Research assessment, ranking and strategic bibliometric analysis – a case of Ural Federal University

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Outline

• Introduction
  – CWTS
  – Web of Science data
  – Data, Methods & Tools

• Case of the UrFU
  – Leiden Ranking
  – Strength Potential & Risk (SPR) analysis
Introduction CWTS

• Research Institute (CWTS)
  – 30 years
  – Initially focusing on bibliometrics
  – Since 2008 substantial funding
  – Since 2010 broadening of agenda
  – Recently evaluated
  – No educational task yet

• Company (CWTS BV)
  – Services derived from research
  – Input for research
  – Studies performed by researchers at institute
Research

• Advanced quantitative methods
• Qualitative studies of research evaluation process
• Science – society interaction
• Science, Technology and Innovation
• Career studies
• Science policy
Services

• Primarily quantitative studies in the context of research evaluation
• For universities, research institutes, funding agencies, ministries ...
• Not just figures and standard reports
• Training and education
Web of Science (WoS) at CWTS

- Web of Science (WoS)
  - Local version
  - Cleaned author affiliations (Leiden Ranking Register)
  - Cleaned Funding organizations (acknowledgements)
  - Improved matching of reference-matching
  - In-house publication-level classification scheme
  - In-house author identification

- Patent database (esp. NPL refs linked to WoS)
Example: advanced bibliometrics

Publication-level classification
Structure of all sciences

• Clusters of publications
• To represent fields of science
• Candidates to establish this:
  – Journal level (e.g., WoS journal categories, OECD/subject classification)
  – Publication level (e.g., based on MESH)
Categorization based on *journals*

- **Advantages:**
  - Easy to understand
  - Stable structure

- **Problems:**
  - ‘Objectivity’
  - Traditional fields
  - Multi-disciplinary/ general journals
  - Fields representing a variety of sub-fields
Publication-based classification
Waltman & Van Eck (2012)

• Citing relations among publications (WoS 2000-2015)

• Self-organized: clusters at four different levels (current version)
  – Top level 5 main fields
  – Second level of ~30 fields
  – Third level of ~800 fields
  – Fourth level of ~4,000 areas

• Disjoint clusters;
• Hierarchical.
CWTS Publication-level classification

• Advantages
  – ‘Objective’
  – Independent from journals
  – Dynamic
  – Sophisticated structure for normalization and benchmarking

• Challenges
  – Labeling
  – updates
Map all sciences

- Map of almost 4000 research fields/topics based on entire WoS (global map of science);
- Self-organized clusters of publications based on citing relations;
- Coherent clusters but not necessarily easy to label;
- Automated labels (keywords, journals);
- Updated on a yearly basis.
Basic structure
Map of all sciences (~4000 clusters)

- Cluster of publications
- Size represents volume
- Distance represents relatedness
- Citation traffic

Social Sci & Hum.
Life & Earth
Biomedical & Health
Maths & CompSci
Physical Sci & Engin.
Methods and tools

• Methods
  – Better indicators
  – Better structures of science/ proper field definition
  – Contextualize bibliometric performance

• Tools
  – Leiden Ranking
  – Journal indicators
  – VOSviewer
  – CitNetExplorer
UrFU ambition

*Source: website UrFU*

• Our aspiration is to *become* a world-class university in the heart of Eurasia committed to the complex and sustainable development of research and teaching.
UrFU in Rankings

Source: UrFU website

• placed 6th among Russian universities (Webometrics Ranking of World Universities)
• top-10 best Russian universities (“Expert RA” rating agency);
• top-60 of the best universities of the Emerging Europe and Central Asia (QS Quacquarelli Symonds);
• top-650 (QS World University Rankings);
• placed 13th in the ranking of national universities by the Interfax Rating Agency;
• placed 77th among BRICS countries universities (QS World University Rankings: BRICS);
• placed 3rd as per the number of patents among the companies in Russia (The Research & innovation performance of the G20 (Russia) — Thomson Reuters).
Leiden Ranking

• Currently a university ranking
• Focusing on Research
• Criteria to enter:
  – Universities only
  – At least 1000 publications (fractionalized) in studied period (recent 4 year)
• Data collected for 2000 organizations to make selection
UrFU *if* in the Leiden Ranking

- We found 124 name variant of UrFU
- UrFU is beyond half way to meet the LR criteria to enter
- We calculated the following scores:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>UrFU 2016</th>
<th>UrFU 2017*</th>
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<tbody>
<tr>
<td>P (2011-2014)</td>
<td>1,657</td>
<td>2,134</td>
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<tr>
<td>P fractionalized</td>
<td>450</td>
<td>586</td>
</tr>
<tr>
<td>MNCS</td>
<td>0.59</td>
<td></td>
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<tr>
<td>Ptop 10%</td>
<td>18</td>
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<tr>
<td>PPtop10%</td>
<td>0.04</td>
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<tr>
<td>PP Collab</td>
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<tr>
<td>PP Intl collab</td>
<td>0.28</td>
<td>0.29</td>
</tr>
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</table>

* Estimated scores
Chart view LR scores 2016
- $P \times PP_{top10}$
Chart view LR results 2016 (cut out) and (virtual) position UrFU
Strategic bibliometric analysis
Profile UrFU

- Distribution of UrFU publications over all sciences (4000 areas, publication clusters)
- 634 areas contain at least 1 UrFU publication
- 120 areas with 10 publications or more (2000-2015)
Map of all sciences
Basic structure

Social Sci & Hum.
Life & Earth
Biomedical & Health
Maths & CompSci
Physical Sci & Engin.
Map of all sciences
Size: world; Color: share UrFU publications

Map of all sciences
Size: UrFU; Color: share UrFU publications

Social Sci & Hum.

Maths & CompSci

Life & Earth

Biomedical & Health

Physical Sci & Engin.
Strength, Potential, Risk areas
- Definitions

<table>
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<th>Type</th>
<th>P</th>
<th>MNCS</th>
<th>MNJS</th>
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<tbody>
<tr>
<td>Strength</td>
<td>&gt;10</td>
<td>Above UrFU average</td>
<td>Well above UrFU average</td>
</tr>
<tr>
<td>Potential</td>
<td>&gt;10</td>
<td>Below UrFU average</td>
<td>Above world average</td>
</tr>
<tr>
<td>Risk</td>
<td>&gt;10</td>
<td>Below UrFU</td>
<td>Below world average</td>
</tr>
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</table>
Map of all sciences
Size: UrFU; Color: Strength areas UrFU

Social Sci & Hum.

Maths & CompSci

Life & Earth

Biomedical & Health

Physical Sci & Engin.
Map of all sciences
Size: UrFU; Color: Opportunity areas UrFU

Social Sci & Hum.
Maths & CompSci
Life & Earth
Biomedical & Health
Physical Sci & Engin.
Map of all sciences
Size: UrFU; Color: Risk areas UrFU

Social Sci & Hum.

Maths & CompSci

Life & Earth

Biomedical & Health

Physical Sci & Engin.

CWTS
## Strength, Potential and Risk

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<tr>
<td><strong>Actor:</strong> Ural Federal University</td>
<td><strong>P:</strong> 128</td>
<td><strong>Strength:</strong> 1</td>
</tr>
<tr>
<td><strong>Growth (wrld):</strong> 0.11</td>
<td><strong>PP(npl):</strong> 0.006</td>
<td><strong>PP(C):</strong> 0.025</td>
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<td><strong>P:</strong> 10</td>
<td><strong>Opp:</strong> 1</td>
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<tr>
<td><strong>Growth (wrld):</strong> 0.16</td>
<td><strong>PP(npl):</strong> 0.016</td>
<td><strong>PP(C):</strong> 0.045</td>
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<td><strong>Threat:</strong> 1</td>
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<tr>
<td><strong>Growth (wrld):</strong> 0.16</td>
<td><strong>PP(npl):</strong> 0.007</td>
<td><strong>PP(C):</strong> 0.043</td>
</tr>
</tbody>
</table>
Conclusions

- Ambition requires strategy;
- Mostly ranking information not sufficient to be used;
- Ranking as such mostly not very useful;
- More detailed information on one dimension can provide more valuable information;
- SPR study provides input to define strategy.