Real-time PCR Data Markup Language

A new standard for archiving and exchanging real-time PCR data

Steve Lefever
On behalf of the RDML consortium

Center for Medical Genetics

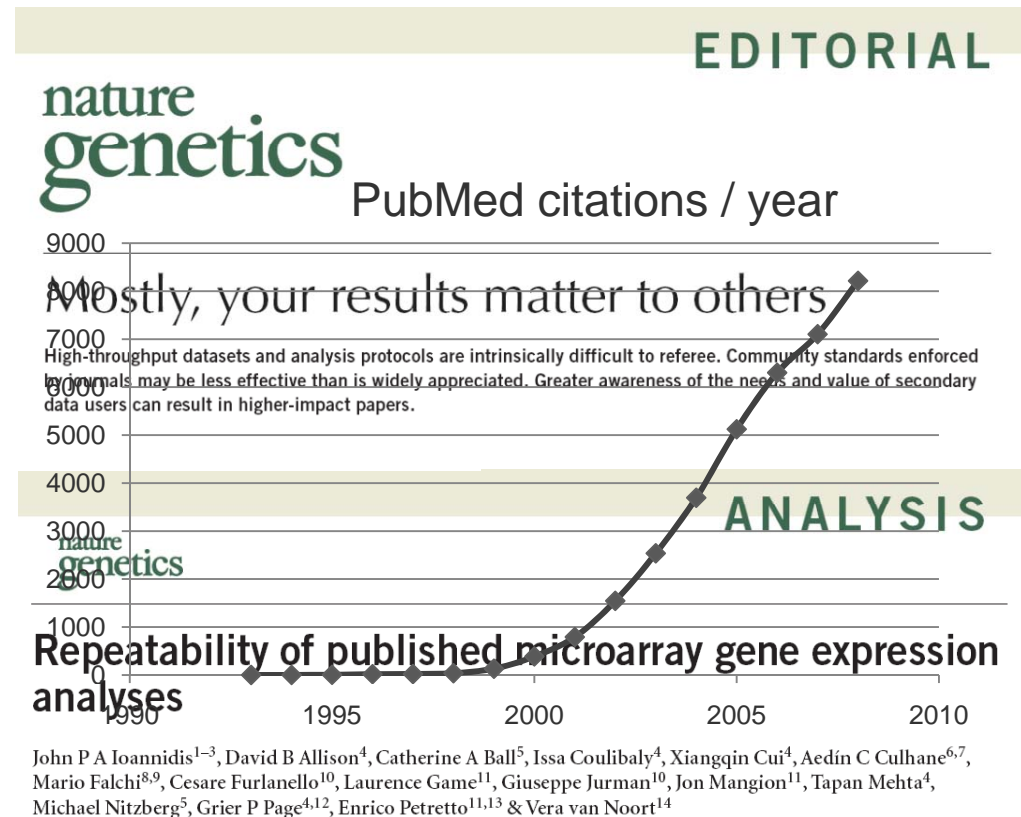qPCR = golden standard for nucleic acids quantification

Dedicated and precise instruments needed

Different software/output format

for each instrument/manufacturer

Limits possibility to exchange and

reanalyse data

RDML

EDITORIAL

nature
genetics

PubMed citations / year

Mostly, your results matter to others

High-throughput datasets and analysis protocols are intrinsically difficult to referee. Community standards enforced by journals may be less effective than is widely appreciated. Greater awareness of the needs and value of secondary data users can result in higher-impact papers.

ANALYSIS

nature
genetics

Repeatability of published microarray gene expression analyses

John P A Ioannidis[1–3], David B Allison[4], Catherine A Ball[5], Issa Coulibaly[4], Xiangqin Cui[4], Aedín C Culhane[6,7], Mario Falchi[8,9], Cesare Furlanello[10], Laurence Game[11], Giuseppe Jurman[10], Jon Mangion[11], Tapan Mehta[4], Michael Nitzberg[5], Grier P Page[4,12], Enrico Petretto[11,13] & Vera van Noort[14]

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- Birth on September 1st 2005 – Jan Hellemans

- 2005 – 2007 : Open discussion about RDML

- January 1st 2008 : start of the RDML consortium

- April 1st 2008 : RDML joins MIBBI

- January 12th 2009 : RDML paper accepted in Nucleic Acid Research
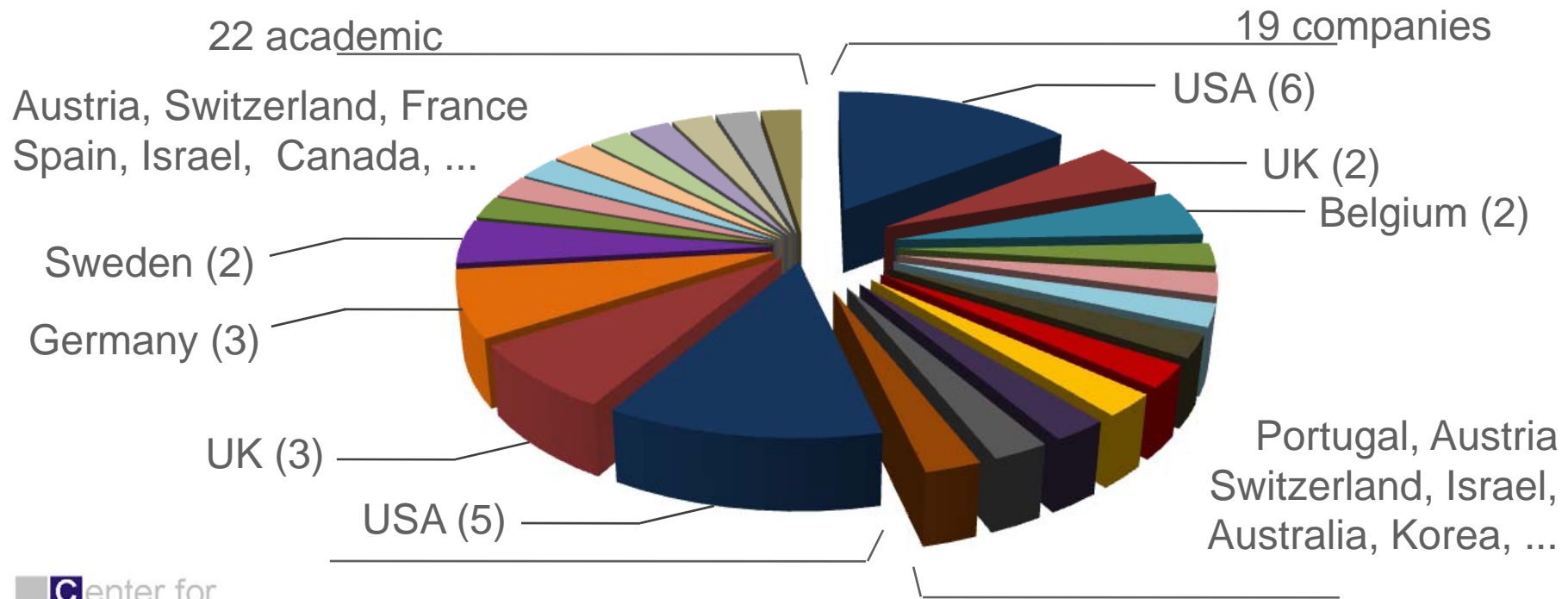
SURVEY AND SUMMARY

RDML: structured language and reporting guidelines for real-time quantitative PCR data

Steve Lefever[1], Jan Hellemans[1,*], Filip Pattyn[1], Daniel R. Przybylski[2], Chris Taylor[3], René Geurts[4], Andreas Untergasser[4] and Jo Vandesompele[1], on behalf of the RDML consortium

Center for Medical Genetics

- Develops and maintains the RDML data exchange format

- Key developer group, a member community and supporters

- 41 supporters and members from 20 different countries

22 academic

Austria, Switzerland, France
Spain, Israel, Canada, ...

Sweden (2)

Germany (3)

UK (3)

USA (5)

19 companies

USA (6)

UK (2)

Belgium (2)

Portugal, Austria
Switzerland, Israel,
Australia, Korea, ...

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- **M**inimum **I**nformation for **B**iological and **B**iomedical **I**nvestigations

- http://www.mibbi.org

- Published in August 2008 by Nature Biotechnology

  _computational BIOLOGY   COMMENTARY

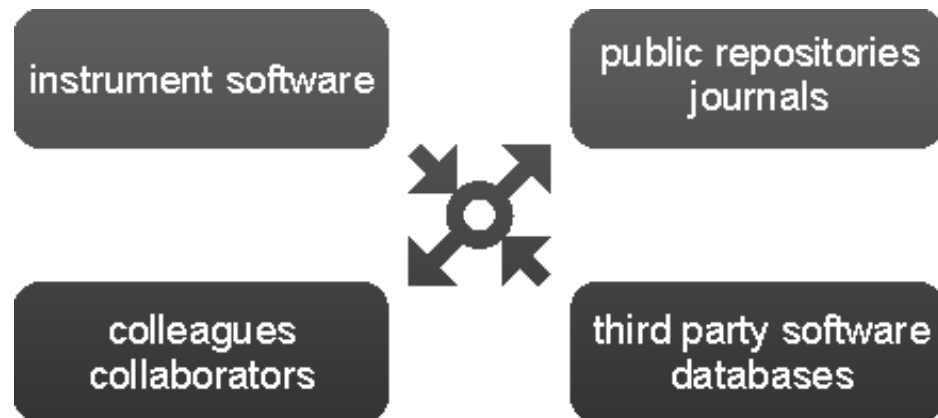 Promoting coherent minimum reporting guidelines for biological and biomedical investigations: the MIBBI project
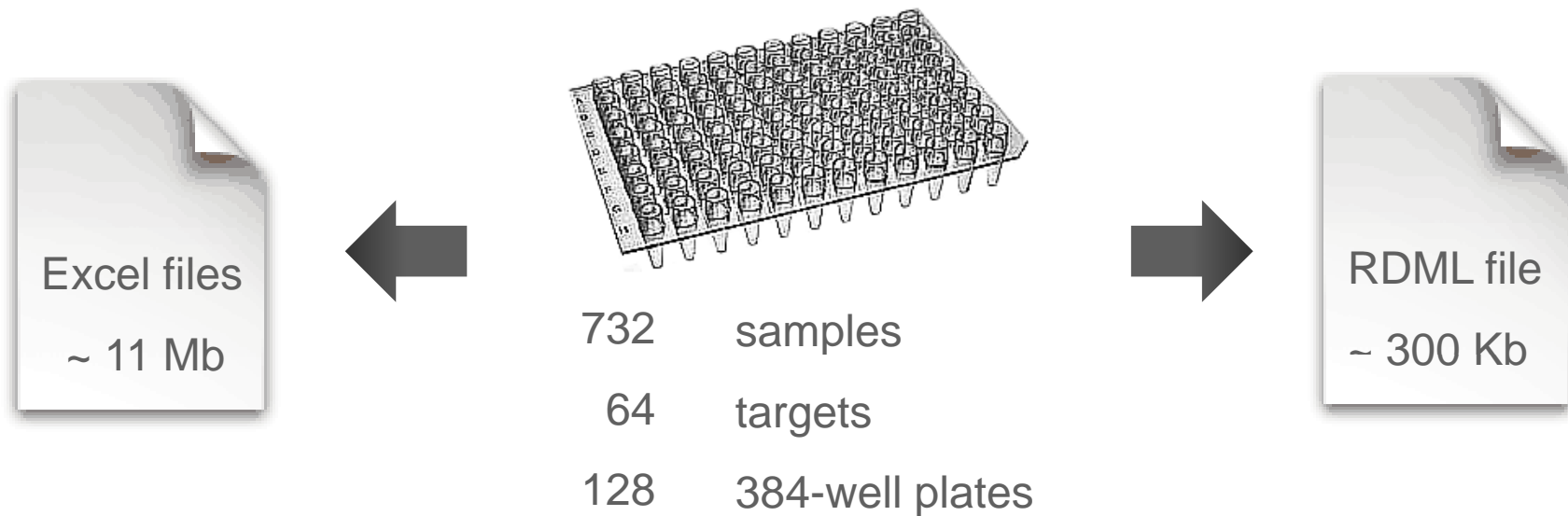
- RDML adopted as standard for qPCR experiments

-

Microarrays		qPCR
MIAME	⬌	MIQE
MAGE-ML	⬌	RDML

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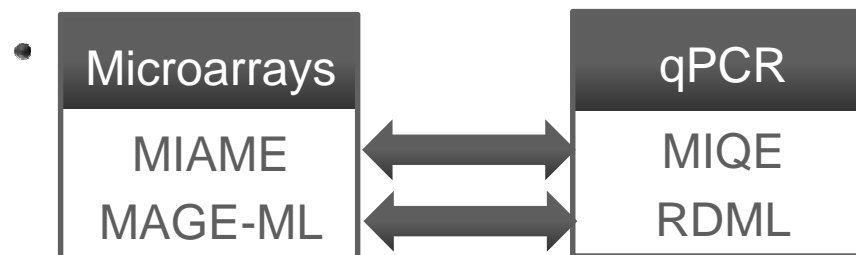
- RDML = **R**eal-time PCR **D**ata **M**arkup **L**anguage

- Universal format to store and exchange qPCR data

- Structured

- Based on XML

- Platform independent

- Easy to extend

- Small RDML files

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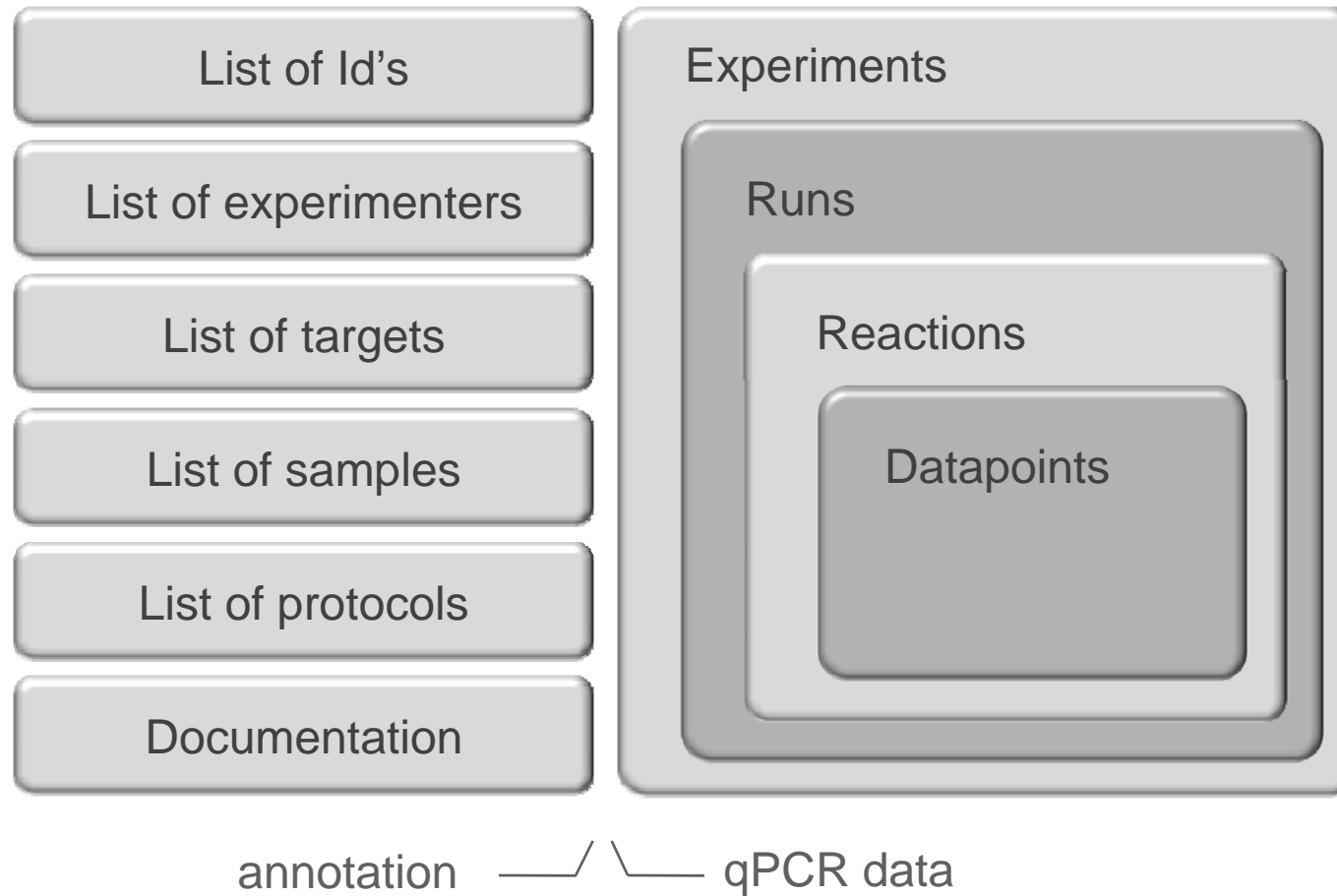- Vermeulen et al.

- Prognostic gene study in neuroblastoma

Excel files	RDML file
~ 11 Mb	~ 300 Kb

732   samples

64   targets

128   384-well plates

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▶ What is XML?

- e**X**tensible **M**arkup **L**anguage

- Language to store data in a structured manner

- Defines elements delimited by opening and closing tags

- Easily extensible

```
<gene>
    <symbol>actb</symbol>
    <function>muscle contraction</function>
    <location>chromosome 7: 5533308-5569941</location>
</gene>
```

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List of Id's

List of experimenters

List of targets

List of samples

List of protocols

Documentation

Experiments

Runs

Reactions

Datapoints

annotation ——/ \—— qPCR data

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- qPCR data

- Experiment annotation

- Multiple experiments per file

- Standard vocabulary (MIQE)

    - reaction

    - Cq

List of Id's

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List of samples

List of protocols

Documentation

- Accession numbers for online repositories or journals

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List of Id's

List of experimenters

List of targets

List of samples

List of protocols

Documentation

- Contact information of experimenters

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List of Id's

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Documentation

- Target annotation

- Oligonucleotide sequences

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List of Id's

List of experimenters

List of targets

List of samples

- Sample annotation

- cDNA synthesis

List of protocols

Documentation

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List of Id's

List of experimenters

List of targets

List of samples

List of protocols

Documentation

- Any type of protocol

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List of Id's

List of experimenters

List of targets

List of samples

List of protocols

Documentation ———— • Additional information

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- RT PRIMER DB

- qbasePLUS

- Under development: - **Primer3Plus**

    - RDML viewer and editor   Microsoft .net

- More to come

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- www.rdml.org

- Tool for creating RDML files

- Tool for converting RDML file to .csv files

- Libraries in Java, C, .NET and PHP

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- Online generation of an RDML file

- Importing the RDML file in qBasePlus for analysis

- Convert RDML file into .csv files

- Data standard for qPCR data

- Universal and extensible

- Easy exchange of data

- Broad acceptance by community

- Submit data in RDML format to journals

- www.rdml.org

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- The RDML consortium

- Jo Vandesompele

- Jan Hellemans

- Filip Pattyn

- Andreas Untergasser

- Daniel Przybylski