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TECHNOLOGY  
AND  
INNOVATION

# Valuation

Advanced Starter Seminars

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Thomas Crispeels

# Funding a High-Technology Company

## Start-up Case Study

- Start-up case study
  - Lecture by Rudy Dekeyser
  - VIB Tech Transfer Course 2009

# Start-up case study

- Round 1: Start-up
  - VIB:31.250 €
  - GIMV :31.250 €
  - Price / share: 0,1 €

	Investment In €	Shares	%
VIB	31.250	312.500	50
GIMV	31.250	312.500	50
Total	62.500	625.000	100

# Start-up case study

- Round 1b: Founder / CEO
  - A CEO is recruited one month after start-up
  - CEO invests 7.500 €
  - Price / share: 0,1 €

	Round 1		Round 1B		Total		%
	Investment (€)	Shares	Investment (€)	Shares	Investment (€)	Shares	
<b>VIB</b>	31.250	312.500	0	0	31.250	312.500	44.6
<b>GIMV</b>	31.250	312.500	0	0	31.250	312.500	44.6
<b>CEO</b>	0	0	7.500	75.000	7.500	75.000	10.8
<b>Total</b>	62.500	625.000	7.500	75.000	70.000	700.000	100

# Start-up case study

- VIB and the lead investor succeed in convincing a syndicate of investors to invest 5,3 M€ in NewCo. The pro rata investment:
  - GIMV: 2,3 M€
  - Gilde: 2,0 M€
  - Alta: 1,0 M€
- Given:
  - The investors will only invest if the AB technology is available to NewCo
  - VIB has no cash to invest

# Start-up case study

- Given:
  - VIB wants to contribute its AB technology in exchange for shares in NewCo
- Question:
  - How much shares should VIB receive?
- Answer:
  - The # of shares depends on
    - The value of the technology
    - The price/share

# Start-up case study

- How to determine the value of a technology / product?
  - Cost for development
  - Opportunity cost
  - Compare with other comparable technology / product / company
  - Calculate
    - Net present value (NPV)/discounted cash flow (DCF)
    - Option pricing





# Start-up case study

- Scenario 1
  - Value VIB technology = 4 M€
  - Price/share = 0,1 €

	Round 1+1B		Round 2		Total		%
	Investment (€)	Shares	Investment (€)	Shares	Investment (€)	Shares	
<b>VIB</b>	31.250	312.500	In kind	40.000.000	31.250	40.312.500	43,0
<b>GIMV</b>	31.250	312.500	2.300.000	23.000.000	2.331.250	23.312.500	24,9
<b>Gilde</b>	0	0	2.000.000	20.000.000	2.000.000	20.000.000	21,3
<b>Alta</b>	0	0	1.000.000	10.000.000	1.000.000	10.000.000	10,7
<b>CEO</b>	7.500	75.000	0	0	7.500	75.000	0,01
<b>Total</b>	70.000	700.000	5.300.000	93.000.000	5.370.000	93.700.000	100

Premoney-valuation = 700.000 X 0,1 € = 70.000 €

Postmoney-valuation = 93.700.000 X 0,1 € = 9.370.000 €

Source: VIB Tech Transfer Course 2009

# Start-up case study

- Round 2. Capital + technology
  - Scenario 2
    - Value VIB technology = 4 M€
    - Price/share = 4 €

	Round 1+1B		Round 2		Total		%
	Investment (€)	Shares	Investment (€)	Shares	Investment (€)	Shares	
VIB	31.250	312.500	In kind	1.000.000	31.250	1.312.500	43,4
GIMV	31.250	312.500	2.300.000	575.000	2.331.250	887.500	29,3
Gilde	0	0	2.000.000	500.000	2.000.000	500.000	16,5
Alta	0	0	1.000.000	250.000	1.000.000	250.000	8,3
CEO	7.500	75.000	0	0	7.500	75.000	2,5
<b>Total</b>	<b>70.000</b>	<b>700.000</b>	<b>5.300.000</b>	<b>2.325.000</b>	<b>5.370.000</b>	<b>3.025.000</b>	<b>100</b>

Premoney-valuation = 700.000 X 4 € = 2.800.000 €

Postmoney-valuation = 3.025.000 X 4 € = 12.100.000 €

Source: VIB Tech Transfer Course 2009

# Start-up case study

- Scenario 1 versus scenario 2 –final result (post-money)

	Scenario 1	Scenario 2
Valuation NewCo	$93.700.000 \times 0,1\text{€} = 9.370.000\text{€}$	$3.025.000 \times 4\text{€} = 12.100.000\text{€}$
Value VIB-input	$40.312.500 \times 0,1\text{€} = 4.031.250\text{€}$	$1.312.500 \times 4\text{€} = 5.250.000\text{€}$
% shares owned by 1st round investors	$43 + 24.9 + 0.01 = 67.9\%$	$43.4 + 29.3 + 2.5 = 75.2\%$
% shares owned by new investors	$21.3 + 10.7 = 32\%$	$16.5 + 8.3 = 24.8\%$
% shares CEO	0.01%	2.5%
Value shares CEO	$75.000 \times 0,1\text{€} = 7.500\text{€}$	$75.000 \times 4\text{€} = 300.000\text{€}$

# Funding a High-Technology Company

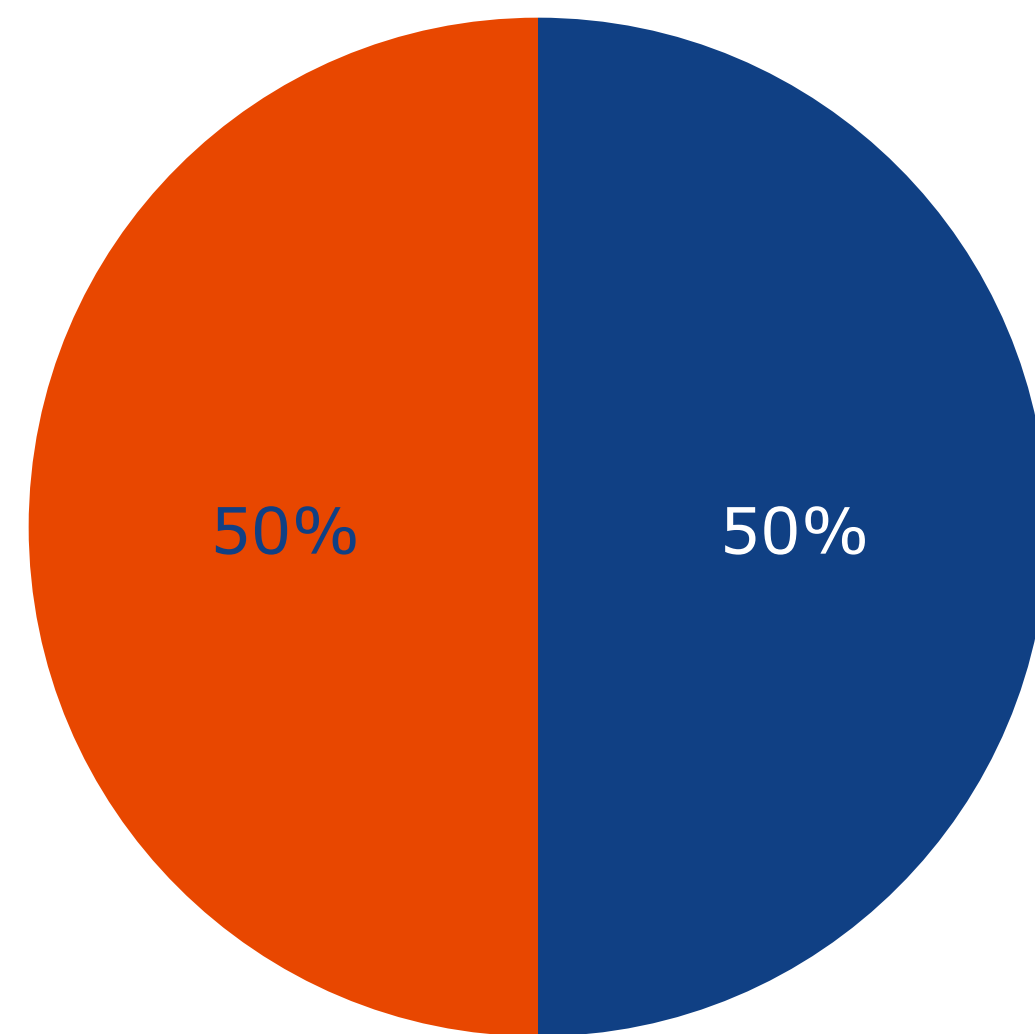
## Dilution

# Dilution

- key term and possible pitfall
- reduction in an investor's share of common stock that occurs through the issuance of additional shares or the conversion of convertible securities

# Example

- Situation after first investment round:
  - Entrepreneur: 50% of shares
  - VC A: 50% of shares for €3 million

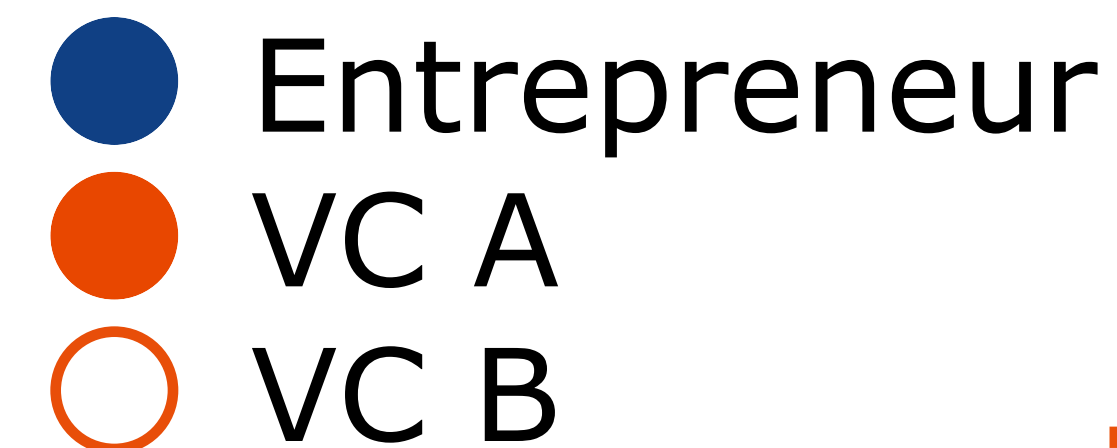
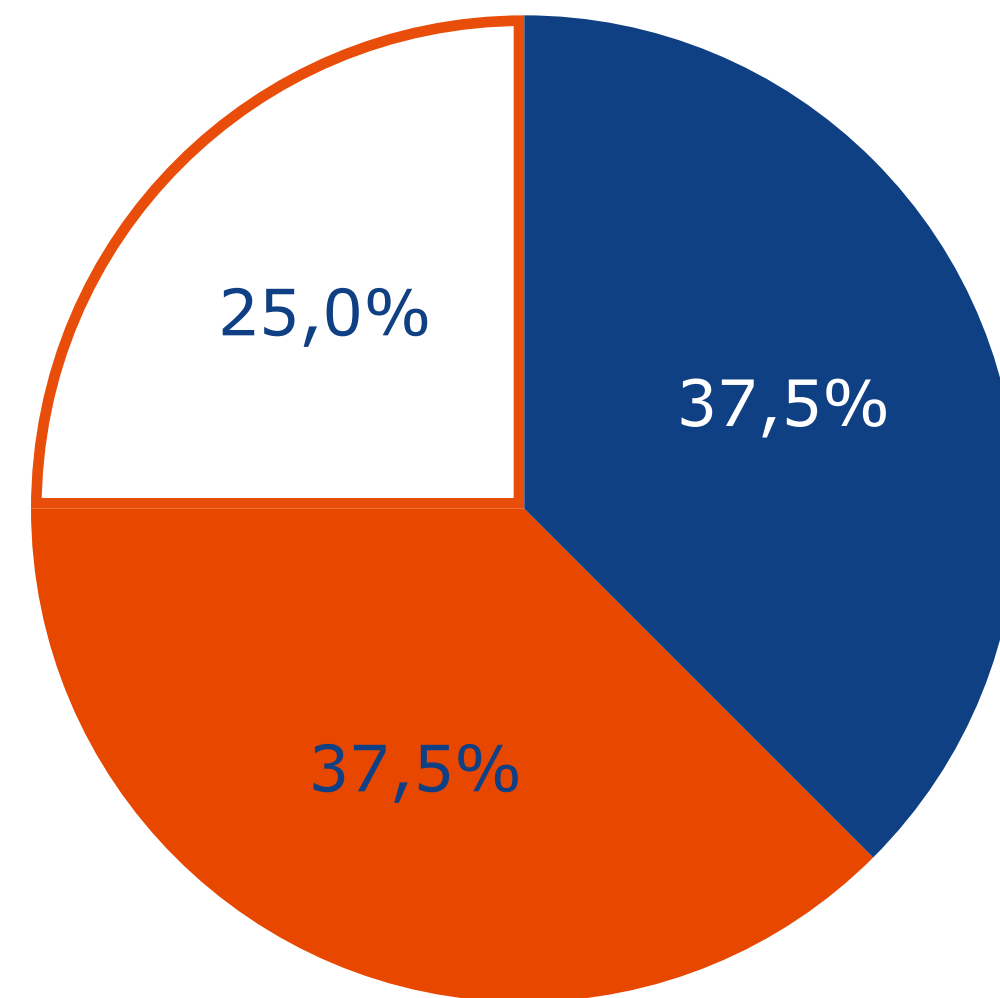


# Example

- In the next financing round, an extra investor is attracted: he will invest €3 million in return for 25% of the shares (new issues). assume that investor “VC A” and the entrepreneur will not participate in this second financing round.
- What will happen?

# Example: Dilution

- New situation: If the dilution is shared equally by the entrepreneur and VC A, the new shareholder structure becomes:
  - Entrepreneur 37,5%
  - VC A: 37,5%
  - VC B: 25%





# Countering dilution

- What can a VC or an entrepreneur do in order to prevent dilution?
  - Put money on the table (follow-on financing)
  - Negotiate when investing: clauses, share classes...
  - ...

# Funding a High-Technology Company

## Funding Stages

# stages of funding of a high technology company: pre-seed and seed stage

- small initial rounds to validate a concept, found the company or complete the business plan.
- terms: straight equity investment, convertible preferred equity, convertible debt or a combination of the three.
- investors: business angels, associated investment funds (and venture capitalists)

*source: Nature Biotechnology*

# stages of funding of a high technology company: series A and B

- one or two early rounds
- typically VCs but also private investors or others (US: pension funds).
- often a number of VCs with one fund acting as a lead investor.
- series A: founders share diluted out by half
- each round needs one new investor to lead the round and value the enterprise

*source: Nature Biotechnology*

- possible financing rounds
- take company through product development and towards an IPO
- smaller funds can not participate as a large amount of capital is needed

- last private financing round
- size dependent on company's needs before IPO or acquisition
- after some validation of drug or technology like collaborations or entering clinical trials
- serves to help justify IPO valuation and give another benchmark to the share price before IPO

- infusion of cash from a VC or business angel before completion of another round of financing or before an IPO
- not preferable: this short-term financing can be very costly in terms of debt and equity

# stages of funding of a high tech company: IPO

- initial public offering: the first time a company is publicly traded
- public companies have easier access to capital
- high-risk profile of biotech
  - easier to raise money on stock exchange than via loans
  - losses at stock exchange: biotech companies are the first to take the punches
- loss of a part of the partnership with current investors
  - usually lock-in period for existing VCs
- accounting and auditing legislation



# Valuation

# what is valuation

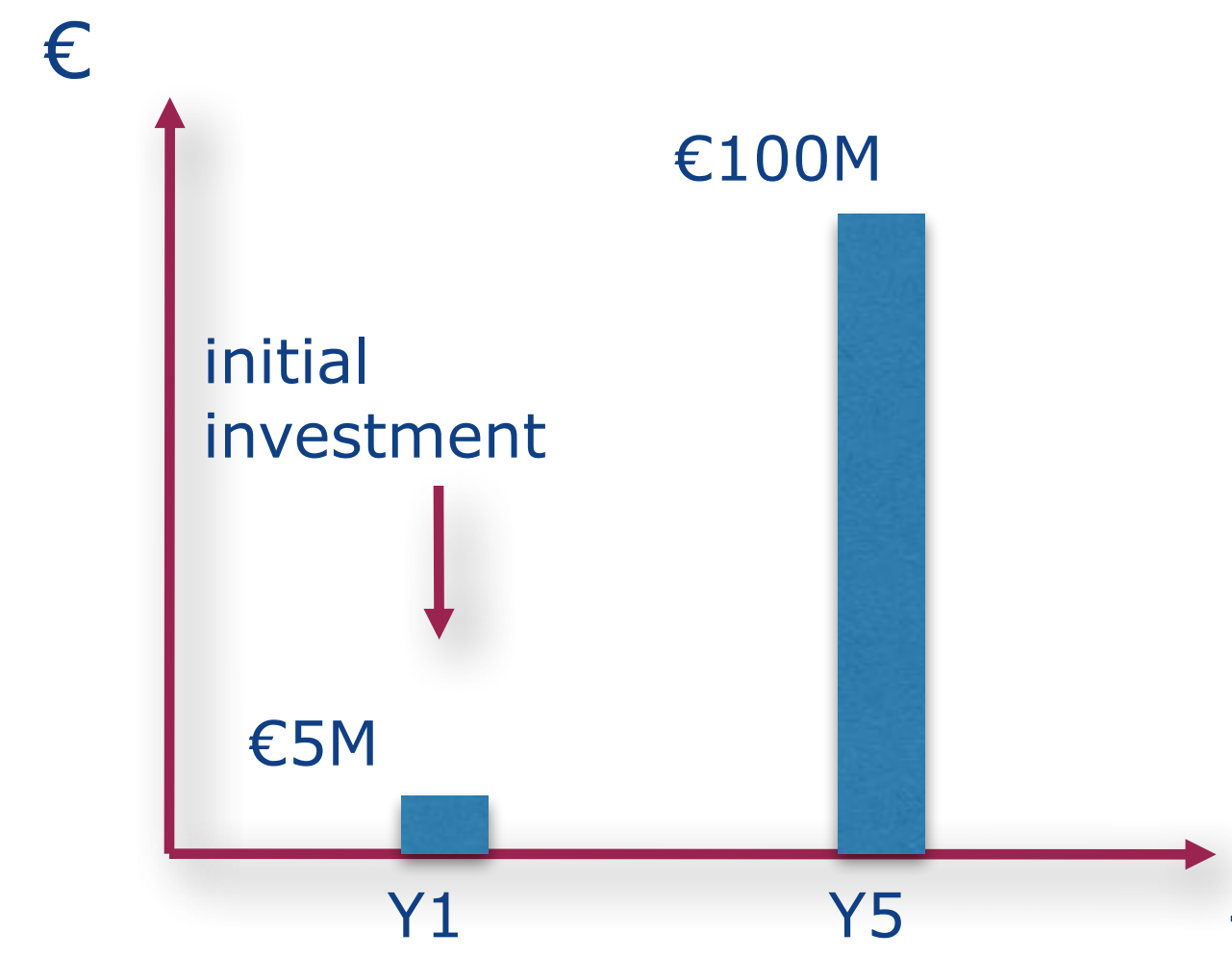
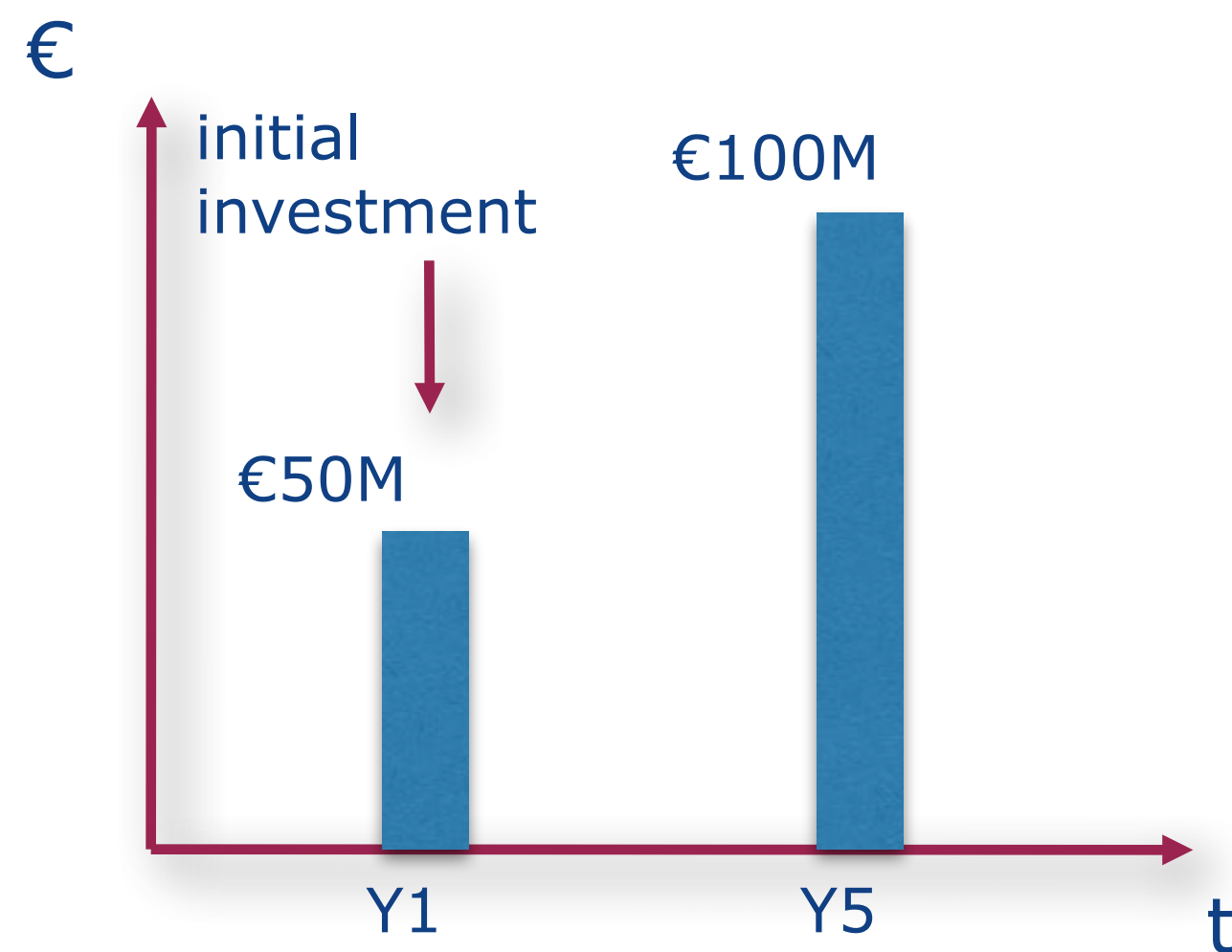
- process of estimating the market value of a financial asset or liability
  - assets: marketable securities such as stocks, options, business enterprises or patents, trademarks...
  - liabilities: bonds

# Why?

- Business valuation: to determine the fair market value of an owner's interest in a business
- Reasons for business valuation
  - External
    - Investors need to find out whether or not they should participate in a company
    - Entrepreneurs need to know what share they are willing to sell in exchange for the additional money
  - Internal
    - Capital allocation
    - Investment decisions
    - M&A
    - During license negotiations

# example

- to put it simple: if you were a VC, in which company would you invest?
- both companies have an expected value of 100 million € after 5 years.



# Determining the price of an investment

- Price is always determined by the laws of supply and demand...
  - A company always asks for as much financial means as possible
  - VC wants to invest an amount as small as possible
- Pitfalls for the VC:
  - Paying a (too) high price for an investment
    - Not reaching (preset) value adding milestones
    - Risk of not reaching the multiples
  - Value inflation
- Countering the pitfalls:
  - Experience and know-how
  - At initial investment, the VC needs to have a clear idea of the companies' future valuation path (experience)

# Valuation: disclaimer

“There is no gold standard when it comes to valuation: it is and will remain a subjective task. consequently, a company can have as many values as there are people doing the valuation.” (Frei & Leleux, 2004)

# Post- and pre-money

- Pre-money value: value of the company before external financing alternatives are added to the balance sheet.
- Post-money value: value of the company after external financing alternatives are added to the balance sheet.
- Example: if VC wishes to invest €100m for 20% of the shares, the company is worth:
  - post-money: €500m
  - pre-money: €400m
- In biotech, the pre-money valuation is based on 'intangible assets'.
- Use backwards



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# Valuation

The Basic VC Formula



# The basic VC formula

- The value of a company is calculated as the sum of the forecasted free cash flow of a company out to a valuation horizon, discounted back to the present at a discount rate and the forecasted value of a company at the horizon or the terminal value, discounted back at the same discount rate.

# Example

Fact summary	
Required IRR	50%
Investment	€3.5 million
Term	5 years
Year 5 net income	€2.5 million
Year 5 P/E	15

What price should the VC pay for the stock?

# Example

- The VC must own enough of the company in five years to realize a 50% annual return on investments. so, at that time his shares must be worth:

$$\begin{aligned} \text{required future value} &= (1 + IRR)^{\text{years}} \times (\text{investment}) \\ &= (1 + 0.5)^5 \times (\text{€}3.5 \text{ million}) \\ &= \text{€}26.6 \text{ million} \end{aligned}$$

# Example

- in five years, the company will be worth:

$$\begin{aligned} \text{total value year 5} &= PER \times \text{net income year 5} \\ &= 15 \times \text{€}2.5 \text{ million} \\ &= \text{€}37.5 \text{ million} \end{aligned}$$

- For the VC to receive the required €26.6 million in year 5, the required percent of ownership at that time must be  $\text{€}26.6/\text{€}37.5 = 70,9\%$

# The basic venture capital formula

$$\begin{aligned} \text{final ownership required} &= \frac{\text{required future value (investment)}}{\text{total end value}} \\ &= \frac{(1 + IRR)^{\text{years}} \times \text{investment}}{PER \times (\text{end net income})} \end{aligned}$$

# But...

- this looks very nice, but... you often don't know what the value of the company will be in five years
  - technology
  - market adoption/penetration
  - uncertainty
  - ...



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# Valuation

Tools and Methodologies

# Valuation methods

- discounted cash flow valuation (DCF)
- relative valuation/comparables
- real option valuation
- ...



# DCF analysis

- The value of a company is calculated as the sum of the forecasted free cash flow of a company out to a valuation horizon, discounted back to the present at a discount rate and the forecasted value of a company at the horizon or the terminal value, discounted back at the same discount rate.

# DCF analysis

$$NPV = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_t}{(1+r)^t} + \frac{C_{TV}}{r(1+r)^u}$$

- net present value method: based on future cash-flows

- $C_t$  = net cash flow in period  $t$
- $R$  = discount rate (defined by CAPM/WACC)
- $U$  = period in which the remaining future cash flows are valued as terminal value (TV)

# DCF analysis

- Calculating the value of the cash flow:
  - NPV: uses interest rate based on expected marginal cost of capital to future cash flows
  - IRR: finds the average return on investment and computes the discount rate that equates present value of future cash flows to the cost of the investment
- Discount factor used is adjusted according to the financial risk of investing in the company
  - Example:
    - Large pharma: 10%
    - Public biotech companies: 20%
    - Private biotech companies: 30%



- risk  
+

# DCF analysis

- In order to use DCF method, some estimations have to be made:
  - life of the company/asset
  - cash flows during life of the company/asset
  - discount rate to apply to the cash flows to get the present value
- These estimations prove to be difficult, if not impossible in the case of young innovative companies

# Ablynx Valuation??

<b>Ablynx</b>		<b>"Aangepast model, nieuw koersdoel"</b>			
		Advies:	KOPEN	Huidige koers:	10 EUR
		Naam analist:	Jan De Kerpel, PhD	Koersdoel:	18 EUR
		ISIN code:	BE0003877942	Opwaarts potentieel:	80.0%
		<u>2014</u>	<u>2015E</u>	<u>2016E</u>	<u>2017E</u>
<b>Winst per aandeel (EUR)</b>		<b>-0.10</b>	<b>-0.12</b>	<b>-0.05</b>	<b>-1.55</b>
<i>% groei j/j</i>		-	-	-	-
<i>Koerswinst ratio</i>		-	-	-	-
<b>Bruto dividend (EUR)</b>		<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<i>% groei j/j</i>		-	-	-	-
<i>Dividendrendement (%)</i>		0.0%	0.0%	0.0%	0.0%

Ablynx is een biofarmaceutisch bedrijf actief in het onderzoek naar en de ontwikkeling van Nanobodies, een nieuwe klasse van therapeutische proteïnen die afgeleid zijn van fragmenten van enkel-domein antilichamen, voor de behandeling van een reeks ernstige en/of levensbedreigende menselijke ziekten. De firma ontwikkelt een portefeuille van op Nanobodies gebaseerde therapeutische programma's voor diverse belangrijke ziektegebieden, met inbegrip van ontstekingen, trombose, kanker en neurologische aandoeningen.

- [bolero.be](http://bolero.be), 26/01/2015



# Sum-of-the-parts valuation

- Valuing companies that have diverse lines of business.
- The worth of each business line is measured separately, using an appropriate valuation parameter, and then, the individual values are added together
- Applied to
  - Multi-industry companies
  - Various divisions in the same sector (see Ablynx valuation)

# Augmented NPV method

- Early stage R&D projects
  - Company has often several programs in parallel in order to reduce the risk
  - Need of decision points: focus on the most promising paths, out-licensing or termination of programs with low priority
- Develop a project target profile
  - Define deliverables
  - Basis for product development plan and sales forecast.
  - Identify competitors
  - Assess the market risk

*source: Bode-Greuel & Greuel, 2004*

# Augmented NPV method

- augmented NPV reflects uncertainty and decision options of biotech R&D
  - NPV: static, managerial actions have virtually no impact on value
  - In the presence of risk, managerial options have value because they minimise the impact of negative outcomes and allow to maximise the value of the project in the presence of new information

*source: Bode-Greuel & Greuel, 2004*



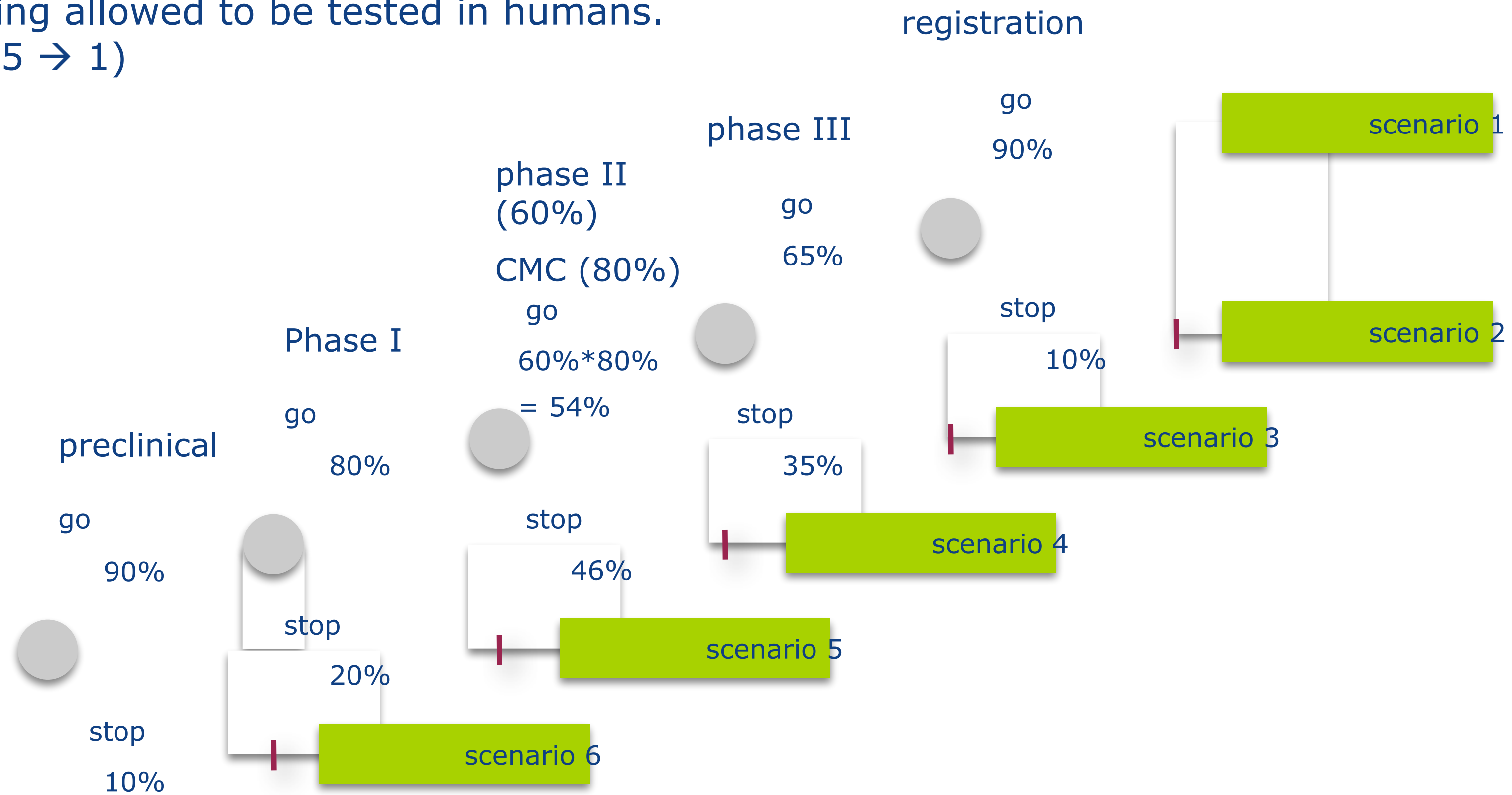
# Augmented NPV method

- Decision trees:
  - Represent development risk and decision options
  - Illustrate investment
  - Should focus on activities essential for completion of development and for the achievements of a competitive product profile
  - Typically: decision points at completion of essential preclinical and clinical trials
  - At decision points there are two possible options:
    - Go
    - Stop
  - Create different scenarios

*source: Bode-Greuel & Greuel, 2004*

# Augmented NPV method

assume we start from compounds that have a great chance of being allowed to be tested in humans.  
(cfr. 5000 → 5 → 1)



# Relative valuation/comparables

- Compare the value of an asset to the value assessed by the market for similar/comparable assets.
- Comparable firms = firms with similar fundamentals
- Distinction:
  - Comparable public company assessment
  - Comparable private company assessment

# Relative valuation/comparables

- Identify comparable companies that already attracted money
- Try to define their pre-money value
  - Know the VC logic and the multipliers they use
  - Know the current stage of development of the company you use as a benchmark
  - Count backwards
- This gives you an indication of the value of the company, but adjustments can and must be made on intangible factors

# Relative valuation/comparables

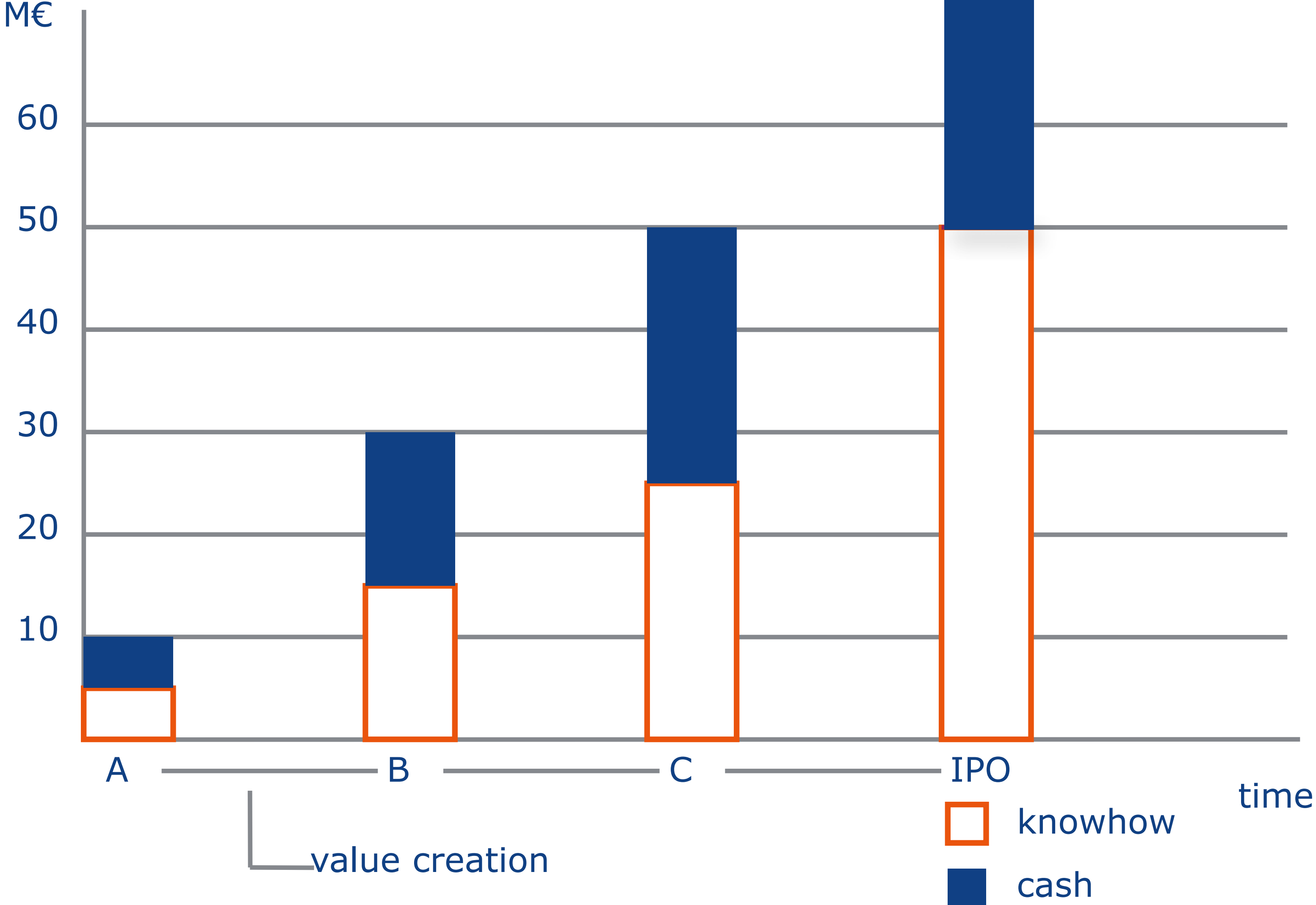
- Difficulty: find truly comparable projects/firms.
- Once a comparable firm is chosen, several valuation ratios can be measured
  - P/E ratio: compare the company's current share price and earnings per share
  - PEG ratio: ratio of market price to expected growth in earnings per share
  - PEGY: p/e to growth plus yield
  - price-to-sales ratio
  - price-to-book value
  - EBITDA
  - enterprise value-to-ebitda
  - ...

# Valuation

Added Value

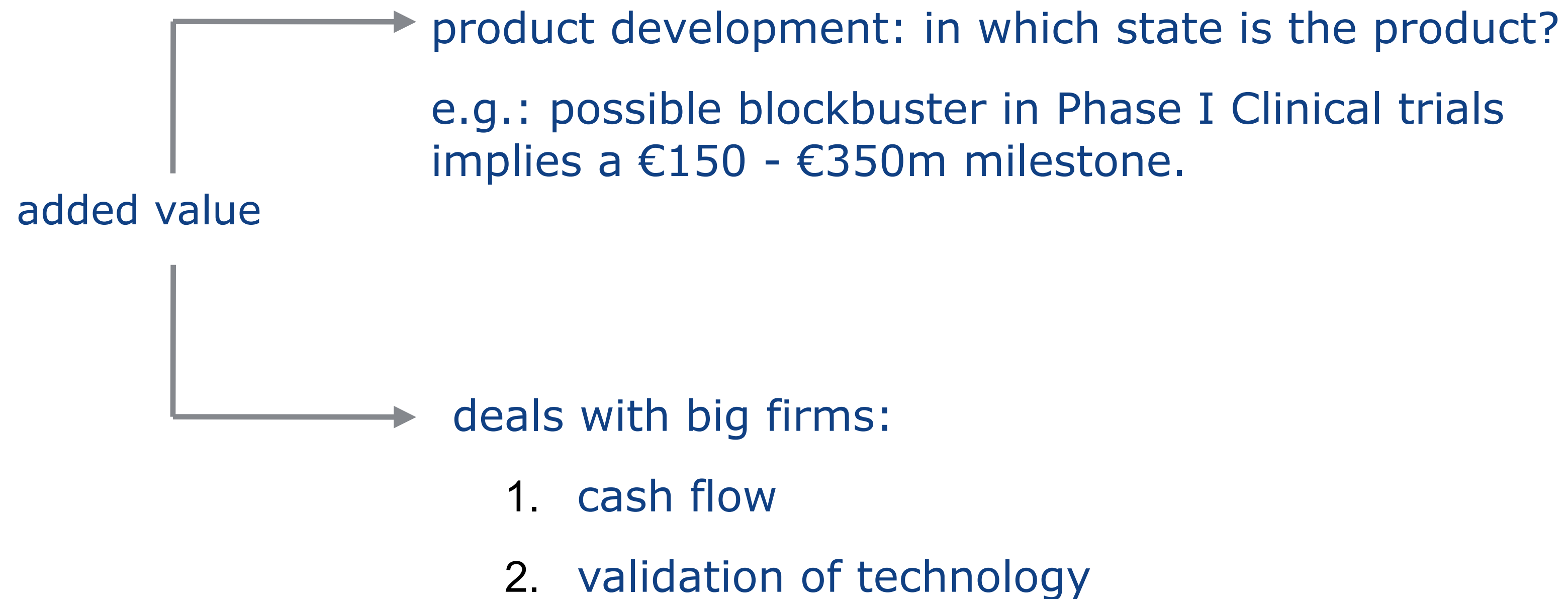
- valuation of many young tech companies is based on the added value the company was able to produce during its cash-burning period.

# added-value





# how to determine the added value?



Note: a blockbuster is a medicine with an annual revenue of more than \$1 billion, once it has reached maturity

# Valuation

Conclusions



# Conclusion

- at the start up: peer comparison was the most “tangible” method
- VC logic has a strong impact on the valuation of the company at start up: the VC aims for his multiples
- Augmented NPV methods become more popular when the company is more mature (e.g. at IPO)
- The valuation method evolves together with the company!!
- The concept of “value”

The End