

RDML Data Format - Ready For The Next Level?

Andreas Untergasser, Steve Lefever, Jasper Anckaert, Jan M Ruijter, Jan Hellemans and Jo Vandesompele on behalf of the RDML-Consortium

RDML vs MIQE

- MIQE (Bustin et al., 2009; 2011)
 - Description what should be recorded in and reported for a qPCR experiment
 - Any data format possible
- RDML (Lefever et al., 2009)
 - Data format to store data

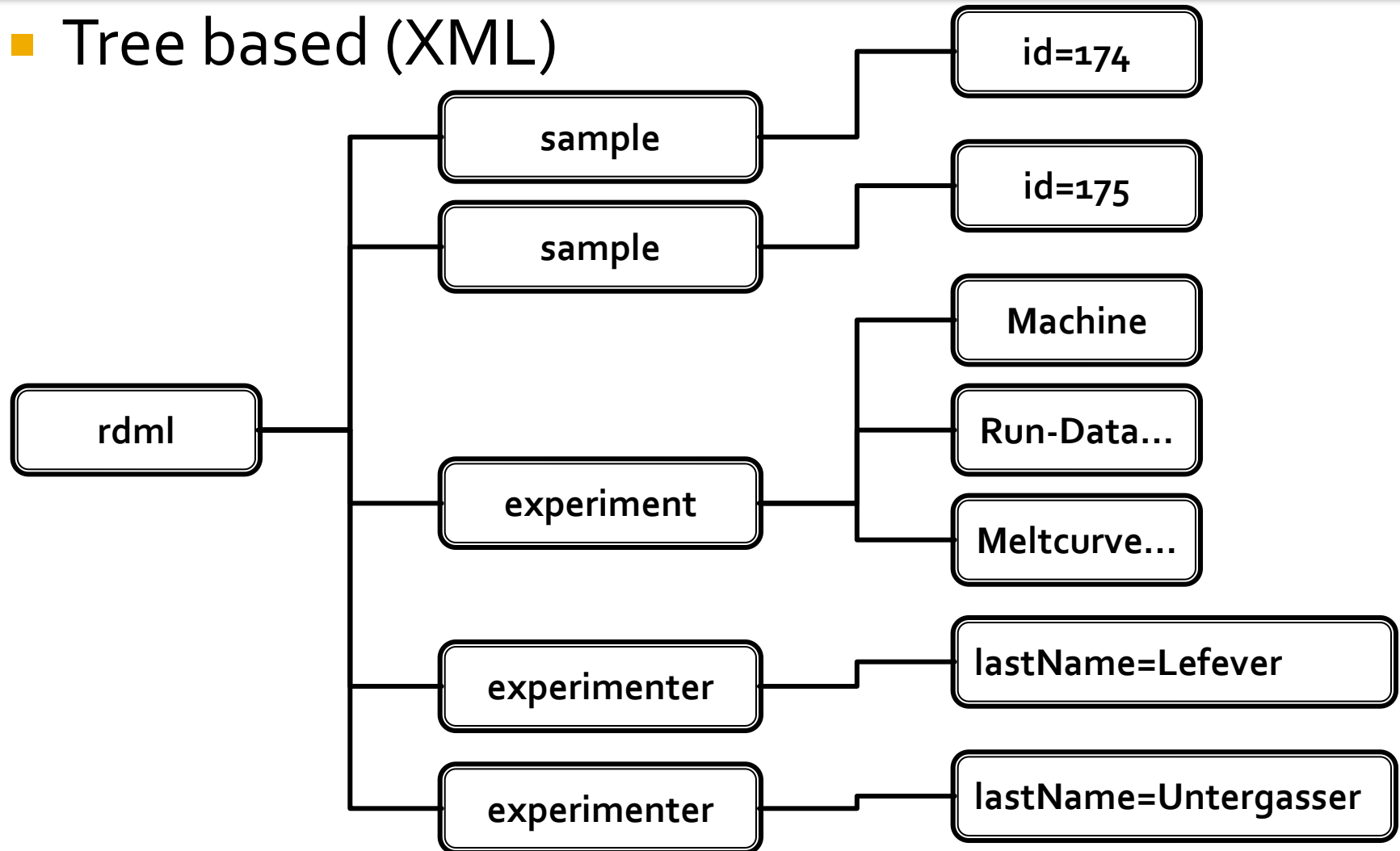


RDML – The idea

- RDML
 - Vendor independent data format for qPCR
 - Store raw data (amplification and melt curves)
 - Store data important for interpretation
 - Allow re-evaluation of all calculations
 - Flexible and extensible
 - Allow creation of databases / complement articles

Data structures

- Tree based (XML)



RDML – Instrument support

- Bio-Rad
 - CFX96
 - CFX384
- Life Technologies
 - StepOne
 - ViiA7
 - QuantStudio
- Roche
 - LightCycler96
- Qiagen
 - Rotor-Gene Q

RDML – Software support

- Primer design tools
 - primer3plus
- Data analysis software
 - LinRegPCR
 - qbase+
- Assay databases
 - RTPrimerDB

RDML – Version 1.0 to 1.1

- Redesign of the plate setup
 - From: "96-well plate; A1-H12"
 - To:

```
<pcrFormat>  
  <rows>8</rows>  
  <columns>12</columns>  
  <rowLabel>ABC</rowLabel>  
  <columnLabel>123</columnLabel>  
</pcrFormat>
```
- Dye element at top level

RDML – Version 1.1 to 1.2

- New annotation element for **samples**:

<sample>

<annotation>

<property>sex</property>

<value>male</value>

</annotation>

</sample>

- Clarification of element definition

RDML – Challenges

- Digital PCR
- Misuse of elements
- Support for more RDML elements
- Import of RDML

RDML – Certification

- Certification of software by the RDML-consortium
- Support levels of RDML
- Customer can judge the software capabilities
- Vendors get gratification for their efforts

RDML-Ninja

- Reference implementation of RDML
- Editor for RDML files
- Visualization and evaluation
- Access to all RDML elements

RDML-Ninja

The screenshot shows the RDML-Ninja web application interface. The window title is "RDML-Ninja". The menu bar includes "File", "RDML", "Fix File", "Online", and "Help". The main interface has a tabbed structure with tabs for "Experiment", "Samples", "Targets", "Cycling Conditions", "Experimenters", "Dye", "Documentation", and "General". The "Experiment" tab is active, showing a list of experiments on the left and a detailed form on the right. The list on the left has buttons "New", "Delete", and "Sort" above it, and contains the entry "Experiment_1". The detailed form on the right has fields for "Unique Experiment ID" (set to "Experiment_1") and "Unique Run ID". It also has buttons for "Set Changes", "Refresh", "New", "Delete", "Sort", and "Show Reaction Data". Below these are tabs for "Run: More...", "Experiment: Doc.", "Run: Doc.", "Experiment: Read Doc.", and "Run: Read Doc.". The "Run: More..." tab is active, showing fields for "Thermal Cycling conditions", "Date and Time of Run", "Machine Information" (Instrument, Software Name, Software Version, cq Detection Method, Background Determination Method), and "PCR Format" (Rows, Columns).

RDML-Ninja

File RDML Fix File Online Help

Experiment Samples Targets Cycling Conditions Experimenters Dye Documentation General

New Delete Sort

Experiment IDs in File:

Experiment_1

Unique Experiment ID: Experiment_1 Set Changes Refresh

New Delete Sort Unique Run ID: Refresh

Run IDs in File:

Run_1

Show Reaction Data

Run: More... Experiment: Doc. Run: Doc. Experiment: Read Doc. Run: Read Doc.

Thermal Cycling conditions: Change Protocol Delete Protocol

Date and Time of Run:

Machine Information

Instrument:

Software Name:

Software Version:

cq Detection Method: not set

Background Determination Method:

PCR Format

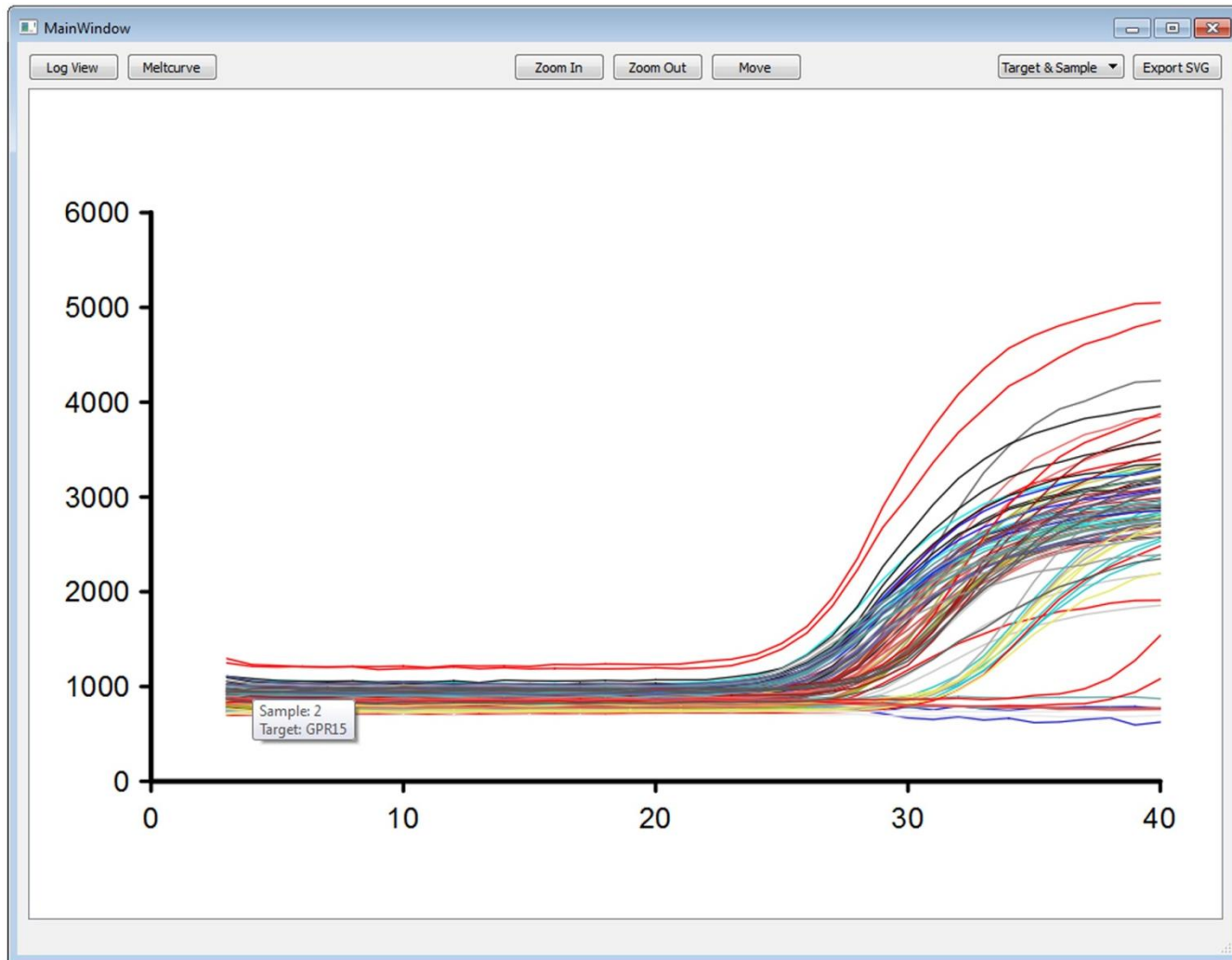
Rows: 123

Columns: ABC

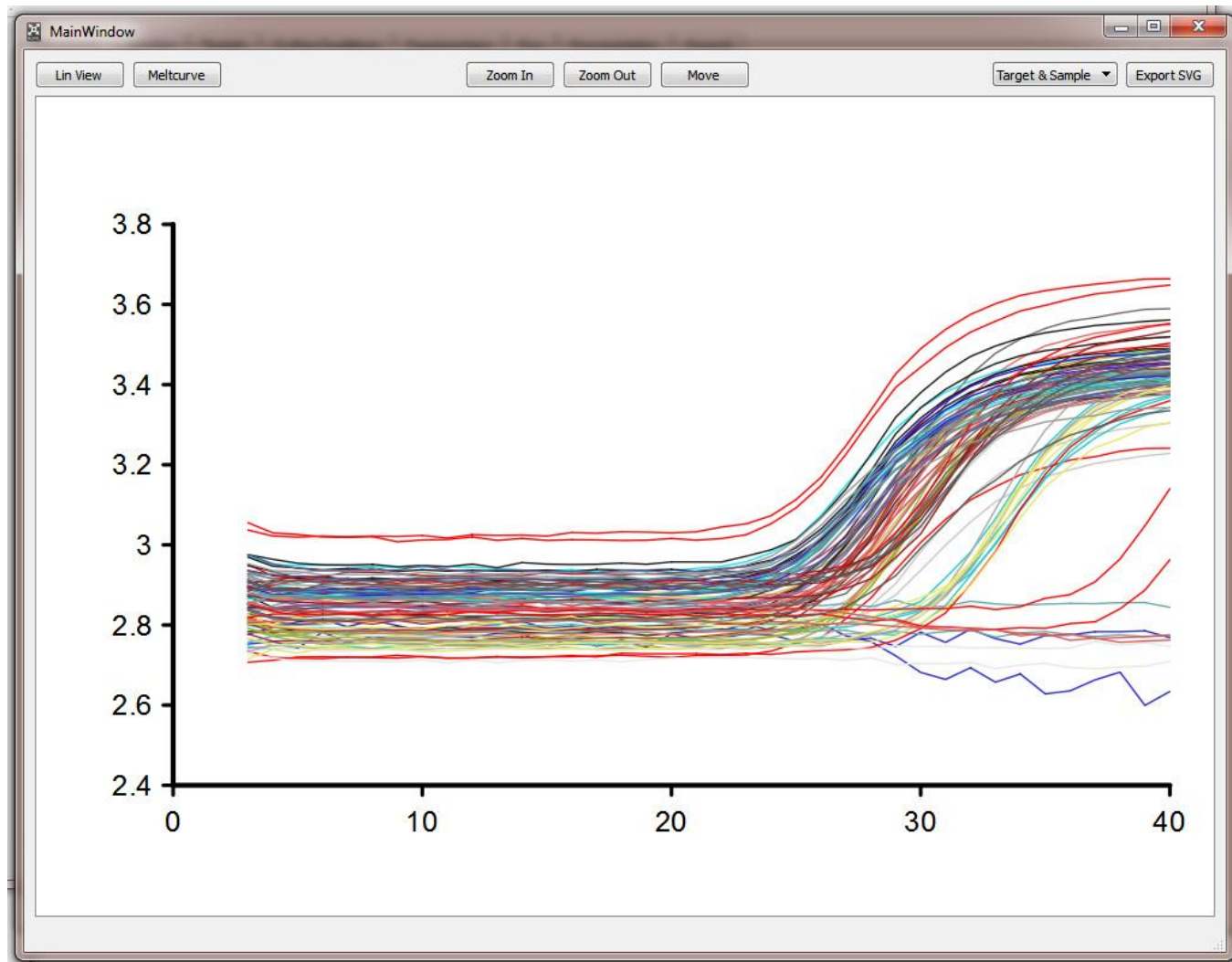
RDML-Ninja – Table View

Dialog												
<input checked="" type="checkbox"/> Sample	<input checked="" type="checkbox"/> Target	<input checked="" type="checkbox"/> Cq Value	<input type="checkbox"/> Excluded	<input type="checkbox"/> Ep	<input type="checkbox"/> Bg	<input type="checkbox"/> Bg Slp	<input type="checkbox"/> Quant	Dye by Pos. ▾	1 ▾	Export Table		
	1	2	3	4	5	6	7	8	9	10	11	12
A - Sample	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	NTC	NTC
A - Target	Exon 1	Exon 1	Exon 2	Exon 2	Exon 3	Exon 3	ZNF80	ZNF80	GPR15	GPR15	Exon 1	Exon 1
A - Cq Value	23.2	23.1	22.7	22.9	22.9	22.3	21.8	21.9	21.9	21.6	40	40
B - Sample	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	gDNA	NTC	NTC
B - Target	Exon 1	Exon 1	Exon 2	Exon 2	Exon 3	Exon 3	ZNF80	ZNF80	GPR15	GPR15	Exon 2	Exon 2
B - Cq Value	22.9	22.7	22.5	22.4	22.9	21.9	21.3	21.6	21.9	21.8	40	40
C - Sample	1	1	1	1	1	1	1	1	1	1	NTC	NTC
C - Target	Exon 1	Exon 1	Exon 2	Exon 2	Exon 3	Exon 3	ZNF80	ZNF80	GPR15	GPR15	Exon 3	Exon 3
C - Cq Value	23.4	23.2	23.2	23.1	24.2	24.3	22.5	22.1	22.3	22.1	40	40
D - Sample	1	1	1	1	1	1	1	1	1	1	NTC	NTC
D - Target	Exon 1	Exon 1	Exon 2	Exon 2	Exon 3	Exon 3	ZNF80	ZNF80	GPR15	GPR15	ZNF80	ZNF80
D - Cq Value	24.2	23.6	22.8	23.1	23.7	24	22.1	21.4	22.1	22.2	36.4	34.3
E - Sample	2	2	2	2	2	2	2	2	2	2	NTC	NTC

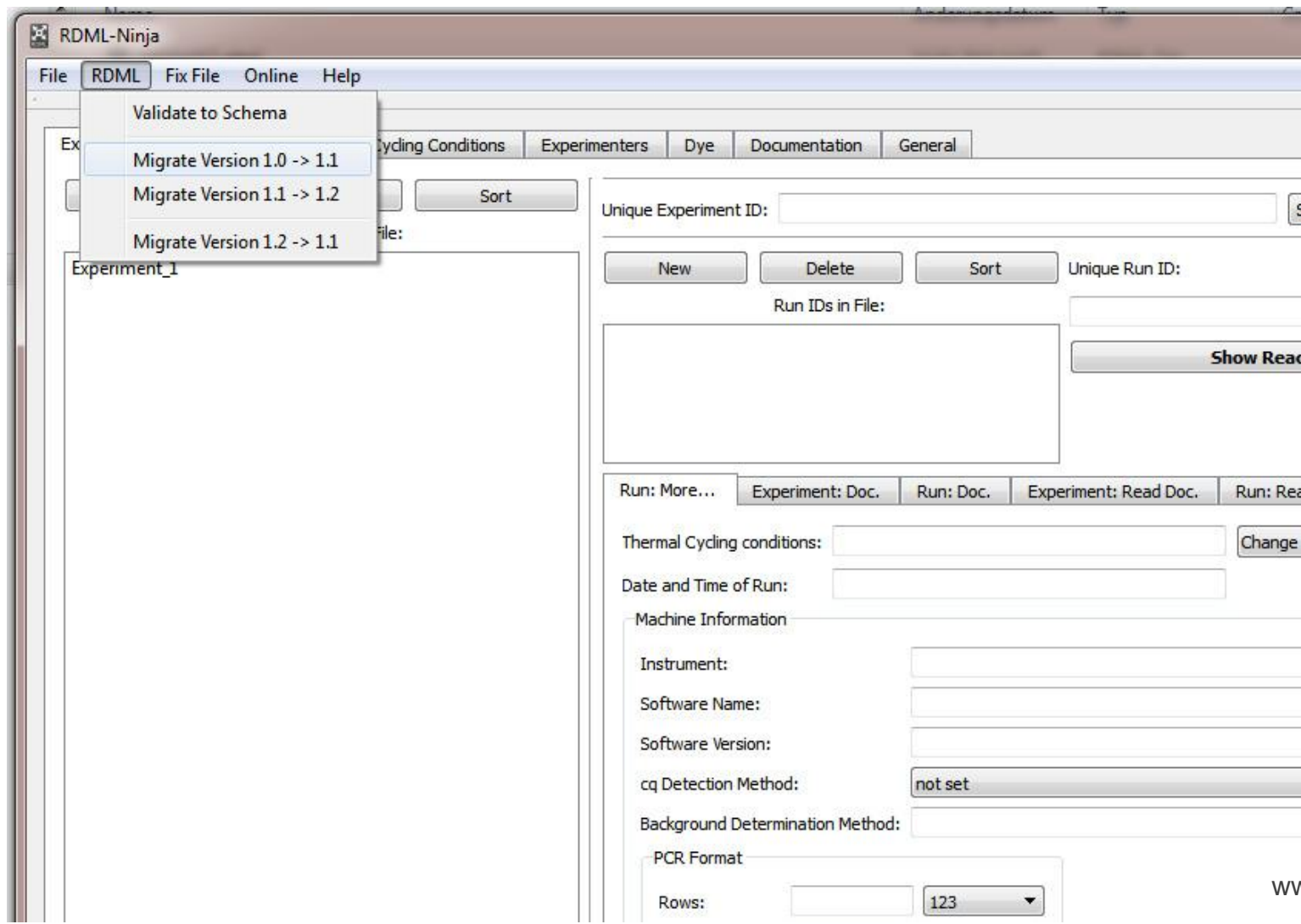
RDML-Ninja – Graph View



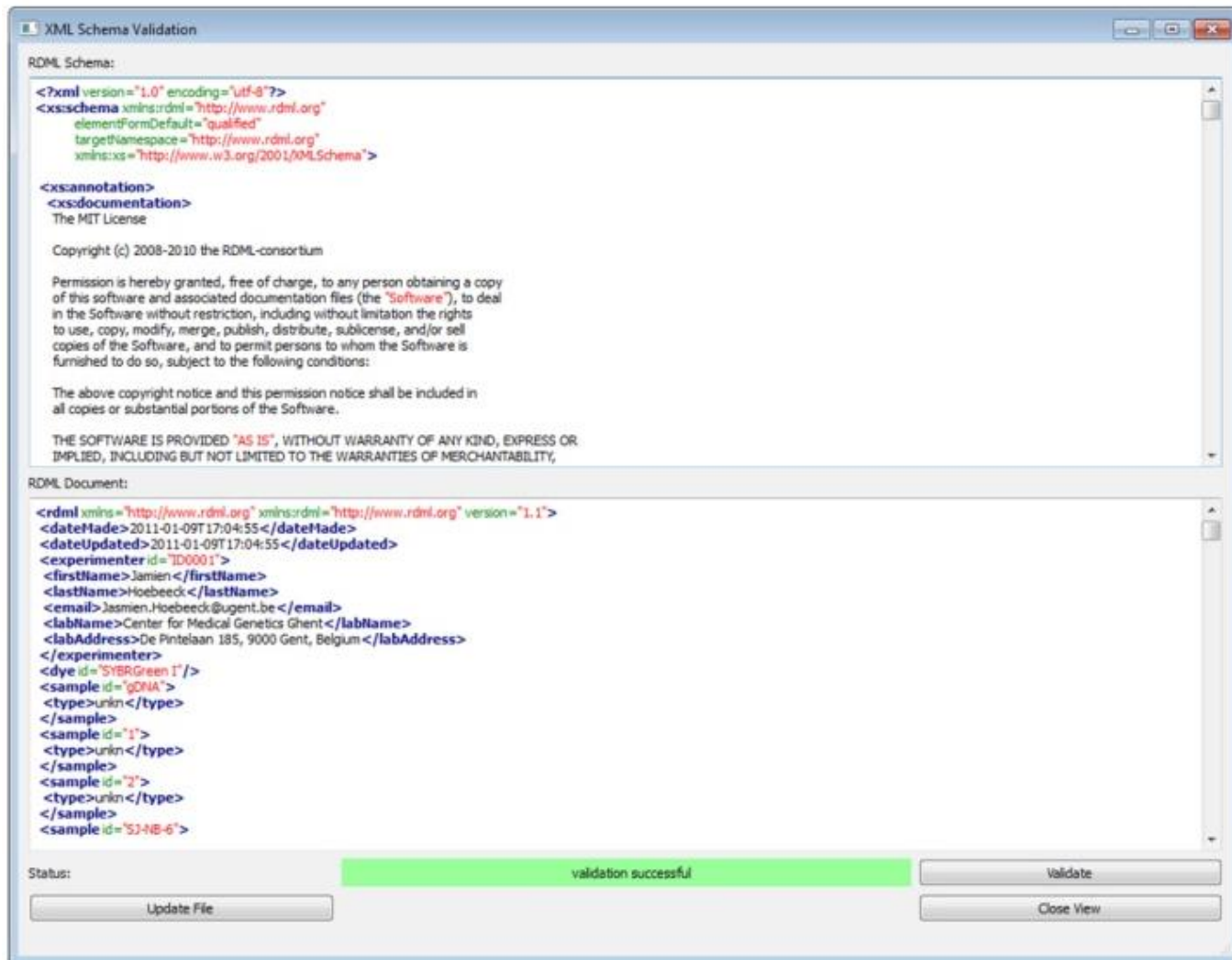
RDML-Ninja – Graph View



RDML-Ninja – Version Migration



RDML-Ninja – Validation



RDML-Ninja – Challenges

- Basic calculation functionality
- MIQE support

RDML-Ninja and MIQE

- MIQE extensive list of information to provide, but no format defined.
- How to provide the data?
- How to check if authors comply?

RDML-Ninja and MIQE

- RDML offers documentation elements
- Special MIQE tags could be defined

RDML-Ninja and MIQE

- RDML-Ninja could check automated MIQE completeness
- RDML-Ninja could offer a wizard to add missing information
- RDML files can be stored in repository
- Reviewers check using RDML-Ninja

RDMLdb

- Online repository for RDML files
- Access based on unique ID suitable to refer to data in publications
- Private access for review process

RDMLdb

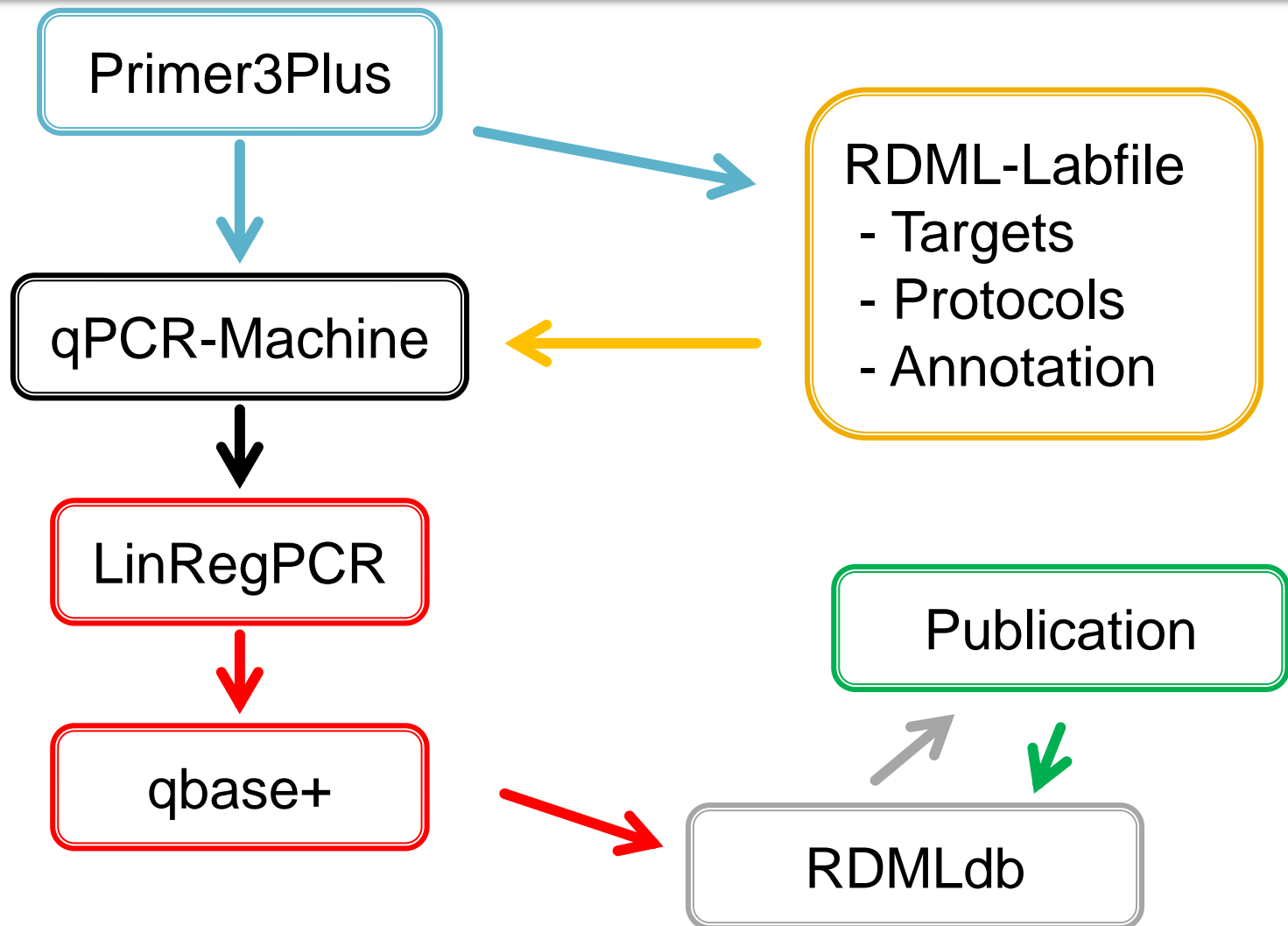


Search

RDML – Too complex to use?

- Manual input for small part of the information
- Information can be reused (target, thermalCyc.)
- qPCR-machine should do most of the work
- Most information required anyway

RDML – Use Cenario



RDML – What are the next steps?

- Import Functionality
- High level support
- Certification of software

- Thank you for your interest in RDML
- Please stay for the discussion:
 - Are certificates a good idea?
 - How to bring MIQE and RDML together?
 - Would RDML import be an option?
 - How to ease digital PCR storage?
 - What is missing in RDML for you?