Exploring futures studies scholarly literature

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To reveal the **social structures** that bond researchers and practitioners together as well as the specialized language and **subject matters** featured in the scholarly literature.
Materials and methods
17 peer-reviewed journals identified by the World Futures Studies Federation:

- 10 indexed by Web of Science
- 5 not indexed by Web of Science
- 2 indexed by Web of Science but not included in the analysis ( >15-year old publications)
10 indexed scholarly journals

Foresight

Futures

Info

International Journal of Foresight and Innovation Policy

Long Range Planning
10 indexed scholarly journals

Technological Forecasting and Social Change
The International Journal of Forecasting
The Journal of Forecasting
Time & Society
NanoEthics
5 scholarly journals not indexed

European Journal of Futures Research
Journal of Evolution and Technology
Journal of Futures Studies
Policy Futures in Education
World Future Review
2 indexed scholarly journals not included

Futuribles (1975-99)

World Futures (1981-84)
Publications crawl

Using open-source, Python-based Scrapy framework

~ 37GB of HTML crawled
Data processing

Using large-scale data processing engine Apache Spark

Steps:

1. Scraping fields (incl. title, authors, abstract, etc) from HTML
2. Entity (incl. publications, authors, institutions, etc) creation
3. Entity disambiguation
4. CSV export
Entity volume

16,958 futures studies publications
14,621 authors
206,488 publications cited by futures studies publications
Data analysis

Using Tableau Software to:

1. Compute metrics
2. Create data visualizations
Social network analysis

Using open source Gephi software to create networks

**Nodes:** futures studies publications’ authors

**Edges:** futures studies publications co-authorship

**Edge weight:** number of coauthored futures studies publications
Social network analysis

**Betweenness centrality**
Number of shortest paths from all nodes to all others that pass through that node

**Modularity (community detection)**
Limitations: nondeterministic, community membership may vary slightly

**Giant component**
Keep the biggest component of the graph
Filter out unconnected authors and small communities
Results
Futures publications (1968-2014)
Futures publications per journal (1968-2014)
Co-authorship patterns
Author networks and communities
Publication patterns by author community

<table>
<thead>
<tr>
<th>Author Community</th>
<th>Year</th>
<th>Journal</th>
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<tbody>
<tr>
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<td>FUTURES</td>
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<td></td>
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<td>INTERNATIONAL JOURNAL OF FORECASTING</td>
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<td>INTERNATIONAL JOURNAL OF FORESIGHT AND INNOVATION POLICY</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>TIME &amp; SOCIETY</td>
</tr>
</tbody>
</table>

Publication Count
Author keyword analysis per community

Publication has Author Keywords
- False
- True
Community A author keywords

Methods

Exponential smoothing (8%)

Time series/time-series forecasting (10%)

Judgmental forecasting (17%)

Scenarios (2%)
Community A author keywords over time

**Methods**


Community B

- foresight
- delphi
- innovation
- forecasting
- technology foresight
- scenarios
- uncertainty
- innovation policy
- quantile regression
- sustainability
- decision making
- kondratieff waves
- transition
- delphi method
- learning
- hydrogen
- long waves

% of Total Publication Count
2.410% - 10.241%
Community B author keywords

Methods
Scenarios/scenario planning (7%)
Delphi (7%)
Exponential smoothing (1%)

Topics
Innovation (23%)
Sustainability (7%)
Community B author keywords over time

Methods

Scenarios/scenario planning (1990-94: 0%, 1995-99: 0%, 2000-04: 0%, 2005-09: 4%, 2010-14: 12.7%)


Topics

Community A references

forecasting
  judgment
  time series
  m-competition
  forecasting accuracy

judgmental forecasting
  exponential smoothing
  combining forecasts
  prediction intervals

evaluation
  decision making
  forecast evaluation
  forecasting competitions

calibration
  relative absolute error
  theils-u
  accuracy

extrapolation
  combining
  rule-based forecasting
Community A references’ author keywords

**Methods**

M-competition (27%)

time series/time-series forecasting (up to 68%)
Community B references

innovation

transition management

innovation policy

innovation system

innovation systems

learning

uncertainty

governance

scenarios

policy

technology

forecasting

sustainable development

scenario planning

sustainability

delphi

foresight

climate change

technology foresight

evolutionary economics

knowledge

% of Total Main Publication Count
7.44%
Community B references’ author keywords

Methods
Uncertainty (12%)

Topics
Sustainability/sustainable development (20%)
Transition management (12%)
Climate change (11%)
Challenges and limitations
Data crawl and analysis

Availability of journals/publications/author keywords

“Intent” of author keywords (intent: why selected these vs. those keywords? keywords terminology may evolve over time? susceptible to fashion?)

Large crawls → Web of Science session expires → need to handle resets

Crawled data requires in-depth preparation to get to analysis-ready entities
Disambiguation

Author disambiguation
Uncovered cases: true homonyms, misspelled names, disambiguation on ambiguous authors e.g. J. Smith

Publication disambiguation
Several publications with same title:
- Some are definitely distinct material (e.g. journal article vs. book chapter)
- Some look like re-editions
- Some might be duplicates
Potential next steps
Potential next steps

Institution-level analysis

Text mining analysis (title, abstract, full-text when available)

Interviews/narratives/data combination

Futures studies ontology/ontologies
Thank you

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