

ALL DIGITAL Summit 2023 – Skills for Digital
Tomorrow

ARE WE READY FOR THE BRAVE NEW WORLD?

Assit.Prof. Mislav Balković, PhD

dean

Zagreb, 26.09.2023.



„Our progress as a nation can be no swifter than our progress in education. The human mind is our fundamental resource.”

John F. Kennedy, 1961.

Agenda

1. Influence of education on society
2. How this applies to Croatia?
3. What can we expect in the future?

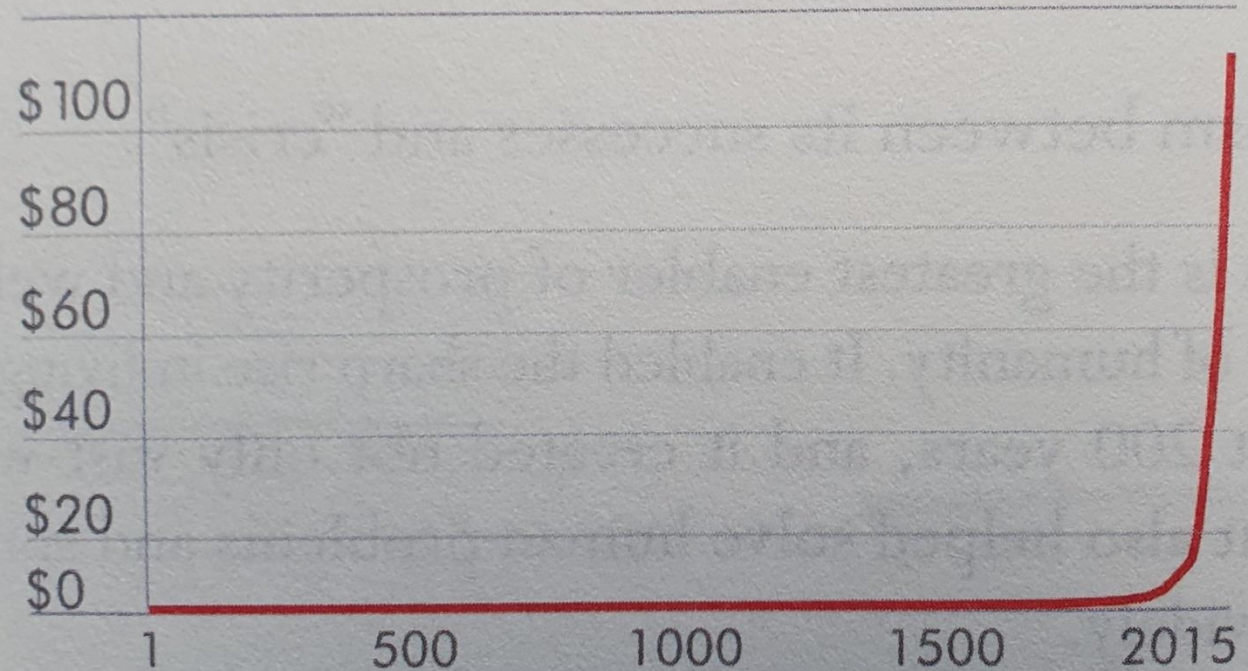
Influence of education on society

- Influence on economic growth
- Influence on life quality
- Social influence
- Political influence

Economic influence of knowledge during past two millenniums

Global wealth exploded in the last 200 years

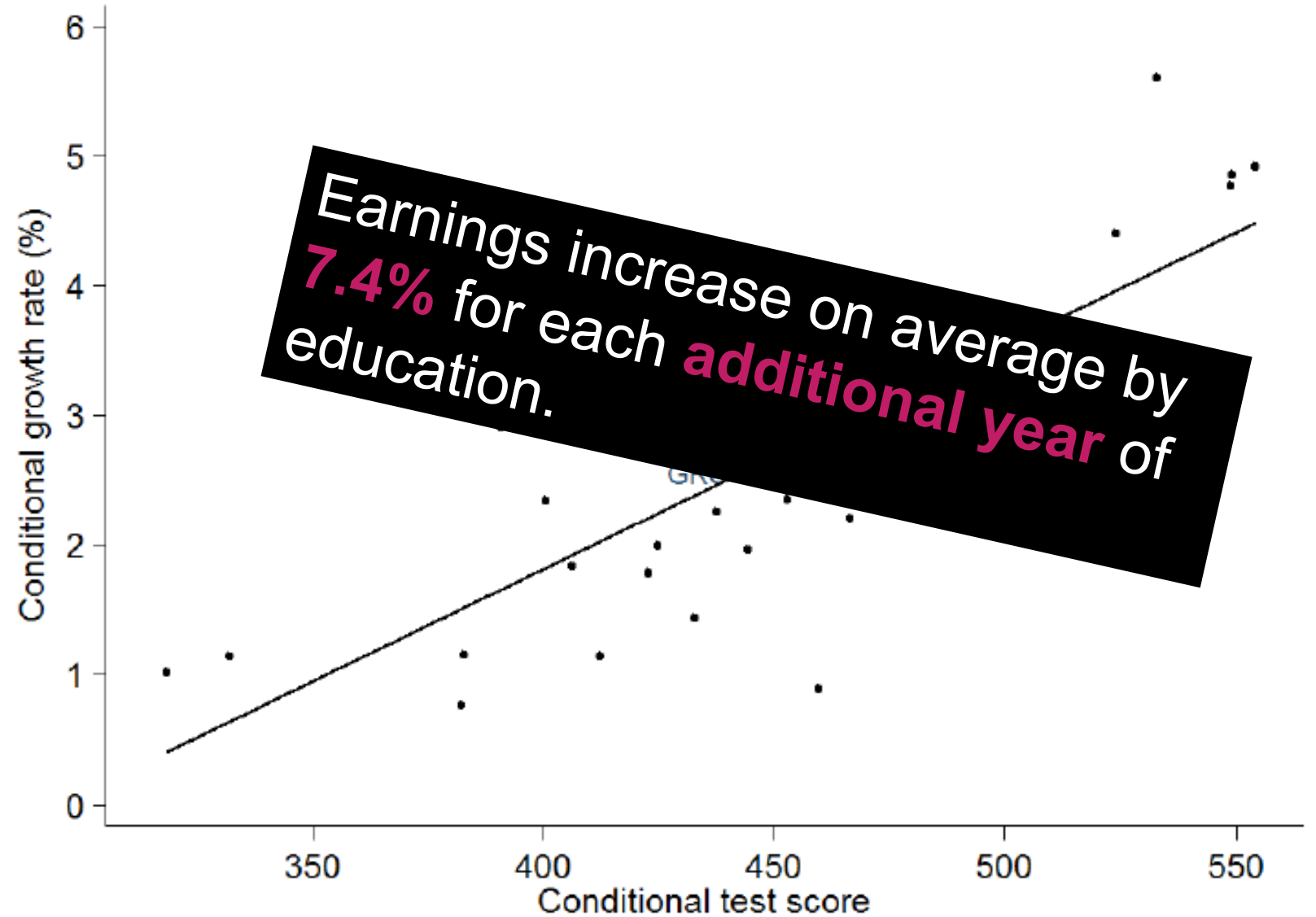
Total output of the world economy;
expressed in 2011 prices in trillions of dollars



Source: Our World in Data based on World Bank & Maddison (2017),
The Trilateral Commission

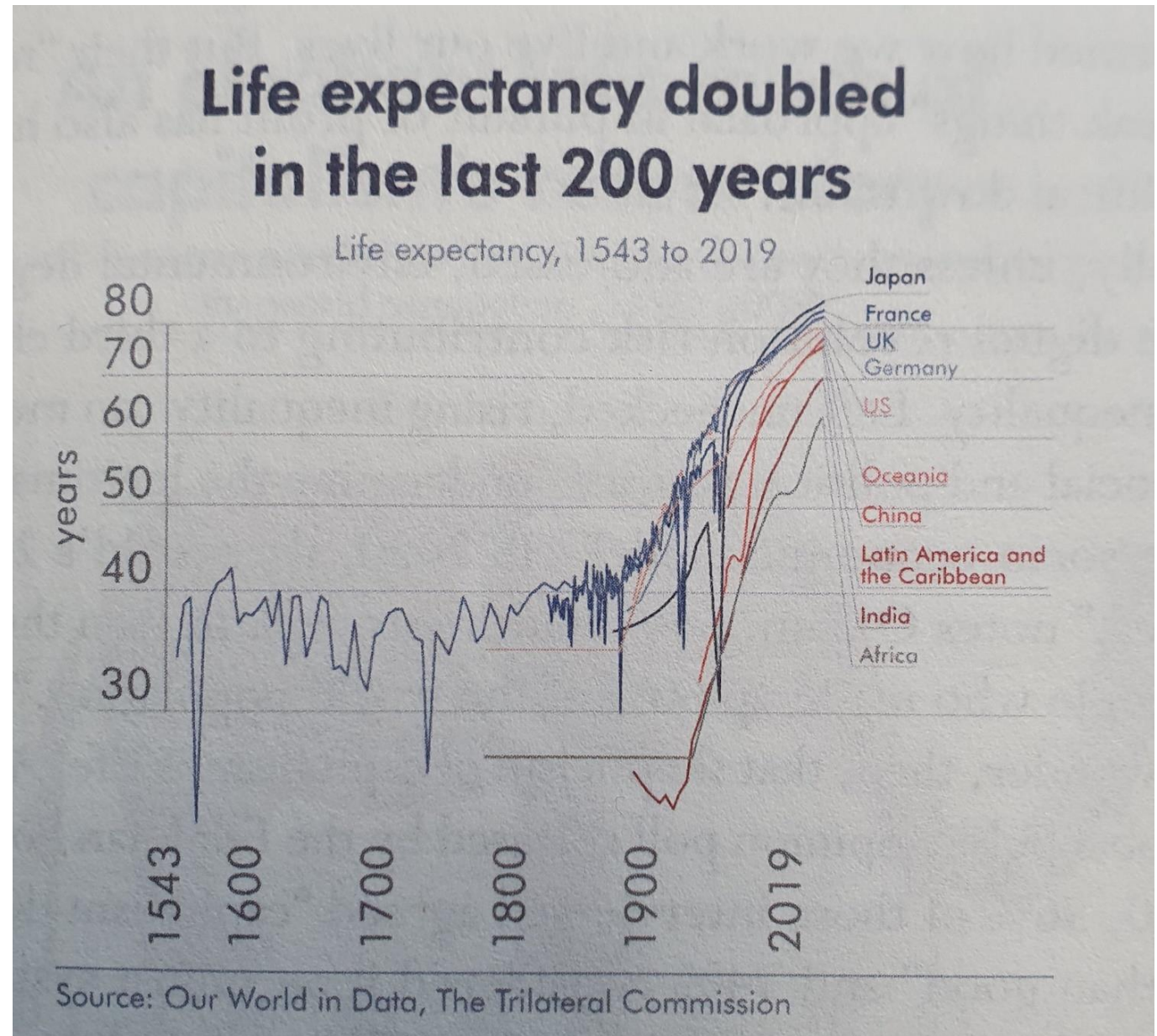
Knowledge influencing economic growth

(average annual rate of growth of real GDP per capita in 1960-2009)



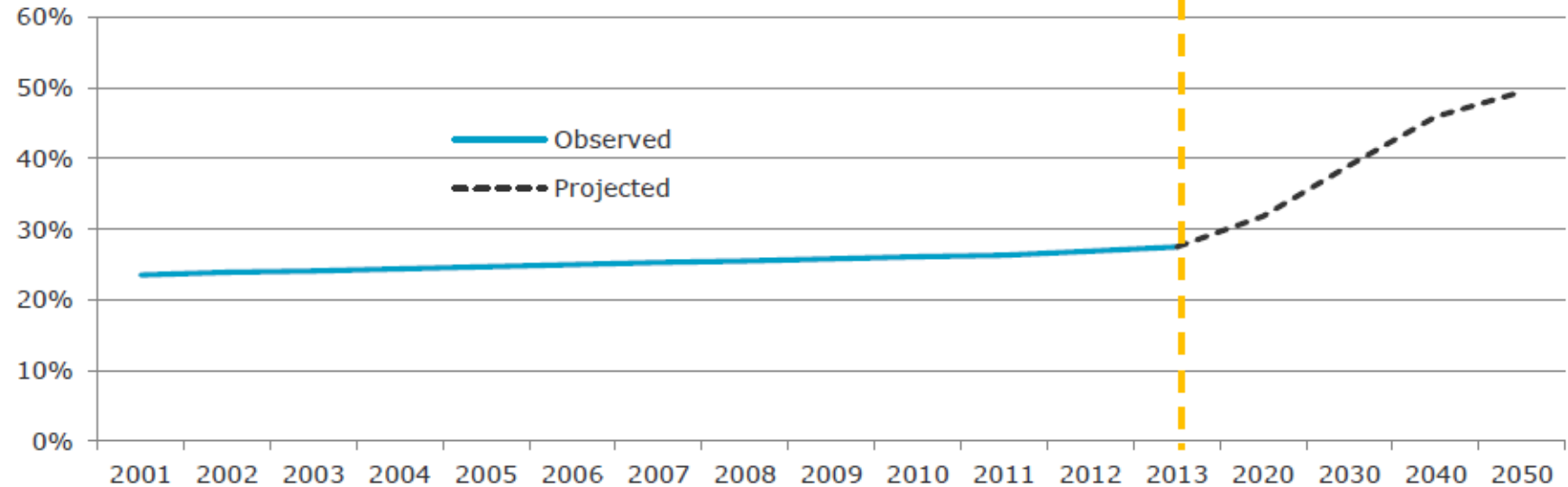
Source: European Expert Network on Economics of Education
EENEE Analytical Report No. 20, Prepared for the European
Commission, 2014

Influence on life duration / quality

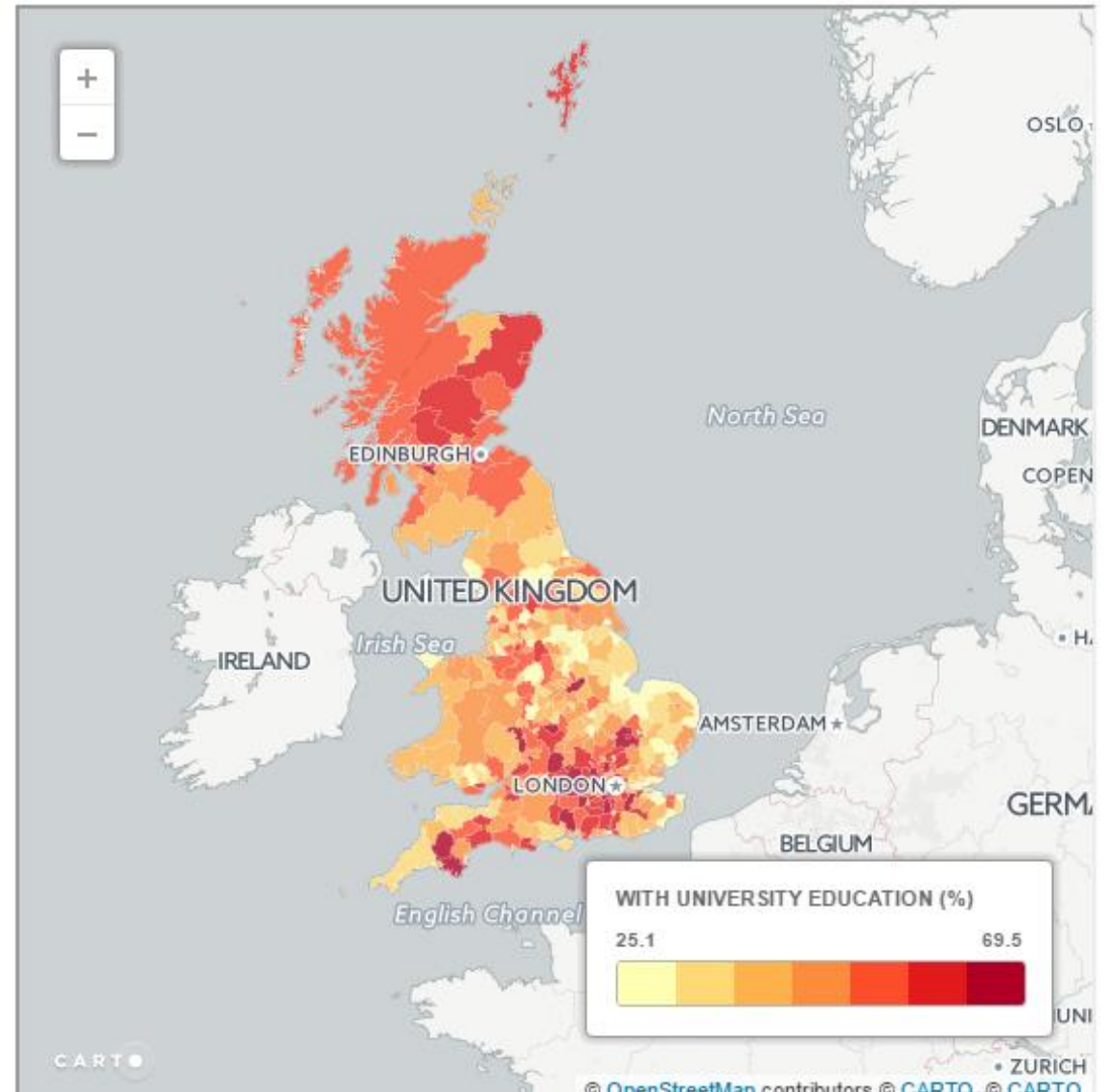
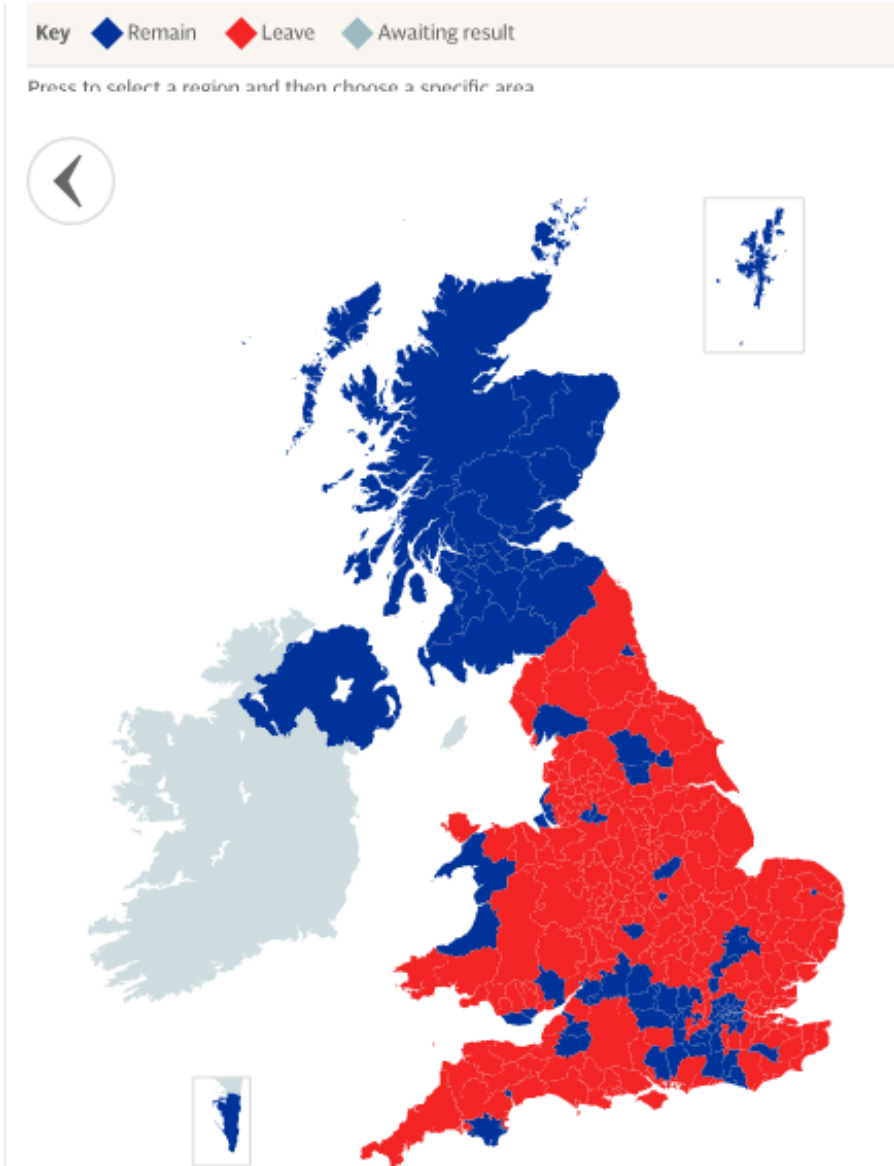


Knowledge influencing social insurance model

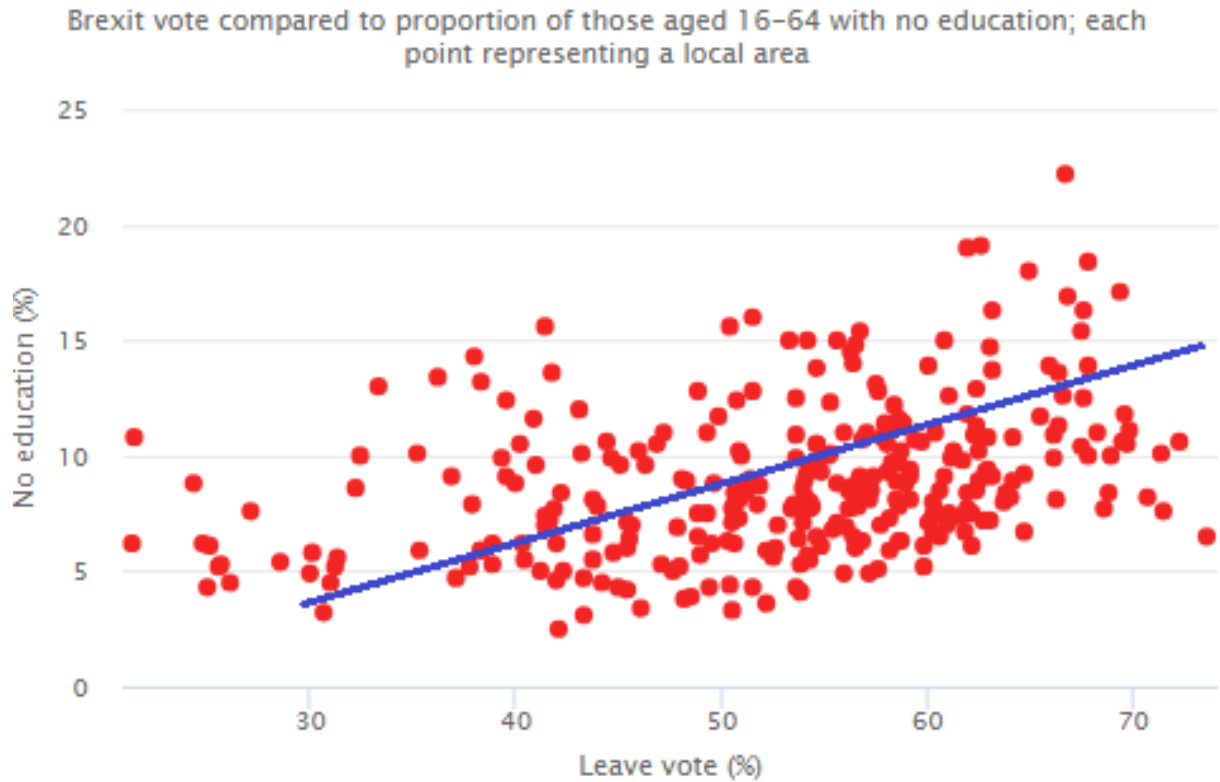
Figure 1.1. Old-age dependency ratio: 2001-2013 figures and projection to 2050



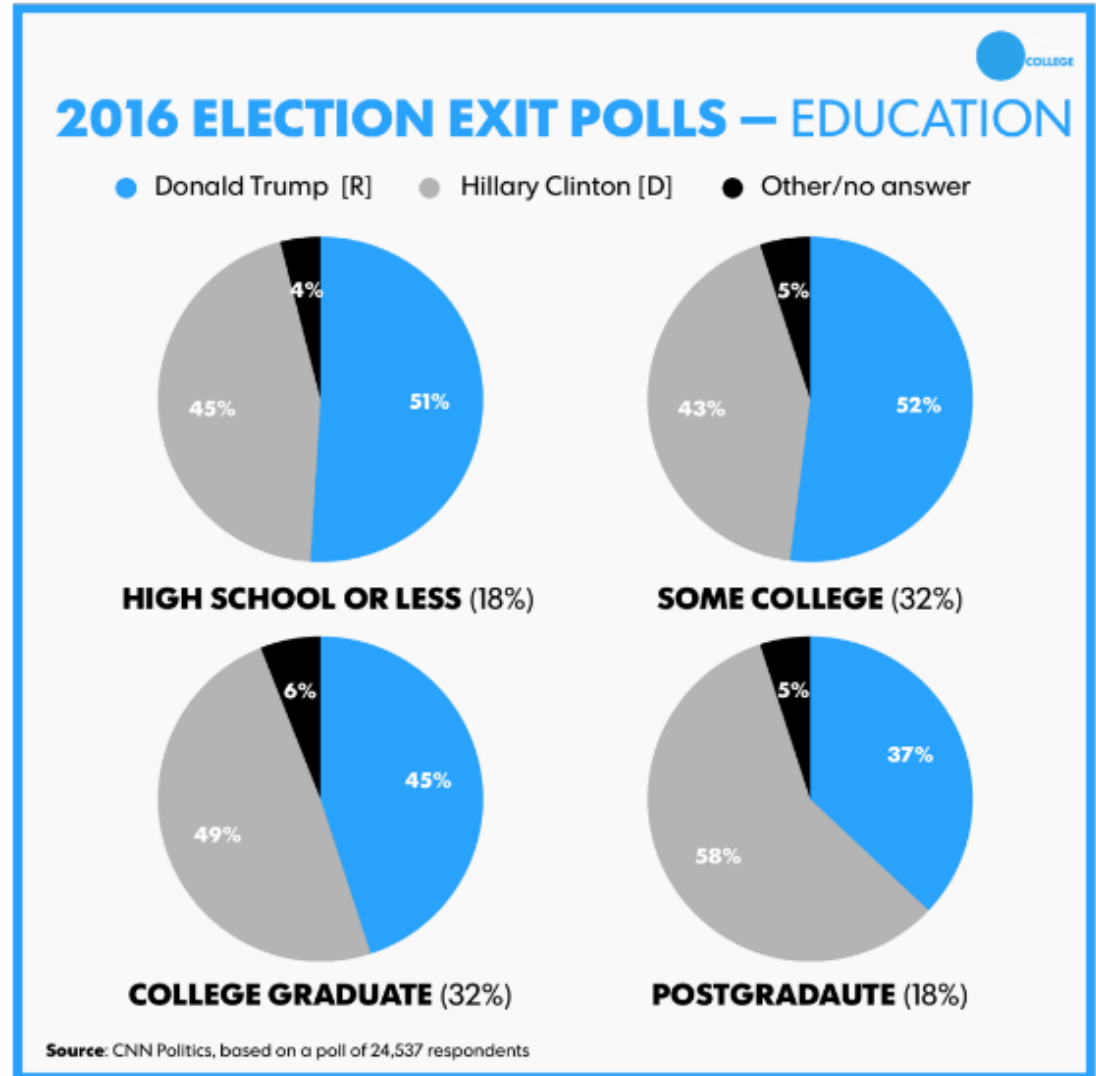
Influence of education on political decisions



Influence of education on political decisions



The Telegraph



„Democracy cannot succeed unless those who express their choice **are prepared to choose wisely.** The real safeguard of democracy, therefore, is education.”

Franklin D. Roosevelt

How this applies to Croatia?

- Is demography our real problem?
- How we compensate with education?



TOP 20 GUBITNIKA

TOP 20 ZEMALJA S NAJVEĆIM PADOM STANOVNIKA PREMA PROGNOZI UJEDINJENIH NARODA		
Rank	Zemlja	Pad broja stanovnika
1	BULGARIJA	22,3
2	LITVA	21,8
3	UKRAJINA	19,5
4	SRBIJA	18,8
5	SRB	18,2
6	HRVATSKA	18,0
7	MOLDAVIJA	18,0
8	JAVNA	17,7
9	ALBANIA	16,8
10	RUMUNJSKA	16,8
11	GRČKA	15,8
12	ESTONIA	15,7
13	MADARSKA	15,7
14	POLJSKA	15,7
15	GRUZIJA	15,7
16	PORTUGAL	15,7
17	SJEVERNA MAKEDONIJA	15,7
18	ITALIA	15,7
19	ITALIA	15,7
20	ITALIA	15,7

Hrvatska je u vrhu UN-ove liste zemalja suočenih s demografskim slomom, do 2050. Hrvata će biti gotovo za petinu manje

22.07.2022 u 19:53



PREMIJER novac scena pret

000 više

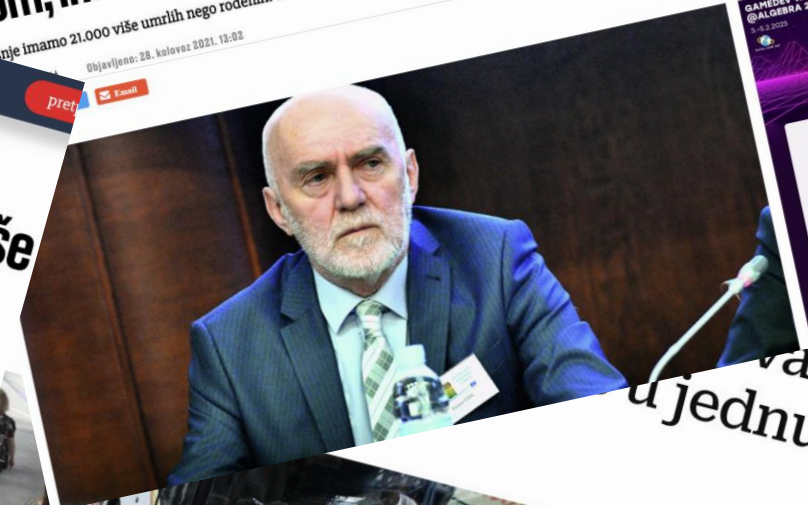
GLOBUS

INTERVJU

Stjepan Šterc za Globus: Hrvatska je ušla u demografski slom, imamo 3,8 milijuna stanovnika

...više imamo 21.000 više umrlih nego rođenih. Ti se trendovi ne zaustavljaju. To su nevjerojatni i zabrinjavajući gubici

Objavljeno: 28. kolovoz 2021. 18:52



GAMEDEV WEEKEND @ALGEBRA 2023
3.-4.2.2023

Mogućnosti direktne komunikacije između poslodavaca i budućih

ernji Shop

Hrvatske u jednu



Prijavi grešku

NAJČITANIJE

NAJNOVIJE

UŽIVO: RAT U UKRAJINI
Detalji tragedije u Kijevu: Imenovan vršitelj dužnosti ministra, okolnosti pada još...

PRAĆENJE CIJENA
'Varaju ljude na cijenama i žele to sakriti': Trgovački lanci odbili Filipovića

ORGANIZACIJSKA IZMJENA
Ukidaju se još neki središnji





Zakon o strancima - Članak 101.

Iznimka od provedbe testa tržišta rada

Siječanj 2022.

Zanimanja (sve županije):

- zidar
- tesar
- armirač
- betonirac
- zavarivač
- fasader
- monter građevinskih elemenata
- rukovatelj građevinskim strojevima
- klesar
- rukovatelj kranom
- stolar
- radnik visokogradnje
- radnik niskogradnje
- monter cjevovoda
- soboslikar i ličilac
- krovopokrivač
- vodoinstalater
- elektroinstalater
- instalater grijanja i klimatizacije
- hidroizolater
- monter metalnih konstrukcija
- polagač keramičkih pločica
- podopolagač
- izolater

- limar
- bravar
- elekromonter

Stranica 1 od 3



- električar održavanja
- vozač teretnog vozila
- vozač teretnog vozila s prikolicom
- automehaničar
- autolakirer
- autolimar
- kožarski radnik
- krojitelj krzna i kože
- kuhar nacionalne kuhinje
- slastičar
- pekar
- mesar
- **programer**
- dizajner korisničkog sučelja
- sistemski administrator

J premium vijesti sport i2 kultura video novac scena preplata

DALJNI RAST U 2023.

U Hrvatskoj je više od 115.000 stranih radnika, dovode ih 424 agencije za posredovanje

Prilikom dovođenja i zapošljavanja stranaca ima i neregularnosti, potvrđuju u agencijama, Inspektoratu i MUP-u

Piše: Gordana Ergas

Objavljeno: 08. siječanj 2023. 22:09

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RENAULT CAPTUR
isporuka odmah

Potrošnja goriva u
mješovitom vožnji:
4,7 - 8,1 l/100 km.
Emisija CO₂: 106 - 149 g/km.



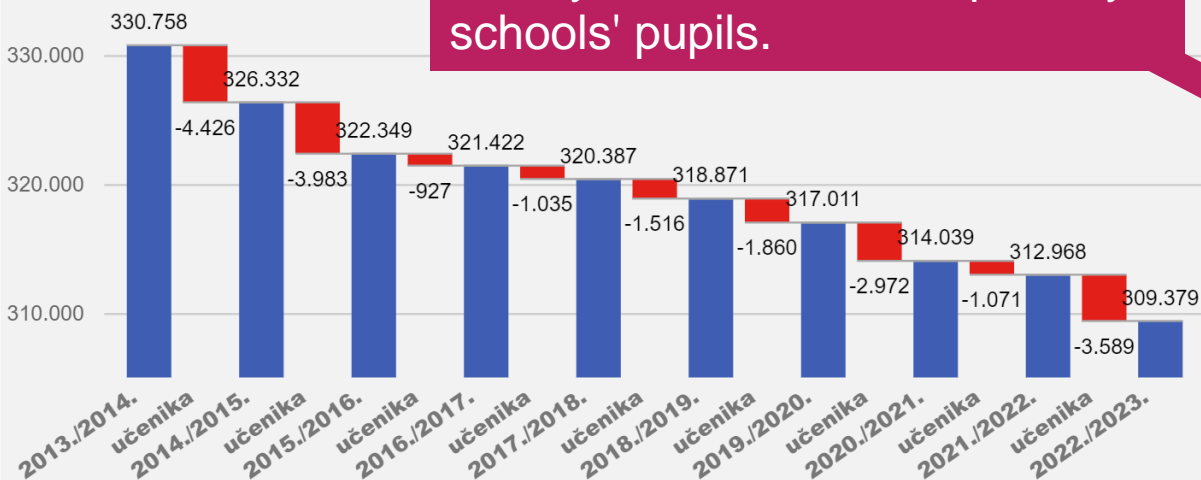
poništi filtre

razlika u broju ustanova

razlika u broju raz. odjela

Broj učenika po školskim godinama

Povećanje Smanjenje Ukupno Dr



In 10 years, total loss of primary schools' pupils.

Ukupna razlika u broju učenika u razdoblju od 2013./2014. do 2022./2023.

-21,379

učenika

-6.46 %

% razlike

-6.52 %

% muški

-6.40 %

% ženski

Osnovna škola

Redovna

Redovno

Ponavljač

Županija	% razlike	učenika
VUKOVARSKO-SRIJEMSKA	-27,69 %	-4.272
BRODSKO-POSAVSKA	-24,11 %	-3.279
POŽEŠKO-SLAVONSKA	-22,24 %	-1.451
SISAČKO-MOSLAVAČKA	-20,32 %	-2.588
VIROVITIČKO-PODRAVSKA	-18,55 %	-1.268
OSJEČKO-BARANJSKA	-17,06 %	-4.061
BJELOVARSKO-BILOGOR...	-14,25 %	-1.338
LIČKO-SENJSKA	-13,27 %	-464
KOPRIVNIČKO-KRIŽEVAČ...	-12,17 %	-1.136
VARAŽDINSKA	-11,62 %	-1.656
KARLOVAČKA	-10,49 %	-932
KRAPINSKO-ZAGORSKA	-9,19 %	-929
ŠIBENSKO-KNINSKA	-8,88 %	-688
SPLITSKO-DALMATINSKA	-6,89 %	-2.595
MEĐIMURSKA	-5,82 %	-575
ZAGREBAČKA	-5,05 %	-1.325
ZADARSKA	-1,14 %	-157
PRIMORSKO-GORANSKA	0,86 %	164
DUBROVAČKO-NERETVAN...	3,69 %	347
ISTARSKA	6,26 %	899
GRAD ZAGREB	10,17 %	5.925

KRAPINSKO-ZAGORSKA

-0,09

Vrsta programa

Osnovno redovno

Strukovno područje

Sve

Razredi

Sve

Osnivač

Sve

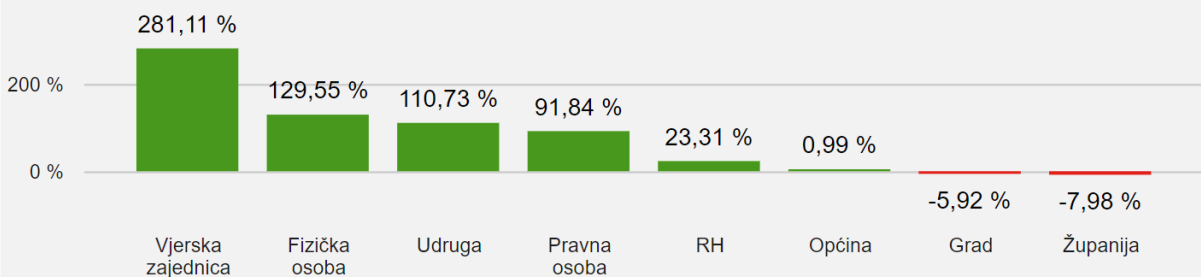
Naziv osnivača

Sve

Ustanova - TUR

Da
 Ne

Ukupna razlika u broju učenika po osnivačima



Škola na otoku

Da Ne

Brdsko-planinska

Da Ne

Financira MZO

Da Ne

2022./2023. 2021./2022. 2020./2021. 2019./2020. 2018./2019. 2017./2018. 2016./2017.

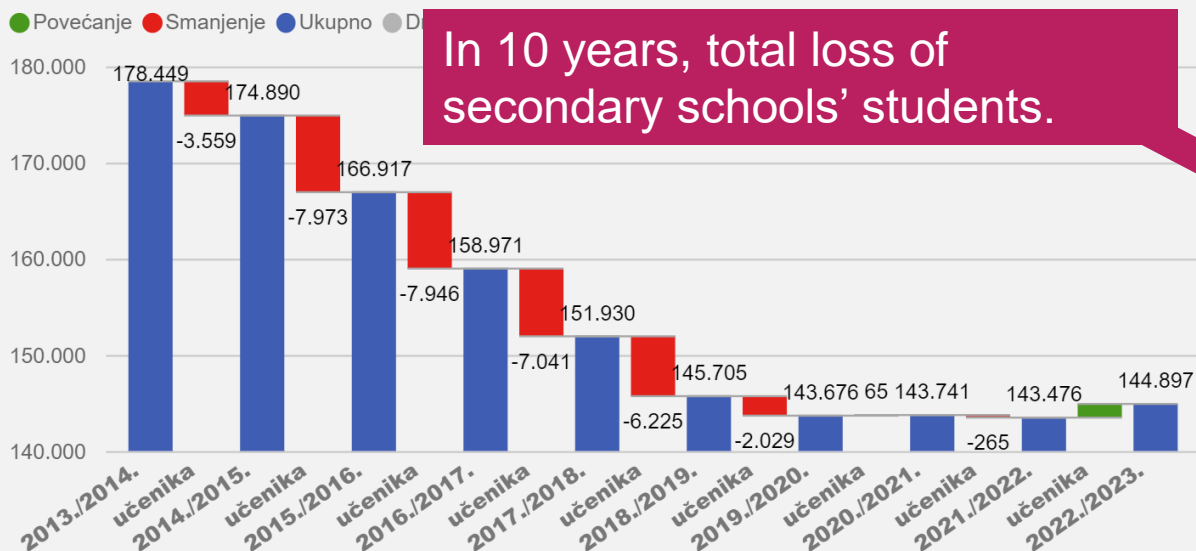
Šifra	Naziv ustanove	Županija	Općina/grad	Mjesto	Program
Sve	Sve	Sve	Sve	Sve	Sve

poništi filtre

razlika u broju ustanova

razlika u broju raz. odjela

Broj učenika po školskim godinama



In 10 years, total loss of secondary schools' students.

Ukupna razlika u broju učenika u razdoblju od 2013./2014. do 2022./2023.

-33,552
učenika
-18.80 %
% razlike
-19.34 %
% muški
-18.26 %
% ženski

Županija	% razlike	učenika
POŽEŠKO-SLAVONSKA	-37,24 %	-1.421
BRODSKO-POSAVSKA	-35,02 %	-2.489
LIČKO-SENJSKA	-34,31 %	-588
VIROVITIČKO-PODRAVSKA	-31,85 %	-1.190
SISAČKO-MOSLAVAČKA	-31,83 %	-1.832
VUKOVARSKO-SRIJEMSKA	-31,34 %	-2.546
ŠIBENSKO-KNINSKA	-30,58 %	-1.412
OSJEČKO-BARANJSKA	-26,60 %	-3.581
KOPRIVNIČKO-KRIŽEVAČKA	-23,28 %	-1.083
KARLOVAČKA	-21,74 %	-1.034
BJELOVARSKO-BILOGORSKA	-21,40 %	-1.141
DUBROVAČKO-NERETVANSKA	-20,99 %	-1.168
KRAPINSKO-ZAGORSKA	-20,82 %	-1.116
MEĐIMURSKA	-16,64 %	-730
SPLITSKO-DALMATINSKA	-16,23 %	-3.418
ZADARSKA	-15,93 %	-1.226
ZAGREBAČKA	-15,81 %	-1.167
VARAŽDINSKA	-15,30 %	-1.203
PRIMORSKO-GORANSKA	-10,00 %	-1.021
GRAD ZAGREB	-9,85 %	-3.834
ISTARSKA	-5,07 %	-352

KRAPINSKO-ZAGORSKA
-0,21

Vrsta programa

Višestruki odabiri

Strukovno područje

Sve

Razredi

Sve

Osnivač

Sve

Naziv osnivača

Sve

Ustanova - TUR

Da
 Ne

Ukupna razlika u broju učenika po osnivačima



Škola na otoku
 Da Ne

Brdsko-planinska
 Da Ne

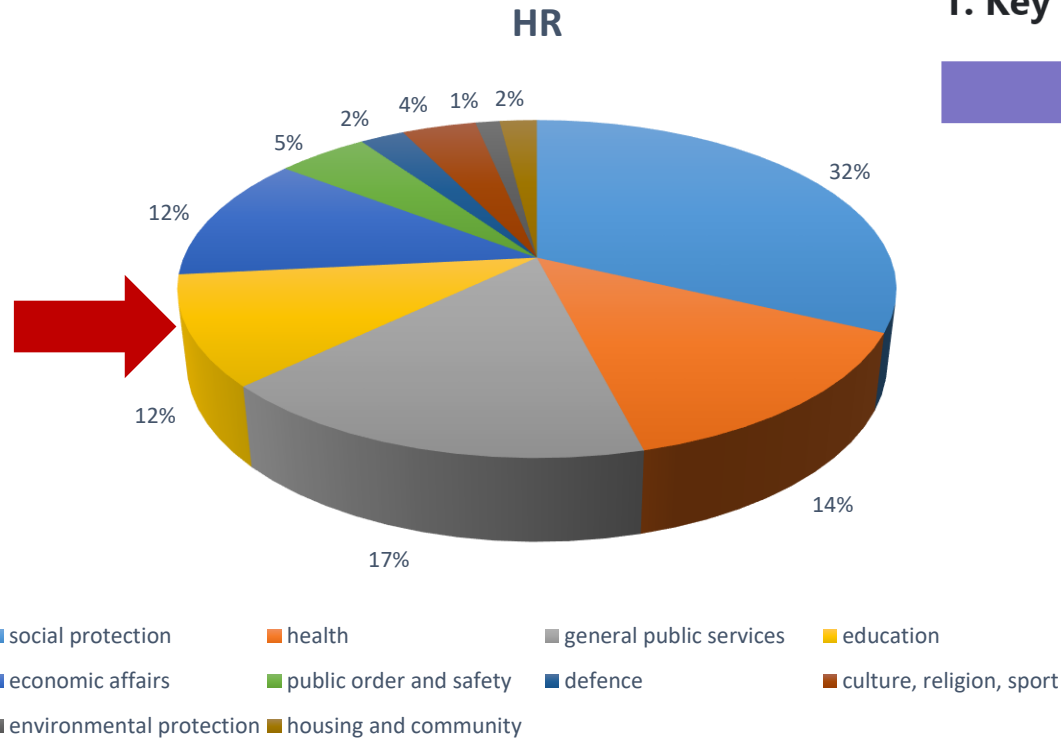
Financira MZO
 Da Ne

2022./2023. 2021./2022. 2020./2021. 2019./2020. 2018./2019. 2017./2018. 2016./2017.

How much we invest in formal education?

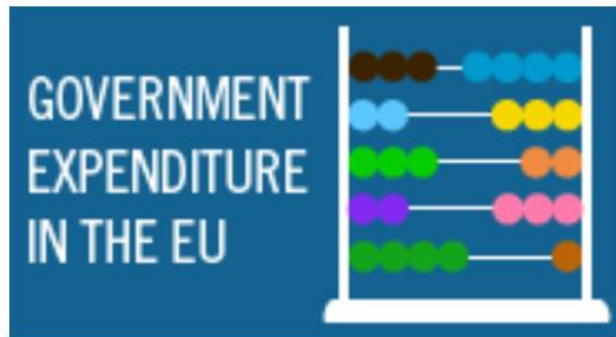
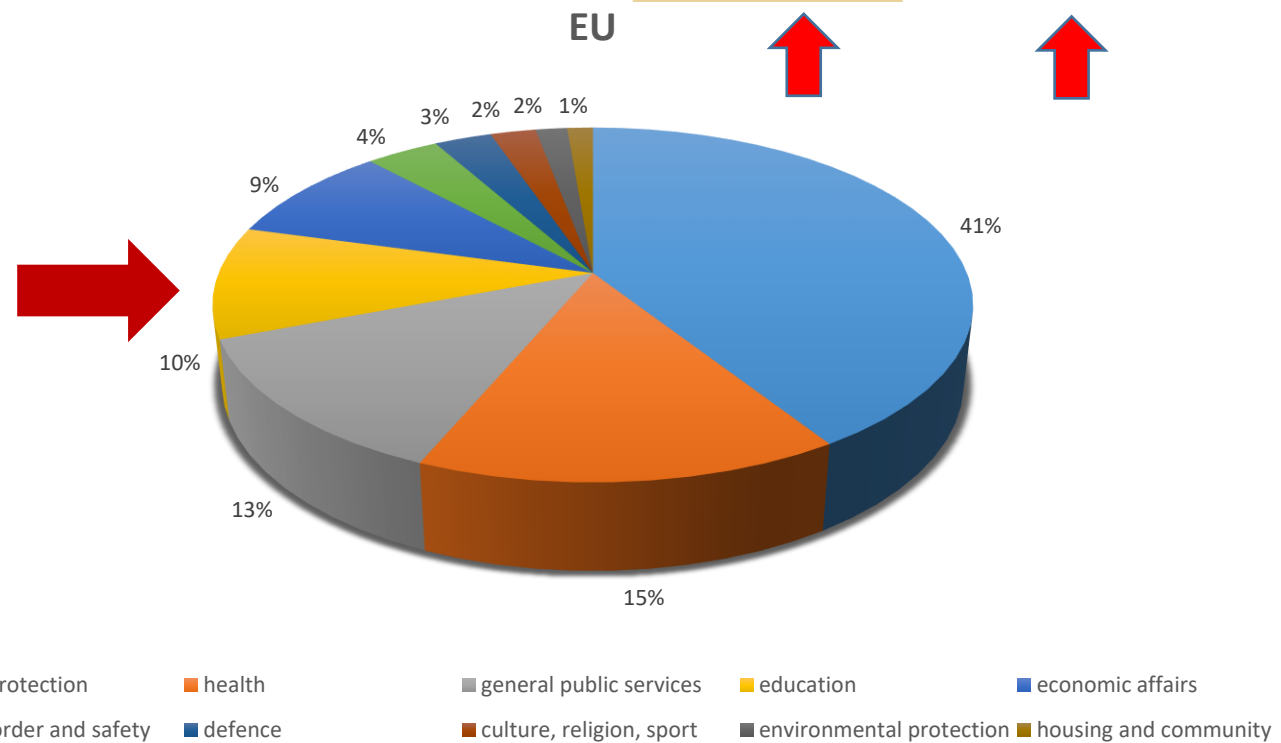
1. Key Indicators

Figure 1: Key indicators overview



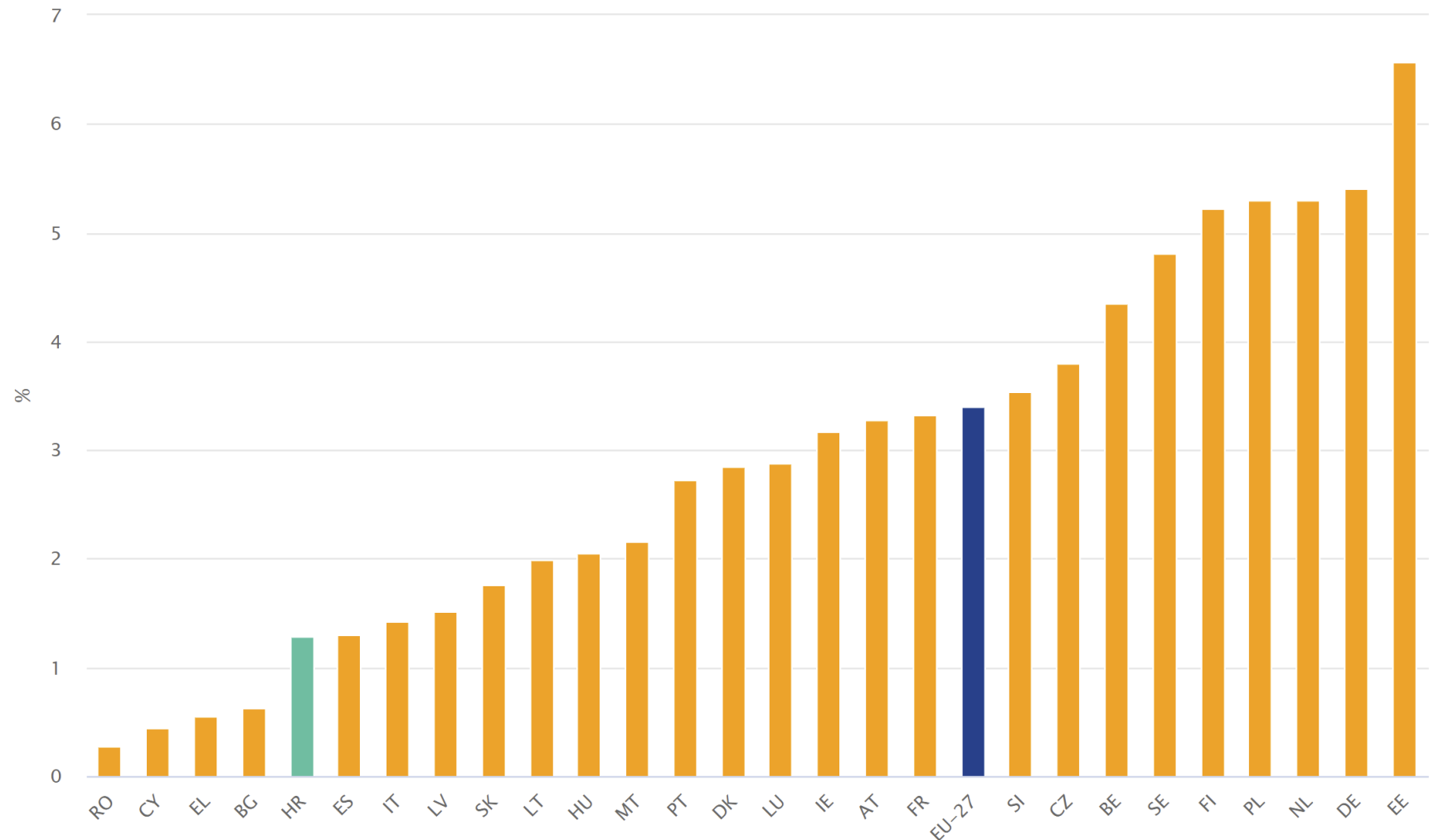
Public expenditure on education as a percentage of GDP

Croatia		EU	
2011	2021	2011	2021
4.6%	5.4% ²⁰	4.9%	5.0% ²⁰



How we develop our talents?

Figure 4 – Top performers in all three domains, PISA 2018



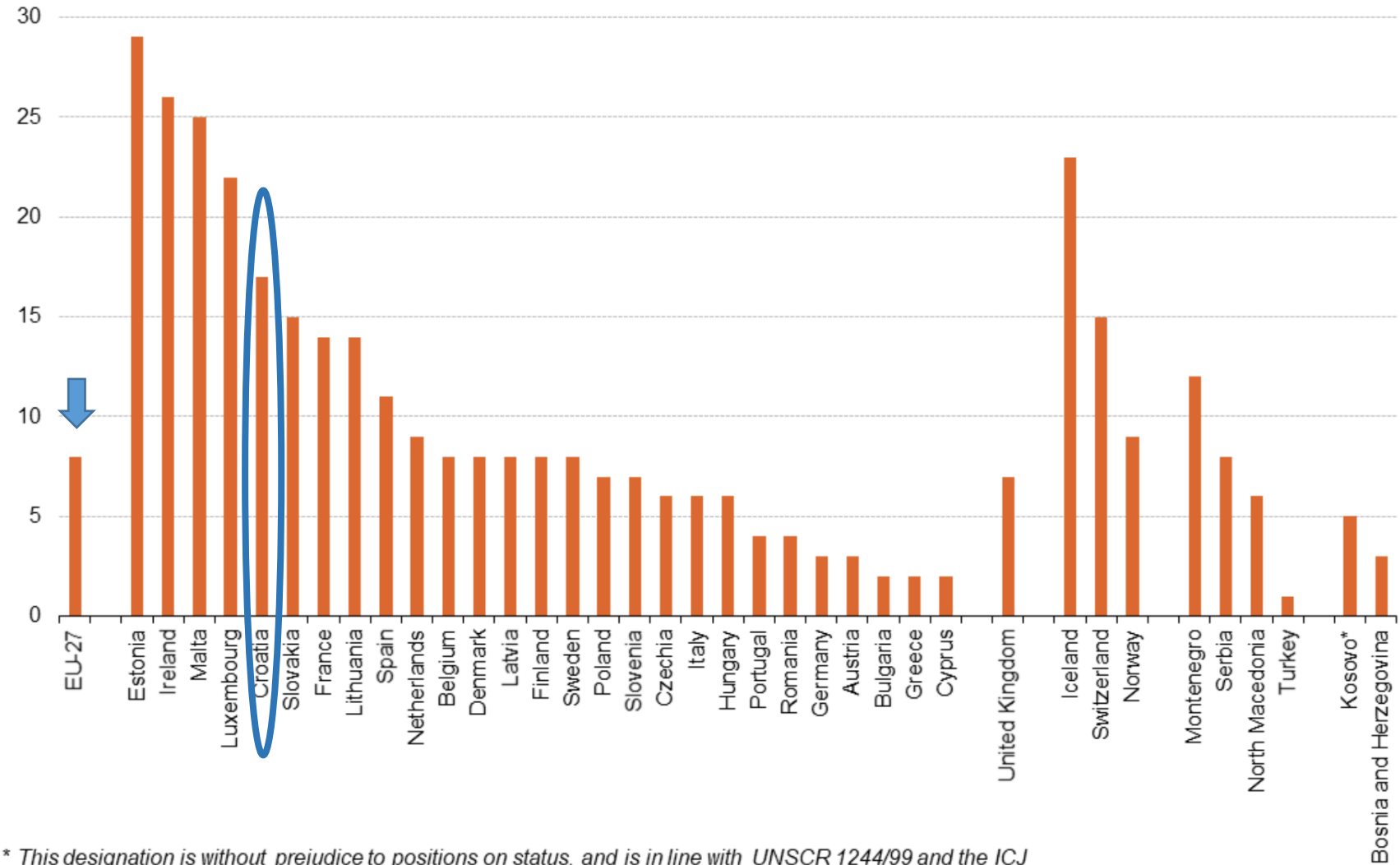
The EU average does not include ES results.

Source: OECD 2019, PISA 2018.

Source: OECD 2019, PISA 2018. The EU average does not include ES results.

How we use technology?

Individuals who used any website or app to arrange a transport service from another individual in the 12 months prior to the survey, 2019
(% of individuals aged 16 to 74)

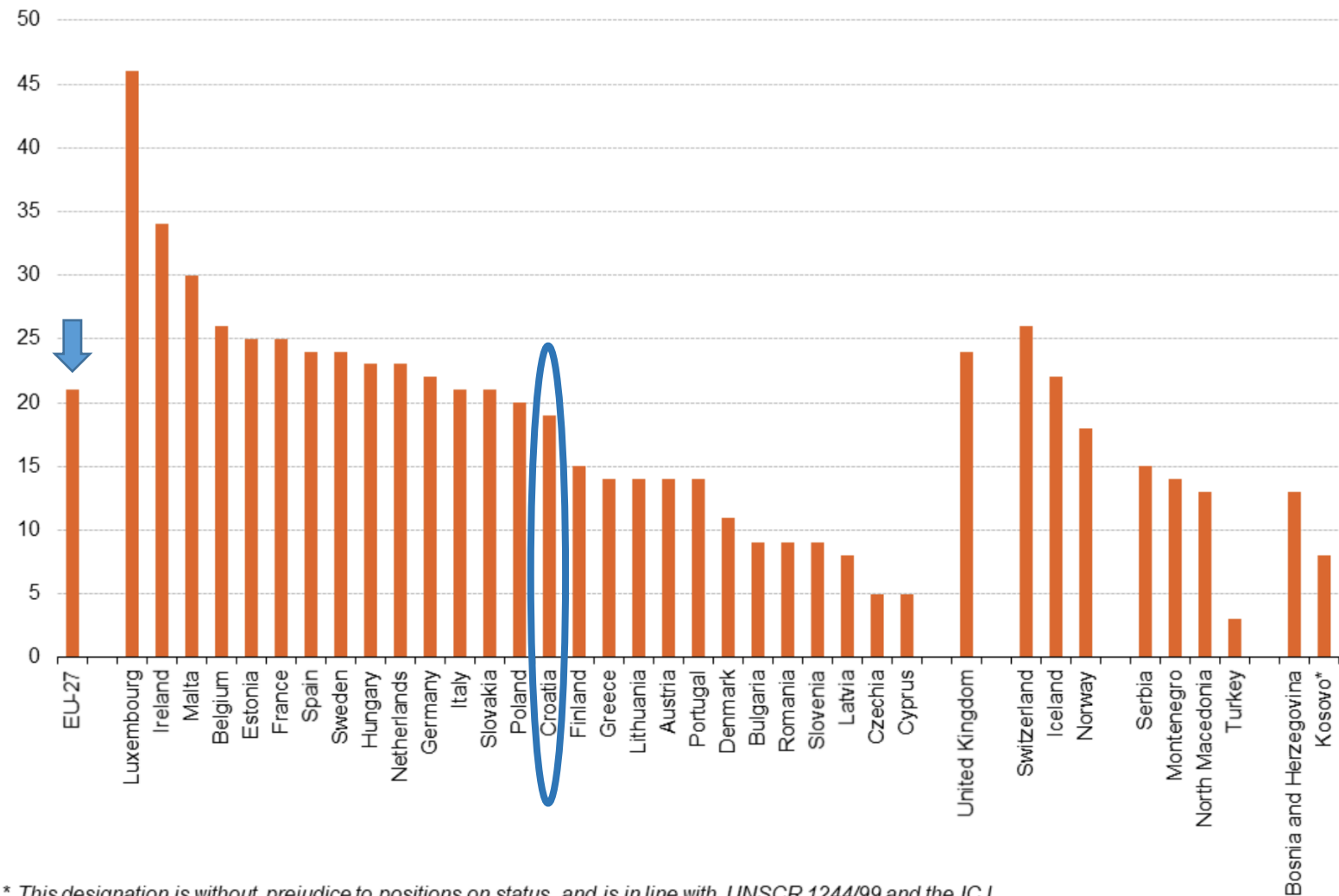


* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Eurostat (online data code: isoc_ci_ce_i)

How we use technology?

Individuals who used any website or app to arrange accommodation from another individual in the 12 months prior to the survey, 2019
(% of individuals aged 16 to 74)

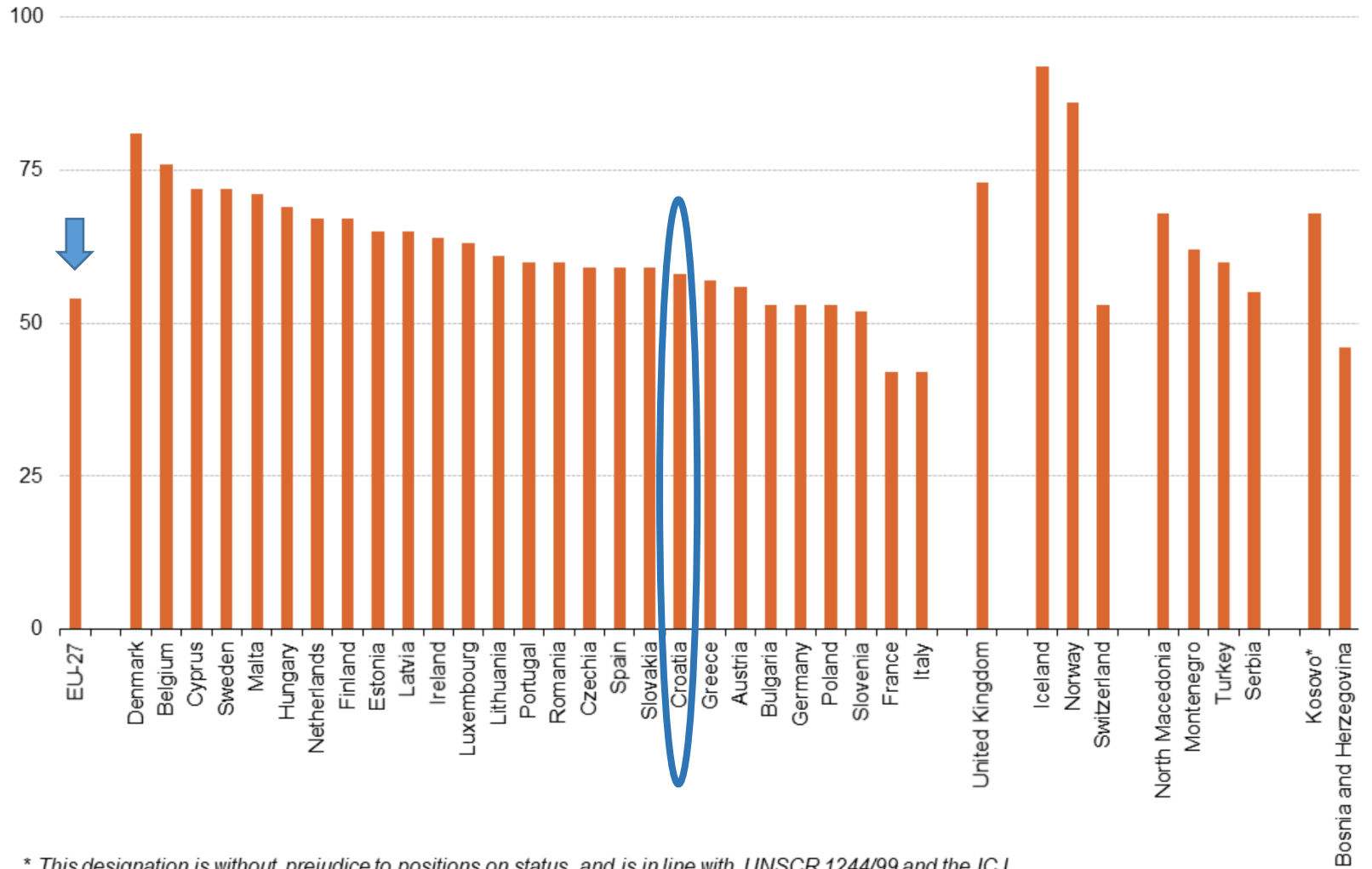


* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.
Source: Eurostat (online data code: isoc_ci_ce_i)

How we use technology?

Individuals who used the internet for participation in social networking, 2019

(% of individuals aged 16 to 74)

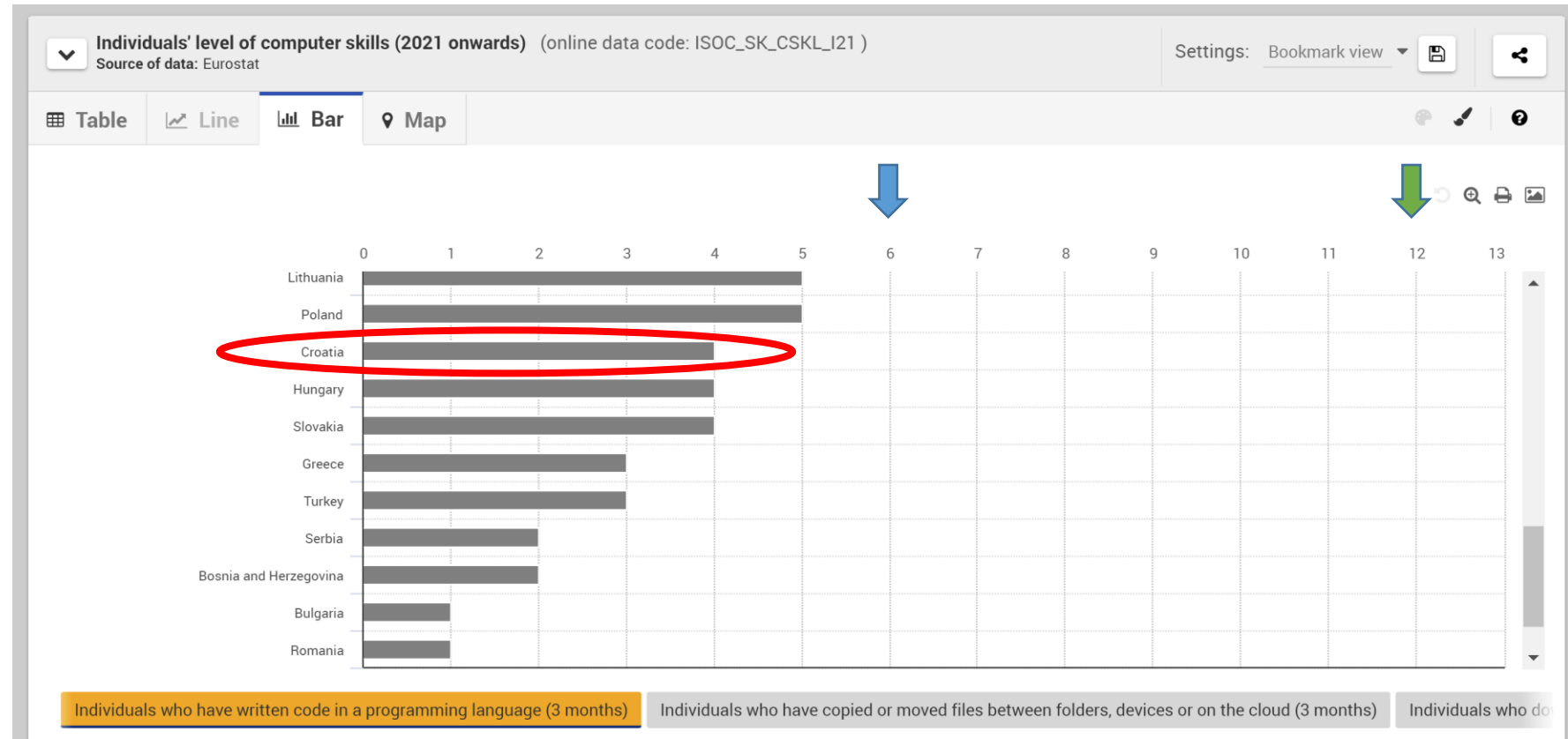


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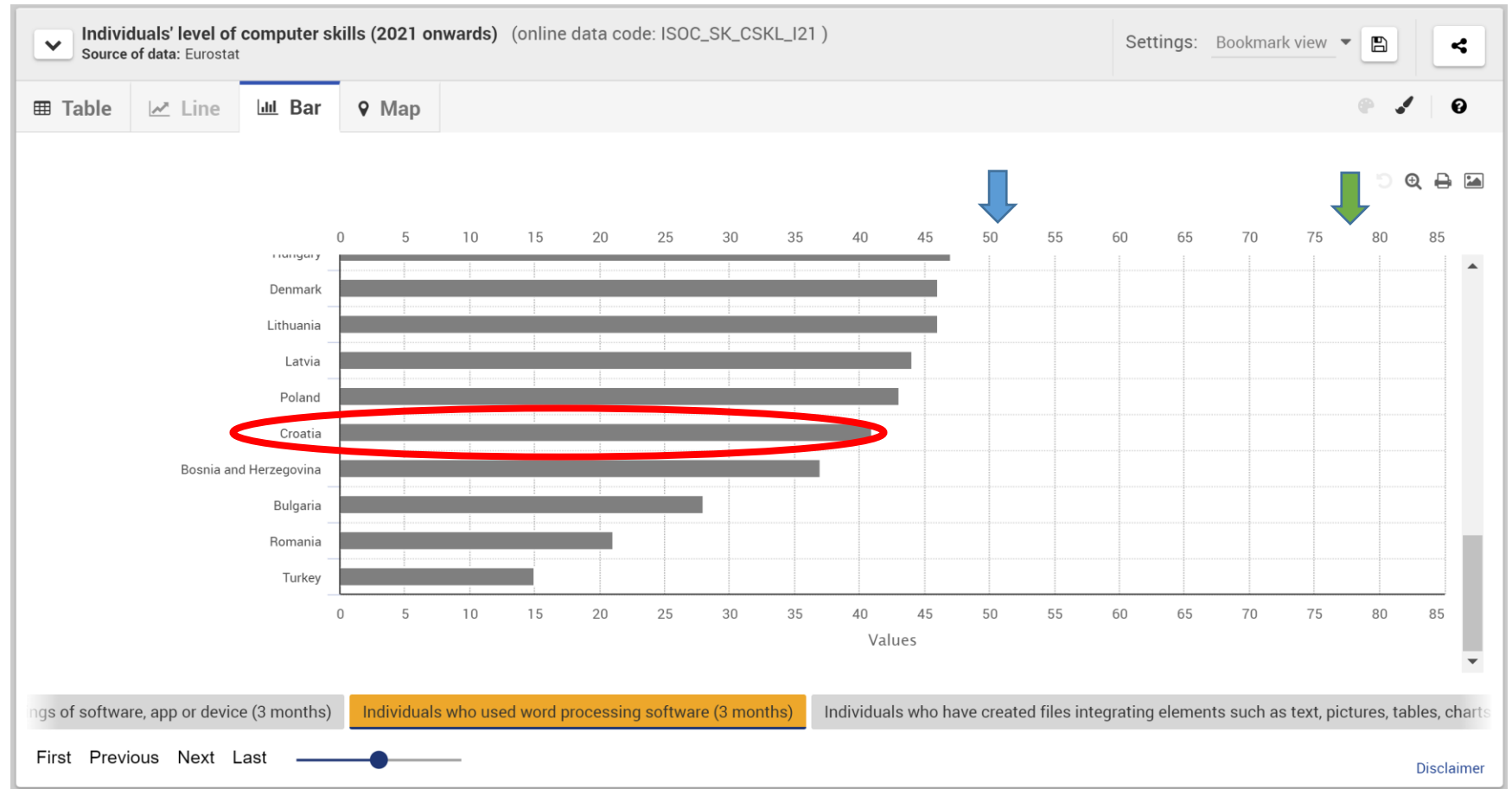
Source: Eurostat (online data code: isoc_ci_ac_i)

eurostat 

How we create digital content?



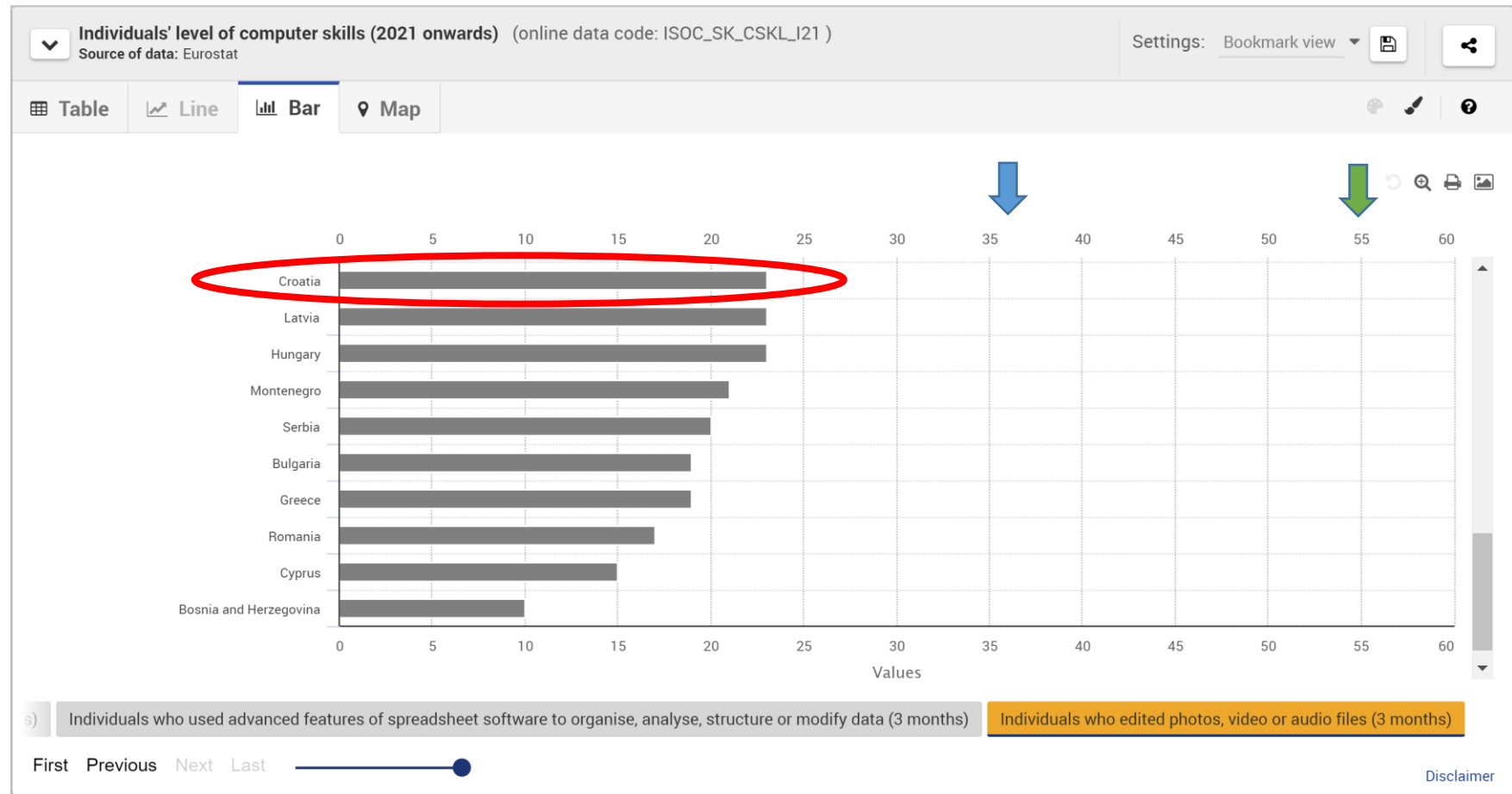
How we create digital content?



How we create digital content?



How we create digital content?



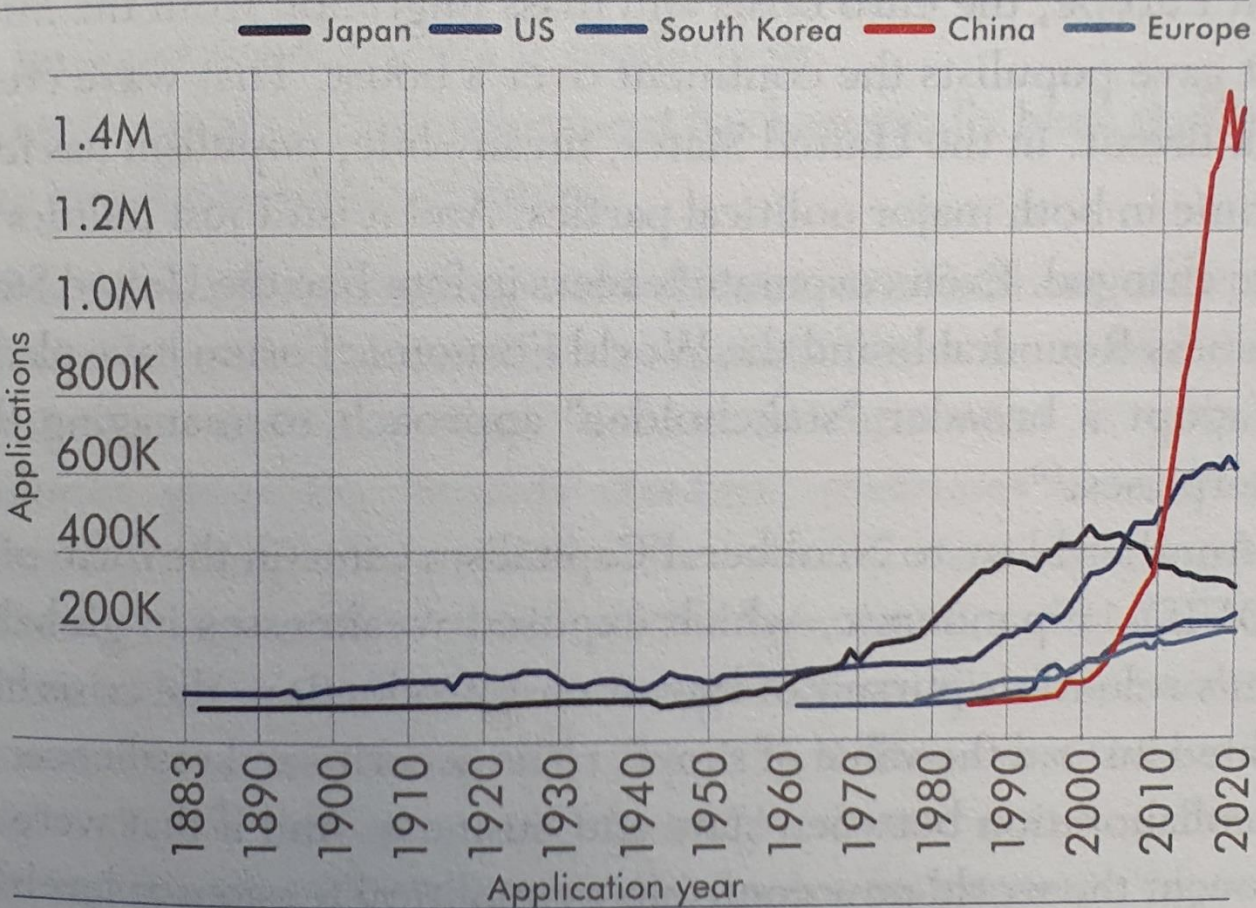
What can we expect in the future?

- Our jobs in AI era
- What can be done by educational systems / professionals?

Where IP developments happens?

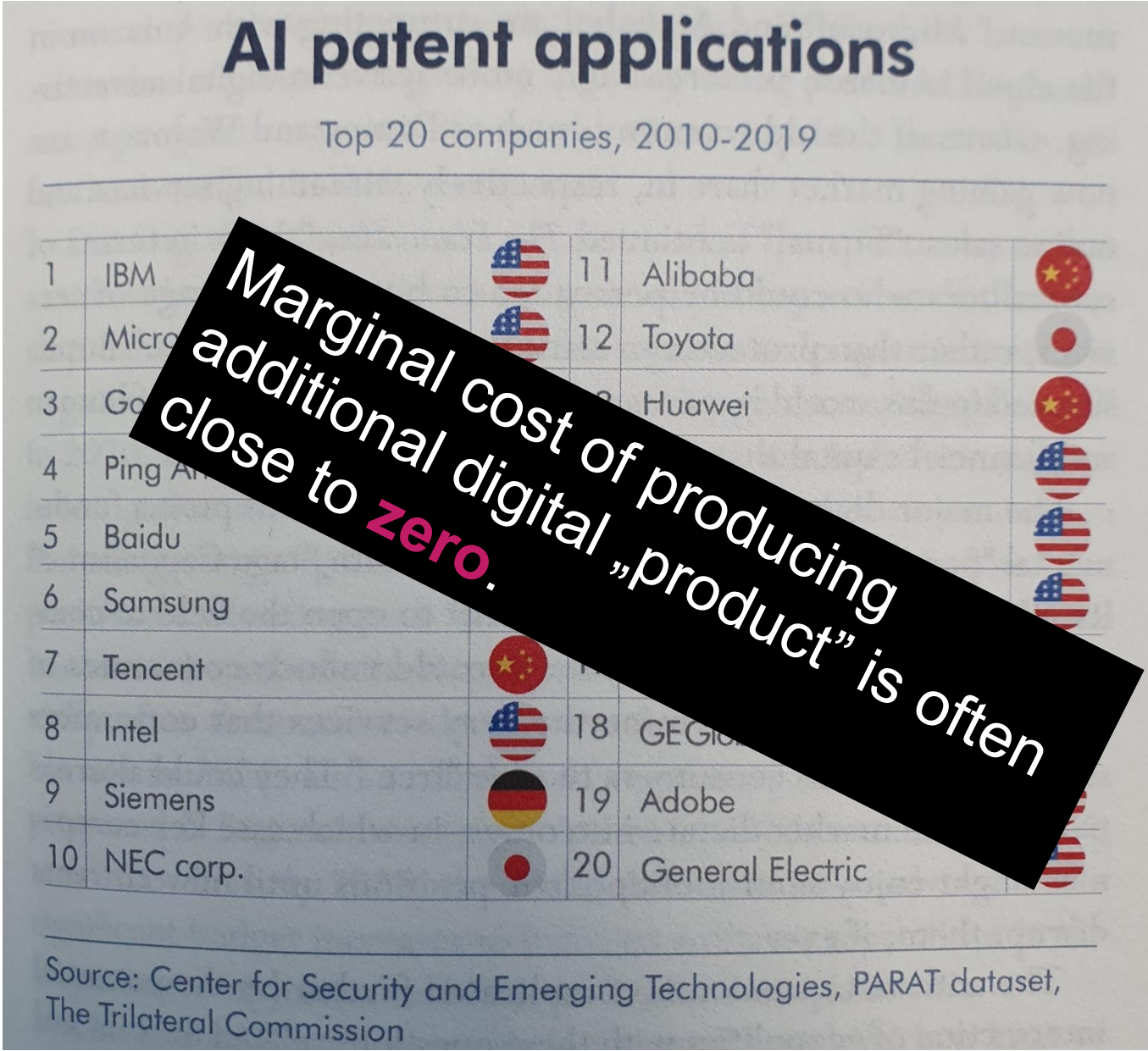
Trends in patents

Applications in the world's top five offices, 1883-2020

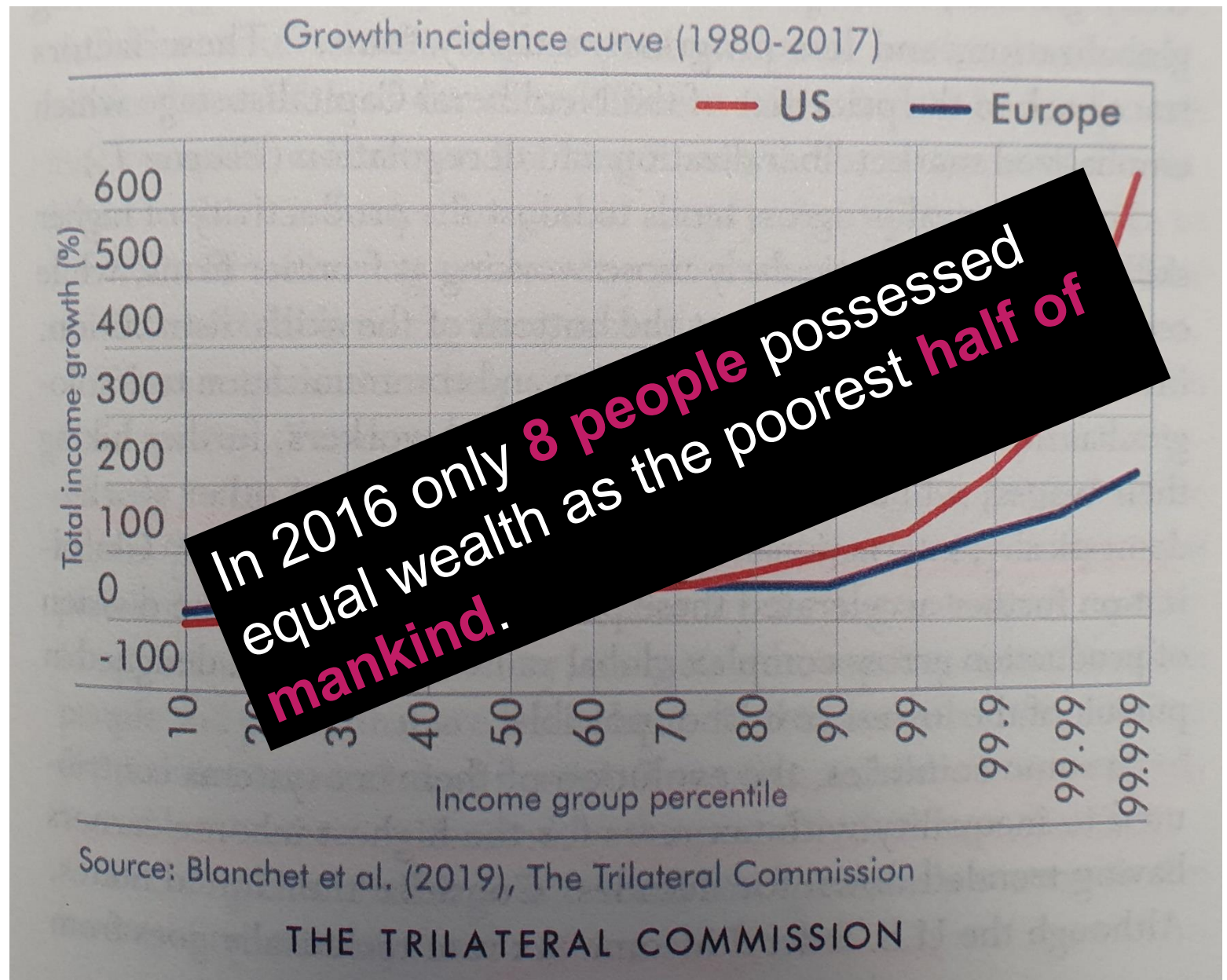


Source: WIPO, Intellectual Property Indicators, The Trilateral Commission

Where AI developments happens?



What are the implications of such development ?



What is your top of mind idea when AI and digitalization is mentioned?

Will A.I.

take my job?

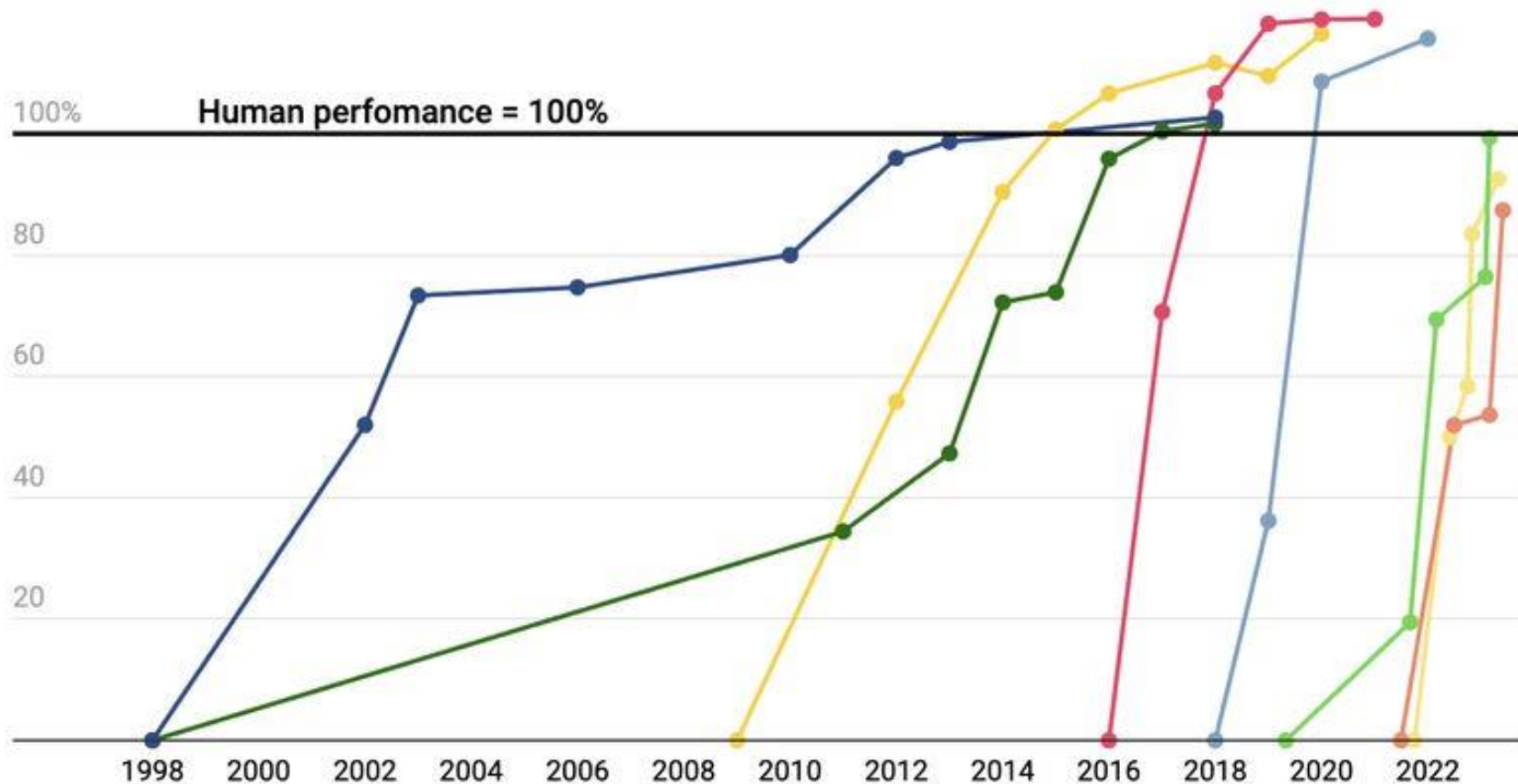
Automate
Automate
Automate

Jobs
Jobs
Jobs

AI has surpassed humans at a number of tasks and the rate at which humans are being surpassed at new tasks is increasing

State-of-the-art AI performance on benchmarks, relative to human performance

- Handwriting recognition
- Speech recognition
- Image recognition
- Reading comprehension
- Language understanding
- Common sense completion
- Grade school math
- Code generation



What's the real value of AI ?

For each benchmark, the maximally performing baseline reported in the benchmark paper is taken as the "starting point", which is set at 0%. Human performance number is set at 100%. Handwriting recognition = MNIST, Language understanding = GLUE, Image recognition = ImageNet, Reading comprehension = SQuAD 1.1, Reading comprehension = SQuAD 2.0, Speech recognition = Switchboard, Grade school math = GSK8k, Common sense completion = HellaSwag, Code generation = HumanEval.

Chart: Will Henshall for TIME • Source: ContextualAI

Potential risks which can jeopardize jobs

- Digitalization **increased productivity** (and wages) for up to **35%** but only **in 5% of best organizations**. Productivity grew only 5% in 95% of other companies.
- Until 2030 roughly 375 million workers will have to change jobs and skillset
- Some 80% of jobs will not be influenced by AI for more than 20% of tasks, while for 20% of jobs 50% of tasks might be automated.
- Many do not even consider paying interpreters anymore, when Google (and other tools) does this job better and better each day, and for free.
- Tomorrow, jobs in accounting, law, part of medical diagnostics, and others will be automated.

Potential opportunities brought by future education

All questions idea of „**comparative labor advantages**” as it was so far understood by economic literature (Samuelson & Nordhaus, 2009).
„**Longer education time for higher qualification**”.

Typical investment in education to get specific qualification is predictor of income (Adam Smith, 1776).

Education should focus more on interpersonal skills opposed to facts and expertise based on facts (or rules) alone.

Machines will become co-workers, new distribution of labor will happen in many occupations.

People will work less (and less people will need to work), although productivity and profits of companies (possessing IP) will grow.

Careers and educational focuses should be chosen wisely.

Think on what you can do as educator to help society.