# The Use of Patent Information

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# Disclosure is Mandatory

Patent Rights

Enabling Disclosure
Registration Info
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# Use of Patent Information

Smart people and businesses can make use of patent information in many ways, e.g.

1. general patent documents as an information (technology) source
2. patent registration information as business intelligence
3. pre-grant publication as a crystal ball to look into the future
4. patent document analysis as a strategic planning tool

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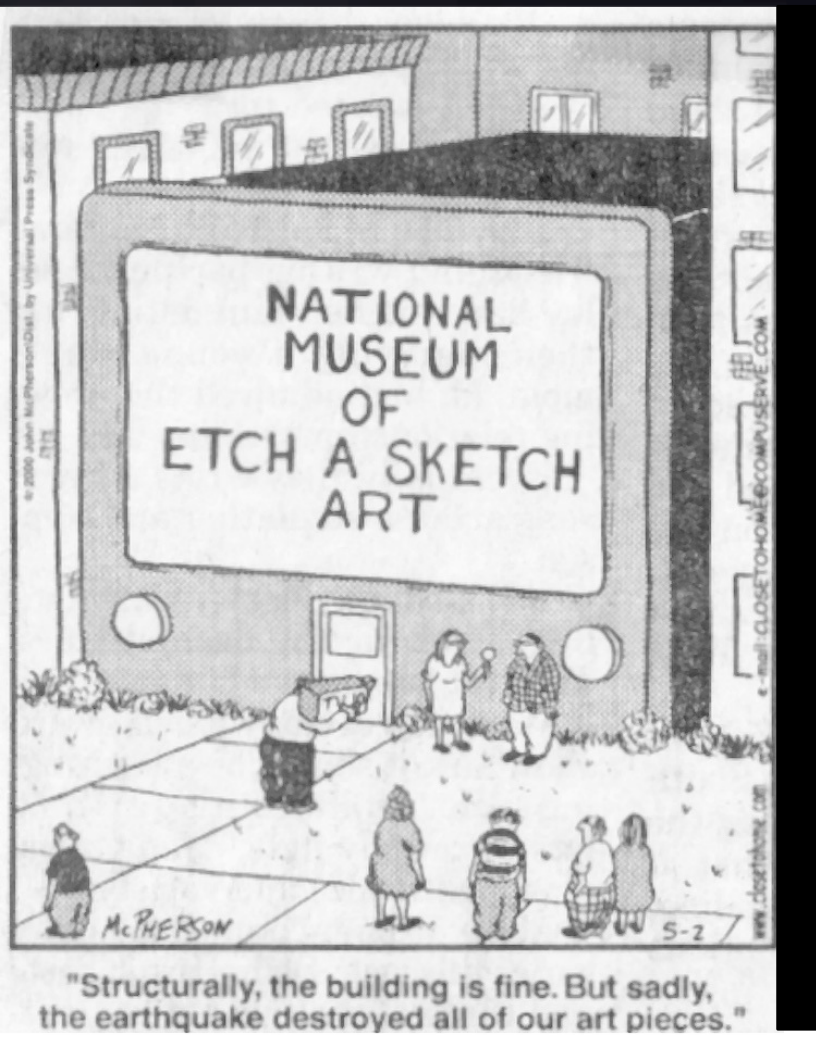
# 1. How does it work?


Most people are familiar with the Etch-A-Sketch tracing toy.
What do you do to arrive at the mechanism?

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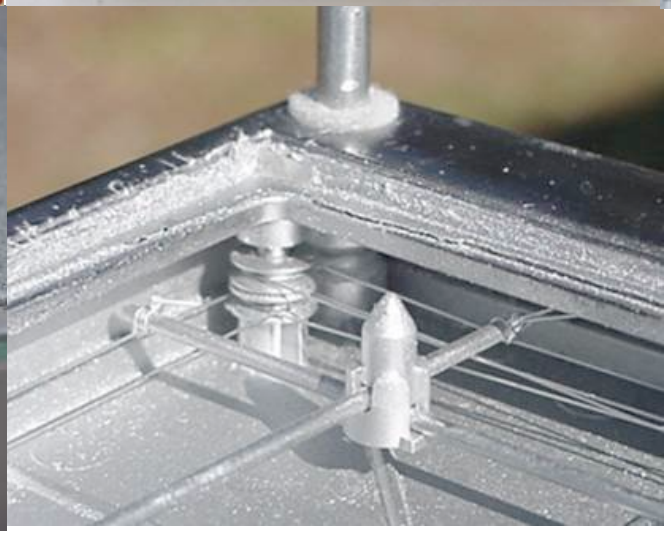
# Reverse Engineering

http://www.howstuffworks.com/question317.htm

1. Etch-A-Sketch
2. with the glass plate removed
3. the Al powder9grandules
4. Al powder sticking to glass surface
5 mechanism

One way is to reverse engineer the product by obtaining a product legally and open up the unit in oder to study the mechanism.

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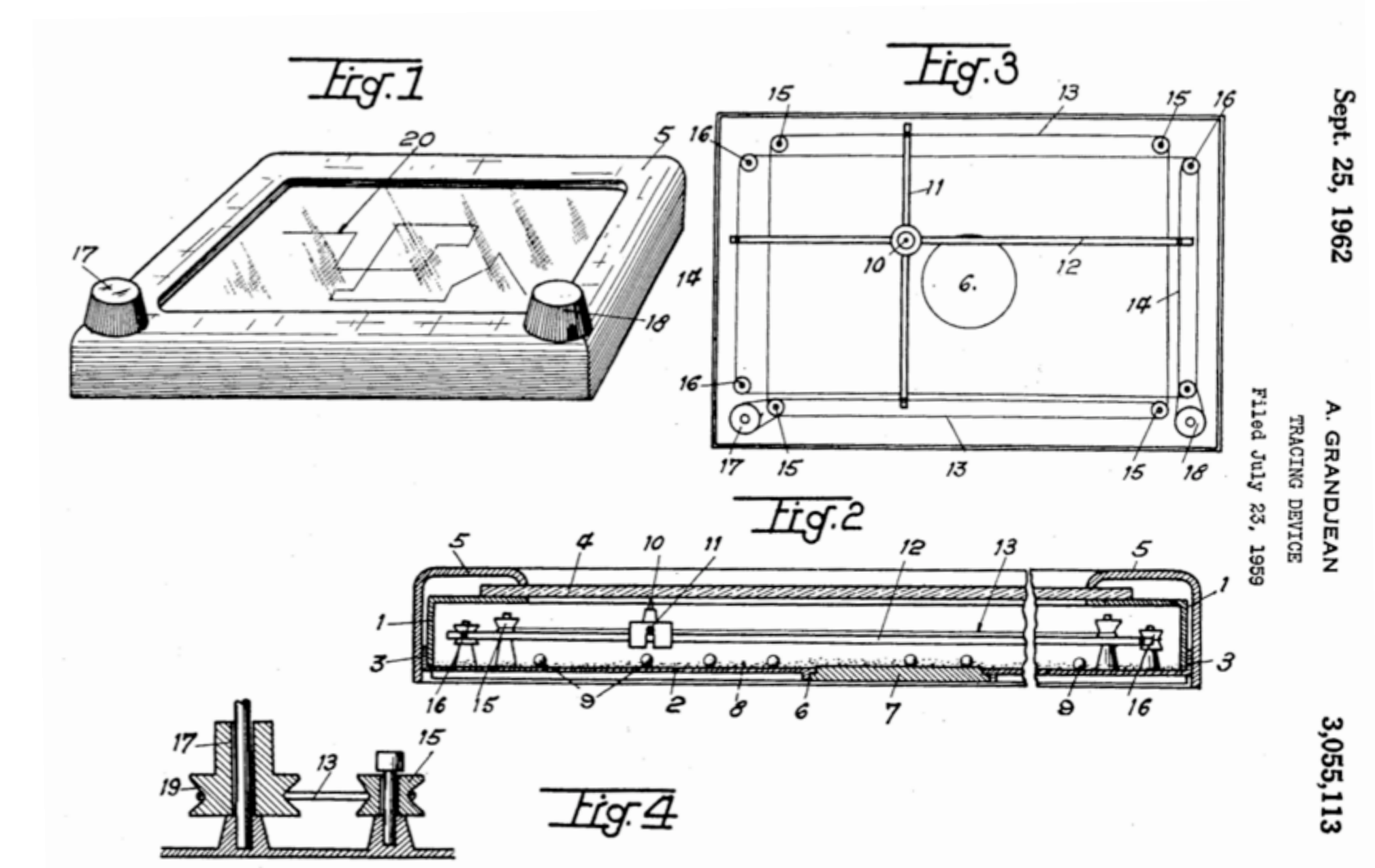
# Original Grandjean Patent

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# Info Gathered from Pat Doc

- When Earl Clark reverse engineered the Grandjean tracing device, the Grandjean patent would help him, for example:
  - the metallic dust is “pulverized metallic or other material adapted to adhere” to a glass surface
  - the larger particles are beads like “balls of glass” to obtain a uniform adherence between the pulverulent material and the translucent surface

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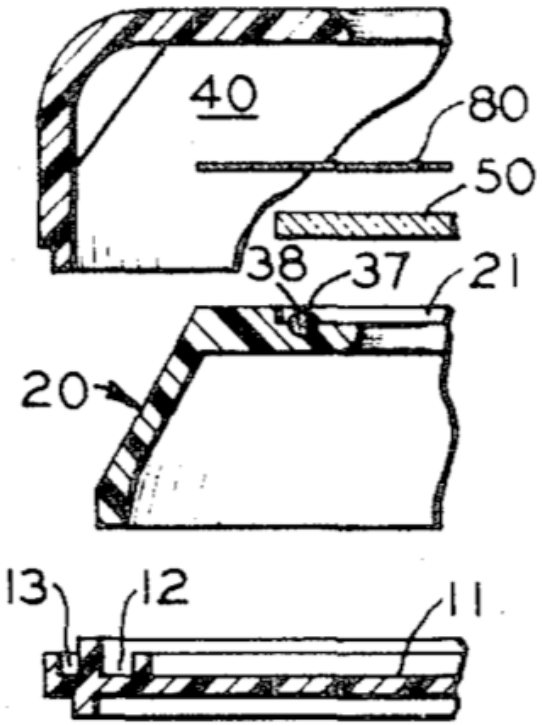
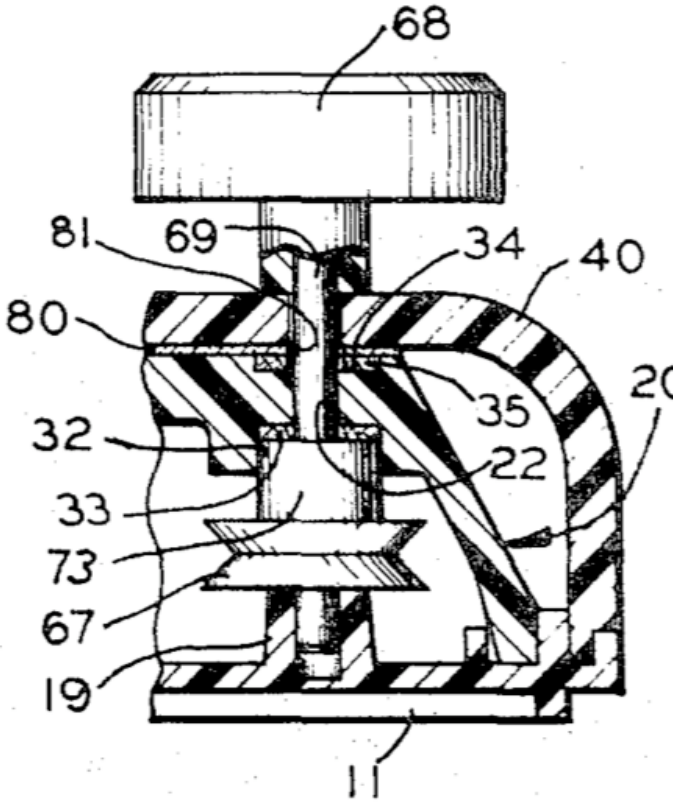
# Improvement By Clark




- Better sealing the top and bottom shells of the case
- Covering the glass window with plastic
- Better sealing of the knob shaft

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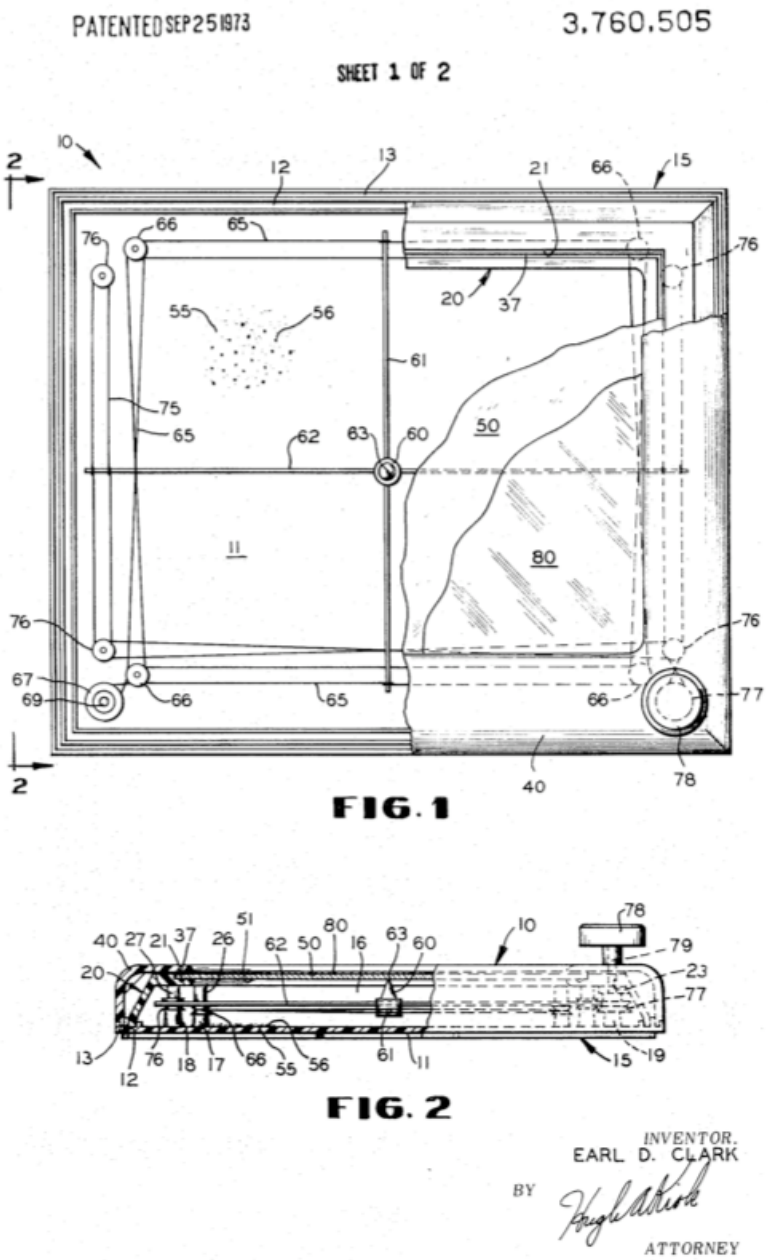
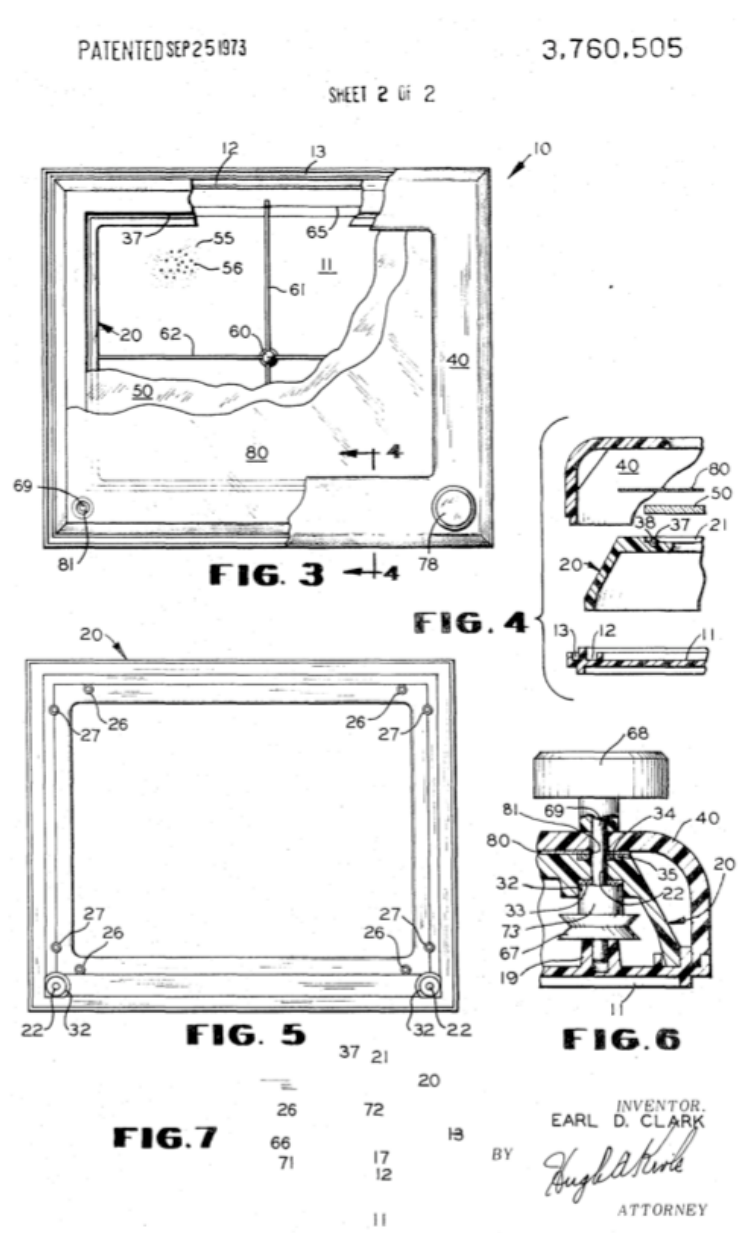
# Etch A Sketch Patented by Clark

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# This Example = Tech Content

- An obvious use of patent information is therefore aimed at the technology contents.
- Useful when you start thinking about a problem to see if others have already found a solution.
- Added benefit: preparation for patenting your invention in the future

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# Patent Search Sites

- Free Databases (actually carry hidden cost of processing)
  - USPTO
  - GOOGLE
  - INPADOC
  - ESPACENET
  - JPO, etc.
- Commercial Databases (value-added services)
  - Now dominated by Thomson Group, e.g.

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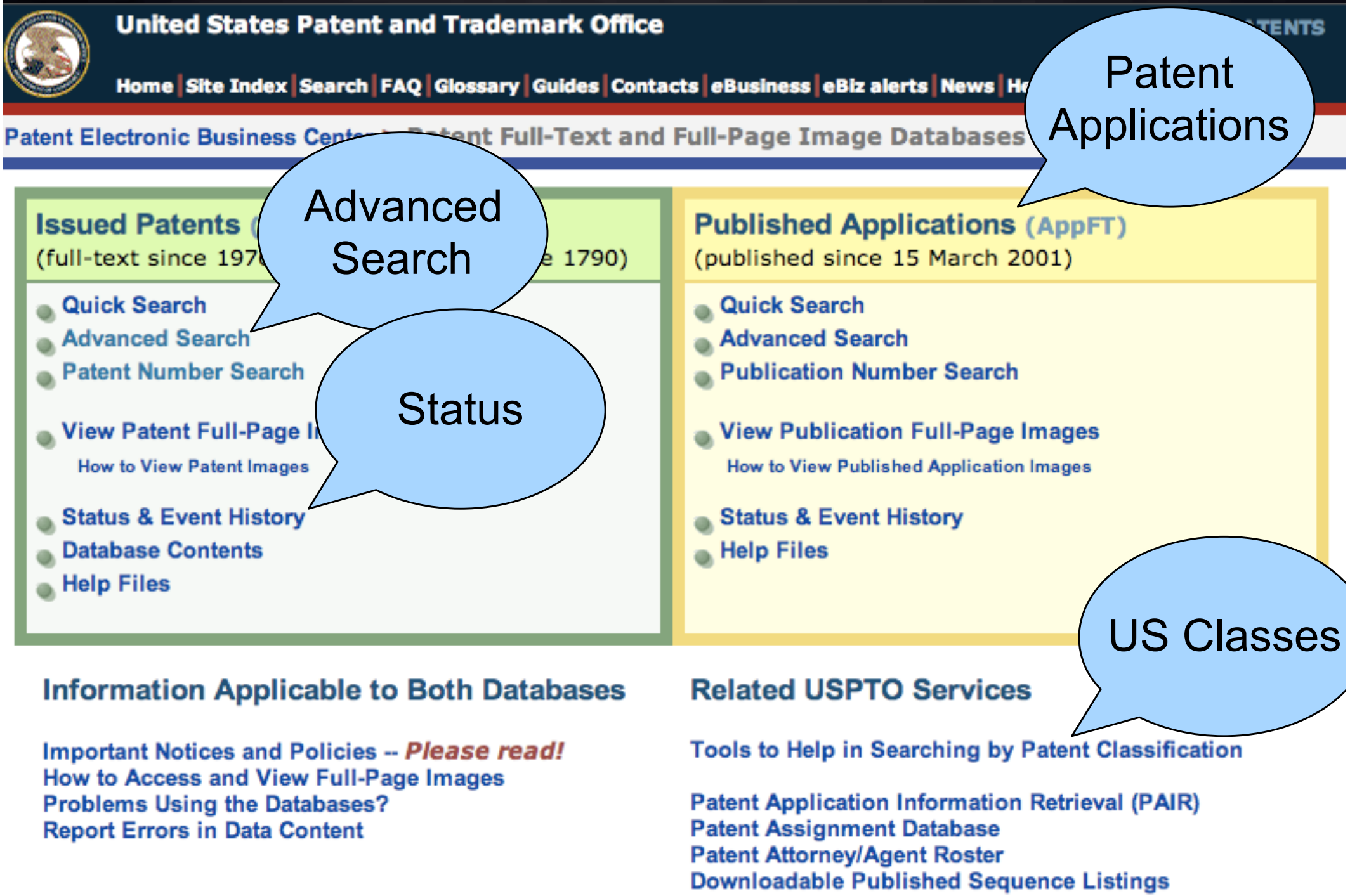
# USPTO Main Search Page



# USPTO Advanced Search

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**Query [Help]**

Examples:
**ttl/(tennis and (racquet or racket))**
**isd/1/8/2002 and motorcycle**
**in/newmar-julie**

**Select Years [Help]**

1976 to present [full-text]

Search

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Patents from 1790 through 1975 are searchable only by Issue Date, Patent Number, and Current US Classification. When searching for specific numbers in the Patent Number field, patent numbers must be seven characters in length, excluding commas, which are optional.

| Field Code | Field Name | Field Code | Field Name |
|---|---|---|---|
| PN | Patent Number | IN | Inventor Name |
| ISD | Issue Date | IC | Inventor City |

# US Class Schedule

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| | | |
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| 1 | | **LINGUISTICS** |
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| 3 | ·· | Having particular Input/Output device |
| 4 | ·· | Based on phrase, clause, or idiom |
| 5 | ·· | For partial translation |
| 6 | ·· | Punctuation |
| 7 | ·· | Storage or retrieval of data |
| 8 | · | Multilingual or national language support |

# GOOGLE PATENTS

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## IMPROVEMENT IN PAPER-CLIPS Wheeler

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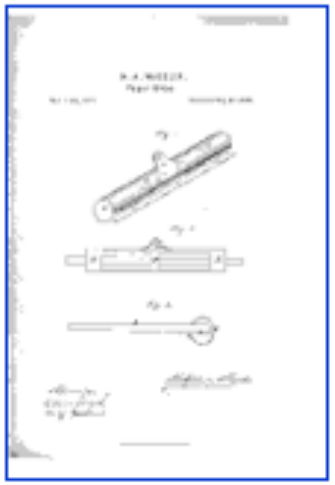
Abstract | Drawing | Description | Claims

**Patent number**: 139285
**Filing date**: 5 Mar 1873
**Issue date**: May 1873
**Inventor**: Wheeler

### Drawings



Page 1

### Search within this patent

Search

# INPADOC

- International Patent Documentation Center
- Paris Convention created “patent families,” corresponding patents in different countries which normally disclose the same invention and claim the same priority date.
- Founded by WIPO and the government of Austria under an agreement in 1972 as a worldwide patent database to handle the patent family issue better. The INPADOC GmbH was dissolved in 1991 when EPO took over.
- On-line access possible in the early 1980s
  Web access now
- The Trilateral (USPTO-EPO-JPO) set up a patent office information use policy in 2001 to keep value-added commercial databases alive
  - limit downloads
  - no or minimal improvement in data processing

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# ESPACENET

- developed by EPO
  - EP - European patents published during the past 24 months
  - WIPO (PCT) - PCT publication during the past 24 months
  - worldwide search - over 60 million patents
    - EP and PCT older than 24 months after publication
    - other countries/region (>80)

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# Japan Patent Search

- JPO-National Center for Industrial Property Information and Training

  Advanced Industrial Property Network (AIPN)

  http://aipn.ipdl.inpit.go.jp/AI2/html/top.html
  - Number search only
- PAJ

  http://www19.ipdl.inpit.go.jp/PA1/cgi-bin/PA1INIT?
  - Date, IPC, Applicant, Title, Abstract
- Patent & Utility Model Gazette

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# World Patent Index (WPI)

- Value-added commercial service (i.e. not cheap by developing country standard)
- patent application & grants from 41 patent issuing authorities
- editorial staff re-write the abstracts using controlled keywords so that index searches would usually get you what you want
- sophistication in handling patent families reduces missing search results (useful for both patentability and infringement

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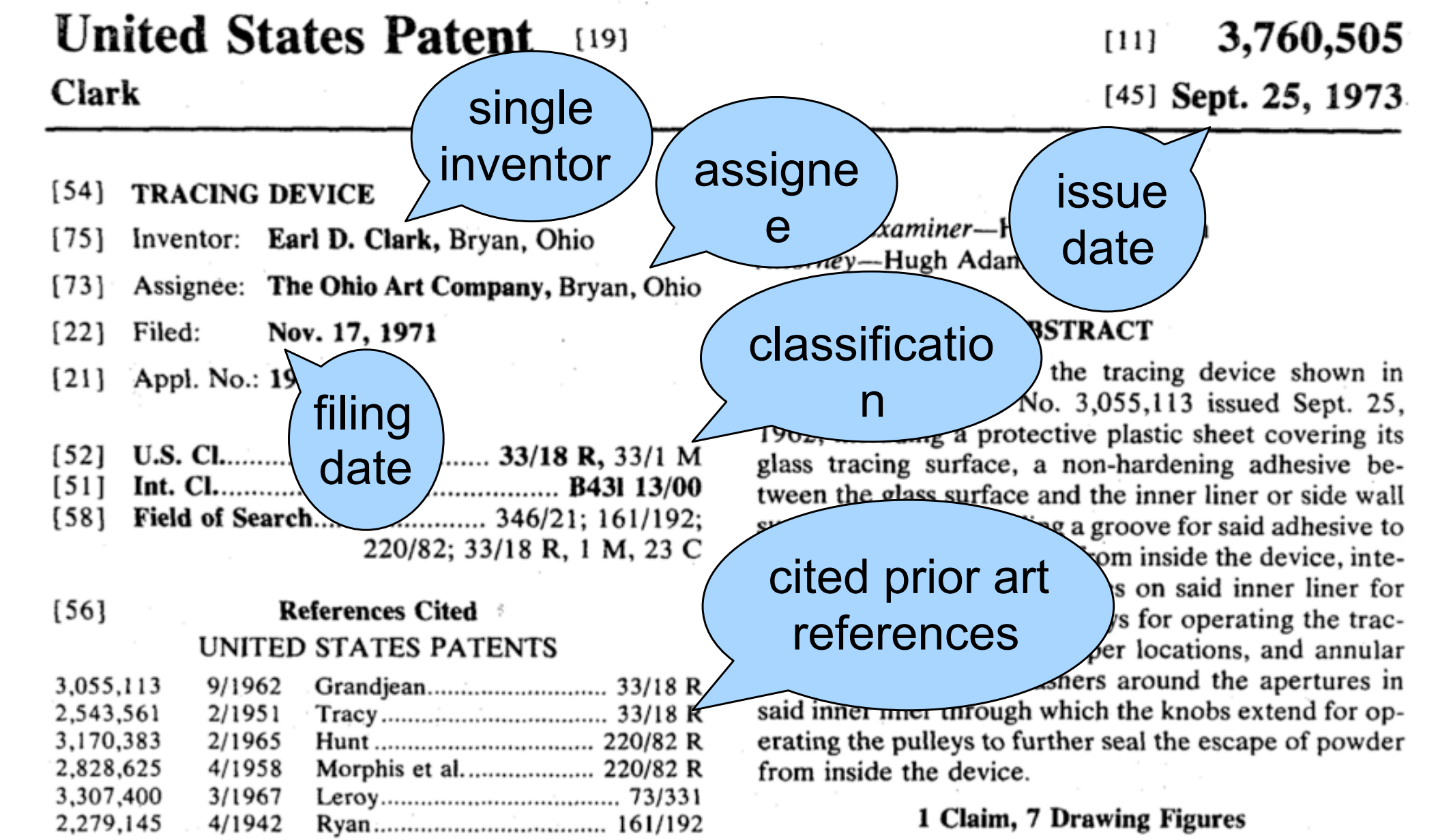
# 2. Registration Information



**United States Patent** [19]

**Clark**

[11] **3,760,505**

[45] **Sept. 25, 1973**

single inventor

assigne e

issue date

[54] **TRACING DEVICE**

[75] Inventor: **Earl D. Clark,** Bryan, Ohio

[73] Assignee: **The Ohio Art Company,** Bryan, Ohio

[22] Filed: **Nov. 17, 1971**

[21] Appl. No.: **19**

filing date

classificatio n

[52] **U.S. Cl.** ..... **33/18 R,** 33/1 M

[51] **Int. Cl.** ..... **B43l 13/00**

[58] **Field of Search** ..... 346/21; 161/192; 220/82; 33/18 R, 1 M, 23 C

cited prior art references

[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,055,113 | 9/1962 | Grandjean | 33/18 R |
| 2,543,561 | 2/1951 | Tracy | 33/18 R |
| 3,170,383 | 2/1965 | Hunt | 220/82 R |
| 2,828,625 | 4/1958 | Morphis et al. | 220/82 R |
| 3,307,400 | 3/1967 | Leroy | 73/331 |
| 2,279,145 | 4/1942 | Ryan | 161/192 |

*Examiner*—H

*Attorney*—Hugh Adan

**BSTRACT**

the tracing device shown in No. 3,055,113 issued Sept. 25, 1962, ...ing a protective plastic sheet covering its glass tracing surface, a non-hardening adhesive between the glass surface and the inner liner or side wall ...ing a groove for said adhesive to ...om inside the device, inte...s on said inner liner for ...s for operating the trac...per locations, and annular ...shers around the apertures in said inner liner through which the knobs extend for operating the pulleys to further seal the escape of powder from inside the device.

**1 Claim, 7 Drawing Figures**

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# What can we see?

- Mr. Clark is a single inventor. If he co-invents, we can perhaps establish a working relationship between Mr. Clark and another inventor.
- There exists some connection between Mr. Clark and the Ohio Art Company. One possibility is that Mr. Clark works for the Ohio Art Company. Other possibilities exist.
- The Classifications (US and IPC) can help us find other patents in the same or

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# Patent Intelligence

- An exercise similar to what we have done but executed on a much larger scale is associated with the so-called "patent intelligence."
- It is not difficult to assemble the R&D team of a company by a few patent searches
- A patent portfolio of a company reflects

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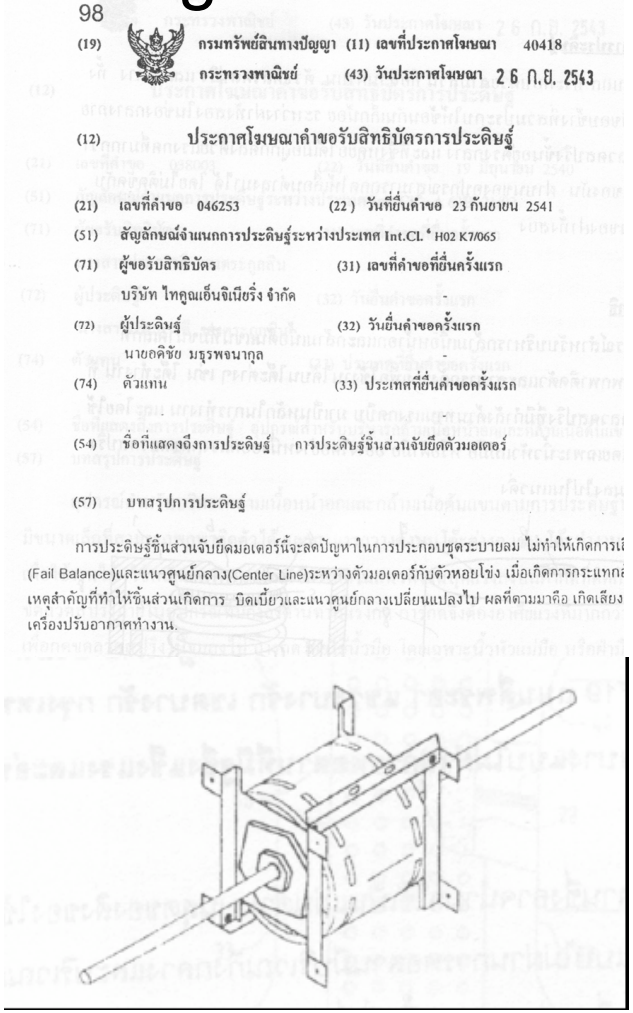
# 3. Looking into the Future

1-2 yrs 2-3 yrs

Filing Publication Issue


98

(19) กรมทรัพย์สินทางปัญญา (11) เลขที่ประกาศโฆษณา 40418
กระทรวงพาณิชย์ (43) วันประกาศโฆษณา 26 ก.ย. 2543

(12) ประกาศโฆษณาคำขอรับสิทธิบัตรการประดิษฐ์

(21) เลขที่คำขอ 046253 (22) วันที่ยื่นคำขอ 23 กันยายน 2541
(51) สัญลักษณ์จำแนกการประดิษฐ์ระหว่างประเทศ Int.CL.[6] H02 K7/065
(71) ผู้ขอรับสิทธิบัตร (31) เลขที่คำขอที่ยื่นครั้งแรก
บริษัท ไทคูณเอ็นจิเนียริ่ง จำกัด
(72) ผู้ประดิษฐ์ (32) วันยื่นคำขอครั้งแรก
นายอดิชัย มธุรพจนากุล
(74) ตัวแทน (33) ประเทศที่ยื่นคำขอครั้งแรก
(54) ชื่อที่แสดงถึงการประดิษฐ์ การประดิษฐ์ชิ้นส่วนจับยึดตัวมอเตอร์
(57) บทสรุปการประดิษฐ์

การประดิษฐ์ชิ้นส่วนจับยึดมอเตอร์นี้จะลดปัญหาในการประกอบชุดระบายลม ไม่ทำให้เกิดการเ
(Fail Balance)และแนวศูนย์กลาง(Center Line)ระหว่างตัวมอเตอร์กับตัวหอยโข่ง เมื่อเกิดการกระแทก
เหตุสำคัญที่ทำให้ชิ้นส่วนเกิดการ บิดเบี้ยวและแนวศูนย์กลางเปลี่ยนแปลงไป ผลที่ตามมาคือ เกิดเสียง
เครื่องปรับอากาศทำงาน.

- In countries with pre-grant publication, e.g. Thailand,
- Reading patent publications is like looking into a crystal ball into the future (3-5 years)
- Example: Thailand's Eastern Seaboard construction coincided with a wave in patent filing in petrochemical technologies.

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# A case study on Agri bacteria

- 3 Thai universities
  + 1 government agency
  + 1 state funding agency
  + 1 private company
- Worked for ~ 4 years until reaching the pre-commercializing stage
- got a notice from a law firm representing a Korean company which filed a patent application on this particular technology a few years back and had received a Thai utility patent on the technology

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# How to avoid this problem

- Read patent documents
  - granted patents
  - patent publications (especially in countries with pre-grant publication)
- Is that a lot of reading?
  - Yes, if you try to read everything.
  - No, if you read only in the technical area related to your interest.
- Has that actually been done?
  - Yes, in many companies around the world
  - Take companies in Japan for example, ...

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# Systematic Analysis in JP Com

- Monitored documents are circulated in the company for comments and actions to be taken (Check Box)

☐ Ignore

☐ File an opposition

☐ Inform R&D Department for possible improvements

☐ Others _____

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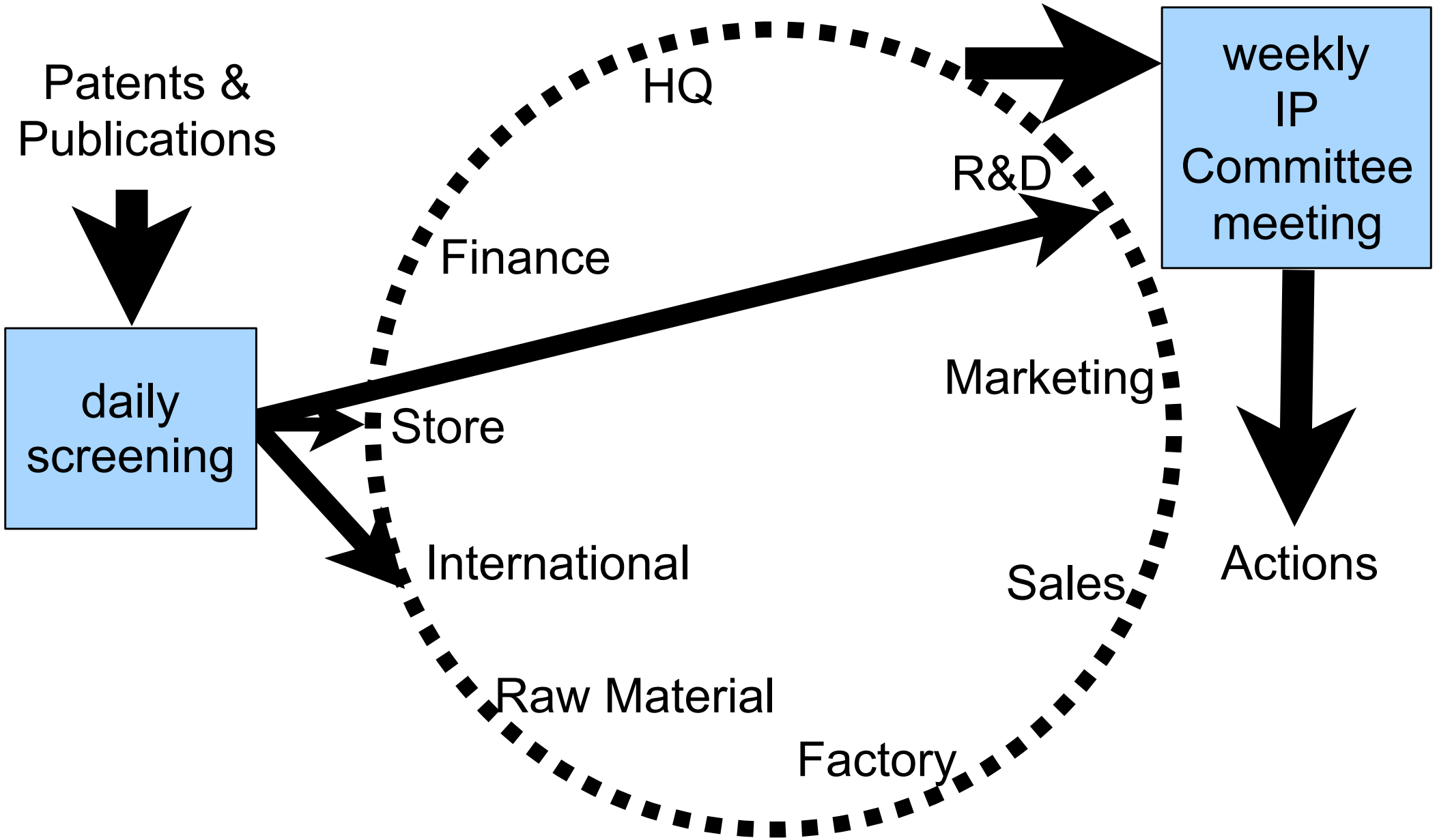
# Paper Trail

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# 4. Strategic Planning

- e.g. how to focus the limited R&D budget
- need to analyze data from many patent documents
- tow modes of operation
  - entry into business

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# Concept of Patent Analysis

- Find wave and trough of patent application (or publication or grant) for a particular technology.
- Guess why the crests and troughs are there
  - New, old technology
  - Problems and problems without solutions (yet)
  - Will it help us if we know the answer?

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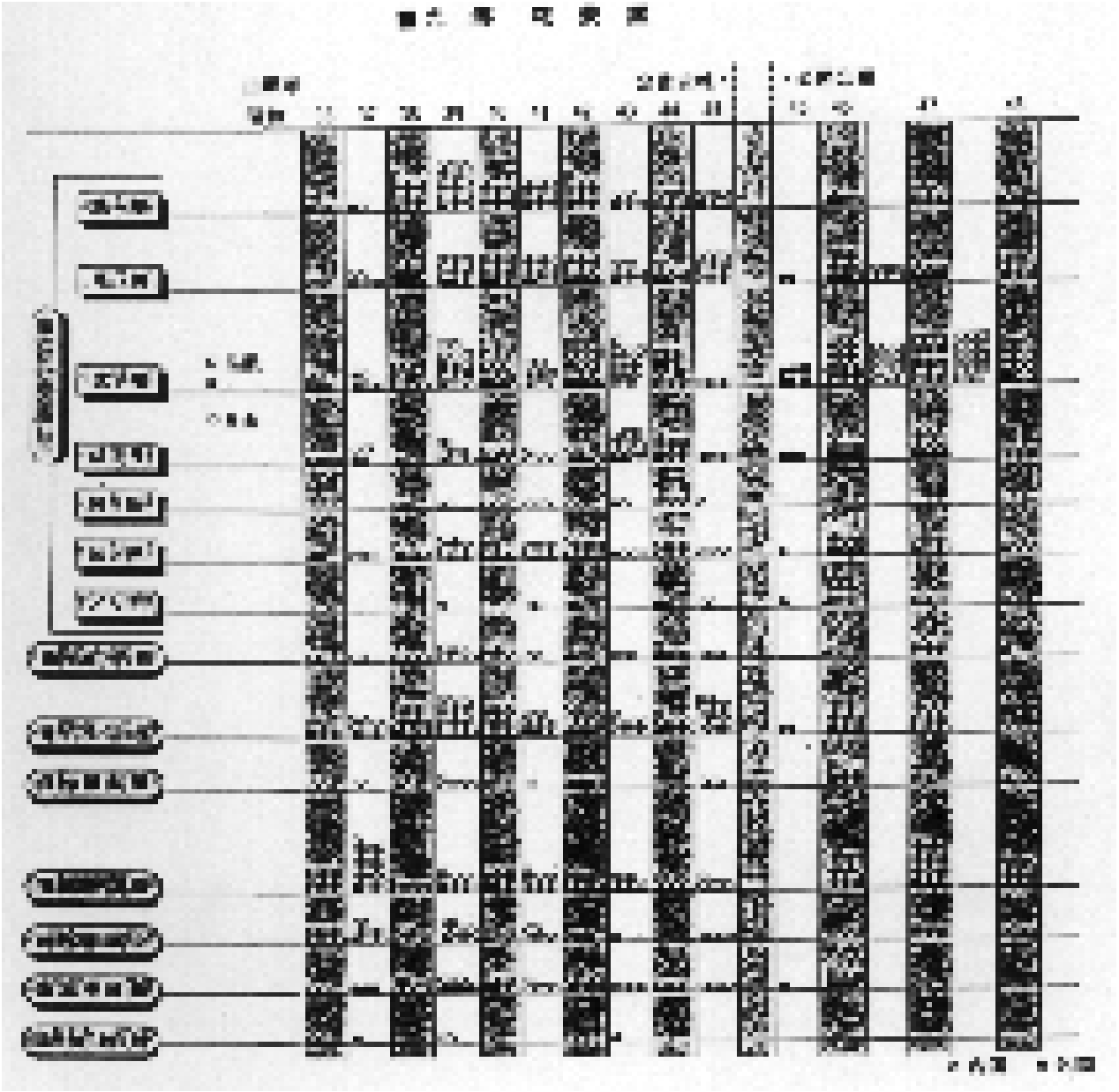
# Temporal Cluster Analysis



AIII/JPO Training Course

- Each row = technology
- Each column = year
- White dots and black dots = presence of domestic or foreign patent in a

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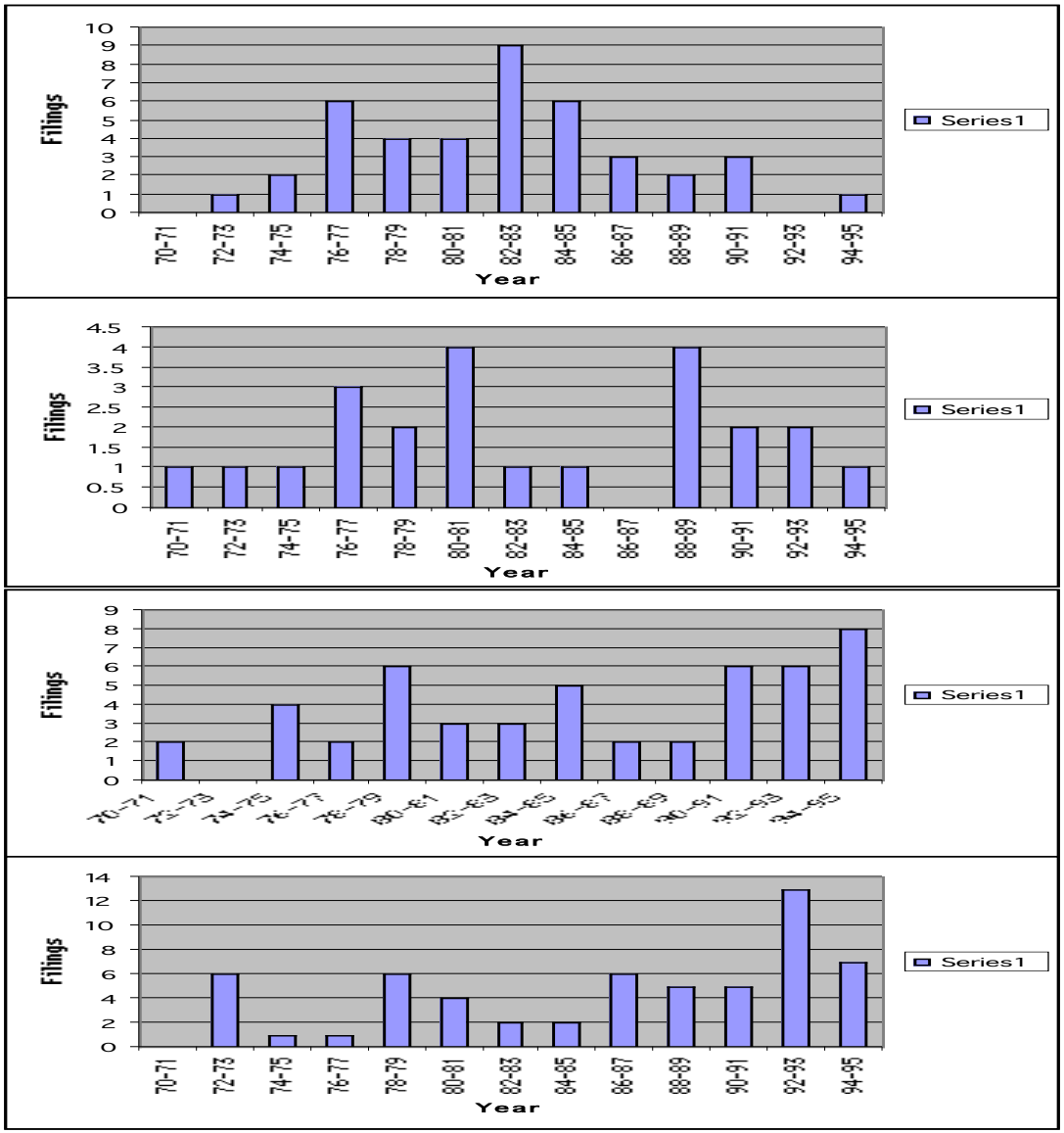
# Storage Batteries




- Storage
- Housing & Sealing
- Charging
- Regulation

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# Technology Maturity Analysis

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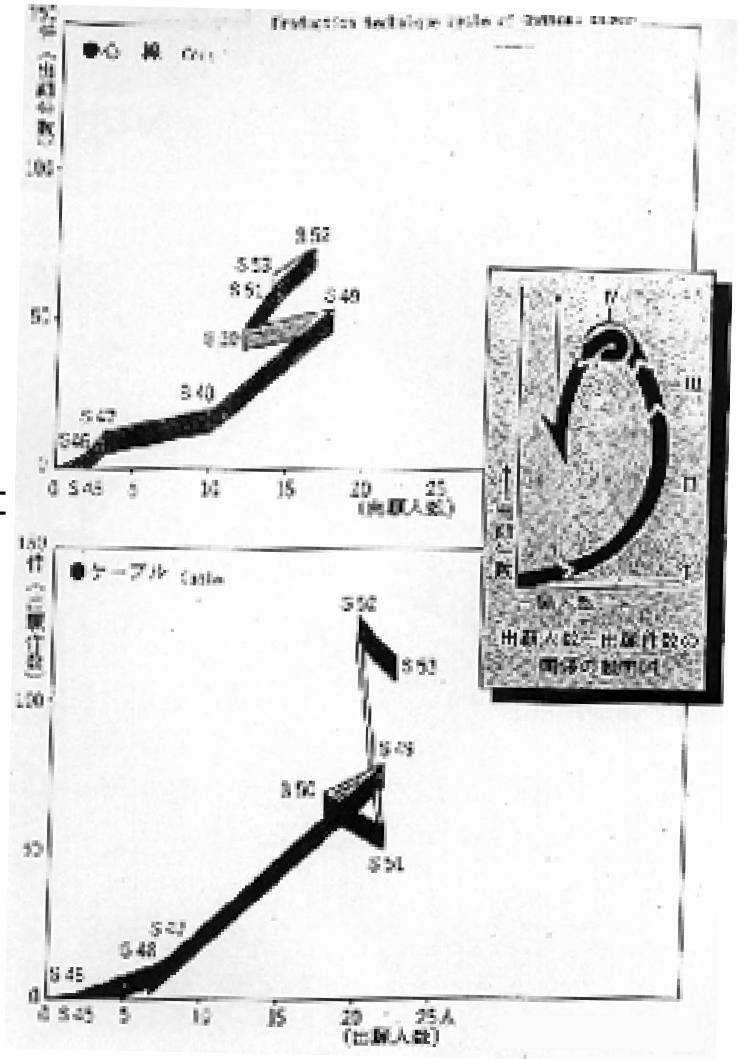


- Fixed time period
- Graph follows a spiral pattern
- Interpretation where maturity is reached and decline

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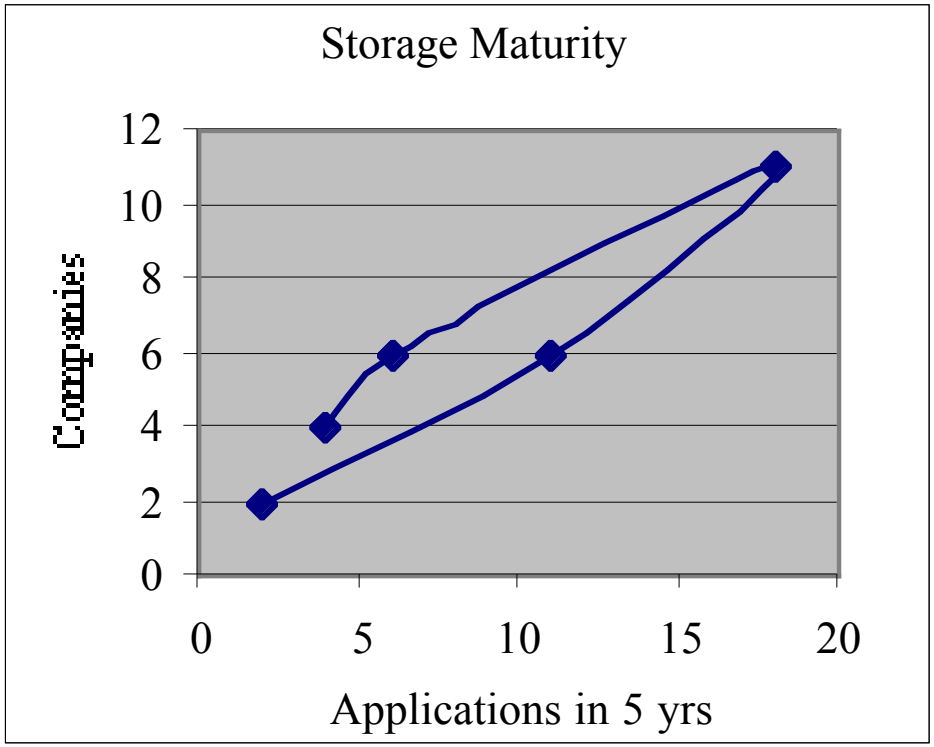
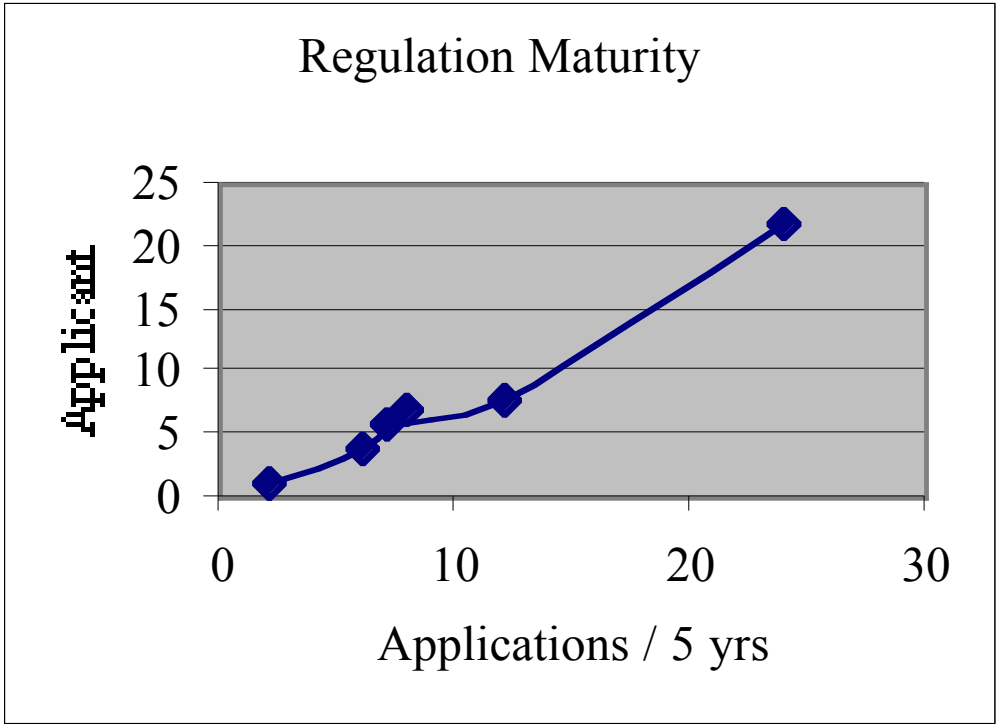
# Storage Battery Technology




- Sensitive to time period and data size
- Other examples also exist.

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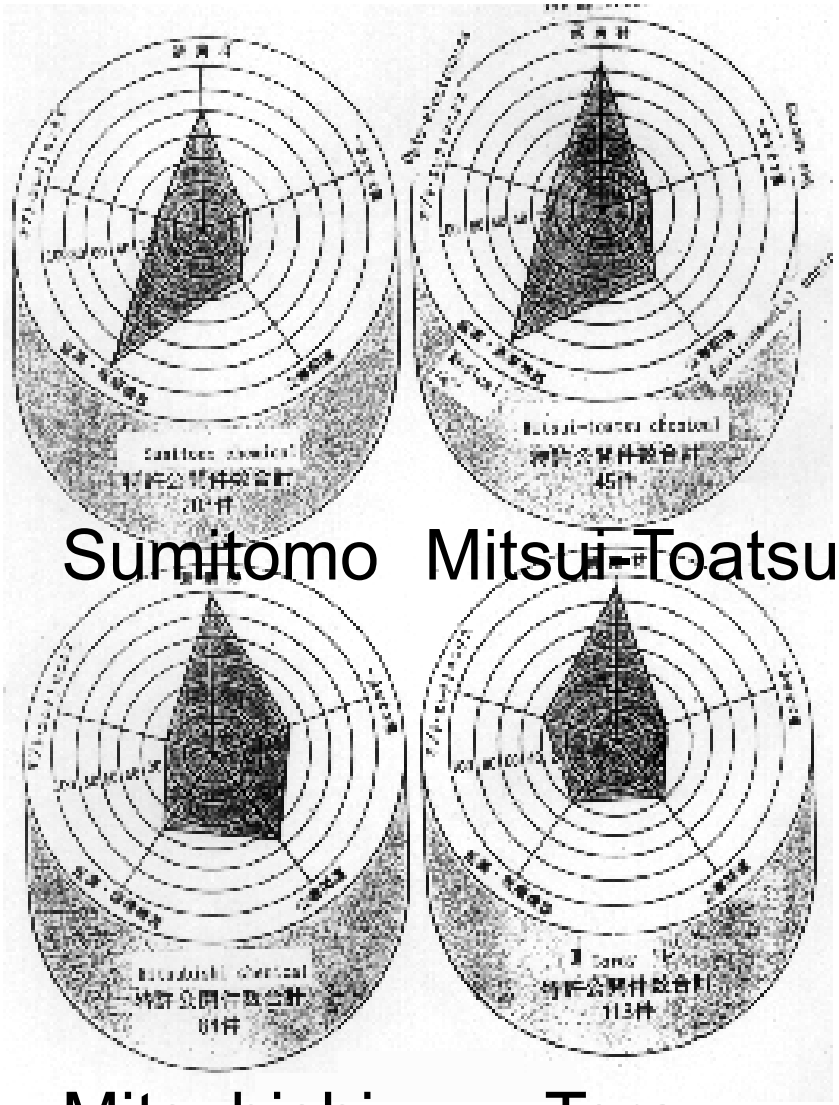
# Business Directions




- Same graph axes for different competitors
- These graphs were produced by Teijin of its competitors
- Distance of radials = number of patent applications or grants
  - raw materials
  - new energy
  - environmental engineering
  - medical



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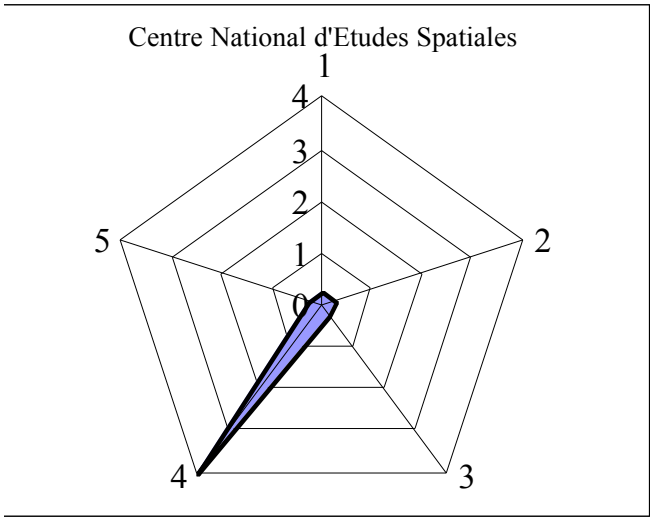
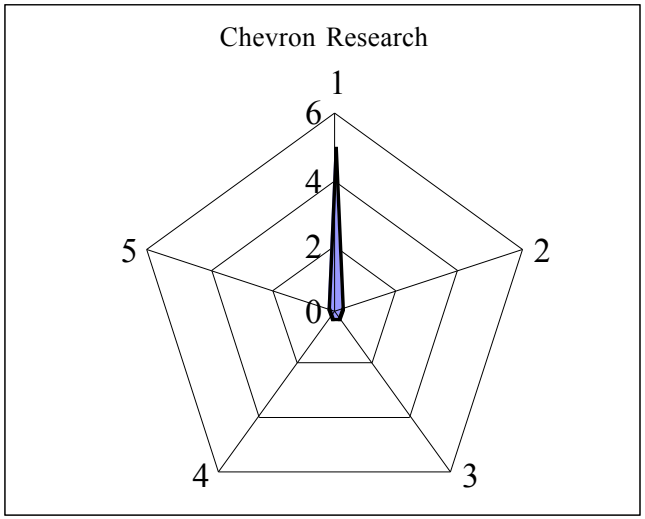
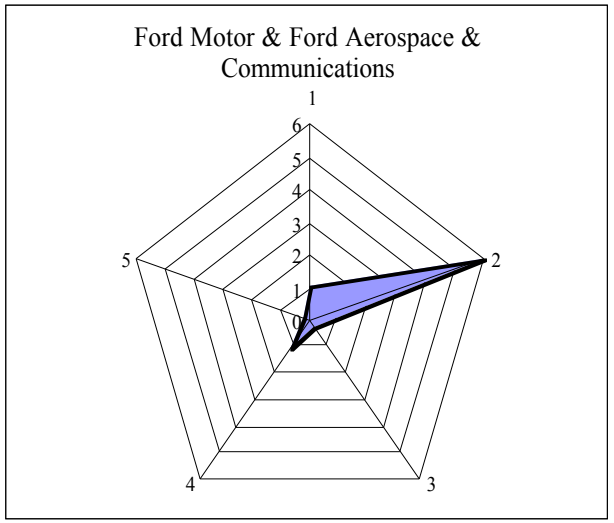
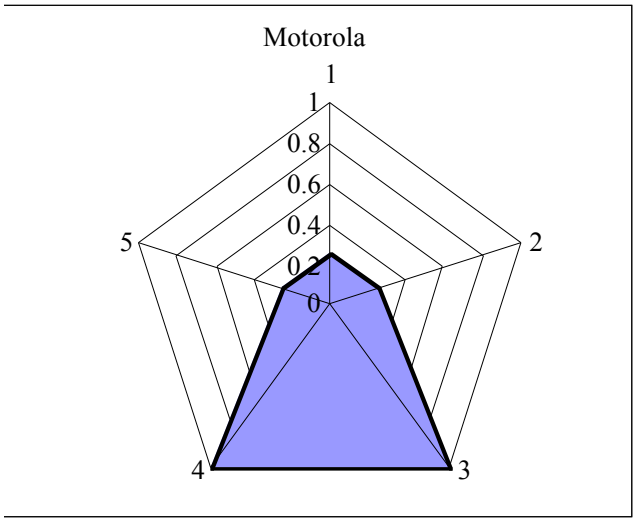
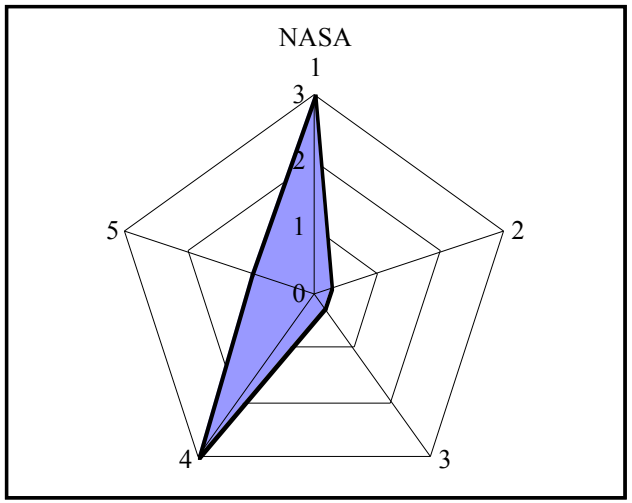
# Storage Batteries

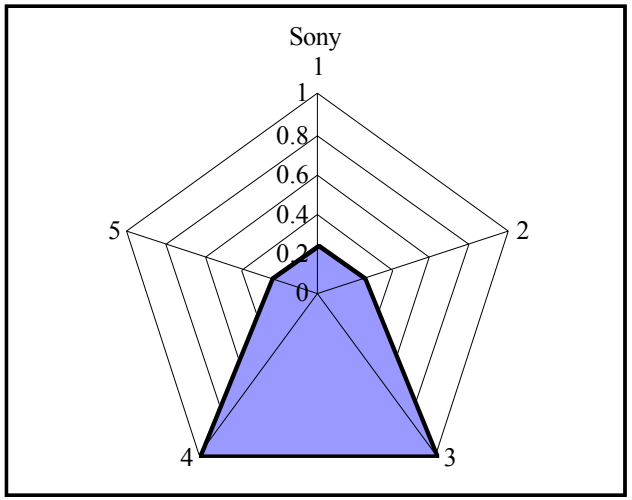



1=storage, 2=housing, 3=charging, 4=regulation, 5=others

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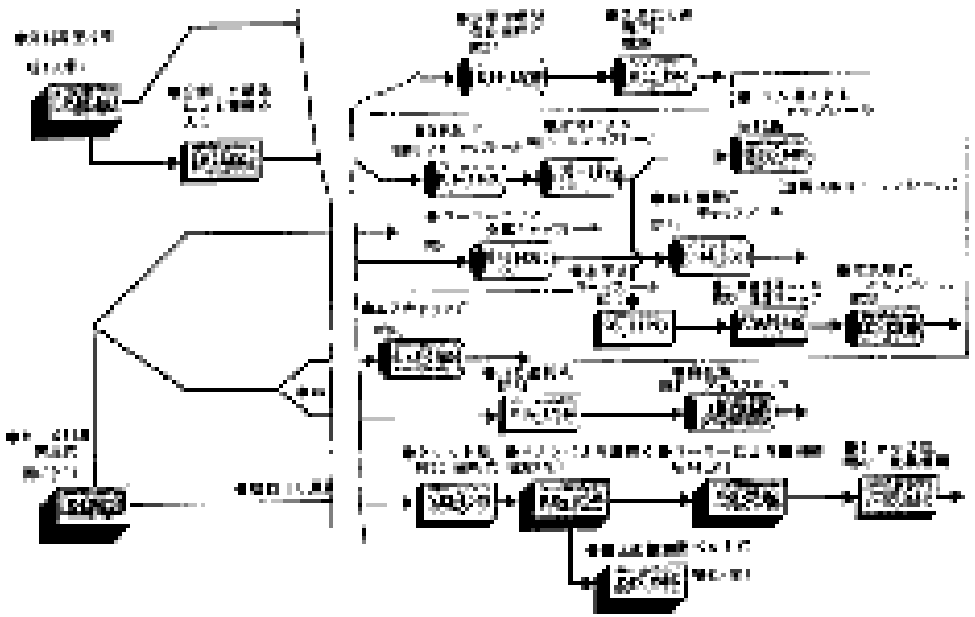
# Patent Mapping



AIII/JPO Training Course

- Technological advancement
  - incremental invention
  - jumps in technology

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# The Canon Story


1950s

1960s

1970s

1980s

- Patent analysis is routinely practiced by Japanese firms
- Cannon Cameras entry into
  - photocopying machine business in the 1970s

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# The Thai Experiment

- 1998 National Research Council Exercise on Analysis of Patent Documents
- Space Telecommunications Storage batteries for use in space environment
- Over 2,700 patent documents were read and selected for analysis
- Results fed into a roundtable discussion to pinpoint the niche and strategies for Thai companies engaged in space

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# Manual v. Computer Mapping

- Manual mapping
  - Each patent is read by at least 1 expert
  - Collected data includes ranking score for importance or relevancy
  - Computer tool -> table, flow chart, etc.
- Computer-generated mapping
  - Computer tool used to
    - Group similar document together
    - Build landscape based on semantic concepts
    - Discover trends and do statistical analysis
  - There is no substitute for actual reading of patent documents.

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# Patent Software List

- Check out various kinds of patent softwares at http://www.european-patent-office.org/online/#soft

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# Computer-Assisted Mapping

- Data Mining
  - Data extracted from “field” in patent documents
  - Many analytical capabilities
    - Temporal analysis
    - Clustering
- Text Mining
  - Text extracted based on AI algorithm

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# Structured Data Example

- Patent Number
- Title
- Inventors
- Application Filing Date
- Publication Date
- Grant Date
- etc.

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# Integrated Text-Data Mining SW

## Examples

- Micropat's Aureka
- Micropat's ThemeScape
- ClearForest
- Synthema's TWID
- Vantage Point
- Invention-Machine
- Bizint's SmartChart
- Chemical Abstract's SCIFINDER
- OmniViz
- Thomson's Current-Patent
- WisDomain
- Delphion
- Patent Citations
- Patent Value Predictor
- TEMIS
- VxInsight

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# Micropat's Aureka

*http://micropat.com/aureka/*

- web-based comprehensive, integrated solution that is used to manage innovation assets.
- Aureka streamlines the creation and extraction of value from innovation assets at all levels and functions across the enterprise: research and development, licensing, corporate intelligence, patent portfolio management, and strategic planning.

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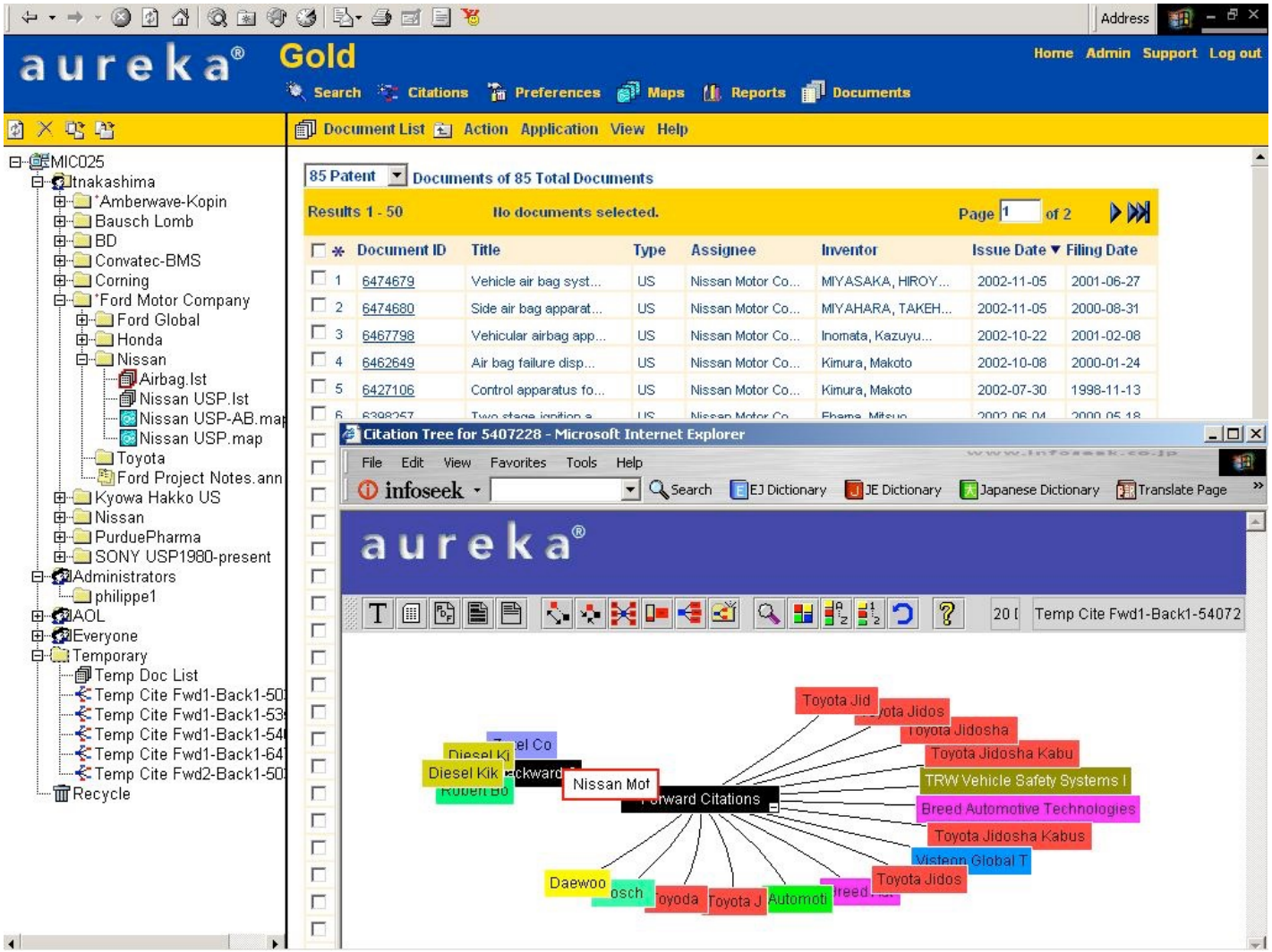
# Aureka Patent Search




- Easy management of patent documents
- Forward and backward references

http://www.micropat.com/0/aureka_online.html

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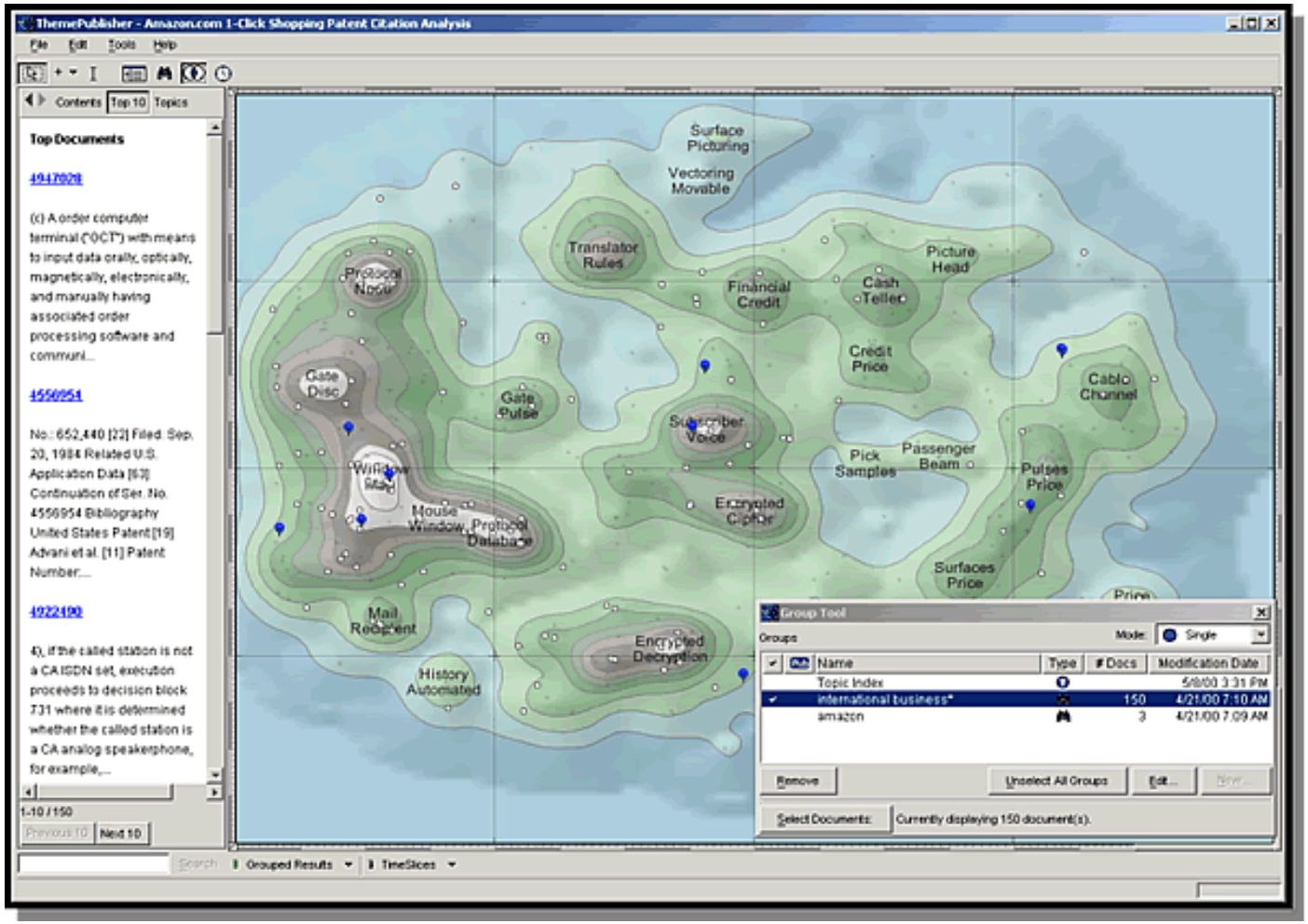
# Micropat's ThemeScape




http://www.micropat.com/0/aureka_online.html

- Topographical map from text analysis
- Select keywords or phrases to collect number of hits
- Searching tool

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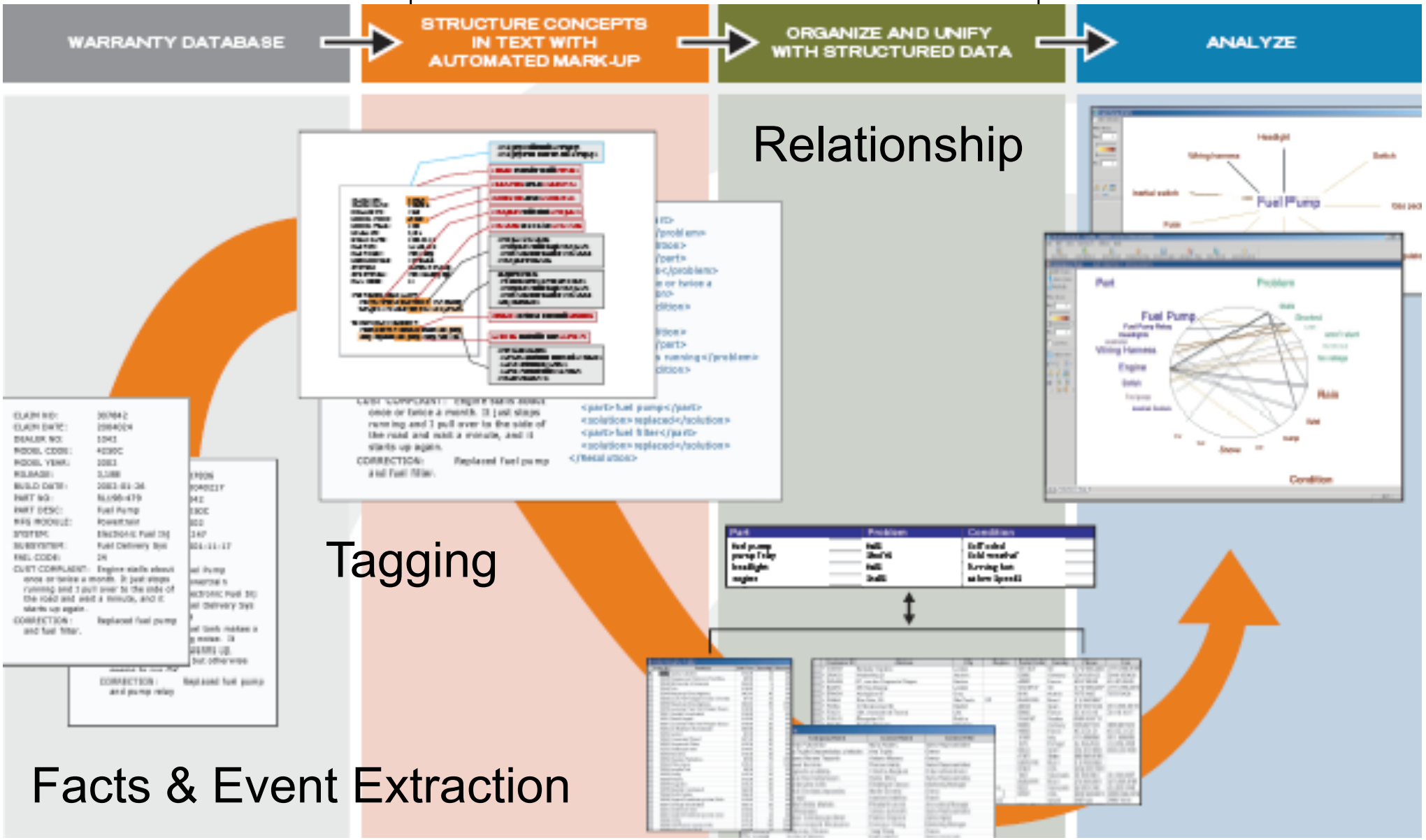
# ClearForest

http://www.clearforest.com

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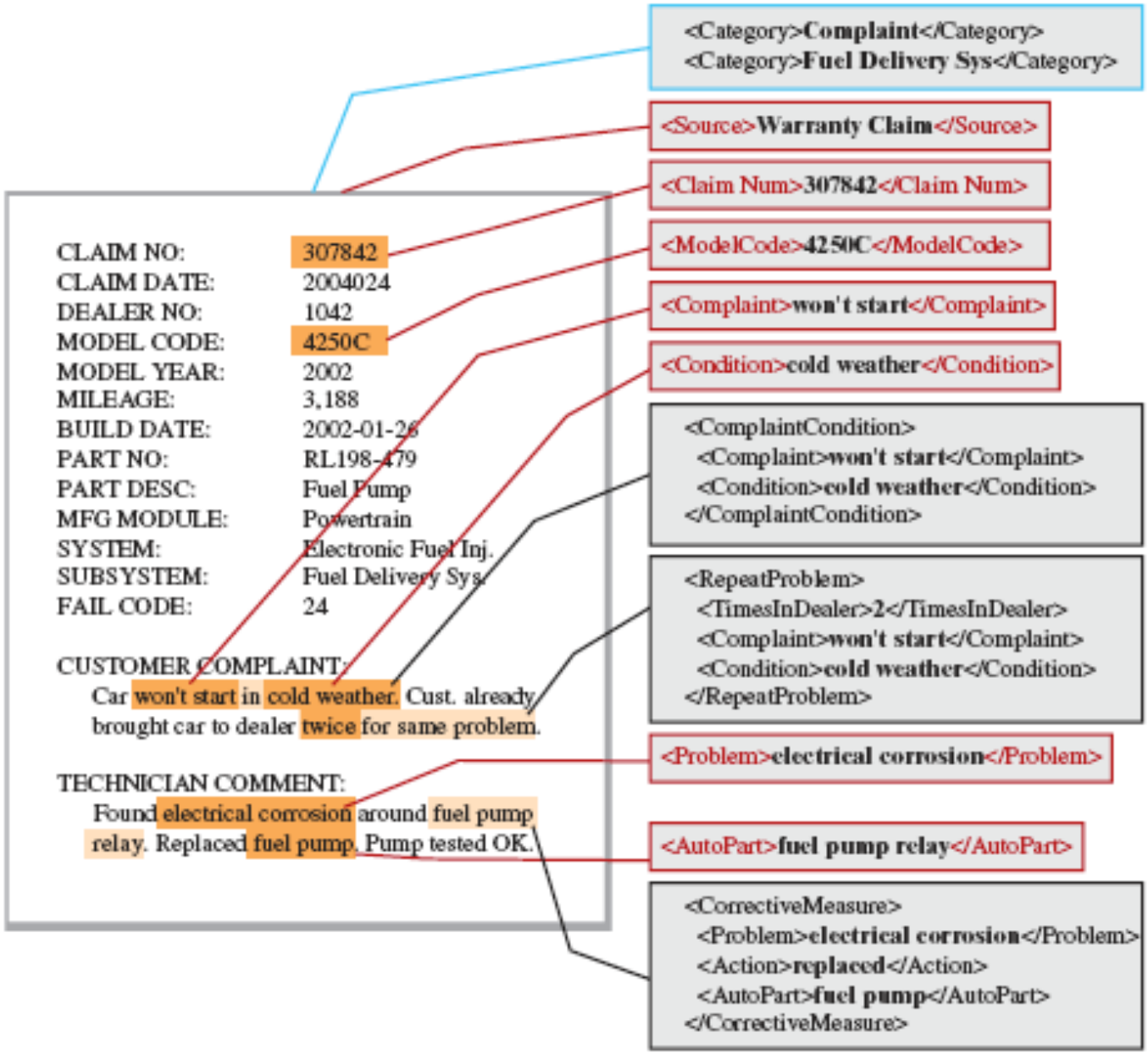
# ClearForest Tags




Extraction of unstructured data into structured data

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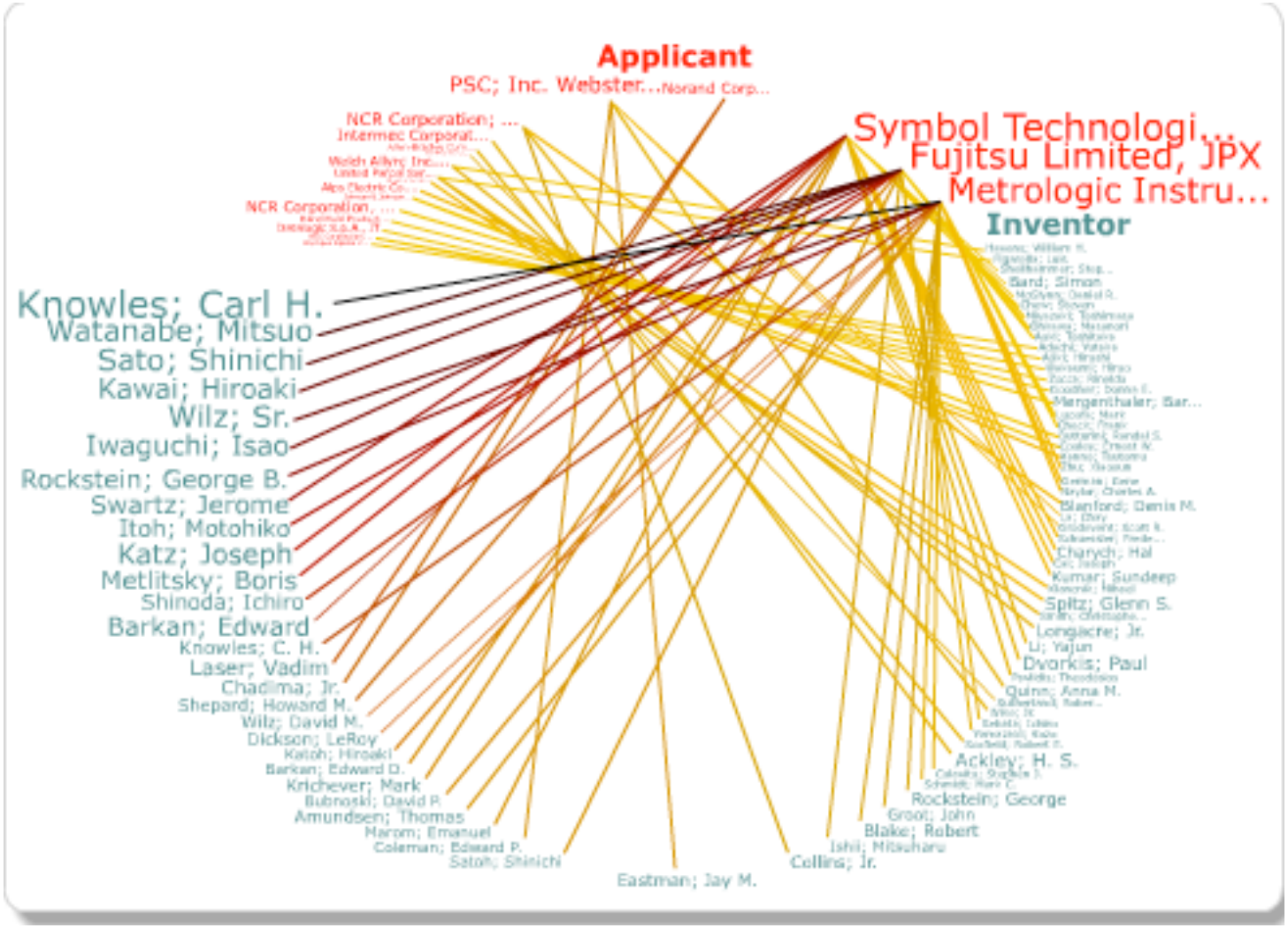
# Example: Major Players




- "Bar Code" AND
  US Class
  235 (registers)
  250 (radiant energy)

- Applicant and claim terms

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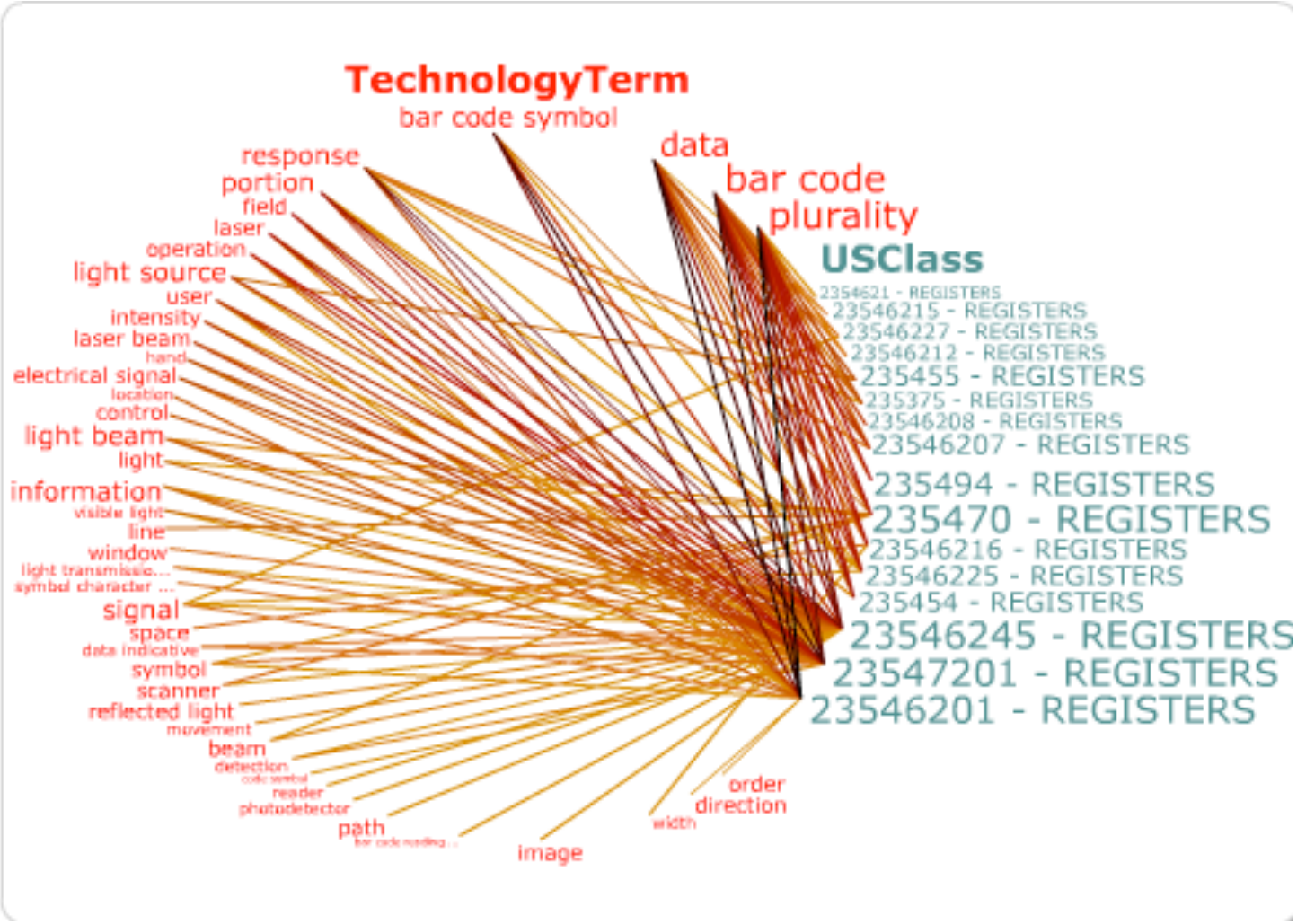
# Example: Classification




- Claim terms link to class 235/472.01 = coded record sensor, hand-held
- 235/462.45 = coded record sensor, bar code, rotating mirror, hand-held

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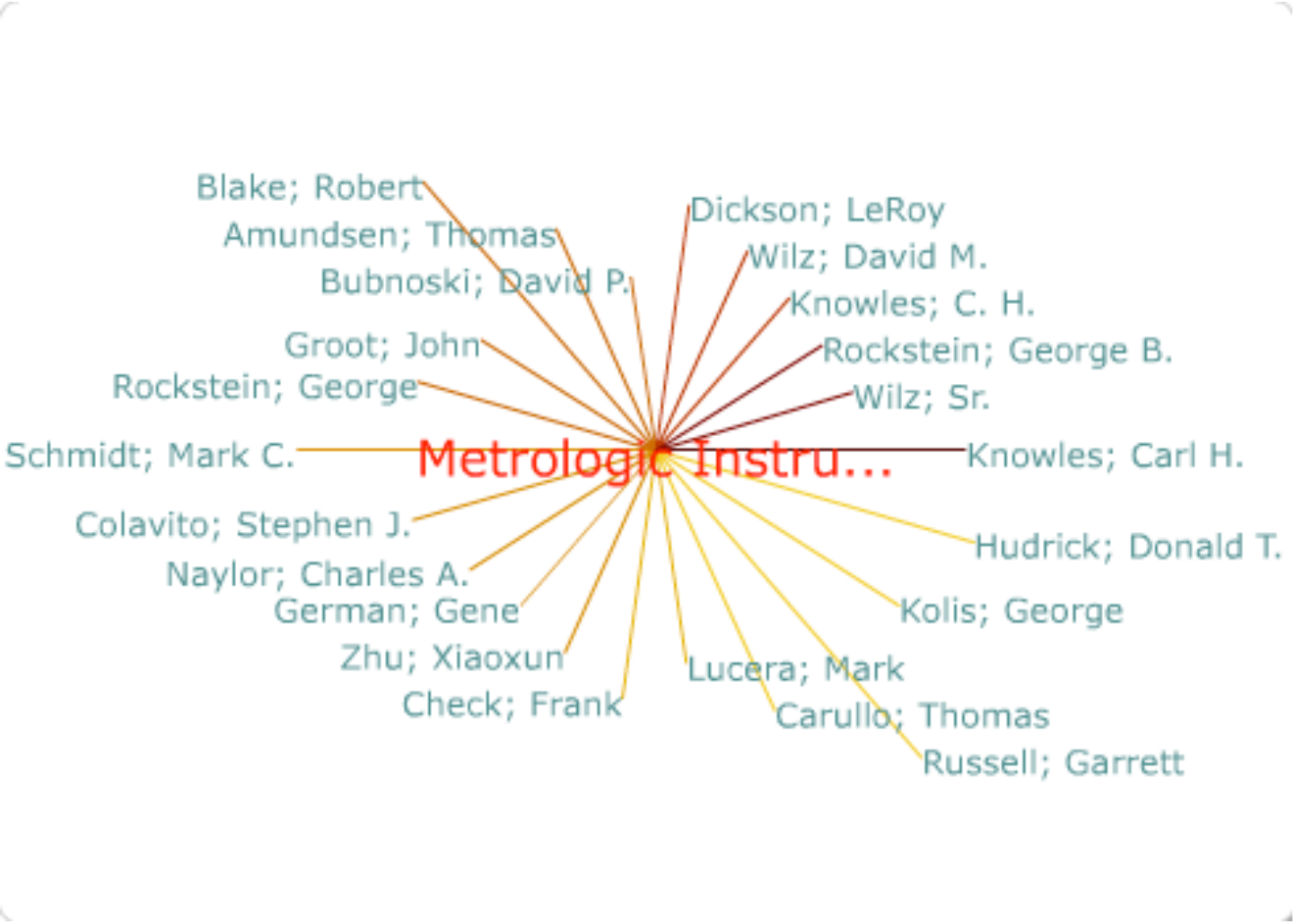
# R&D Team of a Company




- Focus on only one company
- Show the most prolific group of inventors

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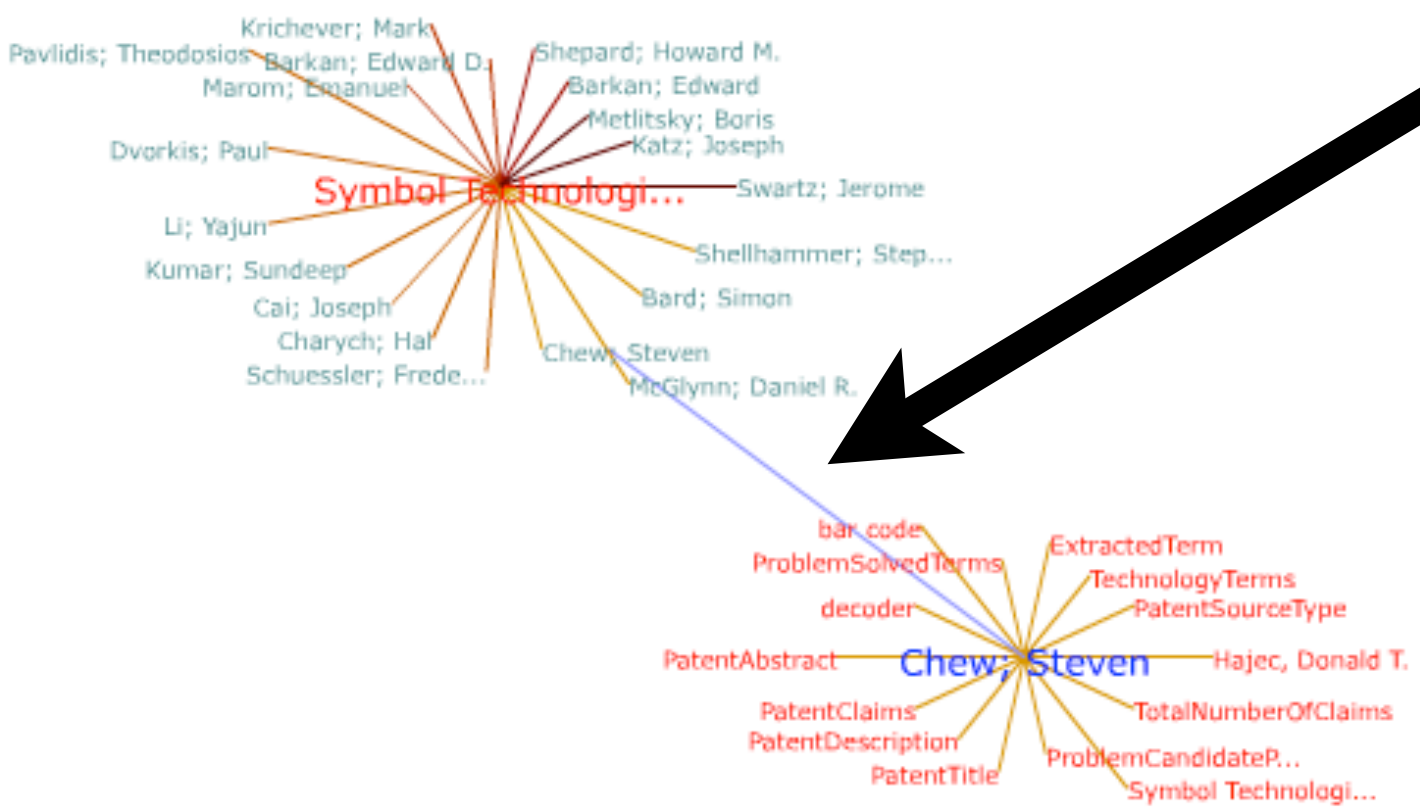
# Profile of Each Inventor

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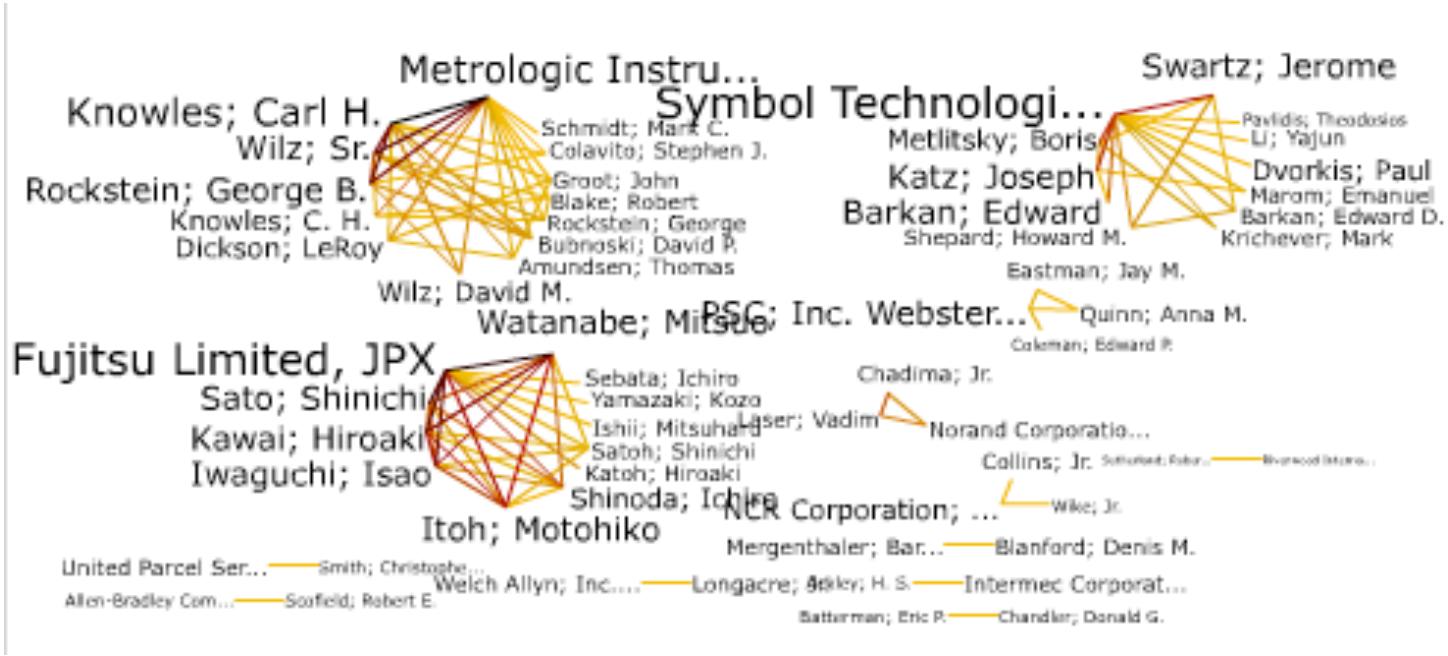
# Co-Inventor Map




co-inventor in each company

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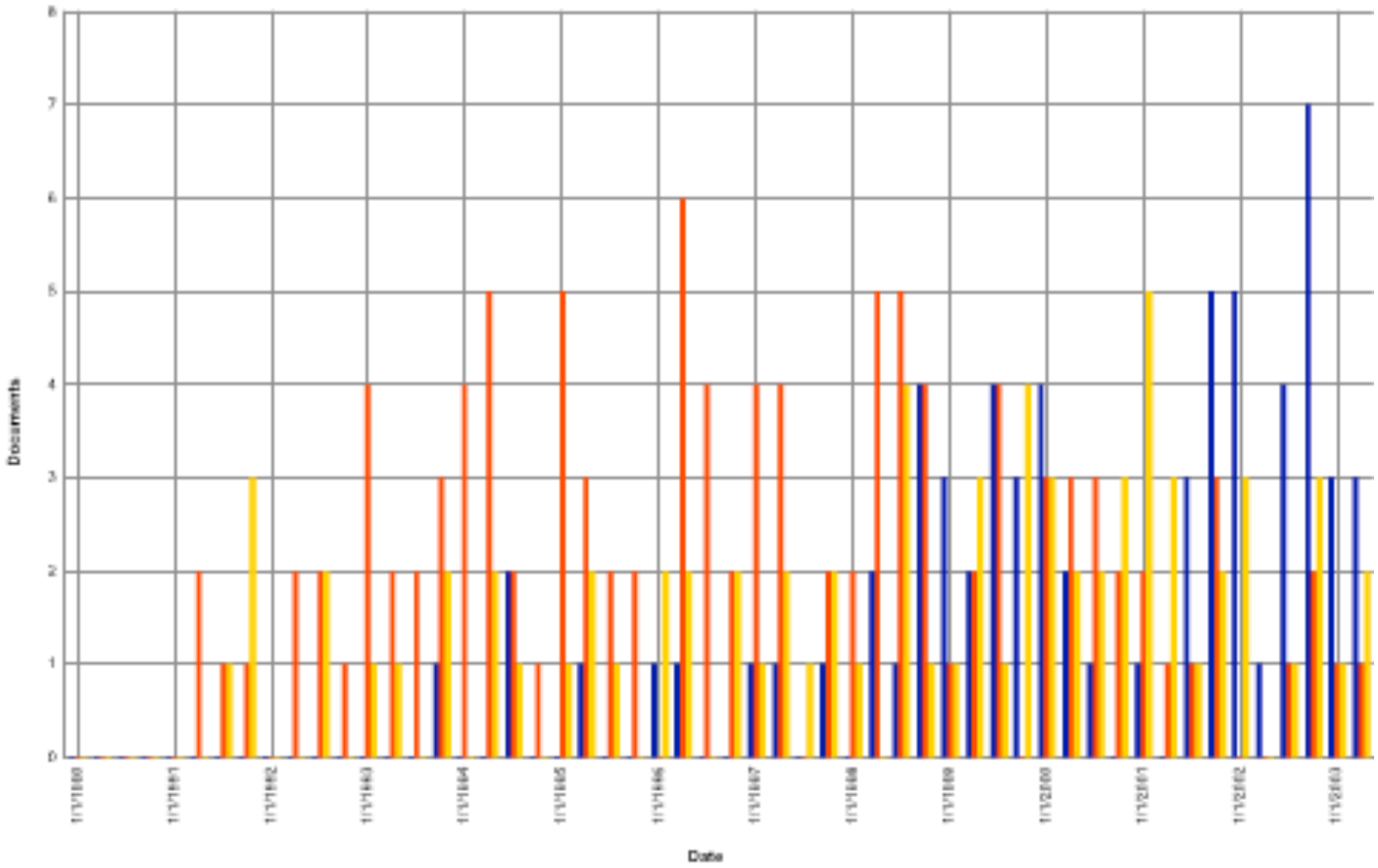
# Example: patents by year




comparing 3 companies

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# SynThema

*www.synthema.it*

- Several pieces of software and services to do data and text mining for patent information.
- Technology watch from several types of clustering analysis

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# TWID@synthema

- Lexical Engine based on a Morphological and a Statistical approach: only particular words or Multi Word Expressions (MWE) are extracted from the texts basing on Statistics (frequency, relevance to the corpus) and Grammar Rules.
- Analyze all the phrases, classifying each word, detecting its attributes and reducing its inflected forms to the normalized form, i.e. infinitive form for verb, singular form for nouns.
- The normalized form is then used as a descriptor for the document.

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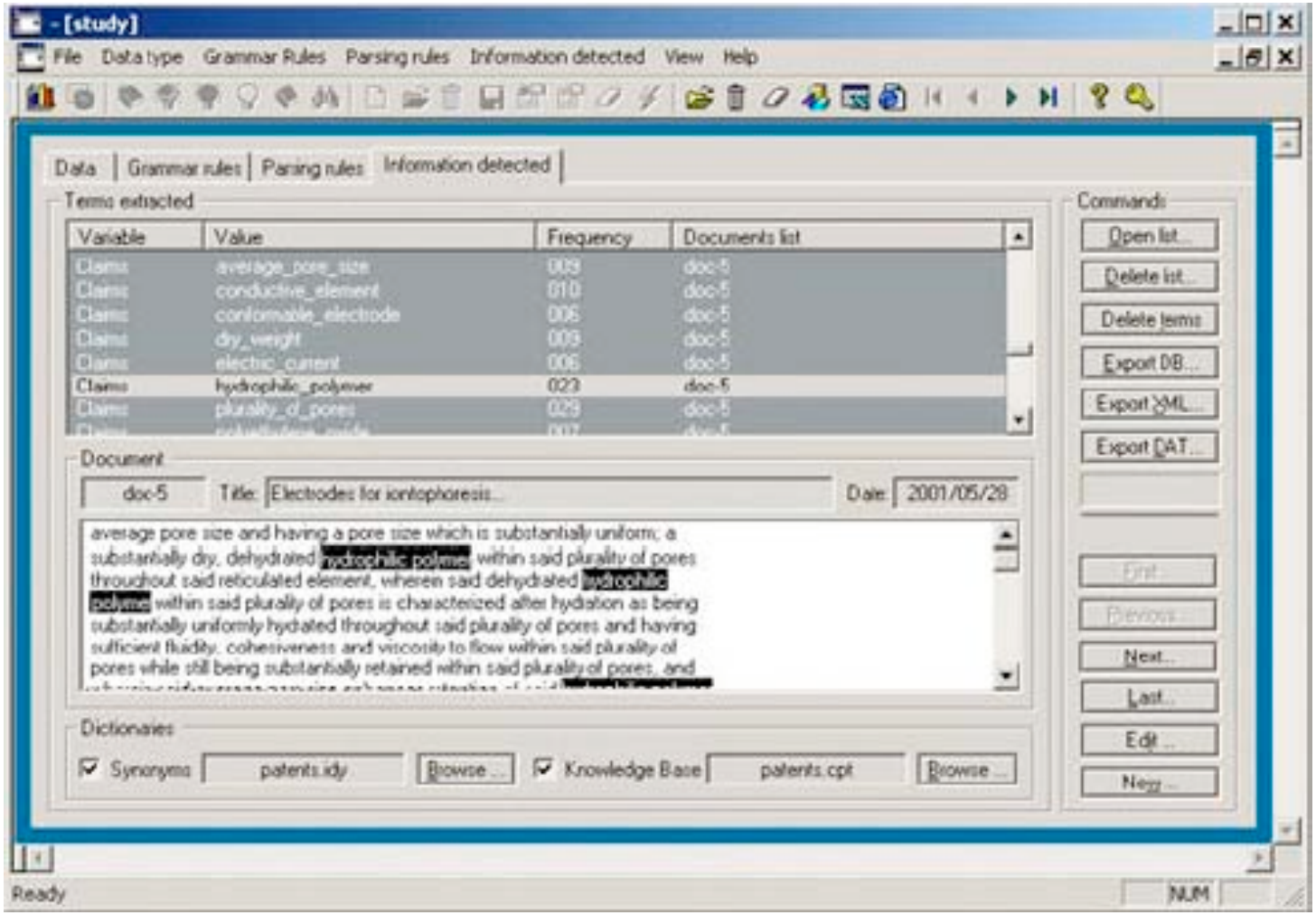
# TWID




The Knowledge Extractor Screen

- Grammar and other rules have to be

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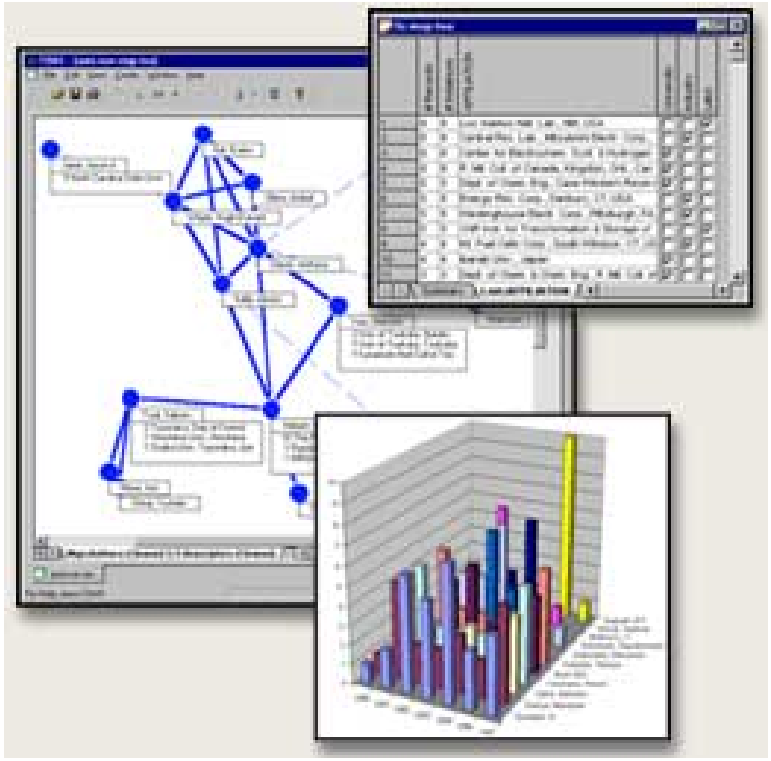
# Vantage Point



- Scanning (new tech)
- Profiling (prople & org)
- Mapping
  - Temporal analysis
  - Co-occurrency matrix
  - Etc.
- Trending
- Forecasting

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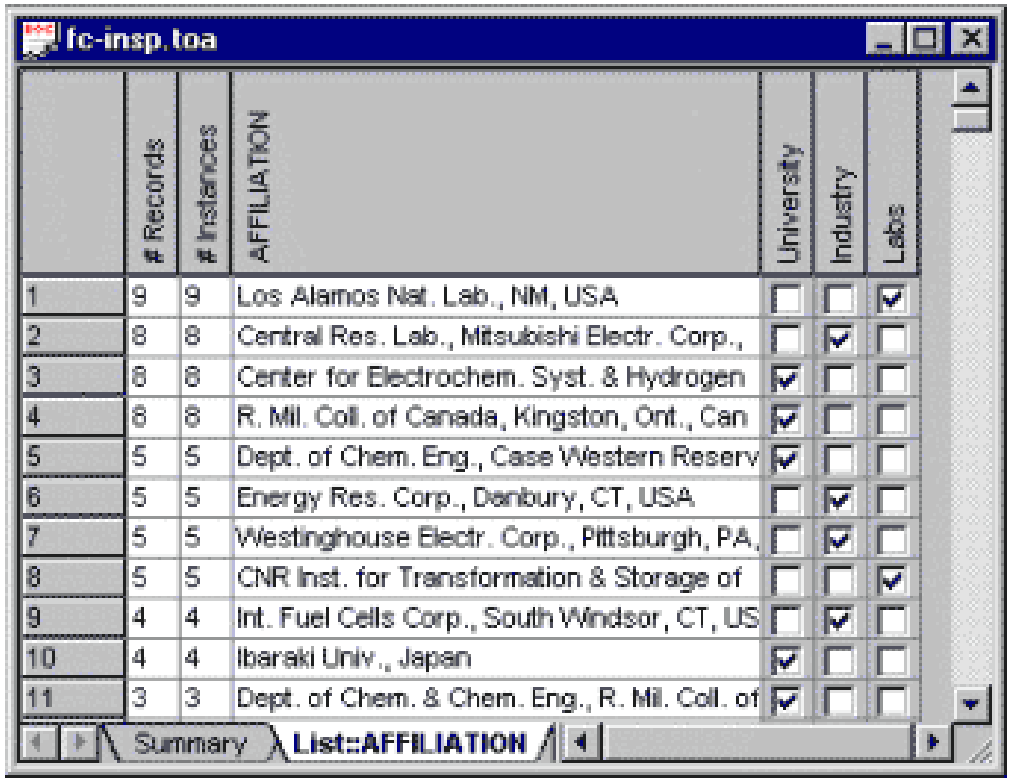
# TopTenList@vantagepoint




- By inventor
- By country
- By affiliation
- etc.

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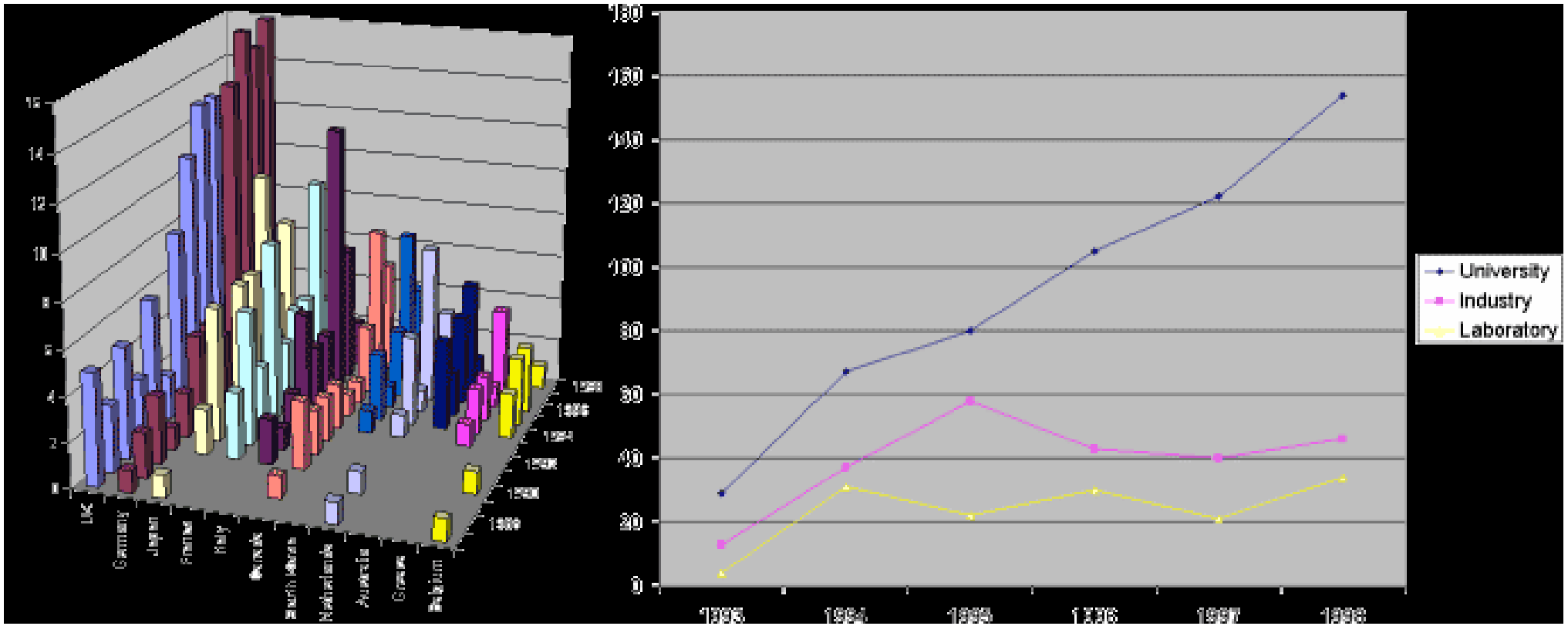
# Co-occurency Matrix @vantagepoint




- Look at any 2 variables, e.g. Inventor & Yr

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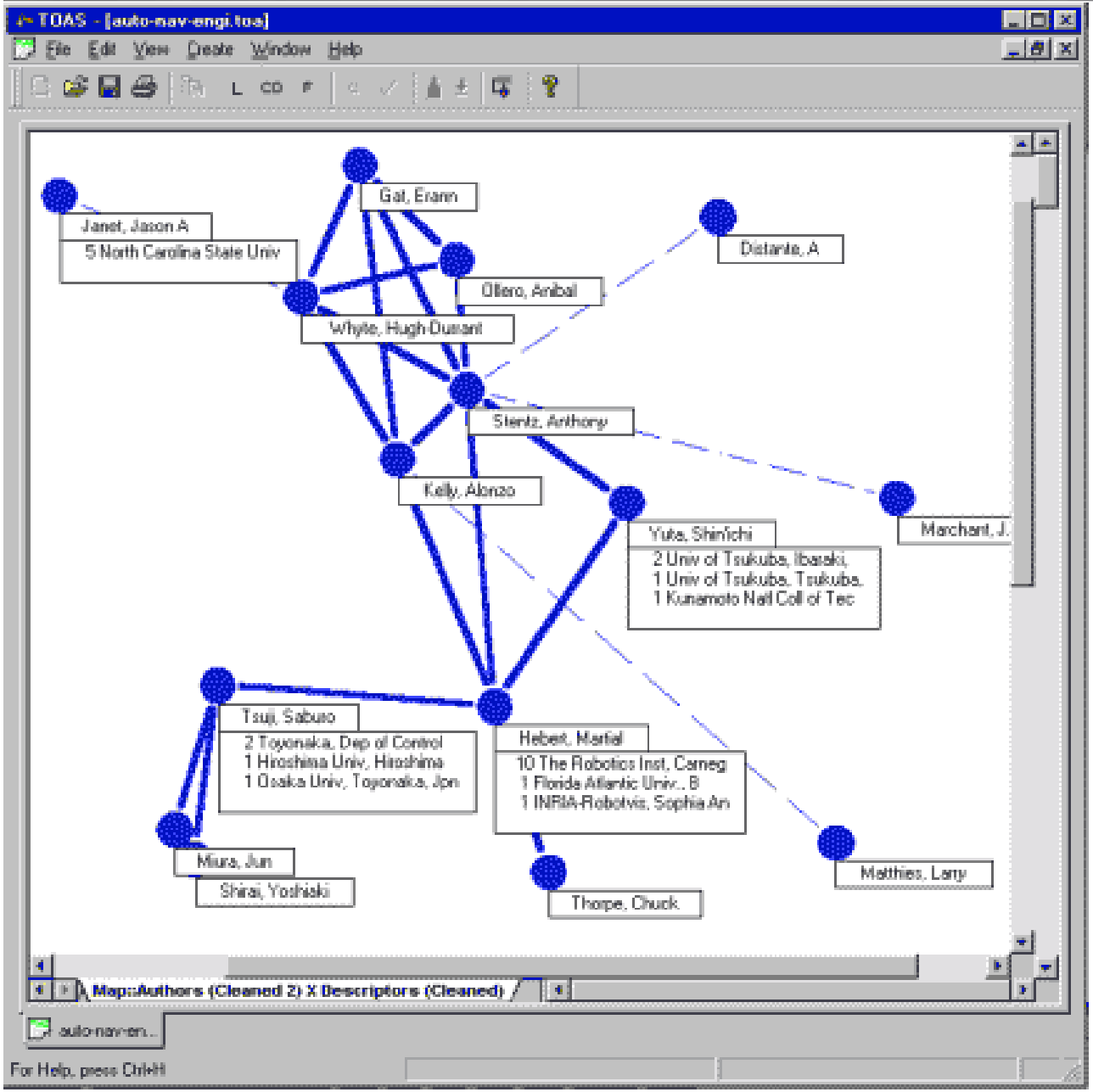
# Mapping@vantagepoint.net




- Here each node represents an inventor
- Linkage by user-given set of descriptors
- Many other types of map

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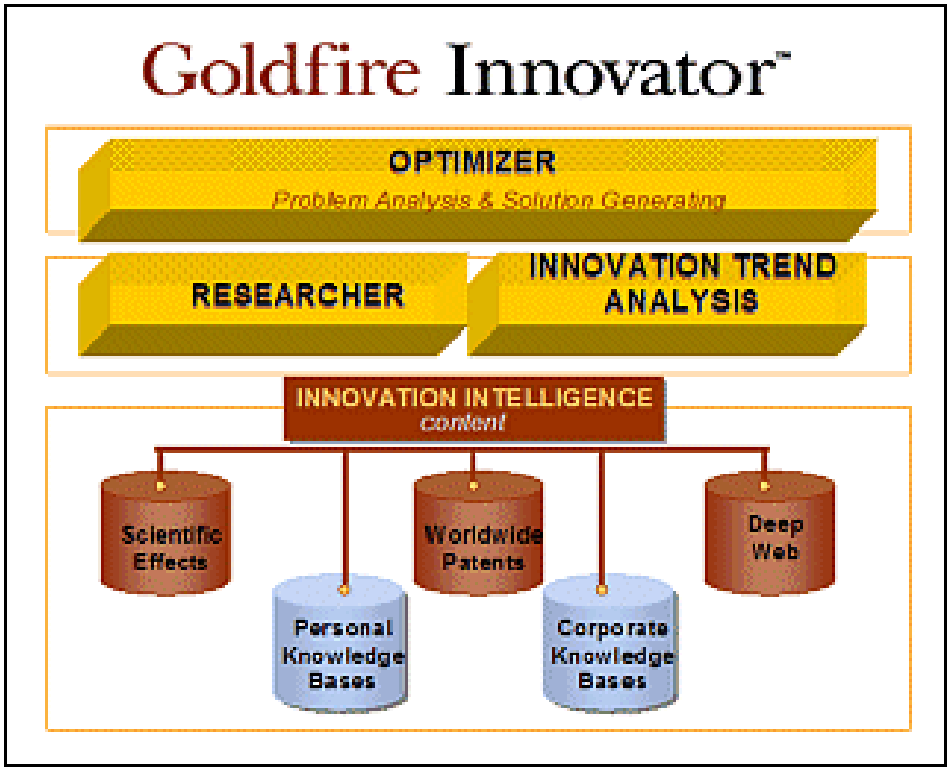
# Invention-Machine

http://www.invention-machine.com




http://www.invention-machine.com/prodserv/GFIN.cfm

- Optimizer
- Trend analysis
- Innovation intelligence

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# BizInt's SmartChart for Patent

*http://www.bizcharts.com/sc4pats/*

- Reporting tool
- Consolidate data from several patent data bases CA, IFI, WPI
- Dialog or STN input

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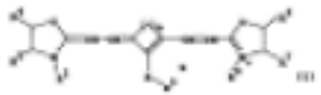
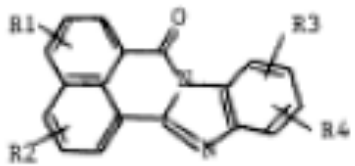
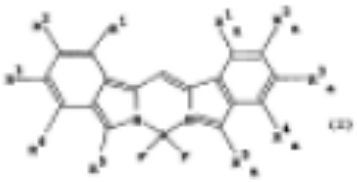
# Chemical Abstract

http://www.cas.org/SCIFINDER/

| | Title | Patent Assignee | Image |
|---|---|---|---|
| 1 | New thio-substd. bis-oxazole deriv. dyes - absorbing throughout the near infrared, useful in laser applications such as recording systems and cancer treatment. | STERLING DIAGNOSTIC IMAGING INC (STER) |  |
| 2 | New fused benzo isoquinolinone derivs. useful for treating neoplasms - are e.g. 10-amino-2-(di methylamino) -7H-benzimidazo (2,1-a)benz (de)isoquinolin-7-one.. | LILLY & CO ELI (ELIL) |  |
| 3 | New bis cyclo-alkylidene ethane dyestuff cpds. - useful as photopolymerisation initiator, in electrophotography or in photo dynamic therapy of tumour. | BASF AG (BADI) |  |

- 2D grid comparing chemical structures to CAS indexin

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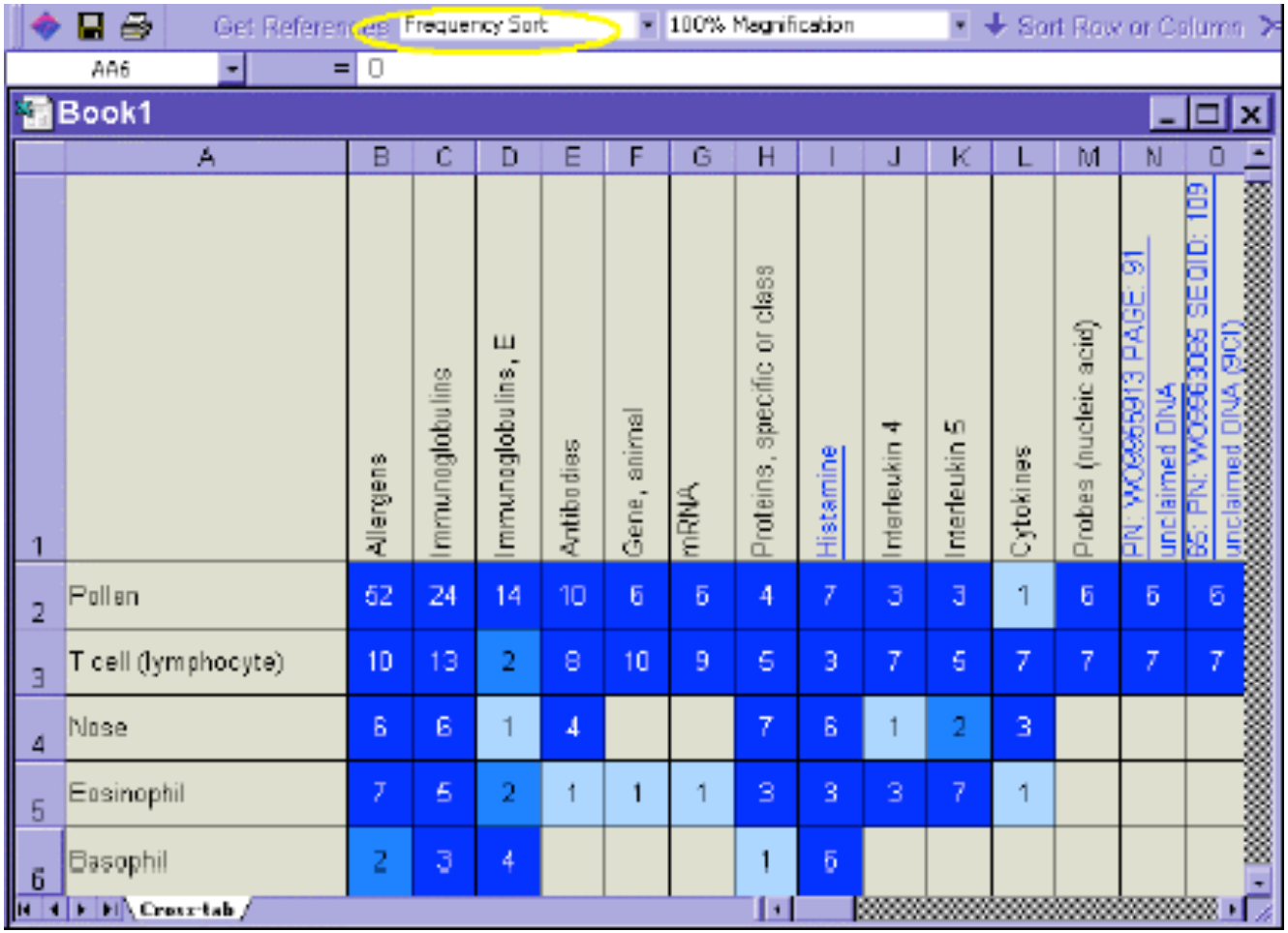
# SciFiner




- Another tabular

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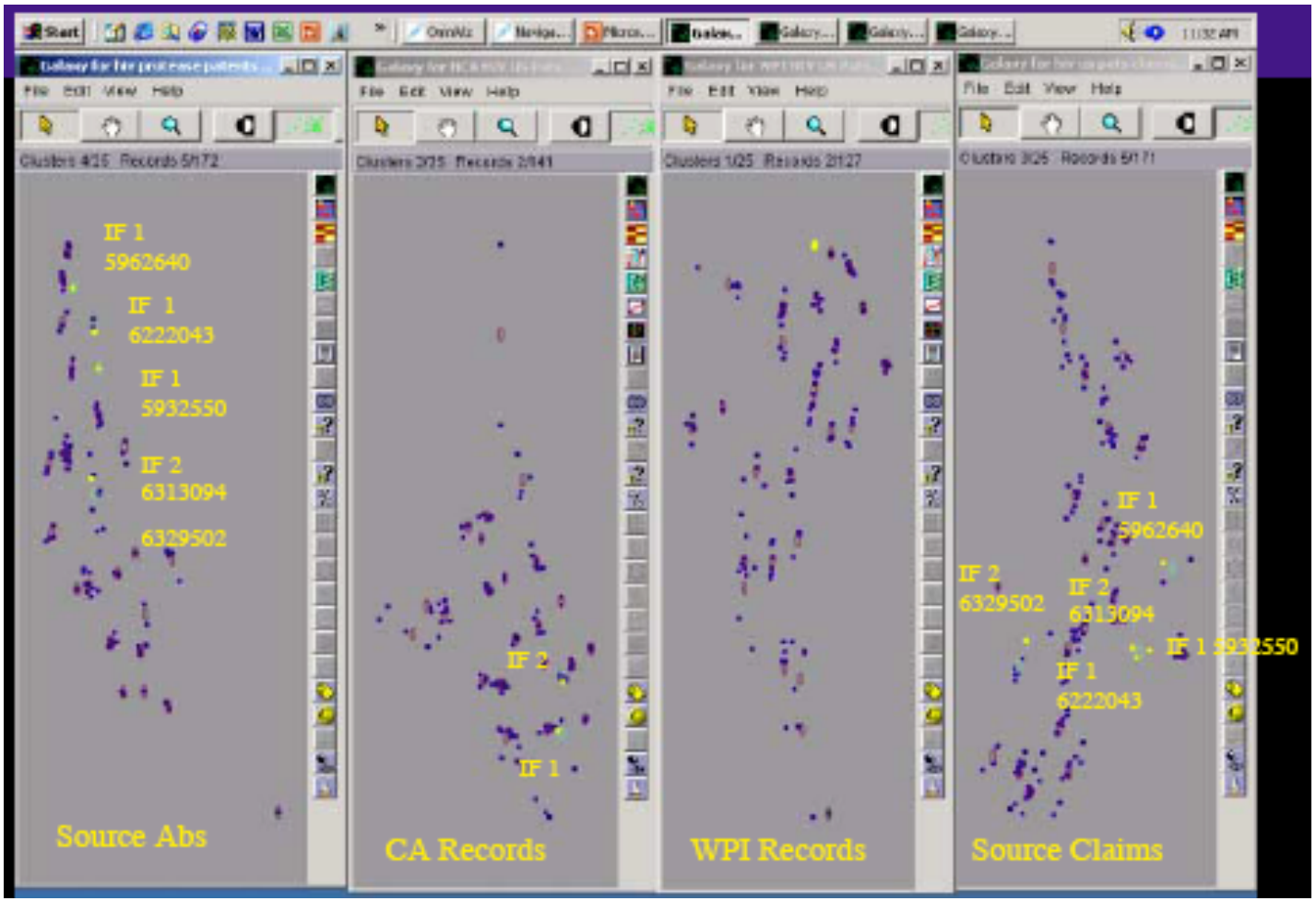
# OmniViz

www.omniviz.com/applications/omni_viz.htm




Text analysis

Cheminformatics

Gene Expression

answer fundamental questions about data, such as how is every record related to every other record, or how are the attributes distributed throughout the data set.

analyze and visualize multiple data types provides for valuable analytical integration.

Numerous query tools including dynamic query devices, plotting tools including interactive 3-dimensional graphs, sophisticated statistical packages, and many other unique functions

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# Thomson's Current-Patents

*http://www.current-patents.com*

- DOLPHIN = Database of All Pharmaceutical Inventions
- therapeutic patents
- patents in areas such as packaging, drug delivery devices, biotechnology inventions with no direct therapeutic application
- consolidates the family and legal status information from INPADOC for twenty-eight countries with information dating back as far as the sixties.
- A unique indexing policy allows highly specific searching and analyzing of patents with relevance to particular drugs or companies

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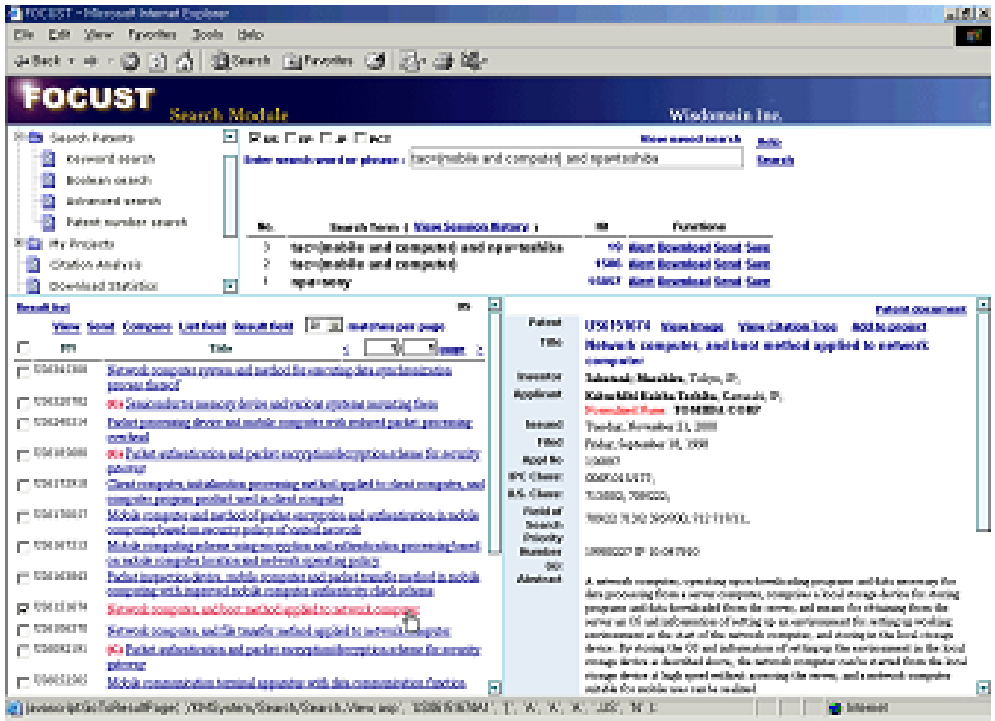
# FOCUST

http://www.wisdomain.com




- Search module
  http://www.wisdomain.com/SearchModule.htm
- Citation module
- Analysis module

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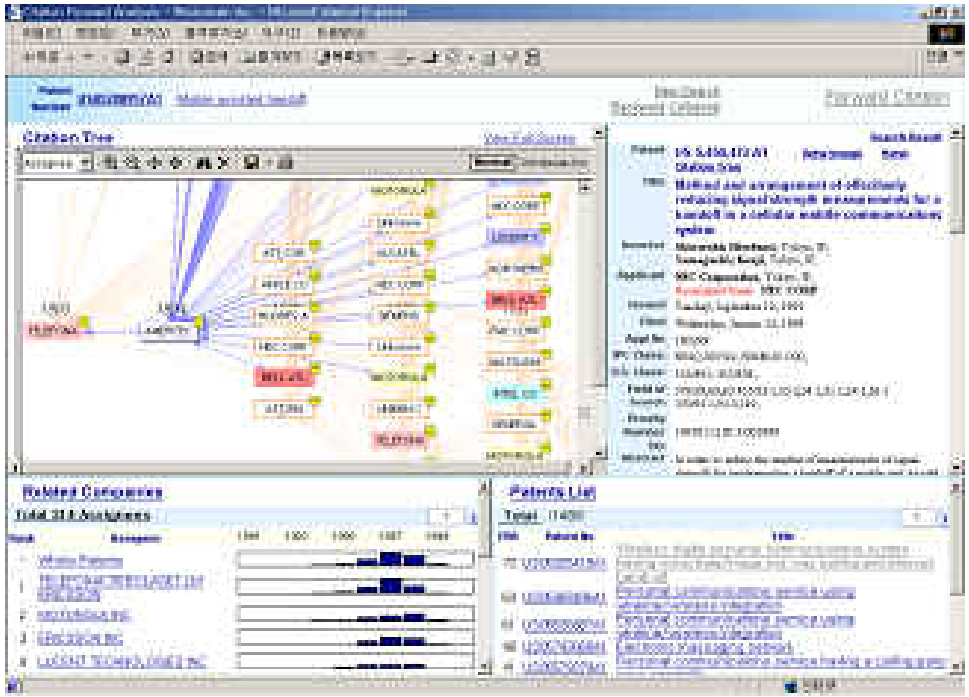
# FOCUST CITATION MODULE



- Forward
- Backward
- Collateral

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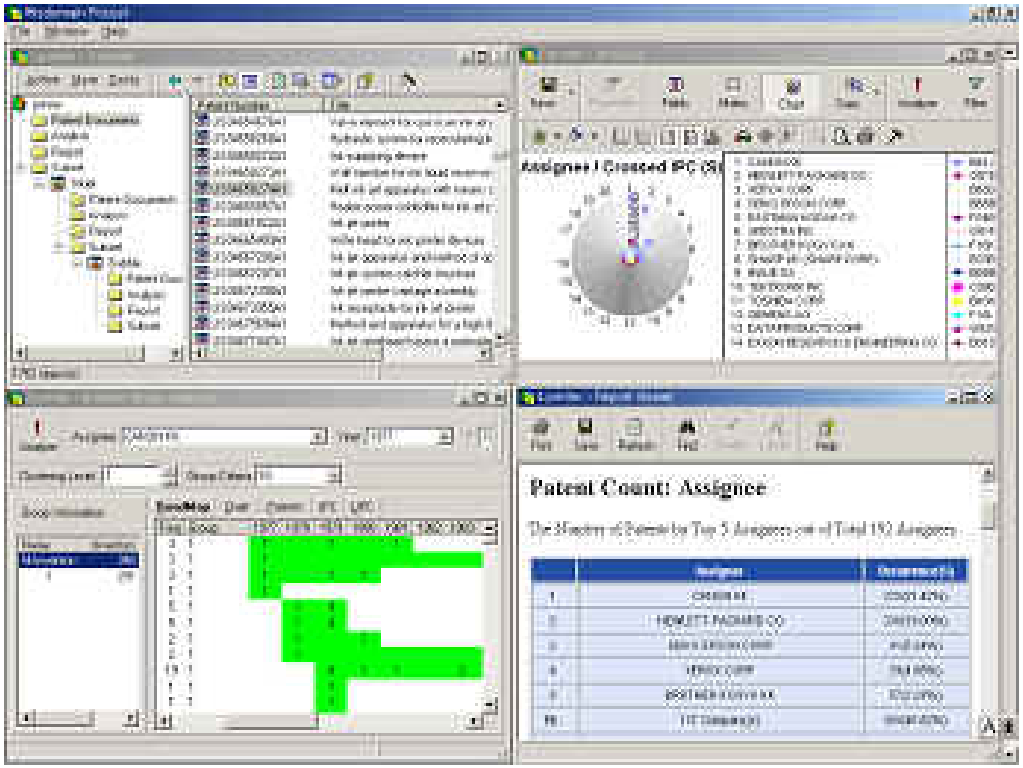
# FOCUST ANALYSIS




- Text mining
- Charts & Tables
- Flexible Document

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# Thomson Delphion

http://www.delphion.com

- Citation link - forward & backward map
- Snapshot - simple bar chart analysis
- Patentlab II - 3D graph display
- Clustering - keyword-based linguistic analysis
- Corporate tree - Assignee names
- PDF Express - facilitates downloading

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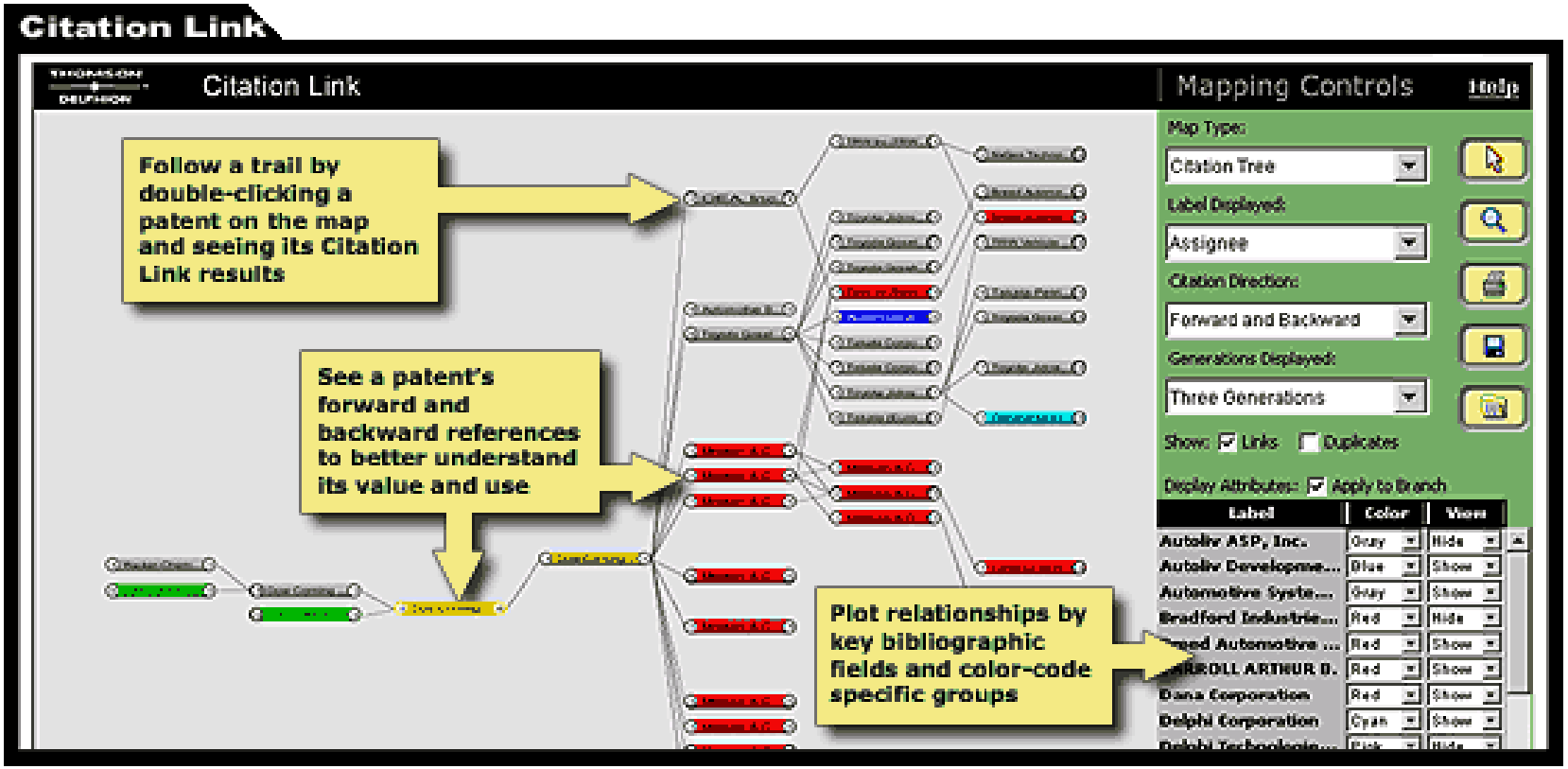
# Delphion's Citation Link

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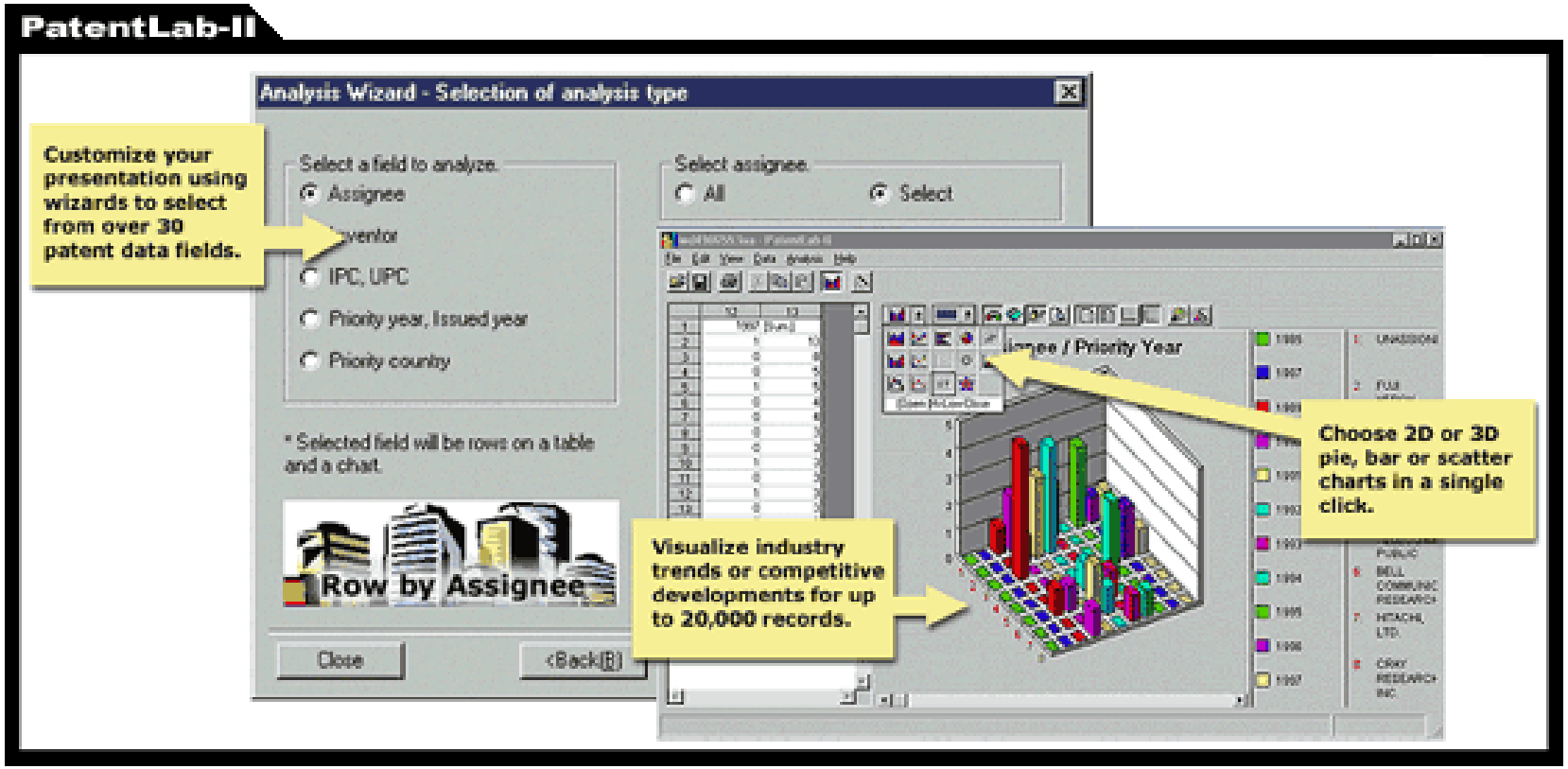
# Delphion 3D plots

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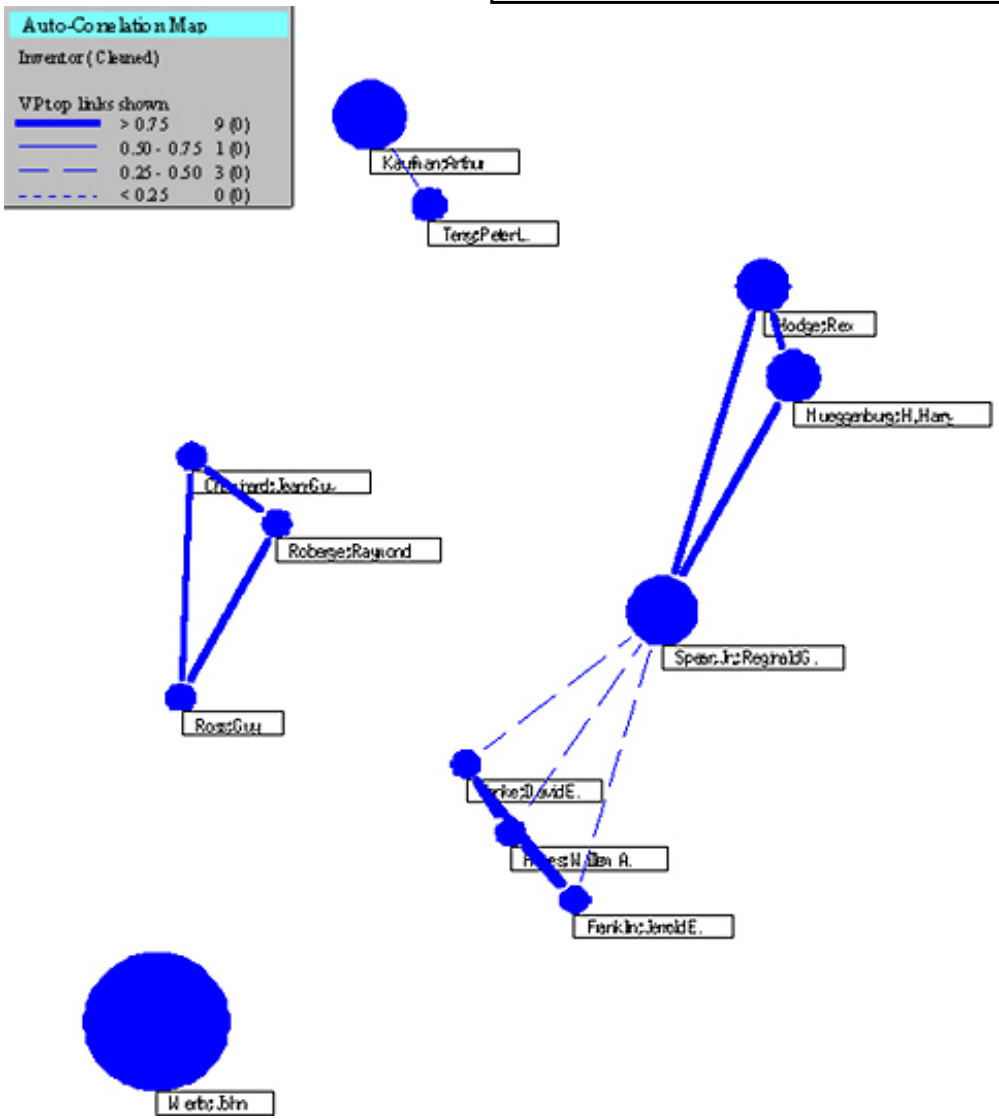
# Metrics' Patent Citations

http://www.patentcitations.com




- Free patent citation analysis
- Link to 3D analysis by VxInsight
- Patent Team Map
  Dot size = No. of pat app
  Solid line thickness = coinventorship
- Patent Trend Analysis
- Reference Watch

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# TEMIS

http://www.temis-group.com/solutions.html


- European-based on-line data and text miner
- Well-developed tools for text analysis
- In 2003 acquired a Xerox Linguistic Product Operations

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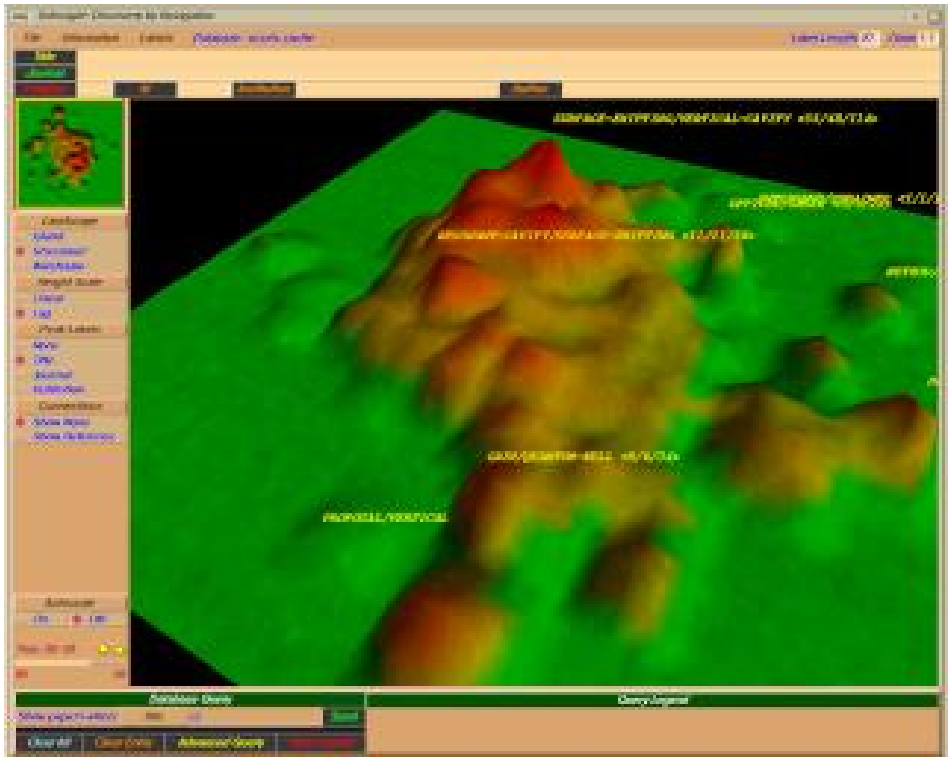
# VxInsight

http://www.cs.sandia.gov/projects/VxInsight.html



- Created by Sandia National Labs & ISI
- tool for discovering relationships within large databases.
- While most data retrieval tools and most data mining tools are able to find information in a database, they only tell you about the data elements.
- VxInsight(TM) reveals the implicit structure of the data. VxInsight(TM) can help analysts uncover strategically important connections and patterns making it an important knowledge

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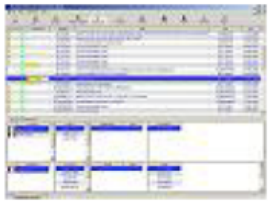
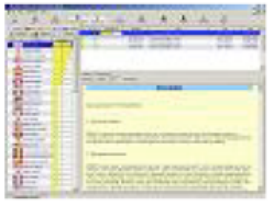
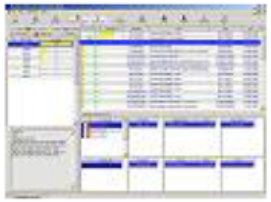
# Matheo Patent

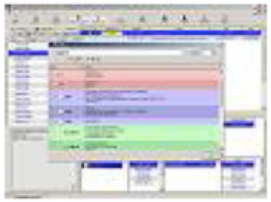

Request on Espacenet


Patent Description

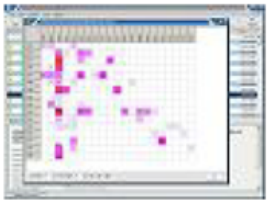

Figures


Assignees analysis


IPC Codes Analysis


Help on IPC


Charts


Matrices


Networks

- Matheo Patent (Jean-Marie Dou, 2005) is for people on the budget
  - EspaceNet Patent Database
  - Competitive Intelligence
  - Patent Information Mapping
  - Patent Portfolio Analysis
  - Creation of Technological Indicators
  - Technology Management

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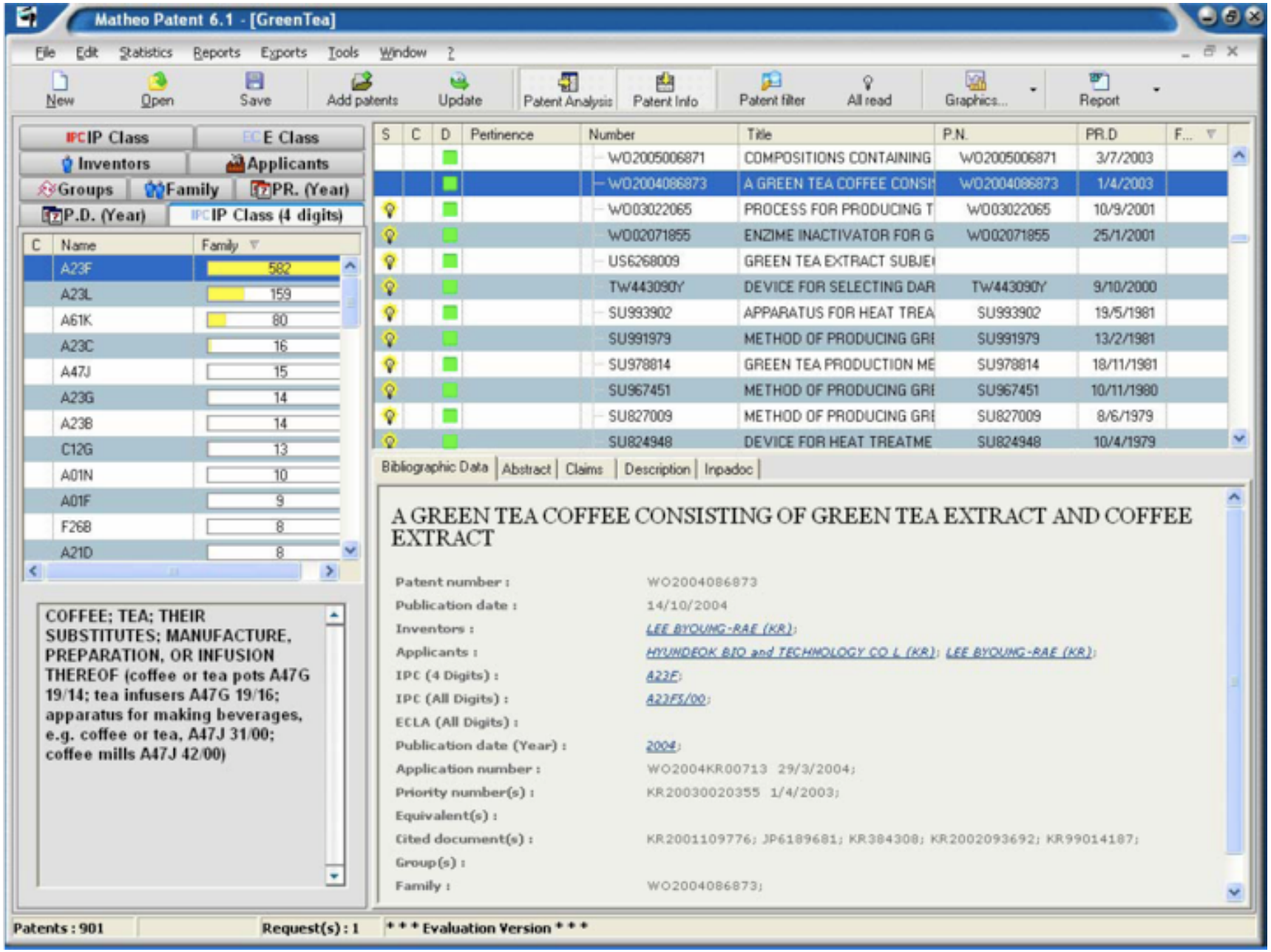
# GREEN TEA - FIELD PARSING




Boonyong, P. and P. Tammarate. 2005. Green Tea Patent Mapping. http://www.toryod.com/pdf/Green%20Tea%20Patent%20Mapping.pdf

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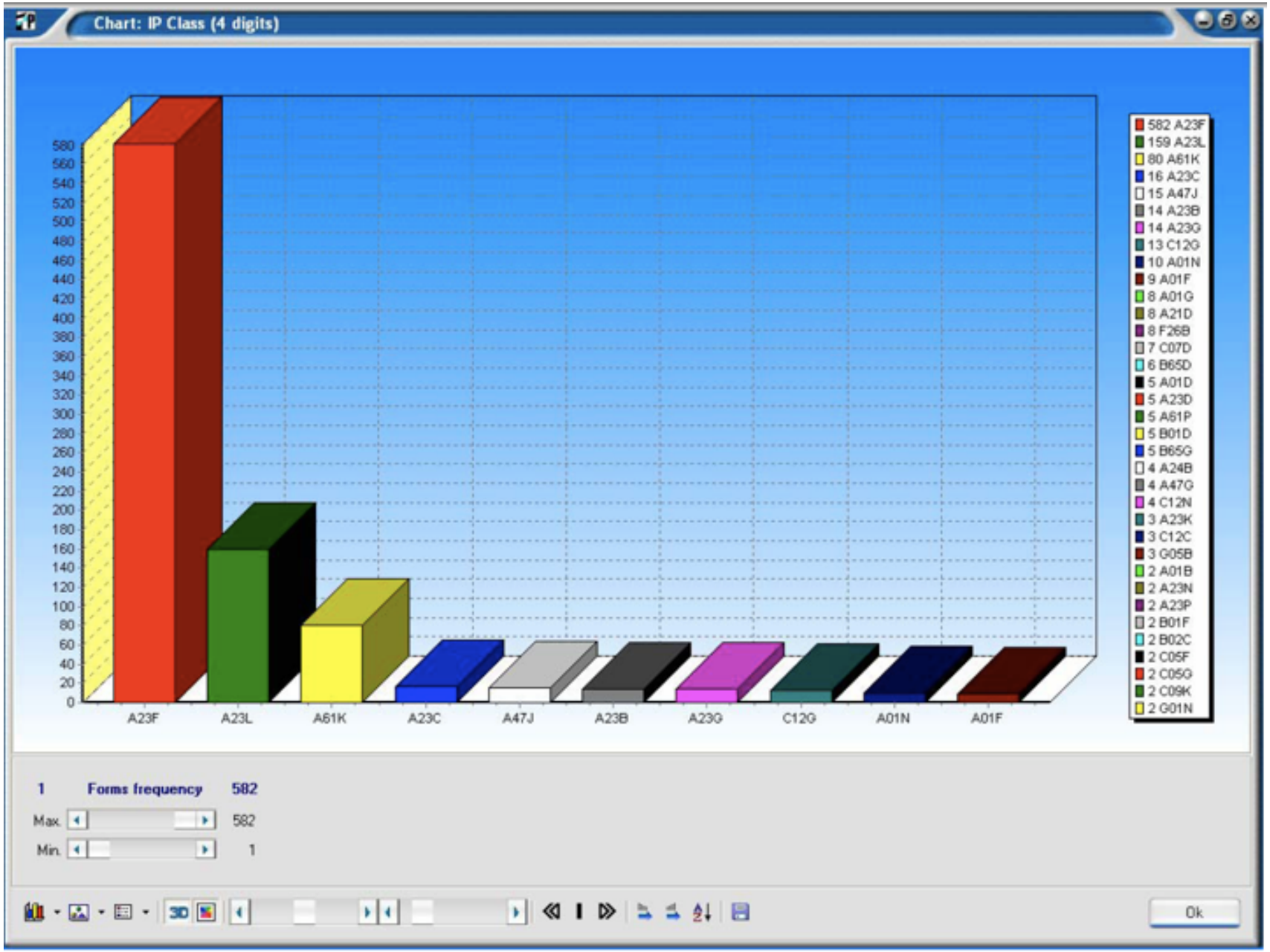
# Green Tea IPC Analysis

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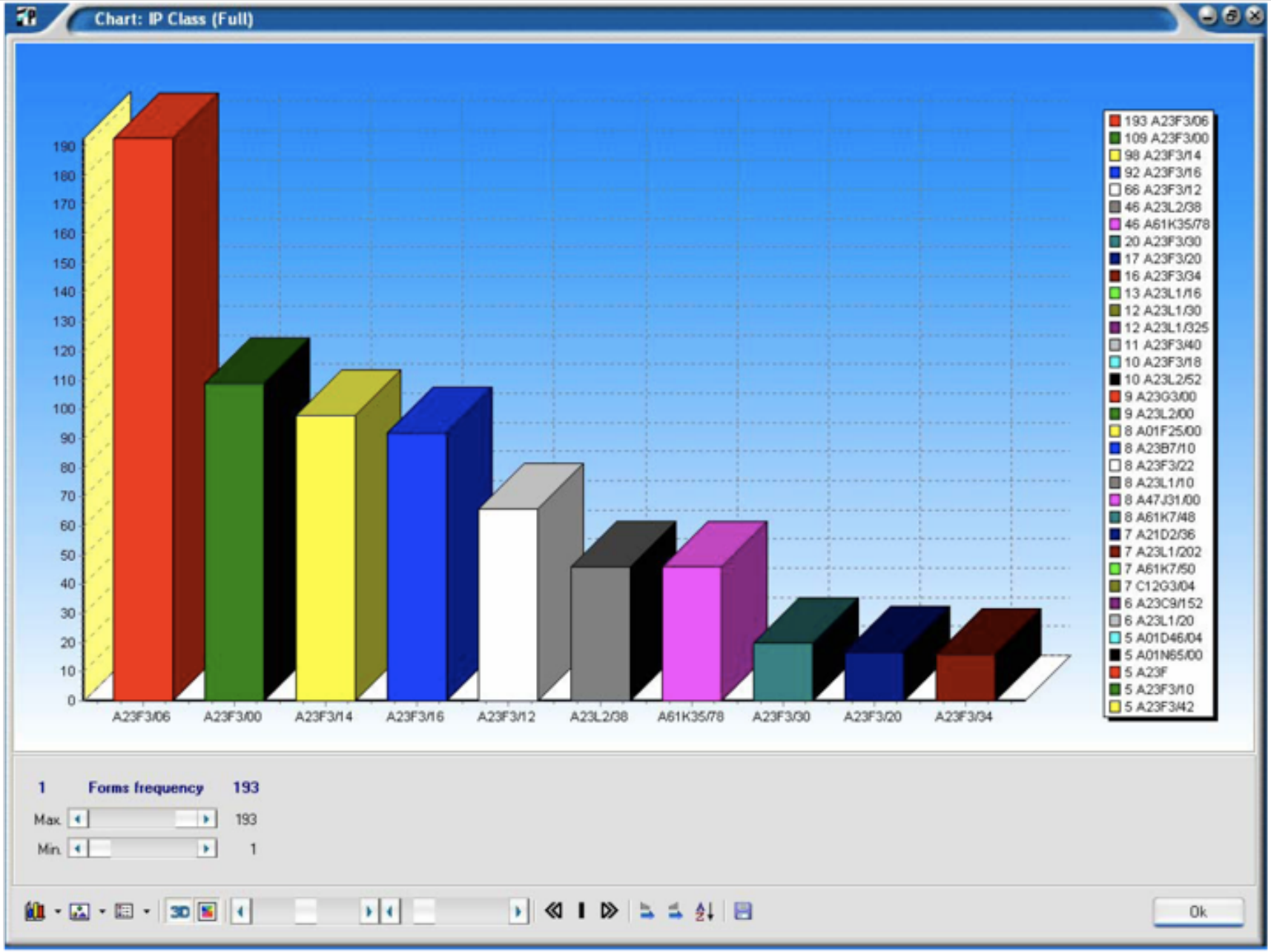
# Green Tea IPC Full Analysis

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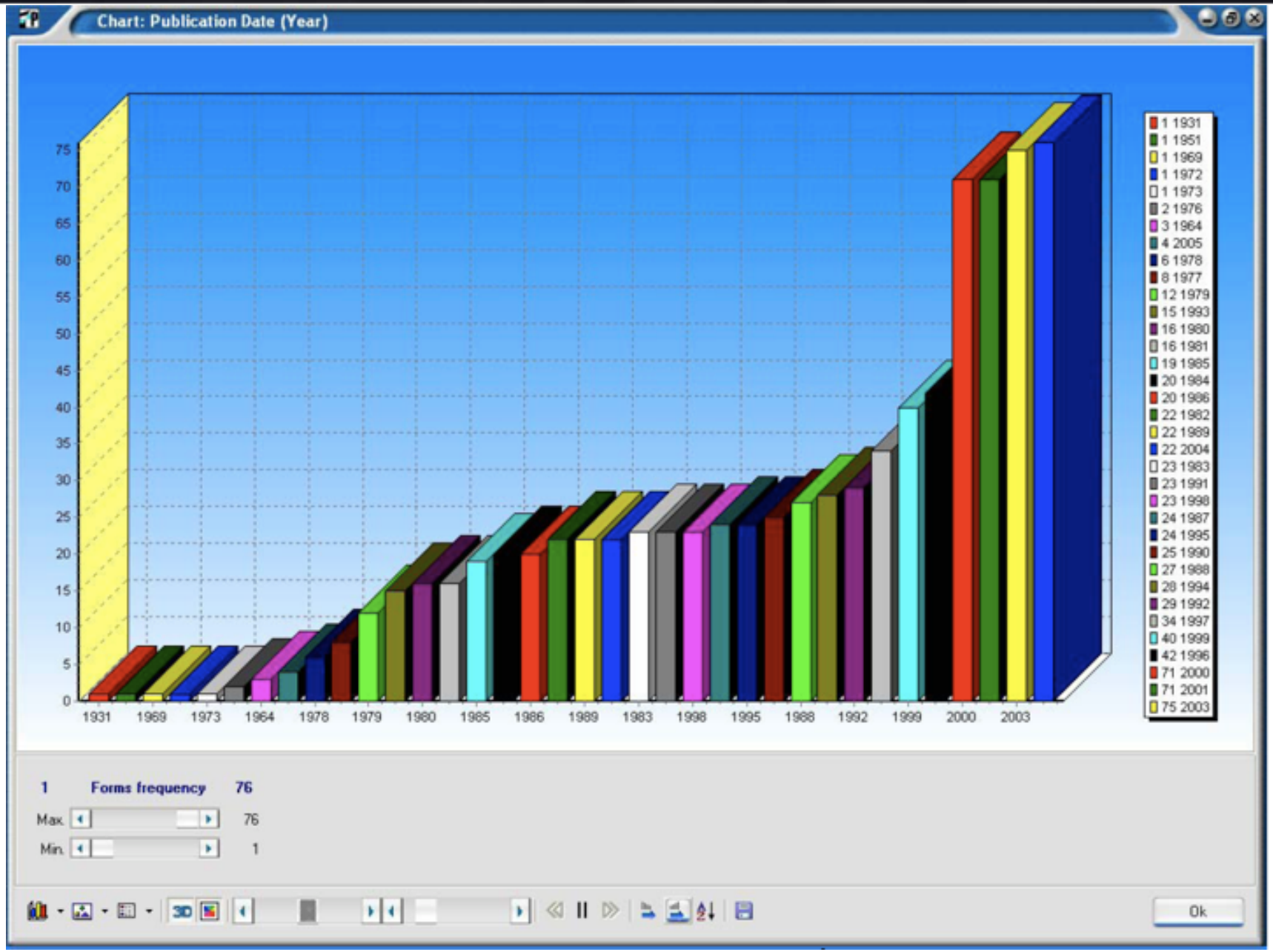
# Green Tea Tech Growth Trend

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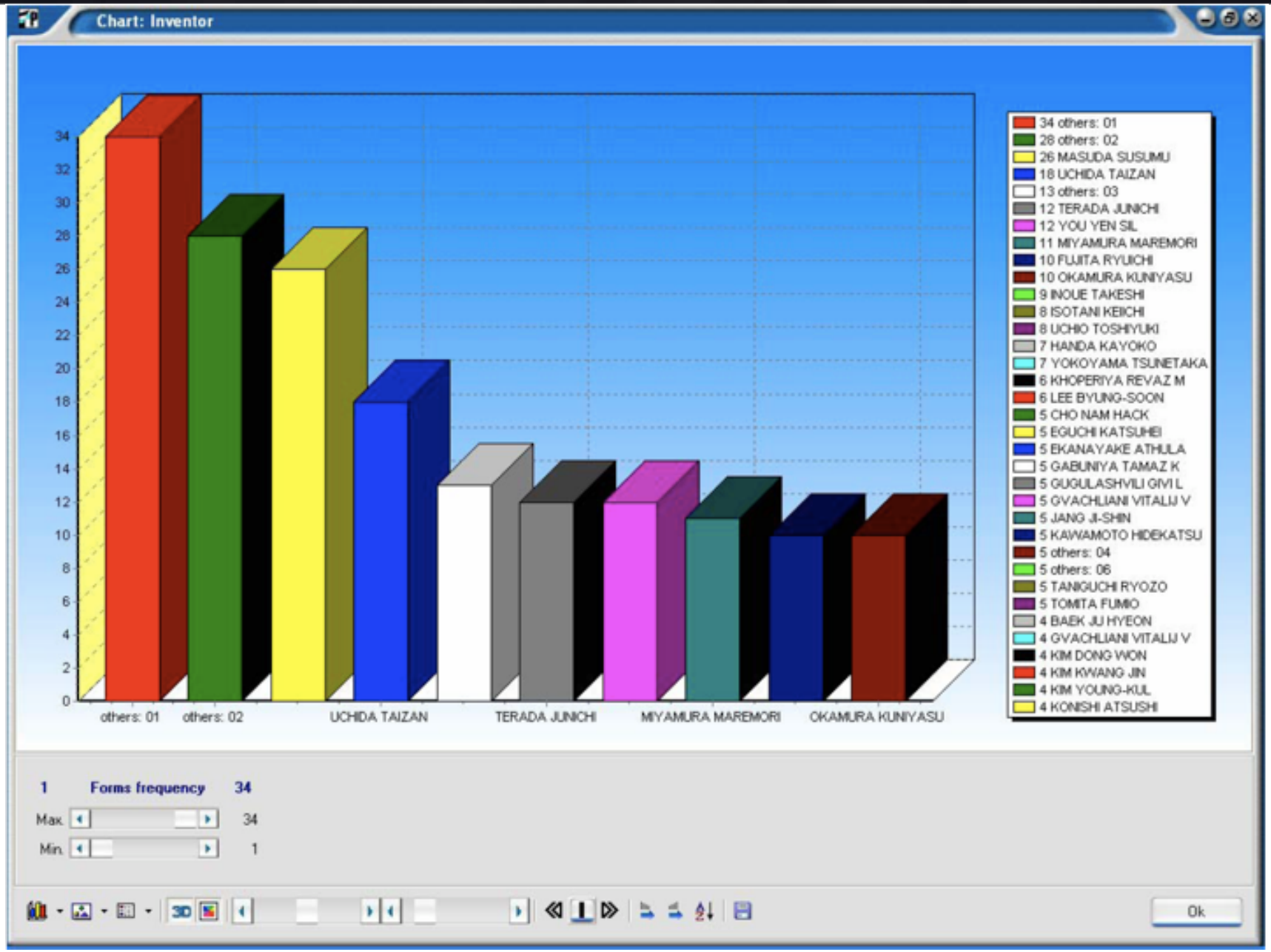
# Green Tea Inventor Analysis

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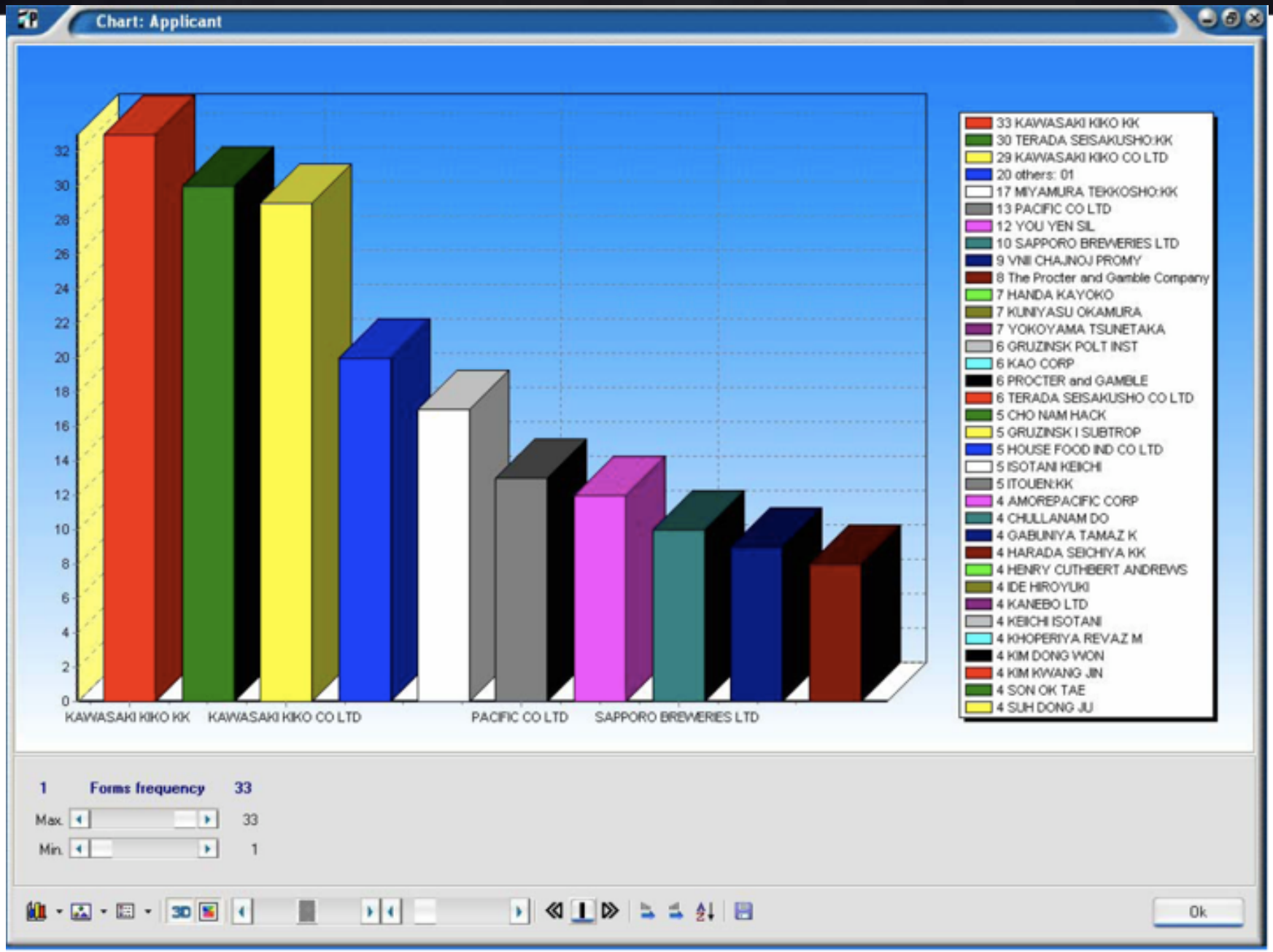
# Potential Applicant Analysis

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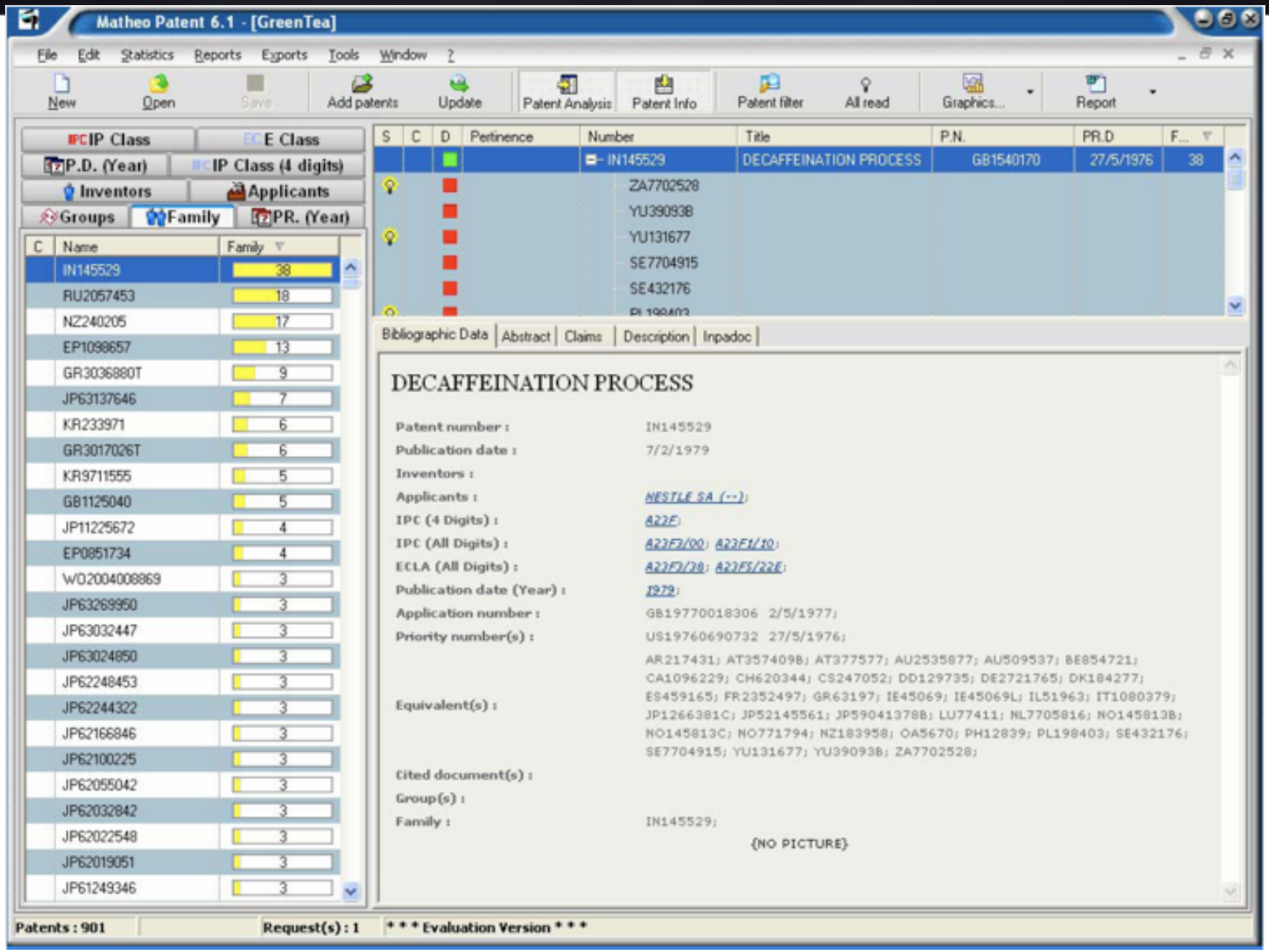
# Patent Family Analysis

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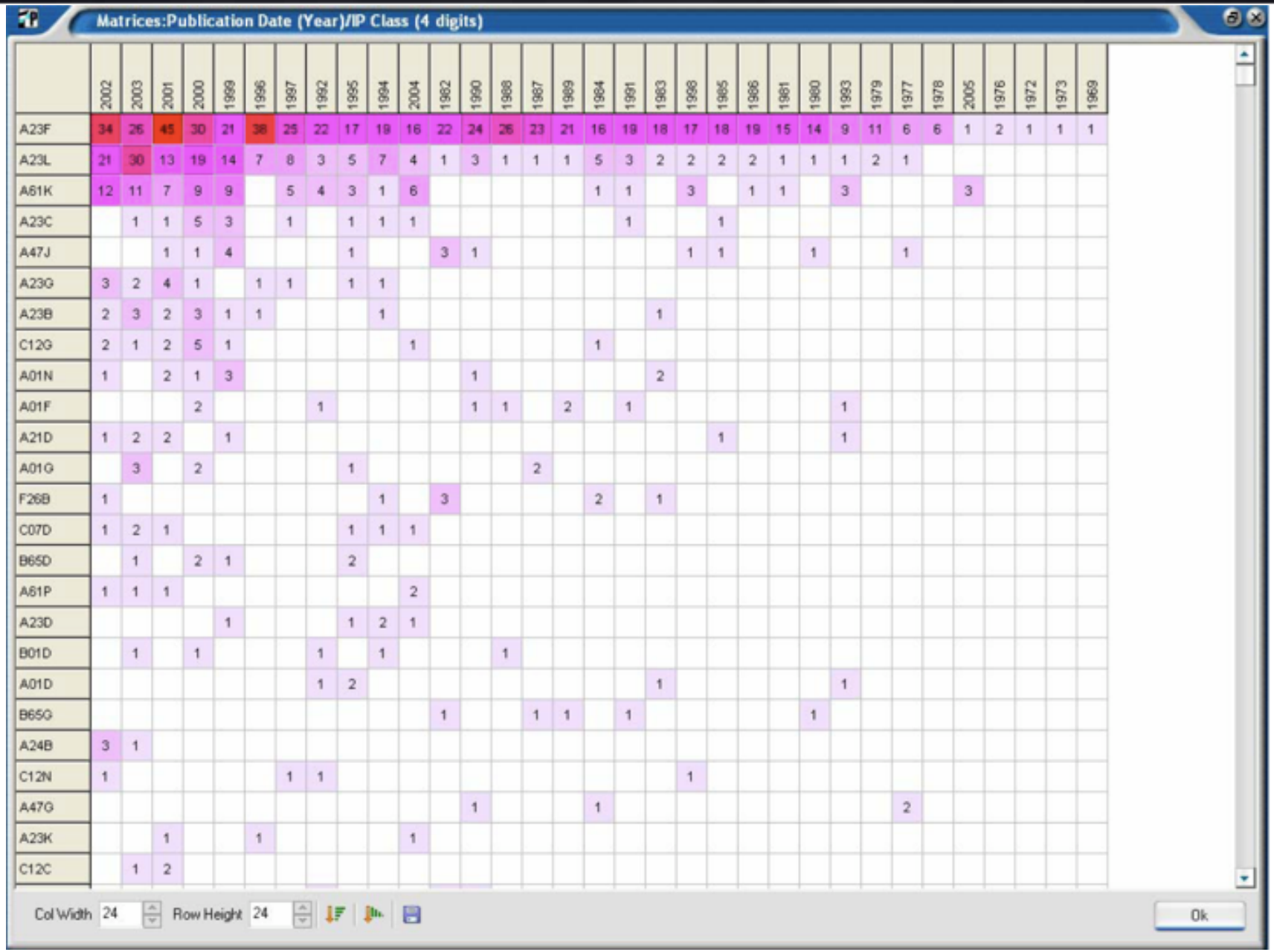
# IPC vs Year Map




| | 2002 | 2003 | 2001 | 2000 | 1999 | 1996 | 1997 | 1992 | 1995 | 1994 | 2004 | 1982 | 1990 | 1988 | 1987 | 1989 | 1984 | 1991 | 1983 | 1998 | 1985 | 1986 | 1981 | 1980 | 1993 | 1979 | 1977 | 1978 | 2005 | 1976 | 1972 | 1973 | 1969 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A23F | 34 | 26 | 45 | 30 | 21 | 38 | 25 | 22 | 17 | 19 | 16 | 22 | 24 | 26 | 23 | 21 | 16 | 19 | 18 | 17 | 18 | 19 | 15 | 14 | 9 | 11 | 6 | 6 | 1 | 2 | 1 | 1 | 1 |
| A23L | 21 | 30 | 13 | 19 | 14 | 7 | 8 | 3 | 5 | 7 | 4 | 1 | 3 | 1 | 1 | 1 | 5 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | | | | | | |
| A61K | 12 | 11 | 7 | 9 | 9 | | 5 | 4 | 3 | 1 | 6 | | | | | | 1 | 1 | | 3 | | 1 | 1 | | 3 | | | | 3 | | | | |
| A23C | | 1 | 1 | 5 | 3 | | 1 | | 1 | 1 | 1 | | | | | | | 1 | | | 1 | | | | | | | | | | | | |
| A47J | | | 1 | 1 | 4 | | | | 1 | | | 3 | 1 | | | | | | | 1 | 1 | | | 1 | | | 1 | | | | | | |
| A23G | 3 | 2 | 4 | 1 | | 1 | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| A23B | 2 | 3 | 2 | 3 | 1 | 1 | | | | 1 | | | | | | | | | 1 | | | | | | | | | | | | | | |
| C12G | 2 | 1 | 2 | 5 | 1 | | | | | | 1 | | | | | | 1 | | | | | | | | | | | | | | | | |
| A01N | 1 | | 2 | 1 | 3 | | | | | | | | 1 | | | | | | 2 | | | | | | | | | | | | | | |
| A01F | | | | 2 | | | | 1 | | | | | 1 | 1 | | 2 | | 1 | | | | | | | 1 | | | | | | | | |
| A21D | 1 | 2 | 2 | | 1 | | | | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | |
| A01G | | 3 | | 2 | | | | | 1 | | | | | | 2 | | | | | | | | | | | | | | | | | | |
| F26B | 1 | | | | | | | | | 1 | | 3 | | | | | 2 | | 1 | | | | | | | | | | | | | | |
| C07D | 1 | 2 | 1 | | | | | | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| B65D | | 1 | | 2 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| A61P | 1 | 1 | 1 | | | | | | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| A23D | | | | | 1 | | | | 1 | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| B01D | | 1 | | 1 | | | | 1 | | 1 | | | | 1 | | | | | | | | | | | | | | | | | | | |
| A01D | | | | | | | | 1 | 2 | | | | | | | | | | 1 | | | | | | 1 | | | | | | | | |
| B65G | | | | | | | | | | | | 1 | | | 1 | 1 | | 1 | | | | | | 1 | | | | | | | | | |
| A24B | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C12N | 1 | | | | | | 1 | 1 | | | | | | | | | | | | 1 | | | | | | | | | | | | | |
| A47G | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | | | 2 | | | | | | |
| A23K | | | 1 | | | 1 | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| C12C | | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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