

290T: The Business of Software

Class Wrap-up: What Did We Learn?

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In the beginning

- **One way or another, all software products begin with people, the team – even a team of one individual**
- **Typically:**
 - **A group of like-minded engineers**
 - **An individual marketer**
 - **An individual entrepreneur**
 - **Or a combination of the above**



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Key SW Team Members

- Key elements of a software product team
- Product leader - the engine
 - spends 24 hours a day working to make project successful
- Architect - the chassis
 - understands the current problem formulation and how the software is structured to solve it
- Marketeer - the steering wheel
 - customer champion - understands the customer's problem
- Visionary - the map reader
 - knows where you've been and where you are going
- (Backstop) – anchor, ballast, lifeboat
 - answers any question, codes the team out of almost any bind

- *“Find the right people and fire them [like a rocket].” G. Tate, CEO Rambus*
- *If you get the right people in the right positions the rest will take care of itself.*

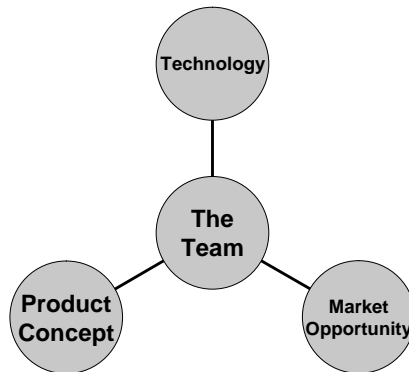
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Product Team Reviews Showed

- As Chief Scientist and later CTO, reviewed 25 core/product teams:
- 100% correlation between team presence of team roles (Leader, Architect, Marketeer, Visionary, Backstop) and product success
- The roles were
 - Understood
 - Staffed
 - Recognized
 - team members respected each other's roles
 - Members rarely competed for roles
- Overall characteristics
 - Clear roles and responsibilities
 - Mutual respect
 - Mutual accountability
 - Genuine admiration

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The Beginning of a Company



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Product Concept Development

Marketing

Adapted for SW from Exhibit 2-2 of Ulrich and Eppinger, 2004

- Identify key customer needs
- Identify “lead customers” – imaginative
- Identify competitive products

Design

- Scope development time and resources
- Prototype
 - For customer feedback
 - To resolve key technical challenges
- Examine intellectual property (patent) issues

Manufacturing and distribution

- We thought we had it easy – but still: licensing, keying, distribution

What did Documentum do?

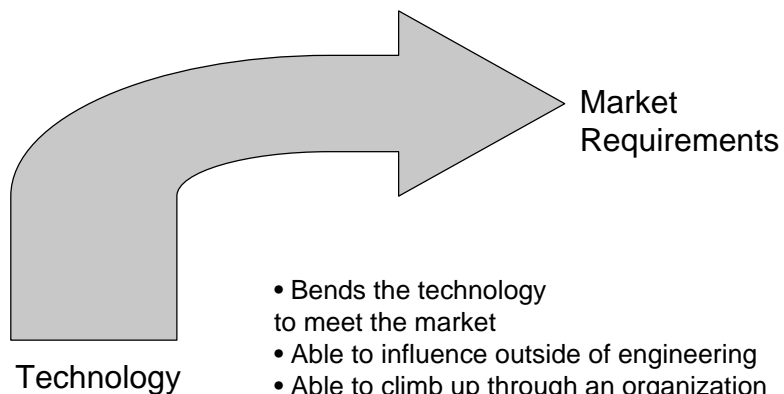
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The Technology

- **Could be radically new and disruptive**
 - Relational data bases
 - Logic synthesis
- **Could be an incremental improvement (NB: Incremental improvements can still solve “headaches”)**
 - Matlab accelerator
 - Compiled code Verilog simulation
- **Could simply be cheaper**
- **But a technology is still not a product – what does our engineer need to learn?**

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The Savvy Engineer



- Bends the technology to meet the market
- Able to influence outside of engineering
- Able to climb up through an organization
- Able to found his/her own company

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Market opportunities

Simple formulas

- Find a lucrative existing market with a lot of headaches
 - Enterprise corporations with
 - Human resource management issues
 - Payroll
 - Benefits
 - Incentive stock-options
 - Non-qualified stock options
 - Vacation/paid-time off/leave-without pay
 - Part-time employment/parental leave
 - IC design teams failing to keep up with Moore's Law
 - Meet an emerging market (Internet) with a killer application
 - The browser for the internet (Netscape)
 - The portal to the internet (Yahoo)
 - The search tool for the internet (Google)

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Sizing the opportunity

Bottom up analysis

- $\text{Number_of_users} * \text{average_sales_price_of_sw} = \text{total_available_market}$
- $\text{Number_of_users_you_can_service} * \text{average_sales_price_of_sw} = \text{serviceable_market}$
- Compute "penetration rate" of the market

Top down analysis

- Average tool budget of IC design team/industry 1-3% of expected revenue
- Average enterprise corporation Information Technology budget
- Size these down by the relative importance of your application (what other products will your customers give up to buy yours)

If you're lucky these numbers are available from Dataquest, Gartner Group, International Data Corporation – otherwise

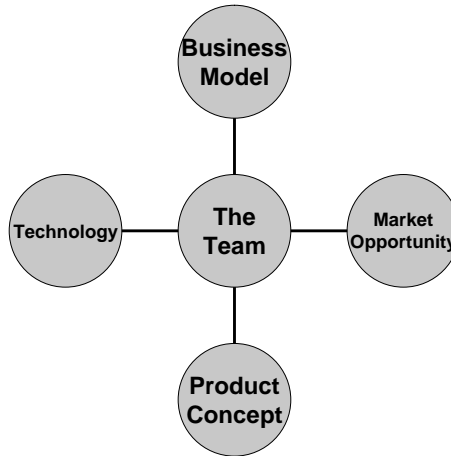
- Private industry analysts (e.g. Will Stauss, Handel Jones)
- International trade shows (Design Automation Conference), Journals (EE Times) and organizations (ACM- SIGDA, IEEE etc.)

That gives you a market opportunity – what's next?

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The business model

- A business model is a system model for the inputs (intellectual property, human effort, capital) and outputs (products, revenue, earnings) of a business



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A Basic Business Model

Your team

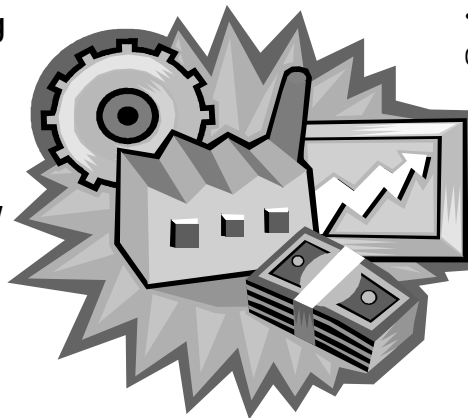
Factory/tooling

- Essential Infrastructure
- R&D Staff

Key technology

Capital needs

- Self-funded
- Angel, VC



Products/Services

- Product/service definition

Marketing

- Market sizing

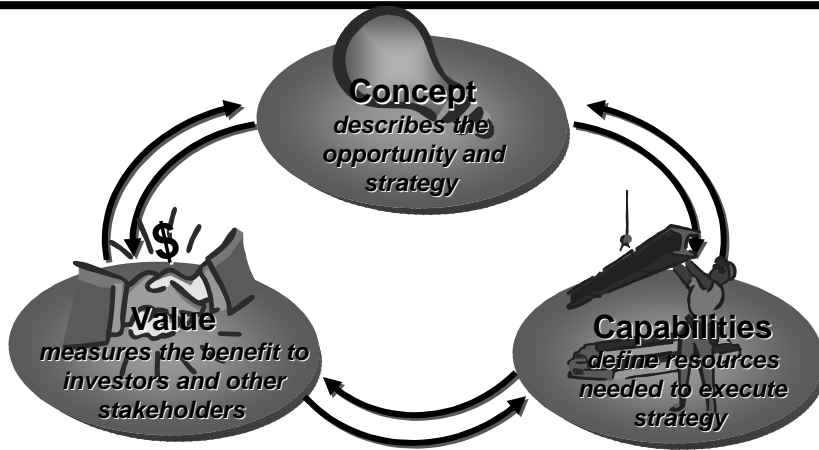
Mktg/Sales

- Model of sales engagement

A system model of the business enterprise
If we put \$\$ into the factory, how do we get more \$\$ out

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What is a Business Model?

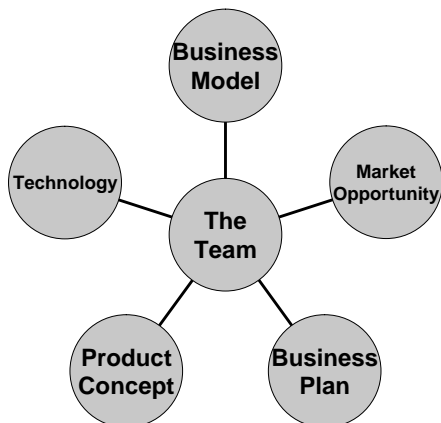


Adapted from Applegate et al, *Corporate Information Strategy and Management*, Chapter 2
McGraw-Hill/Irwin 2003
Adapted by Ray Trygstad, Illinois Institute of Technology

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Business plan

- Need a model of how the product is to be marketed and sold – with financials



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The business plan

The business plan is principally a codification of the business model

- Key questions to address:
- Who are the customers? Target, alpha, beta
- Why should they buy this product?
- How will we validate that the product meets spec?
- What is the “phrase that pays” for the product positioning
- Is there a competitor that can cover your phrase? If not, who are closest competitors?
- Who will be your reference customers?
- What is the one action your competition could take in the next year that would hurt most?
- What is the one action you could take that would hurt your competition most?

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Contents of a Strategic Business Plan for an Entrepreneurial Venture

I. Table of Contents	X. Human Resources Plan
II. Executive Summary	XI. Ownership
III. Nature of the Business	XII. Risk Analysis
IV. Strategy Formulation	XIII. Timetables and Milestones
V. Market Analysis	XIV. Strategy Implementation—Action Plans
VI. Marketing Plan	XV. Evaluation and Control
VII. Operational Plans—Service/Product	XVI. Summary
VIII. Financial Plans	XVII. Appendices
IX. Organization and Management	

**Wheelen/Hunger: STRATEGIC
MANAGEMENT AND BUSINESS POLICY, 8/e (Prentice-Hall, 2002)**

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Simple Outline of the Business Plan

- Team overview
- Business environment
- Product Overview
- Sales and Marketing Plan
- Financial Summary
- Product Development Plan
- Final checklist

Business plan should allow brilliance in:

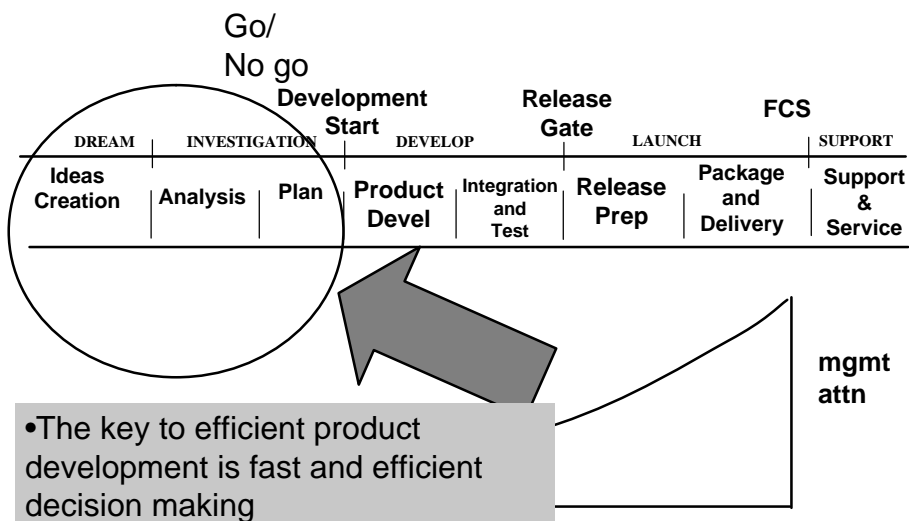
- Market identification
- Product and technology
- Business innovation

to stand out

Business plan is not intended to hide flaws or baffle the viewer/reader

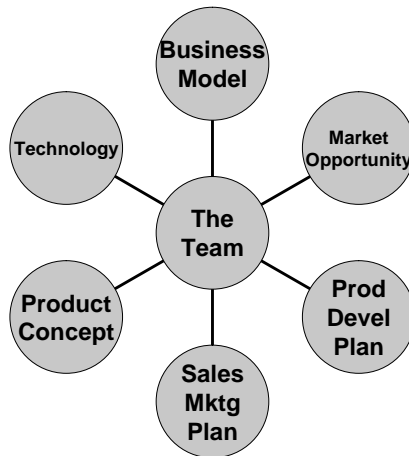
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The Key to Product Development



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With development and financial plans



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Five Easy Questions to a Funded Inc.

- **QUESTION #1: Is your product or service a vitamin or a painkiller?**
 - *Do you know the value of your product?*
- **Q #2: What is the day in the life of your user?**
 - *Do you know your customer?*
- **Q #3: Who are your competitors?**
 - *Do you know your competitive environment?*
- **Q #4: How far will this money take you?**
 - *Do you know your financials?*
- **Q #5: Do you have a CEO?**
 - *Do you know your team?*
- **Courtesy of Mayfield**

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How do we assess the entry value of a company?

- **Cost of replacement**
- **Recent comparables**
- **Present value of future earnings – discounted cash-flow calculation**
- **Disposition of buyers**
 - **Angels**
 - **Venture Capitalists**
 - **Corporate VCs**
- **Disposition of sellers**
 - **The founding team**

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Barriers to entry

These are partially overlapping (“not orthogonal in nerdspeak”)

- **Intellectual property protection**
 - **Patents**
 - **Trade secrets**
- **Lock on the shelf space**
 - **Unique relationship with distributors that eliminates competitors**
 - **Challenge: ruthlessly competitive distributors**
- **Own a key link in the user flow**
 - **Own the source, define the language – e.g. Matlab**
 - **Own the target (e.g. target hardware)**
 - **Challenge: trends toward standardization**
- **Dominant market share**
 - **Especially true for software**
 - **Low incremental cost so dominant player amortizes the development cost the most**
 - **Challenge: evolving markets, *innovators dilemma***
- **Technical lock – exclusive access to technologies/individuals that are essential to success of your endeavor**

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And the Money Arrives

- With a promising market, an experienced team, and a viable product plan funding is landed



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How do we assess the "exit" value of a company?

- Cost of replacement
- Recent comparables
- Present value of future earnings – discounted cash-flow calculation
- If they were public today, what would be their value on NASDAQ?
- Disposition of buyers
 - Investment bank
 - Public markets
- Disposition of sellers
 - The founding team
 - Venture capitalists
 - Employees
 - Board members
 - Angel investors

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What did engineers learn about business?

- “Oh my gosh, I’m going to be a pawn in the game for the rest of my life!”
 - **Some business understanding can change this**
- **Engineers can also learn to make the “marketing elbow”**
- **Intellectual property protection may be the second most important domain of knowledge that you have**
- **Find a business-oriented partner whose judgment (and character) you trust and stick with him/her**

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What did business-types learn about engineers?

- **Engineers are not interchangeable parts**
- **Some engineers can**
 - **Code 10X more productively than the norm**
 - **Create code that runs 10X faster than the norm**
 - **Create code that has 1/10 as many bugs as the norm**
- **Choose an engineering partner whose judgment (and character) you trust and stick with him/her**

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What did I learn from the course?

- I get more excited about the software industry every time I think about it
- From an academic standpoint, the software industry displays business principles so clearly and cleanly because there are so few “incidentals” (materials, geographic limitations, large capital requirements)