



Technology Transfer in Biotechnology – History and Perspectives

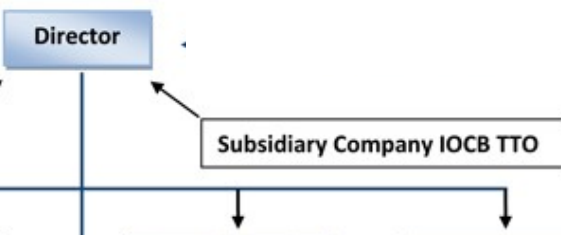
Jaromír Zahradka, Ph.D.



Prague, 12th April, 2016

IOCB TTO s.r.o.

- Founded 2009
- 100% owned by IOCB
- Exclusive contract with IOCB (royalties fee)
- patents, licenses, contracts (MTA, CDA,...), negotiation
- Technology marketing , proof-of-concept-studies
- Targeted research groups supervision
- Project management of grant (Center for Development of Original Drugs)



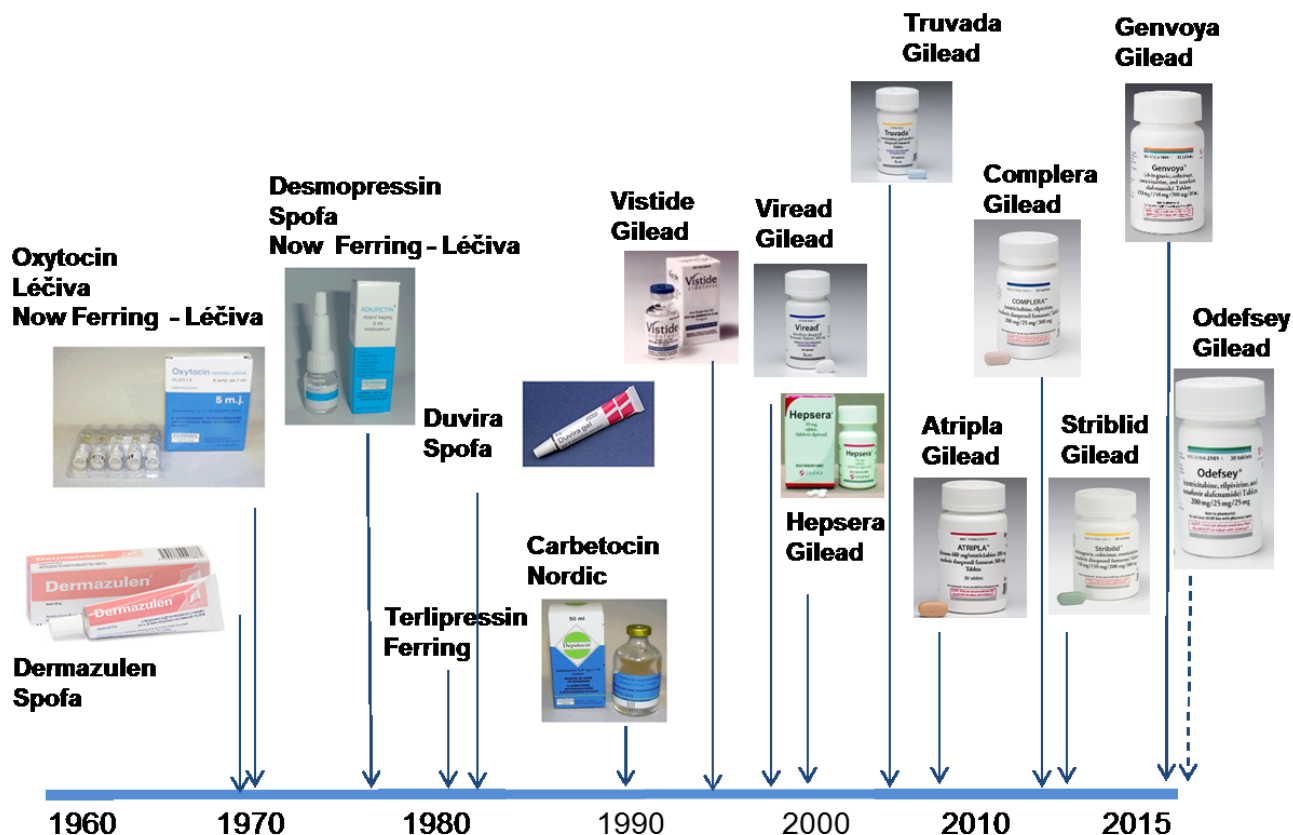


ÚOCHB ^{AV}_{ČR}
IOCB PRAGUE

- IOCB is the largest chemical research institute in the Czech Republic
- Located in Flemingovo nam. + Papirenska
- Part of Czech Academy of Sciences
- App 600 employees (200 scientists + students + admin)
- Mission – **basic research in Organic Chemistry, Biochemistry, Theoretical Chemistry** and related areas with strong emphasis to **use the results of the research** to improve human life.

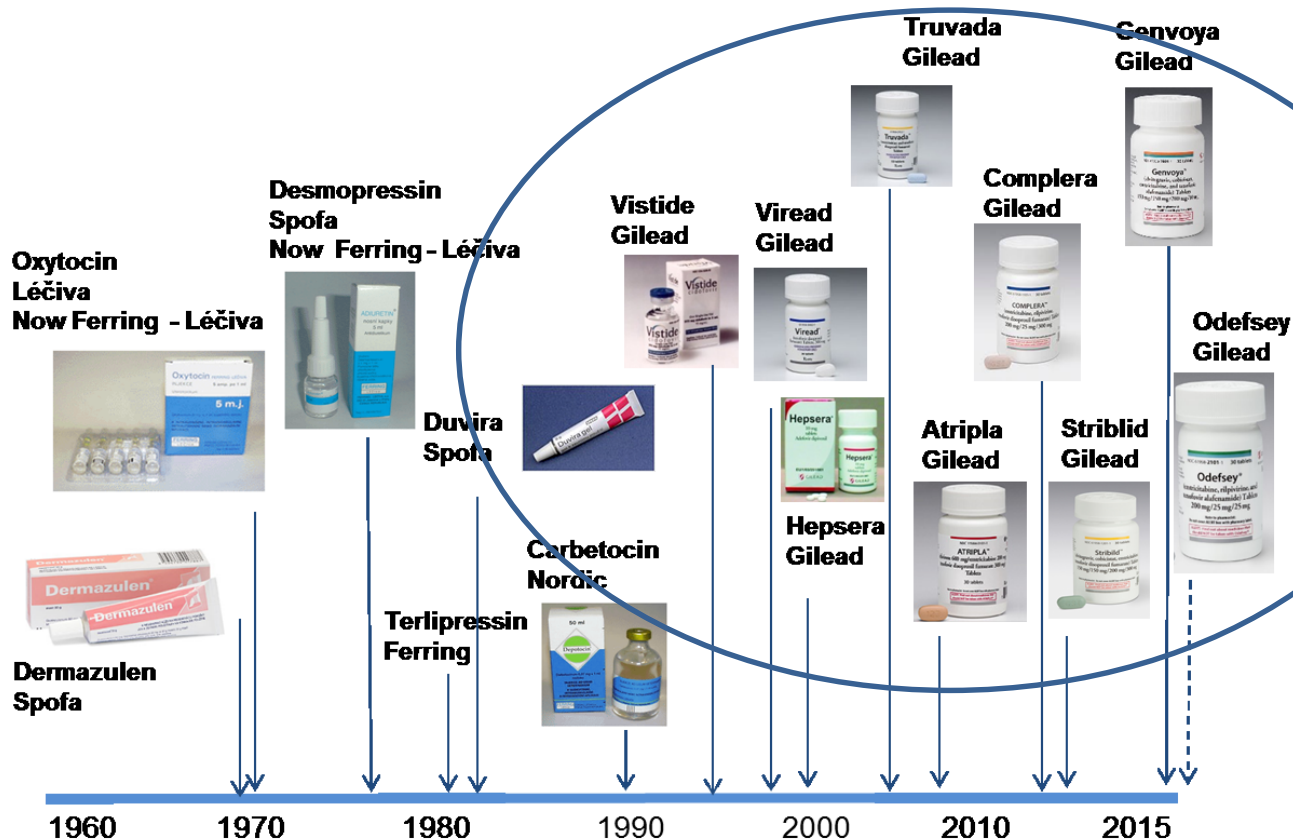
IOCB in Pharma industry

Long term achievements in the field of medicinal chemistry are based on fundamental research and collaboration with pharmaceutical companies



IOCB in Pharma industry

Long term achievements in the field of medicinal chemistry are based on fundamental research and collaboration with pharmaceutical companies

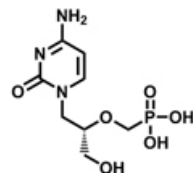


IOCB - Gilead collaboration



- Outcomes:

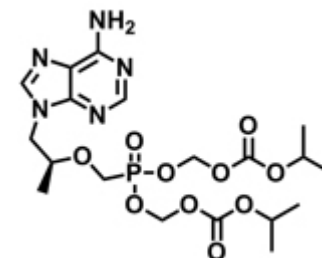
- *cidofovir*: **Vistide™**



opportunistic infections: herpes simplex, smallpox,... FDA 1996

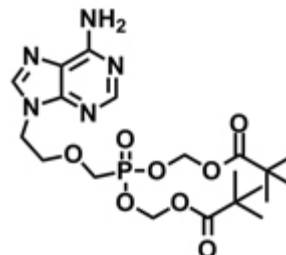
- *tenofovir*: **Viread™** - **Truvada™** - **Atripla™**-...

HIV - FDA 2001/2004/2006/2012/2015/2016/...



- *adefovir*: **Hepsera™**

viral B hepatitis - FDA 2002



Antiviral drugs from IOCB



HIV market leader



2001
First Nucleotide Analogue for HIV/AIDS



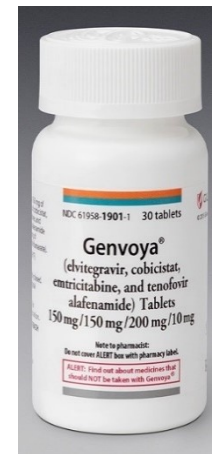
2004
First Once-Daily Combination of Two Antivirals for HIV/AIDS



2006
First Complete HIV Regimen Available as Once-Daily Single Tablet



2012
Anti-HIV "quad pill" Regimen Available as Once-Daily Single Tablet



2015
Anti-HIV "quad pill" Regimen Available as Once-Daily Single Tablet



2016?

Antiviral drugs from IOCB

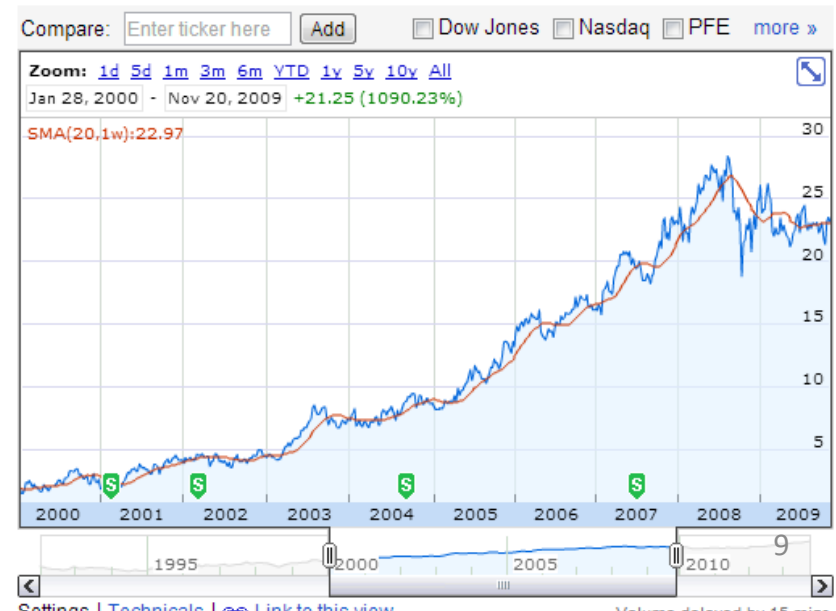
- prof. Antonín Holý (UOCHB)
- prof. Erick De Clercq (KU Leuven)
- Dr. John Marin (Gilead)



IOCB - Gilead collaboration



- Outcomes:
 - Patient benefits:
 - **Atripla™** - The first once-daily single tablet regime (STR) for HIV-1
 - **Hepsera™** - Lower side effect, better for chronic HVB patients
 - Gilead Sci growth:
 - + 1000% (2000 – 2010)
 - IOCB:
 - 60 mil. EUR/year
 - GSRC (coll. projects)
 - employment for PhDs



IOCB in Pharma industry

Anti-HIV Therapy: Progress Over a Decade



1 9 9 6



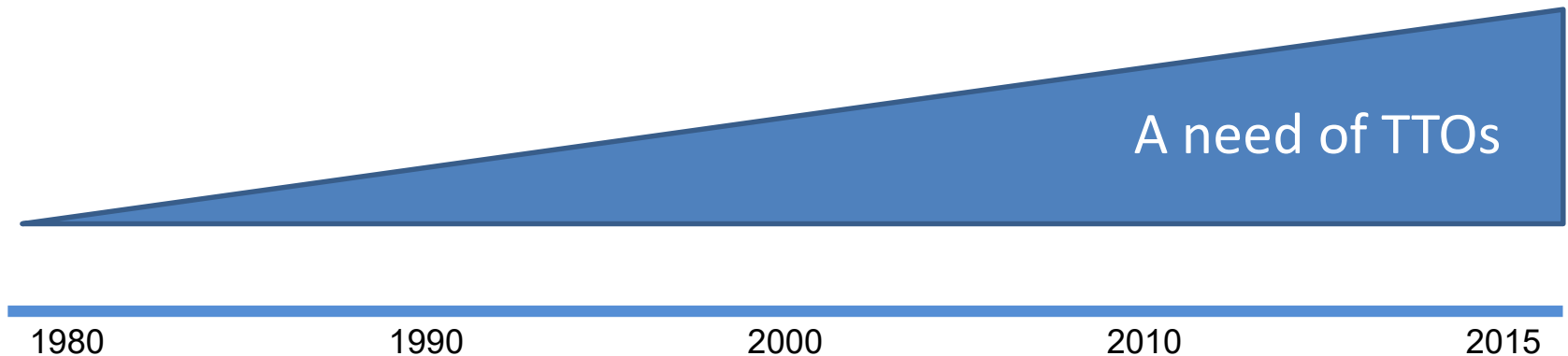
2 0 0 6

Technology Transfer in Biotechnology – History and Perspectives

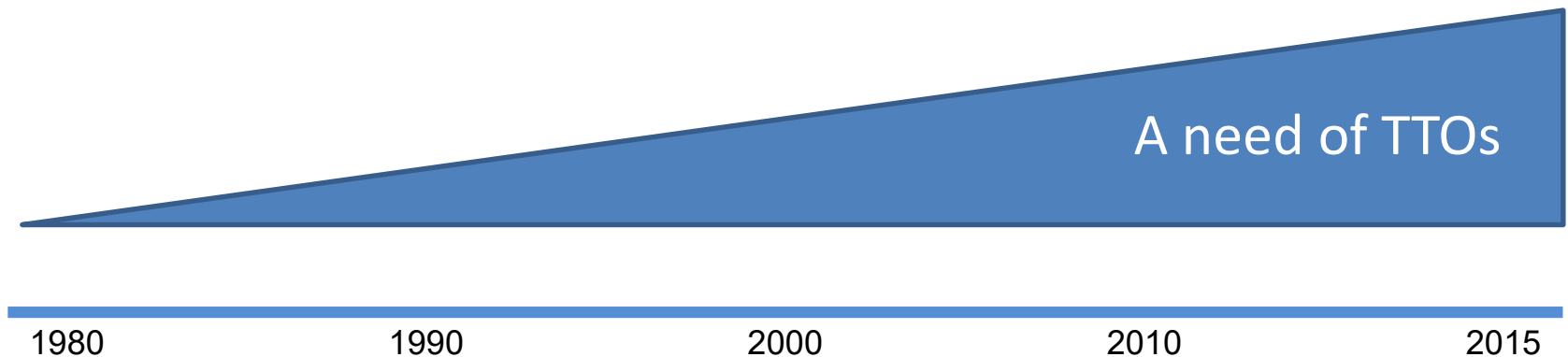
Technology Transfer in Biotechnology – History and Perspectives

- Industry changed!
- It is hard to out-license in early stage
- The answer could be Interim spin-off model
- Novel challenges, need of novel expertise
- TTOs should participate on management of projects ?!

Technology Transfer in Biotechnology – History and Perspectives



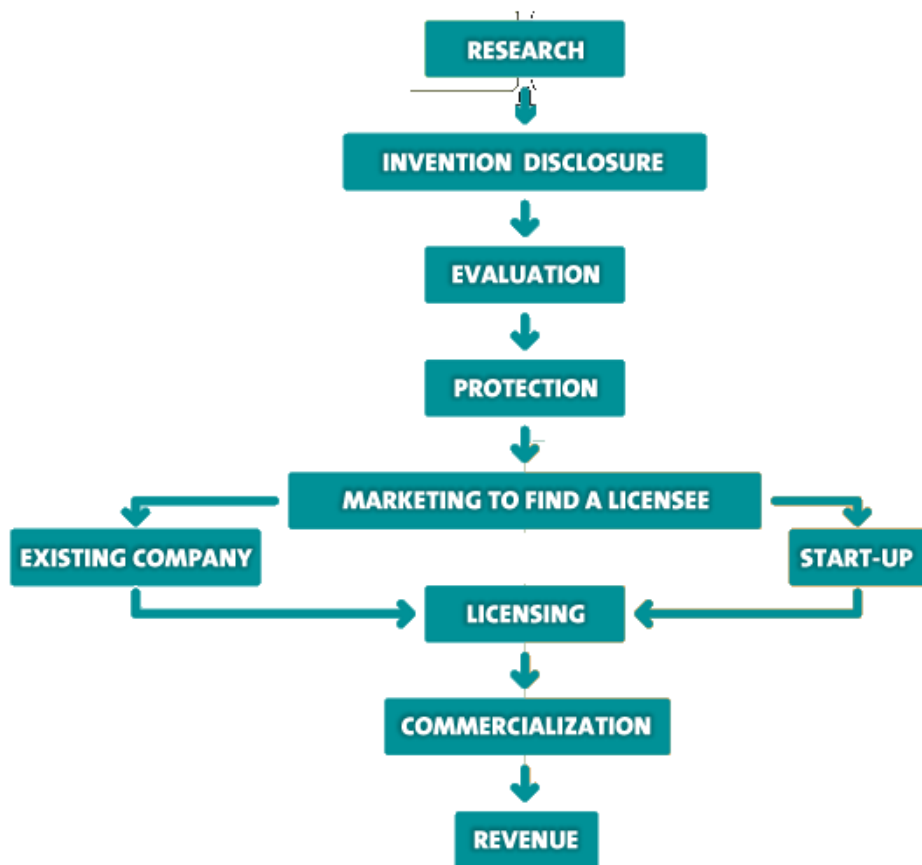
Technology Transfer in Biotechnology – History and Perspectives



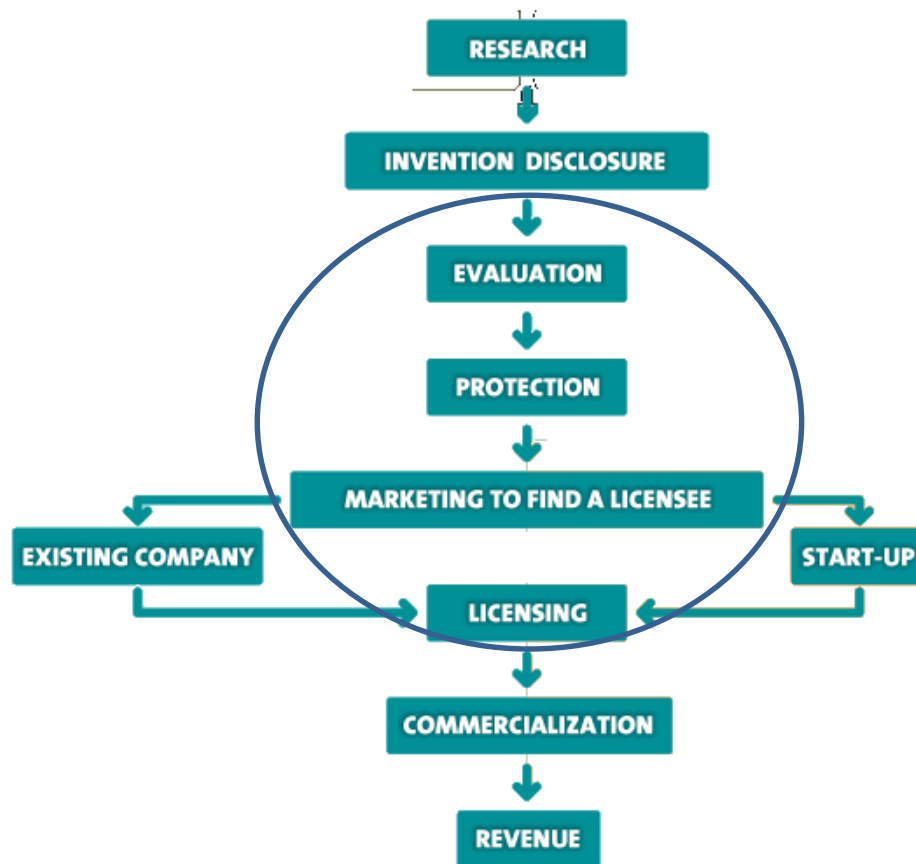
TT is just a service:

- more you pay, better is the service
- junk in – junk out

Technology transfer - History



Technology transfer - History



Technology transfer - History

Tenofovir: Anit - HIV success story

- 1968 The first paper about phosphonates published
- 1976 The first meeting with prof. Erick De Clercq, the first antiviral activity published
- 1985 The key-patent applications on ANP's
- 1986 were filed
- 1987 The patent rights were licensed to **Bristol-Meyers**
- 1989 Bristol-Meyers merged with Squibb; **the development of ANP's was interrupted**, the license rights returned
- 1990 The license rights were transferred to **Gilead Sciences**
HPMPC, PMEA and **PMPA** were selected as drug candidates for development
- 1996 The first drug, **Vistide™ (Cidifovir, (S)-HPMPC)**, approved in USA and EU for treatment of HCMV retinitis, clinically used for larynx, and anogenital papiloma, HSV-2, activity against monkeypox and other poxviruses, etc.



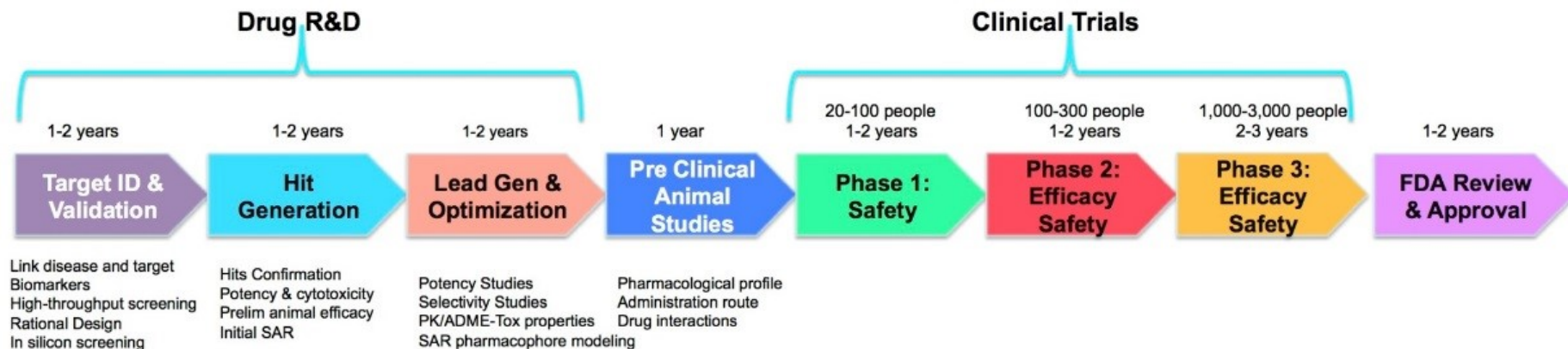
Technology transfer - History

Tenofovir: Anit - HIV success story

- | | | |
|------|--|---|
| 1968 | The first paper about phosphonates published | KU Leuven TTO <ul style="list-style-type: none">- IP protection- Marketing |
| 1976 | The first meeting with prof. Erick De Clercq, the first antiviral activity published | |
| 1985 | The key-patent applications on ANP's were filed | |
| 1986 | | |
| 1987 | The patent rights were licensed to Bristol-Meyers | |
| 1989 | Bristol-Meyers merged with Squibb; the development of ANP's | |
| 1990 | The license rights were transferred to Gilead Sciences
HPMPC, PMEA and PMPA were selected as drug candidates for development | |
| 1996 | The first drug, Vistide™ (Cidifovir, (S)-HPMPC), approved in USA and EU for treatment of HCMV retinitis, clinically used for larynx, and anogenital papiloma, HSV-2, activity against monkeypox and other poxviruses, etc. | |

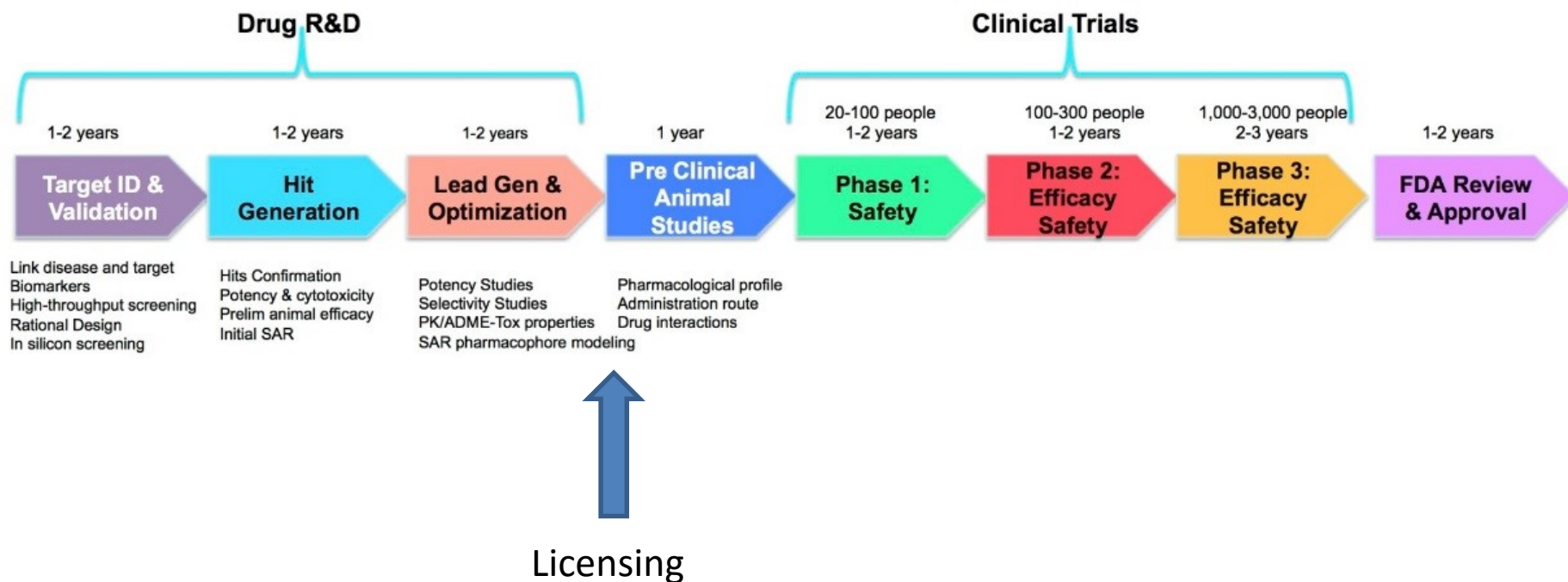
Technology transfer - History

Tenofovir: Anit - HIV success story

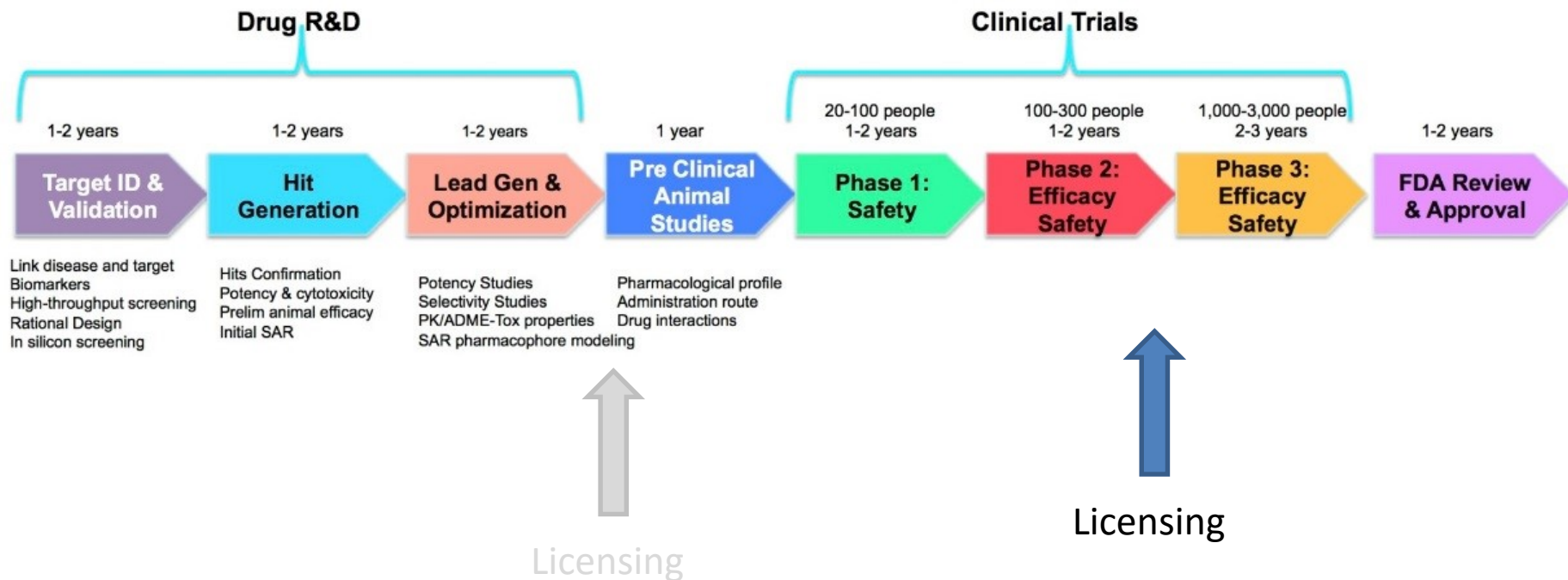


Technology transfer - History

Tenofovir: Anit - HIV success story



Technology transfer - Now



Why it changed?

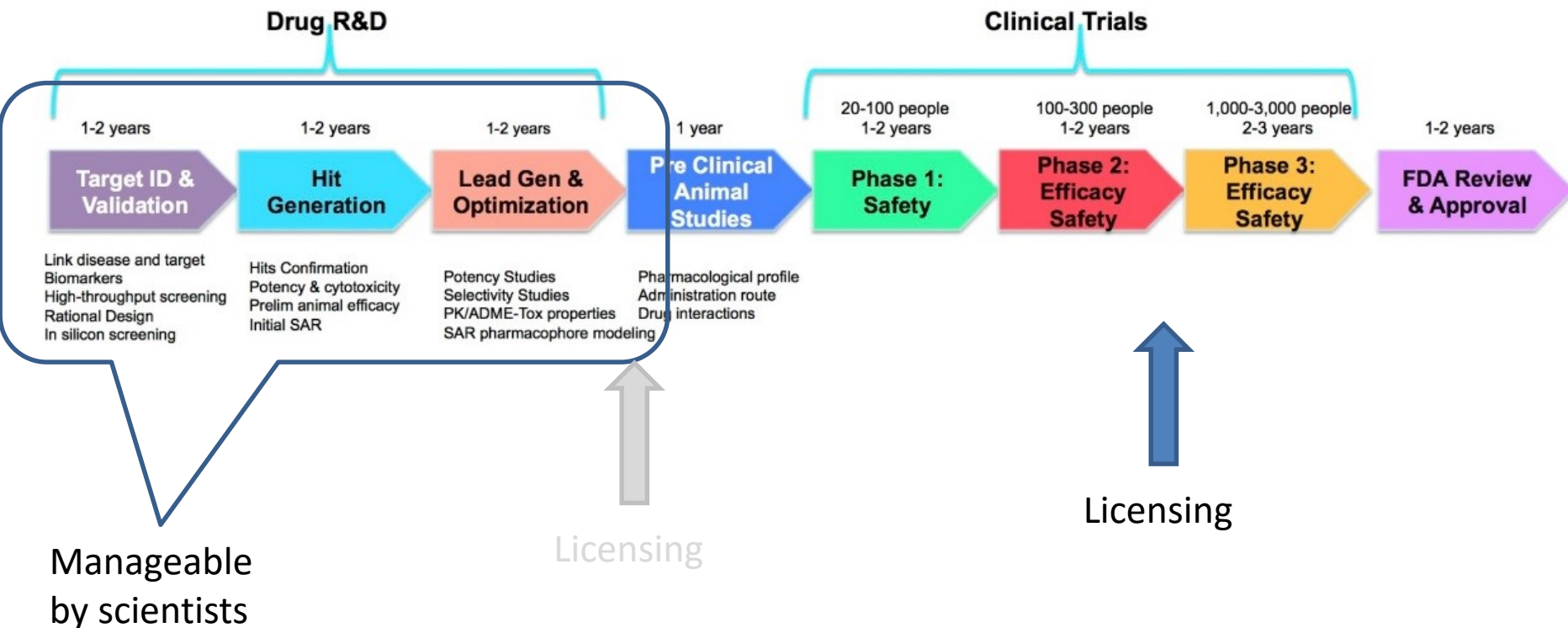
- Higher regulatory hurdles = Higher risk of failure
- Big Pharma work effectivity problems -> budget restrictions
- Short term objectives of managers – actual profit!
- Competition of other R&D projects
- ...

„The project looks great, but it is too early for us.“

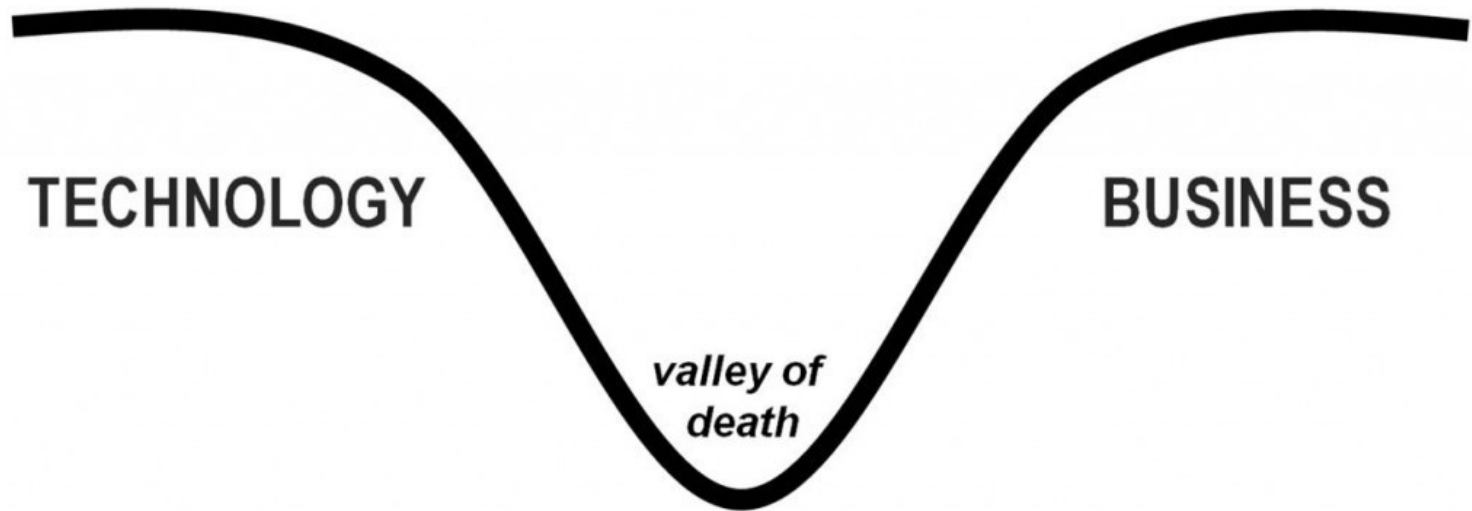
Big Pharma scouts

! Pre-clinical phase projects are not accepted for licensing by Big Pharma !

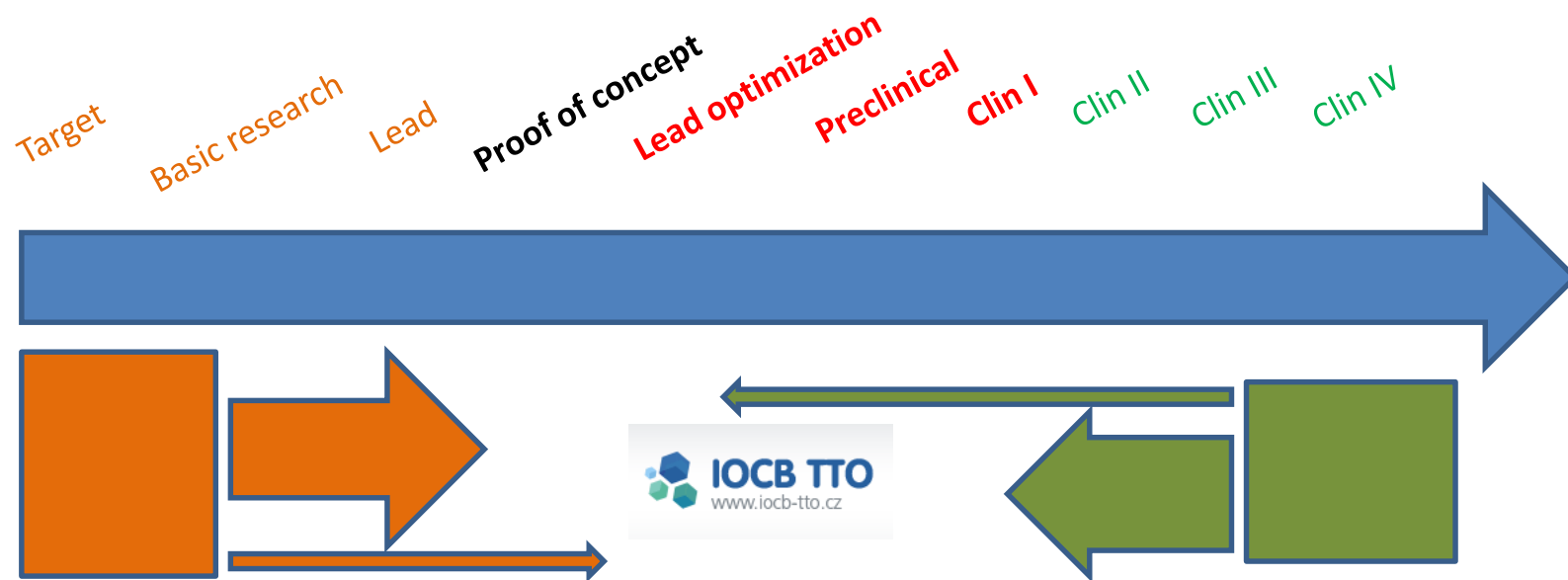
Technology transfer - Now



THE GAP



THE GAP



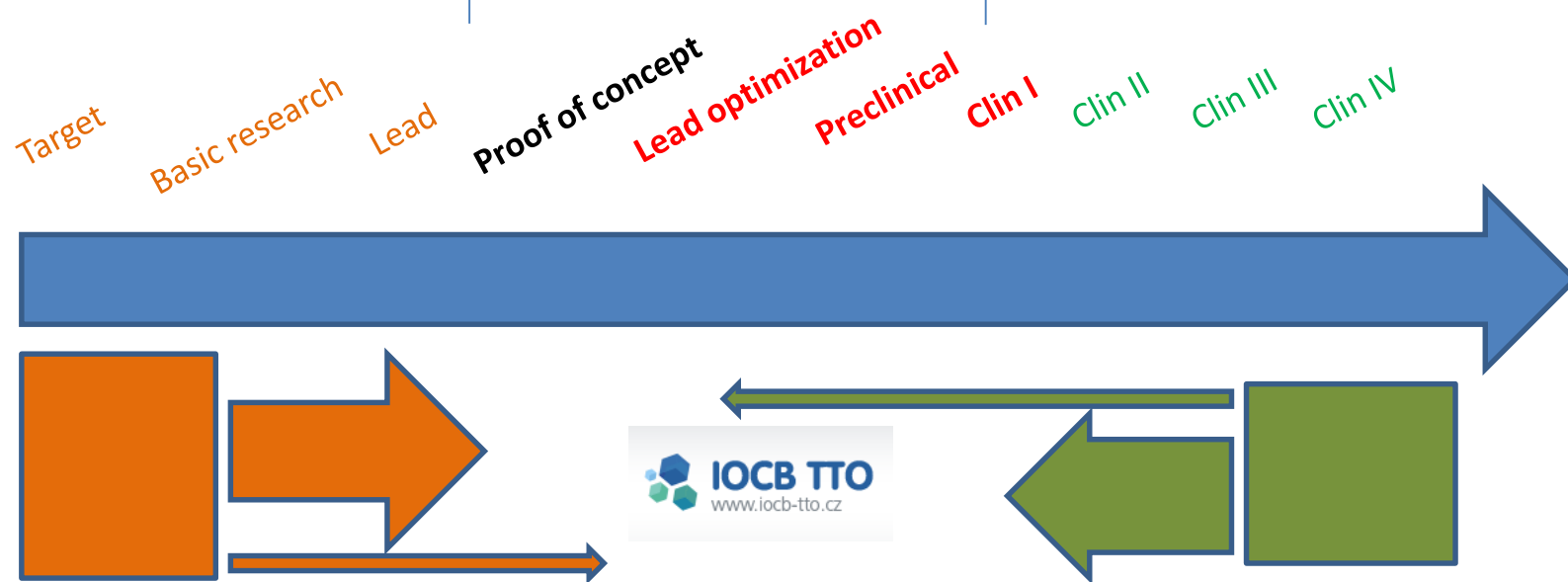
**Academia – mostly finishes
at the proof of concept phase**

**Pharma – mostly wants clin I
results**

THE GAP

2-10 mil. USD

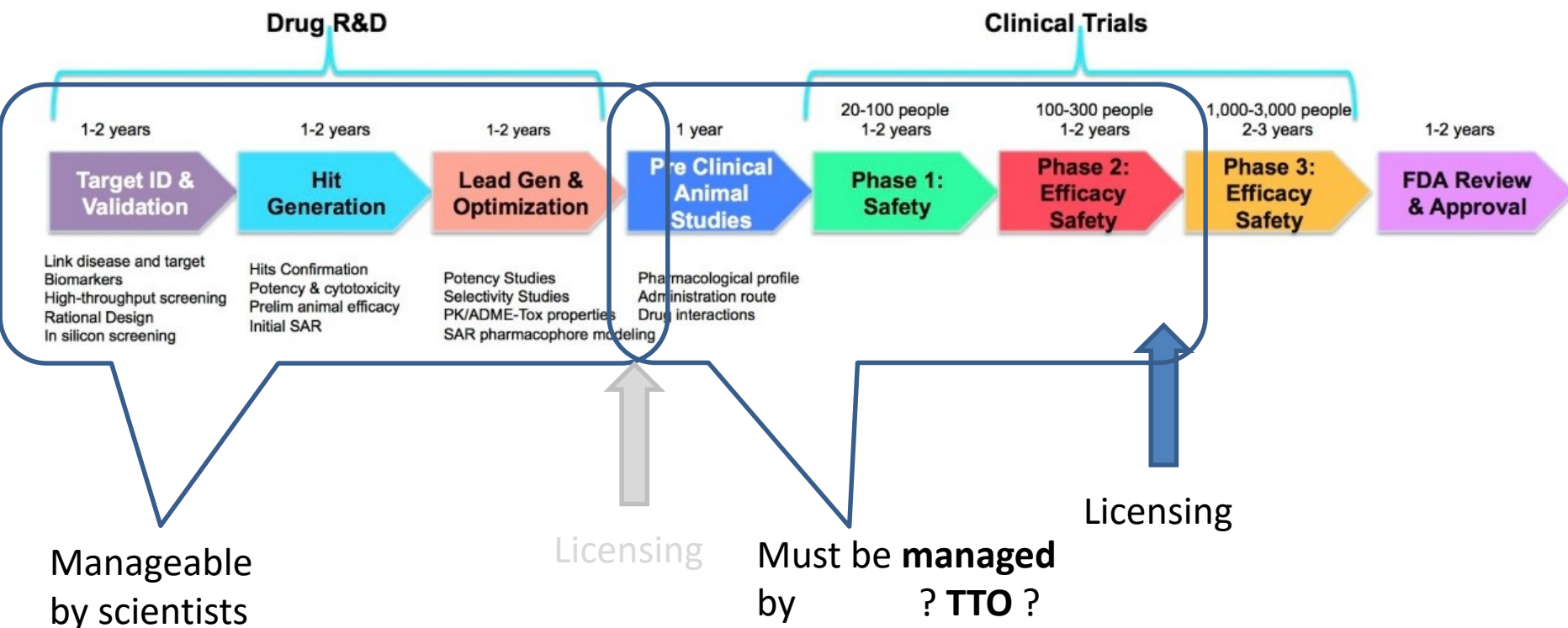
100-200 mil. USD



**Academia – mostly finishes
at the proof of concept phase**

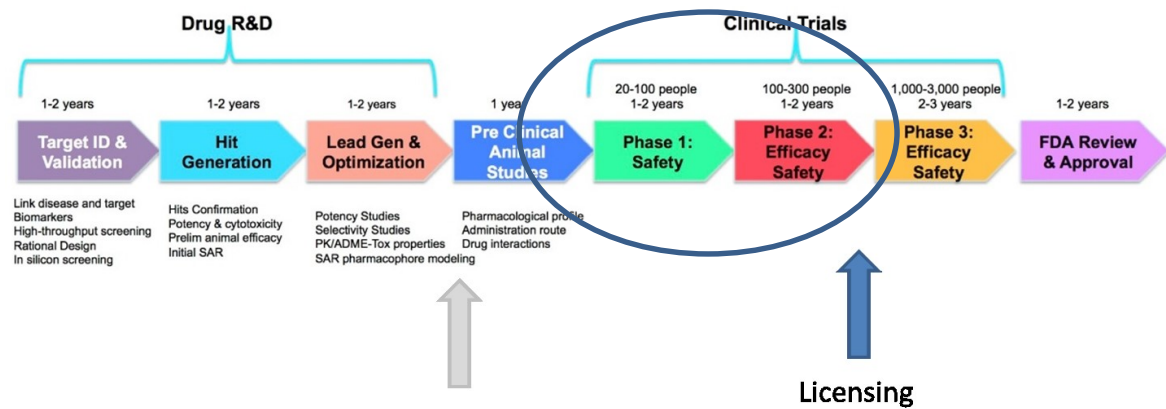
**Pharma – mostly wants clin I
results**

Technology transfer - Now



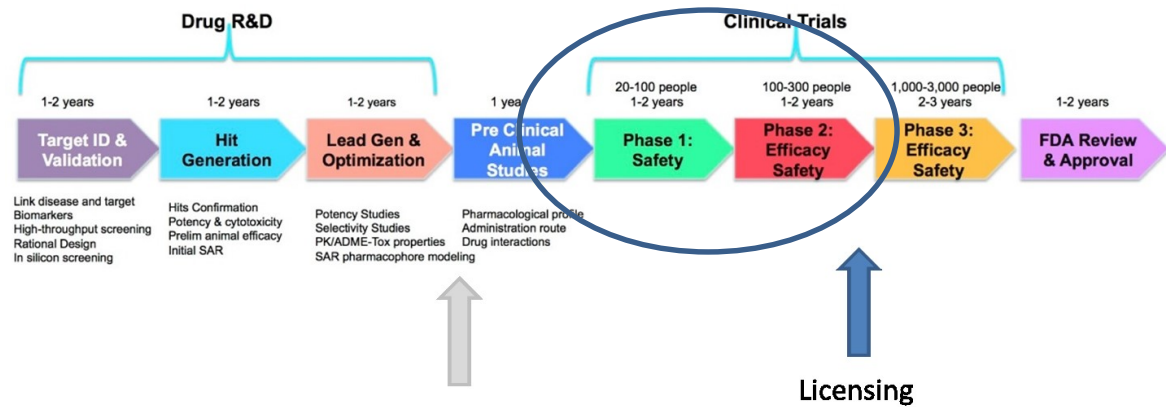
Technology transfer - Now

- Novel competencies of TTOs:
 - Project management (of pre-clin to Phase 1)
 - Business plan writing and pitching
 - Fundraising
 - ...
- Novel models:
 - Interim spin-off/JV



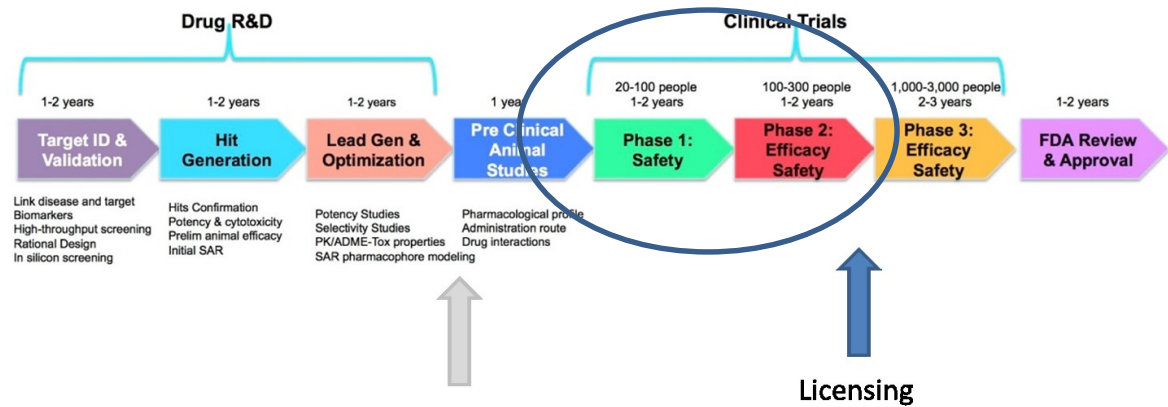
Technology transfer - Now

- Interim spin-off/JV:
 - Mission: To pass thru IND, CPI and/or CPII phase = De-risking!
 - Exit strategy:
 - Out-licensing to Big Pharma
 - Acquisition by Big Pharma
 - Financing and Valuation: - Why this should work????



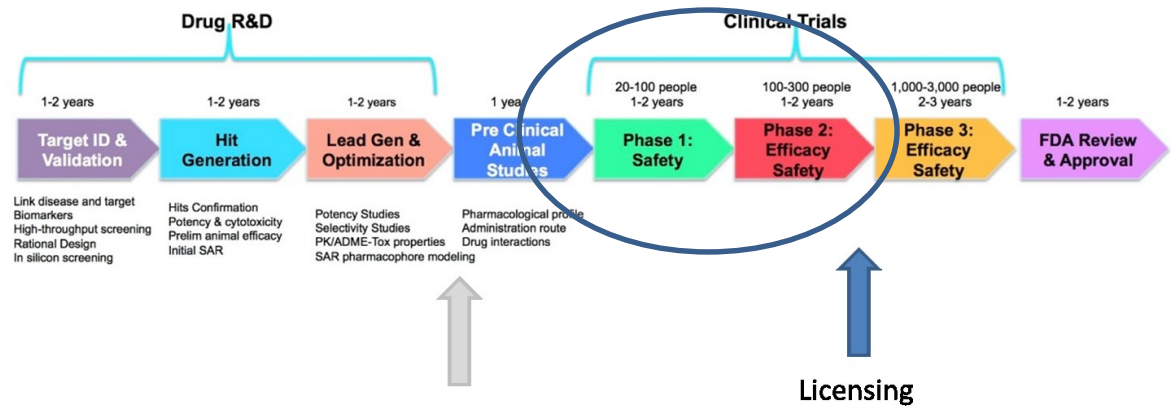
Technology transfer - Now

- Interim spin-off/JV:
 - Outcomes:
 - The Institute:
 - result was applied (prestige)
 - royalties and equity share of the Spin-off
 - The Investor:
 - 90%+ IRR ~ ROI = 600 – 1000%
 - Big Pharma:
 - derisked project in CPII – less risky and short term investment



Technology transfer - Now

- Interim spin-off/JV:
 - Outcomes:
 - The Institute:
 - result was applied (prestige)
 - royalties and equity share of the Spin-off
 - The Investor:
 - 90%+ IRR ~ ROI = 600 – 1000%
 - Big Pharma:
 - derisked project in CPII – less risky and short term investment

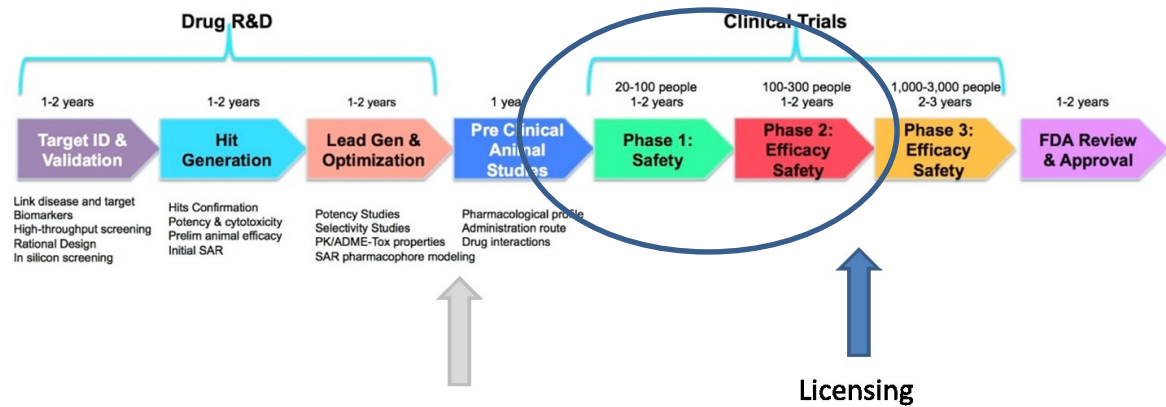


Technology transfer - Now

- Interim spin-off/JV:

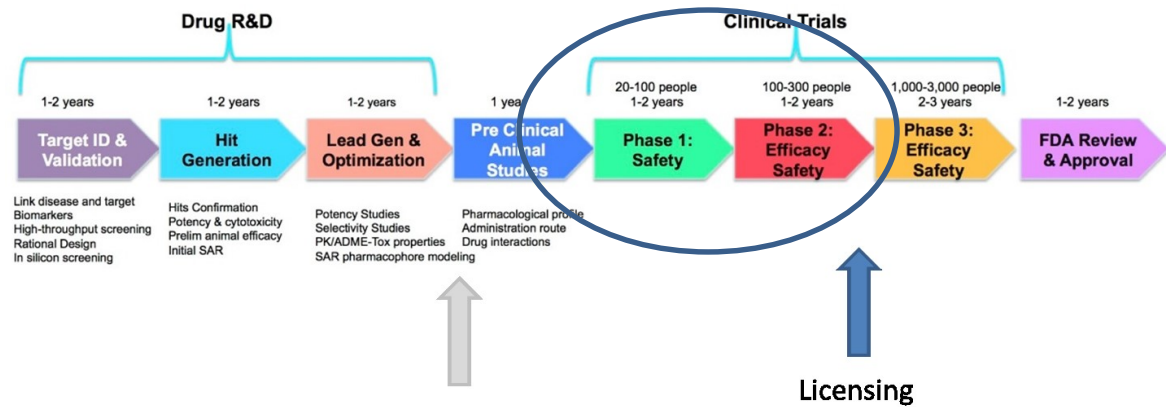
- Outcomes:

- The Institute:
 - result was applied (prestige)
 - royalties and eqvity share of the Spin-off
 Win
- The Investor:
 - 90%+ IRR ~ ROI = 600 – 1000%
 Win
- Big Pharma:
 - derisked project in CPII – less risky and short term investment
 Win



Technology transfer - Now

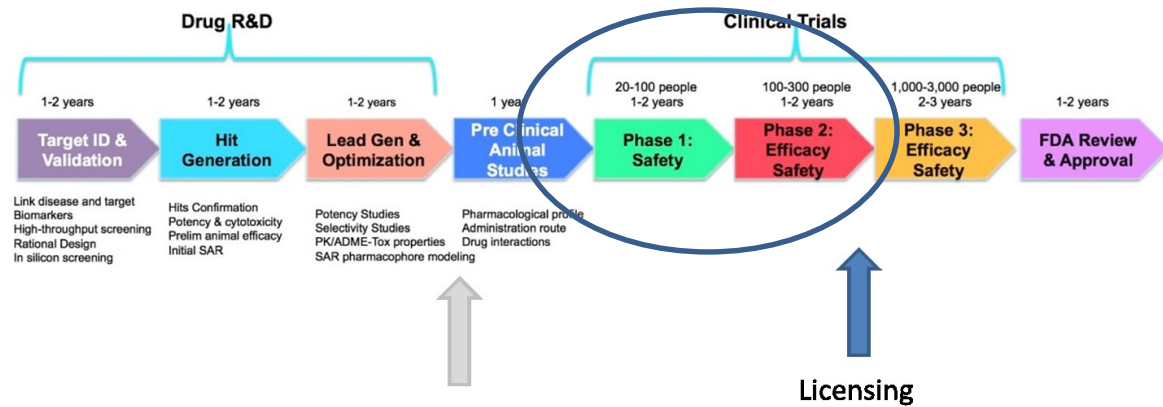
- Interim spin-off/JV:
 - Outcomes:
 - Needs:
 - knowledge
 - (project) management
 - everything must be done by somebody !



Technology transfer - Now

- Interim spin-off/JV:
 - Outcomes:
 - Needs:
 - business planning
 - knowledge
 - (project) management

It must be done by somebody !



Technology Transfer in Biotechnology – History and Perspectives

- Industry changed!
- It is hard to out-license in early stage
- The answer could be Interim spin-off model
- Novel challenges, need of novel expertise
- TTOs should participate on management of projects ?!

Thanks for your attention !



Contacts :

Jaromir Zahradka, PhD

IOCB TTO s.r.o.

Flemingovo nam. 2, 16610 Prague 6, CR

Email zahradka@iocb-tto.cz

www.iocb-tto.cz

