

Small molecules – smartly synthesized

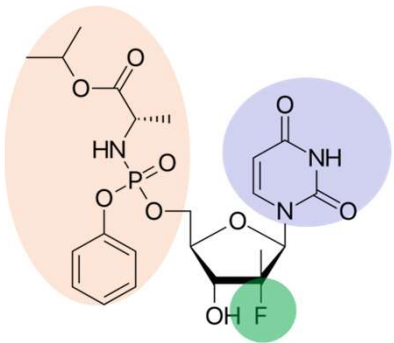
Enzymatic production of nucleic acid derivatives

What we do and why?

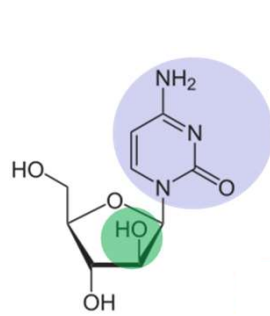
Application of nucleoside + nucleotide analogs

Therapeutic drugs

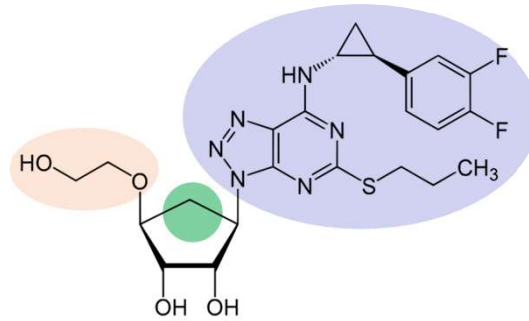
Inhibition of viral replication, cancer proliferation or platelet aggregation



Sofosbuvir
Hepatitis C virus



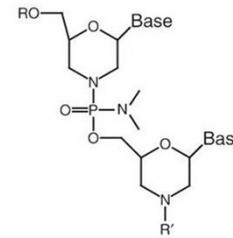
Cytarabine
Leukemia



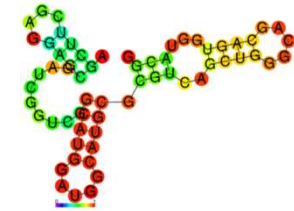
Ticagrelor
Coagulation inhibitor

Precursors for modified nucleic acids

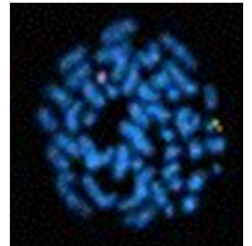
Increased stability and/or target affinity or additional features



Antisense / RNAi
Morpholinos



Molecular recognition
Aptamers



Detection
FISH probes

Chemical synthesis: “Golden standard”



- long multi-step procedures



- multiple protection, deprotection, concentrating and purification steps



- low yields, high purification effort



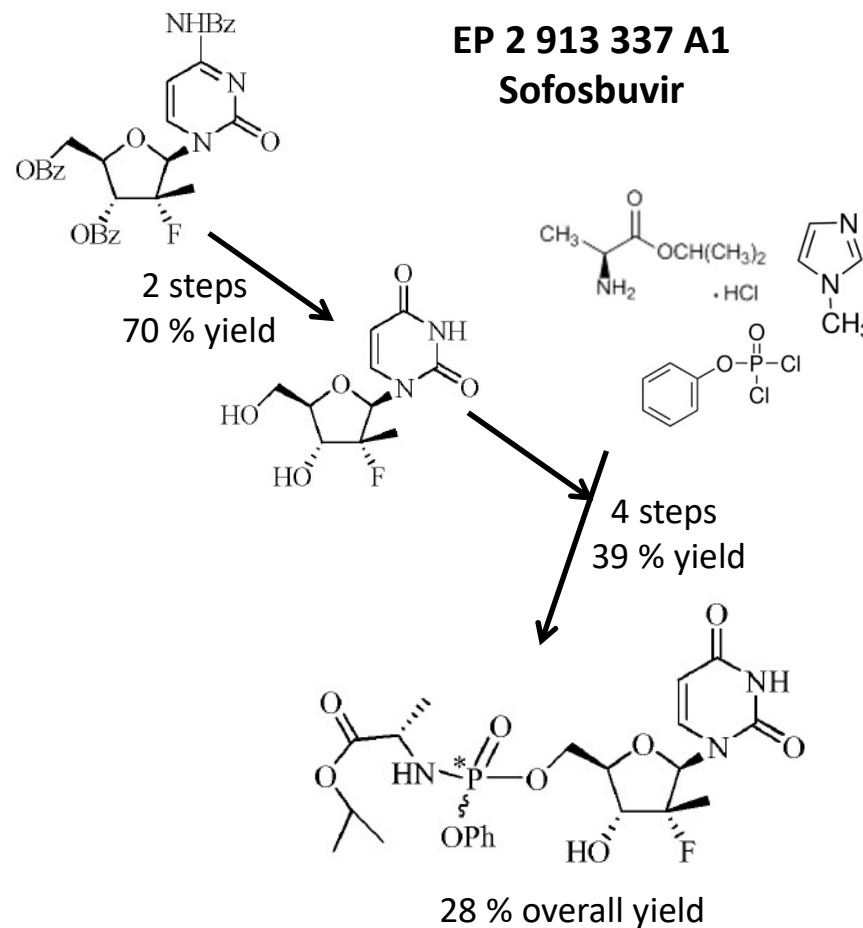
- high amount of (often hazardous) waste



- requires large production lines



- costly and/or hard to find starting compounds and reagents

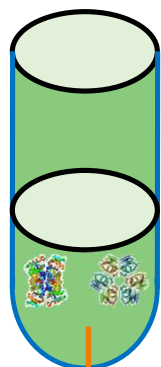
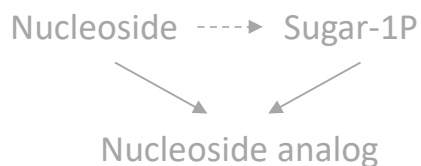


BioNukleo's enzymes

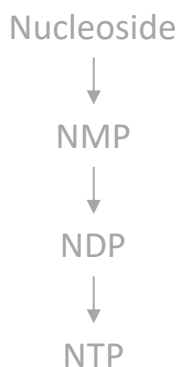
Cheap precursor molecules

Nucleoside analogs

Nucleotide analogs



**Highly valuable products
(70-99% yield)**



➤ simple procedure with few steps



➤ one-pot reaction



➤ high yields and high purity
(70 – 99 %)



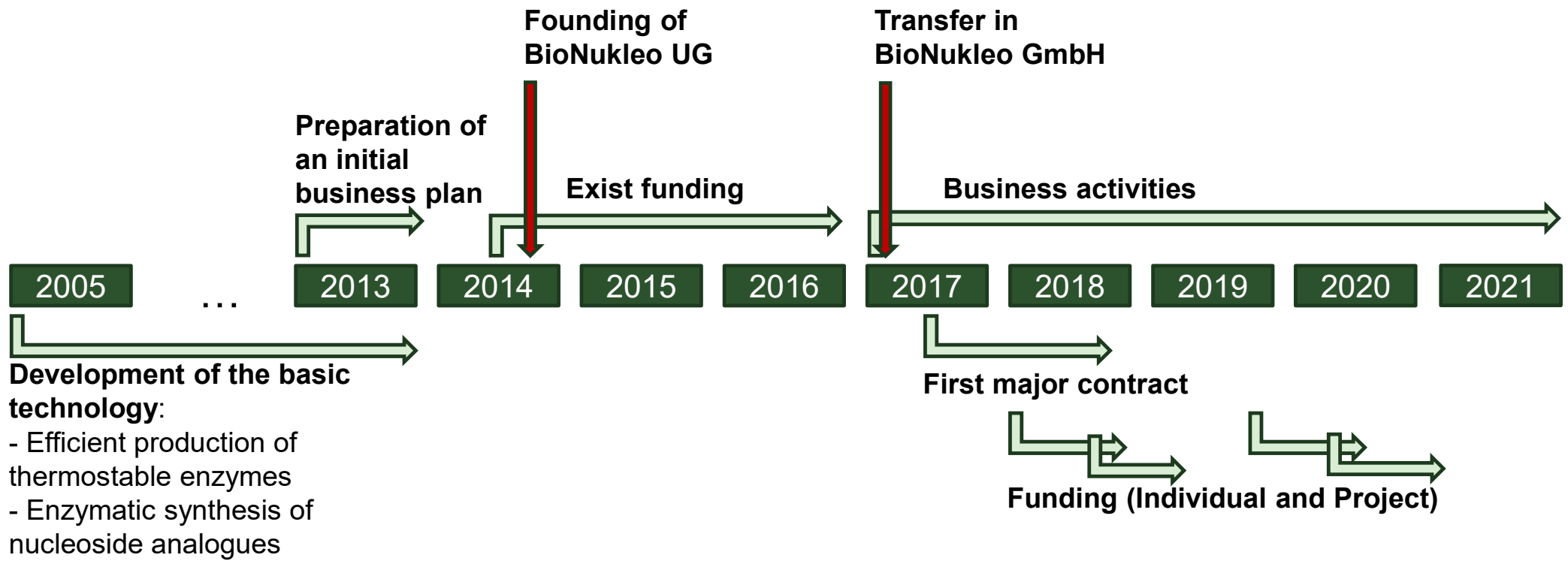
➤ competitive price



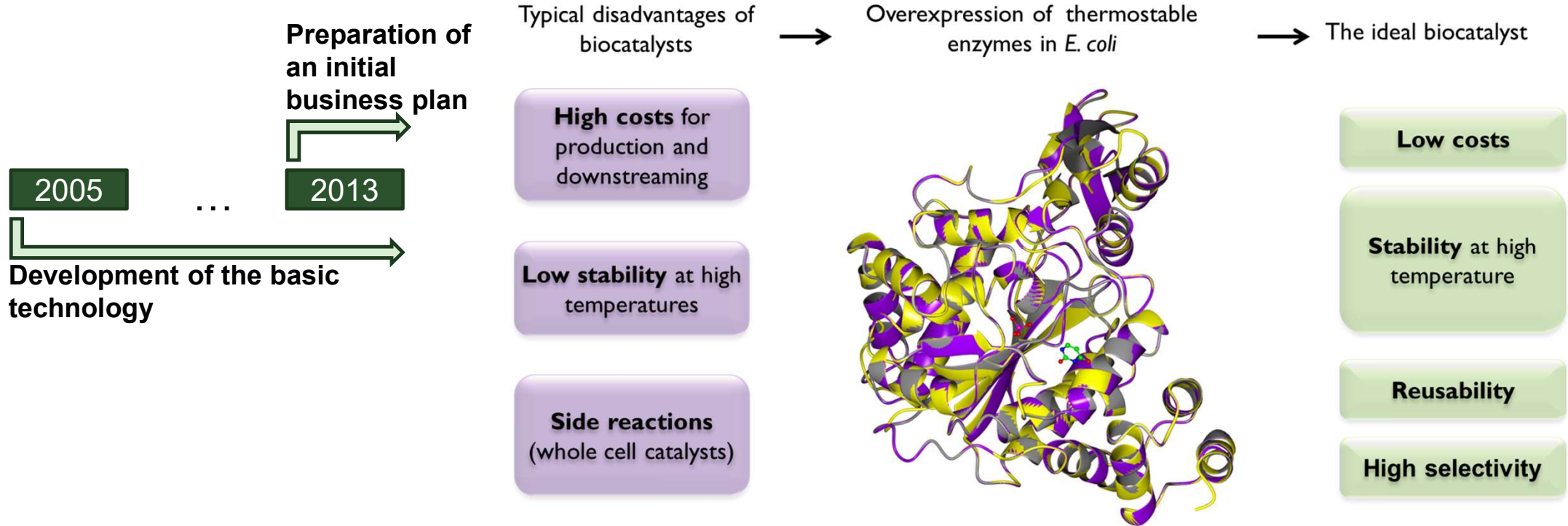
➤ low environmental burden,
sustainable



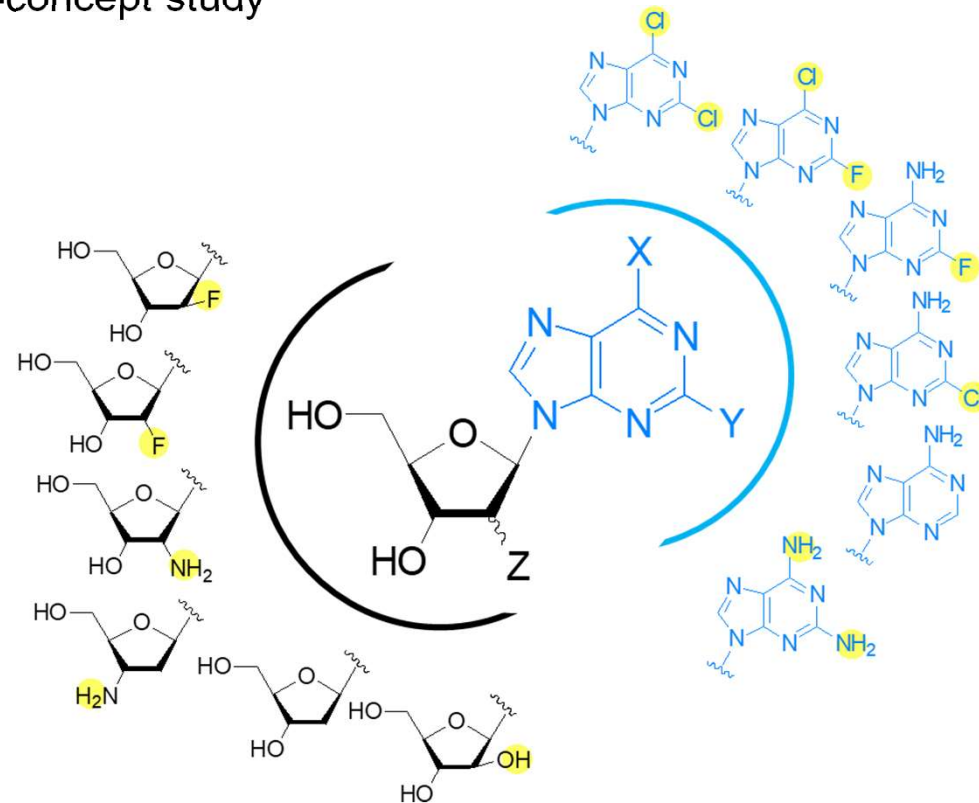
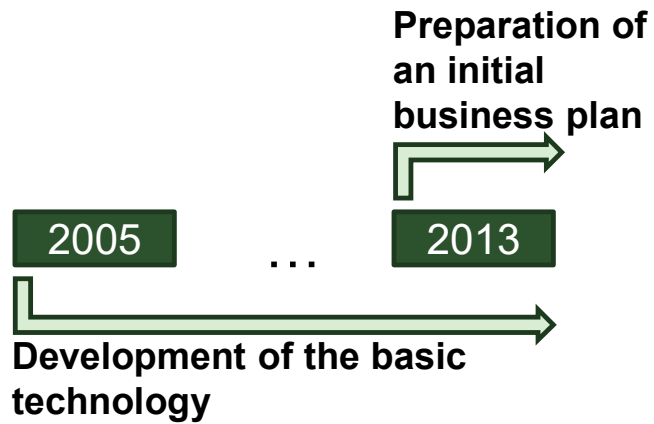
What was the development of
BioNukleo?



- Efficient production of thermostable enzymes



- Enzymatic synthesis of nucleoside analogues in a proof-of-concept study



- Preparation of a Business Plan in the course:
Projektierung biotechnologischer Prozesse

Preparation of
an initial
business plan



2005

...

2013



Development of the basic
technology

Eurikos 

BUSINESSPLAN

für den Businessplan-Wettbewerb Berlin-Brandenburg

Alle Angaben im Businessplan sind streng vertraulich!
Vervielfältigung nur mit Zustimmung des Gründungsteams.

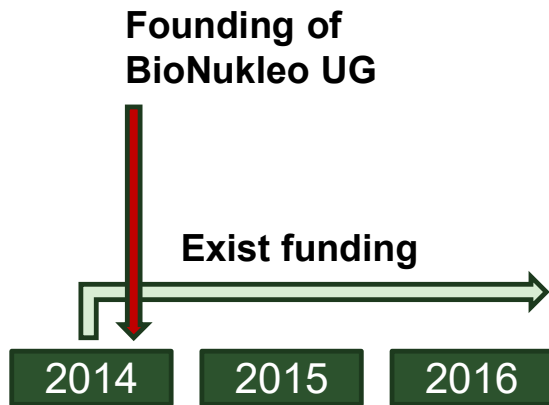
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Berlin, den 15. März 2013



- What is EXIST Forschungstransfer?

EXIST Transfer of Research supports outstanding research-oriented projects that involve expensive and high-risk resource development.

EXIST Transfer of Research has two phases of funding:

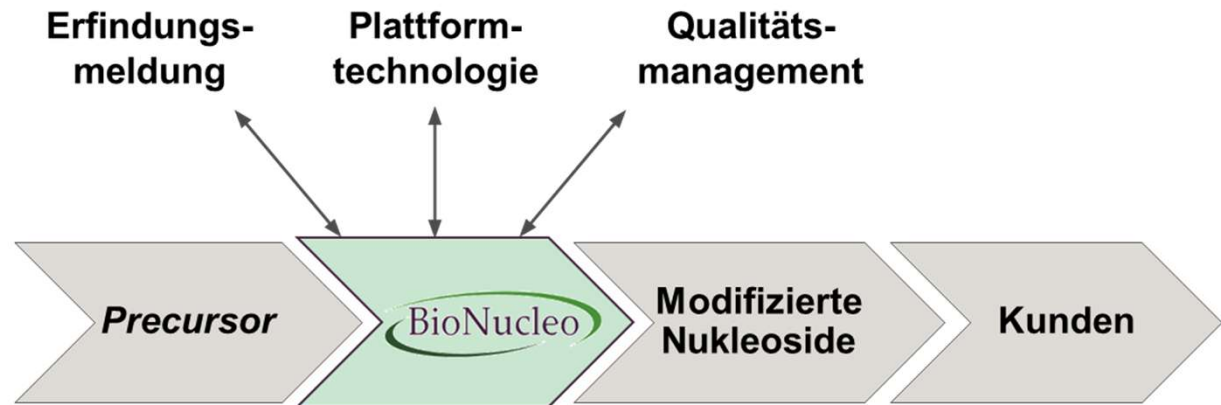
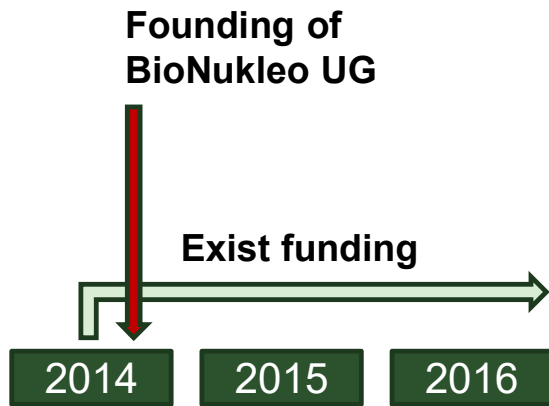
First phase:

- results of research that have the potential of becoming the basis of a start-up business are developed further
- The objective is to carry out further resource development to clarify fundamental problems involved in converting academic findings into technical products and processes. A business plan should be prepared
- Business start-up should be prepared systematically.

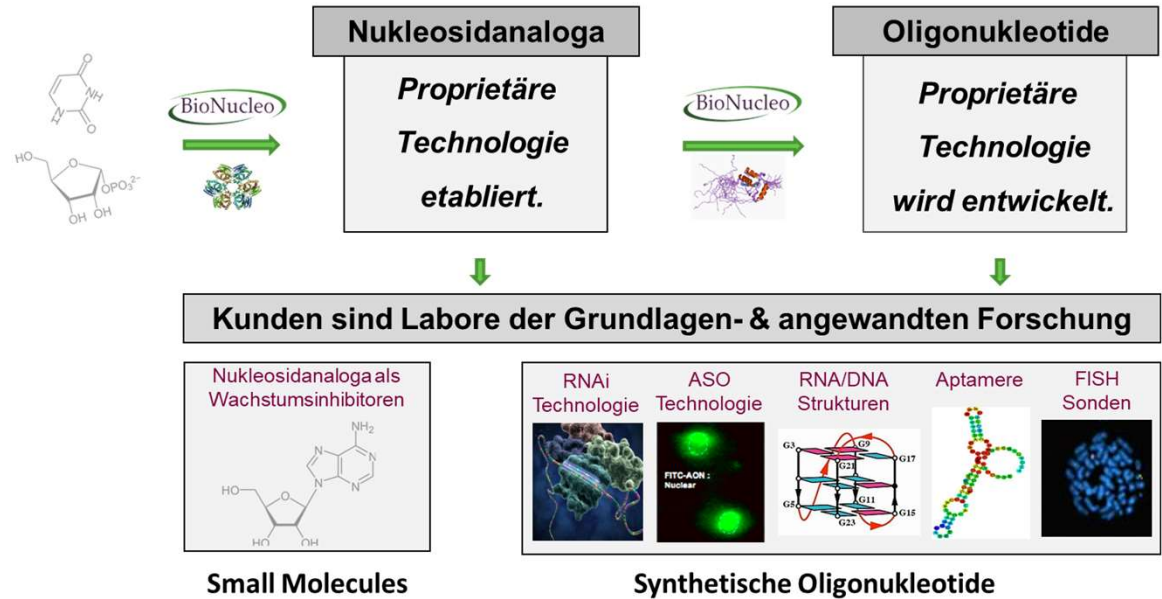
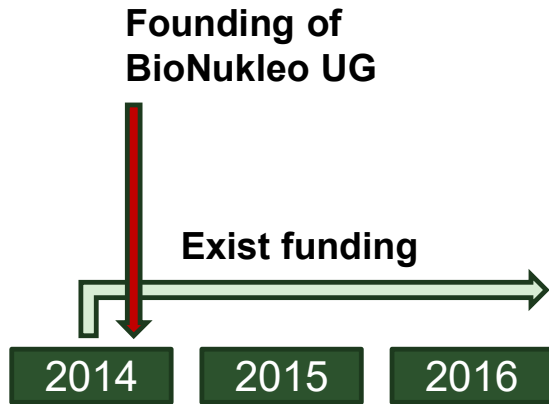
Second phase:

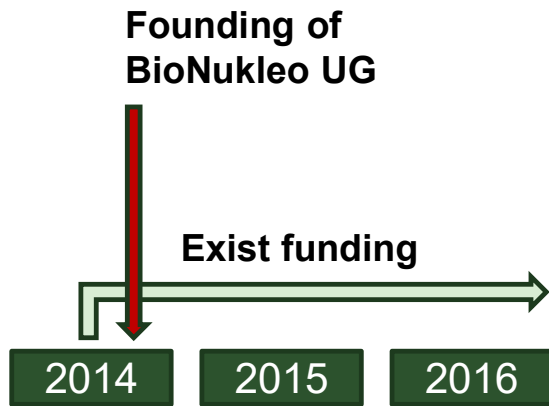
- Meeting the prerequisites for external business financing are at the centre of interest.

- Application for EXIST Forschungstransfer
 - 1. Trial: Application failed
 - Focus on the enzymatic synthesis of highly valuable nucleoside analogues

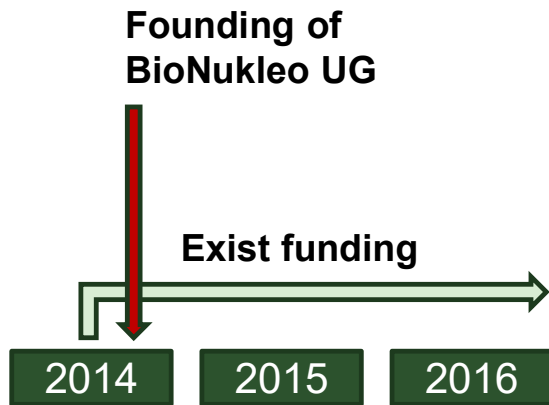


- Application for EXIST Forschungstransfer
 - 2. Trial: Application was successful
 - Focus on the enzymatic synthesis of highly valuable nucleoside, nucleotides and nucleic acids analogues





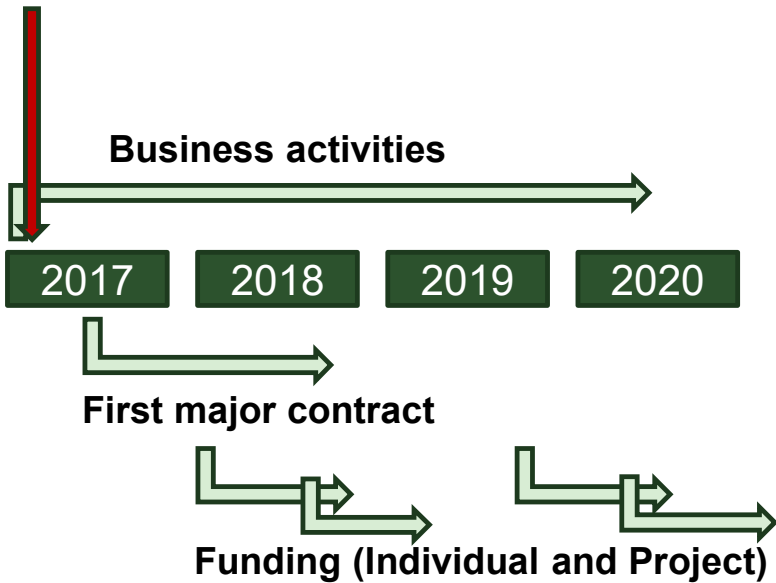
- Results of EXIST funding
- Further development of nucleoside technology from a laboratory method into a usable method
- Starting the nucleotide technology
- Establishment of suitable purification procedures or analytical methods
- Participation in coaching sessions:
 - First insights into business and tax issues
 - How important is the team?
- Support from a mentor with start-up experience
- Contacts to the HTGF



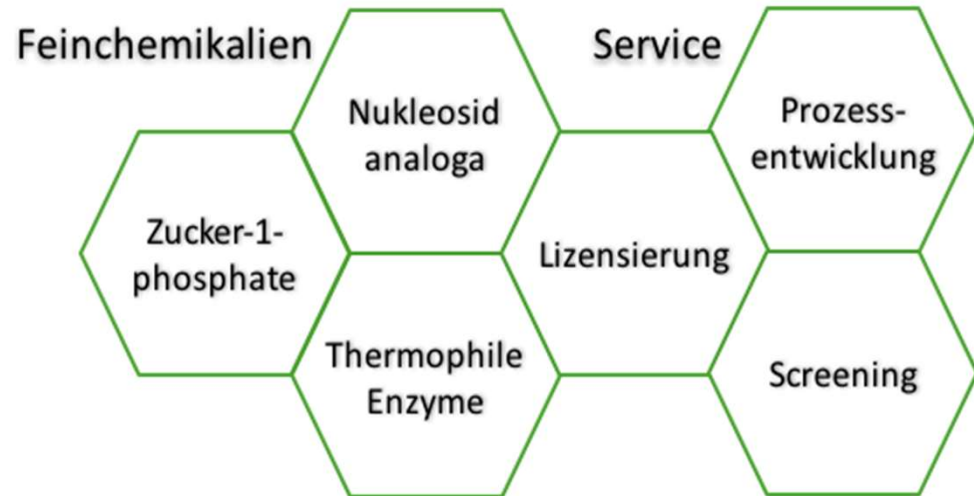
- High-Tech Gründerfonds (HTGF)

- Founded in 2005, High-Tech Gründerfonds (HTGF) invests venture capital in high-tech start-ups.
- HTGF is now Germany's most active and largest early-stage investor and targets young, innovative high-tech start-ups in all sectors. It invests in start-ups that are no more than three years old and in which no more than 500,000 euros in equity, dormant equity holdings or convertible loans have previously flowed.
- In addition, High-Tech Gründerfonds supports the start-ups with its team and an extensive network consisting of investors, experts, experienced managers, multiple founders and scouts.

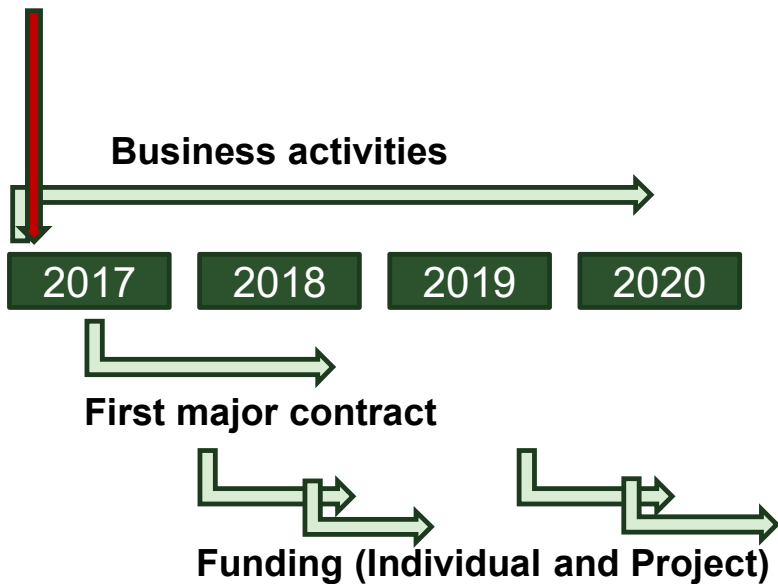
Transfer in BioNukleo GmbH



- Focus on:
 - Offering a few highly valuable nucleoside or nucleotide analogues for basic research
 - Selling enzymes or enzyme kits

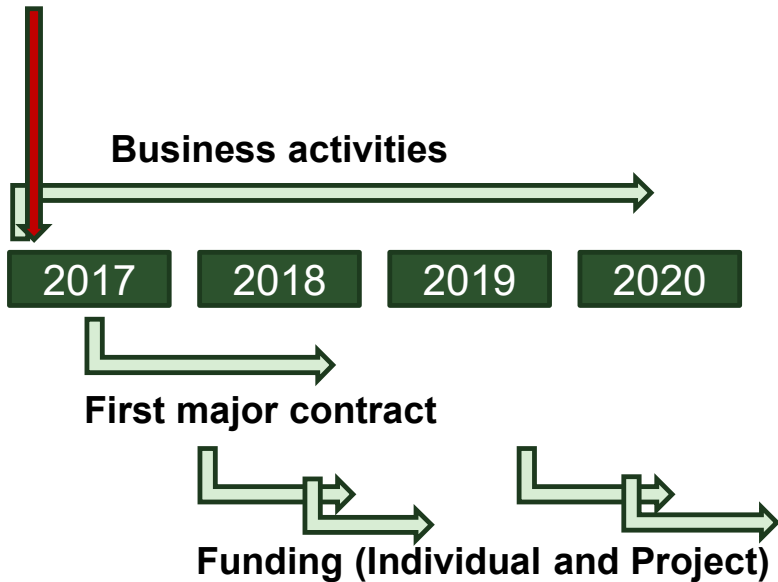


Transfer in BioNukleo GmbH



- BioNukleo's big chance:
 - Finding a customer paying BioNukleo for development of enzymatic processes for the synthesis of nucleoside analogues
- We learnt a lot (much more than before):
 - How to make contracts.
 - How to work with strict deadlines.
 - How to make an FTO analysis.
 - How to make analytics for pharmaceutical industry.

Transfer in
BioNukleo GmbH



- Revenues allow for the application of grants:
 - IBB Innovationsassistent/-in
 - KMU Innovativ Einstiegsmodul
 - Participation in a ZIM network



- ZIM funding in cooperation with TU Berlin
- Profit
- BMBF calls



Innovationsassistent/-in

- ✓ Zuschüsse für die Einstellung von Hoch- und Fachhochschulabsolventen/-innen
- ✓ bis zu 50% der Lohnkosten, maximal 20.000 EUR für 1 Jahr
- ✓ Extrem schlankes Antragsverfahren
- ✓ Sehr gute Betreuung vor und während der Projektlaufzeit
- ✓ Sehr übersichtliche Darstellung der Projektergebnisse



Bundesministerium
für Bildung
und Forschung

KMU-innovativ: Einstiegsmodul

„Das BMBF unterstützt mit der Fördermaßnahme „KMU-innovativ: Einstiegsmodul“ Projekte im Vorfeld von industriellen Forschungs- und experimentellen Entwicklungsvorhaben zur Stärkung der Innovationsfähigkeit im Mittelstand.“

Gegenstand der Förderung

- ✓ neue Produkt-, Verfahrens- und Dienstleistungsideen auszuarbeiten und zu bewerten, die zukünftige eigene Forschung erfordern,
- ✓ die Durchführbarkeit und Umsetzbarkeit von neuen Produkt-, Verfahrens- und Dienstleistungsideen zu untersuchen,
- ✓ den Stand von Wissenschaft, Forschung und Technik sowie die Schutzrechtssituation im angestrebten Themenfeld zu analysieren,
- ✓ Kooperationspartner zu ermitteln und zu gewinnen,
- ✓ notwendige FuE-Arbeiten für die angestrebten innovativen Produkte, Verfahren oder Dienstleistungen (Lösungsideen) und der erforderlichen wissenschaftlich-technischen Expertise zu identifizieren.

Pro FIT – Projektfinanzierung

- ✓ Zuschüsse und Darlehen für technologische Innovationsvorhaben
- ✓ Darlehen bis zu 1 Mio. EUR und Zuschüsse bis zu 400.000 EUR
- ✓ Finanzierung von projektbezogenen F&E-Ausgaben
- ✓ Finanzierungsanteil bis zu 80%
- ✓ Sehr aufwendiges Antragsverfahren: Markt-Nähe und Vermarktungspotenzial werden sehr intensiv geprüft
- ✓ Auch während der Durchführung des Projekts besteht ein erheblicher bürokratischer Aufwand

ZIM network

- Insight into Berlin's/Germany's biotech and pharmaceutical community
- In-depth information on current topics from experts
- Contact to cooperation partners
- Contact to costumers
- Exchange of experience

ZIM research funding

- Establishment of new technology/ product fields
- Contact to research institutes/companies with which innovative projects can be developed
- Retention/recruitment of well-trained employees

=> Visibility and competitiveness are increased.

Hepatitis E virus

- Single-stranded RNA virus of the family *Hepeviridae*
- Global incidence
- The number of infections reported annually is increasing steadily in the western world
- HEV infections are generally self-limiting, acute, and rarely fatal; occasionally a chronic course in immunocompromised individuals is observed

Treatment of Hepatitis E virus infections

- Ribavirin and pegylated interferon- α



EUROPE'S NEW HEPATITIS PROBLEM

Many get infected with hepatitis E, and a few get very sick. How can the virus be stopped?

MYR aus Bad Homburg

Gilead kauft deutsche Biotech-Firma für mehr als eine Milliarde Dollar

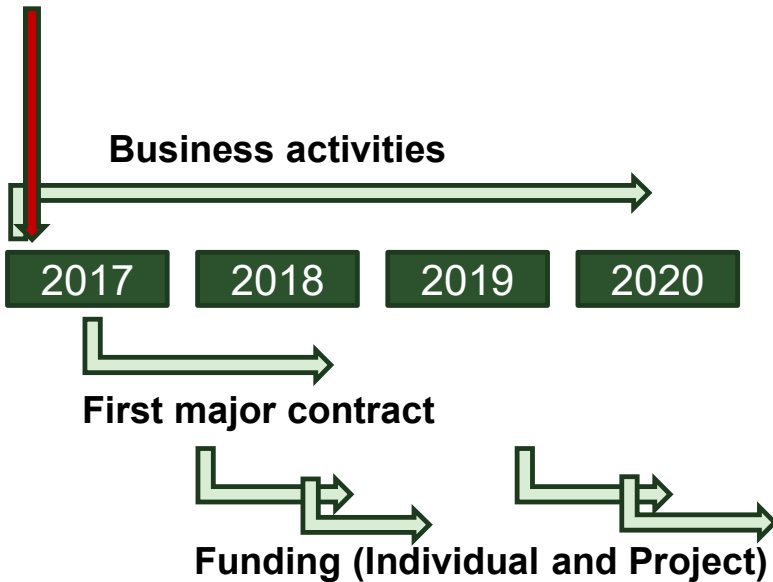
Der US-Pharmakonzern übernimmt die kleine Firma aus Bad Homburg. Es ist einer der spektakulärsten Deals der deutschen Biotech-Szene, der den bisherigen Eignern einen Geldregen beschert.

10.12.2020, 16.31 Uhr

Der US-Pharmakonzern Gilead übernimmt die erst neun Jahre alte Biotech-Firma MYR aus Bad Homburg. Konzernchef **Daniel O'Day** (56) lässt sich den Deal mindestens 1,15 Milliarden Euro kosten. Er verschafft den Amerikanern damit Zugang zu dem von MYR entwickelten Mittel Hepcludex gegen Hepatitis-D-Infektionen, das im Sommer von der Europäischen Arzneimittel-Agentur (EMA) unter Bedingungen zugelassen worden war.

MYR ist ein relativ kleines Biotech-Unternehmen mit 35 Mitarbeitern. Zu den Investoren gehören unter anderem der vom Bundeswirtschaftsministerium und der Staatsbank KfW gestützte High-Tech-Gründerfonds (HTGF) und der russische Maxwell Biotech Venture Fonds, der rund 100 Millionen Dollar verwaltet. Der Gründer des Fonds, **Dmitry Popov**, ist gleichzeitig Vorstandschef von MYR. Man sei stolz, nun Teil von Gilead zu werden, erklärte Popov in einem Statement.

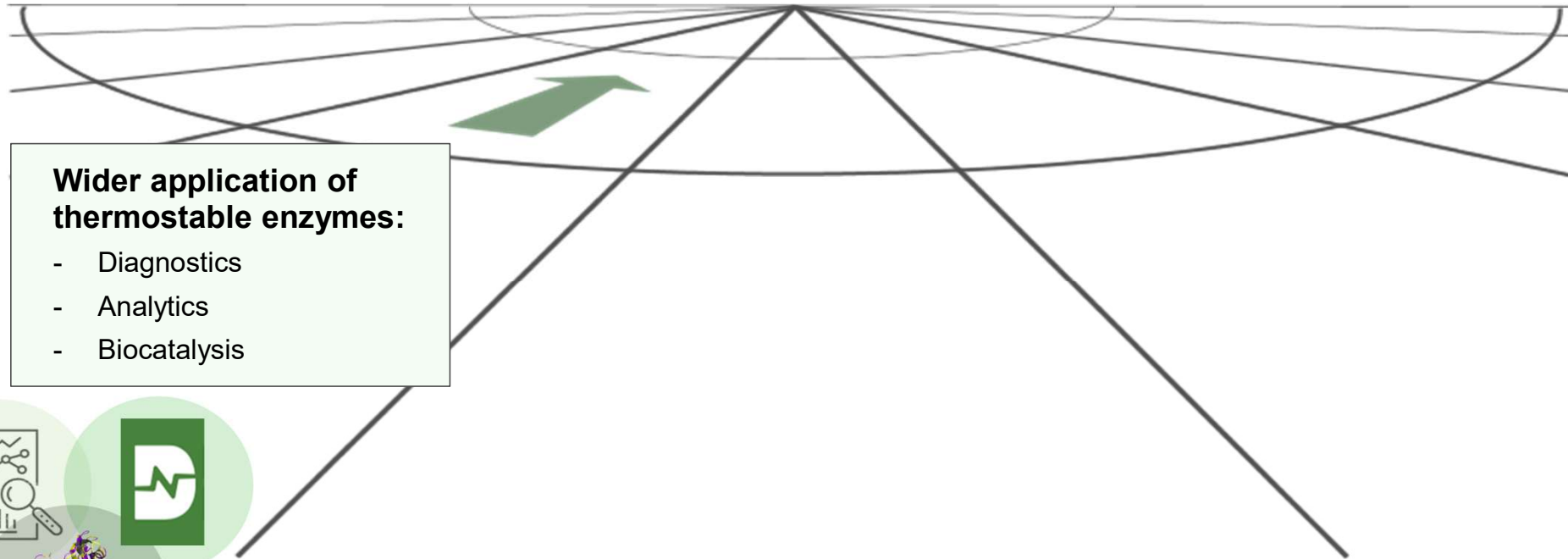
Transfer in BioNukleo GmbH



- Based on our experiences our business model changed:
 - Main focus: Process development based on customer's needs
 - Selling of rare fine chemicals and enzymes with a partner:
 - BioNukleo is working together with abcr GmbH since 2020
 - BioNukleo started a business relationship with Chemspace
 - Development of own active ingredients in cooperation projects
 - Focus more on the application of thermostable enzymes:
 - Diagnostics, Analytics, ...

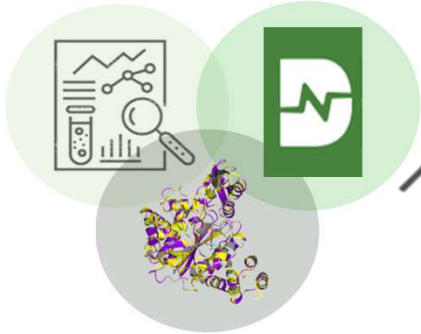
Where is our journey going to?

BioNukleo

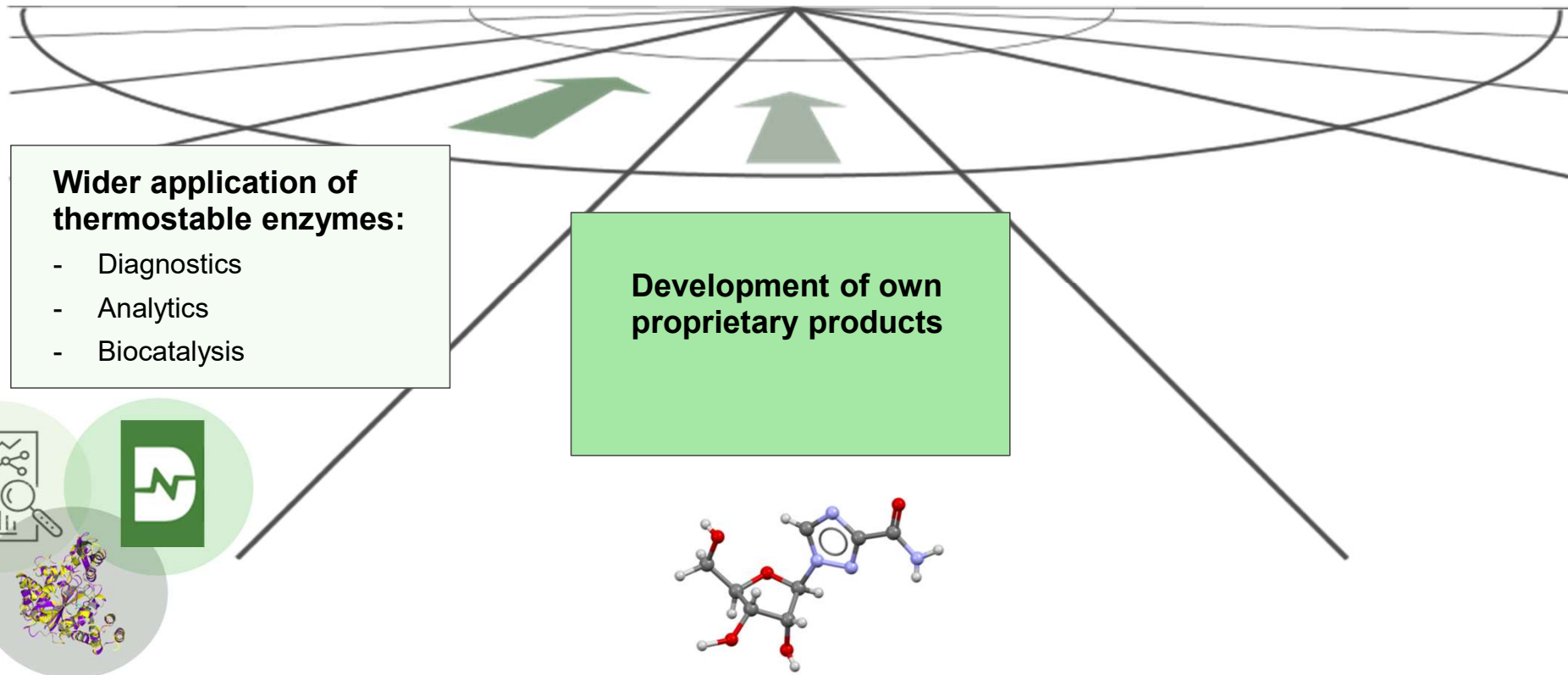


Wider application of thermostable enzymes:

- Diagnostics
- Analytics
- Biocatalysis

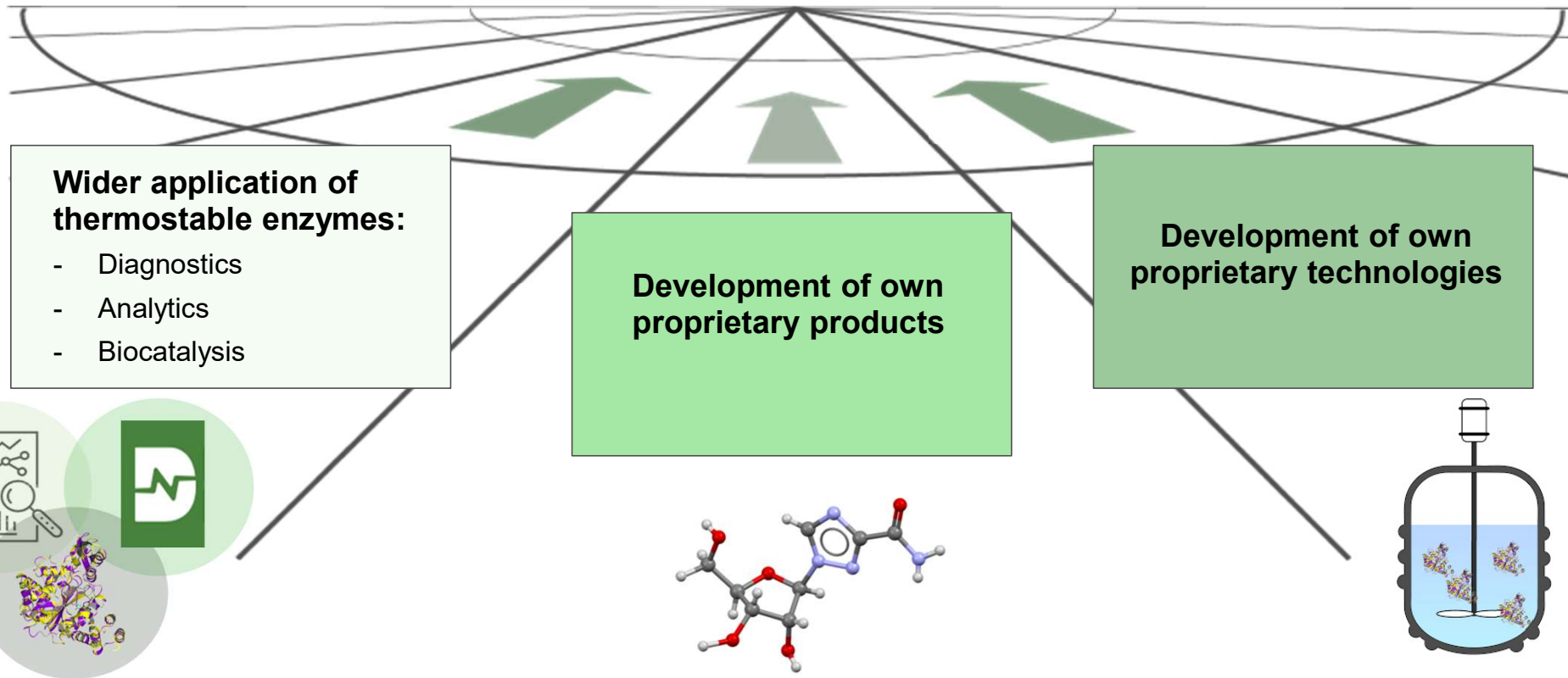


BioNukleo



Where is our journey going to?

BioNukleo



Needs

- Find a good network:
 - a good lawyer, a good tax advisor, a good patent attorney
 - Good scientific advisors

- Present your company at exhibitions and conferences

- Find good employees who pull in the same direction

- Take your opportunities

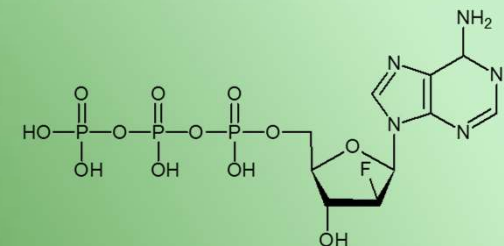
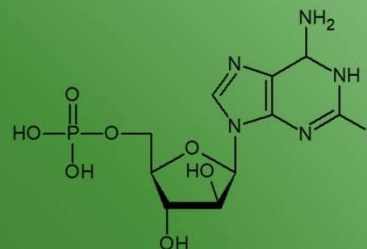
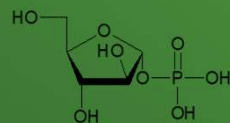
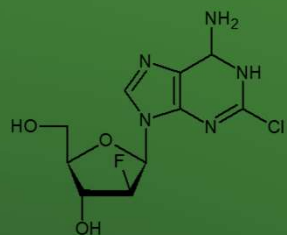
Things better not to do

- To sell products, if you are not sure you can produce them

- Don't sell your products for nothing

What was and is our goal?

**Development of a healthy and slow
growing company.**



Do you have questions?

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