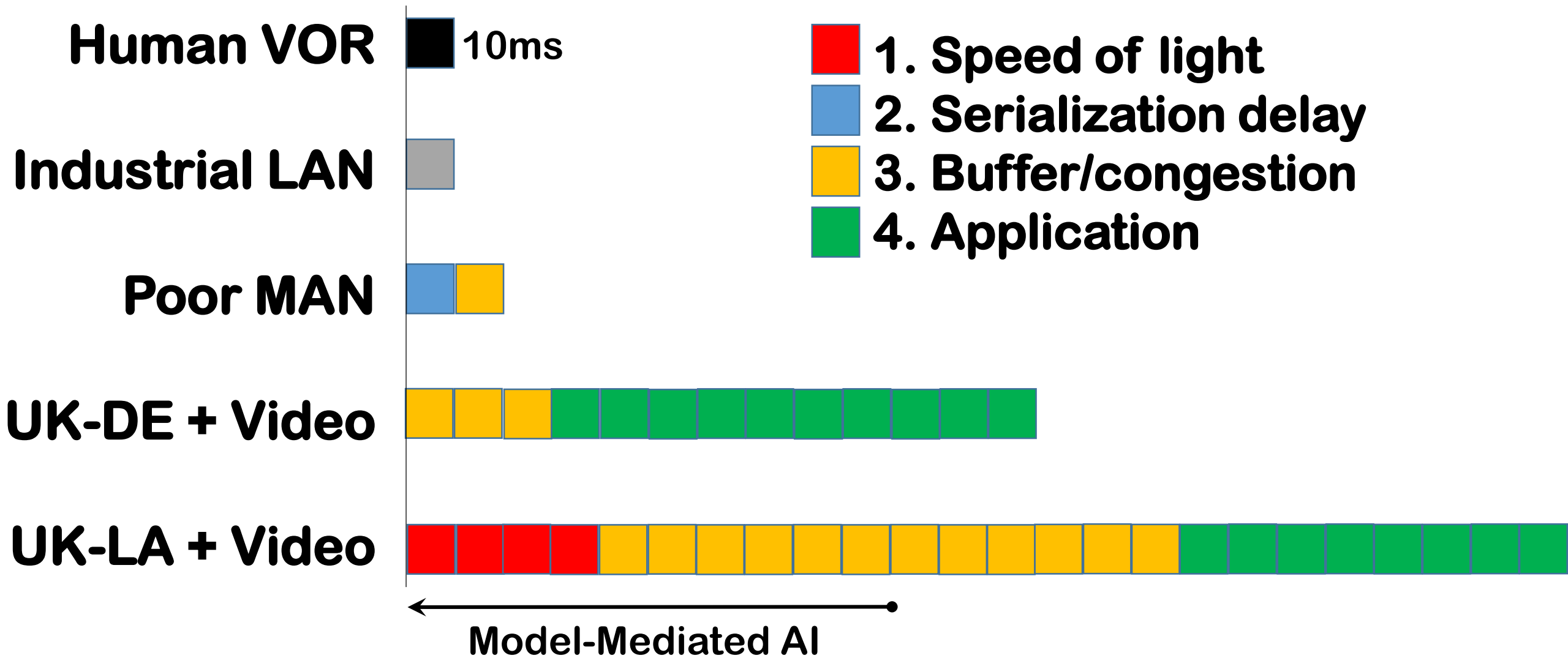
**Proprietary (and expensive)  
Haptic-Edge Technologies**

**Standardized Internet of Skills,  
enabling Service Economy of Scale**

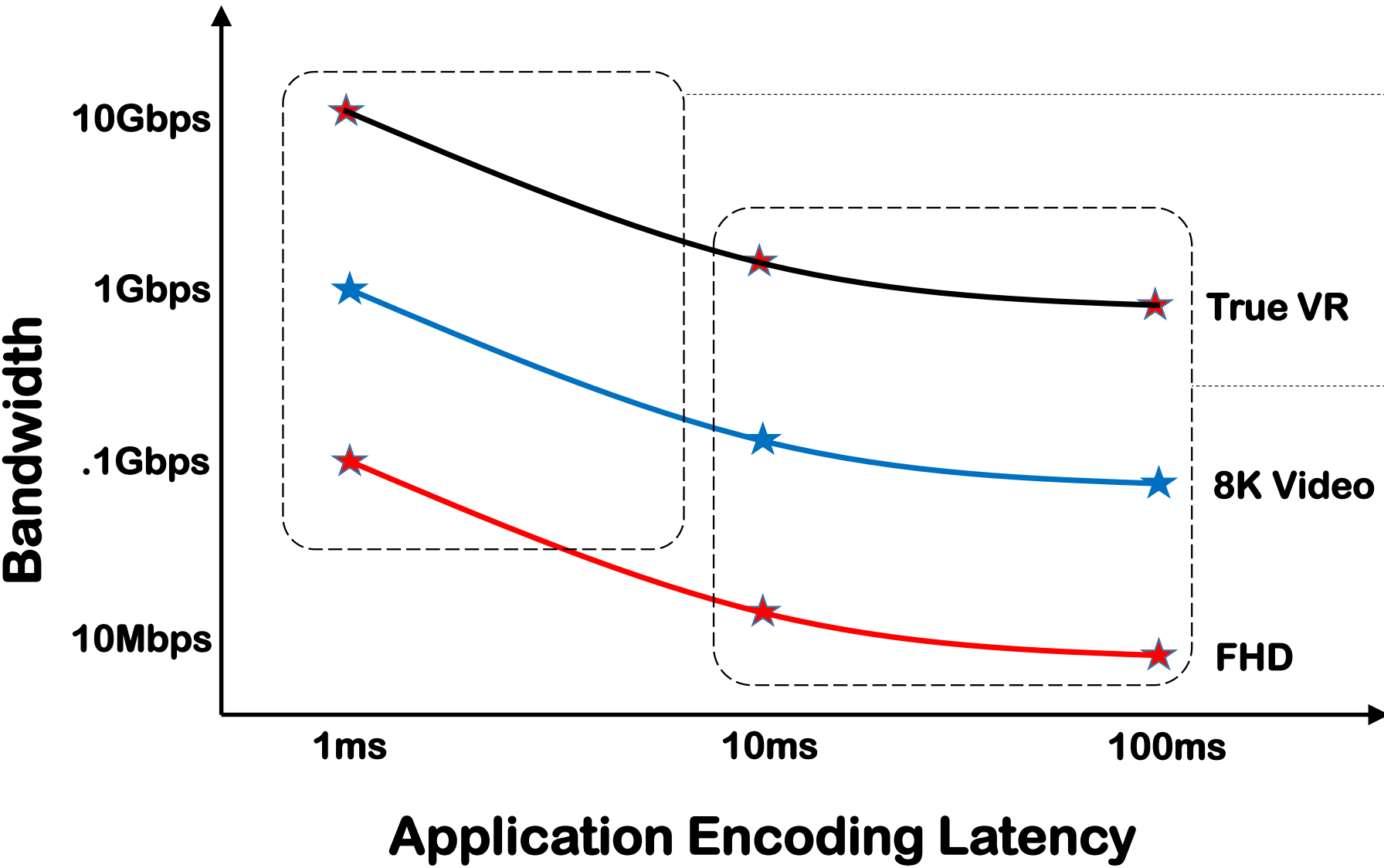
**Fundamental Shift**



# Technology Components



**Delay Challenge**



Impact of 1%?

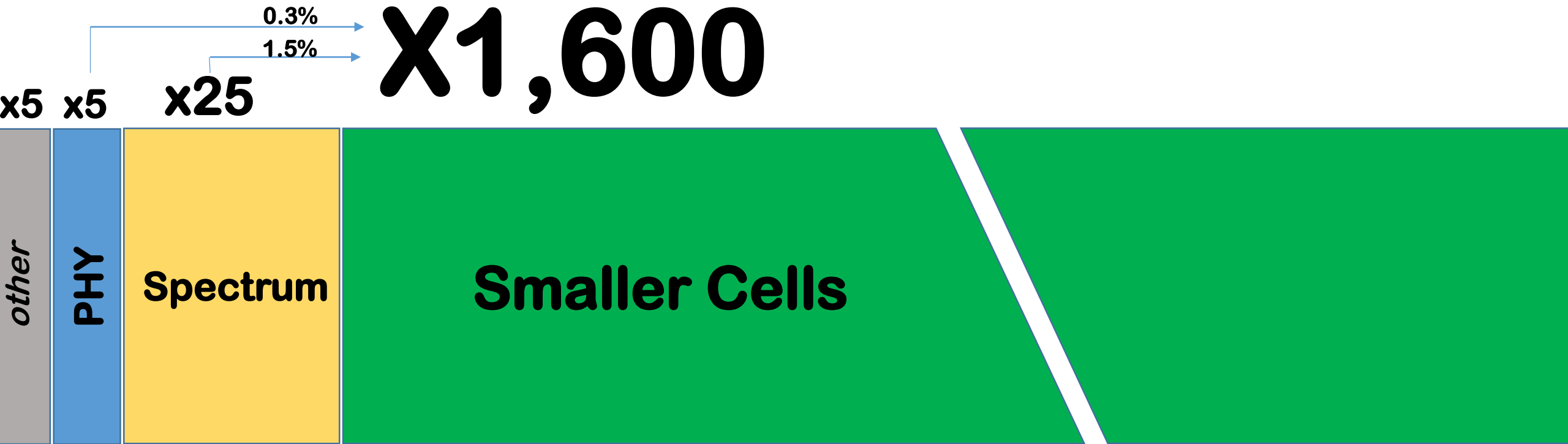
Internet Bandwidth Requirement Forecasts

**Video encoding latency due to commodity hardware impacts bandwidth!**

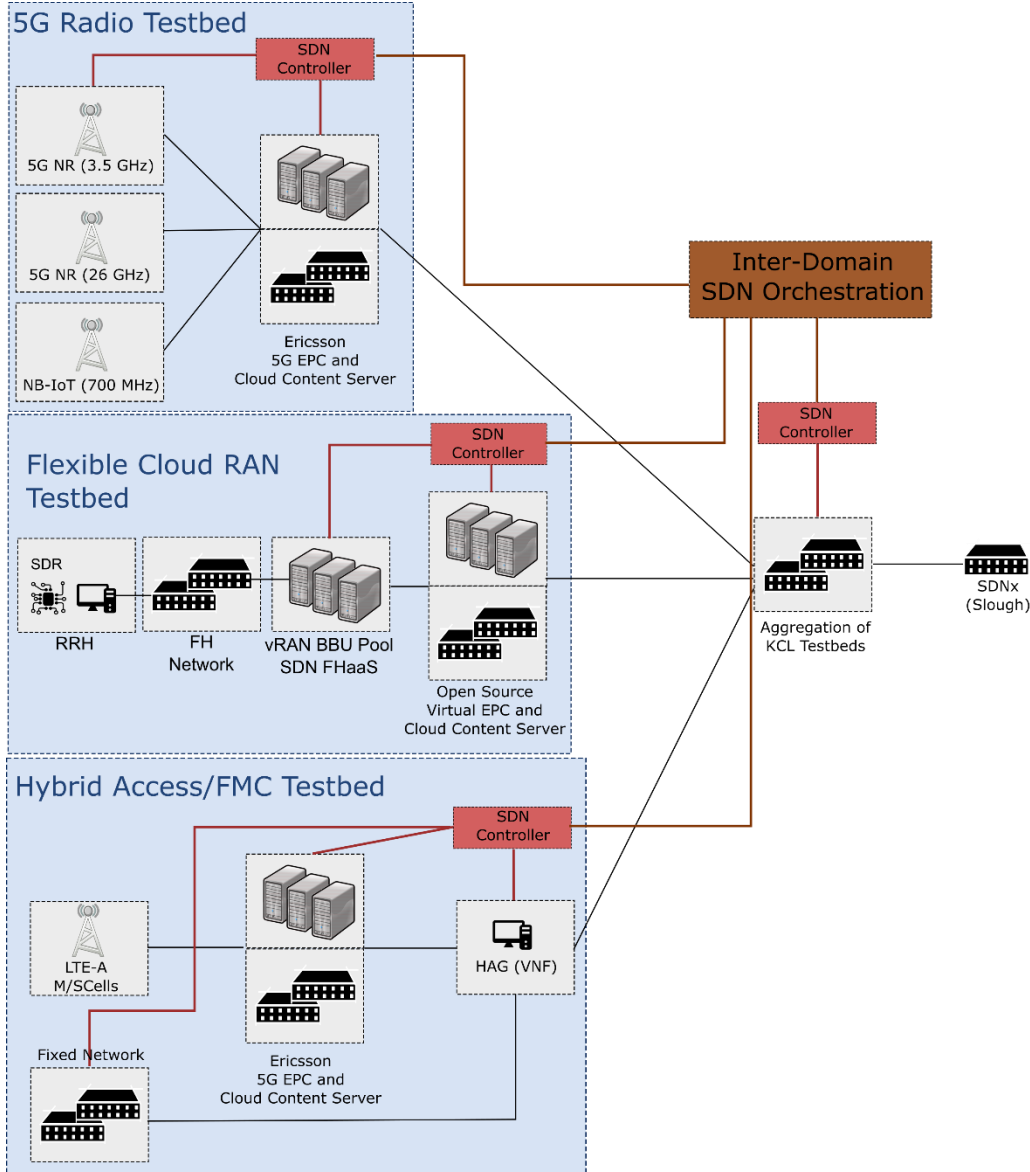
# Bandwidth Challenge

# Cooper's Law

Wireless capacity increase over past decades: x1,000,000



**Architecture Challenge**



**1. Radio tech in three pioneering spectrum bands**

**2. Flexible Functional-Split Cloud-RAN testbed**

**3. Fixed/Mobile Convergence with HAG testbed**

**4. Various controllers & orchestrators**

**King's 5G Testbed**



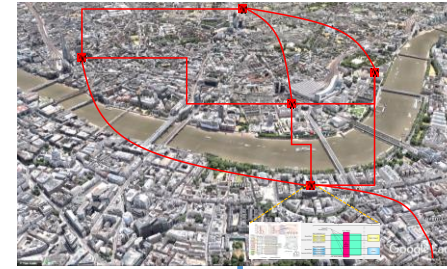


### SDNx Switch & Cloud @ Slough

5G & Fibre @  
University of Bristol  
& Bristol is Open



5G & Big Data @  
King's College  
London



Fibre (Janet)

### 5G Consumer Use-Case Trials



### 5G Industry Use-Case Trials



5G @ 5GIC, University of Surrey

- SDNx allows dynamic interconnection of physical/virtual experimental resources across different laboratories
- Users will be granted access to virtual slices of physical resources
- Enabling multi-tenancy future internet experimentation on a massive scale
- £16m trials

# End-to-End 5G in the UK





# Transforming Industries





A man in a light blue shirt is sitting in the center of a row of black plastic chairs. The chairs are arranged in a line against a dark stone wall. The scene is dimly lit, with the man and the chairs being the primary focus.

# CONNECTED CULTURE

WITH ALI HOSSAINI  
ARTIST, WRITER AND PHILOSOPHER

video on [www.ericsson.com](http://www.ericsson.com)

# Disrupting Performing Arts





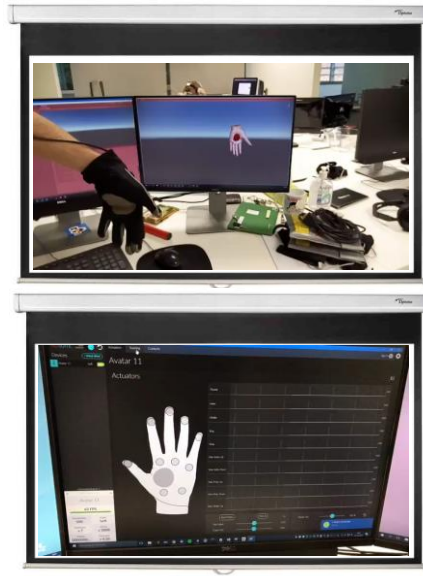
# STORIES FROM ANOTHER WORLD

(C) MISCHA DOHLER, 2017

## Internet of Skills



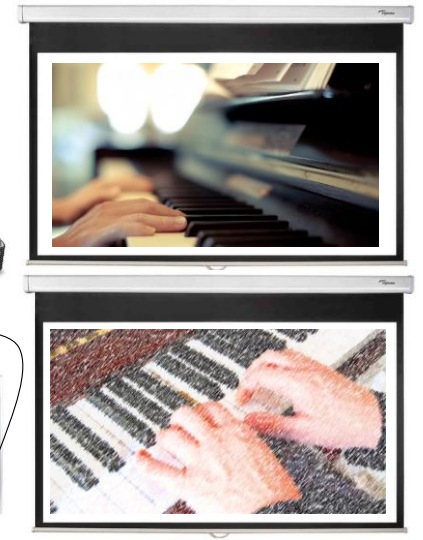
Luis (ND)  
Kostas (KCL)  
Maria (KCL)  
Laura (MMW)



## 5G SDN/NFV



Richard (Opto)  
Frank (KCL)  
Maria (KCL)  
Toktam (KCL)  
Ali (KCL)



# Disrupting Education

A close-up photograph of a person's hands playing a piano. The person is wearing a dark suit jacket. The piano keys are visible, and the background is slightly blurred, showing a red horizontal bar. The text is overlaid on the image.

# TEACH ANYONE TO LEARN ANYTHING

WITH MISCHA DOHLER

CHAIR PROFESSOR IN WIRELESS COMMUNICATIONS  
AT KING'S COLLEGE LONDON

video on [www.ericsson.com](http://www.ericsson.com)

# Disrupting Education





**Disrupting Health & Care**



# MEDICINE WITHOUT BORDERS

WITH DR PROKAR DASGUPTA

CHAIR IN ROBOTIC SURGERY & UROLOGICAL INNOVATION  
AND HONORARY CONSULTANT UROLOGICAL SURGEON

video on [www.ericsson.com](http://www.ericsson.com)

# Disrupting Health & Care





**Stockholm Arlanda  
Airport (25m p.a.):**

***We help King's  
College London  
advance remote  
surgery. With our  
joint 5G research,  
we will allow  
surgeons reach  
difficult areas,  
improve precision  
and reduce  
recovery  
times.***





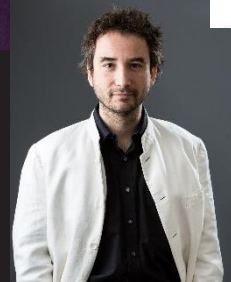
≈ 100 people at CTR:

- 11 academics

- 15 postdocs

- 58 PhDs

- 14 visitors





# King's Strength:

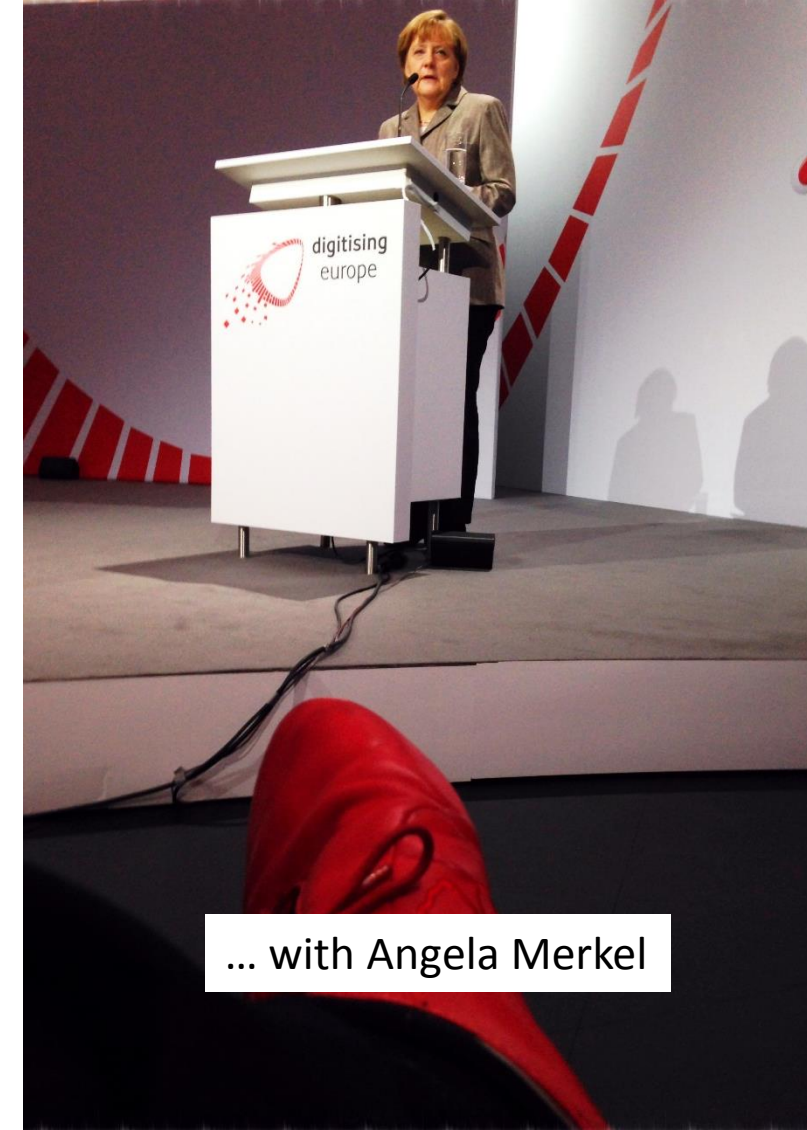
- cross-disciplinary mixing tech with medicine, arts, law, geography, etc
- “porosity” with a strong engagement with industry and general public
- creation of leaders who become the best in their fields
- streamlined impact, from research idea to industry





Paul Kagame, President of Rwanda

- Rwanda
- Taiwan
- UK
- Latvia
- US
- China
- Spain
- Germany
- *etc*



... with Angela Merkel



President of Latvia



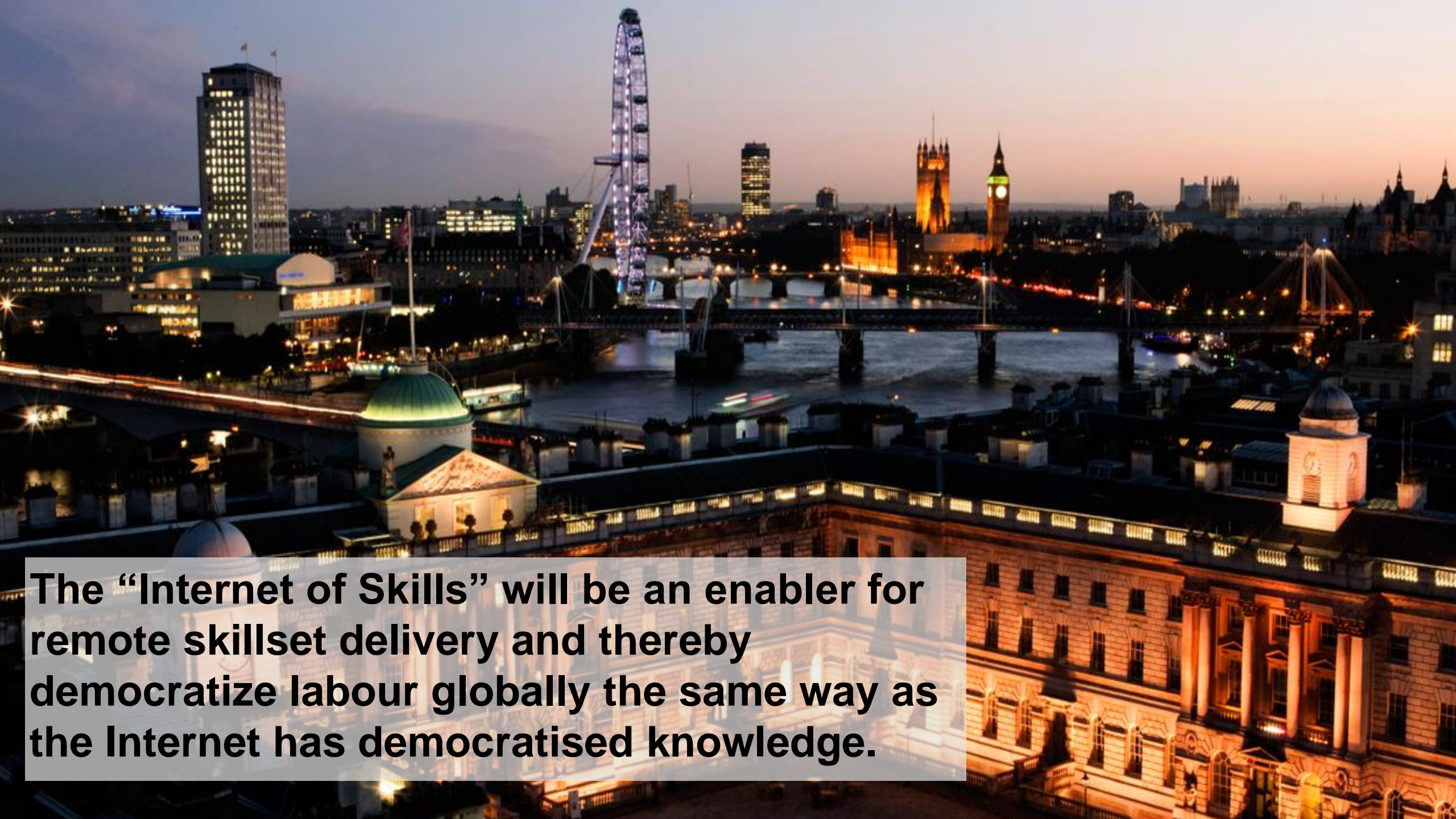
Sir Richard Branson

# Examples of Engagements



# Streamlined Innovation





**The “Internet of Skills” will be an enabler for remote skillset delivery and thereby democratize labour globally the same way as the Internet has democratised knowledge.**