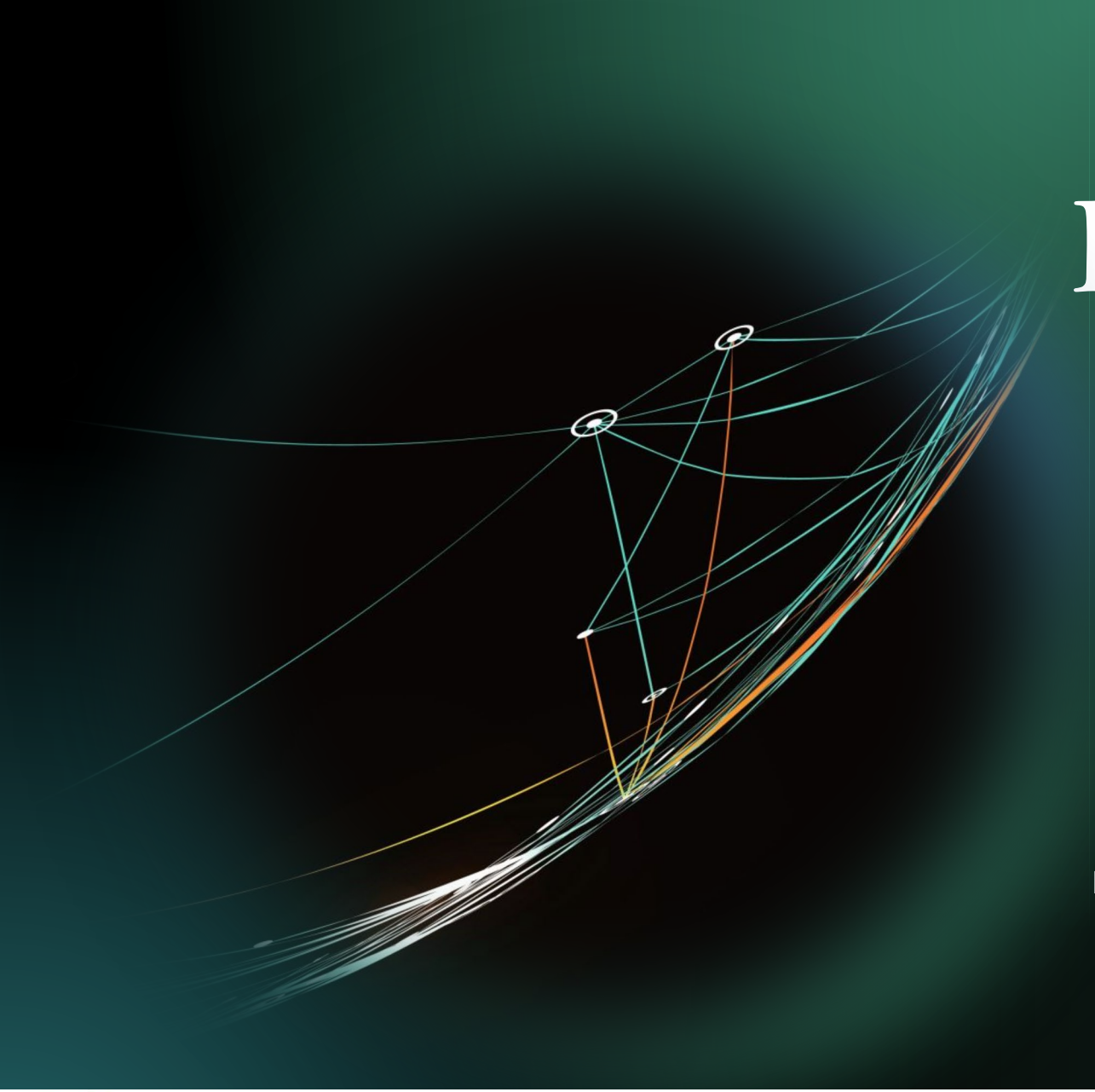

Blockchain Skills in Ireland & UK

BY DR ADELE WHELAN

POSITION: SENIOR RESEARCH OFFICER, ECONOMIC AND SOCIAL RESEARCH INSTITUTE; ADJUNCT ASSOCIATE PROFESSOR, TRINITY COLLEGE DUBLIN (ECONOMICS)

EVENT: **BLOCKCHAIN SKILLS CONFERENCE** (VIRTUAL, HOSTED BY THE ESRI)

DATE: 1 JUNE 2022

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE
digital futures at work research centre
chaise blockchain skills for Europe
US UNIVERSITY OF SUSSEX | BUSINESS SCHOOL
UNIVERSITY OF LEEDS Leeds University Business School
UKRI Economic and Social Research Council

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- Seamus McGuinness (Research Professor)
- Paul Redmond (Senior Research Officer)
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- Special thanks to Abian Garcia Rodriguez (European Commission), Prof. Nachiappan Subramanian (DIGIT), and Dr Wil Hunt (DIGIT)

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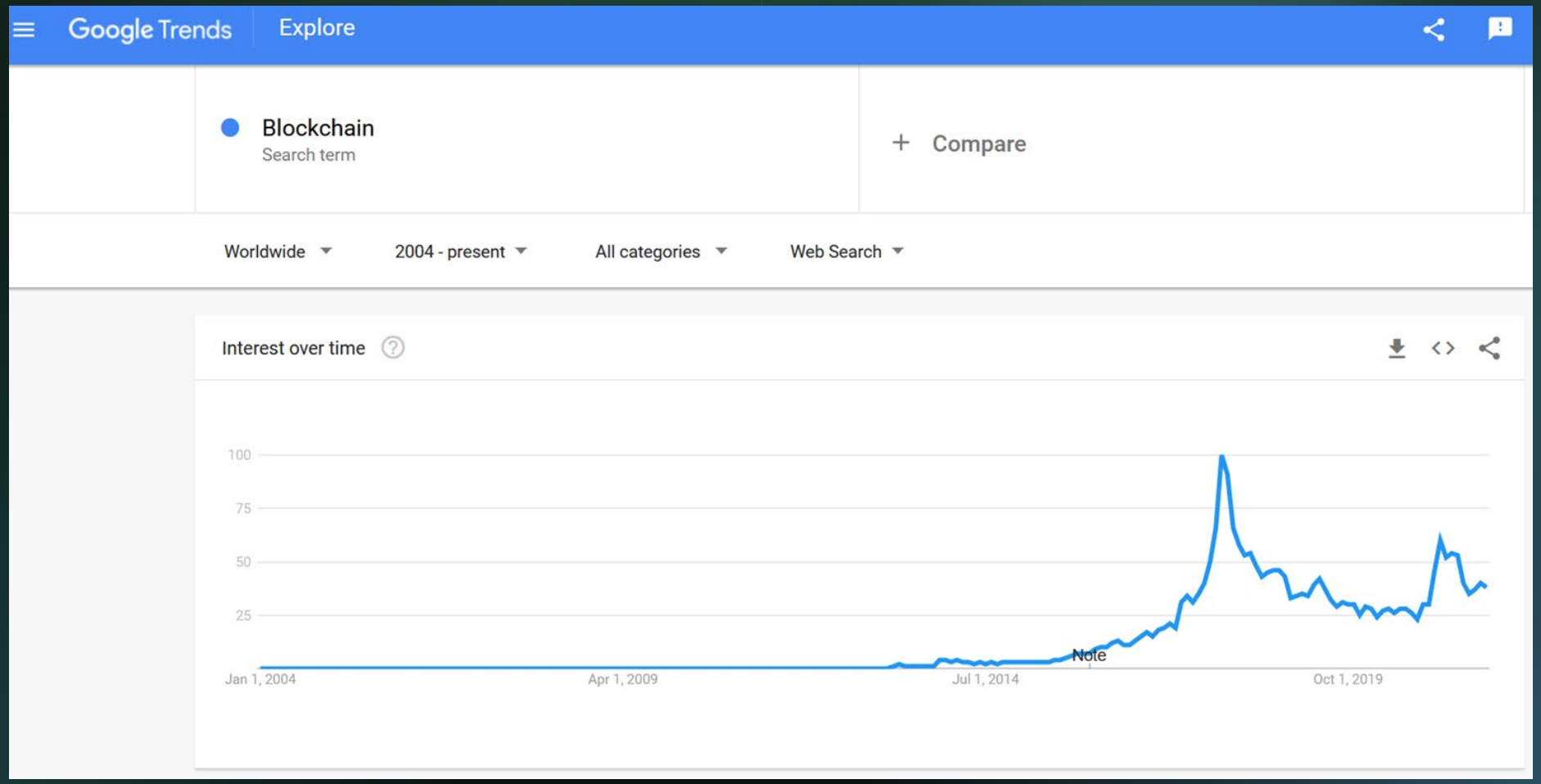
Why?

- Interested in examining emerging technologies and the associated impact on both the demand and supply of skills
- Blockchain : timeframe post-2013



Blockchain Skills: Mismatch

- **Demand**
  - **Step 1:** Examined job advertisements by scaping all LinkedIn jobs for mentions of "Blockchain" in either job title or job description
  - **Step 2:** Matched all jobs to ISCO (3-digit)
  - **Step 3:** Estimated the share of these occupations that were blockchain related
  - **Step 4:** Consultations with industry experts

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- **Supply**
  - **Step 1:** Examined graduates data on those qualifying in blockchain relevant/specific courses (ICT/Computer Science)
  - **Step 2:** Examine the course types
  - **Step 3:** Estimated the share of these graduates that are blockchain-specific
  - **Step 4:** Consultations with industry experts

Key findings…

1. Most people are not familiar with Blockchain, or Distributed Ledger Technology (DLT)

"a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network" (IBM)

- Blockchain is accepted internationally as both an emerging technology and emerging skill set, and the global blockchain market is predicted to grow from $7 billion to over $160 billion by 2029

2. "developers and UX designers are already rare, and, as blockchain is a specialization, it makes [the Blockchain] employee rarer"

Key findings: Demand

3. As a share of total jobs advertised: Blockchain jobs are a very small component in both the UK, Ireland and Europe

4. Core occupations and associated ISCO codes are: Software Developers (2512); Systems Analysts (2511); and Information and Communications Technology Services Managers (1330)

- As a share of these occupations, Blockchain jobs play a significant role (BC Developers, BC Architects, BC Managers)

Key findings: Demand

5. Most jobs advertised as full-time positions. Despite high levels of education among existing blockchain employees, over 40% of job adverts did not specify minimum education requirement (perhaps because of difficulties in recruitment)

6. While the important basic skills appear to be "experience in programming skills, web development, and an eagerness to learn". In terms of future progress, there was an understanding that "increasing specialization will be required due to technological progress" in "larger and more diverse application areas"

	Blockchain Jobs (LinkedIn)	Total Jobs (LinkedIn)	% of Total Jobs
Austria	142	37,203	0.38%
Belgium	216	63,217	0.34%
Bulgaria	350	8,171	4.28%
Croatia	102	2,298	4.44%
Cyprus	50	1,279	3.91%
Czechia	197	36,852	0.53%
Denmark	155	15,357	1.01%
Estonia	53	2,081	2.55%
Finland	86	8,910	0.97%
France	1088	697,752	0.16%
Germany	2624	1,007,673	0.26%
Greece	85	6,607	1.29%
Hungary	261	14,277	1.83%
Ireland	352	38,246	0.92%
Italy	650	173,254	0.38%
Latvia	14	1,588	0.88%
Lithuania	65	4,093	1.59%
Luxembourg	109	6,571	1.66%
Malta	49	2,602	1.88%
Netherlands	731	475,026	0.15%
Poland	1111	112,459	0.99%
Portugal	277	66,868	0.41%
Romania	647	24,871	2.60%
Slovakia	158	3,875	4.08%
Slovenia	22	1,292	1.70%
Spain	585	64,093	0.91%
Sweden	132	52,376	0.25%
United Kingdom	2,173	717,031	0.30%
Total	12,484	3,645,922	0.34%

Blockchain Job Adverts: LinkedIn

- UK : 2,173 'blockchain jobs' (0.30% of all jobs advertised on LinkedIn)
- IRELAND : 352 'blockchain jobs' (0.92% of all jobs advertised on LinkedIn)
- As of the 4th of November 2021

Source: LinkedIn Data, Calculated by Authors

Distribution of Blockchain Jobs by ISCO Categories

	Ireland		UK		EU-27	
	Freq.	*%*	**Freq.**	*%*	**Freq.**	*%*
(ISCO 251) Software and Applications Developers and Analysts	155	*48%*	517	*53%*	3,923	*58%*
(ISCO 133) Information and Communications Technology Services Managers	49	*15%*	269	*27%*	1,008	*13%*
(ISCO 252) Database and Network Professionals	75	*23%*	35	*4%*	340	*5%*
(ISCO 121) Business Services and Administration Managers	21	*7%*	39	*4%*	580	*10%*
(ISCO 261) Legal Professionals	6	*2%*	11	*1%*	41	*1%*
Other	15	*5%*	108	*11%*	1,014	*12%*
Total	**321**	**100%**	**979**	***100%***	**6,906**	**100%**

Source: LinkedIn Data, Calculated by Authors

Blockchain Skills in Demand (Europe)

Blockchain skills and competencies requested					
Technical		**Business**		**Transversal**	
Coding	**67%**	Product development	**42%**	Teamworking	**62%**
Design	**51%**	Management	**23%**	Communication	**51%**
Networking	**30%**	Design	**17%**	Responsibility	**44%**
Front/Backend	**28%**	Finance	**7%**	Self-efficacy	**24%**
Engineering	**20%**	Compliance	**7%**		
Bitcoin	**20%**	Marketing	**6%**		

Source: CHAISE Survey on Skills, Calculated by Authors

Key findings: Supply

7. As a share of total graduates, Blockchain graduates are a very small component in both the UK, Ireland and Europe

8. Total number of ICT and Computer Science graduates are growing in recent years

Key findings: Supply

9. As a share of these ICT graduates, those from general courses are declining while we observe increases in Software & applications development & analysis, AI and Gaming

10. Specific training programmes and courses in blockchain are available (approx. 11 in Ireland) but their uptake is slow

Total ICT Graduates

	2014	2015	2016	2017	2018	2019	Increase 2014 to 2019
Ireland	3,111	4,256	4,624	5,109	6,197	6,271	101%
UK	25,345	23,356	23,144	24,600	26,515	28,583	13%
EU-Other	106,449	118,596	112,664	117,438	117,016	128,638	21%
Total EU-28	134,905	146,208	140,432	147,147	149,728	163,492	21%

Source: Eurostat

Ireland: Graduates by Course Area

ISCED Discipline	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)
Computer use (0611)	12.1	11.4	9.8	8.9	6.4	6.5	4.5
Database & network design & administration (0612)	5.3	6.2	5.3	5.8	5.4	6.4	6.8
Electronics & automation (0714)	22.0	22.1	22.5	22.2	21.6	20.8	19.9
Information and Communication Technologies (ICTs) not further defined or elsewhere classified (0610)	31.4	31.3	33.2	32.9	34.8	34.8	34.5
Interdisciplinary programmes & qualifications involving Information & Communication Technologies (0688)	4.2	3.7	3.6	3.0	1.0	0.7	0.6
(0613) Software & applications development & analysis	**25.0**	**25.3**	**25.7**	**27.3**	**30.8**	**30.8**	**33.6**
Total ICT	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	**5,254**	**5,241**	**5,445**	**5,557**	**5,510**	**6,207**	**7,058**

Source: Higher Education Authority (HEA), Oct 2021

UK: Graduates by Course Area

	HESA Computer science qualifiers by discipline	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)
	Computer science	67.00	66.74	67.54	69.17	69.64	52.69
	Information systems	20.23	19.39	16.50	15.29	14.10	6.07
	Software engineering	6.93	6.57	6.54	6.42	6.49	7.34
	Artificial intelligence	**1.06**	**1.10**	**1.33**	**1.55**	**1.82**	**11.47**
	Health informatics	0.17	0.23	0.31	0.35	0.44	3.18
	Games	**3.62**	**4.58**	**6.02**	**5.83**	**5.96**	**12.92**
	Computer generated visual and audio effects	0.71	0.85	1.02	0.60	0.66	3.14
	Others in computer sciences	0.28	0.55	0.74	0.79	0.88	3.18
	Total Computer Science	100.00	100.00	100.00	100.00	100.00	100.00
	N	*26,770*	*26,410*	*27,815*	*29,925*	*31,805*	*33,595*

Source: Higher Education Statistics Agency (HESA), Aug 2021

Conclusions

- Novel methodology using current job advertising data to describe the nature of the current employment market in blockchain
  - provides a basis to forecast future demand & potential skills gaps

- Current skills requirements for blockchain workers are heavily concentrated in ICT and computer science (mix of technical, business and traversal skills required)

Conclusions

- The vast majority of emerging blockchain jobs are concentrated in three occupational groups: Software and Applications Developers and Analysts; ICT Services Managers; and Business Services and Administration Managers
  - Key roles for now and into the future are Blockchain Developers, Architects and Managers
- As blockchain demand grows, the lack of skills-specific training in ICT graduate populations could act as a constraint on growth

What's next?

- Forecast demand and supply for Blockchain jobs by country using labour force surveys & standard CEDEFOP occupational forecasting approaches

- Examine the determinants of cross-country (or cross regional) variations in blockchain related employment within a panel estimation framework

Thank You!