An Analysis of the Achievements of JST Operations

Mari Jibu, MBA Ph.D.

Department of Databases for Information and Knowledge Infrastructure
Innovation Headquarters
Japan Science and Technology Agency
J-GLOBAL foresight

-combining analytical findings from multiple databases
to gain multiple perspectives on science, technology and innovation activities

Papers:
Highly cited articles
Co-Citation Analysis Bibliographic coupling analysis

Patents:
Citation analysis
Linkage between papers and patents
Time line of the author’s publications
Important co-author relationship
View historiography showing the key papers and timeline of a research field
Earlier publications and documents important to the development of the author’s work
Paradigm Disruptive Innovation
based on Innovation Diagram (ID)

Knowledge embodiment
(Development)

A (Existing Technology)

A' (Paradigm Sustaining Innovation)

A (Existing Technology)

S (Existing Knowledge)

P (Created Knowledge)

A* (Paradigm Disruptive Innovation)

Breakthrough

Field of Resonance

Abduction

Induction

Deduction

Innovation Diagram

Knowledge creation
(Research)
Paradigm Disruptive Innovation
based on Innovation Diagram (ID)
by Dr. Eiichi Yamaguchi (Professor., Doshisha University, JAPAN)

Knowledge embodiment
(Development)

A (Existing Technology)

A' (Paradigm Sustaining Innovation)

A* (Paradigm Disruptive Innovation)

Breakthrough

Field of Resonance

Technology Linkage: linkage between articles and patents

Network Analysis

 Patent

 Citation analysis

Mapping: keywords

Science Linkage

Historical development for a specific technology

Funding

Abduction

P (Created Knowledge)

S (Existing Knowledge)

Paper

Funding

Citation analysis

Mapping: keywords

lagen between articles and patents

Linking databases

Foresight

Historical development for a specific field

Funding

Induction

Deduction

Induction

Historical development for a specific technology

Funding

outputs(articles/patents)

Network Analysis

Linking databases

Funding

Foresight

Patent

Paper

Paper

Paper

Paper

Funding

Citation analysis

Mapping: keywords

Field of Resonance

Knowledge creation (Research)
# JST Indicators

<table>
<thead>
<tr>
<th>Papers</th>
<th>Linkage between papers and patents</th>
<th>Patents</th>
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<tbody>
<tr>
<td>Science Front</td>
<td>Innovation Front</td>
<td>Technology Front</td>
</tr>
<tr>
<td>Essential Science Indicators (ESI)+Web of Science (WoS)</td>
<td>Essential Science Indicators +Derwent Innovation Index</td>
<td>Derwent Innovation Index (DII)</td>
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</table>

**Picture of science, innovation, and technology**
Innovation Front

Methodology

1) Based on identifying the most-cited papers across multiple disciplines over a five year period.
2) Determining how often these papers have been jointly cited.
3) Identifying innovation fronts involves manipulating the co-cited papers in order to group together those that are strongly related.

Clustering:
Starting with co-cited pair that meets the thresholds, this grouping procedure then finds other pairs that share common papers. The gathering process continues until no other pairs can be added to the rest. The resulting clusters vary in size from a minimum of two papers to some maximum size.

Highly Cited Papers: TOP1%
(Essential Science Indicators)
2006-2010: 500,000

Threshold:
The integer threshold was set to accept co-citation frequencies of 2 or greater, and the normalized threshold was set at 0.1.

Innovation Front: 18 Papers
Papers including Japanese Researchers: 3

Papers:
TESI(TOP1%) Y2005-Y2009 500,000
- extract 300 pairs

Derwent Innovation Index
Innovation Front

Node size is proportional to the number of times papers cited
Node title is subject description
Position of node and distance between nodes have no meaning

Cytoscape: open source
- Visualize and analyze large social networks
- Calculate network statistics using plugins

Click a specific node, you can see title, fields, journal, author keywords, author, affiliation on the below panel
Anderson, et al. (1996) pointed out that **the strongest linkage between patented technology and science is found in the biotechnology field.**

Science Nature
Those impact factors are high.

Most papers are being in “Life Science”, especially clinical medicine.
### Cluster 1: MicroRNA (miRNAs)

### Cluster 2: induced pluripotent stem cells (iPS)

<table>
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Thomson Reuters “Derwent Innovation Index”
Technology: Cytoscape
Clusters: 23

Cluster 2
induced pluripotent stem cells (iPS)
S Yamanaka, Kyoto University

Cluster 5
Over expression of monocyte chemoattractant protein-1 in adipose tissues causes macrophage recruitment and insulin resistance
Very basic
T Kadowaki, Tokyo University

Cluster 7
induced pluripotent stem cells (iPS)
S Yamanaka, Kyoto University

Cluster 13
Over expression of monocyte chemoattractant protein-1 in adipose tissues causes macrophage recruitment and insulin resistance
Drug etc.
T Kadowaki, Tokyo University
- Technology Front can assist in identifying technology areas where the technological community is focusing its attention.

1) Based on identifying the most-cited patents across biotechnology fields over a five year period
2) Determining how often these patents have been jointly cited
3) Identifying technology fronts involves manipulating the co-cited patents in order to group together those that are strongly related.

Cluster:
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Threshold:
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Derwent Innovation Index

Papers: biotechnology
TOP1%
(Derwent Innovation Index)
2005-2009

Papers
ESI (TOP1%)
Y2005-Y2009
500,000
-extract 300 pairs

Innovation Front: 18
Papers: 86
### Technology Front - Biotechnology

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**Cluster 1**
New substituted heterocyclic compounds are non-structural 3 protease inhibitors useful to treat e.g. liver fibrosis and hepatitis C infection, and to increase liver function.

**Cluster 2**
Peptidomimetic compounds useful for inducing apoptosis in a cell, stimulating apoptosis in a cell, and for treating cancer.

**Cluster 161**
New composition comprising peptide-dicer substrate RNA, useful for ameliorating inflammation, e.g. arthritis or psoriasis, or infection associated with influenza virus.

B2: Medical, dental, veterinary, cosmetic

D16: Natural products and polymers. Including testing of body fluids (other than blood typing or cell counting), pharmaceuticals or veterinary compounds of unknown structure, testing of microorganisms for pathogenicity, testing of chemicals for mutagenicity or human toxicity and fermentative production of DNA or RNA. General compositions.
induced pluripotent stem cells (iPS)  
S Yamanaka, Kyoto University
Demo: The number of papers on the globe

Description: This demo shows a map of the number of the papers in the world. Clicking a book shows more detailed information and a link to a graphical representation of the time-series of papers.

Creator(s): Mari Jibu, Yusuke Mukai, Hideki Omi

Created: 2011/08/08