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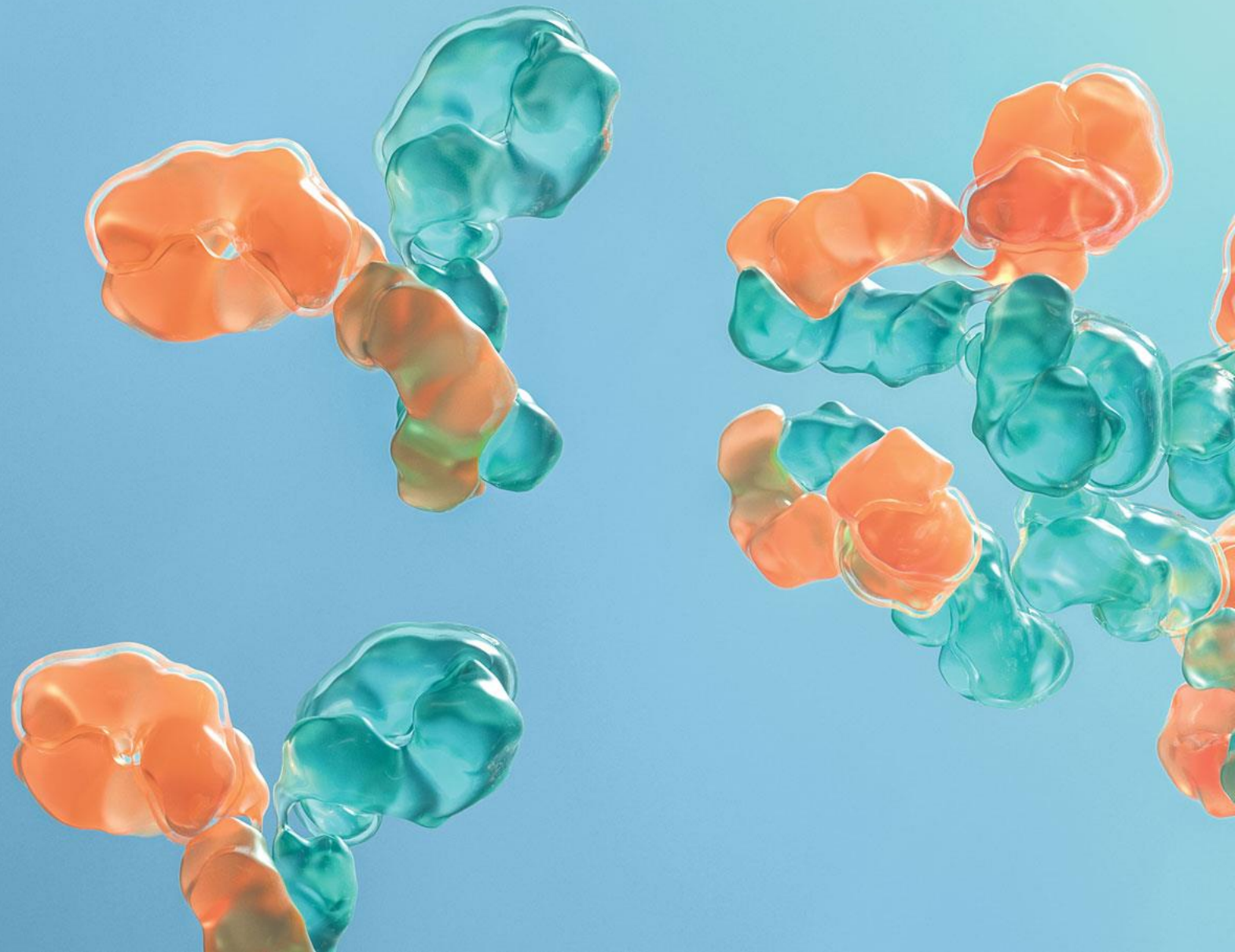
Early Discovery at Genmab: a Data Science Perspective



Roberto Spreafico, PhD
Director, Discovery Data Science

BCF Career Event Belgium 2023
2023-11-23

Forward looking statement

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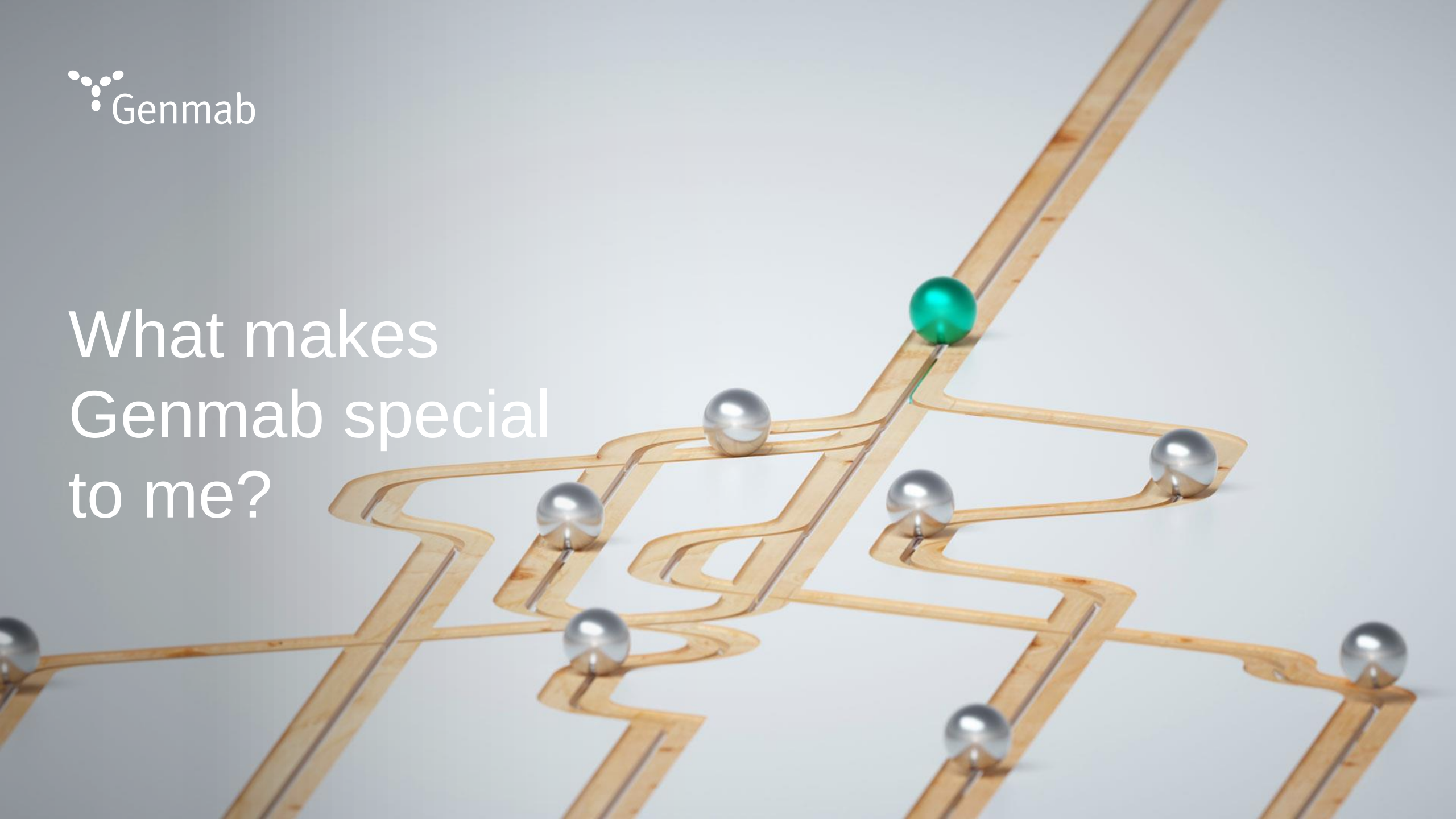
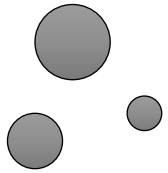
What makes Genmab special to me?



Company Size: Sweet Spot for Innovation, Agility & Resources

Biotech
(10-500)



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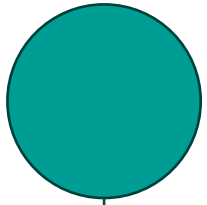
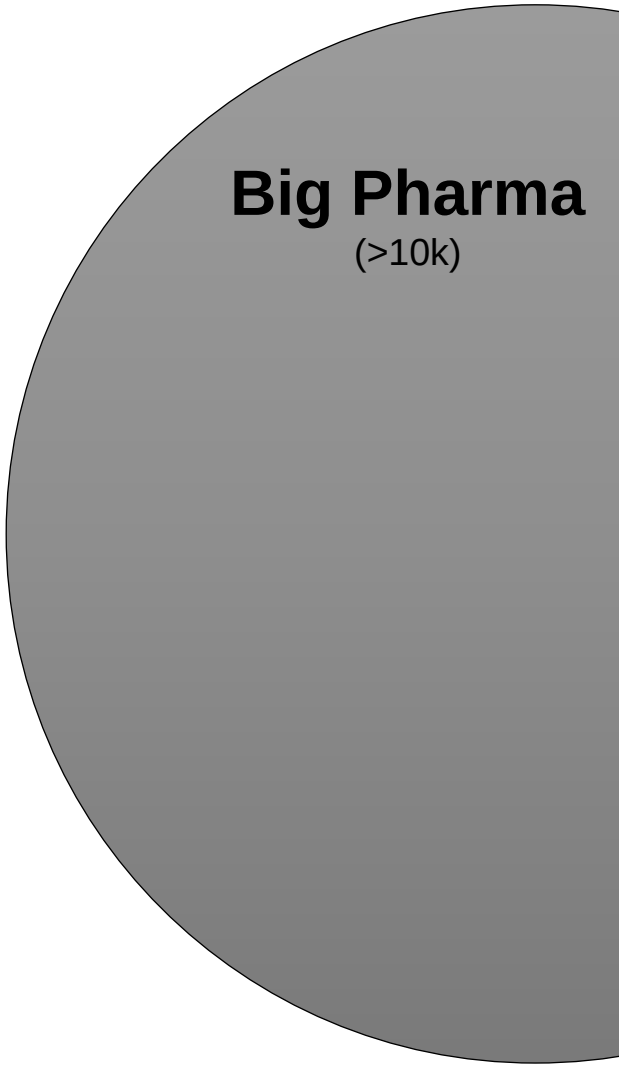
(2000)



- Preserved **innovative discovery spirit** of founders
- Greater **stability** than biotech (commercial stage)
- Discovery projects **resourced** better than biotech
- Corporate structure **without corporate bureaucracy**

Big Pharma
(>10k)



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Genmab's Publications and Academic Collaborations Speak for Culture, Science and Pursuit of Quality

Science 2007

Anti-Inflammatory Activity of Human IgG4 Antibodies by Dynamic Fab Arm Exchange

Marijn van der Neut Kolfschoten,[1] Janine Schuurman,[2] Mario Losen,[3] Wim K. Bleeker,[2] Pilar Martínez-Martínez,[3] Ellen Vermeulen,[1] Tamara H. den Bleker,[1] Luus Wiegman,[2] Tom Vink,[2] Lucien A. Aarden,[1] Marc H. De Baets,[3,4] Jan G.J. van de Winkel,[2,5] Rob C. Aalberse,[1]* Paul W. H. I. Parren[2]*

Science 2014

Complement Is Activated by IgG Hexamers Assembled at the Cell Surface

Christoph A. Diebolder,[1,2]* Frank J. Beurskens,[3]* Rob N. de Jong,[3] Roman I. Koning,[2] Kristin Strumane,[3] Margaret A. Lindorfer,[4] Marleen Voorhorst,[3] Deniz Ugurlar,[1] Sara Rosati,[5] Albert J. R. Heck,[5] Jan G. J. van de Winkel,[3,6] Ian A. Wilson,[7,8] Abraham J. Koster,[2] Ronald P. Taylor,[4] Erica Ollmann Saphire,[9] Dennis R. Burton,[8,9,10] Janine Schuurman,[3] Piet Gros,[1]† Paul W. H. I. Parren[3]†

nature REVIEWS DRUG DISCOVERY 2019

Bispecific antibodies: a mechanistic review of the pipeline

*Aran F. Labrijn[1], Maarten L. Janmaat[1], Janice M. Reichert[2] and Paul W. H. I. Parren[2,3,4]**

nature biotechnology 2022

Logic-gated antibody pairs that selectively act on cells co-expressing two antigens

Simone C. Oostindie[1,2], Derek A. Rinaldi[3], Gijs G. Zom[1], Michael J. Wester[4], Desiree Paulet[1], Kusai Al-Tamimi[1], Els van der Meijden[1], Jennifer R. Scheick[1], Tessa Wilpshaar[1], Bart de Jong[1], Marloes Hoff-van den Broek[1], Rachel M. Grattan[3], Janita J. Oosterhoff[1], Julie Vignau[1], Sandra Verploegen[1], Peter Boross[1], Frank J. Beurskens[1], Diane S. Lidke[3,5], Janine Schuurman[1] and Rob N. de Jong[1]✉

And dozens more

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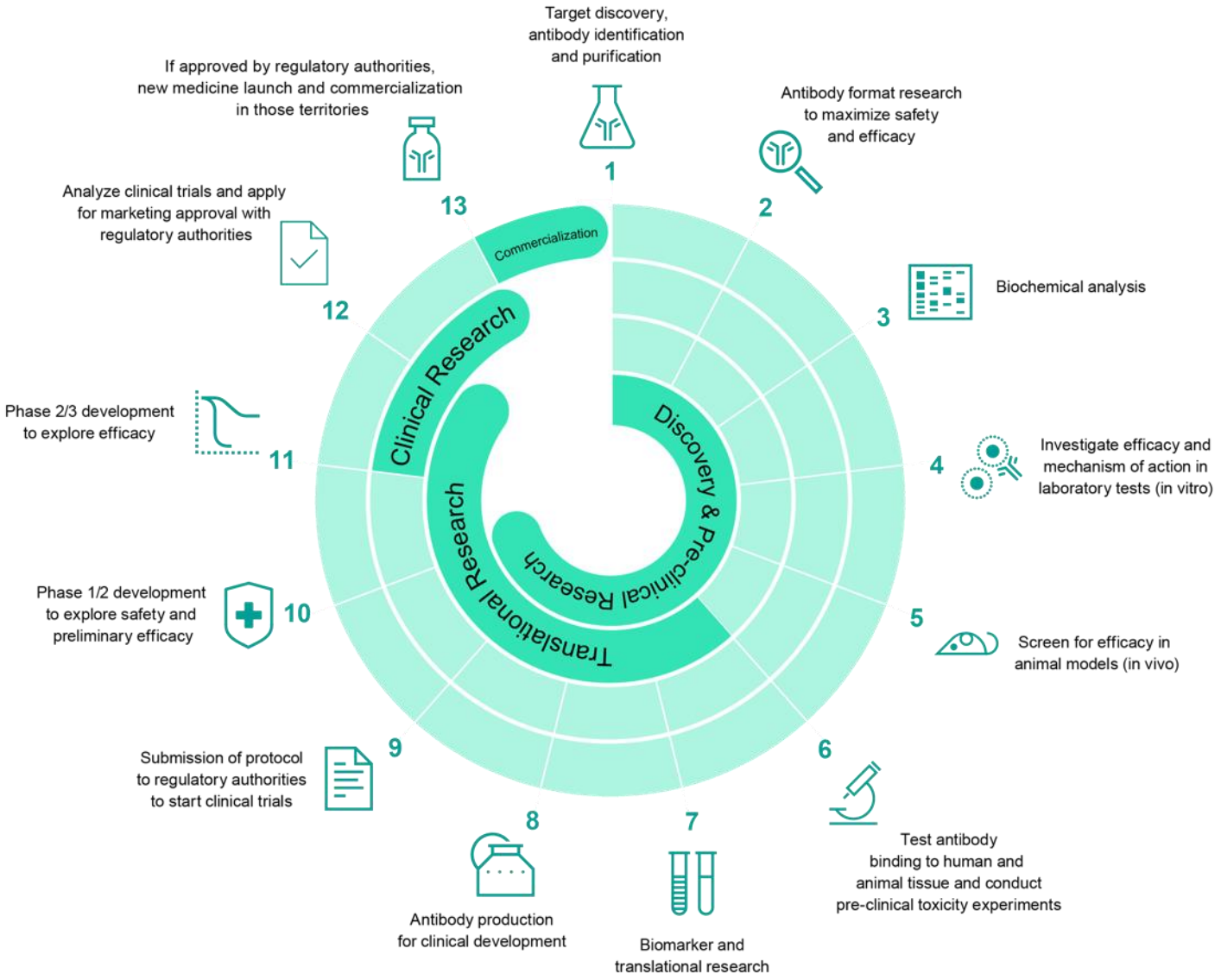
Opportunities for Belgian candidates

Genmab Process of Creating Therapeutic Antibodies



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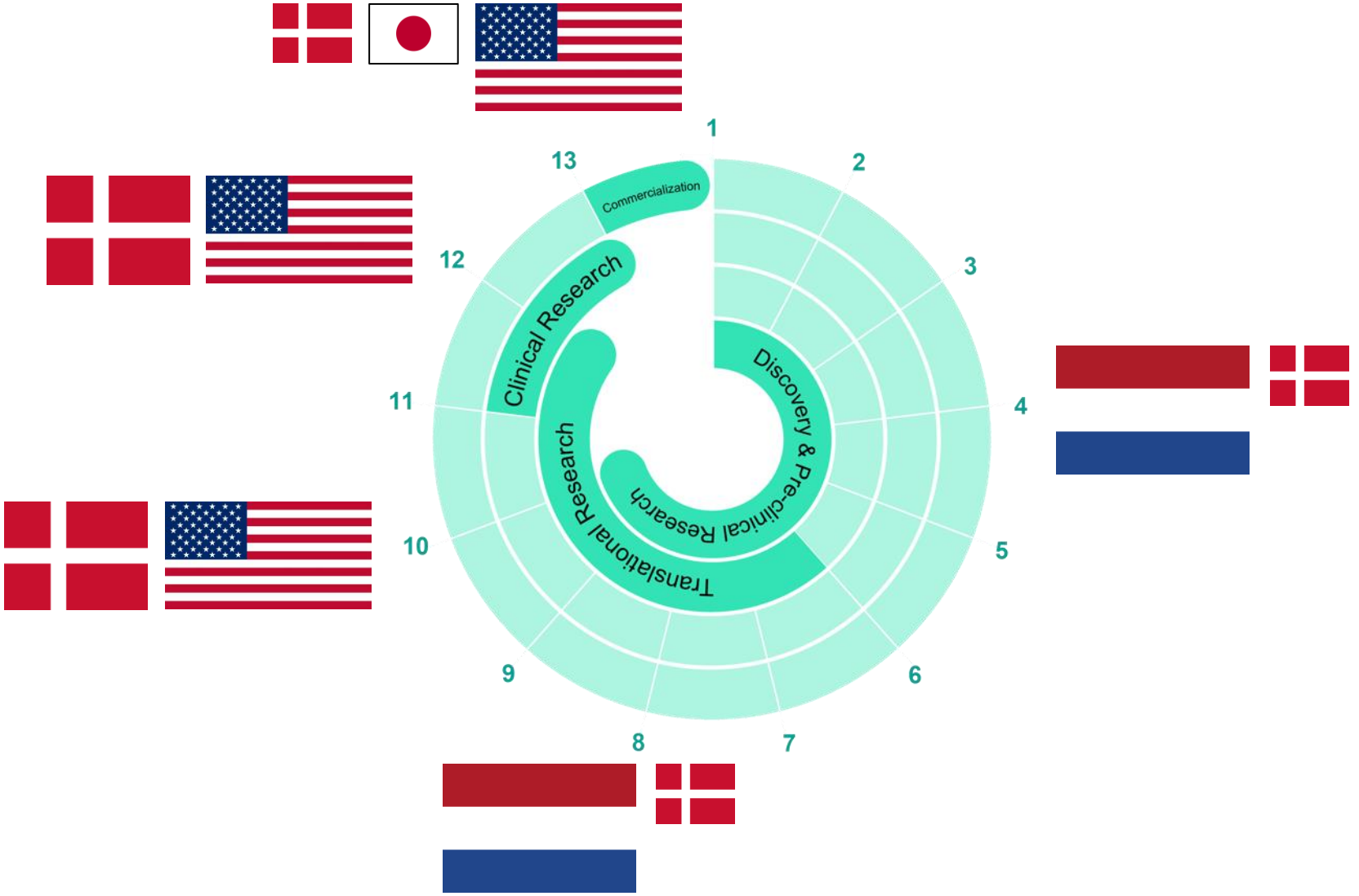
Genmab Process of Creating Therapeutic Antibodies



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Remote Workers from Belgium, since 2022

Currently 8 BE employees

- Data Science
- Biostatistics
- Clinical Data Mgmt

Hybrid (NL) vs Remote (BE)

- Work requires just a laptop?
- Hiring manager preference
- Location of stakeholders

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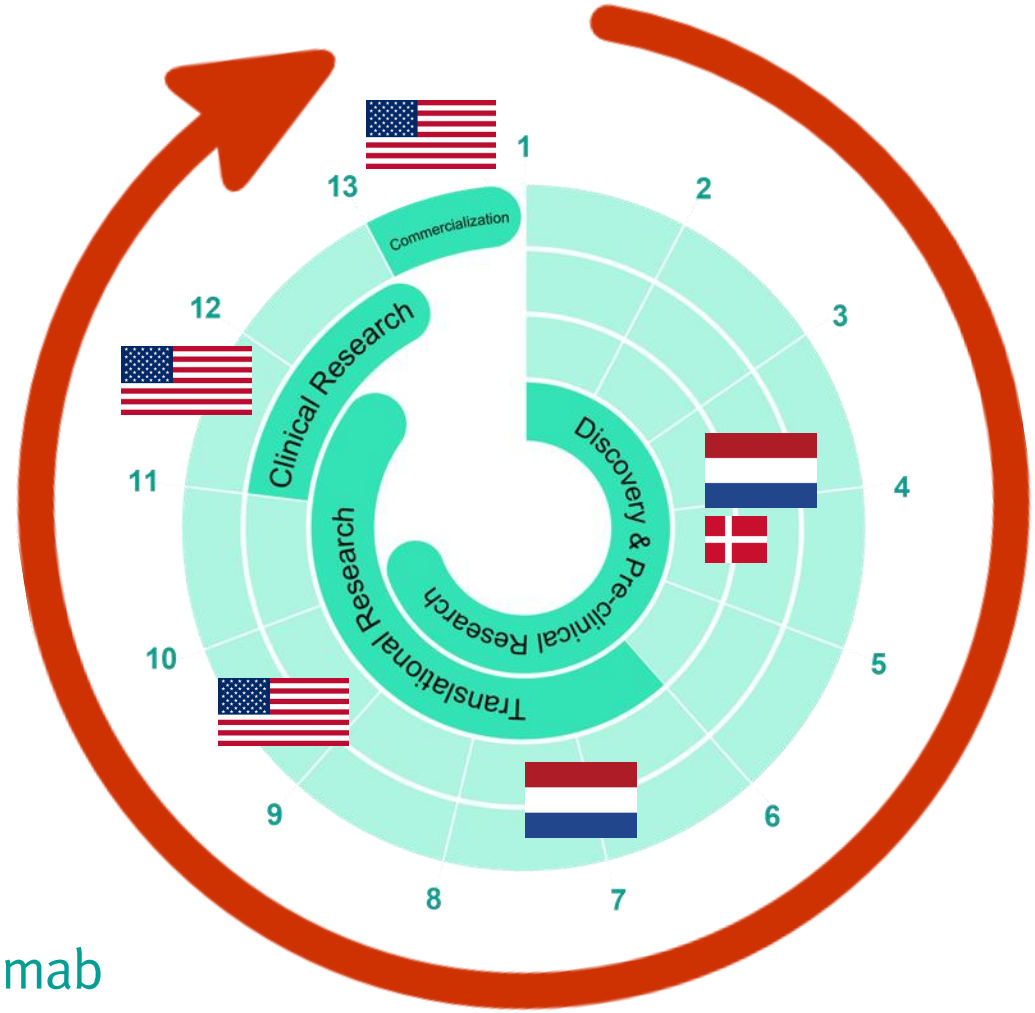
Discovery Data Science at Genmab

Genmab Process of Creating Therapeutic Antibodies

Data Science



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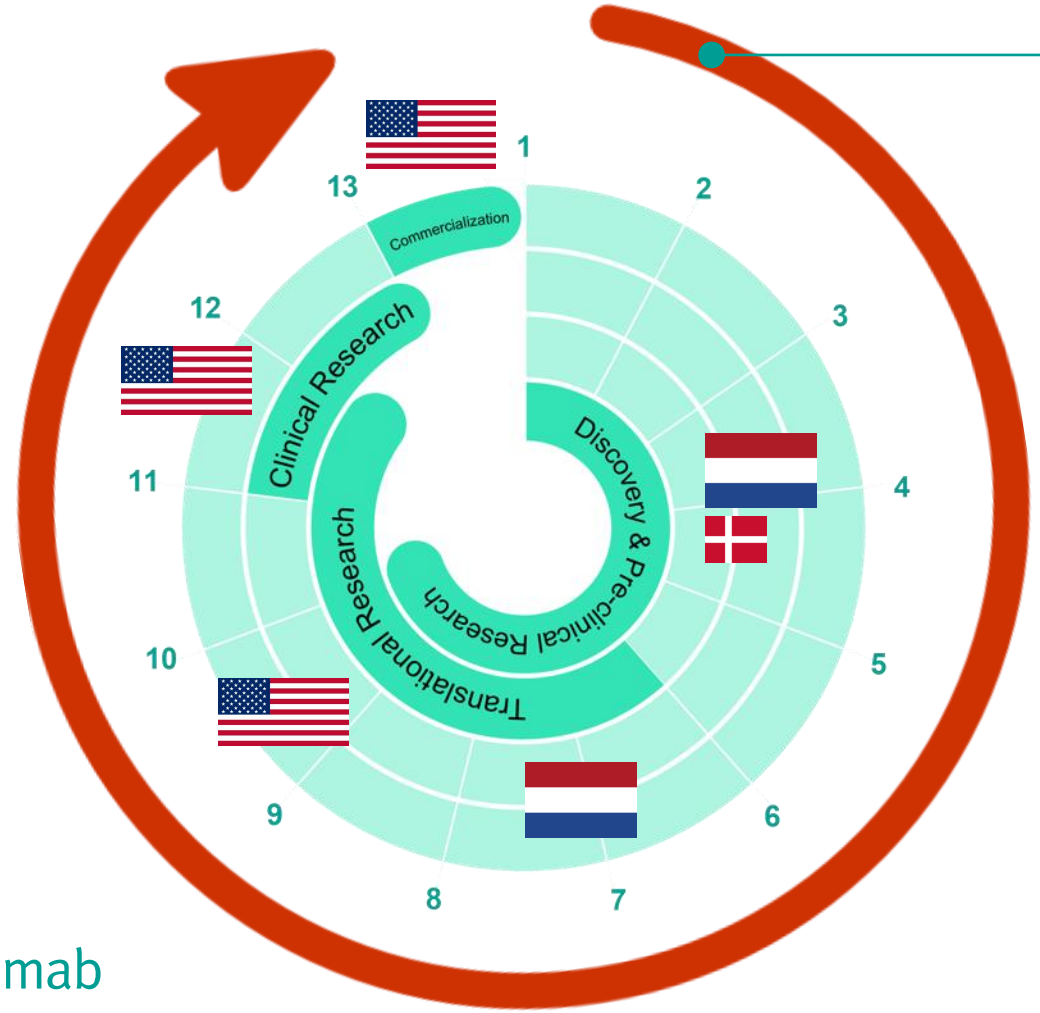
Genmab Process of Creating Therapeutic Antibodies

Data Science



Target Discovery Data Science

Identification of safe antibody targets given desired MoA

Top skills:
- *Transcriptomics*
- *Single-cell omics*
- *Functional genomics*

Focus on insight and scale, not preprocessing

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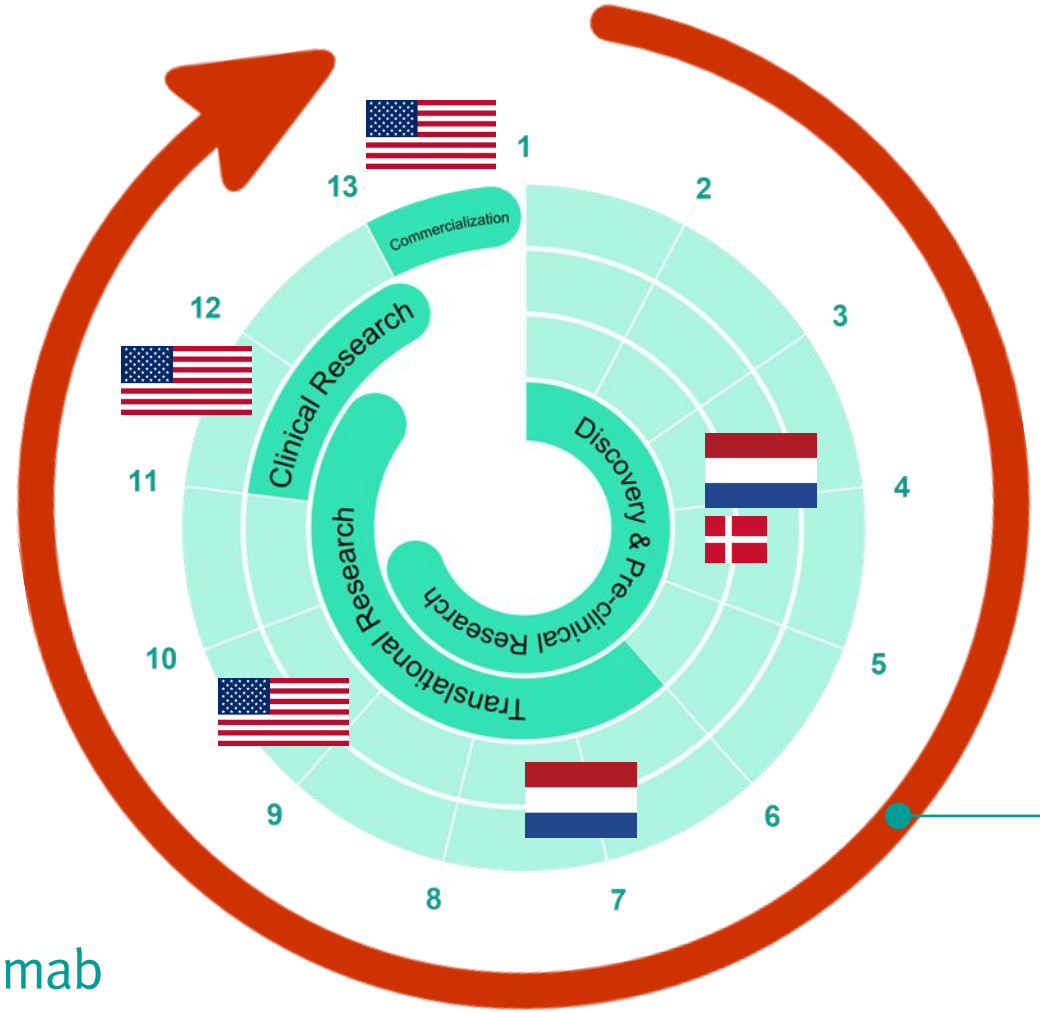
Genmab Process of Creating Therapeutic Antibodies

Data Science



Early Translational Data Science

Biomarkers, preclinical models, synergy, toxicity

Top skills:

- *Statistics*
- *Omics, including single-cell*
- *Dashboarding*

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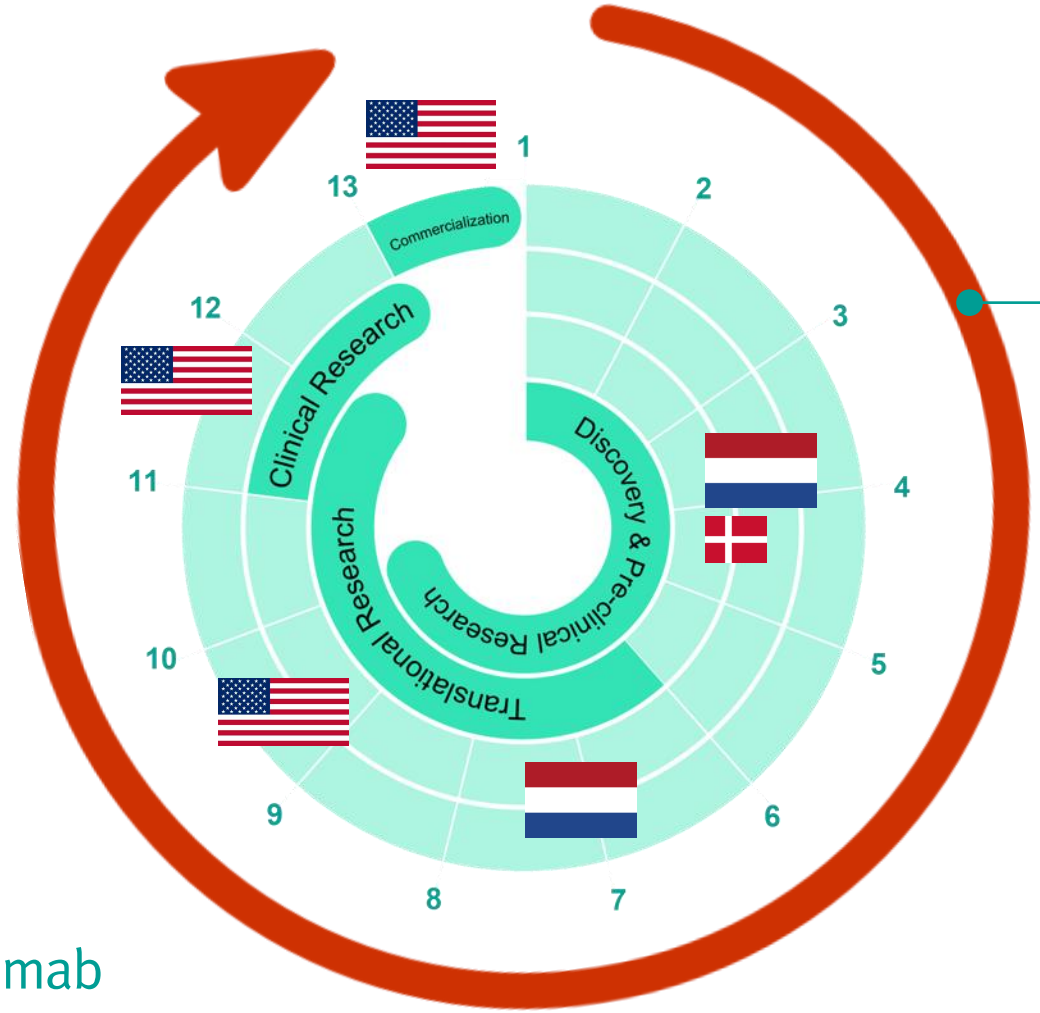
Genmab Process of Creating Therapeutic Antibodies

Data Science



Antibody Engineering Data Science

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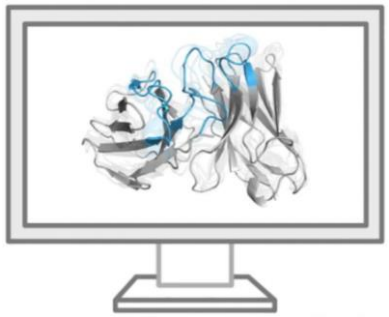
My Team: Antibody Engineering @ Discovery Data Science

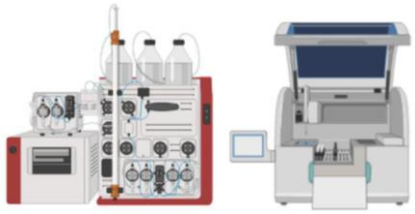
Data & Models

Sequence Models
(AI, Language Models)

Structural Models
(Physics- and AI-driven)



Assays
(Pooled display, Biophysical)



Predict

Application

Screening Libraries
(Binder Enrichment)

Manufacturing
(Yield, Stability)

Antibody Design
(Optimization, De Novo)

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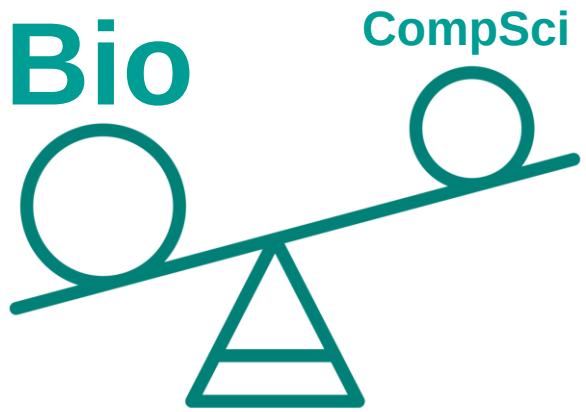
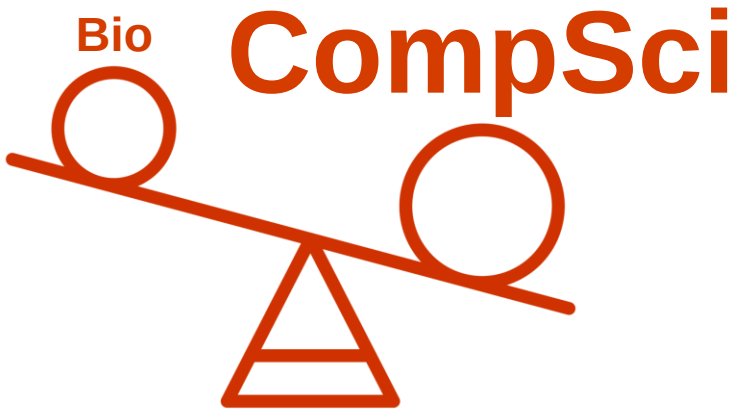
Early Discovery Data Scientists and Engineers at Genmab

Data Scientist



- Emphasis is on **getting insight** from data
- **Domain knowledge** is essential
- Apply suitable SOTA methods, as opposed to developing new methods
- Mostly bio degree + DS experience

Data Engineer



- Emphasis is on **automation** and scalability
- Domain knowledge is desirable but not essential
- Apply best **engineering practices**, but remain flexible to discovery needs
- Mostly CS degree + bio experience

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Discovery Data Science (Utrecht, NL): Open Vacancies

Director Data Science for Target and Product Discovery (R8065)

- *Manages large team of data scientists*
- *Responsible for strategy and connecting stakeholders*
- *Hybrid NL required*

Principal Data Scientist, In Silico Antibody Design (R7840)

- *Plans and drives projects*
- *Emphasis on bridging wet and dry lab*
- *Hybrid NL preferred, but open to remote*

Multiple Data Scientist and (Senior) Research Associate Positions

Coming 2024

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Data Science Department
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