Financing Strategies in the Area of Industrial Biotechnology (and Bio-based Products)

Opportunities of a New Science-to-Business Fund

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Contents

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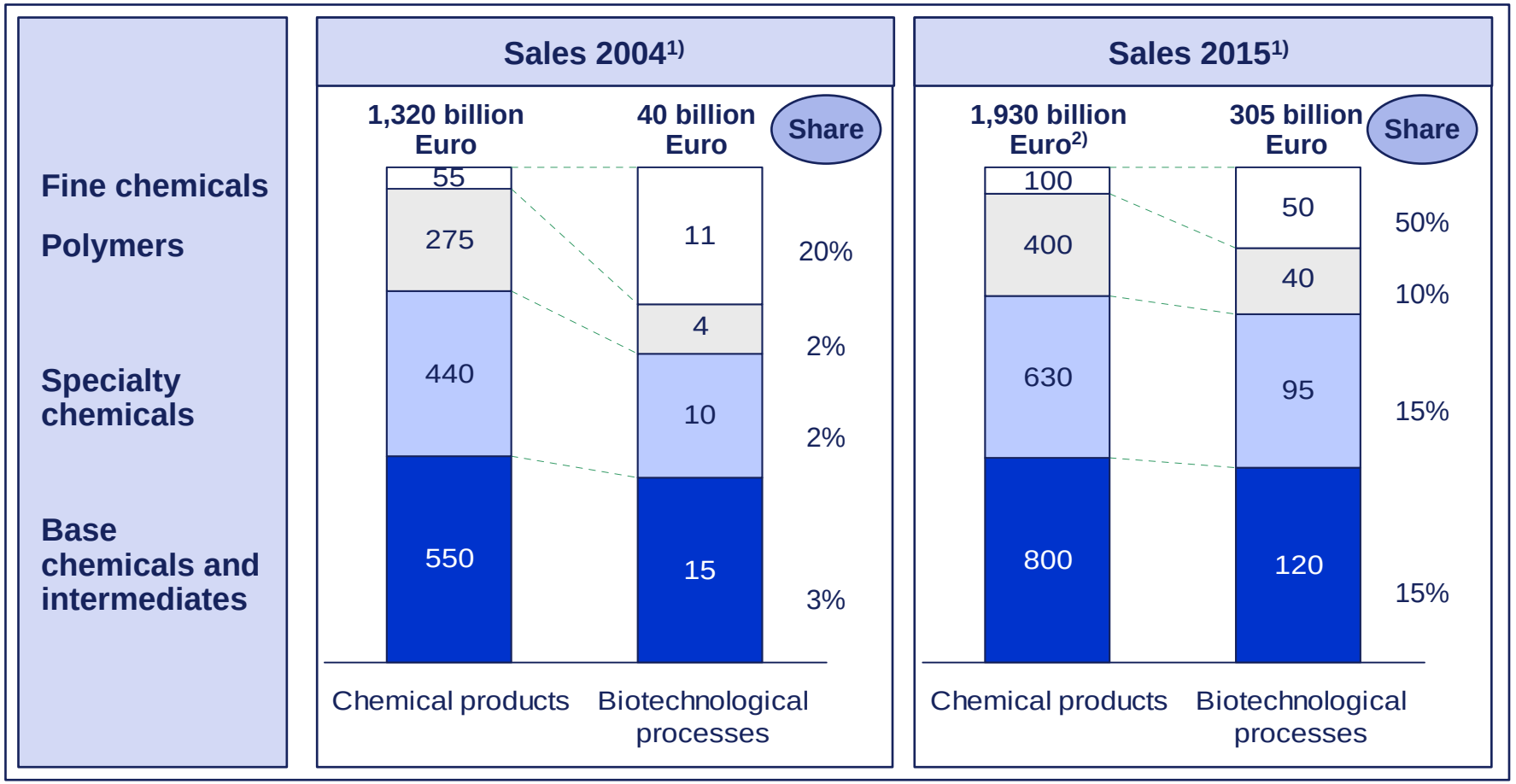
Industrial biotechnology is one of the main enabling technologies for the coming switch from crude oil to renewable resources

- **Industrial biotech** is an emerging field within modern biotechnology that uses living cells like moulds, yeasts or bacteria and enzymes
  - A large number of products are already being manufactured using biotech processes (e.g. bulk chemicals, amino acids and vitamins)
  - The possibilities to replace existing chemical production processes with biotechnological processes will increase due to advances in biotechnological R&D

- Oil price increase, climate change and the resulting **switch from crude oil to renewable resources** are one of the top challenges of today's economy
- Industrial biotechnology is one of the **main enabling technologies** for the switch as it provides technologies to use renewable resources cost effectively

In 2015 about 15% of the chemical products with a sales volume of 305 billion Euro will be produced by biotechnological processes



1) Global chemical sales without pharma products but including pharma intermediates (source: CEFIC)
2) Calculation with an average growth rate of global chemical sales of 3,5% p.a.
Source: Market study of FESTEL CAPITAL from November 2003 (figures updated in April 2005)

The capital requirements of existing and new industrial biotech start-ups/ SMEs in Europe will amount to 500 million Euro during the next years

Seed financing of start-ups

- The potential to found new industrial biotech start-up companies is between 30 and 50 companies
- The average capital requirement for one start-up company is about 2 million Euro

60-100 million Euro

Growth financing of start-ups

- Around 40 industrial biotech start-ups in Europe
- About 50% of these companies need 5 million Euro on average to finance the development of new products

100 million Euro

Growth financing of established SMEs

- Around 20 established industrial biotech SMEs in Europe
- About 25% of these companies need up to 60 million Euro on average for investments in production plants

300 million Euro

Source: Market study of FESTEL CAPITAL from April 2005

The attractiveness of industrial biotechnology in investors' view is limited due to several reasons

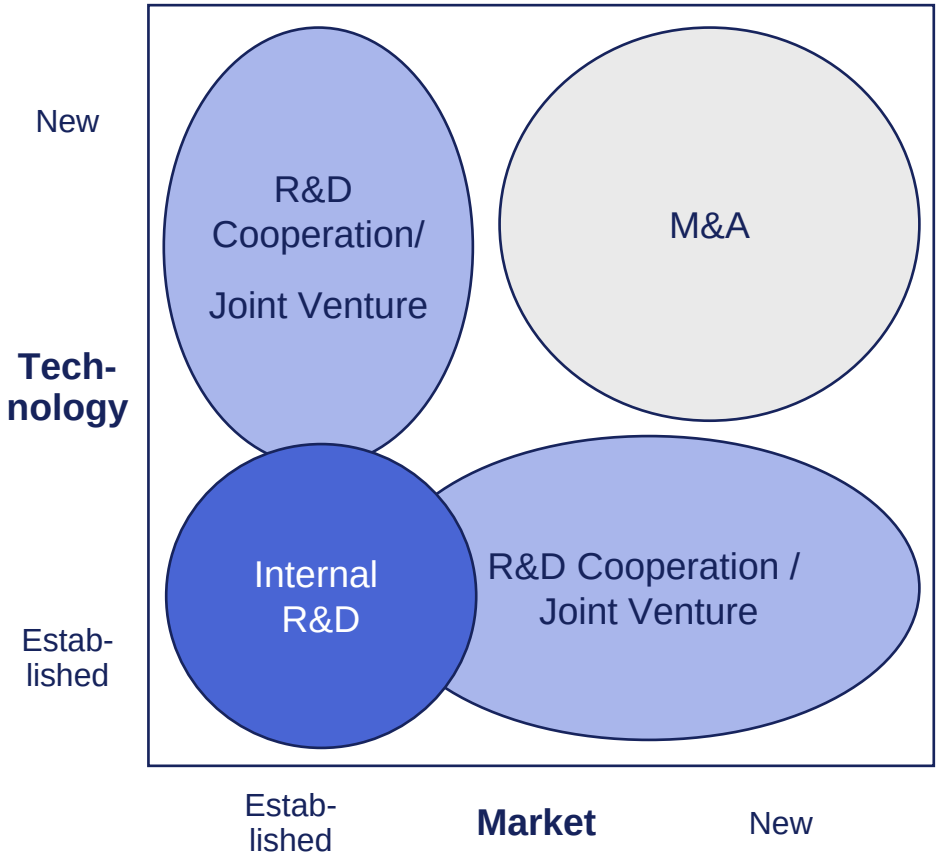
- **Industrial biotech start-ups** are normally profitable from the beginning due to their special characteristics compared to red biotech companies
  - Lower investment volumes - the development periods for new products are shorter and there are no registration procedures
  - More rapid commercialisation of new products/technologies with higher success rates
- Due to the special characteristics of industrial biotech (large and already developed markets, rapid technical progress, short development times, no or only few state regulations) this area should be **well suited for investments**
- **But** (e.g. compared to red biotech and other technology start-ups)
  - Predominantly service-oriented business model (large companies see start-ups primarily as service-providers)
  - Lower margins of the businesses and lower value of IP in the case of success
  - Profitable, but subcritical structures with regard to size and financial strength
  - Not able to realise growth opportunities due to lack of financial resources

Industrial biotech start-ups are trying to move from a service- to an IP-oriented business model

- **Service-orientated business model**
  - Start-up companies offer their particular know-how as services to support established companies (e.g. enzyme optimisation)
  - The growth potential is very limited and, therefore, the attractiveness for investors rather low

- **IP-oriented business model**
  - Start-up companies focus on the development of their own portfolio of technologies and products which they sell or license out
  - A suitable network and co-operation strategy has to ensure the successful commercialisation of own IP

Industrial biotech start-ups normally do not use the growth strategies to move from a service-oriented to an IP-oriented business model



Strategy	Description
Internal R&D	Governmental funds (mainly allocated to basic research projects rather than product development)
R&D Co-operation / Joint Venture	Very unusual (strong competition between start-up companies to get funding from established companies for joint R&D projects)
M&A	Very seldom (e.g. acquisition of Jülich Fine Chemicals through Codexis)

Contents

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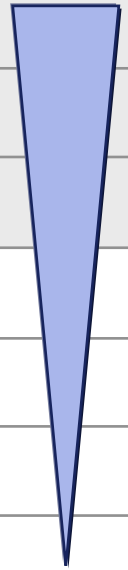
Start-ups are predominantly financed by their operational imcome, private investors and governmental funds

Financing Sources	Importance[1)]
Operational income	
Private investors	
Governmental funds	
VC	
Debt funding	
CVC	
IPO	

1) The ranking of the importance was calculated based on expert interviews

Source: Market study of FESTEL CAPITAL

Private investors play an important role as they strengthen the financial situation of the start-up in critical situations

- **Private investors** are normally management or employees of the start-up or external investors like business angels
- They can improve the **equity to debt ratio** to enable the access to debt financing in early stages
- The volumes of private investments are **rather small** which restricts the use of private investors for large projects
- External private investors can provide **additional know-how** to the start-up company

Only 15 to 20% of industrial biotech start-ups in Europe were able to acquire VC due to their service-oriented business model

- Most industrial biotech start-ups have discussions with **VC companies**, but VC financing rounds are only finalized in a few cases
  - This is due to the **service-oriented business** model which cannot realise the appropriate rate of return for VC companies
  - VC's **lack of knowledge** about the industrial biotech sector often leads to a false evaluation of the company value (e.g. VC's undervalue the b2b relationships)
- **CVC investments** are pretty rare in industrial biotech and the focus is primarily on start-ups with IP-oriented business models
  - A potential conflict with start-up companies and other financial investors is the **exit strategy**
  - In the future, CVC investments are **likely to increase** since the companies want to actively participate in the development within the industrial biotech sector

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Industrial biotech start-ups face serious challenges regarding financing their businesses

- **Governmental funds** play an important role in financing industrial biotech start-up companies especially in early stages
- Other financing sources such as **debt funding and IPOs** are not relevant for industrial biotech start-ups
- The problem with regard to the financing of start-ups in industrial biotech is their **low financial strength**
  - Unexpected events can cause serious threats for the whole company
  - Companies have to cancel R&D projects due to a lack of funding
- Particular problems arise for **volumes between 0.5 and 5 million Euro** („equity gap“) due to a limited number of financial partners covering this range
  - For financial volumes below 0.5 million Euro, start-ups collect the funds from operational income, private investors, governmental funds
  - For financial volumes above 5 million Euro, they try to use VC

Contents

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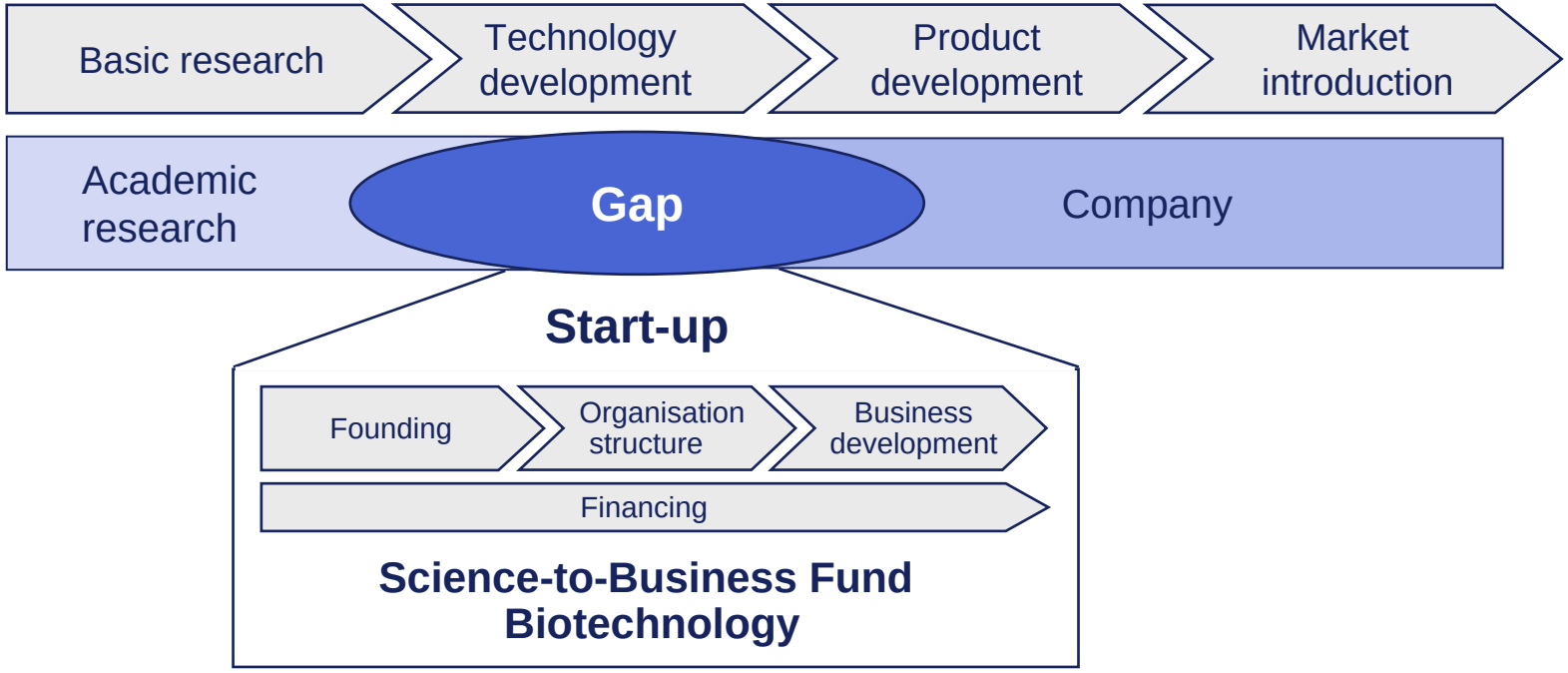
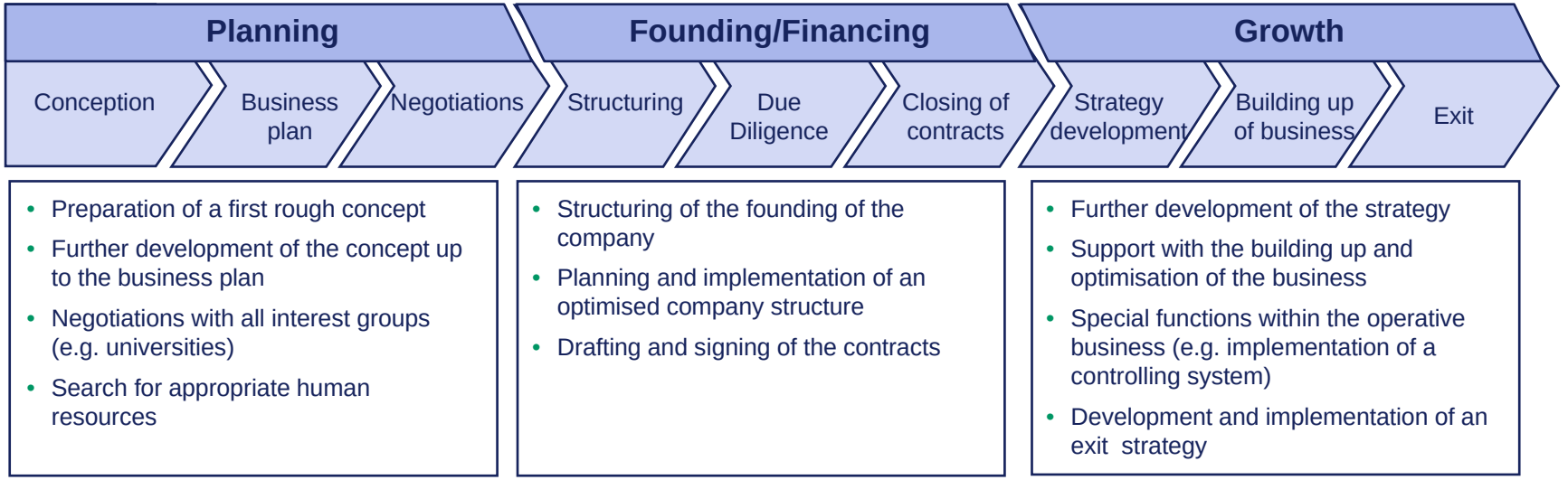
The Science-to-Business Fund Concept is to close the gap between academic research and the realisation / commercialisation of the research results

- As a rule, **a gap** exists between academic research and the realisation / commercialisation of the research results
- The planned Science-to-Business Fund Concept is to close this gap through **financing and operational support** (e.g. the founding of start-up companies)



Within the VC investment model start-up companies will be will financed and supported at a very early stage

- Investment in start-up companies using the known **VC investment model**
  - Engagement at a **very early stage** (usually before founding) with up to Euro 0.5 million
  - The later **growth financing** will be done through the fund, classic VC companies or other investors
- The start-up companies will be supported (usually before the founding of the company) **from the conception through to the exit**



The value creation potential of industrial biotech investments will be fixed using the appropriate investment strategy

- **Step 1:** Identification of interesting markets where established companies are too slow or "conservative"
- **Step 2:** Understanding of the value chain and identification of bottleneck technologies with very focused investments to claim these technologies (e.g. patents)
- **Step 3:** Co-operation with established companies to use their marketing and production resources after the building-up of a strong technological position with own IP rights
- **Very important aspect:** The challenge for industrial biotech start-ups is to create synergies between service- and IP-oriented businesses, as start-ups can profit from transferring results to new applications

The Science-to-Business Fund Concept offers several advantages due to its innovative concept

- The **cross-value chain co-operation** of companies can be improved with the fund concept
- Due to early stage engagement of the fund there is little competition with other investors and the opportunity to ensure **attractive investment possibilities** with very high value creation potential
- Through the initial relatively low investment volume a large number of investments with respective **high risk diversification** are possible
- The **risk with large investments in the growth phase is relatively low**, as the start-ups are usually known to the investor since their founding
- **Public funding**, which does not need to be repaid nor interest paid, results in a leverage effect for the investors

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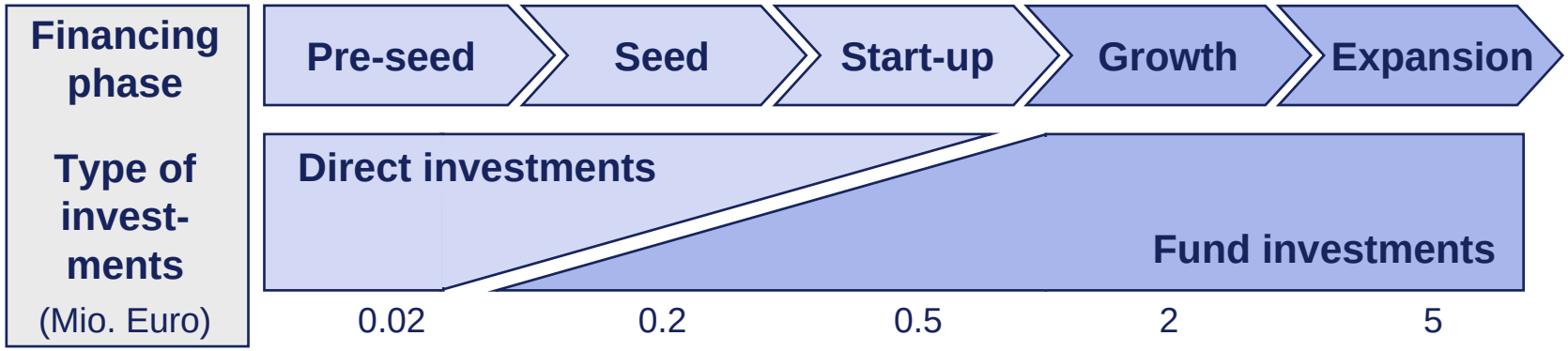
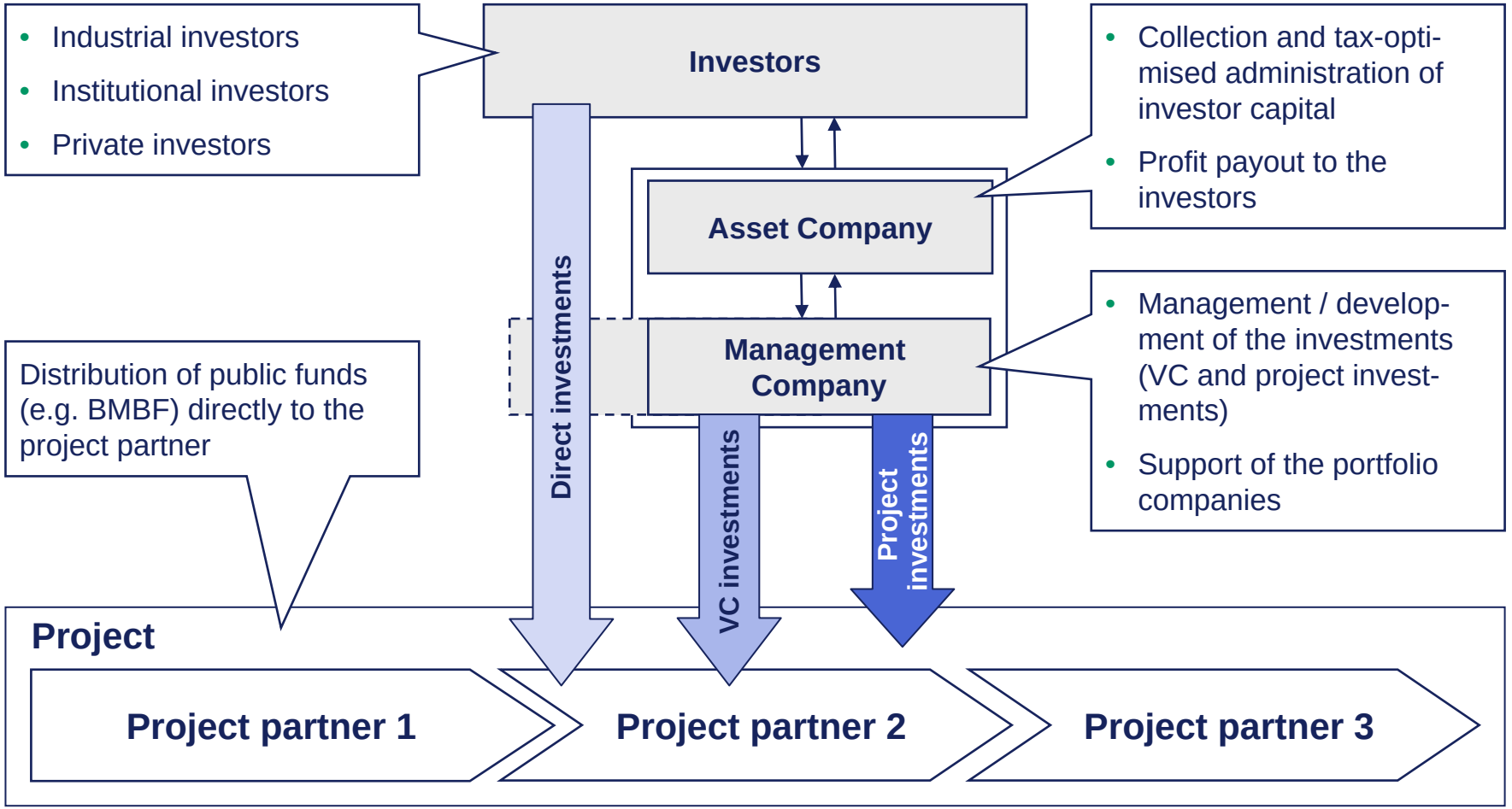
The Science-to-Business Fund Concept realises synergy effects between private and fund investments

- The funds concept **combines private and fund investments** during the different financing phases of an investment case with clear synergy effects



- With a fund volume of around **60 million Euros**, up to around 20 projects (from seed to expansion financing) could be developed over the whole lifetime of the fund
- The fund is to be operative preferably in **Central Europe** (Germany, Austria, Switzerland, Belgium and the Netherlands)
- A **model calculation** showed that with the fund concept, investors could generate attractive and, compared to other investment possibilities, competitive returns

A management company manages investments and controls / supports the further development of the portfolio companies



Contents

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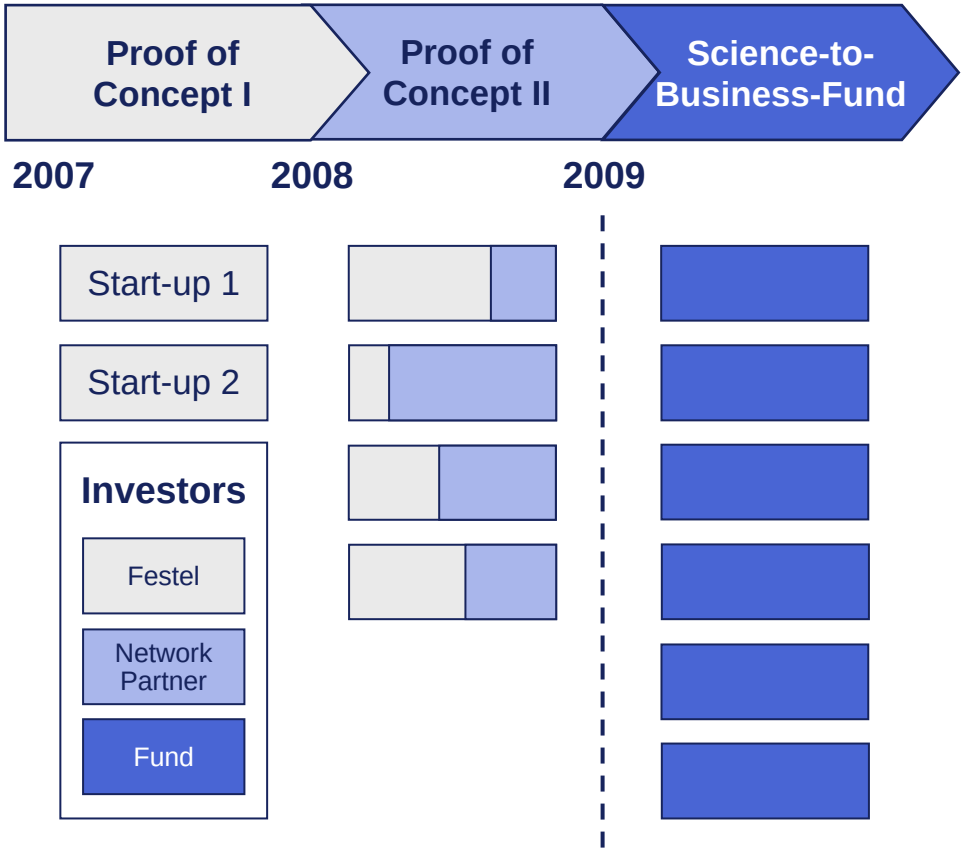
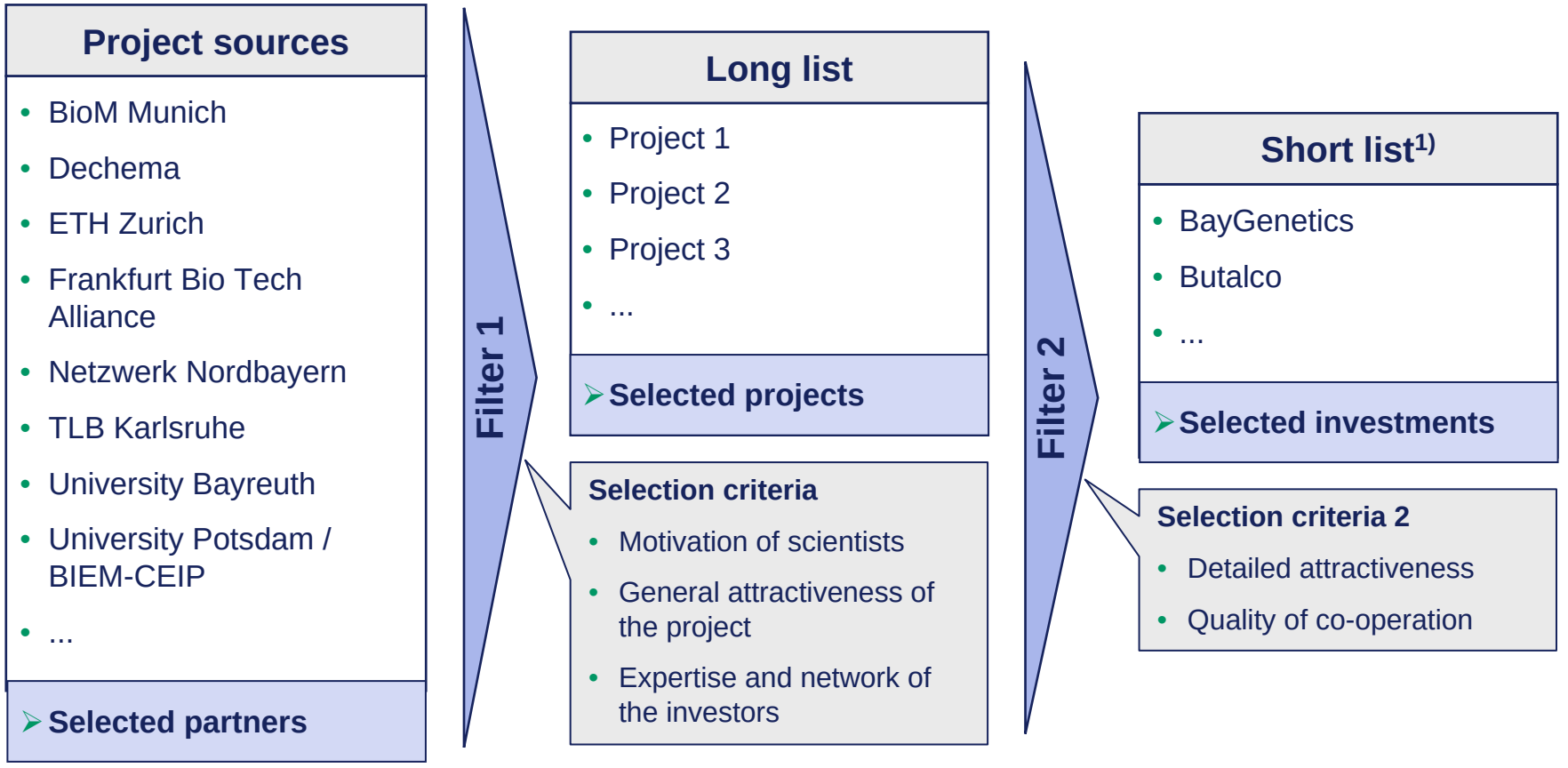
Due to the innovative investment strategy of the Science-to-Business-Fund a proof of concept is to be performed before the realisation of the fund

- In a **first step**, the general concept is to be proven through selective investments of Festel
- In a **second step**, investments through private persons in the network are possible
- After the proof of concept, the fund is to be realised as of 2009 together with a renowned partner from the **financial/investment sector**
- The **detailed investment strategy** and the exact approach are currently being worked out with the support of a prestigious advisory board



The most attractive projects will be identified with a two stage selection process



1) Besides the two described investments, there are also a number of further projects in process, in order to guarantee a continuous flow of interesting investment possibilities

Two of FESTEL's current investments could be used as proof-of-concept for the investment strategy

Butalco GmbH / Zug, Switzerland

- Prof. Boles/University Frankfurt has developed a very promising scientific approach for the production of 2nd generation biofuels, other bio-based chemicals and bioactive substances
- Together with Prof. Boles, Festel founded a start-up in August 2007 for the further development and commercialisation of the results
- Butalco is financing the fundamental scientific work within a research contract with the University Frankfurt

BayGenetics GmbH / Bayreuth, Germany (being founded)

- Research results of Prof. Schumann/University Bayreuth enable new applications in the areas of enzyme catalysis, protein synthesis, molecular diagnostic and vaccines
- In 2007, Festel financed work into the investigation of market potential and patent situation, took care of external recruitment and developed a business plan
- Currently, first discussions with industrial partners are being held and the founding of the start up company BayGenetics at the beginning of 2008 is planned