



國立清華大學  
National Tsing Hua University

04 JULY 2012  
Hsin Chu  
Taiwan

College of Electrical Engineering & Computer Science

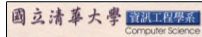
# Perspectives of Good Quality, High Impact, & World Class Research

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“Perspectives of Good Quality, High Impact & World Class Research”  
NTHU, Taiwan

College of Electrical Engineering & Computer Science

## Acknowledgements



**My Thanks to ..... for hosting my visit**

Professor Chung-Ta King – HoD, CS Dept, NTHU

Professor Jang Ping Sheu

Professor Mike Kao

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## Seminar Outline – 4 Parts

1. Introduction - Types of Research
2. Research Quality, Measure, & Impact
3. World-class Universities
4. Conclusion



## Part 1

The background of the slide is a photograph of a grinding wheel in operation, creating a shower of bright sparks. A large, semi-transparent yellow circle is overlaid on the center of the image.

About  
Research



什麼是研究？

What is Research ?

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Research is not about the paper-cranking Machine!

印刷機



論文

1

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什麼是研究？

What is Research ?

Unknowns & Solutions

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Research is like..

You picked a Tunnel ("problem").

You walk in this dark tunnel (investigate the problem)

You do not see light until you walk to the end of the tunnel!

Research involves exploring the "unknown" and "finding solutions".

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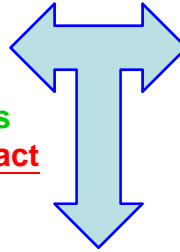
# 什麼是好的研究？

# About Research

What is Good Research?

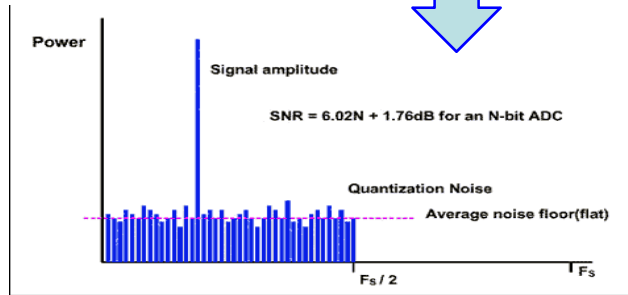
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1. When Research is **Focused**
2. When Research addresses and solves **important problems**
3. When Research creates **Impact**



Many times, we are confused what is "fundamental" work and what are "noises".

Some researchers are busy doing work that resemble "noises" rather than fundamental



重點，  
重要的，  
影響

1

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# 研究的本質

# Research Cycle

Essence

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## Research in Essence:

解決問題，提供解決方案

1. Research is about "solving problems" and "providing solutions".
2. Also, progress **beyond the current-state-of-the-art!** 領域進步
3. Research entails (i) *understanding and appreciation by others* and (ii) *recognizing the importance of the discovery and outcome.*



Ideas

1

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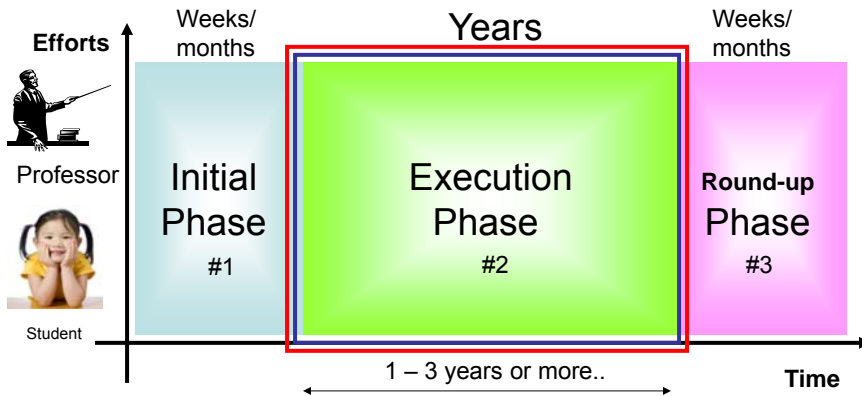


# 研究三階段

# Research Cycle

3 Phases - Initial, Execution, Final

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**Emphasis should be on the "execution" phase.**

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# Research Cycle 1

Initial Phase

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## Cycle 1: P<sub>ro</sub>posal P<sub>re</sub>paration:



Too much time and emphasis on proposal preparation is detrimental to on-going research.

A **good proposal** has **no guarantee** of **good research output** or outcome.

A **highly funded proposal** indicates **high cost** and **large scale** BUT does not necessarily imply research quality nor excellence.

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## Research Cycle 1

Initial Phase

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### Risk of Cycle 1: Initial Phase



No funded proposals → limited resources → **crippled research**

Too much funded proposals → overwhelmed → **quality affected**

Too much efforts in writing proposals → **little time left for research...**



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## 研究執行

## Research Cycle 2

Research Execution

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### Cycle 2: Research Execution:

The most important part of your research. Doing and investigating on unsolved or undefined problems enhances "**creativity**" and "**novelty**". There are many researchers out there, competition is fierce.



time

+



Talent  
Creativity  
Ideas

+



Professor

+



Students,  
Postdocs,  
etc

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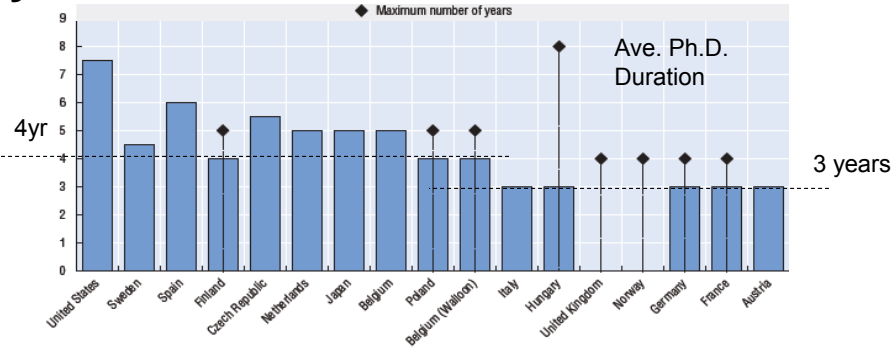


# 研究的執行時間

## Research Cycle 2 Research Execution

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### Cycle 2: Research Execution Period :



1. Defined as the average duration of full-time PhD study from the point of admission into a doctoral programme to completion of degree, excluding any period spent on prior university level studies. For the United States, data is the effective average duration based on surveys of actual graduates.



# 研究結果

## Research Cycle 3 Risk of outcome

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### Cycle 3: Research Outcome:

No ideas → no creativity → no solutions → no contributions

Poor research → no good results → little significance → no publications → no impact

Very hard problem → no solution → failure





## TYPE 1: "POSITIVE" RESEARCH

- Work on "new problems" 新問題
- Find new solutions 找到新的解答答案

現有的,懸而未決的問題

- Or work on existing unsolved problems
- Find solutions 找到解答的答案

- Move the field forward (i.e., beyond the current state-of-the-art)

- Create the "wave"
- Create the "impact"



## TYPE 2: "NEGATIVE" RESEARCH

- Prove existing or past work or solution is wrong!  
證明現有的或過去的解決方案是錯誤的
- Undo and Redo  
撤消和重做
- Re-learn from mistakes made by community
- Impact the community and impact the field !!







## 研究類型

## Types of Research Incremental

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### TYPE 3: "INCREMENTAL" RESEARCH

(稍微的研究)

- Improve on an existing solution

- say by 5-10%
- produce tons of papers,,,
- big deal or no big deal?
- ask yourself



- Don't sweat the small stuff !

(不出汗的小東西 X) (不要為了不值得的事情出汗)

- Take your time to find imp't topics to do.

- Leap, not drag!!



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## 研究類型

## Types of Research Myth or Hype

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### TYPE 4: "MYTH OR HYPE" RESEARCH

- **Hype** – just saying (frenzy publicity, over enthusiasm) 炒作?
- **Myth** – A belief that is widely thought as false 神話, 虛構的.

- High Risk

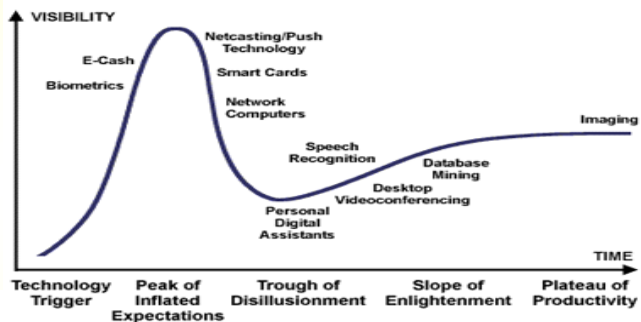
- High Gain

高收益

- No Gain

無收益

Hype Cycle of Emerging Technology



Source: Gartner Group

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Summarizing: **Choosing the right topic is KEY!!**

- 1. "Positive" Research → **Major Contributions** (new solution)
- 2. "Negative" Research → **Major Contributions** (rewrite history)  
..it takes a lot of guts and evidence to...  
...prove something is wrong...
- 3. "Incremental" Research → **Incremental Contributions** (avoid...)  
(5-10% improvement on existing solutions)
- 4. "Myth or Hype" Research → **Solving a problem way ahead of time**  
..when needs are not yet recognized...  
..when problem takes time to gain  
..can result in major contributions  
..or can result in no contributions



**Research  
Quality, Measure,  
Impact,  
Recognition**



什麼是研究質量?

# Research Quality

What is it?

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## How can we know we are doing "Quality" Research?

質量不是數量!

Quality is NOT Quantity!



### Quality Metrics

- 1. Novelty 新奇
- 2. Originality 獨創性
- 3. Technical Correctness 正確性
- 4. Significance 重要性
- 5. Timeliness 時效性
- 6. Impact 影響力

JUDGED by peers?



JUDGE based on impact?



質量與數量

# Research Quality

Quality vs. Quantity

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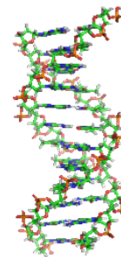
### Point # 1

I have published over 5000 papers in my lifetime!

### Point # 2

I published 1 and 1st paper on DNA that rocks the world!

## Now that is something!!..





# 如何衡量研究？

# Research Measures

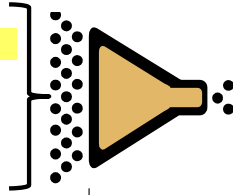
What are we measuring?

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What are we measuring?? **Input** ? **Output** ? Or **what**?

### Research Input

- proposals
- \$\$ (matching)
- researchers
- time



### Research Proposal Outcome

- \$\$
- resources

### Research Output

- Number of Citations
- Number of Publications
- Number of Patents (Inventions)
- Recognition (Awards,,)
- Attention (Follow-on work,,wave,,)
- **IMPACT**



**Q:**  
Which  
Carries  
More  
Weights?



# 如何衡量研究？

# Research Measures

Others judge your work!

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• **Let Your peers judge your work**  
(input/output)



– Proposals, papers, etc..



– Include “international peers”

- Researchers from industries
- Academic professors, postdocs, etc
- ... research...



Reviewers' Feedback

Follow up on your work by others

Research Award

No. of Citations

Recognized internationally

Recognition By peers

Best Paper Award



如何衡量研究？

## Research Measures

Example: USA Way

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### 1. Journal Paper Approach

- Formally reviewed and archived
- No. of papers = productivity, not quality!



USA  
MEASURE  
OF  
PROFESSORS

### 2. Rate of Publications = "Speed"....

- N/T (total papers to time)
- Productivity, not quality!

Source: Prof. Doug Comer, ex-VP Research, CISCO (USA)

2

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如何衡量研究？

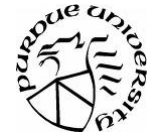
## Research Measures

Example: USA Way

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### 3. Direct Funding Approach

- Amount of \$\$ is not always = quality of research



USA  
MEASURE  
OF  
PROFESSORS

### 4. Profit Generated by Patents, etc

- Revenue is a terrible measure of research quality !

Source: Prof. Doug Comer, VP Research, CISCO (USA)

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如何衡量研究？

## Research Measures

Example: USA Way

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### 5. I/R

- Ratio of **Impact** vs. Amount of **Resources used**.

- ▶ Large funding BUT poor impact = looks bad
- ▶ Small funding BUT large impact = looks good

- Individual PI is concerned with “impact”
- University administrators (Dean, VPs, ) might prefer resources

Source: Prof. Doug Comer, VP Research, CISCO (USA)



2

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如何衡量研究？

## Research Measures

Example: USA Way

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Thomson ISI



### 6. No. of Citations on each paper / author / institution

- Metrics:**
- (a) Total no. of citations
  - (b) Paper with highest citations
  - (b) **H-index**
  - (c) **G-index** / etc .



USA MEASURE OF PROFESSORS



[www.harzing.com](http://www.harzing.com)



[www.google.com/scholar](http://www.google.com/scholar)

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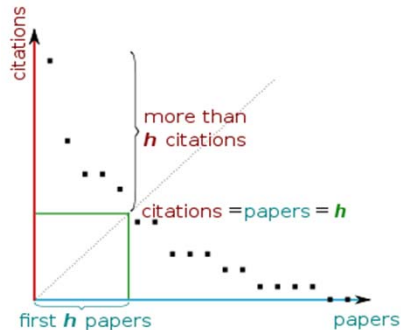
# 如何衡量研究？

## Research Measures

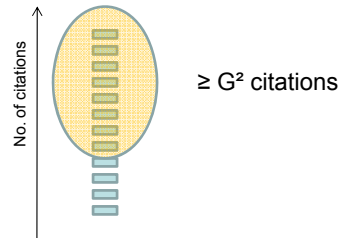
Example: USA Way  
H index versus G index

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A scientist has **index  $h$**  if  $h$  of [his/her]  $N_p$  papers have at least  $h$  citations each, and the other  $(N_p - h)$  papers have at most  $h$  citations each.



Given a set of articles ranked in decreasing order of the number of citations that they received, the  **$g$ -index** is the (unique) largest number such that the top  $g$  articles received (together) at least  $g^2$  citations. [Gives more weight to highly cited papers]



2

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# 如何衡量研究？

## Research Measures

Example: USA Way  
H index versus G index

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Harzing's Publish or Perish

File Edit View Tools Help

- Citation analysis
  - Author impact analysis
  - Journal impact analysis
  - General citation search
  - Multi-query center
  - Web Browser
- Program maintenance
  - Check for updates
- Help resources
  - Help contents
  - What's new?
  - 2-Minute introduction

Author impact | Journal impact | General citations | Multi-query center | Web Browse

Author impact analysis - Perform a citation analysis for one or more au

Author's name:

Exclude these names:

Year of publication between:  and:

NOTE: Subject area selection is currently non-functional

Results

Papers:	317	Cites/paper:	33.14	h-index:	33
Citations:	10506	Cites/author:	7037.13	g-index:	100
Years:	41	Papers/author:	138.60	hc-index:	23
Cites/year:	256.24	Authors/paper:	3.40	hI,norm:	25

2

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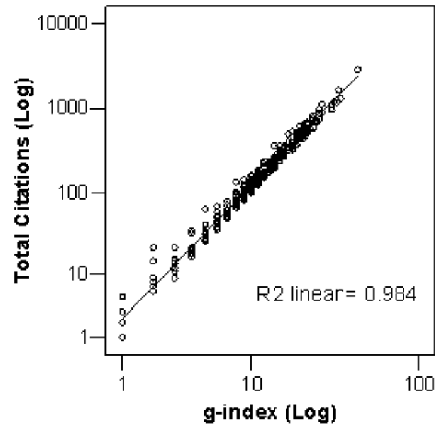
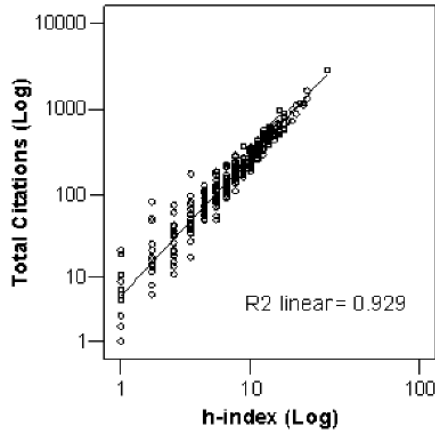


# 如何衡量研究？

# Research Measures H-Index vs. G-Index

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Both G-Index and H-Index correlate well with "total number of citations"



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# 如何衡量研究？

# Research Measures H-Index vs. G-Index

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G-Index is generally 1.5x higher than H; Top scientists have high G and H.

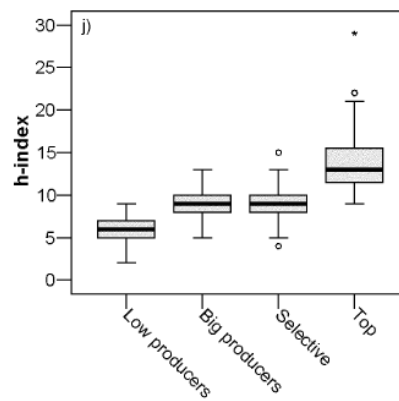
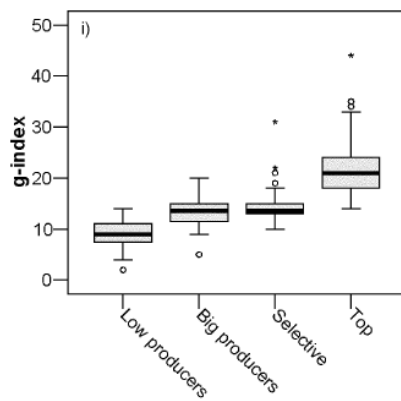


Figure 4g-j. Research performance by type of scientist

2

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### 7. Bad Things About Journal Impact Factor

USA  
MEASURE  
OF  
PROFESSORS

Education and debate

Why the impact factor of journals should not be used for evaluating research

Per O Seglen, professor\*

\* Institute for Studies in Research and Higher Education (NIFU)  
Hegdehaugsveien 31 N-0352 Oslo Norway

**Assumption:** ✗ Publication in a High Impact Journal will enhance the impact of an article. (?)

**Answer:** ✓ Journals do not offer any free ride. **Citation rates of articles determine the journal impact factor, not vice versa!!**

Journal impact factors are not statistically representative of individual journal articles!!

Journal impact factors correlate poorly with actual citations of individual articles



- Don't Get Stuck with "Brand"
  - A "Gucci" bag may be empty inside.
- Focus on
  - the significance of "your work", not specific "brand" of conference or journal.... U need to "publicize" your work, attract attention (if indeed your work is good)

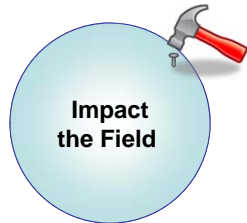




What do we mean by “Research Impact” ?  
How can we quantify “Research Impact” ?



## • 3 Prime Elements of IMPACT (my view)



- New knowledge Creation
- Advances current State-of-the-art
- Open new field
- Breakthrough



- Society;
- Research community;
- Industries;
- Follow-on work;
- Create a “wave”



- Wealth creation
- Jobs creation
- Benefit the country

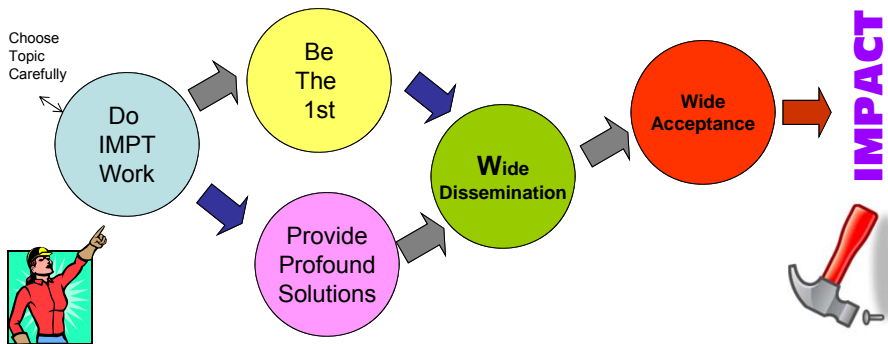


如何實現高的研究影響力和貢獻?

# Research Impact

How to create high impact?

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Do it well,,,,,

It takes **TIME** to see the impact (especially for new fields)

It takes **LESS TIME** to see the impact if it immediately solves an existing issue..

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瑞士教授的研究評價

# Research Evaluation

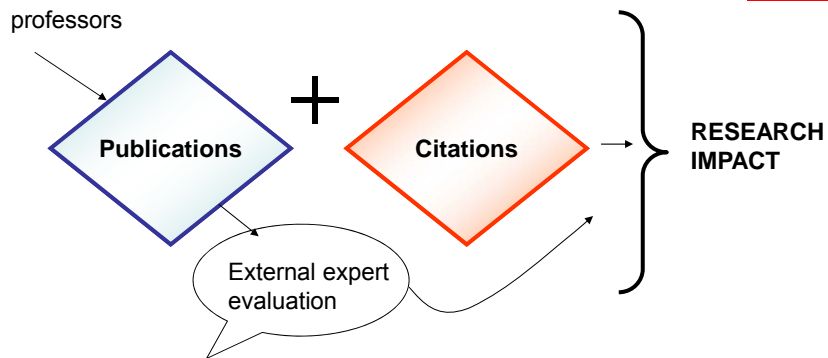
Example: The Swiss Way

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## Swiss Measure of Professors.....



Example from ETHZ (Switzerland) .....



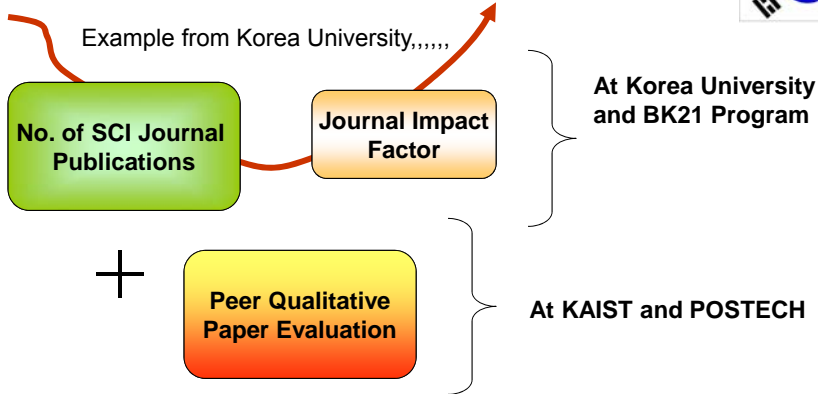
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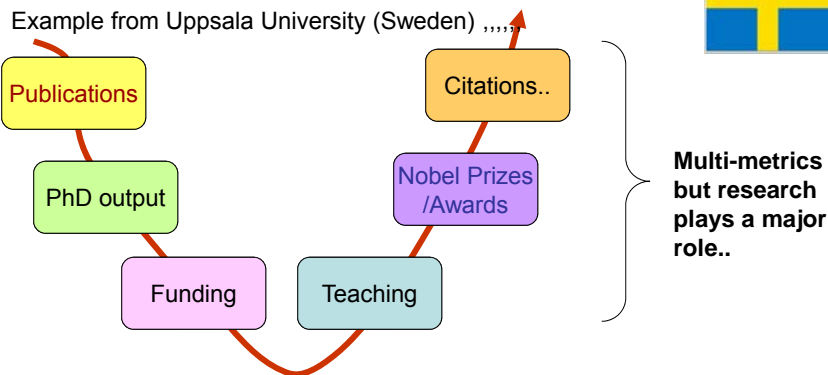
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### Korean Measure of Professors....



### Swedish Measure of Professors....





財團法人高等教育評鑑中心基金會  
Higher Education Evaluation & Accreditation Council of Taiwan

Table 1: The Criteria, Indicators, and Their Respective Weightings Used for the Overall Performance Based Ranking

Criteria	2009 Overall Performance Indicators	Weighting	
Research productivity	Number of articles of the last 11 years (1998-2008)	10	20
	Number of articles of the current year (2008)	10	
Research impact	Number of citations of the last 11 years (1998-2008)	10	30
	Number of citations of the last 2 years (2007-2008)	10	
	Average number of citations of the last 11 years (1998-2008)	10	
Research excellence	H-index of the last 2 years (2007-2008)	20	50
	Number of Highly Cited Papers (1998-2008)	15	
	Number of articles of the current year in high-impact journals (2008)	15	



Specifically, there isn't a Nobel Prize for Computer Science!

So what other international recognitions?

Computing:

Engineering:

Fellowships are also given for leadership and education too



IEEE – IEEE Fellow

ACM – ACM Fellow

AAAS Fellow

IEEE Medals

ACM Turing Award

Kyoto Prize

Shaw Prize

Marconi Prize/Fellow

Queen Elizabeth Prize in Engineering



Leads to....



# IEEE獎牌

## Medals

# Research Recognition

Peak in Engg. & Science Research

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IEEE Bell



IEEE Edison



IEEE Noyce



IEEE Neumann



IEEE Hamming



IEEE Medal of Honor

2

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# 院士

# Research Recognition

Peak in Engg. & Science Research

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## Excellence in Research results In election to National Academy

- UK Royal Academy of Engineering (FREng)
- UK Royal Society of London (FRS)
- US National Academy of Engineering (NAE)
- US Presidential National Medal of Technology
- US Presidential National Medal of Science
- Chinese Academy of Sciences / Engineering
- Taiwan Academica Sinica
- Holders of *Distinguished Chair Professorships*



中國工程院



2

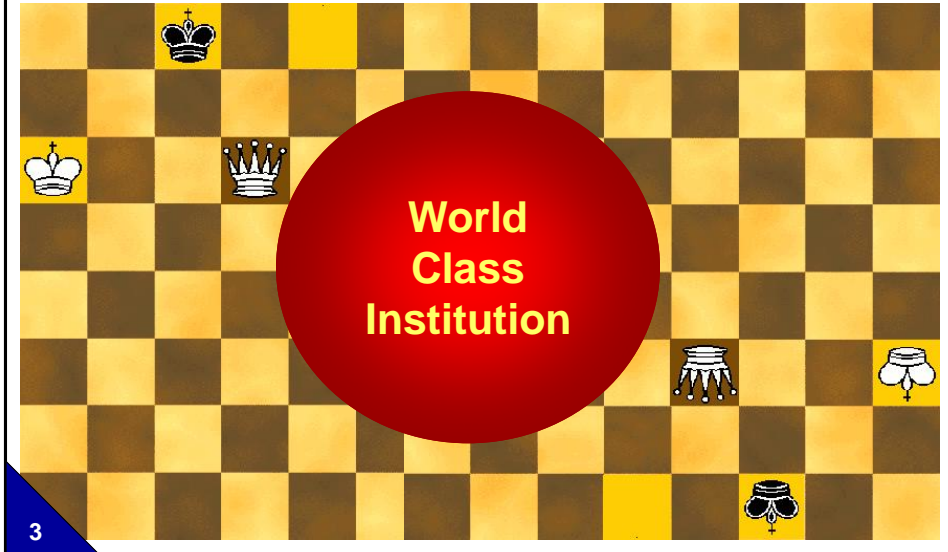
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# Part 3 世界一流的大學

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3



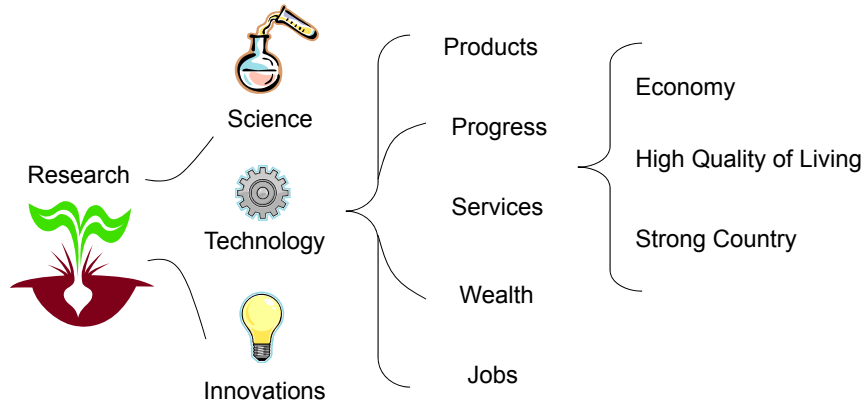
## 為什麼要世界一流的研究？

# World Class

Why the need for World Class?

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## Why World Class? Research can strengthen a country!



3

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很多國家要世界一流的研究!

# World Class

Many countries want world class

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## Many Countries want to be world class in research ,,,,,,

### Global R&D Spending

Billions of U.S. Dollars

	2007 GDP PPP* Billions, U.S.\$	2007 R&D as % of GDP	2007 GERD PPP* Billions, U.S.\$	2008 GERD PPP* Billions, U.S.\$	2009 GERD PPP* Billions, U.S.\$
Americas	18,826	2.19	413.8	429.4	437.1
U.S.	13,844	2.62	362.7	376.9	383.5
Asia	17,267	1.94	334.4	362.6	386.9
Japan	4,290	3.33	142.9	143.9	144.6
China	6,991	1.43	100.0	122.7	142.5
India	2,989	0.69	20.6	22.6	24.1
Europe	15,851	1.73	274.2	278.7	280.2
Rest of World	2,741	1.28	35.2	37.3	39.0
<b>Total</b>	<b>54,685</b>	<b>1.93</b>	<b>1057.6</b>	<b>1108.0</b>	<b>1143.2</b>

3

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個國研發開銷

# World Class

Many countries want world class

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## List of Countries by R&D Spending (2011)

Rank ↕	Country ↕	Expenditures on R&D (billions of US\$, PPP) ↕	% of GDP PPP ↕	Year ↕	Source ↕
1	United States	405.3	2.7%	2011	[2]
2	China	153.7	1.4%	2011	[2]
3	Japan	144.1	3.3%	2011	[2]
4	Germany	69.5	2.3%	2011	[2]
5	South Korea	44.8	3.0%	2011	[2]
6	France	42.2	1.9%	2011	[2]
7	United Kingdom	38.4	1.7%	2011	[2]
8	India	36.1	0.9%	2011	[2]
9	Canada	24.3	1.8%	2011	[2]
10	Russia	23.1	1.0%	2011	[2]
11	Brazil	19.4	0.9%	2011	[2]
12	Italy	19.0	1.1%	2011	[2]
13	Taiwan	19.0	2.3%	2011	[2]
14	Spain	17.2	1.3%	2011	[2]
15	Australia	15.9	1.7%	2011	[2]

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### • Scientific R&D Manpower

(source: University World News 2008)

- USA: 4526 for every million = 1,394,008
  - (308 million population in USA)
- Germany: 3222 for every million
- Finland: 7431 for every million
- Sweden: 5171 for every million
- Japan: 5085 for every million
- China: 633 for every million = 841,890
  - (1.33billion population in China)



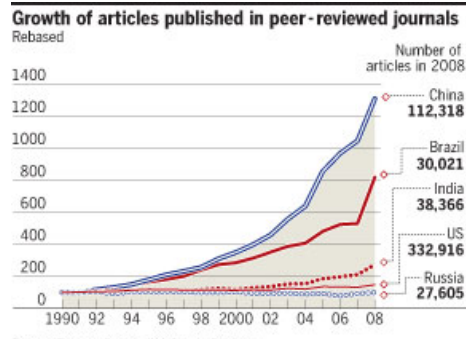
### Publish or Perish?

Financial Times (25Jan2010)

China is now 2<sup>nd</sup> in publications output (SCIE).

- “China scientists lead world in research growth” - by Clive Cookson

Jonathan Adams, research evaluation director at Thomson Reuters, said China's "awe-inspiring" growth had put it **in second place** to the US – and if it continues on its trajectory **it will be the largest producer of scientific knowledge by 2020!!**





# 世界大學排名

# World Class

Where TAIWAN stands among others?

College of Electrical Engineering & Computer Science

<http://www.timeshighereducation.co.uk>



## 2011 World Universities Ranking Top 10 (all fields)

- |              |     |
|--------------|-----|
| 1. Cambridge | UK  |
| 2. Harvard   | UK  |
| 3. MIT       | USA |
| 4. Yale      | UK  |
| 5. Oxford    | UK  |
| 6. Imperial  | UK  |
| 7. Chicago   | USA |
| 8. Princeton | USA |
| 9. MIT       | USA |
| 10. Caltech  | USA |

## 2005 World Universities Ranking Top 10 ( all fields )

- |                 |     |
|-----------------|-----|
| 1. Harvard      | USA |
| 2. Cambridge    | UK  |
| 3. Oxford       | UK  |
| 4. MIT          | USA |
| 5. YALE         | USA |
| 6. Stanford     | USA |
| 7. Caltech      | USA |
| 8. U C Berkeley | USA |
| 9. Imperial     | UK  |
| 10. Princeton   | USA |

PS: There are other rankings, such as Shanghai JiaoTong Universities' Rankings, etc.  
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# 判斷世界大學排名的指標

# World Class

Universities Rankings

College of Electrical Engineering & Computer Science



## Methodology ( Metrics used to judge ranking of Universities)

Six indicators are drawn together to form an international ranking of universities:

40% ACADEMIC REPUTATION FROM GLOBAL SURVEY

10% EMPLOYER REPUTATION FROM GLOBAL SURVEY

20% CITATIONS PER FACULTY FROM SCIVERSE SCOPUS

20% FACULTY STUDENT RATIO

5% PROPORTION OF INTERNATIONAL STUDENTS

5% PROPORTION OF INTERNATIONAL FACULTY



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### 2011 Taiwanese Universities World Ranking

National Taiwan University	World Rank = 87
National Tsing Hua University	World Rank = 213
National Cheng Kung University	World Rank = 285
National Yang Ming University	World Rank = 302
National Chiao Tung University	World Rank = 306
Taipei Medical University	World Rank = 373

NTHU next goal – Beat NTU, get into World Top 100



### QS TOP UNIVERSITIES

#### Asian Universities Ranking – Top 10

Rank	2009	2010	2011	2012
1	HKU	HKU	HKUST	HKUST
2	CUHK	HKUST	HKU	NUS
3	Tokyo U	CUHK	NUS	HKU
4	HKUST	Tokyo U	Tokyo U	SNU
5	Kyoto U	SNU	CUHK	CUHK
6	Osaka U	Osaka U	SNU	Peking U
7	KAIST	Kyoto U	Kyoto U	KAIST
8	SNU	Tohoku U	Osaka U	Tokyo U
9	TIT	Nagoya U	Tohoku U	POSTECH
10	NUS	TIT	TIT	Kyoto



# 台灣個所大學在亞洲的排名

# World Class

Where TAIWAN stands among others?

College of Electrical Engineering & Computer Science

## Asian Universities Ranking (2009)

22. University of Tokyo	JP
24. University of Hong Kong	JP
25. Kyoto University	JP
30. University of Singapore	SG
35. Hong Kong UST	HK
46. Chinese U of Hong Kong	HK
44. Osaka University	JP
47. Seoul National University	KR
49. Tsing Hua University	CH
52. Peking University	CH
55. Tokyo Inst. Of Technology	JP
69. KAIST	KR
73. Nanyang University	SG
95. National Taiwan University	TW

## Asian Universities Ranking (2012)

20. National Taiwan University	TW
31. National Tsing Hua University	TW
37. National Cheng Kung University	TW
39. Kobe University	JP
42. Waseda University	JP
49. National Chiao Tung University	TW
50. National Yang Ming University	TW
53. National Central University	TW
54. National Taiwan U of S & T	TW
60. National Sun Yat-sen University	TW
64. Taipei Medical University	TW
87. National Taiwan Normal U	TW
73. Nanyang University	SG
95. National Taiwan University	TW

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# 台灣個所大學在國內的排名

# World Class

Taiwan University Ranking

College of Electrical Engineering & Computer Science

Universities	Towns
1. National Taiwan University	Taipei
2. National Cheng Kung University	Tainan
3. National Chiao Tung University	Hsinchu City
4. National Sun Yat-Sen University	Kaohsiung
5. National Taiwan Normal University	Taipei
6. National Tsing Hua University	Hsinchu City
7. National Yang-Ming University	Taipei
8. National Chengchi University	Taipei
9. Tamkang University	Tamsui Township
10. National Central University	Jhongli City

## 2010 Taiwan Ranking

3

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Your gateway to World Universities and Colleges

Asia > Universities in Taiwan  
List of top Colleges and Universities in Taiwan by university web ranking. [Link to it](#)



2012  
Taiwan  
Ranking

UNIVERSITIES IN TAIWAN  
by 2012 University Web Ranking

Rank	Universities	Locations
1	National Taiwan University	Taipei
2	National Chiao Tung University	Hsinchu City
3	National Cheng Kung University	Tainan
4	National Tsing Hua University	Hsinchu City
5	National Central University	Jhongli City
6	National Chengchi University	Taipei
7	National Taiwan Normal University	Taipei
8	National Sun Yat-Sen University	Kaohsiung
9	National Taiwan University of Science and Technology	Taipei
10	Southern Taiwan University of Technology	Yungkang



2009



財團法人高等教育評鑑中心基金會  
Higher Education Evaluation & Accreditation Council of Taiwan

World Rank ▲	University	Country Rank	11 years articles	Current articles	11 years citations	Current citations	Ave. citations	H-Index	HiCi papers	Hi-Impact journal articles	Total score	Ref World Rank (FTE)
102	National Taiwan University	1	28.57	34.41	7.37	10.77	15.85	37.33	4.10	14.97	20.02	67
307	National Cheng Kung University	2	16.34	21.37	3.43	5.14	12.88	20.00	1.83	9.09	11.55	145
347	National Tsing Hua University	3	10.97	11.97	2.76	4.33	15.45	22.67	1.48	6.38	10.26	215
456	National Chiao Tung University	4	10.95	12.35	1.73	2.91	9.71	17.33	1.04	5.80	8.26	290
479	Chang Gung University	5	5.27	9.50	1.18	2.89	13.76	21.33	0.53	2.88	8.04	380
483	National Central University	6	6.79	8.34	1.45	2.59	13.15	21.33	0.85	2.56	8.01	378
493	National Yang Ming University	7	7.22	8.93	2.33	2.47	19.86	16.00	0.49	3.07	7.82	365



### Methodology

[edit]

The HEEACT rankings use the following criteria:

- Research productivity (weighed 20%) - The number of published articles of the last 11 years (10%) and the number of articles of the current year (10%).
- Research impact (weighed 30%) - Number of citations of the last 11 years (10%), the number of citations of the last two years (10%), and the average number of citations of the last 11 years (10%).
- Research excellence (weighed 40%) - The h-index of the last two years (20%), the number of highly-cited papers (15%), and the number of articles of the current year in high-impact journals (15%).

Quantitative data is drawn from Science Citation Index (SCI) and Social Sciences Citation Index (SSCI). The data is normalized by faculty number to account for different institution sizes. The indicators used in this methodology highly emphasize research quality (80% of the performance score) and short-term research performance (55% of the score).

Due to disagreement about ranking results, the Taiwanese education authority has announced that the government will not continue support the Higher Education Evaluation and Accreditation Council of Taiwan to do this ranking in 2012. Taiwan refuse to continue supporting the HEEACT ranking



校名	論文數	世界排名	亞洲排名
國立臺灣大學	21,438	54 (+6)	9 (+0)
國立成功大學	18,333	170 (+4)	35 (-1)
國立交通大學	11,871	301 (+2)	62 (-4)
國立清華大學	11,528	308 (+0)	63 (-3)
國立陽明大學	8,144	430 (+20)	88 (+1)
國立中央大學	7,488	477 (+3)	98 (-2)
國立中興大學	7,057	498 (+19)	104 (+1)
長庚大學	7,002	501 (+47)	106 (+12)
國立中山大學	6,688	519 (+3)	114 (-6)
高雄醫學大學	5,000	660 (+32)	163 (+3)
國立臺灣科技大學	4,704	688 (+12)	174 (-4)
中國醫藥大學	4,320	744 (+80)	192 (+19)
臺北醫學大學	3,977	780 (+59)	203 (+13)
國立中正大學	3,665	836 (-3)	224 (-9)
國立臺灣海洋大學	2,990	986 (+13)	280 (-9)
淡江大學	2,893	1,015 (-3)	290 (-10)
中山醫學大學	2,828	1,033 (+64)	297 (+9)
中原大學	2,827	1,036 (+22)	299 (-6)
國立臺灣師範大學	2,649	1,080 (+39)	313 (-1)
逢甲大學	2,592	1,097 (+40)	319 (+2)
國防醫學院	2,331	1,196 (-14)	354 (-19)

校名	被引次數	世界排名	亞洲排名
國立臺灣大學	275,506	165 (+14)	20 (+4)
國立成功大學	130,498	362 (+19)	49 (+0)
國立清華大學	90,920	470 (+18)	68 (-4)
國立陽明大學	79,172	520 (+2)	73 (-3)
國立交通大學	67,349	594 (+30)	90 (+5)
國立中央大學	54,469	699 (+20)	123 (+2)
長庚大學	50,336	742 (+46)	134 (+10)
國立中興大學	46,208	794 (+54)	151 (+13)
國立中山大學	40,994	859 (+24)	169 (+1)
高雄醫學大學	38,442	894 (+69)	181 (+11)
臺北醫學大學	32,449	1,006 (+90)	207 (+16)
中國醫藥大學	30,354	1,065 (+120)	223 (+25)
國防醫學院	24,954	1,213 (-59)	265 (-30)
國立臺灣科技大學	22,223	1,291 (+56)	285 (+4)
國立中正大學	21,266	1,345 (+41)	302 (-2)
中山醫學大學	21,238	1,347 (+100)	303 (+12)
國立臺灣師範大學	17,604	1,547 (+82)	350 (+5)
中原大學	17,040	1,575 (+63)	355 (+5)
國立臺灣海洋大學	16,299	1,618 (+37)	365 (-1)
淡江大學	13,541	1,804 (+45)	411 (-3)
逢甲大學	12,278	1,916 (+113)	441 (+13)



## Quote from a Member of US National Academy of Sciences (NAS)

Professor X-H Cho, Professor of Radiological Science, U C Irvine (USA)

“ A fundamental problem is the lack of understanding of just what is meant by a world-class research institution. As epitomized by Nobel science prizes, it is the “originality” and “major impact and contributions” that define truly world-class science!! World-class buildings, offices, and lab spaces do not make world-class institutions.. ”



## What Constitutes a World Class University?

### 3 Major Characteristics :

1. Research Excellence
  - Significant research achievements/impact
2. Top Faculty
  - Each faculty is a “star” in his field
3. World-Wide Reputation
  - University \*must\* be world famous in something..





# 什麼是世界一流大學?

# World Class

What it Entails?

College of Electrical Engineering & Computer Science

## What it Entails?

### 1. Personal Development

- Promote excellence in research
- Develop "Star professor" Culture
- Intensify research quality and output
- Learn from others! (don't hate or envy)

### 2. Change – "Yes we can!" - Obama"

- Change in emphasis and in recognition
- Shift from "power struggle" to "research excellence"
- Get the "right people" to do the "right things"...
- Empower star researchers to lead by example...

Many Universities in Asia are undergoing changes to achieve World-class Research



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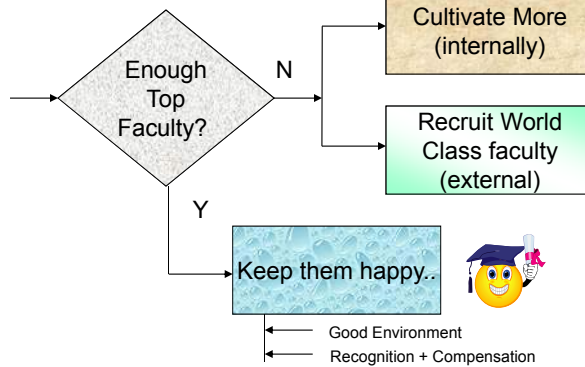
# 世界一流的教授

# World Class

Top Faculty A Must Have

College of Electrical Engineering & Computer Science

## 3. World Class Faculty..



Grade "As" hire grade "As"!

Grade Bs hire grade Cs...!!

3

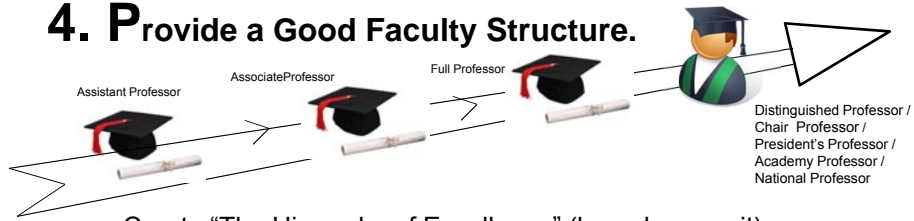
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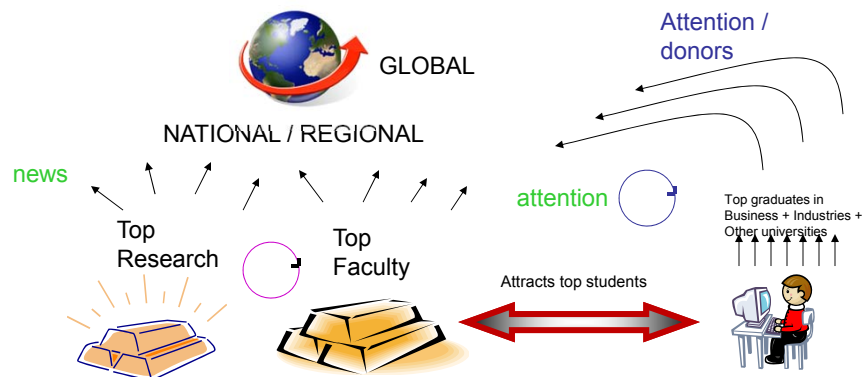
### 4. Provide a Good Faculty Structure.



- Create “The Hierarchy of Excellence” (based on merit)
- **Assistant professors** work on building up their prestige, contributions, and research excellence
- **Associate professors** proceed to perform greater significance in their research with more teaming up
- **Full/Distinguished/Chair/President professors** lead their fields and provide research insights, teaming and excellence; provide mentoring
- Build “**Respect & Recognition**” within schools/colleges/faculty
- Allow “**dual track**” and mutual consultations:
  - Administrators & Star Research Professors

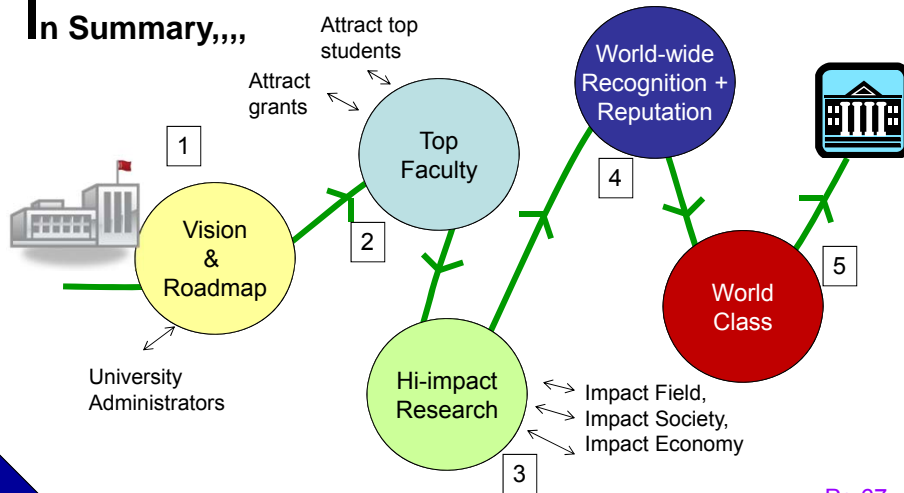


### Build World-wide Reputation...





## In Summary,,,,



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## Essentially,,,,

1. Roadway to "world class university" cannot be done overnight!!
2. Requires "total effort"
3. What it entails:
  1. Personal Development
  2. Change
  3. Recruit/Compete/Cultivate for Top Faculty
  4. Good Faculty Structure
  5. Build World-Wide Reputation
  6. Do "High Impact Work"
4. Then,
 

you are on your way to building a World Class University !

~ End ~ thank you!



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