

Sustainable open-source research software by founding a start-up: A LinkAhead story deRSE24

Florian Spreckelsen

IndiScale GmbH

6 March 2024



LinkAhead: Looking Back

- ✓ LinkAhead Development since 2011 at MPI-DS (Göttingen) (Former name: CaosDB)
- ✓ Used in production since 2016
- ✓ Published as Open Source Software[1] under AGPLv3 in 2018
- ✓ Increasing prevalence since 2020
- ✓ Sample management, literature database, management of raw data, automation of data processing, laboratory automation, indexing and annotation of data lakes and repositories, ...



LinkAhead: Looking Back

- ✓ LinkAhead Development since 2011 at MPI-DS (Göttingen) (Former name: CaosDB)
- ✓ Used in production since 2016
- ✓ Published as Open Source Software[1] under AGPLv3 in 2018
- ✓ Increasing prevalence since 2020
- ✓ Sample management, literature database, management of raw data, automation of data processing, laboratory automation, indexing and annotation of data lakes and repositories, ...



[1] <https://gitlab.com/linkahead>

LinkAhead: Looking Back

- ✓ LinkAhead Development since 2011 at MPI-DS (Göttingen) (Former name: CaosDB)
- ✓ Used in production since 2016
- ✓ Published as Open Source Software[1] under AGPLv3 in 2018
- ✓ Increasing prevalence since 2020
- ✓ Sample management, literature database, management of raw data, automation of data processing, laboratory automation, indexing and annotation of data lakes and repositories, ...



[1] <https://gitlab.com/linkahead>

Challenges in the research group:

- Biomedical experiments, numerical simulations, and data analysis
- Experiments not easily repeatable
- Heterogeneous data: high-speed cameras, ECG, ultrasound, ...
- Vast, unclear parameter spaces and changing research questions
- Many large video files

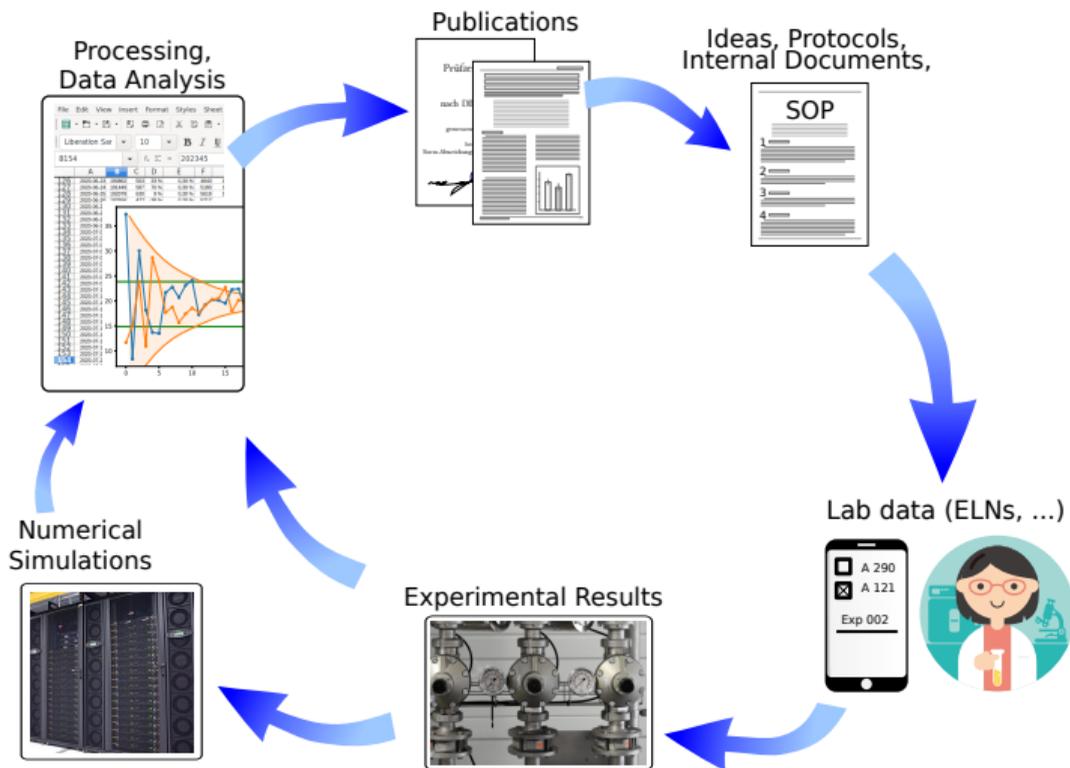
Challenges in the research group:

- Biomedical experiments, numerical simulations, and data analysis
- Experiments not easily repeatable
- Heterogeneous data: high-speed cameras, ECG, ultrasound, ...
- Vast, unclear parameter spaces and changing research questions
- Many large video files

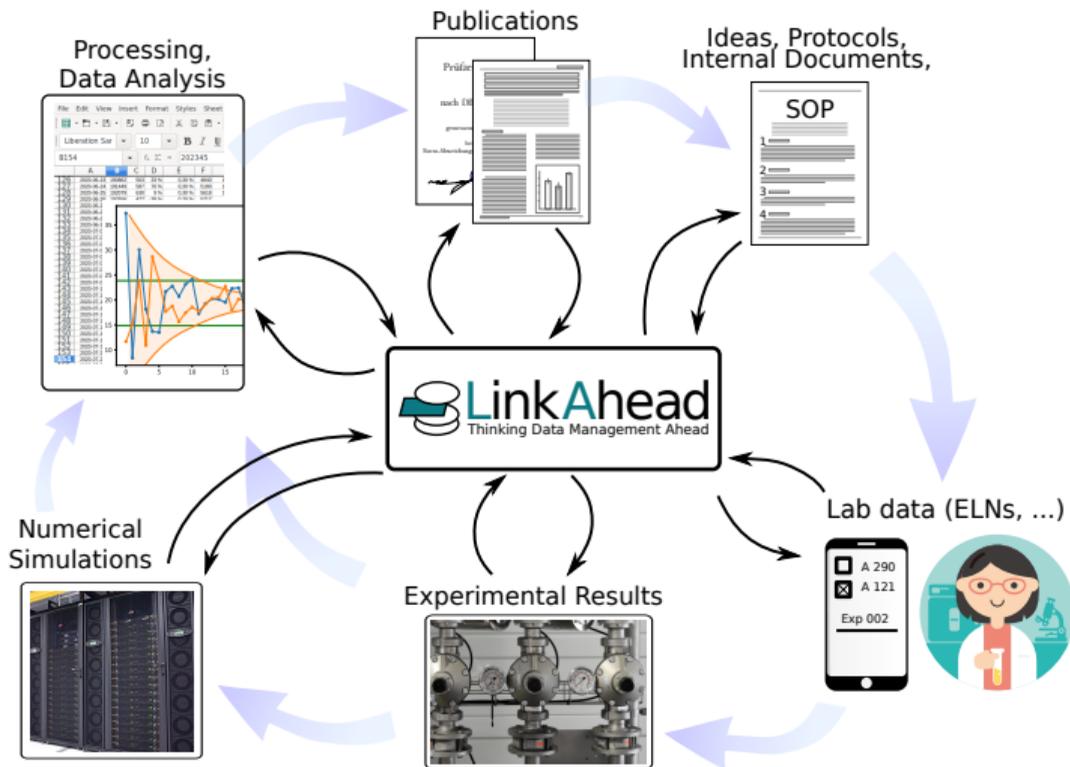
Addressed by RDMS LinkAhead

- Flexible datamodels
- Data remains on file system, linked to in RDMS
- Searchable references between entities
- Support for heterogeneous sources

LinkAhead in the Daily Research Routine



LinkAhead in the Daily Research Routine



Why was LinkAhead well-suited for founding?

- Relatively high level of professionalization

Why was LinkAhead well-suited for founding?

- Relatively high level of professionalization
- “product” rather than product idea

Why was LinkAhead well-suited for founding?

- Relatively high level of professionalization
- “product” rather than product idea
- Independence from the actual field of research: one instance in glaciology before founding, interest from groups from biomedical research, neuroscience, ...

Why was LinkAhead well-suited for founding?

- Relatively high level of professionalization
- “product” rather than product idea
- Independence from the actual field of research: one instance in glaciology before founding, interest from groups from biomedical research, neuroscience, ...
- A lot of programming expertise with ending/limited contracts in working group; threat of significant brain drain

- Initial attempt: (rejected) grant application

- Initial attempt: (rejected) grant application
- Good conditions in working group: other project with prospect of application

- Initial attempt: (rejected) grant application
 - Good conditions in working group: other project with prospect of application
- ⇒ project management know-how in group, especially one project manager with start-up experience and network

- Initial attempt: (rejected) grant application
 - Good conditions in working group: other project with prospect of application
- ⇒ project management know-how in group, especially one project manager with start-up experience and network
- Connection with and support (consulting, not financially) by Max Planck Innovation, SNIC (Südnieidersachsen Innovationscampus), Saarland Accelerator/Incubator

- Initial attempt: (rejected) grant application
 - Good conditions in working group: other project with prospect of application
- ⇒ project management know-how in group, especially one project manager with start-up experience and network
- Connection with and support (consulting, not financially) by Max Planck Innovation, SNIC (Süd-niedersachsen Innovationscampus), Saarland Accelerator/Incubator
 - Mentorship by CEO of Sernet: successful open-source software company in Göttingen

- Initial attempt: (rejected) grant application
 - Good conditions in working group: other project with prospect of application
- ⇒ project management know-how in group, especially one project manager with start-up experience and network
- Connection with and support (consulting, not financially) by Max Planck Innovation, SNIC (Süd-niedersachsen Innovationscampus), Saarland Accelerator/Incubator
 - Mentorship by CEO of Sernet: successful open-source software company in Göttingen
 - Founders stipends for two of the founders; 2 regional innovation awards for young start-ups

Why open-source?

- Plain and simple: LinkAhead made use of a lot of other open-source (GPL) software components

Why open-source?

- Plain and simple: LinkAhead made use of a lot of other open-source (GPL) software components
- Enthusiasm within developers and PIs

Why open-source?

- Plain and simple: LinkAhead made use of a lot of other open-source (GPL) software components
- Enthusiasm within developers and PIs
- Encouragement from mentor, Sernet as positive example

Why open-source?

- Plain and simple: LinkAhead made use of a lot of other open-source (GPL) software components
- Enthusiasm within developers and PIs
- Encouragement from mentor, Sernet as positive example
- Trend towards FOSS in Max Planck Society

The obvious:

- Lack of skills/experience in organizing a company ...

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

- Difficulties in public institutions to pay for FOSS

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

- Difficulties in public institutions to pay for FOSS

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

- Difficulties in public institutions to pay for FOSS
- (Possibly) competing interests: Customer experience vs. internal development goals



MITGLIED

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

- Difficulties in public institutions to pay for FOSS
- (Possibly) competing interests: Customer experience vs. internal development goals
- Establishing a community for an open-source project



MITGLIED

The obvious:

- Lack of skills/experience in organizing a company ...
- ... and marketing and sales
- acquiring customers

Maybe a bit less obvious:

- Difficulties in public institutions to pay for FOSS
- (Possibly) competing interests: Customer experience vs. internal development goals
- Establishing a community for an open-source project
- Expanding beyond academic research

- Competing interests: customers, users, internal development goals

New requirements: Project management and everyday work

- Competing interests: customers, users, internal development goals
- Balancing paid and unpaid work (documentation, performance, bugfixes)

New requirements: Project management and everyday work

- Competing interests: customers, users, internal development goals
- Balancing paid and unpaid work (documentation, performance, bugfixes)
- Efficiency: How do we prioritize? Meetings are expensive!

New requirements: Project management and everyday work

- Competing interests: customers, users, internal development goals
- Balancing paid and unpaid work (documentation, performance, bugfixes)
- Efficiency: How do we prioritize? Meetings are expensive!
- SCRUM + room for unexpected tasks

- Disclaimer: $N = 1$, less than five years

- Disclaimer: $N = 1$, less than five years
- But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers

- Disclaimer: $N = 1$, less than five years
 - But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers
- ⇒ much higher levels of professionalization and support

- Disclaimer: $N = 1$, less than five years
 - But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers
- ⇒ much higher levels of professionalization and support
- Working business model: services for FOSS

- Disclaimer: $N = 1$, less than five years
 - But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers
- ⇒ much higher levels of professionalization and support
- Working business model: services for FOSS
 - Designing our ideal working conditions

- Disclaimer: $N = 1$, less than five years
 - But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers
- ⇒ much higher levels of professionalization and support
- Working business model: services for FOSS
 - Designing our ideal working conditions
 - Challenges remain: Sales&marketing, Community building, ...

- Disclaimer: $N = 1$, less than five years
 - But also: Almost 5 years, increase from 3 to 7 employees, ≈ 20 customers
- ⇒ much higher levels of professionalization and support
- Working business model: services for FOSS
 - Designing our ideal working conditions
 - Challenges remain: Sales&marketing, Community building, ...
 - ... as well as expanding into industry and offering scientific programming services beyond LinkAhead



- ✓ Web site: <https://getlinkahead.com>
- ✓ Online demo: <https://demo.indiscale.com>
- ✓ Documentation: <https://docs.indiscale.com>
- ✓ Software repository: <https://gitlab.com/linkahead>
- ✓ Software paper in **Data**: <https://doi.org/10.3390/data4020083> 