



SciLifeLab possibilities in Drug Discovery & Development

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Director SciLifeLab Drug Discovery & Development

SciLifeLab as a government-funded national infrastructure



Max-IV

Next-generation synchrotron



ESS

European Spallation Source



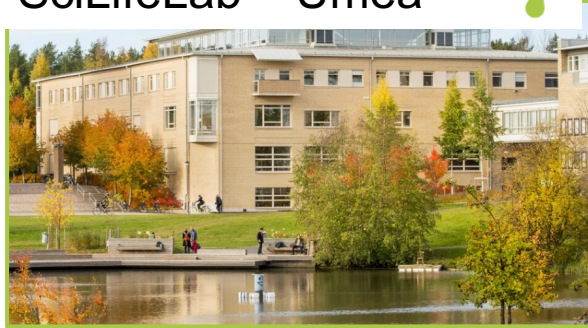
SciLifeLab

Molecular Life Sciences

New SciLifeLab national sites – Est. 2021



SciLifeLab – Umeå



SciLifeLab Uppsala (Navet)



SciLifeLab - Gothenburg



SciLifeLab Stockholm (CS)



SciLifeLab -
Lund



SciLifeLab – Linköping



Many faces of SciLifeLab

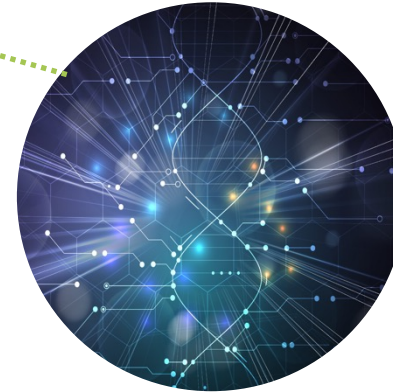


● Translation to healthcare & society

● Training: 3000 participants/yr

● Collaborations

● Recruitments



Infrastructure

10 technology platforms, >40 units
 >1400 users/yr, 3000 projects/yr
 ~ 500 tech experts

- Bioinformatics
- Cellular and Molecular Imaging
- Chemical Biology and Genome Engineering
- Clinical Genomics
- Clinical Proteomics and Immunology
- Genomics
- Drug Discovery and Development
- Integrated Structural Biology
- Metabolomics
- Spatial and Single Cell Biology



Research environment

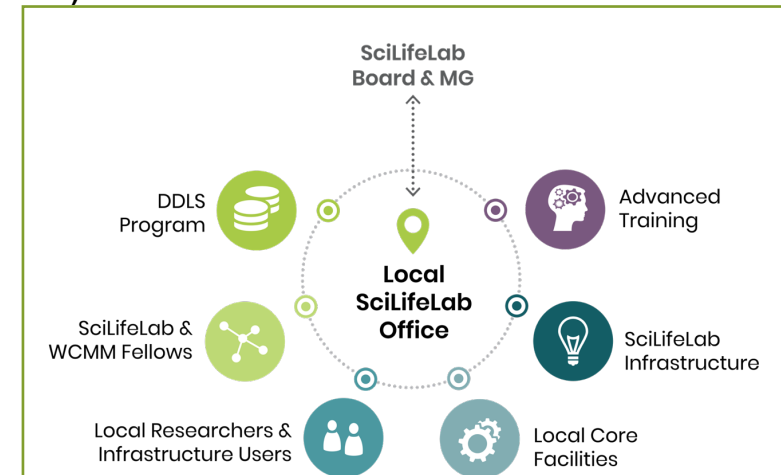
~ 1500 scientists

- 189 affiliated research groups
 - KI 32
 - KTH 47
 - SU 27
 - UU 83
 - Other univs
- Recruitment of 35 SciLifeLab Fellows
- 7 Research Community Programs
- 16 Technology Development Projects
- COVID-19 research program

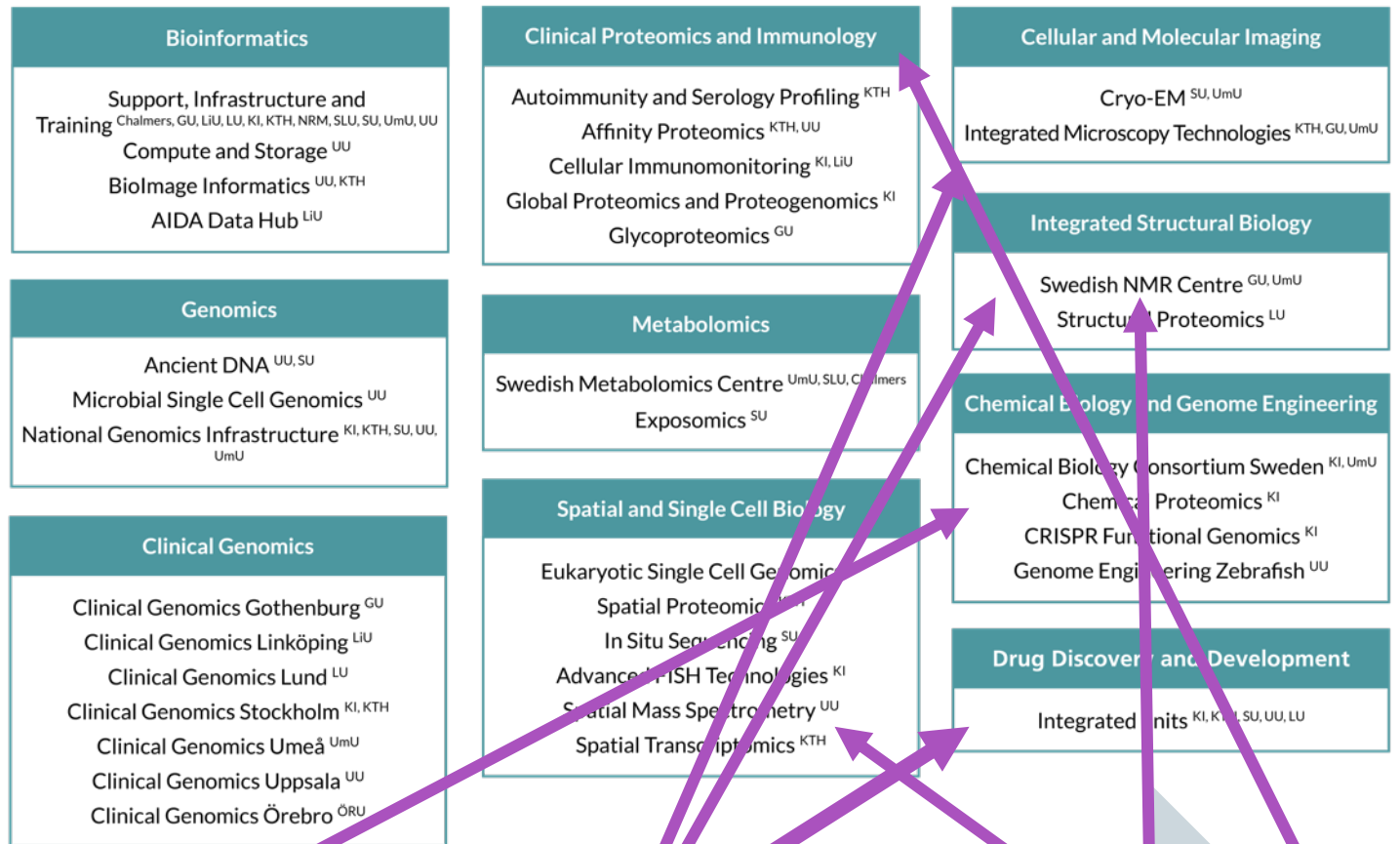
Data-driven life science

A new national 12-year 3.1 BSEK research program, funded by KAW (2021-2033).
 ~ 500 data scientists

- Data support (FAIR)
- Data analysis & AI
- 4 research areas
- Recruitment of DDLS Fellows
- Research and training
- Collaborations with WASP
- Industrial program

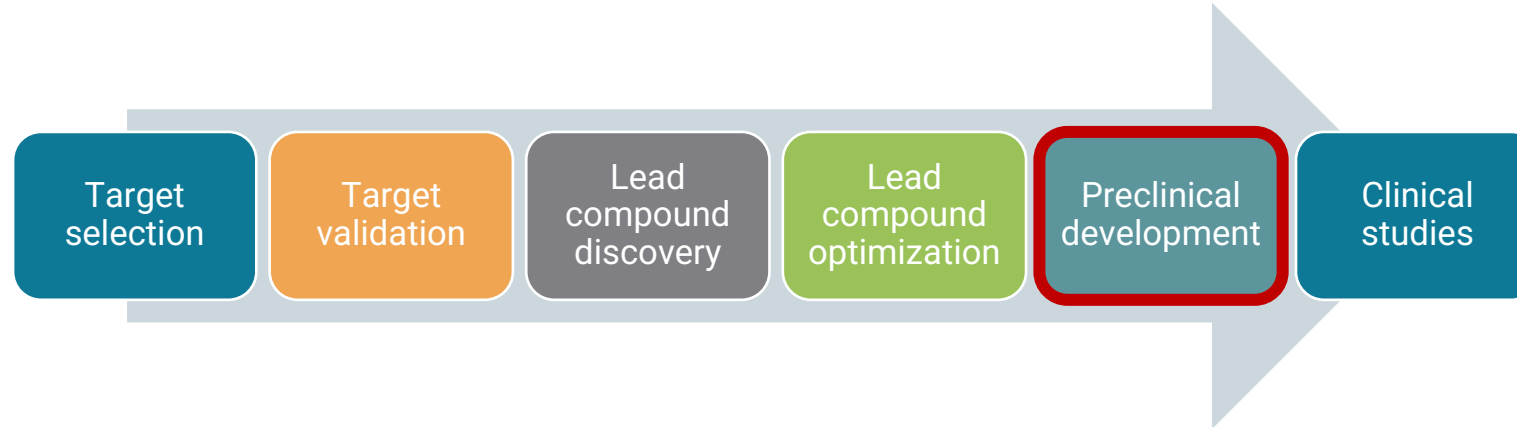


SciLifeLab infrastructure from 2021 - platforms and units





Swedish NMR Centre – New DNP-NMR



Astras nya utrustning – gör jobbet en miljon gånger snabbare

EkonomiDen ser ut som kombinerad värmepanna och kylskåp. Men den nya magnetutrustningen som Astra Zeneca och Göteborgs universitet nu investerar 40 miljoner kronor i kan analysera molekylstrukturer upp till en miljon gånger snabbare än dagens instrument.

– Den är unik för Skandinavien och kommer att hjälpa mycket forskning – från medicin till batteriteknik, säger Göran Karlsson på Göteborgs universitet.



Unit of Chemical Proteomics: Interactions with the Industry Sector

Types of interaction

- A. Projects for Industry (most interactions)
- B. Partnership with several industries in EU and Canadian calls for funding

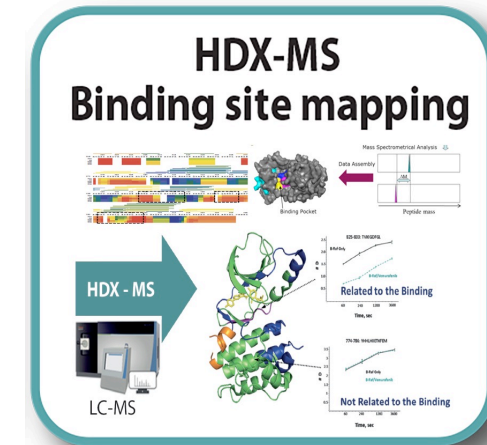
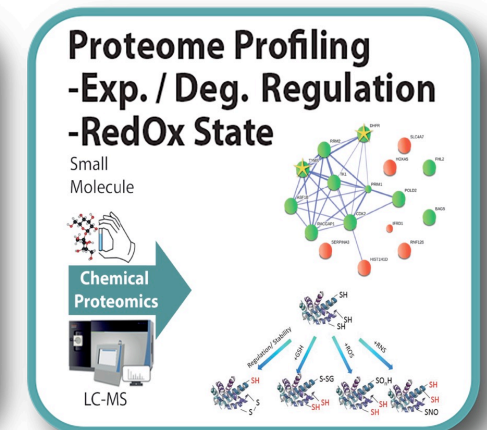
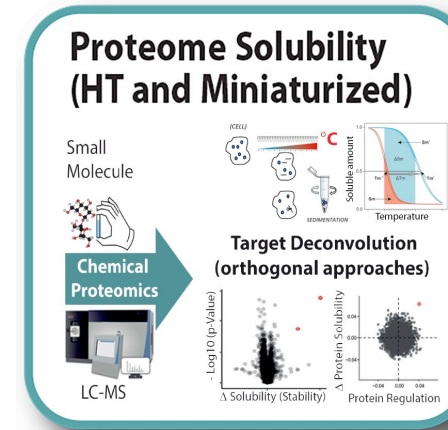
- A. Industry projects from a total of 6 different users from Industry:
 - 3 Swedish SMEs,
 - one EU big Pharma
 - one EU SME
 - one non-EU SME

Major questions answered

- TARGET DECONVOLUTION using MS-based proteomics, including off-targets
- MECHANISM OF ACTION ELUCIDATION of drugs / candidate drugs using MS-based proteomics
- Antigen-antibody EPITOPE MAPPING

Provided service

- ✓ PISA (Gaetani M. et al 2019) for deep, high throughput and proteome-wide thermal stability/solubility profiling, also with orthogonal proteomics approaches integrated with it.
- ✓ Whole pipeline from cells to data analysis provided.
- ✓ Hydrogen / Deuterium Exchange Mass Spectrometry (HDX-MS) for binding site mapping



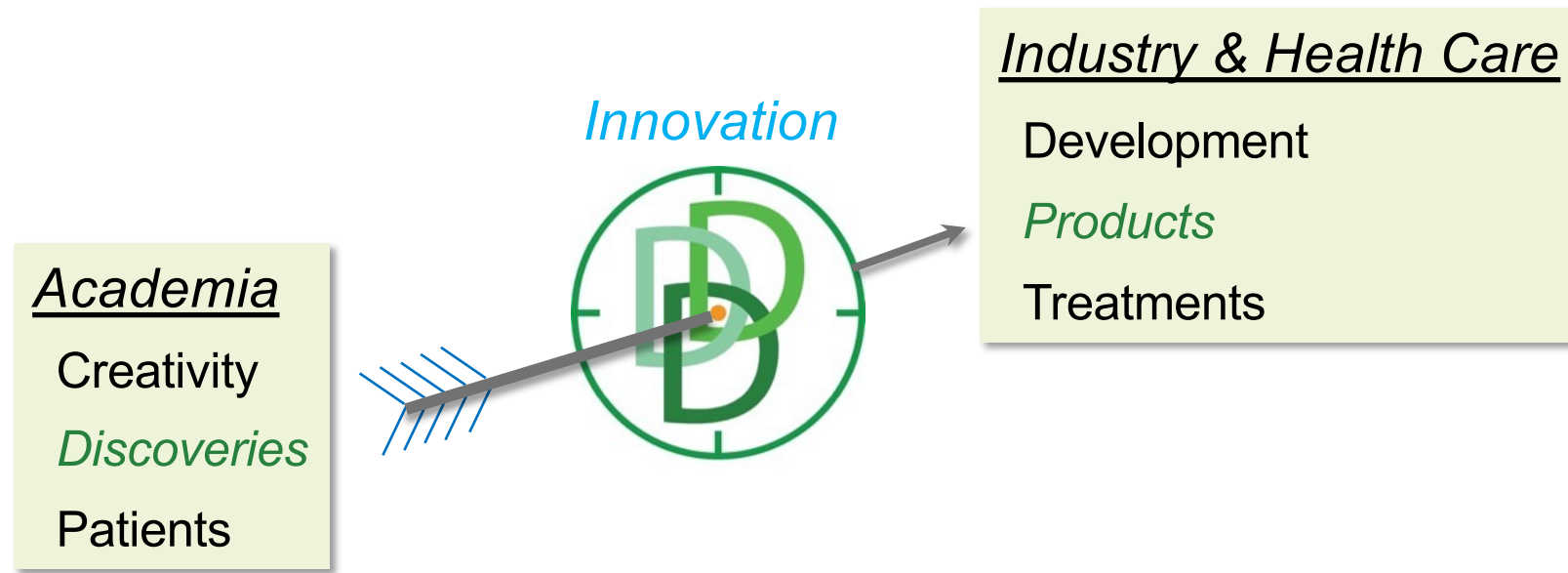


SciLifeLab DDD Mission

Separately funded capability within SciLifeLab with a specific task from the Government

Turn Academic Discoveries into Innovations

Provide State-of-the-art Drug Discovery & Development knowledge in Sweden

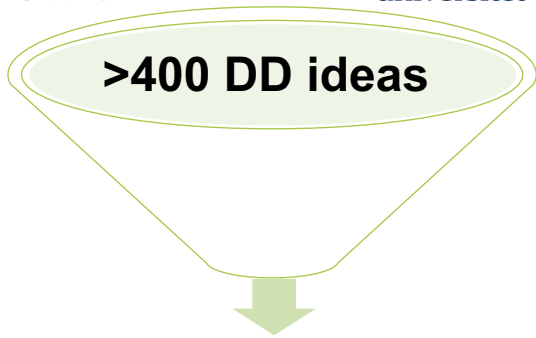


Drug Discovery with the best of both Worlds!



SciLifeLab DDD Objective

“Turn academic discoveries into innovations”



Validated DD programs
Exits: 2 Programs & 40 Service / y

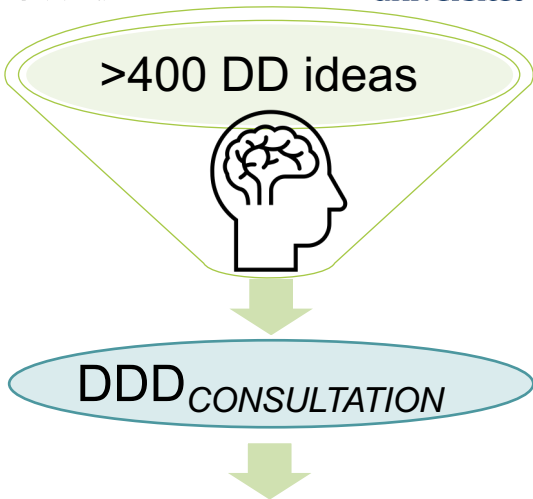
- 3 Clinical
- 4 Internationally partnered
- 5 Swedish biotechs (3 listed)



SciLifeLab DDD Capabilities



“Provide State-of-the-art Drug Discovery & Development knowledge in Sweden”



DDD_{PROGRAM}

DDD_{SERVICE}

HAND OVER



• Small molecules

- DECL – DNA encoded chemical libraries
- AI-enabled IT system
- Targeted Protein Degradation
- Massive virtual screening

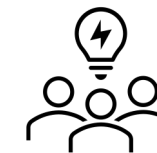
• Antibody therapeutics

- SciLifeLibs – phage display libraries
- Cell therapies
- Bispecific mAbs

• New modalities

- Conjugates

• Oligonucleotides



DDD_{COLLABORATIVE}

• Contractual ability

• Partnerships

- EUbOpen (IMI)
- ENABLE2 (VR)
- Conception (IMI)
- InnoPharma (Vinnova)
- Nevermore Covid (KAW)
- ...

Validated DD programs
Exits: 2 Programs & 40 Service / y

- 3 Clinical
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CBGE, Integrated Structural Biology, Cellular and Molecular Imaging, Metabolomics, Genomics, Bioinformatics, DataCenter, Etc.



SciLifeLab DDD Platform – 2022

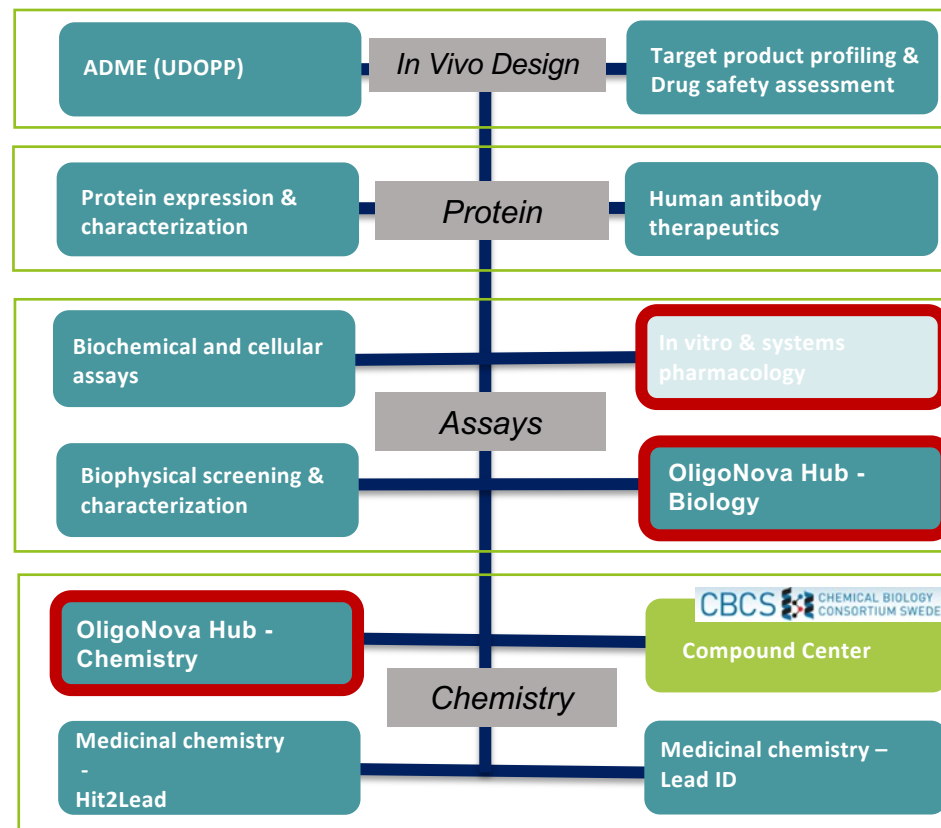


- 40+ Industrially experienced scientists
- 11 Platform Scientific Directors
– Area expertise and network
- National Platform Steering Group
– *Project prioritization, budget and strategy*

Håkan Billig (GU, Chair), **Lars Lannfelt** (UU), **Maria Jenmalm** (LiU), **Lars Ny** (GU), **Anna Sandström** (AZ), **Outi Vaarala** (Orion Corporation, FI), **Tomas Lundquist** (Pretzel Therapeutics)

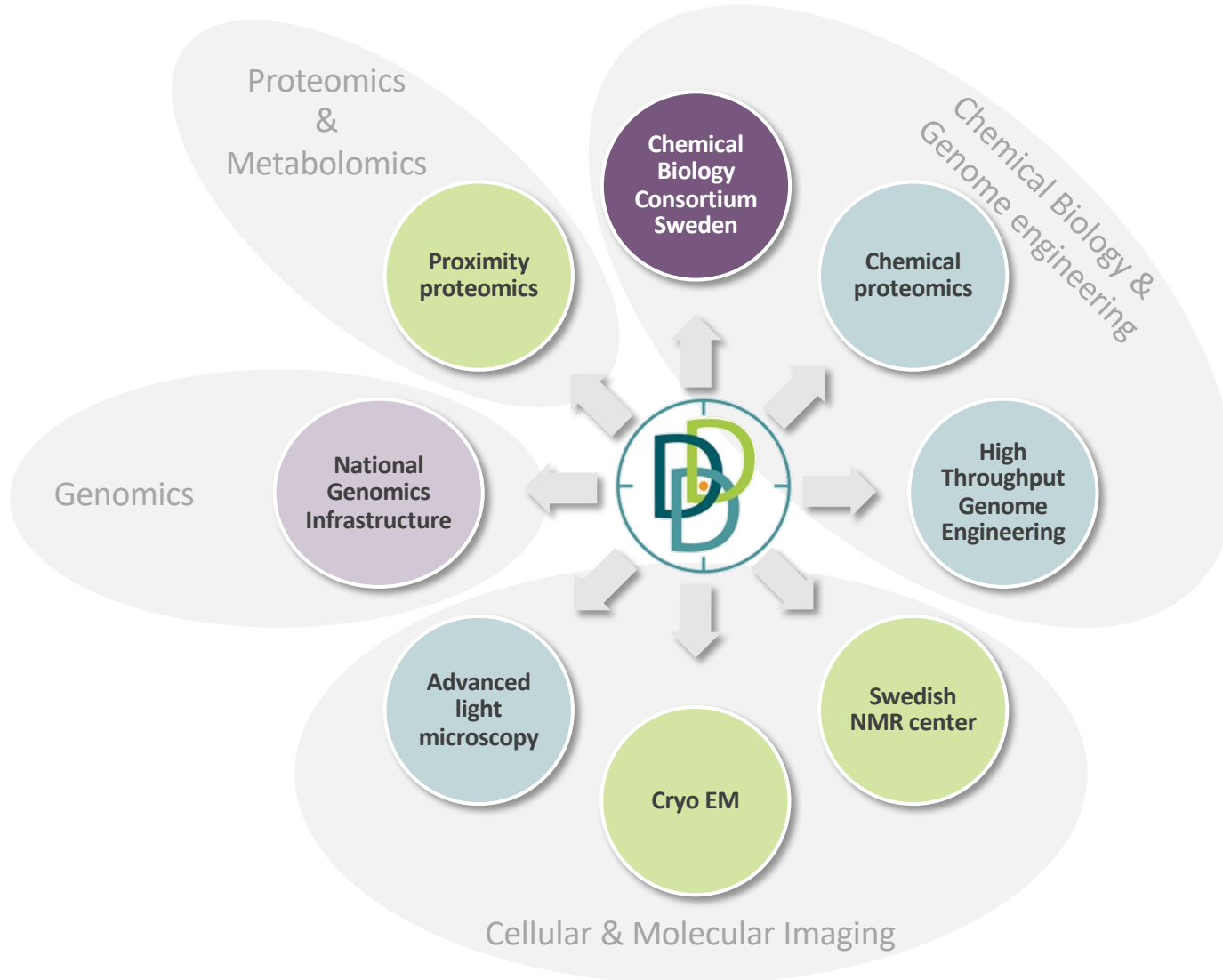
- International Platform Advisory Board – *Long-term strategic input*

Kjetil Taskén (Prof. Oslo Cancer Cluster, NO), **Fiona Marshall** (Head of global research Merck, US), **Justin Bryans** (Head of research LifeArc, UK), **Lorenz Mayr**, (Vector Biopharma, CH), **Lovisa Afzélius**, (Flagship pioneering, US)









DDD within SciLifeLab ecosystem



Color code

-  Shared infrastructure, Projects, Tech. Dev.
-  Collaboration through projects
-  Collaboration through Tech. Dev.
-  Collaboration through Projects & Tech. Dev.

Researcher makes separate applications to other facilities



From Exploration of Biology to Candidate Drug



Target Identification

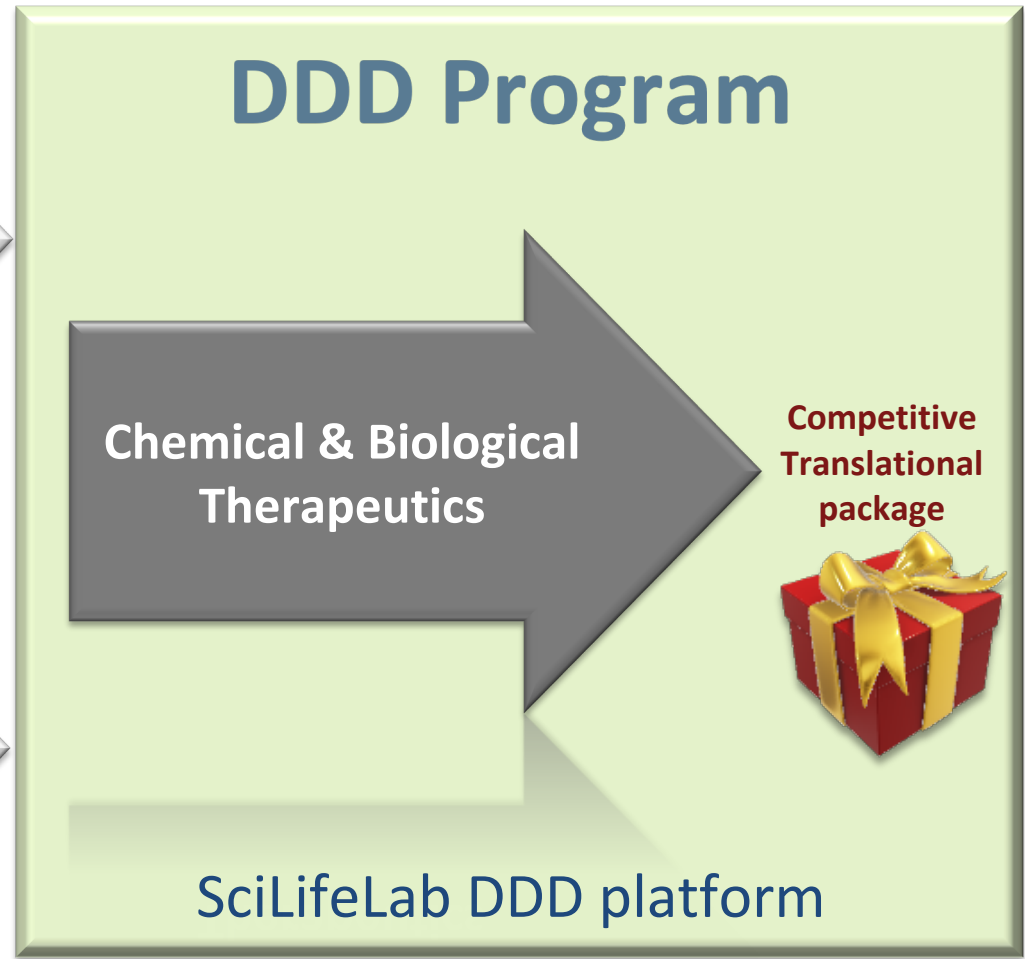
-OMICS & Academia



CBGE

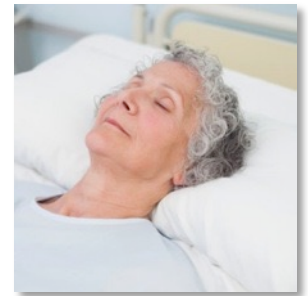
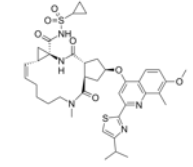
Explorative HTS & tool finding

CBCS, ELF & others



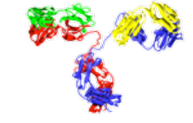
Additional Funding*

Med Chem optimization



Candidate Drug

Biologics production development

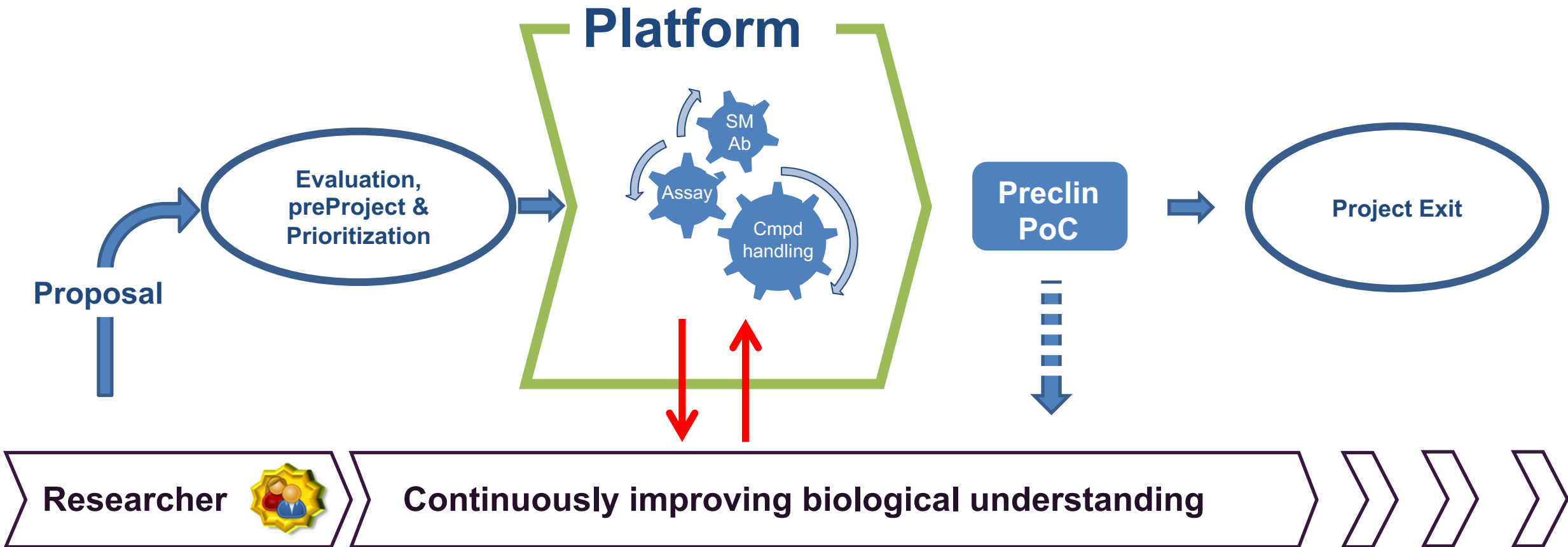


*Spin-out
Risk sharing



Combining Target biology & DD expertise

Industry standard drug discovery infrastructure and expertise for the Swedish academic community



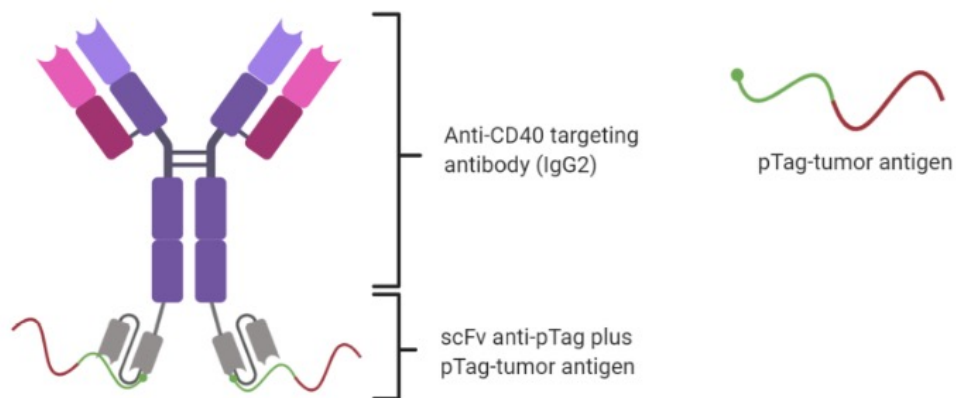
Researcher retains project & IP ownership



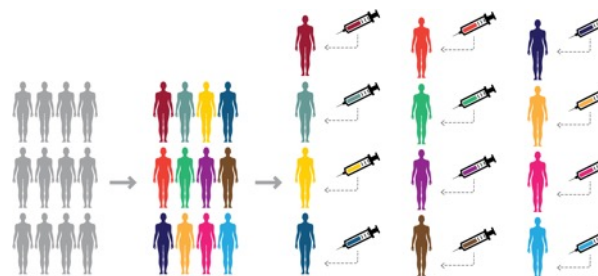
Example



Adaptable Drug Affinity Conjugate (ADAC) Technology



True personalized medicine by making T cells specific for the tumor - in the patient's body



Sara Mangsbo, UU
New Modality –
Technology platform for
Oncology and infection
National partnering 2021



Project Concept developed by Sara Mangsbo, Uppsala University

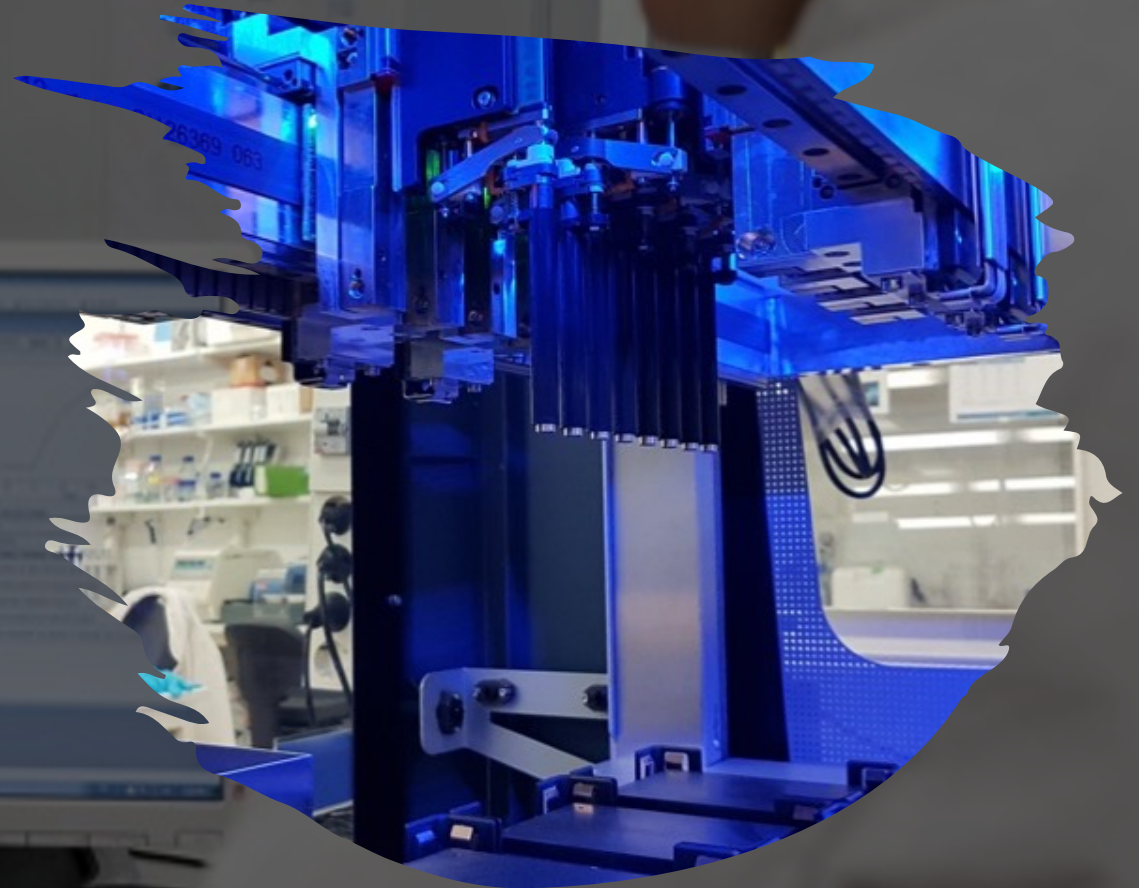
- Targeted peptide delivery
- Internalization and **cross-presentation** (harnessing the strength of the CD40 pathway)
- T cell priming and expansion in vivo
- Flexibility of cargo delivery - neoantigens an opportunity
- No toxicity, safe and simple SC administration
- Fast and cost effective production of individualized part of the drug

DDD contributions

- Design of bifunctional antibody
- Library design
- Identification, production and biophysical characterization of binders to CD40 and pTag from libraries
- Analysis of DMPK properties, bioanalysis and PKPD modelling
- Project coordination
- Coaching and networking

“DDD Industry pitch panel” – 1st attempt 2021

- Part of Vinnova funded “Innopharma project”
- Objective: Assure “customer/funder” perspective on DDD programs
- Present parties: Medivir, Oncopeptides, Eir Venture, AstraZeneca, SOBI, BII – one company had to cancel due to CDA conflict
- Outcome: Valuable technical and market feedback, large interests – multiple follow up discussion, interest from all parties to renew in 2022





Ways to interact



PROGRAM

- New assets for drug development / commercialization



COLLABORATIVE • Access to resources/instruments/technologies at DDD

- Longer term contracts based on full cost model & joint applications
- e.g. IMI programs, Vinnova, KAW Covid, ENABLE2, etc



SERVICE

- Access to spare resources/instruments at DDD

- Non-time critical access
- e.g. Access to separate facility competence & instrumentation, renting of personnel, etc



Infrastructure challenges for industry collaboration

- Contractual ability to access distributed infrastructure
- University had financial restrictions for doing “contract research”
- Limited available resources – “undanträngningseffekt”
- Universities are not ideal for flexible/temporary positions – i.e. need longer-term contracts to hire new personnel for full cost projects
- Universities 3rd mission not prioritized to the right level, e.g. legal support
- Vinnova funding for joint technology developments with 1-2 years duration would enable us to support start-ups without infringing EU regulations for state aid!