<h1>Preface: The digitalSTS Community</h1>
<h1>Introduction</h1>
<h1>Introduction: Materiality</h1>
<h3>Laura Forlano</h3>
<h2>Unfolding Digital Materiality: How Engineers Struggle to Shape Tangible and Fluid Objects</h2>
<h3>Alexandre Camus and Dominique Vinck</h3>
<h2>The Life and Death of Data</h2>
<h3>Yanni Loukissas</h3>
<h2>Materiality Methodology, and Some Tricks of the Trade in the Study of Data and Specimens</h2>
<h3>David Ribes</h3>
<h2>Digital Visualizations for Thinking with the Environment</h2>
<h3>Nerea Calvillo</h3>
<h1>Introduction: Gender</h1>
<h3>Daniela K. Rosner</h3>
<h2>If “Diversity” Is the Answer, What Is the Question? Understanding Diversity Advocacy in Voluntaristic Technology Projects</h2>
<h3>Christina Dunbar-Hester</h3>
<h2>Feminist STS and Ubiquitous Computing: Investigating the Nature of the “Nature” of Ubicomp</h2>
<h3>Xaroula (Charalampia) Kerasidou</h3>
<h2>Affect and Emotion in Digital STS</h2>
<h3>Luke Stark</h3>
<h2>The Ambiguous Boundaries of Computer Source Code and Some of Its Political Consequences</h2>
<h3>Stéphane Couture</h3>
<h1>Introduction: Global Inequalities</h1>
<h3>Steven J. Jackson</h3>
<h2>Venture Ed: Recycling Hype, Fixing Futures, and the Temporal Order of Edtech</h2>
<h3>Anita Say Chan</h3>
<h2>Dangerous Networks: Internet Regulations as Racial Border Control in Italy</h2>
<h3>Camilla A. Hawthorne</h3>
<h2>Social Movements and Digital Technology: A Research Agenda</h2>
<h3>Carla Ilten and Paul-Brian McInerney</h3>
<h2>Living in the Broken City: Infrastructural Inequity, Uncertainty, and the Materiality of the Digital in Brazil</h2>
<h3>David Nemer and Padma Chirumamilla</h3>
<h2>Sound Bites, Sentiments, and Accents: Digitizing Communicative Labor in the Era of Global Outsourcing</h2>
<h3>Winifred R. Poster</h3>
<h1>Introduction: Infrastructure</h1>
<h3>Janet Vertesi</h3>
<h2>Infrastructural Competence</h2>
<h3>Steve Sawyer, Ingrid Erickson, and Mohammad Hossein Jarrahi</h3>
<h2>Getting “There” from the Ever-Changing “Here”: Following Digital Directions</h2>
<h3>Ranjit Singh, Chris Hesselbein, Jessica Price, and Michael Lynch</h3>
<h2>Digitized Coral Reefs</h2>
<h3>Elena Parmiggiani and Eric Monteiro</h3>
<h2>Of “Working Ontologists” and “High-Quality Human Components”: The Politics of Semantic Infrastructures</h2>
<h3>Doris Allhutter</h3>
<h2>The Energy Walk: Infrastructuring the Imagination</h2>
<h3>Brit Ross Winthereik, James Maguire, and Laura Watts</h3>
<h1>Introduction: Software</h1>
<h3>Carl DiSalvo</h3>
<h2>From Affordances to Accomplishments: PowerPoint and Excel at NASA</h2>
<h3>Janet Vertesi</h3>
<h2>Misuser Innovations: The Role of “Misuses” and “Misusers” in Digital Communication Technologies</h2>
<h3>Guillaume Latzko-Toth, Johan Söderberg, Florence Millerand, and Steve Jones</h3>
<h2>Knowing Algorithms</h2>
<h3>Nick Seaver</h3>
<h2>Keeping Software Present: Software as a Timely Object for STS Studies of the Digital</h2>
<h3>Marisa Leavitt Cohn</h3>
<h1>Introduction: Visualizing the Social</h1>
<h3>Yanni Loukissas</h3>
<h2>Tracing Design Ecologies: Collecting and Visualizing Ephemeral Data as a Method in Design and Technology Studies</h2>
<h3>Daniel Cardoso Llach</h3>
<h2>Data Sprints: A Collaborative Format in Digital Controversy Mapping</h2>
<h3>Anders Kristian Munk, Axel Meunier, and Tommaso Venturini</h3>
<h2>Smart Artifacts Mediating Social Viscosity</h2>
<h3>Juan Salamanca</h3>
<h2>Actor-Network versus Network Analysis versus Digital Networks: Are We Talking About the Same Networks?</h2>
<h3>Tommaso Venturini, Anders Kristian Munk, and Mathieu Jacomy</h3>

digitalSTS

A Field Guide for Science & Technology Studies

EDITED BY

Janet Vertesi & David Ribes

CO-EDITED BY

Carl DiSalvo · Laura Forlano · Steven J. Jackson
Yanni Loukissas · Daniela K. Rosner · Hanna Rose Shell

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

digitalSTS

A Field Guide for Science & Technology Studies

EDITED BY

Janet Vertesi & David Ribes

CO-EDITED BY

Carl DiSalvo **Laura Forlano** **Steven J. Jackson**
Yanni Loukissas **Daniela K. Rosner** **Hanna Rose Shell**

PRINCETON UNIVERSITY PRESS / PRINCETON & OXFORD

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

Copyright © 2019 by Princeton University Press

Requests for permission to reproduce material from this work should be sent to permissions@press.princeton.edu

Published by Princeton University Press
41 William Street, Princeton, New Jersey 08540
6 Oxford Street, Woodstock, Oxfordshire OX20 1TR

press.princeton.edu

All Rights Reserved

LCCN 2018955221
ISBN 978-0-691-18707-5
ISBN (pbk.) 978-0-691-18708-2

British Library Cataloging-in-Publication Data is available

Editorial: Eric Crahan, Pamela Weidman, Kristin Zodrow
Production Editorial: Terri O'Prey
Production: Jacquie Poirier
Publicity: Alyssa Sanford, Julia Hall
Copyeditor: Joseph Dahm

This book has been composed in IBM Plex Serif

Printed on acid-free paper. ∞

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

Contents

Preface: The digitalSTS Community ix

Introduction 1

Introduction / Materiality 11
Laura Forlano

Unfolding Digital Materiality: How Engineers Struggle to Shape Tangible and Fluid Objects 17
Alexandre Camus and Dominique Vinck

The Life and Death of Data 42
Yanni Loukissas

Materiality Methodology, and Some Tricks of the Trade in the Study of Data and Specimens 43
David Ribes

Digital Visualizations for Thinking with the Environment 61
Nerea Calvillo

Introduction / Gender 77
Daniela K. Rosner

If "Diversity" Is the Answer, What Is the Question? Understanding Diversity Advocacy in Voluntaristic Technology Projects 81
Christina Dunbar-Hester

Feminist STS and Ubiquitous Computing: Investigating the Nature of the "Nature" of Ubicomp 99
Xaroula (Charalampia) Kerasidou

Affect and Emotion in digitalSTS 117
Luke Stark

The Ambiguous Boundaries of Computer Source Code and Some of Its Political Consequences 136
Stéphane Couture

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

Introduction / Global Inequalities 157
Steven J. Jackson

Venture Ed: Recycling Hype, Fixing Futures, and the Temporal Order of Edtech 161
Anita Say Chan

Dangerous Networks: Internet Regulations as Racial Border Control in Italy 178
Camilla A. Hawthorne

Social Movements and Digital Technology: A Research Agenda 198
Carla Ilten and Paul-Brian McInerney

Living in the Broken City: Infrastructural Inequity, Uncertainty, and the Materiality of the Digital in Brazil 221
David Nemer and Padma Chirumamilla

Sound Bites, Sentiments, and Accents: Digitizing Communicative Labor in the Era of Global Outsourcing 240
Winifred R. Poster

Introduction / Infrastructure 263
Janet Vertesi

Infrastructural Competence 267
Steve Sawyer, Ingrid Erickson, and Mohammad Hossein Jarrahi

Getting "There" from the Ever-Changing "Here": Following Digital Directions 280
Ranjit Singh, Chris Hesselbein, Jessica Price, and Michael Lynch

Digitized Coral Reefs 300
Elena Parmiggiani and Eric Monteiro

Of "Working Ontologists" and "High-Quality Human Components": The Politics of Semantic Infrastructures 326
Doris Allhutter

The Energy Walk: Infrastructuring the Imagination 349
Brit Ross Winthereik, James Maguire, and Laura Watts

Introduction / Software 365
Carl DiSalvo

From Affordances to Accomplishments: PowerPoint and Excel at NASA 369
Janet Vertesi

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

Misuser Innovations: The Role of "Misuses" and "Misusers" in Digital Communication Technologies 393
Guillaume Latzko-Toth, Johan Söderberg, Florence Millerand, and Steve Jones

Knowing Algorithms 412
Nick Seaver

Keeping Software Present: Software as a Timely Object for STS Studies of the Digital 423
Marisa Leavitt Cohn

Introduction / Visualizing the Social 447
Yanni Loukissas

Tracing Design Ecologies: Collecting and Visualizing Ephemeral Data as a Method in Design and Technology Studies 451
Daniel Cardoso Llach

Data Sprints: A Collaborative Format in Digital Controversy Mapping 472
Anders Kristian Munk, Axel Meunier, and Tommaso Venturini

Smart Artifacts Mediating Social Viscosity 497
Juan Salamanca

Actor-Network versus Network Analysis versus Digital Networks: Are We Talking about the Same Networks? 510
Tommaso Venturini, Anders Kristian Munk, and Mathieu Jacomy

Acknowledgments 525
Contributors 529
Index 539

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

Introduction
Global Inequalities

Steven J. Jackson

STS concerns around the relationship between digital technologies and global inequalities are in many ways as old as the field itself. From photoelectric lighting kits (Akrich 1992) to Zimbabwean bush-pumps (de Laet and Mol 2000), STS scholars have long sought to untangle the complex linkages between technological growth and change, and the global flows and forms by which places, regions, and actors are drawn into new (and old) dependencies, both advantageous and otherwise. Against fantasies of a beneficent and frictionless globalism, or the march of happy capitals—Democracy, Development, Progress, etc.—work based in STS calls out the complex and ambivalent dynamics by which technology and "the global" meet. Studies that draw upon the rich heritage of STS theory and empirics are therefore especially well placed to engage with a now-growing set of concerns around the spread and differential impact of digital and human flows of all kinds, both within and across national and transnational spaces, proprietary platforms, and public spaces.

The chapters that follow deepen and extend this tradition. They provide new insight into the intersection between emerging digital forms and the (growing?) structures of inequality and differentiation to be found at the global scale. They speak to the mutual production of difference, inequality, and infrastructure: a relationship that leaves no side untouched. They underscore the distance between frequently utopian technological claims as framed by industry advocates and policy champions, and the messy social realities they are called upon to adjudicate and support. They suggest the frequent limits or brittleness of policy and design in relation to the complexities of social interaction. And they cast new and welcome light on sites and forms of technological labor and agency all too often obscured under prevailing accounts of technology.

Anita Say Chan charts the once and future promise of "edtech"—educational technologies from student laptops to massively open online courses (MOOCs)—and considers the recent explosion of public and private investments in educational technologies against the backdrop of prior histories and achieved (or not) results in countries of the Global South. Her chapter compares the contemporary "cycles of hype and hope" that characterize technology-centered aspirations for social change—here, around educational projects like One Laptop Per Child—against the obdurate realities of complex social and institutional environments, showing how the claims of tech evangelists and other champions of "venture education" work to efface both the realities of educational change (in the process often disempowering

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

actors most needed for such transformations to succeed—local teachers, school leaders, and learners themselves) and the histories of past failed efforts that might themselves provide a more "productive starting point for imagining the present and future as otherwise." Not very good at achieving results on their own terms, such interventions turn out to be very good indeed at reproducing education as a space not of learning but of *data*—and therefore subject to the forms of extraction, oversight, analysis, and control that have come to characterize technology- and data-driven initiatives elsewhere in the economy.

Camilla Hawthorne explores the troubling intersections between Internet security, public safety, and racialized systems of differential control that emerge as liberal democracies (here, Italy) enter into states of exception in response to real and perceived threats of public violence. Tracing the genesis and differential impacts of the 2005 Pisanu Decree, her analysis reveals how racialized imaginaries of violence can lead in turn to racialized regimes of surveillance, practiced against immigrant bodies and places of gathering (notably, public Internet cafés). Her findings give the lie to both any lingering notions of the "placelessness" of online life and the idea of an open and undifferentiated Internet, with freedoms of movement, expression, and association available to all. Locating these trends against longer histories of race and identity stemming from Italy's transformation from emigration to immigration as a dominant imaginary of territorial control, the chapter traces the various "interiorizations" of the border achieved through the regulation of online space. Hawthorne shows how these interiorizations are then made *productive* of forms of racialization and differentiation that characterize the ongoing project of postwar (and post-Fascist) Italian social and political identity.

Carla Ilten and Paul-Brian McInerney explore the as yet underdeveloped juncture between activist adoption of new digital tools, theories of collective behavior and social movements (CBSMs) originating in sociology and media studies, and STS theory and scholarship. As argued by the authors, each of the sociological and media studies traditions around these questions demonstrates important blind spots. CBSM theory lacks adequate accounts of the mechanisms, infrastructures, and networks by which contemporary social movements and activist networks are increasingly constituted. Work in communication and media studies in turn has tended to be platform-centric, missing the important connections across and beyond platforms through which movement identity and communication are sustained. In response, the authors point to older and newer STS work—from social construction of technology (SCOT) and actor-network theory (ANT) to more recent efforts (for example, the Gillespie et al. *Media Technologies* volume)—as providing promising leads for how these worlds might be put back together. The result is a notably co-constitutive approach, built around forms of equivalence, symmetry, and methodological pluralism.

David Nemer and Padma Chirumamilla's moving account of precariousness and repair in a Brazilian favela speaks to growing STS concerns around maintenance and repair as modalities of technological life and engagement, and the complex and irreducible materiality of many objects classed (but too easily) as digital. Turning presumptions of stable infrastructure and predictable function on their head, they explore instead the ongoing labor—of fixing and of living—by which breakdown, failure, and uncertainty are recuperated in the service of a livable(-enough) life, under conditions in which violence and precarity stand as existential and ever-present threats. This sense of fragility—whether expressed through the ongoing battle to sustain LAN house and telecenter connectivity

© 2019 Princeton University Press.
The material is protected by copyright and its reproduction is restricted by law, except that you may download each available chapter and copy, redistribute the material in any medium or format for personal use, educational, and non-commercial purposes only, provided that you give appropriate credit to Princeton University Press.

against the constant threat of brownouts and disconnection, or the equally fraught work of sustaining mobile phones and networks against the uncertain environments of favela living—opens up widely neglected domains of technological work and experience, and helps us toward richer and more satisfying accounts of how objects, infrastructures, and communities are sustained, evolved, and made durable through time.

Winifred Poster maps the emerging forms of communicative labor that subtend the global tech and service industries, with special focus on the nature and tensions of transnational customer service call centers. She tracks how sound and voice—and the increasingly sophisticated management of voice—operate as tools of affect, identity, and the negotiation of geographic and cultural difference. She details the role of accent management and synthetic forms of digital voice in constructing imaginary geographies and "façades of humanness" that mask and obscure the increasingly global organization of the service industries, while sustaining markers of difference and expectation that separate "good" cultural and geographical locations from "bad." The complex interactions of human and machine labor in this story belie any simple and wholesale movement toward automation in the service industries (as has been periodically predicted); rather, Poster's work shows how it is in the interplay of these forces—human, but not too human—that new globalized modes and transits of labor are produced.

Taken together, these chapters demonstrate the many rich possibilities for STS-inspired inquiry to cast new and needed light on "the global digital"—both in its inevitable and irreducible particularities, and in its common properties and gathering lines of force. Eschewing easy meta-stories and monochromatic moralities, the chapters speak instead to the messy entanglements of technology, practice, and power, the multiple forms of loss and violence they give rise to, and the artful (if rarely equal) ways in which actors navigate the shifting terrain of the digital as it moves across and constitutes global space.

Works Cited

Akrich, Madeleine. 1992. "The De-scription of Technological Objects." In *Shaping Technology/Building Society*, edited by Wiebe E. Bijker and John Law, 205–24. Cambridge, MA: MIT Press.

de Laet, Marianne, and Annemarie Mol. 2000. "The Zimbabwe Bush Pump: Mechanics of a Fluid Technology." *Social Studies of Science* 30 (2): 225–63.

Gillespie, Tarleton, Pablo Boczkowski, and Kirsten Foot, eds. 2014. *Media Technologies: Essays on Communication, Materiality, and Society*. Cambridge, MA: MIT Press.