Bika LIMS 2.2 customisation

Sponsored by Benchmark Laboratories

Functional specification and use cases

version 5.1, 10 April 2008 - For 3rd party review and feedback

Contents

1 Purpose of this document

As functional specification and use case stories, the document is used to establish a common understanding of what is required from the LIMS. Use cases and functionality in the LIMS are described in layman's language

Feedback from interested parties are actively encouraged - please post comment and suggestions for improvement to the Bika user list at bika-users@lists.sourceforge.net. Subscribe at http://lists.sourceforge.net/lists/listinfo/bika-users

The Final version will also serve as a functional specification for programmers working on the project and quality management tool

It is used to estimate development cost and establish a quote for the LIMS

2 Document history - Notes to Version 5

Updated with Benchmark's feedback in version 4

History

Version 4

Feedback from Benchmark

Version 3

Re-named to reflect project plan inclusion

Re-formatted for readability by Bika Lab Systems

Not all links repaired yet

Tagging the proposed release Bika LIMS 2. 2

New and reworked sections:

- Calculated analyses with test facility
- Order entry
- Order lists and views
- Order statuses
- Invoice exports
- Change requests
- QC
- Supply orders
- Emailing page content from the LIMS

Alleviated Change request and Results calculation sections to the top level from being subsections of Orders - they have system wide influence and not only on Orders

Brought some use of terminology and workflow closer to Bika standards to prevent expensive forking

Version 2

By Benchmark. Feedback incorporated

Version 1

By Bika. First distributed draft. To be improved after feedback

3 Project overview

The global analytical laboratory sector has become dominated by a handful of very large laboratories who have the benefit of utilizing expensive, non-configurable, proprietary, difficult to integrate, Web access information management systems (LIMS)

Small or mid-sized analytical laboratories that wish to compete within the same geographies are under pressure to provide the same level of Web based serviceability using inexpensive, configurable, non-proprietary, easy to integrate, Web based LIMS

For many small to medium sized labs, Bika LIMS 2. 0 meets those requirements set forth above

To satisfy the day to day operational requirements of small to medium sized labs, the overall functionality of Bika LIMS 2. 0, and speed of access, requires modifications to the process and method of managing samples, reports, invoices, instruments, standards, client set-up information

The system is managed by the 'Laboratory'. Both Lab Managers, Lab Technicians, Lab Clerks and Clients Contacts securely access the LIMS via Internet connections and Web browsers such as Firefox or Internet Explorer

4 Scope of this document - User specifications

The scope of this document is limited to describing the functionality of the proposed LIMS as part of Phase 1 Planning of the project

Only functionality additional to Bika LIMS 2.0 is discussed

4.1 Not in the Scope

Technical developments excluded:

Proof of email delivery

This feature is impossible with current SMTP mail serving technology. Instead the responsibility to report non-delivery are shifted to clients by informing them to 'Please contact laboratory if results are not posted within ID ID working days'

Internet connectivity

For on-site installations, Broadband Internet connectivity is to be in place for high speed upload and download activities

Mail server

For on-site installations, a mail server is assumed to be in place for email delivery of results

Implementation and hosting

Manuals

5 Document convention

All use cases are acted out by role players which can be the LIMS itself, other interfaced systems or any user authorised as Admin, Lab Manager, Lab Clerk, Lab Technician, and Client Contact

For each Use Case it is assumed the role players are logged-on and authorised to execute the actions required by them

Text in square brackets, e.g. **[Submit]** indicates push buttons, between vertical lines indicates navigational tabs, e.g. **|Home|**

Underlined hyperlinks link to relevant information elsewhere in the document

All major data Objects, such as Samples, are capitalised where the context requires

The plural for 1 analysis is many analyses.

6 Acronyms

AR - Analysis Request. The collection of analyses ordered per sample, the most important building block in Bika LIMS

CMS - Content management system, a system that allows the owner of the website to be able to change, edit, add content without the need of a web developer or web skills

COC - Chain of custody

COCC - Chain of custody certificate

CR - Change request

DB - Database

GCFID - Gas Chromatograph(y) Flame Ionization Detector

LIMS - Laboratory Information Management System

MDL - Method detection limits

QA - Quality Assurance

QC - Quality control

SD - Standard deviation

SO - Supply Order, the old Bika 2.0 Product order

TAT - Turn around Time. Measured for analyses from import to publication

WS - Work sheet, a collection of analyses grouped together for a logical purpose, e.g. to be executed at the same work station, on the same instrument or by the same analyst

7 Definitions

Analysis Request is the collection of analyses requested for a specific sample, the most important building block in Bika LIMS

Analysis Service is the term used to describe the analyses, or tests, offered by the lab and are configured in the LIMS set-up with titles, units, methods etc.

Client Order ID is the number provided by the Client to reference a single sample or multiple samples, a single AR or a batch of multiple ARs recorded in a Client's folder

Client Project ID refers to the project number or purchase order number that the Client Contact uses to track the order of samples and analysis in their system

Change Request Form is an extension of the COC, and reports the name of the person requesting the change, the name of the person accepting the change, the date and time the change was accepted, a text box recording the general nature of the changes to be made, and a log of actual changes to sample or ARs

Client Reference is the description that may be provided by the Client to reference to reference a single sample or multiple samples, a single AR or a batch of multiple ARs recorded in the Client system

Client Sample Date is the date that the sample was taken and assigned to the sample by the Client Contact

Client Sample Description is the number or name assigned to the sample by the Client Contact

CMS - Content management system, a system that allows the owner of the website to be able to change, edit, add content without the need of a web developer or web skills

Date Times are expressed as dd Mmm ccyy hh:mm, e.g. 25 December 2008 23:59

Disposal Date is the date calculated by a finite number of days starting from the date the sample is received. The finite number of days is set by the Lab Manager

Lab Technicians are responsible for analysing the samples in the lab, for the purpose of this document, Lab Technicians also means Lab Clerk

Orders is a new format of sample and analysis request entry into Bika LIMS 2.2. It is a collection of samples and ARs per single Client Order ID. It is assigned an unique Order ID by the LIMS to and may include a single sample or multiple samples, and a single AR or multiple ARs

Preservative is a preservative that may be present in a Sample Container at time the sample is placed into the container

Relinquished By refers to the name of the Client Contact who has transferred the samples to the lab for analysis

Report and Invoice refers to the final reports and invoice evidencing all samples and associated AR's for a specific Order ID

Sample Temperature is the temperature of the sample taken by the Lab Clerk, Lab Technician or Lab Manager at time the sample is received and recorded in Bika LIMS.

Supply Order refers to the Clients' ability to order supplies directly from the lab. Replaces the lorderl tab currently in Bika LIMS 2. 0

Turn around Time. Measured for analyses from import to publication

Work sheet, a collection of analyses grouped together for a logical purpose, e.g. to be executed at the same work station, on the same instrument or by the same analyst

8 Modules

As much as possible, new development will be executed as independent modules, down to the level of being their own Plone 'products', so they can be excluded from Bika 'lite' installations

This approach should not have any cost implications - if it is not implemented it could mean a fork in the code which is a recipe for both higher development and maintenance costs

8.1 Orders

Orders in original Bika context meant 'Product orders', non analytical orders of chemicals, sample containers, distilled water etc supplied by the lab. These are called Supply Orders from now on. Orders in LIMS 2. 2 terminology means the batching of ARs per client order

See Definitions paragraph

1. Creation of single order entries for all related samples and analysis

2. Order approval process including the creation of Chain of Custody (COC) creation, publication and change request process, revised sample date process and new sample expiry date and sample temperature field creation, publishing and tracking
3. Production and printing of long sample labels and short sample labels
4. Production, printing and emailing of COC, Analysis Reports, including QA/QC reports and Invoice per order
5. Creation of bi-directional import and export of Order sample and AR data
6. Analytical calculation set-up and maintenance, taking raw data entered directly by the operator or imported directly from a laboratory instrument, and calculating to produce a analysis result directly in the report for review and verification

8.2 Instruments and Maintenance

1. Instrument Inventory
2. Enhanced Instrument Set-up
3. Instrument Maintenance and Calibration
4. Instrument Interfaces
5. Import and Export Templates

8.3 Method Module

1. Enhanced Method Set-up

8.4 Client and Contact Module

1. Enhanced Creation of Contact Information
2. Client Analysis Profiles
3. Privacy Statement & Workflows

8.5 Standards & Stocks Module

1. Label Creation
2. Expiry Date and Notices
3. E-mailing, printing lists

8.6 Analysis Services Module

1. Analysis Categories
2. Creation of Client Analysis Profiles
3. Multi-Select Options for Instruments / Methods and Standard Stocks
4. Copy Select Options for existing Analysis Services

8.7 Order Shipping Module

1. Shipping Price Calculations
2. Auto Calculations on Orders

8.8 Price Module

1. Enhanced Price List creation to include remarks and lab personnel contact information
2. Global Currency & Tax tags
3. Miscellaneous Medications to the system set-up to achieve the above

9 Orders

NB Traditional Bika 2.0 product orders are now called Supply Orders

9.1 Overview

Currently Bika's LIMS 2. 0 creates each sample and its associated AR and though provision is made for secondary ARs on the same sample, the system mostly creates one-to-one relationships between samples and analysis requests

AR reports and invoices can be batched arbitrarily from lists. reports and queries are mainly geared to look up ARs, the fundamental building block of the system

This does not reflect the reality of labs that receive multiple samples to be processed, reported, and invoiced together per Client Order Number or Client Reference. Bika 2.2 requires a one to many relationship between Orders and Samples/Analysis requests

A Bika Order is a collection of samples and ARs per single Client Order ID. Single samples, or large batches of samples, are treated as 1 Order

The purpose of this module is to manage Orders. As such a single sample or multiple samples associated with 1 Order will produce 1 report and 1 invoice

All analyses are done per order in Bika 2.2

9.2 Order statuses

Orders have the statuses similar to existing ARs system and status changes to ARs per sample within that Order Number affect the ARs in the Order and vice versa

> One exception is that New Order require approval from either the Client Contact or the Lab personnel depending on who ordered the new Order. This additional status of “pending approval” is required before being elevated to “sample due”

Object statuses				
Orders	**ARs**	**Samples**	**Analyses**	**Work sheets**
pending	pending order	pending order	pending order	
samples due	sample due	due	sample due	
samples received	sample received	received	sample received	
assigned to work sheet	assigned to work sheet		assigned to work sheet	open
to be verified	to be verified	to be verified		to be verified
verified	verified		verified	verified
published	published		published	
		expired		
		disposed		

Any of the objects may anywhere during its workflow acquire a status of 'pending change request' if a Change request was logged against it. See Change requests

Order Numbers cannot have a higher status than that of the AR with lowest status in the Order - that ensures that orders cannot be published if all the ARs in the Order have not been verified

Similarly, when all ARs in an Order Number gets promoted together, the Order will automatically change status. This is a very real scenario as it cannot be advised that an Order Number representing a number of samples requiring ARs is verified blindly without inspecting the results on the ARs themselves

9.3 Order Alerts

Alerts are raised for Orders that are pending approval, sample due, sample received, verified,published or late to keep TAT down to a minimum

NB Lab managers see alerts for all late orders - other staff members see alerts for late orders assigned to themselves only

9.4 COC Certificate. COCC

Currently, Bika 2. 0 does not provide for the creation of a COC document as required by Benchmark

Often analysis requests are subject to court action. As such, the COC of the sample must be shown to be unbroken. The names of who handled the sample must be documented

Moreover, as many sample analysis are dependent on sample integrity, and sample integrity is often determined by sample temperature, recording the temperature of the sample upon arrival at the lab is important

Lab Personnel receiving samples must complete a COC certificate that formally acknowledge the date, time and temperature at reception. This must then be forwarded to the Client contact to review and confirm sample information, analysis selected and time to complete the job

COC certificates are the primary document that control the transfer of custody of the sample from the person(s) who collected and transferred samples to the lab and who within the lab received those samples.

The COC contains all of the information provided at the time the samples were logged into LIMS by either the Client, or Lab staff plus the name of the Lab personnel who logged the samples in, the date & time they were logged in as well as the temperature of the samples at time of login.

Any changes to the COC must be made via a Change Request procedure (see below) and must be reflected on the COC itself.

9.5 Order Entry

Both Client and Lab users execute the same form with the difference only in how alerts and notifications are addressed to the counter party

It is important to allow clients to track their order as it moves through the lab by viewing its status as well as seeing the name of the lab staff member assigned to it

Use case. Creating Order entries

User: Client Contact, Lab clerk and manager

1. The user navigates to the Client's Orders folder list of Orders
2. The user click son **[add new order]**
3. An Order entry screen opens with unique order ID and status 'open'
4. The user enters:

Contact Name - defaults to the client contact

Sampled By - defaults to the client contact

Submitted By - defaults to the client contact. “The person submitting the samples may not be the person entering the data. For example, a contact listed for a client may be tasked with entering a number of analysis all together even though only a few jobs relate just to them. Their colleagues, who are also listed as client contacts, may prefer to have their name associated with the actual entry. That way if Lab staff have a question, they call the right contact who is listed on the form, not just the person who actually entering the form”

Select [Profile] analysis if required. From drop down as per normal AR creation

Client Order ID

Client Sample ID

Client Reference ID

Client Project ID

Sample Date

Sample Type. From drop down

Sample Point

# of Sample Containers

Preservative (drop down Yes or No)

'Date results needed' from look-up with options
same business day
next business day
within 5 business days
to be determined

Name of staff member assigned to Order (drop own)

cc emails. Defaults to contact's as set up in his/her preferences

5. The AR creation form is shown successively until all samples are captured for the Order. The User has the opportunity to press **[complete the order]** to stop order entry
6. The user may at any time press **[submit]** to quit the entry process and all edits up to that stage will be saved and the Order status left 'open'
7. The system runs an alert portlet to him/her that there are open orders to be completed
8. The system populates all AR and Sample records required for the Order, and reference the order via hyperlinks
9. The system opens a new 'Draft COC' certificate screen to the user
10. Draft COC lists all information as entered above as well as date and time of submission
11. The user reviews the draft COCC and may go back to the Order's edit screen to edit it, or press **[publish]**
12. The system published the COCC to the user's counter party, client or lab, by email and their preferred media as configured
13. The Order's status advances to 'pending
14. The user is returned to the new Order lists

9.6 Approving an Order

Both Client and Lab users execute the same process with the difference only in how alerts and notifications are addressed to the counter party

Use case. Approving an order

User: Lab Clerk and Manager, Client contact

1. The user navigates to the Order's draft COCCO, either from the Alert box at right, email or 'pending' Orders list
2. The user reviews the information contained on the draft COCC
3. If deemed correct, he/she clicks the **[Approve]** button or **approve** on status drop down menu
4. Status of the Order advances to approved. It cannot be changed by the user without consent of the counter party - see Change Request procedure below
5. Statuses of the Order 's associated children objects ARs and Samples are elevated to 'sample due' and 'due' respectively
6. If the user does not accept the Draft COC or wishes - see Change Request procedure below

9.7 Receiving an Order's samples

1. Once Samples are Received Click on Order ID listed on “sample due” Table
2. Click on '**Arrival date**' and enter date and time - the field defaults to current system date time
3. Click on '**Temperature at Arrival**' and enter temperature in degrees Celsius
4. Click **[receive]**
5. The system print, fax or auto e-mail COC to Client contact for their records
6. The system prints the sample labels – see sample labels section
7. The Order's status changes from 'sample due' to 'sample received'
8. **Note:** Sample Chain of Custody Form has been provided by Benchmark for reference

9.8 Analysis prioritisation

Overview

Managing client turnaround time expectations is paramount. It is important that client is able to set their TAT expectations at time of sample submission. This will dictate whether the lab needs to conduct analysis on those samples ahead of regular schedule

This functionality is partially covered in the Order entry section above

It includes

- Setting up the levels of urgency and their price premiums
- Allowing the urgency of new Orders to be set, calculating pricing per AR per Order and due dates accordingly
- Sorting Orders on their due dates and highlighting the most urgent analyses on both the lists and views

When a parent object, like an Order, gets set with a certain priority, all children objects, ARs and Analyses, immediately inherits the same priority and the new priority is reflected in all lists and views

9.9 Sample disposal

Overview

Without properly managing the disposal time for samples, a lab can quickly become overrun with old samples. Periodic purges of “old” samples may also risk the disposal of recent samples. Therefore, a process of accurately determining the “expiry date” of samples is required

A sample “disposal date” is created when Order status is changed from “sample due” to “sample received”

Disposal dates are calculated from a period of time pre-determined and later editable by the Laboratory Manager. Lab personnel can then print “short” or “long” labels to manage the proper disposal of samples who have exceeded their “disposal date” – see labels below

A “disposal date” field is added to sample views and lists and the lists can be sorted on this field. When a sample expires and has not been disposed, a 'samples to be disposed' alert is raised to lab staff and clerks who may then dispose of the sample

Use Case - Sample disposal

Role players: Lab clerks and technicians

1. The system automatically promotes samples from status 'received' to 'expired' once they pass their disposal dates
2. Users may also expire samples manually, at any time, by selecting them from the samples received list and clicking the [expire] button
3. Or on individual sample screens, selecting the 'expire' option from their status drop downs
4. The disposal date was set earlier at sample reception, calculated from the service life period configured for the sample type
5. Sample views include a 'disposal date' field and sample lists a similar sortable column
6. When a sample expires, the system raises a 'samples to be disposed' alert in a portlet at left, hyper-linking the specific sample
7. The user may click on this link to navigate to the sample
8. Or navigate to the samples list and clicking the 'expired' radio button for a list of expired samples
9. Samples to be disposed can be selected from the list by ticking their check boxes and pushing the [dispose] button at the bottom of the screen
10. Or if the user is on an individual sample screen, he/she can select the 'dispose' option from its status drop down

9.10 Sample Labels

Overview

With a vast variety of sample points and sample types to manage within a lab, the use of well defined and easy to read labels are required to ensure that samples are properly marked and processed. Bika LIMS currently provides for the printing of labels that include AR, Sample Date and Sample Number utilizing a stand alone label printer

However, a medium sized lab, may receive hundreds of samples representing 1 job, and may therefore require additional information on the label to ensure that samples are not confused with samples from another Order.

9.11 Printing Labels

Labels are normally printed in two forms, the “long form” and the “short form”.

The first form, or “**long form**” contains all information that is relevant to the original sample and is placed on the original sample jar. This “long form” label is normally printed in sequential order upon changing the “sample due” status in Bika LIMS to “sample received”. As samples may arrive in more than 1 container, the ability to print individual labels may also required.

The layout of this “long form” label would utilize existing Avery, or Avery compatable, labels such as Avery 08923, 3130, 8163, or 5163, each being 4” x 2” (10. 2cm x 5.

1cm) in dimension and 10 labels per page (2 columns of 5 labels) based on a 8 1/2” x 11” page layout. A4 paper layouts may also be made available. The “long form” label would then include the following information:

LIMS Order ID :__________ Client Order ID : ___________

LIMS Sample ID :__________ Client Sample ID : ___________

Preservative: [Yes / No] :____ Date Received:___________

Analyst Name:___________ Disposal date: ___________

The “**short form**” label is used for the analysis containers for which the original sample may be placed. Normally, an original sample may be divided into 4-6 separate containers for individual analysis and each of those containers must then contain information that will then connect those sub-containers to the original sample

This “short form” label is normally printed in sequential order upon changing the “sample due” status in Bika LIMS to “sample received” or can be printed later either as a complete list per Order ID, or on a per Order per AR, or on a per individual labels basis

The operator can pre-select the ID of idential sample labels to be printed, to be set in printer driver, to apply to the ID of analysis containers to be used for each sample. The layout of this “short form” label would utilize existing Avery, or Avery compatable, labels such as Avery 5167 or 8167, each being 1 3/4” x 1/2” (44mm x 13mm) in dimension and 80 labels per page (4 columns of 20 labels) based on a 8 1/2” x 11” page layout. A4 paper layouts may also be made available. The “short form” label would then include the following information:

LIMS Order ID :__________

LIMS Sample ID :__________

Disposal date:___________

9.12 Order lists and views

Similar to ARs, Order lists are available from an **|Orders|** tab - per client in the client folders and globally for all Orders in the system. The lists are likewise available per status or 'All', selected by radio button:

LIMS Order ID	Client Order #	Order date	Due date	Priority	Status	Assigned to

All of these are hyperlinked where possible. Clicking on the Order ID takes the user to the corresponding Order view that displays:

All order header attributes

LIMS Order ID	Client Order #	Order date	Due date	Priority	Assigned to

and lists all children AR and Sample data:

LIMS Sample ID	Client Sample #	Client Reference #	Sample Type	Sample Date	Date received	Sample Expiry Date	Sample status	AR ID	Due date	Date published	AR Status

Order views have tabs for

|edit|

|view|

|manage results|

|export|

|import|

|QC|

|final report|

|pro forma invoice|

9.13 Order Exports and Imports to Lab instruments

Sample and AR information associated with a specific Order can be exported to Lab instruments where the samples are to be analysed. This is done from the Order|export| tab where the instrument can be selected from a look-up.

Conversely, Bika LIMS will accept imported data from Lab instruments following a prescribed template. Data imported is associated with specific Bika Order ID. This is done from the existing **|import instrument|** tab. Detailed information is provided in the Instrument interfaces section

9.14 Order publication

See creating a New Order entry above

Currently, once an AR is published, no one can retract, edit and re-submit changes to it. However, with Orders often including many samples and ARs it is possible that mistakes can be made which are not determined until after the Order has been published

In such cases only the Administrator has the power to retract a published report, edit an AR for that Order and submit that Order to be re-published. All changes are recorded in the touched objects' logs

Use Case - Fixing an error on a published Order

Role players: Administrator

1. The lab is advised of an error that has been detected in a report after publication
2. After confirming the error, the user logs in as Administrator and navigates to the Order
3. The user retracts the Order - its children ARs and analyses are automatically retracted
4. The user navigates to the AR that contains the error
5. The user fixes the error on the AR's **|manage results|** or **|edit|** tab
6. The user describes the action on the AR's Remarks field
7. When done, the user submits the AR for verification
8. Another user with verification rights may verify the AR and Order
9. The Order results can then be published again

10. Listed in the Order's log is the name of the Administrator, date, and time. A copy of the original report is also saved as a hyperlink to the original report

9.15 Order logs

Same as for ARs with the exception of adding "pending approval"

See Creating a New Order Request ID above

9.16 Search & Query

All Users should be able to compile queries based on the criteria:

Order ID

Client name

Contact Name

Assigned to

Sampled By

Submitted By

Profile analysis

AR

Client Order ID

Client Sample ID

Client Reference ID

Client Project ID

Sample Date:

Sample Received Date:

Sample Type:

Sample Point:

# of Sample Containers

Preservative Yes or No

Date Sample Received

Date Sample Published

9.17 Results reports and Invoices per Order

Overview

At publication per Order, a collection of information associated with the Order is put together and published to the Client contact and his/her cc'd recipients:

all samples & sample information

all analysis results

QA and QC data

list of methods used

instrument detection limits

responsible lab manager

It does not make sense to issue multiple invoices and reports to a client who has submitted >1 sample under the same job number. These are grouped and submitted under the same invoice. Invoices are only paid on Order number - therefore it must be integral to the invoice itself

Invoices must also have unique Invoice ID to track and trace payment in relation to the Bika Order ID, Client Order ID, Client Reference ID, Bika Sample ID, Client Sample ID, Date Sample Received, and Client Contact requesting analysis

Reports and Invoices should also have similar look and feel of traditional Benchmark reports and invoices. Reports and Invoices should reference all samples and analysis performed on a specific Order ID and should look similar to traditional invoices

After 'publishing' analyses associated with the same Client Order ID the system produces a complete report and invoice listing all samples, analysis type etc.

It includes company information such as address, business tax number, contact information, date of report, name and signature of lab manager

9.17.1 Invoice exports

Overview

Invoices can be exported and printed individually from Orders' Proforma invoice tabs, or at the end of the month in a month end run. As in existing Bika flow, orders individually printed once and exported are excluded from month-end runs

The only addition to Bika 2's functionality, is the option for the user to decide which accounting export format to use. Defaults are set in the system set-up

9.18 Quality Assurance and Control. QA/QC

Overview: Many accreditation associations require analytical laboratories to include their QA/QC data directly in the final analysis report to the client. To do this, QA/QC data, based on all samples and AR’s contained within a specific Order ID must be contained within the final Order ID report.

QA/QC will contain information including the Standard Deviation, Data Normality, and where applicable, Historic Data for that client on a per AR per Order basis

All QC analyses associated with the Order/Publication are included

Per Analysis/Parameter

Calibration Checks (% Recovery) and their QC Limits (%)

Method Blanks and their QC Limits (%)

Duplicate (% RD) and their QC Limits (%)

Method Detection Limits (mg/kg)

9.18.1 Worksheet per order

The QC specification per order requires interaction with the worksheets on which the different analyses will be recorded with QC results

In addition, a straight **[create worksheet]** button is provided on the Order

and

worksheet workflow be copied to Orders for capturing data, verifying and publishing it

10 Calculated Analyses

Overview

Currently, Bika LIMS provides for entry of final calculated data utilizing the |**manage results|** tab. This requires the processing of raw data outside of Bika LIMS utilizing a separate system and then hand enter or import final data into Bika LIMS

1. To eliminate this 2 step process and
2. maintain raw data inside the LIMS,

it is preferable to enter or import raw data directly into Bika LIMS and then to have Bika LIMS auto-calculate final results

Currently, there are a few standard calculations and dependent calcs that are hard coded. It is preferable to modify this process to make these calculations and dependent calculations accessible and editable by Lab Managers

This is a tough goal. Some expensive big name LIMSs make this functionality only available via ODBC interface with MS Excel, failing point 2 above

Benchmark has provided calculations for a list of analysis services

Making all of these configurable in the LIMS' configuration will be approached like this:

All measurements, including those note reported to clients like weighing vessels and secondary weights, will be taken into the system as an Analysis category 'non-reported'. Like the regular analyses they are assigned Keys and appear on Order, AR and WS views

They will never be shown to clients however

In the set-up of Analyses calculated from dependant results, both no reported and regular, a field is provided where lab managers may enter the formula for the calculation using standard arithmetic, constants and other analyses' keys as variables

Calculating a residual weight for an analysis 'Percentage dry matter' with unreported measurements with keys:

VesselWeight, WetSampleWeight, DryVesselAndSampleWeight:

DryVesselAndSampleWeight /(VesselWeight + WetSampleWeight)

Special care needs taken by the user and system **- through validation -** that the working units of the dependent results are correct

Ditto dry matter basis dependent results to be used or not

A testing facility for the formula is provided. The user is provided with fields where he/she may enter test input data and the expected result for the formula. Pressing the **[test]** button will run the formula on the provided data and compare it with the expected result

A description field is used for describing the calculation to clients, the instruction field for lab staff

Use case: Configuring a Calculated Analysis service

User Lab manager

1. The user navigates to **Analysis services** in the LIMS set-up
2. The user clicks [**add analysis request]**
3. The user completes the regular attribute fields for the analysis service
4. The user ticks the **calculated?** check box

5. The **formula** field becomes editable
6. The user enters a formula containing constants and other analyses' keys as variables, e.g. for Theoretical Gypsum Requirement (TGR)

   ((milliequiv sodium * milliequiv sodium) / 10) * ((1/49) - (1/ (SAR * SAR)))
7. Standard arithmetic symbols are used but

   multiplication is represented by * and not x
   e.g. 2 times 4 is entered as 2 * 4

   power of is represented by **
   e.g. 10 to the power of 3 is entered 10**3
8. The user clicks **[submit]**
9. The systems validates the formula
10. If there are errors in the formula the user is returned to the screen and a warning explains the issue with the formula
11. The user may **[cancel]** edit
12. Or the user may clear the **Calculated?** check box and save the analysis service without a formula so as not to lose his/her other edits
13. When everything is in order and the formula validated, the user is returned to the Analysis Services list and a confirmation message displayed

11 Change requests (CRs)

“ISO requires accurate tracking of change requests within the LIMS. Both Client contact and Lab Manager can initiate the change, but both must provide actual confirmation that the change has been accepted”

Both Client contact or Lab staff may wish to change Orders by changing sample information or ARs associated to those samples

To do this, they initiate a Change Request (CR) for each Order effected, make the changes and add some explanatory text. The counter party to the request gets alerted and must accept the request on-line before the Order is allowed to re-enter the standard workflow

CRs are logged and affected Order, Samples and ARs are hyperlinked for quick find and review

It is proposed that an independent CR object be used and that it references the affected Orders, Samples and ARs. Whenever a CR on an object is open, affected objects and children are flagged as 'Change request' pending and their workflow halted

CRs have statuses

open

approved

CRs are listed similar to other System objects per pages

All

Open

Approved

All open CRs are listed in alert box at right to Lab managers, clerks and technicians

All CRs are logged similarly to other objects too, by user, date time stamp and action taken

The CR view carries hyperlinks to all the affected objects and those are in turn hyperlinked to the CRs affecting them

Logs of all objects such as ARs, Samples etc are expanded to capture edit actions - up to Bika 2, only status changes and the time spent in each state have been captured with the user name and date time stamp. Remarks capture for the change on the object itself, also gets copied to the log where it cannot be edited again ever

11.1.1 Creating a change request

Use Case. **Creating a change request**

User Lab manager, Client Contact

1. The user navigates to the object that needs modification, be it an order, AR or Sample
2. The user clicks **[create change request]**
3. A new CR screen opens
4. The user describes the changes required
5. The user provides a motivation for the CR
6. The user clicks **[submit]**
7. If the form has not been completed correctly, the user is returned to the form with a warning message explaining what the issue is
8. If the form has been completed correctly, the user is returned to the object he/she started with with a confirmation message where the CR is hyperlinked
9. The automated workflow proceeds
10. The CR is saved to the system with status 'pending'
11. The system flags the object and all children as 'pending change request' and halts their workflow
12. The counter party to the change requester, client or lab, is informed of the pending CR by e-mail and other media preferred by the party in his/her set-up
13. The system raises an alert in a 'pending change request' portlet at right on all screens to the appropriate counter party audience

11.1.2 Approving a Change request

Use Case. Approving a Change request

User Lab manager, Client Contact

1. The user navigates to the CR, from the alert box, email or CR lists
2. The user reviews the CR and either **[reject]** or **[accept]** it
3. If the user rejects the CR, he/she is offered a field to enter a motivation for the action which is saved on the CR

4. The action gets logged
5. The counter party to the approver, client or lab, is informed of the pending CR by e-mail and other media preferred by the party in his/her set-up
6. If the CR was accepted, all affected objects are unlocked from 'pending' and return to their previous states
7. The user may the navigate to these objects that need modification, be it an order, AR or Sample, and apply the approved changes

11.1.3 CR lay-out

Tabs for

- view
- edit
- log

11.1.4 CR lists

12 Supply Orders. Bika 2.2 'Product orders'

Orders in original Bika context meant 'Product orders', non analytical orders of chemicals, sample containers, distilled water etc supplied by the lab. These are called **Supply Orders** from now on. Orders in LIMS 2. 2 terminology means the batching of ARs per client order

13 Instruments

13.1 Overview

In this version of Bika LIMS, Instruments become a fully fledged module inclusive of maintenance and calibration scheduling. Instruments are moved out of the restricted set-up area to their own folder in the navigation portlet where Lab Managers, Lab Technicians and Client Contacts may also access it

Condensed instrument information also gets included in the analysis service pop-up

It is an independent module, down to the level of being an independent Plone product, that can be excluded from 'lite' installations

Much more information is kept in the system about the instruments, their suppliers, consumable and service providers. Maintenance is scheduled according their usage or time elapsed since previous service and staff alerted to upcoming maintenance

13.2 Instrument inventory

The full Instrument inventory is available as a report that can be emailed or printed

Current instruments to be considered are:

1. Dionex IC Ion Chromatograph
   www1.dionex.com/en-us/ic/lp39915.html
2. Gas chromatographs by HP:
3. GC FID

4. GC FID/PID
5. GC MS Mass spectrometer
6. IPC MS Mass spectrometer

All HP instruments are bi-directionally interfaced via ChemStation
www.chem.agilent.com/Scripts/PDS. asp?lPage=282

and the Dionex bi-directionally by PeakNet
http://www1 dionex. com/en-us/webdocs/4587_31736-02_PN_IA_V15. pdf

13.3 Instrument set-up

Use case. Instrument set-up

Role players: Lab Manager for edits, view authorisation to Lab Technicians and Client Contacts

1. The user navigates to the instruments folder in the navigation portlet at left
2. The instruments are tabled and sortable by

   Title (hyperlinked)

   Type

   Brand

   Model

   Serial number

   Next service date

   Image (hyperlinked)

   Calibration certificate number

   Calibration expiry date
3. He/she clicks on an instrument to edit it or [add instrument] to create a new one
4. The instrument's pages include on individually tabbed pages

   Instrument information
   Maintenance

5. The fields on the information page is editable and includes

   Title

   Type (from look-up)

   Brand

   Model

   Year manufactured

Serial number

Description

Image - with 'upload new' functionality

Location

Supplier (hyperlinked)

Date purchased

Price

Catalogue number

Warranty information

Condition when purchased - new, used or refurbished

Calibration certificate number

Calibration expiry date

Import? Y/N
to indicate whether the instrument can be interfaced for Sample ID imports from Batches and Work sheets.
This will ensure it gets listed on export template look-ups

Export? Y/N
to indicate whether it can be interfaced for results imports into the system. To ensure the instrument gets listed on import template look-ups

Service interval type - this can be set by time or usage

Service interval - number of days or analyses

Service warning period - number of days or analyses

Previous service date

Next service date

Number of analyses since previous service date

Number of weeks since previous service date

Service information – the standard operating procedure for conducting service and maintenance on this equipment. Existing files may be attached as Adobe Acrobat files or text can be added directly in text box. Other information like costs and consumables may also be included

Detection Limits – sets the minimum detection limit that this instrument can perform. By selecting an instrument in for an Analysis Service in the set-up, this information is then printed at bottom of any report that includes analysis results originating from this instrument

Remarks

6. If the user made any changes on this page, he/she must click [submit] to save the edits. To manage revision control issues a log is created to track date / time of changes and name of user who made changes
7. The Maintenance page tables all previous maintenance on the instrument in a sortable table with columns for

   Date (hyperlinked)
   Type of service
   Serviced by (hyperlinked)

   Client Contacts are not to see this information, but can be made available to the Client Contact via the reporting function described below
8. A report of the instrument's full service history is available from a |report| tab. The report can be printed or emailed. More information in the Reports section
9. To drill down to the details of a service event, the user click on it
10. The event's page open and include amongst others, fields for

    Type of service. Editable from look-up, values are populated in the system set-up

    Description and editable from look-up list of repair standard operating procedures (SOPs).

    Service provider (hyperlinked) (uses drop down list of service providers – note that a lab can make itself a service provider as many labs service their own equipment)

    Service provider representative (hyperlinked) (uses drop down list of service provider representative – note that a lab can make itself a service provider representative as many labs staff service their own equipment)

    Supervised/Signed off by - lab representative other than the person why conducted the work

    Date started, Date completed

    Parts replaced

    Parts serviced

    Cost

    Remarks

13.4 Instrument maintenance and calibration

Scheduling of routine maintenance intervals may be managed according to manufacturer recommendations. The system produces alerts Lab Managers and Lab Technicians when an instrument is nearing routine preventative maintenance

Faults, breakdowns and non-routine operations can be recorded. Comments may be entered for each event and maintenance costs can be entered. See Set-up items for instruments

Specific calibrations maybe recorded but QC is best monitored per analysis type from the system's reporting or standards menus

As many Labs conduct in-house maintenance and repairs, the creation and posting of Standard Operating Procedures (SOPs) for lab equipment and maintenance will need to be posted (similar to Plone Methods) and are accessible when pushing [add maintenance].

Use case: Scheduling routine maintenance

Role players: Lab Manager for edits, view authorisation to Lab Technicians, but not to Client Contacts

1. The system maintains a count of analyses for each instrument of the number of analyses executed by the instrument since its last service
2. If it is specified in its set-up that its routine maintenance depends on its usage, the system raises and alert to the lab manager of the pending service when the usage enters its service warning bracket as specified it its set-up
3. Similarly, if its routine maintenance is time dependent, the system raises and alert to the lab manager when the its service warning period as specified comes up
4. The lab may also run a report to see which instruments are due for maintenance in a given period, see Instrument maintenance report
5. Once the maintenance has been carried out, the user logs it in the system. He/she navigates to the instruments maintenance page
6. The user pushes [add maintenance]
7. A new maintenance page opens and displayed is the pre-selected SOP listing the tools required and steps for maintaining this particular piece of equipment.
8. The user completes the page (fields listed elsewhere) and presses [submit] when complete
9. The system updates the instrument's last service date
10. The system resets the count of analyses since last service to zero

13.5 Instrument interfaces

The instrument interfaces are implemented per comma delimited (. csv) text files in templates formatted for the instruments themselves or middle ware such as Chemstation and PeakNet.

Sample information can be exported from both work sheets or Order ID that contains all samples associated with that Order and all AR's associated with those samples. Imports are entirely governed by the import files generated by the instruments and results are matched per sample ID and AR analysis - if these are part of Order ID or work sheet collections, they are automatically surfaced there

Data returned from the instruments will be 'raw' and final results to be reported are calculated using the calculations set-up for them

13.5.1 Export

Use case: Export data to instruments

Role players Lab technician, Lab manager

1. The user clicks on the work sheet or Order ID |export| tab
2. The system offers a look-up of instruments that are set-up for imports
3. The user selects an instrument
4. The browser presents the standard Linux/Mac/Windows 'save as... ' dialogue where the user selects a folder where the exported file must be saved
5. The user gives the export a meaningful name
6. and presses [save]
7. The system looks up the template for the selected instrument and saves the data to be exported in the designated folder with the name specified and using the template
8. The user may now import the file from the instrument's console

13.5.2 Import

Use case. Import data to instruments

Role players Lab Technician, Lab Manager

1. The user navigates to the instrument import page
2. He/she selects the import template to be used from a look-up
3. He/she selects the file to be imported using the standard Linux/Mac/Windows browse function
4. The user clicks [import]
5. The system picks up the file and validates it while importing the data, matching it to Order ID, sample ID and analyses on ARs. These might also appear on work sheets
6. To be verified, Verified and published data cannot be overwritten - only sample received and assigned
7. Where instruments by default deliver results for analyses not requested by the Client Contact, these get imported to but kept out of view for the purpose of the Client Contact Report and Invoices. If they request it later in may then be pushed into the standard workflow
8. The systems writes a log of the import and exceptions encountered

13.6 Templates

Type		Chemstation	csv	xls	txt	prn	aia	dif	Example
Ion chromatograph	Dionex IC	IC 4.30	•			•			dionexic.csv
Gas chromatograph	HP GC FID	A.06.03	•				•	•	hpgcfid.csv
Gas chromatograph	HP GC FID/PID	A.06.03	•		•				hpgcfidpid.txt
Gas chromatograph Mass spectrometer	HP GC MS	G1034C v C.02.00		•	•				hpgcms.xls
IPC Mass spectrometer	HP IPC MS	4500		•	•				hpipcms.txt

Import and export templates format may differ depending on Instrument limitations and the type of field data required for import vs. export and on a per instrument basis

14 Methods

Most methods are saved as. pdf files which contain images and calculations in addition to text. Some calculations include symbols that are not supported by plain text

Methods are moved out of the set-up area to a folder in the navigation portlet where they are available as reference to both Client Contacts and Lab personnel. They are linked to Analysis Services via a look-up in the Analysis Services configuration

Use Case. Maintaining methods

Role players: Lab manager

1. The role player navigates to the methods folder where all the methods currently in the system are listed
2. To modify a method the user clicks on it or [add method] to add a new one
3. On the method screen, the user may edit its name and short description and upload its file
4. If he/she is editing an existing method, there are options to replace the current file
5. The user clicks [save]. A log is created with date / time and name of user who has made this modification.
6. To assign methods to an Analysis Service the user navigates to these in the system set-up and opens on by clicking on it
7. In the Analysis Service's method field he/she selects methods from a look-up. More than one method can be selected
8. The user clicks [save]

15 Clients and Contacts

15.1 Creation of Contact Information

Overview: Initialising secondary addresses with the values for primary addresses will save a lot of time when creating organisations and their contacts in the system. Ditto for e-mail addresses and telephone numbers. Providing this as a retroactive function for existing Bika LIMS 2. 0 users will also facilitate the completion of unfilled addresses left open during previous entries.

The use case is the same for Clients and their contacts as well as Suppliers and their contacts and to a lesser extent for the laboratory information

Use case

Role players: Lab managers only for lab addresses, Lab managers and clerks for Suppliers and Clients. Also Client contacts for Clients

Note This use case is acted out for Clients and their Contacts, but also applies to Suppliers and their contacts and to a lesser extent for the Lab addresses

1. The user navigates to the Client's set-up area
2. He/she completes the information on the default page including telephone, email and fax numbers
3. The user then proceeds to the addresses page
4. The page is made up of three sections, one each for physical, postal and billing addresses
5. In each section there is a field 'Same As' In the event that the address is different that the initial address, the user may deselect the “Same As” box which then depopulates the box selected and the new address can then be added manually or through using a look-up that offers the 2 other addresses as options.. use this to copy the address in any of the other sections into that particular section

   For example, enter the physical address, the postal and billing addresses will self-populate upon clicking “save” as each has their respective “same as” box selected. If they are different, deselect “same as” and enter the different information before clicking [save]
6. The user now navigates to the contacts for that client by clicking the
   |contacts|tab
7. He/she either creates a new Contact or clicks on an existing one
8. The following fields will then self-populate from the Client information already provided.

   e-mail address

   business phone number

   business fax number

   physical address

   postal address

billing address

9. The user may now override the information in these fields by editing them with special attention to the fax number and e-mail address as these will be used to publish results to for this contact
10. The user presses [submit] when done and is returned to the Clients list

15.2 Client analysis profiles

Sometimes it is necessary to copy and modify a generic lab analysis profile to a client's collection to modify it for that clients' specific use

Use case

Role players: Client contact, Lab clerk, manager and technician

1. The user navigates to profiles list in the client's set-up area
2. The user presses [copy profile]
3. A form opens listing all the client's own profiles as well as those from the lab's collection
4. The user selects a profile to be copied by checking its radio button. Only 1 profile can be copied at a time
5. The profile is copied and its edit screen opens - it has all the same analyses checked as the originating profile and is titled 'Copy of *original profile name*'
6. The user edits the profile and clicks [save]

15.3 Privacy statement and workflow

To “ensure that the Lab complies with legal regulations governing the collection, storage and dissemination of corporate or personal information”, the system indicates “that any of the personal information collected on the Client and Client Contact is secure and complies with Federal Privacy Protection Legislation”

Any new contact created in the system is on his/her first login led over screens that provide the Lab's Personal Information Privacy Protection Policy and offer the option to accept or reject it

If the contact accepts, details are logged on his/her set-up pages. If the contact rejects, he/she is led out of the system and his/her password disabled and the manager notified per email

The Privacy statement is maintained in a public area of the portal where anonymous visitors may also read it. Since it remains editable, the exact text a contact accepts is copied to his/her pages. If the statement is radically changed, and all contacts have to agree to the new text, functionality exists for the lab manager to reset all contacts to force them to accept or reject it at their next login

Use Case: Privacy statement maintenance

Role players: Lab manager

1. The user navigates to Lab information in the system set-up
2. The user clicks on the|edit|tab

3. On the page that opens, there is an editable free text field where the current privacy statement is displayed. If this is the first time a privacy statement is entered, this field is empty
4. The user edits the field
5. If it is an update that differs lots with the one currently in use and requires all client contacts to accept the new one, the user ticks the 'reset all' check box
6. The user clicks [save]
7. The system saves the old privacy text in a log with its author, start and end date. All previously used privacy statements can be looked up in the log
8. If the 'reset all' check box was ticked, the system flags all client contacts to be asked to accept the new policies on their next logon
9. The user is returned to the Lab information page

Use Case: Client contact accepts or rejects privacy policy

Role players: Client contact

1. The user logs on
2. There are two conditions that leads the user to enter this workflow:

    Its the first time the user logs on

    Its the first time the user logs since the lab's privacy statement has been updated radically enough for the lab manager to have reset all users to accept the new policy
3. A screen is shown to the user, displaying the lab's Personal Information Privacy Protection Policy
4. The user pushes [reject] if not in acceptance

    The system disables the user's password and he/she is returned to the public part of the portal
5. The user pushes [accept] if the policy is acceptable
6. The system writes the text of the policy the user accepted to a|privacy policy|tab in the user's set-up, together with a date/time stamp. The user may always return here to see what he/she accepted
7. Should the the user's historically accepted texts be logged?
8. The user proceeds to use the system

16 Standards and Stocks

16.1 More information

In addition to the current fields, the following properties are added for Standard samples

- Manufacturer/Brand - Note that Manufacture/Brand is a different property than supplier. Suppliers A, B and C may all supply Stocks by manufacturer Z. See Manufacturers/Brands in the system set-up
- Catalogue number
- Lot number
- Date received
- Date opened
- Expiry date - This field must be open ended to enter any future date

The extra properties are used as columns in list views

16.2 Labels

Currently Bika LIMS does not provide for the printing of labels to be attached to containers containing Lab Chemicals or Standards.

To properly record relevant information regarding Lab Chemicals or Standards it is preferable that labels be printed directly from Bika LIMS containing the following information:

Standard:	___________	Manufacturer:	___________
Lot:	___________	Received:	___________
Opened:	___________	Expiry:	___________

It is also preferable that existing network printers be utilized using standard Avery, or Avery compatible, label stock such as on 2 5/8” x 1” (6. 7cm x 2. 5cm) labels, Avery ID 5160 or 8160 which prints 3 columns of 10 labels

16.3 Emailing, printing lists

The lists of Standards and Standard Stocks can be printed or emailed from **[print]** and **[e-mail]** buttons on their list views

17 Analysis Services

17.1 Analysis categories

With many analysis services in the system it becomes difficult to easily find specific ones on the lists presented for AR creation, profiles etc and it makes sense to group them together per class or category. The list of categories are maintained in the System set-up

For example, the measurement, method, time to complete and other parameters listed in Analysis Services may vary depending on whether the sample is air, water or soil, yet the name of the Analysis remains the same. Therefore, by adding soil, water and air as categories and the analysis as a sub-category, order is maintained

Furthermore, with hundreds of analysis available within Bika LIMS, it become too difficult to have to sort through each Analysis Request Form etc. to find the 1 or 2 analysis that are required. By first selecting the Category, the range of analysis is reduced to a manageable number

In the Analysis Service set-up, the categories are presented on a look-up for populating this field with

The categories is then used as a means to shorten the list of displayed analysis services throughout the system. The User clicks on the category which then displays all analysis listed under that category

Places where Categories would be displayed include:

Analysis Services list

AR create

AR Views - list of analyses

Order create

Order Views – list of samples / analysis

Work sheets

Profiles

Reports

Analysis category fields are inserted on individual views of

Invoices

and as look-up parameters for defining

Queries

Reports

17.2 More Analysis attributes

Modifications to the Analysis Service set-up include the option to multi-select

- Instruments
- Methods and
- Standard Stocks (currently done the other way round - analyses are assigned on the Standard Stocks pages) to be associated with the Analysis Services

These are selected from look-ups built from these items in the DB already

18 Prices

18.1 Price List

Price lists get 2 extra fields that get included on printed and emailed price lists

Remarks

Lab contact person

18.2 Currency & VAT/GST tags

Current Bika LIMS 2 is hard coded for South African currency and value added tax (VAT). Though this can be fixed for other countries via the system's translation files, these are now rendered configurable in the system's set-up

Furthermore, some labs might trade across borders, so prices have to be kept in the system for each country and currency and shown to clients depending which country they are in

In Canada, GST is a federal tax that applies to all Canadian provinces. The only exception is that GST cannot be charged to Government clients

In addition to Federal tax are local taxes. These local tax's vary from province to province with some provinces not having any provincial tax at all

In the United States it become more complicated in that there is often a Federal, a Provincial and a Municipal tax which all vary from state to state and which vary over time

Use Case: Configuring country currencies and tax types

Role players: Lab manager

1. The user navigates to Countries in the system set-up
2. The page lists countries currently configured in the system with columns for

    Country name (hyperlinked)

    Country (ISO) abbreviation

    Country tax abbreviation (hyperlinked)

    Country tax %

    Country currency (hyperlinked)

    Country currency abbreviation
3. To edit a country's settings, the user clicks on it or clicks [add new country] to add a new one
4. The user may edit the country name and abbreviation. The country look-up is populated with the same values offered in the system's address look-ups
5. The user may complete country tax and currency fields from look-ups populated with values entered earlier in the system set-up for currencies and tax types
6. The user clicks [save] when done

18.3 Country Prices

Use Case: Editing prices for Analysis services and Products in different currencies

Role players: Lab manager

1. The user navigates to the Analysis Services list
2. The user clicks the list's [edit] tab

3. An editable version of the list opens. All the individual analysis fields that are tabled in the list, are editable. This is new functionality to make bulk modifications to many analysis services possible without having to drill down to each individually
4. To add prices in a new currency, the user clicks [add new currency prices]
5. The systems offers a list of countries to select from - these are form the list maintained in the general system set-up
6. The user selects a country
7. The system adds new price fields to all analysis services in the system for the new country: price before tax, tax, price including tax
8. The user is returned to an analysis services list, listing prices before tax in columns for all the currencies already in the system, and an editable column for prices before tax in the new currency
9. The user complete these fields and presses [save]
10. The system calculates the tax on each price, the total price, and saves all to the individual analysis services
11. The user is returned to the analysis services list

Use Case: **Editing prices for Analysis services and Products in different currencies**

Role players: Lab manager

Setting prices in different currencies for Products works exactly the same as for analysis services

18.4 Applying Prices

When a client contact create ARs or orders, the system displays prices and taxes in the currency corresponding to the country value in the Client's physical address. This field is now compulsory in the Client set-up

Invoices are similarly issued in the Client's currency and taxes and the total tax percentage is clearly displayed

If the Client country's currency is not configured in the system, the default is used which is determined from the lab's country value in it's physical address

19 Shipping

Use case: Supply orders - Confirming transportation costs. Dispatching

Role players: Lab clerk, Lab manager, Client contact

1. The user navigates to the Client's Supply order page
2. The user clicks [add new request]
3. The user completes the request in the usual fashion
4. He/she completes new field 'Due date' by using drop down calendar box
5. If the user wants, he/she includes remarks
6. If it is a Client contact completing the order form, he/she may provide their own Courier service and completes the appropriate fields to that effect

7. If the lab has to set up delivery, the user select the shipping mode by clicking the appropriate a radio button, typically any of 'Ground', 'Economy air' or 'Expedited air'. This list is maintained in the system set-up
8. The user clicks [save]
9. The system displays a message to the effect that the Order is confirmed and what the next steps are, using text maintained in the system set-up
10. As per usual the system raises an alert to lab clerks that there are orders pending - they navigate to the order to complete the shipping cost calculation. (This should really be automated. The client is stationary - apart from the shipping mode, it is going to depend on the weight and volume of the order??)
11. The lab clerk enters shipment costs
12. The system calculates VAT/GST and updates the order totals
13. The lab clerk clicks [save]
14. He/she is returned to the order view and if everything is in order, the clerk promotes its status to 'to be confirmed'
15. The systems emails the client contact to inform him/her that the order needs to be confirmed. The email includes a hyperlink to the order
16. The systems also raises an on-line alert to the same effect for the contact, similarly linked to the order
17. The Client contact navigates to the order and review it. The contact may [cancel], [retract] or [approve] the order

    [cancel] - the order gets a 'cancelled' status and become dormant

    [retract] - the order returns to 'pending' status and may be edited by the Contact or lab staff

    [approve] - the order obtains the 'pending' status and continue with the workflow
18. When approved, Orders move to status 'Pending' and appear in the corresponding alert portlet and list
19. After having set up delivery by courier and obtained the tracking information, the lab clerk navigates to the pending order
20. The lab clerk enters shipment way bill number, name of courier and web address for on-line tracking by selecting it from a drop-down menu. The entries for these are maintained in the system set-up
21. The lab clerk clicks [save]
22. When the shipment is dispatched physically, the clerk navigates to the order and promotes its status to 'dispatched'. This can also be done from the list of pending orders

20 Emailing pages from the LIMS

The Plone email function available from the email icon on all pages is modified to send not only a link to the page, but all the contents of the work area on the page. The modified function would make it easy for the lab to send status updates to clients, e.g. when an Order Status has been updated or when a change has been made to an object on behalf of the client

21 System set-up modifications

Set-up items touched in discussion elsewhere are listed here again to keep them together in this context. Not necessarily complete here

21.1 Bika settings

Order prefixes and padding

Default sample disposal period

21.2 Laboratory information

Personal Information Privacy Protection Policy

21.3 Analysis categories

Also see Analysis Services set-up

21.4 Copy set-up

A lot of information is kept per Analysis service which makes the entry of new services rather tedious. This copy function makes it possible to duplicate Analysis Services in the set-up and the modify the duplicate

Use case

Role players: Lab Manager or Lab Clerk

1. The user navigates to the Analysis Services list in the system set-up area where all the current analysis services are listed
2. He/she selects one to copy by ticking its check box
3. The user then presses [duplicate]
4. A 'new analysis service' form opens with all fields defaulted to that of the original analysis service being duplicated. It is titled 'Copy of *original analysis*'
5. The user edits the form and clicks [save]

21.5 Sample types

Disposal period, initialised with default value from general set-up and can then be overwritten

21.6 AR priorities Price premium

Also see Analysis prioritisation

Setting up the levels of urgency and their price premiums

rush/same day + 100%

2 days + 50 %

5 days

regular / to be determined

21.7 Manufacturers/Brands

Note that Manufacture/Brand is a different property than Supplier. Suppliers A, B and C may all supply Stocks by manufacturer Z

A manufacturer can manufacture more than one category of product, e.g. instruments, standards and reagents - these are available per multi-select in its set-up

21.8 Brand and supplier categories

Instruments, Standards, Reagents, Consumables, Lab equipment etc

21.9 Instrument maintenance types

Also see Instrument maintenance and calibration

Routine maintenance, repairs, calibration and inspections

22 Modifications to ARs, Samples, Worksheets and Suppliers

AR, Samples Work sheets and items touched in discussion elsewhere are listed here again to keep them together in this context. Not necessarily complete here

22.1 ARs

Order ID (hyperlinked)

Pending status see, Approving an Order

Log executed analyses against the instrument used for the instruments maintenance schedule

Order creation - add Date sampled on this form, the date then gets written to the actual sample record

Condensed instrument information and image, Methods and Standards listed and hyperlinked in the analysis service pop-up

Analyses listed by category - on create form and Order views

22.2 AR Prioritisation

Urgent Order. Price premium

Also see Order prioritisation

Allowing the urgency of new Orders to be set, calculating their prices and due dates accordingly

Sorting an Orders on their due dates and highlighting the most urgent analyses on both the lists and views

22.3 Samples

Alert 'to be disposed'

22.4 Work sheets

Worksheets per Order

Analysis category column

Export to instruments, see Instrument interfaces

22.5 Suppliers

Suppliers of instruments and services. A supplier can supply more than one category of product, e.g. instruments, standards and reagents - these are available per multi-select in its set-up. As well as more than one brand - also available per multi-select

General lab supplies - Supplier types

23 Additional reports

Instruments

Also see Instruments

Upcoming maintenance / Maintenance performed / Overdue

Per maintenance type

Instrument service history

Instrument inventory listing

Orders per Client, Total

NB Reports for Orders, ARs, Work sheets include a parameter 'Assigned to' with drop down for lab staff member

24 Additional queries

Instruments

Change requests

Work sheets

Orders

NB Queries for Orders, ARs, Work sheets include a parameter 'Assigned to' with drop down for lab staff member