Helis Academy

Helis DAS Curriculum

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Helis theme "Data Analysis and Stewardship" (DAS)

The industry in Life Sciences is and will increasingly become a crucial piece of the economy for both Flanders and the Netherlands. Well trained individuals in the region are indispensable for the workforce, so the types of training available must be tailored to the needs of the surrounding companies. The volume of information and data will only increase as more developments are made in life sciences, a clear indication of the importance of data analysis and stewardship for companies. The Helis Academy has chosen data analysis and stewardship as one of their targets for training and broken it down to four specific topics: **omics data analysis**, **statistics**, **FAIR data stewardship,** and **machine learning** that are combined in the Helis Academy Data Analysis and Stewardship (DAS) pillar.

OMICS DATA ANALYSIS
Transcriptomics data analysis
Multi-omics integration

FAIR DATA STEWARDSHIP
Data management planning
Research life cycle

STATISTICS
Statistical thinking
Experimental design

MACHINE LEARNING
Visual analytics for genomics
Data mining
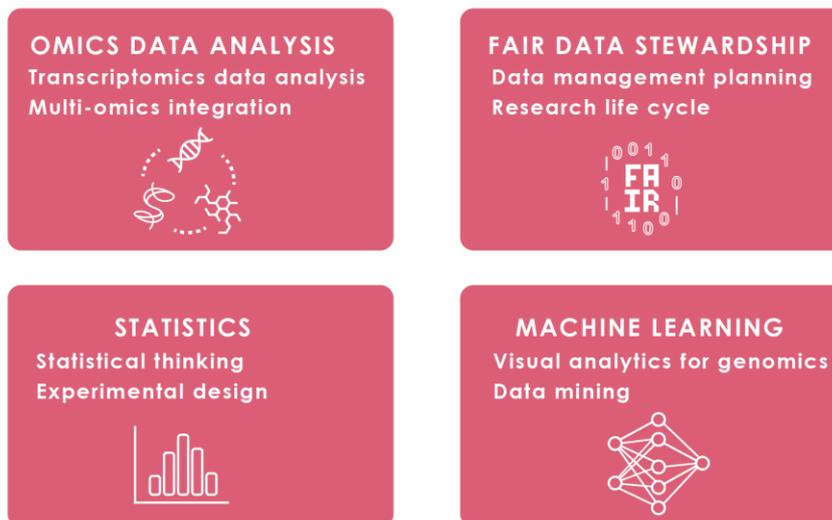
Omics data analysis facilitates understanding of processes in both healthy and diseased states in the human body. Through omics data analysis, targets for disease treatment can be found, making it a valuable tool for companies in life sciences. Companies also benefit from the knowledge of good statistical practices. **Understanding of statistical methods and the proper presentation of data** is critical for companies that will invest money in developing the outcomes from scientific studies. Further, **FAIR data stewardship** is necessary to ensure the (re)usability of data. Proper data curation, data preservation, and information on data provenance reduces costs of added experiments and allows the use of data for subsequent studies that may not have been considered at the time the data was collected. **Machine learning** is a valuable tool for spotting patterns in large data sets that would take humans years to sort through, making it a valuable tool when understanding the sheer volume of data available in life science fields.

Helis Academy Data Analytics & Stewardship courses fill the gap

To get clear insight in the training needs of the foreseen target audiences the following activities were performed.

1) FlandersBio conducted a Competences Need survey in 2016 which led to the Helis Academy project proposal.
2) Helis broad survey in WP3. To ensure industry relevance, a questionnaire has been sent to companies to inquire about their specific training needs.

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Helis Academy on-line survey for employers

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- In first year of Helis, finalized Spring 2019
- 37 companies answered
- performed by Helis partner Hyphen projects
- provided starting point for the 6 Helis themes

- For DAS theme:
  - estimated number of people to be employed the coming 5 year: 420
  - education level needed: Mainly MSc and PhD
  - areas: majority in Research
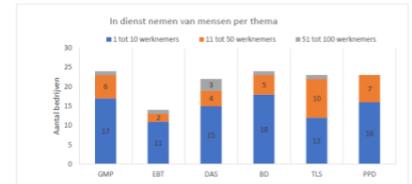
Figuur 9. Het opleidingsniveau, waar bedrijven die meer kennis nodig hadden over DAS, behoefte aan hadden.
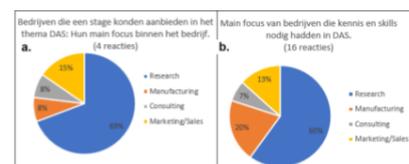
Figuur 10. De main focus van bedrijven die DAS-stages konden aanbieden of kennis en skills nodig hadden in DAS. A) Main focus van bedrijven die bereid waren DAS-stages aan te bieden. B) Main focus van bedrijven die behoefte hadden aan meer kennis over DAS.

3) Helis DAS specific activities related to gap analysis: In addition, we are actively reaching out to companies for interviews about their challenges and training needs and for an inventory of possible company trainers. VIB held 5 interviews with 5 companies and other stakeholders, DTL held 4 interviews. TU/e had a number of interviews in which also Helis Academy was discussed as well as several (3) specifically targeted towards (the DAS program of) Helis Academy.

4) Other specific activities from Helis DAS partners

   a) VIB Training survey 2018 and 2020
      In a survey conducted early 2018, several topics emerged focussing on Machine Learning techniques, advanced statistics and big data analyses. In 2020, a comparable survey resulted in the same focus areas reinforcing the selection of topics of the Helis Academy.
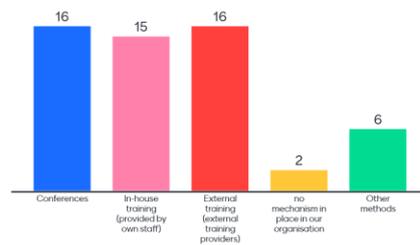
   - DTL/ELIXIR-NL Mentimeter session during ELIXIR-NL SME Forum October 2019
     - Companies experience challenge in recruiting in DAS themes

○ Companies have a mixture of training solutions implemented

Establishing the Helis DAS Course Portfolio

Target audiences for Helis DAS

The target audiences for the Helis DAS programme are professionals in life sciences and engineering, coming from different career stages (students, young professionals, PhD, postdoc) working in industry and academia.

The Helis DAS Course Portfolio

The specific courses organized by the 4 different partners are summarized in the table below and described in detail in these four documents.

1. VIB
2. DTL
3. UM
4. TU/e

Outreach and Dissemination

The Helis DAS team participated in the overall Helis outreach events (e.g. several BioCareer Event editions and the Closing Symposium Summer 2021). Details can be found in the Helis reporting.
In addition several DAS specific outreach and dissemination activities were organized (details can be found in the Helis reporting documents):

- Talk at BioSB Conference 2020, October 2020, by Rita Neves: "HELIS ACADEMY
- Data Analysis and Stewardship Training"
- Posters op BioSB Conference 2019
  https://drive.google.com/file/d/19f7jQMbrxHDdcmUVmkjw_fvoHb1RW-4I/view?usp=sharing
- 15 March 2021, Helis DAS Event on Upskilling young professionals in Data Analysis and Data Stewardship
- DTL: Helis Academy courses explicitly mentioned in all our training related presentations, for example:
  - Mijke Jetten, & Celia W.G. van Gelder. (2021, May 18). ELIXIR webinar: towards professionalising data stewardship. Zenodo. https://doi.org/10.5281/zenodo.4769858
  - Mijke Jetten, Celia van Gelder, & Rob Hooft. (2021, June 16). Dutch involvement in the ELIXIR data management project CONVERGE. Zenodo. https://doi.org/10.5281/zenodo.4963901
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DAS Closing Event Upskilling (young) professionals in Data Analysis and Data Stewardship

- March 15, 2021
- Virtual, hosted by VIB Hopin platform
- >60 participants
- Skills gaps in life sciences - 2 academic speakers and 2 industry speakers
- Introduction to each of the themes of the Data Analysis and Stewardship Pillar
- Introduction to the career tools RésuMe and SuitAbility
- Panel Discussion on the general outlook

●

Course	Host	Date	DAS theme	Target audience
FAIR data stewardship course Digital data scholarship for the life sciences	DTL	27-29 May 2019	Data Stewardship	Life science researchers and data stewards
Omics data analysis through data integration	VIB/UM	11-14 June 2019	Omics Data	Life science researchers
FAIR data stewardship course Digital data scholarship for the life sciences	DTL	4-6 November 2019	Data Stewardship	Life science researchers and data stewards
Statistical Thinking	VIB	3 March 2020 (1d)	Statistics	Life science researchers
Omics Data Analysis	UM	Apri 2020 (2 d)	Omics Data	Life science researchers and data stewards
Experimental Design	VIB	April and May 2020	Statistics	Life science researchers
Writing Data Management Plans and its RDM context	VIB	as of May 2020, e-learning	Data Stewardship	All academics
Workshop on Pathway drawing and analysis	UM	July 2020 (1d)	Omics Data	Life science researchers and data stewards
Automated Machine Learning	TU/e	16-Jul-20	Machine Learning	Students and young professionals in the Life Sciences & Health sector
Challenges in Omics Data Integration	VIB	8 & 9 October 2020 (2d)	Omics Data	Life science researchers
Deep Learning	TU/e	13-Oct-20	Machine Learning	Students and young professionals in the Life Sciences & Health
Omics Data Analysis with MOFA	VIB	15 & 16 October 2020 (1d)	Omics Data	Life science researchers
Research Data Management in Life Sciences	VIB	9 & 10 November 2020	Data Stewardship	Life science researchers
Process aware Data Mining	TU/e	26-Jan-21	Machine Learning	Students and young professionals
Statistics	TU/e	20 November 2020	Statistics	Students and young professionals
Deep Learning using CNN	TU/e	25-Nov-20	Machine Learning	Students and young professionals
Visual Analytics	TU/e	01-Dec-20	Data Analysis	Students and young professionals
Omics Data Analysis	UM	12-13 January 2021	Omics Data	Life science researchers
FAIR data stewardship course - Digital data scholarship for the life sciences	DTL	Feb 2021 (3d) (virtual)	Data Stewardship	Life science researchers and data stewards
Process-aware Data Mining	TU/e	26-Jan-21	Machine Learning	Students and young professionals
Omics Data Analysis	UM	12-13 January 2021	Omics Data	Life science researchers
Expert Pathway Curation Workshop	UM	04-Feb-21	Omics Data	Life science researchers in Rare Diseases
FAIR data stewardship course - Digital data scholarship for the life sciences (3rd edition)	DTL	March 2021 (6 half days, virtual)	Data Stewardship	Life science researchers and data stewards
Omics Data Analysis	UM	Apr-21	Omics Data	Students/Interns
Pathway Drawing and Curation in Pancreatic Cancer	UM	13-Apr-21	Omics Data	Life Science Researchers
Statistical Thinking	VIB	03-May-21	Statistics	Life science researchers
Experimental Design	VIB	15-May-21	Statistics	Life science researchers
Using MOFA for integration of omics data	VIB	25-May-21	Omics Data	Life science researchers
Deep Learning (2nd edition)	TU/e	May/June 2021	Machine Learning	Students and young professionals
Visual Analytics (2nd edition)	TU/e	May/June 2021	Machine Learning	Students and young professionals

Schedule

Full overview

13:00 - 13:10 Welcome

13:10 - 14:20 Skill gap in Life Sciences & Health in the industry
- "Future of Work in Life Sciences & Health sector": *Carmen van Vilsteren*
- "Prospects for Life Long Learning at TU/e": *Paul Koenraad*
- "Personalised healthcare: why data skills are crucial to get there": *Mariëlle Gallegos Ruiz*
- "Gut-feelings in data-driven decision making": *Uwe Thissen*

14:20 - 14:35 Introduction to Helis Academy
- "Helis Academy: Becoming industry-ready in Life Sciences": *Pascale Engelen*

14:35 - 15:00 Break & possibility of networking

15:00 - 16:00 Introduction to Data Analysis and Stewardship Portfolio
- FAIR Data Stewardship: *Celia Van Gelder*
- Statistics: *Alexander Botzki*
- Machine Learning: *Harold Weffers*
- Omics Data Analysis: *Lauren Dupuis*

16:00 - 16:20 Helis web-based tools: RésuMe & SuitAbility: *Rita Neves*

16:20 - 17:00 Outlook and Next steps
- Panel discussion moderated by Alexander Botzki
- Keynote speakers: *Mariëlle Gallegos Ruiz, Chris Evelo and Jeroen Wynen*

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Appendix: Contact details Helis DAS Partners

VIB
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