



University of Ljubljana  
Faculty of Electrical Engineering

**IKT** Department of Information and Communications Technologies  
**LTFE** Laboratory for Telecommunications  
**LMMFE** Laboratory for Multimedia

# Digitalizacija in nove tehnologije IKT

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Novo mesto, 4.4.2023



**ARRS**  
SLOVENIAN RESEARCH AGENCY  
P2-0425



**IKT**  
horizontalna mreža



**FABLAB**  
NETWORK  
SLOVENIA



**MakerLab**  
Ljubljana

**LTFE**  
ICT academy

# University of Ljubljana (UL)

- We are comprehensive, traditional, research oriented University
  - established in 1919
- Among 500 best universities on:
  - Shanghai list
  - Webometrics list
  - Times lists
- 27 members (faculties–schools–colleges)
  - 43.000 students
  - 1.800 foreign students
  - 1.500 exchange students
  - 9.700 graduates
  - 5.600 employees
  - 439 EU projects
  - 123 other international projects
  - an annual budget of app. 350 mio €
  - the largest higher education and research institution in Slovenia



# UL Faculty of Electrical Engineering (FE)



- 300 academic & research staff
- Teaching
  - 50%- of total budget
  - 2.000 students
- Research
  - 50%+ of total budget
  - acquired on market
    - 10% industry
    - 40% EU&national

news



06 November

## UNIVERSITY OF LJUBLJANA CAREER CENTRES - INVITATION FOR INTERNATIONAL STUDENTS

Dear international students, University of Ljubljana Career Centres are doing our best to support your career planning, as well as offer you opportunities for getting to know Slovenia and Slovenians. In November we are therefore organising interesting workshops that will enable you to carry out a thorough self-assessment, prepare for entering the global labour...



06 October

## INFORMATION FOR FOREIGN STUDENTS IN ONE PLACE

Please find all the necessary information about enrolment on this links.

links

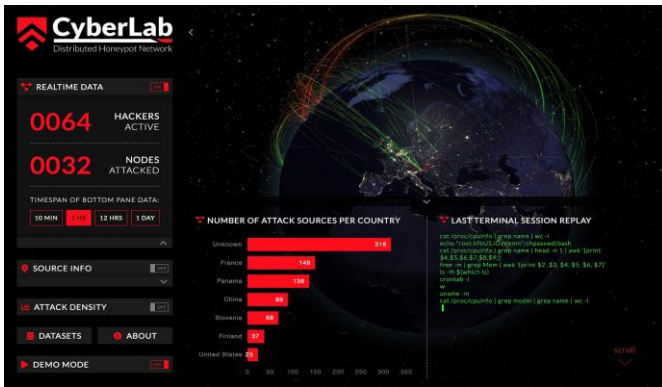
[studis](#)  
[timetable](#)  
[study calendar](#)  
[staff contacts](#)  
[exchange student guide](#)  
[students office](#)  
[enrolment](#)  
[study in slovenia](#)



# UL FE LTFE&LMMFE

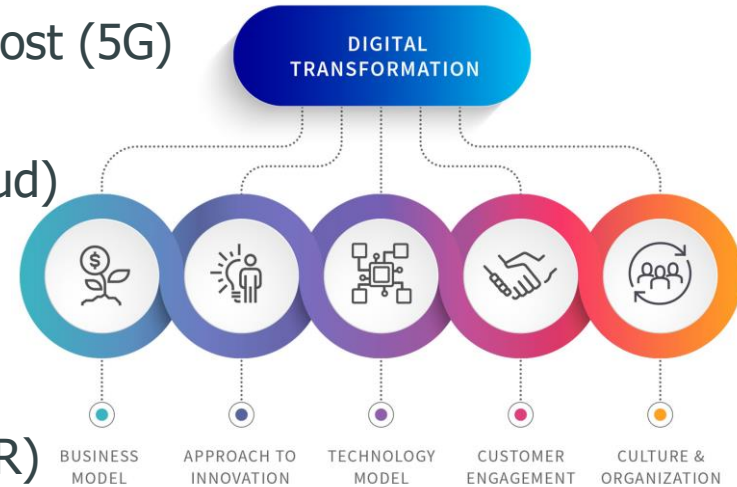
- Laboratory for telecommunications (LTFE)
- Laboratory for Multimedia (LMMFE)

- Team
  - 40 + 20
- Teaching
  - 25% of the lab budget
- Research & development
  - 75% of the lab budget
    - 30% industry
    - 45% EU & national research projects



# Tehnologije

- Nekateri tehnološki trendi:
  - Zmogljiva komunikacijska omrežja, mobilnost (5G)
  - Internet stvari
  - Virtualizacija in oblačno računalništvo (cloud)
  - Servitizacija
  - Velike količine podatkov (big data)
  - Umetna inteligenca (artificial intelligence)
  - Navidezna in obogatena resničnost (VR, AR)
  - Roboti, droni, 3D tisk
  - Blokovne verige in decentralizirane aplikacije
  - Kibernetska varnost



# Izzivi

- Tehnološki trendi → Vpliv na storitve
- Vendar tudi
  - Spremembe v družbi
  - Spremembe v ekonomiji
  - Spremembe v turizmu
  - Spremembe delovne sile
  - Spremembe v demografiji
  - ...



# Vodja digitalne transformacije?

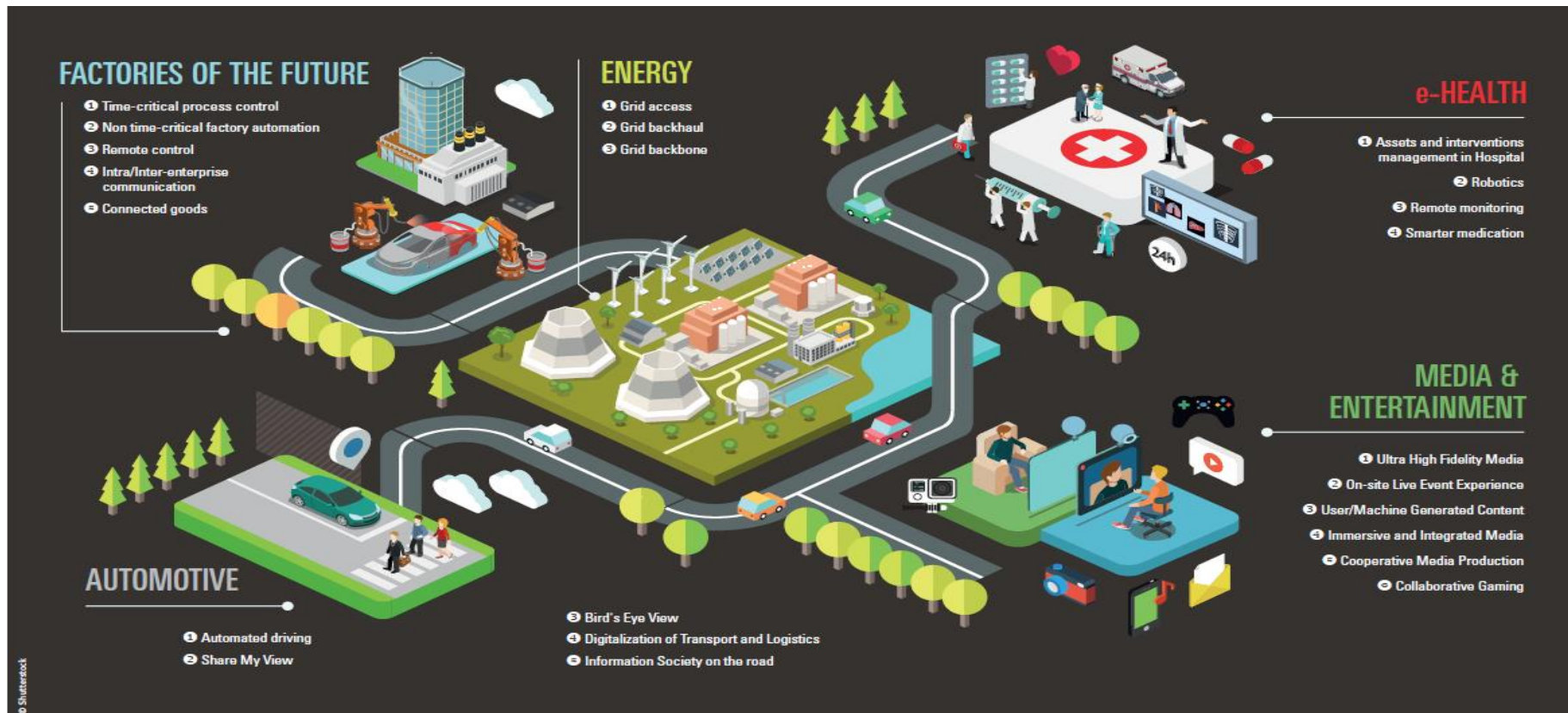
Who led the digital transformation of your company?

A) CEO

B) CTO

C) COVID-19

# IoT, 5G in storitve v oblaku

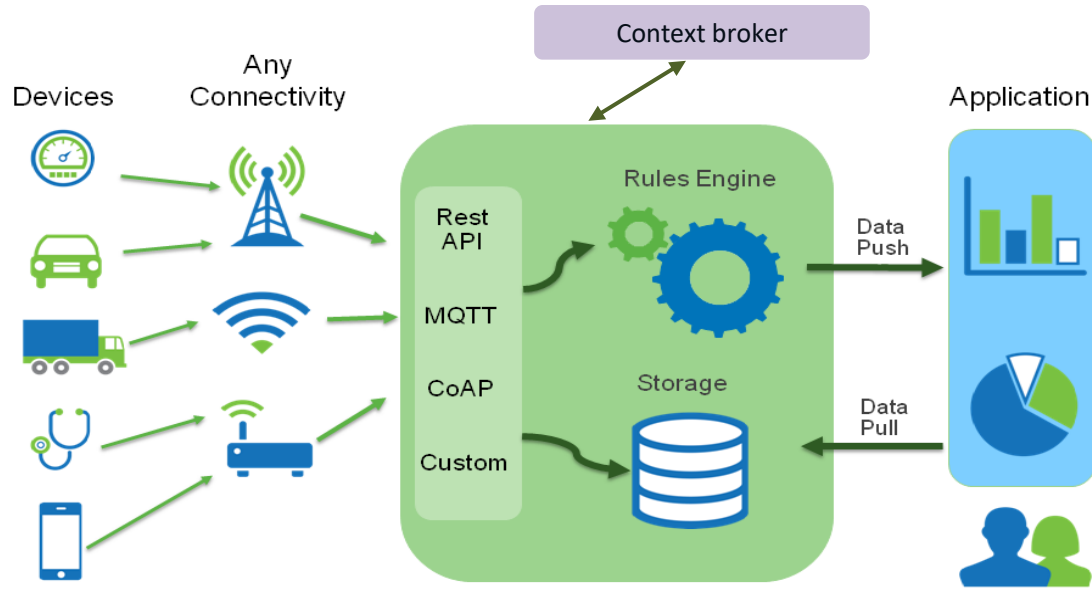


Source: DG Connect, EC



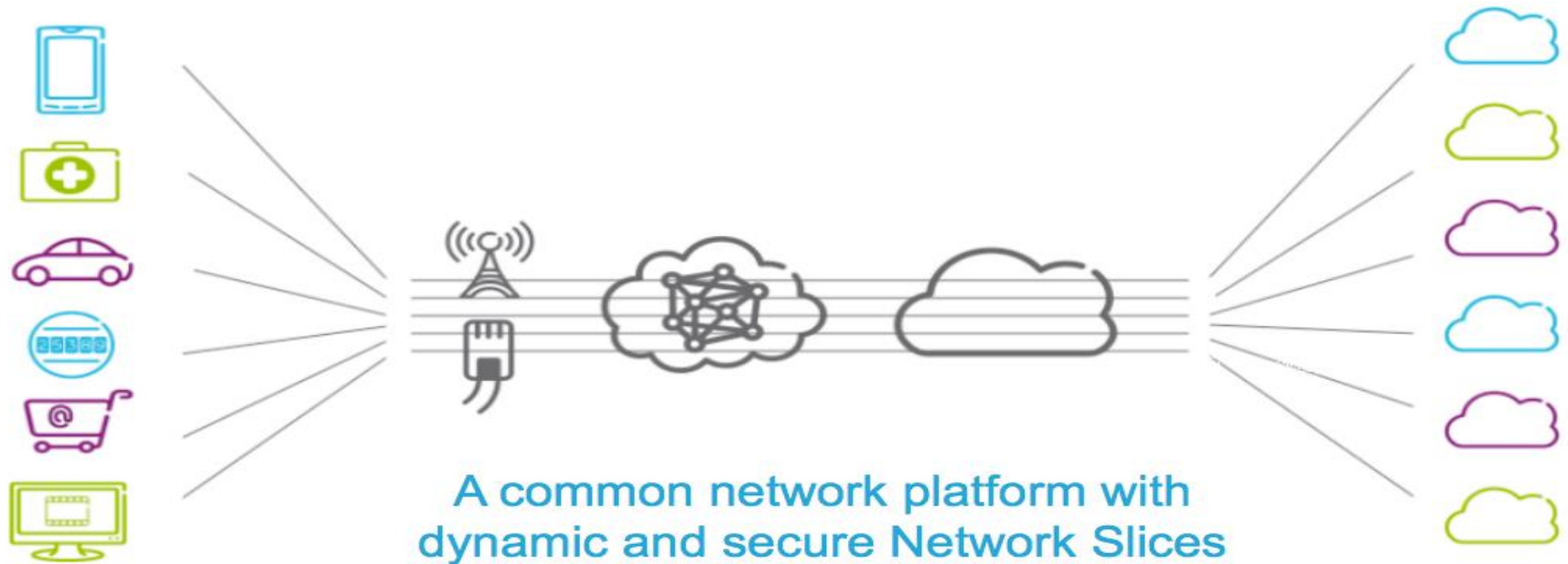
# Internet stvari

- Naprave in senzorji, povezljivost, platforma
- Domensko znanje, (vele)podatki, umetna inteligenca, aplikacije



# 5G javno omrežje za mnoge industrije

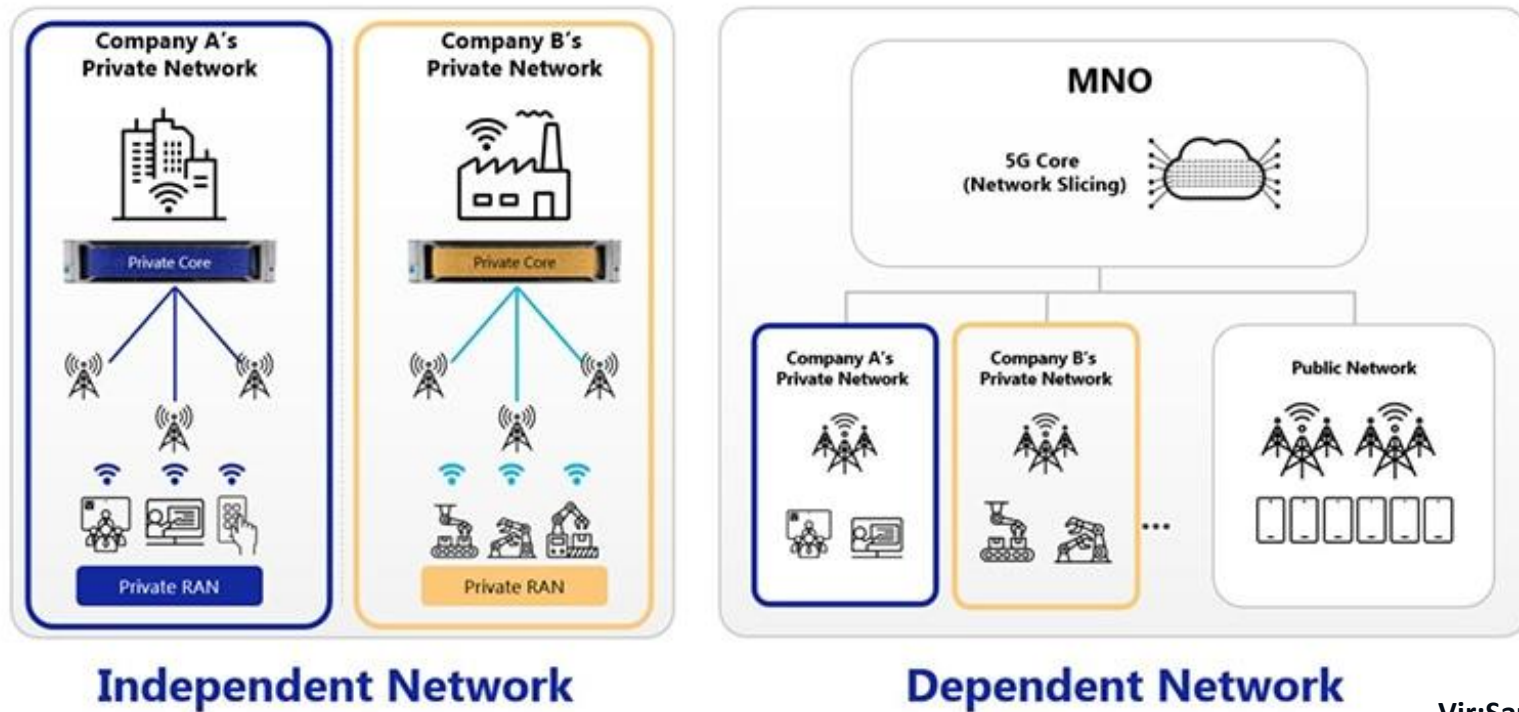
- Javno 5G omrežje; rezinjenje, računalništvo na robu, ...
- Zasebno 5G omrežje



Vir: Ericsson

# 5G zasebna omrežja

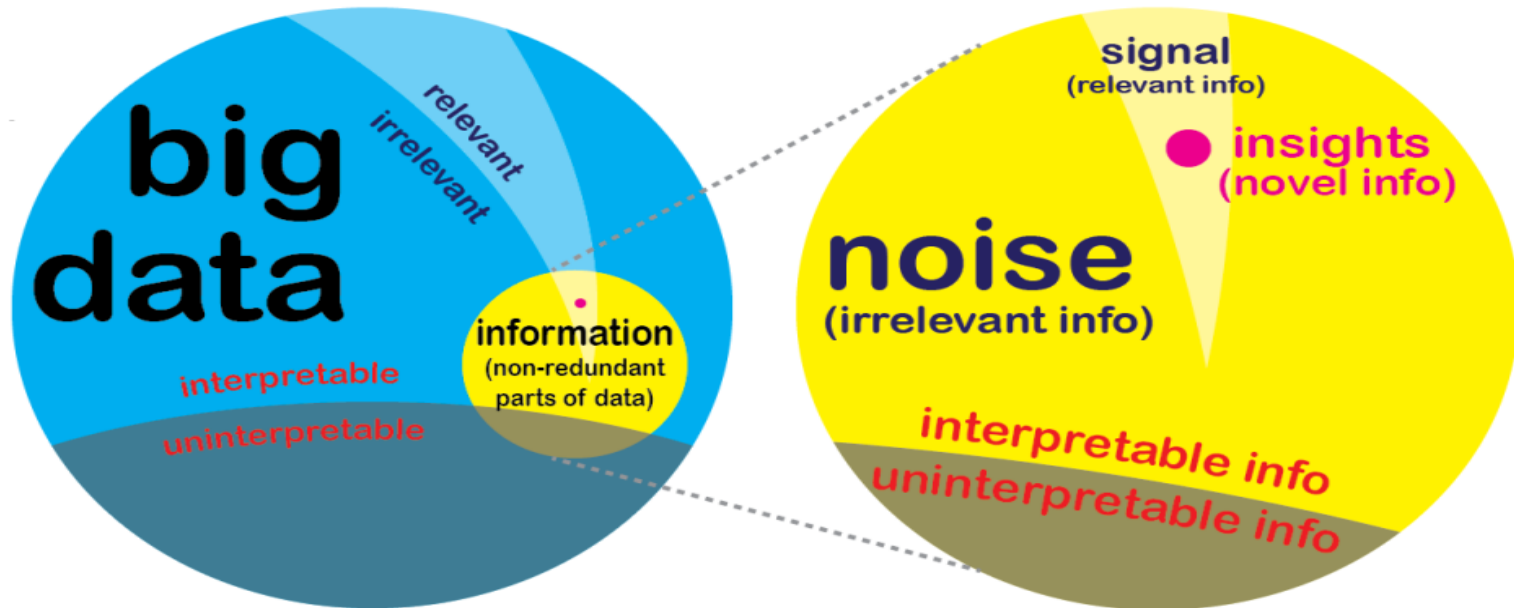
## Types of Private 5G Networks



Vir: Samsung

# Big data in domensko znanje

- „Imeti podatke“ ne pomeni „razumeti podatke“
- Vsaka aplikacija potrebuje domensko znanje



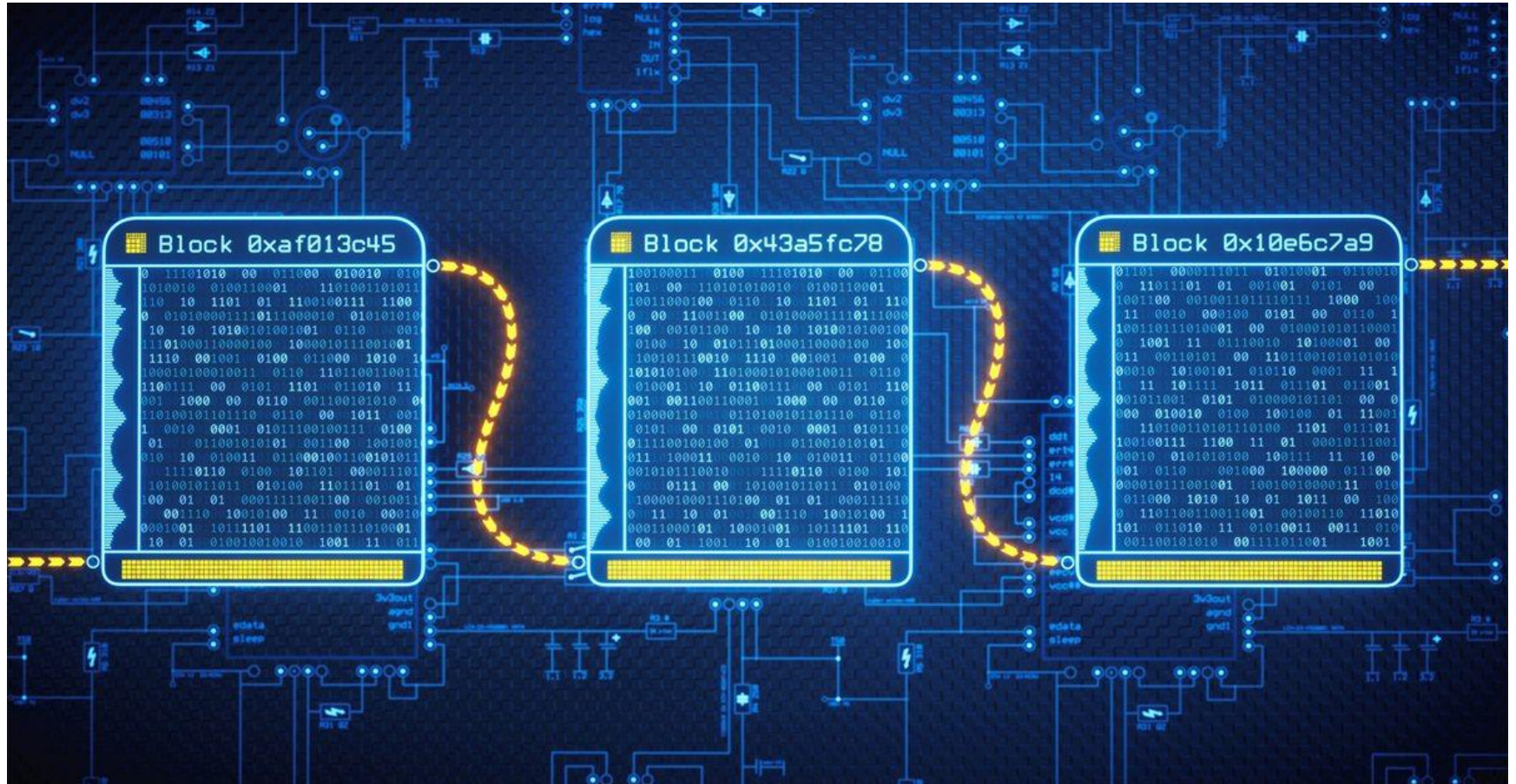
# Umetna inteligenca in veliki podatki



# Multimedija, AR, MR, VR, XR

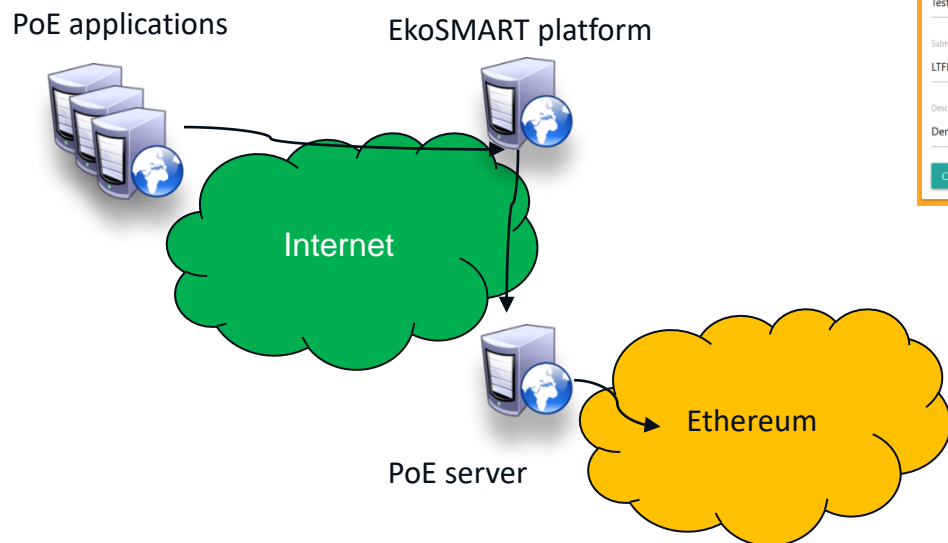


# Blokovne verige



# Potrdilo o obstoju

- Proof-of-Existence (PoE)



The screenshot shows the 'Create Proof of Existence' web interface. It includes a 'Select your document' section with a file named 'testna datoteka.txt' and a 'Calculating hash' progress bar. Below, the generated hash is displayed: `e3b0c44298fc1c149afb4c8996fb92427ae41e4649b9`. The form also contains fields for 'Name' (Testna datoteka), 'Submitted by' (LTFE), and 'Description' (Demonstracija delovanja), along with a 'CREATE POE' button.

Below the screenshot is a network diagram showing the 'Apikacije PoE' (PoE applications) connected to the 'Platforma EkoSMART' via the 'Internet'. The 'Platforma EkoSMART' is connected to a 'PoE strežnik' (PoE server), which is connected to the 'Ethereum' blockchain.



# Kibernetska varnost

Your **CYBERSECURITY**  
is our priority.



Patient  
Monitoring



Workstations



Data  
Management



Patient  
Transport



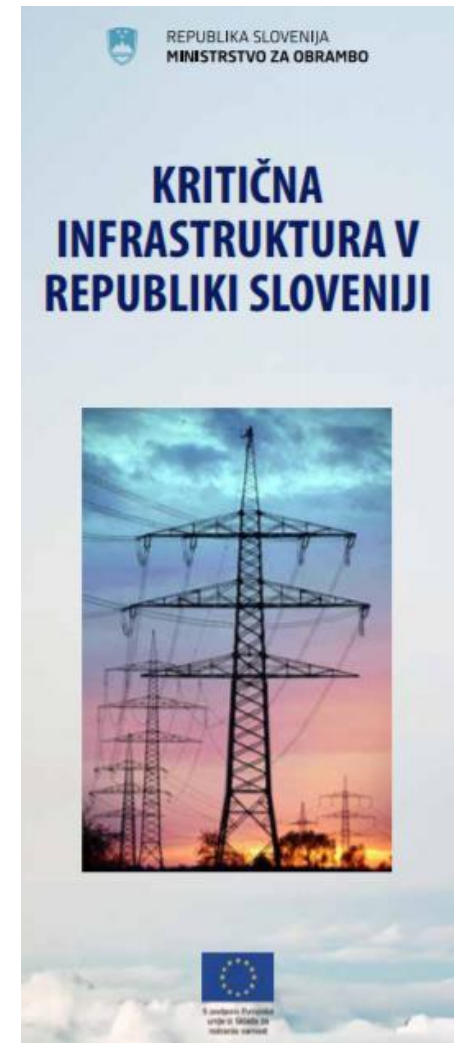
Telemetry



Networking

# Kritična infrastruktura

- <https://www.gov.si/assets/ministrstva/MO/Publikacije/Kriticna-infrastruktura-v-Republiki-Sloveniji.pdf>
- Sektorji kritične infrastrukture v Sloveniji
  - energetika
  - promet
  - prehrana
  - preskrba s pitno vodo
  - zdravstvo
  - finance
  - varovanje okolja
  - informacijsko-komunikacijska omrežja in sistemi



# Pametna mesta

- Veliko možnih vektorjev napada
  - Promet, zdravje
  - Energetika, voda
- Kaskadni efekt
  - Majhen, razmeroma irelevanten sistem lahko ogrozi večje sisteme
- Odprti podatki
- Veliko (poceni) naprav
  - Preslabo stestirano
- Pomanjkanje nadzora in upravljanja



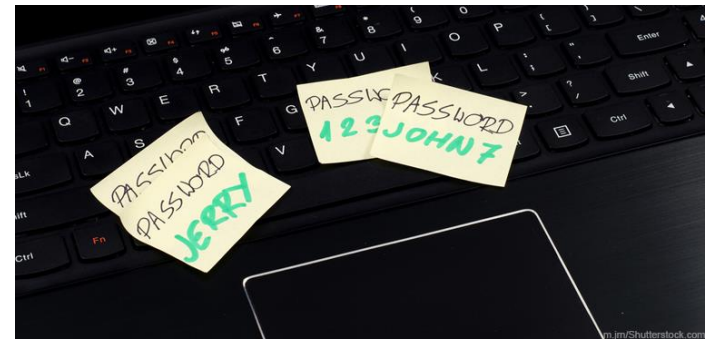
# Zabavna elektronika

- Enostavna uporaba – narejene na primer za otroke
- Priključene v domače omrežje
- Zbiranje osebnih podatkov
  
- Ciljne naprave
  - Igrače
  - Pametni domači ljubljenci
  - ...
- BYOD



# Socialni inženiring: „People hacking“

- Izkorišča (pogosto) najšibkejši člen v verigi: človeka
- Raziskovanje človeškega obnašanja:
  - želja biti koristen
  - navdušenje nad zastonj nagrado
  - odnos do zaupanja
  - strah pred težavami
  - nasprotovanje avtoriteti
  - nevednost, naivnost
- Namen:
  - Pridobiti (neposredno) denar
  - Pridobiti osebne podatke (npr. gesla) (in z njimi pridobiti denar)
- Phishing
  - Ne verjemi na prvo žogo
- Dumpster diving
  - Glej, kaj mečeš v smeti
- Shoulder surfing
  - Geslo pod tipkovnico, PIN na kartici



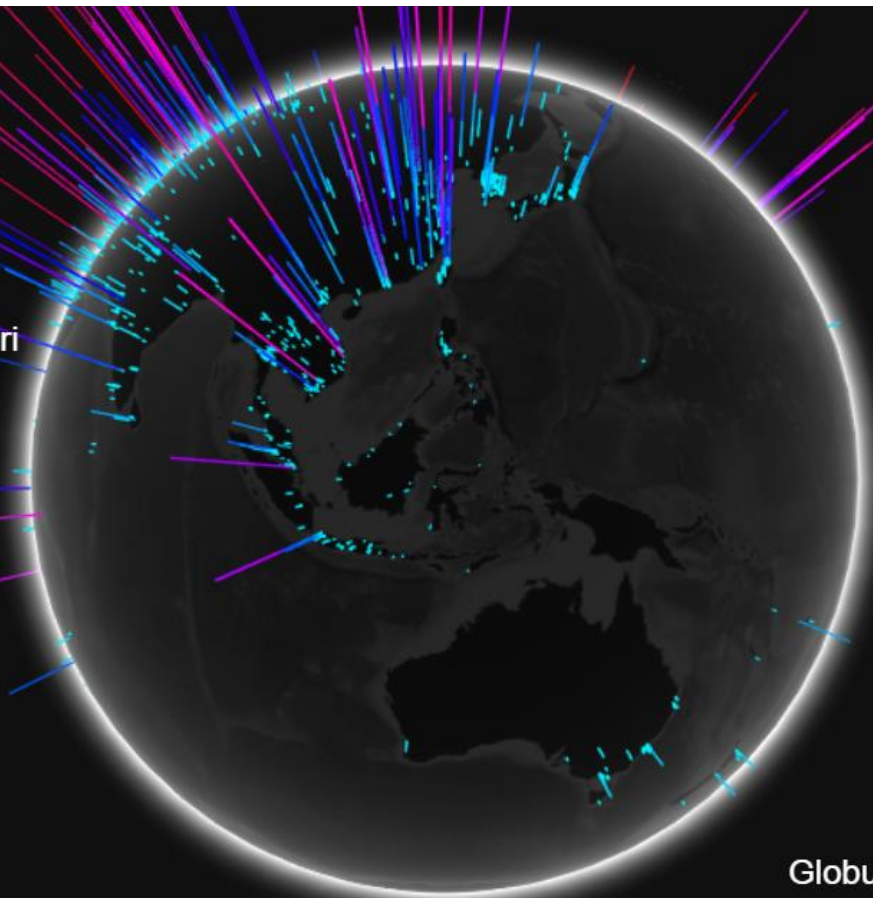
## Statistika

Poskusov v zadnji minuti

# 1547

Najpogostejša vrata v zadnji uri

Vrata	Št. poskusov
TCP 23	8640
TCP 1433	1969
TCP 445	1431
TCP 80	955
TCP 5555	909



**Kdo se poskuša povezati na naše temne naslove IP**

Blok 256 naslovov IP, ki še nikoli niso bili uporabljeni

Globus prikazuje izvore v zadnjih 3 h



## REALTIME DATA ON

0050

HACKERS  
ACTIVE

0021

NODES  
ATTACKED

TIMESPAN OF BOTTOM PANE DATA:

10 MIN

1 HR

12 HRS

1 DAY

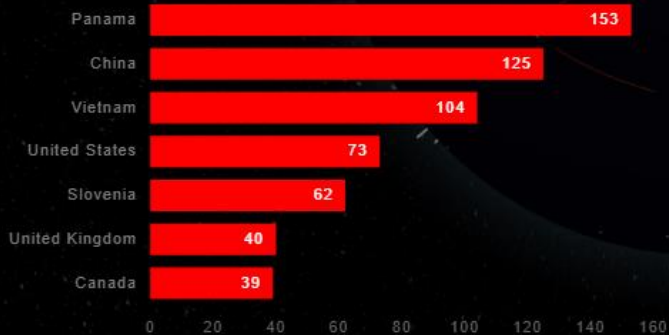
## SOURCE INFO ON

DISPLAY ALL TIME SOURCES  
ATTACKING MORE THAN

- 65 +

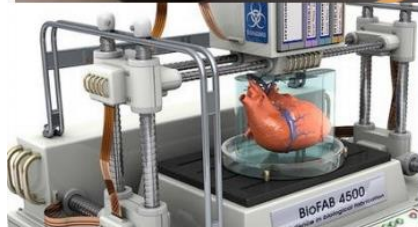
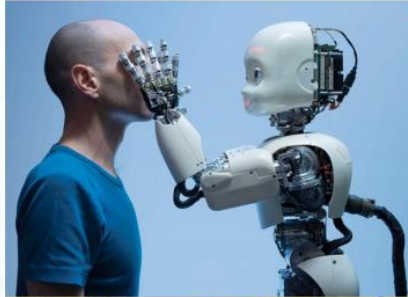
HONEYPOTS







## NUMBER OF ATTACK SOURCES PER COUNTRY



## LAST TERMINAL SESSION REPLAY

# (Veliki) Samorogi



 <b>UBER</b> World's largest taxi company Owns <b>NO</b> <del>Taxis</del>	 <b>airbnb</b> World's largest Accommodation provider Owns <b>NO</b> <del>Real estate</del>	 <b>skype WeChat</b> World's largest Phone companies Owns <b>NO</b> <del>Telco infra</del>	 <b>Alibaba Group</b> World's most Valuable retailer Owns <b>NO</b> <del>Inventory</del>
<b>facebook.</b> Most popular Media owner Owns <b>NO</b> <del>Content</del>	 <b>SocietyOne</b> World's fastest Growing bank Owns <b>NO</b> <del>Actual money</del>	<b>NETFLIX</b> World's largest movie house Owns <b>NO</b> <del>Cinemas</del>	 <b>Apple Google</b> World's largest Software vendors Owns <b>NO</b> <del>Apps</del>



# (Manjši) Samorogi

daibau mojmojster emajstor

**CONSTRUCTION PLATFORM  
FOR MIDDLE AND LARGE PROJECTS**

8000 PARTNERS    22.000 PROJECTS    75 mil. PROJECT WORTH EUR

03. problem

**8 hours**  
on average

Time spent for Booking of DJs for 1 Event

We make this 8x faster.

CLUBIO

beeping Blog Darilni bon Priporoči prijatelju Postani Beeper Pomoč Registracija Prijava

**Zanesljivi čistilci že od 29,5 € na čiščenje**

Zaupaj nam že več kot 2000 uporabnikov

Naša ponudba

**TOP 8 TRADING PLATFORMS**  
FOR ORDERFLOW, VOLUME AND MARKET PROFILE ANALYSIS

# Digitalno. Duh je ušel iz steklenice.



The Clinical Thermometer for Parkinson's



Diagnostic method for **early detection** of neurodegenerative diseases by using **eye-tracking technology**.

## WELCOME TO THE AGE OF SMART IRON

LEARN MORE

EQUIPMENT



POWER SYSTEMS



ATTACHMENTS



PARTS



Web Assistant Contact Dealer Locator Newsletter deutsch english

### Bosch Power Tools Innovation Portal

BOSCH  
Invented for life

Home Assignments Submit Your Own Ideas About The Innovation Portal Register Login



With ideas to success!

**Do you have the solution?**  
Dust Extraction  
> You know how to extract dust perfectly or how to avoid dust at all?

**With ideas to success!**  
High innovation power as well as the exact alignment of our products with our customers' needs has led us to being the world market leader in portable electric power tools and power tools accessories.  
With your help we can continue to develop products that fulfill exactly the

# Spremembe

# Society 5.0 – nov ekosistem



Contribute



Cross-sectoral Innovation Facilitation Platform



Increase



Increase



Increase



Increase



Data Platform

Autonomous Driving

Data Platform

Construction Disaster Mgm

Data Platform

Agriculture

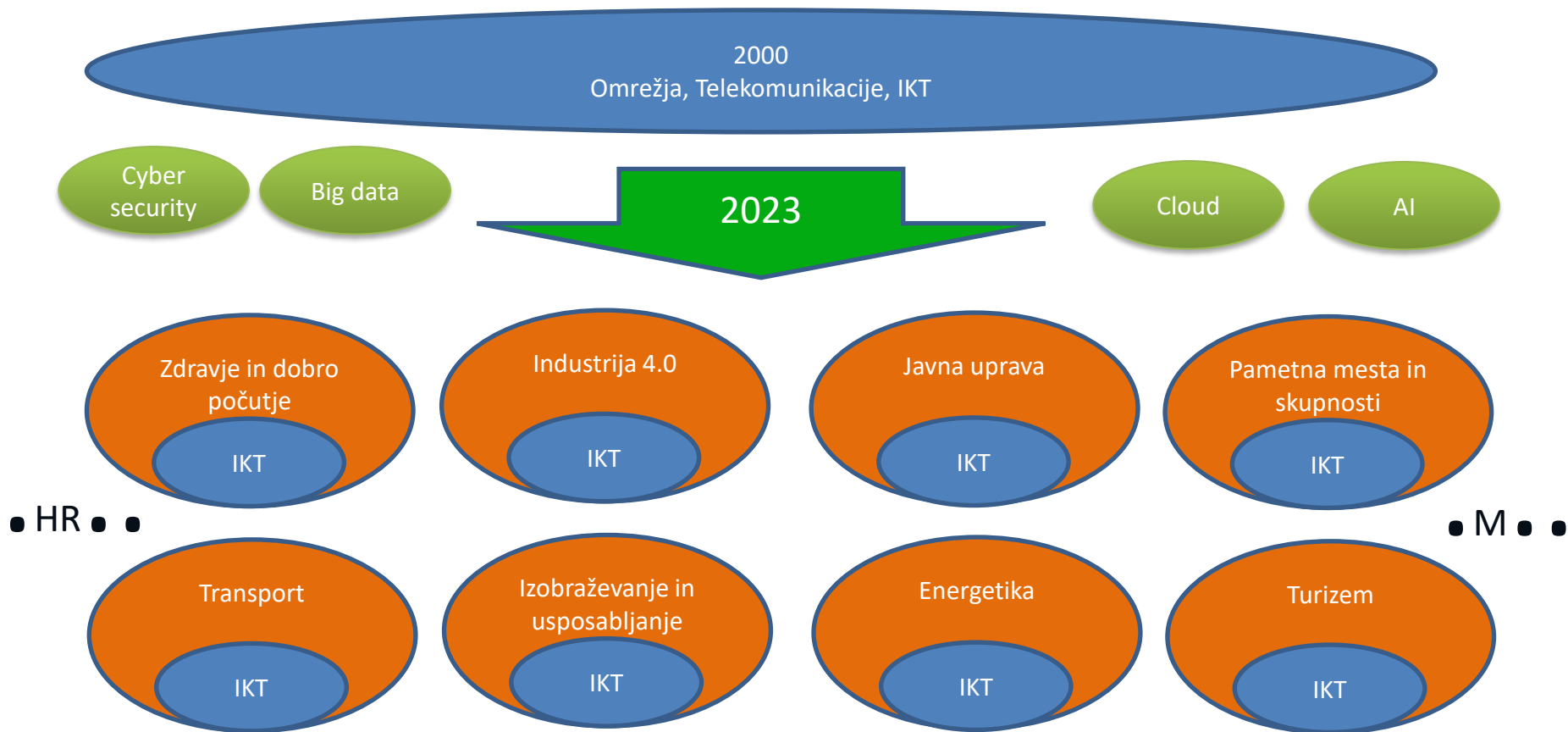
Data Platform

Manufacture

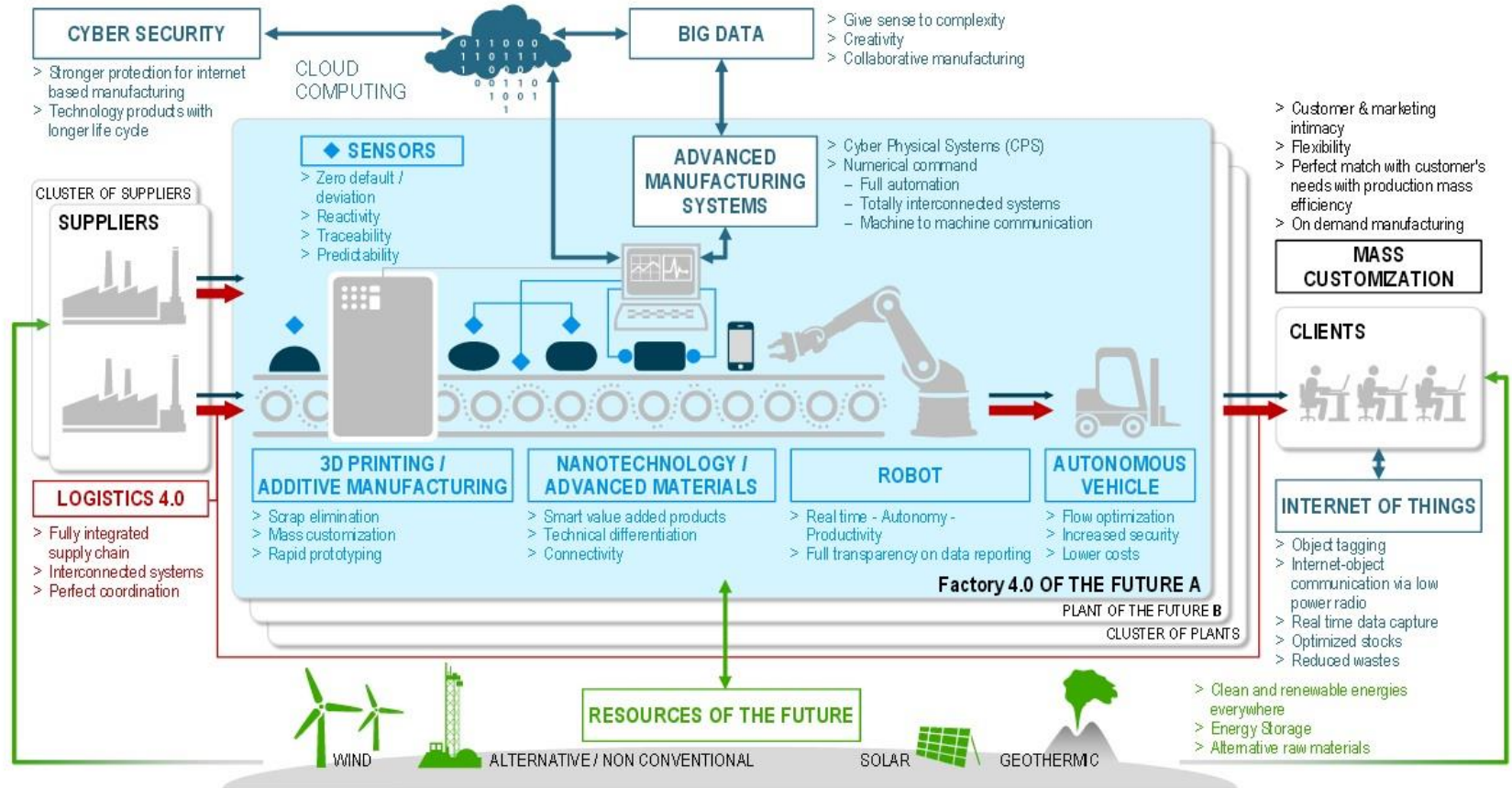
Data Platform

Health/ Medical

# Spremembe na področju IKT



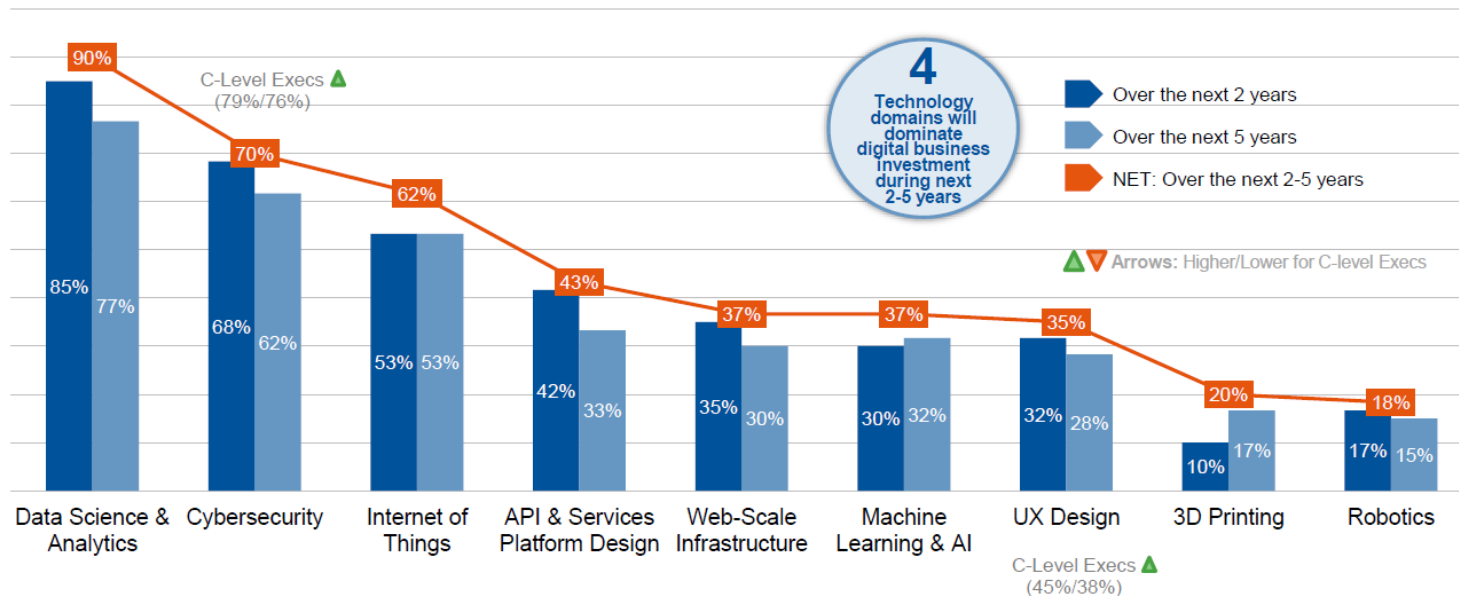
# Industrija 4.0



# Talenti

# Ključne IKT kompetence

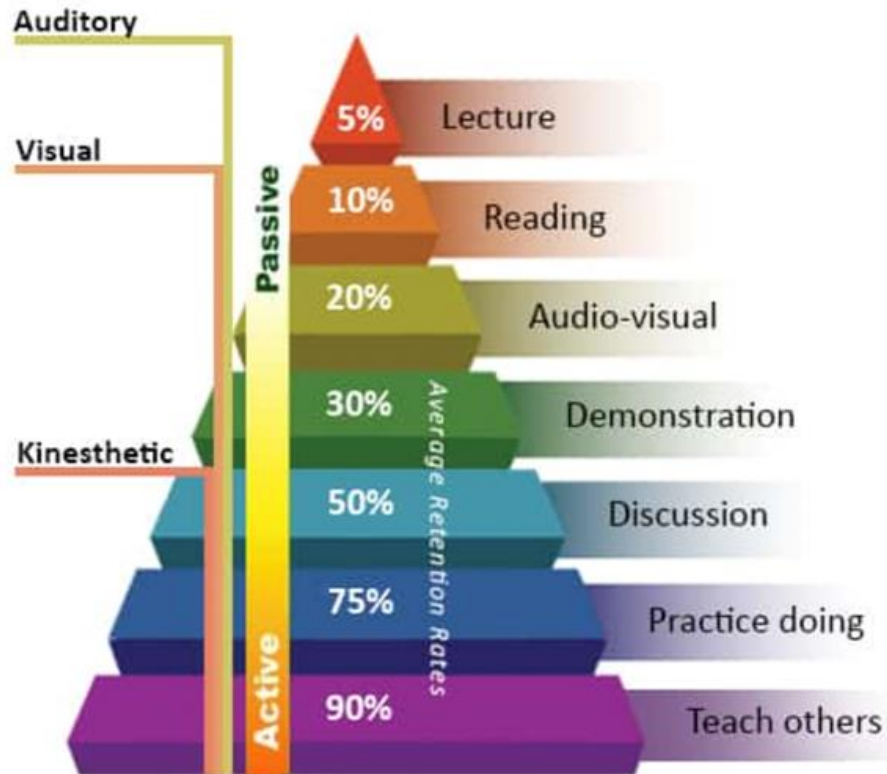
## What Will You Need? Expertise in Key Technology Domains



Gartner.



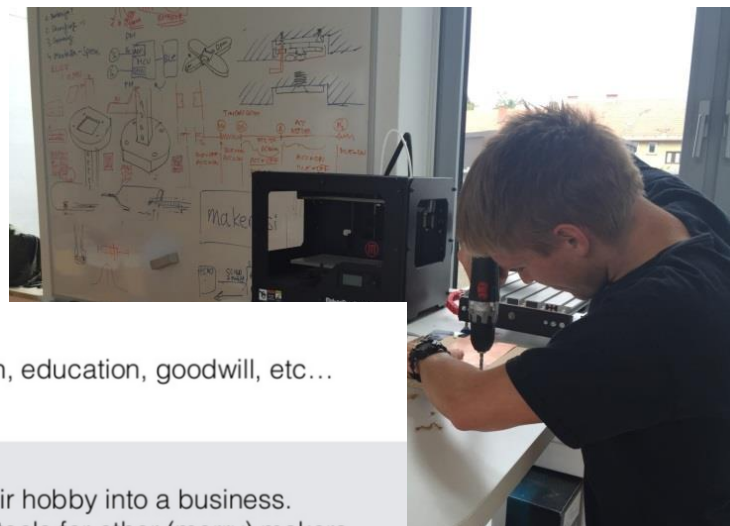
# Koliko si zapomnimo



Adapted from the NTL Institute of Applied Behavioral Science Learning Pyramid

# MakerLab at LTFE/LMMFE

- IoT Makerlab
  - Razvoj
  - Inovacije
  - Izobraževanje



## Makers

Build for fun, education, goodwill, etc...

## Maker Pros

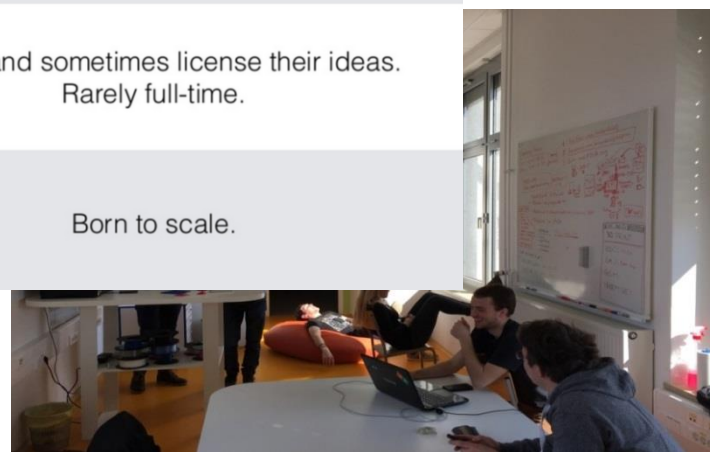
Turn their hobby into a business.  
Often create tools for other (merry) makers.

## Inventors

Invent and sometimes license their ideas.  
Rarely full-time.

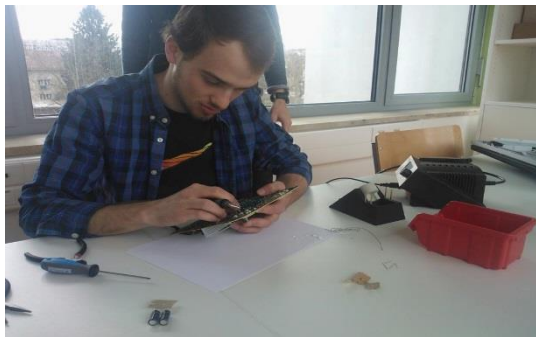
## Hardware Startups

Born to scale.



# Evolucija v izobraževanju

- Kratka, hands-on izobraževanja/usposabljanja
- Ne vedno formalno priznana
- Learning by doing
- Makerlab IoT akademija
- 1 dnevne delavnice
  - Hit

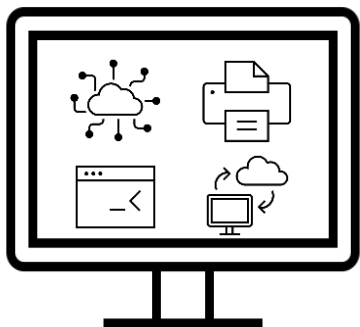


# ICTA = IKT akademija

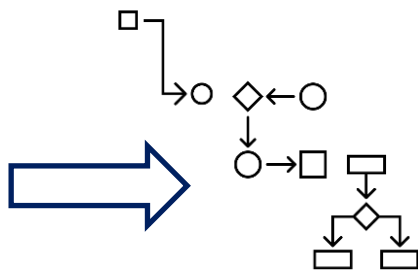


# Sklep

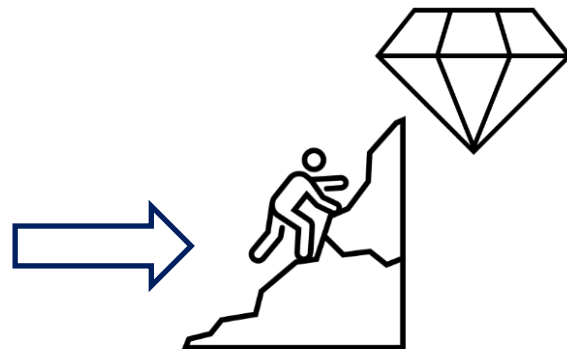
# (Samo) tehnologija ni dovolj



Informacijsko-komunikacijska tehnologija



Preoblikovanje procesa



Poslovna vrednost



**Diskusija.  
Hvala.**

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