



TRI-INSTITUTIONAL **THERAPEUTICS DISCOVERY INSTITUTE**

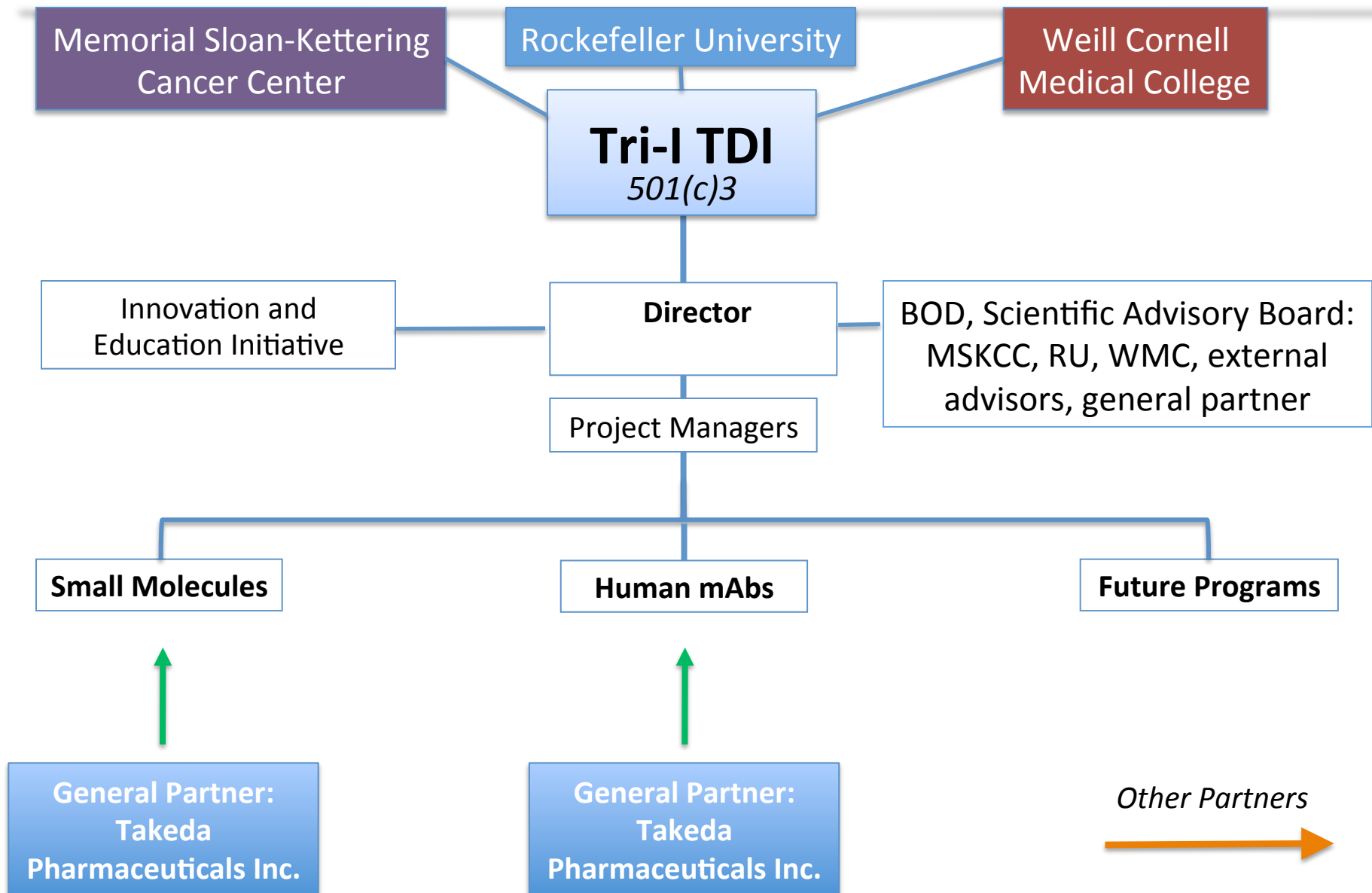
RE(ACT)^x Switzerland
How to build a sustainable model

Michael A. Foley, Ph.D.

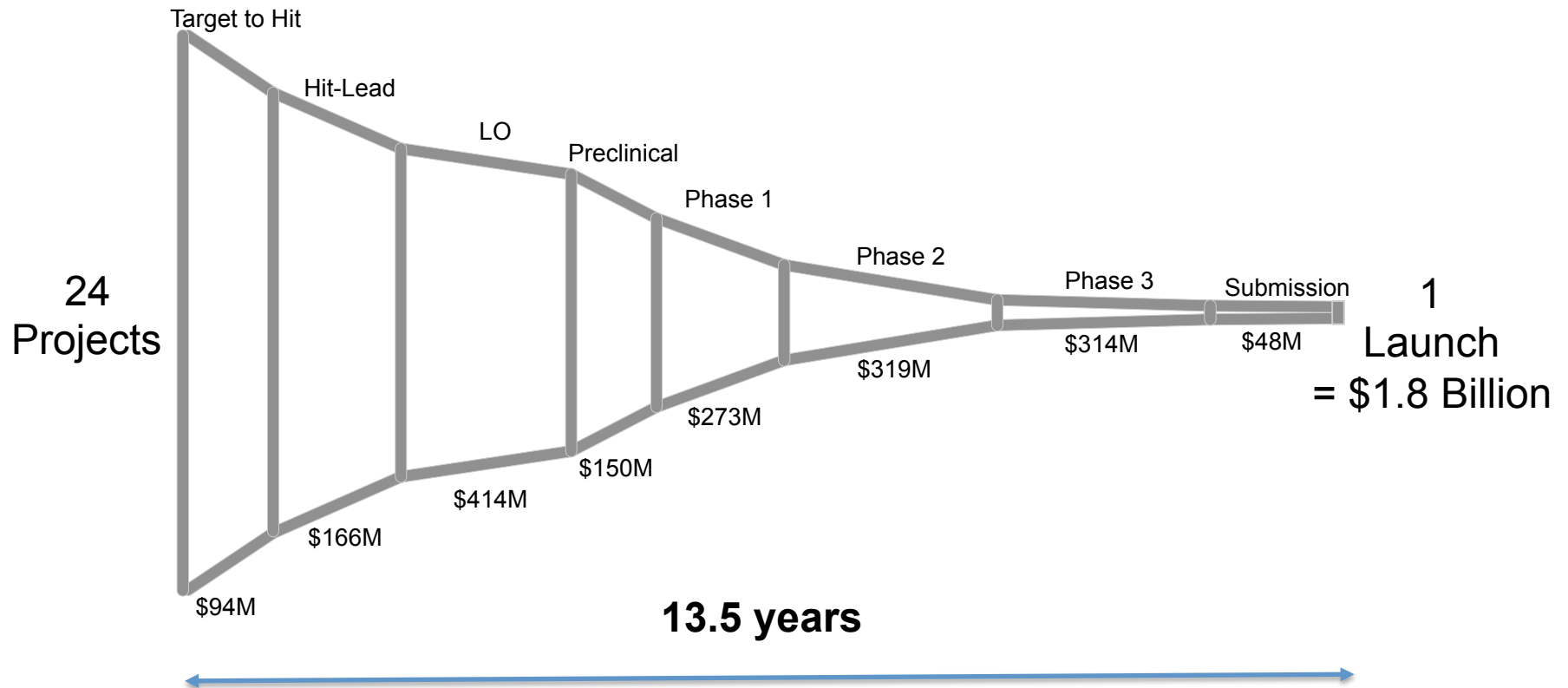
Tri-Institutional Therapeutics Discovery Institute
& the Sanders Innovation and Education
Initiative

November 10, 2016

Structure of Tri-I TDI



Current model: gradual, slow and costly *uncertainty resolution*

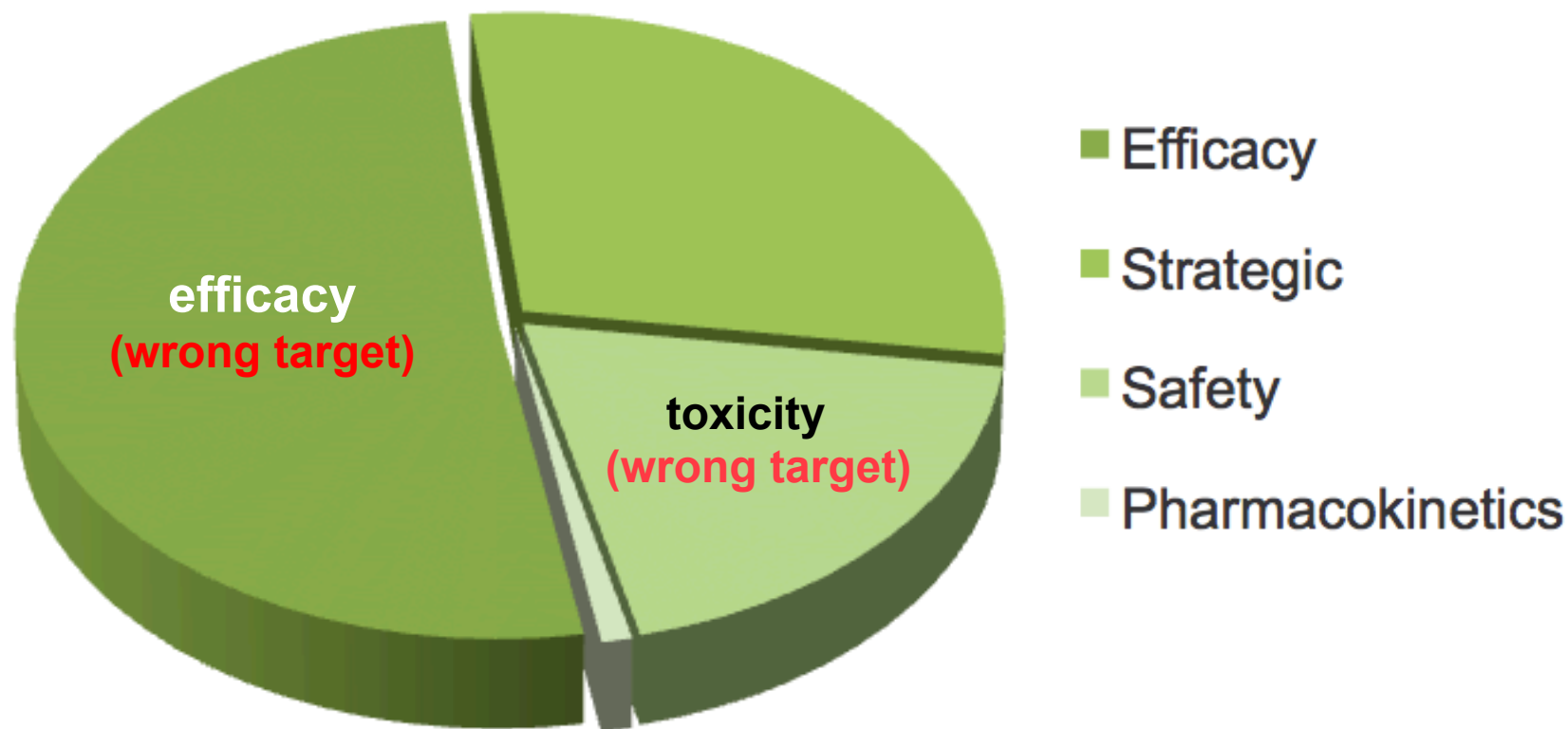


Stage width represents relative cycle time.
Costs per stage are capitalized at 11% cost of capital.
S. Paul et al. Nature Reviews Drug Discovery. 2010

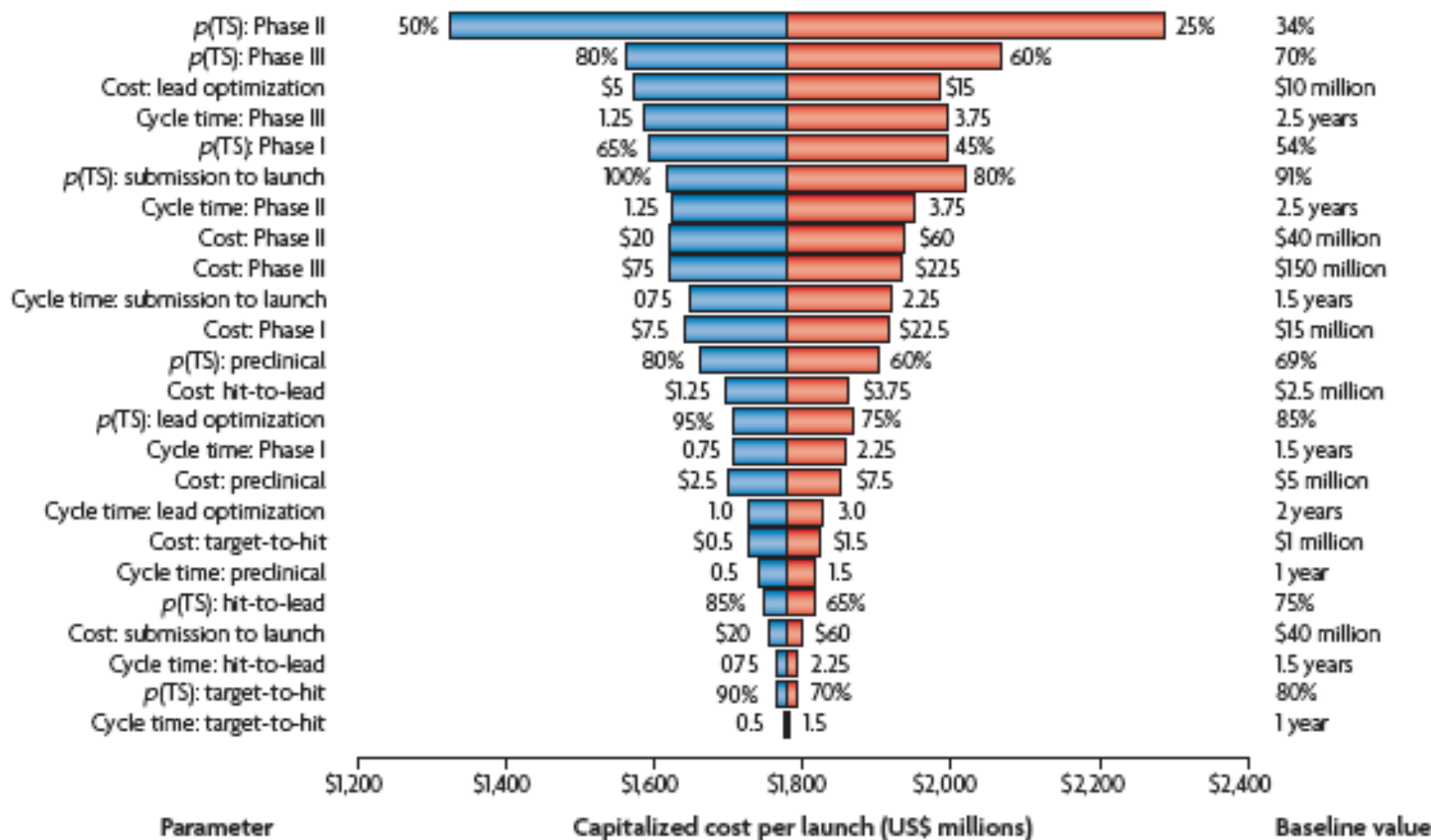


Why projects fail in phase II

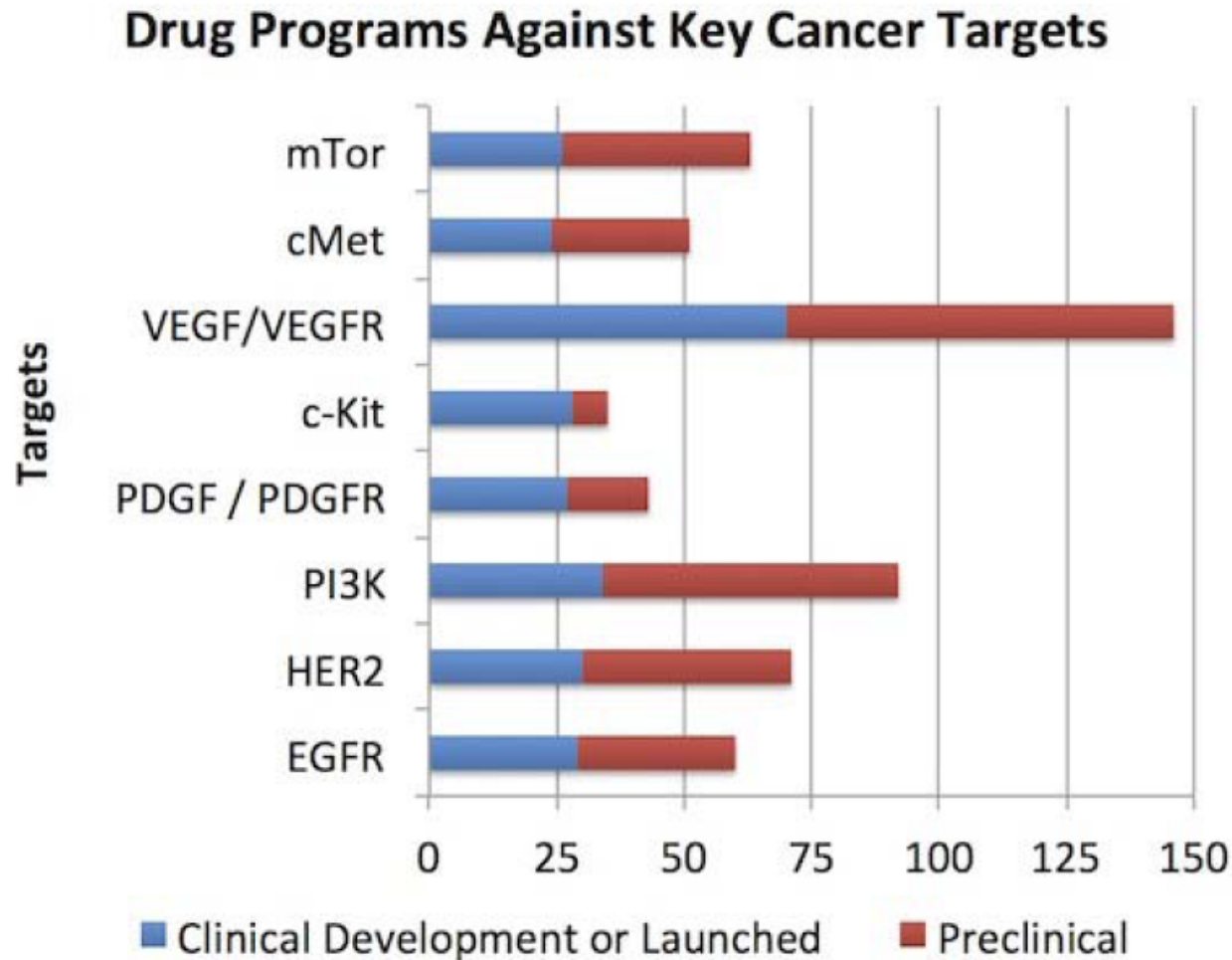
Projects terminated in clinical phase 2 (2008-2010)



Phase II failures: key issue facing drug development



1000 projects in oncology pipeline: 50% focus on 8 targets



“These chemistries are also perceived to be lower risk (“this series has been in the clinic” etc...), and maybe they are. But they don’t provide a lot of room for novel discoveries.”



Productivity in drug discovery

Efficiency: Inputs to outputs

Effectiveness: Outputs to outcomes

$$P \propto \frac{WIP \times p(TS) \times V}{CT \times C}$$

P= Productivity

WIP= Work in process

$p(TS)$

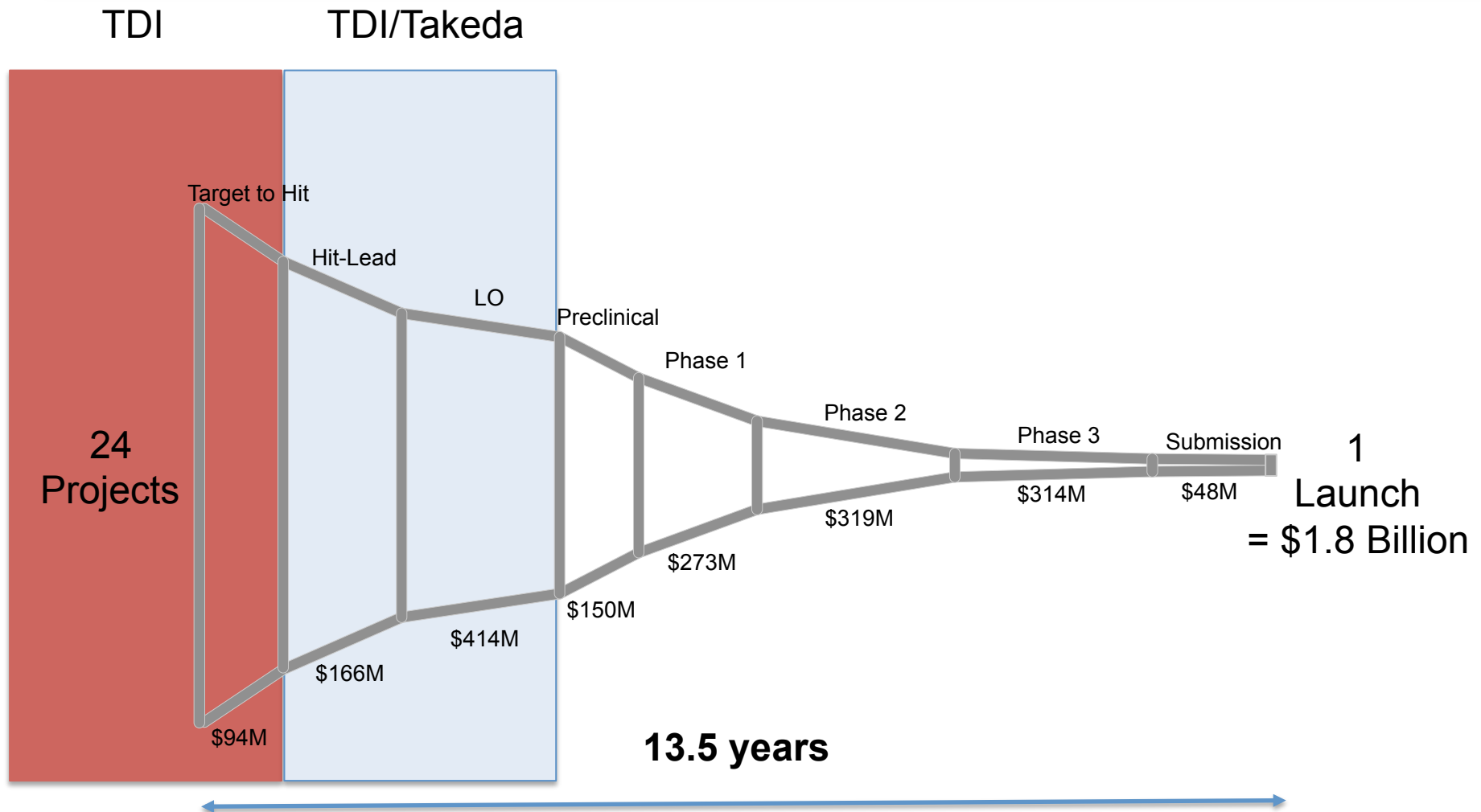
V= Value

CT= Cycle time

C= Cost



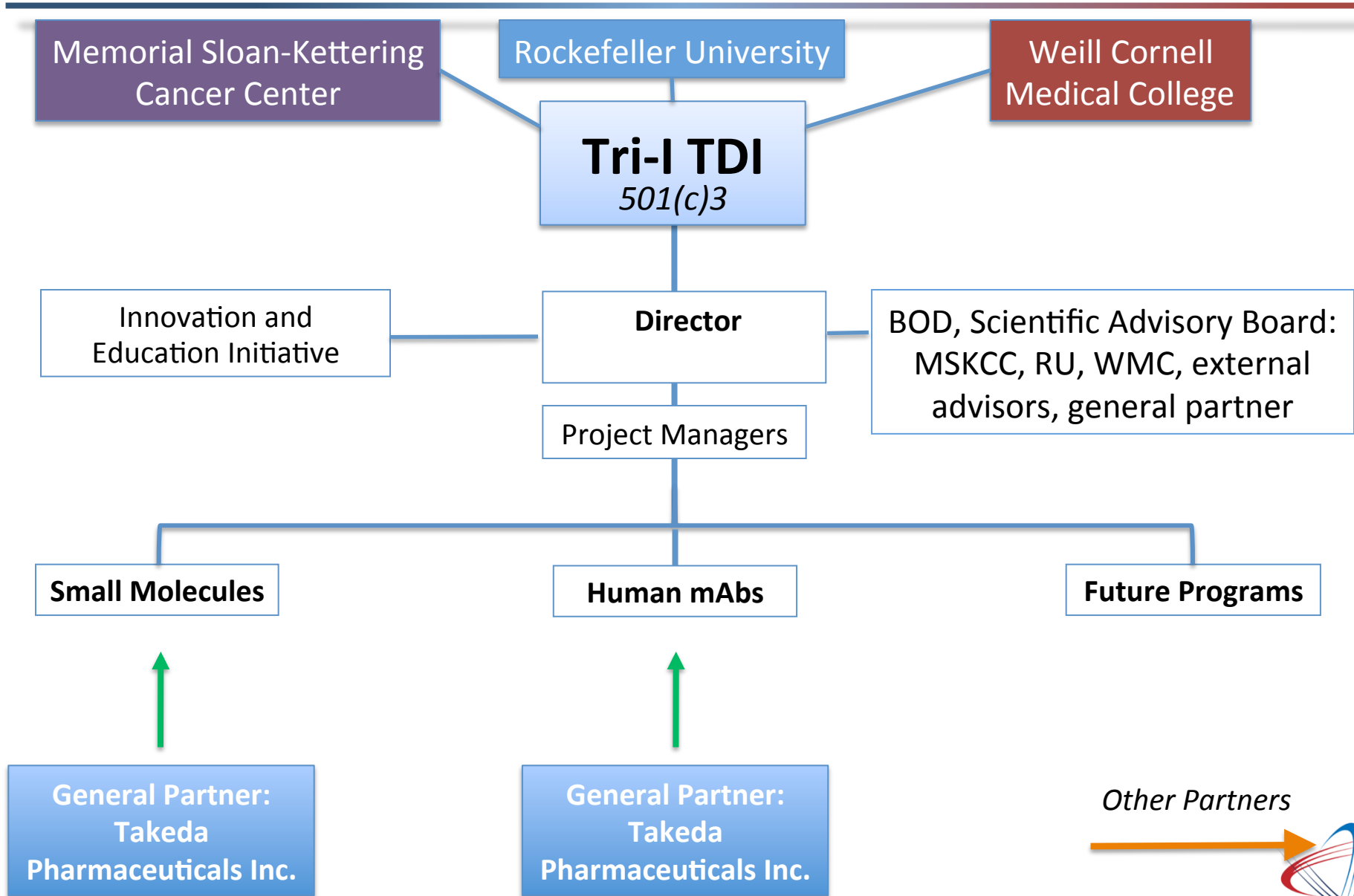
TDI model: rapid leveraged *uncertainty resolution*



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Structure of Tri-I TDI



Tri-I TDI: Concepts and goals

- In 2013, Memorial Sloan Kettering Cancer Center, the Rockefeller University and Weill Cornell Medicine filed to form a 501(c)3 not-for-profit corporation to pool resources, raise funds, **share** space, constitute **a critical mass and achieve economies of scale** to jointly facilitate...
- The ability of our faculty to **create new** diagnostics, biomarkers, preventive & therapeutic compounds and biologics
- To promote basic and translational research
- Enable **early-stage drug discovery**
- **Increase** technology transfer
- Realize **revenue**
- Innovate in **improving the success** and lowering the cost of drug discovery
- **Accelerate** improvements in human health
- On October 1, 2013, the Tri-I TDI signed a partnership with Takeda Pharmaceuticals, Inc. on small molecules



Features of Tri-I TDI

- 501(c)3 BOD appoints Director, SAB
- Projects selected for their **potential to identify the role** of a specific pathway in disease
- Three institutions **share costs** of Director, legal services, external advisers, administrator, project managers, equipment, space, office supplies, and a proportion of project-specific costs (mostly chemistry consumables)
- Tri-I TDI resources apportioned equally for WCMC, RU and MSK projects
- **Intellectual property** for medicinal chemistry projects assigned to the institution whose faculty originate the project
- General partner for small molecules provides on-site medicinal chemistry
- General partner for small molecules has right of first offer for project-specific licensing



Benefits of the General Partnership

- Advantages to the academic institutions
 - Control project selection process
 - Retain IP
 - Work side-by-side with industry experts, markedly improving the marriage of innovative biology to early stage drug discovery
- Advantages to the General Partner
 - Immersion in an innovation environment
 - Improved quality of projects submitted for licensing
 - Improved vetting of projects before licensing
 - Preferred position as a licensee of projects both within and outside TDI



Areas of responsibility

1. Vision
 - Drug discovery
 - Innovation and Education
2. Provide proper resources
3. Build the culture
4. Deliver performance against goals



Vision

1. Drug discovery

- Deliver a pre-clinical pipeline of the same size as a major pharmaceutical company with the same success metrics for $1/62^{\text{nd}}$ of the internal cost.

2. Innovation and Education

- Provide training and access to key technologies to enable proof-of-concept studies for novel targets and pathways.



Vision: Innovation and Education

1. Innovation

- Unlimited access to Schrodinger software
- Transgenic mouse platform
- Combination screening platform
- DNA-encoded libraries
- Microfluidic synthesis and screening platform

2. Education

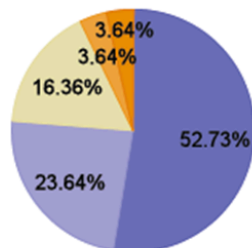
- Drew University ResMed course
- Schrodinger training
- Seminar series
- Professional grant writer
- Industry-academic team structure



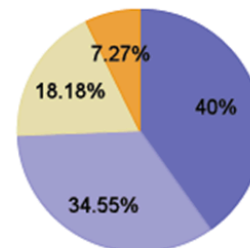
Resources: Complement strengths through collaboration

Comparison Between Industry and Academia

Medicinal Chemistry

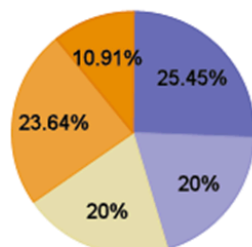


Assay Development and Screening

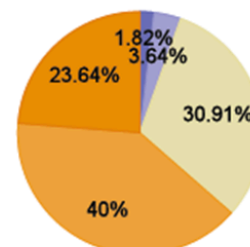


- much better in industry
- somewhat better in industry
- about the same
- somewhat better in academia
- much better in academia

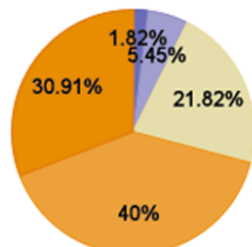
Organizational Commitment & Stability



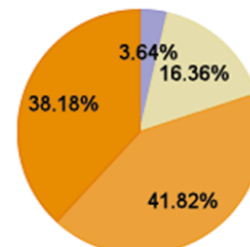
Aligned with Needs and Values of Society



Innovation



Disease Expertise

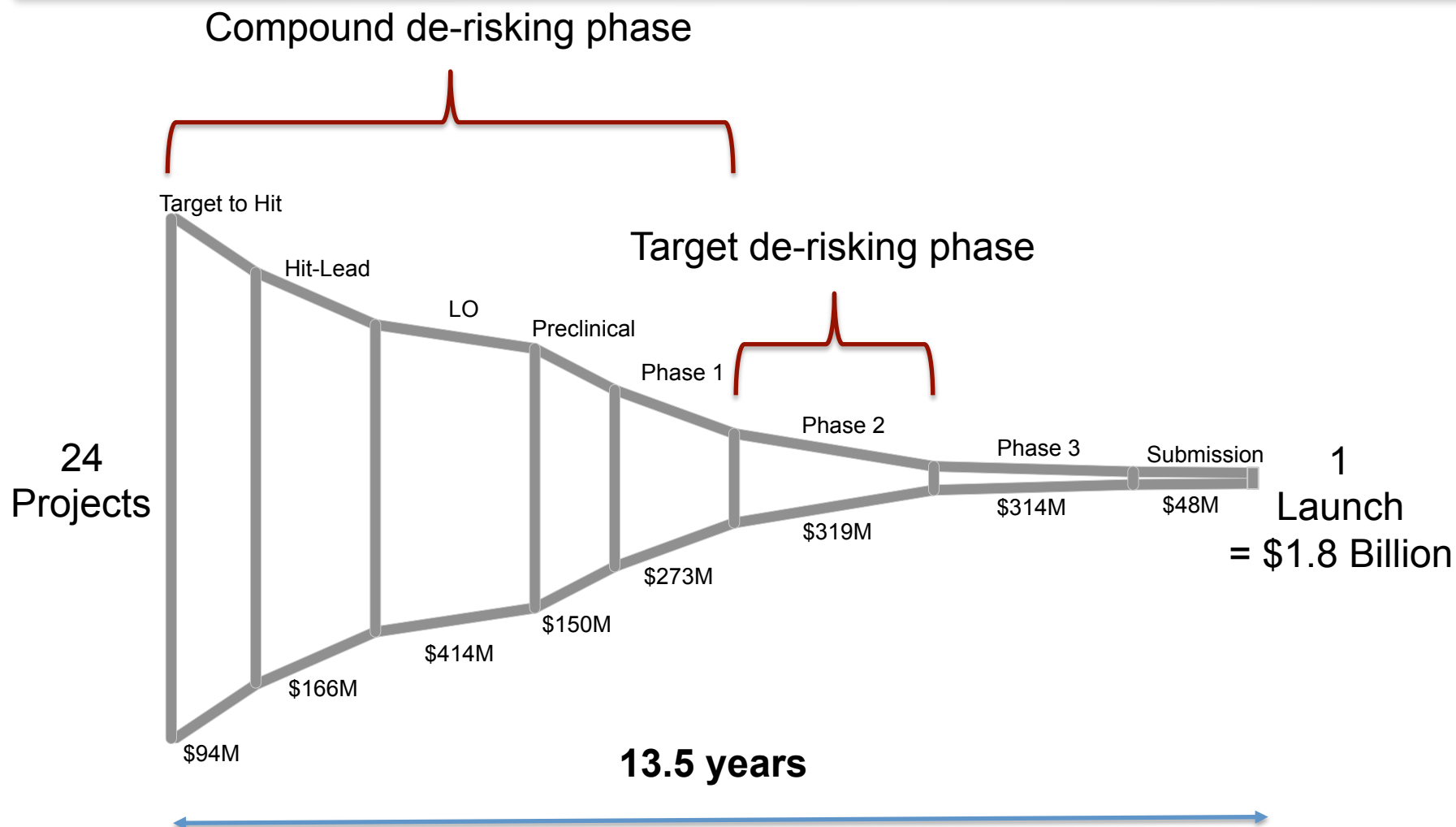


Deliver performance: Business strategy

Leverage existing infrastructure, funding and people



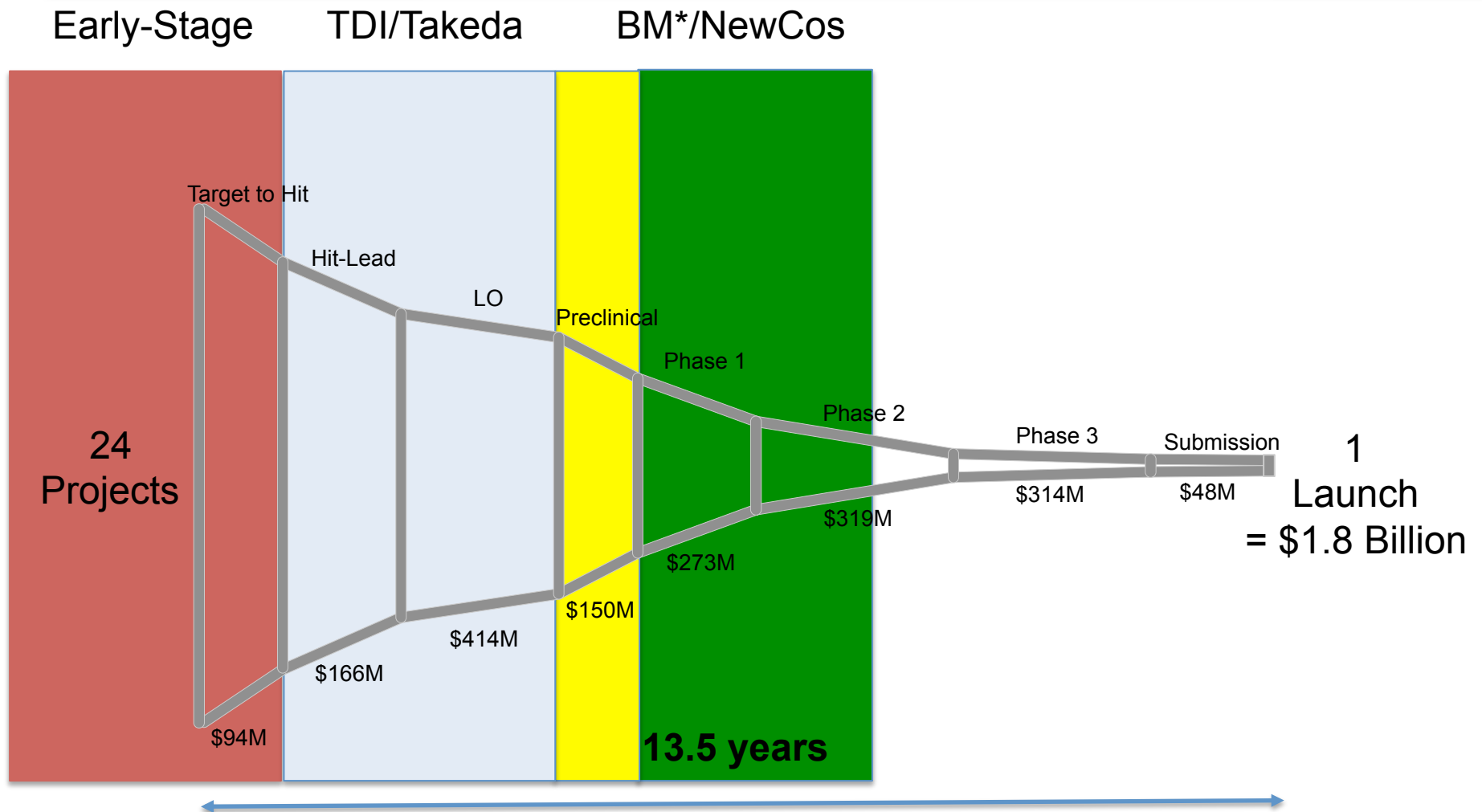
Current model: De-risk the compound not the **target**



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TDI model: rapid leveraged *uncertainty resolution*



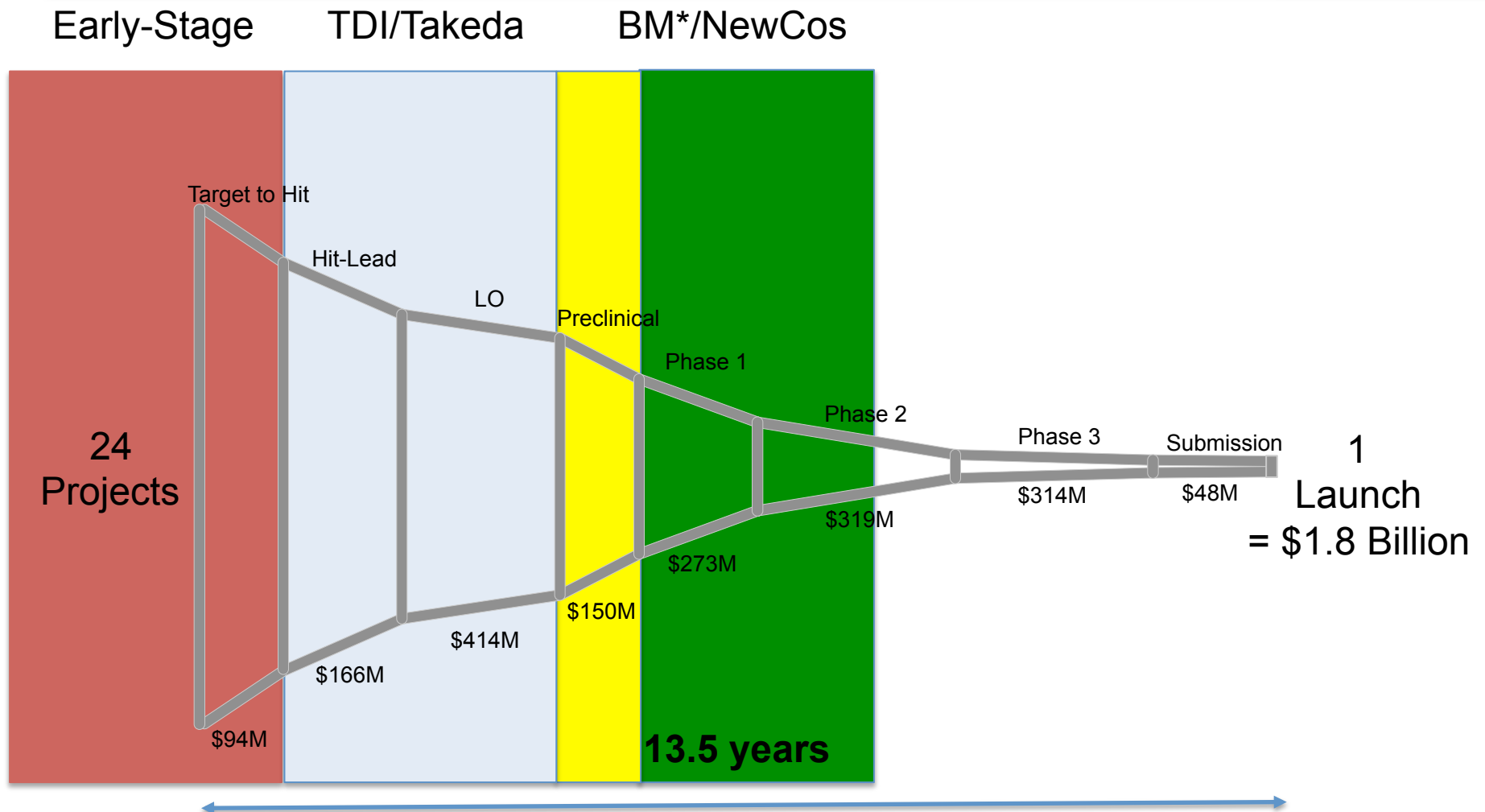
*Bridge Medicines Inc.



Need for human-proof-of-concept



TDI model: rapid leveraged *uncertainty resolution*



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