Patterns of co-occurrent skills in UK job adverts

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The Pissarides Review
into the Future of
Work and Wellbeing

Robots say they have no plans to steal jobs or rebel against humans
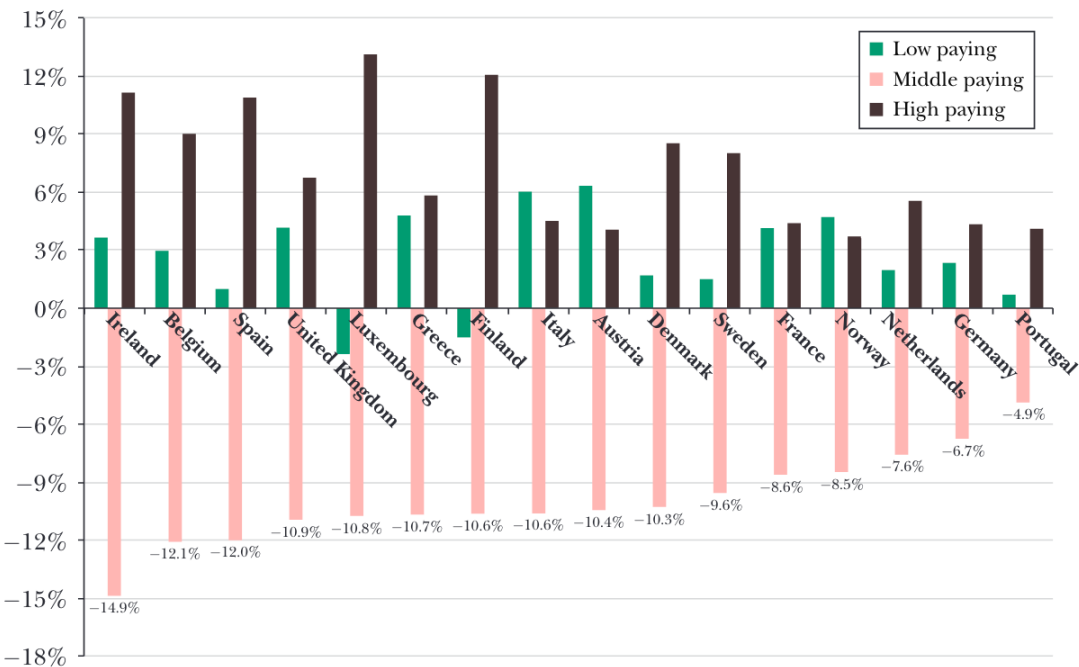
Humanoid robots speak - with some awkward pauses - in 'world first' press conference at Geneva AI summit

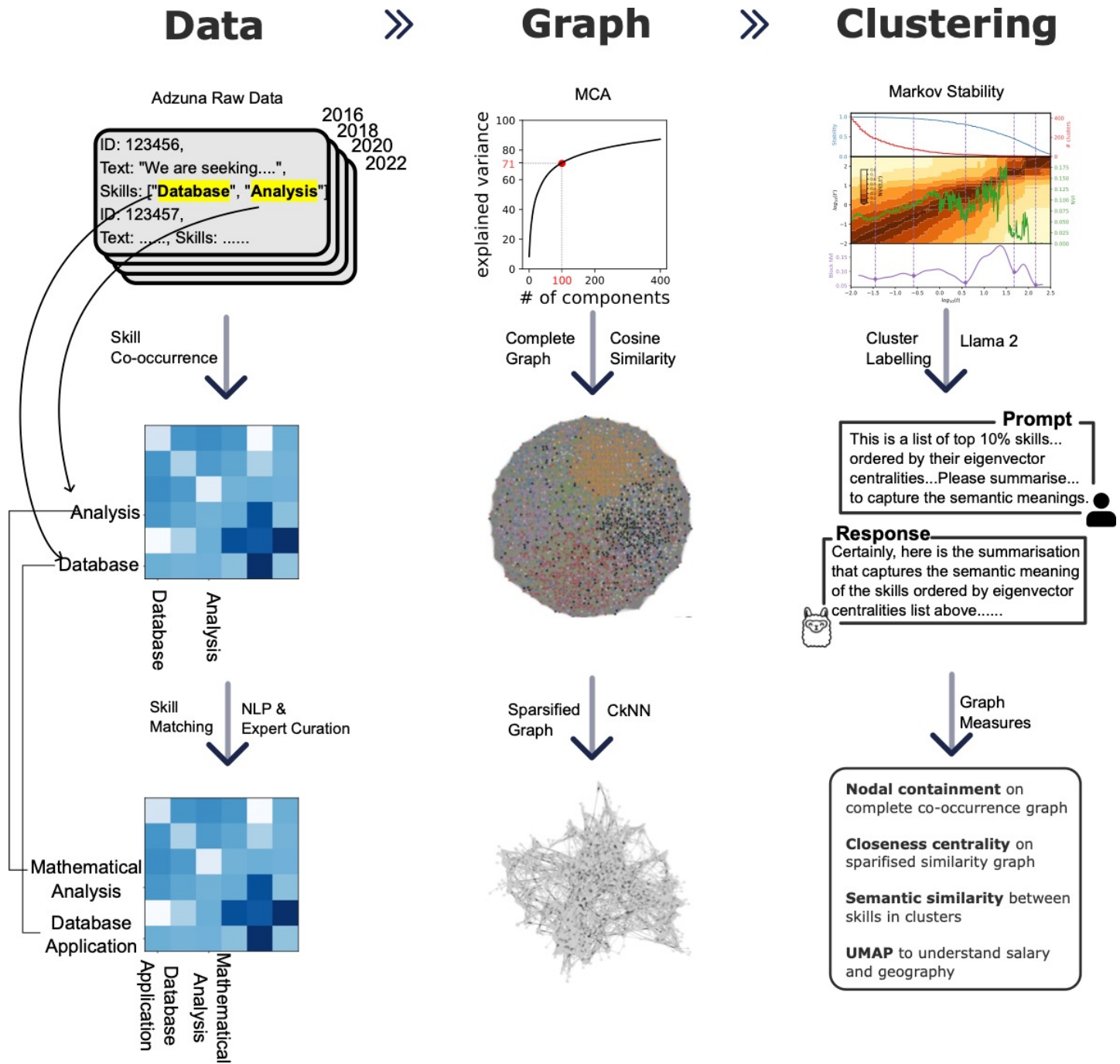# Why Are There Still So Many Jobs? The History and Future of Workplace Automation[†]

David H. Autor

Figure 3

Change in Occupational Employment Shares in Low, Middle, and High-Wage Occupations in 16 EU Countries, 1993–2010
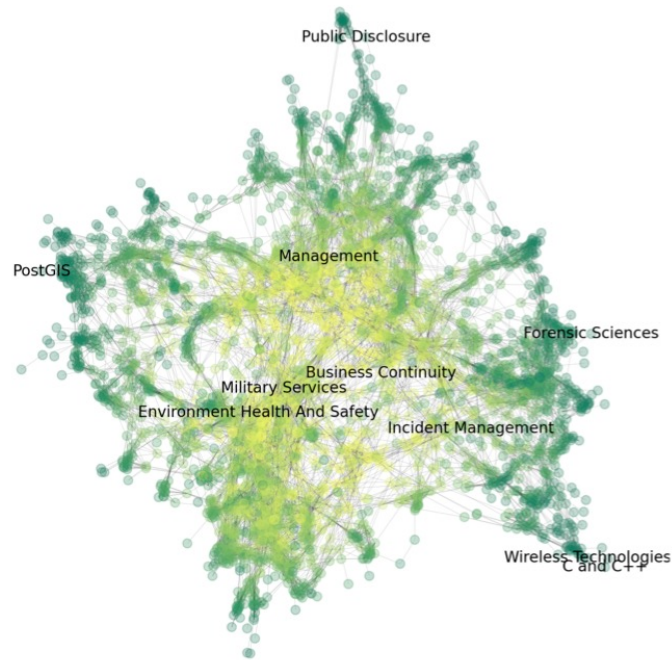
The Data

- 2016 (Apr-Dec), 2018, 2020, 2022
- Weekly snapshots
    - Duplicates vs. multiple roles (drop duplicate ad IDs)
- 197 million job adverts, 606,450 different organisations
    - Deduplicated to 65 million adverts

- Various metadata:
    - Location, occupation, industry, wages
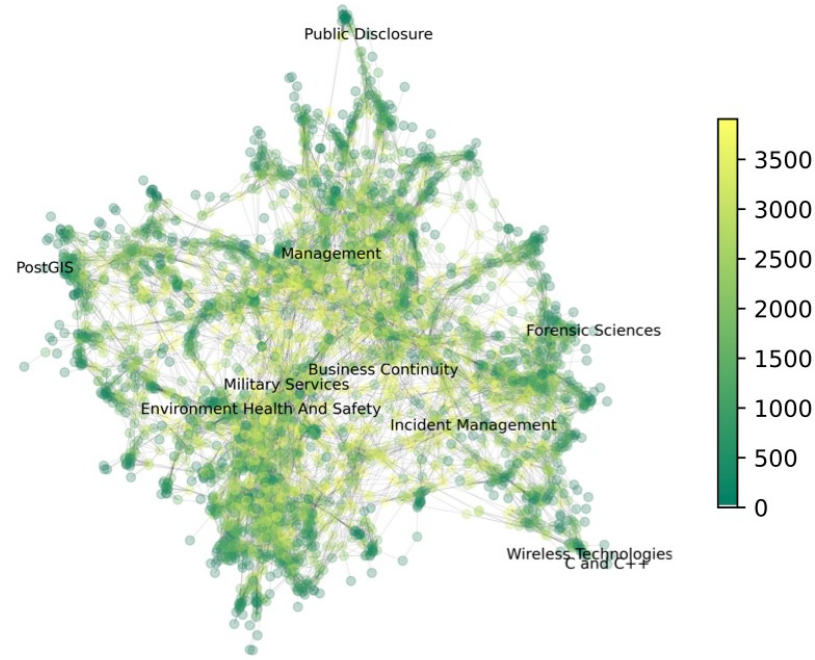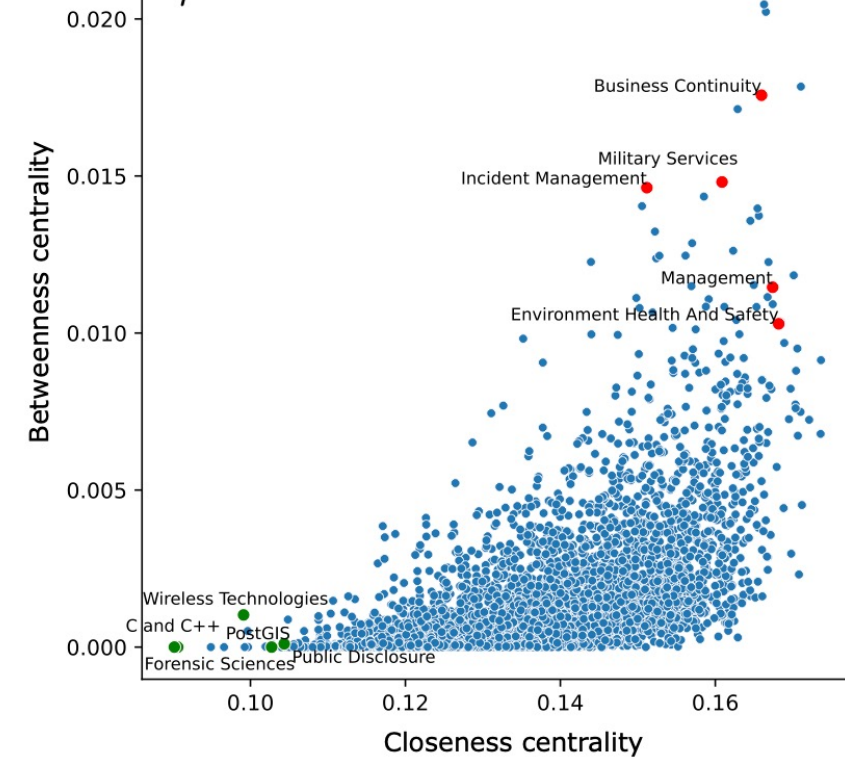   - Skills – free text and coded

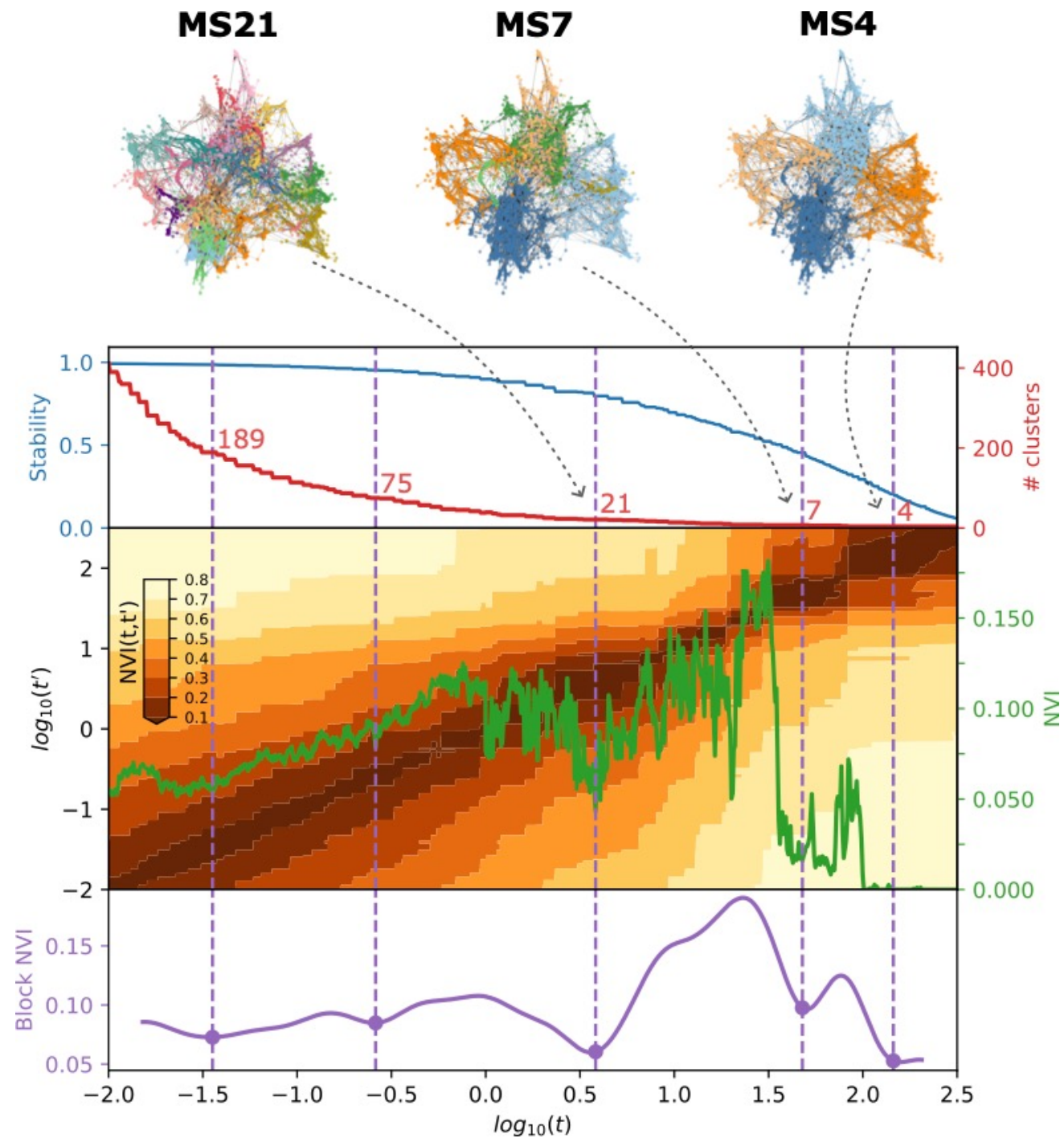# Pipeline

Centrality

a. Closeness centrality
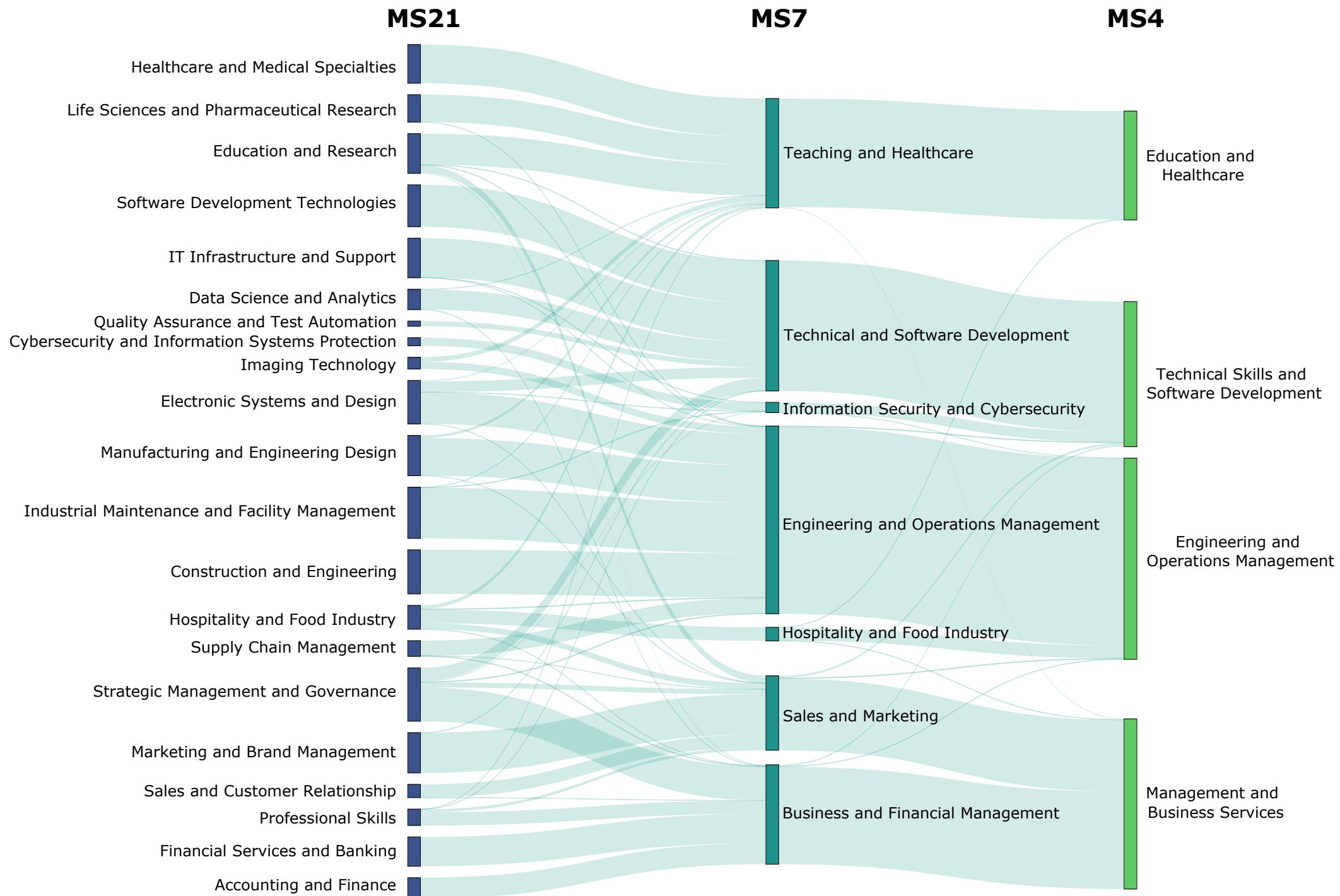
b. Betweenness centrality

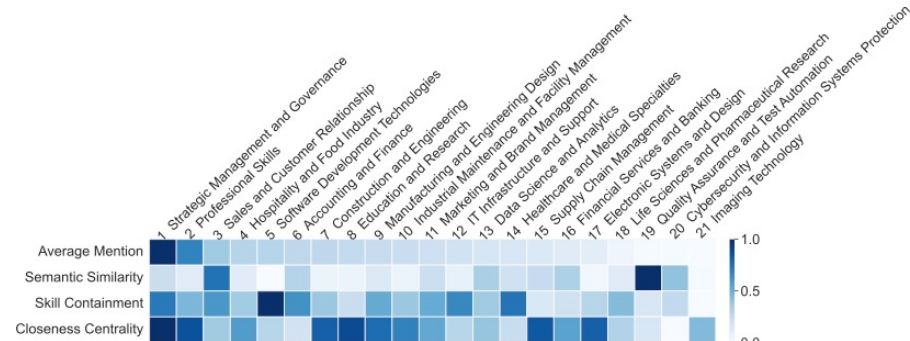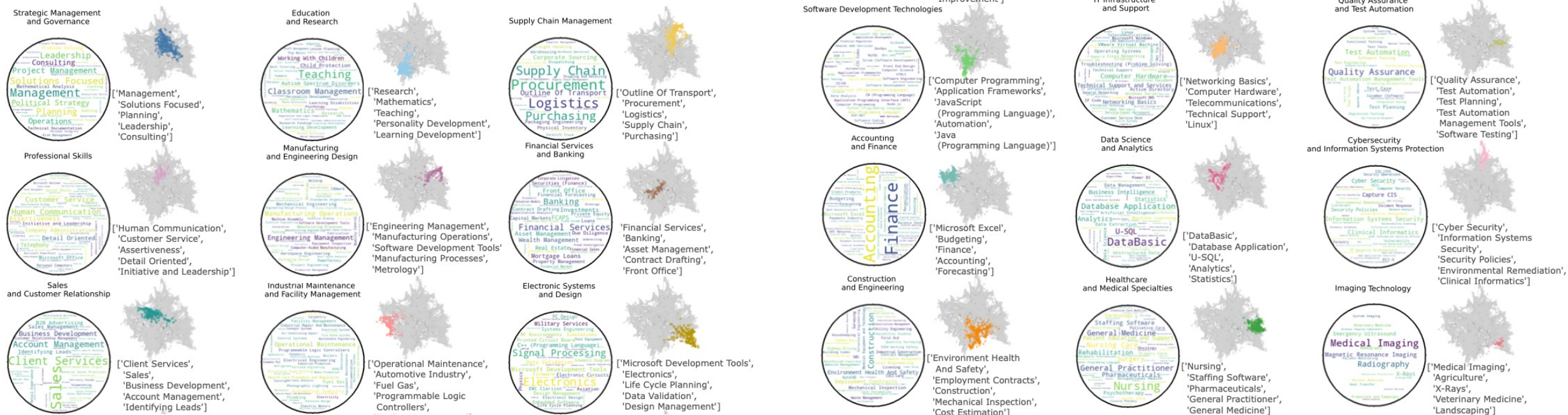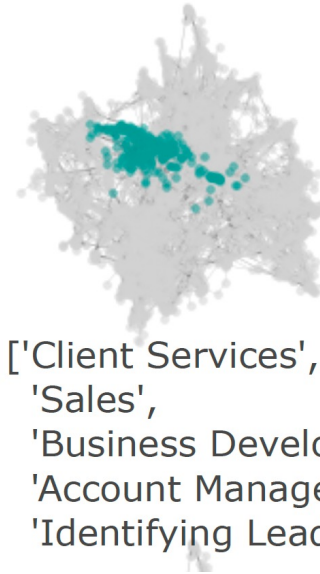**c.** $\rho = 0.66$

Markov
Stability

MS21	MS7	MS4
Healthcare and Medical Specialties	Teaching and Healthcare	Education and Healthcare
Life Sciences and Pharmaceutical Research	Technical and Software Development	Technical Skills and Software Development
Education and Research	Information Security and Cybersecurity	Engineering and Operations Management
Software Development Technologies	Engineering and Operations Management	Management and Business Services
IT Infrastructure and Support	Hospitality and Food Industry	
Data Science and Analytics	Sales and Marketing	
Quality Assurance and Test Automation	Business and Financial Management	
Cybersecurity and Information Systems Protection		
Imaging Technology		
Electronic Systems and Design		
Manufacturing and Engineering Design		
Industrial Maintenance and Facility Management		
Construction and Engineering		
Hospitality and Food Industry		
Supply Chain Management		
Strategic Management and Governance		
Marketing and Brand Management		
Sales and Customer Relationship		
Professional Skills		
Financial Services and Banking		
Accounting and Finance		

7

a.

b.

	1 Strategic Management and Governance	2 Professional Skills	3 Sales and Customer Relationship	4 Hospitality and Food Industry	5 Software Development Technologies	6 Accounting and Finance	7 Construction and Engineering	8 Education and Research	9 Manufacturing and Engineering Design	10 Industrial Maintenance and Facility Management	11 Marketing and Brand Management	12 IT Infrastructure and Support	13 Data Science and Analytics	14 Healthcare and Medical Specialties	15 Supply Chain Management	16 Financial Services and Banking	17 Electronic Systems and Design	18 Life Sciences and Pharmaceutical Research	19 Quality Assurance and Test Automation	20 Cybersecurity and Information Systems Protection	21 Imaging Technology
Average Mention																					
Semantic Similarity																					
Skill Containment																					
Closeness Centrality																					

c.

Strategic Management and Governance

['Management', 'Solutions Focused', 'Planning', 'Leadership', 'Consulting']

Professional Skills

['Human Communication', 'Customer Service', 'Assertiveness', 'Detail Oriented', 'Initiative and Leadership']

Sales and Customer Relationship

['Client Services', 'Sales', 'Business Development', 'Account Management', 'Identifying Leads']

Education and Research

['Research', 'Mathematics', 'Teaching', 'Personality Development', 'Learning Development']

Manufacturing and Engineering Design

['Engineering Management', 'Manufacturing Operations', 'Software Development Tools', 'Manufacturing Processes', 'Metrology']

Industrial Maintenance and Facility Management

['Operational Maintenance', 'Automotive Industry', 'Fuel Gas', 'Programmable Logic Controllers',

Supply Chain Management

['Outline Of Transport', 'Procurement', 'Logistics', 'Supply Chain', 'Purchasing']

Financial Services and Banking

['Financial Services', 'Banking', 'Asset Management', 'Contract Drafting', 'Front Office']

Electronic Systems and Design

['Microsoft Development Tools', 'Electronics', 'Life Cycle Planning', 'Data Validation', 'Design Management']

Hospitality and Food Industry

['Retail Sales', 'Food and Beverage', 'Brand Design', 'Key Performance Indicators (KPIs)', 'Customer Experience Improvement']

Software Development Technologies

['Computer Programming', 'Application Frameworks', 'JavaScript (Programming Language)', 'Automation', 'Java (Programming Language)']

Accounting and Finance

['Microsoft Excel', 'Budgeting', 'Finance', 'Accounting', 'Forecasting']

Construction and Engineering

['Environment Health And Safety', 'Employment Contracts', 'Construction', 'Mechanical Inspection', 'Cost Estimation']

Marketing and Brand Management

['Marketing', 'Writing', 'Social Media', 'Advertisement', 'E-Commerce']

IT Infrastructure and Support

['Networking Basics', 'Computer Hardware', 'Telecommunications', 'Technical Support', 'Linux']

Data Science and Analytics

['DataBasic', 'Database Application', 'U-SQL', 'Analytics', 'Statistics']

Healthcare and Medical Specialties

['Nursing', 'Staffing Software', 'Pharmaceuticals', 'General Practitioner', 'General Medicine']

Life Sciences and Pharmaceutical Research

['Scientific Studies', 'Life Sciences', 'Medical Laboratory', 'Customer Relationship Management', 'Drug Development']

Quality Assurance and Test Automation

['Quality Assurance', 'Test Automation', 'Test Planning', 'Test Automation Management Tools', 'Software Testing']

Cybersecurity and Information Systems Protection

['Cyber Security', 'Information Systems Security', 'Security Policies', 'Environmental Remediation', 'Clinical Informatics']

Imaging Technology

['Medical Imaging', 'Agriculture', 'X-Rays', 'Veterinary Medicine', 'Landscaping']

8

Sales
and Customer Relationship

['Client Services',
'Sales',
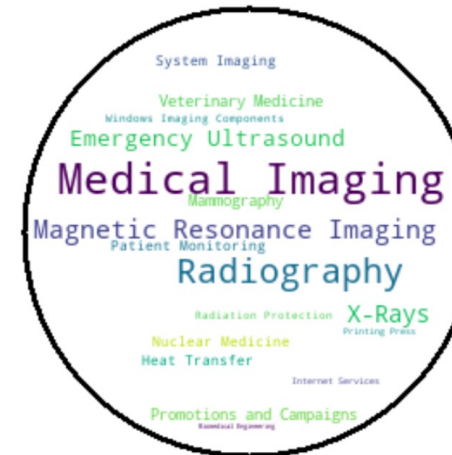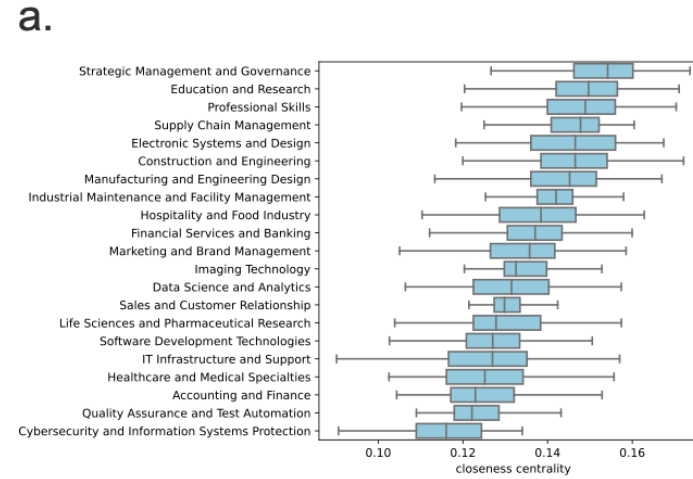'Business Development',
'Account Management',
'Identifying Leads']

Education
and Research

['Research',
'Mathematics',
'Teaching',
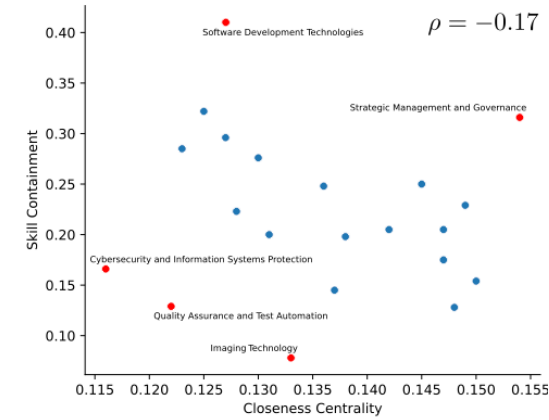'Personality Development',
'Learning Development']

Imaging Technology

['Medical Imaging',
'Agriculture',
'X-Rays',
'Veterinary Medicine',
'Landscaping']

Closeness Centrality

Containment
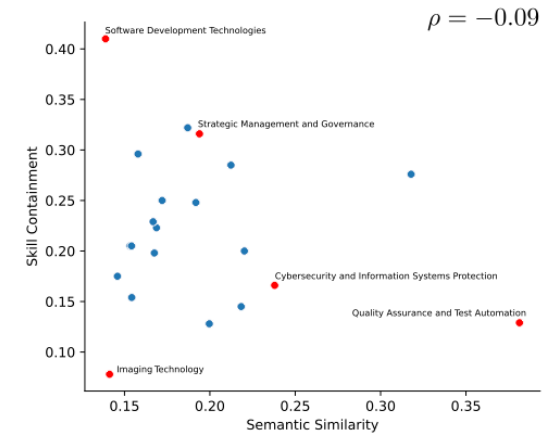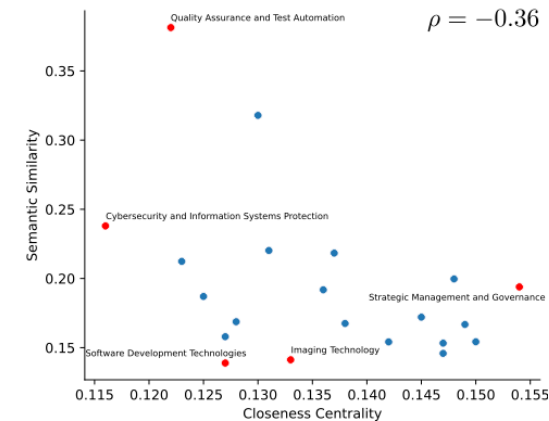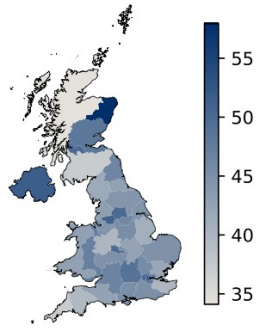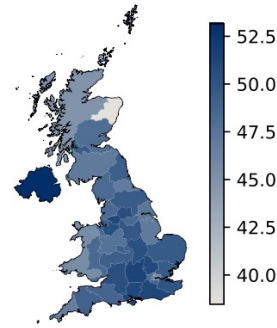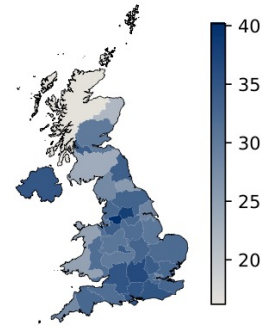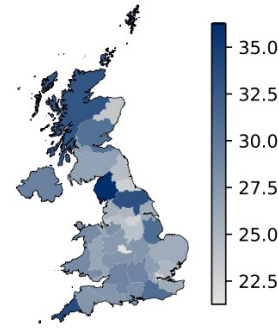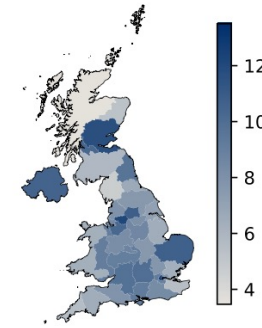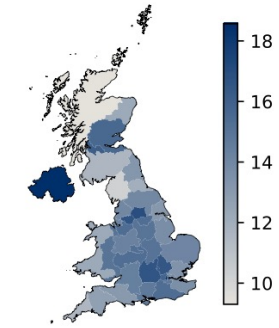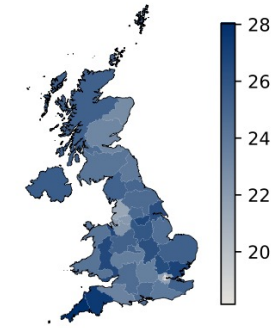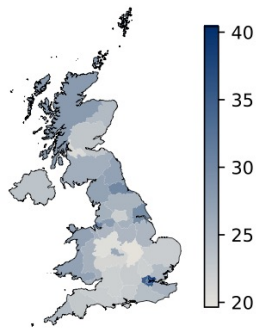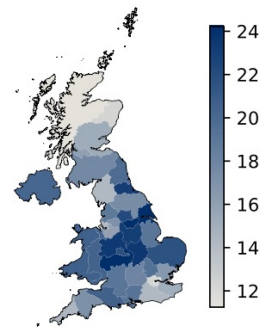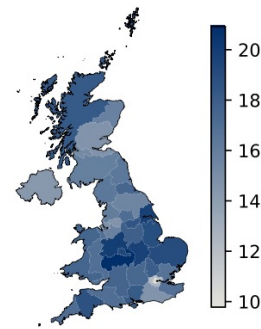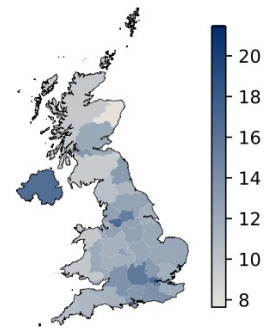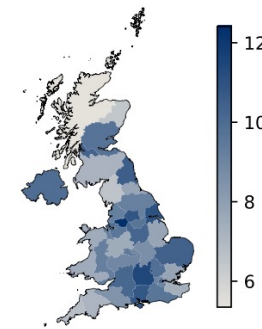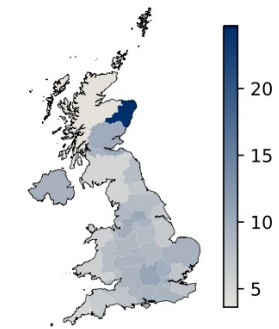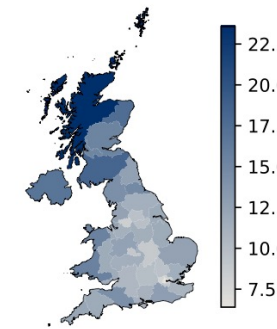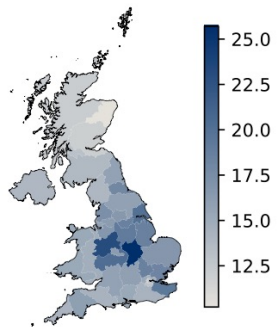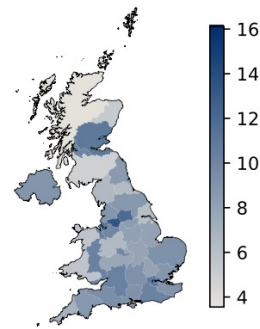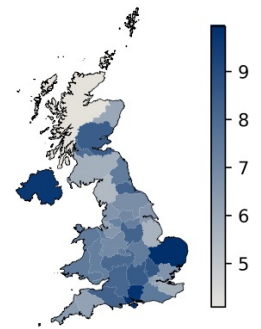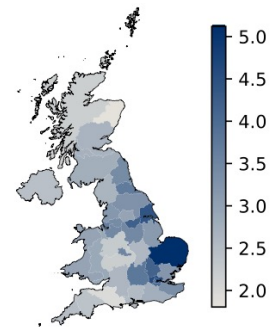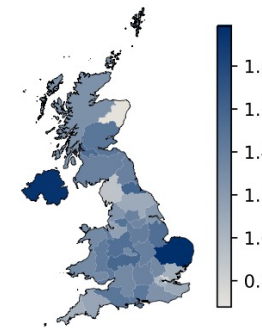
Semantic Similarity

Strategic Management and Governance · Professional Skills · Sales and Customer Relationship · Hospitality and Food Industry · Software Development Technologies · Accounting and Finance · Construction and Engineering · Education and Research · Manufacturing and Engineering Design · Industrial Maintenance and Facility Management · Marketing and Brand Management · IT Infrastructure and Support · Data Science and Analytics · Healthcare and Medical Specialties · Supply Chain Management · Financial Services and Banking · Electronic Systems and Design · Life Sc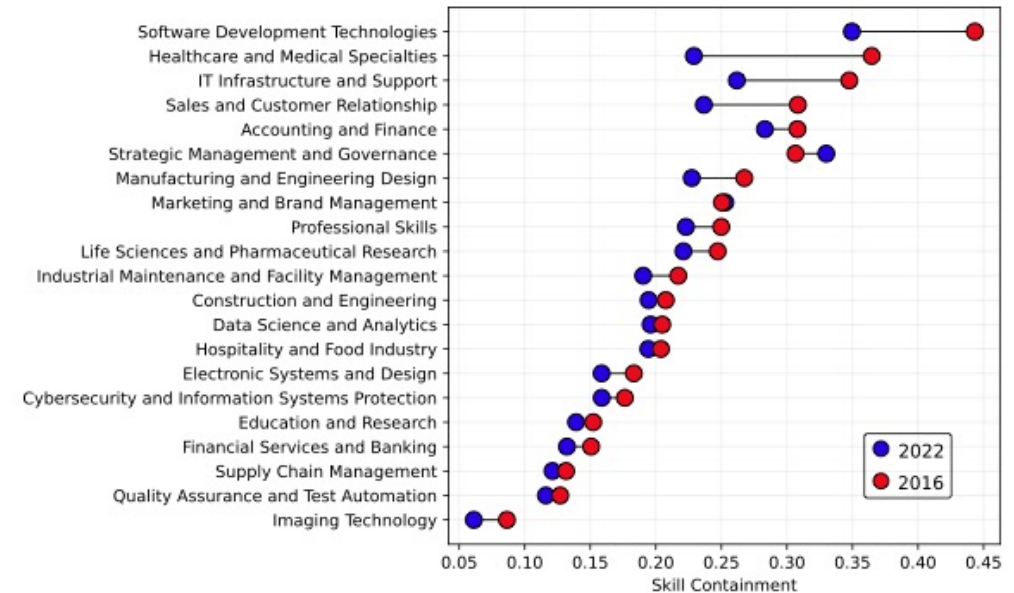iences and Pharmace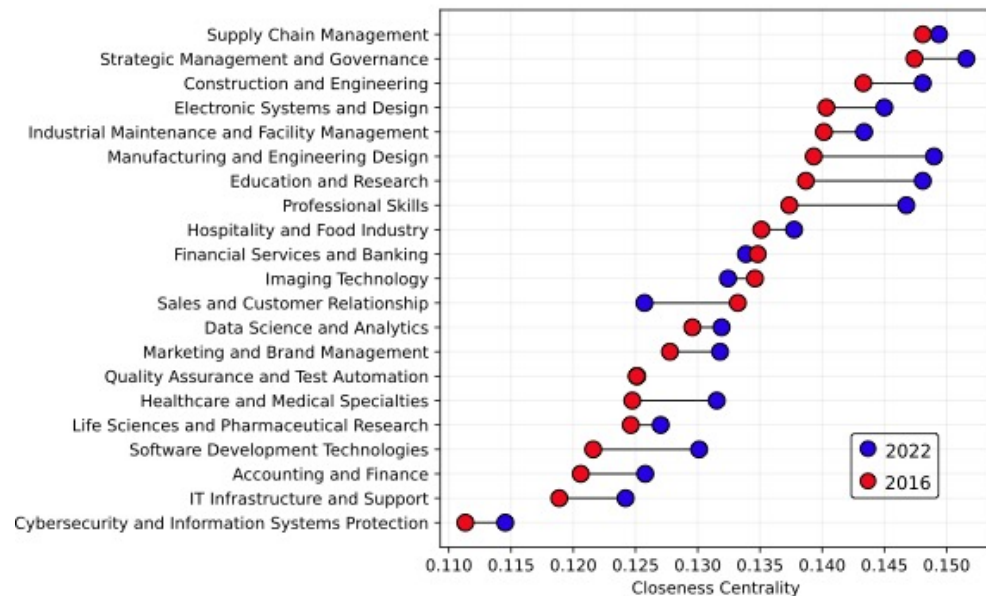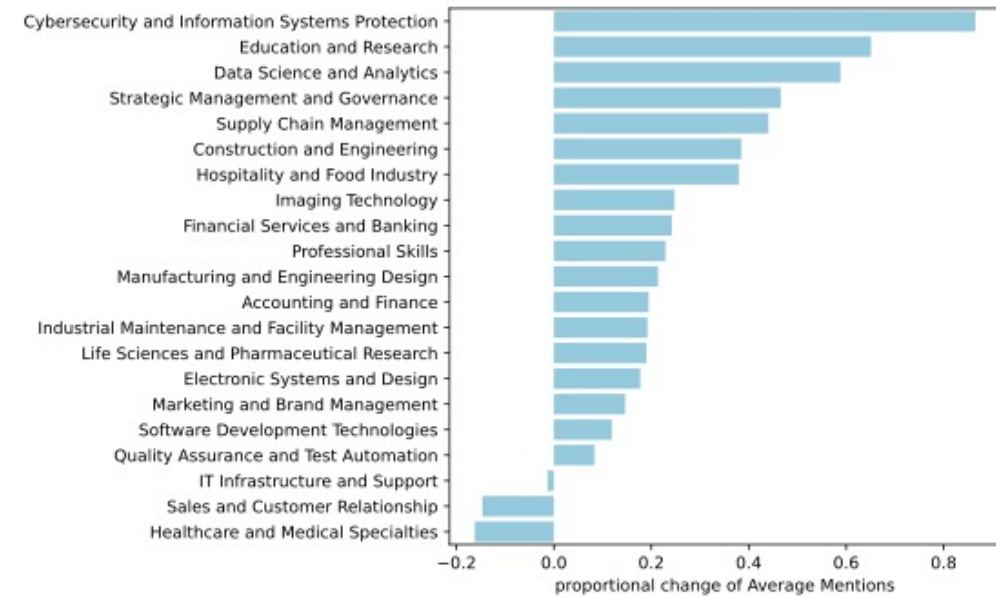utical Research · Quality Assurance and Test Automation · Cybersecurity and Information Systems Protection · Imaging Technology
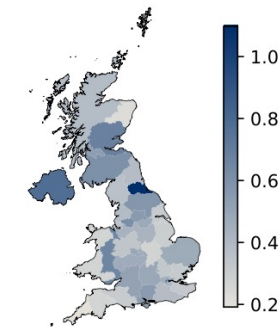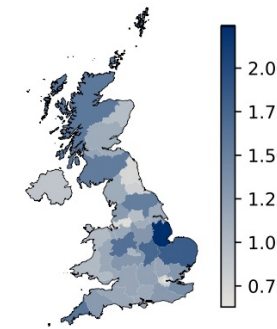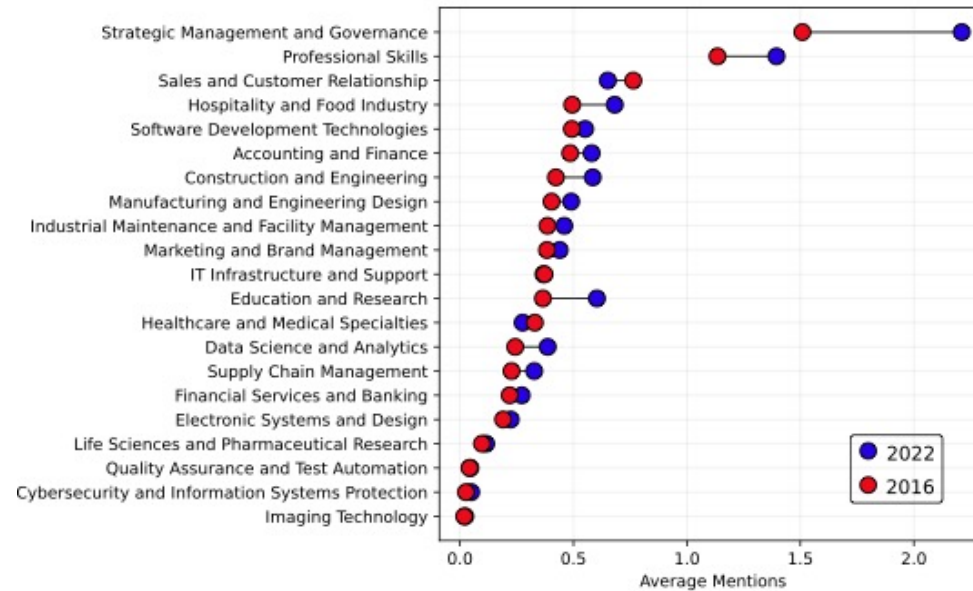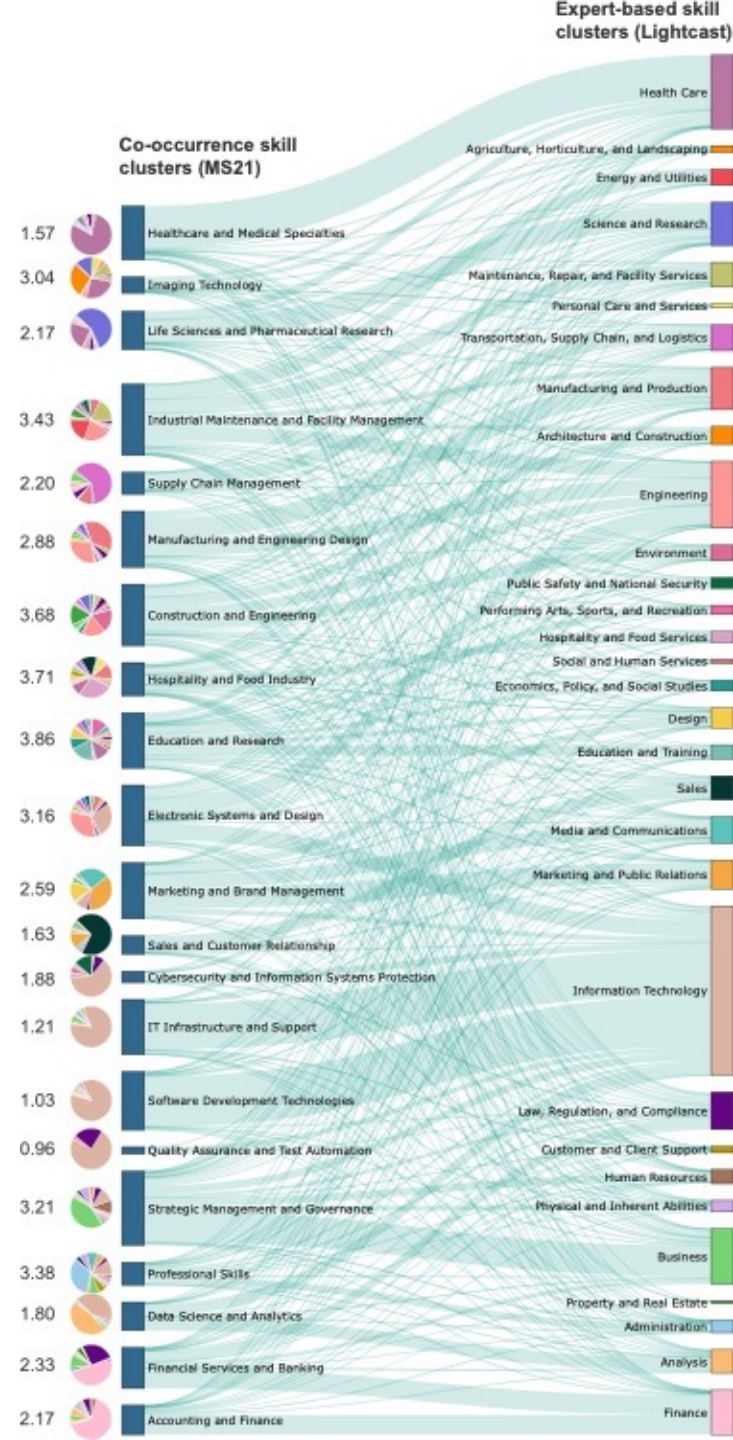
Temporal trend

Comparison with Lightcast

Summary of Findings

- Skills co-occurrence networks show clear structure

- Some skills have wide-reaching associations, while others are much more siloed

- Skills are grouped in ways that don't always agree with experts

- Potentially useful lens by which to understand changes to labour markets

Collaborators:

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Mauricio Barahona
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Imperial College London

Zhaolu Liu, Jonathan M. Clarke, Bertha Rohenkohl and Mauricio Barahona
Patterns of co-occurrent skills in UK job adverts,
https://arxiv.org/pdf/2406.03139