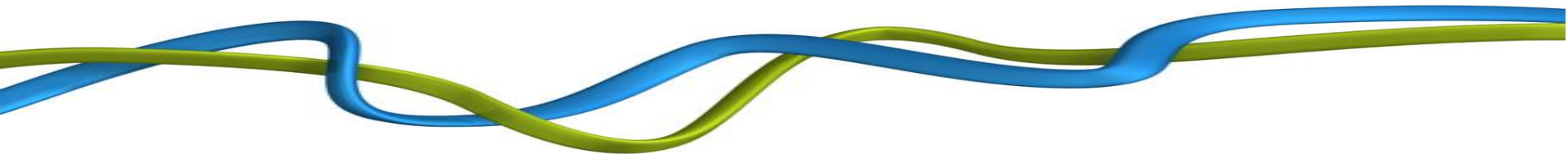


# **Visiting Professors Conference and Induction**

**10<sup>th</sup> November 2016**

**Dr Rhys Morgan**  
**Director, Education & Engineering**  
**Royal Academy of Engineering**



# Overview of Academy activity



**Supporting  
excellent research**



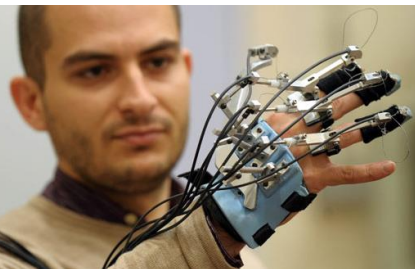
**Engineering Policy**



**Education and skills**



**International  
including GCRF and  
Newton fund**



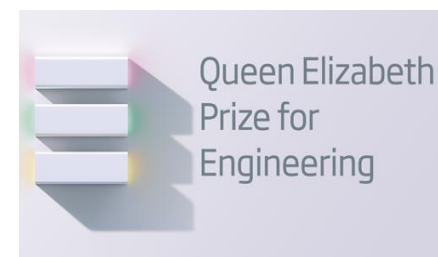
**Enterprise and  
innovation**



**Public engagement  
and  
communications**



**National awards  
and events**



**QE Prize for  
Engineering**

# Overview of education activity

**Changing perceptions: Engineering Talent Project**

**Diversity and Inclusion**

**Research and Policy**

**Education programmes**

# Overview of education activity

Changing perceptions: Engineering Talent Project

Diversity and Inclusion

Research and Policy

## Education programmes

### Schools

- Connecting STEM Teachers
- STEM resources
- Regional programmes

### Higher Education

- Visiting Professors
- ELA awards
- Sustainable Building Engineering Centres of Excellent

### Further Education

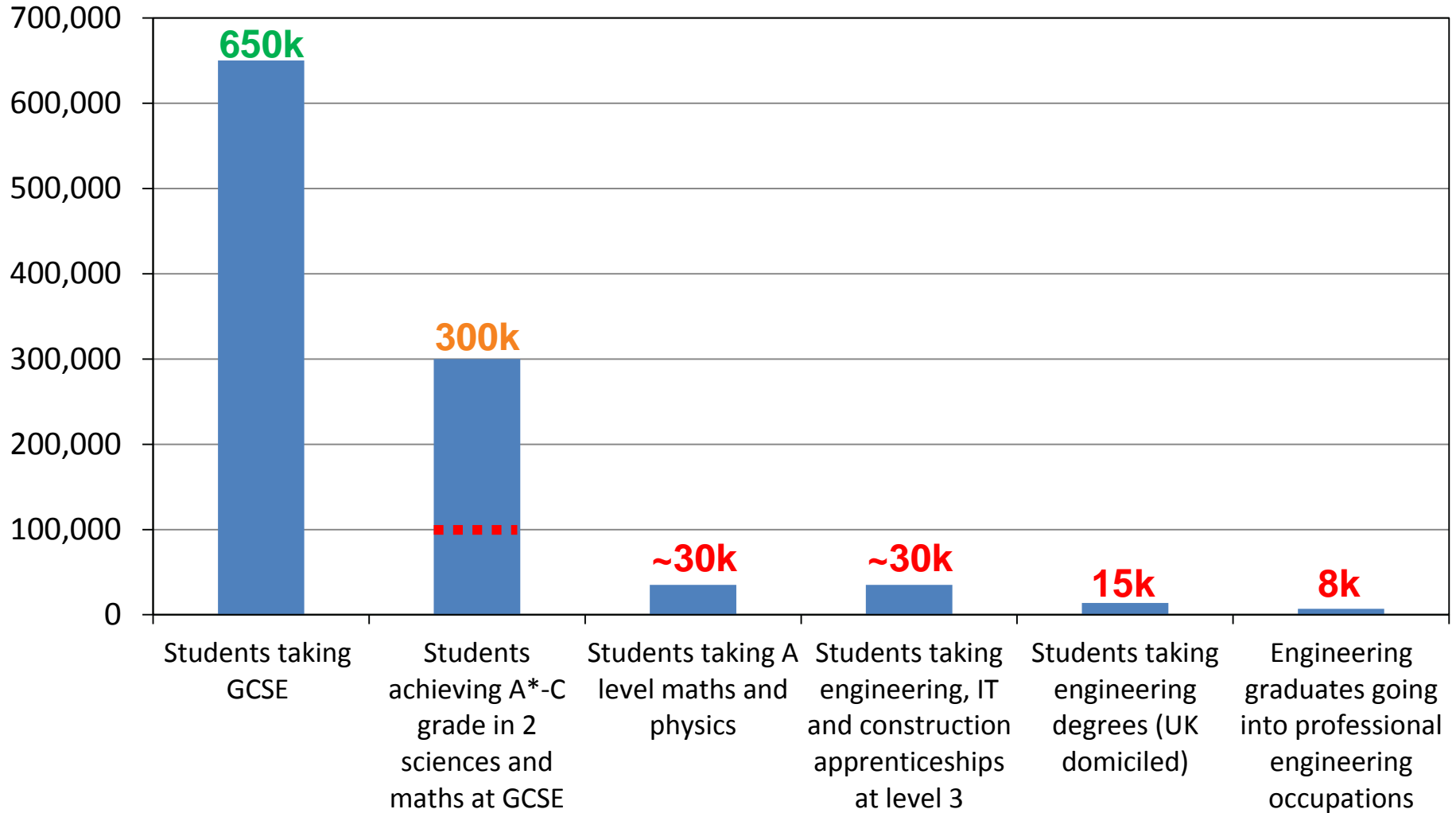
- Visiting Teaching Engineers
- FE resources

### Professional

- Exec engineers programme
- Sainsbury Management Fellowships

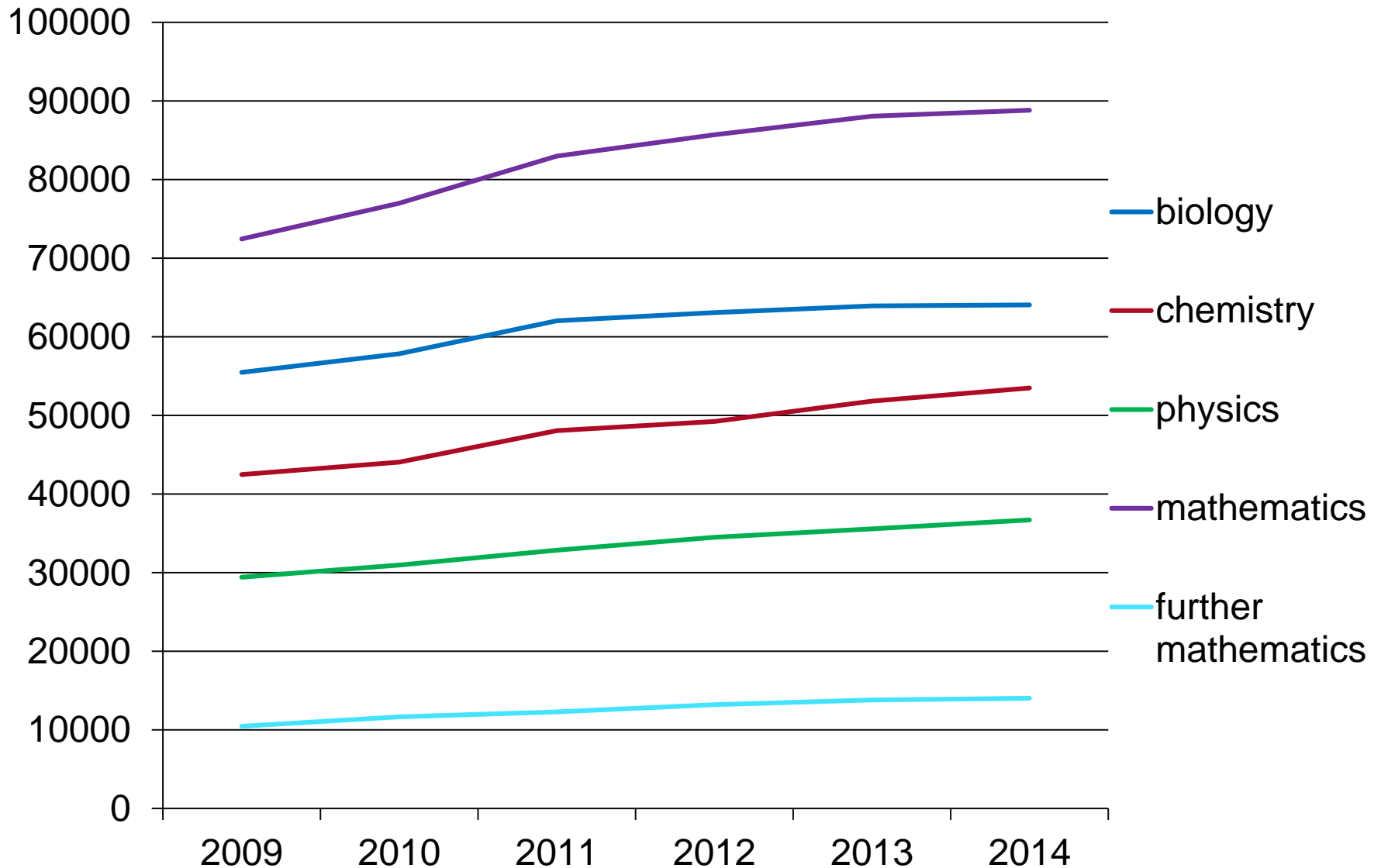
# Skills shortages

# Skills Shortages

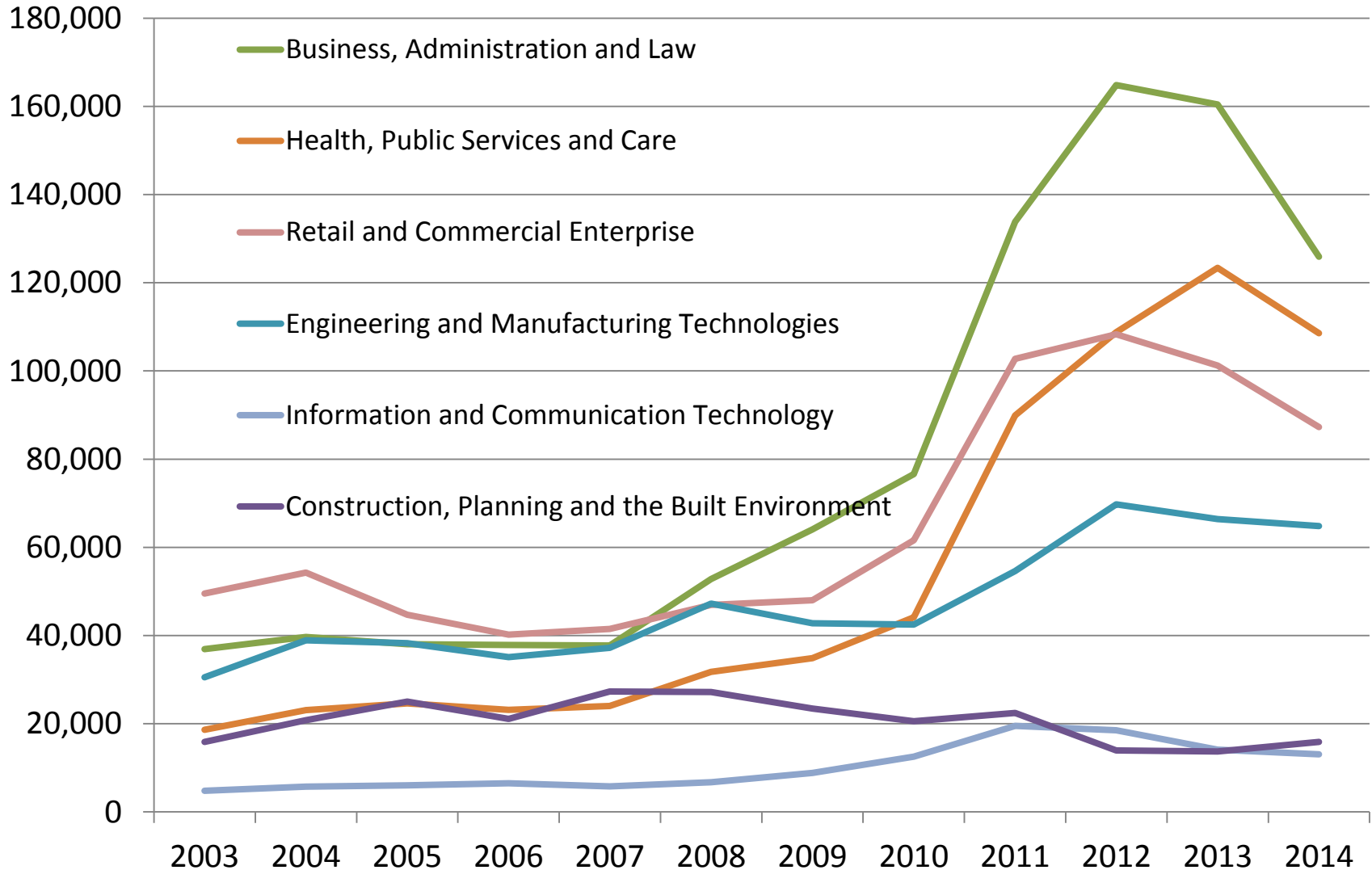


Diversity organisations	Mathematics community	Museums / Zoos Discovery Ctrs	STEM teacher support and supply	Government and agencies	Charitable trusts & foundation	Science community
WISE	JMC	Science Museum	Design and Technology Assoc (DATA)	Dept for Education	Salters Institute	Royal Society
Athena Forum	LMS	Technquest			NESTA	Royal Soc Chemistry
Inter Engineering	RSS	Nat Space Centre	National STEM Learning Network	Dept Business, Innovation and Skills	Gatsby Foundation	Royal Soc Biology
AFBE-UK	IMA	Winchester Sci Centre	Assoc of Science Educators (ASE)	National Careers Service	Wellcome Trust	Inst of Physics
WES	20+ additional	@ Bristol	Computing at School	National Apprenticeship Service	Nuffield Foundation	Royal Institution
Your Life	Computing support	50+ others			Lloyds Register	Science Council
many others...					Ogden Trust	Royal Society of Edinburgh
STEM activities / providers	Raspberry Pi /Code club	Engineering Profession	NAACE (ICT subject assoc)	HEFCE / HEFCW		
Big Bang Fair	Apps for Good	Royal Academy of Engineering	NCETM	ETF	Comino Fnd	Royal Astronomical Society
Tomorrows Engineers	Coderdojo	Engineering Council	London Knowledge Lab	OFQUAL	Sutton Trust	
EDT	Stemettes	Engineering UK	Maths Hubs	OFSTED	ERA Foundation	Geological Society of London
Smallpeice Trust	Young rewired state	Engineering UK	Teach First	NCTL	1851 Commission	Geological Society of London
Young Engineers		Inst Mech Eng	Teaching Leaders	Careers and Enterprise Co.	Reece Foundation	Geological Society of London
Primary Engineer	Education institutions	The IET	Brilliant Club	UKCES	Edu Endowment fund	Geological Society of London
Arkwright Trust	Schools	Inst Civil Eng	Awarding bodies	Employers and bodies	Livery Companies	68 additional biologicalal learned societies
STEM in schools	FE colleges	Inst Chem Eng	AQA	EMPLOYERS	STEM policy bodies	
STEMNET	6 <sup>th</sup> form colleges	Inst Struct Eng	Pearson	Sector Skills Councils	ACME	UK forum for Computing Edu
Industrial Cadets	UTCs	CIBSE	OCR	Sector partnerships	SCORE	NCUB
Imagineering	National Colleges	IOM3	WJEC		Education for Engineering	
EESW	ILPs / GTAs / ATAs	IMarEST	EAL			EPC / CPHC
500+ additional	Teacher and leadership bodies	27 additional	City and Guilds	CBI, EEF, BCC...	CASE	

# Brief background – A levels



# Brief background – Apprenticeship starts

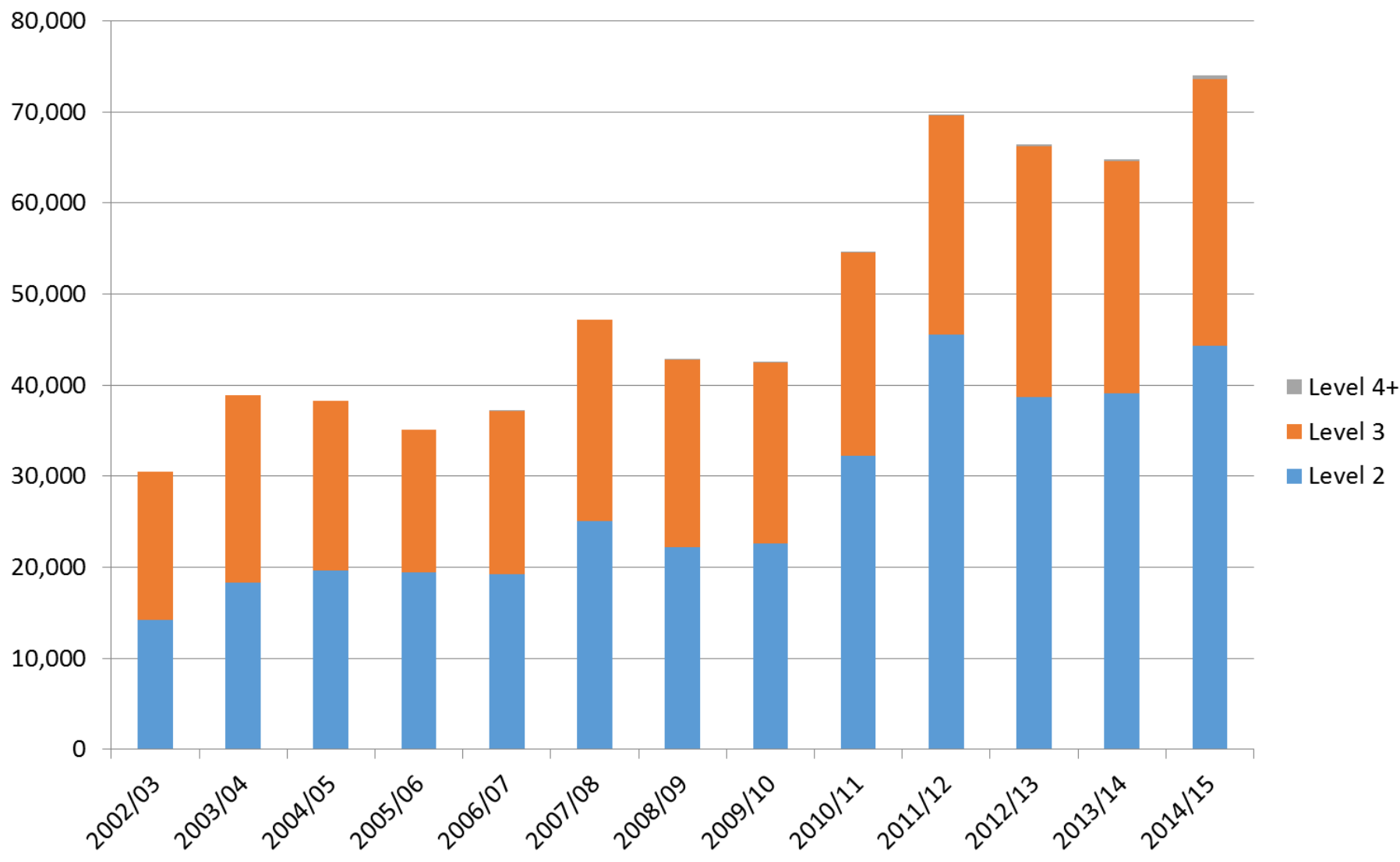




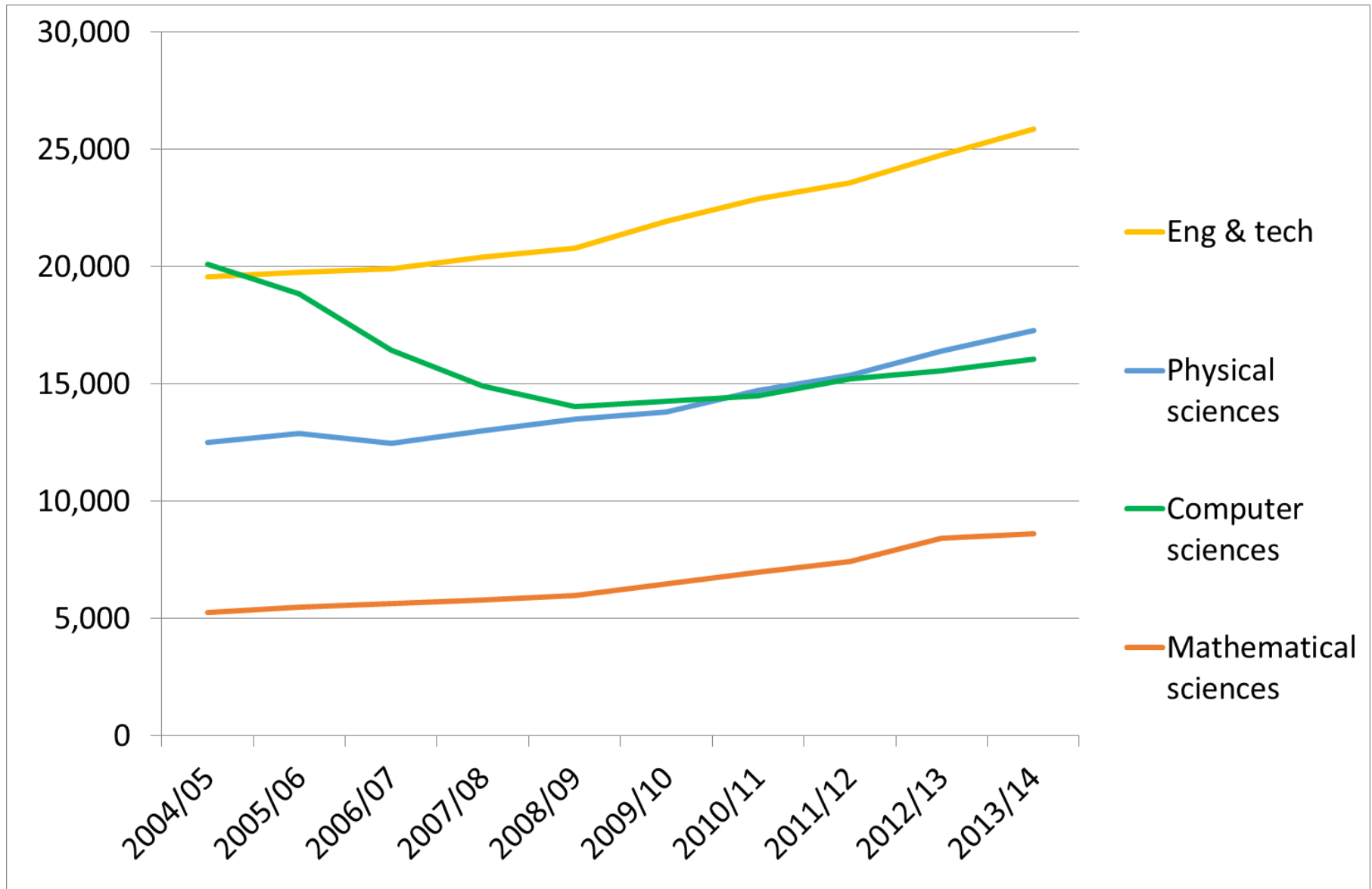
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# Engineering apprenticeship starts by level

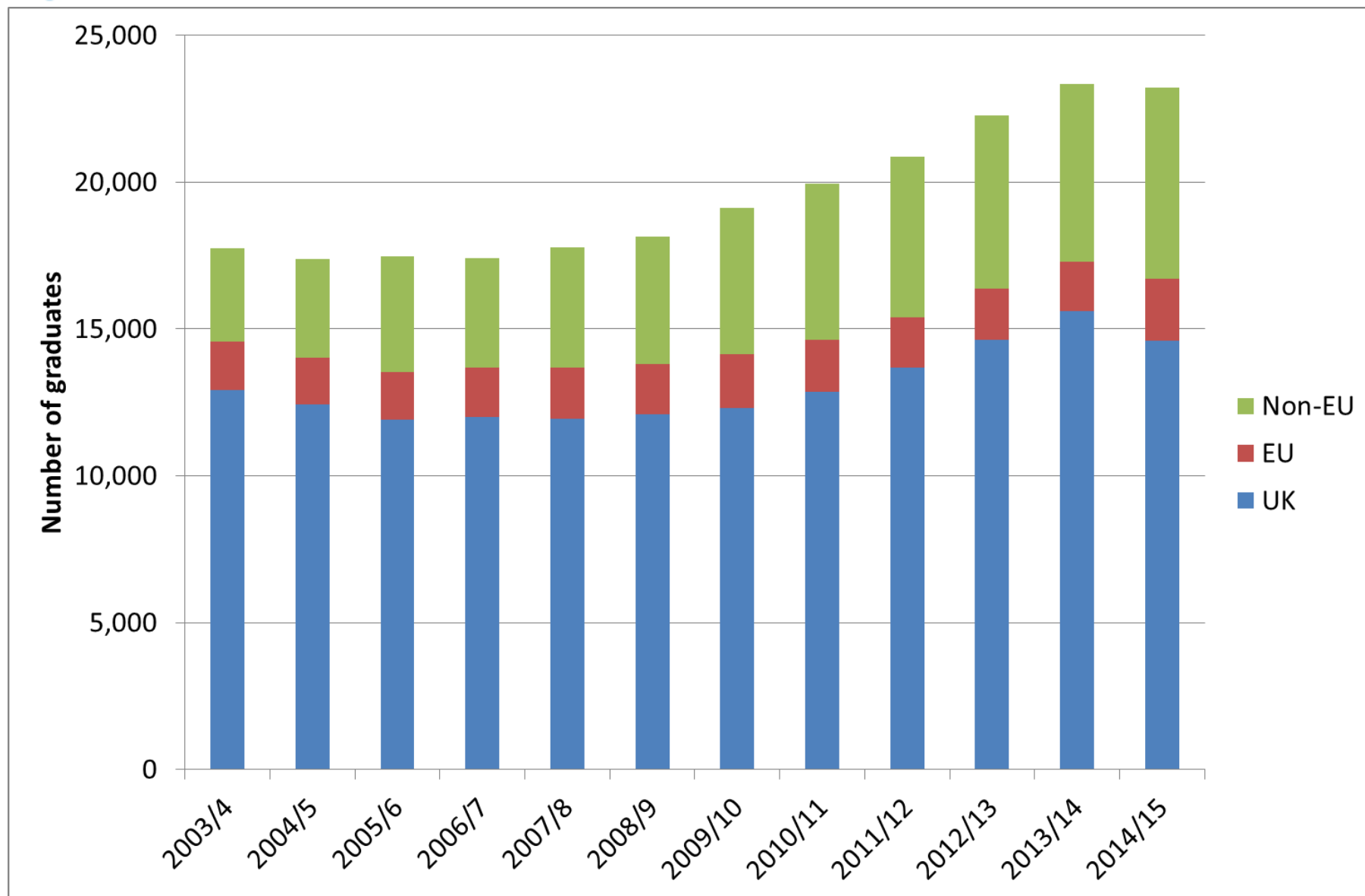
Engineering apprenticeships at intermediate (GCSE, advanced (A level) and higher (level 4+)



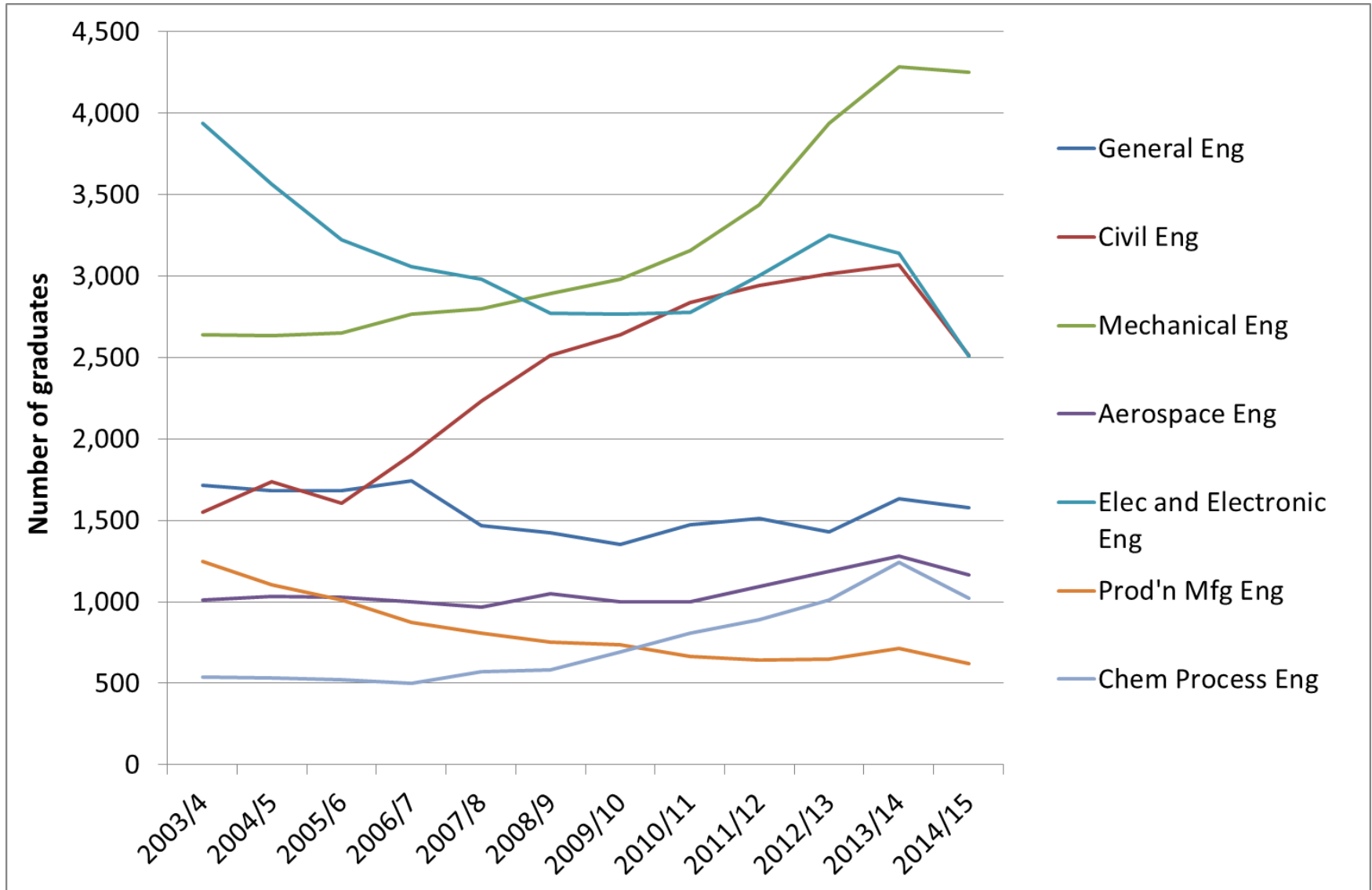
# First degrees in STEM subjects



# First degrees in engineering

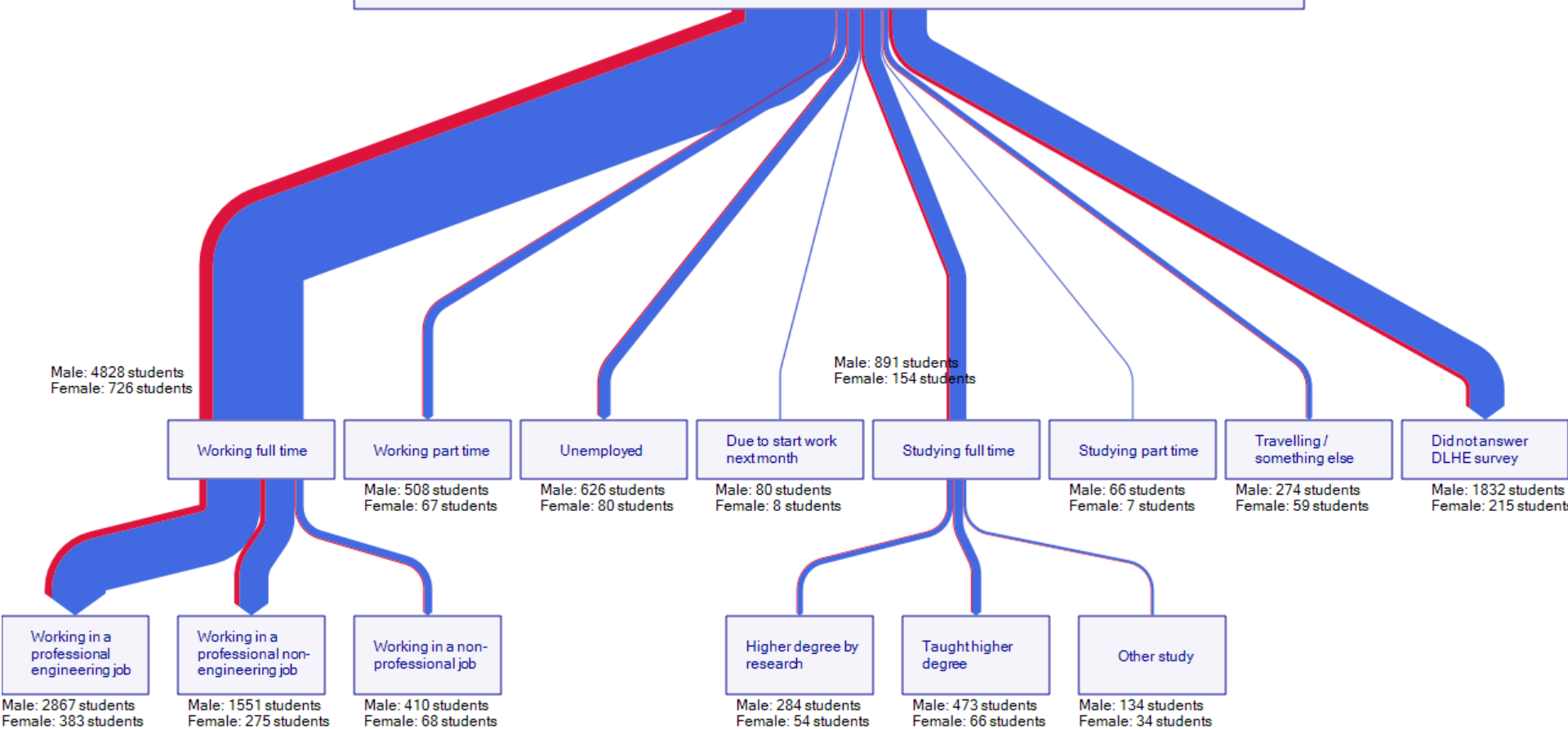


# First degrees by discipline



# Graduate destinations

Destinations of Leavers from Higher Education (DLHE) summary of "Most important activity" for UK domiciled, full-time engineering graduates (10,421 students)



# Employment outcomes from engineering were strong

Destination	Full-time work only	Part-time work only	Work & further study	Further study only	Unemployed	Other	Engineering occupation
<b>Engineering graduates</b>							
First destination (total)	60.0%	6.7%	7.6%	13.0%	9.8%	2.9%	54.5%
Long destination (total)	83.7%	2.2%	3.3%	6.9%	2.5%	1.3%	68.9%
<b>All graduates</b>							
First destination (total)	47.9%	14.8%	10.3%	15.1%	8.8%	3.2%	
Long destination (total)	73.4%	6.9%	5.3%	9.0%	2.5%	2.9%	

**Table 1. 'Long' (40 month) and first destinations of 2010/11 graduates. First destinations based only on those responding to both surveys**

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# Employment outcome within engineering occupations were very strong

Destination	Full-time work only	Part-time work only	Work and further study	Further study only	Unemployed	Other	Engineering occupation
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**Table 1. 'Long' (40 month) and first destinations of 2010/11 graduates. First destinations based only on those responding to both surveys**

Destination	Full-time work only	Part-time work only	Work and further study	Further study only	Unemployed	Other	Engineering occupation
<b>2013/14 – Engineering graduates</b>							
Male	66.0%	7.2%	3.4%	11.3%	7.9%	4.2%	56.1%
Female	65.3%	5.4%	5.0%	12.7%	6.1%	5.6%	52.4%
<b>Total</b>	<b>65.9%</b>	<b>7.0%</b>	<b>3.6%</b>	<b>11.5%</b>	<b>7.7%</b>	<b>4.4%</b>	<b>55.6%</b>

**Table 2. First destinations of graduates, by gender**

# Ethnicity

Destination	Full-time work only	Part-time work only	Work & further study	Further study only	Unemployed	Other	Engineering occupation
<b>2013/14 - Engineering graduates</b>							
Black	45.9%	12.8%	4.5%	17.9%	14.3%	4.6%	36.7%
Asian	52.0%	10.4%	3.0%	17.0%	13.0%	4.8%	40.9%
Mixed/Other	52.3%	8.2%	2.9%	18.1%	13.8%	4.7%	43.4%
<i>All BME</i>	<b>50.6%</b>	10.5%	3.4%	17.5%	<b>13.5%</b>	4.7%	<b>40.4%</b>
White	<b>70.8%</b>	5.9%	3.7%	9.5%	<b>5.8%</b>	4.3%	<b>60.4%</b>
<b>Total</b>	<b>65.9%</b>	<b>7.0%</b>	<b>3.6%</b>	<b>11.5%</b>	<b>7.7%</b>	<b>4.4%</b>	<b>55.6%</b>

**Table 3. First destinations of graduates, by ethnicity**

# Degree classification

Destination	Full-time work only	Part-time work only	Work and further study	Further study only	Un-employed	Other	Engineering occupation
<b>2013/14 – Engineering graduates</b>							
1st & 2:1	69.10%	5.20%	3.50%	11.50%	6.20%	4.40%	59.70%
2:2 & below	53.40%	13.70%	3.50%	11.80%	13.00%	4.50%	40.40%
<b>Total</b>	<b>65.90%</b>	<b>7.00%</b>	<b>3.60%</b>	<b>11.50%</b>	<b>7.70%</b>	<b>4.40%</b>	<b>55.60%</b>

**Table 4. First destinations of graduates, with degree classification (where known)**

# **New approaches... and innovative teaching**

### Subjects of concern:

- Biological sciences , environmental sciences, some engineering subjects (aero,

### Additional findings:

- The value of work experience
- The need for work-readiness, employability skills
- Better careers advice and guidance
- Greater personal responsibility among graduates for employment opportunities
- employer engagement in course design & delivery
- Accreditation is powerful driver

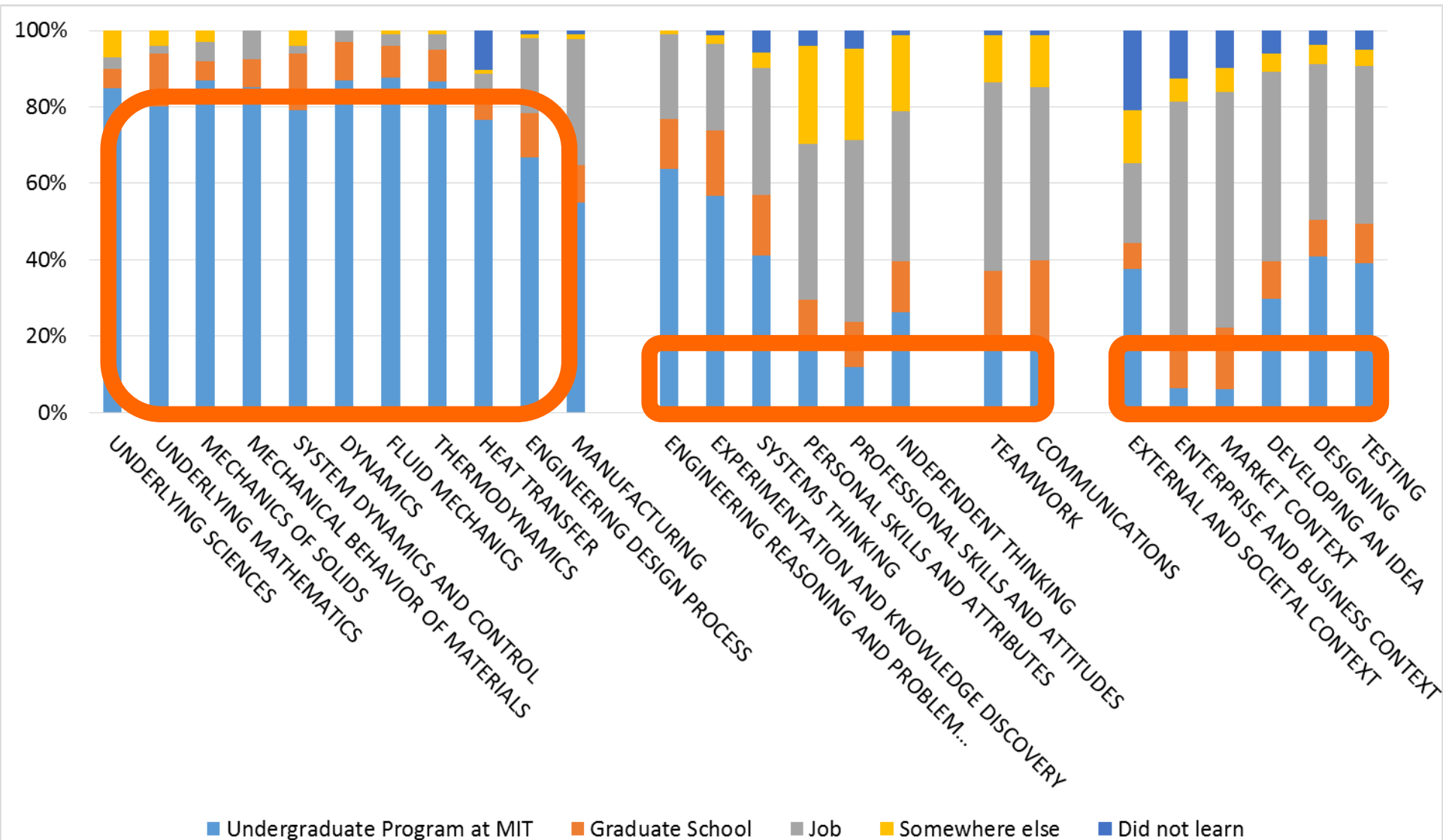


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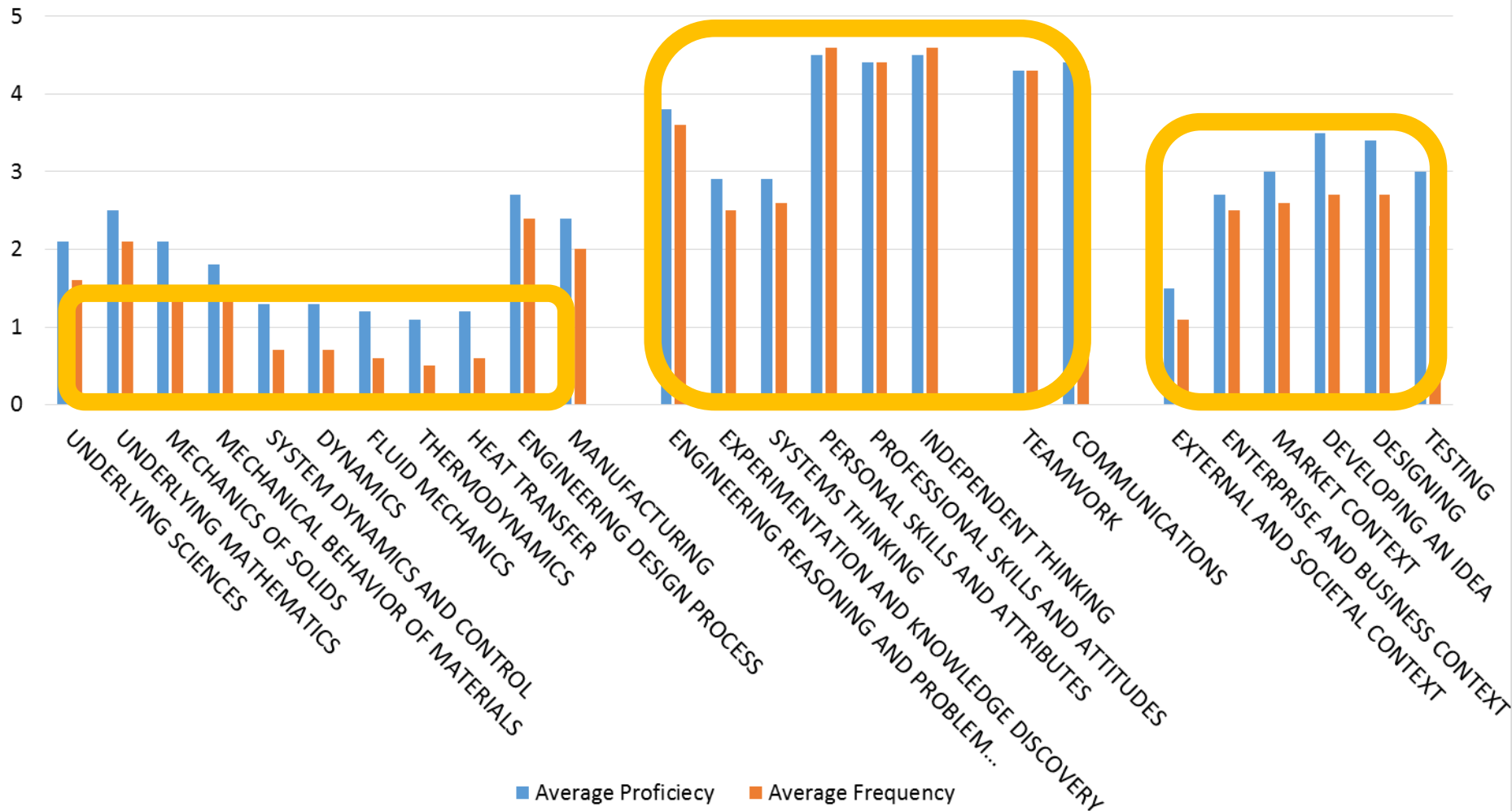
# Teaching Excellence Framework

- Reward and encourage teaching practices that:
  - provide an appropriate level of contact and stimulation
  - encourage student effort
  - are effective in developing their knowledge, skills and career readiness
- There is a strategic and effective approach to understanding the ways in which students are intellectually challenged and engaged in the curriculum and their learning
- The courses, curriculum design, teaching and assessment are effective in developing all students' knowledge and skills.

# MIT analysis – alumni skills



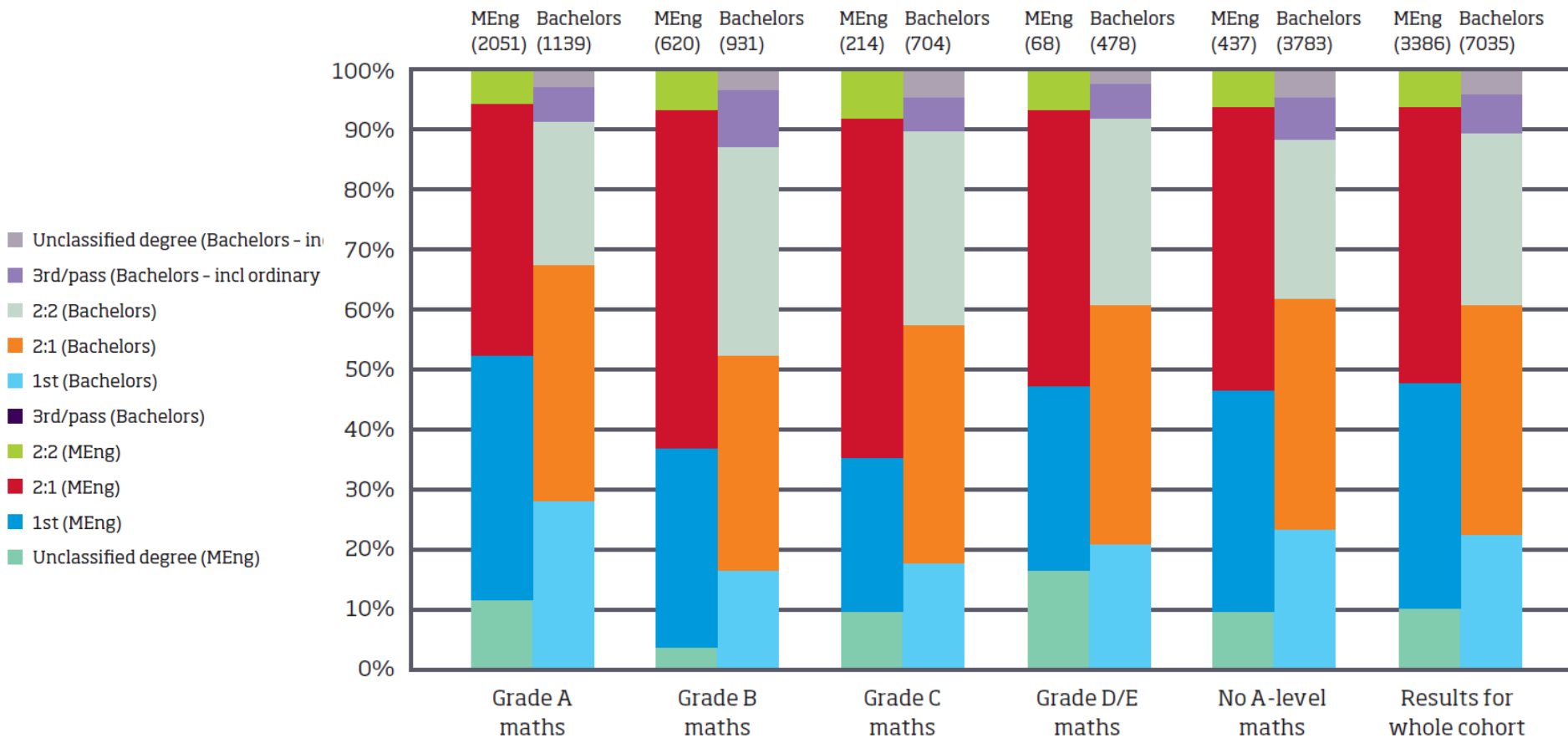
# MIT analysis: proficiency and frequency of use



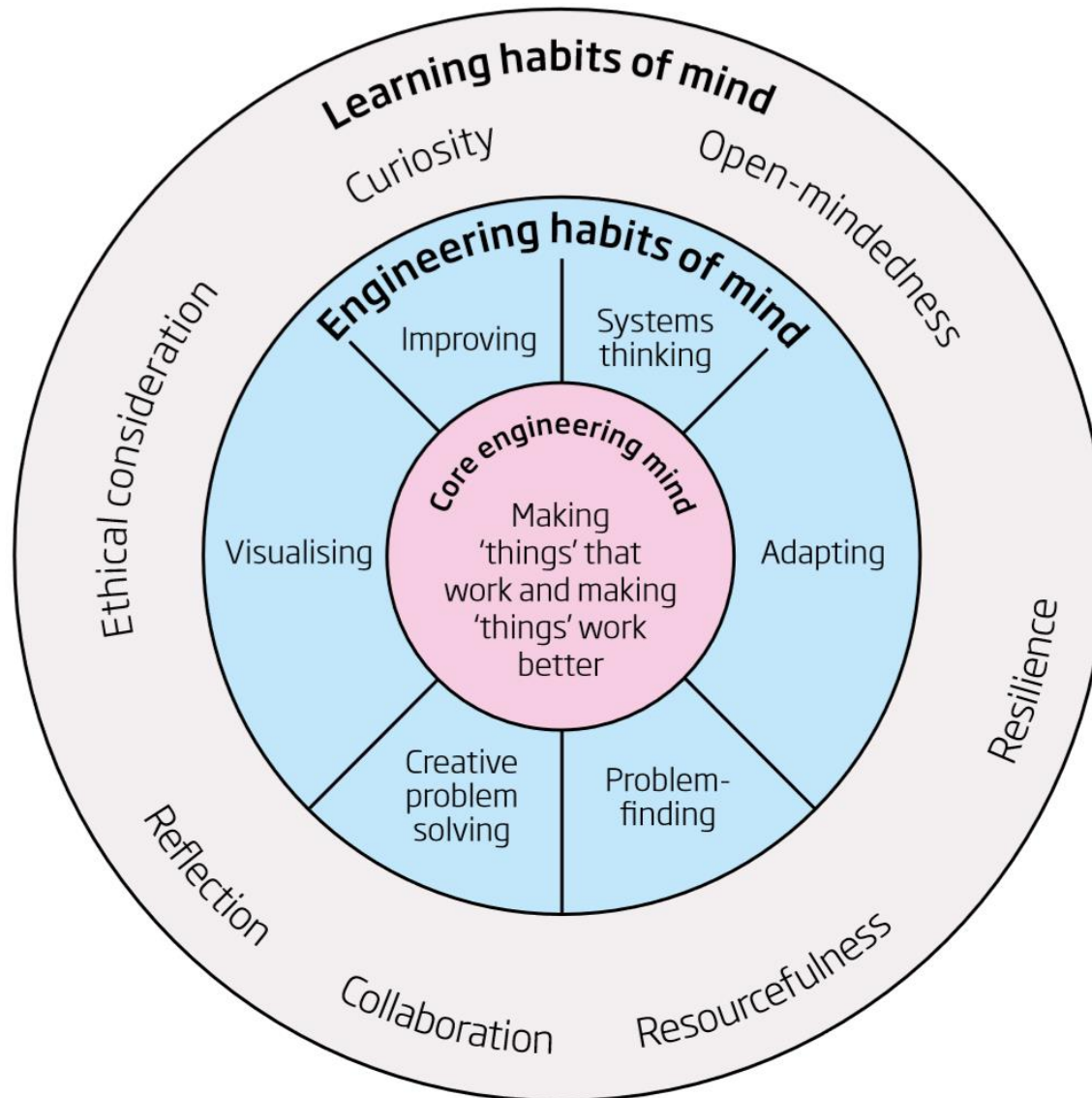


## The importance of maths...

- No statistical correlation between degree classification and A level maths results (or lack of maths) for MEng or BEng



# A new focus? ...Engineering Habits of Mind



**Thank you.**