



ELIXIR Industry strategy

April 2016

Background

Industry usage of many key bioinformatics resources within Europe is high. Users of ELIXIR services range from large multinationals to micro-SMEs and cover fields including pharma, biotech, food and agriculture and blue biotech. These industries are major employers globally, generating wealth and supporting transformation to a knowledge-based economy.

The biomedical sector is worth €60 billion annually¹. The pharmaceutical industry alone directly employs over 700,000 people in the EU, generating three to four times more downstream jobs and contributing to a trade surplus of €80 billion². As a sector, the bioinformatics industry is forecast to be worth \$13.3 billion by 2020³. Europe is a rich breeding ground for biotech start-ups, with 1,799 healthcare biotech companies operating in Europe in 2012. The healthcare sector as a whole accounts for 8% of the total European workforce and for 10% of the EU's GDP⁴.

In the food sector, the EU was the top world exporter of food and drink products in 2012⁵, exporting \$98.7 billion (20.5% of world total) and importing \$85.9 billion (18.1%). Fish production in aquaculture is increasing on average 8.8% per annum globally⁶, driven by technological developments and better molecular understanding of species and parasites.

Industry itself sees added value in ELIXIR in terms of reduced costs and decreased duplication of effort, access to common

data and interface standards and much better public-private data integration. Many of these requirements are addressed through the general implementation of ELIXIR and are relevant for all users in industry and academia.

Given the number of research-intensive companies in Europe, and the increasing reliance within industrial R&D upon computational methods, stimulating innovation and supporting industry is a key priority for ELIXIR. Indeed, ELIXIR's Scientific Programme for the period 2014-2018 includes a Strategic Objective to "Support Innovation in 'big-data biology'"⁷.

The range of industry sectors that ELIXIR has the potential to support is also broad - from publishers to SMEs to HPC and cloud providers. ELIXIR's Industry Strategy aims therefore to be comprehensive in its scope, yet focussed and tailored enough to address the needs of each industry sector.

Understanding Industry's needs

In order to understand the needs of industry and ensure that proposed activities are fit for purpose, ELIXIR's Industry Advisory Committee⁸ provides high-level strategic advice on the activities included in this strategy. The ELIXIR Industry Advisory Committee's recommendation reports^{9,10}, map closely against the activities within this strategy.

ELIXIR's Industry Strategy responds to input from several other reports and analyses of industry needs. The ELIXIR Preparatory Phase Industry report¹¹, and a report entitled "Developing ELIXIR Interactions with Industry", commissioned in 2013 and carried out by ConnectedDiscovery, clearly articulates a number of key value drivers for

1 Chakma et al. NEJM, 2014. doi:10.1056/NEJMp1311068

2 European Federation of Pharmaceutical Industries and Associations: <http://www.efpia.eu/facts-figures>

3 Bioinformatics Market by Sector (Molecular Medicine, Agriculture, Forensic, Animal, Research & Gene Therapy), Segment (Sequencing Platforms, Knowledge Management & Data Analysis) & Application (Genomics, Proteomics & Metabolomics) - Global Forecast to 2020": <http://www.marketsandmarkets.com/Market-Reports/bioinformatics-39.html>

4 EC: Investing in Health 2013: http://ec.europa.eu/health/strategy/docs/swd_investing_in_health.pdf

5 FoodDrinkEurope, 2014: http://www.fooddrinkurope.eu/uploads/publications_documents/Promoting_an_EU_industrial_policy_for_food_and_drink.pdf

6 Sustainable agriculture, forestry and fisheries in the bioeconomy: <http://ec.europa.eu/research/scar/pdf/ki-01-15-295-enn.pdf#view=fit&pagemode=none>

7 ELIXIR Scientific Programme 2014-2018: https://www.elixir-europe.org/sites/default/files/documents/elixir_scientific_programme_final.pdf

8 ELIXIR IAC membership: https://www.elixir-europe.org/industry/understanding_industrys_needs

9 ELIXIR IAC's Summary Report 2016: https://www.elixir-europe.org/system/files/elixir_iac_meeting_14_january_2016_public_summary_report_0.pdf

10 ELIXIR IAC's Summary Report 2015: <https://www.elixir-europe.org/system/files/IAC%20meeting%20public%20summary%20report.pdf>

11 ELIXIR Preparatory Phase industry report: <https://drive.google.com/drive/folders/0B4W0Qq4hwmbOblJF1YyN1RkbUo>

both SMEs and larger companies. Some of the common themes identified were discoverability and interoperability of tools and data resources and the need for stable and sustainable archives.

Ownership of Strategy

Responsibility for coordinating ELIXIR's Industry strategy resides with the ELIXIR Hub as a deliverable of Work Package 13 in ELIXIR-EXCELERATE. However, ELIXIR Nodes will form a key part of implementing the strategy, not least through running services that are used by industry, hosting ELIXIR Innovation and SME Programme events and through their direct collaboration with industry. Indeed, a major objective of the Strategy is to ensure that industry is aware of and able to engage in the services run by ELIXIR Nodes.

As well as harnessing the strength of the Hub and Nodes structure, ELIXIR's Industry Strategy also seeks to ensure complementarity with the industry programmes already being run by ELIXIR Nodes, adding value where

possible and ensuring no unhelpful duplications emerge. Several ELIXIR Nodes have a clear objective to support industry. EMBL-EBI, as the European Node in ELIXIR, has a mature and effective industry programme, which includes membership from major multinational corporations. ELIXIR Netherlands, through DTL, operates as a public-private partnership with members from SMEs and publishing companies. ELIXIR UK has a priority to support the training needs of industry and has carried out surveys of requirements^{12,13}.

Implementing the Strategy

The Strategy contains five key Objectives. In order to deliver each Objective, a number of concrete, measurable Actions will take place. These Actions will have an owner within ELIXIR and will be subject to regular review against key metrics (to be developed throughout 2016 and later annexed to the Strategy).

- 1 Increase industry usage of ELIXIR resources and ensure that name is synonymous with quality*
- 2 Enable Open innovation by Europe's SMEs*
- 3 Build effective partnerships with key industry stakeholders and initiatives*
- 4 Ensure effective communication between industry and ELIXIR*
- 5 Support the bioinformatics training needs of industry*

Figure 1: ELIXIR Industry objectives

¹² ELIXIR UK industry survey results for wet lab scientists: <http://elixir-uk.org/industry-engagement/ELIXIRUKIndustrySurveyWetlab-scientists.pdf>

¹³ ELIXIR UK industry survey results for bioinformaticians: <http://elixir-uk.org/industry-engagement/ELIXIRUKIndustrySurveyBioinformaticians.pdf>

Table of Actions and Responsibilities

Objective 1: Increase industry usage of ELIXIR resources and ensure that name is synonymous with quality

ACTIONS	RESPONSIBILITY
Ensure ELIXIR services are of the highest quality and industry standard: support ELIXIR services in striving for continuous improvement	Supported through Software development best practices
Improve access to and interoperability of public datasets: Expose standard metadata for datasets and databases from key reference resources	Implementation Study (foreseen in 2016)
Develop indicators and recommendations for Core Resources: Engage industry in defining suitable metrics	Led by EXCELERATE WP3
Build picture of the scale and value to industry of public bioinformatics services: <ul style="list-style-type: none"> Develop case stories of impact and usage Run high-level ELIXIR/Industry/funder events such as Open Data in Action Engage industry in discussions around funding models and sustainability 	ELIXIR Hub through ELIXIR Communications Strategy Long-term Sustainability Working Group

Objective 2: Enable Open innovation by Europe's SMEs

ACTIONS	RESPONSIBILITY
Expand the reach and impact of ELIXIR's Innovation and SME programme: Run regular SME event in ELIXIR Nodes, linked to EXCELERATE Use Cases such as marine, rare diseases, plants, and areas of focus for ELIXIR Nodes	ELIXIR Hub in partnership with ELIXIR Nodes
Build lasting partnerships with SME associations, clusters and industry bodies through regular interaction with EBN, CEBR, EuropaBio and other bodies to showcase ELIXIR to industry and facilitate links to ELIXIR Nodes	ELIXIR Hub, supported by ELIXIR Node experts
Sharing best practice within ELIXIR on outreach to industry, including highlighting models for industry-academia collaboration and role of 'industry as an operator'	ELIXIR Capacity building programme and CORBEL Innovation Work Package ELIXIR Nodes

Objective 3: Build effective partnerships with key industry stakeholders and initiatives

ACTIONS	RESPONSIBILITY
<p>Lasting engagement with key Innovative Medicines Initiative (IMI) consortia and other European PPP's including:</p> <ul style="list-style-type: none"> • Collaboration with EFPIA around Data and Knowledge Management and the role for public archives in this • Joint collaboration with key IMI projects such as OncoTrack and non-IMI projects such as CTMM TraIT 	<p>ELIXIR Hub, ELIXIR Nodes and Implementation Studies</p>
<p>Engage publishers and build dialogue around referencing of sources: support moves to ensure data in publications can be linked clearly to relevant databases</p>	<p>ELIXIR Hub (closely linked to Implementation Study on Access to public datasets)</p>
<p>Collaboration with HPC and commercial cloud providers:</p> <ul style="list-style-type: none"> • Facilitate collaboration between ELIXIR Nodes and cloud and HPC companies such as Amazon Web Services, Google and ATOS • Support collaboration between cloud providers and the biomedical industry, particularly around data mobility 	<p>ELIXIR Hub and Compute Platform</p>
<p>Map ELIXIR-industry collaborations: collaboration with Pistoia Alliance on map of alliances and delivery of the BioSchemas project</p>	<p>ELIXIR Hub</p>

Objective 4: Ensure effective communication between industry and ELIXIR

ACTIONS	RESPONSIBILITY
<p>Expand the size of the Industry stakeholder mailing list and increase frequency and content of campaigns: ELIXIR Industry stakeholder newsletters</p>	<p>ELIXIR Hub</p>
<p>Expand ELIXIR presence at industry-related events and conferences : attend and present ELIXIR in relevant events and conferences - ELIXIR's Industry conference attendance plans</p>	<p>ELIXIR Hub</p>
<p>Build network of industry experts across ELIXIR Nodes to facilitate information sharing: current list of ELIXIR industry contacts</p>	<p>ELIXIR Hub and Nodes</p>

Objective 5: Support the bioinformatics training needs of industry

ACTIONS	RESPONSIBILITY
<p>Ensure visibility and discoverability of ELIXIR training courses to industry, for example:</p> <ul style="list-style-type: none"> • Training events communicated through Industry mailing list, ELIXIR Events Portal and TeSS • Ensure industry usage of TeSS for courses and materials (https://tess.elixir-uk.org) • Work towards defining an ELIXIR certified training 'Quality stamp' 	<p>ELIXIR Training Platform and Training Coordinator's Group</p>
<p>Perform gap analysis for training needs in industry:</p> <ul style="list-style-type: none"> • Survey industry partners in ELIXIR Member countries, using existing 'ELIXIR UK survey' as a basis and expanding to other countries • Define the training needs (including scope, content, target audience(s) and format) in industry (e.g. using the Training platform survey) and use that to help guide ELIXIR's Training strategy 	<p>ELIXIR Training Platform and Training Coordinator's Group</p>
<p>Improve the communication between training-related experts in industry and ELIXIR Training Platform:</p> <ul style="list-style-type: none"> • Communicate scope and vision of ELIXIR's training programme to industry • Build a liaison system for effective communication including, for example, an e-mail list for industry researchers interested in training 	<p>ELIXIR Training Platform and Training Coordinator's Group</p>