Abernathy, W.J. 308, 354
Abolafia, M.Y. 356
accumulative function 111
activity-based costing (ABC) 201
adaptability standards 114
advanced audio coding (AAC) 332
   high-efficiency AAC (HE-AAC) 341
Aggarwal, N. 230
Ala-Fossi, M. 336, 340
Aldaz-Carroll, E. 28
Allied Tube & Conduit Corp. v. Indian Head, Inc. 413
Almunia, Joaquín 243
American National Standards Institute (ANSI) 281, 413
American Society for Testing and Materials (ASTM) 86, 413
American Society of Mechanical Engineers (ASME) 412
Anand, F.S.D. 28
Appelt, S. 58
Applegate, L.M. 323
Apple II 91
Arbanowski, S. 324
architectural innovation 71
The Architecture of Markets (Fligstein) 357
Arrow, K. 171, 262
Association Française de Normalisation (AFNOR) 405
Association of Licensed Automobile Manufacturers (ALAM) 313
Baller, S. 22
Ballon, P. 321, 322, 324, 329, 342
bandwagons 71
Baron, J. 261, 262
Bar, T. 49
Baskin, E. 113
battery electric vehicles (BEVs) 14, 302, 312, 315, 316
Beghin, J. 278
Bekkers, R. 92, 248, 258, 259
Bénézech, D. 27
Beniger, J.R. 84
Bergek, A. 44, 45, 68
Bernal, J.D. 64
Blind, K. 23, 42, 47, 48, 57, 188, 194–6, 200, 277, 383, 406
Blind, N. 23, 42, 47, 48, 57, 188, 194–6, 200, 277, 383, 406
Bluetooth Special Interest Group (SIG) 388
Board of Standards Review (BSR) 413
Bonvillian, W.B. 402
Bordeaux meeting 366, 367
border carbon adjustment (BCA) 408
Bowker, G.C. 108
Bozeman, B. 47
Braverman, H. 84
Brazilian Broadcasters Association (ABRA) 340
Brem, A. 41
British Standards Institution (BSI) 170
Brundtland Commission 404
business models
   costs and revenues 327
   defined 323, 324
   degree of modularity 325
   distribution of intelligence 325
   functional architecture 325–6
   interoperability 325
   and standards 325
   value network 326
   value proposition level 327–8
business model theory 323–5
Butter, F.A.G. 29
Cabral, L. 262
Callon, M. 357, 364, 368
Canada’s Oil Sands Innovation Alliance (COSIA) 406
Canadian Standards Association (CSA) 409
capital expenditure (CAPEX) 335
carbon capture and storage (CCS) 408, 409
Carlborg, P. 192
Carlsson, B. 66
Cassab, H. 191
CDD (European chip manufacturer) 386–7, 391
centralization versus decentralization 80
Chan, E.S.W. 276
Chen, M.X. 22
Chen, T. 214
Cheiran, E. 323
Chesbrough, H.W. 382
Choi, D.G. 39
Choudhary, M.A. 172
Clarke, K. 403
Clark, K.B. 354
Cloninger, P.A. 191
Cloud Management Working Group (CMWG) 416
Cloud Standards Customer Council (CSCC) 416
code division multiple access (CDMA) 278
codex alimenartarius 80
collective standards 85
commitment-based patent policies 239
committee standard 4
common innovation 68
Community Innovation Survey (CIS) 27, 30
corporate standardization management 377–94
case studies 384–91
chairman, ambivalent role 389
competition 383
definitions of success 390
diffusion of innovations 383–4
external influences 378–9
general managerial implications 391–2
influential factors 390–91
invested efforts and enthusiasm 388–9
stakeholders 380–81
standardization, marketing tool 389
success factors 390
cost and revenue structure 345–6
cost–benefit structure 13
cost sharing model 327
Cowan, R. 313, 402
CTM (Chinese telecommunication equipment manufacturer) 387–8, 391
cumulative innovation 253
Curkovic, S. 276
Cusumano, M.A. 93, 329
data communication 88
Dattée, B. 305
David, P.A. 4, 8, 9, 21, 27, 79
decentralized regulation process 294
declared essential patents 257–9
de facto standards 4, 79, 85, 91, 107, 146, 147, 151, 165, 178, 182, 281, 305, 354
Defense Advanced Research Projects Agency (DARPA) 414
de jure standards 4, 107, 272
Delcamp, H. 263
Delemarle, A. 360
Department of Justice (DoJ) 244, 247, 248
Department of Trade and Industry (DTI) 23, 27
de-skilling process 84
de Vries, H.J. 107–9, 111–12, 188, 281
diffusion
innovation and 304–5
selection and 307–8
digital audio broadcasting (DAB) 331–6, 342, 344, 345
architecture and business models 334–6
origin 331–2
standardization strategy 333–4
digital multimedia broadcasting (DMB) 331–6, 345
architecture and business models 334–6
origin 331–2
standardization strategy 333–4
Digital Radio Mondiale (DRM) 336
digital radio standardization 330–42
DAB/DMB 331–6
IBOC 336–42
Disclosed Standard Essential Patents (dSEP) database 231
disclosure rules 239
dominant technology platforms 146
Dost, G. 70, 402
Drejer, I. 199
Driver, C. 172
Dudley, Charles Benjamin 85, 86
Dutch Smart Industry fieldlabs 218
DVORAK design 21
e-business model 323
ecologies 83
of standards 86–91
economic actors 304
economic functions, of standards factors 39–40
in innovation process 38–58
integrating 45–6
research, development and 46–50
economic performance 176–7
economic sociology 289
Egyedi, T.M. 28, 355
Electric Vehicle Association of America (EVAA) 312
El Shamy, H. 24
emergent transition theory 308
Empirical economics of standards 23
EMS tool kit 406–9
energetic function 109
enterprise resource planning (ERP) 217
entrepreneurs 6, 72
environmental management system (EMS) 400
Environmental Protection Agency 405
Environmental Technology Verification standard 407
essence 123
European Broadcasting Union (EBU) 331
European Factories of the Future Research Association (EFFRA) 222
European Medicines Agency (EMA) model 294
European notified bodies (NBs) 291, 292, 294, 296, 297
European Patent Office (EPO) patents 232, 359
European Single Market 14, 287–99
historical background 290–93
European Standardization Organizations (ESOs) 291, 297
European Telecommunications Standards Institute (ETSI) 237, 246, 278, 331
Eurostat Oslo Manual 6
ex ante pricing commitments 96, 97, 254, 255, 259
exchange function 111
ex post methods 97, 254
eXtensible Markup Language (XML) 90
external company standards 214
Facilities Management Information System (FMIS) 202, 204
facility departments 202
facility management (FMT) 201–4
managerial implications 206–7
in the Netherlands 201, 205
standardization committee 202
facility suppliers 202
fair, reasonable and non-discriminatory (FRAND) patent 53, 89, 90, 96, 238, 245, 247, 255, 256, 259, 423, 424
Farrell, J. 21, 262
Federal Trade Commission (FTC) 244, 245
Ferguson, C.H.F. 91–2
Ferro, E. 277
fieldlabs
Dutch Smart Industry fieldlabs 218–19
Flexible Manufacturing 220
Smart Bending Factory 221
fifth-generation mobile (5G) standards development 213
Fikru, M.G. 276
handbook of innovation and standards

firm’s problem 271–4
first-generation mobile (1G) 222
Fligstein, N. 289, 356
Fontagné, L. 22
Ford, Henry 84, 85
Fordism 84, 312
Ford Motors 84, 85
Freeman, C. 66
Frenz, M. 31, 176
functional architecture 345
functional classification, of standards
classification requirements 108
commonalities and ambiguity 115
completeness 116–17
consistency 117
criteria for 108
description 118
de Vries functional classifications 111–12
economic functional classifications 112–13
extrinsic functions 111–12
independent, of subject area and sector 117
intermediate stocktaking 115
intrinsic functions 111
Kienzle’s primary functional classification 109–10
layered classification, ICT origins 113–14
literature review of 109–17
mutual exclusion 117
parsimony 116
primary functions 118–19
requirements 115–17, 121–2
secondary functions 110–11, 120–21
subjective functions 112
systematic underpinning for 107–8
function-specific innovation effects 108
Gaillard, J. 309, 310
Galindo-Rueda, F. 58
Gauch, S. 47
Gawer, A. 93, 329
General Data Protection Regulation 293
general purpose technologies (GPTs) 71, 168
generic effect 123
generic functional classifications 109
generic technology 167
German HighTech Strategy 47
Geroski, P.A. 172
Ghosh, R.A. 57
Global Approach 292
Global System for Mobile Communications (GSM) 53, 71, 192, 237, 383
Goffman, E. 357
greenhouse gas (GHG) emissions 408
green public procurement 57
Greenstein, S. 4, 79
green technology 302
Grimaldi, R. 29
Grimshaw, D. 191
gross domestic product (GDP) 12, 23
Großmann, A.-M 40, 50
Guerrero, J.L. 275
Hanseth, O. 27
harmonized standards 291, 333
Hawkins, R. 321, 329, 342
Henderson, R. 403
Heracleous, L. 190–91
Hesser, W. 109–12
high-technology industries 321
Hipp, C. 194, 277
Hoelck, K. 322
Ho, J. 43–5
honest brokers 169
Hounshell, D.A. 84
Hudson, J. 22, 29, 276
Hultén, S. 313
HyperText Markup Language (HTML) 90, 418
HyperText Transfer Protocol (HTTP) 418
iBiquity Corporation 344, 345
IBM PC 91
in-band on-channel (IBOC) 336–42, 344
architecture and business models 340–42
origin 336–9
standardization strategy 339–40
industrialization 82
Industrial Revolution 147
industrial standardization 308
industry growth rate 146–8
industry standardization efforts 86
inevitability 107, 147
information and communication
technologies (ICTs) 15, 83, 109, 212, 377, 392
information standardization 219, 220
infra technologies, quasi-public-good character 157
Inklaar, A. 109–12
innovation
compatibility and coordination 9
definition of 6–7
diffusion, S-curve 305
functions of standards 42–5
implications for 122–6
and public policy 64–9
innovation-friendly regulation 298
innovation nexus 9
innovation policy, renewal 74–5
In re Innovatio IP Ventures 242
Institute of Electrical and Electronics
Engineers (IEEE) standards 247, 248
instrument producers 171–3
intellectual property claims 90
intellectual property element 13
intellectual property laws 82
intellectual property rights (IPR) 41, 47, 50–53, 143, 253, 303, 381
protection measures 200
strategic ex post disclosure of 52
inter alia 63, 182
interchangeability 84
inter-firm collaboration 382
intermediate stocktaking 115
internal combustion engine (ICE) 303
internal combustion vehicles (ICVs) 302–5, 312, 315
International Classification for
Standards (ICS) 188
International Electrotechnical
Commission 415
International Electrotechnical
Committee (IEC) 362
international management quality
standards 275–7
International Organization for
Standardization (ISO) 39, 108, 358, 415
standardization activities 361–2
International Telecommunication
Union (ITU) 246, 415
Internet Engineering Task Force
(IETF) 4–5, 393, 418
Internet Protocol, IPv6 154
Internet Protocol (IPR) Suite 88, 89
interviews 202
intra-organizational standards 84
ISO 14000 environmental standards 398–410
ISO management standards 403–6
issues 400–403
ISO 14001, launching of 399–403
ISO TC 229 committee 361–9
activities 362–4
collective vision, framing 365–8
norms and values 368
rules, shaping 368–9
working groups 363–4
IT standardization 419
Iversen, E.J. 383
Jakobs, K. 380
Johnson, David B. 93
Joint Technical Committee (JTC) 331
Joly, P.B. 368
Jones, P. 22, 29
Kambhu, J. 280
Kanerva, M. 200
Karachalios, K. 248
Katz, M.L. 21
Kienzle, O. 107, 109–10, 112
Kim, S.J. 22
King, M. 30, 178, 355
Kite Mark® symbol 29
knowledge complementarities 181
knowledge-intensive industries 11, 138
knowledge production process 48
Krechmer, K. 113
Lach, E.M. 248
Lafuente, E. 275
Lai, J. 191, 194
Lambert, R. 28, 31, 40, 176, 377
Langlois, R.N. 30
Larédo, P. 359
Layne-Farrar, A. 49
Leadership in Energy and Environmental Design (LEED) 54
least-common-denominator method 88
legitimacy 44
Leiponen, A.E. 49, 261, 263
Leitbild concept 365
Lemarié, S. 368
Lerner, J. 49, 53
Lindsay, M.A. 248
long-term economic growth 156
Lösch, A. 365
Malerba, F. 66
Manders, B. 41
Mangelsdorf, A. 48, 383
Mangiarotti, G. 194
Mansell, R. 97
market failure 152, 165
market infrastructures 358, 364–5
defined 369
markets 287–99
market standards 4
market transparency 203
Markus, M.L. 383
Maskus, K.E. 23
Massoud, M.A. 276
mass production 84–6
principles of 85
Mattoo, A. 22
McKinnon, Rebecca 419
measurement activities, public support case 165–9
measurement infrastructure 163–5, 176–7
innovation and 174–5
source of standards 169–70
measurement knowledge 177
medical devices 293–6
Medical Devices Directives (MDDs) 293–6
metrology 50, 170, 182
Microsoft Corp. v. Motorola, Inc. 242
Miozzo, M. 191
mixed modes 176–7
firm 31
mobility barriers 80
modularity analysis tradition 92
modularization 92
Moenius, J. 22
Montreal Ozone Protocol 408
Morris, C.R. 91, 92
Mosch, R.H.J. 29
Mowery, D. 67
Murphy, C.N. 355
nanoscience and technology (NST) emerging field 358–9
general-purpose technology 359
global phenomenon 359–60
scientific and social uncertainties 360–61
specificities of 358–61
nanotechnology 155, 157
Narayanan, V.K. 214
National Cooperative Research Act 414
National Cooperative Research and Production Act of 1993 (NCRPA) 415
National Fire Protection Association (NFPA) 413
National Institute of Standards and Technologies (NIST) model 218
National Measurement System (NMS) 30, 174
national metrology institutes (NMIs) 169
National Nanotechnology Initiative (NNI) 367
national standards 277–8
national standards setting agency 164
National System of Innovation (NSI) 66, 67
Nelson, R. 16
neoclassical economic model 65
Netherlands Facility Cost Index Cooperation (NFC Index) 203
network centric production 219
network effects 152
New Approach Directive 296
New Approach directives 290, 291
New Legislative Framework 292
Noble, D. 84
non-price competitiveness 22
Office of Technology Assessment (OTA) 418
O’Neill, B. 330
one-off standardization efforts 164
Open Cloud Consortium (OCC) 416

Richard Hawkins, Knut Blind and Robert Page - 9781783470082
Downloaded from Elgar Online at 08/12/2019 05:27:22AM via free access
open innovation 95, 382
open standardization processes 53
open standards ecologies 96, 97
Open Systems Interconnection (OSI) model 218
operations expenditure (OPEX) 335
ordering function 110
Organisation for Economic Co-operation and Development (OECD) 6, 42, 65, 199
original equipment manufacturers (OEMs) 219
Ortt, J.R. 28, 355
Orviska, M. 276
OSC (a European small firm) 385–6, 391
Oslo Manual 199
Osterwalder, A. 324
O’Sullivan, E. 43–5
Paris Agreement 406, 408
parsimony 108
participation-based patent policies 239
Patel, P. 172
patentable knowledge 90
patents 52, 227–49
antitrust cases 242–5
conflicts 242–5
court cases and competition 242–5
empirical facts 230–33
ex post patent hold-up 233, 236
for fourth generation (4G) mobile telecommunications 230
non-availability of licences 233
overinclusion 236
patent policies, at SSOs 237–41
potential problems 233–7
royalty stacking 236
undue discrimination 236
see also intellectual property rights
path dependence, characterization 150
Pavitt, K. 172
Pelkmans, J. 383
PERINORM© standards database 169
Perkmann, M. 47
pivotal structural position 71
platform leadership models 98
platform ownership 97
platforms, standards and 79–101
Pohlmann, T. 230
Polanyi, Karl 288
policy implications 151–6
political regulation 297
Poly Implant Prothése (PIP) affair 294–6
portfolio management 157–8
post, telegraph and telephone (PTT) companies 88
prescriptive standards 4
primary functional classification 109–10
primary ordering function 111
PRISM programme 420
private branch exchanges (PBXs) 87
private sector 94
process innovation 274
process innovators 175
product acceptance standards 148
product innovation 274
productivity spillovers 162–83
operating via science base 178–81
product life cycle management (PLM) 217
proof-of-concept technology research 141
proprietary platforms 91–4
proprietary standards platforms 95
propulsion system 307
public policy
and innovation 64–9
systems of innovation concept 66–9
public procurement, standards in 53–7
Puller, S.L. 280
Qualcomm 89, 90
quality function 110–11
quality management system standards 193
quality standard 277
Quarterman, J.S. 88
quasi-public technology goods 157
QWERTY keyboard 21, 152
Raballand, G. 28
Radio Frequency Identification (RFID) 365
Rahikka, E. 191
Rainville, A. 57
Ranganathan, R. 41
Rappa, M. 323
impact of standards on 192–4
measuring 199–201
service standardization impact
187–207
service standards
relationship at company level
196–7
relationship at sector level 197–9
standardization, involvement impact
195–6
services standards model 189–90
service standardization
feasibility of 188
standards, for services 187–91
Shapiro, C. 21
Sherif, M.H. 113, 114
signals of trust 29
Simcoe, T.S. 47, 54, 260–62
similarity standards 114
simple technology transfer model 48
Singapore Airlines 190
single-frequency network (SFN)
architecture 335
Sirbu, M. 262
Slywotzky, A.J. 323
small- and medium-sized enterprises
(SMEs) 49, 276
Small Computer System Interface
(SCSI) 281
Smart Connected Supplier Network
219–20
Smart Grid Architecture Model
(SGAM) 218
Smart Industry 12, 212–25
data sharing 217
defined 215
digitization 215
Dutch Smart Industry fieldlabs
218–19
fifth generation (5G) case 221–2
flexible manufacturing 217, 220
formal and informal standardization
214–15
in Netherlands 213
network-centric production 215
new manufacturing technologies 215
priority areas for standardization
216–17
reference models 217–18
robotics 217

Richard Hawkins, Knut Blind and Robert Page - 9781783470082
Downloaded from Elgar Online at 08/12/2019 05:27:22AM
via free access
Index 435

Smart Bending Factory 221
standardization role for 216
Smartphone Patent War entry 242
Smith, Adam 29
Smith, K. 67, 70
social welfare perspective 93
standard-essential patents (SEPs) 13, 229, 230, 232, 238–40, 243, 246, 253, 254, 258, 260–63, 423
standardization
business and commerce, implications for 421–3
of common components 7
complex technology and scale economies 313–14
by convention 3
and coordination 313
coordination and 310
on costs 273
definition of 3–5
demand-focused functions of 53
by fiat 3
government, implications for 419–20
and innovation 7–9, 312–13, 354–6
intellectual property rights and 50–53
legal issues 423–4
macroeconomic effects of 23
and market framing 356–8
nanotechnology case 353–71
by negotiation 3
public policy role 315–16
search cycle 311–12
and selection 309–10
selection cycle 312
social policy, implications for 420–21
and transition 310–11, 315
transportation systems, current stage 315
transportation systems, early stage selection 311
transportation systems, intermediate stage 313
standardized residuals 178–80
standardized service protocols 191
standards
and business models 325
and contest for control 91–4
definition of 3–5
ecologies, emergence of 86–91
economic functions, in high-tech industries 136–9
economic significance of 22
empirical illustration 201–4
expansion paths, in high-tech industries 135–59
for facility management (FMT) 201–4
first phase 84–6
functional classification of 105–29
functions of 42–5
growth and 23–4
industry growth direction 148–51
industry growth rate 146–8
and innovation 314
innovation policy, renewal of 74–5
mass production 84–6
non-product standards 143–6
patented technologies in 229–30
and patent litigation 313
and platforms 328–9
productivity spillovers 162–83
product standards 141–3
in public procurement 53–7
in research 24–5
second phase 86–91
Smart Industry 212–25
strategies, practitioner perspective 15–16
and technological substitution 302–18
technology systems evolution 143–6
third phase 91–4
three general roles 309
trade 22–3
transportation systems case 302–18
types of 139–46
use by firms 271–84
standards developing organizations (SDOs) 4, 5, 106, 252, 328
standards–innovation nexus 10
standards making organizations 96
standards setting organizations (SSOs) 157, 229, 231, 232, 252, 253, 255, 260–64, 378, 381, 382, 413
intellectual property policies 253–6
patent policies at 237–41, 246–8
Stankiewicz, R. 66
Star, S.L. 108
Stavitsky, A.G. 336, 340
Handbook of innovation and standards

Steinmueller, W.E. 29
Stoneman, P. 67
Strategic Advisory Group on the Environment (SAGE) 399
strategies, practitioner perspective 15–16
Streeter, T. 340
Study Group on Cloud Computing (SGCC) 416
substitution dynamics 317–18
supply chains 7
supply–demand asymmetries 67
Swaidan, S. 191
Swann, G.M.P. 27, 28, 30, 39–40, 68, 165–8, 377
Swann, P. 197, 207
systems of innovation concept 66–9
functional model of 72
lock-in effects 70
in policy applications 68–9
scholarly evolution in 66–8
standards and 69–74
tacit knowledge 48
Tassey, G. 107, 112, 166, 174, 355
Taylor, Frederick 412
Technical Barriers to Trade (TBT) Agreement 420
technical politics 289
technical standardization 297
technical standards 278–9
technological competition 304
technological paradigm 308
technology-based industries 140, 141
technology-based systems 146
technology element model (TEM) 139
technology guideposts 308
technology infrastructure, invisibility 157
technology–product–process (TPP) perspective 67
telecommunication standardization 221
Telecommunication Standardization Bureau (TSB) 247
Temple, P. 22, 24, 171, 174, 184
ten Raa, T. 172
Terzirovski, M. 275
3rd Generation Partnership Project (3GPP) 262, 328
Thompson, G.V. 7, 70
time division synchronous code
division multiple access (TD-SCDMA) 278
Timmers, P. 323
Tirole, J. 49, 53
Toffel, M.W. 54
Torrisi, S. 29
traceability chain 165
Tracking Protection Working Group (TPWG) 421
trademarks 200
trade-promoting effects 22
trade-promoting relationship 22
traditional market failures 153
transactional function 110
Transatlantic Trade and Investment Partnership (TTIP) 288
transformational innovations 98
transition theory 310–11
transmission mechanisms 25–32
division of labour 28–9
knowledge complementarities 31–2
network effects 30
one-step mechanisms 25–8
precision 30
transaction costs 28–9
trust and risk 29
two-step mechanisms 28
transportation systems, innovation and 303–4
Treaty of Rome 290
turnkey solution 203
Tuunanen, T. 191
UK Innovation Surveys 185
Undertakings for Collective Investment in Transferable Securities (UCITS) 280
United Nations Framework Convention on Climate Change (UNFCCC) 409
United States Patent and Trademark Office (USPTO) 232
United States Pharmacopeia (USP) 80
Universal Mobile Telecommunication System (UMTS) 263
Updegrove, A. 380, 382
Urga, G. 22
US International Trade Commission 237
US standards system 412–14
US telecommunication network 87
Utterback, J.M. 308

value network 345
value proposition 346
Vancauteren, M. 22
Van den Bossche, P. 316
Van Wessel, R. 206
variety reduction 127
Verein Deutscher Ingenieure (VDI) 214

videocassette recorder (VCR) 143
Vitale, M.R. 323
voluntary consensus standardization 162
voluntary consensus standards 5
voluntary standards organizations 83
Von Hippel, E. 67

Wakke, P. 48, 195
Wayland, Joseph F. 244
Weber, A. 194
Weill, P. 323

Weiserbs, D. 22
Weiss, C. 402
Weiss, M.B. 262
Werle, R. 383
Williams, G. 171
Wilson, J.S. 22
Winter, S. 16
Wirtz, J. 190, 191
Wolff, E.N. 172
Wong, S.C.K. 276
wording effect 123
working groups (WGs) 363–4
World Trade Organization (WTO) 399, 420
World Wide Web Consortium (W3C) 5, 89, 415
World Wide Web (WWW) 89
‘write once, run anywhere’ (WORA) 281
Wurster, S. 383

Xiong, B. 278

Yates, J. 355
Zi, A. 48