



**ALGEBRA
BERNAYS**
UNIVERSITY



POSLOVNI INFORMACIJSKI SUSTAVI (PIS)

Umjetna inteligencija
(UI) u poslovanju

Tomislav Bronzin, mag. ing. el.



**Što je umjetna
inteligencija?**

Umjetna inteligencija (UI)

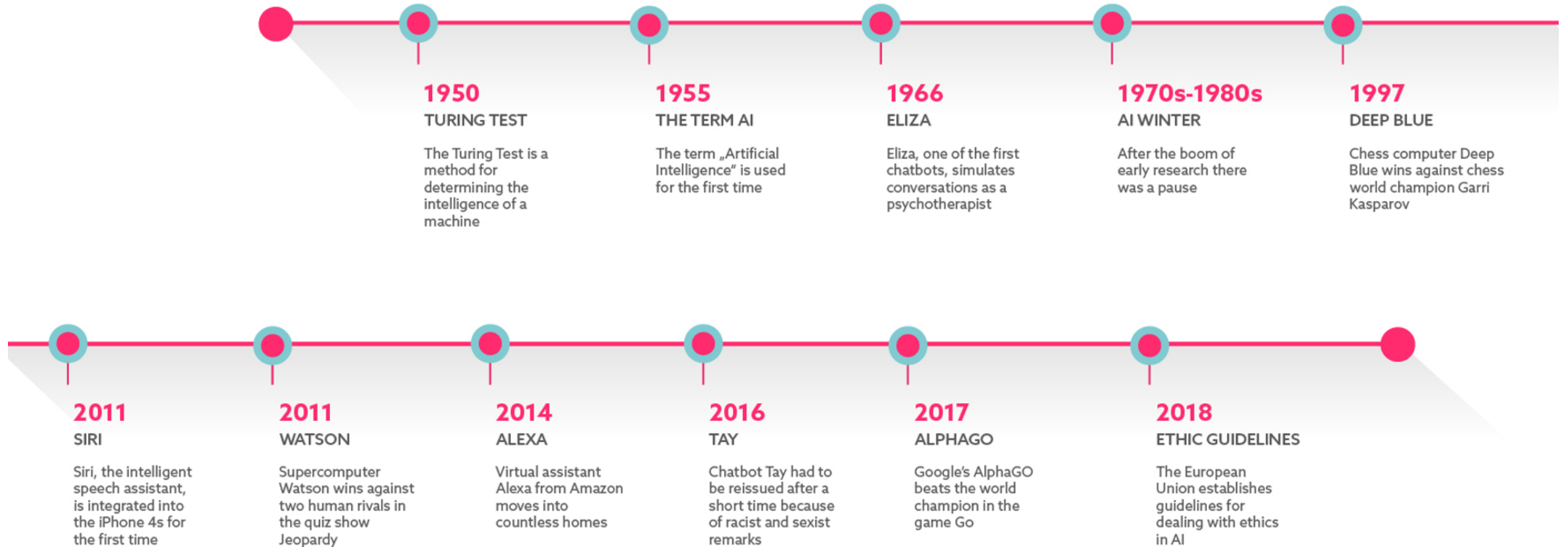
- Je li područje znanosti i tehnologije temeljeno na disciplinama kao što su:
 - Računarstvo
 - Biologija
 - Psihologija
 - Matematika
 - Inženjerstvo
- Cilj umjetne inteligencije je razviti IT sustave koji mogu simulirati sposobnost razmišljanja, kao i gledanja, slušanja, hodanja, govora i osjećanja

Obilježja inteligentnog ponašanja

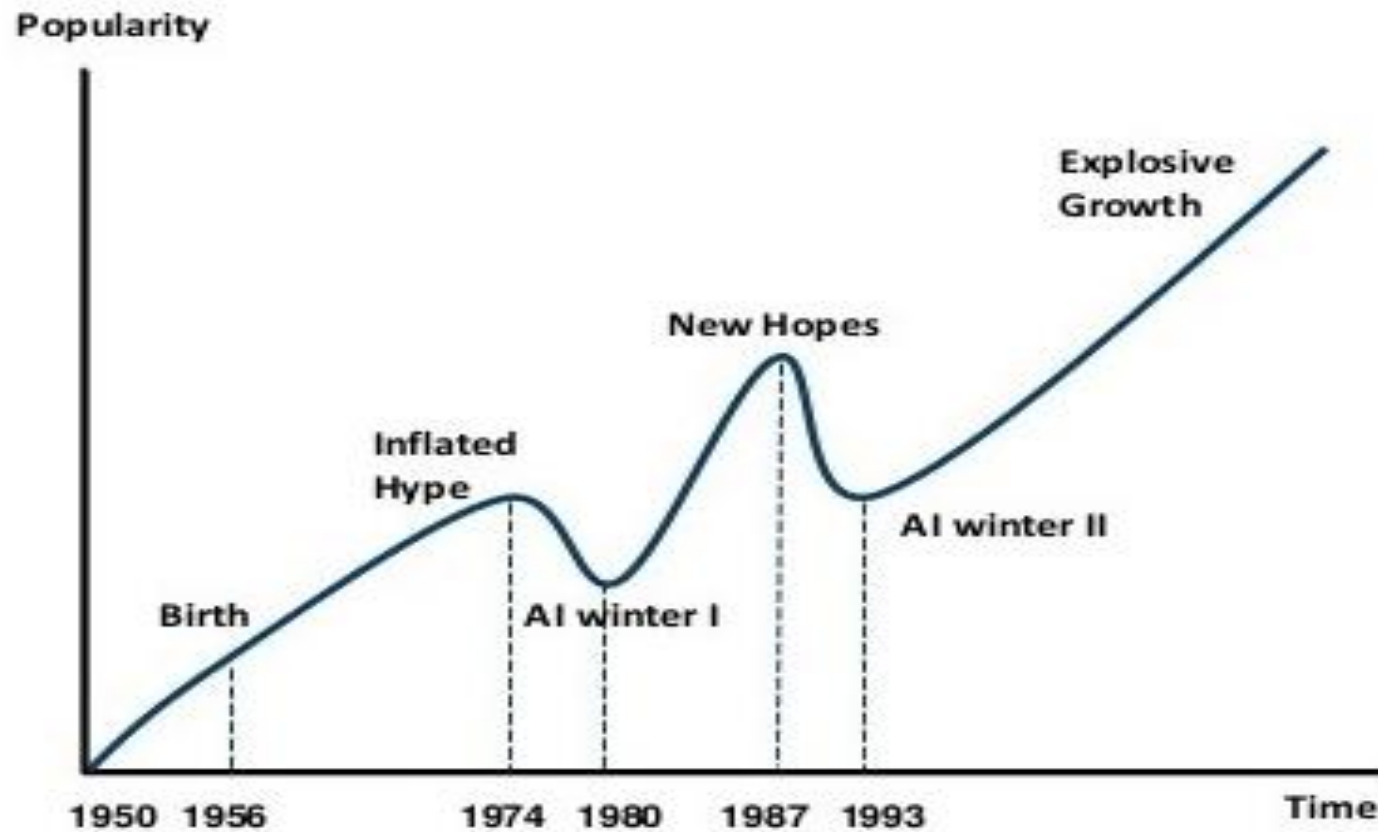
- Misliti i rasuđivati
- Koristiti razum za rješavanje problema
- Učiti ili razumijevati iz iskustva
- Sticati i primjenjivati znanje
- Izražavati kreativnost i maštovitost
- Nositi se sa složenim situacijama
- Brzo i uspješno reagirati na nove situacije
- Prepoznavati relativnu važnost elemenata u situaciji
- Rukovati dvosmislenim i nepotpunim informacijama



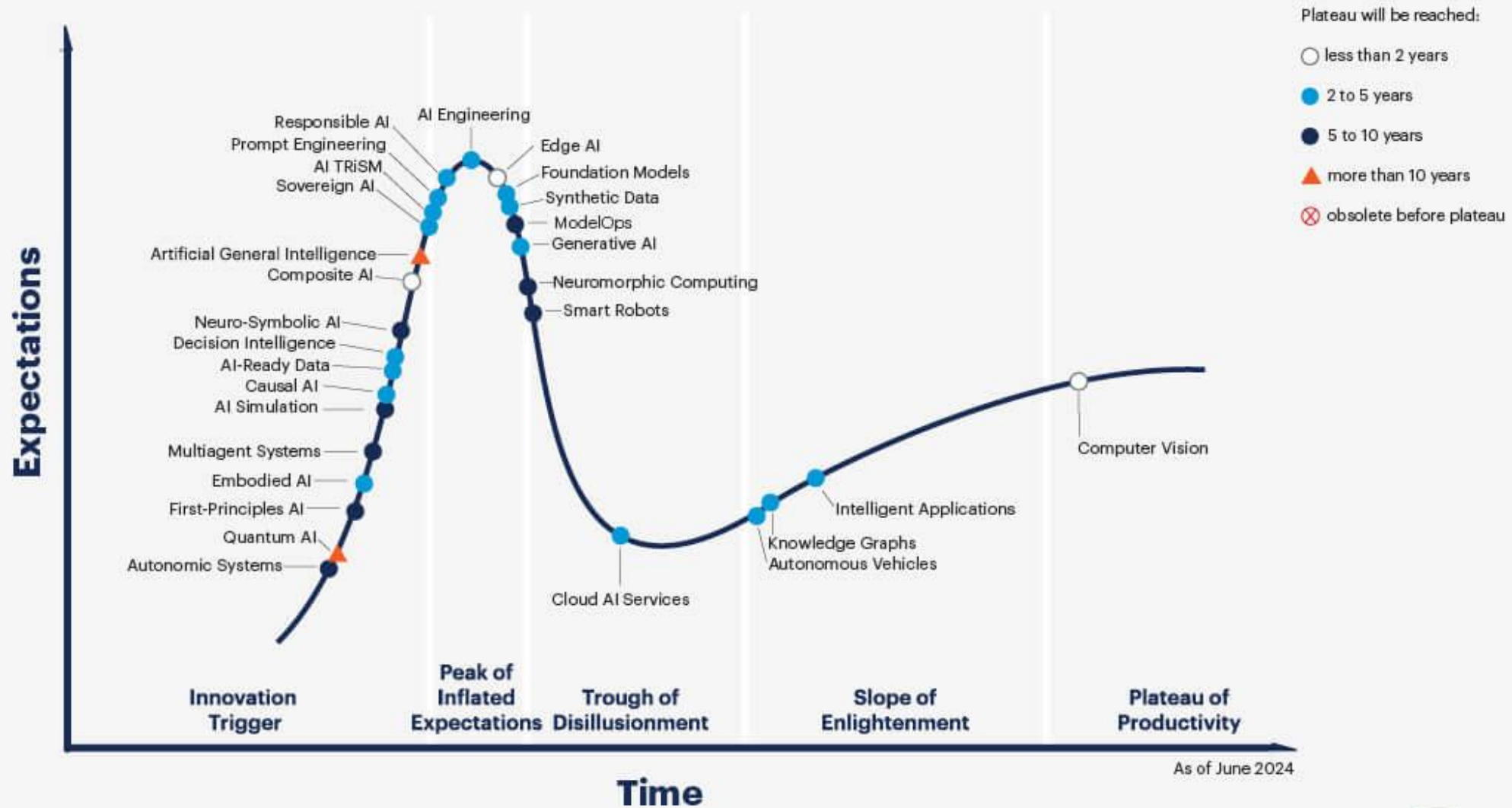
Kratka povijest UI



Putovanje i dvije zime



Hype Cycle for Artificial Intelligence, 2024

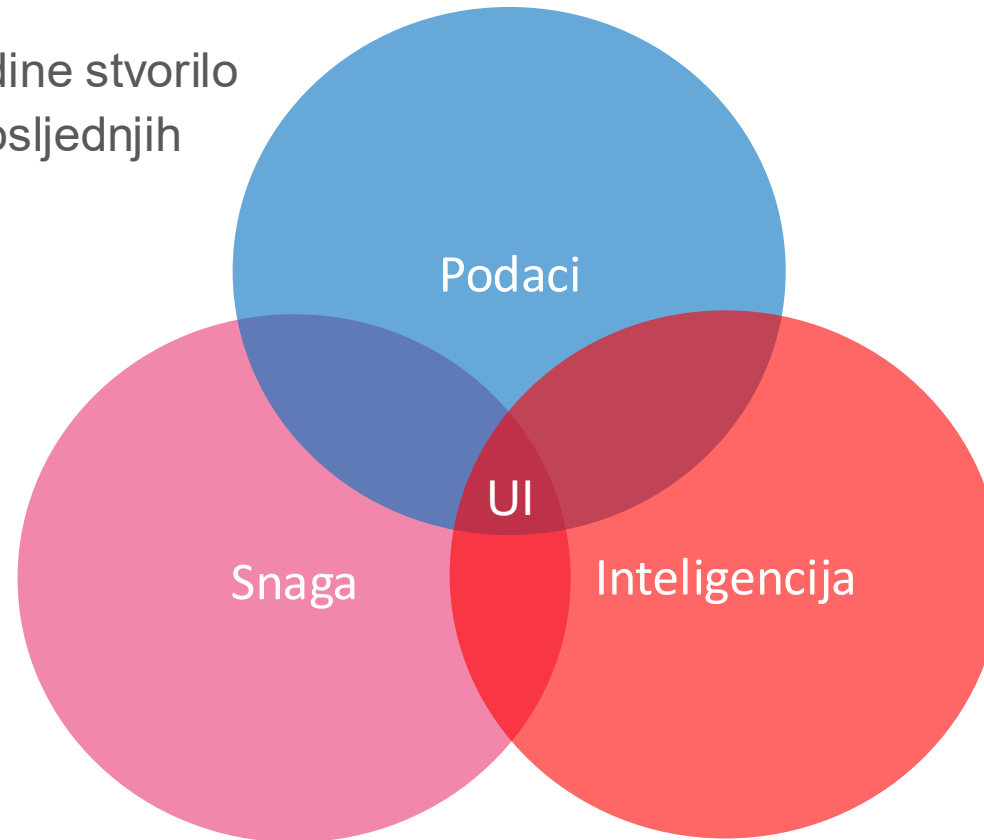


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Osnovne činjenice

Čovječanstvo je ove godine stvorilo više podataka nego u posljednjih 5000 godina



Procesorska snaga je već dostupna

Kako analizirati podatke i donositi inteligentne odluke?

Evolucija AI

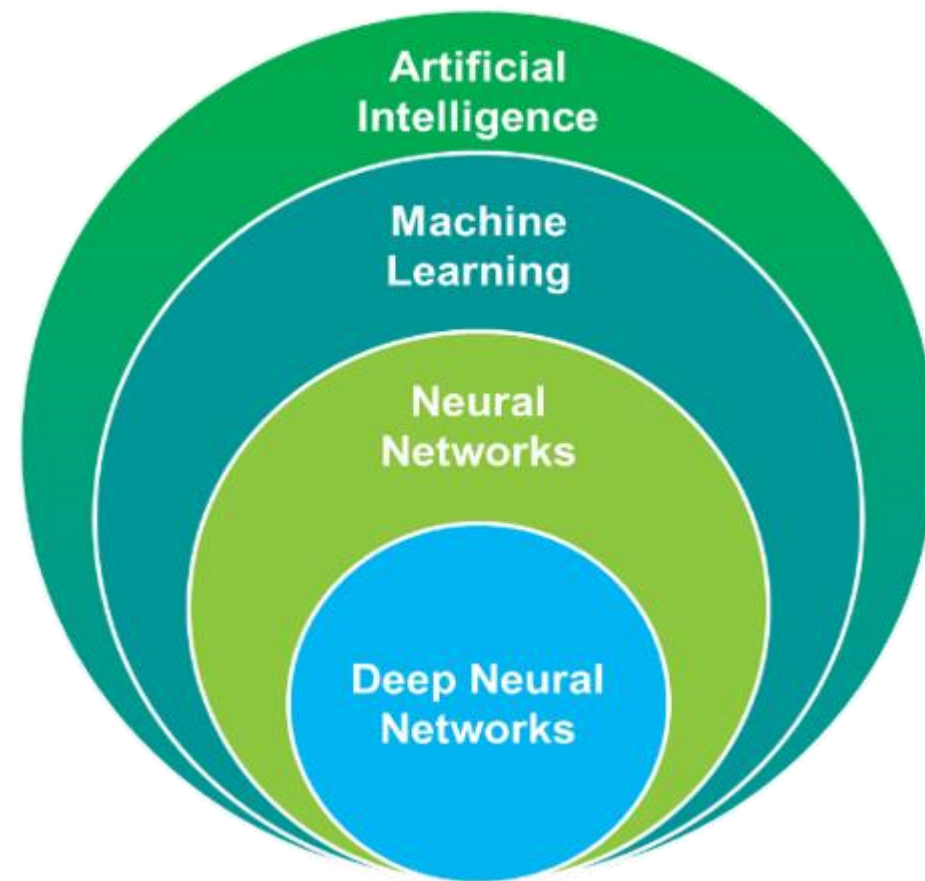
- Symbolic AI
- Machine learning
- Deep learning
- Generative AI

Osnove Machine Learning

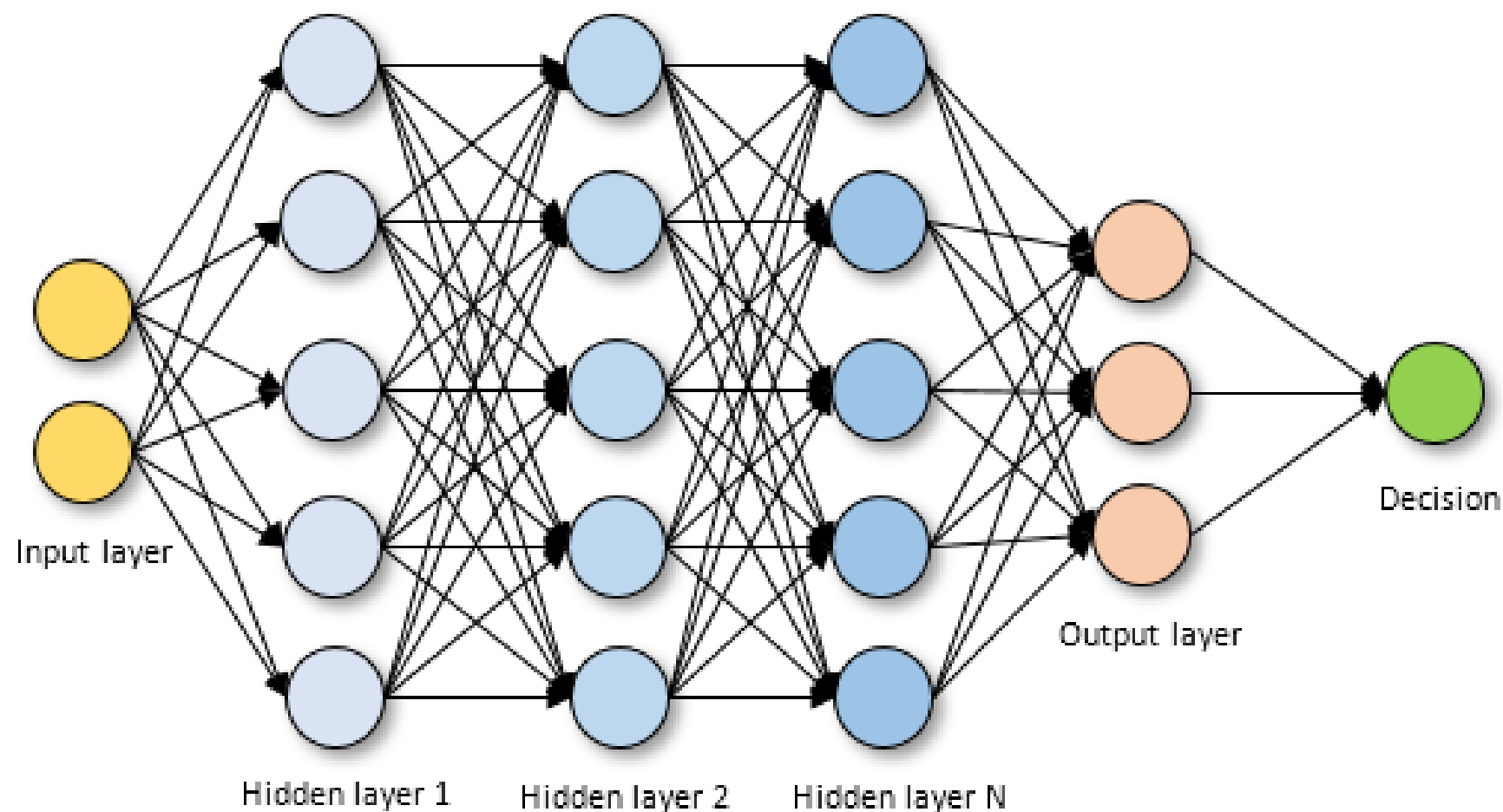
- Supervised
- Unsupervised
- Reinforcement learning

Strojno učenje vs Duboko učenje

- Algoritmi strojnog učenja zahtijevaju strukturirane podatke
 - Algoritmi koji se mogu modificirati kako bi proizveli željeni izlaz - tako što se sami hrane strukturiranim podacima
- Mreže dubokog učenja oslanjaju se na slojeve umjetnih neuronskih mreža
 - Ugniježđeni slojevi u neuronskim mrežama stavljaju podatke kroz hijerarhije različitih koncepata i na kraju uče kroz vlastite pogreške.
- Podaci su ključ
 - Kvaliteta podataka određuje kvalitetu rezultata



Revolucija dubokog učenja: višeslojne neuralne mreže



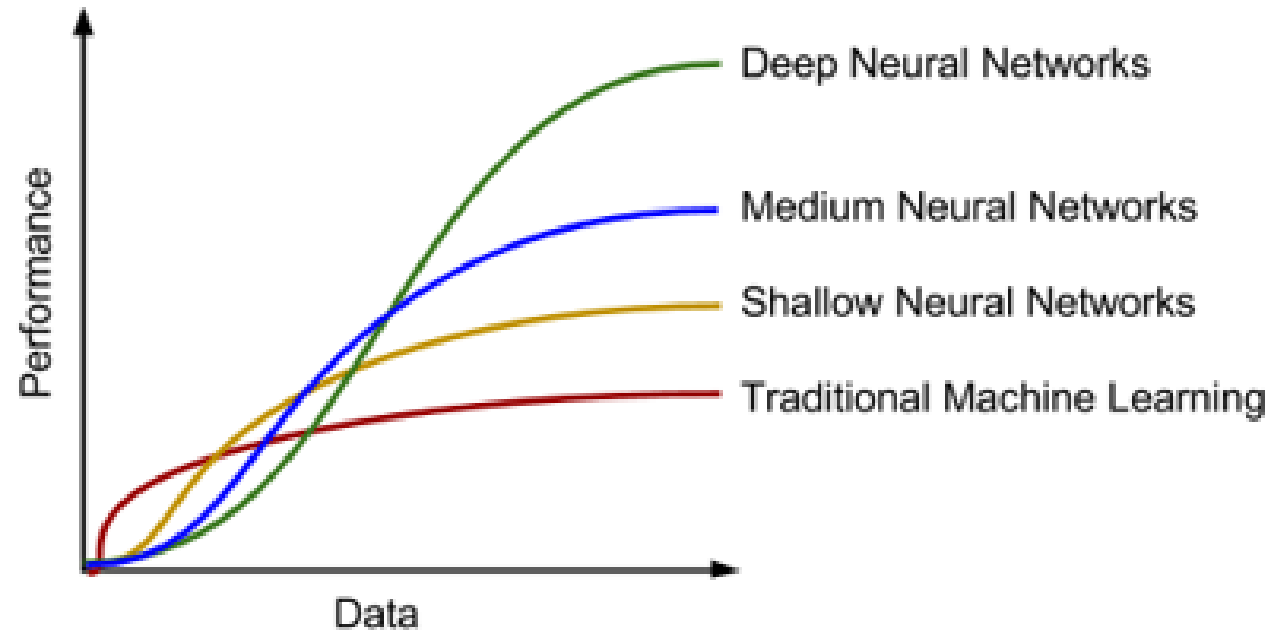
Deep Learning

- Neuronske mreže
- Zahtjevi za podatke
- Skaliranje performansi
- Primjene

Izvedba u odnosu na količinu podataka

Vrlo neobični rezultati

- Što više podataka treba obraditi, to je izvedba bolja!



Primjer količine podataka

- Dubravko Hlede (ex CIO, Rimac automobili)

U tom trenutku, najveće skladište u Hrvatskoj bilo je 4.5 PB
(1 PB = 1,024 TB).

Pohrana se koristi za čuvanje videozapisa prikupljenih tijekom razvoja autonomne vožnje.

Svaki dan, dodatnih **90 TB** novih podataka se generira.

Predviđeni maks. Kapacitet koji će biti dosegnut do 2021.-2022. **75**

PB."



Generativna umjetna inteligencija

- LLMs
- Multimodalni modeli
- Generiranje sadržaja
- Upotreba u poduzećima

AI tehnološki sloj

- Podaci
- Modeli
- Platforme
- Primjena

Poslovni informacijski sustavi

- ERP
- CRM
- SCM
- BI

UI u poslovnim sustavima

- Automatizacija
- Predviđanje
- Optimizacija
- Augmentacija

Arhitektura podataka poduzeća

- Operativni sustavi
- Data warehouse
- Lakehouse
- AI sloj

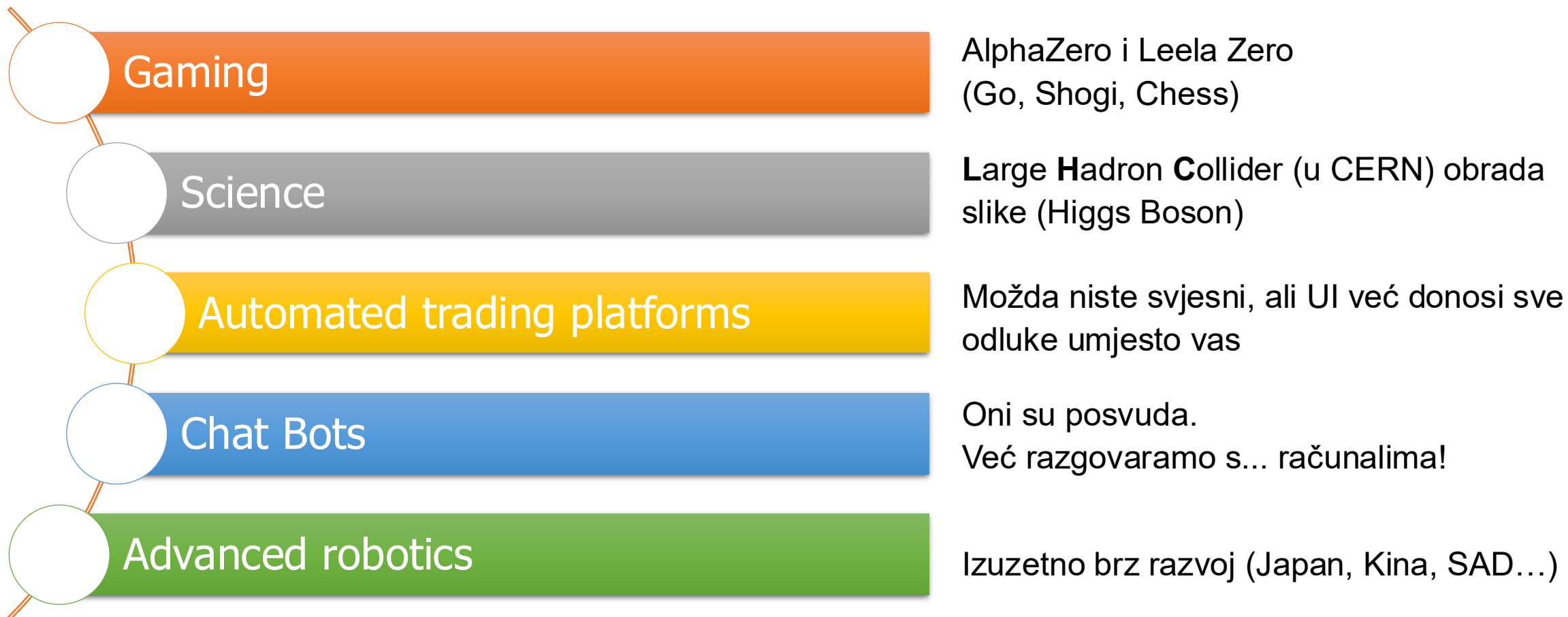
Kvaliteta podataka za umjetnu inteligenciju

- Točnost
- Potpunost
- Dosljednost
- Upravljanje



Komercijalne aplikacije umjetne inteligencije

Što se već dogodilo?



Što je iza ugla/što nam dolazi?

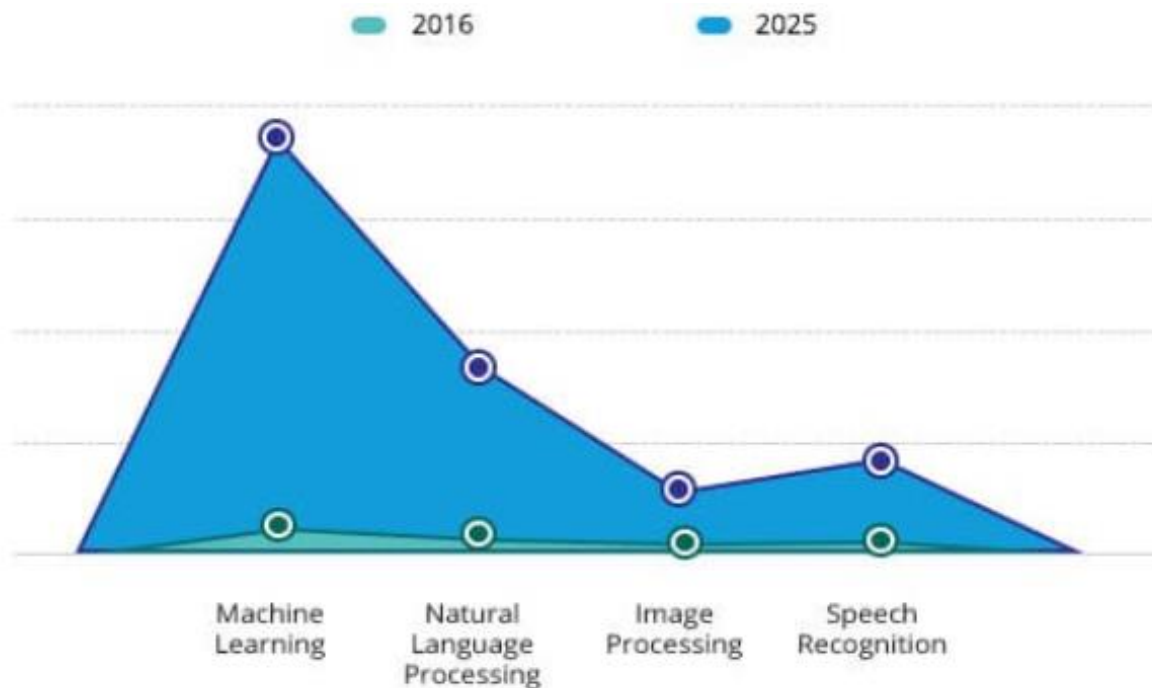
Poslovna područja

Zdravstvo, autonomna vožnja, poljoprivreda, energetika, financije i operacije, osiguranje, proizvodnja, ljudski resursi i talenti, digitalni marketing, sigurnost i rizici, maloprodaja, digitalna trgovina, logistika, produktivnost, poslovna inteligencija, znanost o podacima...

Tehnološka područja

Obrada videa
Prediktivna analitika
Napredna robotika
Virtualna, produžena i proširena stvarnost
IoT ...

UI tržište segmentirano prema tehnologiji



10 UI aplikacija koje mogu promijeniti zdravstvo

APPLICATION	POTENTIAL ANNUAL VALUE BY 2026	KEY DRIVERS FOR ADOPTION
Robot-assisted surgery	 \$40B	Technological advances in robotic solutions for more types of surgery
Virtual nursing assistants	 20	Increasing pressure caused by medical labor shortage
Administrative workflow	 18	Easier integration with existing technology infrastructure
Fraud detection	 17	Need to address increasingly complex service and payment fraud attempts
Dosage error reduction	 16	Prevalence of medical errors, which leads to tangible penalties
Connected machines	 14	Proliferation of connected machines/devices
Clinical trial participation	 13	Patent cliff; plethora of data; outcomes-driven approach
Preliminary diagnosis	 5	Interoperability/data architecture to enhance accuracy
Automated image diagnosis	 3	Storage capacity; greater trust in AI technology
Cybersecurity	 2	Increase in breaches; pressure to protect health data

6 razina automatizacije u automobilima bez vozača

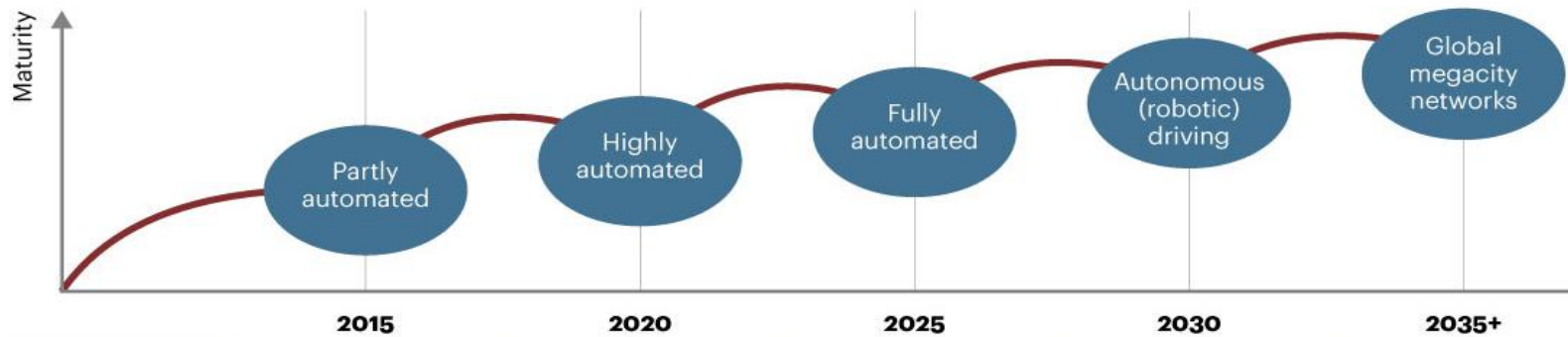
The U.S. National Highway Traffic Safety Administration lays out six levels of automation, beginning with humans doing the driving through driver assistance technologies up to fully autonomous cars.



LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
The human driver does all the driving.	An advanced driver assistance system (ADAS) on the vehicle assists the human driver.	The vehicle's ADAS can control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention and perform all other driving tasks.	An automated driving system (ADS) on the vehicle can perform all driving tasks under some circumstances. In those circumstances, the human driver must be ready to take the wheel and drive outside of those set circumstances.	An ADS on the vehicle can perform all driving tasks and monitor the road in certain circumstances. The human doesn't have to pay attention in those circumstances.	An ADS on the vehicle does all the driving in all circumstances. The human occupants are just passengers and are never involved in driving.

5 faza u napretku autonomne vožnje

Autonomous driving technology will advance in waves



	2015	2020	2025	2030	2035+
Legal protection	Scoring system for preventive driving	Daily legal protection for car rental and car-to-go	Legal protection based on mobile devices	Legal protection for all kinds of devices	Legal protection for all kinds of devices
Technology	First-generation automation and control	Second-generation automation, pooling	Third-generation fixed-distance automation	Fourth-generation automated traffic junctions	Fully automated traffic flow management
Infra-structure	Highway networks	Regional or national network	Selected megacities	Micro-/mobile city metropolises	Globally interconnected megacities
Standards	Internet standards for mobility apps	Camera and image processing and interfaces	Radio frequency and interface standards	Control and automation standards	Fully automated networks/telematics

5 slučajeva upotrebe UI u poljoprivredi

ANALYZING SATELLITE IMAGES



IN-FIELD MONITORING



ASSESSING CROP/SOIL HEALTH



PREDICTIVE ANALYTICS

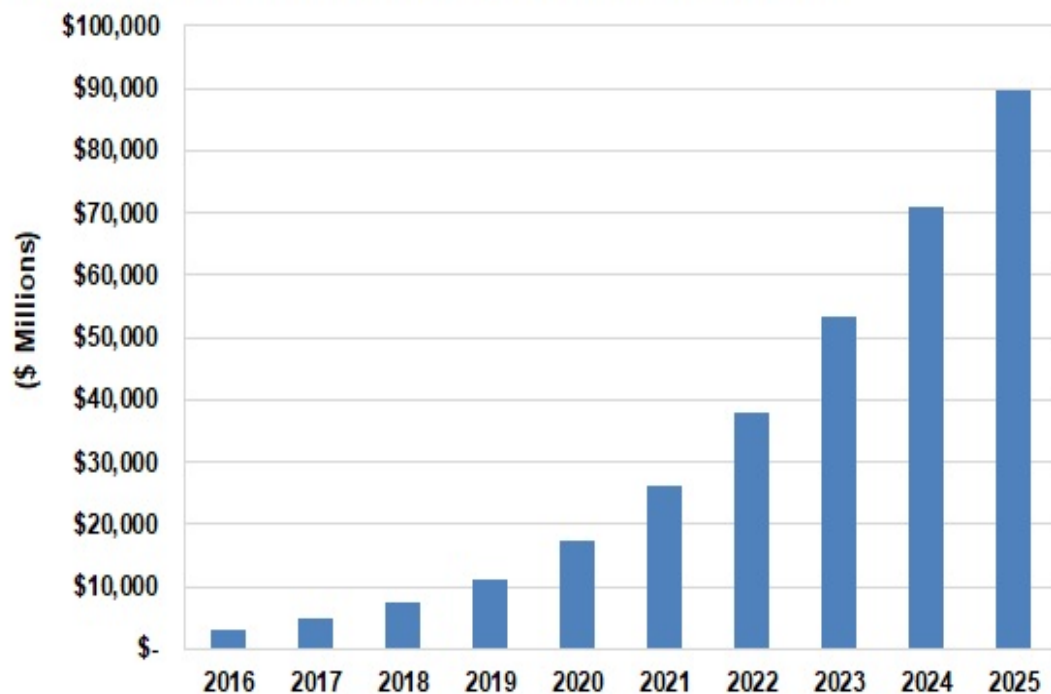


AGRICULTURAL ROBOTS

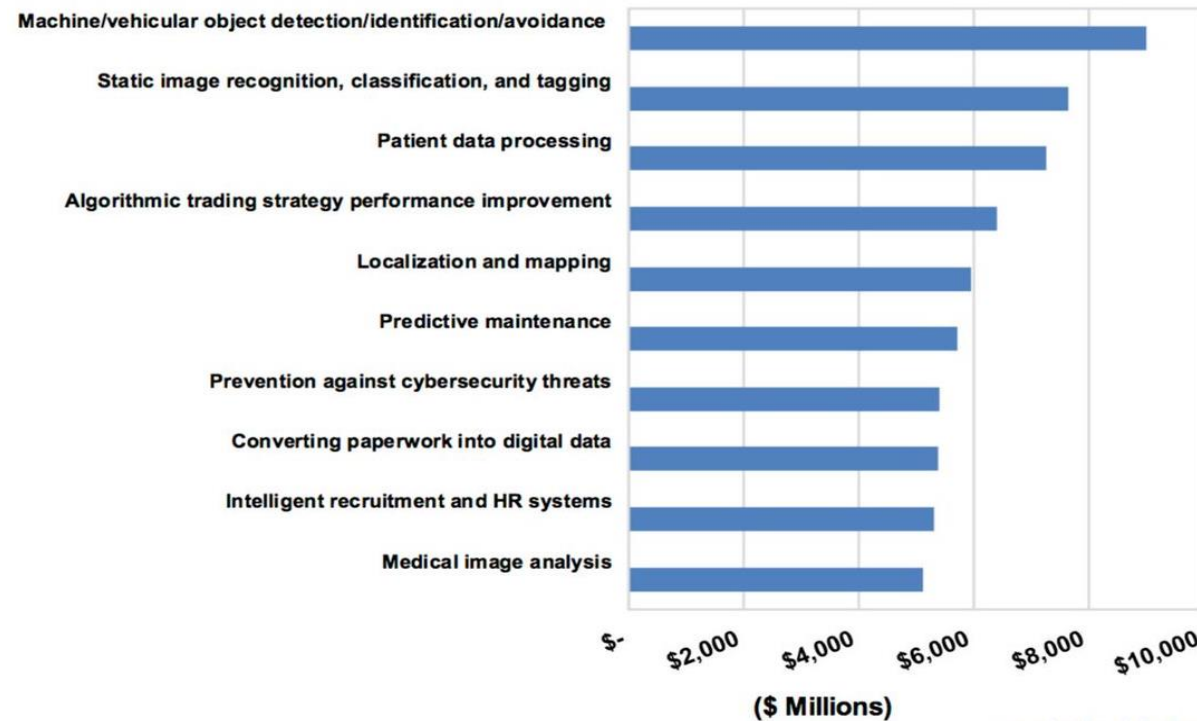


Pokaži mi novac!

Prihod od AI softvera: globalno tržište 2016.-2025.

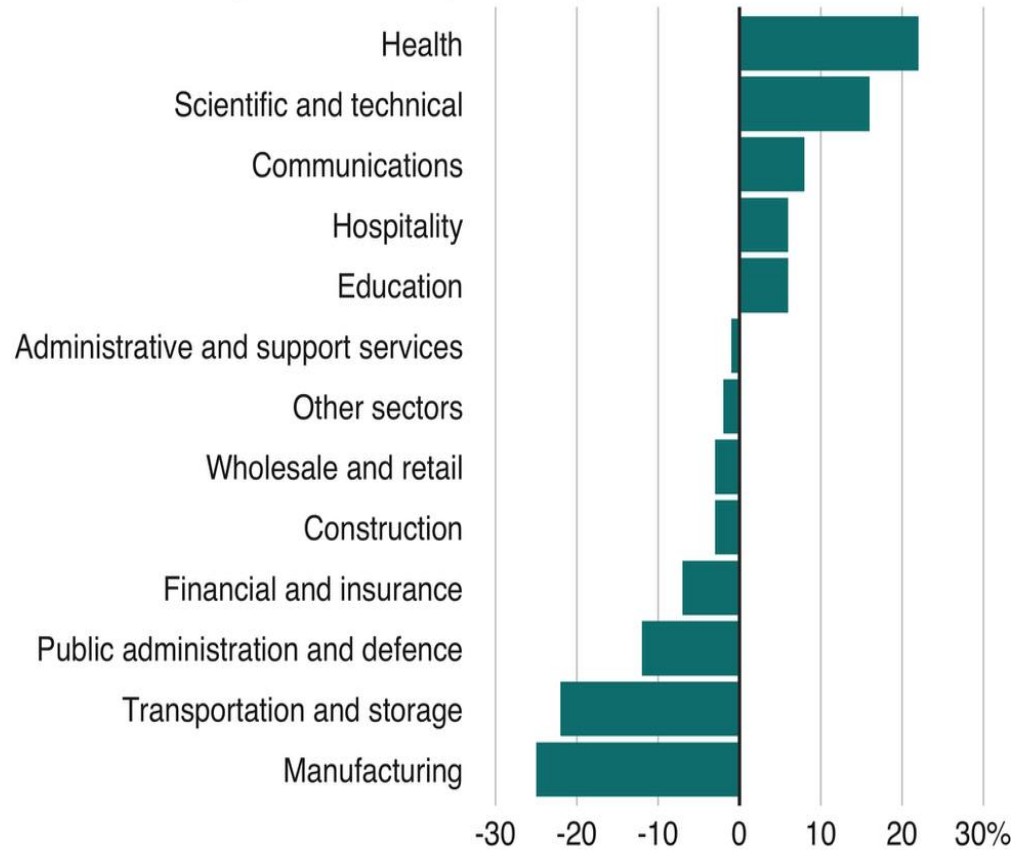


Prihod od UI: 10 najvećih slučajeva upotrebe 2016.-2025.

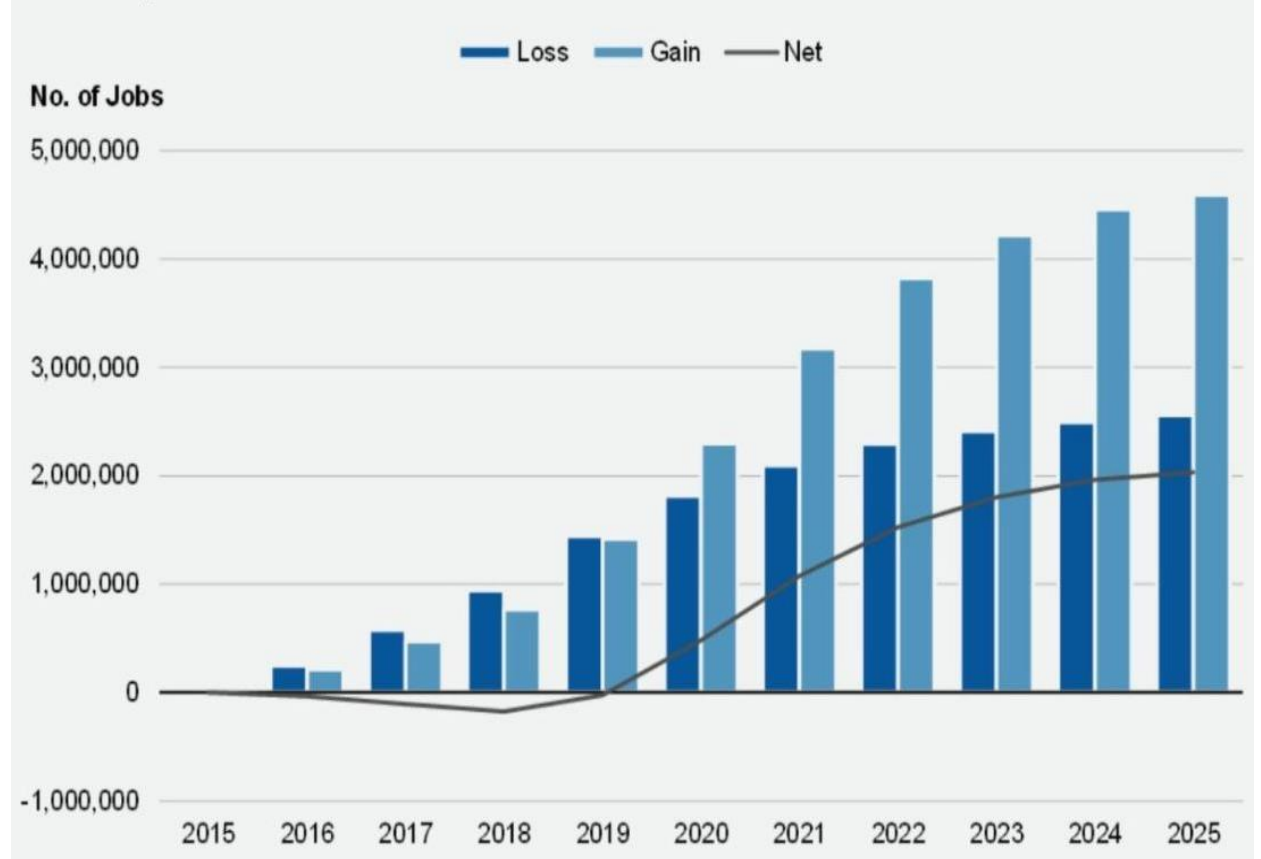


Biti ili ne biti?

Estimated net job creation by industry sector, 2017-2037



The Impact of AI Automation on Jobs



Sofisticirani roboti su posvuda

AI osobni asistenti (SIRI, Home, Alexa)

Uskoro će automatizirati
svakodnevni život

AI odvjetnici (ROSS)

Precizniji (90% naspram 70%) u
odnosu na ljude; Estonija čak
planira uvesti AI suce

AI liječnici (IBM Watson)

4 puta precizniji od ljudi

AI autonomni vozači (Google, Tesla)

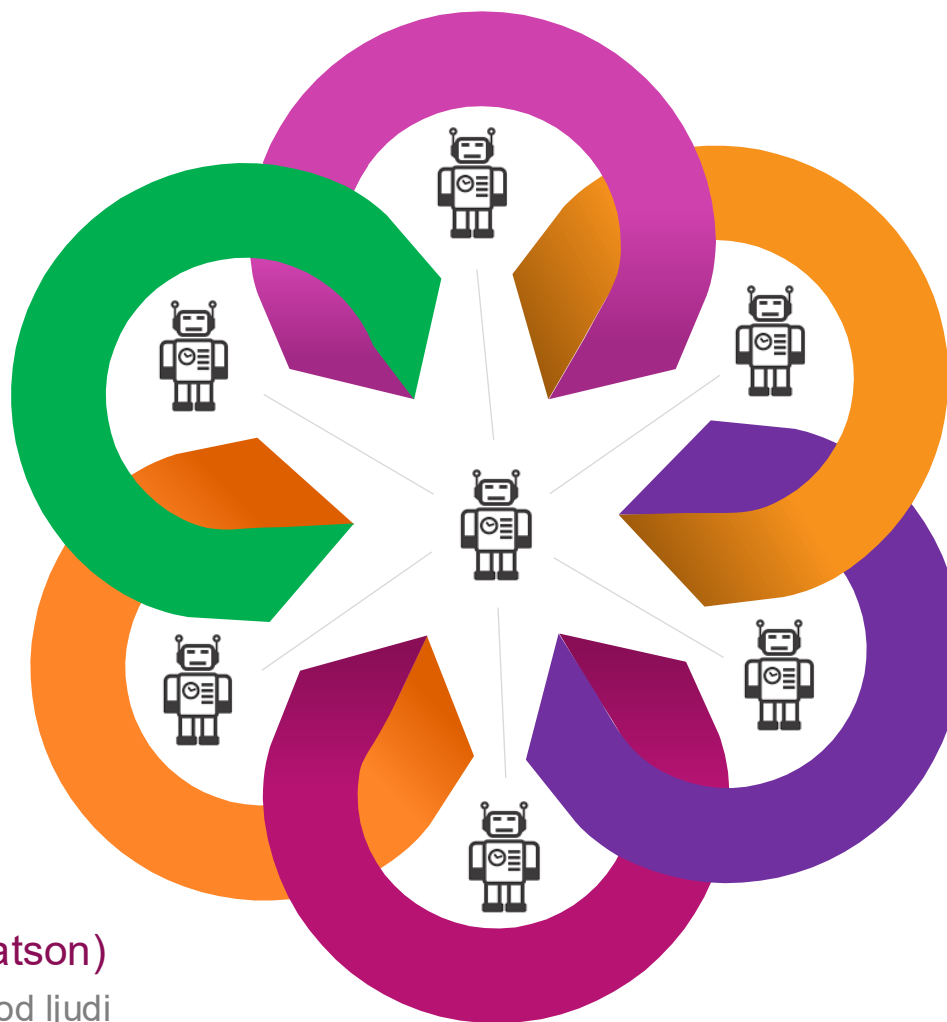
Namijenjen potpunoj zamjeni ljudi
vozača

AI investitori (Numerai)

Hedge fond sa sjedištem u San
Franciscu (osnovan 2015.)

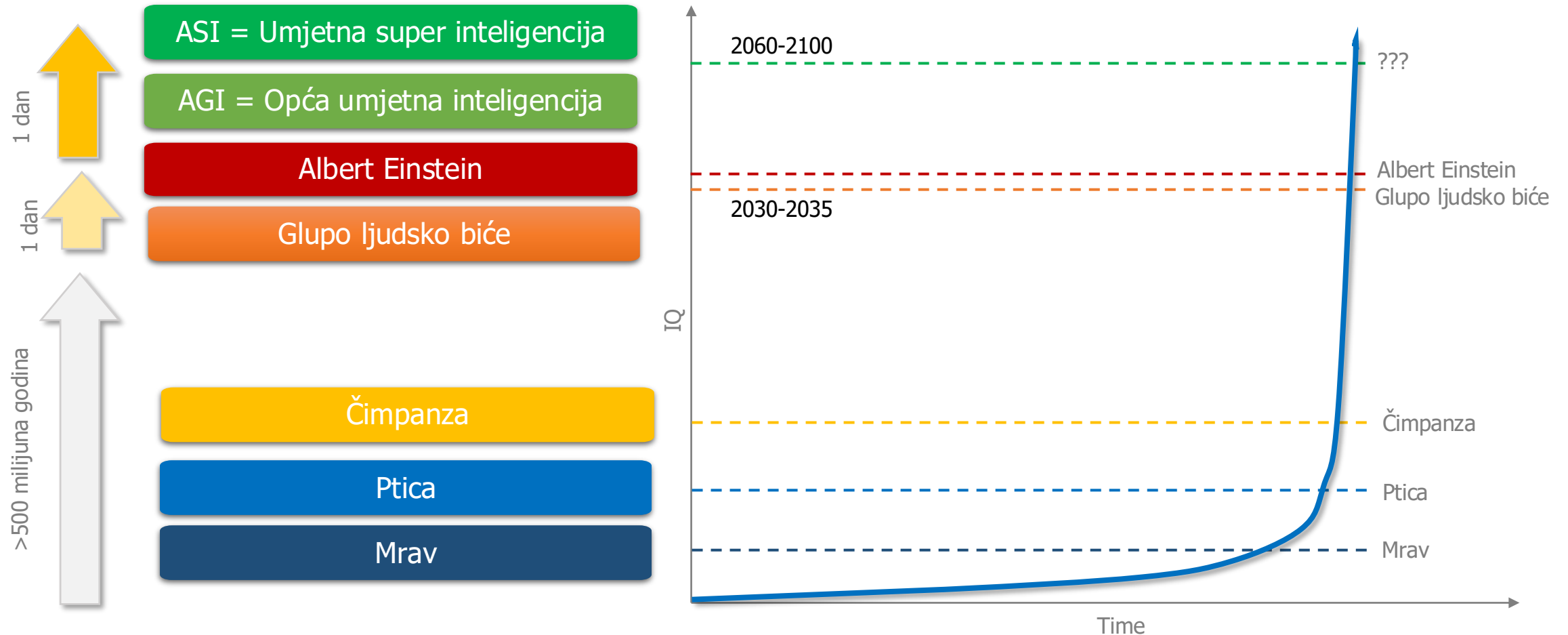
AI prepoznavanje lica i analiza (MS Kinect)

Stereoskopske kamere

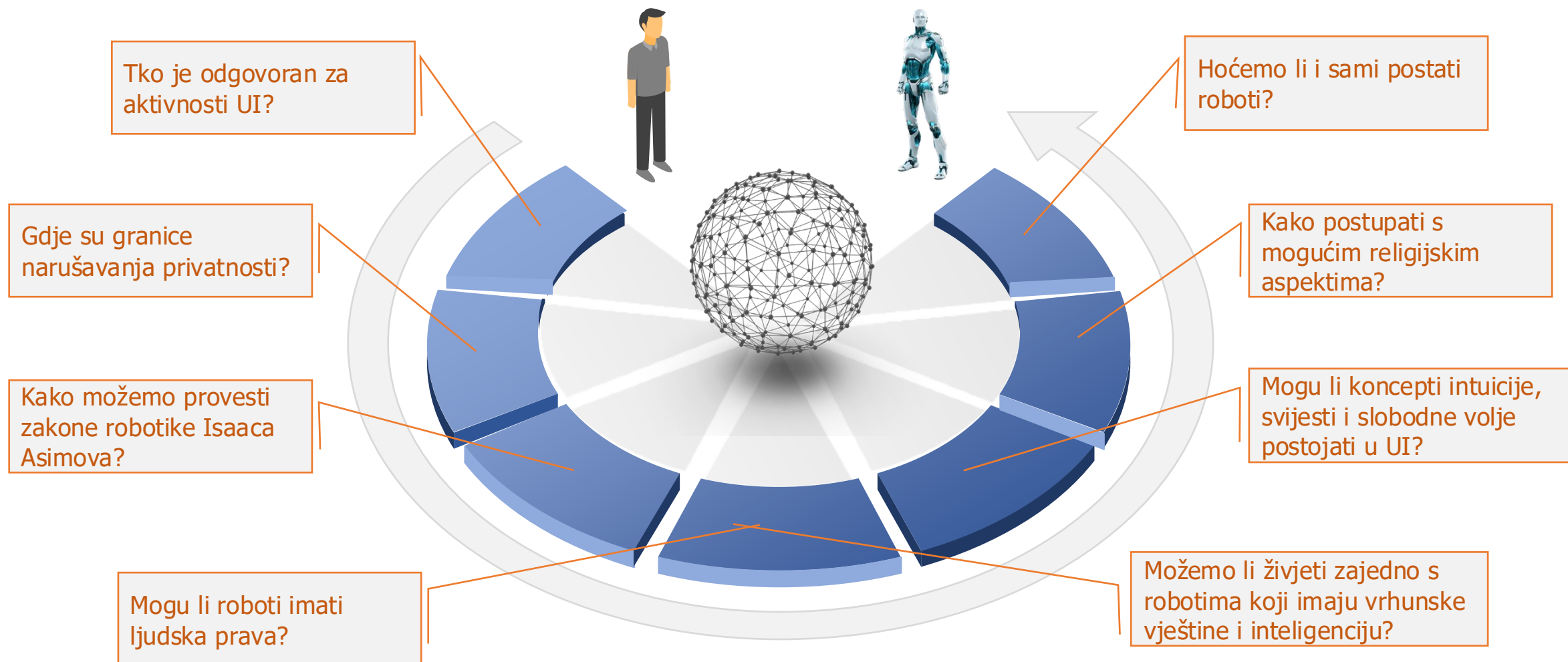




Napredak se rapidno ubrzava



Etička razmatranja: neka teška pitanja





Pitanja



Okvirna pitanja na provjerama znanja

- Što je umjetna inteligencija?
- Koja su obilježja inteligentnog ponašanja?
- Koje su značajne prekretnice u povijesti umjetne inteligencije?
- Što je Hype Cycle for Artificial Intelligence prema Gartneru, 2024?
- Koje su razlike između strojnog učenja i dubokog učenja?
- Kojih je šest razina automatizacije u automobilima bez vozača kako ih definira U.S. National Highway Traffic Safety Administration?
- Koja su etička razmatranja vezana uz umjetnu inteligenciju?



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