

# SeqAn - BioStore Workshop Requirements

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## 1. Introduction

This document presents the results of a combined usability and satisfactory study of the SeqAn Workshop from September 12<sup>th</sup>-14<sup>th</sup> 2011 in Berlin. Its purpose is to serve as a guideline for an incremental improvement of the workshop, the tutorials and the library. In order to do so, requirements extracted from core data, such as the users operating system, and a survey (September 14<sup>th</sup>) are presented.

## 2. Statistical Findings

### 1. Organization

14 out of 15 of the surveyed considered the workshop and its organization good to very good. 13 out of 15 of the surveyed considered the staff's assistance very helpful.

### 2. Qualification

#### Professional Qualification

##### Education

53% (8) Bioinformaticians  
40% (6) Computer scientists  
7% (1) Physicians

##### Degree

47% (7) PhD  
33% (5) Diploma / MSc  
20% (3) BSc

### Programming Experience

Each third of the participants has few, advanced or expert experience with C++. All participants know C++ but no one considers himself as a real professional.

Nearly all participants also have experience with C. Beginners tend to have the same level of experience as in C++. The more experience participants have in C++ the larger the gap between their experience in C.

There were no participants with C# knowledge.

### SeqAn Experience

Two out of three participants never worked with SeqAn. The other third has advanced experiences with SeqAn.

## 3. Operating System

47% (7) Windows  
33% (5) Linux  
13% (2) Mac OS X  
7% (1) Unknown

## 4. Development Environment

### IDE

50% used a graphical IDE  
50% used Unix/MinGW Makefiles

### OS + IDE

33% (5) Linux + Unix Makefiles  
27% (4) Windows + Visual Studio  
13% (2) Windows + Eclipse  
13% (2) Mac OS X + Xcode  
7% (1) Windows + MinGW Makefiles  
7% (1) Unknown OS + Unix Makefiles

## 3. Survey / Data Collection Requirements

About a third of the workshop participants did not stay until the 14<sup>th</sup> September and therefore could not attend to the survey.

❖ Feedback must be collected once a day.

25% of the workshop participants needed help. Not answerable if people at least successfully solved the tutorials.

❖ Ask participants whether they successfully solved the tutorials.

33% of the participants were computer scientists.

❖ Ask for motivation to attend to the workshop

## 4. Organizational Requirements

The participants liked the introduction to SeqAn as well as the introduction to SeqAn's new feature.

- ❖ An introduction must be given.
- ❖ An overview of new features must be given

Some participants proposed to do a tutorial with all participants instead of small groups. (A reason for this could be that people had difficulties to estimate their own level.)

- ❖ An overview of each tutorial's aims, content and requirements must be provided.

The gap between the introduction of SeqAn and the tutorials was considered to large (with a day in between)

- ❖ Avoid larger gap between introduction and tutorials

The workshop was considered slightly too short.

- ❖ Reserve 3 fixed days for SeqAn.
- ❖ External tutorials and projects require additional day.

Participants with no to very limited C++ knowledge encountered problems, even in the basic tutorials.

- ❖ ??? Invitees must be informed about minimal requirements such as basic C++ skills. This enables them to decide whether or not join them ???

The Participants with no experience had great problems and couldn't finish the tutorials without help.

- ❖ The SeqAn staff has to provide help for the participants. Especially in the tutorial sessions.

## 5. Library Requirements

The first compilation takes much time

- ❖ Create a dummy target to compile and create the forwards instead.

People with Cygwin installed had problems using MinGW Makefiles. The problems were so rigorous, that they were forced to remove Cygwin and install MinGW in order to work with Eclipse.

- ❖ There are 2 options:
  - a) Support Cygwin and MinGW on Windows platforms
  - b) Make MinGW co-exist with existing Cygwin installation.

Most of the people liked the classical CMake - Make - calls and the broad platform support.

In addition, people used a wide variety of platforms.

- ❖ SeqAn should stick to CMake
- ❖ SeqAn must support the following platforms

- ❖ Windows - Eclipse - MinGW
- ❖ Windows - MinGW Makefiles
- ❖ Windows - Visual Studio 2009
- ❖ Windows - Visual Studio 2010
- ❖ Linux - Unix Makefiles
- ❖ Mac OS X - Unix Makefiles
- ❖ Mac OS X - Xcode

Some participants experienced problems with the readability of their written code (which was based on basic tutorials).

- ❖ Improve code readability of SeqAn (generated) code using the new C++11 standard.

The broad range of functionality was considered good.

The same holds for the performance of code using SeqAn.

- ❖ Provide a library with a large functional range.
- ❖ Provide a library with high performance.

## 6. Documentation Requirements

2 out of 3 participants considered the documentation to be improvable.

Additionally the location of the build directory and general structure of folders confused people.

The installation was considered to be too difficult.

- ❖ Checked out directories and those created by CMake have to be extensively described in one document.

Participants proposed to add links to tutorials and to add code snippets to the documentation.

- ❖ Documentation items must have links to relevant tutorials.
- ❖ Documentation items must provide short examples / code snippets that demonstrate the usage.

## 7. Tutorial Requirements

The participants solved the tutorials in their listed order.

- ❖ The tutorials must appear in a logical order.
- ❖ Each tutorial must specify its required tutorials.
- ❖ Each tutorial must specify its level (e.g. beginner, advanced, etc.).
- ❖ Each exercise / task / assignment within a tutorial must specify its level (e.g. 1-4).
- ❖ Each tutorial must consist of

- ❖ Explanations
- ❖ Tasks
- ❖ Examples
- ❖ TODO???

- ❖ ??? extra category applications ???

Inexperienced participants and beginners could only manage to go through very few tutorials.

- ❖ ??? limit tutorials to X minutes ??? (eventually split a tutorial up into portions of 90 minutes)

More than 50% of the basic tutorial participants with few C++ or few SeqAn relevant basic concepts (STL, Metafunctions, Template Subclassing, Global function interface) knowledge needed help from the SeqAn team.

On the other hand no basic tutorials participants with sufficient C++ knowledge needed help.

The participants considered the “Basic” tutorial too difficult by participants.

- ❖ Create tutorial “from OOP to SeqAn”.
- ❖ Tutorial “from OOP to SeqAn” must be solvable by users with basic C++ skills.
- ❖ Tutorials with level “Beginners” must be solvable by users who successfully solved tutorial “from OOP to SeqAn”.

## 8. Miscellaneous

The participants disagreed about / misunderstood (“rape of OOP”, “template madness”) the design decision “template programming” in the SeqAn library.

- ❖ Explanation of the “template programming” design decision must be included in:
- ❖ the documentation,

❖ the tutorials (e.g. as part of the introduction) and

❖ the workshop (introduction into SeqAn).

## 9. To-do

1. The SeqAn team has to think about considering different user groups.
2. Modifier tutorial
  - 2.1. add tasks
  - 2.2. add more examples
3. Alignment tutorial
  - 3.1. check whether tutorial is too short
  - 3.2. more explanations could be necessary (esp. initialization of the score object)
4. Seed and Extend tutorial:
  - 4.1. is not up-to-date

## 10. Revisions

Date	Change
September 23, 2011	First Draft
October 15	First results of survey analysis of workshop (September 12-14, 2011 incorporated
November 28, 2011	Survey analysis of workshop (September 12-14, 2011) finished and incorporated
December 06, 2011	Document design finalized