

## Index

Note: Illustrations and tables are indicated by page numbers in *italics*.

- abduction, 94
- advertising, 68–69, 185, 185n1
- AI. *See* artificial intelligence (AI)
- Alac, M., 163
- ambient technologies, 187n1
- analogy, 42, 42, 94
- archaeology, 97, 174–175
- Arctic, 16, 22, 56, 142–150, 149, 156
- Arctic Program, 152, 161
- artificial intelligence (AI), 12, 90–91, 169, 177, 183n4, 185n3
- automation, 6–7, 78, 85, 116–120, 173, 186n2
  
- Bachelard, G., 113
- Bailey, D. E., 119–120, 186n2
- barriers to communication
  - business, 57–59
  - historized, 59–60
  - professional, 60–61
  - silos and, 57–61
- Bateson, G., 67
- Bayesian networks, 70
- behaviorism, 187n2
- behavior surplus, 69, 176
- Berg, M., 173
- black boxing, 58–59, 145, 185n3
- Black-Scholes model, 118
  
- Boellstorff, T., 7, 109, 172
- Bowker, G. C., 31, 41, 58, 145
- Braverman, H., 117
- Brazil, 29–30, 57, 171
  
- Cambridge Analytica, 68
- CBM. *See* condition-based maintenance (CBM)
- Cecez-Kecmanovic, D., 139
- Chapman, R., 175
- choke erosion, 135, 137–138
- churns, 86
- circulating reference, 171
- climate change, 16, 40, 55, 73, 146, 161–162, 164, 181
- closed-loop system, 124
- communication, silos as barriers to, 57–61
- computerization, 12, 14, 117, 186n2
- concessional rounds, 30–32, 35–36, 40
- condition-based maintenance (CBM), 67–68
- Consolini, P. M., 173
- Constantiou, I. D., 87
- continuity, 32, 55, 74, 98–103, 110, 110
- control room, 3
- coral, 15, 146, 151–153, 153, 156–157, 170
- core sample, 36, 49, 49
- Crosby, A. W., 11
- Cumbers, A., 35

- data, defined, 71. *See also* geodata
- databases, 79–81
- data crafting, 71, 75–85, 77
- data curation, 73–74, 96, 173
- datafication, 7, 19, 25–26, 146–150, 149, 165, 173, 175–177
- liquefaction and, 119
- data friction, 20, 30, 57, 59, 62–63, 73–74, 87
- data identity, 79–82
- data maintenance, 72–73
- data managers, 20, 75–87, 77, 97–98
- data overviews, 83–85
- data platforms, 61–63. *See also* platformization
- data provenance, 73
- data repair, 72–74
- decision-making, organizational, 91–98, 96
- deep learning, 12, 70, 85, 89, 91, 185n2
- Deepwater Horizon* spill, 39, 55, 142, 185n1
- de Jonge, B., 68
- Denmark, 29–30
- Didier, E., 170
- digitalization, 186n2
- automation and, 116
- big data and, 118–119
- cost cutting and, 150–151
- disembedding and, 10
- industrial revolution and, 18
- knowledge and, 15–16
- as phenomenon, 14–15
- in sand-monitoring routines, 114
- transformative capacity of, 13
- digital representation, 8–12, 15, 42, 109, 114–116, 118–123, 122, 126, 130, 134, 171–172
- discontinuity, 2, 15, 32, 103–106, 110, 110
- disembedding, 10–11, 15, 109, 119, 121, 123–124, 180. *See also* liquefaction
- Diskos database, 79–81
- Dodgson, M., 119
- domestication, 139, 169
- Dougherty, D., 94
- Dourish, P., 183n2
- Dreyfus, H., 90
- Dreyfus, S. E., 90
- drilling, 48–51, 49
- Dunne, D. D., 94
- “Dutch illness,” 29
- economic liberalization, 19, 36–38
- Edwards, P. N., 73, 164
- efficiency standards, 33–34
- embeddedness, 1, 10. *See also* disembedding
- embodiedness, 1, 90, 120, 164, 172, 175
- emergence, 1
- empiricism, 12, 69–70
- environmental monitoring, 146–150, 149
- EnviroTime project, 155–160
- evidence, for prospect, 98–103, 100–101, 103
- explainable artificial intelligence, 185n3
- exploration, 44–48, 45–46, 48, 95–98, 96
- Facebook, 68–69
- “facts,” 144–146
- Fine, G. A., 93
- fishing industry, 18, 40, 141–142, 147–149, 154, 158, 165
- Foucault, Michel, 145
- 4-D seismic, 47–48, 48
- funnel model, 95, 96, 106–107
- gaps, 98–99
- Garfinkel, H., 89
- geodata
- in databases, 79–81
- digital representation of, 42–43
- drilling and, 48–51, 49
- exploration and, 44–48, 45–46, 48
- historical, 77
- information systems and, 43
- maintenance and, 54–57
- monitoring and, 54–57
- navigating, 77

- phases, 43
- production and, 53, 53–54
- quality, 43
- real-time, 43
- silos and, 57–61
- types and characteristics, 43–57, 44–46, 48–49, 51, 53
- well logging and, 51–53, 52
- work practices and, 56
- geological analogy, 42, 42
- Gerlitz, C., 176
- Gitelman, L., 73
- granularity, of data, 47, 50, 159
- Grover, V., 91
  
- handlingsregel*, 37
- Helmond, A., 176
  
- ice edge, 147, 161–162, 162
- IloT. *See* Industrial Internet of Things (IIoT)
- India, 34, 180
- individualism, 176–177, 187n2
- Industrial Internet of Things (IIoT), 7, 18, 67, 116, 169
- Internet of Things (IoT), 11, 18, 38, 48–49, 67, 116–120, 143, 146, 150–154, 153, 155, 157, 169
- IoT. *See* Internet of Things (IoT)
  
- Jackson, S., 72, 74, 86
- Johan Sverdrup, 50–51
- Jones, M., 71
  
- Kallinikos, J., 87, 165
- Kling, Rob, 183n3
- Knorr Cetina, K., 9, 109, 163, 171, 186n3
- knowing
  - action and, 115
  - infrastructure, 32
  - machineries of, 12, 16, 18–19, 21, 21–22, 43, 170, 175–178
  - method of, 113
  - modes of, 15–16, 21, 164, 172–175
  - objects of, 10, 15, 21, 170–172
- Kotliar, D. M., 177
  
- LaPorte, T. R., 173
- Latour, Bruno, 9, 13, 34, 67, 78, 141, 171
- Lehr, D., 139
- Leonardi, P. M., 119–120
- liberalization, economic, 19, 36–38
- Lie, Einar, 30
- lightweight interventions, 54–55
- liquefaction, 10–12, 109, 118–119, 124, 139, 180
- logging while drilling (LWD), 52
- Long-Term Ecological Research Network, 146
- Lula da Silva, Luiz Inácio, 29–30
- LWD. *See* logging while drilling (LWD)
- Lyytinen, K., 91
  
- machine learning, 12–13, 15, 69, 78, 86–87, 118, 122, 173
- machineries of knowing, 12, 16, 18–19, 21, 21–22, 43, 170, 175
- MacKenzie, A., 70, 118
- maintenance
  - condition-based, 67–68
  - data, 72–73
  - geodata and, 54–57
- Malaysian Airlines flight 370, 145
- March, J. G., 92, 94
- Marcus, G., 185n2
- MAREANO program, 145–146
- marketing, 54, 68–69
- migration path, 26, 27, 46.98
- Millo, Y., 118
- models, 99–101, 100, 104–105, 161–162, 162–163
- modes of knowing, 15–16, 21, 164
- Mol, A., 111
- Møller, A. P., 29
- monitoring, geodata and, 54–57
- Monteiro, E., 42

- Morgan, M. S., 13, 120  
multiplicity, 94, 106–109, 110, 111
- natural resources, as public good, 30–36, 33  
neural nets, 70–71, 90–91, 185n2  
NGU. *See* Norges Geologiske Undersøkelser (NGU)  
nonconformities, 103  
Norges Geologiske Undersøkelser (NGU), 27–28  
Norwegian Petroleum Directorate (NPD), 28, 36, 49, 62, 185n3  
“no theory” position, 69–71, 90  
NPD. *See* Norwegian Petroleum Directorate (NPD)  
numbers, 183n2
- Obama, Barack, 39  
objects of knowing, 10, 15, 21, 170–172  
O’Connell, J., 126–127  
Ohm, P., 139  
Open Subsurface Data Universe (OSDU), 33–34, 63  
Orlikowski, W. J., 115  
Orr, J. E., 74  
OSDU. *See* Open Subsurface Data Universe (OSDU)  
outsourcing, 25, 45, 57–58
- Passi, S., 86  
Pearl, Judea, 70  
pedocomparator, 171  
Peirce, Charles Saunders, 119, 186n3  
permanent reservoir monitoring, 47–48, 48  
Petroleum Development Act, 32  
phenomenology, 72, 170–172  
PI System, 62  
platform, digital, 14, 61–63  
platformization, 62–63, 175–177  
Polk, J. B., 13, 73–74  
Pollock, N., 18, 93  
Porter, T. M.a, 163  
practice-oriented perspective, 1–2, 4, 85  
prediction, 12, 67–69, 86, 89–90, 93, 97, 100–101, 103–104, 106–107, 110, 138, 174  
Prentice, R., 172  
privatization, 30, 35–36  
programmatic advertising, 68, 185n1  
public goods, 19, 25–26, 30–36, 33, 50, 61, 64  
quantification, 2, 11, 15–16, 22, 42, 89, 97, 107–109, 164–165, 169–178  
reflection seismology, 44–45  
Reinert, E. S., 32, 36–37  
Ribes, D., 13, 73–74  
Ryggvik, H., 29, 143
- sand-monitoring rounds, 113–115, 120–138, 122  
seismic data, 44–48, 45–46, 48, 77, 101, 101–103  
seismic processing, 44  
seismic shadow, 47  
self-referentiality, 10  
sensemaking, 30, 41, 91, 98, 110, 172, 174  
sensors, 11  
sequence, 6  
simulation, referents and, 119  
Singh, D., 11  
situated action, 1, 9, 90  
situatedness, 1, 15  
sketches, 42  
Skinner, B. F., 187n2  
Snowden, Edward, 68  
social media, 2, 165, 175–176  
Solberg, Erna, 147–148  
source rock, 26, 27, 46, 100, 185n4  
standardization, 61–63  
standards, efficiency, 33–34  
Star, Susan Leigh, 14, 145, 183n3  
Stark, D., 94  
step-rate testing, 136–137

- subsea technologies, 5, 5–6, 6, 26, 38–40
- Suchman, L. A., 74
- swim bladder, 159–160
- symbolic artificial intelligence, 12, 90–91
- synthetic situation, 9, 171
  
- Tempini, N., 165
- 3-D seismic cubes, 108
- time-depth curve, 84
- Timmermans, S., 173
- trap, 26, 27
- Turkle, S., 119
  
- uncertainty
  - analogy and, 94
  - in exploration, 95–98, 96
  - multiplicity and, 94
  - prediction and, 93
  
- Venus project, 150–154, 153, 155, 158–161
- Vertesi, J., 163
- vitronite reflectance, 100, 185n4
- von Krogh, G., 13, 173
  
- WDP. *See* wired drill pipe (WDP)
- welfare technologies, 180, 187n1
- well intervention, 54
- well logging, 7, 19, 43, 51–52, 52, 101, 101, 101–102
- well maintenance, 54
- well tie-ins, 102, 103, 104, 108, 110
- well-time, 84–85
- Williams, R., 18, 93
- wired drill pipe (WDP), 50
- work, invisible, 20, 72–73, 76, 85, 92, 185n2
- Wylie, A., 94, 174–175
  
- Yoo, Y., 118
  
- Zittrain, J. L., 118
- Zuboff, S., 1, 8, 11, 68, 117, 176, 187n2
- Zuckerberg, Mark, 68–69



## INFRASTRUCTURES SERIES

Edited by Geoffrey C. Bowker and Paul N. Edwards

Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*

Lawrence M. Busch, *Standards: Recipes for Reality*

Lisa Gitelman, ed., *"Raw Data" Is an Oxymoron*

Finn Brunton, *Spam: A Shadow History of the Internet*

Nil Disco and Eda Kranakis, eds., *Cosmopolitan Commons: Sharing Resources and Risks across Borders*

Casper Bruun Jensen and Brit Ross Winthereik, *Monitoring Movements in Development Aid: Recursive Partnerships and Infrastructures*

James Leach and Lee Wilson, eds., *Subversion, Conversion, Development: Cross-Cultural Knowledge Exchange and the Politics of Design*

Olga Kuchinskaya, *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*

Ashley Carse, *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal*

Alexander Klose, translated by Charles Marcum II, *The Container Principle: How a Box Changes the Way We Think*

Eric T. Meyer and Ralph Schroeder, *Knowledge Machines: Digital Transformations of the Sciences and Humanities*

Geoffrey C. Bowker, Stefan Timmermans, Adele E. Clarke, and Ellen Balka, eds., *Boundary Objects and Beyond: Working with Leigh Star*

Clifford Siskin, *System: The Shaping of Modern Knowledge*

Lawrence Busch, *Knowledge for Sale: The Neoliberal Takeover of Higher Education*

Bill Maurer and Lana Swartz, *Paid: Tales of Dongles, Checks, and Other Money Stuff*

Katayoun Shafiee, *Machineries of Oil: An Infrastructural History of BP in Iran*

Megan Finn, *Documenting Aftermath: Information Infrastructures in the Wake of Disasters*

Ann M. Pendleton-Jullian and John Seely Brown, *Design Unbound: Designing for Emergence in a White Water World, Volume 1: Designing for Emergence*

Ann M. Pendleton-Jullian and John Seely Brown, *Design Unbound: Designing for Emergence in a White Water World, Volume 2: Ecologies of Change*

Jordan Frith, *A Billion Little Pieces: RFID and Infrastructures of Identification*

Morgan G. Ames, *The Charisma Machine: The Life, Death, and Legacy of One Laptop per Child*

Ryan Ellis, *Letters, Power Lines, and Other Dangerous Things: The Politics of Infrastructure Security*

Mario Biagioli and Alexandra Lippman, eds., *Gaming the Metrics: Misconduct and Manipulation in Academic Research*

Malcolm McCullough, *Downtime on the Microgrid: Architecture, Electricity, and Smart City Islands*

Emmanuel Didier, translated by Priya Vari Sen, *America by the Numbers: Quantification, Democracy, and the Birth of National Statistics*

Andrés Luque-Ayala and Simon Marvin, *Urban Operating Systems: Producing the Computational City*

Michael Truscello, *Infrastructural Brutalism: Art and the Necropolitics of Infrastructure*

Christopher R. Henke and Benjamin Sims, *Repairing Infrastructures: The Maintenance of Materiality and Power*

Stefan Höhne, *New York City Subway: The Invention of the Urban Passenger*

Timothy Moss, *Conduits of Berlin: Remaking the City through Infrastructure, 1920–2020*

Claude Rosental, translated by Catherine Porter, *The Demonstration Society*

Blake Atwood, *Underground: The Secret Life of Videocassettes in Iran*

Huub Dijstelbloem, *Borders as Infrastructure: The Technopolitics of Border Control*

Dylan Mulvin, *Proxies: Standards and Their Media*

Eric Monteiro, *Digital Oil: Machineries of Knowing*



This is a section of [doi:10.7551/mitpress/14604.001.0001](https://doi.org/10.7551/mitpress/14604.001.0001)

# Digital Oil

## Machineries of Knowing

By: Eric Monteiro

### Citation:

*Digital Oil: Machineries of Knowing*

By: Eric Monteiro

DOI: 10.7551/mitpress/14604.001.0001

ISBN (electronic): 9780262372282

Publisher: The MIT Press

Published: 2022

The open access edition of this book was made possible by generous funding and support from MIT Press Direct to Open



The MIT Press

© 2022 Massachusetts Institute of Technology

This work is subject to a Creative Commons CC-BY-ND-NC license. Subject to such license, all rights are reserved.



The MIT Press would like to thank the anonymous peer reviewers who provided comments on drafts of this book. The generous work of academic experts is essential for establishing the authority and quality of our publications. We acknowledge with gratitude the contributions of these otherwise uncredited readers.

This book was set in Adobe Garamond and Berthold Akzidenz Grotesk by Jen Jackowitz.

Library of Congress Cataloging-in-Publication Data

Names: Monteiro, Eric, author.

Title: Digital oil : machineries of knowing / Eric Monteiro.

Description: Cambridge, Massachusetts : The MIT Press, [2022] |

Series: Infrastructures. | Includes bibliographical references and index.

Identifiers: LCCN 2022003259 (print) | LCCN 2022003260 (ebook) |

ISBN 9780262544672 (paperback) | ISBN 9780262372282 (pdf) |

ISBN 9780262372299 (epub)

Subjects: LCSH: Petroleum industry and trade—Norway. | Oil fields—Norway—Data processing. | Oil field equipment and supplies industry—Norway—Technological innovations.

Classification: LCC HD9575.N62 M66 2022 (print) | LCC HD9575.N62 (ebook) |

DDC 338.2/72809481—dc23/eng/20220124

LC record available at <https://lccn.loc.gov/2022003259>

LC ebook record available at <https://lccn.loc.gov/2022003260>