Reproducibility and standards: ELIXIR Training Platform perspective

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www.elixir-europe.org
ELIXIR connects national bioinformatics centres and EMBL-EBI into a sustainable European infrastructure for biological research data.

ELIXIR underpins life science research – across academia and industry.
ELIXIR Membership

ELIXIR Members

Belgium  Czech Republic  Denmark  EMBL
Estonia  Finland  France  Germany
Ireland  Italy  Israel  Luxembourg
Netherlands  Norway  Portugal  Slovenia
Spain  Sweden  Switzerland  United Kingdom

ELIXIR Observers

Greece
ELIXIR Structure

Five technical platforms for Data, Tools, Interoperability, Compute and Training

Complemented by four Use Cases for marine metagenomics, rare diseases, human data and plants sciences
Training: Professional skills for managing and exploiting data

- Mission: provide developers, researchers and trainers with skills to use and exploit ELIXIR services
- Builds on and complements trainings in ELIXIR Nodes

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Training: Professional skills for managing and exploiting data

- ELIXIR Training infrastructure:
  - TeSS portal to share and exchange training content and events: [http://tess.elixir-uk.org](http://tess.elixir-uk.org)
  - E-learning platform and solutions
  - Large pool of ELIXIR trainers (Train the Trainer)
  - Good training practices and guidelines, including metrics and evaluation
  - Training events for researchers, developers, trainers and infrastructure operators
We need standards to

Describe Training related:

- Measures and metrics
- Events
- Materials
- Trainer competencies
Standardised measures - training quality, success & impact

1st step: Survey the community – identified descriptors in 3 categories

- descriptors for training programs
- quantitative metrics for individual training events
- questions for short-term feedback
Standardised measures - training quality, success & impact

1st step results - Some descriptors

• **quantitative data** - course program:
  • #events, #days, #participants, geographical spread

• **trainers’ quantitative data** - effort involved:
  • #trainers, #hours in preparation/delivery/post course

• **course ratings** - overall organization, course content, balance and level, evaluations of each day of the course

• **qualitative data** - capturing suggestions for improvements and additional training topics.
Standardised measures - training quality, success & impact

Next steps – descriptors of impact on

• **productivity and quality** – publications, citations, skills learned useful to the research, to validate results, data analysis shorter

• **career trajectory of the trainee** – hired, promoted, same job but accomplished better, new collaborations

• **career trajectory of the trainer** – efforts acknowledged or validated in job, hired, promoted, same job but accomplished better, new collaborations
Standardising the process

And then next steps:

• From the set of common descriptors – create a standard

• Define a mechanism to ensure and facilitate capturing this information from Nodes

• Best practices and guidelines on standard and capturing

• Seek commitment of the community to adopt the standard
ELIXIR TeSS Portal (Training eSupport System)

for browsing, discovering and organizing training events, courses and materials

https://tess.elixir-uk.org/
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Aims to give a snapshot of the ELIXIR training landscape

- automatically aggregating data from Nodes & 3rd-party providers
- making events & resources discoverable through useful filtering tools
- surfacing information to support user decisions & choices via training packages & workflows
- forming a resource network by linking data with other ELIXIR registries such as bio.tools and biosharing

Allows Nodes to contribute their training resources

- showcase latest news, events, activity highlights, etc.
TeSS driving development of standard for sharing training materials and events

Bioschemas

- improves data discoverability in life sciences by improving the exposure of our data repositories:
  - By search engines like Google
  - By aggregated portals like TeSS
- It does this by encouraging content providers in life sciences to expose consistent structured data in their websites by using schema.org mark-up.

In TeSS

- Describes all training events and materials using Bioschemas
- Parses, aggregates and integrates any Bioschemas compliant training resource metadata
  
Identifier, Title, Description, Author, Topics, Audience, Publication Date, ...
Bioschemas compliant metadata integration into TeSS
Competency profiles

• Standards to describe the knowledge, skills, values and attitudes necessary for a profession or a particular job role

• Initiated in ISCB

• Applying such profiles to define professionals and the identify training needs
We care for reproducibility

In Training related:
• Courses
• Materials
Insuring courses can be reproduced

Course materials (slides, exercises, datasets)
- Training materials annotated, findable in TeSS and reusable
- Hackathons: Metagenomics, Data carpentry, etc.

Clouds, virtual machine (VM) images and Docker
- Overcoming technical problems during courses
- Containers pre-installed
- Cloud platforms: more computing power and memory, scaling for running hundreds of simultaneous jobs

Distance learning
- Enable remote execution of a live course: teacher in one location and students on remote and distributed locations
Train the trainers - why

• Need for courses outweighs the number of places available, notably in NGS courses
• Life sciences expand into newer territories
• Need for bioinformatics competencies (and hence training):
  • well recognised
  • ability to provide such training - not yet well developed in all ELIXIR Nodes

New trainers are therefore required across both academia and industry
Train the trainers
Build a highly skilled and coherent community of trainers

- Tools and tips for providing an enriching learning experience to their trainees
- Guidance on course development
- Access to a wider support network, with a focus on ELIXIR-derived resources and infrastructure

Development
- Reproducible framework and associated material
- Guidelines for delivery of TtT courses
We are responsible for:

Scientists
Developers
Trainers

Training for Standards and Reproducibility

ELIXIR community and beyond
Courses - Data management and data stewardship

• Data-intensive analyses: data-management expertise is essential

• Scientists need to ensure that:
  • their experiments are reproducible
  • the resulting data ("data stewardship") are:
    • accessible
    • reusable
    • sustainable

• ELIXIR priority: providing solutions, best practices and training
ELIXIR Software and Data Carpentry programme

- Bring the model and format of Carpentry training to ELIXIR and its Nodes
- Several workshops organised within Nodes
- ~240 life science researchers and instructors trained
- First ELIXIR instructors received their certificates in February 2016
- Many more yet to come in collaboration with Software and Data Carpentry
Training in ELIXIR Nodes

- Reproducible research
- Experimental design
- Statistical analysis
Acknowledgements

Acknowledgements – Quality/Success/Impact

Acknowledgements - TeSS

Acknowledgements – Train the trainers

Acknowledgements


And many more, that I have certainly forgotten and I apologise in advance ....
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Over 160 institutes involved in ELIXIR

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