Guidelines to fill the BioData.pt/ELIXIR PT Impact Assessment Canvas

Impact assessment should be a group exercise, including all people involved in the impact pathway (i.e., the project or activity) being assessed. The group should brainstorm and write-storm, and finally write down their ideas on post-its and place them on the canvas. The post-its can be moved during the exercise if necessary.

The exercise should be carried out for one individual impact pathway, and should aim to assess impact from the vantage point of the organization.

The canvas contains the sections detailed and explained below, grouped by stages. The stages are intended to be filled sequentially, but this is not a strict requirement, and the group can come back to previous stages if needed.

Preliminary step: Defining the Impact Pathway

Impact Pathway: the process from inputs (eg. funding), **activities**, outputs, **outcomes** to **impact**.

The management unit or a stakeholder indicates which Impact Pathway, picked from table A in Annex I, is to be assessed.

Stage 1: General Information

1. **Project/activity:** the name of the project or activity that is going to be assessed (e.g. Cork Oak DB, Ready for BioData Management, GTPB, BioData.pt project...).
2. **Description:** the executive summary of the project/activity.
3. **Objectives/Mission:** Strategic objectives of the organization that will progress with this pathway (e.g. Become the reference long-term research infrastructure (RI) for bioinformatics and data management support for the academic system and the industrial sector, at the national level.)

Stage 2: Activities, Outcomes and Impact

4. **Activities:** Identify the activities to be carried out within the scope of the project/activity; these should be concrete activities, visible to the public and under full control of the organization. Number the activities to facilitate correlation with later steps of the exercise.

- e.g. “Data management course” is a good activity from the perspective of this exercise, “Planning data management course” is not, because it is invisible to the public

5. **Outcomes:** the short-term direct results of each activity identified in the previous point; note that an activity can have several outcomes, and an outcome may be shared by several activities; outcomes are not under direct control of the organization. Number the activities to facilitate correlation with later steps of the exercise.

    - e.g. “Course attendance” and “Participants acquire data management skills” are reasonable outcomes from the “Data management course” activity.

6. **Impact:** the transformative effects of the activity on its target audience and beyond, in the mid to long term; these are often related with the Objectives/Mission field, but it is also relevant to identify areas of impact that go beyond them.

    - e.g. “Increased adoption of the FAIR principles among Portuguese researchers” and “More Portuguese datasets published” are reasonable impacts from the “Data management course” activity.

Stage 3: Indicators

This section should be filled in with consultation of the table of indicators provided in the last section of this document. For each Activity/Outcome/Impact topic identified in stage 2, try to identify one or more indicators from that table that would be adequate to assess it. Distribute the indicator by the corresponding areas of impact. If necessary, given the specificities of the organization, new indicators/proxies can be developed.

7. **Indicators:** concrete measurable things that reflect the activities, outcomes, or impact and are organized by Areas of Impact.

    - e.g. “Number of courses delivered” is a reasonable indicator for the activity “Data management course”

    - e.g. “Number of people trained” is a reasonable indicator for the outcome “Course attendance”

    - e.g. “Number of Portuguese datasets published” is a reasonable indicator for the impact “More Portuguese datasets published”

8. **Areas of Impact:** Are defined in the socio-economics indicators table - Human Resources, Economy and Innovation, Society or Policy; note that scientific impact is not the scope of the impact assessment.

9. **Evidence:** the physical proof of the evidence

- e.g. “screenshot”, “report”, “graph”

10. **Methods:** the way indicators will be measured, including both instruments (e.g. “attendance sheet”), techniques (e.g. “counting”). Narratives are also acceptable if adequate.
    - e.g. “counting page views in google analytics”
    - e.g. “counting participants in attendance sheets”

References: RI-PATHS project, namely “Validated IA Model”, March 2020, RI-PATHS Consortium

Annex I

Table A: Impact Pathways

P1	Publication-citation-recognition
P2	Employment, operations and standardised procurement
P3	Employment, operations and standardised procurement
P4	Learning and training through joint development of instruments and tools
P5	Learning and training by using RI's facilities and services
P6	Training and higher education cooperation
P7	Interactive problem solution for the private sector (industry)
P8	Addressing societal and public sector challenges
P9	Provision of specifically curated/edited data
P10	Changing fundamentals of research practice
P11	Creating and shaping scientific networks and communities
P12	Promoting dialogue between science, society and policy
P13	Communication, outreach and engagement

Table B: Information about Impact Areas

Human Resources	a. Research jobs and career development Skills and career development of RI personnel, students (internships), young researchers, scientists, engineers; professional development (e.g. research management, transdisciplinary skills, communication and other 'soft/transferable' skills); b. Skills development for non-scientific staff and users Competence development outside of research and beyond the core curriculum; output of trained stakeholders; openness to other cultures, languages; c. Better working conditions[AH2] Better working conditions for students, researchers and auxiliary staff; social security, workplace safety/prevention of occupational risks, etc. d. Relationship capital and international collaboration

	Attraction of highly educated people from other parts of the world; international cross-recruitment; access to networks and international consortia; researcher and student alumni networks [creation of social capital – also can have impact at societal level]; e. Wider effects of new competences Some effects at the level of the human resources can be aggregated at the social/societal level, e.g. wider interest in and student retention in STEM study subjects, possible increase of scientific/technology vocations, increase of the overall educational level, etc.
Economy & Innovation	a. Industry Industry R&D and problem solution through the use of the RI; impact on suppliers (technology, goods, various services) and other local/national/international organisations (e.g. due to visitors and tourism); reputation and market position effects of suppliers; b. Labour market and productivity Job creation (e.g. highly-skilled, low-skilled, staff exchanges, etc.); productivity; more efficient processes (e.g. easier access to data, improved functionalities, savings through coordination); salary premiums; c. Innovation Transfer of knowledge/technology transfer; innovation in industry (also due to collaboration); spin-offs; increased commercial value and competitiveness through the development of new processes, improved quality, higher efficiency, wide-spread availability of components, equipment, technologies, methods, software, patents, licences; research efficiency; d. Impact on the local and regional economy Express impacts at geographical dimension - clustering of activities in the region (e.g. opening of adjoining research centres, universities and other organisations due to RI).
Society	a. New solutions, technologies, open access data and software for societal use New technologies, methodologies, instruments, treatments for application to citizens' everyday lives; long-term value of scientific discoveries and technological innovation; open data and software for the use of other organisations (industry, civil society); b. Knowledge benefits for society in different domains Knowledge for addressing societal challenges and contributing to reaching UN Sustainable Development Goals – SDGs (e.g. in health, food security, environment, cultural heritage, etc.); raising awareness of societal challenges; contribution to scientifically literate society; c. Public awareness and engagement General public understanding of the benefits of science; public engagement (e.g.

	through outreach, training of journalists, etc.); rational society (e.g. countering fake news); d. Environmental impact The ecological footprint of RIs (e.g. the reconstruction of brownfields as compensation of societally detrimental situations through investment); e. Cultural impact Cultural goods benefits for society such as contribution to art, movies, books that popularise science, etc.; in a long run, these cultural benefits lead to tangible economic value and more societal awareness about the benefits of science; f. Social inclusion RIs may contribute to social inclusion by integrating people with disability in their staff; adoption of practices for promoting gender equality
Policy	a. Policy, regulations, standards and institutions Evidence-based policy making; influence on R&D strategies, new standards, regulatory frameworks, data management policies; b. Science diplomacy Building international partnerships to address common problems; promotion of science as a priority in the international arena; c. Co-funding and sustainability Develop co-funding models with funders at local/regional/national/EUlevel; optimisation of research funding and ensuring strategic fit with the overall EU RIs landscape; creating models of RI sustainability; d. Ethics and trust in science Development of research ethical codes of conduct; guidelines for responsible research and innovation.

Table C: Example of Indicators by Impact Area

Impact Area	Indicator	Type of Indicator
Human Resources	Number of publications	Activity
	Number of publications weighted by impact	Activity
	Scientific collaborations with other RIs (joint projects)	Activity
	Number of persons employed by RI (FTE)	Activity

	Number of continuously employed scientists (local site and entire RI)	Activity
	Number and duration of stays of Post-Docs/Professors	Activity
	Number and duration of stays of M.Sc./Ph.D. students	Activity
	Number and duration of (non-scientific) internships	Activity
	Number and duration of (non-scientific) trainees	Activity
	Number of technical staff	Activity
	Number of administrative/ research management staff	Activity
	Number of training measures, by type of users	Activity
	Number of long-term higher education training programmes	Activity
	Number of higher education students trained within RI	Activity
	Number of conferences/seminars hosted/organised by RI	Activity
	Number of students from local universities using the RI	Activity
	First and second level citations for publications	Outcome
	Prizes won by researchers having worked at RI	Outcome
	Excellent collaborations (visits by world leading teams)	Outcome
	Satisfaction of people trained	Outcome
	Grants for trainees to follow RI trainings	Outcome
	Academic career advances: promotions within RI or after leaving	Outcome
	Academic career advances: salary increase within RI or after leaving	Outcome
	Career advances through administrative qualification	Outcome
	Career advances through technical qualification	Outcome
	Scientific attractiveness	Impact
	Increased Prestige as Training Facility	Impact
	Improvement of HRST (C) in region/country (Scientific)	Impact
	Improvement of HRST (C) in region/country (Technical/Managerial)	Impact
	Improved job opportunities in the region/nation	Impact

Economy & Innovation	Production capacities (of drugs, etc.)	Activity
	Number and Volume of regional (and total) suppliers	Activity
	Number, volume, nature of procurement, by supplier type	Activity
	Number of scientific instruments/infrastructures developed	Activity
	Number of software tools developed	Activity
	Number of applications to use data developed	Activity
	Research results fed into shared data sets/repositories	Activity
	Number of patents filed	Activity
	Number of non-patented technologies developed	Activity
	Number and Volume of collaborations with public sector	Activity
	Number and Volume of collaborations with industry	Activity
	Number of projects funded by industry	Activity
	Contracts with industry	Activity
	Joint technological developments with industry	Activity
	Co-patenting with companies	Activity
	Number of firms/private companies using facilities (for testing, etc.), by type	Activity
	Number of students working in enterprise and using RI	Activity
	Uptake of accessible data sets/instruments/tools outside RI (in science)	Outcome
	Uptake of accessible data sets/instruments/tools outside RI (by firms)	Outcome
	Business usage of RI information (e.g. via browser)	Outcome
	Firms using a novel technique or procedure	Outcome
	Number of patents licensed	Outcome
	Number of non-patented technologies licensed	Outcome
	Patent citations	Outcome

	Stimulation of technology diffusion	Outcome
	Number of spin-offs created	Outcome
	Number of spin-offs surviving to date	Outcome
	New tax payers: employees living in the area for > 3 years	Outcome
	(Local) expenditure of RI, employees & visitors	Outcome
	Added value of RI-owned patents and other IP	Impact
	Corporate efficiency gains through use/application of RI data	Impact
	Technological impact: Number of new technologies and designs	Impact
	Market creation impact: triggered sales volume	Impact
	Market expansion impact: increased sales volume	Impact
	Market expansion impact: increased revenues	Impact
	Increased economic activity in the region/nation	Impact
Society	Number of visitors at RI, by type	Activity
	Number of school classes/university courses visiting	Activity
	Number of promotional events, exhibitions, fairs	Activity
	People reached and engaged in outreach activities	Activity
	Public awareness: visitors on website and followers on social media	Activity
	Hosting of (high-level) scientific events	Activity
	Visits to (high-level) scientific events	Activity
	Number of scientific users	Activity
	Use of open data (access and download)	Outcome
	Satisfaction of scientific users	Outcome
	Public awareness: engagement of RI in social media/press/online media	Outcome
	Public awareness about taxes going to RI	Outcome
	Inclusion of topics in schools and academic curricula	Impact
	Improvement of wellbeing: Health & Ageing	Impact

	Contribution to public sector challenges: Administration & governance	Impact
	Contribution to environmental sustainability: Energy & Waste issues	Impact
	Contribution to social sustainability: CSR, Social Inclusion, Culture	Impact
	Contribution to Gender balance	Impact
Policy	Presence of RI in relevant thematic committees	Activity
	Presence of RI in relevant standardisation committees	Activity
	Presence of RI in relevant committees that define scientific norms	Activity
	Participation of RI in local/ regional networks (e.g. clusters)	Activity
	Participation of RI in exchanges with relevant policy makers	Activity
	Provision of databases in support of public policy	Activity
	Provision of expert advice in public policy	Activity
	Provision of empirical data in support of public policy	Activity
	Contracts with public sector (specific region or country)	Activity
	Uptake of RI input in committee discussions	Outcome
	Uptake of RI input in political discussions	Outcome
	Success rate of funding grants from national/supra-national sources	Outcome
	Success rate of follow up funding applications at project level	Outcome
	Uptake of new topics proposed by RI as funding sections	Outcome
	Increased trust in science	Impact
	Notable changes in relevant regulations	Impact
	Notable changes in funding decisions	Impact
	Notable changes in policy decisions	Impact

References: RI-PATHS project, namely "Validated IA Model", March 2020, RI-PATHS Consortium