



Economic Situation of Commercial Industrial Biotechnology

Business Models & Growth/Financing Strategies

Swiss Biotech Association
"Swiss Industrial Biotech: Quo Vadis?"

Basle, June 2, 2006

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Future

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- **For queries, please contact**

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- Therefore, all liability for costs or damage resulting from information and conclusions in this document is excluded

FESTEL CAPITAL investigated the impact of white biotech on industrial production processes in 2003

Participants

- AC Biotech
- Bayer
- BRAIN
- Celanese
- Ciba SC
- Cognis
- Dechema/Verbundprojekt Biokatalyse
- Degussa/Projekthaus Biotechnologie
- DSM
- DSM Biotech
- Jülich Enzyme Products
- Jülich Fine Chemicals
- Lonza Group
- Merck
- Roche Diagnostics
- Schirmer Consulting
- Solvias
- X-Zyme

Marktstudie zum Einfluss der Biotechnologie auf industrielle Produktionsverfahren

Interviewergebnisse, Schlussfolgerungen und Fazit

Ergebnispräsentation

Autoren: Gunter Festel und Jürgen Knöll

Hünenberg, 18. November 2003

FESTEL
CAPITAL
Innovations in Chemicals
and Lifesciences

Languages: German (Long Version) / English (Short Version)

FESTEL CAPITAL investigated financing strategies in white biotech in 2005

Participants

- AC Biotech
- Artes Biotechnology
- ATG Biosynthetics
- Biospring
- Brain
- Enzis
- Jülich Enzyme Products
- Jülich Fine Chemicals
- Prokaria
- Solvias
- Two unidentified start-ups



Market Study on Financing Strategies in White Biotechnology

Interview Results, Conclusions and Outlook

Presentation of Results

Authors: Gunter Festel and Andreas Heft

Huenenberg, April 25, 2005

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Innovations in Chemicals
and Lifesciences

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More information: www.festel.com

Languages: only English

FESTEL CAPITAL investigated the potential of renewable resources with focus on biopolymers and biolubricants in 2005

Participants	
<ul style="list-style-type: none">• Bayer• BayWa• Biomer• Biop• Biotec• Cerestar• Cognis• FBAW• FKUR Kunststoff• FNR• Fraunhofer UMSICHT• Fuchs• Galactic• Hycail BV• IBAW• IFAS Aachen• Innovia Films• INTERSEROH	<ul style="list-style-type: none">• Lehmann & Voss• NNZ• Nordzucker• Novamont• Pacovis• Panolin• Petroplast Vinora• Pfeifer & Langen• Plantic• Procter & Gamble• Rheinchemie• Roquette• Schill & Seilacher• Süd-Chemie• Südzucker• Total• Treofan• Wentus



Marktstudie zu den Potentialen nachwachsender Rohstoffe
Stärkehydrolyse, Biopolymere und Bioschmierstoffe

Ergebnispräsentation
Autoren: Gunter Festel und Sarai Kölle
Hünenberg, 15. Juli 2005



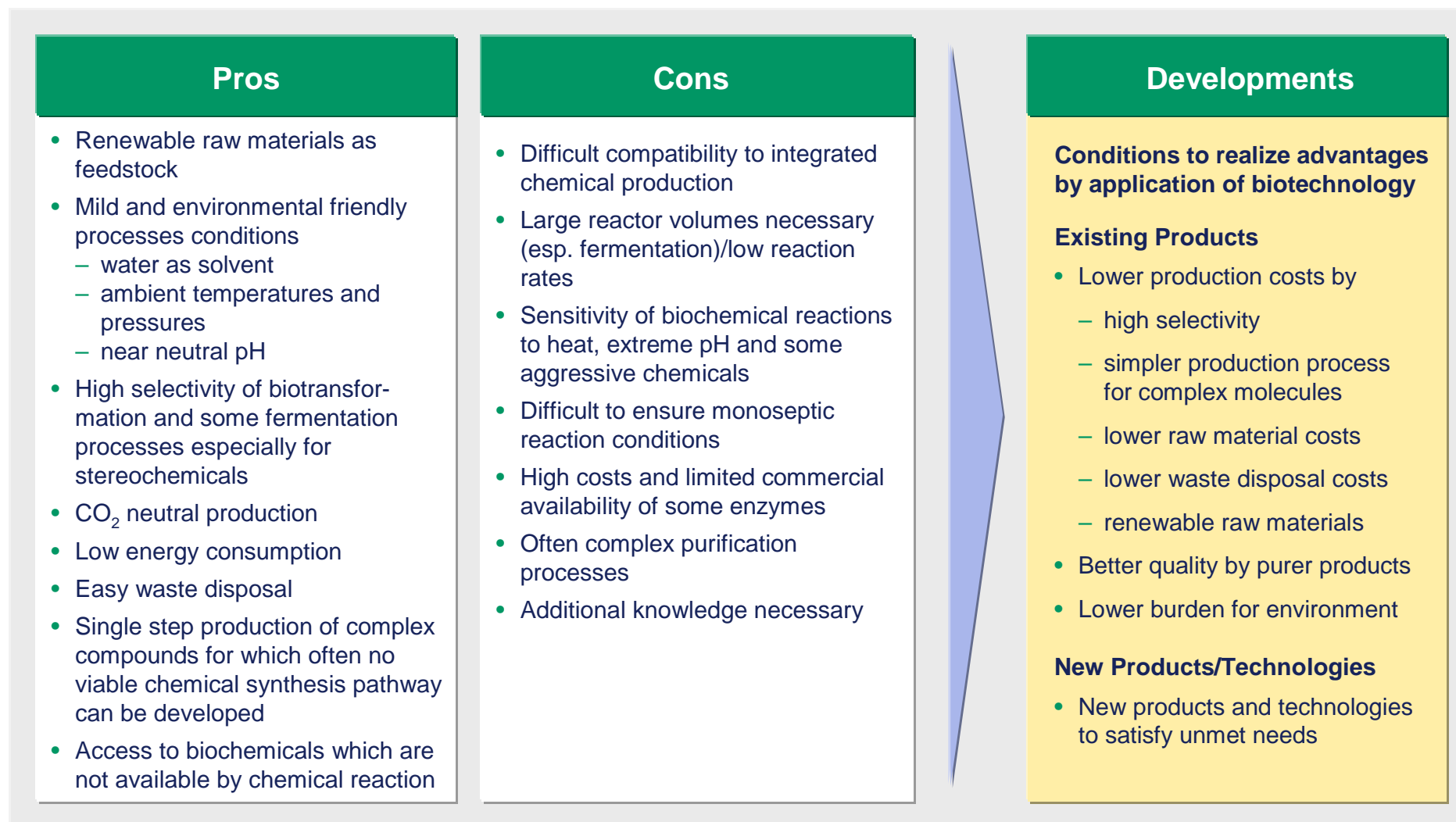
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Languages: German (Long Version) / English (Short Version)

1	Impact of Industrial Biotechnology
2	Applications and Market Potentials
3	Business Models and Growth Strategies
4	Financing Strategies and Sources
5	Conclusion and Outlook
A	Appendix: Information on FESTEL CAPITAL

Impact of Industrial Biotechnology - Developments

The specific pros and cons of industrial biotechnology extend to many areas with new possibilities for development



Certain restrictions have to be considered for biotechnological production processes

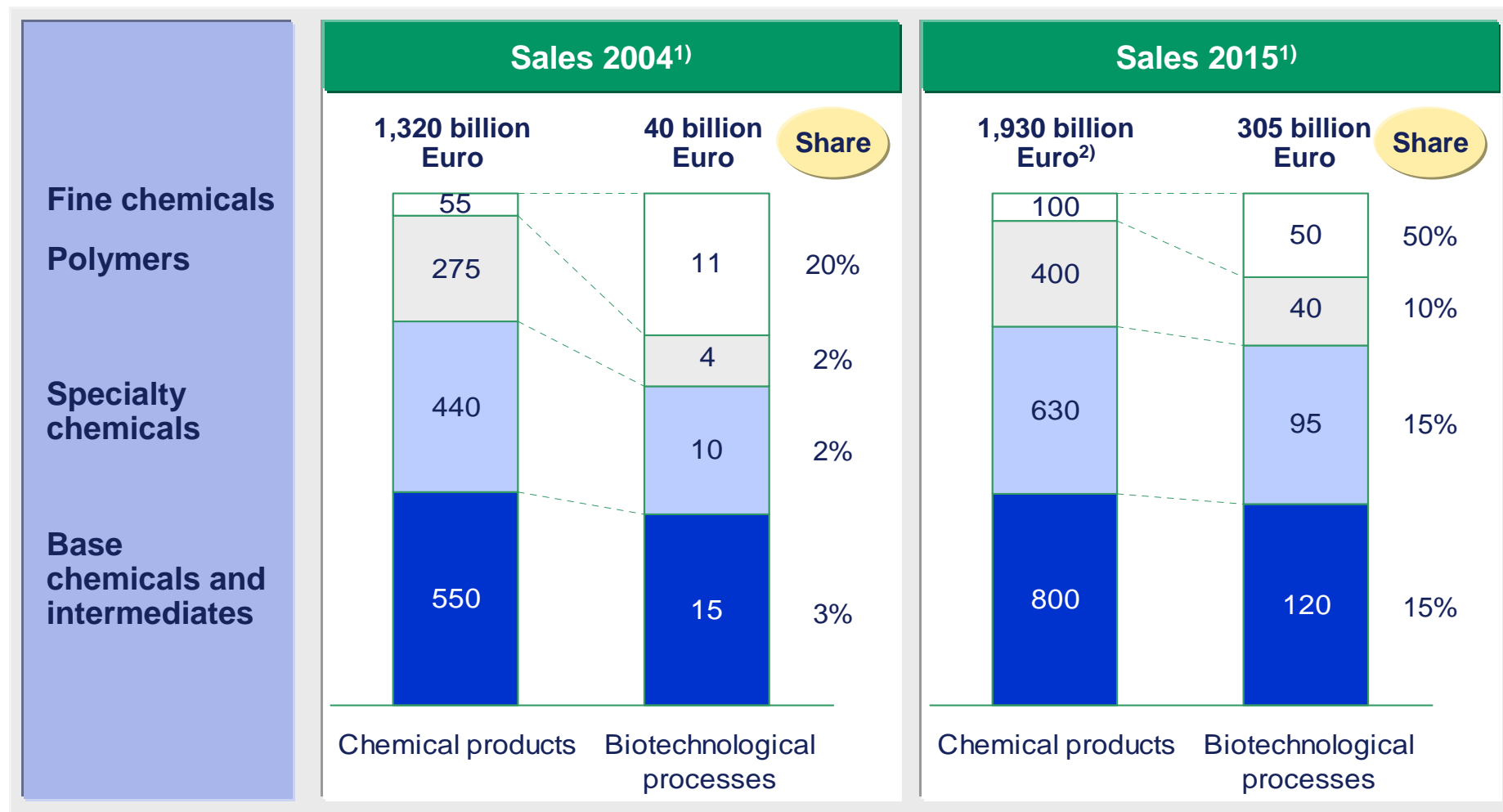
- The restrictions of biotechnological production processes are predominantly viewed on the side of **economics** (operative costs, R&D costs, investments)
 - The synthesis of simple molecules by the chemical path is usually so inexpensive, that the **development of a new biotechnological production process** is normally not economical
 - The development of a suitable **biocatalyst** is very costly and time intensive and therefore the enzyme catalysis is not economical especially for niche products
 - Production facilities for chemical synthesis already exist; these cannot be changed for biotechnological production, so that massive **new investments** are necessary
- In **developing nations** industrial biotechnology has very good growth prospects, as biotech processes do not have to compete with established processes in existing production facilities

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Applications and Market Potentials - Potential

In the year 2015 about 15% of the chemical products with a sales volume of approx. 300 billion Euro will be produced using biotechnology



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.

Applications and Market Potentials - Potential

The largest potential lies in the production of agents and performance chemicals in the fine and specialty chemicals sectors

Chemical Sector	2010 Biotechnologically Produced	Trends
Fine Chemicals	~ 50%	<ul style="list-style-type: none"> • Trend towards chiral pharmaceutical agents • Often simplified synthesis paths • Many reaction types can be catalysed by enzymes (oxidation, reduction, carbon-carbon bond formation) • Only through biotechnological process accessible products
Polymers	~ 10%	<ul style="list-style-type: none"> • Stronger use of renewable raw materials • Polymers with new properties • Biopolymers cost competitive to polyesters
Specialty Chemicals	~ 15%	<ul style="list-style-type: none"> • Strong growth in industrial enzymes • Advantages especially in the food, cosmetic, textile and leather industries
Base Chemicals and intermediates	~ 15%	<ul style="list-style-type: none"> • Stronger use of renewable raw materials • Production of organic chemicals through biocatalysis and fermentation

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Service- and IP-oriented business models have been established in the field of white biotech

- **Service-oriented business model**

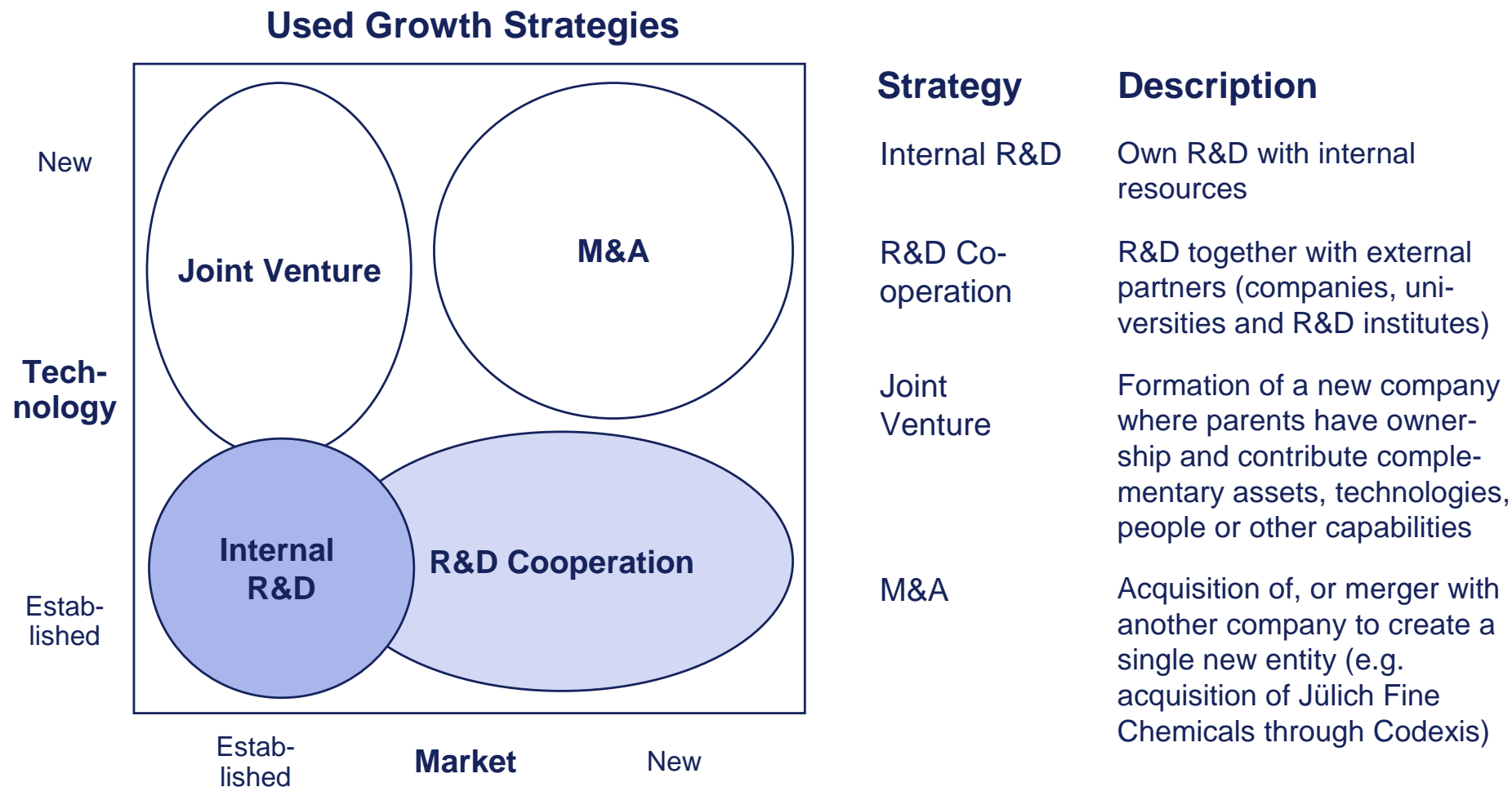
- Start-up companies offer their particular know-how predominantly as services to support established companies
- Project risks and developed IP remain with the customer
- The growth potential is very limited and, therefore, the development and commercialisation of own IP is important for further growth

- **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
- Project risks and developed IP remain with the start-up company
- A suitable network and co-operation strategy has to ensure the successful commercialisation of own IP

Business Models and Growth Strategies - Growth Strategies

There are four different potential growth strategies to move from a service-oriented to a IP-oriented business model



Business Models and Growth Strategies - Growth Strategies

The four different growth strategies have specific advantages and disadvantages from an entrepreneurial view

Strategy	Advantages	Disadvantages
Internal R&D	<ul style="list-style-type: none"> • Enables the development of own IP • Start-up decides on R&D projects • Increased flexibility on project choice and research goals 	<ul style="list-style-type: none"> • Cost and capital intensive • High project risk • Limited research capacities prevent a fast reaction concerning new projects • Lack of networks that provide new ideas with regard to the research
R&D co-operation	<ul style="list-style-type: none"> • Increases number of possible technologies available for R&D projects • Makes use of synergies, uses resources of the partner • Splitting the risk of the project • Rarely receive considerable volume of IP developed in the project (often the case with academic partners) 	<ul style="list-style-type: none"> • Need for a strong project management • Limited possibility of development of own IP
Joint Venture	<ul style="list-style-type: none"> • Enables growth in a new business area • Makes use of the resources of the partner (assets, technologies, human capital) • Uses synergies of complementary resources (technologies) 	<ul style="list-style-type: none"> • The time involved for negotiations and contract development is high • An inflexible co-operation model, where the search for the appropriate partner is critical
M&A	<ul style="list-style-type: none"> • Enables use of synergies • Enables expansion into new markets / international markets • Enables acquisition of IP and technologies 	<ul style="list-style-type: none"> • Loss of control in the company • Loss of flexibility in the decision making process

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The capital requirements of existing and new white biotech start-ups in Europe will amount to 200 million Euro during the next years

Growth financing

- In Europe there are currently around 40 white biotech start-ups in operation
- About 50% of these companies need a new financing round within the next two years with a volume of 5 million Euro on average to realise the next growth step

100 million Euro

Seed financing

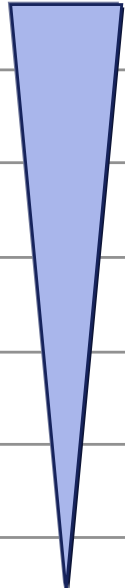
- The potential to found new white biotech start-up companies is between 30 and 50 companies during the next years
- The average capital requirement for one start-up company is about 2 million Euro

60 - 100 million Euro

Financing Strategies and Sources - Sources

The various financing sources are of very different importance for white biotech companies

Financing Sources	Importance ¹⁾
Operational income	7
Private investors	6
Governmental funds	5
VC	4
Debt funding	3
CVC	2
IPO	1



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

Financing Strategies and Sources - Advantages/Disadvantages

The considered financing strategies each have specific advantages and disadvantages

Strategy	Advantages	Disadvantages
Private investors	<ul style="list-style-type: none"> • Invest in early stage, often after first year • Lower expectation on rate of return / long term investment horizon • Improves equity ratio • No intervention in operations 	<ul style="list-style-type: none"> • Investments are smaller than with VC • Increased dependence from external Stakeholders
Governmental funds	<ul style="list-style-type: none"> • Do not need to be paid back • Employees and overhead are paid • Enables to strengthen the portfolio (technology and products) 	<ul style="list-style-type: none"> • Excessive bureaucracy causes add on costs and is time consuming • Inflexible programs and long admission processes • Limited number of Programs for service-oriented start-ups
VC	<ul style="list-style-type: none"> • Enables to collect large sums • Enables a fast development of the start-up • Strategic investment over the total period of development and growth with no intervention in operations • Improves equity ratio and enables financing of further expansion 	<ul style="list-style-type: none"> • Efforts/expenditures to get VC are very high • Increased probability of loss of control • Increased dependence from external Stakeholders • Sale of stake of the company
Debt funding	<ul style="list-style-type: none"> • Increases liquidity • No participation in the profit • No intervention in operations 	<ul style="list-style-type: none"> • Permanent costs with interest payments • Banks require securities to back up the loans – start ups predominantly cannot offer them
IPO	<ul style="list-style-type: none"> • Enables acquisition of large financial volumes • Enables to pursue a fast development of the start-up 	<ul style="list-style-type: none"> • Regulations with regard to the IPO cause significant add-on costs • New stakeholders in the firm that cause a loss of independence and control

Start-ups are predominantly financed by own cash-flows, private investors, governmental funds and debt funding

- The problem with regard to the financing of start-ups in white biotech is their **low financial strength**; some companies reported that they had to cancel R&D projects due to a lack of funding
 - 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
 - Particular problems arise for volumes **between 0.5 and 5 million Euro** („equity gap“) because only a limited number of financial partners cover this range
- Unexpected events can therefore cause **serious threats** for the whole company

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Conclusion and Outlook - Situation

Most of the white biotech start-ups use primarily their operational income for financing current operations and growth

- Start-ups in white biotech are more **conservatively financed** than start-ups in red biotech (nearly all of the start-ups in red biotech are financed by VC compared to only 15% to 20% in white biotech)
 - Most of the start-up companies are **profitable from the beginning** and use their operational income for financing current operations and growth
 - The **investment volumes** are lower, the development periods for new products are shorter and there are no admission procedures for the product
 - Consequently, the products can be commercialized more rapidly and **operational income** contributes to the financing much earlier and the start-up needs lower pre-financing
- The growth potential of service-oriented companies is limited to a certain extent - in order to realize further growth, the **development of own IP** is necessary
- The realization of **growth options** is very limited due to low financial strength of most of the white biotech start-ups

Conclusion and Outlook - Recommendation

Europe is a long way from using the potential of white biotech as the start-up scene in that area is not properly developed

- White Biotech is of enormous importance for the competitiveness of **European chemical and lifescience industry**
- The further development of white biotech in Europe depends on the ability to establish a **prospering start-up scene** in Europe
- The field seems to be **rather unattractive** for investors, due to the lack of experience and **positive examples**
- Long-term oriented **financial support** during the seed and growth phase is the key success factor to develop a prospering white biotech start-up scene in Europe
- The establishment of a dedicated “**European White Biotech Seed and Growth Fund**” would be a suitable instrument to enable capital markets access and foster industrial growth in white biotech

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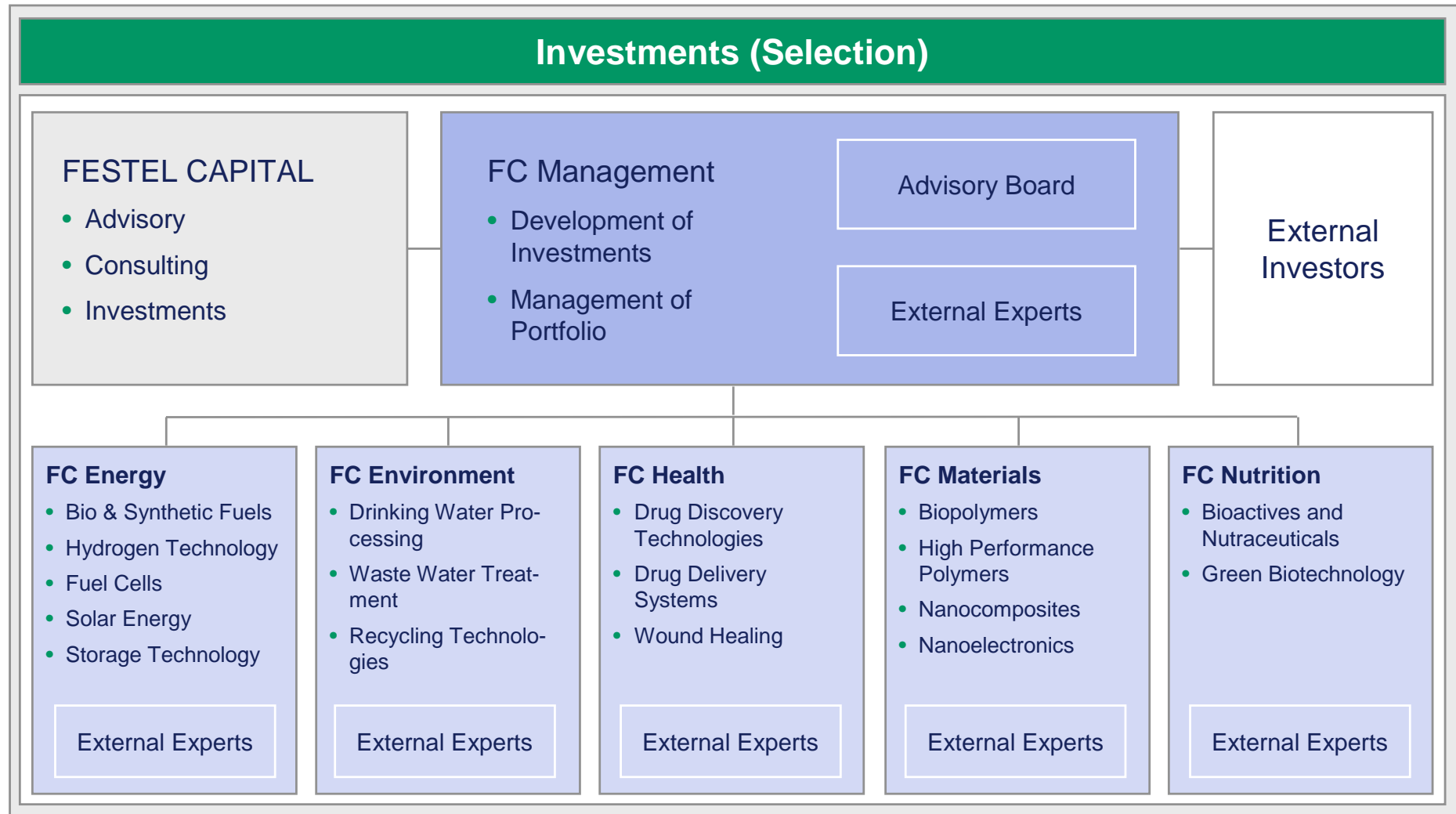
FESTEL CAPITAL is an international advisory and investment firm focusing on the commercialisation of technologies and optimisation of organisations

Profile	Activities (Examples)
<p>FESTEL CAPITAL is an advisory and investment firm focusing on the commercialisation of technologies and optimisation of organisations in the areas of energy, environment, health, infrastructures, materials and nutrition</p>	<p>FESTEL CAPITAL ...</p> <ul style="list-style-type: none"> • supports companies to commercialise innovative products and technologies • advises entrepreneurs and investors to successfully create and develop new businesses • invests in selected start-up and spin-off companies mainly in the seed phase • shares the entrepreneurial risk by providing services for equity • advises on the optimisation of organisations • fosters the development of technology-related businesses and co-operations in China
<p>FESTEL CAPITAL combines entrepreneurship, advisory and investment to create and develop innovative businesses</p> <div data-bbox="465 1098 1012 1412" data-label="Diagram"> </div>	

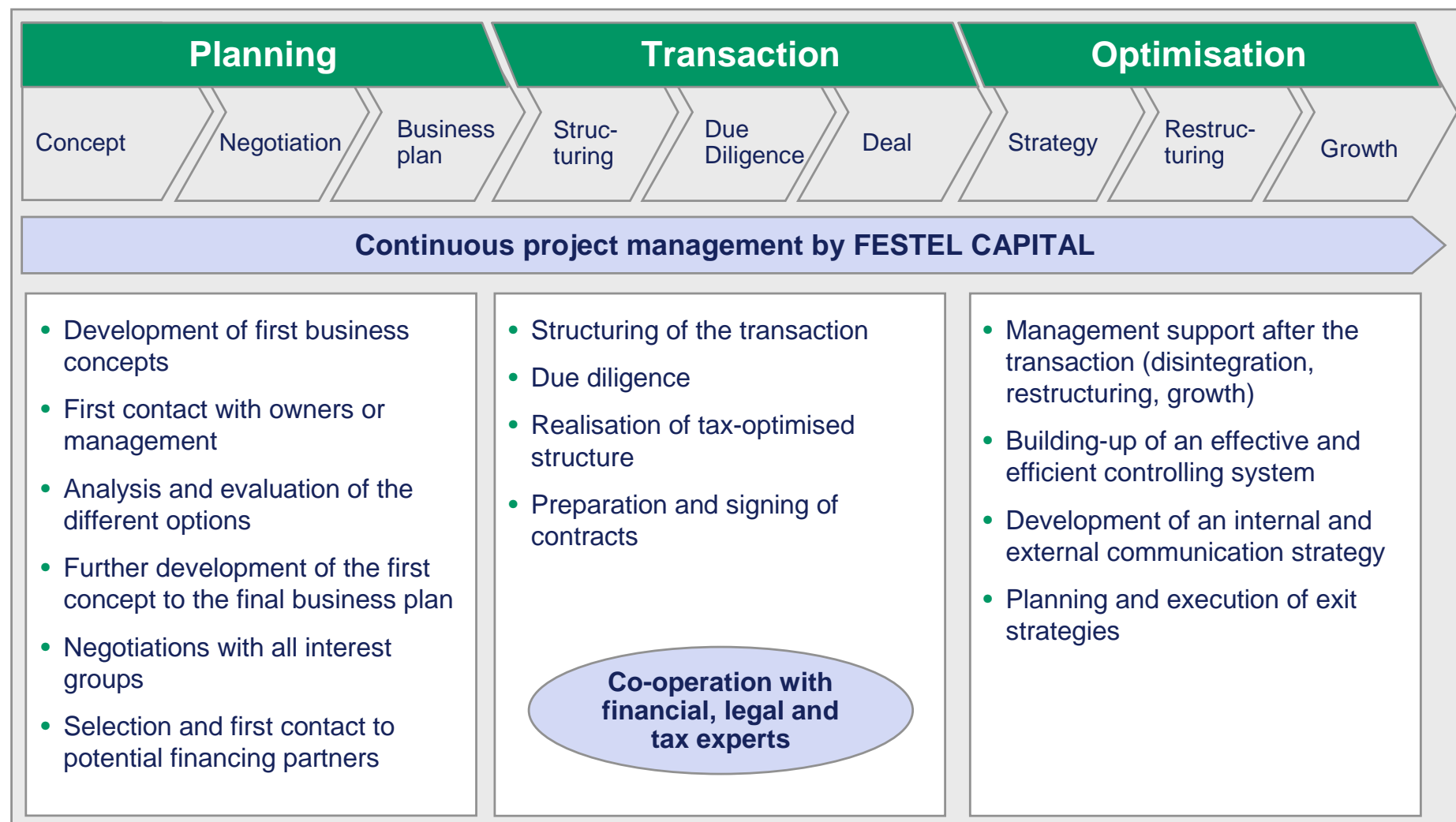
FESTEL CAPITAL has expertise in the areas of energy, environment, health, infrastructures, materials and nutrition

Area	Expertise (Examples)	
Energy	Drug Discovery & Development	<ul style="list-style-type: none"> • Biological Targets • Active Substances • Synthesis & Process Development
Environment	Industrial Biotechnology	<ul style="list-style-type: none"> • Bioconversion & Biorefineries • Biopolymers • Enzyme Technology
Health	Industrial Parks	<ul style="list-style-type: none"> • Facility & Infrastructure Management • Safety & Environmental Protection • Utilities & Waste Management
Infrastructure	Molecular Biology	<ul style="list-style-type: none"> • Bioactives • Drug Delivery • Wound Healing
Materials	Nanotechnology	<ul style="list-style-type: none"> • Nanobiotech & Nanomedical • Nanocomposites • Nanoelectronics
Nutrition	Production Technology	<ul style="list-style-type: none"> • Biopharmaceuticals • Catalysis • Process Optimisation
China	Renewable Energy	<ul style="list-style-type: none"> • Bioenergy • Biofuels & Synthetic Fuels • Solar Energy
	Water Technology	<ul style="list-style-type: none"> • Drinking Water Processing • Waste Water Treatment • Water Chemicals

FESTEL CAPITAL invests in various areas supported by an advisory board and external experts



FESTEL CAPITAL supports start-ups and spin-offs from business planning over transactions up to business optimisation



FESTEL CAPITAL has worked together with leading technology-oriented companies

Partners (Selection)



BASF



SIEMENS

