

# Accreditation of University Undergraduate Programs – A Global Perspective



# Accreditation

- **Head of an Engineering Department for 14 years**
- **Dean of a large Engineering Faculty for 6 years**
- **On the receiving end of Accreditation visits from the IChemE and Engineers Australia**
- **On the receiving end of Quality Assurance visits from various Government authorities**
  - **Justifying the worth of my Engineering Department to the Dean, Deputy Vice Chancellor and University Business Manager**

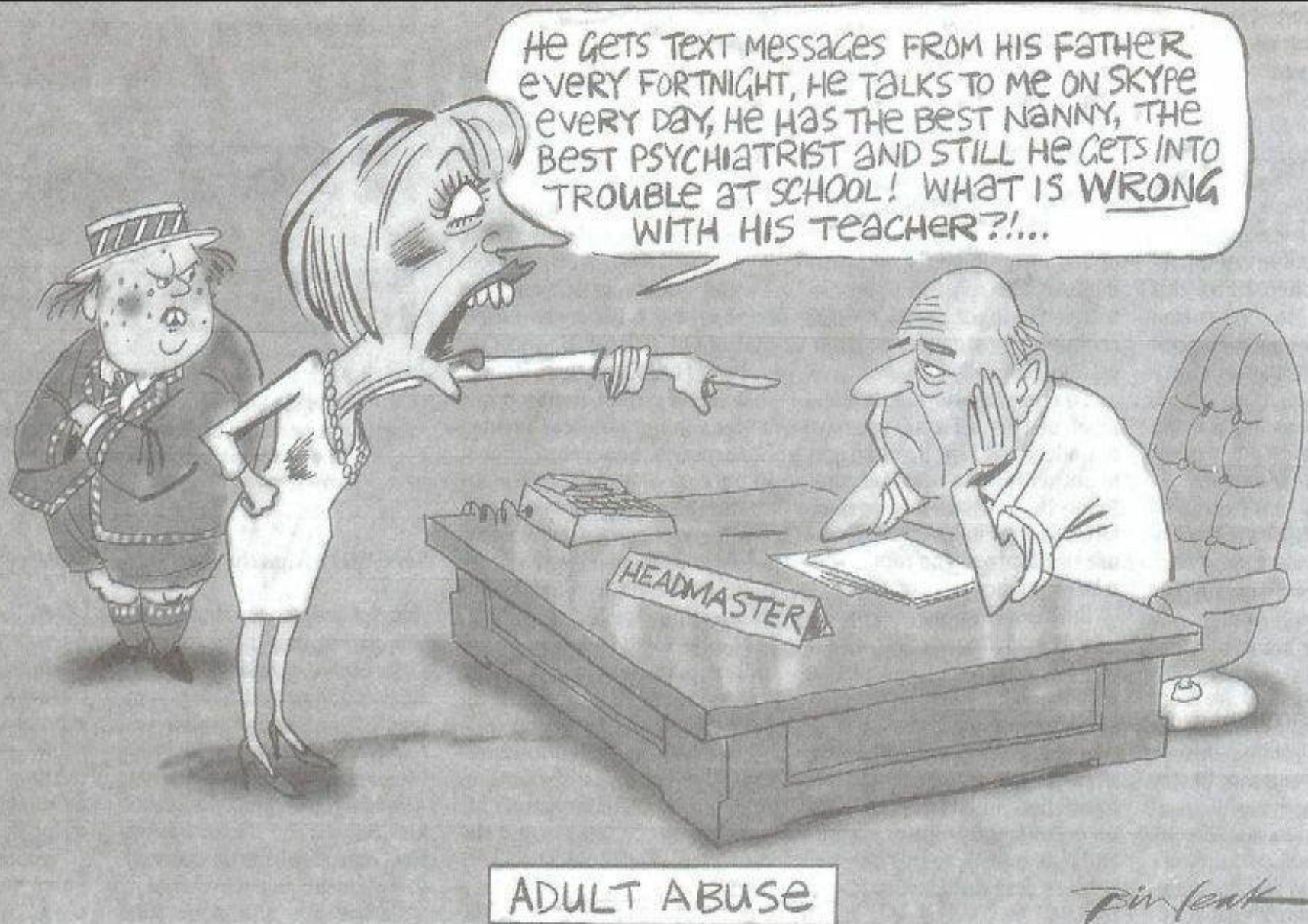
# Accreditation

- **Ultimately justifying the worth of the Engineering Faculty to the Vice Chancellor and his Business managers.**
- **It appeared that together with my senior academic staff much of my time was spent on what many thought were useless evaluations.**

# Accreditation

- In addition to the many evaluations, the need to make sure that all of the Faculty staff were regularly evaluated on teaching performance was important because remuneration depended in part on this.
- These evaluations sometimes turned into making sure that the staff could control a bunch of unwieldy Engineering 101 students!!
  - Hence I couldn't resist sharing a recent newspaper cartoon with you!

## Bill Leak cartoon (Australian 16-6-12)



# Accreditation

- **There were other evaluations which I shall not bore you with and I am sure that many of you will have suffered some of these.**
  - **I regarded Independent Professional Accreditation of our engineering programs as the most important of the evaluations.**
  - **Independent - from the University management and beauracracy**
- **Professional - they were conducted by an external professional engineering organisation.**

## **A wonderful myth!**

- I am currently the President of the Royal Australian Chemical Institute (RACI)**
- One of several changes that I have sought to bring to this organisation is to modernise the accreditation system.**
- The RACI is the responsible body for accrediting chemistry programs in Australia and the current system has been in place for a very long time!!**



## **A wonderful myth!**

- **It still requires chemistry programs to include a huge number of hours working in laboratories.**
- **The modern industrial chemistry laboratory is very different from those of the 1960s and with modern instruments the lab scene is very different.**
- **I advised my colleagues that the approach in engineering is very different and this was met with the statement:**





## **A wonderful myth!**

- ***“Are but the engineers cannot be employed unless they graduate from an accredited program”***
- **Quite untrue of course!**

# Accreditation

- **Through much of my career I was involved at the sharp end of accreditation in Australia, the UK, Hong Kong, Malaysia, Singapore, New Zealand.**
  - **This was primarily for the IChemE but occasionally for EA.**
- **To me, accreditation of engineering programs has always been a very important part of university engineering education.**

# Accreditation

- **The Independence and professionalism of accreditation demonstrates to the general community, the media, the politicians and the international community of professional engineering organisations, that the University of Melbourne Engineering programs are of a truly international standard.**

# International Accreditation

- On the international scene in 1989 a number of national professional engineering institutes signed an accord known as the Washington Accord.
- This accord which has grown in signatories essentially agrees to provide international recognition of locally accredited degree programs.
  - ABET, the USA Accreditation Board for Engineering & Technology, was a driving force in establishing this accord.

# International Accreditation

- In 2006 the European Network for accreditation of Engineering Education (ENAE) was established and this oversees the EUR-ACE accreditation program for 1<sup>st</sup> and 2<sup>nd</sup> cycle degrees (Bologna style)
- The Washington Accord network has grown significantly as has the EUR-ACE coverage.
- Indeed Melbourne Uni. is now accredited by the IChemE, EA (Washington Accord) and by EUR-ACE which is perhaps 'Overkill' !

# International Accreditation

- The establishment of the EUR-ACE scheme was timely given the development of the Bologna accord in Europe.
- It specifically assesses 3+2 engineering programs and brings European Engineering programs into the accreditation process.
  - It is also particularly useful for the Melbourne Model which is a 3+2 program.
- Neither EA nor the IChemE are equipped to provide accreditation for the “3” component of the Melbourne Model.

# Accreditation

- **During my latter years as Dean and since I left the University's full time employment I have visited a number of countries, mainly in Asia, on a professional basis, including helping to develop accreditation programs.**
- **Now I have time to reflect on important issues that affect the general community and of course the engineering profession.**



# What's the value of accreditation?

**To quote from the IChemE:**

**“Fundamentally, IChemE accreditation provides benchmarking of academic programmes against high, internationally recognised standards. This is of increasing importance as the globalisation of engineering products and services demands greater confidence by employers in the skills and professionalism of the engineers they recruit.”**

# Accreditation

- **Most Engineering faculties & departments are focussed on 'National' accreditation programs.**
- **Employers of our graduates want an assurance that the graduates have received a fully accredited education in the profession**
- **The community wants some assurance that the manufacturing and other industries are using engineering graduates of the highest standard**
- **I am unsure if the community really thinks about this but I do!**

# Accreditation

- **Manufacturing and many other engineering industries have moved into international corporations, particularly to China and other parts of Asia**
- **This includes chemical manufacturing and oil refining etc.**
  - **Obviously it also includes food**



WALL STREET JOURNAL.

## China's serial bidder swallows Weetabix



## Accreditation

- Also will the Japanese rebuild their Nuclear power industry using Japanese engineers?

**Mayday for Japan's**

**stalled nuclear industry**

# **China has targeted some takeover possibilities in Australia**

- **Mines**
- **Farmland for coal seam gas**
  - **LNG resources**
- **Food manufacturing & processing**
  - **Wineries**
- **With a shortage of certain types of engineer in Australia, Chinese companies wish to bring in Chinese and other Asian engineers.**



KUDRKA.

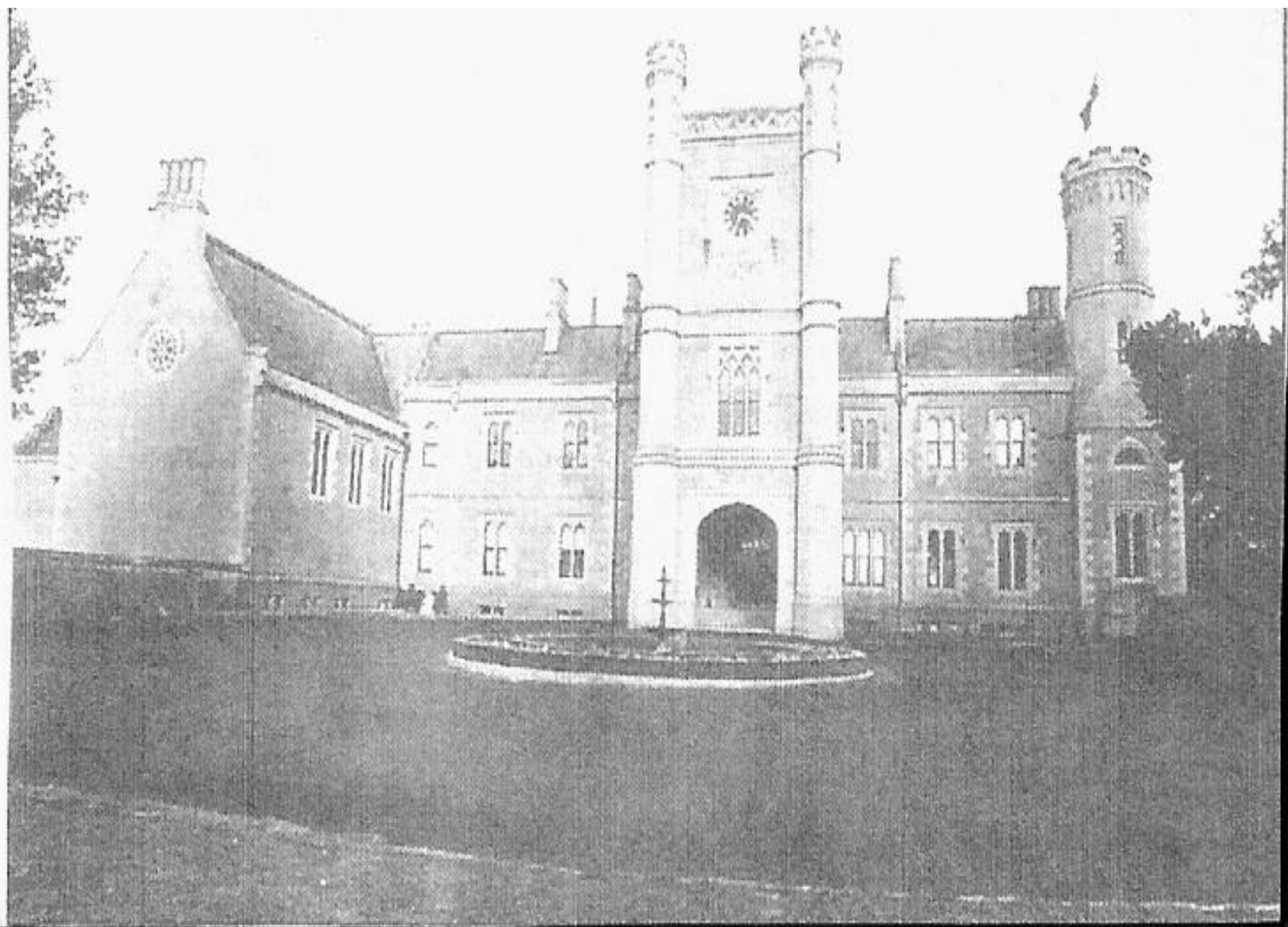
CROCKER WELL  
URANIUM FIELD  
UNDER NEW  
MANAGEMENT

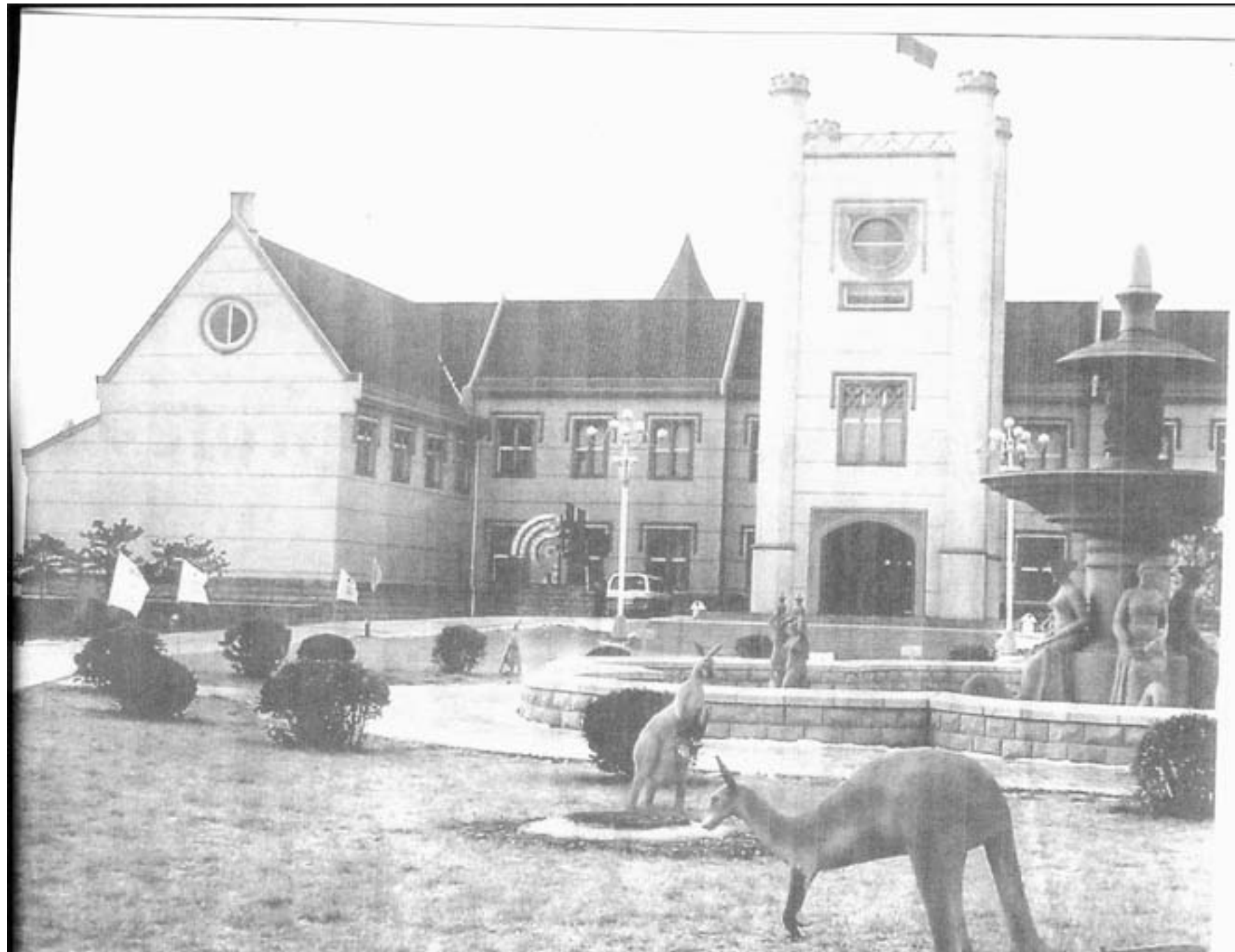
THEY'RE  
TURNING IT  
INTO A CHINESE  
TAKEAWAY.











# Accreditation

I have highlighted China and Japan for manufacturing, and chemicals but I could also have included Indonesia, India, Malaysia and of course some African countries for mining interests.

It came as a big surprise to me to discover that with very few exceptions China has **NO engineering accreditation** other than Government oversight.

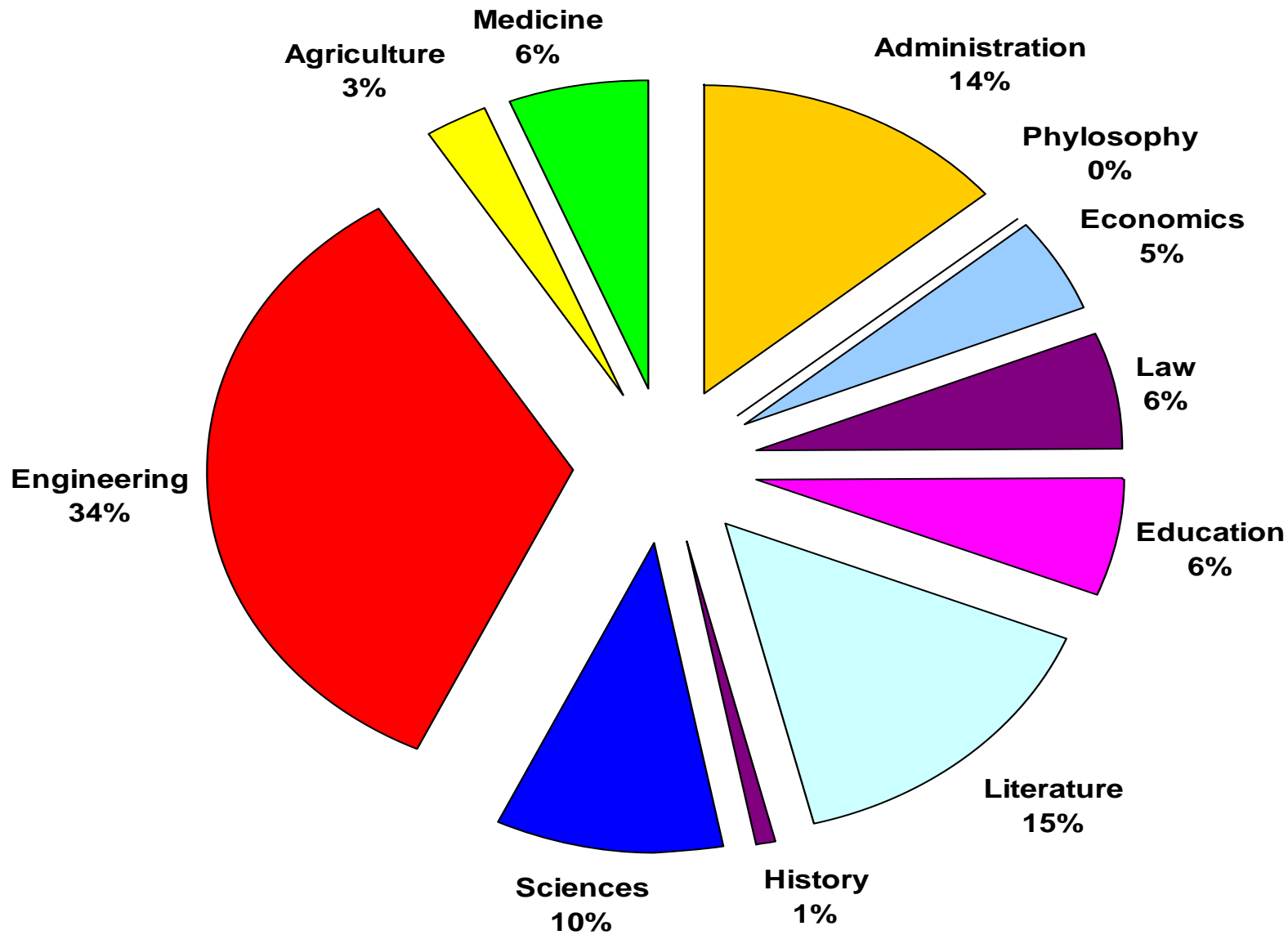
# Value of Accreditation

- For the past 10 years I have visited China on many occasions, mostly on behalf of the IChemE.
- In 2003 I identified the top 9 Chinese chemical engineering departments and in 2005 I organised an agreement for each of these departments to have their chemical engineering programs undergo an accreditation assessment by the IChemE.
- In 2008 the Tianjin University chemical engineering program was accredited by the IChemE. – the first in China.

# Top Chinese engineering, science and chemical engineering universities

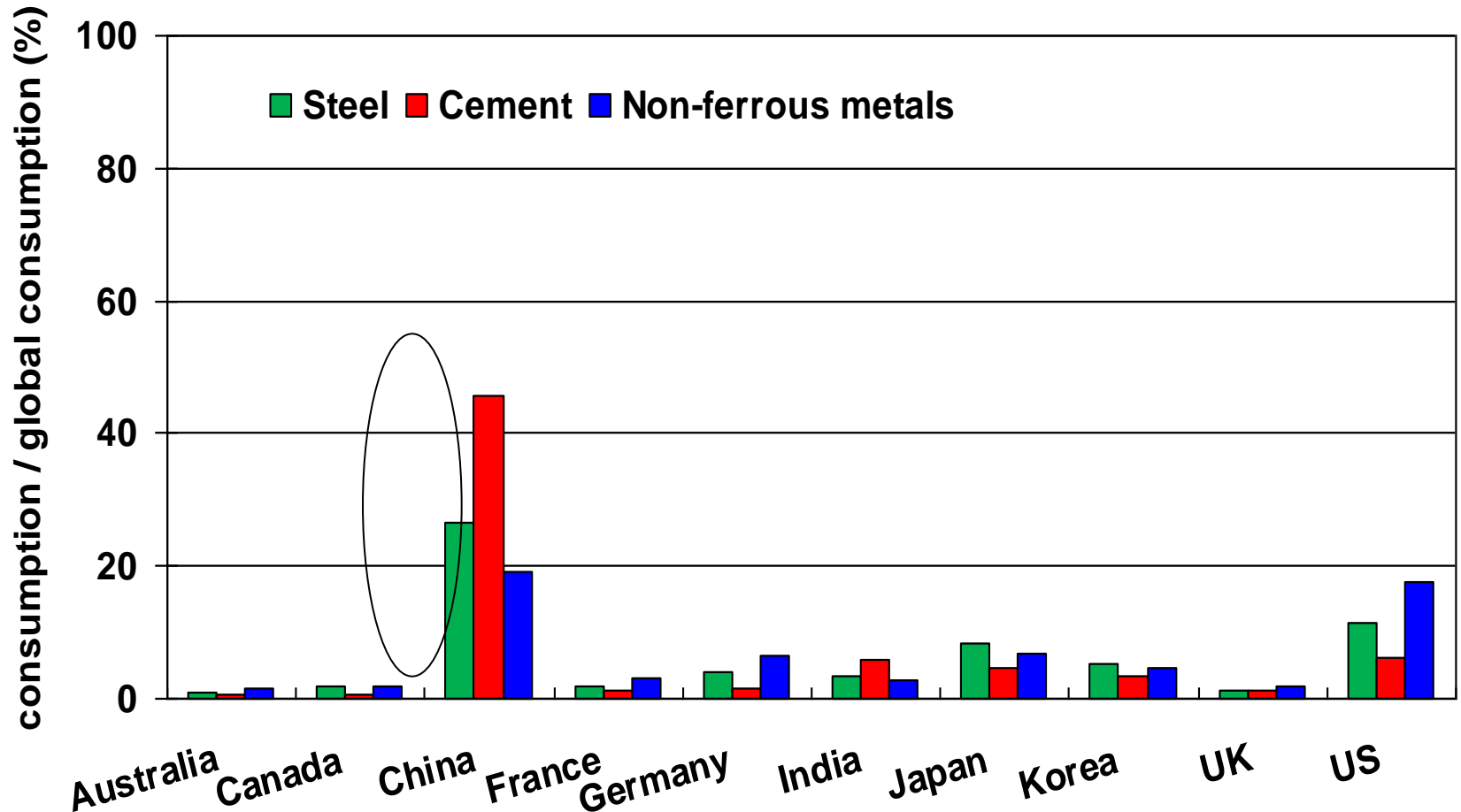
<b>Science</b>	<b>Engineering</b>	<b>ChemEng (top 10)</b>
Beijing Uni.	Tsinghua Uni.	Tianjin Uni.
Nanjing Uni.	Shanghai Jiaotong Uni.	East China Uni. of Sci. & Tech
Beijing Normal Uni.	Zhejiang Uni.	Zhejiang Uni.
Tsinghua Uni.	Harbin Inst. of Technology	South China Uni. of Sci. & Tech
Sun Yat-sen Uni.	Central South Uni.	Nanjing Uni. of Tech
		Dalian Uni. of Tech
		China Petrochem Uni.
		Beijing Uni. of Chemical Tech
		Tsinghua Uni.
		Sichuan Uni.







# China leads the world consumption of major raw materials



Source: National Bureau of Statistics, 2006

# Accreditation

- **My recent visit to Japan led to the surprising revelation that only a small minority of chemical engineering programs receive accreditation by the Japanese Accreditation Board of Engineering Accreditation (JABEE).**
- **JABEE is a signatory to the Washington Accord.**
- **I wonder if this is typical of other Japanese engineering programs in which case what is the value of engineering accreditation on a global basis?**

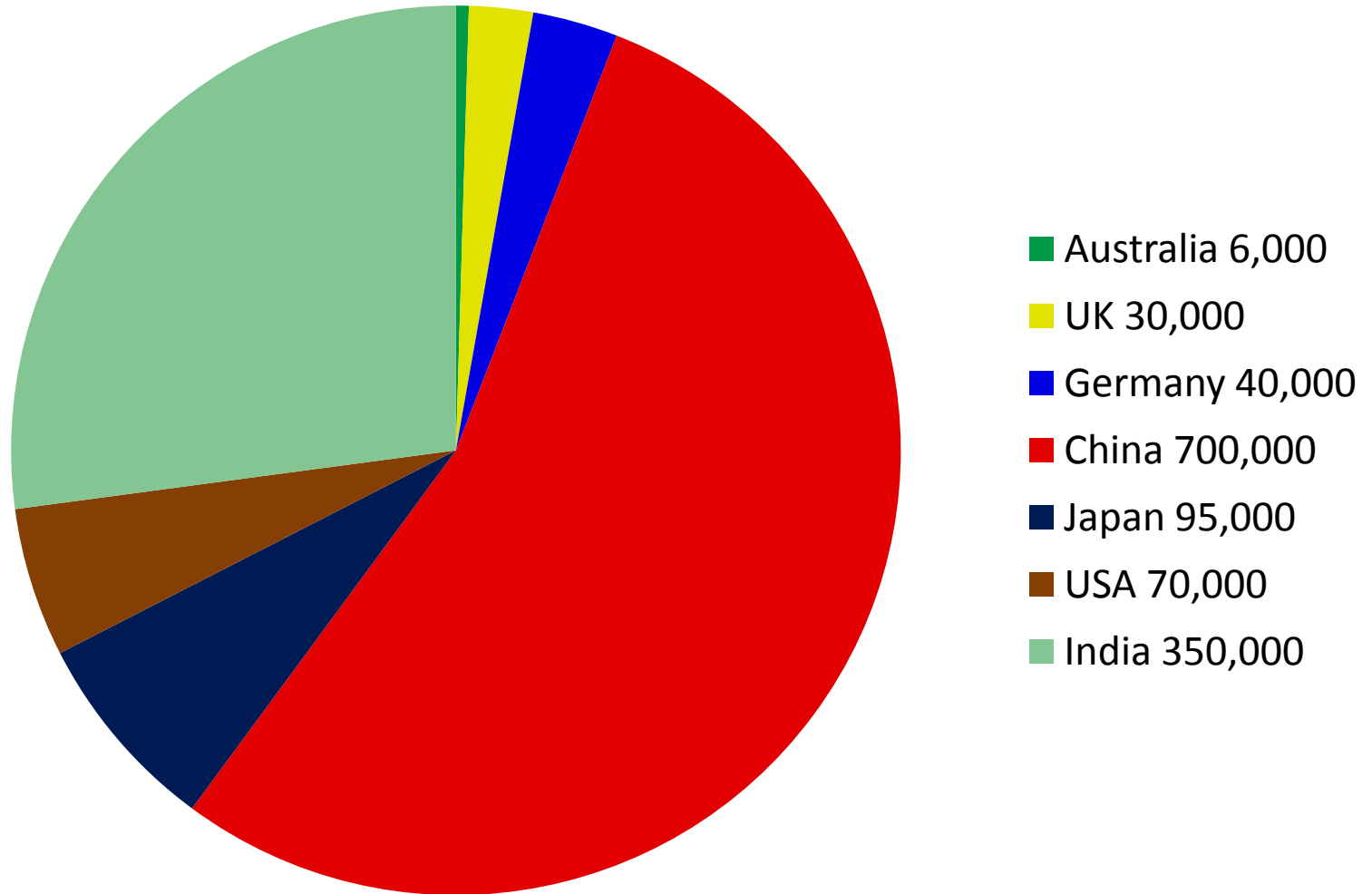
# International Accreditation

- The Japanese chemical engineering departments from the “ top” universities could see no point in seeking accreditation.
- They “ knew” that they delivered high quality chemical engineering education and their research performance was outstanding at the international level!!!!
- One mitigating factor is that the majority of Japanese 1<sup>st</sup> degree graduates proceed to the Masters level

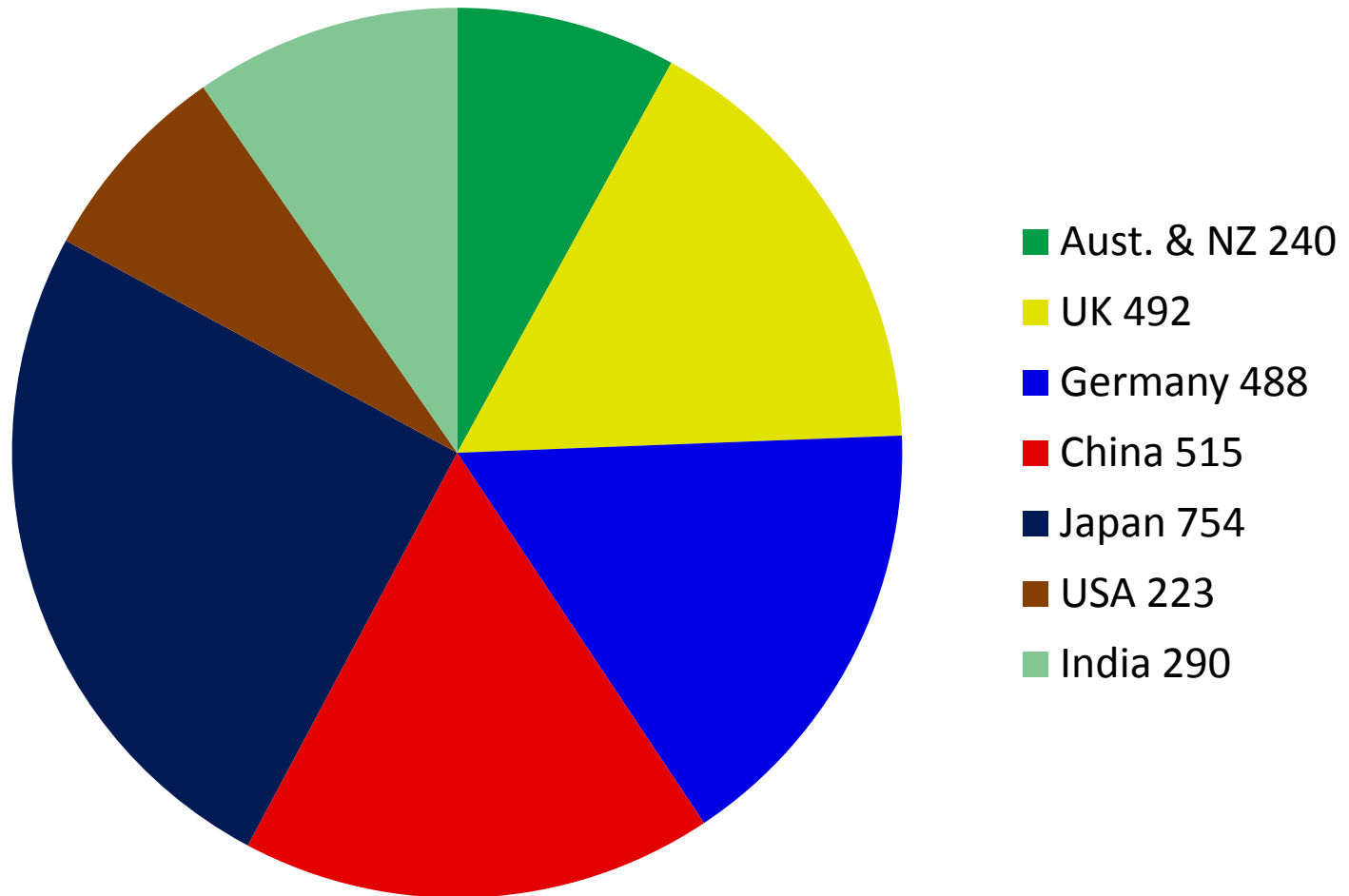
# Accreditation

- **Excuse me if I once again refresh my memory regarding the number of engineers graduating in different countries!**

## Engineering Graduate Numbers



## Graduates per million pop.



# International Accreditation

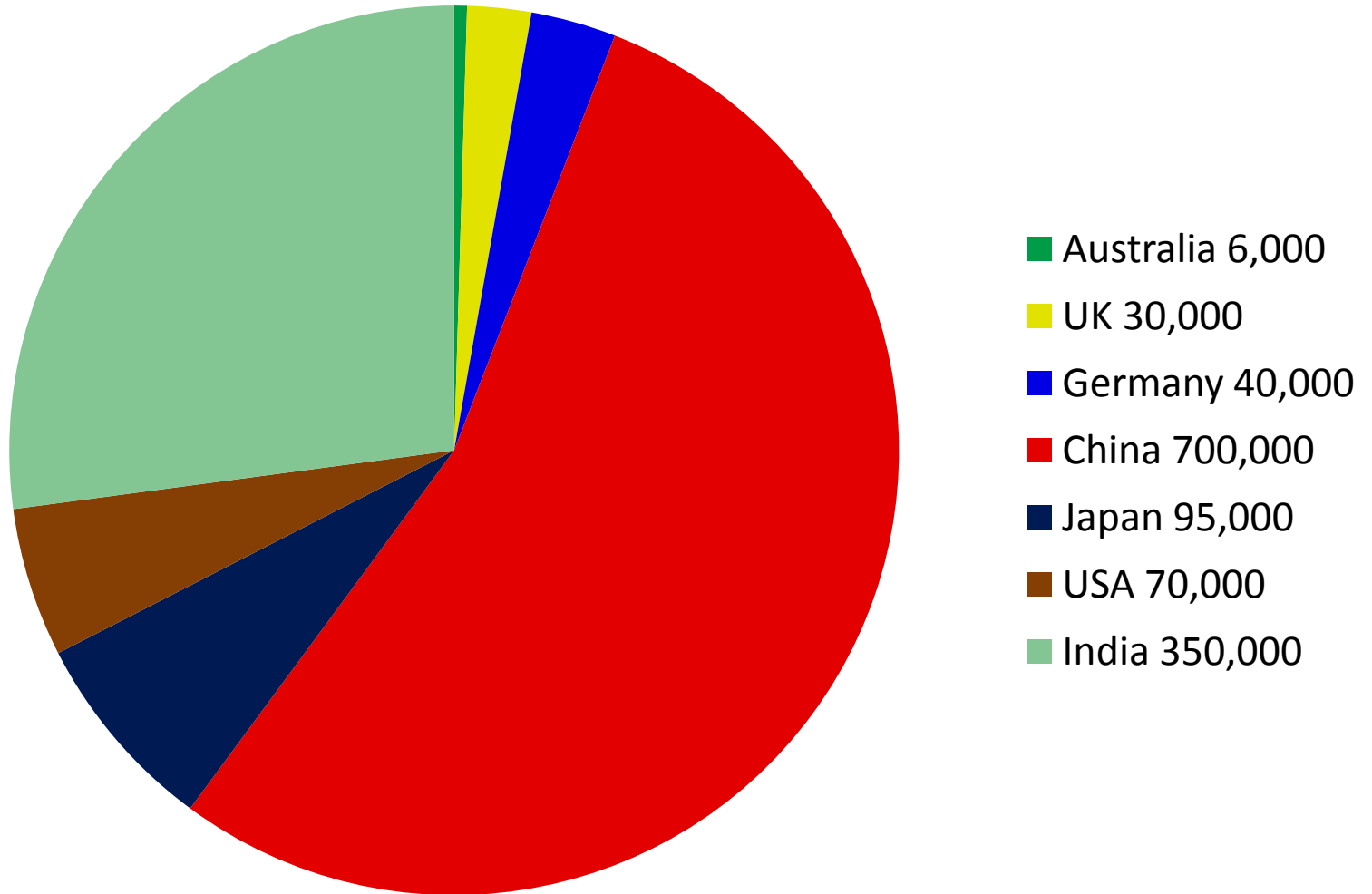
- The engineering profession regards accreditation as a very important international quality standard
- It is reasonable to assume that society considers that the international engineering profession oversees graduate standards at the highest level.
- And yet two of the countries which are responsible for the highest number of engineering graduates globally, appear to be found wanting in terms of accreditation.



# International Accreditation

- **It is worth noting that the accreditation standard in India is highly variable and yet India is also a major manufacturing and processing country.**
- **It is estimated that over 300,000 graduate engineers are produced from Indian universities each year.**

## Engineering Graduate Numbers



## Overseas students

- I have made no allowance for overseas students graduating from countries with strong accreditation processes.
- Many of these graduates return to their own country which may be considered to strengthen the Engineering Profession in the 'Home' country.
- Nevertheless the very best school leavers in China study at the top Chinese universities and do not go overseas.

# Can accreditation be a constraint on innovation?

**Davis - 2009**  
(Caltech)



- There should be a focus on molecular chemical engineering and biology without a loss of chemistry.
- Accrediting requirements need an overhaul...“current methodologies seem to restrict chem. eng. Curricula to what chem. eng. was in the past rather than what it needs to be in the future.”

## Can accreditation be a constraint on innovation?

- My experience suggests that Davis is correct, particularly with “pan engineering accreditation” where new discipline innovations are not properly understood.
- During my period as Dean at Melbourne, EA had great difficulty recognising innovations in education outside the civil engineering sub-discipline.
- In particular the challenges of “Beyond the Molecular Frontier” provided the accreditation team from EA with a real challenge!!

## Can accreditation be a constraint on innovation?

- **Alternatively the IChemE has been a leader in innovation and is very willing to recognise the need for change.**
- **I am advised that EUR-ACE has taken a more open approach to innovation in curricular.**

## To summarise:

- **Engineering accreditation under the auspices of the Washington Accord signatories is professional and regarded as an appropriate international standard.**
  - **EUR-ACE brings the same degree of professionalism to the universities of Europe.**
- **It is a great strength to global accreditation to have the EUR-ACE scheme for new models of education.**

## To summarise:

- In global terms the situation in China, Japan & India is of concern.
- The normal degree in China is modelled on the standard USA program of 4 years duration but there is much political material studied in the first 2 years.
- Design is a weakness in Chinese programs.
  - The IChemE is to be commended for encouraging innovation in China through the accreditation process



## To summarise:

- **If what is happening to the accreditation of Japanese chemical engineering programs is common to other engineering sub disciplines there is cause for concern**
- **The situation is less clear in India & other Asian countries although a number of programs have ABET accreditation.**
- **It is probably worth exploring accreditation processes in countries not covered in this talk.**

谢谢!

THANK YOU