BIHSENA
Bridging Innovations, Health and Societies

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WORK PACKAGE 3

COURSE

Innovations and Society: A Critical Understanding

Syllabus

Compulsory course
for students of Master program „Innovations and Society“

PAST – Centre, Tomsk State University

9 ECTS

Project “Bridging Innovations, health and societies: Educational capacity-building in Easter European neighbouring countries”

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Course outline

Innovations are key driver in modern economies. They improve our life, offer solution to problems and often profoundly change the very fabric of social relationship. Yet their introduction is not an easy process and there are substantial differences among the societies, cultures, and social groups & communities in their appreciation and attitudes towards innovations, and in their capacity to introduce and sustain them.

What lays behind these differences? In what cases are innovations becoming dangerous? Are innovations inevitable by something "good"? Is it possible to manage innovations and their effects? And should we consider innovations in narrow economic terms or we need to adopt a broader vision on it?

Some people admire scientific and technological innovations and innovators. For them, innovations as such are unquestionably good and all we should do is to promote new achievements of science and technology, to make them effective and to help them to overcome various social barriers on their way. They are highly optimistic about the future of our technological and increasingly technologized societies. Others are quite the opposite. They tend to accurse fast changes and innovations that are dehumanizing once warm and meaningful social relations. At best they tend to be alarmists, at worst they become luddists. We can easily find people with such opposing world-views both inside and outside academia. Far from trying to find some "third way" in the middle ground between the two poles in this course we will follow Baruch Spinoza famous dictum "*Non indignari, non admirari, sed intelligere*".

The course examines existing theoretical and practical approaches and provide a coherent frame for understanding innovations and the processes of their emergence, development and spread through the economies and societies. By taking distance from uncritical and favored approach to innovation as a value in itself, the module focus the attention of students to the users involvement in innovations, as well as their effects on social justice, on social (in)equality, and their contribution to the societies' welfare.

It should be noted that there are many perspectives and discourses on innovation (e.g. economics and management of innovations). This particular course approaches innovations within the framework of interdisciplinary field of science and technology studies (STS) that accumulate an expertise on studying innovations since late 1970s. Though STS constitute a vast array of heterogeneous theoretical approaches and empirical case studies, they share in common a view of co-production of science, technology and society. STS consider innovations not as purely scientific and technical process, but as a complex and precarious socio-political activity. The scientific and the social, the technical and the political go hand in hand and are intertwined within innovation process. Society is not external to innovations but actively shape them. Innovations in their turn produce, disrupt, sustain and enhance social relations. Innovations are impossible without society and vice versa contemporary societies are not viable without innovations. It does not make much sense to talk separately about scientific and technological content of innovations on the one hand and about its societal context or environment on the other. Hence we will talk about sociotechnical processes and arrangements that is underscored in the title of the course Innovations *and* Society. Given all this we consider STS framework as the best way to problematize and to understand innovations.

Examination

Examination within this course is divided into two parts

1. **Mid-term theoretical paper**. This task implies that students will use acquired analytical reading skills and compare no less than two of the theoretical approaches studies in the Part II of the course. It is expected that they will draw not only on the key texts discussed in class, but also consult suggested additional readings. For the requirements to the paper see section 1.6. Grading. For rules of formatting references please consult TSU Library web page (http://www.lib.tsu.ru/win/produkzija/metodichka/spis_lit.html)

2. **Final project** (a case-study of a particular innovation). The task suggests that students will rely on their experience of working with adapted cases in class and chose some real-life innovation case for their own analysis. It is required to use theoretical concepts, principles and insights studied during the course. A choice of cases should be negotiated with course coordinators prior to the analysis. Students may do a case-study individually or work in pairs. In finding relevant innovation cases students may use any information sources available to them. If they have difficulties of finding proper we suggest to use rich electronic resources of TSU Library (http://www.lib.tsu.ru/ru/zarubezhnye-setevye-resursy), particularly United States Patent and Trademark Office, Questel, OECD iLibrary.

PART I. INTRODUCTION: PROBLEMATIZING INNOVATIONS

Are innovations necessarily a «good» thing? Why innovations are so closely connected with risks and sometimes turned into catastrophes? How to innovate responsibly? How a principle of precaution in innovations could look like? Should we speed up or slow down innovations? Who are the main beneficiaries of innovations? How innovations could erase, maintain or enhance inequalities? What are socio-technical and environmental burdens of innovations? Who are suffering from innovation? What are «oligarchic effects» of innovations?

These questions are always asked after we know what is to innovate, what are key aspects and actors of innovations, how to make innovations successful and effective. But let's ask these questions first. Obviously we will not come to definite answers to these questions neither in the beginning nor in the end of the course. The value of putting such questions right from the start is to frame the subsequent and more substantial discussions during the course. These are painful question that urge us to think and to understand innovations and not just to praise or criticize them. We encourage you to carry these recurring questions through the course and beyond it.

2.1.1. Introductory Group Discussion: Innovation and «common good». Do We Need Innovations? What? When? How? If?

Literature:

Callon, M. 1994. "Is Science a Public Good? Fifth Mullins Lecture, Virginia Polytechnic Institute, 23 March 1993." Science, Technology, & Human Values 19 (4):395–424. https://doi.org/10.1177/016224399401900401.

Gane, Nicholas. 2004. The Future of Social Theory. A&C Black. (Chapter 4). pp. 77-91.

Hilgartner, S. 2009. "Intellectual Property and the Politics of Emerging Technology: Inventors, Citizens, and Powers to Shape the Future." Chicago-Kent Law Review, 84 (1): 197-224. http://scholarship.kentlaw.iit.edu/cklawreview/vol84/iss1/9/

2.1.2. Introductory Group Discussion: Innovations and inequalities

***Literature*:**

Winner L. (2010) Do artifacts have politics? in Winner L. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. University of Chicago Press.

Williams R. (2000) "All That is Solid Melts into Air": Historians of Technology in the Information Revolution in *Technology and Culture*, Vol 41, Number 4 (October 2000): 641-68.

2.1.3. Case 1. Boiling water in Peru

Description of case is in Coursebook

2.2. PART II. KEY CONCEPTS AND MODELS OF INNOVATION STUDIES

2.2.0 Lecture Innovation Studies: From Economics to STS

Literature:

Pinch,T. (2007) The Sociology of Science and Technology, in C. Bryant and D. Peck (eds) 21st Century Sociology, London: SAGE. Pp. 266-276.

Bowden, G. (1995) Coming of age in STS: Some methodological musings in Jasanoff, Sheila et al. (Eds) Handbook of Science and Technology Studies. Sage Publications. Pp. 64-80.

2.2.1. Lecture: Invention vs. Innovation: How Innovations Became Important Through Entrepreneurship

2.2.2. Group Discussion: Innovation, financial system and economic development; the entrepreneurship as discovery process.

Literature:

Schumpeter, J.A. 2011. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Transaction Publishers. (Chapter 2).

Kirzner I. Entrepreneurial Discovery Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach. *Journal of Economic Literature*, Vol. XXXV (March 1997), pp. 60–85

Additional reading:

Jouko Nikula and Ivan Tchalakov (2013), *Innovations and Entrepreneurs in Socialist and Post-Socialist Societies*, Cambridge Scholars Publishing, Newcastle upon Tyne, UK

2.2.3. Flipped classroom: The New Age, Western capitalism and preconditions for harvesting innovations

Key text:

Rosenberg, N., and L. E. Birdzell Jr. 2008. How The West Grew Rich: The Economic Transformation Of The Industrial World. Basic Books. (See for russian translation: http://www.libertarium.ru/l_lib_rich0)

Additional literature:

Rosenberg, N. 1982. *Inside the Black Box: Technology and Economics*. Cambridge University Press, ch. 1 and 2, ch. 7.

2.2.4. Lecture: Science and Industrial Order: Industrial Research, Communist Science, High-Tech

Literature:

Shapin S. Scientific Life. Chicago: Chicago Univ. Press, 2008 (Chapter 4: Who is the Industrial Scientist? The View from the Tower). p. 93-127

Krementsov, N. (1997) Chapter 1 (Russian Science in Transition, 1890-1929) and Chapter 2 (The Stalinization of Russian Science, 1929-1939), in his book Stalinist Science, Princeton Univ. Press, Princeton, pp.13-53

Tchalakov, I. (2001) Innovating in Bulgaria — two cases in the life of a laboratory before and after 1989. in *Research Policy* 30/2001, pp. 391–402 https://doi.org/10.1016/S0048-7333(00)00083-4

2.2.5. Analytical Reading Group: Science *and* (Industrial) Social Order

Key text:

Shapin, S. Scientific Life. Chicago: Chicago Univ. Press, 2008 (Chapter 4: Who is the Industrial Scientist? The View from the Managers). pp.127-163

Suggested literature:

Merton, R.K. 1968. Social Theory and Social Structure. Simon and Schuster. (Chapter 18. Science and Democratic Social Order)

Mirowski, P., Sent E.-M., (2007), 'The Commercialization of Science and the Response of STS', in Hackett, E., .O Amsterdamska, M. Lynch and J. Wajcman (eds), (2008), *The Handbook of Science and Technology Studies*. Third edition. Cambridge, Mass: MIT Press: 635-690.

Cagliano, R. et al (2000) Differences and similarities in managing technological collaborations in research, development and manufacturing: a case study. *Journal of engineering and technology management*, vol. 17, pp. 193-224 https://doi.org/10.1016/S0923-4748(00)00021-7

Additional readings:

Myers, Greg. 1995. "From Discovery to Invention: The Writing and Rewriting of Two Patents." Social Studies of Science 25 (1): 57–105. doi:10.1177/030631295025001004

Owen-Smith, J. 2005. "Dockets, Deals, and Sagas: Commensuration and the Rationalization of Experience in University Licensing." Social Studies of Science 35 (1): 69–97. doi:10.1177/0306312705047738.

2.2.6. Case 2. Science The Endless Frontier

Literature:

Bush, V. (1945), "Science The Endless Frontier" A Report to the President by Vannevar Bush, Director of the Office of Scientific Research and Development, July 1945, United States Government Printing Office, Washington: 1945 (https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm)

2.2.7. Lecture: Linear model vs Social-Constructivist Model

Additional readings:

Bijker, Wiebe E. 1995. Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change. MIT Press.

Bijker, Wiebe E., and Karin Bijsterveld. 2000. "Women Walking through Plans: Technology, Democracy, and Gender Identity." Technology and Culture 41 (3):485–515. http://www.jstor.org/stable/25147539.

Aibar, Eduardo, and Wiebe E. Bijker. 1997. “Constructing a City: The Cerdà Plan for the Extension of Barcelona.” Science, Technology, & Human Values 22 (1):3–30. https://doi.org/10.1177/016224399702200101.

Hommels, Anique, Jessica Mesman, and Wiebe E. Bijker. 2014. Vulnerability in Technological Cultures: New Directions in Research and Governance. MIT Press.

Russell, Stewart. 1986. “The Social Construction of Artefacts: A Response to Pinch and Bijker.” *Social Studies of Science* 16 (2):331–46. https://doi.org/10.1177/030631278601600200 8.

Pinch, Trevor, and Wiebe Bijker. 1986. “Science, Relativism and the New Sociology of Technology: Reply to Russell.” Social Studies of Science 16 (2):347–60. https://doi.org/10.1177/030631278601600200 9.

Bijker, Wiebe E. 2007. “Dikes and Dams, Thick with Politics.” Isis 98 (1):109–23. https://doi.org/10.1086/512835.

Kline, Ronald, and Trevor Pinch. 1996. “Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States.” Technology and Culture 37 (4):763–95. https://doi.org/10.2307/3107097.

Oudshoorn, Nelly, and Trevor Pinch. 2005. How Users Matter: The Co-Construction of Users and Technology. MIT Press.

Bijker, W. 2001. Understanding technological culture through a constructivist view of science, technology, and society. in Cutcliffe, Stephen H., and Carl Mitcham (Eds) Visions of STS: Counterpoints in Science, Technology, and Society Studies. SUNY Press. pp. 19-35.

2.2.8. Analytical reading group: The Social Construction of Technology Approach

Key text:

Pinch, Trevor J., and Wiebe E. Bijker. 1984. “The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other.” Social Studies of Science 14 (3): 399–441. http://www.jstor.org/stable/285355

2.2.9. Case 3. Social Construction of Fluorescent Lighting

2.2.10. Group Discussion: Diffusion model vs Translation Model.

Literature:

Rogers, Everett M. 2003. Diffusion of Innovations, 5th Edition. Simon and Schuster. (Chapter 1). pp. 1-38

Godin, Benoît. 2014. “Invention, Diffusion and Linear Models of Innovation: The Contribution of Anthropology to a Conceptual Framework.” *Journal of Innovation Economics & Management*, no. 15 (September): 11–37. https://www.cairn.info/revue-journal-of-innovation-economics-2014-3-page-11.htm.

Callon, M, Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay in Law, J. (Ed) *Power Action and Belief A New Sociology of Knowledge*. Blackwell. pp. 196-223.

Akrich M., Callon M., Latour B. The key to success in innovation part 1: The art of interessement. International Journal of Innovation Management Vol. 6, No. 2 (June 2002) pp. 207–225. http://www.bruno-latour.fr/sites/default/files/downloads/88bis-MANAGEMENT-1.pdf

Akrich M., Callon M., Latour B. The key to success in innovation part 2: The art of choosing good spokespersons. International Journal of Innovation Management Vol. 6, No. 2 (June 2002) pp. 187-207. http://www.bruno-latour.fr/sites/default/files/downloads/88bis-MANAGEMENT-2.pdf

Martin, Paul, Nik Brown, and Alison Kraft. 2008. "From Bedside to Bench? Communities of Promise, Translational Research and the Making of Blood Stem Cells." Science as Culture 17 (1): 29–41. doi:10.1080/09505430701872921

Additional literature: see the two papers of Michel Callon below in Case 4

2.2.11. Analytical Reading Group: Translation Model

Key text:

Callon, M. and Latour B. Comment concevoir les innovation? Prospective et sante, No.36, Hiver 1986, pp.13-25 (edited translation in Russian, Ivan Tchalakov)

or

Latour, B. 1987. Science in Action: How to Follow Scientists and Engineers Through Society. Harvard University Press. (Chapter 3)

2.2.12 Case 4. Failed Electromobile Utopia in France: Time Visions in Innovation

Related texts:

Callon, M. (1987) Society in the Making: The Study of Technology as a Tool for Sociological Analysis, in: Wiebe E. Bijker, Thomas Hughes, Trevor Pinch (eds) *The Social Construction of Technological Systems,* MIT Press, pp.83-105

Callon, M. (1986) "The Sociology of Actor-Network: The Case of Electric Vehicle", in: M. Callon, J. Law and A. Rip Mapping Dynamics of Science and Technology, The Mackmillan. pp. 19-35.

2.3. PART III. CRUCIAL DIMENSIONS OF INNOVATION PROCESS

2.3.1.–2.3.2. Group Discussion: Innovations Between Uncertainties and Risks

Why it is hard to assess the exact measure of investment in innovation project in terms of money, time, workforce, social and political resources? Why it is not always evident whether an innovation is successful, working, viable, profitable or not? Why it is not simple to anticipate real technological, social and environmental consequences of innovations?

Failure is more common in innovation than success. However, failures are more informative on the actual workings of innovations in society. When discussing diffusion and translation models of innovations above, we already arrived at *the key role of time* in the process of innovation and uncertainty and risk related with it. There we also pointed at role of other actors in innovation process and their unpredictable behaviour as one of the sources of uncertainty. In this unit we intend to further explore the uncertain nature of innovation by pointing different source and types of uncertainty, including the distinction between risk and uncertainty. The outline of possible strategies and actions to cope with uncertainty and risk in innovation is another issue in this task.

Literature:

Callon M., Barthes Y., and Lascoume Ph. 2010. Acting in an Uncertain World, MIT Press. (Chapter 4). pp. 12-36.

2.3.2 - 2.3.3. Presentation of theoretical papers.

See sections 1.5 Examination and 1.6 Grading for requirements.

2.3.4. Case 5. Uncertainty and Risk in New Technology Development.

Key text:

Excerpt from Tracy Kidder book, you should read 4 parts of the text, see folder in the Reader to Course:

1. The new industry was born...
2. The new industry, transistors and 'chip. The rise of competitors of IBM.
3. The competition among minicomputer producers. DEC and Data General.
4. The new round of competition between DEC and Data General: 32-bits minicomputers. Tom West.

Literature: Tracy Kidder (1982) *The soul of A New Machine* (see file *Tracy Kidder the soul of a new machine.rtf* in teaching materials folder)

2.3.5. Group Discussion: Expert vs Lay/Common Knowledge in Innovation

Literature:

Schutz, A. Well-Informed Citizen. Essay on Social Distribution of Knowledge, in: *Collected papers, Vol. III* (Russian translation uploaded at course te aching materials in '*schutz_Essayes.pdf*')

Bijker W. Understanding technological culture through a constructivist view of science, technology, and society. in Cutcliffe, Stephen H., and Carl Mitcham (Eds). 2001. Visions of STS: Counterpoints in Science, Technology, and Society Studies. SUNY Press. pp. 19-35.

Collins, Harry, and Robert Evans. 2008. Rethinking Expertise. University of Chicago Press, Ch. 1 *The Periodic Table of Expertises: Ubiquitous and Specialist Expertises* .

Callon M., Barthes Y., and Lascoumes Ph. 2010. *Acting in an Uncertain World*, MIT Press. (Chapter 4). pp. 107-152.

2.3.6. Group Discussion: Path-Dependencies in Innovations

Literature:

David, P. (1986) Clio and economy of QWERTY "

2.3.7. Group Discussion: Disruptive Innovations

Literature:

Christensen, Cl. (2000) *The Innovator's Dilemma*, Harper Books, chapter 1 - section 1 and 3 (pp.3-28; 62-76) - *Christencen Disruptive innov 1.pdf* and *Christencen Disruptive innov 3.pdf*

2.4. PART IV. AGENTS AND PLACES OF INNOVATIONS

2.4.1.–2.4.2. Group Discussion: Agents and Places of Innovations : Entrepreneurial Firms, Corporations, Governments and Users

Literature:

Start-ups and Venture Capital

Florida, R. and M. Kenney (1988) Venture capital-financed innovation and technological in the USA, in *Research Policy,* Volume 17, Issue 3, June 1988, pp.119-137

Венчурное финансирование в России.pdf (Venture Capital in Russia.pdf)

Lazonick W. The Innovative Firm in Fagerberg, Jan, David C. Mowery, and Richard R. Nelson (Eds) 2006. The Oxford Handbook of Innovation. OUP Oxford.

New Role of Governments in Innovations

Etzkowitz, Henry. 2008. The Triple Helix: University-Industry-Government Innovation in Action. Routledge. (Additional reading: Etzkowitz, Henry, and Chunyan Zhou. 2017. The Triple Helix: University–Industry–Government Innovation and Entrepreneurship. Routledge.)

Callon, M., P. Laredo, V. Rabeharisoa, T. Gonard, and T. Leray. 1992. "The Management and Evaluation of Technological Programs and the Dynamics of Techno-Economic Networks: The Case of the AFME." Research Policy 21 (3):215–36. https://doi.org/10.1016/0048-7333(92)90017-X.

Mazzucato, Mariana. 2013. The Entrepreneurial State: Debunking Public Vs. Private Sector Myths. Anthem Press, chapter 3 and 4

Users in Innovations

Hippel, Eric von. 2005. Democratizing Innovation. MIT Press. (Chapter 9).

Oudshoorn, Nelly, and Trevor Pinch. 2005. How Users Matter: The Co-Construction of Users and Technology. MIT Press. pp. 1-29.

Kline, Ronald, and Trevor Pinch. 1996. "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States." Technology and Culture 37 (4):763–95. https://doi.org/10.2307/3107097.

Woolgar, S. 1990, Configuring the user: the case of usability trials. The Sociological Review, 38: 58–99. doi:10.1111/j.1467-954X.1990.tb03349.x

Akrich, M. 1992. The De-scription of Technical Objects in Wiebe Bijker, John Law, Eds. Shaping Technology/Building Society: Studies in Sociotechnical Change. MIT Press.

Rosenberg, N. 1982. *Inside the Black Box: Technology and Economics*. Cambridge University Press. Chapter 6. Learning by using. pp. 120-141.

Cowan, R. S. 1987. "The consumption junction: A proposal for research strategies in the sociology of technology." In The Social Construction of Technological Systems, ed. W. Bijker et al. MIT Press. pp. 261-281.

2.4.3. Case 6. Agents and Places in the New Electric Car Revolution

In addition to the text on electric vehicle already given above please consult also the following files in online materials folder:

Tesla Motors and automotive industry 09 2010.pdf
Volt_ GM strikes back 04_2017.pdf
Bob Lutz and Elon Musk interview.flv

2.4.4. Group discussion: Infrastructure (Technology, Financial) and Regulatory Environment (Legal Frame, Standards, etc.) for Innovation

Literature:

Hwang, Victor W., and Greg Horowitt. 2012. The Rainforest: The Secret to Building the Next Silicon Valley. CreateSpace Independent Publishing Platform, ch. 2 and 4

Hilgartner, S. 2002. Acceptable Intellectual Property, Journal of Molecular Biology, 319: 943-946. https://pdfs.semanticscholar.org/d41b/7710b29fe90fed2d44af6b46ab65f38ee9a1.pdf

Hilgartner, S. 2009. Intellectual Property and the Politics of Emerging Technology: Inventors, Citizens, and Powers to Shape the Future." Chicago-Kent Law Review, 84 (1): 197-224. http://scholarship.kentlaw.iit.edu/cklawreview/vol84/iss1/9/

Metlay, Grischa. 2006. "Reconsidering Renormalization: Stability and Change in 20th-Century Views on University Patents." Social Studies of Science 36 (4): 565–97. http://www.jstor.org/stable/25474460.

Myers, Greg. 1995. "From Discovery to Invention: The Writing and Rewriting of Two Patents." Social Studies of Science 25 (1):57–105. http://www.jstor.org/stable/285525.

Powell, Walter W., Jason Owen-Smith, and Jeannette A. Colyvas. 2007. "Innovation and Emulation: Lessons from American Universities in Selling Private Rights to Public Knowledge." Minerva 45 (2):121–42. https://doi.org/10.1007/s11024-007-9034-2.

2.4.5. Group discussion: Sectoral Dimensions of Innovations: patterns of innovation activities, 'traditional' and 'high technologies' sectors, labour & policy specificities

Literature:

Greskovits, B. (2003) - Beyond Transition: The Variety of Post-Socialist Development, paper presented at the Workshop "Sectoral Approaches to Late Development", June 14-15, CPS-CEU, Budapest, Hungary

Shafer, Michael (1994) Winners and Losers. How Sectors Shape the Developmental Prospects of States, 1994, Ithaca, New York, Cornell Univ. Press, ch. 2 and 4

Malerba V. Sectoral Systems: How and Why Innovation Differs across Sectors in Fagerberg, Jan, David C. Mowery, and Richard R. Nelson (Eds) 2006. The Oxford Handbook of Innovation. OUP Oxford. pp. 380-407.

Lundvall B.-A., Borras S. Science, Technology & Innovation Policy in Fagerberg, Jan, David C. Mowery, and Richard R. Nelson (Eds) 2006. The Oxford Handbook of Innovation. OUP Oxford. pp. 599-631.

von Tunzelmann N., Acha V. Innovation in "Low-Tech" Industries in Fagerberg, Jan, David C. Mowery, and Richard R. Nelson (Eds) 2006. The Oxford Handbook of Innovation. OUP Oxford. pp. 407–433.

2.4.6.-2.4.7. Presentations of the final project

See sections 1.5 Examination and 1.6 Grading for requirements.