

Lecture #2

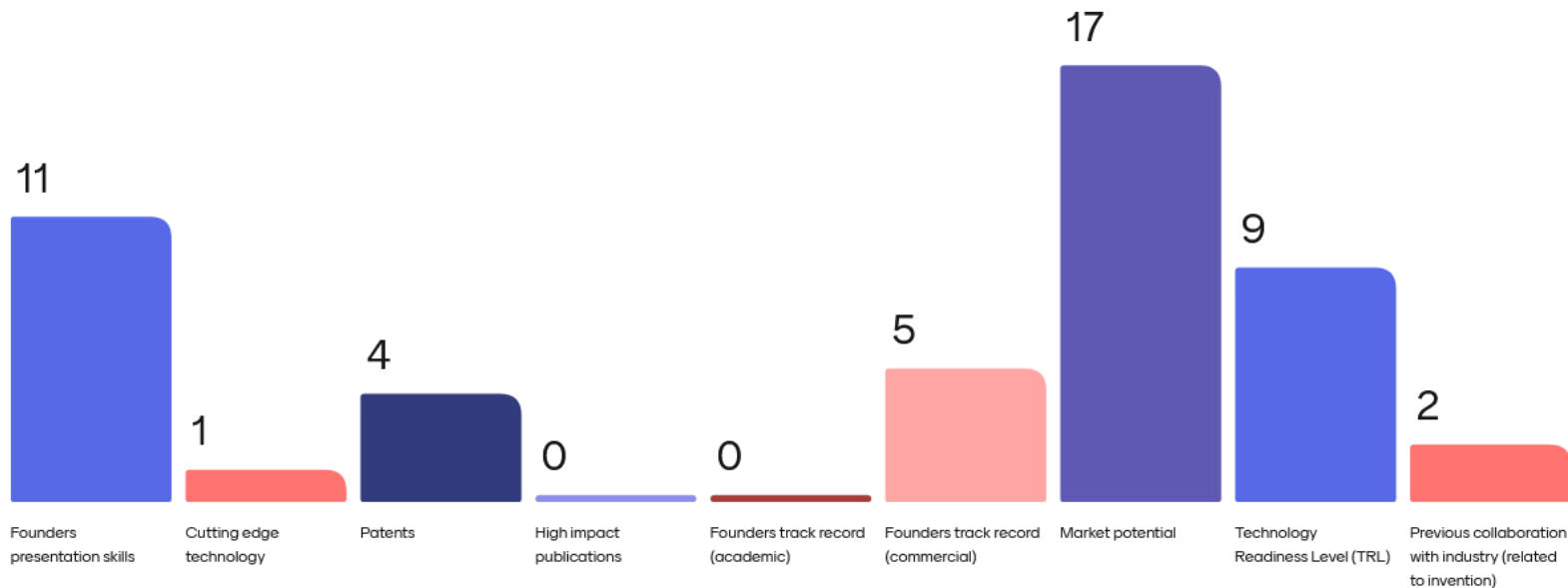
Roadmap

Aims:

- See a template business case study and prepare one based on Theranos
- Get a general idea of the steps required to found a startup
- Analyze what is required to build a perfect team
- Learn from the failures of others

theranos

- What did Theranos offer to the customers?
- How could the company get so big (10 billion US\$ peak value) without having a functional product?
- What are Elisabeth Holmes' strengths, what are her weaknesses?



- Prepare an example case study on theranos during the seminar

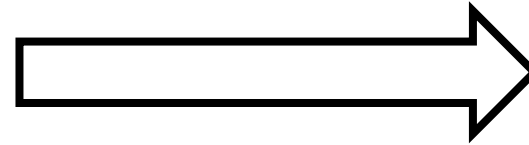
Sample case study by Han-Yi Huang

ava co

Roadmap for commercializing academic technology

Academic Science & Technology

Case study TheraMe!
www.thera-me.com



Commercialization

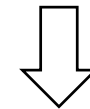
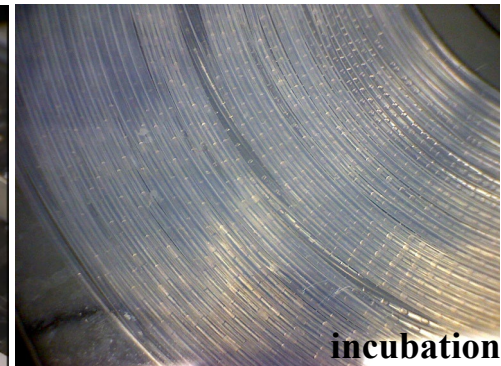
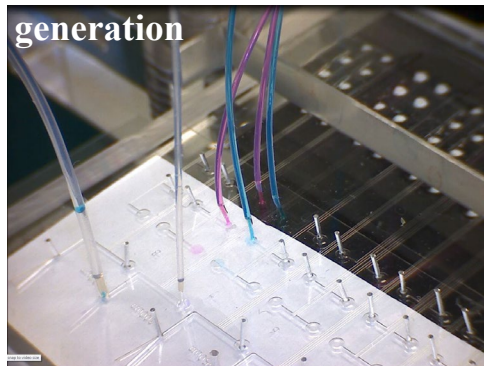
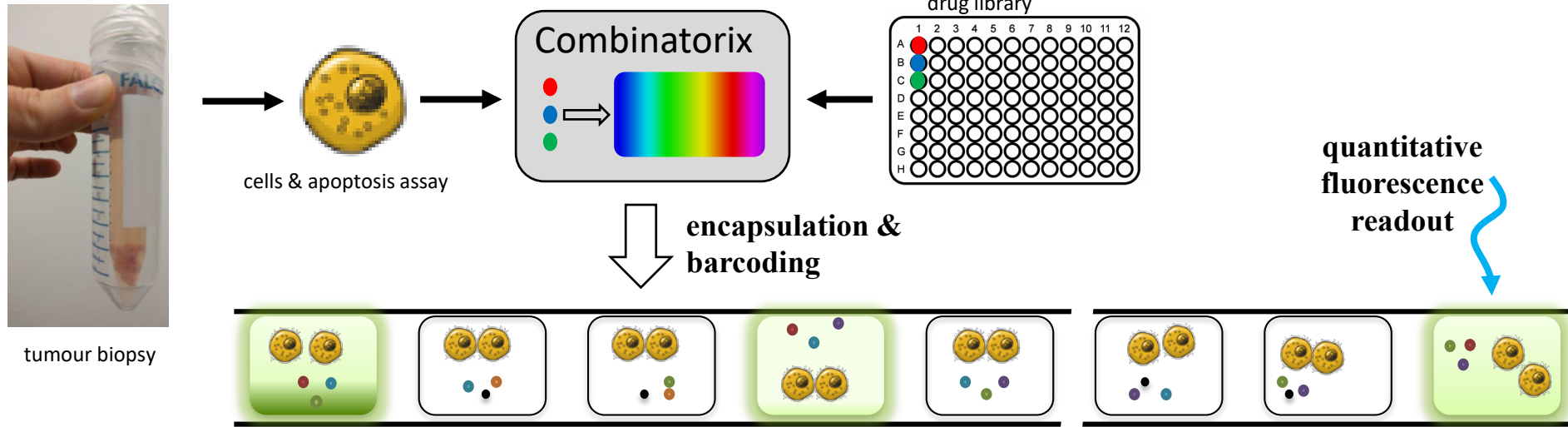
1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

Invention/USPs **Limitations** **Other points**

Microfluidic drug testing on tumor biopsies	Patient benefit not yet shown	TRL IP Costs Technology*
---	-------------------------------	-----------------------------------

* Combination of droplet microfluidics with microfluidic valves using proprietary technology

Personalized combinatorial cancer therapy



- 1.) Prediction of best therapy option
- 2.) Combinatorial pathway modelling

- results within 24h
- consumables costs of <150 US\$ per screen
- target agnostic, no need for biomarkers

Eduati F. et al., *Nature Communications* (2018)
 Eduati F. et al., *Molecular Systems Biology* (2020)
 Mathur L. et al., *Small* (2020)
 Kolmar L. et al., *Trends in Cell Biology* (2022)
 Mathur L. et al., *Nature Communications* (2022)
 Utharala R. et al., *Nature Protocols*, (2022)
 Panwar J. et al., *Nature Protocols*, (2023)



Federica Eduati



Julio Saez Rodriguez



Vida Vafaizadeh



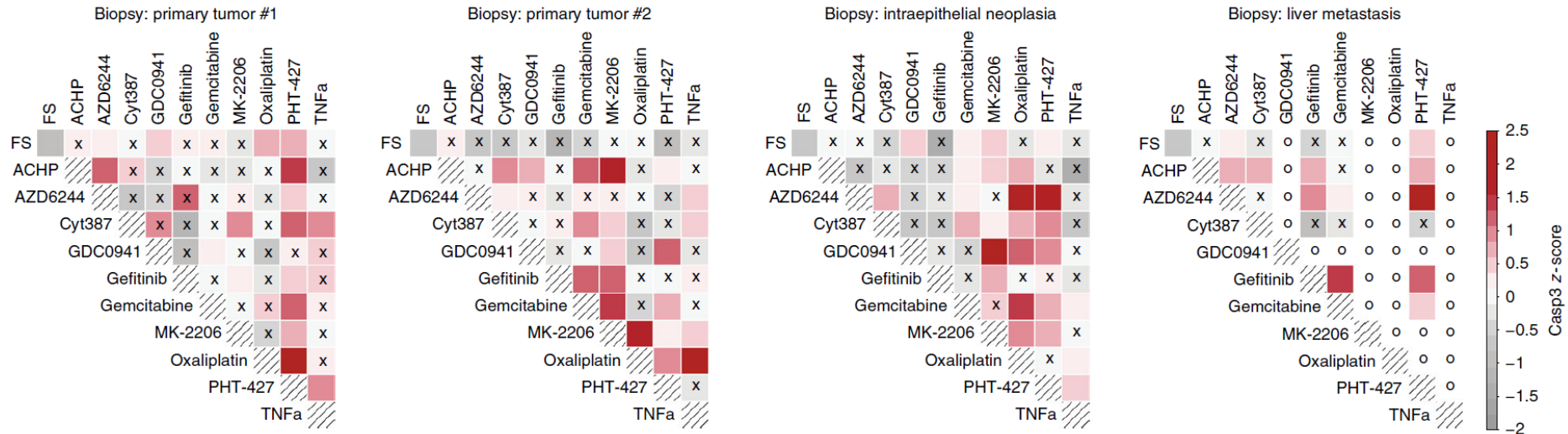
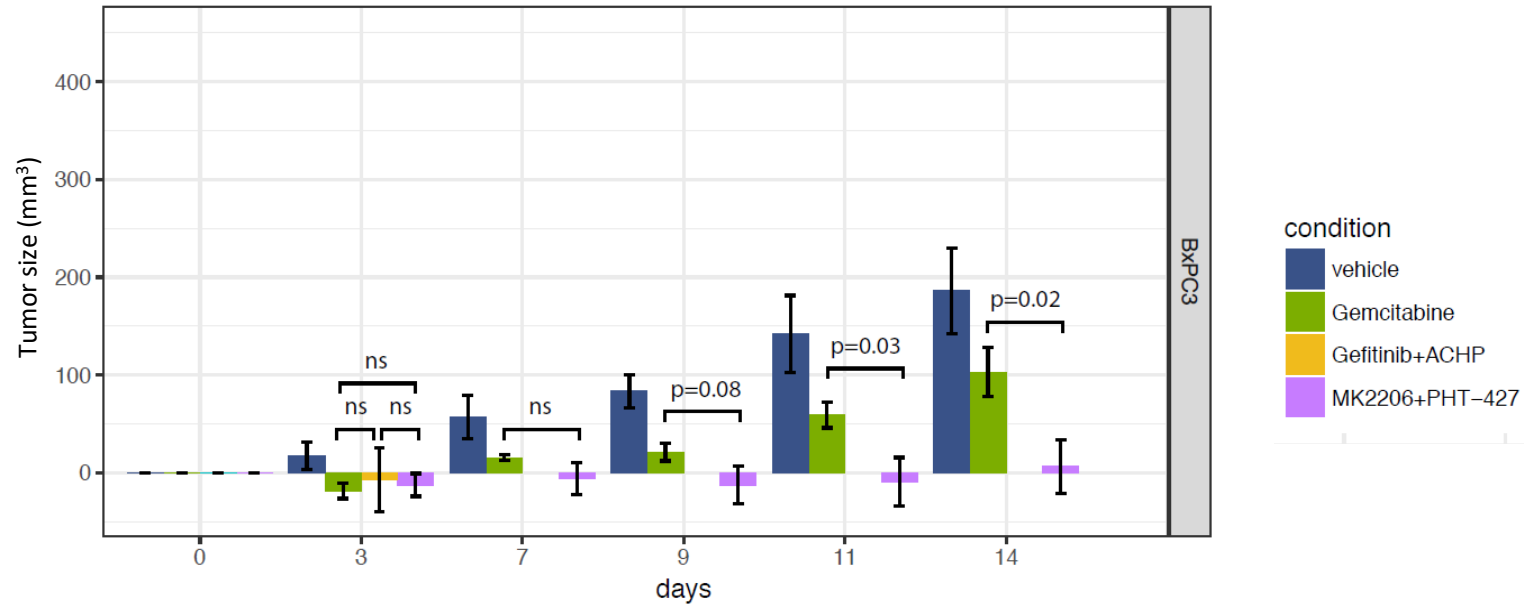
Hien Du Ngoc



Hana Samet



Data on xenograft mouse models an patient samples







Road to founding a startup

Given that cancer is a big problem, can we translate this technical innovation into a startup?

If so...how?



Comparison with existing diagnostic products

System	FDA-approved Companion Diagnostics Tests	FDA-approved Circulating Tumor Cell Count	THERAme 
Detection of individual resistances	✓	✓	✓
Comparison of 100+ therapy options	✗	✗	✓
Diagnosis before treatment	✓	✗	✓
Diagnosis without prior knowledge/ biomarkers	✗	✓	✓
Direct evidence for efficiency of therapy	✗	✓	✓
Costs per test & patient	~ 1,500-5,800 US\$ 	~350 US\$ 	~2500 US\$* 

*envisaged market price, internal consumable costs = 150 US\$ per screen

Road to founding a startup

Commercialization

1. **What is the USP?** Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

Drugs are tested directly on patient's tumor cells (in contrast to conventional formats, microfluidic approaches require only small numbers of cells per assay, allowing large scale screens on limited patient material)

No need for biomarkers (target agnostic and widely applicable)

Compatibility with clinical needs - results available within 24h at internal consumables costs of less than 150 US\$

Many therapy options can be tested in parallel and before start of the therapy

Road to founding a startup

Commercialization

1. What is the **USP**? **Is there a market and how big is it?**
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

The total economic cost of cancer is 1.14 trillion US\$/year

Annual sales in the field of cancer diagnostics are 160 billion US\$/year

Annual sales of cancer diagnostics in Switzerland are ??? million US\$/year

Pancreatic cancer accounts for only about 3% of all cancers



How do I get MY market potential out of all these numbers and infos?

=> **Lecture on market analysis**

Road to founding a startup

Commercialization

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

Business-to-business (B2B)?

Business-to-consumer (B2C)?

Selling instruments and kits or fee for service (FFS)?

Growth and exit strategy of the company?



=> **Lecture on Corporate Planning**

Road to founding a startup

Commercialization

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

What is the technology readiness level of my innovation?

How does a first product look like?

Which steps are necessary to develop an MVP/MMP?



=> Lecture on Timelines & initial steps

Road to founding a startup

Commercialization

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

Patents – how to file, life time, dependencies

Do I infringe other patents when selling my product or service?

What certifications (e.g. ISO) are required for diagnostic products?

Are there ways to circumvent certification in the beginning?



=> Lecture on patents and legal issues

Road to founding a startup

Commercialization

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. **How to secure funding?**

Which public funding opportunities exist?

What support can I get from EPFL?

When to involve external investors and how?

What do I have to prepare to pitch for funding?



=> Lecture on funding plus guest lectures by Gautam Maitra (C4L)

Road to founding a startup

Commercialization

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. **How to secure funding?**

Final aim of this course: Prepare an individual case study, a written funding application and a group pitch deck addressing these aspects!

- **Get an idea of the problem based on real-world case studies** (5min Individual presentations)
- **Provide an executive summary and overview on commercial potential on *YOUR* innovation (C4L format)**
- **Do a professional group pitch** (10min; e.g. 1-2 slides on technical innovation, 2 slides on USP and market, 1 slide on business model, 1-2 slides on patents and legal/regulatory issues, 2 slides on corporate planning and a nice slide on the team (pointing out skills and role in future startup))

***WHO* is walking down this road? Build the perfect team!**

An innovative scientist (= usually a tech person) is almost never sufficient to translate academic research into a marketable product, potentially not even into a clearly defined product idea!

The TheraMe! project required experts in many different domains:

- Microfluidics & Engineering
- Bioinformatics
- Cellular and molecular biology
- Clinical oncology
- Entrepreneurship and business administration
- Design and execution of clinical trials
- Mass manufacturing
- Certification of IVD devices
- Law & accounting
- Business development (future)

WHO is walking down this road? Build the perfect team!

An innovative scientist (= usually a tech person) is almost never sufficient to translate academic research into a marketable product, potentially not even into a clearly defined product idea!

The TheraMe! project required experts in many different domains:

- Microfluidics & Engineering
- Bioinformatics
- Cellular and molecular biology
- Clinical oncology
- Entrepreneurship and business administration
- Design and execution of clinical trials
- Mass manufacturing
- Certification of IVD devices
- Law & accounting
- Business development (future)

In general, these skill sets can be covered either by the **founders** or by **external consultants or companies**.

Concentrate on what YOU are doing best and what others likely don't do equally well. Don't try to be an expert in everything, many tasks can be done much *better* and *faster* by others!

This question will come up in any team!

How to distribute shares in a startup? What are the most relevant contributions (and who made them)?

⇒ **Mentimeter: What are the most relevant contributions determining individual shares?**



Join at menti.com | use code **6653 9975**

A few things to keep in mind when assigning shares

- What is most valuable for external observers (e.g. investors)?
- Make sure you leave some shares for future contributors
- Consider releasing shares over time rather than in one go (“vested shares”, e.g. to avoid that people get shares and immediately leave)
- In contrast to contributions to a scientific paper (“who did what?” - past), shares of a company must also take into account *future* contributions (who *will* be needed most)

Road to founding a startup – potential pitfalls!

LEAD
Innovation

Blog on Top 5 reasons for failure

<https://www.lead-innovation.com/english-blog/reasons-startups-fail>

Menti: What do you think are the Top 5 reasons for failure?



Join at menti.com | use code **3614 0700**

1. Lack of market demand

No Market, no Cash. A study by CB Insight shows that more than 40 percent of the 101 shutdown companies examined failed because they had planned their product or service completely out of the market. In some cases, the market was not yet mature or features were developed that were not relevant from the point of view of the target group and which the market therefore did not want.

The latter applies to the Austrian startup Woodero. The company was able to raise the required capital successfully via crowdfunding, but then failed due to the lack of demand for its wood-made smartphone and tablet cases. Dave Sloan's startup Treehouse Logic, launched as SurveyMonkey for Website Configurators, also failed because Sloan wanted to solve a problem that was not relevant enough for customers to generate a profitable business model.

How important the correct interpretation of market research results is can be seen from the Dinnr food delivery service. 70 percent of 250 respondents agreed that they would buy the product. The Alpha test group and 1:1 interviews also produced positive results. Nevertheless, founder Michael Bohanes ruined the startup because he misinterpreted the market research results. Bohanes only presented his idea, which did not offer a solution for a customer problem or a relevant additional benefit. He interpreted the survey data as market potential, while the respondents only expressed their general interest. De facto there was no demand for such a delivery service.

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

2. Insufficient financial resources

Another important reason for the failure of start-ups is the lack of capital resources. In the growth phase, follow-up financing is often lacking. The CB Insight study puts the proportion of companies that failed due to liquidity problems at just under one third (29 percent).

An example of this is the drone company Airware, which had to close its bulkheads again a few months ago. Airware desperately looked for financiers for 18 months before the company ran out of money and was shut down. The startup wanted to gain a foothold as a pioneer in commercial drones. However, the market did not develop as quickly as Airware expected. In addition, there were **long development cycles** and **missing software features that competitors already had on offer**. When Caterpillar left as one of the largest financiers, the company lacked the financial resources to successfully position itself on the market in the long term. Approximately 120 employees were out of a job after the start-up had burned \$118 million in cash.

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

3. The wrong team

Another reliable killer for startups are problems and inconsistencies within the team (23 percent according to CB Insight study). If the cooperation between the team members does not work, the startup doesn't stand a chance either.

„The first five employees will make or break your start-up.“

Oliver Holle, CEO Managing Partner Speedinvest

However, an unbalanced composition of the teams with regard to the competencies of the individual members often hampers the success of the company. Sometimes there is a lack of important skills for the technical implementation of the business idea, sometimes there is a lack of a CTO who acts as an interface between management and the technical departments. The online job platform Standout Jobs, for example, failed due to a lack of professional skills. The team was not able to build an MVP (Minimal Viable Product) itself or with some external support from freelancers. The company could have brought on board additional founders or external innovation partners with the appropriate skills, but failed to take this step and went bankrupt.

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

4. Strong competition

In 19 percent of the CB Insight study, startups were overtaken by their competitors and forced to give up. A well-known example is Wesabe, a failed online personal financial management service outperformed by Mint. Mint analyzed the weaknesses of Wesabe's MVP and only launched the platform when they had developed a better solution. This gave Mint a competitive edge among other factors. Wesabe was more powerful than Mint and offered more functions, but was more difficult to operate.

Another example of a company that has been caught up by the market is Raptr. The company offered a social network for gamers and benefited for several years from the graphics card manufacturer AMD bundling Raptr software with its graphics driver. When gradually other games platforms like Steam or Xbox were represented on the market and the agreement with AMD 2016 was not extended, this sealed the fate of the company. Until then, investors had invested 44 million dollars in the company.

Investors had put a lot more into Jawbone Up, the company that launched the first fitness bracelet in 2011, namely around one billion dollars. However, the company was outperformed by its competitors. With the entry of Fitbit and various other manufacturers, the market became increasingly competitive and the company's own innovative products did not generate enough demand. After all, the company ran out of money.

1. **What is the USP?** Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

Blog on Top 5 reasons for failure

5. Pricing and costs

Other problems with many startups arise from difficulties in calculating a price that is high enough to cover costs but low enough to attract customers. After all, 18 percent of the companies in the CB Insight study cited profitability issues as the main reason for failure.

Startup Delight, for example, had the vision of developing a new type of mobile analysis: visual analysis. The most expensive monthly plan was \$300. Customers had expected more for this price. In addition, there was a poorly chosen billing model. The price was calculated according to the number of recording credits. Since the customers had no influence on the length of the recordings, most of them were very careful when using up the credits. Pricing models based on the accumulated duration of recordings would have made much more sense and increased the number of subscriptions.

1. What is the **USP**? Is there a **market** and how big is it?
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time**, **budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?

BIO-490 students tasks for today/ this week

Prepare a business case study on theranos:

- **Problem 1-2 slides**
- **Solution and USP 1-2 slides**
- **Business model 1-2 Slides**

Form groups and start selecting startups for individual case studies

Course content and schedule 2025

Lecture #/Date	Topic	Details	Seminar tasks
1/ 11.09	General Introduction	Aims of the course, expectations, tasks and assessments General proceeding	Watch Elisabeth Holmes Documentary (Theranos story)
2/ 18.09	Roadmap from academic idea to startup	template business example, Learn about all the steps needed to translate a scientific idea into a startup and what your pitch deck should include => Focus on Value proposition and Business model	Define customer value proposition, USPs and business model (= business example) of Theranos Grouping and assignment of individual presentations
3/ 25.09	Market analysis	Market size, competitors, customer models, growth and scalability,	Introduction into (GlobalData), Find market data on your business example & group innovation
4/ 02.10	Corporate planning	Business models, exit strategies, website & visibility,	Define business example of your group innovation, define markets and competitors
5/ 9.10	Business examples	Business examples 1-4 , detailed feedback	
6/ 16.10	Intellectual property and other legal issues	Business examples 5-8 Patents – facts, data bases, examples Concept of freedom to operate, regulatory hurdles, etc.	Find & analyze patents in your field
23.10 – no lecture!			
7/ 30.10	Timelines & initial steps	Business examples 9-12 Milestones and finance plan from idea to startup/product	Prepare milestones and financial plan for your startup idea
8/ 06.11	Finalizing the pitch deck	Business examples 13-16 Recap: Detailed analysis of individual case studies, last year's best group pitch and TheraMe pitch	Finalize pitch deck
9/ 13.11	How to secure funding	Business examples 17-20 Public funding programs, investments, venture capital, EPFL programs	
11/ 20.11	Guest speaker Daniel Alpern (EPFL entrepreneur)	Business examples 21-24 Real-world EPFL startup insight (Alithea)	Prepare Executive Summary and commercial potential in C4Lformat
12/ 27.11	Guest speaker tbd (EPFL I4L)	Introducing EPFL funding instruments	
13/ 04.12	Pitches Groups A (e.g. 4-6) Feedback Groups B (e.g. 1-3)	10min pitches with non-presenting students to provide written feedback, Submission of Executive Summary and commercial potential in C4Lformat	Prepare written feedback on other group's pitches
14/ 11.12	Pitches Groups B (e.g. 1-3) Feedback Groups A (e.g. 4-6)	10min pitches with non-presenting students to provide written feedback, Submission of Executive Summary and commercial potential in C4Lformat	
11.12 at 10:15 am	Trophy Award & Feedback		

Questions?

