University of Amsterdam
Faculty of Humanities

Course Manual

European Technology Policy since 1975

Artificial Intelligence, Starlink, and 5G

Ariane 5 rocket is launched from the ELA-3 launch pad in Kourou, French Guiana Credit: ESA/CNES/Arianespace – Photo Optique Video du CSG – JM Guillon

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Introduction

Welcome to this class! We will research how states, companies, civil society, scholars, engineers, and others co-produce technology through regulation, funding, development, standardisation, licensing, and institutionalisation.

This course aims to equip you as a future policy maker, policy influencer, or public intellectual with the ability to analyse the complex nature of technology and its societal impact. Furthermore, it aims to develop your ability to practice the skills needed to influence the trajectory of technology's development and implementation.

This course is quite intense, with many readings, exercises, and excursions, but I trust that working together will be rewarding!

Please read and reread this syllabus carefully. Answers to most of your questions can be found here. You can use the Canvas messaging system for queries about the course or simply ask them in class.

I look forward to learning, engaging, and collaborating with you in this course!

Course Description

In this course, we will jointly trace back the roots of many of the characteristic technologies of today, such as GPS, 5G, AI, Starlink-enabled satellite internet, and fibre-optic internet connectivity. It is often thought that these technologies have their roots in the private sector, but in this course, we will trace back these developments to foreground their intertwinement with the public sector. This allows us to unearth the role of technology policy in the shaping of 'breakthrough technologies', but also show where such policies and technologies fail. This course straddles the fields of the history of technology, science and technology studies, and governance studies as it seeks to provide students with the methodological tools and theoretical understanding to critically interrogate claims about contemporary and historical technologies such as the telegraph, artificial intelligence (AI), and quantum computing.

Course Objectives

- Students can explain the different facets of the socio-technical production of society through technology and innovation policy and the limitations of these approaches;
- Students can apply different theoretical frameworks from the fields of policy and governance studies, the history of technology, and science and technology studies;
- Students can critically interrogate claims about contemporary and historical technologies such as the telegraph, Artificial Intelligence (AI), and quantum computing, and demonstrate this ability by communicating it to an academic and policy audience.

Course Langauge

The principal course language is English. All course readings and other materials are in English.

Course Schedule, Lesson Objectives, and Readings

Session #	Date	Topic & Objective	Readings
1	February 10 **Sign up for Presentations. Discussants, Group Policy Papers, and Paper Presentations.**	What is Technology Gain insight into the social nature of technology. Establish shared expectations for the course.	Latour, Bruno. 1990. "Technology Is Society Made Durable." The Sociological Review 38 (S1): 103–31. https://doi.org/10.1111/j.1467-954X.1990.tb03350.x. Draghi, Mario. 2024. "The Future of European Competitiveness." Brussels: European Commission. https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en. Bonus: Dietrich, Anita, Florian Dorn, Clemens Fuest, Daniel Gros, Giorgio Presidente, Philipp-Leo Mengel, and Jean Tirole. 2024. "Europe's Middle-Technology Trap." 25. Munich, Germany: Economic Policy Forum Europe.

			https://www.econpol.eu/publications/forum-2024-4-economic-policy-and-its-impact/europes-middle-technology-trap.
2	February 12 Choose a technology you will research and write your paper on during this course.	What is Technology Policy? Interrogate the political nature of technology and the ways politics seek to enable technology development.	Winner, Langdon. 1980. "Do Artifacts Have Politics?" Daedalus 109: 121. https://www.jstor.org/stable/20024652 Cantner, Uwe, and Andreas Pyka. 2001. "Classifying Technology Policy from an Evolutionary Perspective." Research Policy 30 (5): 759–75. https://doi.org/10.1016/S0048-7333(00)00104-9. Bonus: Pack, Howard, and Kamal Saggi. 2006. "Is There a Case for Industrial Policy? A Critical Survey." The World Bank Research Observer 21 (2): 267–97. https://doi.org/10.1093/wbro/lkl001.
3	February 17	Who Produces Technology? Argue about the role of different actors in the production of technology	Jasanoff, Sheila, Sang Hyun Kim, and Stefan Sperling. "Sociotechnical Imaginaries and Science and Technology Policy: A Cross-National Comparison." NSF Research Project, Harvard University, 2007. https://sts.hks.harvard.edu/files/imaginaries/NSF-imaginaries-proposal.pdf Blind, Knut. 2024. "The Role of the Quality Infrastructure within Socio-Technical Transformations: A European Perspective." Technological Forecasting and Social Change 199 (February): 123019. https://doi.org/10.1016/j.techfore.2023.123019. Bonus:

			Laurent, Brice. 2022. European Objects: The Troubled Dreams of Harmonization. MIT Press.
4	February 19	Technology Policy in the EU Analyze the approach to technology policy in the EU	Eaton, Jonathan, Eva Gutierrez, and Samuel Kortum. "European Technology Policy." Economic Policy 13, no. 27 (October 1, 1998): 404–38. Peterson, John, and Margaret Sharp. Technology Policy in the European Union. London: Macmillan Education UK, 1998. Introduction and Conclusion. Bonus: Kaiser, Wolfram, and J. W. Schot. 2014. Writing the Rules for Europe: Experts, Cartels, and International Organizations. Making Europe : Technology and Transformations, 1850-2000. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan.
5	February 24 13:00 at EPO in Rijswijk! (see details below)	**EXCURSION EPO** Experience different approaches to managing knowledge - and how this is an innovation and protection policy mechanism.	Rouvinen, Petri, and Rikard Stankiewicz. 2009. "Are Intellectual Property Rights Hindering Technological Advance? The Need for Technological Commons." Review of Policy Research 26 (1–2): 195–217. https://doi.org/10.1111/j.1541-1338.2008.00375.x.
6	February 26	Space I Dissect the complex entanglements of state and market in space programs	Robinson, Douglas K. R., and Mariana Mazzucato. "The Evolution of Mission-Oriented Policies: Exploring Changing Market Creating Policies in the US and European Space Sector." Research Policy, New Frontiers in Science, Technology and Innovation Research from SPRU's 50th Anniversary Conference, 48, no. 4 (May 1, 2019): 936–48.

			Klimburg-Witjes, Nina. 2023. "A Rocket to Protect? Sociotechnical Imaginaries of Strategic Autonomy in Controversies About the European Rocket Program." Geopolitics, February, 1–28. https://doi.org/10.1080/14650045.2023.2177157. Bonus: Deudney, Daniel. 2020. Dark Skies: Space Expansionism, Planetary Geopolitics, and the Ends of Humanity. Oxford University Press, USA. Pic, Pauline, Philippe Evoy, and Jean-Frédéric Morin. 2023. "Outer Space as a Global Commons." International Journal of the Commons 17 (1): 288–301. Sutch, Peter, and Peri Roberts. 2019. "Outer Space and Neo-Colonial Injustice: Distributive Justice and the Continuous Scramble for Dominium." International Journal of Social Economics.
7	March 3 13:00 - 16:30 at ESA in Noordwijk! (see details below)	**EXCURSION ESA** Experience the breath and materiality of the European space program	Suzuki, Kazuto. Policy Logics and Institutions of European Space Collaboration. Routledge, 2017. Chapters 1 and 2 Watch: https://www.youtube.com/watch?v=XjRHl2Rr9tQ&t=13s&ab_channel=MCH2022
8	March 5	Space II Understand the role of infrastructure, knowledge and policy in the building of Europe	Tricco, Giovanni. 2023. "The Upcoming of Iris2: Bridging the Digital Divide and Strengthening the Role of the EU in International Space Law." Journal of Law, Market & Innovation 2 (2): 17–42. https://doi.org/10.13135/2785-78

			67/7952. Michael, Chlormann, and Nina Klimburg-Witjes. 2022. “Troubled Orbits and Earthly Concerns: Space Debris as a Boundary Infrastructure.” Science, Technology & Human Values 47 (5): 960–85. https://doi.org/10.1177/01622439211023554. Bonus: Deplano, Rossana. 2021. “The Artemis Accords: Evolution or Revolution in International Space Law?” International & Comparative Law Quarterly 70 (3): 799–819. https://doi.org/10.1017/S0020589321000142.
9	March 10	Telecommunications I Gain insight into the long history of telecommunications and the role of Europe.	Zajácz, Rita. Reluctant Power: Networks, Corporations, and the Struggle for Global Governance in the Early 20th Century. MIT Press, 2019. ‘Introduction: Network Control’ Kammerer, Patrick. “Off the Leash. The European Mobile Phone Standard (GSM) as a Transnational Telecommunications Infrastructure.” In Materializing Europe: Transnational Infrastructures and the Project of Europe, edited by Alexander Badenoch and Andreas Fickers, 202–22. London: Palgrave Macmillan UK, 2010. Bonus: Fickers, Andreas, and Pascal Griset. 2019. Communicating Europe: Technologies, Information, Events. Making Europe : Technology and Transformations, 1850-2000. London: Palgrave Macmillan.

10	March 12	Telecommunications II Understand more recent conflicts and contestations in telecommunications, most notably around 5G	Frias, Zoraida, and Jorge Pérez Martínez. "5G Networks: Will Technology and Policy Collide?" Telecommunications Policy, The implications of 5G networks: Paving the way for mobile innovation?, 42, no. 8 (September 1, 2018): 612–21. Maxigas, and Niels ten Oever. 2023. "Geopolitics in the Infrastructural Ideology of 5G." Global Media and China, August, 20594364231193950. https://doi.org/10.1177/20594364231193950. Bonus: Gabrys, Jennifer. 2014. "Programming Environments: Environmentality and Citizen Sensing in the Smart City." Environment and Planning D: Society and Space 32 (1): 30–48. https://doi.org/10.1068/d16812.
11	March 19	AI challenges Session with AI governance expert Lisa Vermeer of the Dutch Ministry of Economic Affairs and Climate who was part of the negotiations on the AI act	Cancela-Outeda, Celso. 2024. "The EU's AI Act: A Framework for Collaborative Governance." Internet of Things 27 (October):101291. https://doi.org/10.1016/j.iot.2024.101291. Balayn, Agate, and Seda Gürses. 2024 "Misguided: AI Regulation Needs a Shift in Focus." Internet Policy Review. https://policyreview.info/articles/news/misguided-ai-regulation-needs-shift/1796. Bonus: Liebig, Laura, Licinia Güttel, Anna Jobin, and Christian Katzenbach. 2024. "Subnational AI Policy: Shaping AI in a Multi-Level Governance System." AI & SOCIETY 39 (3): 1477–90.

			https://doi.org/10.1007/s00146-022-01561-5. Liebig, Laura, Anna Jobin, Licinia Güttel, and Christian Katzenbach. 2024. “Situating AI Policy: Controversies Covered and the Normalisation of AI.” Big Data & Society 11 (4): 20539517241299725. https://doi.org/10.1177/20539517241299725. Schinkel, Willem. 2023. “Steps to an Ecology of Algorithms.” Annual Review of Anthropology 52 (1): 171–86. https://doi.org/10.1146/annurev-anthro-052721-041547.
12	March 20	AI history Understand the relation between AI and cybernetics and its role in the cold war and the internet	Edwards, Paul N. 1996. The Closed World: Computers and the Politics of Discourse in Cold War America. MIT Press. Chapter 7 + 8 Bonus: Cath, Corinne. 2018. “Governing Artificial Intelligence: Ethical, Legal and Technical Opportunities and Challenges.” Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 376 (2133): 20180080. https://doi.org/10.1098/rsta.2018.0080.
Canvas	March 25		Deadline Group Policy Paper
Canvas	March 28		Deadline Individual Academic Research Paper

Excursions
There will be two excursions. The first is to the European Patent Office on February 24.

On February 24, you must be at 13:00 at EPO at the Patentlaan 2, 2288 EE Rijswijk. Bring your passport or other government-issued ID.

The second excursion is to the European Space Agency on March 3.

On March 3, you must be at 13:00 at the ESTEC Gate Reception, Keplerlaan 1, in Noordwijk. **Bring your passport or other government-issued ID.** (To travel by public transport, take a train to Leiden Centraal and then take bus Arriva 400 destination Katwijk and you will stop at ESA ESTEC.

If you arrive too late for the excursions, you will not be able to participate in them and hence will not be able to finish the course.

Passing Grade
An average of 5.5 is the minimum grade you need to pass the course. Lower grades on one deliverable may be compensated by higher grades on others. Individually written assessments that count for the final mark may be retaken once (see the current version of the Teaching and Examination Regulations), on or before the end of the Block. Group work may not be resubmitted.

Resits
Resits are only available for individual submissions. In case of a resit, the last grade counts as the final grade. The research paper resit will be a rewritten version of the paper, with a deadline on or before the date of the exam resit. Research papers that are handed in late will be treated as resits.

Participation
This course takes place over six weeks. Meetings usually consist of two times two hours of contact time per week in which we will work actively together in a seminar style. All sessions will take place onsite, except for the excursions. There are two excursions, one to the European Space Agency and one to the European Patent Office. To finish the course, participation in both excursions is mandatory, one in-person class may be missed. If you miss a class, ensure someone else takes notes for you. Please ensure you have read the texts before class, if you have not done so, please let me know.

The classroom is a place of learning for everyone; therefore, it should be a safe and enabling learning environment. This can only be the case if we make it that space together. This means there is ample room to make mistakes, experiment with different opinions, take each other's opinions seriously, and consider sensibilities to make it an inclusive space. If you have particular needs that should be considered for this course, please contact the study advisors about this.

Study Load
The standard of ECTS credit states that coursework amounts to 28 hours of work per ECTS point, the total amount of this course is 6 ECTS. This means that the total work

hours for this course is 168 hours. This means a total of 28 hours per week. If one deducts two times two hours for the seminars, there are **twenty-two hours for self-study per week.**

This consists of preparing for and participating in the meetings and completing the deliverables. The amount of effort may vary from session to session, but the workload is inevitably focused on the period around delivery due dates. Therefore, I encourage that we work together in class, in groups, and individually on the research and policy papers during the whole course period.

Course Evaluation
Course evaluations are vital for improving the quality of courses and study programmes. At the end of a teaching period, questionnaires are distributed among the course participants. The Board of Studies discusses the results of these questionnaires, and ideas for improvement are communicated to the course coordinator. More information on the Board of Studies is available at http://student.uva.nl/meus/az/item/board-of-studies.html.

Please take time to fill the course evaluations at the end of the course.

However, you do not have to wait until the end of the course to voice any issues or suggestions that you may have. Let me know about them before or after a class or via Canvas.

Session Locations
Please check https://rooster.uva.nl for the location of our meetings.

Deliverables

General guidelines for submitting written work
During the course, you are expected to submit several pieces of work. It is important to note the following requirements:

- Documents submitted digitally should conform to the following rules: PDF format, A4 size, fully justified paragraphs, with single-line spacing, and page numbers identified. The following information should be marked on the front page of the submission:
    - name
    - student number
    - course title and academic year
    - deliverable name
    - title of piece
    - date of submission
- Note that the front page of your submission is not included in the page limits described below.

- Students must inform themselves of standard academic procedures for citing and referencing: coherence and consistency are most important. Please use Chicago (author-date) as the reference style.
- Language, spelling, and grammar are important, please double-check before submitting.
- Students are expected to be familiar with the University's code of conduct and rules on plagiarism. For more information on preventing plagiarism, see the UvA webpage on plagiarism and fraud, and the Academic Integrity Guide from the Faculty of Humanities.
- All deliverables are submitted via Canvas.

Individual Academic Research Paper (40%)

Students will write a short individual research paper (3000 words, margin either way of 10%, excl. references and bibliography) about a specific research topic related to a central theme in the course.

This research paper is based on literature and (archival or published) primary sources, or by deploying other research methods.

At the end of the course, you will submit a paper in which you apply the perspectives on the co-production of a particular technology in an extensive analysis of, for instance, the policies that enabled it, the sociotechnical imaginary that guided its development, the ideology that underpins it, the societal ordering that it provided, or the (economic or political) interests that it serves.

During the seminar sessions, you must give a short (eight-minute) presentation of your plans for your paper. You will receive feedback from the lecturer and your peers during the session. Please sign up for your presentations on Canvas during the first session.

Your research paper will be assessed using the following rubric:

1. formulation of a feasible research question
2. accurate synthesis and comprehensive review of existing secondary literature
3. critical engagement with both primary and secondary sources
4. the clarity of presentation (style, language, formatting, et cetera)

Your presentation will be assessed using the following criteria:

1. clarity of presentation
2. awareness of context (show you have read relevant literature, etc.)
3. feasibility of your research design

Your paper will have the following sections

1. Abstract (Summary of the paper in max 200 words)
2. Introduction (Introduce research questions, relevance, and context)
3. Method (How will you answer your research question)
4. Literature Review (What did other academics say about your topic)

5. Analysis (Your original research)
6. Conclusions (The answer to the research question, contribution to theory and potential practical recommendations, and suggestions for future research)
7. References

To help you develop your research, we will take time in the course to develop your ideas. You are recommended to choose a technology topic in week 1 and then research and analyse it using the theoretical frameworks provided in the course (focusing on the roles of the state, companies, civil society, and societal impact). Possible example technologies you could choose as the topic of your paper:

- the (colonial) telegraph
    - Great Britain
    - India
    - Netherlands (Radio Kootwijk!)
    - ITU
- telephony and telecommunication
    - Wired
    - GSM
    - 3G
    - 4G
    - 5G
    - Spectrum policy
    - Standardization
        - ETSI
        - ITU
- Space
    - Green Space
    - Space Debris
    - National Space Programmes
        - Japanese
        - Congolese
        - French
        - Soviet
        - US
        - Chinese
    - International Space Programmes
    - Specific satellite constellations, Space Missions, Vessels, etc
        - Galileo
        - Mir
        - International Space Station
        - Ariane
    - Space Weapons
    - Space Treaty
    - Space Governance
- Artificial Intelligence
    - The history of AI (cold war)

    - Machine learning
    - Neural Networks
    - Computing power industry
    - Data for AI
    - AI winters

- Quantum
    - Quantum computing
    - Quantum standardization
    - Quantum networking
    - Quantum sensing
- Computing
    - ARPAnet
    - Bulletin Board Systems
    - Linux/Unix
    - Android
    - Gaia-X
    - Data centers
    - Submarine cables
    - IoT and sensor networks
    - Open source software
    - Open hardware
- Energy
    - Euratom
    - Smart grids
    - Net congestion
    - Small modular reactors
    - Chernobyl
    - Mururoa

Every week you are invited to select and read a source related to your topic and write 250 words about your reflection on it on Canvas.

Policy Brief (Group work) (30%)

Students are required to submit, as a group, a three-page advice to the European Commission on how to respond to the Draghi report. This advice should be written from a perspective that considers material technology, societal, economic, and environmental impacts. Sign up for the group work on Canvas in week I.

It would draw on theoretical and empirical literature to build up an argument. The assignment should contain recommendations for future action.

For this deliverable, imagine you are a policy expert trying to convince a group of stakeholders about your concerns. The length should be no longer than 2000 words and be actionable.

Presentation of Text (20%)

Students will sign up for the presentation of one of the texts on Canvas. The presentation will introduce the author, the main concepts in the text, the main line of argumentation, and the text's relation to other readings in the course. You could also try to illustrate the text by applying it to a concrete issue or illustrate it by applying it to a cultural object. Slides and/or handouts may be part of the presentation.

Discussant (of Presentation) (10%)

Students will sign up to be the discussant of one of the presentations on Canvas. As a discussant, you will briefly summarise and reflect on the presentation (what was good, what could be done better, what was missing), ask questions to the presenter, and subsequently engage the audience and the presenter in a discussion about the text. Your main responsibility is to help the audience understand the paper better and to help establish a class discussion.

Deliverables Checklist

	Item	Weight	Date Due	Length
1	Individual Academic Research Paper	40%	March 28, 2025	3000 words
2	Policy Brief (Group work)	30%	March 25, 2025	2000 words
3	Presentation of Text	20%	during seminars	10-15 minutes
4	Discussant (of Presentation)	10%	during seminars	5 - 10 minutes

Research Resources

You will need to consult academic periodicals for your research paper!

Online sources such as https://lib.uva.nl, https://scholar.google.com, https://academia.edu, and https://osf.io/preprints/socarxiv host great papers. There are also tools such as https://www.researchrabbit.ai/ and https://www.webofscience.com/ that help you find relevant (related) publications.

Use the University Library online service to scan through the following journals: New Media and Society, Science, Technology and Human Values, Social Studies of Science, Science and Technology Studies, Journal of Responsible Innovation, European Policy Analysis, Information Infrastructure and Policy, and European Journal of Transport and Infrastructure Research.

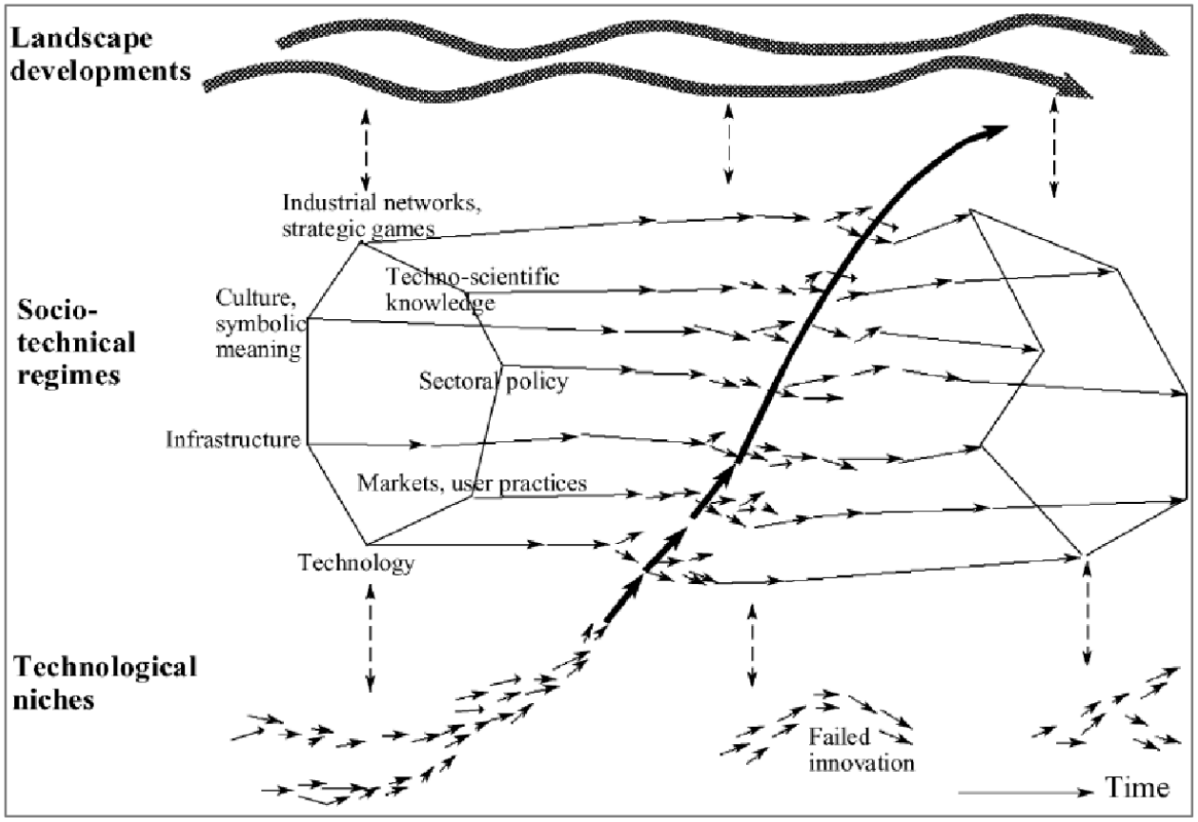
In addition to the UvA University Library, books can be consulted in the university libraries in Leiden or Utrecht (via Interlibrary loan or by visiting the libraries themselves), and the library of the International Institute of Social History (Amsterdam) or the Royal Library (The Hague).

Writing Tips

Writing is one of the main tools used in the academic and policy trades. However, writing is notoriously hard. The good news is: it gets easier if you practice, but it will always take effort. My supervisor once told me that a text can be easy on the reader or the writer. Luckily, you are not on your own. The University of Amsterdam has several online resources to help you focus and deal with procrastination. I also wholeheartedly recommend the UvA Writing Center; they provide courses, support, tutorials, and crash courses on writing. Finally, make sure you write every day and make it a habit. Start with 250 words every day. This can be through journaling, making summaries of classes, or writing fiction. Once you get comfortable with writing, it will be much more fun and engaging (just like with any other craft or ability).

Last note

You made it to the end! That's excellent! Please wear a red garment to the first class so I know you did read this.



from: Geels, Frank W. 2002. "Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study." Research Policy, NELSON + WINTER + 20, 31 (8): 1257–74. https://doi.org/10.1016/S0048-7333(02)00062-8.