Patent analytics

Discover the unknown EPO patent information conference 2018 (T3)
Figures

From the World bank: Scientific and technical journal articles
Figures

From the World bank: R&D expenditure (% GDP)
Figures

From the World bank: Charges for the use of IP (licences $)
Starting point

- Most companies and institutions are nowadays **global players**
- Steeply increasing volume of technical and economic information available is posing a major challenge
- Reduced product development time
- Increasing importance of technology for competitive advantage
- More and more **difficult to keep abreast** of what is happening and to generate essential information for important decisions
Example from nature

https://www.youtube.com/watch?v=Q3CtGoqz3ww
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Customer is interested in ...

- Technical information
- Legal information
- The broad picture
- An update
Traditional search: Patentability or Invalidation search (novelty / prior art)

Typical result: Search report with:

- Search methodology
- List of documents destroying the novelty and/or showing the lack of inventive step
- Databases and tools used
- Full text where possible
- Can be a zero-hit search
- No guarantee of completeness, unless the same invention is found (efforts/budget to be agreed)
... some basic knowledge is needed!

Beware of 'naïve' keyword searches such as ...

"Energy storing means"
Customer is interested in ...

Statistical analyses

Examples:

- What are emerging technological trends?
- What are the patent portfolios of my competition?
- What are the newest developments protected by my competitors?
Precision and Recall

Precision and Recall

How many selected items are relevant?  How many relevant items are selected?

Precision =  
Recall =  

Precision

fewer false positives

time

Recall

fewer false negatives
Patent statistics

- Used for **big results sets**
- Approach different from traditional types of patent searches
- Patent statistics does not aim at identifying and analysing individual patent documents
- **Statistical approach:**
  - bibliographical data and relationship between inventions in the focus of the statistical analysis
  - creating basic set of patent documents
  - define criteria for statistical analysis, e.g. examining chronological development, aggregating according to country of residence
Contents

- Patent analytics versus traditional patent searches
- **A procedure for patent statistics and data mining**
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Patent statistics: Procedure

- patent classes
- search concepts
- applicants
- countries of residence
- [...]
Patent statistics: Procedure

Procedure for basic search:

1. define goals
2. choose database
3. define query (dates, patent classes, key words, ...)
4. collect data and remove noise
Important data issues

- Data coverage (e.g., with respect to time, patent authorities)
- Completeness
- Harmonisation of data basis
- Accessibility of data
Patent statistics:
Development over time: Which date?

1. Earliest filing date
2. Application date
3. Publication of application
4. Latest publication
5. Date of grant
Patent statistics:
Development over time: Which date?

5 different graphs on patents filed in the same time span but using different "YEARS"
Example trend analysis: Differences by using earliest filing date versus publication date

18 months between first priority and publication

Source: PATSTAT Biblio, 2016 Autumn Edition
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Case study
"green energy "
with PATSTAT Online

www.epo.org/patstat
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Questions to answer ...

- What is the most important patent filed in Spain in the field of "green energy"?
- Who are the most prolific Spanish applicants (or inventors) filing "green energy patents" in Spain?

... Based on our criteria ...

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>Solar energy</td>
</tr>
<tr>
<td>Wind</td>
<td>Wind energy</td>
</tr>
<tr>
<td>Tidal</td>
<td>Tidal energy</td>
</tr>
</tbody>
</table>

Applications filed in Spain
Applications filed by "Spanish" applicants

Biggest in Spain?
Statistics Window: Built-in cross reference charts AND Patent value indicator

REMEMBER?

- What is the most important patent filed in Spain in the field of "Green energy"?

- Who are the most prolific Spanish applicants (or inventors) filing "Green Energy" in Spain?

- Who has close research cooperation?
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Patent Classification systems

www.epo.org/pi-tour
Classification systems

The IPC and CPC have a hierarchical structure:

- **Sections**: A, B, C, D, E, F, G, H, Y
- **Classes**: e.g. Y02
- **Sub-classes**: e.g. Y02E
- **Groups**: e.g. Y02E 10
- **Sub-groups**: e.g. Y02E 10/28 → tidal stream
- **IPC**: e.g. F03B13/26 → tidal stream
# Classification systems

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Classification and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>GENERAL TAGGING OF NEW TECHNOLOGICAL DEVELOPMENTS; GENERAL TAGGING OF CROSS-SECTIONAL TECHNOLOGIES SPANNING OVER SEVERAL SECTIONS OF THE IPC; TECHNICAL SUBJECTS COVERED BY FORMER USPC CROSS-REFERENCE ART COLLECTIONS [XRACs] AND DIGESTS</td>
</tr>
<tr>
<td>Y02</td>
<td>TECHNOLOGIES OR APPLICATIONS FOR MITIGATION OR ADAPTATION AGAINST CLIMATE CHANGE</td>
</tr>
<tr>
<td>Y02E</td>
<td>REDUCTION OF GREENHOUSE GASES [GHG] EMISSION, RELATED TO ENERGY GENERATION, TRANSMISSION OR DISTRIBUTION</td>
</tr>
</tbody>
</table>

- **Y02E 10/00** Energy generation through renewable energy sources
- **Y02E 10/40** Solar thermal energy
- **Y02E 10/42** Dish collectors
Short introduction to PATSTAT Online
Hands-on: let's play around with the output ...

```
SELECT appln_id, appln_auth, appln_nr, appln_filing_date, granted
FROM tls201_appln
WHERE appln_auth = 'ES' AND appln_filing_year = 2015
```

All statistics are application based Select statement

→ **SELECT appln_id ....**

- Table: SQL result
- Application: links to the patent applications
- Statistics: cross-reference & patent indicator
Hands-on: let's play around with the output ...

Output: Table

<table>
<thead>
<tr>
<th>Row</th>
<th>appln_id</th>
<th>appln_auth</th>
<th>appln_nr</th>
<th>appln_filing_date</th>
<th>granted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>425948027</td>
<td>ES</td>
<td>201530021</td>
<td>2015-01-13</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>425948029</td>
<td>ES</td>
<td>201500005</td>
<td>2015-01-07</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>425948037</td>
<td>ES</td>
<td>201530035</td>
<td>2015-01-15</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>425948039</td>
<td>ES</td>
<td>201530043</td>
<td>2016-01-19</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>425948043</td>
<td>ES</td>
<td>201530017</td>
<td>2015-01-12</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>425948045</td>
<td>ES</td>
<td>201530033</td>
<td>2015-01-14</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>425948047</td>
<td>ES</td>
<td>201530046</td>
<td>2015-01-20</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>425948051</td>
<td>ES</td>
<td>201530018</td>
<td>2015-01-12</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>425948053</td>
<td>ES</td>
<td>201530028</td>
<td>2015-01-14</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>425948057</td>
<td>ES</td>
<td>201500031</td>
<td>2015-01-16</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>439117271</td>
<td>ES</td>
<td>201500187</td>
<td>2015-03-13</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>439117273</td>
<td>ES</td>
<td>201530346</td>
<td>2015-03-24</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>439117275</td>
<td>ES</td>
<td>201500217</td>
<td>2015-03-25</td>
<td>1</td>
</tr>
</tbody>
</table>
Hands-on: let's play around with the output ...
Output: Application

SELECT appln_id, appln_auth, appln_nr, appln_filing_date, granted
FROM tis201_appln
WHERE appln_auth = 'ES' AND appln_filing_year = 2015

Translate text
Link to Espacenet
Hands-on: let's play around with the output ...
Output: Statistics

cited by 42 families
Hands-on: let's play around with the output ... 

Output: Statistics

Date of filing: 2015
Applicant (PATSTAT Standardized Name): UNIVERSIDAD POLITECNICA DE MADRID
Applications: 48 (0.70%)
## Bringing things together: the one slide recapitulation

<table>
<thead>
<tr>
<th>SQL Query</th>
</tr>
</thead>
</table>
| SELECT appln_id, appln_auth, appln_nr, appln_filing_date 
  FROM tls201_appln 
  WHERE appln_auth = 'ES' |
| SELECT appln_id, cpc_class_symbol 
  FROM tls224_appln_cpc 
  WHERE (cpc_class_symbol LIKE 'Y02E_10%') |
| SELECT person_name, person_address, person_ctry_code 
  FROM tls206_person 
  WHERE person_ctry_code = 'ES' |
Next step

Applications filed in Spain

Green energy

Filed by ES "persons"

? applications

'ES PERSONS'

European Patent Office
Next step: Join the tables = make 1 table from many
Questions to answer ... 

- What is the most important patent filed in Spain in the field of "green energy"?
- Who are the most prolific Spanish applicants (or inventors) filing "green energy patents" in Spain?

... Based on our criteria ...

- Solar energy
- Wind energy
- Tidal energy
- Applications filed in Spain
- Applications filed by "Spanish" applicants
The "selected" tables: tls201_appIn

The applications

<table>
<thead>
<tr>
<th>appln_id</th>
<th>appln_auth</th>
<th>appln_nr</th>
<th>appln_filing_date</th>
</tr>
</thead>
<tbody>
<tr>
<td>497575408</td>
<td>ES</td>
<td>201831003</td>
<td>28-06-2018</td>
</tr>
<tr>
<td>497245151</td>
<td>ES</td>
<td>201830949</td>
<td>20-06-2018</td>
</tr>
<tr>
<td>497575472</td>
<td>ES</td>
<td>201830945</td>
<td>20-06-2018</td>
</tr>
<tr>
<td>497244968</td>
<td>ES</td>
<td>201830933</td>
<td>19-06-2018</td>
</tr>
<tr>
<td>497245140</td>
<td>ES</td>
<td>201830941</td>
<td>19-06-2018</td>
</tr>
<tr>
<td>497573089</td>
<td>ES</td>
<td>201830932</td>
<td>19-06-2018</td>
</tr>
<tr>
<td>497575477</td>
<td>ES</td>
<td>201830935</td>
<td>19-06-2018</td>
</tr>
<tr>
<td>497244974</td>
<td>ES</td>
<td>201830927</td>
<td>18-06-2018</td>
</tr>
<tr>
<td>497245142</td>
<td>ES</td>
<td>201830929</td>
<td>18-06-2018</td>
</tr>
<tr>
<td>497575406</td>
<td>ES</td>
<td>201830925</td>
<td>18-06-2018</td>
</tr>
<tr>
<td>497245161</td>
<td>ES</td>
<td>201830916</td>
<td>15-06-2018</td>
</tr>
<tr>
<td>497406183</td>
<td>ES</td>
<td>201830918</td>
<td>15-06-2018</td>
</tr>
<tr>
<td>497573087</td>
<td>ES</td>
<td>201830919</td>
<td>15-06-2018</td>
</tr>
<tr>
<td>497575470</td>
<td>ES</td>
<td>201830921</td>
<td>15-06-2018</td>
</tr>
</tbody>
</table>
## The "selected" tables: tls224_appLn_cpc

### Applications having CPC = 'Y02E' classifications

<table>
<thead>
<tr>
<th>cpc_class_symbol</th>
<th>appln_id</th>
<th>appln_auth</th>
<th>appln_nr</th>
<th>appln_filing_date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y02E 10/22</td>
<td>487871217</td>
<td>ES</td>
<td>201731406</td>
<td>17-11-2017</td>
</tr>
<tr>
<td>Y02E 10/46</td>
<td>485568900</td>
<td>ES</td>
<td>201700677</td>
<td>05-10-2017</td>
</tr>
<tr>
<td>Y02E 10/50</td>
<td>485568900</td>
<td>ES</td>
<td>201700677</td>
<td>05-10-2017</td>
</tr>
<tr>
<td>Y02E 10/72</td>
<td>484891542</td>
<td>ES</td>
<td>201731130</td>
<td>22-09-2017</td>
</tr>
<tr>
<td>Y02E 10/72</td>
<td>484685006</td>
<td>ES</td>
<td>201731093</td>
<td>09-09-2017</td>
</tr>
<tr>
<td>Y02E 10/40</td>
<td>486730960</td>
<td>ES</td>
<td>201731074</td>
<td>07-09-2017</td>
</tr>
<tr>
<td>Y02E 10/722</td>
<td>485081555</td>
<td>ES</td>
<td>201731021</td>
<td>08-09-2017</td>
</tr>
<tr>
<td>Y02E 10/47</td>
<td>484999762</td>
<td>ES</td>
<td>201730958</td>
<td>09-08-2017</td>
</tr>
<tr>
<td>Y02E 10/50</td>
<td>483460695</td>
<td>ES</td>
<td>201700614</td>
<td>09-08-2017</td>
</tr>
<tr>
<td>Y02E 10/70</td>
<td>483659248</td>
<td>ES</td>
<td>201730954</td>
<td>07-08-2017</td>
</tr>
<tr>
<td>Y02E 10/72</td>
<td>483659248</td>
<td>ES</td>
<td>201700537</td>
<td>17-07-2017</td>
</tr>
<tr>
<td>Y02E 10/72</td>
<td>487871201</td>
<td>ES</td>
<td>201700535</td>
<td>23-06-2017</td>
</tr>
<tr>
<td>Y02E 10/223</td>
<td>487871201</td>
<td>ES</td>
<td>201700535</td>
<td>23-06-2017</td>
</tr>
</tbody>
</table>

**Observe!**

Multiple classification codes for 1 application
The "selected" tables: tls206_person

"person_ctry_code" = 'ES'

<table>
<thead>
<tr>
<th>psn_name</th>
<th>person_ctry_code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB (ASEA BROWN BOVERI)</td>
<td>ES</td>
</tr>
<tr>
<td>ABENGOA SEAPOWER</td>
<td>ES</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ES</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECH</td>
<td>ES</td>
</tr>
<tr>
<td>ABENGOA SOLAR SOLAR NEW TECHNOLOGIES</td>
<td>ES</td>
</tr>
<tr>
<td>AB-WORKS, S.C.A.</td>
<td>ES</td>
</tr>
<tr>
<td>ACCIONA ENERGIA</td>
<td>ES</td>
</tr>
<tr>
<td>ALTERNATIVA SOLAR, S.L.</td>
<td>ES</td>
</tr>
<tr>
<td>ANDALUZA DE SISTEMAS Y CONTROL ENERGETICO</td>
<td>ES</td>
</tr>
<tr>
<td>ANDALUZA DE SISTEMAS Y CONTROL ENERGETICO, S.L.</td>
<td>ES</td>
</tr>
<tr>
<td>APLICACIONES RENOVABLES INTEGRADAS</td>
<td>ES</td>
</tr>
<tr>
<td>APLICACIONES RENOVABLES INTEGRADAS, S.L.</td>
<td>ES</td>
</tr>
<tr>
<td>CALTER INGENIERIA, S.L.</td>
<td>ES</td>
</tr>
<tr>
<td>COMPANIA DE NUEVAS TECNOLOGIAS EOLICAS S.L.</td>
<td>ES</td>
</tr>
<tr>
<td>COMPANIA VALENCIANA DE ENERGIAS RENOVABLES</td>
<td>ES</td>
</tr>
<tr>
<td>COMPLUTENSE UNIVERSITY</td>
<td>ES</td>
</tr>
<tr>
<td>CONSEJO SUPERIOR DE INVESTIGACIONES (CSIC)</td>
<td>ES</td>
</tr>
<tr>
<td>CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS</td>
<td>ES</td>
</tr>
</tbody>
</table>

Observe diversity of the "same" names → problem for statistics
Harmonisation of names is needed!

<table>
<thead>
<tr>
<th>psn_name</th>
<th>person_name</th>
<th>psn_id</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIES S.A.</td>
<td>140791</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIES S.A.</td>
<td>140791</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>140791</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIES, S.A.</td>
<td>140791</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIE, S.A.</td>
<td>140791</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>ABENGOA SOLAR NEW TECHNOLOGIES, S.A.</td>
<td>140791</td>
</tr>
<tr>
<td>ACCIONA WINDPOWER</td>
<td>ACCIONA WINDPOWER S,A,</td>
<td>171544</td>
</tr>
<tr>
<td>ACCIONA WINDPOWER</td>
<td>ACCIONA WINDPOWER SA</td>
<td>171544</td>
</tr>
<tr>
<td>ACCIONA WINDPOWER</td>
<td>ACCIONA WINDPOWER, S.A.</td>
<td>171544</td>
</tr>
<tr>
<td>ACCIONA WINDPOWER</td>
<td>ACCIONA WINDPOWER S.A.</td>
<td>171544</td>
</tr>
</tbody>
</table>
Next step: Join the tables = make 1 table from many

<table>
<thead>
<tr>
<th>appln_nr_epodoc</th>
<th>applt_seq_nr</th>
<th>invt_seq_nr</th>
<th>psn_name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES19880002158</td>
<td>0</td>
<td>1</td>
<td>CALVO ROBERTO</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>AIZPIRI CIRIACO</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>ECHABE IDOYA</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>IBERDUERO</td>
</tr>
<tr>
<td>ES19890004023</td>
<td>0</td>
<td>1</td>
<td>SORIANO DE ARPE LEONARDO</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>GALAN ESTELLA LUIS</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>AUTONOMOUS UNIVERSITY OF MADRID</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>0</td>
<td>1</td>
<td>MINANO DOMINGUE J. CARLOS</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>LUQUE LOPEZ, ANTONIO</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>UNIVERSIDAD POLITÉCNICA DE MADRID</td>
</tr>
<tr>
<td>ES19900002395</td>
<td>0</td>
<td>1</td>
<td>MINANO DOMINGUE JUAN CARLOS</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>UNIVERSIDAD DE MALAGA</td>
</tr>
</tbody>
</table>
Next step: Join the tables = make 1 table from many

JOIN on matching appln_id
JOIN on matching appln_id
JOIN on matching person_id
## Result from query on joined tables

<table>
<thead>
<tr>
<th>appln_nr_epodoc</th>
<th>psn_name</th>
<th>appln_filing_date</th>
<th>cpc_class_symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES19880002158</td>
<td>CALVO ROBERTO</td>
<td>08-07-1988</td>
<td>Y02E 10/226</td>
</tr>
<tr>
<td>ES19880002158</td>
<td>AIZPIRI CIRIACO</td>
<td>08-07-1988</td>
<td>Y02E 10/226</td>
</tr>
<tr>
<td>ES19880002158</td>
<td>ECHABE IDOYA</td>
<td>08-07-1988</td>
<td>Y02E 10/226</td>
</tr>
<tr>
<td>ES19880002158</td>
<td>IBERDUERO</td>
<td>08-07-1988</td>
<td>Y02E 10/226</td>
</tr>
<tr>
<td>ES19890004023</td>
<td>SORIANO DE ARPE LEONARDO</td>
<td>24-11-1989</td>
<td>Y02E 10/544</td>
</tr>
<tr>
<td>ES19890004023</td>
<td>GALAN ESTELLA LUIS</td>
<td>24-11-1989</td>
<td>Y02E 10/544</td>
</tr>
<tr>
<td>ES19890004023</td>
<td>AUTONOMOUS UNIVERSITY OF MADRID</td>
<td>24-11-1989</td>
<td>Y02E 10/544</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>MINANO DOMINGUE J. CARLOS</td>
<td>23-07-1990</td>
<td>Y02E 10/41</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>MINANO DOMINGUE J. CARLOS</td>
<td>23-07-1990</td>
<td>Y02E 10/52</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>LUQUE LOPEZ, ANTONIO</td>
<td>23-07-1990</td>
<td>Y02E 10/41</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>LUQUE LOPEZ, ANTONIO</td>
<td>23-07-1990</td>
<td>Y02E 10/52</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>UNIVERSIDAD POLITECNICA DE MADRID</td>
<td>23-07-1990</td>
<td>Y02E 10/41</td>
</tr>
<tr>
<td>ES19900001985</td>
<td>UNIVERSIDAD POLITECNICA DE MADRID</td>
<td>23-07-1990</td>
<td>Y02E 10/52</td>
</tr>
</tbody>
</table>
Join the tables with SQL

```
SELECT distinct tls201_appln.appln_id, appln_auth, appln_nr, appln_kind, appln_filing_date
FROM tls201_appln JOIN tls224_appln_cpc ON
tls201_appln.appln_id = tls224_appln_cpc.appln_id
JOIN tls207_pers_appln ON
tls201_appln.appln_id = tls207_pers_appln.appln_id
JOIN tls206_person ON
tls207_pers_appln.person_id = tls206_person.person_id
WHERE appln_auth = 'ES' AND person_ctry_code = 'ES' AND
(cpc_class_symbol LIKE 'Y02E 10%')
```
### Result from query on joined tables

<table>
<thead>
<tr>
<th>appln_id</th>
<th>appln_auth</th>
<th>appln_nr</th>
<th>appln_nr</th>
<th>appln_filing_date</th>
</tr>
</thead>
<tbody>
<tr>
<td>17559628</td>
<td>ES</td>
<td>8700607</td>
<td>A</td>
<td>05-03-1987</td>
</tr>
<tr>
<td>17560396</td>
<td>ES</td>
<td>8701039</td>
<td>A</td>
<td>09-04-1987</td>
</tr>
<tr>
<td>17566796</td>
<td>ES</td>
<td>8800619</td>
<td>A</td>
<td>02-03-1988</td>
</tr>
<tr>
<td>17566882</td>
<td>ES</td>
<td>8800666</td>
<td>A</td>
<td>05-03-1988</td>
</tr>
<tr>
<td>17572946</td>
<td>ES</td>
<td>8803942</td>
<td>A</td>
<td>23-12-1988</td>
</tr>
<tr>
<td>17577527</td>
<td>ES</td>
<td>8902393</td>
<td>A</td>
<td>24-05-1989</td>
</tr>
<tr>
<td>17578061</td>
<td>ES</td>
<td>8902688</td>
<td>A</td>
<td>28-07-1989</td>
</tr>
<tr>
<td>17578512</td>
<td>ES</td>
<td>8902933</td>
<td>A</td>
<td>25-08-1989</td>
</tr>
<tr>
<td>17579164</td>
<td>ES</td>
<td>8903291</td>
<td>A</td>
<td>29-09-1989</td>
</tr>
<tr>
<td>17580771</td>
<td>ES</td>
<td>8904366</td>
<td>A</td>
<td>26-12-1989</td>
</tr>
<tr>
<td>17581854</td>
<td>ES</td>
<td>9000538</td>
<td>A</td>
<td>23-02-1990</td>
</tr>
<tr>
<td>17583879</td>
<td>ES</td>
<td>9001666</td>
<td>A</td>
<td>15-06-1990</td>
</tr>
</tbody>
</table>

**Unique applications**
Next step

Applications filed in Spain

Green energy

Filed by ES "persons"

2,625 applications

1,187,274 applications

528,123 applications

448,213 'ES PERSONS'
Table Window
Table Window layout

```
SELECT distinct tls201_appln.appln_id, appln_auth, appln_nr, appln_kind, appln_filing_date FROM tls201_appln JOIN tls224_appln_cpc ON tls201_appln.appln_id = tls224_appln_cpc.appln_id JOIN tls207_pers_appln ON tls201_appln.appln_id = tls207_pers_appln.appln_id JOIN tls206_person ON tls207_pers_appln.person_id = tls206_person.person.person_id WHERE appln_auth = 'ES' AND person_ctry_code = 'ES' AND (cpc_class_symbol LIKE 'Y02E 10%')
```

Query

```
13:02:45 [SELECT - 0 row(s). 0 secs][Error Code: 4104, SQL State: S0001] The access of the table 't2' is denied.
14:03:08 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:03:28 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:03:48 [SELECT - 0 row(s). 30.529 secs, server #0] Result set fetched
14:03:58 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:04:19 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] The access of the table 't2' is denied.
14:04:29 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:04:40 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:04:50 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:05:01 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:05:11 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:05:21 [SELECT - 50 row(s), 30.566 secs, server #0] Result set fetched
14:05:31 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:05:41 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:05:51 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:06:01 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:06:11 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
14:06:21 [SELECT - 0 row(s). 0 secs][Error Code: 207, SQL State: S0001] Invalid access to the table 't2'.
```

Messages

Table = result of the SQL query
Application

Window
Application Window layout

SELECT DISTINCT tls201_appln.appln_id, appln_auth, appln_nr, appln_kind, appln_filing_date
FROM tls201_appln JOIN tls224_appln_cpc ON
    tls201_appln.appln_id = tls224_appln_cpc.appln_id
JOIN tls207_pers_appln ON
    tls201_appln.appln_id = tls207_pers_appln.appln_id
JOIN tls206_person ON
    tls207_pers_appln.person_id = tls206_person.person_id
WHERE appln_auth = 'ES' AND person_ctry_code = 'ES'

Application number and appln_id

some bibliographic information with links to Espacenet and WIPO IPCs
Statistics Window:
Built-in cross reference charts AND
Patent value indicator

REMEMBER?

- What is the most important patent filed in Spain in the field of "Green energy"?

- Who are the most prolific Spanish applicants (or inventors) filing "Green Energy" in Spain?

- Who is cooperating with whom?
What is the most important patent filed in Spain in the field of "Green Energy"?

Step 1
Make an SQL query that selects your data sample (done) and take option "statistics".
What is the most important patent filed in Spain in the field of "Green Energy"?

Step 2
Choose "Patent indicator"

Composition of the patent indicator:
- Number of citations (family)
- Size of the patent family
- Number of applicants
- Number of inventors
- Granted or not

Coefficients can be given weights
What is the most important patent filed in Spain in the field of "Green Energy"?

Step 3
Calculate the patent indicator
What is the most important patent filed in Spain in the field of "Green Energy"?

Step 4
Results

ES493713 filed on 1982-12-01 is the most cited ES patent filed by a ES "person" in the field of Green energy.
Who are the most prolific Spanish applicants?

Step 1
Make an SQL query that selects your data sample (done) and take option "statistics".
Who are the most prolific Spanish applicants?
Who are the most prolific Spanish applicants?

Step 2
Choose "Cross-reference" & calculate

Composition of the cross reference
- Define X-axis parameter
- Define Y-axis parameter
Which one's do you take?
Who are the most prolific Spanish applicants?

Step 3

Calculate the cross reference chart

Kyoto entered into force 2005
## Applicant hit list

<table>
<thead>
<tr>
<th>psn_name</th>
<th>applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAMESA INNOVATION &amp; TECHNOLOGY, S.L.</td>
<td>161</td>
</tr>
<tr>
<td>ABENGOA SOLAR NEW TECHNOLOGIES</td>
<td>115</td>
</tr>
<tr>
<td>UNIVERSIDAD POLITECNICA DE MADRID</td>
<td>73</td>
</tr>
<tr>
<td>ACCIONA WINDPOWER</td>
<td>55</td>
</tr>
<tr>
<td>TORRES MARTINEZ MANUEL</td>
<td>32</td>
</tr>
<tr>
<td>MUNOZ SAIZ MANUEL</td>
<td>25</td>
</tr>
<tr>
<td>UNIVERSITY OF A CORUNA</td>
<td>17</td>
</tr>
<tr>
<td>SENER, INGENIERIA Y SISTEMAS</td>
<td>15</td>
</tr>
<tr>
<td><strong>GAMESA INNOVATION &amp; TECHNOLOGY</strong></td>
<td><strong>13</strong></td>
</tr>
<tr>
<td>UNIVERSITY LA RIOJA</td>
<td>13</td>
</tr>
<tr>
<td>UNIVERSIDAD POLITECNICA DE CATALUNA</td>
<td>11</td>
</tr>
<tr>
<td>PORRAS VILA FCO. JAVIER</td>
<td>11</td>
</tr>
<tr>
<td>INNEO TORRES, S.L.</td>
<td>10</td>
</tr>
<tr>
<td>UNIVERSIDAD DE CANTABRIA</td>
<td>10</td>
</tr>
<tr>
<td>UNIVERSIDAD NACIONAL DE EDUCACION A DISTANCIA</td>
<td>9</td>
</tr>
<tr>
<td>VILLARRUBIA RUIZ JONAS</td>
<td>9</td>
</tr>
<tr>
<td>INGETEAM ENERGY</td>
<td>9</td>
</tr>
<tr>
<td>PRODUCCIONES MITJAVILA</td>
<td>9</td>
</tr>
<tr>
<td>CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS (C.I.E.M.A.T.)</td>
<td>9</td>
</tr>
</tbody>
</table>
## Inventor hit list

<table>
<thead>
<tr>
<th>psn_name</th>
<th>applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUNEZ POLO, MIGUEL</td>
<td>33</td>
</tr>
<tr>
<td>TORRES MARTINEZ MANUEL</td>
<td>30</td>
</tr>
<tr>
<td>LLORENTE GONZALEZ JOSE IGNACIO</td>
<td>24</td>
</tr>
<tr>
<td>GARCIA SAYES, JOSE MIGUEL</td>
<td>23</td>
</tr>
<tr>
<td>ARLABAN GABEIRAS, TERESA</td>
<td>21</td>
</tr>
<tr>
<td>NUNEZ BOOTELLO, JUAN PABLO</td>
<td>20</td>
</tr>
<tr>
<td>MARTINEZ-VAL PENALOSA, JOSE MARIA</td>
<td>16</td>
</tr>
<tr>
<td>MARTINEZ SANZ, NOELIA</td>
<td>13</td>
</tr>
<tr>
<td>LUQUE LOPEZ, ANTONIO</td>
<td>13</td>
</tr>
<tr>
<td>MUNOZ SAIZ MANUEL</td>
<td>13</td>
</tr>
<tr>
<td>SAENZ-DIEZ MURO, JUAN CARLOS</td>
<td>13</td>
</tr>
<tr>
<td>BLANCO FERNANDEZ, JULIO</td>
<td>13</td>
</tr>
<tr>
<td>FERNANDEZ GOMEZ, MIGUEL ANGEL</td>
<td>13</td>
</tr>
<tr>
<td>JIMENEZ MACIAS, EMILIO</td>
<td>13</td>
</tr>
<tr>
<td>AROCENA DE LA RUA, ION</td>
<td>12</td>
</tr>
<tr>
<td>MARTINEZ CAMARA, EDUARDO</td>
<td>12</td>
</tr>
<tr>
<td>MUNOZ ANTON, JAVIER</td>
<td>11</td>
</tr>
<tr>
<td>PIERA CARRETE, MIREIA</td>
<td>11</td>
</tr>
<tr>
<td>NUNEZ POLO MIGUEL</td>
<td>10</td>
</tr>
</tbody>
</table>
Same for Swedish patent office → 2 clicks away
Top applicants
When PATSTAT Online is not enough ...  
Advanced data download
The result of a PATSTAT query can be used with built-in charts or downloaded for local analysis and visualization.

**PATSTAT Online**

- **Download graphs (pdf) on user's PC**
- **Download Patstat subset on user's PC**
- **Download Result Table on user's PC**

**Local analysis / visualization**

- **local analysis / visualization (multiple tables in PATSTAT data structure)**
- **local analysis / visualization (single table)**
Name harmonisation

- Control for variations of a given applicant name
- **Variants** are mapped on standard name:

<table>
<thead>
<tr>
<th>AKTIENGESELLSCHAFT VOLKSWAGEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUORUKUSUAAGENUERUKU AG</td>
</tr>
<tr>
<td>FUORUKUSUWAAGEN AG</td>
</tr>
<tr>
<td>VOLKSWAGEN</td>
</tr>
<tr>
<td>VOLKSWAGEN AG</td>
</tr>
<tr>
<td>VOLKSWAGEN AG VW</td>
</tr>
<tr>
<td>VOLKSWAGEN AKTIENGESELLSCHAFT</td>
</tr>
<tr>
<td>VW</td>
</tr>
<tr>
<td>VW AG</td>
</tr>
<tr>
<td>VW WOLFSBURG</td>
</tr>
<tr>
<td>WOLFSBURG VW</td>
</tr>
<tr>
<td>BRASIL S A VOLKSWAGEN DO</td>
</tr>
<tr>
<td>BRASIL S A VOLKSWAGEN DO</td>
</tr>
<tr>
<td>BRASIL SA VOLKSWAGEN</td>
</tr>
</tbody>
</table>
## Name harmonisation: Corporate structure

E.g., corporate tree of Volkswagen in Thomson Innovation:

<table>
<thead>
<tr>
<th>Volume</th>
<th>Source: Thomson Innovation, 1790 Analytics</th>
<th>European Patent Office</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VOLKSWAGEN AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VOLKSWAGEN DO BRASIL S/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VOLKSWAGEN AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VOLKSWAGEN AKTIENGESELLSCHAFT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUDI AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEAT SA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SKODA AUTO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WILHELM KARMANN GMBH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WILHELM KARMANN GMBH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WILHELM KARMANN GMBH II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAN SE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAN DIESEL &amp; TURBO SE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAN TURBOMASCHINEN AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAN NUTZFAHRZEUGE AKTIENGESELLSCHAFT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAN GUTEHOFFNUNGSCHUTTE AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PORSCHE LIZENS-UND HANDELSGESELLSCHAFT MBH &amp; CO KG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DR ING H C F PORSCHE AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F PORSCHE AKTIENGESELLSCHAFT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DR ING H C F PORSCHE AG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scania AB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCANIA CV AKTIEBOLAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCANIA CV AB (PUB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AKTIEBOLAGET SCANIA-VABIS SODERTALJE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DYNAMATE AB</td>
<td></td>
</tr>
</tbody>
</table>

Source: Thomson Innovation, 1790 Analytics
Name harmonisation: Dynamic corporate structure

- Volkswagen
- Wilhelm Karmann GmbH
- Man SE
- Porsche AG
- Scania AB

[...]

time

today
Name harmonisation: Dynamic corporate structure

Volkswagen

Wilhelm Karmann GmbH

Man SE

Porsche AG

Scania AB

[...]

2008  2011  2012 _today_
Name harmonisation: Dynamic corporate structure

Volkswagen Static vs. Dynamic corporate structure

Inventions over time

Year of invention

0 200 400 600 800 1000 1200

Patent information and Porter's 5 forces model

early detection of ...

**Suppliers**
- supplier's forward integration
- own backward integration
- substitutes for suppliers products

**Competitors**
- freedom to operate and product clearance
- *Comparison of patent portfolios (e.g. Xlicensing)*
- state of the art search (appeal)
- competitor's R&D- patenting- and marketing strategy

**Customers**
- customer's backward integration
- own forward integration
- other uses for own technology

**Value chain**
- in-bound
- operations
- out-bound

**Substitutes**
- technological advantages
- determination of switching costs

**New entrants**

- freedom to operate and product clearance
- *Comparison of patent portfolios (e.g. Xlicensing)*
- state of the art search (appeal)
- competitor's R&D- patenting- and marketing strategy

More than analysing well known competition

<table>
<thead>
<tr>
<th>Bold: Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italic: Opportunities</td>
</tr>
</tbody>
</table>

---

European Patent Office
Example 2:

Applicants over classes
Spanish Applicants

Parameters for Cross-reference
Parameter 1 (X axis)
CPC
technical field: Environmental technology
Parameter 2 (Y axis)
Applicant (PATSTAT Standardized Name)
top 20 of the search result list
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
Retrospective analysis of patenting activity
Renewable Energy

Geothermal energy
Hydro energy
Energy from sea
Solar thermal energy
Photovoltaic energy
Thermal-PV hybrids
Wind energy
Case study: Identifying candidates for emerging technologies: Starting point

- Companies have genuine interest to identify new/emerging technologies early on

- Common approaches include:

<table>
<thead>
<tr>
<th>Approach based on</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent classes</td>
<td>assigned by experts in the technical field</td>
<td>delay</td>
</tr>
<tr>
<td>Keywords</td>
<td>available earlier than new patent classes for emerging technology</td>
<td>quality may vary significantly</td>
</tr>
</tbody>
</table>
Identifying candidates for emerging technologies: Starting point

Emerging technologies:

- typical situation: patent examiner cannot classify completely claimed invention by means of existing patent classes in a given technical field
- combination of patent classes from different technical fields required
- E.g. EP2704902 A1 ('Magnetic graphene-like nanoparticles or graphitic nano-or microparticles and method of production and uses thereof'):
  - **CPC classes**: A61K49/10, B32B9/00, B82Y5/00, C01B31/0446, C01B31/0476, C01B2204/20
Identifying candidates for emerging technologies: Co-occurrence matrix

CPC sections

quantity of inventions

A B C D E F G H Y

B32B

C08F

C08L

high

small
PATSTAT Cross reference chart: CPC – CPC
MX Applicants → green energy
Y02B: CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS
→ light, heating, ventilation, elevators, isolation, ...
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent analytics
A market for technology

Technology management

Research & Development
Inventions and technical know-how
Market introduction
Continuous improvement (routine business)

External technology acquisition
External technology commercialization

Innovation management
Patent Intelligence: patent portfolios

One colour per inventor per company

Own company

Company 1

Company 2

Company 3

IPC 1
IPC 2
IPC 3
IPC 4
IPC 5

Patenting activity

Candidate for M&A
Headhunt prolific inventor

European Patent Office
Which company to acquire?  
When to stop a merger?

2010

2015, only new patents 2010–2015

Steady patenting activity is needed for sustainable patent portfolios

Adapted from Source: PatentSight GmbH
Cooperation or Litigation in the fuel cell industry?

What advice can be given to UTC?

candidates for cooperation

potential infringers

Courtesy: inrea – http://www.inrearesearch.com/
Assessment of potential co-operation in Mergers and Acquisitions

Auto-correlation: Co-inventors (top10)

Company A

Usoro Patrick B

Company B
HANDS ON.
PATSTAT Cross reference chart: Inventor networks

[Diagram showing inventor networks with various names like BRUCE DAVIDSON, NEIL CHARLES, ERNST KUSSUL, etc.]
Contents

- Patent analytics versus traditional patent searches
- A procedure for patent statistics and data mining
- Case study
  - Applicants and Inventors
  - Technological areas
  - Identifying candidates for emerging technologies
  - Collaboration and acquisition
- A workflow for patent data analytics
Workflow for patent analytics

Understand customer needs | Identify suitable analytical approach | Carry out patent analysis | Process results | Communicate with the customer
Inverted pyramid for a statistical analysis

Target groups
- Managers
- IP managers
- Engineers, students, inventors

Willingness to substantial reading effort

Level of detail

Search report
- Executive summary
- Objective of the analysis
- Key results
- Methodology
- Details
How to use patent information in daily routine

Data processing
- Management
- Research & development
- IP management, patent and legal division

Data visualisation

Data
- Technical information
- Legal information
- Other information
- Business information
Typical topics in the business context patent information can help to answer

<table>
<thead>
<tr>
<th>Question/Topic</th>
<th>IP management</th>
<th>Management</th>
<th>Research &amp; development</th>
<th>Technology transfer offices, PATLIB’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patentability</td>
<td></td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Freedom to operate</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Most important competitors</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Most important technologies</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Changes in technical field</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Technical focus of main competitors</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Capitalisation of own technology</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Patent strategy of main competitors</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Use of my technology in other fields</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>
Patent analytics: Summary

- Patent analytics is an excellent approach to assess large sets of patent data.
- Data quality and quality of analysis: Critical prerequisites for reasonable results.
- Patent intelligence can be used to reveal business-relevant information, e.g. about:
  - emerging technologies
  - competitive environment
- Increasing importance of patent intelligence in light of the mass of technical data and global challenges.
Thank you for your attention!

Johannes Schaaf
Geert Boedt
European Patent Office
Directorate 5.4.2 | Patent Information Promotion
Rennweg 12
A-1030 Vienna

Acknowledgments
Christian Soltmann
European Patent Office