What Drives Venture Capital?

A Perspective From Both Sides of the Table

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Agenda

1. Introduction
2. How Venture Capital Works
   - The Impact of Internal Rate of Return Expectations
3. Case Study: Sandbridge Technologies, Inc.
   - A $15M Powerpoint Presentation
4. The Future of Venture Capital
   - Big Changes Coming….

Thought Experiment

You are an entrepreneur….

- You have worked for 10 to 12 hours per day, often 7 days a week for the past 3 years,
- You have risked your entire personal savings,
- You have endangered your marriage,
- You see your kids mostly just before they fall asleep,
- You have questioned your own sanity,

But, you finally have a working prototype….

The Entrepreneur's View

What??

- They want 10X return on their money?
- They want 65% ownership of my company?
- They want a controlling vote on the Board of Directors?
- They want to be paid their money first before anyone else gets anything, even me, the founder, if we sell the company?

Vulture Capitalists!!

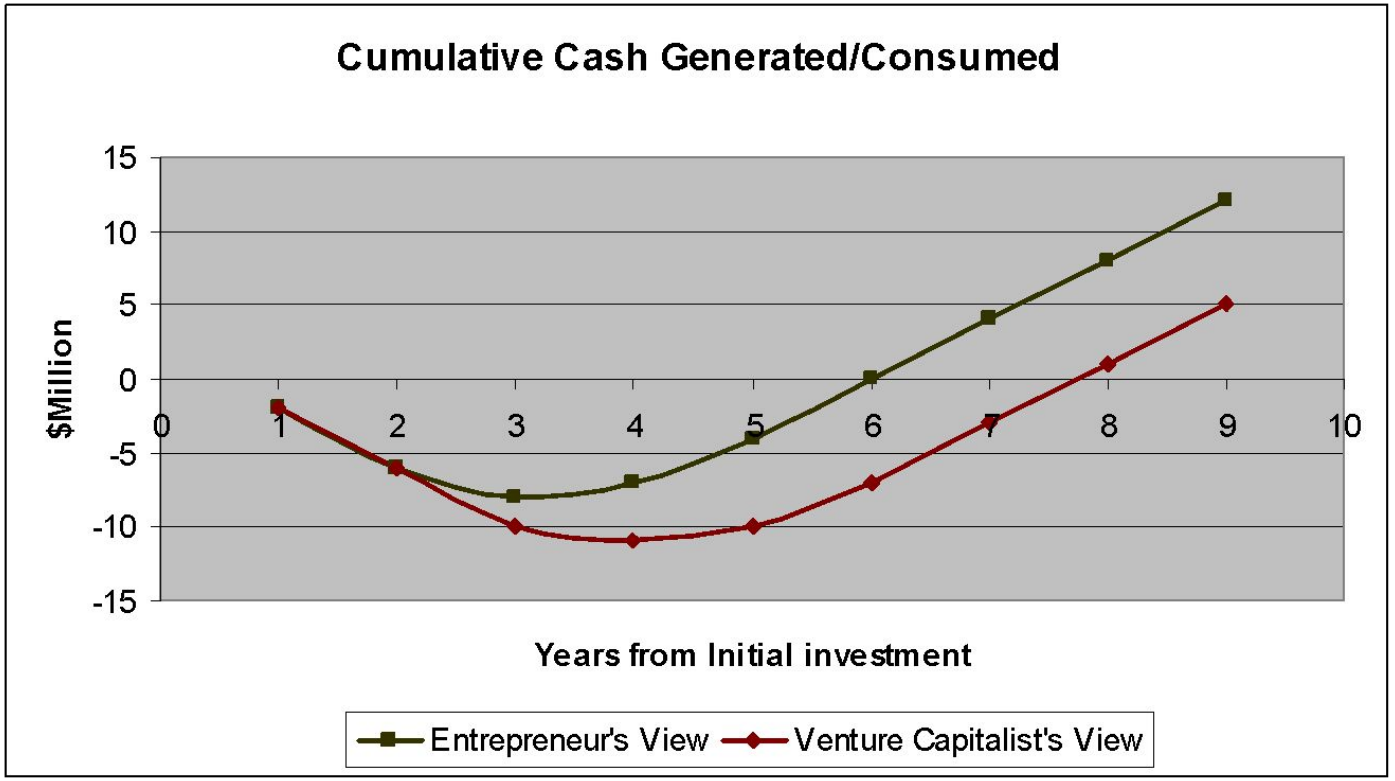
The Venture Capitalists View

This guy has a good idea , BUT:

- He has no CEO track record and has never run a company before
- His executive team has significant holes (especially in marketing)
- The company's business plan is way too optimistic, especially given that it has missed critical milestones, twice
- They have one significant customer, but that customer is known for collaborating with innovative start-ups and then doing their own thing

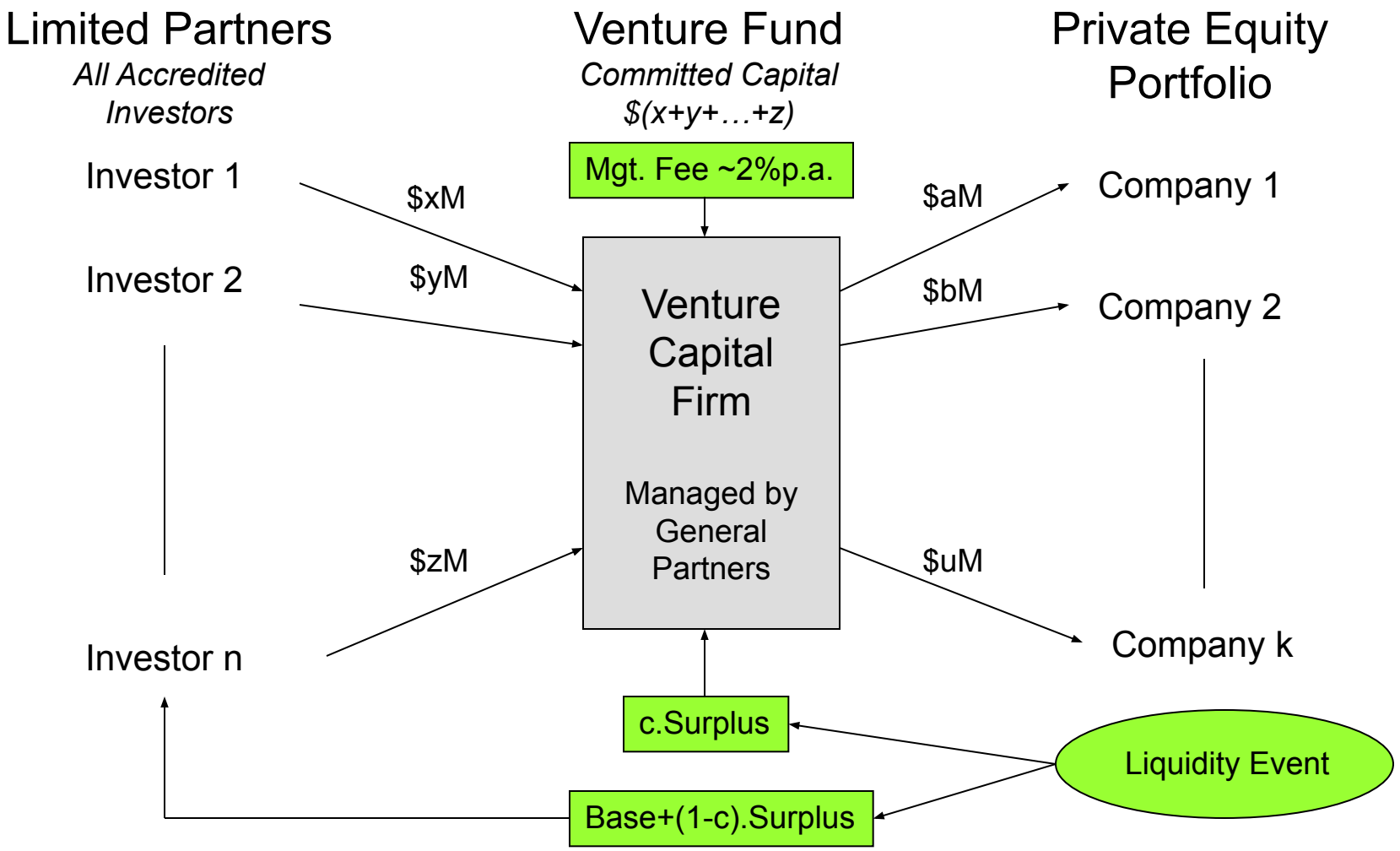
I will ensure that our term sheet enables me to protect my capital and is structured so that I can direct the CEO to correct the issues with the company or replace him with someone that can if he does not!

The Primary Reason



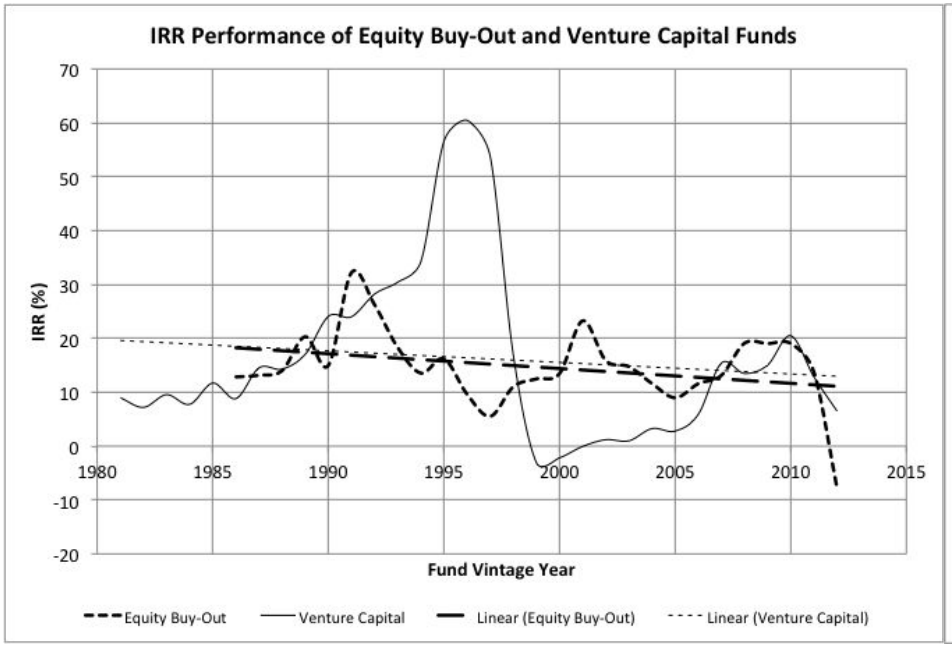
The Entrepreneur, by definition, is an optimist
The Venture Capitalist, by experience, is a pessimist
The partnership can work, sometimes spectacularly, if each understands what is driving the other.

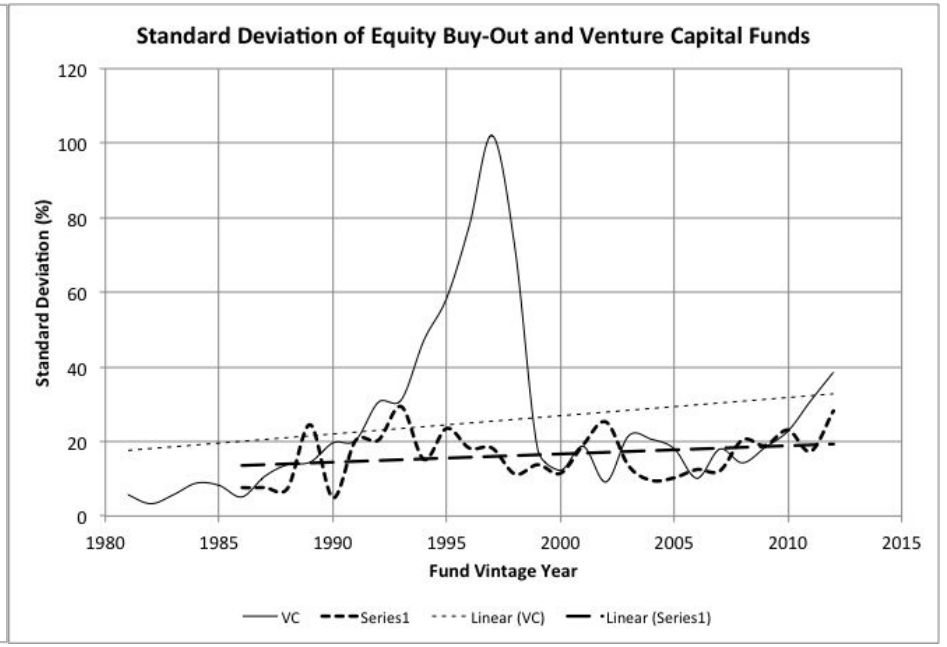
How Venture Capital Firms Work



C = “Carry” = 20% - 35%

EBO and VC Historical Performance





Source: US Venture Capital Index and Selected Benchmark Statistics, June 2014, Cambridge Associates, LLC
IRR: Net cash on cash returns to Limited Partners (after deduction of management fees and carry percentages)

AVERAGE IRR (1999-2009)	**AVERAGE IRR (1999 -2009)**
Electronics: -0.54%	**Information Technology:** 24.23%
Financial Services: 14.42%	- Internet-Business: 23.2%
BioTech: 16.04%	- Internet-Commerce: 37.8%

Implications of IRR Expectations

Required capital growth to achieve IRR:

Time from investment:	**5 Years**	**7 Years**	**10 Years**
IRR: 25%	3.0X	4.8X	9.3X
IRR: 33%	4.2X	7.4X	17.3X
IRR: 50%	7.6X	17.1X	57.7X

To achieve 33% IRR, a $1 investment needs to grow to $7.40 in 7 years.

Typical VC Fund Performance

Ten year VC fund that returned 3X net to limited partners from a portfolio of 20 companies:

- Received proposals from >1,000 companies per year
- Agreed to view presentations from 300+ companies per year
- Performed Due Diligence on 30 companies per year
- Invested in 3 - 4 companies per year (during first 5 years of fund)
- 10 companies were shut down within 3 years of initial investment
- 6 companies were acquired within 3-7 years and returned sufficient to recover capital
- 3 companies were acquired within 3-7 years and returned 1.5X to 5X
- 1 company returned >38X in 8 years (IPO - Home Run!)

Sandbridge Technologies, Inc.

Company/Team:

- Fabless semiconductor company based in White Plains, NY
- Founded in 2002 by 2 veteran IBM TJ Watson Research Center engineers
- Team of 55 experienced semiconductor and software engineers

- **Product:**
  - Multi-threaded, multi-CPU DSP chip for mobile phone baseband applications
  - Automatically adapts to the protocol in which the phone was operating.

- **Customers:**
  - Multi-million dollar contractual partnership with one of the world's top three cell phone makers.

- **Intellectual Property:**
  - 25 granted patents and 20 pending or provisional patents

By late 2008, Sandbridge had consumed $53M in 3 VC funding rounds and needed a further

$15M for the commercialization phase

The $15M Presentation…

Sandbridge Technologies, Inc.

But things change quickly! By late 2009:

- The company's primary customer and software partner had withdrawn from the partnership – it had quietly built its own chip in parallel with the partnership
- The software team was behind schedule in delivering the broadband communications software stack; PC dongle and femtocell markets were well below forecast
- The company was scrambling to identify and negotiate partnership agreements with software partners for cellular protocol software development
- To generate short term revenue the company was negotiating license agreements with several interested parties.
- The Board of Directors had decided that the company should focus on identifying potential M&A transactions

Sandbridge Technologies, Inc.

Conclusion

- Company was sold for an aggregate of $55M in several transactions in late 2009 and early 2010.
- All employees were hired by two licensees of the company's technology
- One licensee also acquired the right to deploy the original chip in electronic systems in China and is using it in "home gateway" applications
- Management received a "carve out" from the proceeds of the sale
- C Round Investors received a 1.6X return on their investment of $35M in 3 years, for an IRR of 16%; Venture Funds in the Electronics industry returned (4.9%) in 2010.
- Everyone was happy.

Big Changes Are Coming to the Private Equity Investment World….

Why?

Security Token Offerings (STO) create a new asset class in private equity:

Crowd Funding (CF)

Crowd Funding Growing Rapidly

Crypto-token (ICO + STO) Crowd Funding

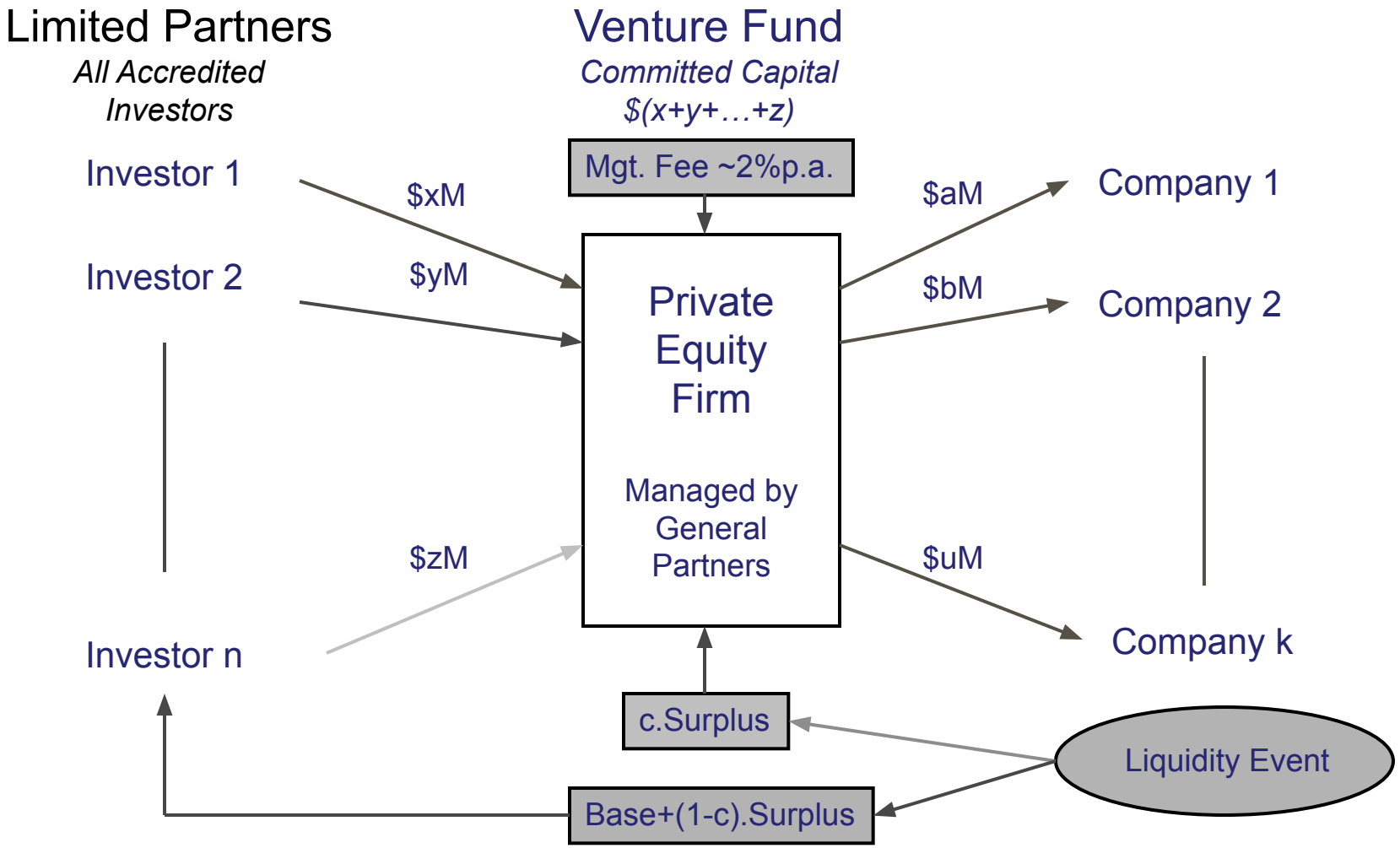
	2015	2016	2017	2018
No. of ICOs/STOs	0	50	552	1,132
Amount Raised ($B)	-	0.098	7.24	20.033

Source: coinschedule.com/stats

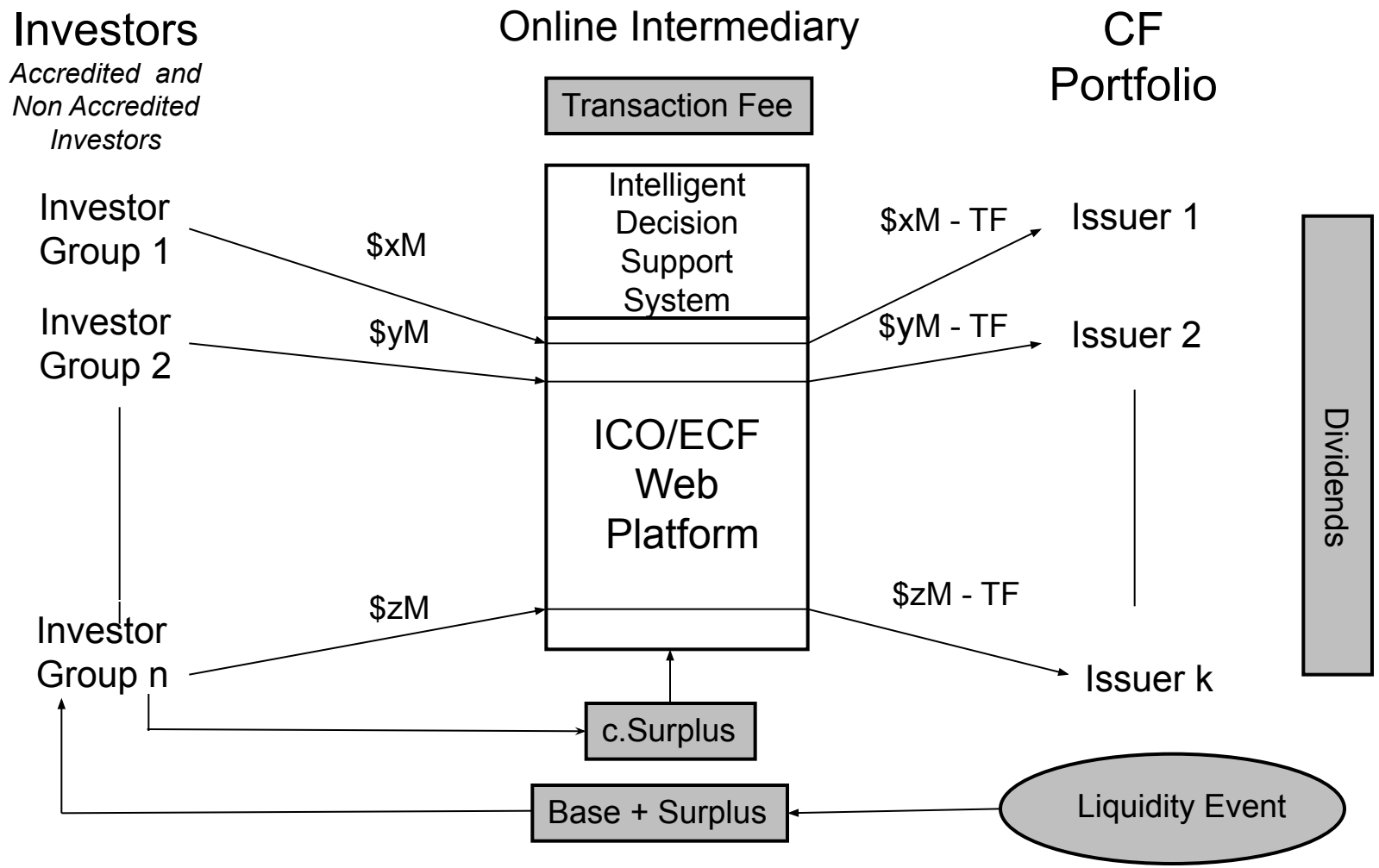
Why Crowd Funding Growth?

- REACH:
  - Online – investors and issuers worldwide can participate
  - Not limited to accredited investors – access to larger amount of capital
- LIQUIDITY:
  - Smart contracts/STO tokens can be bought & sold at will (for now)
  - JOBS Act mandates 1 year holding period
- TRANSACTION COST
  - Standardized terms – reduces legal expense
  - Smart contracts – reduces investor management expense
  - Transaction fees lower than traditional financing cost
- TIME TO MONEY
  - Financing campaign can be completed in days, even hours.

Private Equity Model Changing



The New Private Equity Investment Model



c = “Intermediary Commission %”

The Problem

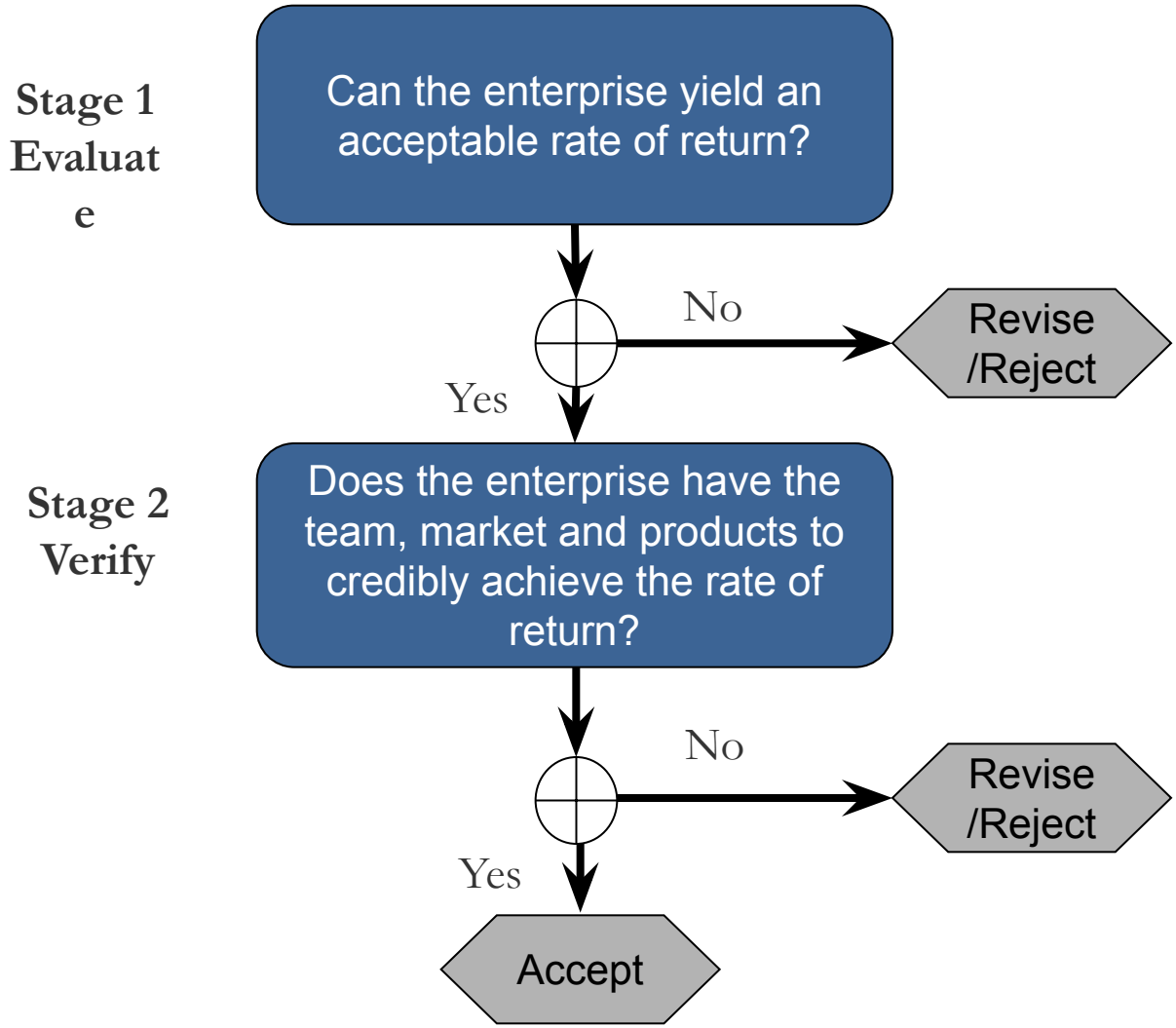
How to enable a large, diverse set of non-expert investors to identify investment opportunities that are likely to succeed, from a large, diverse set of privately held companies of different size, stage and quality?

A Solution

- Create an Intelligent Decision Support System (IDSS) drawing on:
  - Private Equity Investment Practice
  - Finance Theory
  - Statistical Learning Algorithms & Processes
  - Decision Support Systems Engineering

- Deploy the IDSS as a tool to support investors and issuers on a web based Crowd Funding Platform (CFP)

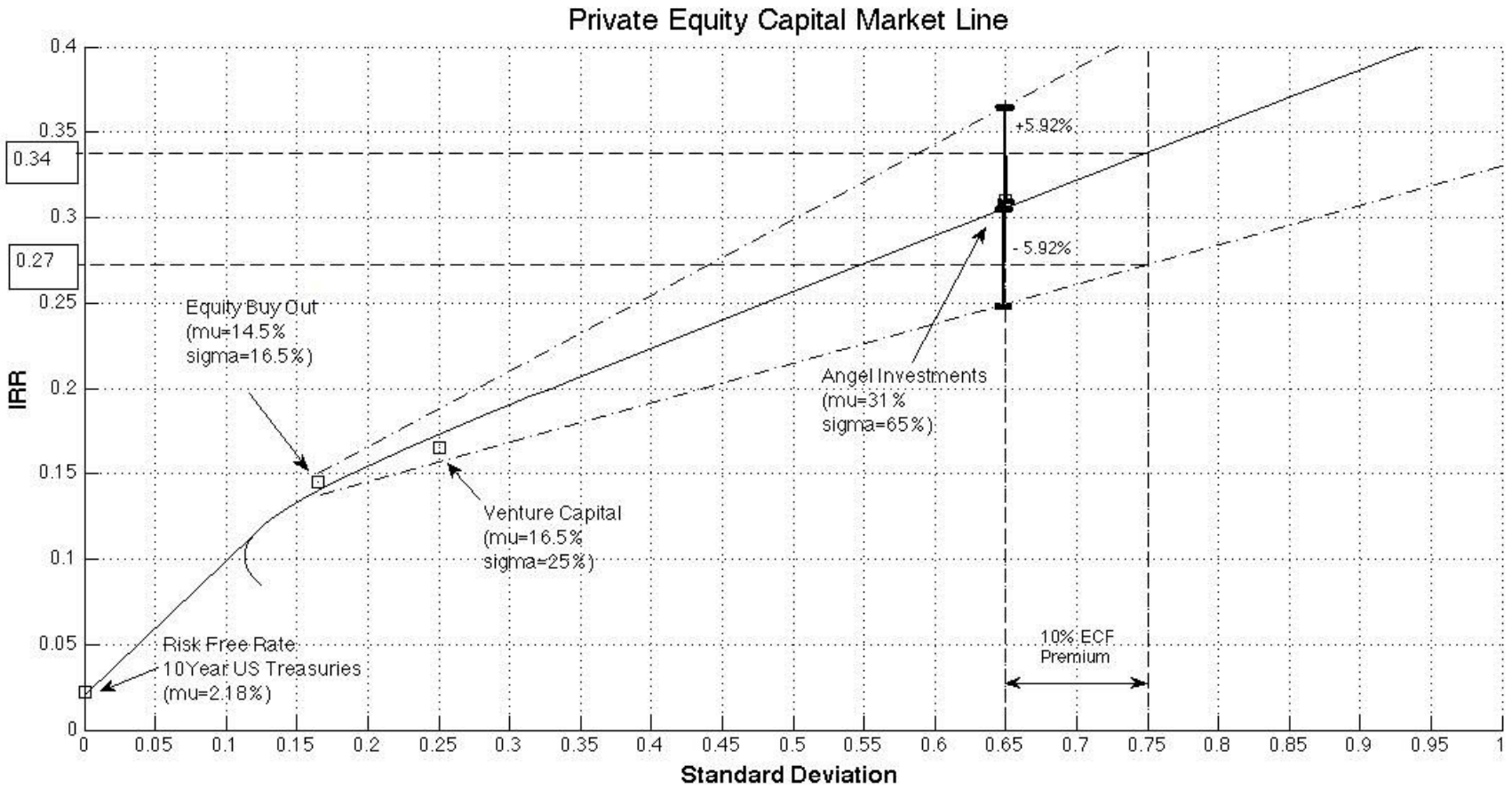
IDSS Overview



What is an “Acceptable Rate of Return”?

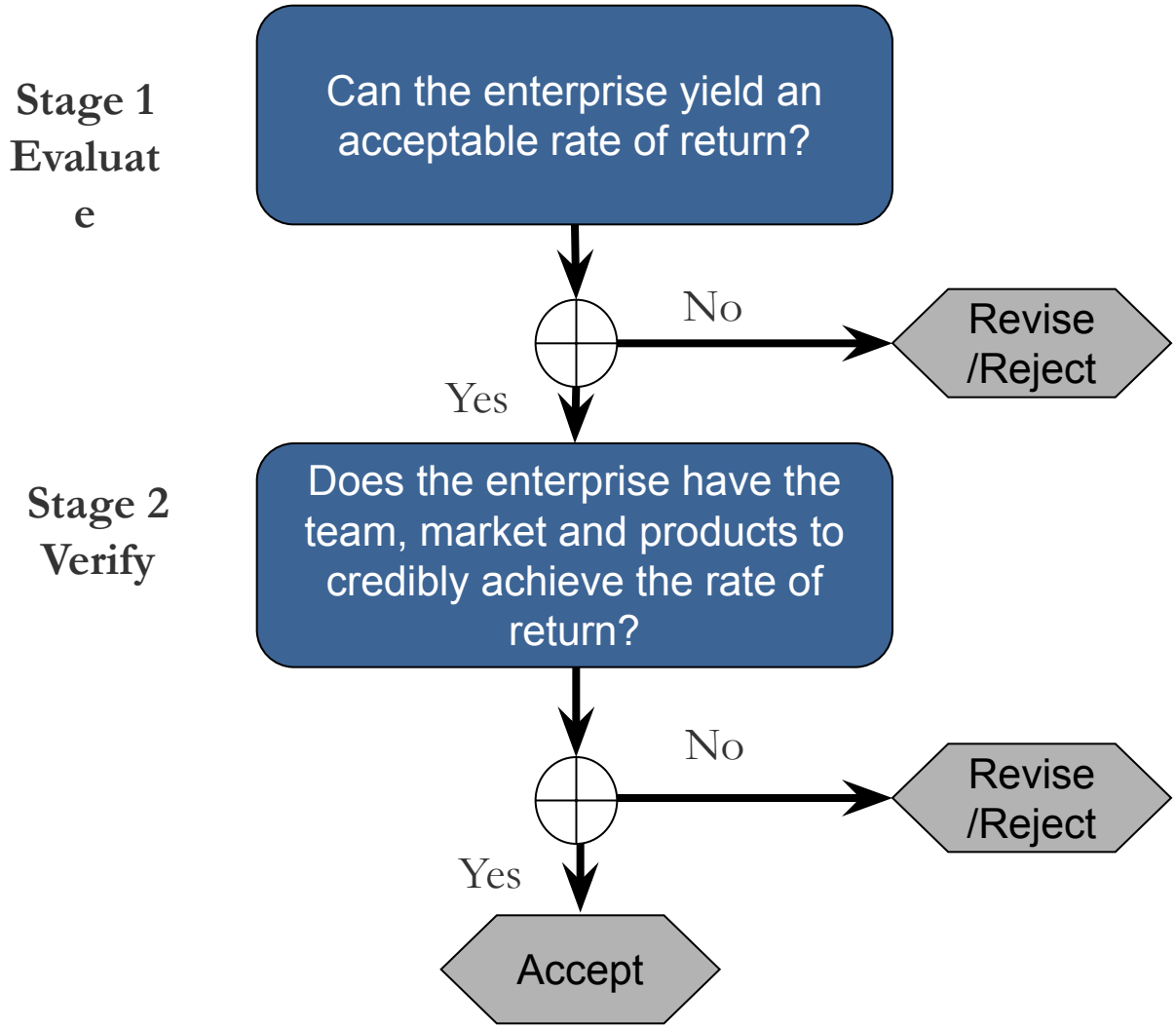
- Apply:
  - Finance Theories
    - Modern portfolio theory
    - The theory of efficient markets
  - Statistics:
    - The central limit theorem
  - Historical IRR data for large datasets of: Equity Funds, VC Funds (Cambridge Associates), Angel Investments (AIPP)
- To Determine:
  - The optimum risk-reward “frontier” for the Private Equity market
    - The efficient frontier
  - The target IRR for an efficient CF portfolio and consequently, individual CFF investments

Efficient Frontier: Equity Market



At 10% higher risk for CF, the expected IRR target for an efficient portfolio of CF assets is >= 28% with 99% confidence

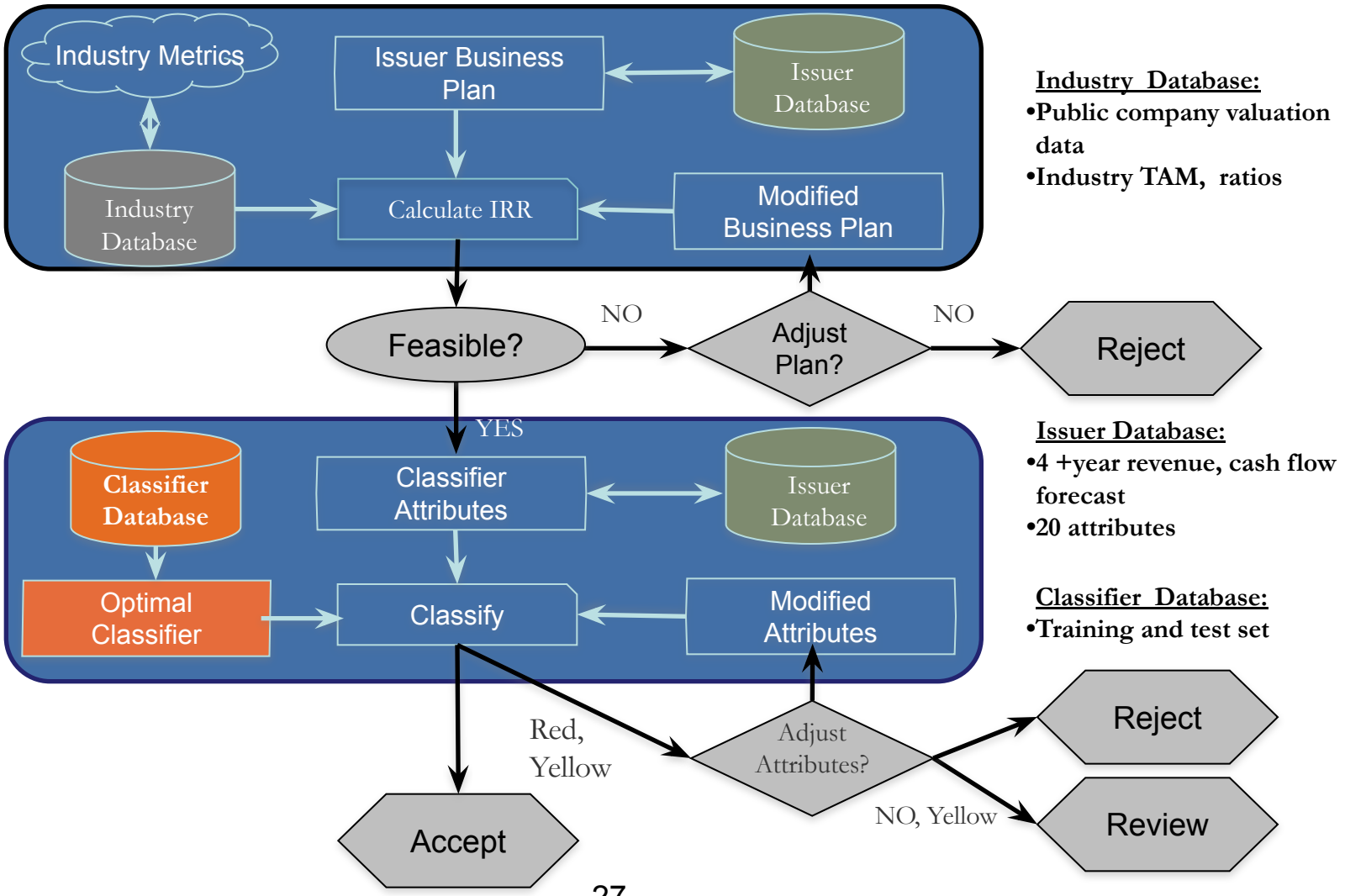
IDSS Overview



IDSS Functional overview

Stage 1 Evaluate

Stage 2 Verify



Industry Database:
- Public company valuation data
- Industry TAM, ratios

Issuer Database:
- 4 +year revenue, cash flow forecast
- 20 attributes

Classifier Database:
- Training and test set

Attribute set

Founding Team

1. **EFF** - Capable of intense sustained effort
2. **GRO** - Able to evaluate and react to risk
3. **MKT** - Market Experience
4. **EXP** - Leadership Experience
5. **INO** - Able to Innovate
6. **CPL** - Team Completeness
7. **TCH** - Quality of Technical Team
8. **JNT** - Joint Experience of Team

Product Value Proposition

1. **PTN** - Intellectual Property
2. **MAC** - Market Acceptance
3. **VPR** - Value Proposition
4. **PPL** - Product Execution Plan
5. **SCH** - Supply Chain Integration
6. **PRT** - Functioning Prototype

Market Dynamic

1. **MGR** - Market Growth Rate
2. **SOM** - Target Market Share
3. **MXS** - Targets Existing Market
4. **CMP** - Competitive Landscape
5. **MDV** - Market Diversity

Other

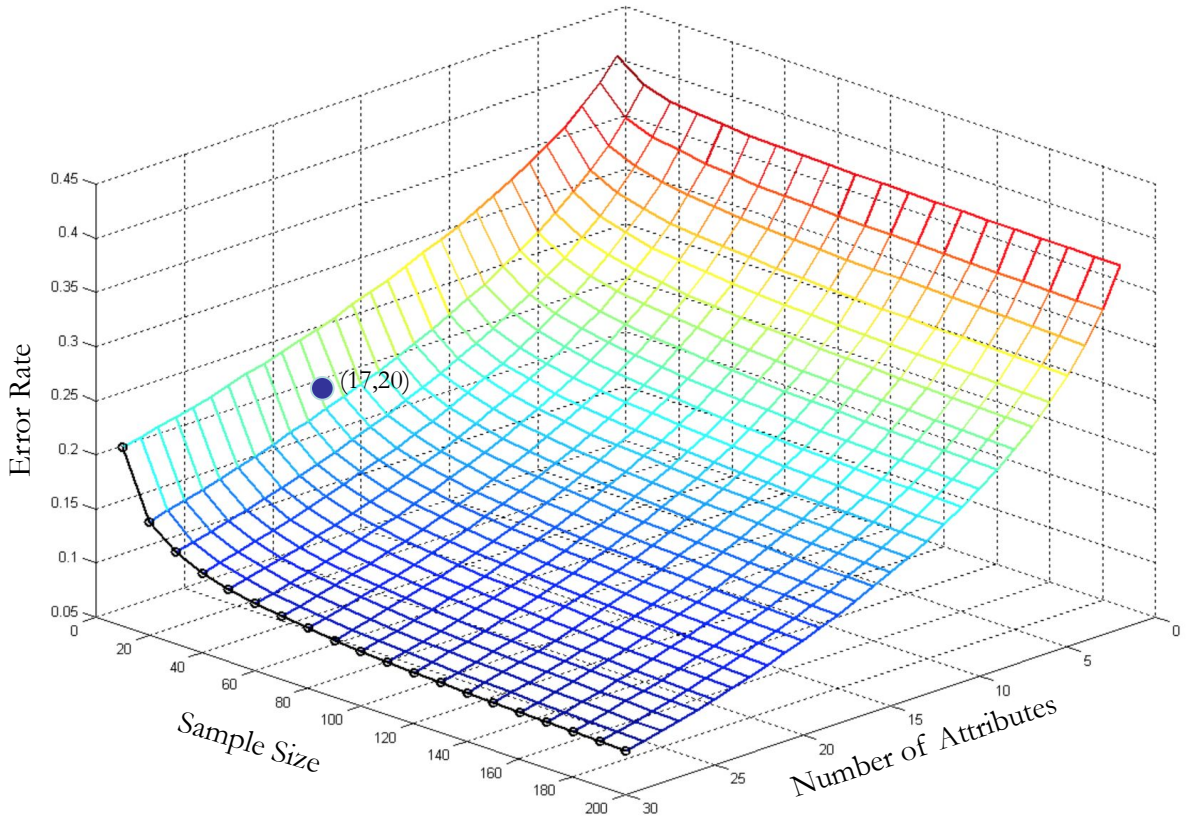
1. **AGE** - Company Age
2. **SCL** - Strategic Clarity

Attribute Quantification

Parameter	Description	Measure	Quantify
Team: **EXP**	Demonstrated leadership ability in the past	Measures number of years each team member has been in same position, or had equivalent title/responsibility in prior career as in new venture	Years in same position divided by total work experience of founding team, in years
Product: **PPL**	Level of product development planning detail	Measures the degree of thoroughness of the product/service development plan, specifically time granularity, staffing, critical path, dependencies and key milestones	At least weekly granularity =1; each task staffed =1; critical path identified=1; dependencies identified=1; key milestones identified=1; Score=sum of the above/5
Market: **MGR**	The target market enjoys a significant growth rate	Determines whether the Compound Annual Growth Rate (CAGR) of the Market that can be served with the product(s)/service(s) that generate plan revenue (SAM), lies within predefined thresholds	If CAGR>25% score =1; if CAGR>20% score =0.8; if CAGR>15% score =0.6; if CAGR>10% score =0.4; if CAGR>5% score=0.2; else score =0

Performance

Accuracy (true positives plus false yellows): 64%



Learning curves for kNN algorithm
(synthetic model, uncorrelated attributes)

- Room for performance improvement with more data
- At ~ 60 instances, synthetic model error rate approaches Bayes error within 5% (current dataset has 17 balanced instances)

Key Outcomes

1. Accuracy (true positives plus false yellows): 64%
2. Accuracy will improve with a larger training set – learning curve
3. 94.5% confidence that IDSS performs better than random selection
4. Stage 1: 99% confidence that IRR target for CF assets is >= 28% at 10% higher risk
5. Stage 2: >98% confidence kNN (k=1) performs best for current data set

Conclusion

The private equity industry is on the verge of facing the same disruption that the Internet has brought to the music industry, the airline industry, the hotel industry, the car rental industry,…...

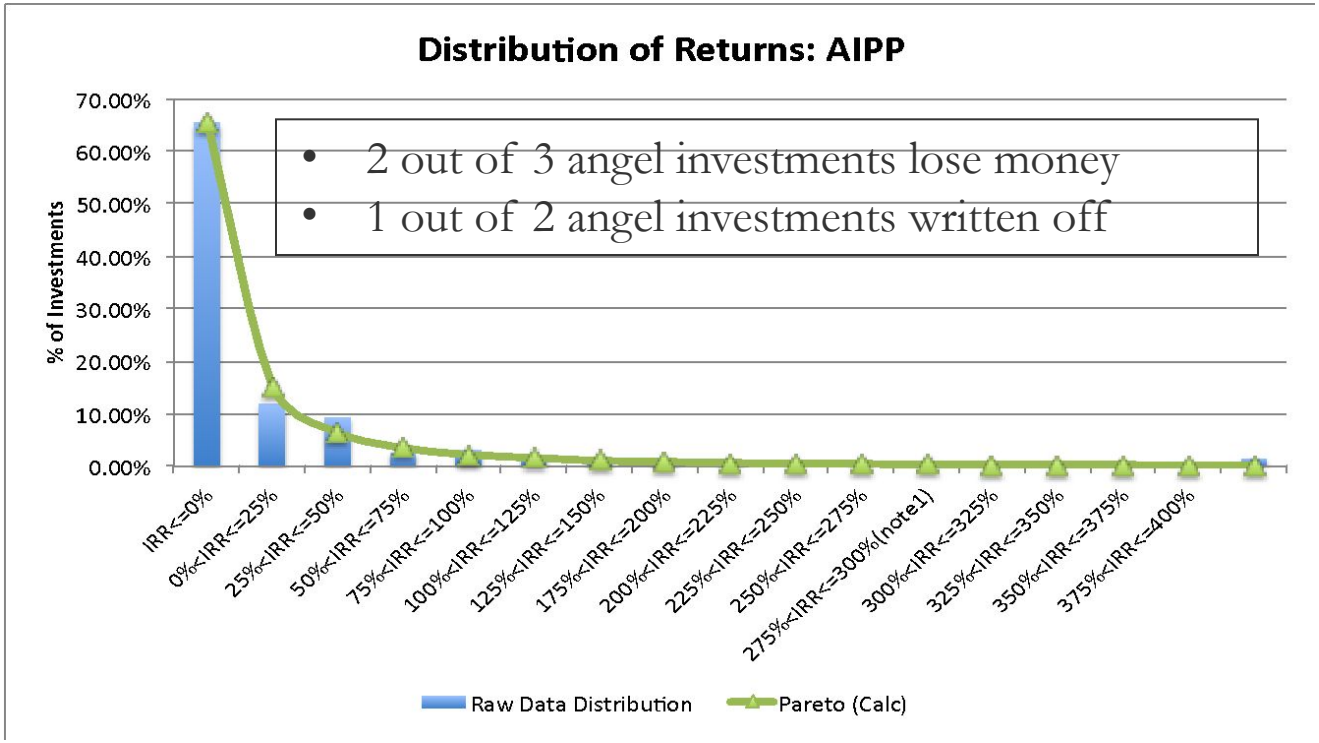
Appendix

CF Investment Risk

Angel Investments are Risky….

1,137 AIPP exited angel investments:

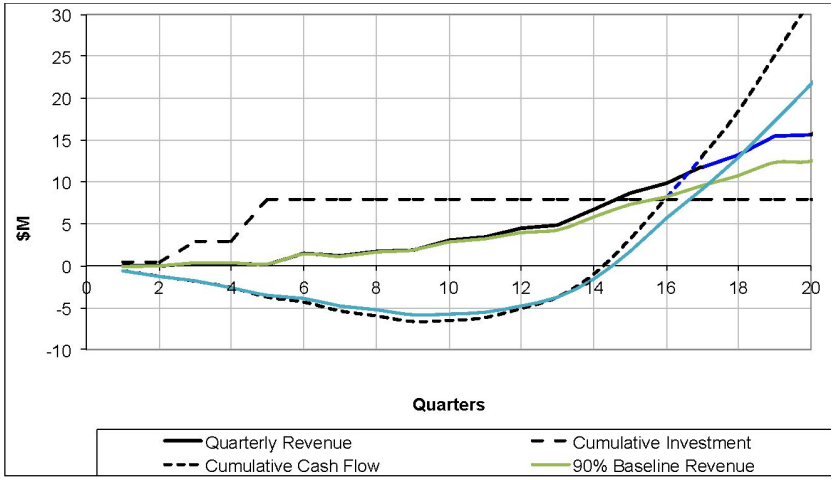
IRR = -100%: 46.7%
-100%<IRR <= 0%: 20.1%



CF Investments are riskier than Angel Investments:

- Reduced Control – "micro" shareholders
- Reduced Visibility – information asymmetry
- Possible (Likely?) Regulatory Constraints – JOBS Act
- Increased Moral Hazard

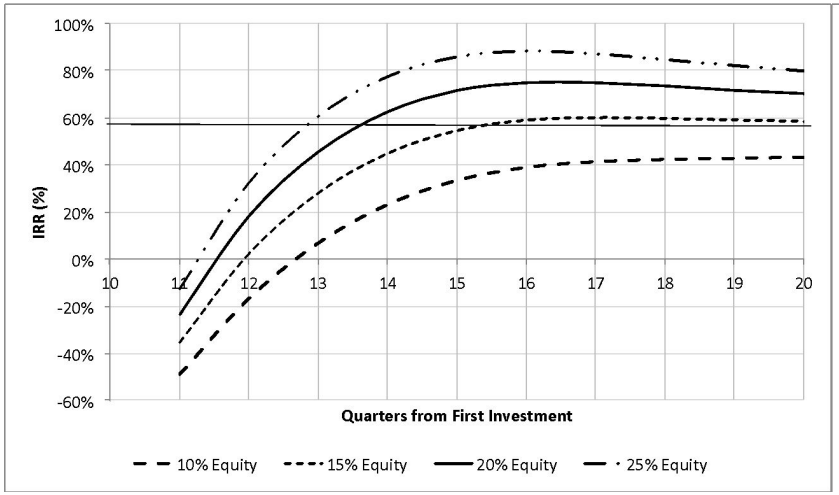
Implications

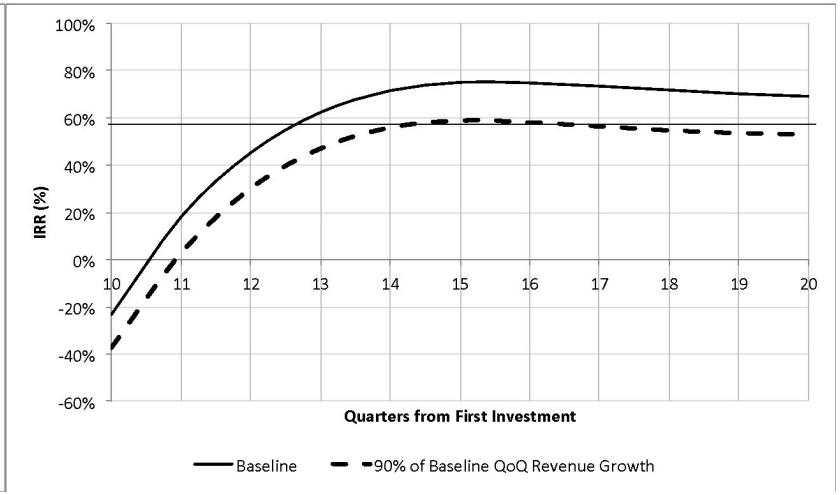


Bio-Sciences Start-Up

Accelerated Growth Plan

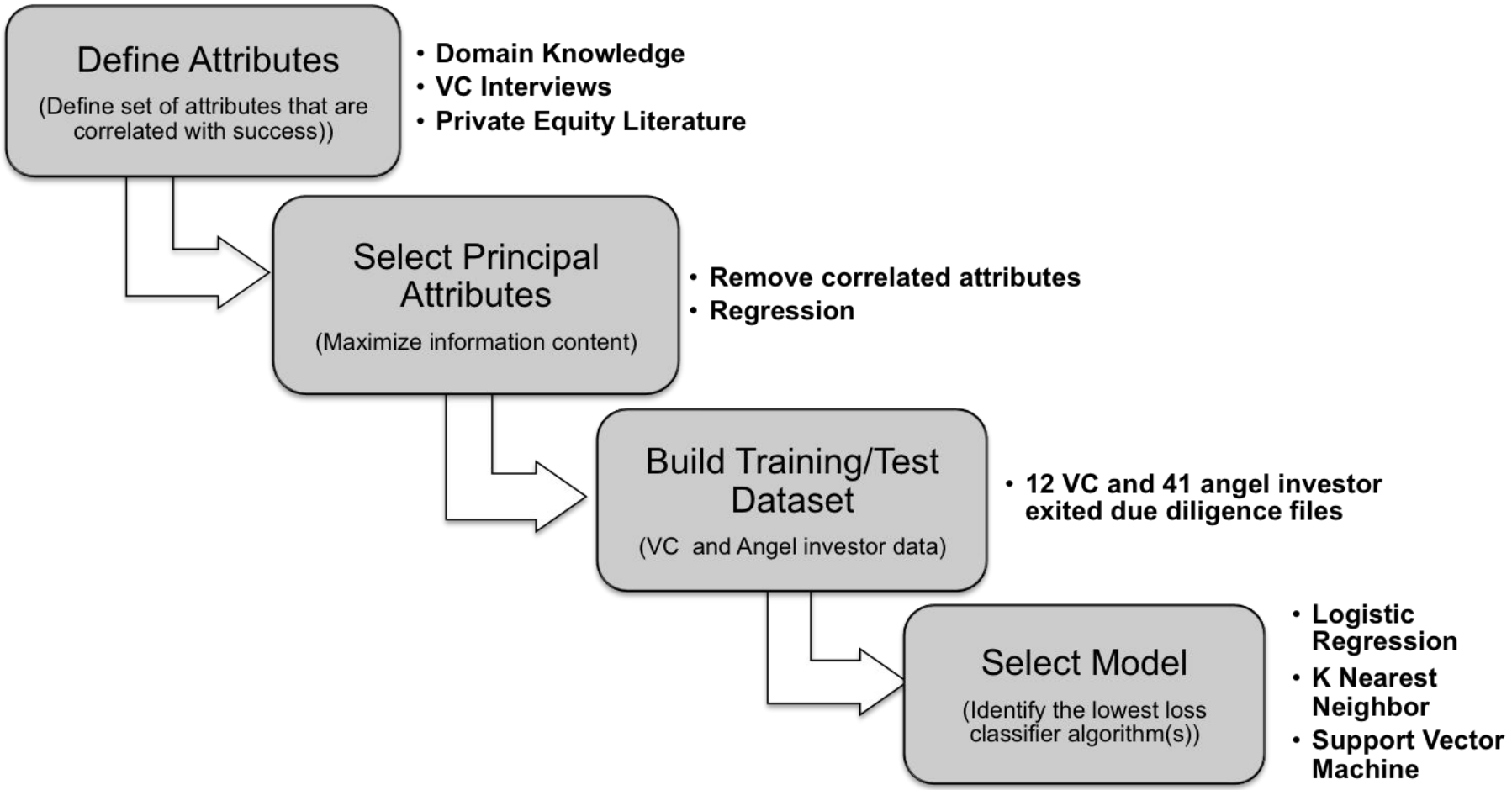
- Seed Round ($0.5M in Q1)
- 2 VC rounds ($2.5M Q3, $5M Q6; 1X liquidation preference)
- Target portfolio IRR is 35%; 45% productive => target investment IRR = 58%
- Valuation: 12x rolling average of future 4 quarter cash flow





Demonstration: Stage 1

Statistical Learning Process



Attribute Selection

1. Create preliminary set based on domain knowledge (*15 attributes*)

2. Interview domain experts (3 VC General Partners, 3 CFOs (1 large, 2 small companies) and add if not identified in 1. (*18 attributes*)

3. Extract attributes from the research literature and add if not identified in 1, 2. (*31 attributes*)
   a. Identify research papers from peer reviewed journals containing statistically significant correlation between attributes and success
   b. Rank research papers by citation rate (citations/year)
   c. Starting at highest ranked article extract attributes if not already identified in 1,2
   d. Repeat until no new attributes are found

4. Analyze attributes to eliminate redundancy or correlation (*21 attributes*)