The Need for STEM Education

Professor Colin Turner

23rd June 2017, ASE Conference

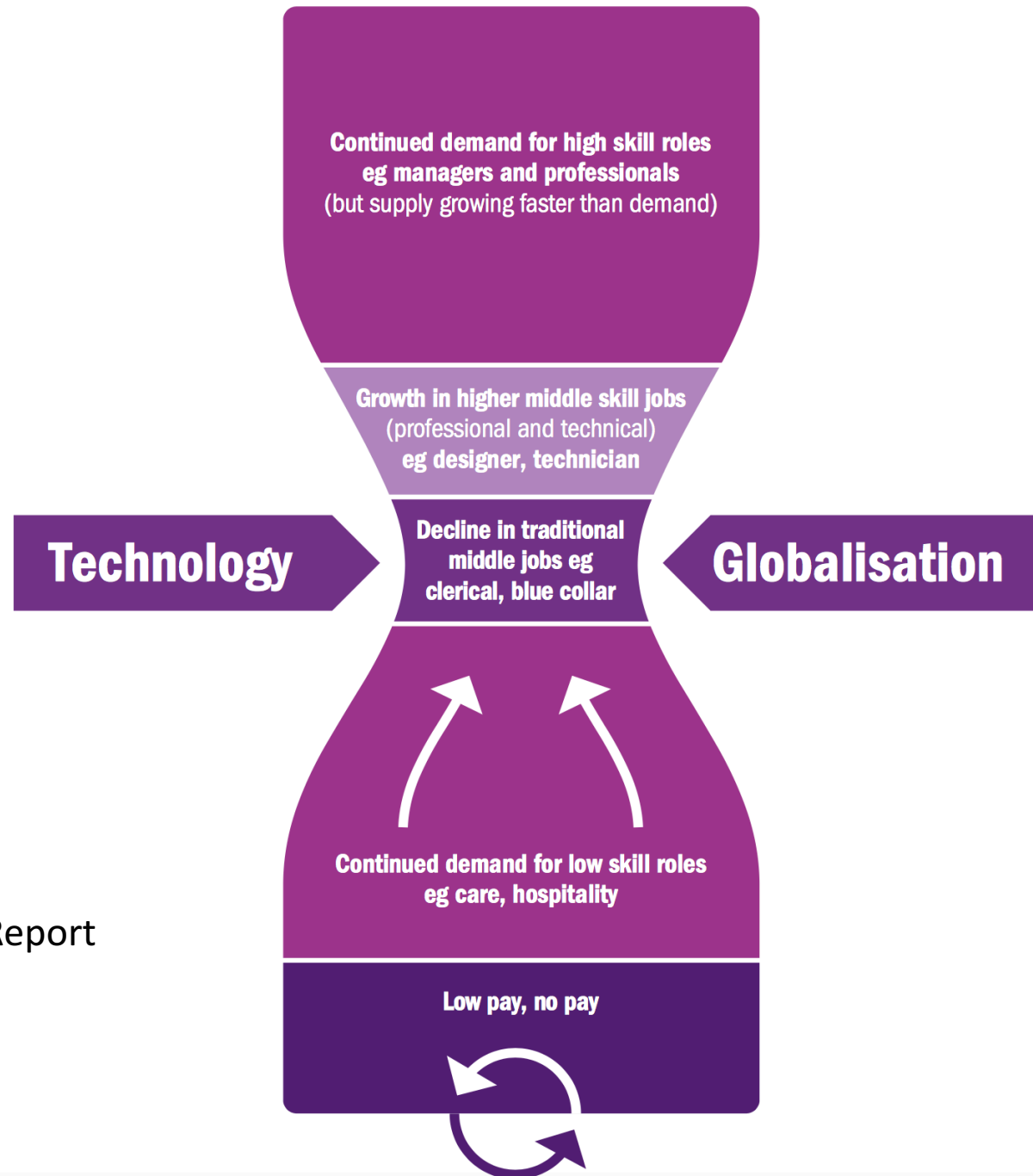ulster.ac.uk

Credit: XKCD
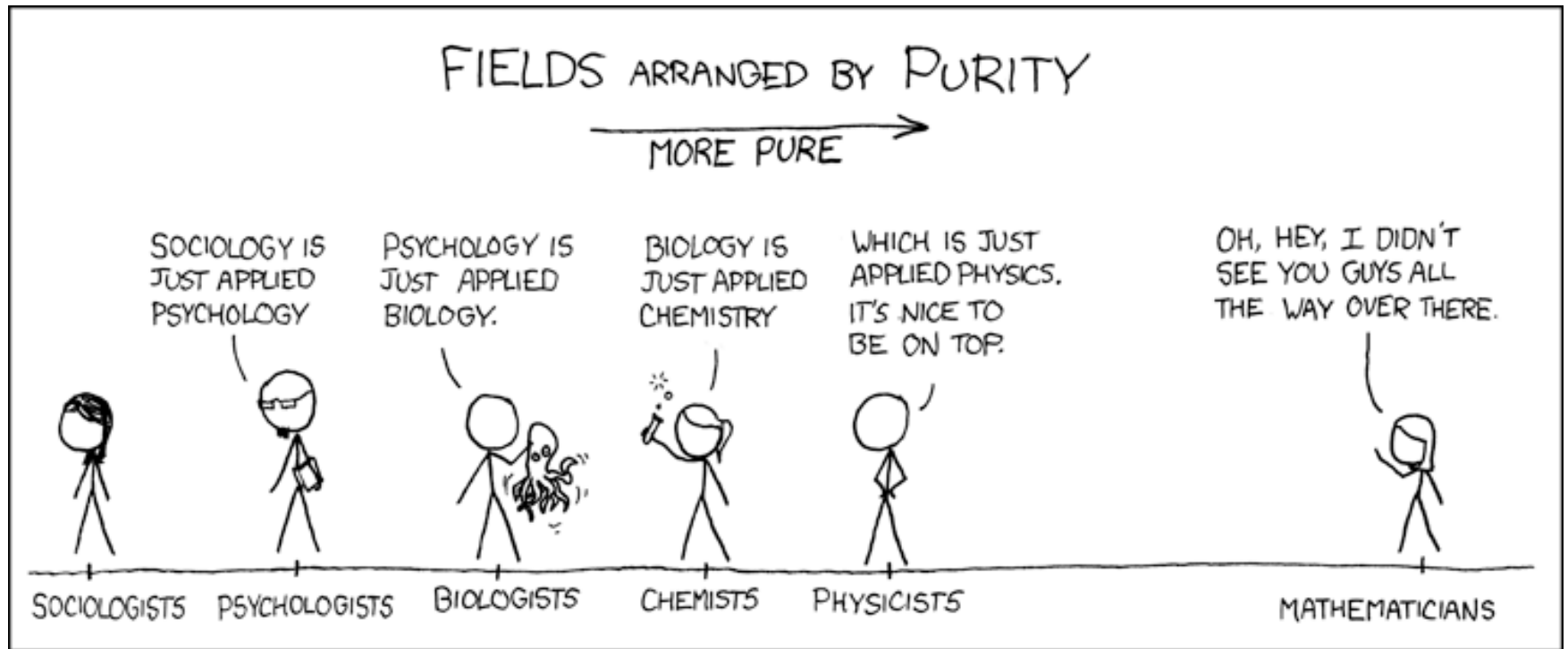
"If we are going to succeed as a country then we need to train more scientists and more engineers."

The then Prime Minister, Rt. Hon. David Cameron MP 2013

The Hourglass Economy

Credit: Engineering UK 2017 Report

Ulster University

Continued demand for high skill roles eg managers and professionals (but supply growing faster than demand)

Growth in higher middle skill jobs (professional and technical) eg designer, technician

Technology

Decline in traditional middle jobs eg clerical, blue collar

Globalisation

Continued demand for low skill roles eg care, hospitality

Low pay, no pay

The UK Engineering Picture

- £486 million contributed by Engineering to UK in 2015 (26% of GDP)

- 186,000 engineers needed, annually, for **replacement** and **expansion** demand up to 2024.

- 20,000 annual shortfall in engineering graduates.

- In 2016 45% of STEM educators believed their pupils know what people in engineering do, but fewer than one third of young people claim to do so. Engineering is the area of work relating to STEM that they know the least about.

Ulster University

Credit: Engineering UK 2017 Report

New Industrial Strategy for NI

- The Department for the Economy recently published its Draft Industrial Strategy for Northern Ireland – Economy 2030. It is welcome that within the draft strategy one of the "Five Pillars of Growth" is focused on "*Enhancing education, skills and employability*".

- In this regard, it is important that this revision to the Skills Barometer reflects the priorities and milestones identified in the strategy. The Industrial Strategy aims for 80,000 new jobs by 2030* and the Skills Barometer High Growth scenario (which we recognise is highly aspirational but on which skills demand is based) assumes 87,000 new jobs by 2026.

- Therefore the assumptions used in the Skills Barometer to identify the demand for skills will support the delivery of the new Industrial Strategy.

* The final agreed strategy document will include targets against a wider range of indicators.

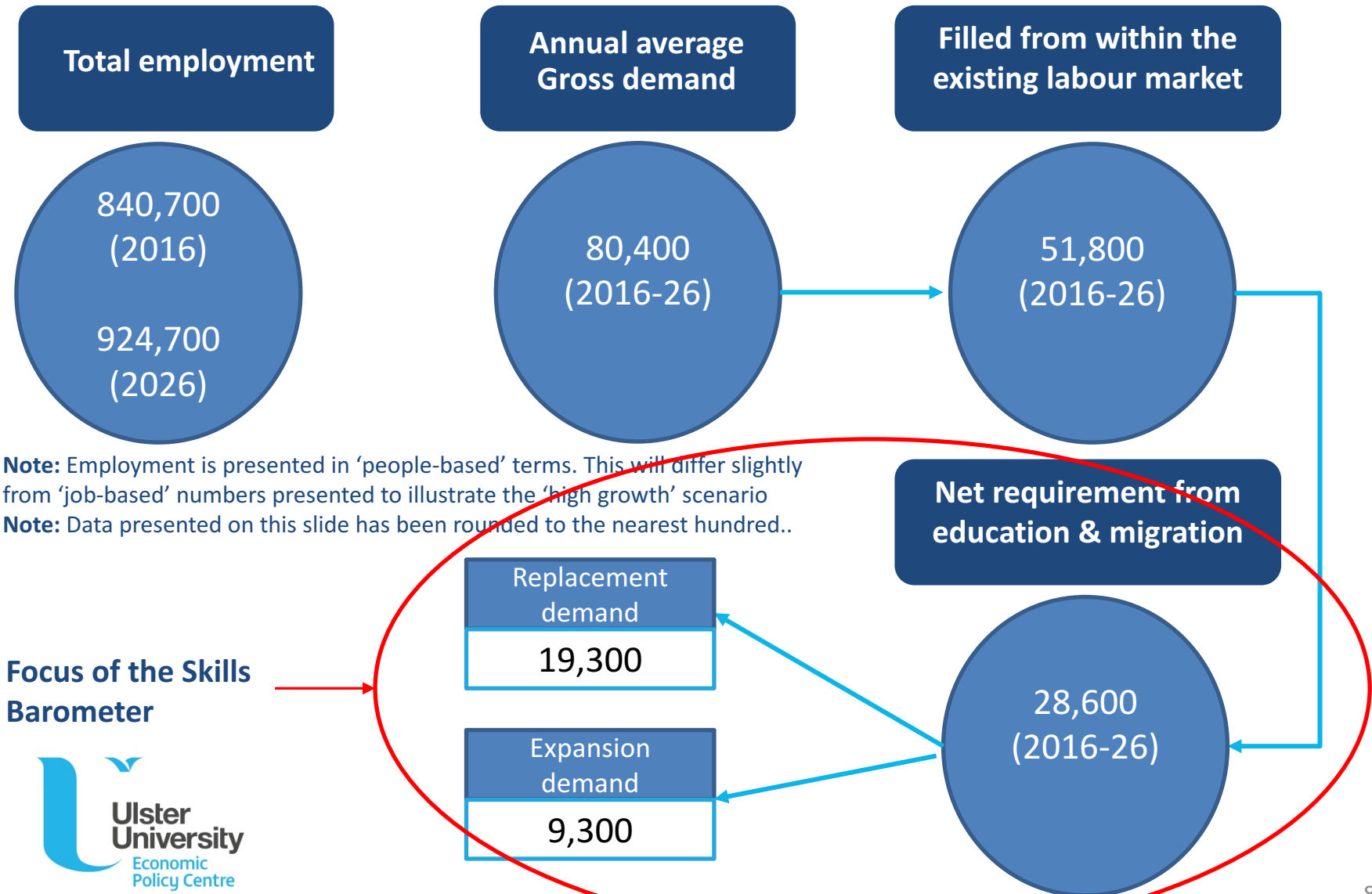Ulster University
Economic Policy Centre

New Industrial Strategy for NI

- The Draft Industrial Strategy for Northern Ireland – Economy 2030, finds that small advanced economies cannot be expert or world class in every area and has undertaken research to identify the following priority sectors for growth.

Priority Sectors for Growth	
Financial, Business and Professional Services	Life and Health Sciences
Digital and Creative Technologies	Agri-Food
Advanced Manufacturing, Materials and Engineering	Construction and Materials Handling

- The growth assumptions applied in the Skills Barometer also reflect these priority areas.

Ulster University Economic Policy Centre

Supply and demand

Total employment

840,700
(2016)

924,700
(2026)

Annual average Gross demand

80,400
(2016-26)

Filled from within the existing labour market

51,800
(2016-26)

Note: Employment is presented in 'people-based' terms. This will differ slightly from 'job-based' numbers presented to illustrate the 'high growth' scenario
Note: Data presented on this slide has been rounded to the nearest hundred..

Net requirement from education & migration

28,600
(2016-26)

Focus of the Skills Barometer

Replacement demand

19,300

Expansion demand

9,300

Ulster University
Economic Policy Centre

Skills projections

Assessment of current and projected skills mix

The skills mix refers to the proportion of staff in a sector with a particular level of skills as measured on the National Qualifications Framework (NQF) scale. This scale is set out below:
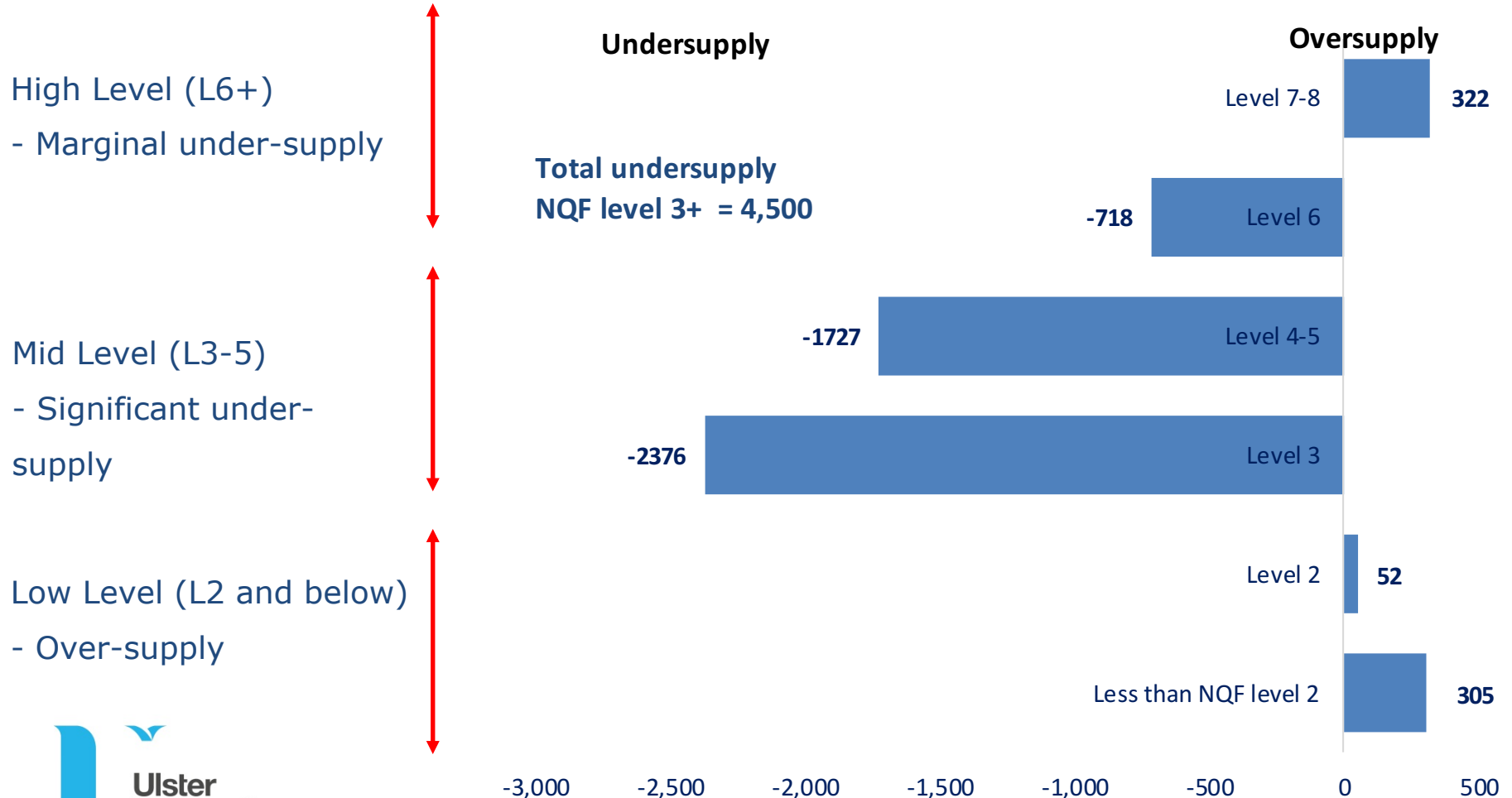
- Level 8 – PhD/ Doctorate
- Level 7 – Masters
- Level 6 – Honours Degree
- Level 5 – HND and equivalent
- Level 4 – Diploma, HNC and equivalent
- Level 3 – A-Levels and equivalent
- Level 2 – GCSEs (Grades A – C)
- Level 1 – GCSEs (Grades D – G)
- Level 0 – No qualifications

Ulster
University
Economic
Policy Centre

The High Growth Scenario

- **The assumptions on job creation (and demand for skills) used in the Skills Barometer are based on this High Growth scenario.**

- The job growth assumptions are detailed further below and have been compared to actual job growth achieved in the period 1997 to 2007 (the last period of sustained employment growth). A few key points:

  - The overall forecast level of job creation from 2016 to 2026 is lower than the ten year period to 2007 (10.1% compared to 16.9%). In contrast the baseline forecast employment growth is 3.8%.

  - Assumed growth in ICT and Professional Services is ambitious but still lower than in 1997 to 2007.

  - Manufacturing is forecast to grow significantly reversing a long term trend of decline and typically in higher value sectors driven by an increase in FDI.

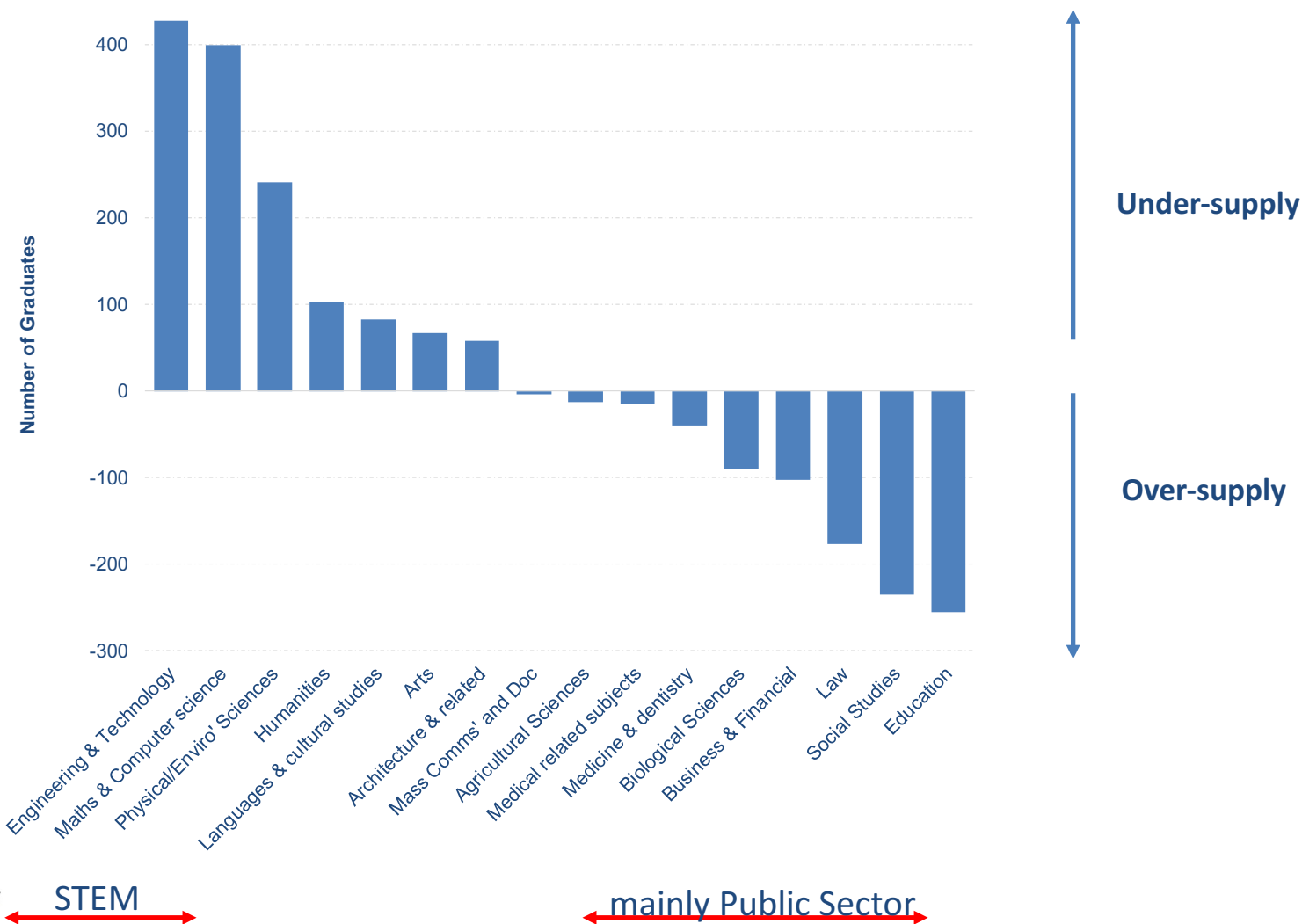 - A more detailed analysis between baseline and high growth is set out in Annex B1 and B2.

Ulster University
Economic Policy Centre

Supply gap – NQF Level

Annual average labour market supply gap (NQF L1 to L8)

Undersupply   **Oversupply**

High Level (L6+)
- Marginal under-supply

Total undersupply
NQF level 3+ = 4,500

Level 7-8	**322**
-718 Level 6	
-1727 Level 4-5	
-2376 Level 3	

Mid Level (L3-5)
- Significant under-supply

Level 2	**52**
Less than NQF level 2	**305**

Low Level (L2 and below)
- Over-supply

-3,000   -2,500   -2,000   -1,500   -1,000   -500   0   500

Ulster University
Economic Policy Centre

11

NQF L6+ supply gap – Broad subject area

Annual average supply gap NQF L6+ (JACS 1 digit)

Under-supply

Over-supply

STEM

mainly Public Sector

Source: HESA, EPC

NQF L4-5 supply gap – Broad subject area

Annual average supply gap NQF L4-5 (SSAs 1 digit)
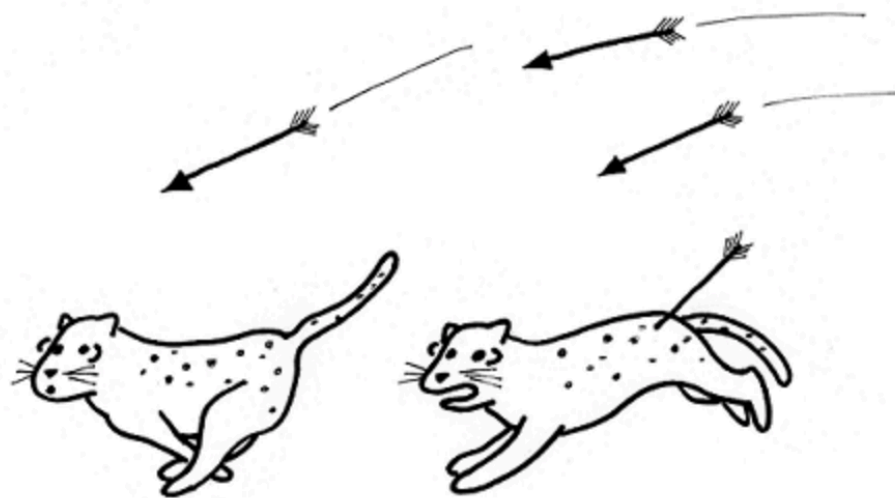

Source: HESA, EPC

13
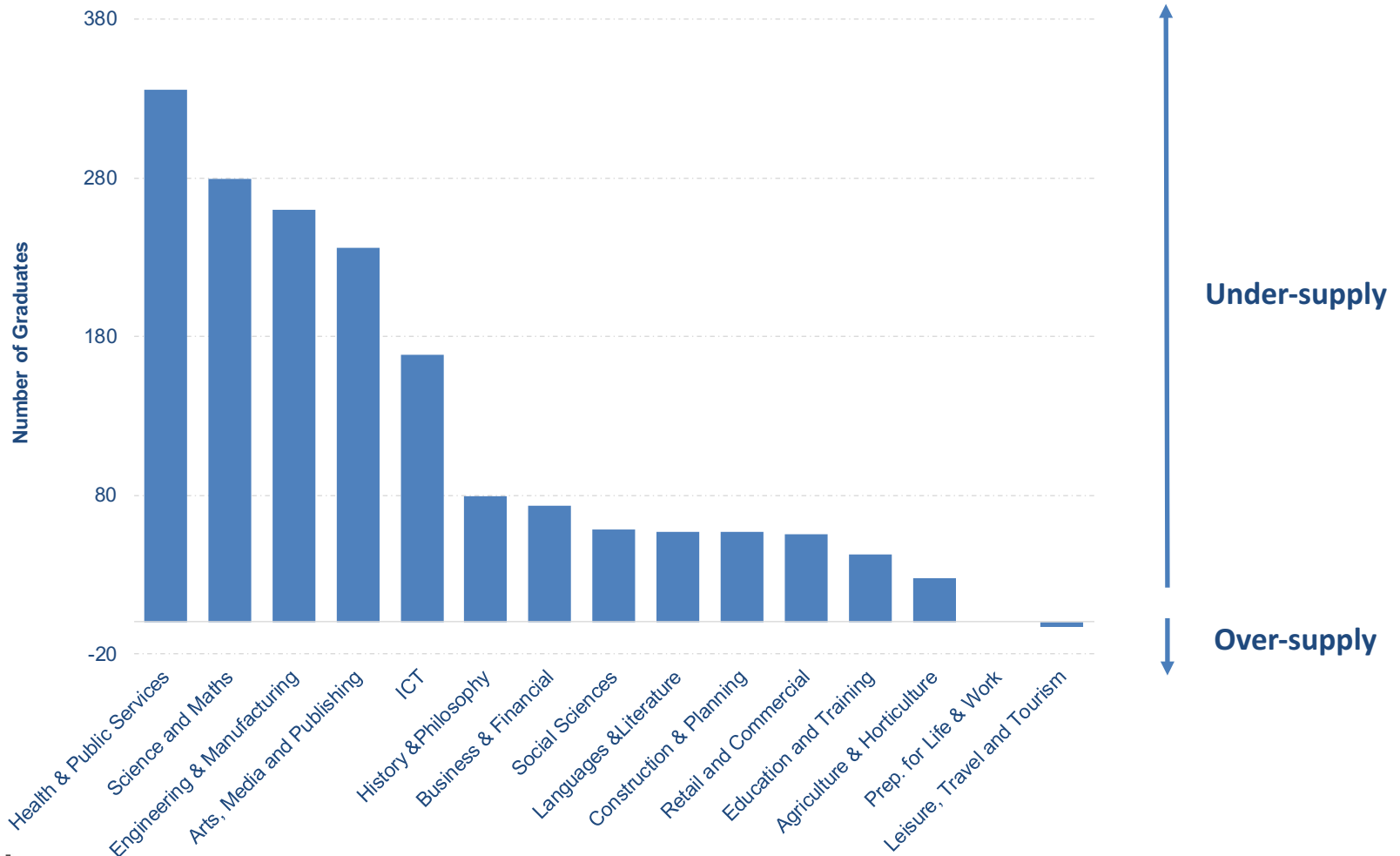
Increasing STEM provision

- **Removing barriers to studying STEM subjects** – work to increase provision could also explore any barriers to students taking up STEM courses and identify ways to address these barriers. This work could be wide ranging but some examples could include:

  - Gender – is there sufficient work being done to ensure that courses and a career in STEM areas are seen as attractive to both genders?

  - Pathways onto STEM courses – is it possible to expand the number of pathways onto STEM related courses and/ or promote existing pathways further?

  - Teaching of STEM related entry subjects – are pedagogical changes required to STEM related subjects in post-primary education to encourage higher levels of uptake in tertiary education.

Ulster
University
Economic
Policy Centre

Homo Sapiens
300,000 years old?

HUMANS

The geeks of the animal kingdom

Credit: Abstruse Goose
PS. Spear heads are much older than this!