



15.482 Healthcare Finance

Spring 2017

Andrew W. Lo, MIT

Unit 7: Venture Capital &
New Business Models

Disclaimer

I am NOT a biotech venture capitalist!

- This may be a feature rather than a bug...
- I invest in biotech startups and biotech VC funds
- I advise biotech startups and VC funds
- My focus is on financing and business strategy
- My own startup experience

Rashomon Moment





The Challenges of Drug Development

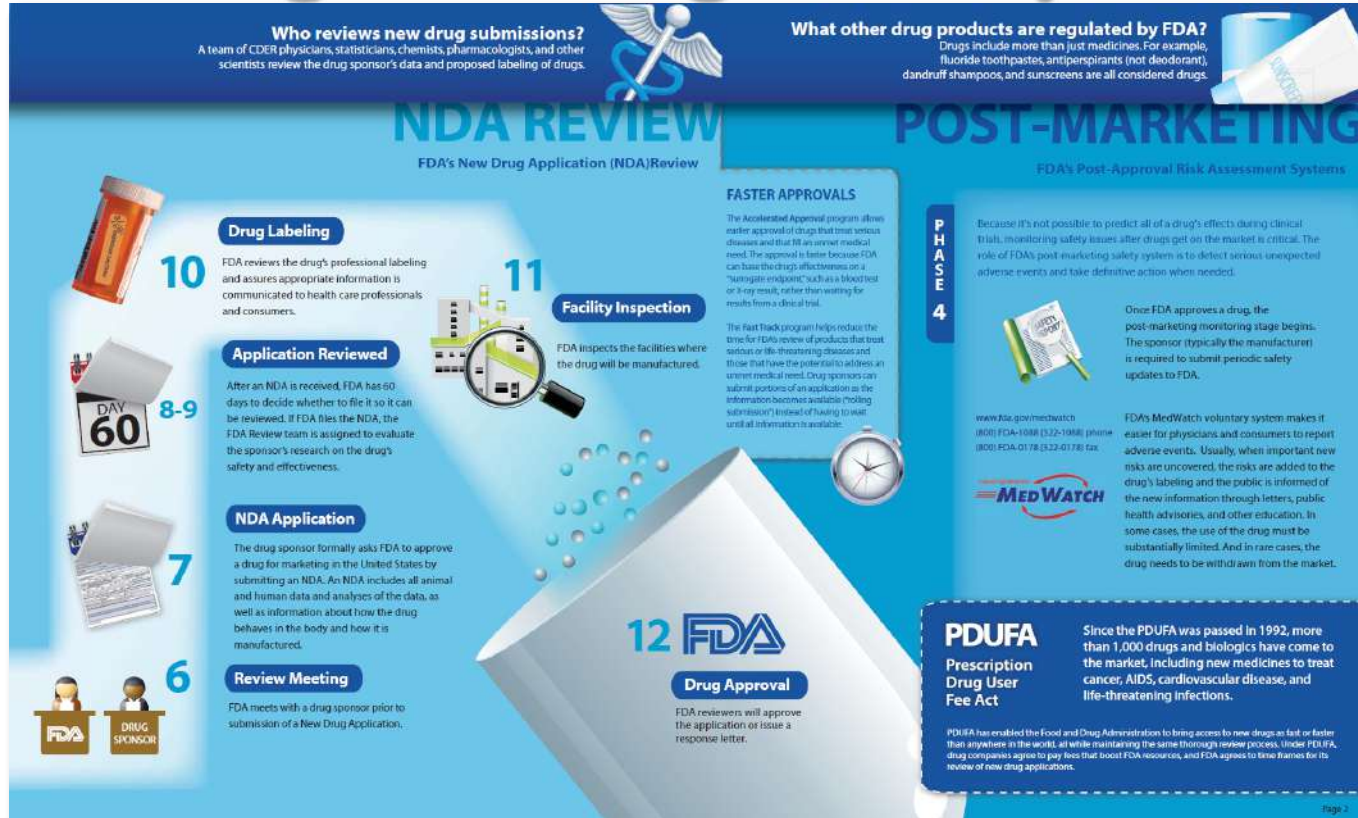


→ **“Maximum Tolerated Dose”**

→ **“Biological Activity”**

→ **“Clinical Effectiveness”**

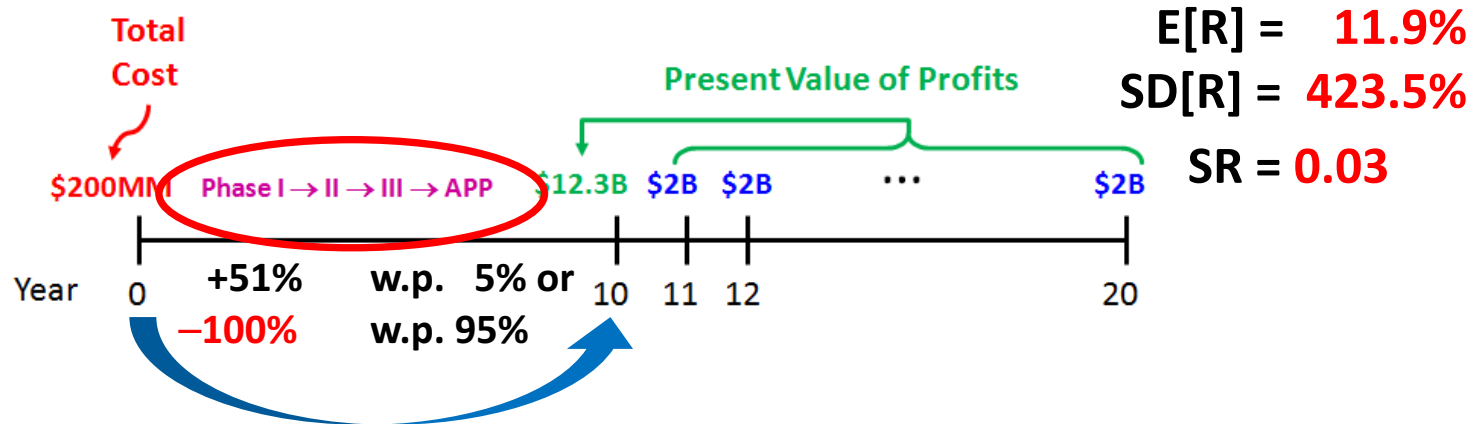
The Challenges of Drug Development



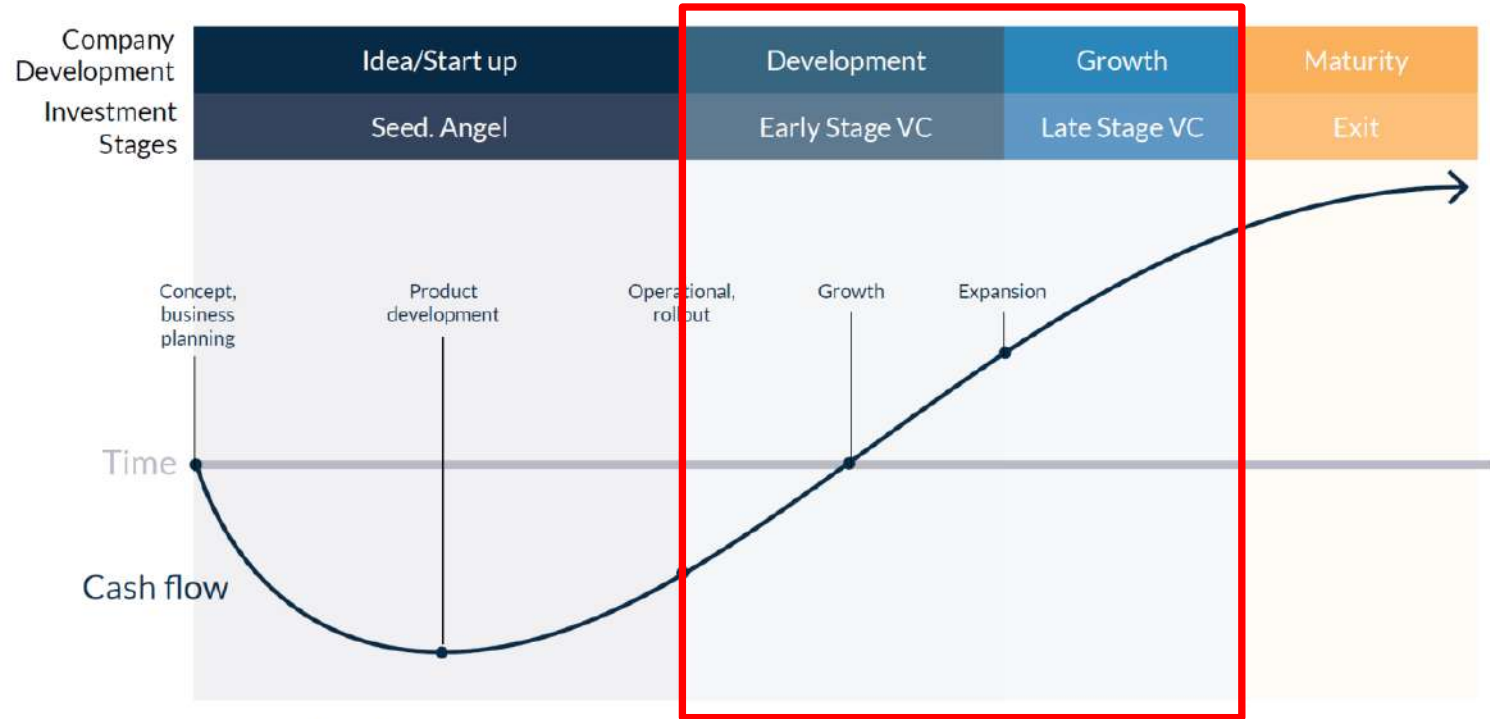
The Challenges of Drug Development

Would You Invest In This Project?

- \$200MM investment, 10-year horizon
- Probability of positive payoff is 5%
- If successful, annual profits of \$2B for 10-year patent



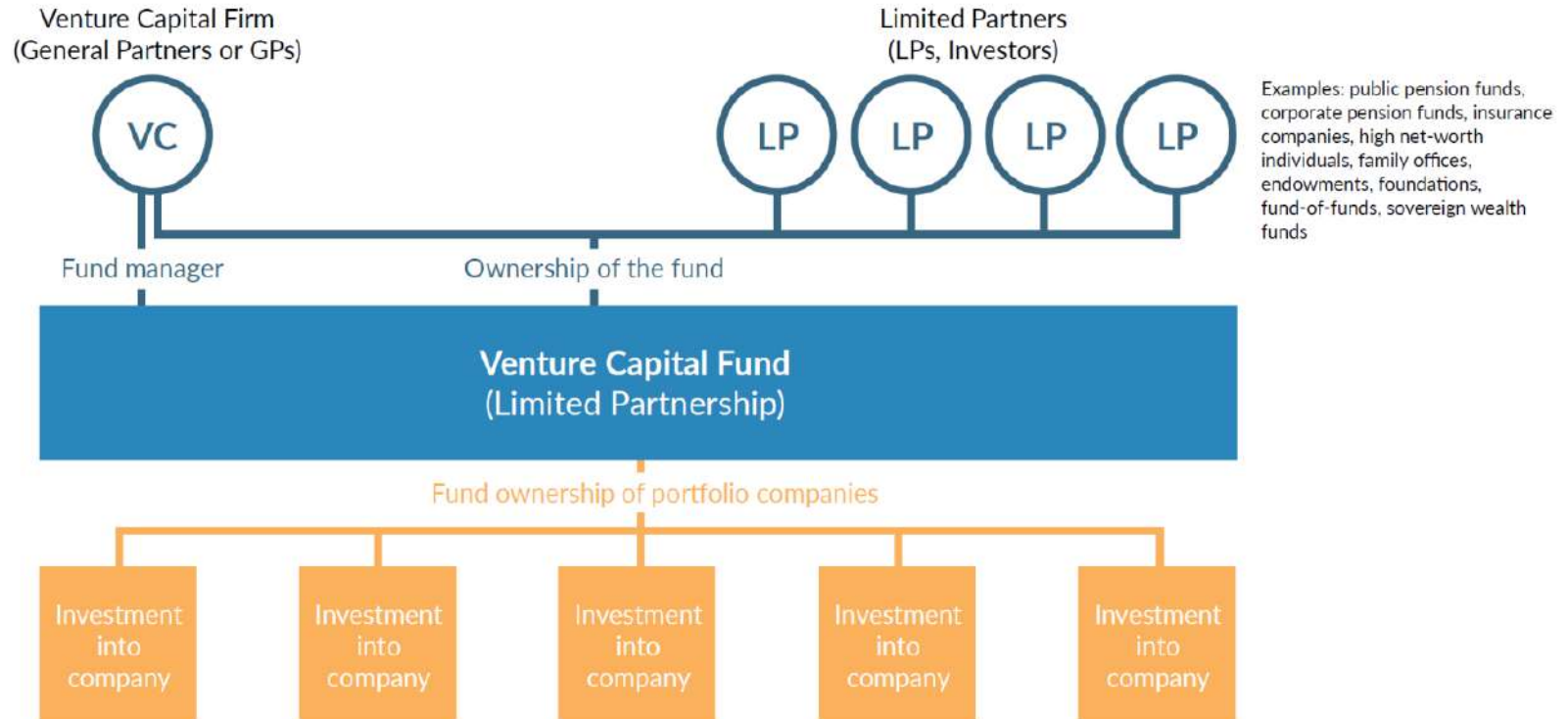
What Is Venture Capital?



Sources of funding: VCs, angel investors, incubators, accelerators, strategic investors (corporate groups), growth equity investors, private equity firms, debt investors

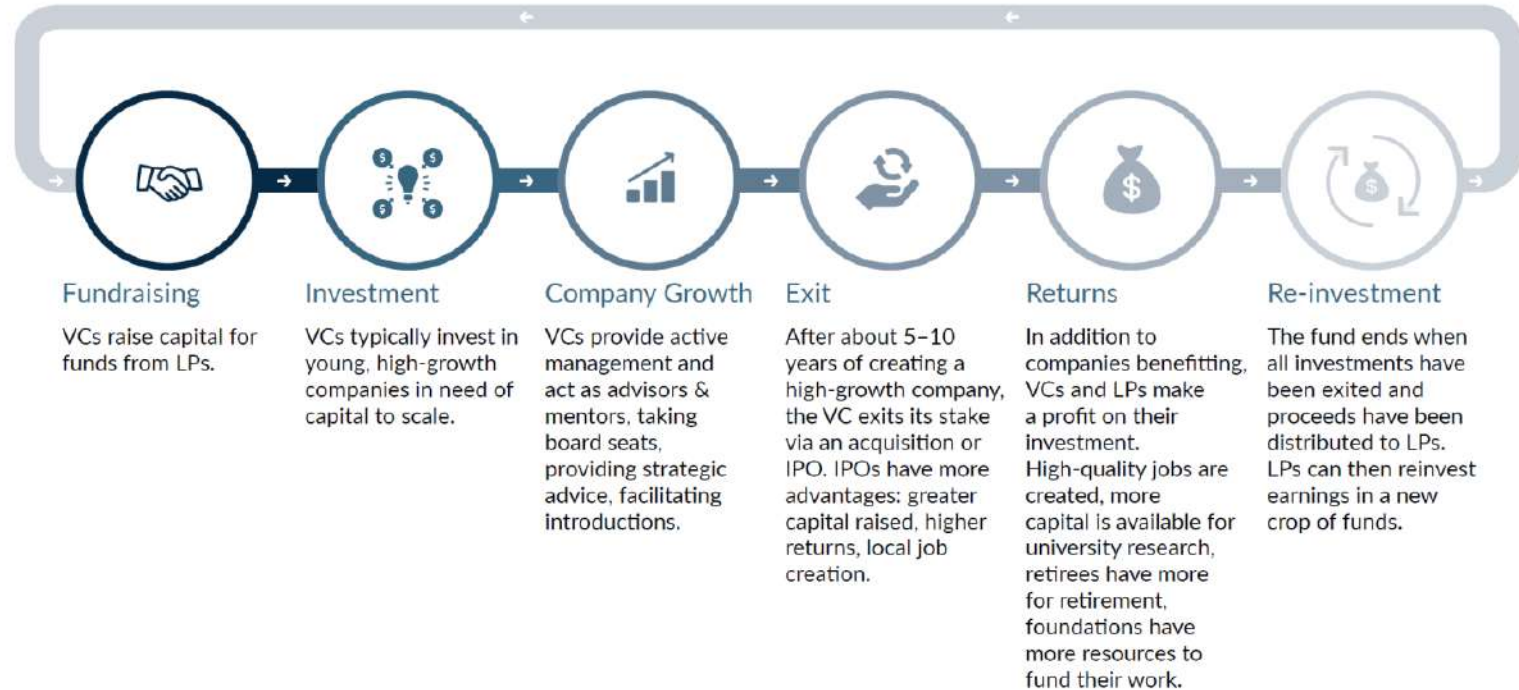
Source: nvca.org (2018 Yearbook)

What Is Venture Capital?



What Do VCs Want?

How Venture Capital Works



Investing In Startups Is High Risk

Asymmetry of Information between Entrepreneur and VC

The entrepreneur can assess the value of the firm much more accurately

- Few external sources of information
- Intangible assets
- Inputs are difficult to measure

Asymmetry of Objectives between Entrepreneur and VC

Entrepreneur

- Build a company
- Realize a vision
- Financial returns
- Management/ control of firm

Venture Capitalist

- Build a portfolio of high flyers
- Reputation, financial returns
- Control of firm in bad states
- Exit rights

Term Sheet Is Key

Term Sheet Component	Description	Objective
1. Staged commitment of capital	VC provides capital to entrepreneur in several rounds, e.g., seed stage, expansion etc.	Manage investment risk; Control firm development
2. Convertible securities	Debt-like security that can be converted into common stock, e.g., convertible preferred	Allocate control to the party with more expertise; incentives for entrepreneur; distribute cash flow rights
3. Covenants	Contract provisions to establish governance of firm	Control rights; incentives for entrepreneur
4. Registration Rights	Define exit options for VC and entrepreneur	Obtain liquidity for VC and entrepreneur

Term Sheet Is Key

15.482

NATIONAL VENTURE CAPITAL ASSOCIATION

Funding innovation. Empowering entrepreneurs.

ABOUT NVCA ▶

PUBLIC POLICY ▶

NEWSROOM ▶

RESEARCH ▶

ECOSYSTEM ▶

RESOURCES ▶

JOIN NVCA ▶

MEMBERHUB

Resources / Model Legal Documents

MODEL LEGAL DOCUMENTS

Annually, the venture industry closes several thousand financing rounds, each consuming considerable time and effort on the part of investors, management teams and attorneys. Conservatively, the industry spends some \$200 million in direct legal fees annually to close private financing rounds. In an all-too-typical situation, the attorneys start with documents from a recent financing, iterate back and forth to get the documents to conform to their joint perspective on appropriate

DOWNLOAD

NVCA offer Documents, community, short form v

Voting

Term Sheet

Stock Purchase Agreement

Right of First Refusal/Sale Agreement

Last Updated: January 2019

TERM SHEET FOR SERIES A PREFERRED STOCK FINANCING OF (INSERT COMPANY NAME), INC.

This Term Sheet is a non-binding document. It is intended to provide a summary of the terms of the financing and to serve as a starting point for the negotiation of the definitive documents. The definitive documents will be subject to legal review and approval by counsel to the Company and the investors.

Offering Terms

Closing Date:

Investors:

Amount Raised:

Price Per Share:

1. The choice of law clause in the term sheet to good faith (May 24, 2019) (holding that the obligation was enforceable under the law of the state of Delaware) (the "Choice of Law Clause") shall be the law of the state of Delaware. The Company acknowledges that it is a Delaware corporation and that the law of the state of Delaware shall govern the interpretation and enforcement of the term sheet.

Last Updated: January 2019

While venture capital investors in the tech sector are generally reluctant to enter into confidential disclosure agreements (CDAs) and generally eschew them, life science venture investors generally will enter into CDAs in advance of looking at proprietary and confidential information. This form was developed by in-house counsel at a number of leading life science venture firms and represents consensus "best practices" for a life science VC that is the receiving party.

CONFIDENTIALITY AGREEMENT

This Confidentiality Agreement (this "Agreement") is made and entered into as of [] ("Effective Date"), by and between [] ("Company") and VC FIRMVC FUND ("Recipient") (the Company and Recipient, collectively, the "Parties").

1. **Definition of Confidential Information.** "Confidential Information" as used in this Agreement shall mean information concerning Company's business, property or technology that has commercial and other value [related to the Company's programs described in Attachment A - attach non-confidential presentation or description if available], is confidential in nature and not generally known to the public and is disclosed by Company to Recipient. Information shall be identified as "Confidential" at the time of disclosure and disclosed in writing, or if disclosed orally or visually, shall be confirmed in writing as confidential within thirty (30) days of such oral or visual disclosure. [Consider including where disclosing company is public: Notwithstanding anything else contained in this Agreement, Company hereby represents and agrees that all Confidential Information disclosed under this Agreement will either (A) not constitute material non-public information relating to the Disclosing Party for purposes of U.S. federal or state securities laws or (B) be publicly disclosed no later than [] ("Company's earnings call or quarterly (or annual) report for the quarter ending 2011"). Company acknowledges that Recipient intends to rely on this representation and agreement in selling securities acquired by Recipient from Company, if any.]

2. **Non-disclosure and Non-use Obligation.** Recipient shall not disclose any Confidential Information of Company to any third party (other than to its employees and representatives as provided for below), and shall only use Confidential Information of Company in connection with its internal evaluations of the proposed transaction or business relationship between the parties. Recipient will treat all Confidential Information with the same degree of care as it accords its own Confidential Information, but in no case less than reasonable care. Recipient will disclose Confidential Information only to those of its employees and representatives [including without limitation actual or potential co-investors already under CDA with the Company, and Recipient's members, partners, directors, officers, contractors, agents, advisers, affiliates, attorneys, accountants, lenders and consultants] who need to know such information and who are bound by confidentiality obligations that are similar to those which protect the Confidential Information hereunder.

3. **Exclusions from Non-disclosure and Non-use Obligations.** Recipient's obligations under Paragraph 2 shall not apply to Confidential Information that is (a) in the public domain known in the trade at or subsequent to the time communicated to Recipient by Company through no fault of Recipient; (b) rightfully in Recipient's possession free of any obligation of confidentiality at or subsequent to the time communicated to Recipient by Company; (c)

Source: <http://nvca.org>

Staged Commitment and Dilution

Date 0

Assets	Liabilities
Idea	Susan
V_0	V_0

Date 1

Assets	Liabilities
Idea, Patent	Susan, MIT
V_1	V_1

Date 2

Assets	Liabilities
Idea, Patent, Cash, Plant, Equipment	Susan, MIT, Investors, Employees
V_2	V_2

V_0

?

<

V_1

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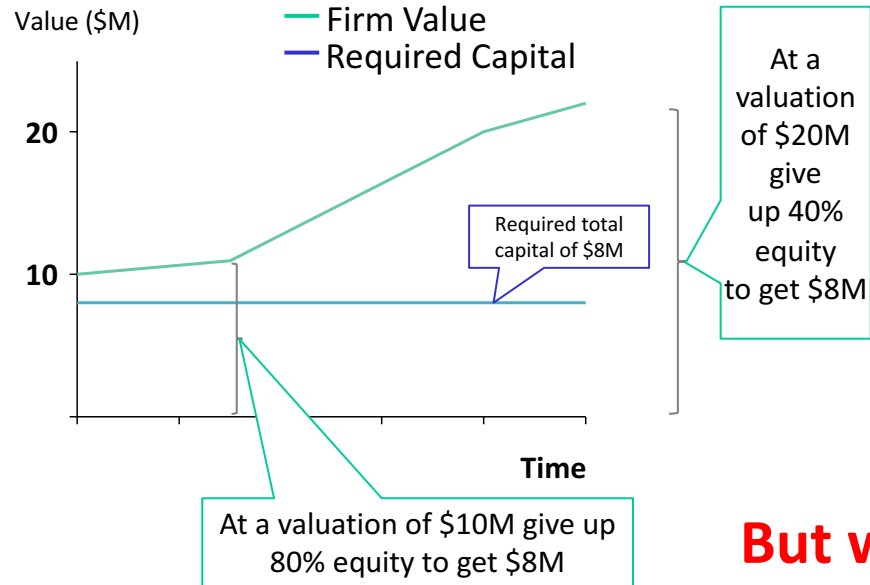
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V_2

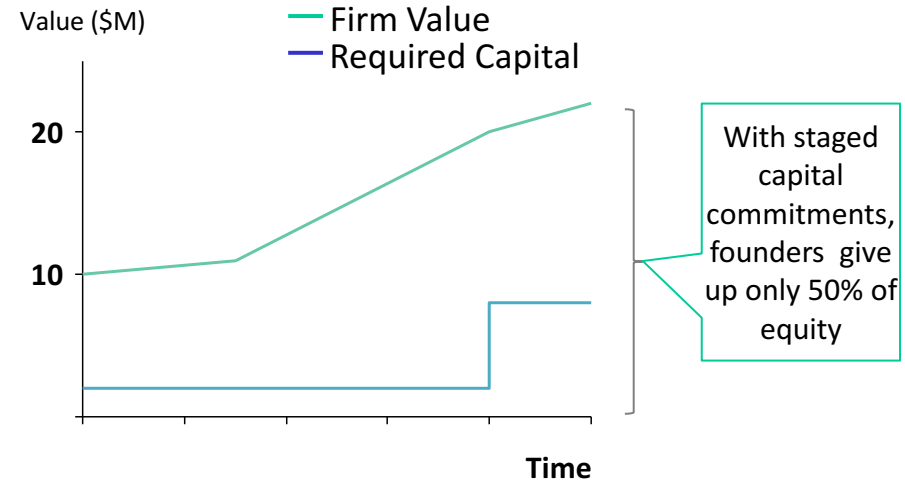


Staged Commitment and Dilution

**Upfront capital commitment:
raise \$8M in one round**



**Staged capital commitment: raise
\$2M up front and \$6M at later stage**



But what if you can't get \$6M later??

Challenges For The Entrepreneur

- Raise enough capital to reach the next value inflection point
- Don't take too much capital now, otherwise you get diluted
- But assess and manage the risk that capital may not be as readily available if/when you reach that point (rainy day capital)
- Ensure that the next round will be an up-round ($V_t > V_{t-1}$)

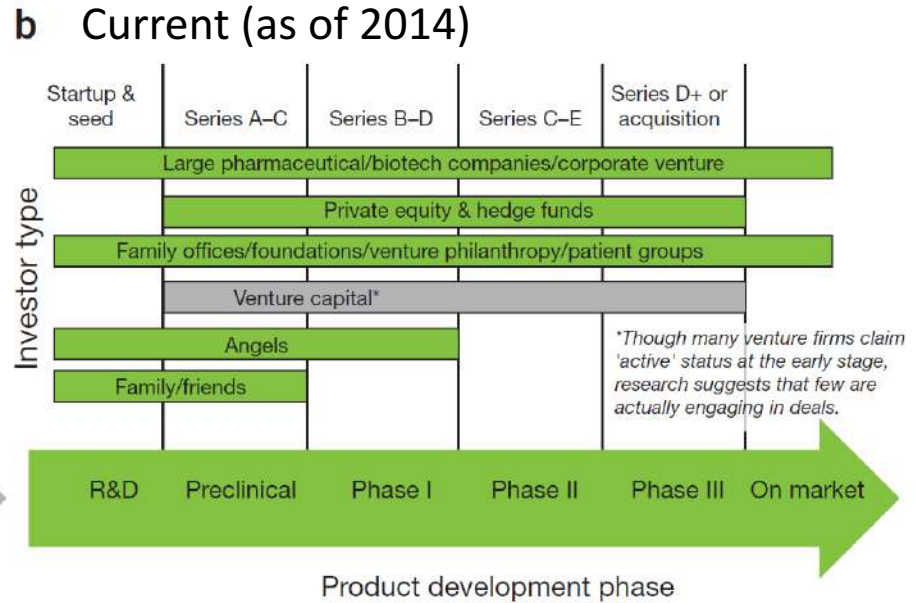
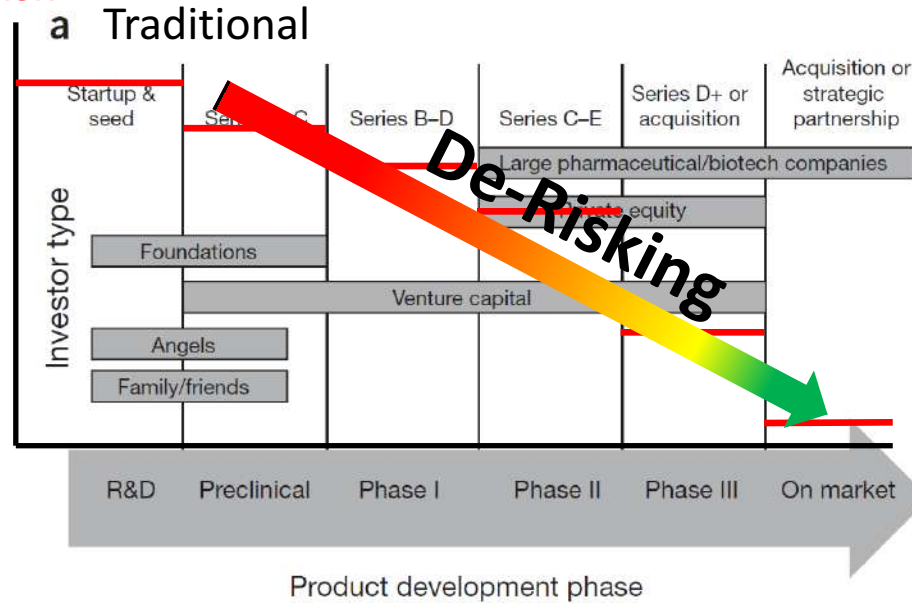
How To Do This??

- Pay attention to financing needs, cost of capital, timelines
- Get to know current and future investors and **communicate**



Raising Capital

Risk

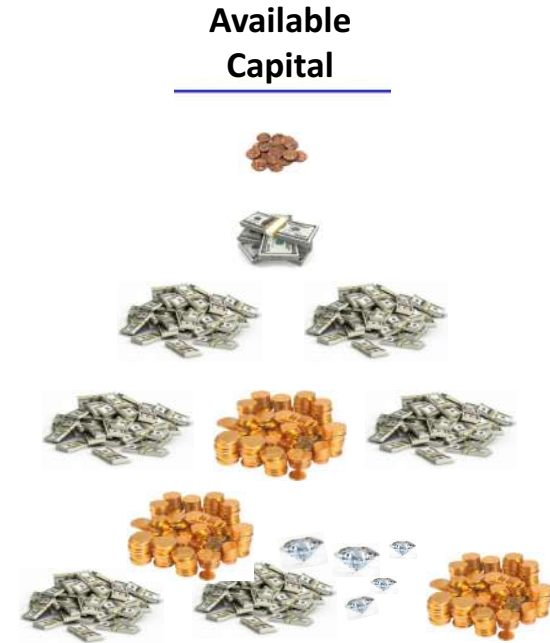
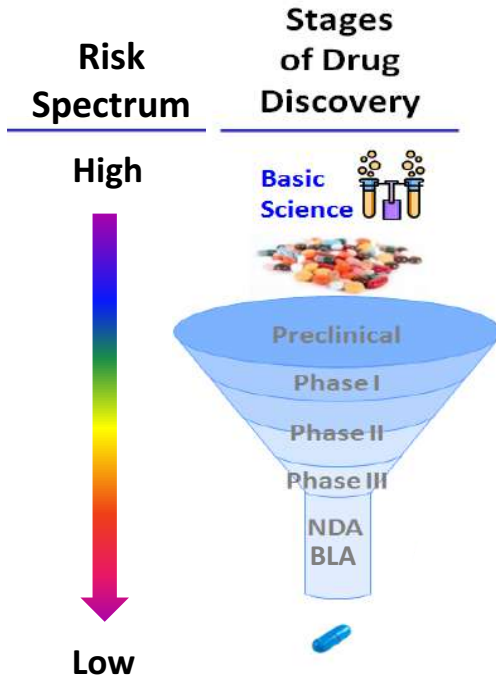


Source: Ford and Nelsen (NBT, 2014)

The Funding Ecosystem

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$$\text{Sharpe Ratio} = \frac{\text{Reward}}{\text{Risk}}$$



The Funding Ecosystem

- NIH, NSF, SBIR, DOD/DARPA, MassBIO, etc.
- Philanthropy (e.g., MIT RD)
- Patient Advocacy Groups (e.g., CFF)
- Big Pharma (“innovation centers”)
- Biotech
- CROs

How To Tap Into These Resources??

Ten Tips for Raising Startup Capital in Biotech

– Bruce Booth, Atlas Ventures (9/12/13)

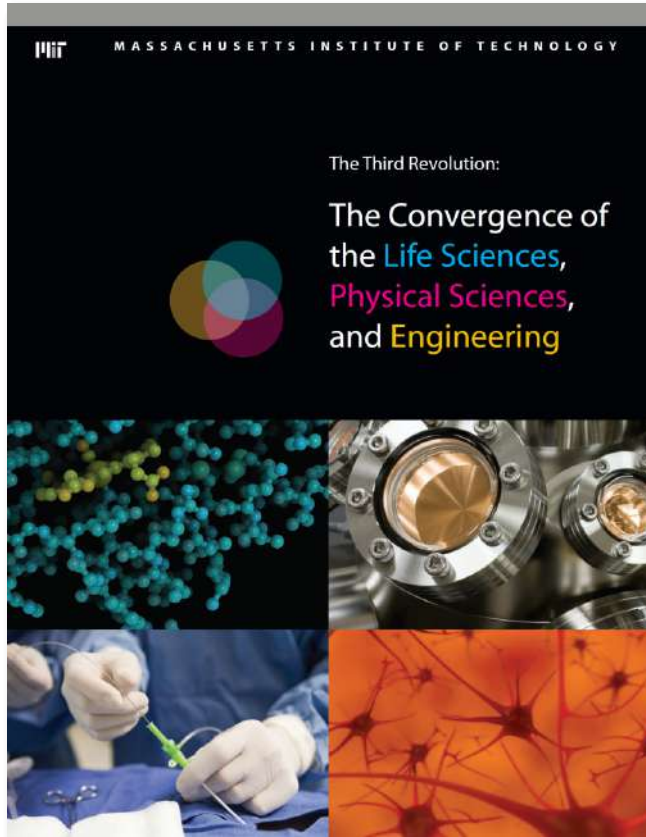


1. Know your investor audience
2. Know what you are, and what you aren't
3. Sell the science, because that's what we're buying in early stage startups
4. Make sure your team has some gray hair, but not so much as to lack youthful enthusiasm
5. Biotech R&D is all about risk management and mitigation, so have clear sense of the first major de-risking

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6. Ground your valuation expectations in reality
7. Present a credible case for the long-term capital needs of your company and the likely liquidity paths
8. Your introduction to a venture firm matters
9. Don't skimp on legal advice as you lay out the foundations of a startup
10. Crank up the energy – the time is now



The “omics” Revolution:

- Gen**omics**
- Epigen**omics**
- Transcript**omics**
- Prote**omics**
- Metabol**omics**
- Microbi**omics**

What About Econ**omics**??