May 2024

Skills for Biopharma

Prepared by the EGFSN Secretariat

Expert Group on
Future Skills Needs

Expert Group on Future Skills Needs

- Independent advisory body established in 1997; key element of the "skills architecture" in Ireland
- Key Functions:
  - Advises Government on projected skills requirements for enterprise
  - Makes recommendations on how existing education and training system can address the skills needs identified
  - Advises on any skills requirements that cannot be met internally and so must be met through inward migration
  - Works to ensure relevant authorities progress implementation plans
- Membership: Government Departments (DETE, DFHERIS); Enterprise Development Agencies (EI, IDA), HEA, SOLAS, Business, Unions
- Secretariat, based in DETE, provides the EGFSN with research and analysis support

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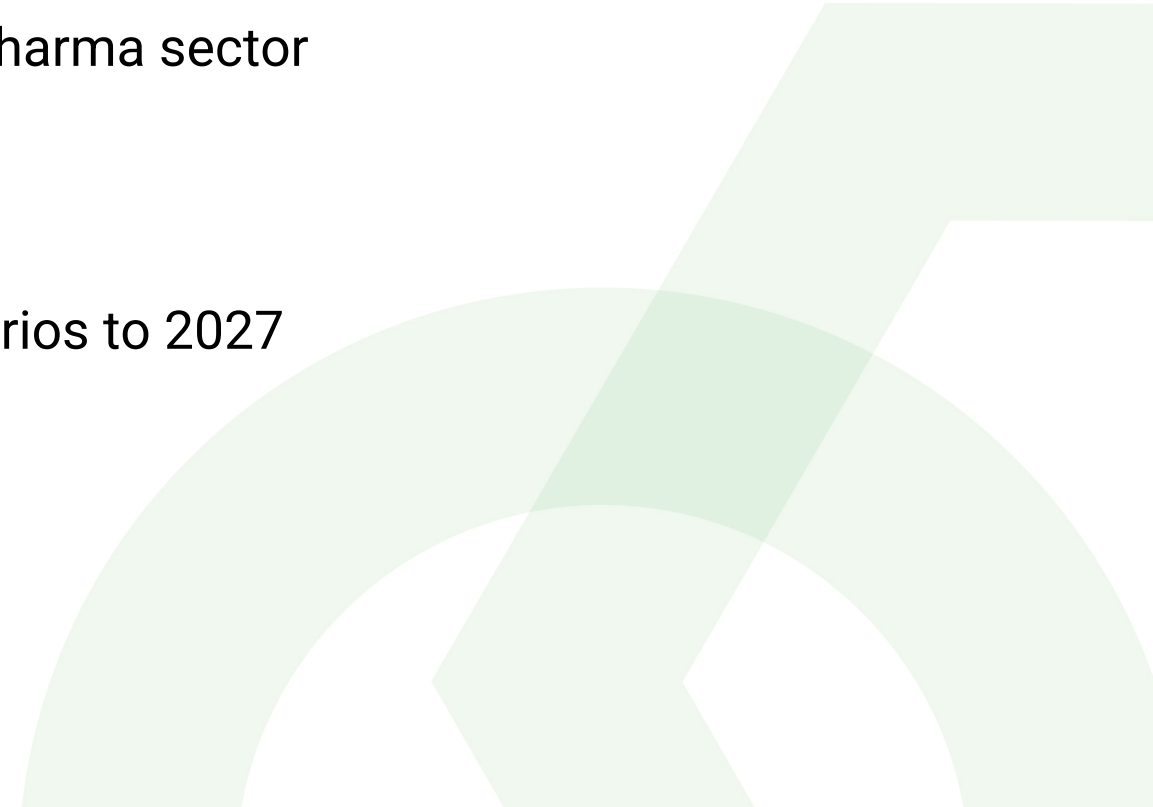## Introduction: Objective and Methodology

1.1 Background and Rationale

- Biopharma is a strategically important and rapidly growing component of the Irish economy.

- The availability of a highly skilled workforce and supportive skills ecosystem is central to Ireland's present and future success.

- In 2016, the EGFSN published a report on "Future Skills Needs of the Biopharma Industry in Ireland"

- Now is an appropriate time to update that analysis.

1.2 Objective

To review and forecast of the current and future manufacturing and services skills needs in the Biopharma sector to ensure that it can realise its full growth potential, including:

- A profile of the Biopharma sector in Ireland

- An assessment of the growth trajectory of the Biopharma sector

- A review of existing skills supply channels

- A skills demand and supply forecast within 3 scenarios to 2027

- Recommendations

1.3 Methodology

Qualitative data:

- 25 Biopharma company interviews

- 3 regional workshops

Statistical analysis:

- Employment trends

- Existing skills supply

- Forecasting gaps between skills demand and supply to 2027

Literature review

2

Profiling the Biopharma sector and its skills needs

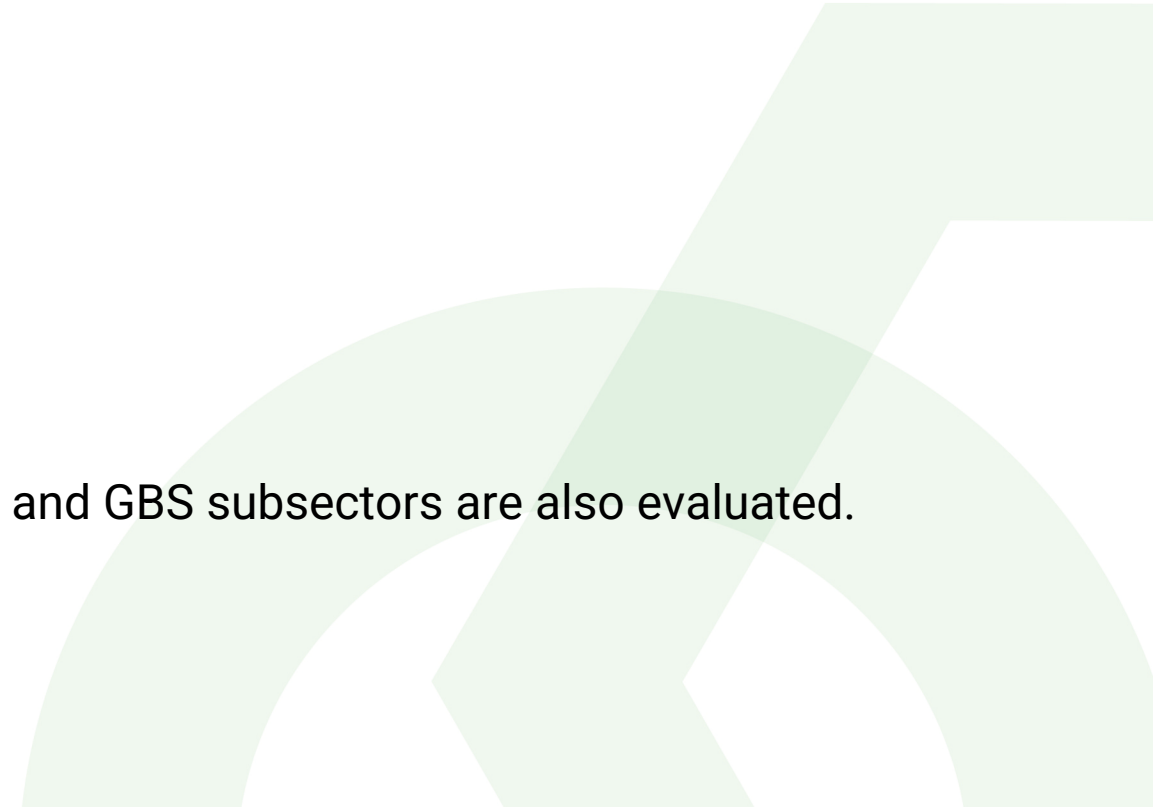# 2.1 Biopharma subsectors and business functions

To best reflect Ireland's niches within the global Biopharma value chain, the study focusses on the skills needs of the following subsectors

1. Small Molecule manufacturing (including synthetic pharmaceuticals and non-pharmaceutical chemicals)

2. Biologics/Large Molecule manufacturing

3. Other Manufacturing activities

4. Services activities, including:

   - Global Business Services

   - Biopharma Services

   - Specialty Pharma Services

2.2 Mapping Roles and Competencies in the Biopharma Sector

The main personnel roles/functions within a typical Biopharma company were identified and categorised under the following broad functional areas:

- Research & Development

- Production

- Regulatory Affairs

- Quality Control

- Supply chain, Procurement and Planning

- Environmental / Occupational Health & Safety (EHS)

- The distinctive skills needs of the Biopharma Services and GBS subsectors are also evaluated.

2.3 Key Industry Trends and Drivers of Skills Demand

- **New therapies**, particularly:
  - **Biologics**- monoclonal antibodies
  - **ATMPs** and **CGTs:** important areas of future growth opportunity

- Continuing importance of **Small Molecule manufacturing**

- The growth of Ireland as a hub for **Global Business, Biopharma and Specialty Pharma services**

- **Increased Global Competition**

- **AI** and **Big Data**

- **Sustainability**
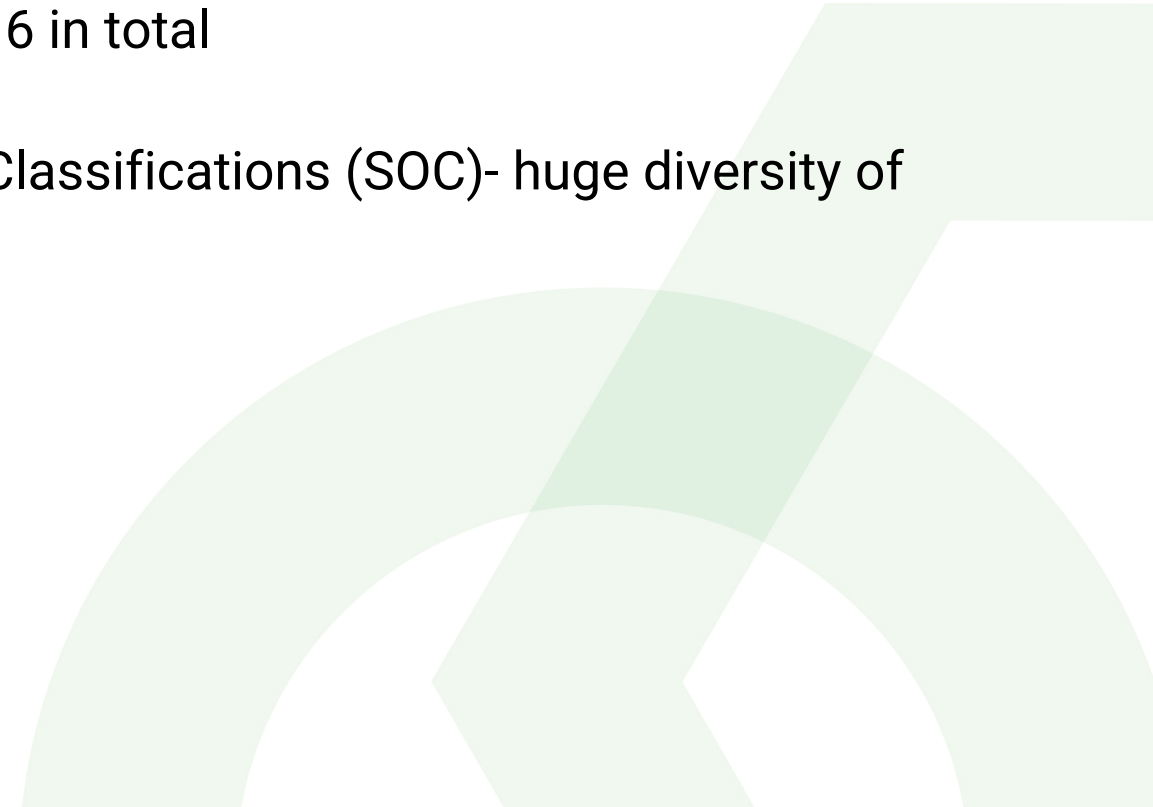
2.4 Employment Trends 2016-2022

	Employed 2022	% change since 2016	Total additional Jobs
Manufacturing	**37,949**	**55%**	**13,465**
Biologics	18,080	98%	8,928
Small Molecule	18,351	31%	4,367
Other Manufacturing	1,518	13%	170
Services	**11,621**	**84%**	**5,310**
Global Business Services	1,752	86%	808
Biopharma Services	7,332	79%	3,232
Specialty Pharma Services	2,537	100%	1,270
Grand Total	**49,570**	**61%**	**18,775**
Source: EGFSN analysis, 2023			

2.5 Employment Trends: Biopharma subsectors 2016-2022

Chart data:

Subsector	Employed 2016 (n)	Employed 2022 (n)	% Growth 2016-2022
Biologics	~9,200	~18,100	98%
Small Molecule	~14,000	~18,400	31%
Other Manufacturing	~1,350	~1,500	13%
Global Business Services	~950	~1,750	86%
Biopharma Services	~4,100	~7,300	79%
Specialty Pharma Services	~1,250	~2,500	100%

Legend: Employed 2016 (n) — Employed 2022 (n) — % Growth 2016-2022
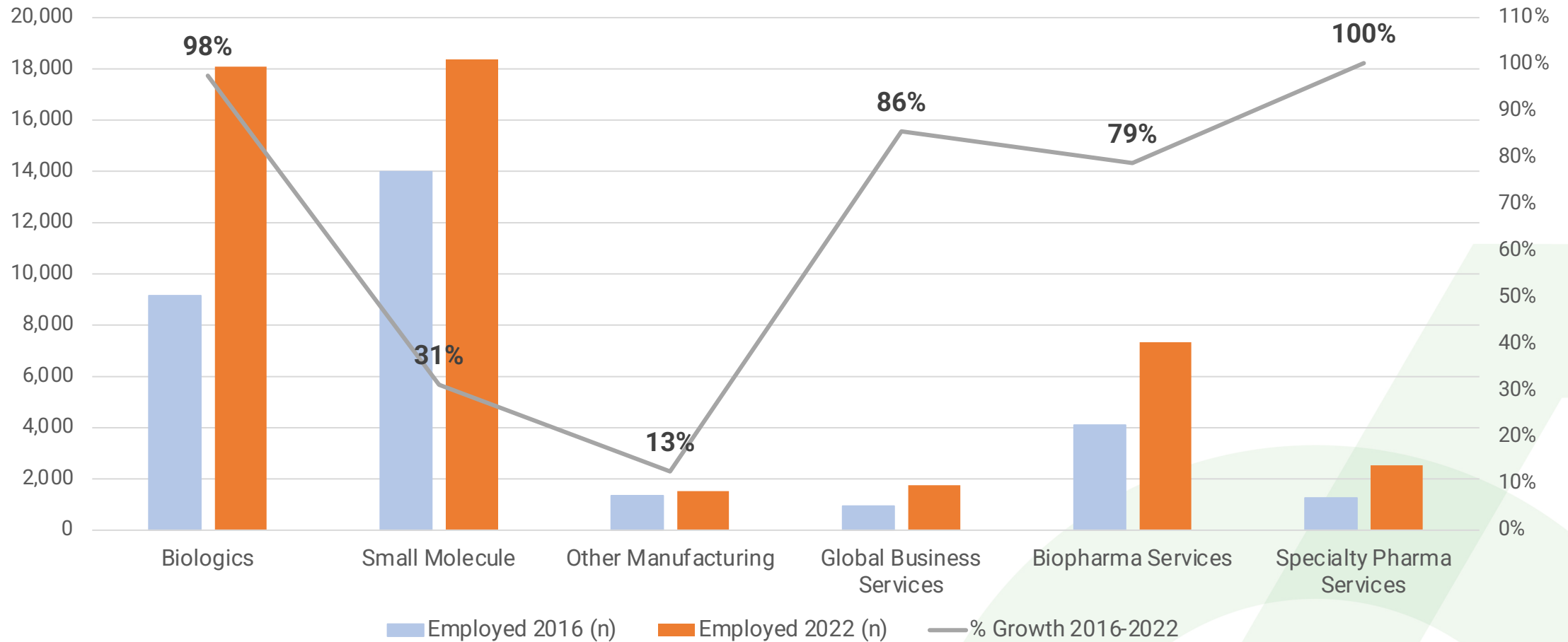
2.6 Employment Trends: Employment Permit Data 2016-2023

- **877** employment permits issued to Biopharma and chemical firms in 2023- up by 416% since 2016

- Nearly **2,700** employment permits issued since 2016 in total

- Permits issued for over 80 Standard Occupational Classifications (SOC)- huge diversity of manufacturing and service roles

2.7 Broad Expert Insights

- Staff **Recruitment** and **Retention**

- Shortages of **Senior Directors**

- Lack of availability of **higher technical qualifications** (NFQ Level 6+)

- **Ready-for-Industry Skill Sets**

2.8 Expert Insight: Specific Skills Challenges

- **Innovation** and **R&D skills**

- **QC** and **Regulatory skills**

- **Transversal skills:** project management, technical writing and team working

- **Skills for Digital Transformation:** digitisation, digitalisation, overarching digital transformation skills

- **Engineers** with both digital and pharmaceutical manufacturing expertise

- **Digital Data scientists** with knowledge of Biopharma manufacturing

- **Chemists/Pharmacists** who understand artificial intelligence (AI)

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Modelling Gaps between Skills Demand and Supply to 2027

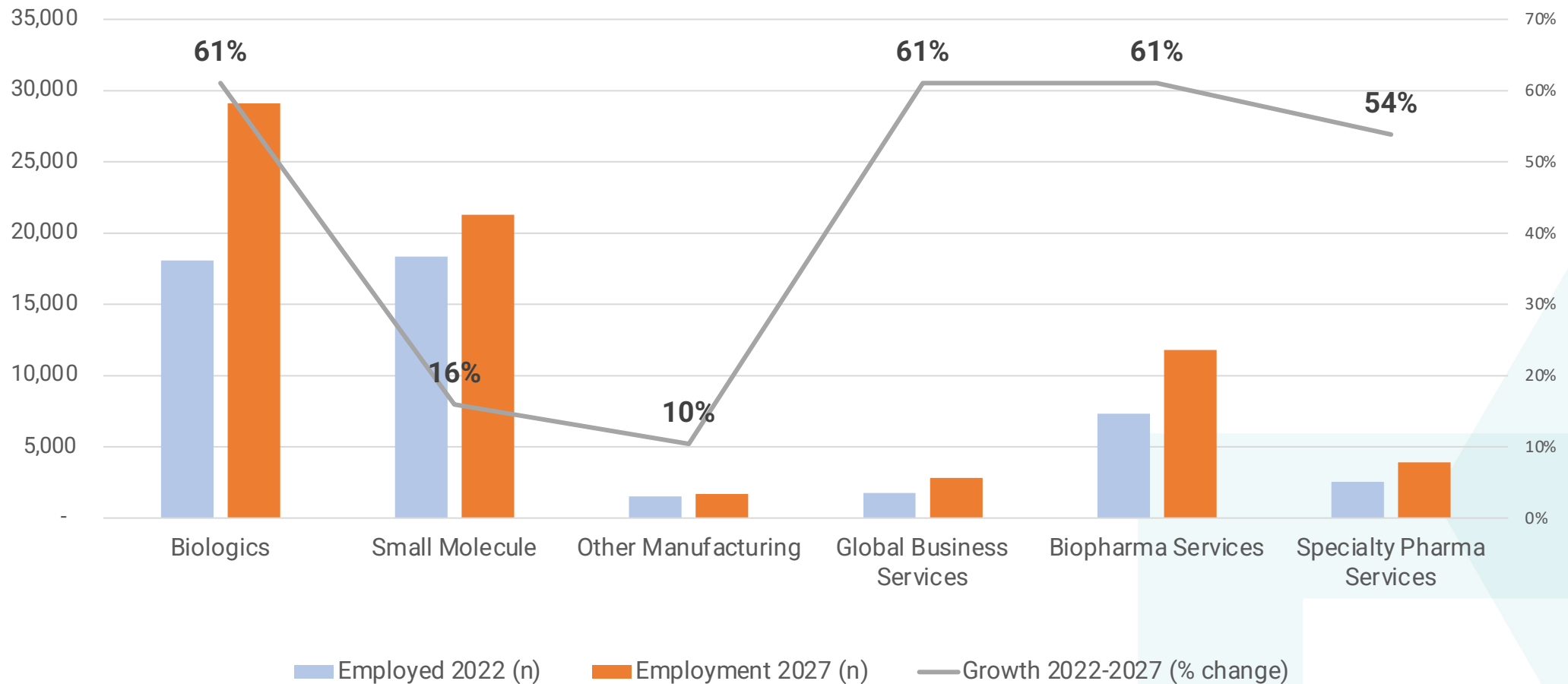# 3.1 Modelling Skills Demand 2023-2027: Employment Growth

Three scenarios were developed to forecast the likely future employment trends in the Biopharma sector:

Low Growth: Global Forecast

5.39%[110]

CAGR to 2027 based on global forecast growth for the Biopharma sector applied uniformly across all of its subsectors.

Medium Growth: Expert Estimate

7.2%

CAGR to 2027 based on enterprise agency expert estimates of the growth potential of the Biopharma sector and each of its subsectors.

High Growth: Historical Trend

8.3%

CAGR to 2027 based on the Biopharma sector and each its subsectors maintaining their historical post-2016 growth rates.

3.2 Forecast Biopharma employment to 2027 (all scenarios)

	Employed 2023	Employed 2027	CAGR
High: Historical Trend			
Manufacturing	40,964	56,257	8%
Services	12,865	19,331	11%
Grand Total	**53,828**	**75,588**	**8%**
Medium: Expert Estimate			
Manufacturing	40,338	52,068	7%
Services	12,618	17,646	9%
Grand Total	**53,096**	**70,601**	**7%**
Low: Global Forecast			
Manufacturing	39,994	49,340	5%
Services	12,247	15,109	5%
Grand Total	**52,242**	**64,449**	**5%**

Source: EGFSN analysis, 2023

3.3 Forecast Biopharma Employment by Subsector to 2027 (medium scenario)

Chart data labels:
- Biologics: 61%
- Small Molecule: 16%
- Other Manufacturing: 10%
- Global Business Services: 61%
- Biopharma Services: 61%
- Specialty Pharma Services: 54%

Legend:
- Employed 2022 (n)
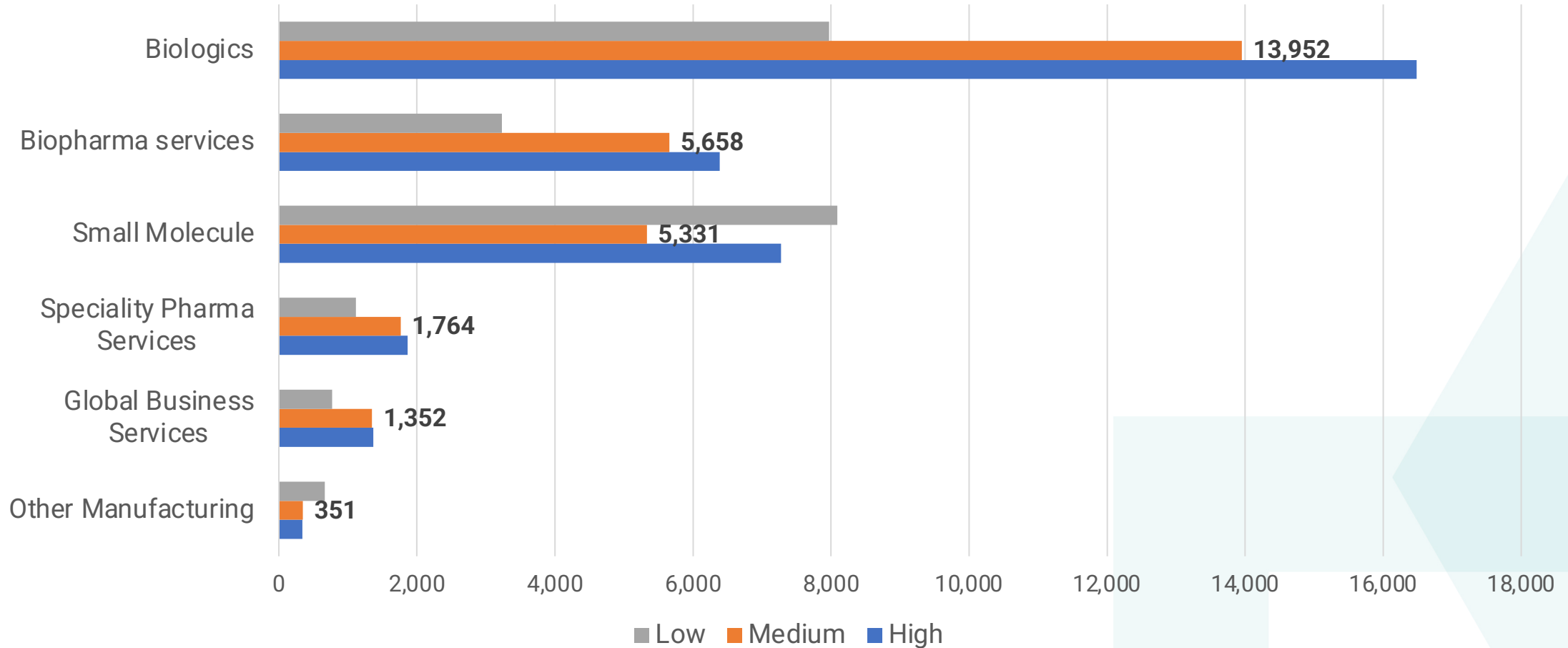- Employment 2027 (n)
- Growth 2022-2027 (% change)

3.4 Total Recruitment Need – Additional Jobs Created Plus Replacement Demand to 2027

	Additional jobs 2023-2027	Replacement jobs 2023-2027 @ 2.4% pa	Total recruitment needed 2023-2027	Average annual recruitment 2023-2027
High: Historical Trend				
Manufacturing	18,308	5,790	24,098	4,820
Services	7,710	1,912	9,622	1,924
Grand Total	**26,018**	**7,702**	**33,720**	**6,744**
Medium: Expert Estimate				
Manufacturing	14,119	5,516	19,635	3,927
Services	6,912	1,861	8,774	1,755
Grand Total	**21,031**	**7,377**	**28,408**	**5,682**
Low: Global Forecast				
Manufacturing	11,391	5,345	16,736	3,347
Services	3,488	1,637	5,125	1,025
Grand Total	**14,879**	**6,982**	**21,861**	**4,372**

Source: EGFSN analysis, 2023

3.5 Forecast Overall Recruitment Need by Subsector to 2027- All Scenarios

Biologics		**13,952**
Biopharma services		**5,658**
Small Molecule		**5,331**
Speciality Pharma Services		**1,764**
Global Business Services		**1,352**
Other Manufacturing		**351**

■ Low ■ Medium ■ High

3.6 Supply: Biopharma Skills Sources

- HE and FET

- Human Capital Initiative

- Springboard+

- Biopharmachem Skillnet

- Apprenticeships

- Specialist providers: GetReskilled, Innopharma, NIBRT, SSPC etc.

3.7 Supply: Estimated Graduate Entry to Biopharma 2020 (all disciplines)

2020 Awards	Level 4 & Level 4/5	Level 5-6 (FET)	Non-aligned (Other FET)	Level 6-7 (HE)	Level 8	Level 9 & 10	Prof	Total
Awards by NFQ level	2,809	26,577	12,384	18,121	42,939	29,333	1,840	134,003
Estimated entering employment (%)	44%	60%	60%	73%	77%	83%	100%	72%
Estimated entering employment (n)	1,236	15,946	7,430	13,228	33,063	24,346	1,840	97,089
Estimated entering employment in Industry NACE B-E (%)	21%	21%	21%	21%	11%	11%	11%	15%
Estimated entering employment in Industry NACE B-E (n)	260	3,349	1,560	2,778	3,637	2,678	202	14,464
Estimated entering Biopharma (%)	14%	14%	14%	14%	14%	14%	14%	14%
Estimated entering Biopharma (n)	**36**	**469**	**218**	**389**	**509**	**375**	**28**	**2,025**

Source: EGFSN Analysis of SLMRU/HEA and CSO data, 2023

3.7 Gap between Forecast Graduate Entry to Biopharma and Overall Recruitment Need to 2027

|	2023	2024	2025	2026	2027	Total 2023-2027	Average 2023-2027
Forecast recruitment demand (net growth+ replacement)							
High: Historical Trend	5,550	6,087	6,681	7,337	8,065	33,720	6,744
Medium: Expert Estimate	4,800	5,201	5,640	6,121	6,646	28,408	5,682
Low: Global Forecast	3,926	4,137	4,360	4,595	4,843	21,861	4,372
Estimated annual graduate entry to Biopharma	**2,386**	**2,520**	**2,661**	**2,810**	**2,967**	**13,343**	**2,669**
Estimated gap between demand/entry							
High: Historical Trend	**-3,164**	**-3,567**	**-4,020**	**-4,528**	**-5,098**	**-20,377**	**-4,075**
Medium: Expert Estimate	**-2,414**	**-2,682**	**-2,980**	**-3,311**	**-3,679**	**-15,066**	**-3,013**
Low: Global Forecast	**-1,540**	**-1,618**	**-1,700**	**-1,786**	**-1,876**	**-8,518**	**-1,704**

Source: EGFSN analysis, 2023

3.8 Gap between forecast graduate inflow to Biopharma and overall recruitment needs to 2027

Medium scenario:

- Over **21,000** additional jobs by 2027

- Potential shortfall of around **3,000** graduates entering Biopharma on average 2023-2027 without policy interventions

- Need for upskilling/reskilling of existing staff an additional demand on the skills pipeline: Potentially over **46,000** people 2023-2027

3.9 Conclusion:10 Priority Areas for Action

1. Strengthening STEM Education in Schools

2. Increasing Capacity for Education & Training at Tertiary Level

3. Increasing Collaboration between Industry and Academia

4. Promoting Careers in Biopharma

5. Promoting New Pathways into the Sector
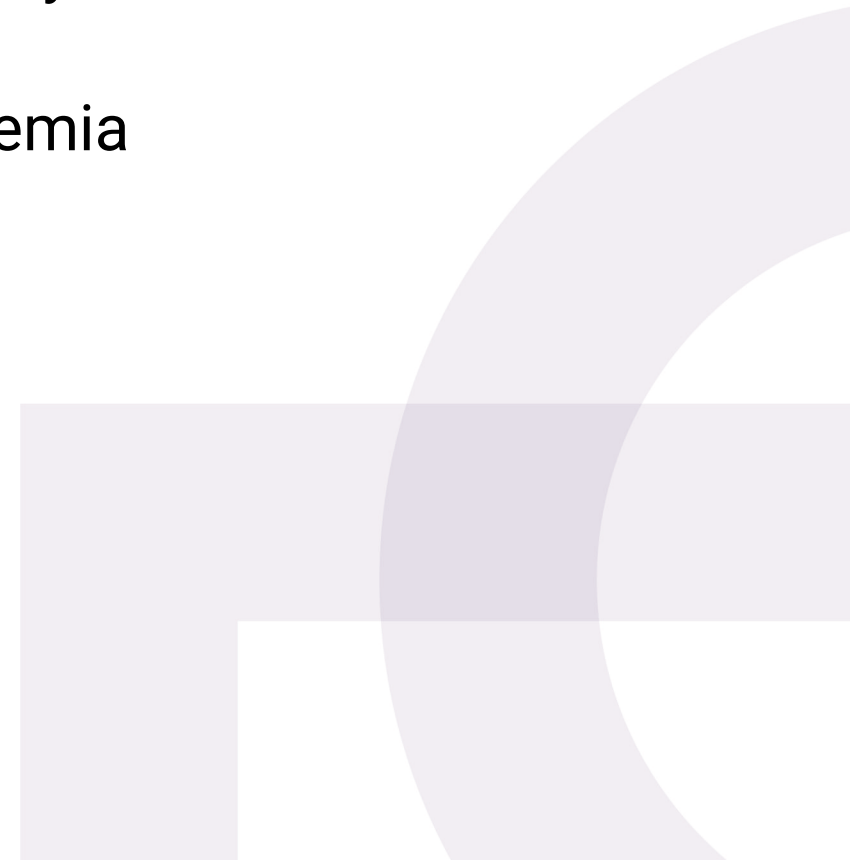
3.9 Conclusion:10 Priority Areas for Action

6. Developing Leadership and Transversal Skills

7. Growing Digital Skills

8. Accelerating the Development of Skills for ATMPs

9. Fostering an Environment of Diversity and Collaboration

10. Developing a Skills Framework and Further Skills Mapping

4

Recommendations

1. Strengthening STEM Education

1. Enhance and **increase access to digital and STEM** (Science Technology Engineering Mathematics) at both primary and post-primary levels. *[D Education]*

2. Continue to **support** the development of digital and **STEM skills through industry engagement with schools**. *[BPCI (Ibec), NIBRT, Industry, D Education]*

2. Increasing the Capacity for Education & Training

1. HE and FET institutions will continue to provide and **build upon existing provision** to address the current and evolving skills demands of the Biopharma sector. [**DFHERIS**, *HEA*, **IUA**, **THEA**, *SOLAS, HEIs, ETBs, Skillnet Ireland*]

2. Continue to **promote postgraduate study opportunities** including study within specialist research centres. [**SFI**, *Industry, HEIs, HEA, NIBRT, SSPC, PMTC*]

3. **Consider investing to extend** the **Centre for Research Training PhD programme** to embrace the needs of the Biopharma sector. [**SFI**, *DFHERIS, Skillnet Ireland*]

4. HE and FET providers to develop and **roll-out micro-credentials and micro-qualifications** for the Biopharma sector. [**IUA, SOLAS,** *Industry, BPCI, THEA, HEIs, HEA, HCI MicroCreds Project, Biopharmachem and Technology Ireland ICT Skillnets, RSFs, NIBRT, Skillnet Ireland*]

5. Develop **a lifelong learning strategy for the sector**, focussed on upskilling and reskilling existing staff to fill future roles. [**BPCI**, *Biopharmachem and Connected Health Skillnets, DFHERIS, SOLAS, Education providers and Industry*]

3. Increasing Collaboration between Industry and Academia

1. Establish **a permanent strategic Biopharma stakeholder forum** to monitor and coordinate responses to emerging skills needs. [**BPCI**, *Industry, Biopharmachem Skillnet, Connected Health Skillnet, Skillnet Ireland, RSFs, SOLAS, ETBs, in collaboration with relevant stakeholders and government bodies.*]

2. Supplement this with **a recurring conference** where relevant organisations can come together to educate and inform one another. [**BPCI**, *Industry, Skillnet Ireland, RSFs, in collaboration with relevant Research Centres and Biopharmachem Skillnet*]

3. Form **a working group focussed on education and skills** within the Biopharma sector, in conjunction with the IDA and BPCI. [**GBS firms**, *Biopharmachem Skillnet, Technology Ireland ICT Skillnet, SOLAS, BPCI, IDA, American Chamber of Commerce, NIBRT, Regional Skills Fora, TU Dublin*]

4. Promoting Careers in Biopharma

1. **Industry should promote Biopharma as a career choice** with multiple entry points for people of all backgrounds through:

    - Developing a more structured approach for industry engagement **with 2nd level** *[BPCI, D Education, Industry]*

    - developing **a career promotion strategy for the sector** *[BPCI, NIBRT, Industry, DFHERIS]*

    - **creating an online catalogue** of Biopharma jobs **[BPCI**, *NIBRT, Industry]*

2. **Promote the career journeys** and options available **in Biopharma GBS** and Services. *[GBS Firms, BPCI, IDA, Industry]*

5. Developing Apprenticeships and Traineeships

1. **Promote and develop apprenticeships** more effectively in Biopharma, including NFQ levels 6 to 10. *[Industry, BPCI, DFHERIS, NAO, HEA]*

2. Establish **a group to** discuss how best to increase and **promote traineeships** for the sector. *[ETBs, HEA, Industry, BPCI, DFHERIS, SOLAS)*

3. **Establish a coordinated national internship programme** between the **GBS**, Biopharma and Specialty Pharma services industries and relevant HEIs FET bodies. *[GBS Firms, BPCI, HEIs, HEA, IUA, THEA, (+ MTU), SOLAS, ETBs]*

6. Developing Leadership and Transversal Skills

1. Ensure the **development of leadership and transversal skills**, through **collaboration between industry and academia**, including:

   - **Regular meetings** between IUA and THEA and industry **to assess transversal skills needs** *[IUA, THEA, HEIs, ETBs, HEA, SOLAS, BPCI, Industry]*

   - Ensuring that transversal skills are **embedded** in technical/scientific courses *[IUA, THEA, HEIs, ETBs, HEA, SOLAS, BPCI, Industry]*

   - Leadership, transversal and soft skills are **developed within companies**. **[Regional Skills Fora**, Biopharmachem Skillnet, Connected Health Skillnet, SOLAS, Industry, Training providers]

7. Growing Digital Skills

1. Carry out **a skills needs analysis for Digital Transformation skills** with the aim of creating a tailored course addressing the needs of the BPC services. [*Biopharmachem Skillnet, Technology Ireland ICT Skillnet*, *Skillnet Ireland, BPCI, DMI, American Chamber of Commerce, IDA]*

2. **Support digitalisation across the sector**. Encourage uptake of **the Digital Transition Fund**. *[EI, IDA, Industry, I5.0LN , BPCI, DMI, DFHERIS, SOLAS, ETBs, Skillnet Ireland, Biopharmachem Skillnet, HEIs, IUA, THEA, HEA]*

3. Ensure that the required **skills are developed to support Industry 5.0**, including data science and analytical skills, and skills needed for digitalisation in the sector, including basic digital literacy. [*DFHERIS, SOLAS, ETBs, Skillnet Ireland, HEA, HEIs*, *Biopharmachem Skillnet, BPCI, DMI, NIBRT, ETBs, IUA, THEA]*

8. Accelerate the Development of Skills for ATMPs

1. Accelerate the development of an all island ATMP (Advanced Therapy Medicinal Products) ecosystem through investment in facilities, education and training, in conjunction with the NIBRT CGT Forum. [NIBRT, University of Galway, Industry, EI, IDA, BPCI]

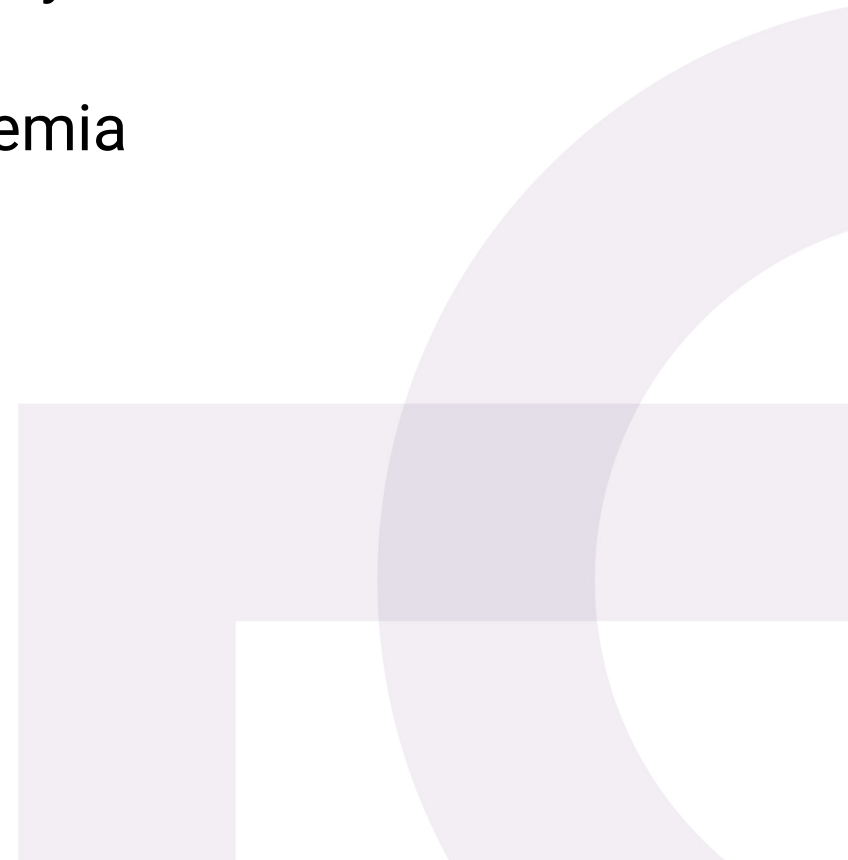# 9. Fostering an environment of diversity and collaboration

1. Create **an inclusive and diverse workforce** in the Biopharma sector by implementing policies that promote equal opportunities for all. *[**BPCI**, Industry]*

2. Encourage **diversity in recruitment practises**, provide scholarships/grants and mentor programmes to support the career development of individuals from marginalised communities. *[**BPCI**, Industry]*

10. Developing a Skills Framework and Further Skills Mapping

1. Develop **a skills framework for the Biopharma sector**, including both manufacturing and services. *[**Biopharmachem Skillnet**, NIBRT, Industry, BPCI, other relevant bodies]*

2. Develop **elective modules** to meet the BPC sector's GBS needs **integrated into the MSc & Diploma courses**. Undertake a needs analysis to define the specific skills gaps in Pharma / GBS areas could collaboratively be carried out by both Skillnets supported by BPCI. *[**Biopharmachem Skillnet**, GBS Firms, Technology Ireland ICT Skillnet, BPCI, Industry]*

4.2 Recommendations Summary

1. Strengthening STEM Education in Schools

2. Increasing Capacity for Education & Training at Tertiary Level

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Thank you

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