



# Clarinox Technology

## Pro-Forma Business Case Document

**Version Date: dd/mm/yyyy**

*This Pro-Forma Business Case document is a guide for customers, it:*

- *Details the fundamentals for making a business case and justifying an investment in Clarinox SoftFrame*
- *Provides an example of a formal request to the Executive team and Board of Directors recommending an investment in ClarinoxSoftFrame and the release of appropriate funding*

*Customer situations vary and consequently the content and calculation examples provided in this document will need to be reviewed and adapted as appropriate. This document will provide methods and examples to assist customers in formulating a solid business case for the investment in Clarinox SoftFrame.*

	Name	Signature	Date
<b>Prepared by:</b>			
<b>Approved by Management Team:</b>			

*Disclaimer: This Business Case document has been produced as a general guideline document only for Clarinox Technologies customers and potential customers.*

*The assumptions contained in, are believed to be accurate and are made in good faith. We disclaim all liability to any person or business in respect of anything done or omitted to be done, and the consequences of such action or omission, by any such person in reliance upon any part of the information used from this document.*

*Any person or business intending to act or rely on the information should check its application to their circumstances. We would recommend that you consult with your Accountant or Consultant before making any decision.*

# 1 Executive Summary

## Recommendation

The development of our wireless electronic product relies critically on the quality, functionality and speed of development of the embedded software it will contain.

Wireless embedded software expertise is necessary to reduce learning time, testing time and ultimately product development time.

This proposal justifies and recommends acquiring this expertise by investing in ClarinoxSoftFrame.

ClarinoxSoftFrame is a flexible application development framework that will allow us to utilise pre-written embedded software modules to develop high functionality embedded software for our product with reduced programming and testing effort.

We anticipate a reduction in embedded software development time from XX months to YY months when compared to developing in-house. A reduction in total embedded software development effort of ZZ% is anticipated.

This business case is recommending the investment in Clarinox SoftFrame. This business case requests that the Executive and the Board of Directors approve and endorse the purchase and release the funds for this project.

## Strategic Benefits

The investment in ClarinoxSoftFrame will:

- Reduce embedded software development time, assisting us in bringing our wireless product to market faster
- Reduce reliance on existing or acquired in-house expertise for wireless embedded software
- Reduce embedded software testing time
- Utilise a proven software system
- Increase existing and future product design flexibility, allowing options of hardware and operating system changes without significant software re-development penalties

## **Project Financials**

The savings in reduced project software development resources are anticipated to be (see financial calculations section).

The benefits from launching our wireless product on the market are estimated at (see financial calculations section) increased product cumulative profit.

The cost of the investment in SoftFrame for this development project is (see financial calculations section)

The Net Present Value of the project is increased by (see financial calculations section)

## **Timing of project**

The key project milestones are:

- (insert project milestones, taking into account reduced embedded software development time)

# Table of Contents

- 1 EXECUTIVE SUMMARY ..... 1**
- 2 PROJECT DEFINITION ..... 4**
  - 2.1 BACKGROUND ..... 4
  - 2.2 SCOPE OF THIS BUSINESS CASE ..... 4
  - 2.3 BUSINESS CASE OBJECTIVES..... 4
- 3 THE CLARINOXSOFTRFRAME INNOVATION..... 5**
  - 3.1 CLARINOX SOFTFRAME ..... 5
  - 3.2 HOW CLARINOXSOFTRFRAME DELIVERS BUSINESS VALUE ..... 7
- 4 EVALUATION OF OPTIONS ..... 9**
- 5 PREFERRED OPTION ..... 10**
- 6 BENEFITS ..... 10**
- 7 RISKS ..... 11**
- 8 FINANCIAL ANALYSIS ..... 12**
- 9 IMPLEMENTATION..... 14**
  - 9.1 PROJECT TEAM RESOURCES ..... 14
  - 9.2 IMPLEMENTATION PLAN ..... 14
- 10 REFERENCES ..... 14**

## **2 Project Definition**

### **2.1 Background**

The current development project will produce a profitable wireless electronic product to meet the needs of our market. The business is aware of the need to bring this product to the market as soon as possible.

Early launch of this product will allow higher margins and provide increased market share for the product. It will also result in earlier return on investment.

A key part of the product development project is the writing and testing of embedded software for the wireless device. The software must have high functionality and reliability, requiring a high level of expertise in wireless protocol and thorough testing.

The ClarinoxSoftFrame is an application development framework that will substantially reduce embedded software development and testing time. This is possible because of reduced reliance on internal wireless embedded software expertise. An important part of ClarinoxSoftFrame is the pre-written embedded software modules that encapsulate wireless best practice expertise and allow a "select from menu" approach to writing the embedded software.

This business case document recommends the business to invest in ClarinoxSoftFrame to realise substantially reduced product time-to-market with fewer software development resources.

### **2.2 Scope of this business case**

The scope of this business case is the purchase, training and use of Clarinox SoftFrame, an embedded software application development framework.

### **2.3 Business case objectives**

The objective of this business case is to invest in ClarinoxSoftFrame and use it to develop the embedded software for our wireless product. This will therefore result in:

- Faster product development and reduced time-to-market
- Reduced requirement for embedded software development resources
- Reduced product testing
- Increased design flexibility due to SoftFrame's portability across hardware and operating system profiles
- Reduced product (software) maintenance requirements
- Greater reusability of application code for upgrades and future product developments

## 3 The ClarinoxSoftFrame innovation

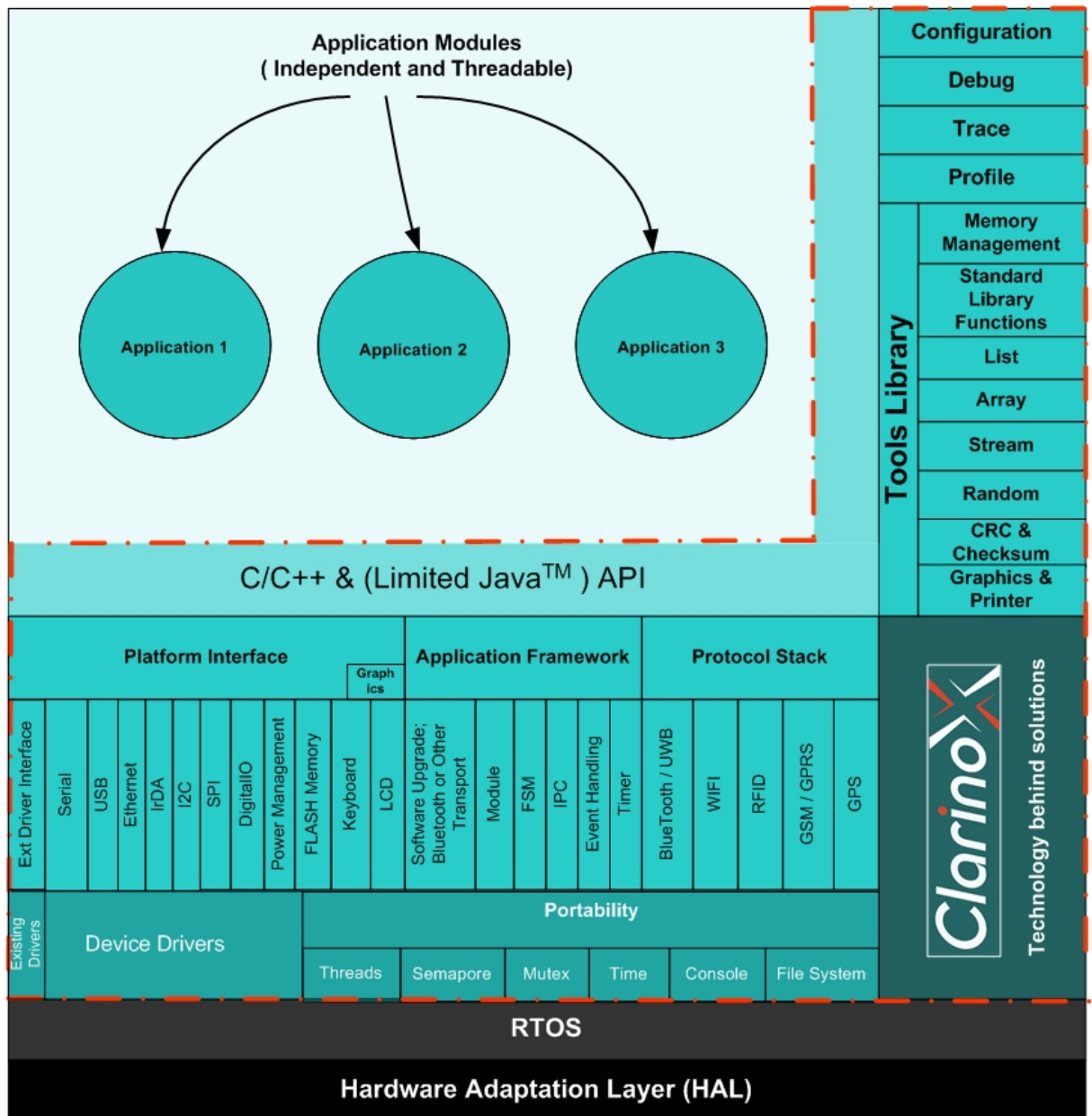
### 3.1 *Clarinox SoftFrame*

ClarinoxSoftFrame is an application building framework specifically designed for wireless embedded software. It is an object oriented package that greatly assists the programmer to develop and integrate operating system, middleware and protocol stacks.

The conventional approach to wireless product software development is to select an operating system, select off-the-shelf protocol stack, select off-the-shelf middleware and then write an application in-house that tries to merge the components together.

The conventional approach requires a good knowledge of the operating system, the device drivers and the protocol stacks. Debugging is time consuming and is performed at a low level. The development of middleware for protocols such as Bluetooth is often considered so complex as to be beyond many smaller firms<sup>4</sup>. This is because of the requirement for an understanding of many layers: radio, baseband, stack, profile, operating system driver and application. The interface and interaction between the layers is complex and creates many opportunities for bugs and potential crashes<sup>1</sup>.

The ClarinoxSoftFrame provides a range of pre-written software modules that allows the programmer to use any of a number of operating systems and processors. Platform interfaces, protocol stacks and other application code modules are essentially picked from a menu to create the product middleware and develop the product application. The programmer works in an object oriented C++ environment.



The programmer is not required to have a detailed knowledge of the Real Time Operating System (RTOS) or the wireless protocols.

Because the modules have been developed as a suite their compatibility is assured. Debugging of low level code is completely eliminated. The product can even be prototyped and simulated with SoftFrame on a conventional PC then moved to the target platform with 100% compatibility.

Once the embedded software/application has been developed the ClarinoxSoftFrame provides further efficiency gains. Changes can easily be made to interfaces or protocols by simply adding or switching these pre-built modules. In this way the product specification can be updated quickly to respond to market demands and opportunities.

Portability to new or revised hardware platforms is also very simply achieved. Even a change of operating system is possible if required.

## 3.2 **How ClarinoxSoftFrame delivers business value**

The challenges this product development project presents include:

- Developing a product ready for market in a reduced time frame. This will improve market share and profitability for the product.
- Producing embedded software that has high reliability and high functionality. This will improve the product's market appeal.
- Reducing the resource effort required for embedded software development. This will reduce development costs.
- Reducing the reliance on internal expertise, whether existing or learned as part of the project. This will reduce both development time and risk.

### **Reduced development time**

Bringing our product to the market faster will result in earlier returns on our investment, potentially higher margins and improved market share<sup>3</sup>.

ClarinoxSoftFrame helps reduce our product development time by providing pre-written embedded software modules to handle protocols, platform interfaces and application building blocks. These modules can be selected and integrated to form high functionality embedded software. The experience of experts in the wireless field is encapsulated in the modules.

The embedded software is developed and simulated on a PC based environment. The embedded software is then ported to the platform. ClarinoxSoftFrame also provides a tool library and debug/trace tools.

As most of the embedded software has been pre-written and tested, development time is substantially reduced. The reduced learning requirements and the high-level programming interface also contribute to reducing development time.

Typical reductions in embedded software development time from seven months to two months have been reported for a Bluetooth communication device project.

We estimate that embedded software development time without ClarinoxSoftFrame to be XX months and with ClarinoxSoftFrame to be YY months.

### **High functionality high reliability**

ClarinoxSoftFrame does not limit the product developer to any particular processor, operating system or protocol so functionality is not limited by the processor manufacturer's software support offerings, for instance. A full range of protocols, interfaces and operating systems are catered for.

Because the modules contained within ClarinoxSoftFrame have been developed as a suite, compatibility is assured and low level testing is not required.

### **Reducing embedded software resource effort**

The reduction in training and actual programming effort that ClarinoxSoftFrame brings varies depending on the complexity of the project. Reductions of 75% in total programming effort have been reported for a Bluetooth communication device.

We estimate that the total development time will be reduced and that fewer resources will be employed during that time. We estimate a total reduction in embedded software development effort of \_\_\_%

### **Reducing reliance on internal expertise**

To develop and maintain wireless embedded software in house the business requires access to expertise in the field. Options include training of our software engineers, hiring or contracting suitably experienced software engineers and outsourcing experience.

The use of ClarinoxSoftFrame reduces the business's reliance on in-house and contract expertise, thus reducing cost (training and maintaining) and risk.

## 4 Evaluation of options

Product specification	Embedded software functionality may be limited by proprietary processor/operating system vendor offerings	Embedded software functionality is not limited by proprietary processor/operating system offerings
Product development time	Embedded software development typically 7 months from scratch	SoftFrame typically reduces embedded software development time to 2 months
Development resources	Training required in embedded wireless A team of programming resources required	Very little training in embedded wireless required One programming resource required
Cost	No up front or ongoing cost Development resource cost "high"	Small up front and fixed licence cost Costs fully offset by reduced development resource cost
Risk	Risk of loss of market position and profit due to later release of product to market Risk of development time and cost over-run due to insufficient expertise	As detailed in business case
Other		Increased design flexibility for future products or product upgrades

## 5 Preferred option

The preferred option is to invest in ClarinoxSoftFrame to assist our business to develop high functionality wireless embedded software. This option reduces development time, cost and reduces the businesses reliance on internal expertise.

## 6 Benefits

The benefits from the ClarinoxSoftFrame investment are:

<b>Benefit</b>
<b>FINANCIAL BENEFITS</b>
<ul style="list-style-type: none"><li>▪ Reduced development resources resulting in reduced development cost</li></ul>
<b>STRATEGIC BENEFITS</b>
<ul style="list-style-type: none"><li>▪ Faster development will result in earlier release of the product to market<ul style="list-style-type: none"><li>○ Earlier returns on investment</li><li>○ Stronger market share</li><li>○ Higher margins</li></ul></li><li>▪ Reduced reliance on internal expertise in wireless technologies</li><li>▪ Greater design flexibility allowed for</li></ul>
<b>OTHER BENEFITS</b>
<ul style="list-style-type: none"><li>▪ Reduced product maintenance requirements</li></ul>

## 7 Risks

The risks identified to date, which may impact on the success of this project, are tabulated below.

<b>Risk</b>	<b>Initial Severity Grading</b>	<b>Likelihood of occurrence</b>	<b>Proposed mitigating action</b>
<b>Implementation Risks</b> Future programme changes may increase requirements beyond what SoftFrame currently provides	High	Rare	<ul style="list-style-type: none"> <li>Clarinox Technologies are constantly extending the capabilities of SoftFrame according to customer needs. If new requirements beyond current capabilities are requested, Clarinox may be contracted to develop new or revised modules to cover the new requirements.</li> </ul>
<b>Sunk costs</b> In the event of project cancellation, the investment in SoftFrame is not recoverable	Minor	Rare	<ul style="list-style-type: none"> <li>Negotiations with Clarinox to split fees into an up front fee combined with a royalty fee.</li> </ul>
<b>Strategic Benefits Risks</b> Early launch of product delayed by unrelated project issues	Minor	Moderate	<ul style="list-style-type: none"> <li>The benefits of early launch may be lost, but the benefits of reduced development costs will still be available. The increased design flexibility of SoftFrame may assist in solving some project hardware or specification issues.</li> </ul>
<b>Support Risks</b> Service and training	Moderate	Moderate	<ul style="list-style-type: none"> <li>Clarinox provide product training with SoftFrame</li> <li>Negotiate a product service contract with Clarinox Technologies</li> <li>If required Clarinox can be contracted to provide embedded software development services, replacing our internal software engineering resource</li> </ul>
<b>Other Risks</b> Untried product supplier	Moderate	Unlikely	<ul style="list-style-type: none"> <li>Speak to current Customers</li> </ul>

Legend Categories:

- Severity Grading – Catastrophic, High, Moderate, Minor, Insignificant.
- Likelihood – Almost Certain, Likely, Moderate, Unlikely, Rare.

## 8 Financial Analysis

The following examples are designed to assist the customer in the financial analysis of the benefits of Clarinox SoftFrame:

Development cost savings		Comments
<b>Example 1: a small business</b>		
In house development project		
Development team	3.5	Software engineers (average)
Embedded software development project	7	total duration of project
	2.5	effort months
Cost of Software development engineer	\$600	per day
Total resource cost	\$105,000	
SoftFrame assisted development project		
Development team	1	Software engineers
Embedded software development project	2	months
Cost of Software development engineer	\$600	per day
SoftFrame up front investment	\$7,000	Typical
SoftFrame royalty cost	\$30,000	Typical
Total resource cost	\$61,000	
Net Development cost saving using SoftFrame	\$44,000	
<b>Example 2: a large business</b>		
In house development project		
Development team	5	Software engineers (average)
Embedded software development project	7	total duration of project
	2	effort months
Cost of Software development engineer	\$1,200	per day
Total resource cost	\$240,000	
SoftFrame assisted development project		
Development team	1	Software engineers
Embedded software development project	3	months
	2	effort months
Cost of Software development engineer	\$1,200	per day
SoftFrame up front investment	\$7,000	Typical
SoftFrame royalty cost	\$30,000	Typical
Total resource cost	\$85,000	
Net Development cost saving using SoftFrame	\$155,000	

These two examples show how, under different assumptions, the development cost savings can be calculated.

The following analysis shows the differential effect of the use of ClarinoxSoftFrame in the development of product embedded software. That is, the analysis shows the increase in cash flow stream directly resulting from choosing to use SoftFrame rather than developing in house.

The four input variables are:

1. Up front cost of purchasing and using SoftFrame
2. Savings in development costs resulting from using SoftFrame (see previous section)
3. Increased margins resulting from earlier introduction of the product to the market

The customer will need to estimate the financial benefits of early product release. The factors that need to be estimated are:

1. increased sales revenue directly due to earlier introduction (ie. Monthly sales revenue multiplied by number of months early)
  2. increased sales revenue due to higher margins over the lifetime of the product (ie. Total product volume multiplied by increased margin)
  3. increased sales revenue due to higher market share/higher volume of product sold per month (ie. Product price multiplied by increased product volume).
4. Ongoing embedded software maintenance costs

## Discounted Cash Flow Analysis

	Yr0	Yr1	Yr 2	Yr 3	Yr 4	Yr 5
Increased Margin		200,000	150,000	125,000	110,000	100,000
Development Cost Savings		44,000				
<b>Costs</b>						
Implementation Costs - one off costs	37,000					
Recurring costs (annual maintenance costs)			N/A	N/A	N/A	N/A
<b>Net Effect on Cash Flow</b>	<b>-37,000</b>	<b>244,000</b>	<b>150,000</b>	<b>125,000</b>	<b>110,000</b>	<b>100,000</b>
Accumulative Cash Flow		244,000	394,000	519,000	629,000	729,000
NPV (15%, 5 Years)		\$483,396				
IRR (5 Years)		623%				
Payback Period		< 1 year				

(An example of the estimated benefit for desktop laser printers is given in reference 6 – the conclusion was that a product launch six months earlier can increase whole of lifetime profits by 31%).

## 9 Implementation

### 9.1 *Project team resources*

It is anticipated that one software engineer will be required to oversee and develop the embedded software for this project.

### 9.2 *Implementation plan*

The investment in ClarinoxSoftFrame can be quickly implemented as the product is available immediately.

1. Specification of required ClarinoxSoftFrame modules (1 week)
2. Purchase ClarinoxSoftFrame (2 days)
3. Training/familiarity (1 day)

## 10 References

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