



# War stories on IoT product development

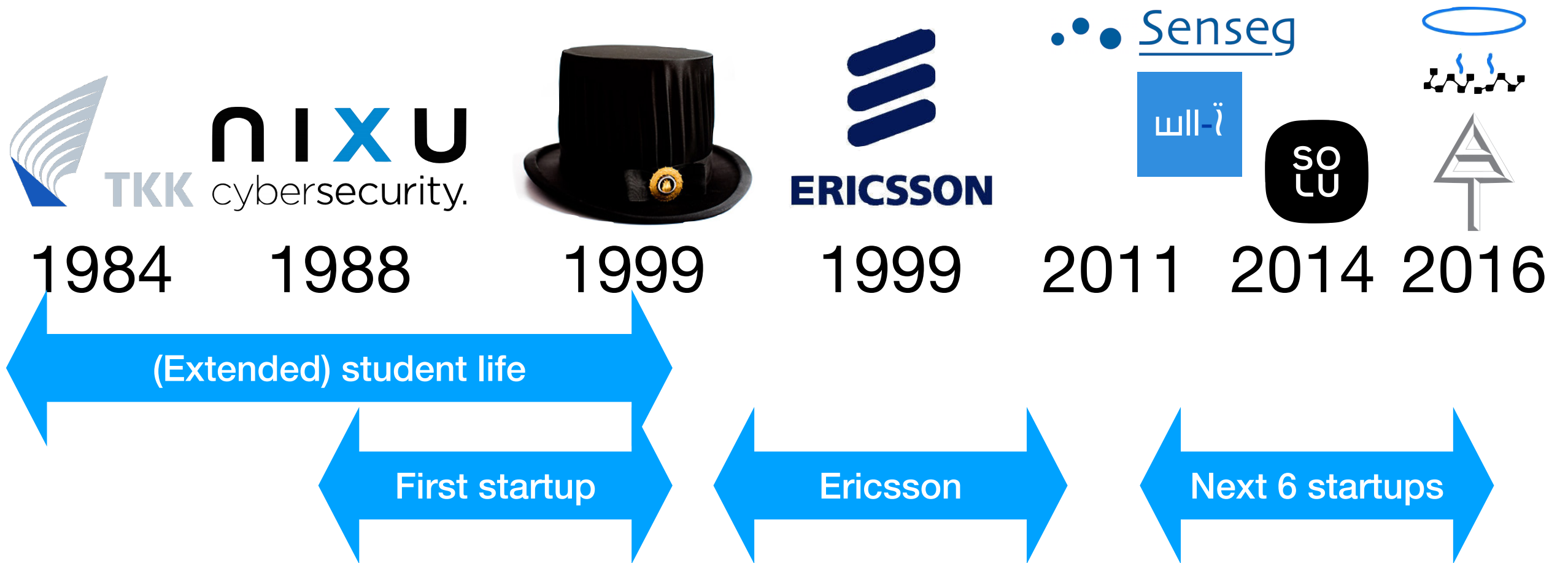
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**November 23th, 2020**

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# Outline

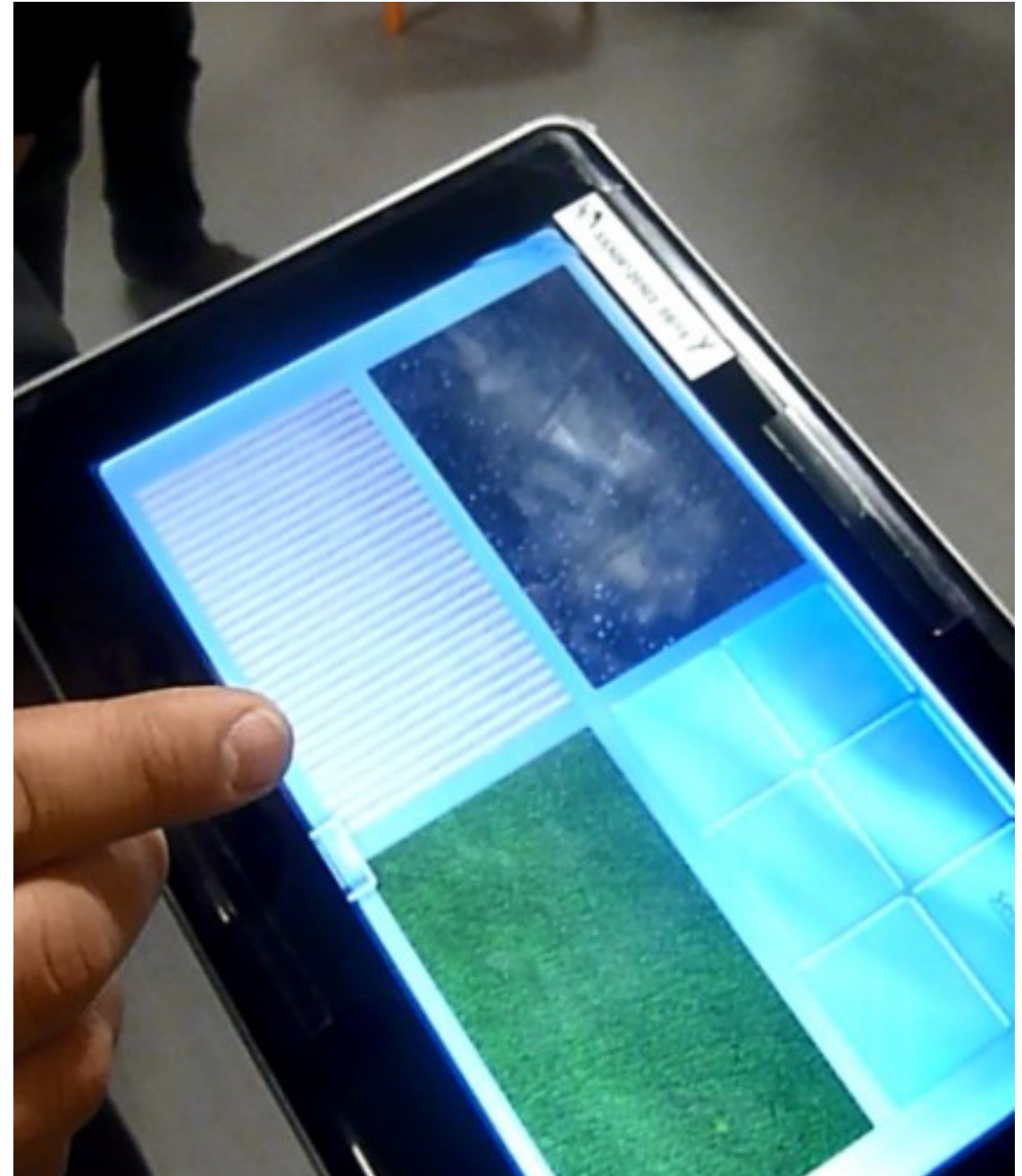
- Pekka's personal history
- Select startups
  - Senseg
  - Solu
  - PulseOn
- Some lessons learned

# My life



# Senseg: 2007 –

- Key technology:  
Electrostatic haptic actuation
- Pekka worked there:
  - 2011–2014
  - Chief Software Architect



# Senseg in 2014





# Senseg in 2019

## ELFIAC: flexible, universal actuator technology

Elastomeric Film Actuator (ELFIAC) is a completely new kind of actuator technology specifically designed to address the issues that arise when using piezo technology in small consumer devices.



Simple yet robust, ELFIAC outperforms rigid form factor piezos in a number of key areas:

- **Flexible and compliant** – Stretches and bends, unlike piezos
- **Lead-free and biocompatible** – Suitable for consumer products
- **Cost-efficient** – Constructed from low-cost, readily available materials
- **Thin and adaptable** – From fractions of a millimetre to several millimetres thick
- **Excellent low-frequency performance** – Down to DC
- **High actuation displacement** – Up to 20% of overall stack thickness

# Solu Machines: 2014–2017

- Key vision:  
PC as a Service
  - A full personal computer
  - as a hand held device
  - utilising the cloud
- One of the three co-founders
  - Chief Technology Officer
  - Left in the end of 2015







# Bankrupt as of Sep 2017



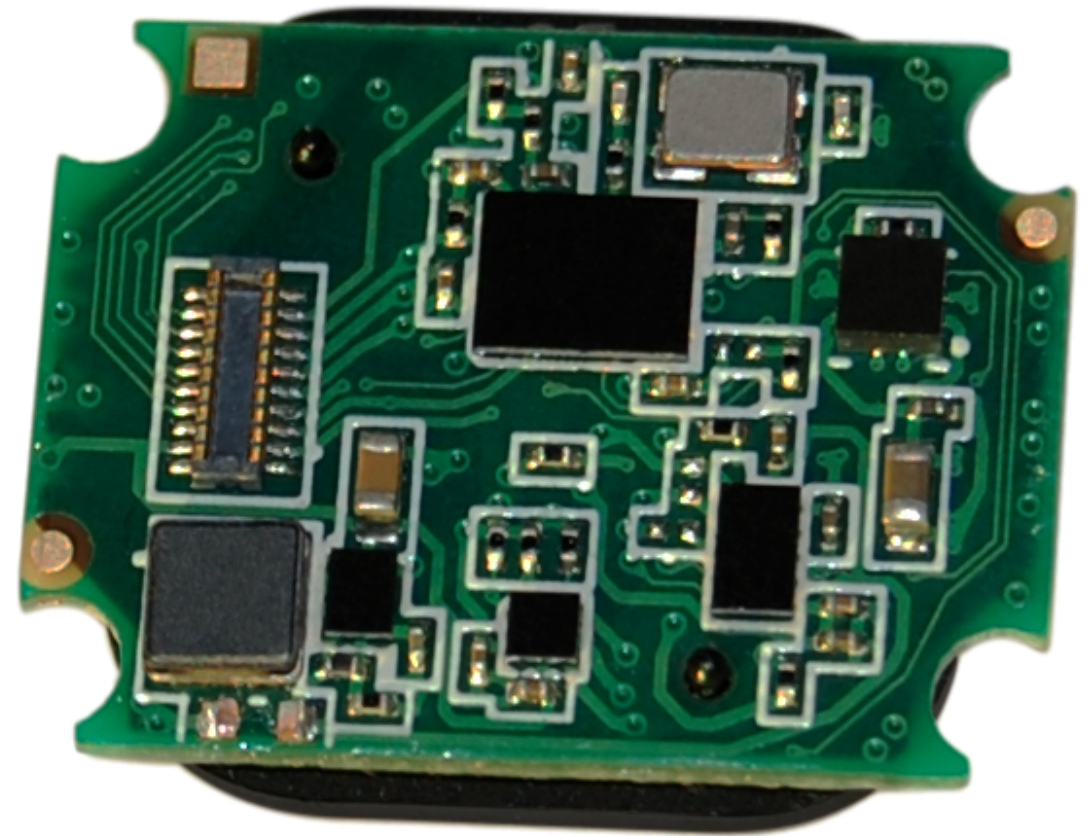
# PulseOn: 2011 –

- Key technology:  
Monitoring heart rate on an
  - activity tracker
- Worked in 2016 for
  - 9 months as the
  - Chief Software Architect



# PulseOn hardware

- Compute: nRF52
- Communicate: BLE
- Sensing: custom technology



# PulseOn 2019

- Pivoted a few times
- From B2C: End-user product (activity tracker)
- To B2B: Technology and algorithms provider
- Lesson to learn:

Good end-user products are very hard to produce

# Startups

	Senseg	Solu	PulseOn
Key technology	Custom actuation	Custom computing	Custom sensing
Founded	2007	2014	2011
Sold or bankrupt	2015	2017	–
Money spent	15M+	~2M	5M+
Product status	First out in late 2019	Failed	Technology sales contracts

# Some lessons learned

- Avoid anything non-standard
  - Getting it working is likely to take a lot of time
  - OTOH, non-standard is what is likely to give you value
- Hardware design is very different from software design
  - Cannot fix anything afterwards
  - E.g. several rounds of PCBs
    - Each round takes weeks

