NOTE #13

Technical Assistance in the STARBIOS2 project

By Giovanni Caiati and Claudia Colonnello

RRI IMPLEMENTATION IN BIOSCIENCE ORGANISATIONS

GUIDELINES FROM THE STARBIOS2 PROJECT

Andrea Declich with the STARBIOS2 partners

STARBIOS2 project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 709517.

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In the STARBIOS2 project, Technical Assistance (TA) has been a service provided by the STARBIOS2 Consortium as a whole to help the Core Teams in carrying out their individual Action Plans (APs). TA has been implemented by a dedicated team of people external to the individual Core Teams composed of social researchers with experience in RRI, in project management, and in structural change initiatives.

More specifically, the support provided by TA has been aimed at **helping the Core Teams to drive the APs successfully** from the detailed design phase to completion. The **specific objectives** of the TA were to:

- **Support the implementation** of the activities and overcome emerging problems and issues
- **Reflect upon the AP activities**, results and reactions, and on this basis provide advice for developing a strategic approach in order to orient such activities toward the goal of structural change
- **Promote mutual learning** from other similar experiences inside the Consortium, in Europe and worldwide and, in general, improve the quality of their actions.

The TA activity is, by its nature, a reflexive and participatory exercise. In the STARBIOS2 project, it began with a reflection on the TA Team contribution to the life of the AP. Such reflection was presented and discussed with the AP Core Teams and, once their feedback was collected, was adopted as a general framework within which the TA played its role. TA started by considering three methodological lines.

a) **TA team as a "liminal" agent** – between outsider and insider. In fact, the TA team was an "outsider" since it was not part of the organisations where each AP was taking place. At the same time the Technical Assistance was part of the STARBIOS2 project and this made the TA team an "insider". This situation informed all the work of the TA team, which was not directly implied in and kept abreast of all the dynamics (resistances, drivers, institutional mechanisms) that characterized the research organisation implementing the APs. On the other hand, because it shared the same goals of the Core Teams, the TA team was in the position of providing advice, suggestions and observations, free from the biases deriving from being an insider of the research institution where the AP was taking place. This particular position helped the TA team in being accepted as an "assistant" by the AP Core Teams.

b) **TA as a bridge between the AP and other experiences** (inside and outside the project). The TA team was composed of social scientists, researchers and experts in RRI, Structural Change, Gender in science, Education and socialization of scientific research. Nevertheless, it was impossible to cover all the expertise related to the implementation of the APs that are wide in scope (the 5+1 keys of RRI) and whit diverse national background; for this reason, the TA acted not only on the basis of its own expertise but also as a bridge with expertise developed in all the APs (and those existing within their institutions), with the international partners (covering the experiences from outside Europe), and with other experiences and projects (on RRI or on each of the 5+1 keys) present in Europe. This was particularly useful for the implementation of APs within bioscience organisations in which, obviously, an internal expertise and specialization in RRI and social science was not prevalent (indeed, various AP Core Teams included also social scientists with experience in RRI; but nevertheless, they were composed mainly by bioscientists operating within bioscience research organisations).

c) **TA as a "non-invasive" action.** TA activities had to deal with the time constraints that the APs were facing since they were very ambitious in terms of tasks and activities to be carried out. In this framework, it is to be considered that the Core Teams were composed of researchers, professors, PhD students, etc. that have many research, institutional and teaching-related duties beyond the implementation of the APs. In order to cope with this situation, from the beginning the TA approach has stressed the quality of AP Core Teams time spent interacting with the AP Core Teams, over the quantity of interactions. This has meant a careful preparation of the meetings, their scheduling in advance (as far as possible), recording of what was said in feedback sheets, and having a dedicated space and time for the team without other interruptions.

In practice, the main areas in which the assistance to the APs took place are described below.

- Area 1: support the **APs design and reporting activities**. In this area fall all the activities that are related to designing and revising the AP, as well as the reporting activities foreseen in the project. The effort of the TA in these actions was at two levels. At a first level, TA supported the AP Teams to deliver the plans or the reports in time and in good shape. At the second level TA facilitated the use of these occasions as opportunities for reflection and for ensuring a strategic use of the AP. All the plans and reports delivered by the 6 AP teams followed an itinerary of discussion, reflection, review and suggestion in interaction with the Technical Assistance team.
- Area 2: support the **APs implementation**. Under this area fall all the activities connected with the everyday work of the AP teams. The effort of the TA in this area was trying to sustain the AP Teams in order to help them to achieve the goals they had established and to make their action more effective and efficient. Under this area lie activities such as: the periodic overview of the activities carried out in the APs (and related suggestions), the development of "joint activities" (between the AP and the TA teams); the supply of "on demand" support actions, sharing and presenting useful material for the development of the APs (toolkit, questionnaire models,

examples of similar actions, etc.), the identification of useful contacts for the implementation of the APs, etc.

- Area 3: activation and coordination of **mutual learning among the APs**. In this area fall the activities related to the learning across the different APs of the project. In this respect annual mutual learning meetings among the APs were organised. Moreover, the mutual learning was favoured through many different means by the TA team such as: suggestions, exchange of information, exchange of documents and tools, etc. Finally TA activated a cycle of remote Multilateral Sessions at a distance each one dedicated to sharing experiences inside the Consortium on one of the five RRI keys (Societal Engagement, Gender, Education, Open Access and Ethics). The mutual learning activities were oriented toward two goals: sustaining the implementation of the AP – even if indirectly; fuelling the general learning process in each AP team and in the project as a whole.

These three areas of action are obviously overlapping to certain extent. Nevertheless they catch very well the territory where the Technical Assistance operated for supporting the 6 APs.

The TA activities related to the three areas described above were implemented through a set of tools that were made available by the project, and namely:

- Assistance sessions at a distance
- Periodic on-site visits
- Mutual learning meetings
- On-demand support actions.

REFERENCES

- Ahuja, S.K., Aiuti, F., Berkhout, B., Biberfeld, P., Burton, D.R., Colizzi, V., Deeks, S.G., Desrosiers, R.C., Dierich, M.P., Doms, R.W., Emerman, M., Gallo, R.C., Girard, M., Greene, W.C., Hoxie, J.A., Hunter, E., Klein, G., Korber, B., Kuritzkes ,D.R., Lederman, M.M., Malim, M.H., Marx, P.A., McCune, J.M., McMichael, A., Miller, C., Miller, V., Montagnier, L., Montefiori, D.C., Moore, J.P., Nixon, D.F., Overbaugh, J., Pauza, C.D., Richman, D.D., Saag, M.S., Sattentau, Q., Schooley, R.T., Shattock, R., Shaw, G.M., Stevenson, M., Trkola, A., Wainberg, M.A., Weiss, R.A., Wolinsky, S., Zack, J.A. (2006). A plea for justice for jailed medical workers. Science, 314(5801).
- Alberts, B., Kirschner, M.W., Tilghman, S., &Varmus, H. (2014). Rescuing US biomedical research from its sistemi flaws. ***Proceedings of the National Academy of Sciences***, ***111***(16).
- Alsop, R., Bertelsen, M., Holland, J. (2006). Empowerment in practice: from analysis to implementation, The International Bank for Reconstruction and Development/The World Bank.
- Ambrosio, A.M., Mariani, M.A., Maiza, A.S., Gamboa, G.S., Fossa, S.E., Bottale, A.J. (2018). Protocol for the production of a vaccine against Argentine Hemorrhagic Fever in Maria S. Salvato (ed.) Hemorrhagic Fever Viruses: Methods and Protocols. Methods in Molecular Biology, vol. 1604. Springer. Doi 10.1007/978-1-4939-6981-4_24.
- Andoh, C.T. (2011). Bioethics and the challenges to its growth in Africa. ***Open journal of philosophy. 1***(02), 67-75. 10.4236/ojpp.2011.12012.
- Bamgbose, A. (2011). African languages today: The challenge of and prospects for empowerment under globalization. ***In Selected proceedings of the 40th Annual Conference on African Linguistics.*** ed. Eyamba G. Bokamba, et al., 1-14. Cascadilla Proceedings Project Somerville. www.lingref.com, document #2561.
- Barugahare, J. (2018). African bioethics: methodological doubts and insights. ***BMC medical ethics***. 19(1), 98. 10.1186/s12910-018-0338-6.
- Battilana, J., Leca B., and Boxenbaum E. (2009). "How actors change institutions: towards a theory of institutional entrepreneurship." Academy of Management annals 3.1 (2009).
- BBSRC Biotechnology and Biological Sciences Research Council (2018). "Forward look for UK Bioscience" released on 29 September 2018. https://bbsrc.ukri.org/documents/forward-look-for-uk-bioscience-pdf/ (accessed on: 05/09/2019).
- Beckert, J. (1999). Agency, entrepreneurs, and institutional change. The role of strategic choice and institutionalized practices in organisations. Organisation studies, 20(5).
- Bendels, M.H., Dietz, M.C., Brüggmann, D., Oremek, G.M., Schöffel, N., Groneberg, D.A. (2018). Gender disparities in high-quality dermatology research : a descriptive bibliometric study on scientific authorships. ***BMJ Open*** 2018;8:1–11. doi:10.1136/bmjopen-2017-020089

- Berger, P., & Luckmann, T. (1969). *La costruzione sociale della realtà*. Il Mulino, Bologna.
- Besley, J.C., & Nisbet, M.C. (2013). How scientists view the public, the media and the political process. Public Understanding of Science, 22(6), 644–659. https://doi.org/10.1177/0963662511418743
- Bijker, W.E. & d'Andrea, L. (eds.) (2009). *Handbook on the Socialisation of Scientific and Technological Research, Social Sciences and European Research Capacities*, Rome: River Press Group.
- Boylan, J., Dacre, J., Gordon, H. (2019). Addressing women's under-representation in medical leadership. *The Lancet*. 2019; 393(10171): e14.
- Bromme, R. (2000). Beyond one´s own perspective. The psychology of cognitive interdisciplinarity. In P. Weingart & N. Stehr (Eds.), *Practising interdisciplinarity* (pp. 115-133). Toronto: Toronto University Press.
- Bubela, T. (2006). Science communication in transition: Genomics hype, public engagement, education and commercialization pressures. Clinical Genetics, 70(5), 445–450. https://doi.org/10.1111/j.1399-0004.2006.00693.x
- Bubela, T., Hagen, G., & Einsiedel, E. (2012). Synthetic biology confronts publics and policy makers: Challenges for communication, regulation and commercialization. Trends in Biotechnology, 30(3), 132–137. https://doi.org/10.1016/j.tibtech.2011.10.003
- Burchell, K. (2015). *Factors affecting public engagement by researchers: literature review*, Policy Studies Institute, London, https://wellcome.ac.uk/sites/default/files/wtp060036.pdf (accessed on: 24/07/2019).
- Burns, D., Squires, H., (2011). *Embedding public engagement in higher education: Final report of the national action research programme*, NCCPE. https://www.publicengagement.ac.uk/sites/default/files/publication/action_research_report_0.pdf (accessed on: 26/07/2019)
- Burns, T.W., O'Connor, D.J., & Stocklmayer, S.M. (2003). Science communication: A contemporary definition. Public Understanding of Science, 12(2), 183–202
- https://doi.org/10.1177/09636625030122004
- Capps, D.K., & Crawford, B.A. (2013). Inquiry-Based Instruction and Teaching About Nature of Science: Are They Happening? Journal of Science Teacher Education, 24.
- Cartwright, N., & Hardie, J. (2012). *Evidence-based policy: A practical guide to doing it better*. Oxford: Oxford University Press.
- Caulfield, T. (2005). Popular Media, Biotechnology, and the "Cycle of Hype". Houston Journal of Health Law & Policy, 337(2004).
- Chen, H.T. (2012). Evaluation von Programmen und Projekten für eine demokratische Kultur. In R. Strobl, O. Lobermeier, W. Heitmeyer (eds.). *Evaluation von Programmen und Projekten für eine demokratische Kultur*. Fachmedien Wiesbaden: Springer.
- Clark, B.R. (1998). *Creating Entrepreneurial Universities: Organisational Pathways of Transformation. Pergamon*, http://blog.ub.ac.id/yogidwiatmoko/files/2012/12/gibb_hannon.pdf
- (accessed on: 17/09/2019).

- Clark, H. (1996). Using Language. Cambridge: Cambridge University Press.
- Clarke, L.J., & Kitney, R.I. (2016). Syntheticbiology in the UK–an outline of plans and progress. ***Synthetic and systems biotechnology***, ***1***(4), (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5625736/ (accessed on: 18/07/2019).
- Colizzi V., de Oliveira T., Roberts R.J. (2007). Libya should stop denying scientific evidence on HIV. Nature; 448 (7157):992.
- Colizzi,V., et al. (2019). Structural Transformation to Attain Responsible BIOSciences (STARBIOS2): Protocol for a Horizon 2020 Funded European Multicenter Project to Promote Responsible Research and Innovation. JMIR Res Protocl 8(3):e11745, https://www.researchprotocols.org/2019/3/e11745/ (accessed on: 30/09/2019).
- Condit, C. (2001). What is "public opinion" about genetics? Nature, 2(10). https://doi.org/10.1038/35093580
- d'Andrea, L., Marta, F.L., Kahma, N. and Vase, S., (2017). FIT4RRI, Project Report on the Literature Review, Deliverable 1.1 (public), December 31st, 2017, https://zenodo.org/record/1434349#.W8iFg3szbcs (accessed on: 30/09/2019).
- d'Andrea, L., & Declich, A. (2005). The sociological nature of science communication. ***JCOM***, ***4***(2).
- d'Andrea, L., Quaranta, G., & Quinti, G. (2005). Manuale sui processi di socializzazione della ricerca scientifica e tecnologica. CERFE. Rome.
- Dahler-Larsen, P. (2006). Evaluation after Disenchantment? Five Issues Shaping the Role of Evaluation in Society. In Shaw, I.F., Greene, J.C., Mark, M.M. (eds.), ***The Sage Handbook of Evaluation***. London: Sage Publications.
- Dahler-Larsen, P. (2012). ***The evaluation society.*** Stanford: Stanford University Press.
- D'Armiento, J., Witte, S.S., Dutt, K. Wall, M., McAllister, G. (2019). Achieving women's equity in academic medicine: challenging the standards. ***The Lancet***. 2019; 393(10171).
- Declich G., d'Andrea, L. (2018), "Triggering Institutional Change Towards Gender Equality In Science. Final Guidelines of the TRIGGER Project", project funded by the European Commission under the FP7 for Research.
- de Oliveira, T., Pybus, O.G., Rambaut, A., Salemi, M., Cassol, S., Ciccozzi, M., Rezza, G., Gattinara, G.C., D'Arrigo, R., Amicosante, M., Perrin, L., Colizzi, V., Perno, C.F. (2006). Benghazi Study Group. Molecular epidemiology: HIV-1 and HCV sequences from Libyan outbreak. Nature. 2006; 444.
- Döring, N., & Bortz, J. (2016). ***Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften.*** Berlin: Springer.
- Eden, G., Jirotka, M., & Stahl, B. (2013). Responsible research and innovation: Critical reflection into the potential social consequences of ICT. In Research Challenges in Information Science (RCIS), 2013 IEEE Seventh International Conference on. IEEE.
- Elster, D. (2016). Deliverable 5.1 First Interim Report, University of Bremen, Bremen.
- Elster, D., Barendziak, T., Birkholz, J. (2016). Science Education as a Trigger to Attain Responsible Research and Innovation. In Pixel: New Perspectives in

Science Education, Conference Proceedings 2017, Florence/LibreriaUniversitariaEdizioni.
- Elster, D., Barendziak, T., Birkholz, J. (2019). Towards a sustainable and open science. Enhancing responsible research and innovation in the biosciences at the University of Bremen. Bremen: University of Bremen.
- Equality Challenge Unit (2005). Athena SWAN Charter. 7th Floor, Queen's House, 55/56 Lincoln's Inn Fields, London, WC2A 3LJ https://www.ecu.ac.uk/equality-charters/athena-swan/
- ERA CoBioTech (2018). Strategic Agenda – a vision for biotechnology in Europe, November 2018, https://www.cobiotech.eu/lw_resource/datapool/systemfiles/elements/files/7D5DE99D41EC4DCCE0539A695E869159/current/document/114492_ERA_CoBio_agenda_final_high-res.pdf (accessed on 18/07/19)
- ERA CoBioTech (2018). Strategic Agenda – a vision for biotechnology in Europe, https://www.cobiotech.eu/lw_resource/datapool/systemfiles/elements/files/7D5DE99D41EC4DCCE0539A695E869159/current/document/114492_ERA_CoBio_agenda_final_high-res.pdf (accessed on: 18/07/19)
- ESFRI European Strategy Forum on Research Infrastructures (2006), Roadmap for European Research Infrastructure. Report of the Biology and Medical Science. Roadmap Working Group, October 2006, https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri_roadmap/roadmap_2006/bms-report-roadmap-wg-2006_en.pdf (accessed on: 05/09/2019).
- European Commission (2016). SheFigures 2015, Directorate-General for Research and Innovation, Brussels.
- Eze, M.O. (2008). What is African communitarianism? Against consensus as a regulative ideal. *South African Journal of Philosophy*. 27(4). 10.4314/sajpem.v27i4.31526
- Faria, N.R, Quick, J, Claro I.M, Theze, J, de Jesus, J.G, Giovanetti, M. et al. (2017). Establishment and cryptic transmission of Zika virus in Brazil and the Americas. Nature 546.
- Faria, N.R. et al. (2016). Mobile real-time surveillance of Zika virus in Brazil. *Genome Medicine*, 96.
- Felt, U., Fochler, M., & Sigl, L. (2017). IMAGINE RRI: A Card-based Method for Reflecting Responsibility in Life Science Re-search
- Filardo G, da Graca B, Sass DM, Pollock BD, Smith EB, Martinez MA. Trends and comparison of female first authorship in high impact medical journals : observational study (1994-2014). *BMJ* 2016;352:1–8. doi:10.1136/bmj.i847
- Flipse, S.M., Van der Sanden, M.C., & Osseweijer, P. (2014). Setting up spaces for collaboration in industry between researchers from the natural and social sciences. Science and engineering ethics, 20(1).
- France, B., Gilbert, J.K. (2006). A model of communication about biotechnology. Rotterdam: Sense Publishers in cooperation with The New Zealand Biotechnology Learning Hub.
- Gade, C.B. (2012). What is ubuntu? Different interpretations among South Africans of African descent. *South African Journal of Philosophy*. 31(3). 10.1080/02580136.2012.10751789

- Gardy, J.L., and Loman N.J. (2018). Towards a genomics-informed, real-time, global pathogen surveillance system. Nature Reviews Genetics (19) (1.
- Gerber, A. (2018). RRI: How to 'mainstream' the 'upstream' engagement. *Journal of Science Communication*, *17*(3), C06,
- https://jcom.sissa.it/sites/default/files/documents/JCOM_1703_2018_C06.pdf (accessed on: 21/07/2019)
- Gibb, A. and Hannon, P. (2006). "Towards the entrepreneurial University?, in International Journal of Entrepreneurship Education, v. 4, http://blog.ub.ac.id/yogidwiatmoko/files/2012/12/gibb_hannon.pdf (accessed on: 30/10/2018)
- Gittelman, M., (2016). The revolution re-visited: Clinical and genetics research paradigms and the productivity paradox in drug discovery. Res. Policy, http://dx.doi.org/10.1016/j.respol.2016.01.007
- GREAT (2013). *Annual report on the main trends of SiS, in particular the trends related to RRI*, http://www.great-project.eu/deliverables_files/deliverables05.
- Griffiths, R. (2004). Knowledge production and the research- teaching nexus: The case of the built environment disciplines. *Studies in Higher Education* 29, no. 6.
- Healey, M. (2005). Linking research and teaching: Exploring disciplinary spaces and the role of inquiry- based learning. In *Reshaping the University: New Relationships Between Research, Scholarship and Teaching*, edited by R. Barnett. Maiden head, UK: McGraw- Hill/Open University Press.
- Herschberg, C., Benschop, Y., & van denBrink, M. (2018). Precarious postdocs: A comparative study on recruitment and selection of early-career researchers. *Scandinavian Journal of Management*, *34*(4).
- Herzog, C. (2016). Successful comeback of the single-dose live oral cholera vaccine CVD 103-HgR. *Travel medicine and infectious disease*, *14*(4). doi: 10.1016/j.tmaid.2016.07.003.
- Hill, S.C. et al. (2019). Emergence of the Zika virus Asian lineage in Angola. bioRxiv 520437; doi: https://doi.org/10.1101/520437.
- Jagsi, R., Guancial, E., Worobey, C., Henault, L., Chang, Y., Starr, R., Tarbell, N., Hylek, E. (2006). The 'Gender Gap' in Authorship of Academic Medical Literature — A 35-Year Perspective. *N Engl J Med* 2006;355.
- Jenkins, A. (2004). *A Guide to the Research Evidence on Teaching- Research Relations*. York, UK: The Higher Education Academy. Available online: https:// www.heacademy.ac.uk/system/ files/ id383_ guide_ to_ research_ evidence_ on_ teaching_ research_ relations.pdf (accessed on: 20/06/2019).
- Kalpazidou Schmidt, E., Ovseik, P.V., Henderson, L.R., & Kiparoglou, V. (2019). Understanding the Athena SWAN award scheme for gender equality as a complex social intervention in a complex system: analysis of Silver award Action Plans in a comparative European perspective. *bioRxiv*. *doi:10.1101/555482*.
- Kalpazidou Schmidt, E. & Cacace, M. (2017). Addressing gender inequality in science: the multifaceted challenge of assessing impact. *Research Evaluation,* vol. 26, no 2.
- Kalpazidou Schmidt, E. & Cacace, M. (2018). Setting up a Dynamic Framework to Activate Gender Equality Structural Transformation in Research Organisations. *Science and Public Policy*, vol. 59.

- Kalpazidou Schmidt, E. (2009). Evaluation, in Bijker W. E. &d`Andrea (eds.), ***Handbook on the Socialisation of Scientific and Technological Research, Social Sciences and European Research Capacities***, pp. 169-189, Rome: River Press Group.
- Kalpazidou Schmidt, E. (2016). Development of monitoring and assessment tools of structural transformation actions to attain responsible biosciences. STARBIOS2 report.
- Kalpazidou Schmidt, E.K., & Cacace, M. (2018). Setting up a Dynamic Framework to Activate Gender Equality Structural Transformation in Research Organisations. ***Science and Public Policy***.
- Kuhlmann, S., Lindner, R., & Randles, S. (2016). Conclusion: making responsibility an institutionalised ambition. In ***Navigating Towards Shared Responsibility in Research and Innovation: Approach, Process and Results of the Res-AGorA Project*** (pp. 161-166). Fraunhofer ISI.
- Kwiek, M. (2015). "Academic Entrepreneurialism and the Changing Governance in Universities. Evidence from Empirical Studies", in Reihlen, W.M., Frost, J., Hattke, F. (eds.) ***Multi-level Governance of Universities: The Role of Strategies, Structures, and Controls***
- Lawrence, T., Suddaby, R., & Leca, B. (2011). Institutional work: Refocusing institutional studies of organisation. ***Journal of Management Inquiry***, ***20***(1).
- Lederman, N. G., Antink, A., & Bartos, S. (2014). Nature of science, scientific inquiry, and socio-scientific issues arising from genetics: A pathway to developing a scientifically literate citizenry. Science & Education, 23(2).
- Lindlof, T.R. (1995). ***Qualitative Communication Research Methods***. London: Sage.
- Lutz, D.W. (2009). African Ubuntu Philosophy and Global Management. ***Journal of Business Ethics***. 84(3), 313-328. 10.1007/s10551-009-0204-z
- Mann, A., & Di Prete, T.A., (2013). Trends in gender segregation in the choice of science and engineering majors. ***Social science research***, ***42***(6), https://www.ncbi.nlm.nih.gov/pubmed/24090849 (accessed on: 26/07/2019)
- March, J.G., Gherardi, S., & Cimmino, S. (1993). ***Decisioni e organizzazioni***. Il Mulino, Bologna.
- Mezzana, D. (2018). Some Societal Factors Impacting on the Potentialities of Electronic Evidence, in M.A. Biasiotti et al. (eds.), Handling and Exchanging Electronic Evidence Across Europe, Law, Governance and Technology Series 39, Springer, https://doi.org/10.1007/978-3-319-74872-6_14.
- Mezzana, D. (ed.) (2011), Technological responsibility. Guidelines for a shared governance of the processes of socialisation of scientific research and innovation, within an interconnected world, Roma, CNR: www.scienzecittadinanza.org/public/SetDevGuidelines.pdf (accessed on: 08/11/2018)
- Msoroka, M.S. & Amundsen, D. (2018). One size fits not quite all: Universal research ethics with diversity. ***Research Ethics***. 14(3), 1-17. 10.1177/1747016117739939.
- Musselin, C. (2007). The Transformation of Academic Work: Facts and Analysis. Research & Occasional Paper Series: CSHE. 4.07. ***Center for studies in higher education***;

- Naveca, F.G. et al. (2019). Genomic, epidemiological and digital surveillance of Chikungunya virus in the Brazilian Amazon. ***PLoS Negl Trop Dis***. 13, 3-0007065.
- Nowotny, H. (2007). Knowledge Production and its Constraints: epistemic and societal considerations, paper presented at the Gulbenkian Foundation, Lisbon, 2007, http://helga-nowotny.eu/downloads/helga_nowotny_b58.pdf (accessed on: 18/07/2019)
- Nowotny, H., Scott, P., Gibbons, M., & Scott, P.B. (2001). ***Re-thinking science: Knowledge and the public in an age of uncertainty***. Cambridge: Polity.
- Owen, R., Forsberg, E-M., Shelley-Egan, C. (2019). RRI-Practice Policy Recommendations and Roadmaps, RRI-Practice project report. Deliverable 16.2, https://www.rri-practice.eu/knowledge-repository/recommendations/ (accessed on: 21/07/2019)
- Pan-African Bioethics Initiative (PABIN), (2003). PABIN Third Conference: ***Good Health Research Practices in Africa***. Addis Ababa, Ethiopia.
- Pawson, R. & Tilley, N. (1997). ***Realistic Evaluation.*** London: Sage.
- Pierini, M. (2008). Le prix de la liberté: Libye, les coulisses d'une négociation, Actes Sud.
- Pinheiro, R., & Stensaker, B. (2014). Designing the entrepreneurial university: The interpretation of a global idea. Public Organisation Review, 14(4).
- Quaranta, G. (1985). L'era dello sviluppo, Franco Angeli, Milano.
- Quick, J., et al. (2017) Multiplex PCR method for MinION and Illumina sequencing of Zika and other virus genomes directly from clinical samples. Nat Protoc, 2017. 12(6).
- Reale, E., Nedeva, M., Thomas, D., & Primeri, E. (2014). Evaluation through impact: A different viewpoint. ***Fteval Journal, 39***.
- Reydon, T.A., Kampourakis, K., & Patrinos, G.P. (2012). Genetics, genomics and society: the responsibilities of scientists for science communication and education. Personalized Medicine, 9(6). https://doi.org/10.2217/pme.12.69
- Rog, D.J. (2012). When background becomes foreground: Toward Context-Sensitive Evaluation Practice. ***New Directions for Evaluation,*** 135.
- Rome Declaration on Responsible Research and Innovation in Europe https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf (accessed on: 26/07/2019)
- Royal Society (2006). ***Survey of factors affecting science communication by scientists and engineers***, the Royal Society,
- https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2006/1111111395.pdf (accessed on: 24/07/2019).
- Ruggiu, D. (2015). Anchoring European governance: Two versions of responsible research and innovation and EU fundamental rights as 'Normative anchor points'. NanoEthics, 9(3).
- Sadler, T.D. (2011). Socio-scientific issues in the classroom. Heidelberg, Springer.
- Sambala, E.Z., Cooper, S. and Manderson, L. (2019). Ubuntu as a Framework for Ethical Decision Making in Africa: Responding to Epidemics. ***Ethics & Behavior***. 10.1080/10508422.2019.1583565
- Shendure, J., Ji, H., (2008). Next-generation DNA sequencing. In ***Nature Biotechnology***, 26.

- Smith, R.D.J., Scott, D., Kamwendo, Z.T., Calvert, J. (2019). An Agenda for Responsible Research and Innovation in ERA CoBioTech. Swindon, UK: Biotechnology and Biological Sciences Research Council and ERA CoFund on Biotechnology
- https://www.cobiotech.eu/lw_resource/datapool/systemfiles/elements/files/85886BE9C7161C71E0539A695E865A64/live/document/ERA_CoBioTech_RRI_Framework.pdf (accessed on: 18/07/19)
- Spruit, S.L., Hoople, G.D., & Rolfe, D.A. (2016). Just a cog in the machine? The individual responsibility of researchers in nanotechnology is a duty to collectivize. Science and engineering ethics, 22(3).
- Stephan, P. (2013). How to exploit postdocs. *BioScience*, *63*(4).
- Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, *42*(9).
- Sutcliffe, H. (2011). A report on Responsible Research and Innovation for the European Commission. Retrieved from http://ec.europa.eu/research/science-society/document_library/pdf_06/rri-report-hilary-sutcliffe_en.pdf (accessed on: 30/9/2019).
- Temoshok, L.R., & Wald, R.L. (2008). Integrating multidimensional HIV prevention programs into healthcare settings. *Psychosomatic medicine*, *70*(5). doi: 10.1097/PSY.0b013e31817739b4.
- Thézé, J. et al. (2018). Genomic Epidemiology Reconstructs the Introduction and Spread of ZikaVirus in Central America and Mexico. *Cell Host Microbe*. 23.
- Van Belle, S.B., Marchal, B., Dubourg D. and & Kegels, G. (2010). How to develop a theory-driven evaluation design? Lessons learned from an adolescent sexual and reproductive health programme in West Africa. *BMC Public Health*, 10, 741.
- Van Schomberg, V. & van Schomberg, R. (2013). A Vision of Responsible Research and Innovation. In Owen, R., Heintz, M. & Bessant J. (Eds.), Responsible Innovation (pp. 51-74). London: John Wiley & Sons, Ltd.
- Von Schomberg, R. (2019). Why Responsible Innovation. In The International Handbook on Responsible Innovation. A Global Resource. Von Schomberg, R. and Hankins, J. (Eds.). Cheltenham: Edward Elgar Publishing. Forthcoming.
- Watermeyer, R. (2015). Lost in the 'third space': the impact of public engagement in higher education on academic identity, research practice and career progression, *European Journal of Higher Education*, 5:3, http://www.tandfonline.com/doi/pdf/10.1080/21568235.2015.1044546 (accessed on: 24/07/2019).

ABOUT THE STARBIOS2 GUIDELINES

This guideline aims to help readers formalize and trigger structural change aimed at introducing appropriate RRI-related practices to their own organisations. This is not a series of prescriptions, but an itinerary of reflection and self-interpretation addressed to different actors within the biosciences. To support this itinerary of reflection and self-interpretation, the document provides...

- a description of a general RRI Model for research organisations within the biosciences, that is a set of ideas, premises and "principles of action" that define the practice of RRI in bioscience research organisations,
- some practical guidance for designing interventions to promote RRI in research organisations in the Biosciences, putting into practice the RRI Model,
- a set of useful practices in implementing the structural change process,
- and information on particular STARBIOS2 cases and experiences, as well as materials, tools and sources, are also provided in the Appendix and in the Annex.