

WindRiver Systems: The Transition from Consulting to Products (A)

This Case was written by M.G. Lyons, Consulting Associate Professor, Stanford University School of Management Science and Engineering. It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Copyright © 2007 Stanford University. All Rights Reserved.

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Overview

Instead of building a company from scratch to pursue an identified market, sometimes companies that are formed to deliver technology-based services to clients hit on market opportunities for products that can create transition strategies enabling much higher market capitalizations than would be possible for a consulting company. These opportunities are hard to predict or visualize at the outset.

Background: Jerry Fiddler and WindRiver

After graduating from UC Berkeley in 1977 with a Masters in Computer Science, Jerry took a position in 1978 doing software development at the Lawrence Berkeley National Lab working on Government funded research. His continued frustration with working in a Government lab led to the founding of WindRiver in 1981. He figured if he could make almost as much money while controlling his own destiny, he'd be much happier.

WindRiver started in a garage as a sole proprietorship consulting to clients like NFL sports teams and Francis Ford Coppola. Microprocessor "embedded" applications were starting to become important. In particular, around 1985, 16-bit processors were ready to replace mini-computers for proprietary applications but the operating system software and application development tools were not. Embedded systems engineers all tended to be hardware centric. There was no standards-based way to map applications to these devices. Software solutions were highly ad hoc. Network computing was in its early development stage as well and the hardware was way ahead of software implementation.

Launch of VxWorks in 1987

The consulting business needed an operating system and an IDE to increase project efficiency, margins, and revenue. Using existing components like Berkeley TCP/IP, a Sun C compiler, NFS and other available utilities, a small team was able to create the first VxWorks product by leveraging an existing product, VRTX. The name *VxWorks* is a pun on the VRTX real-time operating system, at the time created by Ready Systems, now a Mentor Graphics product. In the early 1980s VRTX was a new product. It was just a very minimal kernel, 4KB in size, and could not be fully used as an operating system because it was missing so many features. Wind River acquired the rights to resell VRTX with an extension named VxWorks which was much more feature-complete (including for example an I/O system, a file system, a

network, and an [integrated development environment](#)), so VxWorks was meant to imply *VRTX now Works* or *VRTX that Works*.

When Wind River anticipated that Ready Systems would cancel the license agreement, they developed their own kernel and offered it as an option that could be used in VRTX's place. The core functionality of the VxWorks kernel is similar to that of VRTX, though the architecture is quite different.

Like most [RTOSes](#), VxWorks includes a [multitasking kernel](#) with pre-emptive [scheduling](#) and fast [interrupt](#) response, extensive [inter-process communications](#) and [synchronization](#) facilities, and a [file system](#).

Major distinguishing features of VxWorks include efficient [POSIX-compliant memory management](#), [multiprocessor](#) facilities, a [shell](#) for user interface, symbolic and [source level debugging](#) capabilities, and performance monitoring.

Although VxWorks was initially created as an internal tool for Wind River's consulting business, it provided obvious advantages for anybody else doing embedded device development. The company saw this as an opportunity, and therefore made the necessary investment to convert it to an off-the-shelf product, and transformed itself from a consulting to a product-based company.

VxWorks is generally used in [embedded systems](#). Unlike "native" systems such as [Unix](#) and [Forth](#), VxWorks development is done on a "host" machine running Unix or Windows, [cross-compiling](#) target software to run on various "target" [CPU](#) architectures as well as on the "host" by means of VxSim.

VxWorks has been ported to a number of platforms and now runs on practically any modern CPU that is used in the embedded market. This includes the [x86](#) family, [MIPS](#), [PowerPC](#), [SH-4](#) and the closely related family of [ARM](#), [StrongARM](#) and [xScale](#) CPUs.

Company Growth

The product was extremely successful. Revenues accelerated at a 125% growth rate between 1987-1993. From 1987 until 1990, about 80% of all demos resulted in a sale because the product was so highly

differentiated. In 1990, Venture capital investments were taken and the Company went public in 1993 (WIND).

Study Questions

1. WindRiver didn't get VC financing until 3 years after its product launch. How much do you think they raised and what dilution did the founders incur?
2. Under what conditions would this strategy work again?