

# High-Technology Innovation and Entrepreneurship: Principles and Pitfalls

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## CHI 2003 Tutorial

Fort Lauderdale, Florida, USA  
7 April 2003

# Agenda

Introduction	9:00-9:10
1. Innovation and Entrepreneurship	9:10-9:35
2. Focus and Objectives	9:35-10:10
3. Opportunity and Timing	10:10-10:30
<i>Coffee Break</i>	<i>10:30-11:00</i>
3. Opportunity and Timing (cont.)	11:00-11:15
4. Proprietary Technology	11:15-11:45
5. From Technology to Product	11:45-12:15
6. Writing a Business Plan	12:15-12:30
<i>Lunch break</i>	<i>12:30-2:00</i>
7. Marketing and Sales	2:00-2:35
8. Finance and Financing	2:35-2:50
9. Leadership, Management, Partnerships Q&A, and Discussion	2:50-3:15 3:15-3:30
<i>Coffee Break</i>	<i>3:30-3:50</i>
Panel of Guest Entrepreneurs	3:50-5:30

# Objectives

HCI is a fertile area for high-technology innovation. Design and usability are also critical to success in a variety of high-technology ventures.

As a result many HCI people are involved in entrepreneurial startups, or have considered founding or joining a startup, or are involved in intrapreneurial ventures in established companies. This tutorial is for such individuals.

More specifically:

- Managers of start-up or high-growth entrepreneurial technology firms or intrapreneurial ventures within established firms face complex problems. This tutorial covers topics where they will likely need help.
- Individuals thinking of starting their own company often have unrealistic expectations of the ease and speed with which they can make their fortune. This tutorial will acquaint them with the realities of the current technology marketplace.
- Individuals thinking of joining start-up or high-growth technology firms often also have unrealistic expectations. This tutorial will help them intelligently evaluate employment opportunities, avoid turkeys, and better contribute to firms they do join.

After taking this tutorial, you will:

- Have learned basic principles for defining and crafting a healthy profitable growing high-tech business or line of business
- Be better able to understand the problems and avoid the pitfalls
- Have gained practice in thinking about strategic high-technology business issues
- Understand how challenging all of this is.

## High-Technology Innovation and Entrepreneurship: Principles and Pitfalls

- A One-Day Tutorial
- CHI 2003
- 7 April 2003
- 
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## Introduction

- The Instructor
- Objectives
- Methods
- Guest Entrepreneurs
- Topics and Schedule

## Ronald M. Baecker

- Bell Professor of Human-Computer Interaction, and Professor of Computer Science, Elec./Comp. Eng., and Management, University of Toronto
- Founder and Chief Scientist, Knowledge Media Design Institute, University of Toronto
- Visiting Professor and Research Scientist — M.I.T. Media Lab, Apple Computer, Xerox Palo Alto Research Center
- B.Sc., M.Sc., Ph.D., M.I.T.

## Ronald M. Baecker (cont.)

- Founder and CEO (1976-1983), HCR Corp., UNIX contract R&D firm, sold in 1990 to SCO
- Founder and CEO (1998-2002), Expresto Software Corp., multimedia software products firm, sold in 2002 to Caseware Int'l.
- Adviser+consultant to start-up software firms
- Has taught versions of this course in Toronto, Ottawa, Calgary, Vancouver, Los Angeles, Buenos Aires (Argentina), Santiago (Chile)

## Objectives

- To learn principles for defining and crafting a healthy profitable growing high-tech business or line of business, i.e., both *entrepreneurship* and *intrapreneurship*
- *To be better able to understand the problems and avoid the pitfalls*
- To hone one's skills in thinking about strategic high-tech business issues
- To convey how difficult this is

## Methods

- Lecture and discussion of material organized in terms of principles for success
- Exercises
- Elaborations and illustrations based on experiences of real “HCI” companies
- Panel of guest HCI entrepreneurs/intrapreneurs
  - James Landay
    - Co-founder and CTO, NetRaker Inc.
  - Aaron Marcus
    - Founder and principal, Aaron Marcus and Associates
  - Dave Martin
    - Co-founder and CEO, Smart Technologies
  - Gord Kurtenbach
    - Director, User Interface Research, Alias|Wavefront

## James Landay

- Co-founder and CTO, NetRaker Inc.
- Netraker sells a suite of Web site evaluation tools and associated consulting services
- Netraker (Mountainview CA) founded in 1998
- James
  - Professor of Computer Science at UCal, Berkeley
  - Co-author of *The Design of Sites*
  - Research foci: UI design tools, gesture recognition, pen-based UI, mobile computing, visual languages

## Aaron Marcus

- Founder and principal, Aaron Marcus and Assoc.
- AM+A provides user-interface and information visualization design consulting
- AM+A (Emeryville CA) founded in 1982
- Aaron
  - First graphic designer to work full-time in computer graphics (1967)
  - Presenter of numerous tutorials at SIGCHI, HCII, UPA, HFES, SIGGRAPH
  - Author of several books, including *Graphic Design for Electronic Documents and User Interfaces*

## Dave Martin

- Co-founder and CEO, Smart Technologies
- Smart develops and markets Roomware products: interactive whiteboards, multimedia furniture, whiteboard camera systems and software
- Smart (Calgary Alberta) founded in 1987
- Smart Canada's Exporter of the Year in 2000
- Dave
  - In charge of strategic planning, corporate alliances and partnerships, and setting the vision for the company
  - Member, Prime Minister's Advisory Council on Science and Technology

## Gord Kurtenbach

- Director, User Interface Research, Alias|Wavefront
- Alias|Wavefront develops and markets 3D graphics technology for the film, video, game development, interactive media, industrial design and visualization markets
- Alias Research founded in 1983
- Alias|Wavefront formed in 1995
- Gord
  - Will focus on the intrapreneurial development of Alias Sketchbook Pro for the Tablet PC



## Morning Topics and Schedule

- *Introduction* 9:00-9:10
- Innovation/Entrepreneurship 9:10-9:35
- Focus and Objectives 9:35-10:10
- Opportunity and Timing 10:10-10:30
- *Coffee Break* 10:30-11:00
- Opportunity and Timing (cont.) 11:00-11:15
- Proprietary Technology 11:15-11:45
- From Technology to Product 11:45-12:15
- Writing a Business Plan 12:15-12:30

## Afternoon Topics and Schedule

- Marketing and Sales 2:00-2:35
- Finance and Financing 2:35-2:50
- Leadership/Management/Partnerships 2:50-3:15
- Q&A and Discussion 3:15-3:30
- *Coffee Break* 3:30-3:50
- Panel of Guest Entrepreneurs 3:50-5:30

## *An Interactive Tutorial with Questions Encouraged!*

- *Let's start with a few student introductions ...*

## **I. Innovation and Entrepreneurship**

- Information technology and Internet Industries
- Entrepreneurship
- Intrapreneurship
- Hardware-enabled software paradigms
- Drucker's sources of innovative opportunity

## Information Technology Industries

- Millions of people
- Hundreds of millions of Web sites
- Billions of Web pages
- Tens of billions of email messages per day
- Tens of billions of \$ of e-commerce per year
- U.S.\$250B per year — U.S. software industry
- Huge .com fortunes made (and lost)
- Despite ups and downs of economy, a continuing supply of opportunities for entrepreneurship and intrapreneurship

## Entrepreneurship

- “Entrepreneurship is the dynamic process of creating incremental wealth. The wealth is created by individuals who assume the major risks, in terms of equity, time, and/or career commitment, of providing *value* for some *product or service*. The product or service may or may not be new or unique, but value must somehow be infused by the entrepreneur by securing and allocating the necessary skills and resources.” (Ronstadt, 1984, p. 28)
- “Entrepreneurship is a little like coming to a traffic light which is red and not necessarily stopping.....”
- “The job of an entrepreneur in our 'competitive' economy is to create an unfair advantage.....”

## Exercise

- *Why be an entrepreneur?*
- *Please answer in a few words.*

## Motivations for Entrepreneurship

- Wealth
  - “I can smell the Ferrari.”
- Independence, being your own boss
- Building something
- An idea that cannot be denied, must be done
- But must also ease real “pain”, offer a compelling *value proposition* to enough paying customers
  - Enabling something that couldn’t be done previously
  - Saving \$, speeding a process, improving quality, etc.

## The Entrepreneurial Spirit

- *Don't start a business unless you possess an entrepreneurial spirit — the courage to take risks, to venture into the unknown, and to make decisions despite uncertainty. You must have self-confidence, drive, energy, and boundless commitment. You must also possess expertise — a distinctive competence, and qualities of leadership. (#1)*

## Intrapreneurship

- Entrepreneurship in corporate environments
- Conceptualizing and initiating change — developing (beyond one's job description) new ideas, services, products, systems, process improvements, businesses
- Requires an innovation culture that encourages and rewards and exploits new ideas
- Example: *Alias|Wavefront Sketchbook Pro*

## Intrapreneurship (cont.)

- Problem typically not lack of ideas. Why so hard?
- Kanter's "rules for stifling innovation" describe how the desire for excessive control, beurocracy, small-mindedness, and fear of failure often stifle innovation (see also Dilbert)
- "The emphasis... is on getting a substantial percentage of all the members of the company thinking innovation on a daily basis so that business as usual is subject to experimentation and change." (Brandt)

## Hardware-enabled Software Paradigms

- *Scan technology trends carefully looking for new hardware paradigms that could open up and enable new software paradigms and applications, sometimes called "killer apps." New software paradigms, e.g., the spreadsheet, object-oriented programming, CASE, hypertext, neural nets, groupware, and eCommerce, open up new domains of vigorous entrepreneurial activity. (#2)*

## New Paradigms

- |                     |                         |                              |
|---------------------|-------------------------|------------------------------|
| • IBM Mainfr.       | Capacity planning       | <i>BGS Systems Best 1</i>    |
| • HP minis          | RDBMS+4GL               | <i>Cognos PowerHouse</i>     |
| • Personal computer | PC software develop.    | <i>Microsoft Basic</i>       |
| • Apple II          | Spreadsheet             | <i>Visicorp Visicalc</i>     |
| • IBM PC            | Integrated Productivity | <i>Lotus 1-2-3</i>           |
| • Macintosh         | Desktop publishing      | <i>Aldus PageMaker</i>       |
| • SGI Workstation   | Sensual 3D design       | <i>Alias Research ..</i>     |
| • Networks          | Groupware               | <i>Lotus Notes</i>           |
| • Networks          | Grid computing          | <i>Platform Computing ..</i> |
| • The Internet      | Global info access      | <i>Netscape Navigator</i>    |
| • The Internet      | Virtual stores          | <i>Amazon.com</i>            |
| • PDAs              | PDA software            | <i>Palm ..</i>               |
| • Wireless          | Wireless software       | <i>7/24 Solutions ..</i>     |
| • Tablet PCs        | Pentric software        | <i>Alias Sketchbook Pro</i>  |

## Drucker's Sources of Innovative Opportunity

- *Search for sources of innovation systematically, as Drucker asserts is possible, looking at (#3):*
  - New knowledge
  - The unexpected
  - Process need
  - Changes in industry or market structure
  - Demographics
  - Incongruities
  - Changes in perception, mood or meaning.

## New Knowledge

- New hardware paradigms
- New software paradigms & proprietary algorithms

## New Hardware Paradigms

- Highly || machines enabling new approaches to weather forecasting, exploration
- VLSI graphics chips enabling applications in computer animation, simulation, virtual reality, entertainment, education, e.g., *SGI*
- Internet enabling commerce, information access, communications, e.g., *Amazon.com*, *eBay*
- Ubiquitous computing enabling new applications in office and home



## New Software Paradigms

- The spreadsheet, e.g., *Visicorp Visicalc*
- The relational database management system
- Graphical user interfaces (GUIs), e.g., *Apple*
- Object-oriented programming
- Hypertext, e.g., *Netscape Navigator*
- Neural nets
- Groupware, e.g., *Lotus Notes*
- Intelligent agents

## Proprietary Algorithms

- Performance modelling algorithms
- Speech recognition algorithms
- Handwriting recognition algorithms
- Load sharing software, e.g., *Platform Computing*
- Search engines, e.g., *Google*

## The Unexpected

- Use of “scientific” computers for business
- Success of the personal computer
- Extensive use of spreadsheet macros by non-programmers, e.g., *Consumer Software Spreadsheet Auditor*
- Multiple PCs in the home
- Success of Internet
- eCommerce “success”, e.g., *Amazon.com*, *eBay*
- Teenage high-tech fashion, e.g., *Mirabilis ICQ*
- Sept. 11

## Process Need

- Interfaces between systems and standards
- Software emulating one environment in another
- Compilers replacing interpreters, e.g., *Borland*
- More generally, performance enhancements
- Novel coupling of technology to application
  - Electronic page layout, e.g., *Aldus Pagemaker*
  - Computer-aided design
- Using spare cycles on networks of computers, e.g., *Platform Computing*

## Process Need (cont.)

- Corporate collaboration, e.g., *Lotus Notes* and *Groove Networks* desktop collaboration software
- Network design and management tools
- Software metering tools
- Virus immunization tools
- Universal mailbox software
- Email filtering software
- Internet security and privacy software
- Internet domain name registration, e.g., *Tucows*

## Changes in Industry or Market Structure

- Innovations in promotion, e.g., *Lotus*
- Innovations in pricing, e.g., *Borland*
- Innovations in distribution, e.g., shareware, open source software
- Innovations in packaging, e.g., software suites
- Changes in manufacturing, e.g., *Dell Computer*
- Decentralization/communications replacing travel, hence the need for electronic mail

## Changes in Industry/Market Structure (cont.)

- Computing/telecom convergence → groupware opportunities, incl. *White Pine CUSeeMe*
- Opening up of Eastern Europe → new markets for technology and software
- Increasing availability of broadband → Internet multimedia, e.g., network games
- Internet success → new publishing, distribution, and eCommerce opportunities

## Demographics

- Increasing amounts of home-based business
- Increasing amounts of telecommuting
- Continuing high levels of illiteracy
- Growing expectations in “developing countries”
- Increasing numbers of skilled “downsized” people
- Increasing numbers connected to the Net
- Increasing numbers of wireless phones
- Increasing numbers of elderly people

## Incongruities

- Discrepancies between reality as it actually is and reality as it is assumed to be or as it “ought to be,” e.g.....
  - “High-level” languages not very high-level → 4GLs
  - Voice mail not just electronic answering machine technology → need for “voice mail surgeons”
  - Everything you want to know is on the Net, yet you can't find it → search engines, e.g., *Google*

## Changes in Perception, Mood, or Meaning

- “I'm mad as hell ... not going to take it anymore”
  - “The computer for the rest of us” ... *Apple Macintosh*
  - More emphasis on ergonomics, “user friendliness”
- Wearable computers as fashionable, not geekish
  - *Charmed Technologies, BodyMedia*
- Sept. 11
  - Technological options to travel, i.e., videoconferencing
  - Technology for security
  - Responses to cyber-terrorism

## *Questions and Discussion*

## II. Focus + Objectives — Defining and Planning the Business

- Entrepreneurial Success
- Focus
- Objectives
- Competitive Edge
- Distinctive Competence
- Proprietary Technology
- Barriers to Entry

## Equation for Entrepreneurial Success

- *To succeed, according to Silver's Law of Venture Capital, you must identify a major problem, devise an elegant solution to the problem, and assemble an outstanding entrepreneurial team capable of turning the problem and the solution into a successful business. If any of the three factors is lacking, all is for naught. (#4)*

## Silver's Law of Venture Capital

- If  $V = \text{Valuation}$ , then  $V = P \times S \times E$ , where
  - $P = \text{Problem size (i.e., market)}$
  - $S = \text{Solution elegance (e.g., technology)}$
  - $E = \text{Entrepreneurial team quality}$
- “The goal of entrepreneurship is to create value ( $V$ ) by formulating a big problem ( $P$ ), creating an elegant solution ( $S$ ) that solves the problem, and forming a capable entrepreneurial team ( $E$ ) to create a unique system for delivering  $S$  to  $P$ .”
- Ask yourself ... where is the *pain* to be alleviated?
- Ask yourself ... what is the *value proposition*?