



کارگاه آشنایی

با مفاهیم و کاربرد علم سنجی

دکتر پیام کبیری

رئیس مرکز توسعه و هماهنگی اطلاعات و انتشارات علمی

معاونت تحقیقات و فناوری

وزارت بهداشت، درمان و آموزش پزشکی

برنامه کارگاه امروز !

- اطلاع‌سنجی و علم‌سنجی، مفاهیم و کاربرد
- معرفی خلاصه شاخص‌های علم‌سنجی
- آشنایی با نمایه‌نامه‌های استنادی
- جستجو و تحلیل استنادی در ISI Web of Science و Scopus
- معرفی شاخص H-Index
- ضریب تاثیر مجلات Impact Factor، معرفی (JCR)
- آشنایی با Academic Social Networks

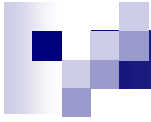


Scientometrics (bibliometrics)

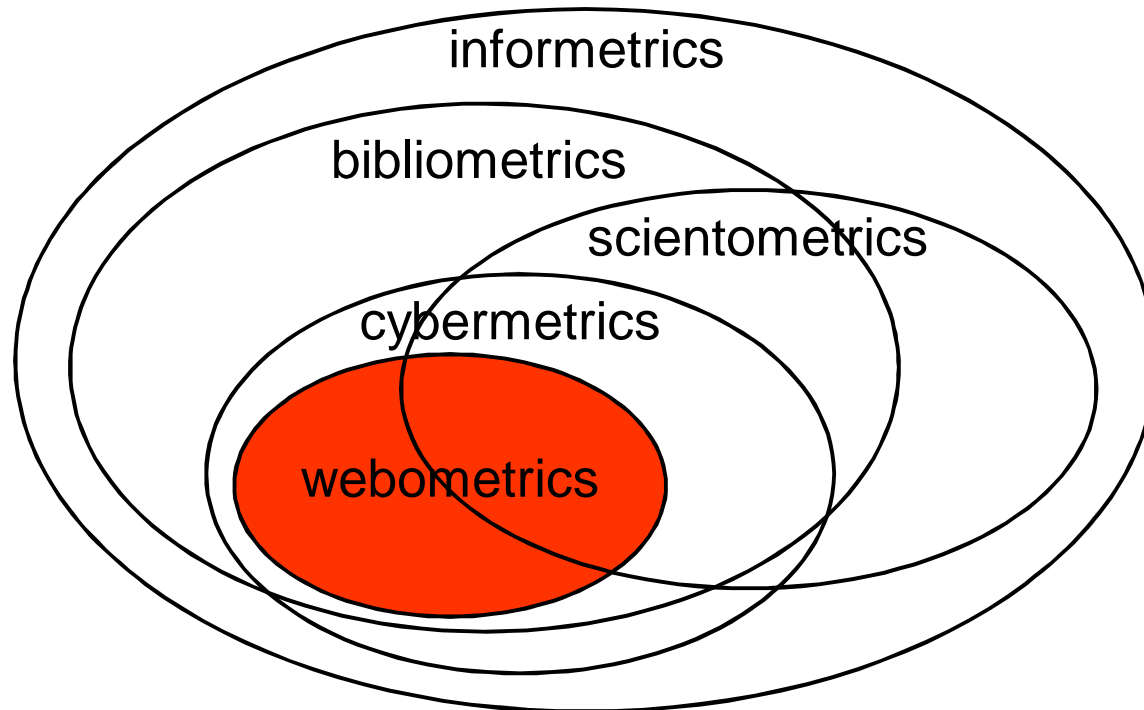
- **Scientometrics (bibliometrics)** - The measurement of scientific output activity through statistics on academic publications
- The scope of bibliometrics includes:
“all quantitative aspects and models of science communication, storage, dissemination and retrieval of scientific information”.

تعریف علم سنجی

- آن دسته از روش‌های کمی را که به تحلیل علم بعنوان یک فرآیند اطلاعاتی تأکید دارند "علم سنجی" می‌نامند.
- "علم سنجی" به تعبیری ساده تر عبارت است از دانش اندازه‌گیر علم.



Scientometrics





Informetrics

- broader than bibliometrics and scientometrics
- Informetrics examines patterns that show up not only in publications but also in many aspects of life as long as the patterns deal with information.

e.g. Willis Law deals with the relationships between the age of a group of the animal and plant species and the habitation of these species

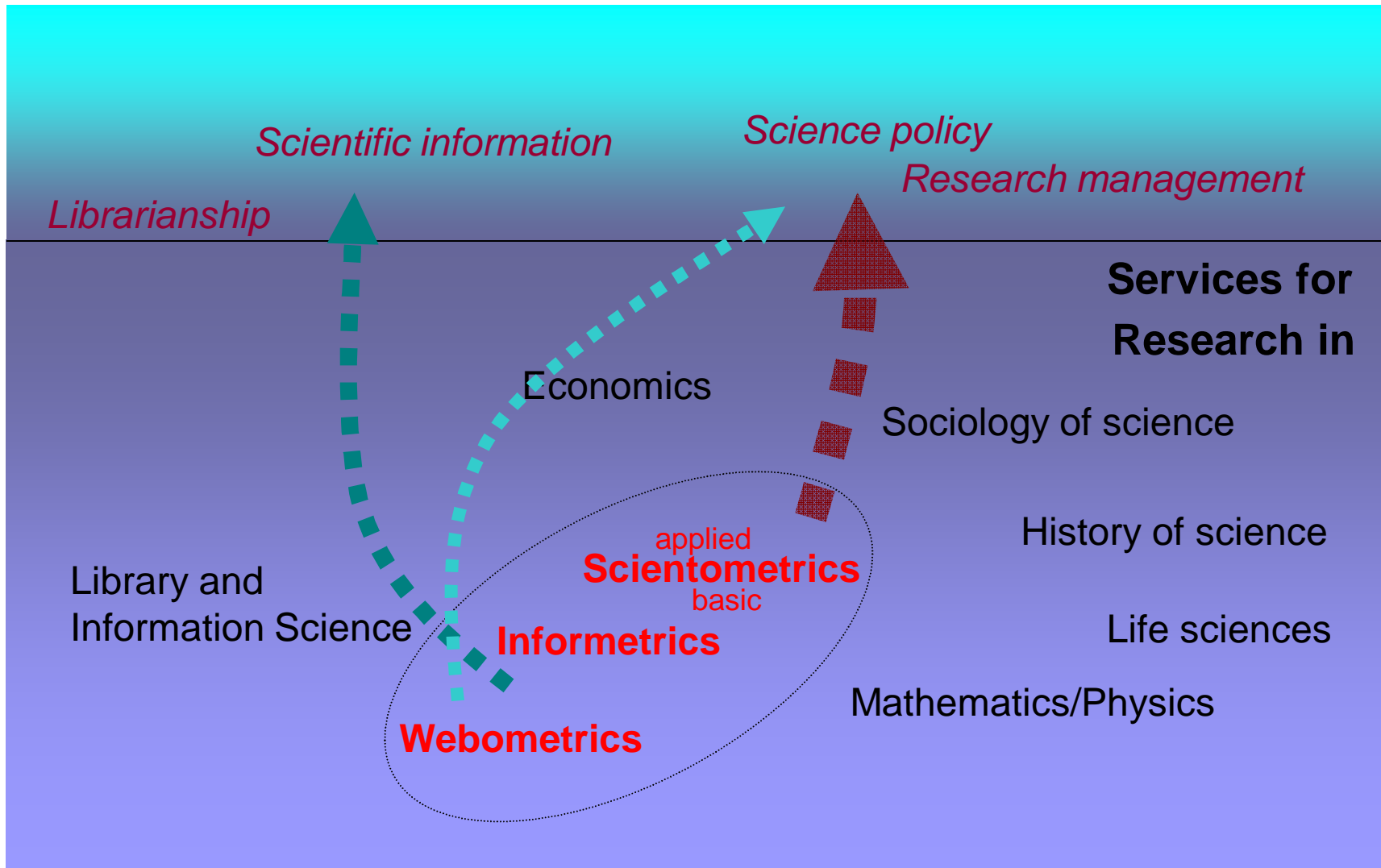
- its concepts, formulas applicable to publication patterns.



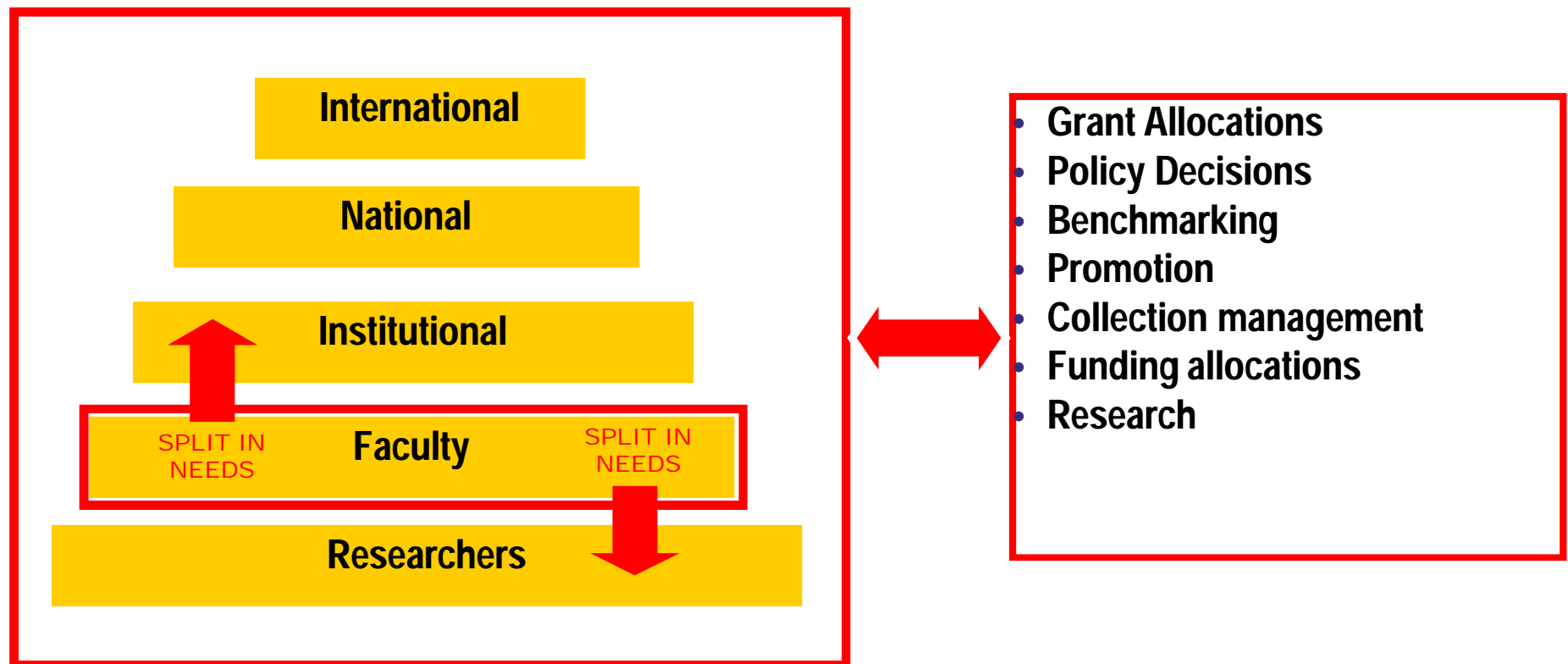
Bibliometrics Data **Used for..**

- Scientific output evaluation
 - Impact
 - Citations
- History of science
- Publication strategies
- Science policy; resource allocation
- Collection management
- Sociology of science
- Information organization
- Information management & utilization

Links of Scientometrics with Related Research Fields and Application Services



Why do we evaluate scientific output





Citation Databases

- Web of Science
- Scopus
- Google Scholar
 - (<http://scholar.google.com>)



3 Types of Citation Data Indexes

Articles

- Citation Impact

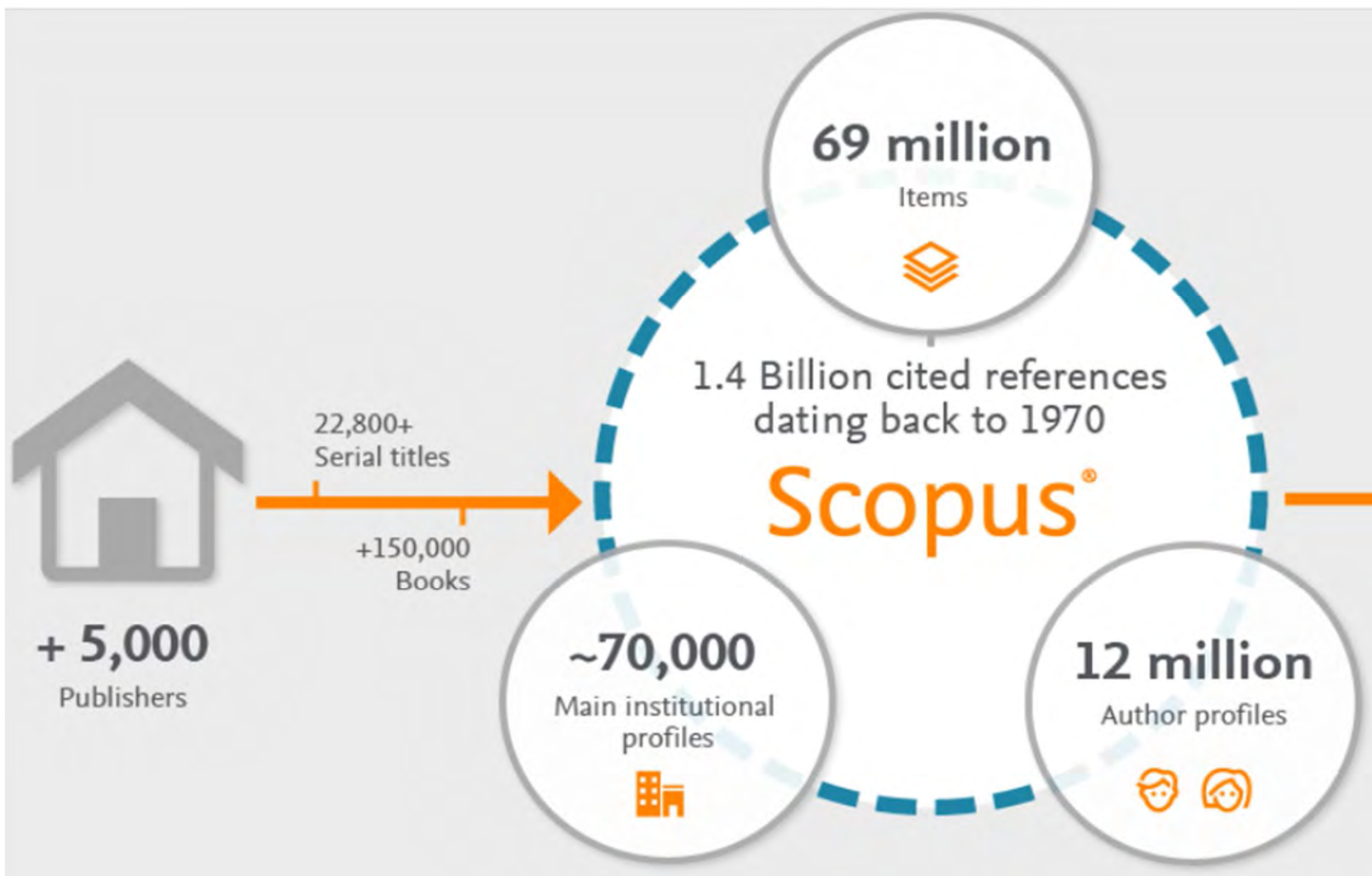
Authors

- Number of Papers (**Quantity**)
- Number of Citations (**Quality**)
- Average number of **Citations/Paper**
- *h*-index & *g*-index (Quantity & Quality Both)

Journals

- Journal Impact Factor
- *h*-index

Scopus





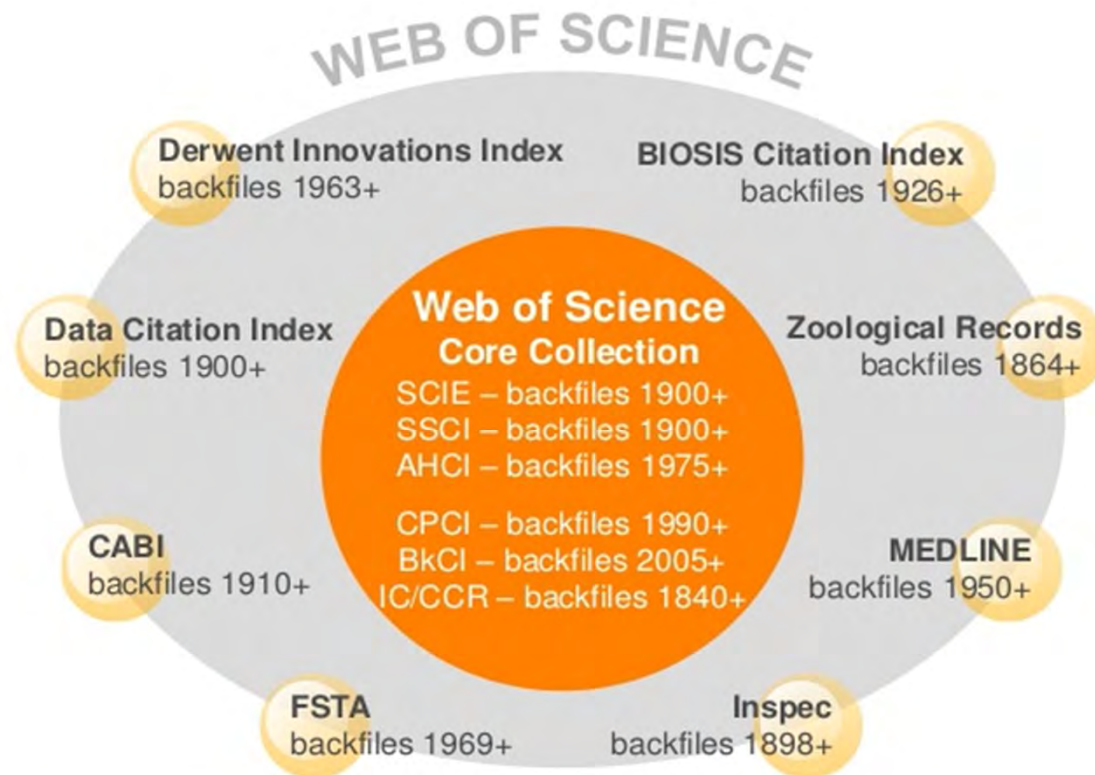
Google Scholar

- Better coverage for all citations as it retrieve web !
- More coverage of references also gray literature !
- Coverage and scope?
- Inclusion criteria?
- Very limited search options
- No separate cited author search
- Back to 1990 NOT more !
- Free!



Web of Science

(Now **Clarivate Analytics**)



100%

Fully indexed cited references, authors,
and author affiliations

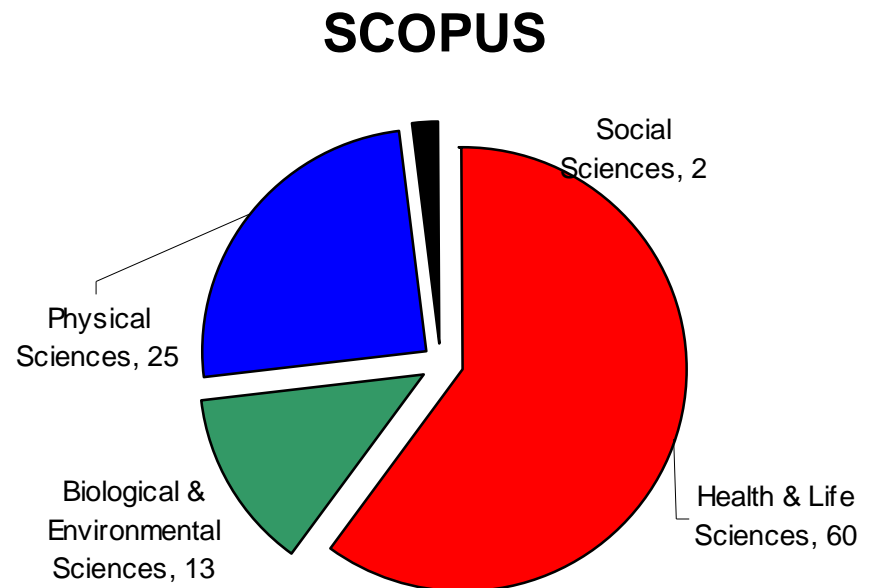
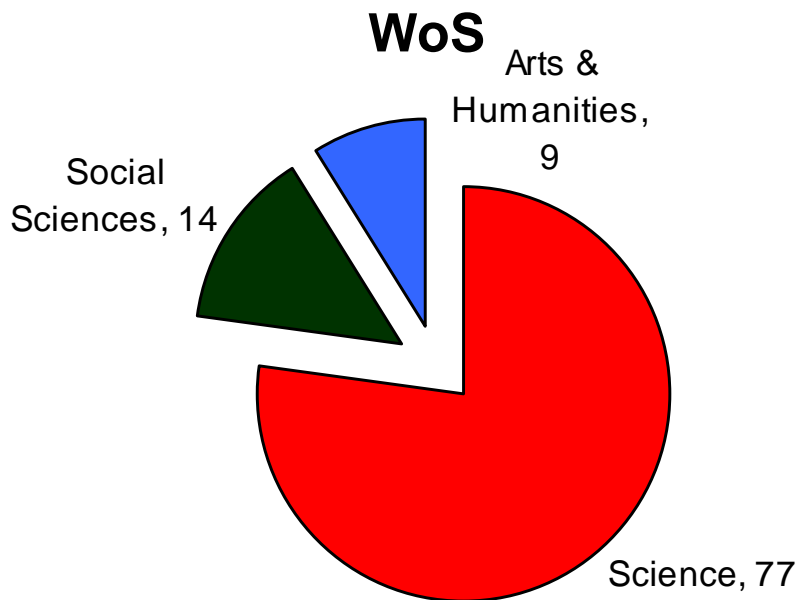
18,000+

Journals carefully and objectively
selected for quality

1.3 billion

Cited references going back to 1900

WoS and Scopus: Subject Coverage (% of total records)



Google Scholar ?



ISI Web of Science

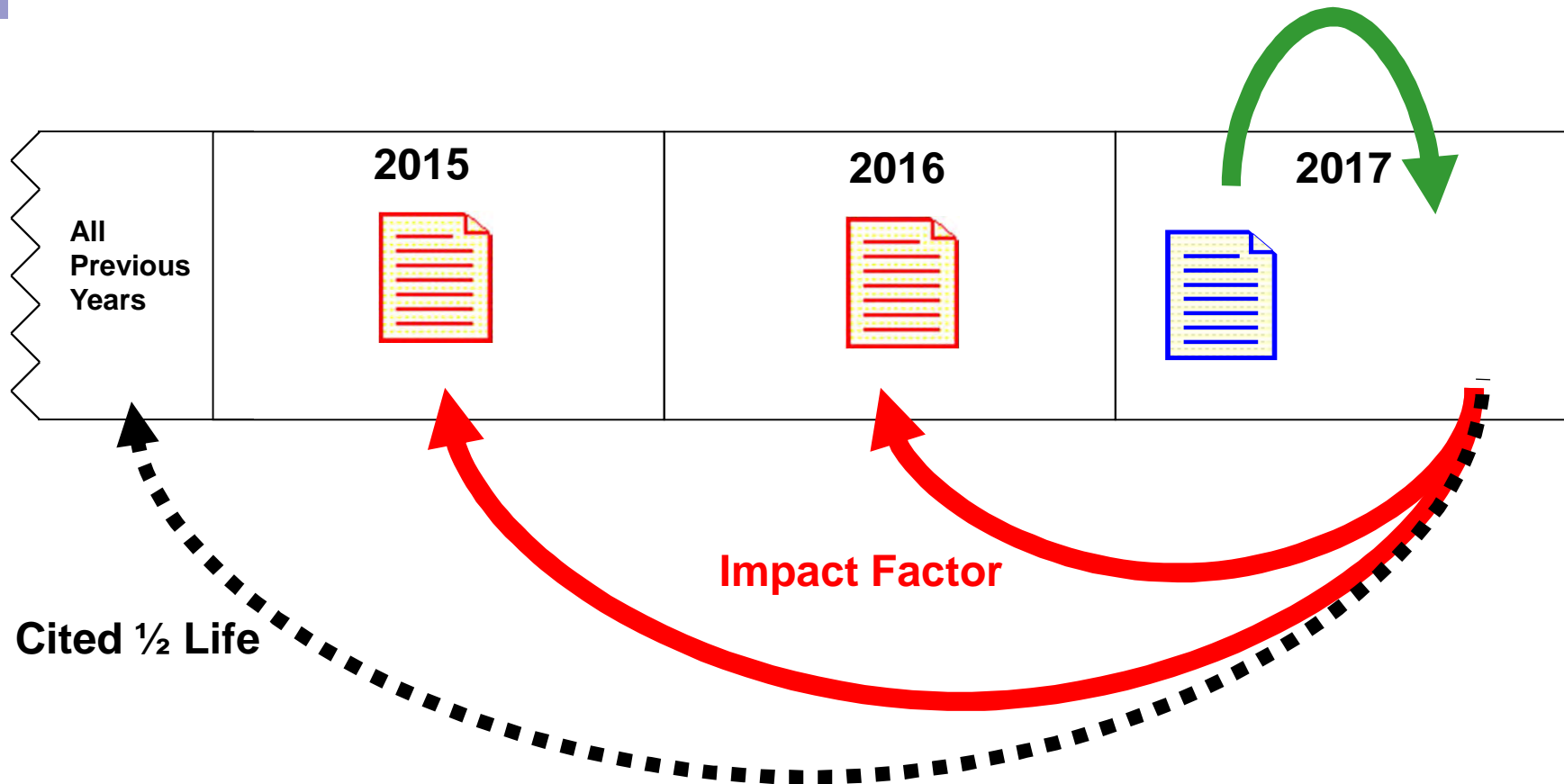
- If a journal is in **Web of Science**, it means it should have **Impact Factor** & vice versa.
- Don't confuse **Web of Sciences Journals** with **ISI Master list Journals** !
- Web of Science indexed about 11,000 Journals while ISI Master List 14,000 Journals.



What is **Journal Impact Factor**?

- It is primarily invented to screen those **high quality** journals into be included in **ISI Web of Science** database.
- The **average citation frequency for articles published in a journal**, or **how many times**, on average, during the study year the articles that appeared in the 2 preceding years of that journal received citations in other **(ISI)** indexed journals only.

Immediacy Index



Citation



Source paper – published in 2017

Cited reference – published in 2017

Cited reference – published in 2015 or 2016

Impact Factor **Formula** & **Calculations**

- Suppose there is a journal, published some papers in 2015 & 2016:

Item	2015	2016	Total
Total Papers Published	130	170	300
Citations Achieved in 2017	360	240	600

$$\text{Impact Factor} = \frac{\text{Citations}}{\text{Papers}} = \frac{600}{300} = 2 \quad \text{IF}$$



Impact Factor Calculation

- Citations in the current JCR year to articles published in the previous **two years** divided by **the number of articles** published in the previous two years.

Citations in 2017 to articles published in 2015 + 2016

IF=

Total 2015 + 2016 Papers

The Journal **Impact Factor**

- The **Journal Impact Factor** is calculated for those journals only which are indexed & included in **Web of Sciences** Databases, NOT more, So

ISI Indexing \longleftrightarrow Having IF

- Except



How to Find Impact Factors?

- The database which contain the Journal Impact Factors is **Journal Citation Report** abbreviated **JCR**.
- Its amiable at:
<https://jcr.incites.thomsonreuters.com>
- Directly from **Journal Citation Report** Database through ISI Web of Science.



The *h*-index

- شاخص جدیدی از شاخص‌های علم‌سنجی است. این شاخص در سال ۲۰۰۵ میلادی توسط **Jorge Hirsch** در دانشگاه کالیفرنیا ابداع شد. این شاخص در واقع با هدف ارزیابی کیفی اثر و ارزیابی کمی برون‌داد پژوهشی محققین ابداع شده است.

The *h*-index

■ مفهوم **H-Index** عبارت است از تعداد مقالات نویسنده که تعداد ارجاعات برابر با h و یا کمتر از آن دارند. مثلاً چنانچه **H-Index** محققى ۵ باشد، مفهوم آن این است که این محقق ۵ مقاله منتشر شده دارد که هر کدام حداقل ۵ استناد یا **Citation** دارند. به عبارت دیگر مفهوم آن این است که سایر مقالات این محقق کمتر از ۵ استناد دارند.

■ امروزه این شاخص معادل **Impact Factor** برای محققین محسوب می‌شود.



H-index was born !

- We need an Index both to include quantity & also quality of an authors' paper
 - ✓ Productivity
 - ✓ Impact
 - ✓ Not affected by “big hits”
 - ✓ Not affected by “noise”



The H-index: a definition

- ‘The H-index is the highest number of papers a scientist has that have at least that number of citations.’ *Nature* (2005)


H-index Concept through its Graph





How to calculate the h-index?

- You can calculate the h-index through the following citation databases:
 - Web of Science
 - Scopus
 - Google Scholar
 - (<http://scholar.google.com>)



h-index Calculation through Google Scholar

- To calculate h-index through Google Scholar, you should use the 3rd parties services.
- Some softwares has been developed for this matter, like: **Publish or Perish**



Publish or Perish Software

- You can download from:
<http://www.harzing.com/>
- It's a free software which can be downloaded directly at:
<http://www.harzing.com/pop.htm>



The highest h -index in the World & Iran

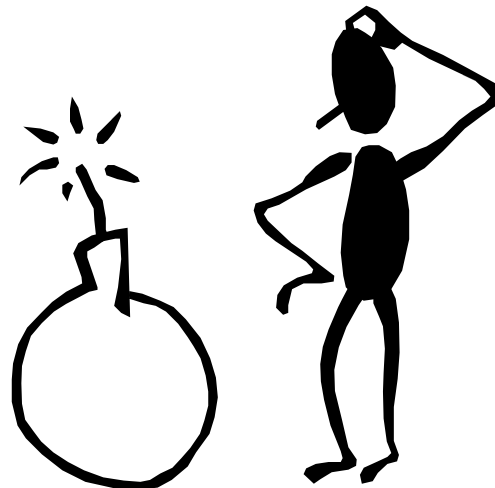
- بزرگترین شاخص h در دنیا مربوط به حوزه علوم زیستی برابر با ۱۹۷ و بزرگترین شاخص h محققان ایران جناب آقای دکتر شمسی پور استاد شیمی دانشگاه رازی کرمانشاه با عدد h برابر ۴۷ می باشد.*

*مربوط است به سال ۱۳۹۰

An Example

Entity	Subject Area	Citation/Paper
Researcher A	Clinical Medicine	3
Researcher B	Mathematics	1

Which one's **Performance** is Better?





A **New Metrics** is Required !

- We need a new Metrics to **fairly compare** the papers within their **similar publication group** in the universe.
- By similar publications, we mean:
 - Same Publication **Year**
 - Same Publication **Discipline**
 - Same Publication **Type**



New Metrics:

Field-Weighted Citation Impact

- Field-Weighted Citation Impact is a **Ratio** that takes into account the **differences in research behavior across disciplines**.
- Field-Weighted Citation Impact is the **ratio** of the **total citations** actually **received** by the denominator's output, and the **total citations that would be expected** based on the **average of the subject field, year & document type**.



New Metrics:

Field-Weighted Citation Impact

- Field-Weighted Citation Impact is the **Ratio** of the **total citations** actually **received** by the denominator's output, and the **total citations that would be expected** based on the **average of the subject field**.
- Field-Weighted Citation Impact takes into account the **differences in research behavior across disciplines**.



New Metrics:

Field-Weighted Citation Impact

- Field-Weighted Citation Impact in SciVal indicates how the number of citations received by an entity's publications compares with the average number of citations received by all other similar publications in the data universe: how do the citations received by this entity's publications compare with the world average?



What we mean by **Similar Publications?**

- By **similar** publications, we mean:
 - Same Publication **Year**
 - Same Publication **Discipline**
 - Same Publication **Type**
- So it would be **adjusted** for Papers **Disciplines, Age, & Type.**

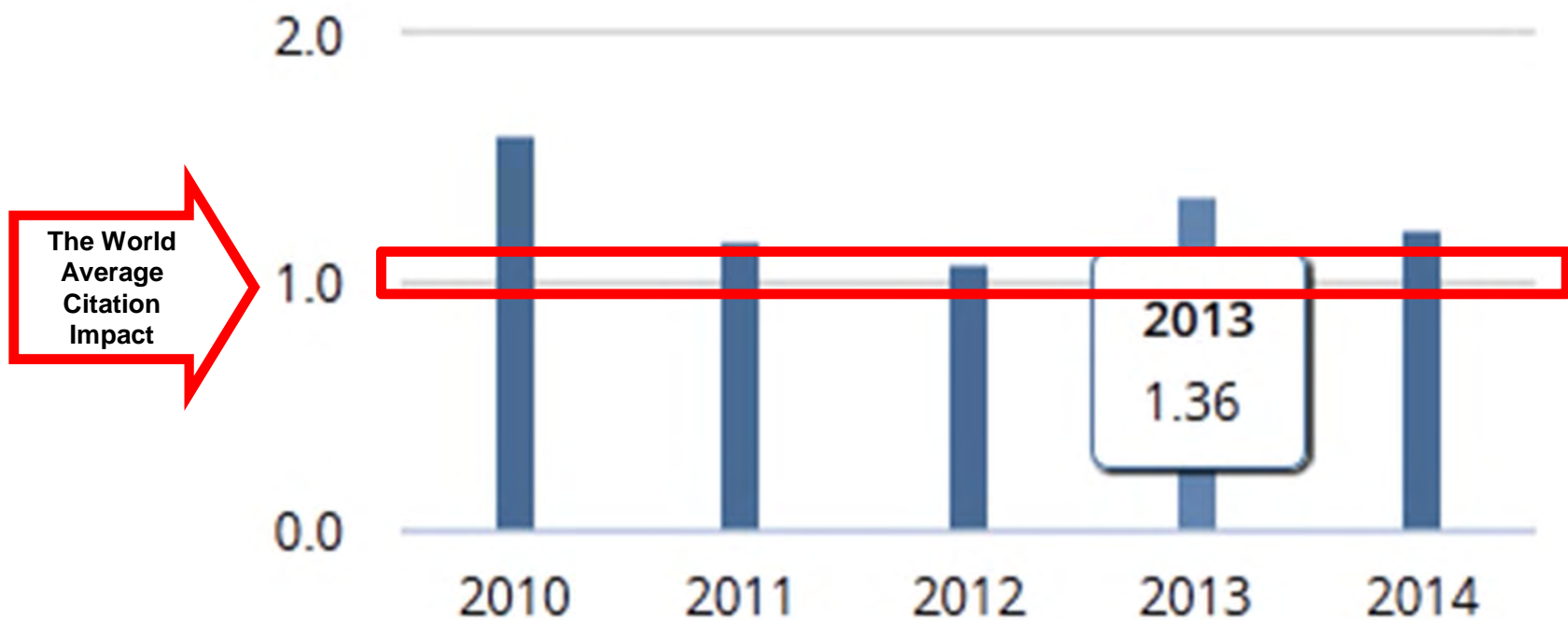


Field-Weighted Citation Impact

- $FWCI=1$ means that the output performs just as expected for the global average
- $FWCI>1$ means that the output is more cited than expected according to the global average; for example, 1.48 means 48% more cited than expected
- $FWCI<1$ means that the output is cited less than expected according to the global average.

Field-Weighted Citation Impact

Field-Weighted Citation Impact



the **Example** Again

Entity	Subject Area	Citation/Paper
Researcher A	Clinical Medicine	3
Researcher B	Mathematics	1

Which one **Performance** is Better?

Entity	Subject Area	Field-Weighted Citation Impact
Researcher A	Clinical Medicine	1.5
Researcher B	Mathematics	3

سامانه‌های پروفایل پژوهشگران

Authors Profiles System



Authors Profiles Services

- Through these services, you can set your **own academic CV's & profiles** & make them **visible in the web** for all.
 - 1) Scopus Authors ID
 - 2) ResearcherID
 - 3) ORCID (Open Researcher & Contributor ID)
 - 4) Google Citation Service

ResearcherID

<http://www.researcherid.com>

ResearcherID

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Thomson Reuters will be performing maintenance to Web of Knowledge, EndNote Web and ResearcherID this Sunday, December 18th, 2011 beginning at 2:00 PM GMT. We expect this maintenance to last approximately 12 hours. During this time, there may be disruption of service and product access, including Web of Knowledge Personalization. We apologize for any inconvenience this may cause.



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Search for Members

Last Name (example: Smith):

Search [\[more options \]](#)



Interactive Map

There are members from more than 150 countries / territories!

[View the Map](#)

Top Researcher Keywords

analytical chemistry
biodiversity
bioinformatics
biomaterials
biomechanics
cancer
catalysis
climate change
computational biology
computational chemistry
data mining
ecology
electrochemistry
epidemiology
evolution
genomics
graphene
machine learning
mass spectrometry
nanomaterials
nanoparticles
nanotechnology
organic chemistry

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With a unique identifier assigned to each author in ResearcherID, you can

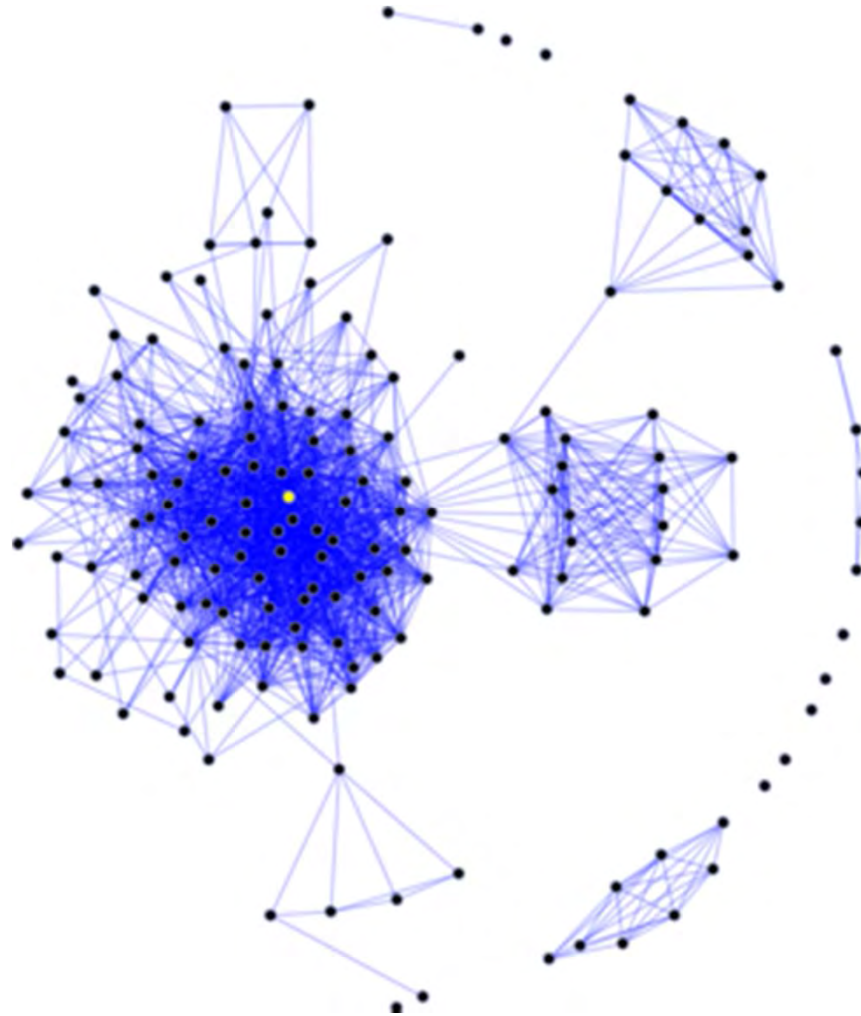


What is a **Social Network**?

- A social network is a social structure **made up of individuals** which are connected by one or more specific types of interdependency, such as friendship, common interest, relationships of beliefs, knowledge or prestige.



Social Network Analysis





Examples of Scientific Social Networks

- <http://www.researchgate.net/>
- <http://www.mendeley.com/>
- <http://www.linkedin.com>
- <http://www.academia.edu/>

Researchgate

www.researchgate.net

The screenshot displays the ResearchGate website interface. At the top left, the ResearchGate logo is visible. The main header includes a search bar, navigation icons (home, settings, notifications), and a user profile picture. The left sidebar contains the user's name, 'Payam Kabiri', affiliation 'Tehran University of Medical Sciences', and navigation options: 'Live Feed', 'Topics', 'Publications', and 'Resources' (Conferences, Workgroups, Jobs). The central 'Live Feed' section shows three activity items: 1) 'Majid Salehi is following Abdollah Ghasemi Pirbalouti and Mostafa Gholami.' with sub-profiles for Abdollah Ghasemi Pirbalouti (Islamic Azad University, Shahrekord Branch) and Mostafa Gholami (University of Tehran), dated '4 hours ago'. 2) 'Farhad Shokraneh changed his/her research keywords to Medical Journalism.' dated '4 days ago'. 3) 'Farhad Shokraneh is following mohammad reza Shirzadi, Barbara Shearer and 1 other.' with sub-profiles for mohammad reza Shirzadi (MOH) and Barbara Shearer (Florida State University College of Medicine, Medicine), dated '4 days ago'. The right sidebar features 'Profile Completion 90%' with a progress bar, 'Related Researchers' (Shima Tavakol, Hamidreza Hashemi) with 'Follow' buttons, 'Find or invite your colleagues' with a magnifying glass icon, and 'Suggested Topics' (Medicine, Human Embryonic and Primary Stem Cell Re) with 'Follow' buttons. The bottom status bar shows 'Waiting for http://blank... hgate.net/...', 'Internet | Protected Mode: Off', and '100%' zoom.

Academia

www.academia.edu

The screenshot shows the Academia.edu website interface. At the top left is the Academia.edu logo with the tagline "share research". A search bar contains the text "Search People, Research Interests and Universities". On the top right, there is a navigation menu with "Home", "Payam Kabiri", and "Acco".

The main content area features a status update section with the prompt "What are you thinking about right now?" and a text input field. Below the input field is an "Update Status" button.

Below the status update section, there are three research posts:

- Open Access: Imaging Policies for Medieval Manuscripts in Three University Libraries Compared** (follow) - Added with research interest **Open Access** and 3 others. by Kathryn Rudy (follow), School of Art History, University of St Andrews, Faculty Member. about 16 hours ago.
- Prefigurative Action Research: an alternative basis for critical psychology** (follow) - Quick view | Updated with research interest **Action Research** and 3 others. about 16 hours ago.
- Capacity to consent to participate in research a recontextualization** (follow) - Updated with research interest **Research Ethics** and 1 other. by Mark Burton (follow), Research Institute for Health and Social Change, Manchester Metropolitan University, Department Member. about 24 hours ago.

On the right side of the page, there is a "Your Stats" section with a line graph showing activity over time. The graph has two lines: a green line and a blue line. The green line starts at 13, drops to 7, and then rises to 7. The blue line remains flat at 0. The x-axis is labeled "5 Days Ago" and "Today".

Below the stats is a "Who to follow" section with two suggestions:

- azam majidi** (Follow)
- Faraz Kalantari** (Follow)

There are also links for "See more suggestions" and "Find or Invite your friends". At the bottom right, there is a section for "Find Your Facebook Friends".

اگر میل داشتید Email بزنید !

kabiri@research.ac.ir