



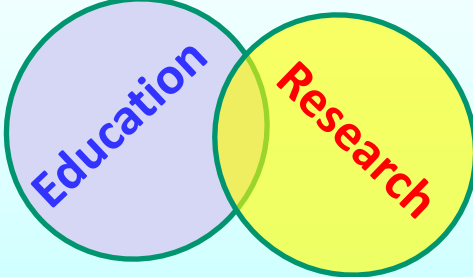
Mesto i uloga transfera tehnologije, razvoja proizvoda i inovacija u savremenim uslovima


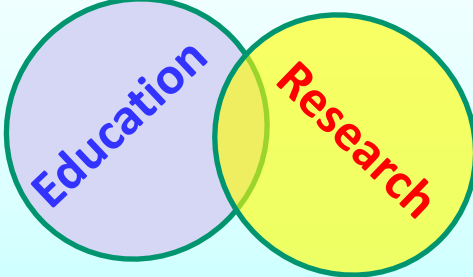
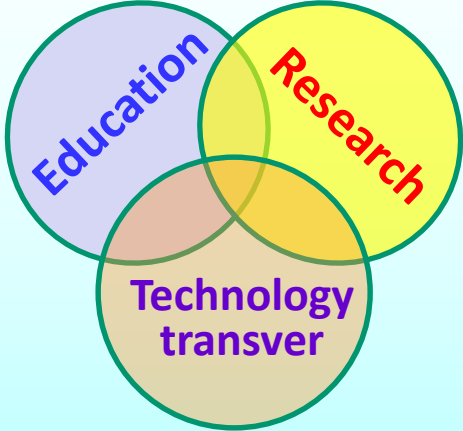
Prof.Dr.-Ing. Vojislav Miltenović

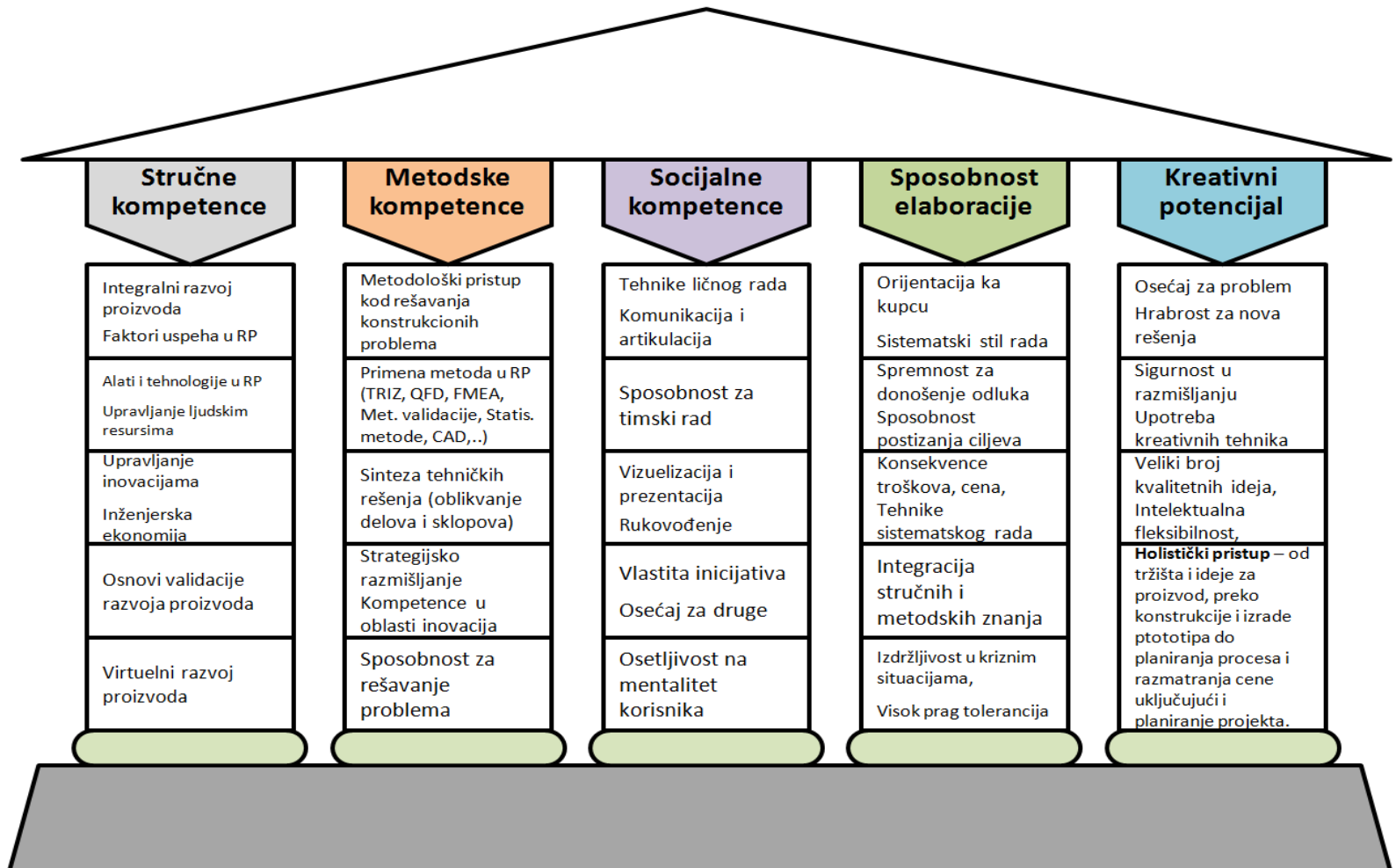
Reč univerzitet potiče iz latinskog jezika – *universitas magistrorum et scholarium*, što znači zajednica učitelja i učenika. Univerziteti predstavljaju **autonomne** ustanove visokoškolskog obrazovanja koje izdaju diplome i zvanja, a sastoje se od više fakulteta.

Visoko obrazovanje već duže vreme se nalazi u procesu tranzicije i **višestrukih reformi** koje prati veoma duga rasprava. Jedno od važnih pitanja u tim raspravama su **misije univerziteta**.

Mission	1st
Presentation	
Time - Years	1150
Trigger	<p>University of Paris (College of Sorbonne since 1257).</p> <ul style="list-style-type: none"> • Academic performance in the humanities – notably in theology and philosophy. • Introduced several academic standards and traditions.

Mission	1st	2nd
Presentation		
Time - Years	1150	1810
Trigger	<p>University of Paris (College of Sorbonne since 1257).</p> <ul style="list-style-type: none"> • Academic performance in the humanities – notably in theology and philosophy. • Introduced several academic standards and traditions. 	<p>University of Berlin – Humboldt (29 Nobel prize winners)</p> <ul style="list-style-type: none"> • independence of academia, • integration of natural, social sciences and humanities • unity of research and teaching. <p>Motto: Der Wind der Freiheit weht.</p>

Mission	1st	2nd	3rd
Presentation			
Time - Years	1150	1810	1980
Trigger	<p>University of Paris (College of Sorbonne since 1257).</p> <ul style="list-style-type: none"> Academic performance in the humanities – notably in theology and philosophy. Introduced several academic standards and traditions. 	<p>University of Berlin – Humboldt (29 Nobel prize winners)</p> <ul style="list-style-type: none"> independence of academia, integration of natural, social sciences and humanities unity of research and teaching. <p>Motto: Der Wind der Freiheit weht.</p>	<p>Silicon Valley and Stanford, UNI from Japan and EU</p> <ul style="list-style-type: none"> Global pressure on universities to take a important role in knowledge economy; OECD - technology transfer and innovation activities, creation of spin-off firms and technology parks; The entrepreneurial university - engine of economic growth of a country.



Naučno istraživanje predstavlja skup svesnih, sistematskih i metodološki organizovanih aktivnosti (disciplinarnih i/ili interdisciplinarnih) koje omogućuju otkrivanje i dokazivanje naučnih istina o predmetima, odnosno pojavama u prirodi i društvu pomoću naučnih metoda.

Nauka je dakle sređeno, sistematizovano i provereno znanje o nečemu, postignuto metodičnim, pažljivim i savesnim istraživanjem i razmatranjem.

Znanje može da se definiše kao sveukupnost objektivnih informacija povezanih sa ljudskim bićem i njegovim potrebama.

Treba razlikovati količinu znanja (**kvantitet**) i njegov značaj (**kvalitet**).

Znanje je ključni resurs i jedini resurs koji se tokom upotrebe i deljenja **uvećava**.

U savremenim uslovima razvoj nauke i tehnike je izuzetno brz i dinamičan, što za posledicu ima **enormno brzo uvećanje znanja** iz najrazličitijih oblasti tehnike.

Znanje

- teško se **čuva i štiti**,
- brzo **gubi vrednost** na tržištu,
- **ne podleže** poznatim procedurama i metodama upravljanja.

Znanje, kao rezultat istraživanja u nauci i tehnologiji u savremenim uslovima postaje **dominantni resurs** u razvoju zemlje sa većim potencijalnim mogućnostima u odnosu na prirodna bogatstva, jer je preduslov razvoja **novih visoko kvalitetnih proizvoda** i proizvodnje visoke produktivnosti i efikasnosti.

Kao mera kvaliteta rezultata naučnoistraživačkog rada najčešće se koriste **izvrsnost** i **relevantnost**.

Izvrsnost u nauci predstavlja meru kvaliteta rezultata naučnoistraživačkog rada prvenstveno sa aspekta internacionalne vidljivosti. Važni parametri vrednovanja izvrsnosti su broj radova godišnje u mreži WoS, broj monografskih publikacija istaknutih inostranih izdavača, citiranost radova, itd.

Relevantnost je takođe mera kvaliteta rezultata naučnoistraživačkog rada ali sa aspekta uticaja na društvo i ekonomske aspekte napredka.

Relevantnost naučnih istraživanja čine prvenstveno broj patentnih prijava odnosno patenata, pronalasci koji imaju aplikativni značaj, rad na projektima gde je prisutna primena rezultata istraživanja, kao i prihodi koji se na taj način ostvaruju.

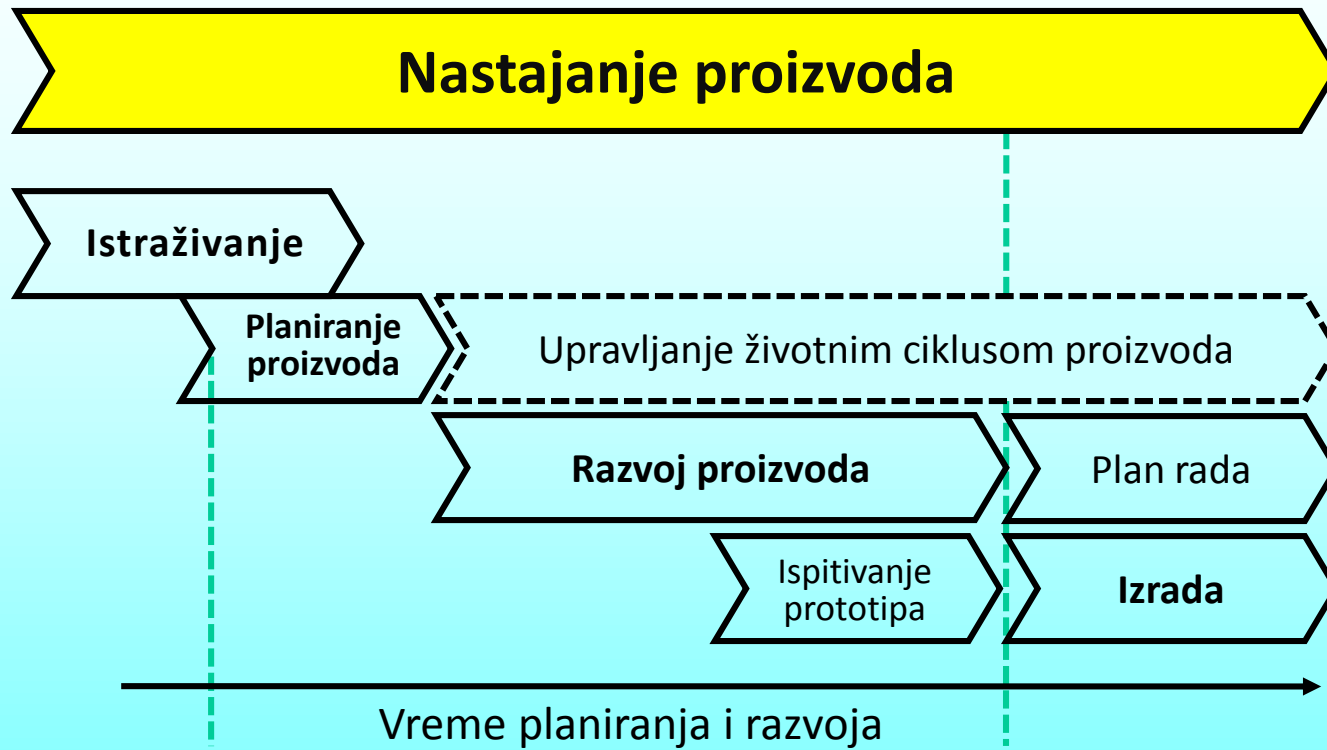
Stanje u Srbiji:

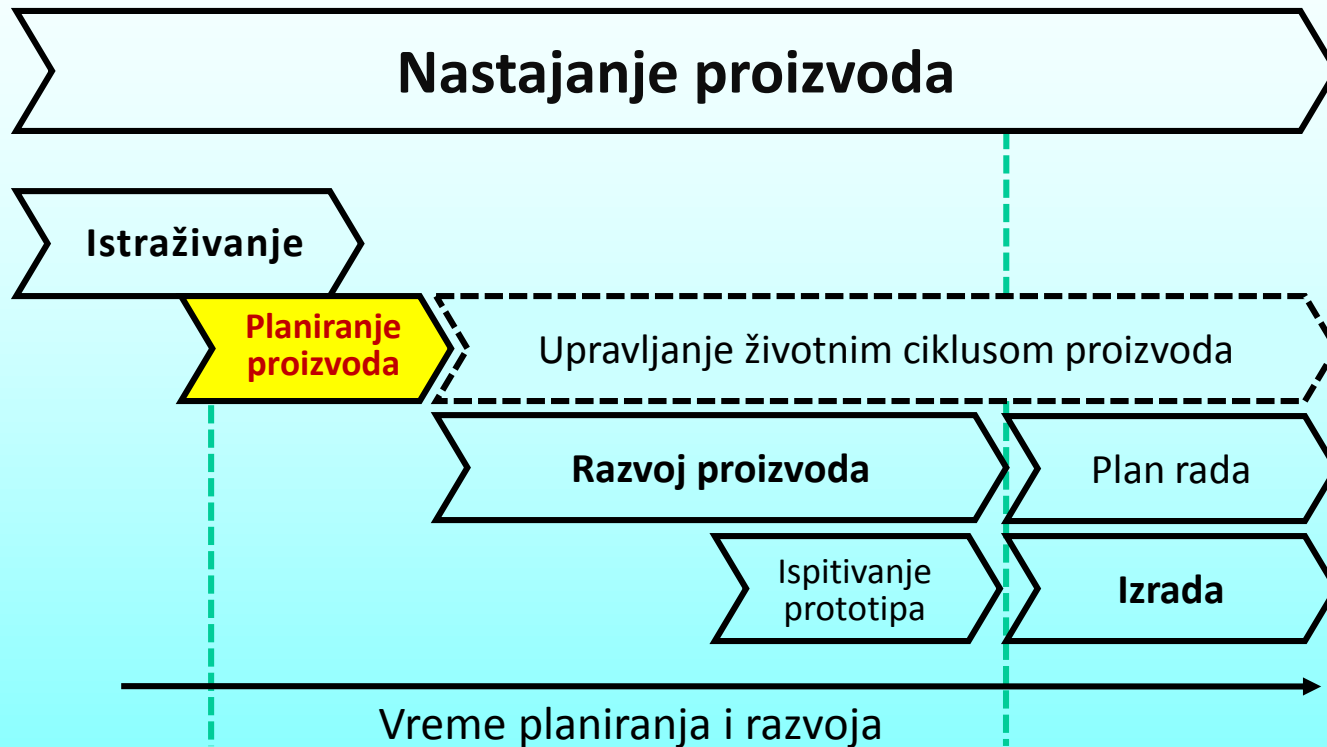
Izvrsnost: od ukupnog broja naučnih radova

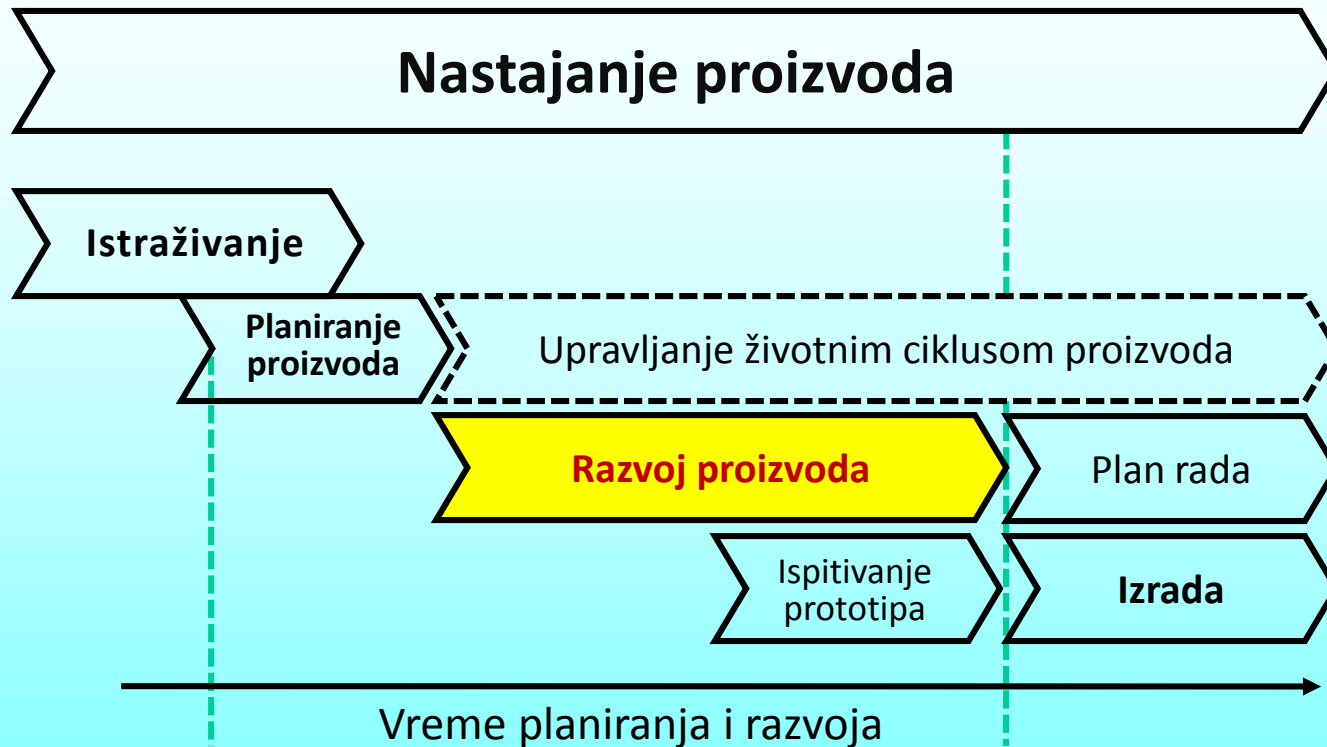
- 40% čine radovi objavljeni u časopisima koje referiše baza WoS;
- 60% čine naučni radovi objavljeni u nacionalnim časopisima.

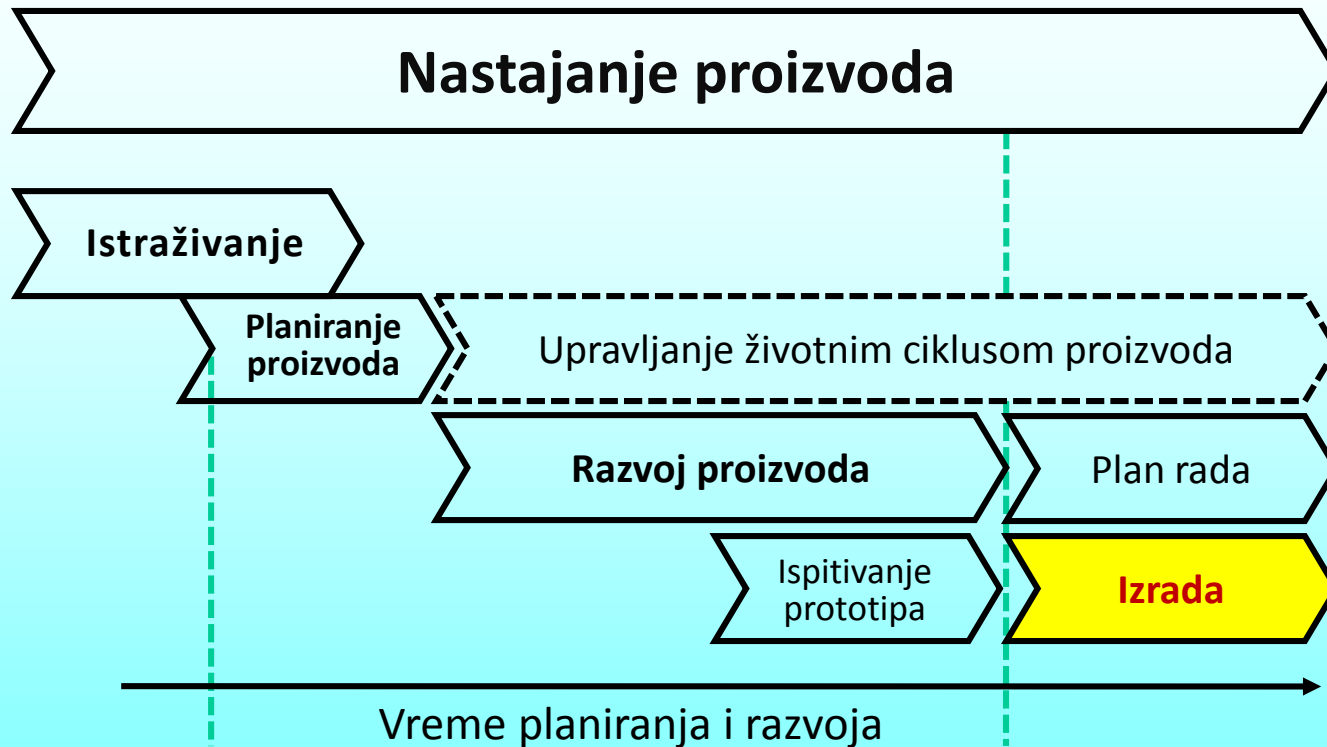
Relevantnost:

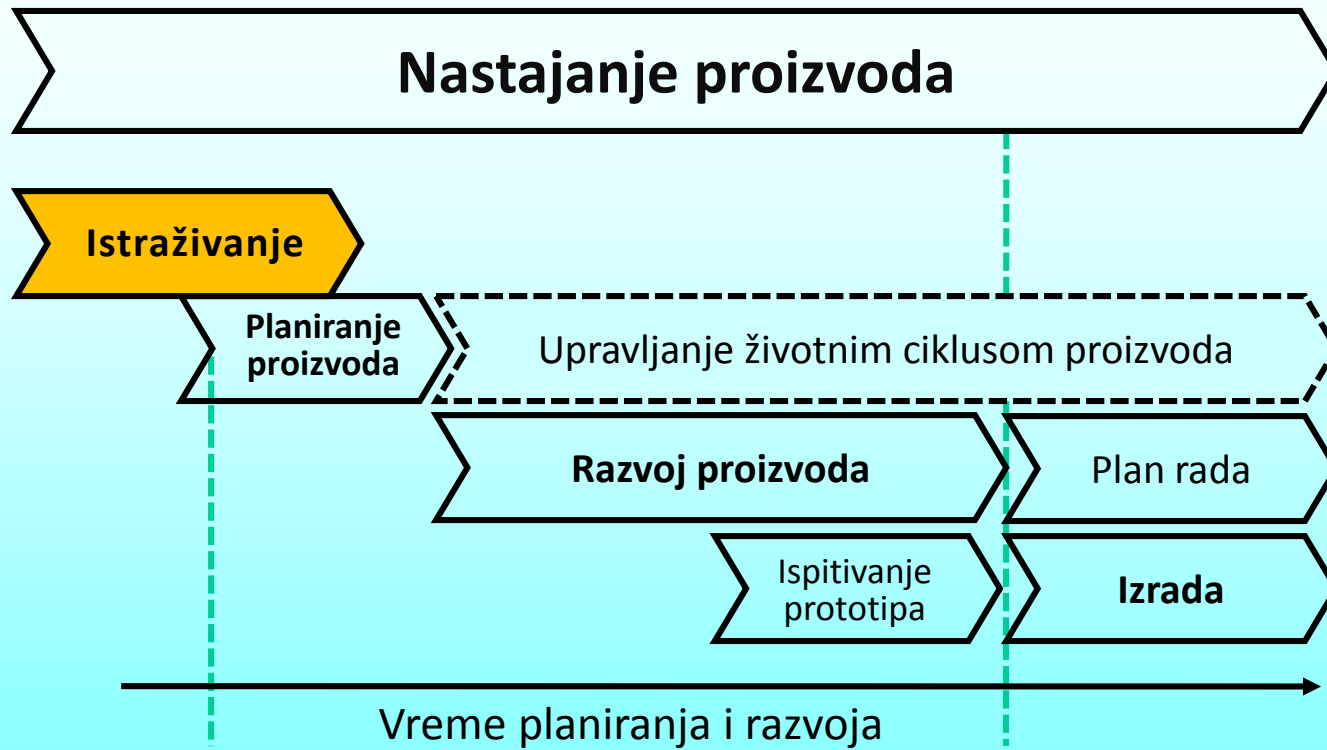
- broj rezultata koji mogu biti **od značaja za privredu jako nizak**, jer od ukupnog broja svih ostvarenih rezultata patenti i tehnička rešenja čine **3,3%**.











Primena znanja prvensteno se ogleda u procesu transfera tehnologije, razvoja proizvoda i adekvatne primene inovacija.

U užem smislu **transfer tehnologije** može se razmatrati kao proces protoka znanja od **izvora** (naučna istraživanja) do **korisnika** (privredni subjekti).

Inovacija doslovno znači "izmenu" ili "obnovu".
Izvedena je od latinske reči *innovare* što znači obnoviti.

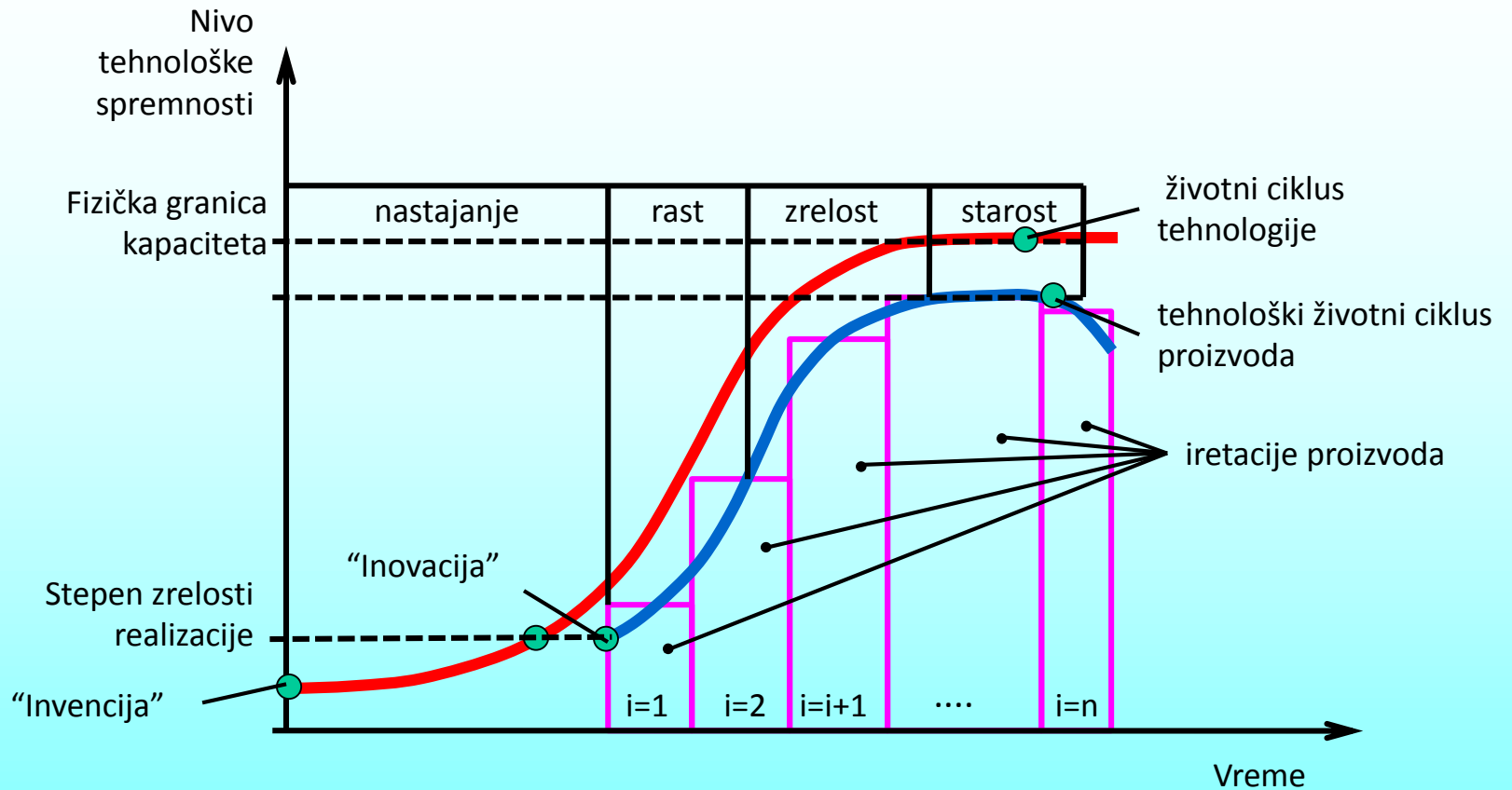
Inovacija je primena ideje, koja kod novih proizvoda, usluga i postupka donosi nove koristi ili kvalitet u primeni.

Prema stepenu inovativnosti razlikuju se:

- **radikalne inovacije** (značajan, jasno uočljiv stepen inovativnosti),
- **inkrementalne inovacije** (manje izražen stepen inovativnosti).

Inovacije mogu preduzećima **povećati konkurentnu sposobnost** putem:

- razvoja novih visoko kvalitetnih proizvoda,
- uvođenja novih tehnologija u proizvodnju,
- uvođenja nove organizacije u proizvodnju,
- osvajanja novih tržišta,
- uspostavljanja novih tržišnih odnosa, itd.

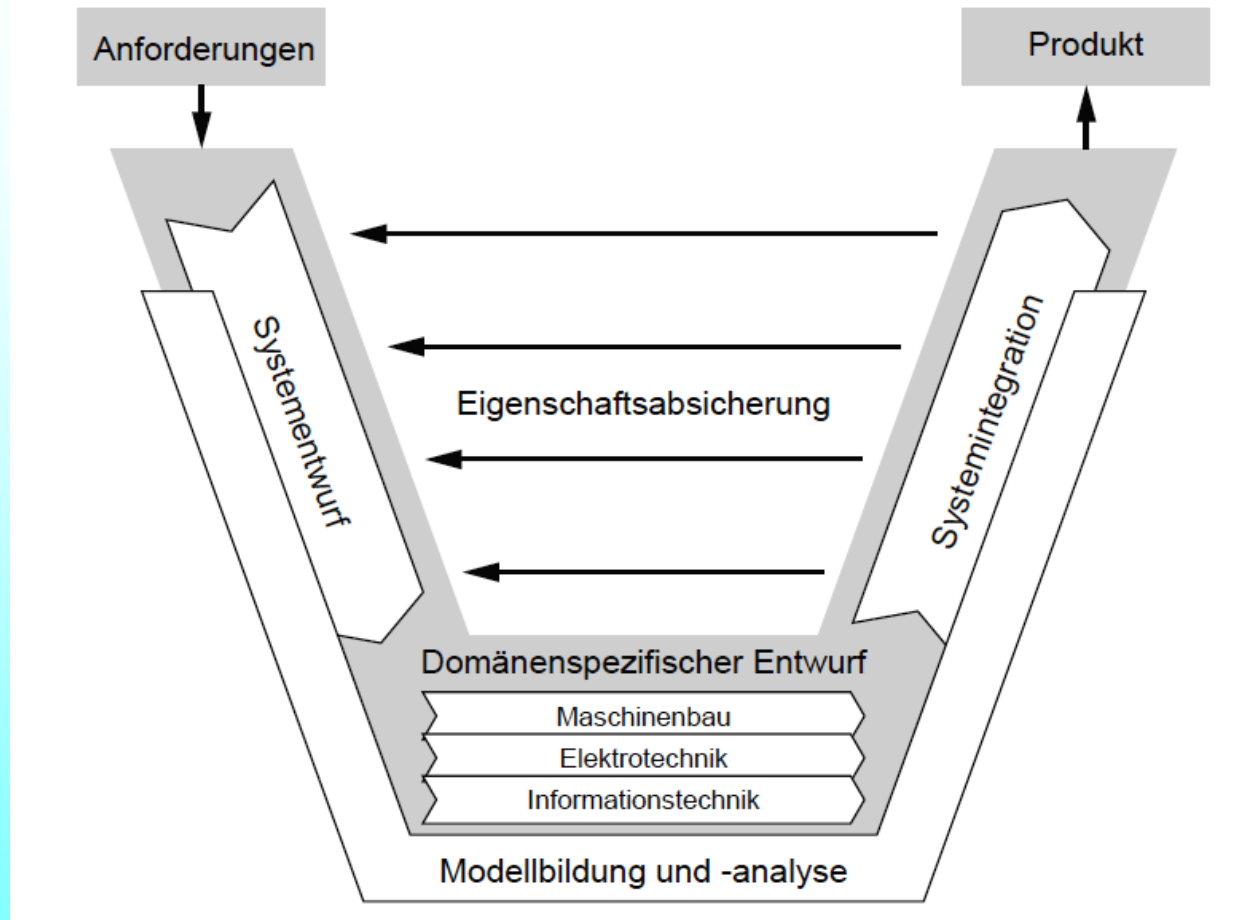


Treba imati u vidu da je put od invencije do inovacije **težak i dugotrajan**, uz veliki rizik da bude **neuspešan**. Inovacije i razvoj proizvoda su jako usko povezani.

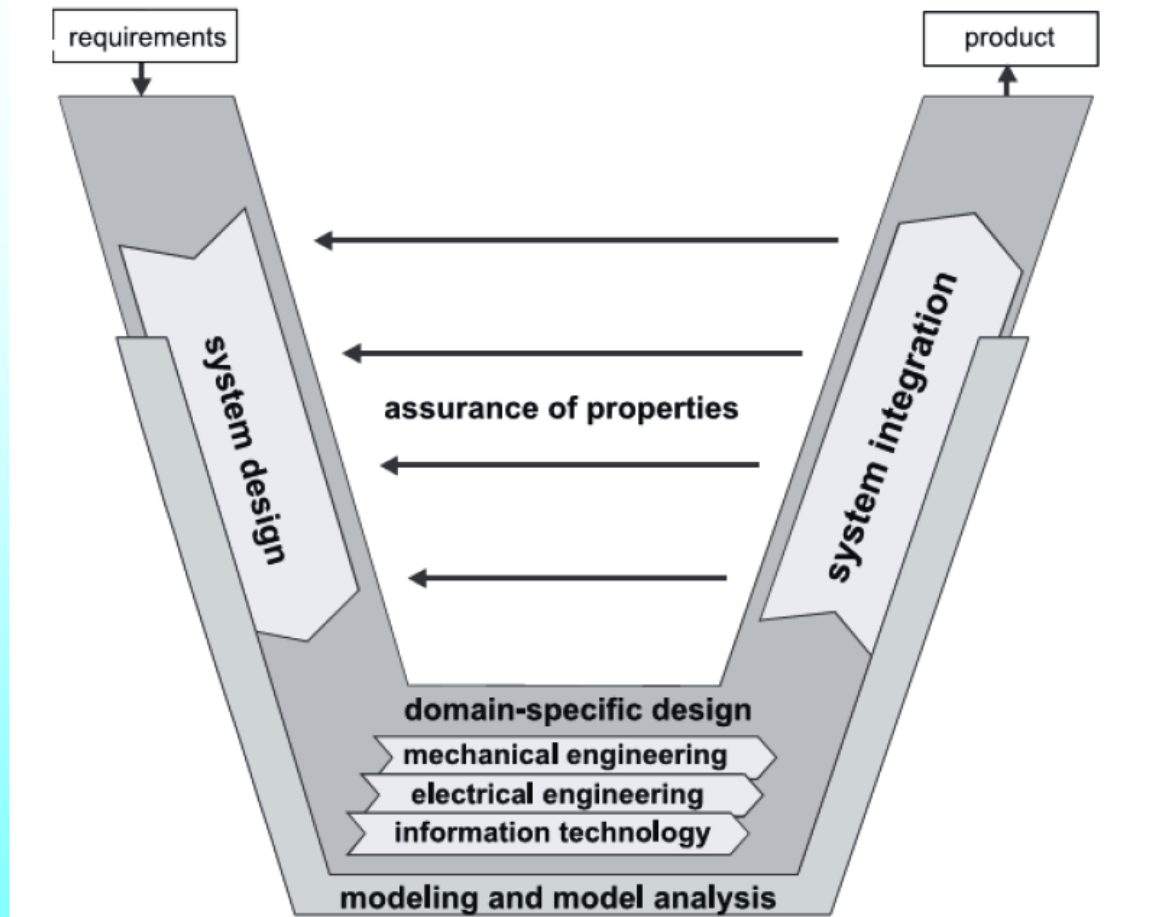
Početak inovacije je ustvari razvoj proizvoda. U tom smislu uveden je termin
„inovacioni razvoj proizvoda“.

Kod inovacionog razvoja proizvoda svrsishodno je naći odgovore na sledeća pitanja:

- Kako kreativne i efikasne inovativne ideje **generisati i oceniti**?
- Kako od **ideje doći do inovacije** koja ima primenu kod kreiranja novog proizvoda?
- Kako sistematski **upravljati** inovacionim procesom generisanja ideja, **proceniti njihovu aplikativnost** i njihovu transformaciju u tržišno profitabilan proizvod?
- Kako ovladati tehnikama **kreativnosti** (Brainstorming, Mind Mapping, TRIZ,..)?
- Kako forsirati **radikalne** inovacije i kako primeniti profitabilne usluge od **inkrementalnih** (postepenih) inovacija?



VDI-Richtlinie 2206



Mechatronic design process VDI 2206



V-модел према VDI 2206

Inovacije mogu nastati kao:

- rezultat rada pojedinaca,
- rezultat rada u samom preduzeću
- rezultat **naučnih istraživanja**

Najkvalitetnije inovacije nastaju kao rezultat rada istraživačkih organizacija

Ranking lists:

Shanghai Ranking of World Universities (since 2003), - 500

<http://www.shanghairanking.com> /

World University Rankings (Times Higher Education - UK), - 1250

<https://www.timeshighereducation.com/news/world-university-rankings-2019>

Webometrics Ranking of World Universities located in Spain - 12000

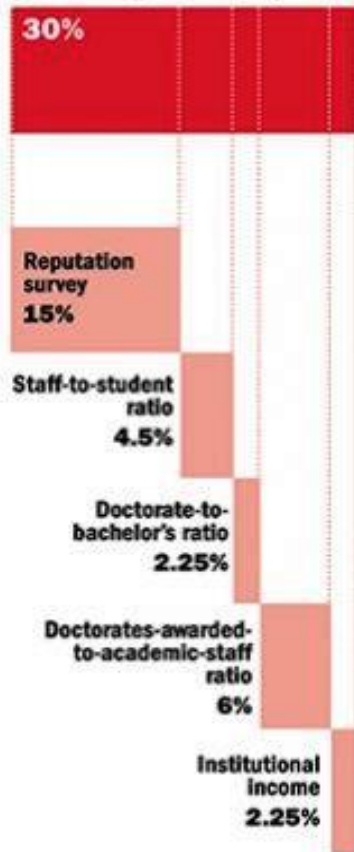
<http://www.webometrics.info/en>

Indicators and Weights of *Shanghai Ranking*

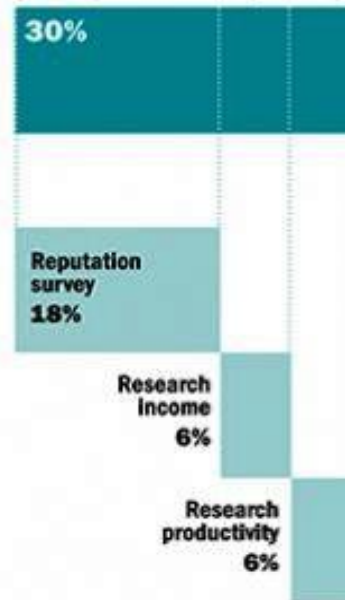
Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
	Highly cited researchers in 21 broad subject categories	HiCi	20%
Research Output	Papers published in Nature and Science*	N&S	20%
	Papers indexed in Science Citation Index-expanded and Social Science Citation Index	PUB	20%
Per Capita Performance	Per capita academic performance of an institution	PCP	10%
Total			100%

Ranking list of world universities

Teaching (the learning environment)



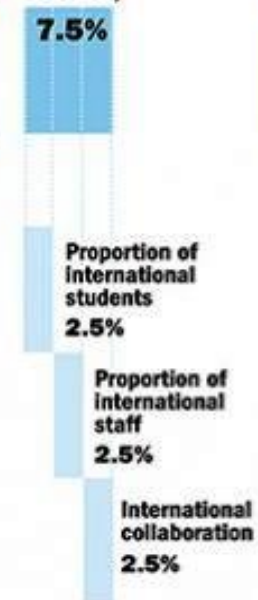
Research (volume, income and reputation)



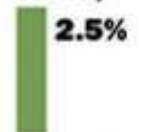
Citations (research influence)



International outlook (staff, students, research)



Industry income (knowledge transfer)























Criteria and indicators of **World University Rankings** [2]

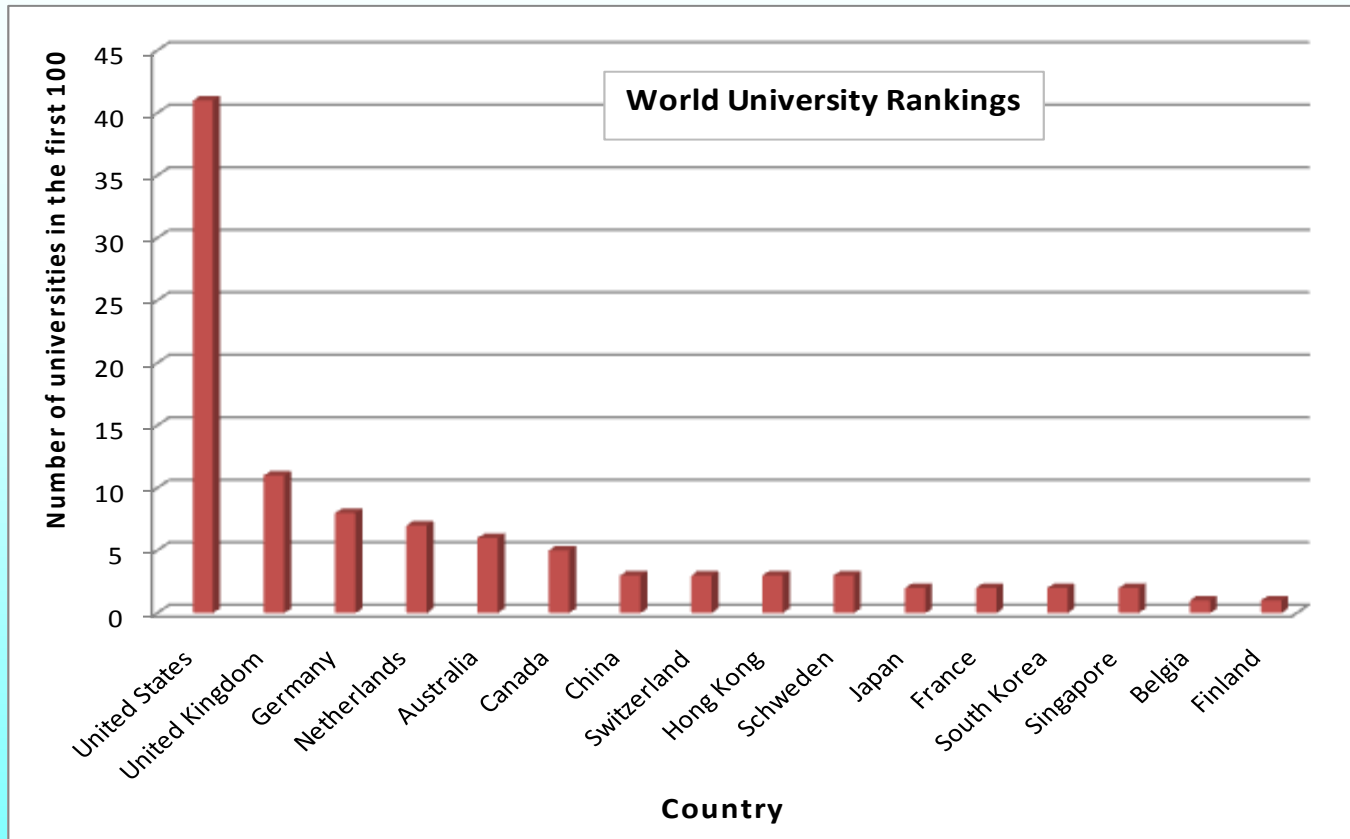
Webometrics criteria and indicators

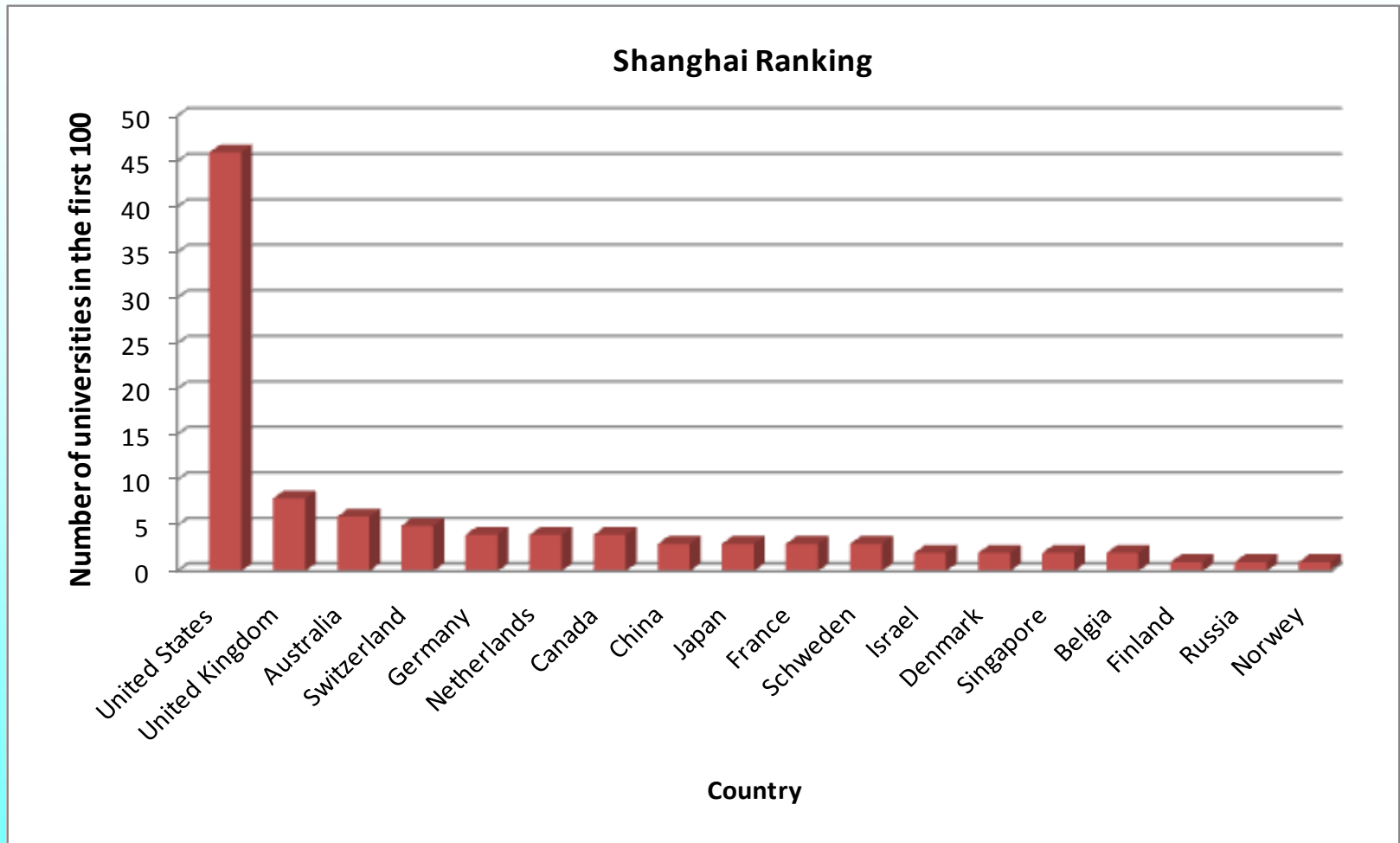
Criteria	Indicator	Code	Weight
Visibility	Number of obtained unique external links to a university website (institutional prestige, academic performance, information value, usefulness of the service)	Impact	50%
Activity	Total number of university web pages from where the data are downloaded via Google	Presence	10%
	Number of rich files, whereby the following formats are taken into consideration: Adobe Acrobat (.pdf), Adobe PostScript (.ps), Microsoft Word (.doc) and Microsoft PowerPoint (.ppt)	Openness	10%
	Quality of scientific papers published by a university - number of citations of scientific papers	Excellence	30%
Total			100%

Table 3. *Top 10 universities in the world [1] [2]*

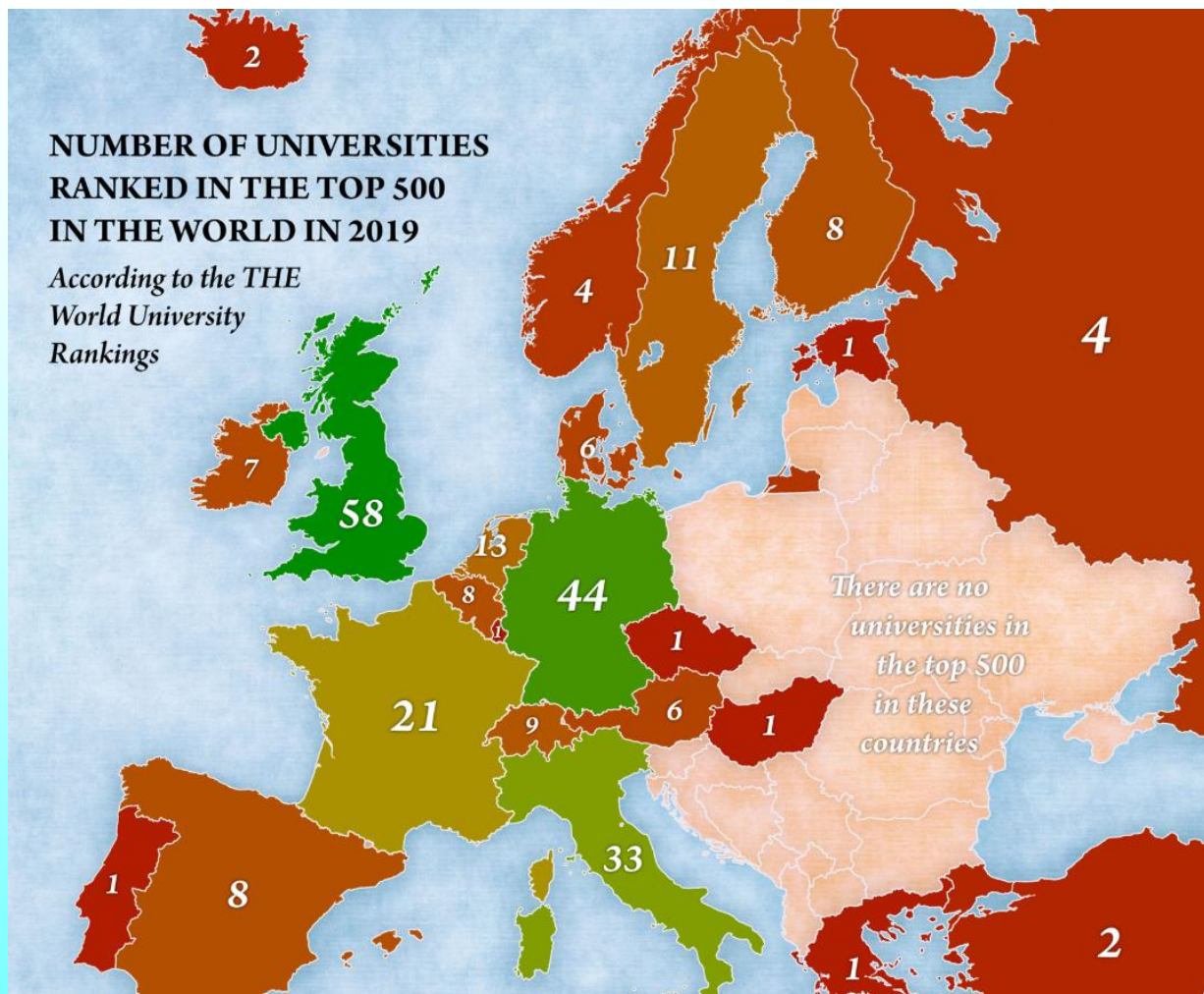
Rank	World University Rankings - 2019		Shanghai Ranking - 2018	
	University	Country	University	Country
1	University of Oxford		Harvard University	
2	University of Cambridge		Stanford University	
3	Stanford University		University of Cambridge	
4	Massachusetts Institute of Technology		Massachusetts Institute of Technology	
5	California Institute of Technology		University of California, Berkeley	
6	Harvard University		Princeton University	
7	Princeton University		University of Oxford	
8	Yale University		Columbia University	
9	Imperial College London		California Institute of Technology	
10	University of Chicago		University of Chicago	

The best world universities





The best Europe universities



<https://jakubmarian.com/number-of-top-ranked-universities-by-country-in-europe/>







Ranking	University	World Rank		
		Jan. 2018	July 2018	Jan. 2019
1	University of Ljubljana	325	295	318
2	University of Belgrade	512	1028	484
3	University of Zagreb	692	668	659
4	University of Split	1015	1102	791
5	University of Novi Sad	1108	1096	1083
6	University of Maribor	1244	1169	1180
7	University of Rijeka	1534	1535	1458
8	University of Niš	1498	1519	1523
9	University of Skoplje	1612	1628	1579
10	University of Sarajevo	2019	1676	1785
11	University of Kragujevac	1840	1898	1910

Webometrics ranking list for universities in ex-YU countries

Inovacije su velika konkurentaska prednost za bilo koju razvijenu ekonomiju.

Međutim, postizanje **održive stope inovacija** je jako teško jer zavisi od velikog broja faktora.

Jedan od glavnih faktora je ulaganje u istraživanje i razvoj.

Rashodi za (R&D) su svakako jedan od ovih faktora i iako to nije uvijek u direktnoj korelaciji sa rezultatima inovacija, ono predstavlja vrijeme, kapital i trud koji se ulaže u istraživanje i projektovanje proizvoda budućnosti.

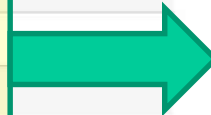
Rank	Country	R&D Spending (PPP)	Global share (%)
#1	United States	\$476.5 billion	26.4%
#2	China	\$370.6 billion	20.6%
#3	Japan	\$170.5 billion	9.5%
#4	Germany	\$109.8 billion	6.1%
#5	South Korea	\$73.2 billion	4.1%
#6	France	\$60.8 billion	3.4%
#7	India	\$48.1 billion	2.7%
#8	United Kingdom	\$44.2 billion	2.5%
#9	Brazil	\$42.1 billion	2.3%
#10	Russia	\$39.8 billion	2.2%
#11	Italy	\$29.6 billion	1.6%
#12	Canada	\$27.6 billion	1.5%
#13	Australia	\$23.1 billion	1.3%
#14	Spain	\$19.3 billion	1.1%
#15	Netherlands	\$16.5 billion	0.9%
All other countries		\$249.8 billion	13.9%

Put together the numbers for the U.S. (\$476.5 billion) and China (\$370.6 billion), and it amounts to 47.0% of total global R&D expenditures. Add in Japan and Germany, and the total goes to 62.5%.

At same time, the countries left off the above list don't even combine for 15% of the world's total R&D expenditures.

Istraživanje, razvoj, inovacije

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62.5%

Rank	Country	R&D (as a % of GDP)
#1	South Korea	4.3%
#2	Israel	4.2%
#3	Japan	3.4%
#4	Switzerland	3.2%
#5	Finland	3.2%
#6	Austria	3.1%
#7	Sweden	3.1%
#8	Denmark	2.9%
#9	Germany	2.9%
#10	United States	2.7%



IRMES
Kragujevac 2019

9th International Scientific Conference
IRMES 2019
Research and Development of
Mechanical Elements and Systems
05. – 07. SEPTEMBER 2019
Kragujevac, Serbia

FIRST CALL

Important Dates

- 10. 02. 2019. – First call for papers
- 01. 04. 2019. – Short abstract submission deadline
- 10. 04. 2019. – Notification of abstract acceptance
- 15. 06. 2019. – Paper submission deadline
- 15. 07. 2019. – Student section submission deadline
- 01. 09. 2019. – Conference fee payment deadline

Contact:

IRMES 2019 - Faculty of Engineering,
34000 Kragujevac, Serbia
Sestre Janjic 6
www.irmes2019.kg.ac.rs
email: irmes2019@kg.ac.rs
tel: +381 34 335 990
fax: +381 34 333 192

- 1. Mechanical Elements and Systems** (*modeling and simulation, loading and stress conditions, tribology, noise and vibrations, maintenance and monitoring, safety, quality, reliability*)
- 2. Power and Motion Transmission Systems** (*development of new concepts, modeling and simulations, noise and vibrations, testing, safety, quality, reliability*)
- 3. Product Development Process** (*technology transfer, creativity and innovations, development and design, Innovative product development, smart systems, industry 4.0, knowledge economy*)
- 4. New Technologies and Materials** (*CAD/ CAM/ CAE technology, intelligent production systems, robotics and mechatronics, rapid prototyping, new materials*)

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1. Mašinski elementi i sistemi (*modeliranje i simulacije, opterećenja i naponska stanja, optimizacija, tribologija, buka i vibracije, ispitivanje, održavanje i monitoring, bezbednost, kvalitet, pouzdanost*)

2. Sistemi za prenos snage i kretanja (*razvoj novih koncepcija, modeliranje i simulacije, buka i vibracije, prenosnici snage i kretanja kod obnovljivih izvora energije, bezbednost, pouzdanost*)

3. Proces razvoja proizvoda (*transfer tehnologija, kreativnost i inovativnost, razvoj i konstruisanje, inovativni razvoj proizvoda, Smart sistemi, Industrija 4.0, ekonomija znanja*)

4. Nove tehnologije i materijali (*CAD/CAM/CAE tehnologije, inteligentni proizvodni sistemi, robotika i mehatronika, brza izrada prototipova, novi materijali*)

3. Proces razvoja proizvoda

- *transfer tehnologija,*
- *kreativnost i inovativnost,*
- *razvoj i konstruisanje,*
- *inovativni razvoj proizvoda,*
- *Smart sistemi,*
- *Industrija 4.0,*
- *ekonomija znanja)*

<http://irmes2019.kg.ac.rs/topics.php?lang=sr>



NIKAD SE NE PREDAJ!