



RDML: structured data format and guidelines for the exchange and storage of real-time PCR data

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introduction

problems

- Each real-time PCR instrument supplier has its own data export format
- prevents easy import of Cq values into data analysis software
 - hampers the exchange of qPCR data between users
 - does not allow submission of qPCR data as supplemental data to a paper
 - block the development of central data repositories

solution

create a universal qPCR data format (RDML: real-time PCR markup language) that can be used by anyone regardless of qPCR instrument and analysis software
supplement this format with guidelines and tools to achieve maximum benefits with minimal burden for users

RDML consortium

aims

develop a universal qPCR data exchange format (RDML), guidelines on minimal information (MIqPCR) and tools to support usage of RDML

members

anyone who helps developing, makes suggestions and comments or just declares support for the RDML initiative

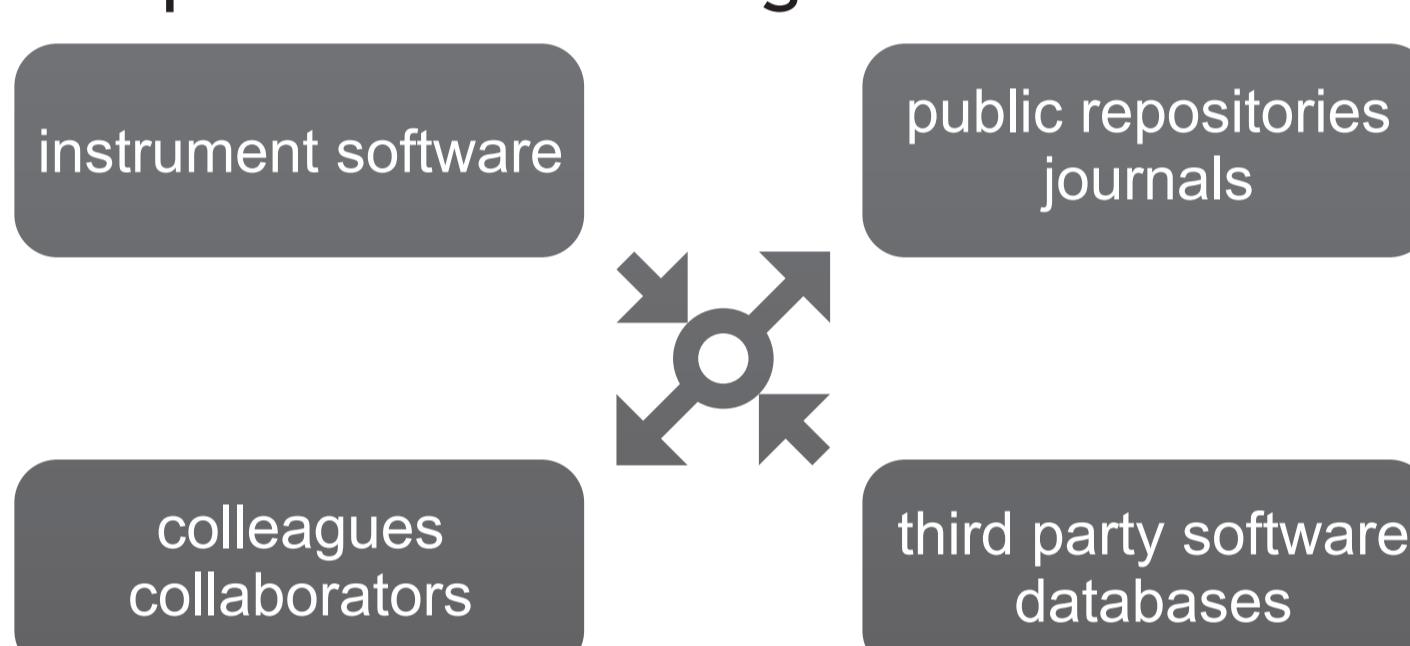
links

- info@rdml.org
- <http://www.rdml.org>
- <http://sourceforge.net/projects/rdml/>

results

RDML concept

Facilitate qPCR data exchange and submission



news

2008 October 6	Filip Pattyn presents RDML at the 1st Benelux qPCR Symposium, Ghent, Belgium
April 1	Jo Vandesompele presents RDML at the CHI's 4th Annual Quantitative PCR: Getting the Basics Right, San Diego, USA
April 1	A new standard for qPCR data : RDML (European Biotechnology News, Issue 03-04/2008)
April 1	Primer Standardisierung : RDML - neuer Standard für qPCR-Daten (Laborwelt, Nr.2/2008, 9. Jahrgang)
January 1	RDML joins MIBBI
2007 March 26-30	Birth of the RDML consortium and new website
2005 October 1	Jan Hellemans moderates the RDML discussion at the 3rd International qPCR Symposium, Freising-Weihenstephan, Germany
September 5-7	RDML website and discussion forum online
July 1	Jan Hellemans presents RDML at the 2nd International qPCR Symposium, Freising-Weihenstephan, Germany
	Jan Hellemans and Jo Vandesompele start the RDML initiative

development

The development of the RDML data format, MIqPCR guidelines and tools is driven by the open RDML consortium. Anyone can join the consortium to help in the development or post suggestions. All development is hosted on sourceforge: <http://sourceforge.net/projects/rdml/>

guidelines

The MIqPCR (Minimum Information about a Quantitative Polymerase Chain Reaction experiment) guidelines have been developed in collaboration with MIBBI (Minimal Information for Biological and Biomedical Investigations) and delineate the minimum information required to report the use of qPCR assays in a manner sufficient to support the unambiguous interpretation of the results presented and the potential corroboration of the conclusions drawn.

RDML file structure

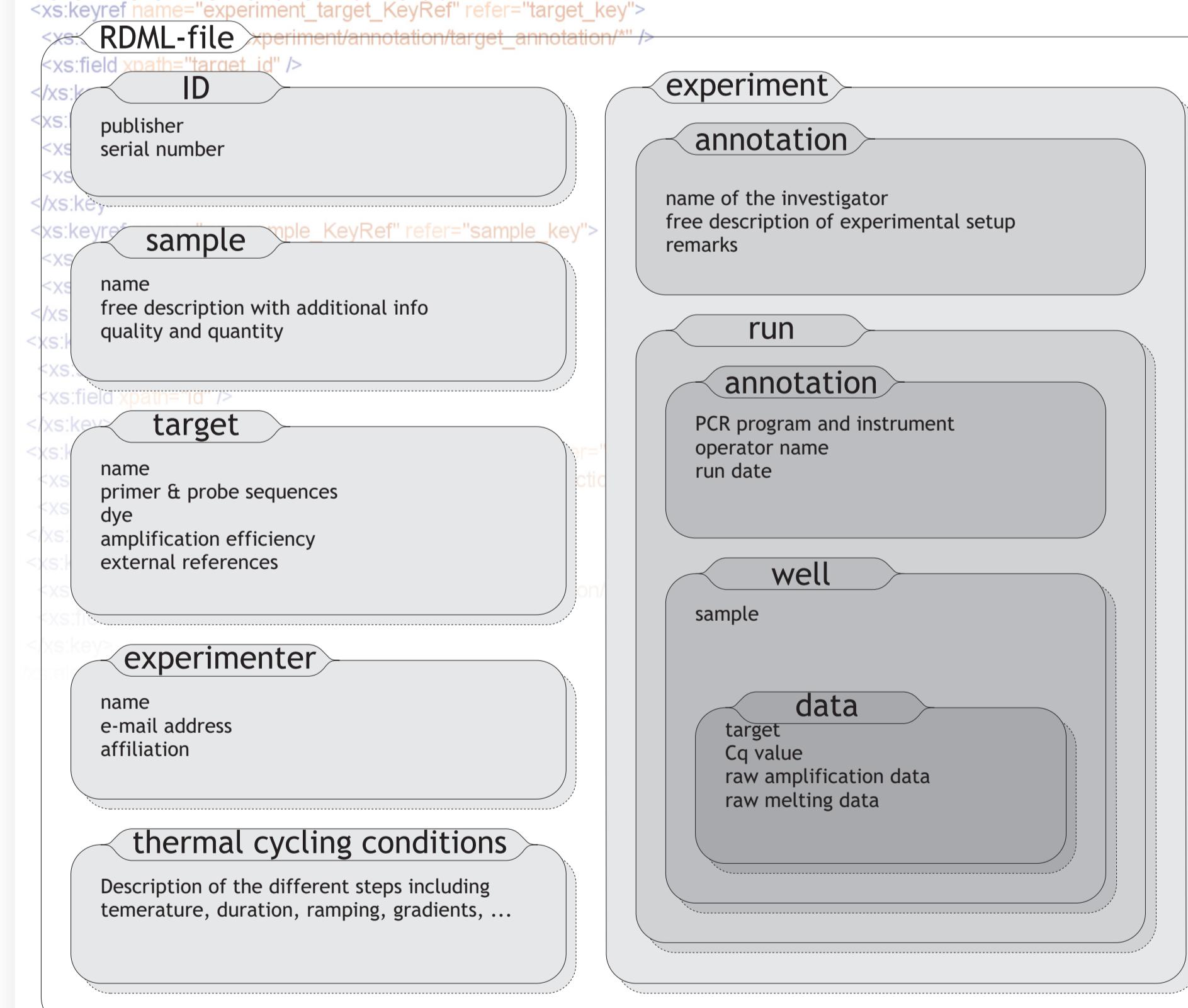
XML based to provide

- cross platform functionality
- extensibility with new or custom fields
- structure described in a XML schema definition

XML schema definition

```
<x:element name="rdml">
<x:complexType>
<x:sequence>
<x:element name="version" type="xs:string"/>
<x:element name="id" type="rdml_id_type" minOccurs="0" maxOccurs="unbounded"/>
<x:element name="user_information" type="user_information_type" minOccurs="0"/>
<x:element name="sample_information" type="sample_information_type" minOccurs="0"/>
<x:element name="target_information" type="target_information_type" minOccurs="0"/>
<x:element name="thermal_cycling_conditions_information" type="thermal_cycling_conditions_information_type" minOccurs="0"/>
<x:element name="experiment" type="experiment_type" minOccurs="0" maxOccurs="unbounded"/>
<x:sequence>
<x:element name="third_party_extensions" type="third_party_extensions_type" minOccurs="0"/>
</x:sequence>
</x:complexType>
<x:keyref name="exp_experimenter_ID_Kref" refer="experimenter_ID_key">
<x:selector xpath=".//experiment/annotation/*" />
<x:field xpath=".//experimenter_ID" />
<x:keyref name="run_experimenter_ID_Kref" refer="experimenter_ID_key">
<x:selector xpath=".//experiment/uv/annotation/*" />
<x:field xpath=".//experimenter_ID" />
<x:keyref name="experimenter_ID_key">
<x:selector xpath=".//user_information/experimenter" />
<x:field xpath=".//id" />
<x:keyref name="run_target_KeyRef" refer="target_key">
<x:selector xpath=".//experiment/uv/data/well/dye/*" />
<x:field xpath=".//tar_id" />
<x:keyref name="run_annotation_KeyRef" refer="target_annotation">
<x:selector xpath=".//experiment/uv/annotation/*" />
<x:field xpath=".//target_annotation" />
<x:annotation>
<x:element name="ID">
<x:complexType>
<x:sequence>
<x:element name="publisher_serial_number" />
<x:element name="key" />
<x:element name="keyref" />
<x:element name="target_id" />
<x:element name="sample" />
<x:element name="target" />
<x:element name="experimenter" />
<x:element name="thermal_cycling_conditions" />
<x:element name="run" />
<x:element name="well" />
<x:element name="data" />
</x:complexType>
</x:element>
</x:sequence>
</x:complexType>
</x:element>
</x:annotation>
</x:element>
</x:sequence>
</x:element>
</x:complexType>
</x:element>
```

content overview



supporting software

RDML is supported by the following software (if your software supports RDML, please contact us)

RDML compliant software			
qBaseplus	qBasePlus	Biogazelle	real-time PCR data-analysis software
Primer3Plus	Primer3Plus	Untergasser et al.	online primer design
RTPrimerDB	RTPrimerDB	Pattyn et al.	the real-time PCR primer and probe database
			Status : in progress

RDML generator

The generator is a tool for creating an RDML file which is compliant with the latest version of the RDML schema. Data has to be submitted by means of files. At the end of the process a RDML file will be made available for download.

Please supply the following information (fields in bold are mandatory, others are optional)

Experiment name :	Experiment description :
A list with all the experimenters :	<input type="checkbox"/> Bladeren... ?
A list with all the samples :	<input type="checkbox"/> Bladeren... ?
A list with all the targets :	<input type="checkbox"/> Bladeren... ?
A list with all the thermal cycling conditions :	<input type="checkbox"/> Bladeren... ?

Next

RDML validator

Choose the schema you want to use :

- Candidate Recommendation (CR) - February 1st 2008
 Proposed Recommendation (PR) - March 1st 2008

Upload the RDML file :

RDML file : Bladeren...

The validator can be used to check if a RDML file is consistent with a certain version of the RDML schema. The tools uses XML validation functions incorporated in PHP and Java. It also generates error messages which can help in making the RDML file compliant with the schema.

Libraries for C, PHP and Java have been made available. These libraries can be used to import or create RDML files in third-party software.



PHP library



Java library



C++ library

libraries

conclusions and future plans

conclusions

A new and universally applicable data format for the exchange and storage of real-time quantitative PCR data has been developed. The RDML format will facilitate the exchange of data between instruments and data analysis software, between different users and even allow to submit qPCR data to central repositories or as supplemental data to a paper. MIqPCR guidelines have been developed in collaboration with MIBBI to assure that data files contain the minimal information allowing unambiguous interpretation of the data.

future plans

- publish RDML manuscript containing MIqPCR guidelines
- work on RDMLv2 with new fields for items such as sample grouping, data analysis results, ...
- search for support by third party software
- strive for a public repository of qPCR data