



# Features of PiMS

Chris Morris  
STFC...

...and the PIMS development team



## PiMS 3.3 supports ....

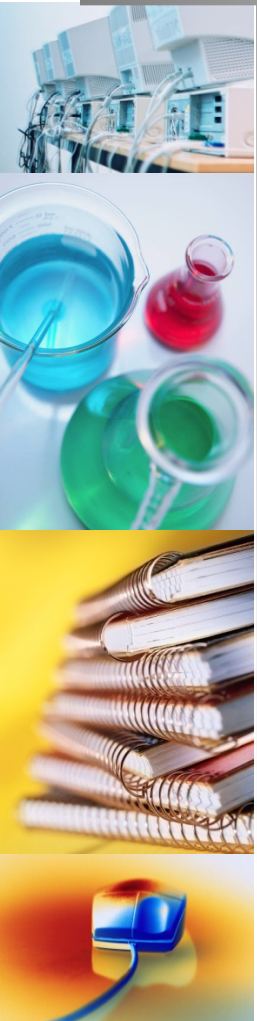
- work on ORF targets, complexes, promoters, protein from natural source ...
- Gateway, Infusion, ...
- individual experiments, groups of experiments, and work with plates
- Tracking samples
- Tracking reagents used
- Upload of results from Akta instruments



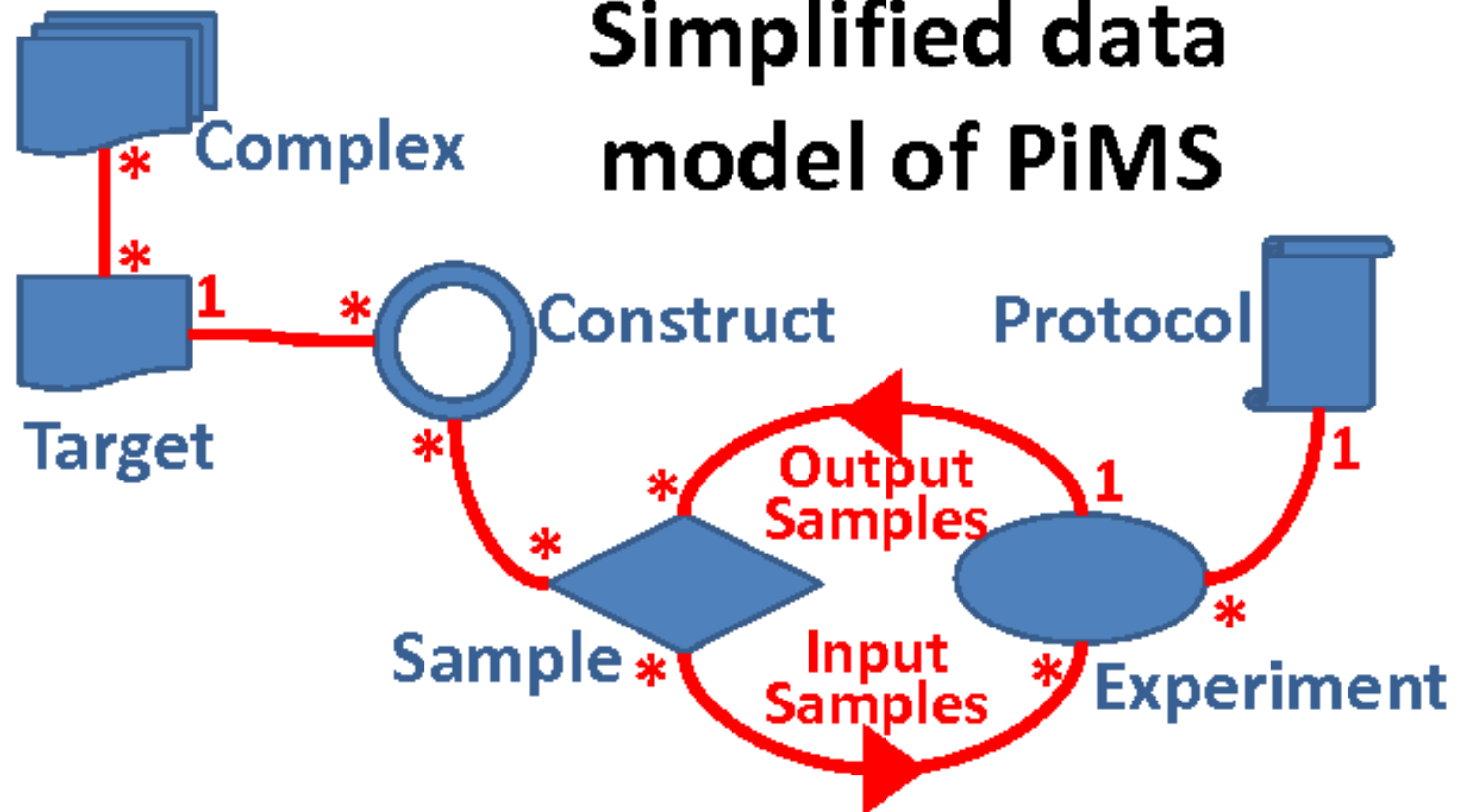
# Technologies used

- PIMS is used from a web browser
  - Mozilla Firefox or Internet Explorer
  - No client software to install (perhaps plugins)
  - Windows, Macintosh and Linux clients
- PIMS requires a web and database server
  - Typically the same machine
  - Web server Apache Tomcat
  - Development on free PostgreSQL
  - Now available for Oracle
  - Windows and Linux servers
- Technologies used by developers
  - Java1.5, Hibernate, JUnit, BioJava, dot, batik, AJAX, ...

# Basic concepts of PiMS



## Simplified data model of PiMS



# Target: sequences and annotations

Target: 000911 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://cseilnx4.dl.ac.uk:8080/demo/View/org.pimslms.model.target.Target:200788

Most Visited Information for Staff ... INSTRUCT JIRA Rail Many Eyes e-claims Revision 16391: /dev... webmail Post to CiteULike Scala weather

PIMS home Page Load Error Target: 000911

Home Log out demo Target Experiment Sample User History Help

Perspective: standard

**Targets :**

**000911**

New experiment New construct Diagram Delete

Target Details

Sequences

**DNA sequence**

```

ATGACACACGTTTCCAGAAG AAAATTTCTTTTACCACAG GCGCGGCGGCGGGGCTTCT ATTTGGTACATGGCTGTAC TTCCAATGGTTCTCAATCAG CTACCACAGGAGAACAAGCG
CCTTCAGCAGCAGCAGCGC TAAATGTCAGCGCGTAACG CACCCAAAGGTAGAAACGACT AAAGCCAAAGTTAGGATTTAT CCTCTTACTGATGCGGCGC CCCTCATCTAGTTAAAGAA
AAGGGCTTTTTCGTAATAA TGCGATGACAGATATCGAAG TCATCAAGCAAAAATCTTGG CCTGTCAACCCGCGATAACTT AAAAAATTGGCTCATCTGGTG GTGGCATCGATGCGGCACAT
ATCCTTAGTCCCATGCGCTTA CCTCATGACCATCAATGATA AAGTGCCAAATGTATATTTTG GCTAGGTTAAACACTAATGG TCAGGCTATTTCTGTGGCGG AGAAATTTAAAGAACTTAAT
GTCACCTAGAAAAGTAAATC CCTTAAAGACGACGCGATTA AAGCCAAAGCTGACAAAGAAA GCCTTGAATAATGGGTATTAC CTTTCCCGGTGGTACACACG ATTTGGGATGCGCTATTGG
TTAGCGGCTGGTGTATTAA TCCTGATCAAGATGTGGTTT TGAAGCTGTACCACCACCG CAAATGGTGCCAAATATGAA AGTCAATACTGTGATGGTT TCTGTGTAGGAGAACTTGG
AATGCTCAGTTGGTCAACCA AAAAATAGGTTATTCTGCTC TAGTTACAGGCGAATTGTGG AAAATCATCCAGAAAAAGC CTTTAGTATGCGGCAAGATT GGATTAGCAAAATCCCAAT
GCAGCCAGGCAATTTTGTAT GGCAATCTTGAAGCAACAAC AATGGTGCACAAAGCGAGAA AACAAAGAAGAAATGTGTAA AATCTGCTGTATGCTGTAAT ACTTTAATGTTGCTGCGGCA
GATATTATCGAGAGAGCTAA AGGCAATATCGATTATGTGTC ATGGTCTGAAGGAGCAAAAC TTGCGCCATCGGATGAAATT CTGGGAGATAATGCTTCTCT ATCCTTATAAGAGTACAGAT
ATTTGGTTTTTAACTGAAGA TATTGCTGGGGTATTATTAC CAAAAGATACCAAAGTTCAA GACATTGTTAATCAAGTCAA TAAAGAAAGACTTGTGAAAAA AAGCGCGGAAAGCGGATGGT
GTGGCTGATGCGGAAATTC TGCTAGCAGTTCCCGTGGGG TGGAAACTTTCTTTGATGGC GTGAAATTCGACCCAGAAAA GCCAGAAAGTAATCTTAAATA GTTTGAAATCAAAAAAGTC
TAA
  
```

DNA sequence [Fasta pop-up](#) length: 1323 %GC: 42.78

**Protein sequence**

```

MTHVSRKFLFTTAAAAAAS ILVHGCTSNQSQSAATTGEQA PSAAPAAVNVAANAPKVETT KAKLGFIPLTDAAPLIIAKE KOFFAKYGMTDIEVIKQSW PVTRDNLKIGSSGGGIDGAH
ILSPHPYLMHTINDKVPYHIL ARLNTNGQAISVAEKFKEIN VNLESKSLKDAAIKAKDKK ALKMGITFPGGTHDLUHRVW LAAGGINPDQDVVLEAVPPP QHVNHNKVNVTGDFCVGEPW
NAQLVNRKIGYSALVTGELW KDHPKFAFSHRQDWIEQNPV AAQAILMLAILEAQQWCDKAE NKEEMKICSDRKRYFNVAAD DIIERAKGNIDYGDGRKEQN FAHRMKFWADNASTPYKSHD
IWFLETDIRWGYLPKDKTKVQ DIVNVNKNEDLWKKAAKAIG VADAEIPASSSRGVETTFDGV VKFDFPEKPEEYLNLSKIRKV
  
```

Protein sequence [Fasta pop-up](#) length: 440

Make changes...

Constructs [Design new Construct](#)

Experiments [New Experiment](#)

Milestone	Experiment	Type of Experiment	Experiment Date	Protocol Used	Experiment Status
	000911.full-PCR 1	PCR	13/08/09	QPF PCR	To_be_run
	000911.full-SCD 1	SPOT Construct Design	13/08/09	SPOT Construct Primer Design	OK

Database references [Add New](#)

Done



# Construct: starting point for experiments, links to target

Construct: 000911.full - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://csehn4.dl.ac.uk:8080/demo/View/org.pimslims.model.target.ResearchObjective:200826

Most Visited Information for Staff ... INSTRUCT JIRA Rail Many Eyes e-claims Revision 16391: /dev... webmail Post to CiteULike Scala weather

PIMS home Page Load Error Construct: 000911.full

Home Log out demo Target Experiment Sample User History Help Perspective: standard

Targets : Target 000911 :

**Construct: 000911.full**

[Diagram](#) [Delete](#) [New experiment](#) [All Experiments](#) [New SDM Primers](#)

Basic Details

Construct Name	000911.full	Scientist	none
Description		Comments	

[Make changes...](#)

Forward Primer: 000911.fullF

Reverse Primer: 000911.fullR

Full Sequence	<a href="#">CGCGGTACCCTAGACTTTT TGATTTTCAAACATTTAAG TATTCTTC</a>		
	Length: 48	Tm °C: 69.4	%GC: 33.3
Overlap	<a href="#">GACTTTTGTGATTTTCAAAC TATTTAAGTATTCTTC</a>		
	Length: 36	Tm °C: 60.4	%GC: 22.2
5'-Extension	<a href="#">CGCGGTACCCTA</a>		

Predicted PCR Product

Proteins

Images

Attachments

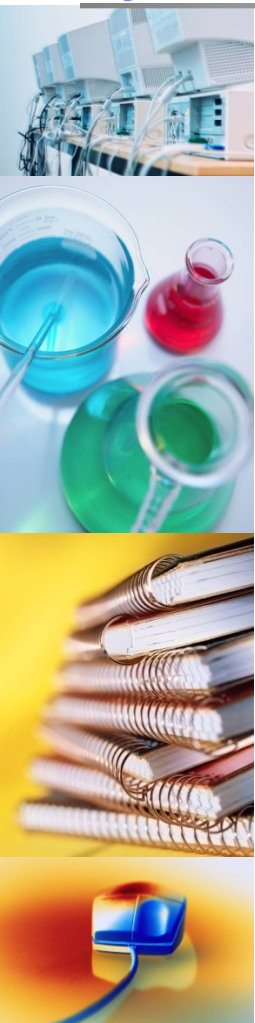
Notes

Aug 2009

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					



# Sample: has type, owner, location



Sample/Stock: 1232536270348 Plasmid - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.oppf.ox.ac.uk/pims/View/org.pimslims.model.sample.Sample:361786

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Home Log out administrator Target OPF Experiment Sample User History Help

Perspective: OPF

**Samples :**

**70348 Plasmid**

[Diagram](#) [Target to Crystal Report](#) [Delete](#) Can't divide sample - set an amount first.

**Details**

Name*	1232536270348 Plasmid	Stock available	<input checked="" type="radio"/> Yes
Amount	21.0		<input type="radio"/> No
Details	uL	Location	No location recorded for this sample <a href="#">Set sample location</a>
		Use by date	
		Assigned to	none
		(Cancel editing)	<a href="#">Save changes</a>

**Extra details**

**Recipe** None

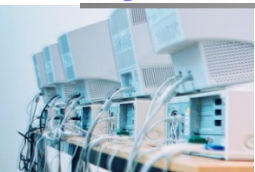
**Output Sample from Experiment:** [Ligation 2](#)

Parameter	Value
Notes	
Total Volume (uL)*	21

[Make changes...](#)

Done

# Experiment: samples in, samples out



CS Concentration DO NOT USE 21/01/09: mShh-hHipdeltaN Concentration 1 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.oppf.ox.ac.uk/pims/View/org.pimslims.model.experiment.Experiment:362054

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Perspective: OPPI

Experiments : Concentration Experiments :

## mShh-hHipdeltaN Concentration 1

Diagram Copy Delete

Basic Details

Name*	mShh-hHipdeltaN Concentration 1	Start date*	21/01/09
Type	Concentration▼	End date*	21/01/09
Protocol	CS Concentration▼	Construct / target	mShh-hHipdeltaN▼
Status	To be run	Scientist	benjamin▼

Details

Make changes...

Set Up and Results

Parameter	Value
Final Concentration*	12.2
Initial Concentration*	1.5
PCT Result	Pass

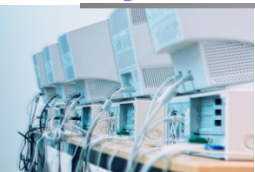
(Cancel editing)

Save changes

Done



# Protocol: template for experiment



Production scale expression protocol: CS Eukaryotic Expression - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.oppf.ox.ac.uk/pims/View/org.pimslims.model.protocol.Protocol:376653

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Perspective: OPPF

**Protocols :**

## CS Eukaryotic Expression

[Export](#) [Delete](#)

**Details of protocol: CS Eukaryotic Expression**

Name	CS Eukaryotic Expression	Objective	Large Scale Expression of Target Protein
Remarks	Details		

Experiment type Production scale expression ☐

Design new protocol based on this

**Method**

**Inputs**

**Plasmid**

Name	Plasmid	
Amount	0.0	$\mu\text{L}$ <input type="checkbox"/>
Category	Plasmid	<input type="checkbox"/>

Done

# Experiments and protocols

A protocol is a reusable user-defined template describing what you record for your experiments.

## Set Up Parameters

- *E.g.* incubation temperature or the number of PCR cycles; promoter sequence; was reagent added?

## Input Samples

- Samples or reagents used when performing an experiment that you wish to track, e.g. primers, host strains

## Output Samples

- Samples or reagents produced when performing an experiment that you wish to track





# Typing of PIMS items

Typing helps PIMS offer sensible choices: only a plasmid can be used for transfection experiments...

## **Samples**

- Typed to show what they are

## **Input/Output samples for protocols**

- State what type of sample can be used and what is produced

## **Experiments and protocols**

- An experiment type is defined by its protocol. A protocol type links similar protocols together



# The PIMS holder (plate experiments)

A holder groups samples. This allows PIMS to perform plate experiments in groups

## Samples

- For plate experiments output samples of previous experiment are mapped to input samples of next. (Provided sample type matches!)

## User interface for plate experiments

- Gives graphical and spreadsheet views. Allows editing, reformatting and spreadsheet upload



**Plate PCR119 Cleanup, well A1**  
**Target OPPF3926**

Kit: 90.0uL, **Unspecified**

PCR product: 50.0uL PCR119 PCR:A01

Checked on gel?: Yes

Status: To be run

1

2

3

4

5

6

7

8

9

10

11

12

A

B

C

D

E

Spreadsheet view

Files

Output

Kit

Sample

Vol uL

PCR119  
Cleanup:A01

(None) 90.0








**Basic details**

**Quick setup**

**Plate view**

**Spreadsheet view**

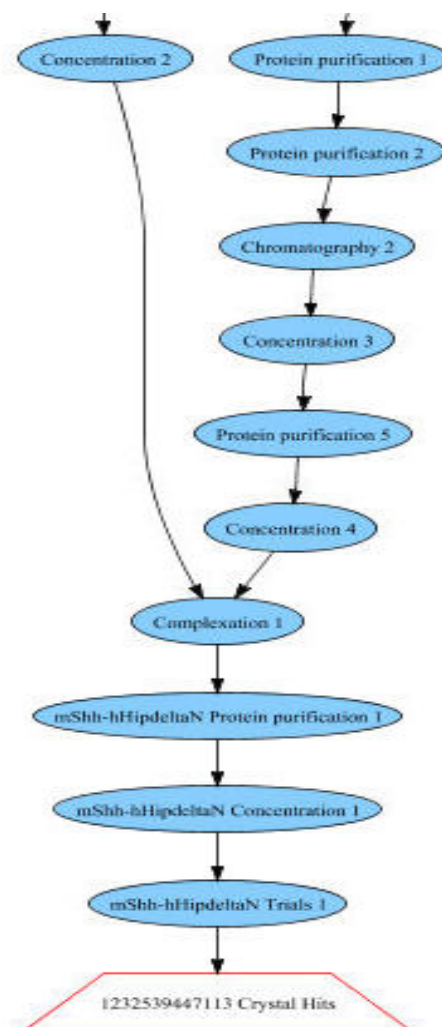
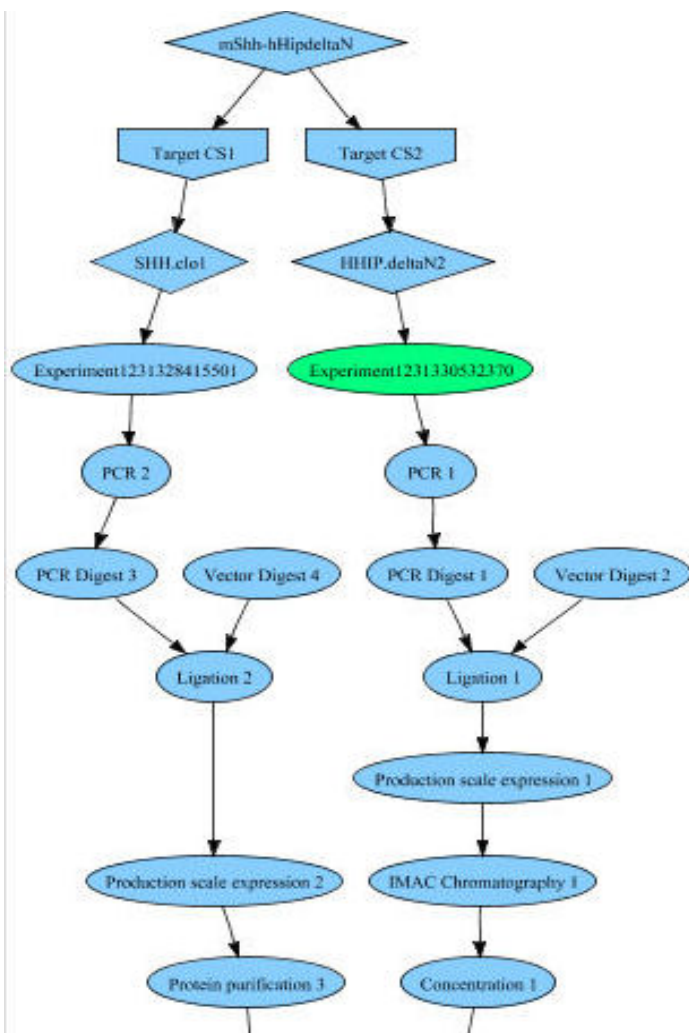
**Files**

Tray	Row	Col	Target	Status	Output	Kit	
						Sample	Vol uL
PCR119 Cleanup	A	1	OPPF3926	To be run 	<a href="#">PCR119 Cleanup:A01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	B	1	OPPF4861	To be run 	<a href="#">PCR119 Cleanup:B01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	C	1	OPPF4864	To be run 	<a href="#">PCR119 Cleanup:C01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	D	1	OPPF4184	To be run 	<a href="#">PCR119 Cleanup:D01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	E	1	OPPF4867	To be run 	<a href="#">PCR119 Cleanup:E01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	F	1	OPPF4870	To be run 	<a href="#">PCR119 Cleanup:F01</a>	<a href="#">(None)</a>	90.0
PCR119 Cleanup	G	1	OPPF4873	To be run 	<a href="#">PCR119 Cleanup:G01</a>	<a href="#">(None)</a>	90.0

**Can attach  
files to  
samples &  
experiments**



# A workflow derived from PIMS



# Acknowledgements

- Johan van Niekerk, Dundee
- Susy Griffiths, YSBL
- Anne Pajon, EBI
- Ekatarina Pilicheva, Marc Savitsky, Jon Diprose, Robert Esnouf OPPF
- Bill Lin, Ed Daniel, Peter Troshin STFC
- ... all who told us what PiMS should do