Orphanet 20 years later
Lessons on Information needs
and Value of Data

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Consultancy for...

- Pfizer
- Shire
- Biogen
Orphanet was established in 1997 in France to address identified problems

Report to the Minister of Health

Lack of information → Inventory and Encyclopaedia

Scarce expertise → Directory of experts/clinics

Too few collaborations → Directory of research projects

Difficult recruitment → Directory of clinical trials

Isolation of patients → Directory of patient organisations
Orphanet had Ancestors

- **1974 GENDIAG:**
  - A computerized system to support the diagnosis of patients attending a genetic clinic
- **1992 GENINFO:**
  - A directory of expert clinics and research groups of relevance to advance Gene Mapping
It is now the reference portal worldwide because it provides answers.
Content of Orphanet
Orphanet Consortium for Expert Services in 2016
The End Users
Orphanet: over 13 Million Visits from 1 million unique Users in 2015

Figure 27 Types of Orphanet users (percentage of total respondents) n = 3795
Visitors from over 200 countries
Main Reason for Visiting

- Information for a specific disease: 85.1%
- Information on genes: 18.2%
- Information on clinical guidelines: 16.9%
- Information on rare diseases in general: 13.5%
- Information on epidemiology: 13.3%
- Information on laboratory tests: 12.8%
- Information on disabilities: 11.6%
- Information on rare disease...: 10.6%
- Information on specialist clinics: 9.6%
- Information on classifications: 9.4%
- Information on research projects: 9.4%
- Information on clinical trials: 8.2%
- Information on patient organisations: 7.5%
- Information on orphan drugs in general: 5.3%
Utility of Orphanet services as ranked by users

- List of diseases and classifications: 95.7%
- Texts on diseases: 95.2%
- Epidemiological data: 91.5%
- Clinical guidelines: 88.4%
- Orphanet Report Series - List of rare diseases: 86.0%
- Cross-referencing of terminologies: 85.7%
- Orphanet Report Series on epidemiology of...: 81.5%
- Orphacode nomenclature: 80.6%
- Search by sign facility: 79.7%
- Emergency guidelines: 78.9%
- Directory of medical laboratories: 77.6%
- Directory of patient organisations: 76.7%
- Disability factsheets: 75.2%
- Directory of clinics: 74.7%
- Directory of orphan drugs: 73.4%
- Orphanet national websites: 71.8%
- Orphanet Report Series on Orphan Drugs: 71.6%
- Directory of research projects: 71.6%
- Directory of clinical trials: 71.5%
- OrphaNews newsletter: 63.9%
- Orphadata (downloadable Orphanet...: 63.6%
- Directory of registries: 63.1%
- ORDO: Orphanet Rare Diseases ontology: 59.0%
- Orphanet mobile app: 58.7%
20 years of Feed-back from End-Users

1- Inventory of Rare Diseases
2- Encyclopaedia
3- Inventory of Drugs (R&D and Marketed drugs)
4- Inventory of Expert services
5 - Data freely accessible to researchers for re-use
6- Communication Channels
1- Inventory of Rare Diseases
Orphanet Inventory of Diseases

- Identity card + genes
- Unique Orpha number
  - Stable whatever the evolution of knowledge
  - Every disease is positioned in classifications

- Suitable to code clinical activity / lab activity in information systems

- Suitable to cluster diseases for research purpose

- Serve as a base for the revision of the International Classification of Rare Diseases at WHO
Phenomes: a continuum + zooms

Group of phenomes
- Top of classification = System disorder
- Group

« Disorder » level
- Clinical criterion
- Disease, syndrome, condition, anomaly...

Subtypes
- Etiological
- Clinical
- Histopathological...

- Disease
- Malformation syndrome
- Morphological anomaly
- Biological anomaly
- Clinical syndrome
- Particular clinical situation
An Orphan Diseasome permits investigators to explore the orphan disease (OD) or rare disease relationships based on shared genes and shared enriched features (e.g., Gene Ontology Biological Process, Cellular Component, Pathways, Mammalian Phenotype).

The red nodes represent the orphan diseases and the green ones the related genes. A disease is connected to a gene if and only if a mutation which is responsible of the disease has been identified on this gene.

http://research.cchmc.org/od/01/index.html
Ontologies in the field of RD

• HPO: Human Phenotype Ontology
  – To describe the signs and symptoms
  – Developed at La Charité, Berlin

• ORDO: Orphanet Rare Diseases Ontology
  – To describe the entity in an aggregated manner
  – Developed at INSERM, Paris
  – Collaboration with the EBI
## Contribution of each Medical Field in % of the RD total prevalence

<table>
<thead>
<tr>
<th>Field</th>
<th>% of RD Total Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysmorphology</td>
<td>16.4</td>
</tr>
<tr>
<td>Oncology</td>
<td>10.9</td>
</tr>
<tr>
<td>Neurology</td>
<td>10.8</td>
</tr>
<tr>
<td>Metabolism</td>
<td>7.4</td>
</tr>
<tr>
<td>Haematology</td>
<td>6.8</td>
</tr>
<tr>
<td>Cardiology</td>
<td>6.7</td>
</tr>
<tr>
<td>Bone diseases</td>
<td>5.6</td>
</tr>
<tr>
<td>Dermatology</td>
<td>5.4</td>
</tr>
<tr>
<td>Rhumatology</td>
<td>4.5</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>4.5</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>3.7</td>
</tr>
<tr>
<td>Pneumology</td>
<td>3.5</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>2.6</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>2.4</td>
</tr>
<tr>
<td>Vascular diseases</td>
<td>2.2</td>
</tr>
<tr>
<td>NET *</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Nephrology</strong></td>
<td><strong>1.7</strong></td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>1.7</td>
</tr>
<tr>
<td>Hepatology</td>
<td>1.3</td>
</tr>
<tr>
<td>Immunology</td>
<td>0.3</td>
</tr>
</tbody>
</table>

* Orphanet data 2013
* Neuroendocrine gastrointestinal tumors
5- Free Access to Orphanet Data Since 2011
Uptake of Orphadata Files 2011 - 2015

Figure 21 Number of downloads from the Orphadata website since mid 2011
Most popular products for re-use

Figure 22 Distribution of the downloads of Orphadata freely available datasets in 2015
[totals of 200,383 downloads]
6- Communication Channels

Orphanet Report Series

OrphaNews
Figure 25 Number of downloads of the Orphanet Report Series in all languages since 2010
Conclusion

• Enormous appetite for authoritative information vs Social Media vs raw data

• Collaborative effort
  – Clinical guidelines
  – Annotation signs and symptoms
  – Expert clinics
  – Curation of Data

• Free access is a pre-request
  – Creative Commons
Thank you!