



Case Study:

[Application Development for a Novel Technology](#)

The Client

The client is a start-up biotechnology company, founded in 2006 that develops simple and affordable genomic testing solutions for the research, diagnostic and therapeutic markets.

The Need

The client has developed a proprietary genomic testing platform that replaces the traditional enzymatic amplification techniques with a robust chemical reaction. Knowing that the design of probes is complex, balancing numerous parameters to come out with a design that meets them all, the client felt the need for a design software.

The popularity of any such platform also hinged on its performance and ease of use. Users of the technology would need to design the assays manually by trial-and-error, which would add to the cost and time. Alternatively, they would have to rely on the client for the design in the absence of adequate software support. With an intention to increase the popularity of the technology, the client approached Apticraft to develop an easy-to-use software tool.

The Challenge

Unlike traditional enzymatic amplification reactions, the clients platform:

- Works under a wide variety of environmental conditions
- Does not require expensive, sophisticated instrumentation to control the reaction conditions.
- Can reproducibly amplify highly degraded RNA and DNA samples,
- Can be used to develop diagnostic tests capable of functioning under harsh environmental conditions.

Software design challenges:

- The biggest challenge was to understand the requirements and translate them into a fully functional tool from the users perspective
- Looking at the possibility of a large user base the tool was required to be generic, user friendly, cross platform and stable at the same time
- The tool needed to be highly customizable to allow the user to control all their design parameters

The Solution

Leveraging our deep domain knowledge and experience in developing applications, we developed a sophisticated probe design tool. The highlights of the tool are as follows:

- Intuitive and user friendly interface.
- Integrated algorithms handle the stringent design considerations based on the technology
- Design mutation specific probes with the ability to allow the user to specify the type of mutation to be targeted
- Included access control to this module that helped the client to restrict its use by a targeted customer base.

Sequence Information
Search Status

#				
NM_007125	Good	Complete		Complete
M55127	Good		Selected	
AF065440	Good		Selected	
X05332	Good	Complete		Complete
Y13051	Best	Complete	Selected	Complete
X02851	Best	Complete		Complete
AF103796	Best	Complete		Complete
AJ300450		Complete		Complete

Probe Properties
 BLAST Information
 Exon Information
 Mutation Information
Sequence View

Accession Number: All Probe... Error Results...

Status:

	Rating	Sequence	Positi...	Len...	Tm	GC %	Hairpi...	Self Di...	Run L...	BLAS...
				bp	°C		kcal/mol	kcal/mol	bp	
420>G (Exon1)										
Anti-sense Wild Li...	68.0					50.0	-1.3	-1.6	3	
Anti-sense Wild P...	68.3					50.0	-1.5	-1.5	2	
Anti-sense Mutant...	68.0					50.0	-1.3	-1.6	3	
Anti-sense Mutant...	66.6					50.0	-1.5	-1.5	2	

Probe Search

Probe type

Copy Number Probe Mutation Specific Probe

Search parameters

Avoid Template Structure Avoid Cross Homology

Design parameters

Hybridization Sequence Length: To: bp

Tm: ± °C

GC%: To: %

Advanced...

Advanced Search Parameters

Advanced design parameters

Hairpin Maximum ΔG: -kcal/mol

Self Dimer Maximum ΔG: -kcal/mol

Run/Repeat (dinucleotide) Maximum Length: bp

Mutation Distance from Probe Center: bp

Maximum Distance Between Two Probes: 0 1

Ligation Probe must start with T base at its 5' end

Advanced probe pair parameters

Maximum Probe Pair Tm Mismatch: °C

Maximum Probe Pair GC% Mismatch: %

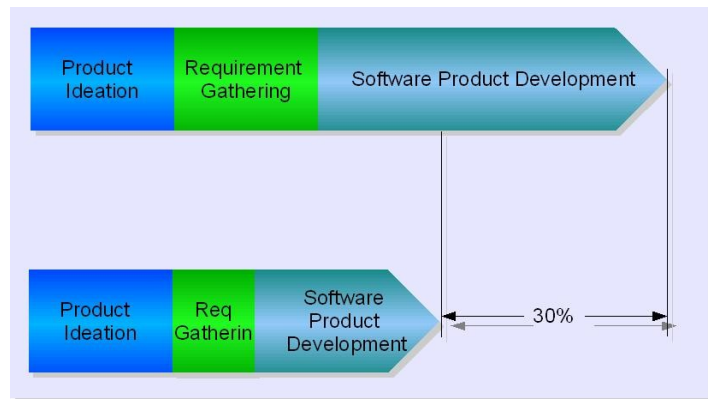
Cross Dimer Maximum ΔG: -kcal/mol

Default OK Cancel Help

Screen Shots of the application developed

Benefits:

- Quick turn around time
- The use of sophisticated algorithms ensures that each base is interrogated to find a suitable probe that passes all the set design parameters, thereby increasing
 - ✦ Efficiency of the assay
 - ✦ Reliability of the technology
 - ✦ Acceptance and market penetration by 30%
- Helped reduce cost by 20%



Technology used

Platform/OS:

Windows 9x, 2K, XP, Vista
Mac OS X 10.x

Development environment:

- Languages/Scripts:
 - Java, JDBC, JNI, Multithreading
 - UML for design artifacts (project design/architecture)
 - XML for data communication on web/internally.
- Database:
 - JDataStore (BORLAND)
- GUI:
 - JFC/Swing Framework.
- UML Design Tools:
 - Poseidon
- Editor/ Development Environment:
 - Eclipse IDE (from IBM),
 - Forte for Java CE IDE (from SUN Microsystems)
- Installer Tool:
 - InstallAnywhere (from MacroVision)
- Deployment Tools:
 - Ant, Java Web Start