

# Index

- accidents
  - analytic trace 125–33
    - bottom up 125, 127–8
    - top down 125, 129–33
  - causes 17
  - CFIT 98
  - models 81–92
  - probable causes 78–80
- accountability
  - models 201–3
  - without authority 200, 228
  - see also* responsibility
- after-the-fact-worlds 29–30
- Air Ontario incident 79–80, 178
- analytic trace
  - bottom up 125, 127–8
  - conversation analysis 127–8
  - investigations 124–31
  - top down 125, 129–33
- authority
  - and accountability 200, 228
  - constraints on 198–200
  - responsibility, mismatches 196–203
- automation
  - and coordination 153–4
  - traces 98
- automation surprises
  - human error 84, 114–15, 152–4
  - new technology 149
- Bad Apple Theory 1–14
  - features 2
  - futility of 9–10, 228
  - investigations as 6
  - popularity 10–12
  - sidelining 216–18
- behavior
  - and human error 71–2
  - and process 111–14
- Bhopal incident 88
- blame game 4, 188–9
- blunt end, vs sharp end 59–60
- Boeing 747 incident 5, 45–6, 51–2
- buggy knowledge, and human error 145–6
- causality
  - construction of 73, 75–80
  - pressure to discover 73
  - ‘probable causes’ 78–80
  - simplification of 25
- cause-consequence equivalence 24
- cause-effect relationships 84
- CFIT (Controlled Flight Into Terrain)
  - accidents 98
- Challenger incident 164, 169
- cherry-picking, data 29, 33–5
- Clapham Junction railway incident 23
- cognitive
  - consequences, computerization 150–51
  - fixation 135–9
- Columbia incident 83–4, 90–91
- compartmentalization, human error 187–88

- complacency
  - and human error 119, 120
  - meaning 131–3
- complex systems 17
  - and human error xi
- computers
  - cognitive consequences 150–51
  - dumbness 150
  - and human error 149–51
  - interface problems 150
  - keyhole problems 149–50
- context
  - data in 29–38, 123–4
  - and hindsight 29
- conversation analysis, analytic trace 127–8
- coping strategies, stress 141–3
- counterfactuals
  - examples 48–51
  - and hindsight 40–41
  - human error 39–44, 195
  - language use 39, 48–54
- countermeasures, New View 218–19
- CRM (Crew Resource Management) 119, 120, 122, 124, 125, 128, 129–30, 131
- data
  - availability 32
  - cherry-picking 29, 33–5
  - in context 29–38, 123–4
  - events identification in 114–16
  - and hindsight 31–2
  - human factors 93–9
  - leaps of faith 120–23, 124
  - micro-matching 29–33
  - observability 32
  - out of context 29–37
  - overload, new technology 149
  - performance, recordings 97–8
- DC-9 incident 126
- DC-10 incident 82, 178
- debriefings
  - aim 94–5
  - inconsistencies 96
  - questions to ask 95–6
- demand-resource mismatch 141–2
- disaster relief work, variant images 167
- dumbness, computers 150
- dynamic fault management 139
- epidemiology, model 81, 82–3, 87–90
- error
  - problem of defining 66–8
  - see also* human error
- ETTOs (Efficiency-Thoroughness Trade-Offs) 198
- events, linearity of 25
- evidence, and hindsight 35–6
- explanation, vs indignation 45–57
- face saving 11
- failure
  - avoidance of word 42–3
  - as by-product 17–18
  - false calls 221–2
  - and hindsight 23–4, 40–41
  - learning from 220
  - perspectives on 26
  - reactions to 21–3, 60
    - counterfactual 21
    - distal 60
    - judgmental 22
    - proximal 22, 60, 63
    - retrospective 21, 22–3
    - system overview 59–61
    - see also* human error
- fatigue
  - causes 144
  - and human error 143–5
  - and performance 144
- fault management, dynamic 139
- Fitts, Paul 15
- folk models, human factors 121–2, 131–3

- goal conflicts
  - causes 169–70
  - coping strategies 168–71
  - identification 170
  - NASA 166
  - and production pressure 164–71
- hard fixes 189–92
  - see also* quick fixes
- hindsight
  - and context 29
  - and counterfactuals 40–41
  - and data 31–2
  - and evidence 35–6
  - and failure 23–4, 40–41
  - investigation, effect on 23
  - as OldView 28
  - and simplification 24–5
  - ubiquity of 27–8
  - and viewpoint 24–5, 29
- human error
  - active 88
  - automation surprises 84, 114–15, 152–4
  - and behavior 71–2
  - blame game 4, 188–9
  - and buggy knowledge 145–6
  - categorization 68–9
  - causes of 3, 17, 73–80, 135–58
  - cognitive fixation 135–9
  - compartmentalization 187–8
  - and complacency 119, 120
  - and complex systems xi
  - and computers 149–51
  - as coping strategy 67–8
  - counterfactuals 39–44, 195
  - definition, difficulties of 66–8
  - and fatigue 143–5
  - hard fixes 189–90
  - and inert knowledge 145–7
  - labels 119–23
  - language use 48–57
  - latent 88
  - location 68–70
  - mechanical failure, distinction 73, 74–5
  - and mind-matter divide 72
  - nature vs nurture 201
  - need to understand 14
  - and new technology 9, 19, 147–52
  - and non-compliance 119, 120
  - normalizing 186
  - OldView, vs NewView xi
  - opportunities 18–19
  - as organizational problem 159, 195, 226
  - plan continuation 140
  - and procedural adaptations 154–8
  - quantification 65–72
  - quick fixes 183–94, 228
  - reconstruction 70–72, 227
  - reporting, avoidance of 186–7
  - stress 140–43
  - as symptom x, 4, 18, 226
  - viewpoint 225
  - see also* Bad Apple theory; failure; New View; OldView
- human factors
  - data 93–9
  - essence 13
  - folk models 121–2, 131–3
- indignation
  - as OldView 45
  - vs explanation 45–57
- interface problems, computers 150
- International Civil Aviation Organization 176
- investigations
  - analytic trace 124–31
  - as Bad Apple Theory 6
  - and hindsight, effect of 23
  - key points 227
  - and NewView 18–19
  - and OldView 5–6
  - and personal shortcomings 211–12
  - perspectives 26
  - purpose 5

- keyhole problems, computers 149–50
- knowledge, inert, and human error 145–7
  - see also* buggy knowledge
- Ladbroke Grove train incident 59, 61
- language use
  - counterfactuals 39, 48–54
  - human error 48–57
  - New View of human error 220–21
  - Old View vs New View 48–57
- leaps of faith, data 120–23, 124
- learning
  - from failure 220
  - nature of 184
  - openness to 183
- local rationality principle 13, 48, 61–3, 185
- mechanical failure, human error,
  - distinction 73, 74–5
- micro-matching, data 29–33
- mind-matter divide, and human error 72
- mode errors, new technology 148, 150
- models
  - accident 81–92
  - accountability 201–3
  - epidemiological 81, 82–3, 87–90
  - human factors 131–3
  - predictive use 81–2
  - procedures 156–7
  - purpose 81
  - sequence-of-events 81, 82, 83–7
  - see also* folk models; systemic accident model
- Murphy's Law 164, 165
- NASA
  - goal conflicts 166
  - safety department 209
- nature vs nurture, human error 201
- new technology
  - automation surprises 149
  - complexities 148
  - data overload 149
  - display confusion 148, 149
  - and human error 9, 19, 147–52
  - mode errors 148, 150
  - non-coordination 148–9
  - operational pressures 151–2
  - workload 149
  - see also* computers
- New View 1, 3–4, 15–20, 222
  - adoption 215–22
  - stages 216–20
  - countermeasures 218–19
  - and investigations 18–19
  - language use 220–21
  - procedures model 157
  - research insights 17–18
  - responsibility-authority mismatches 197
  - and safety progress 19, 230
  - technology role 147–8
- non-compliance, and human error 119, 120
- Old View 1–2, 216–18, 229
  - hindsight as 28
  - indignation as 45
  - and investigations 5–6
  - procedures model 157
  - responsibility-authority mismatches 197
  - safety progress 7
  - shortcomings 12–14
  - thinking 229
- omnipotence, illusion of 11–12
- operational
  - pressures, new technology 151–2
  - vulnerability 184–5
- organizations, and human error 159, 195, 226
- Osaka train incident 213
- PBL (Problem-Based Learning) 146
- performance, and fatigue 144

- performance data, recordings 97–8
- plan continuation 140
- practice, and procedures, mismatches 8, 30–31, 159–64
- predictions, recommendations as 173–4
- 'probable causes' 78–80
- procedures
  - adaptations, and human error 154–8
  - application 155–6
  - enforcement 7–8
  - models, opposing 156–7
  - and practice, mismatches 8, 30–31, 159–64
- process, and behavior 111–14
- production pressure, and goal conflicts 164–71
  
- quantification, human error 65–72
- quick fixes 183–94
  - examples 185
  - human error 183–94, 228
  - see also* hard fixes
  
- recommendations
  - countermeasures identification 179–80
  - high-end 175
  - participant involvement 179
  - problems with 177–9
  - low-end 174–5
  - as predictions 173–4
  - problems with 180–81
  - SMART implementation 174
  - trade offs 175–6
- reconstruction, human error 70–72, 227
- regression, stress 142
- responsibility
  - authority, mismatches 196–203
  - safety 196–203
  - see also* accountability
  
- safety
  - auditing 192–4
  - confidence in 192–4
  - creation 16, 65, 218, 226
  - culture, elements 172
  - inconstancy of 163–4
  - levels 190–92
  - monitoring 192–4
  - negative attitudes to 2
  - personal responsibility 196–203
  - policies, written 191
  - progress
    - New View 19, 230
    - Old View 7
  - supervision 191
  - trade offs 16–17
  - whistleblowers 193
- safety departments 205–13
  - constraints on 205–6
  - education role 207
  - line management, feedback to 210–13
  - NASA 209
  - outputs expected 207–8
  - proactivity 206–7
  - requirements 206–7, 209–10
  - role 208–9
  - safety intelligence provision 207–8
  - targets, inappropriateness of 207
- sensemaking, dynamics 136–8
- sequence-of-events
  - countermeasures 84–7
  - model 81, 82, 83–7
- sharp end, vs blunt end 59–60
- shortcomings
  - personal, and investigations 211–12
  - systemic 212–13
- simplification
  - of causality 25
  - and hindsight 24–5
- situation awareness, loss of 135–6
- SMART implementation, of
  - recommendations 174
- Space Shuttle
  - Challenger incident 164, 169
  - Columbia incident 83–4, 90–91
- standards, imposition of 32–3

- stress 140–43
  - coping strategies 141–3
  - regression 142
  - and time perception 143
  - triggers 141–2
  - tunneling 142–3
- Swissair 111 incident 54–7
- Swissair MD-11 incident 78–9, 86
- symptom, human error as x, 4, 18, 226
- system overview, failure 59–61
- systemic accident model 81, 82, 83,  
    90–92
  - advantages 92
  - basis 91
- systemic shortcomings 212–13
  
- technology *see* new technology
- time perception, and stress 143
  
- timeline
  - communication
    - high-resolution 101, 108–11
    - low-resolution 101, 104–5
    - medium-resolution 101, 105–8
  - events in 114–16
  - limitations 102–3
  - types 101
- tunneling, and stress 142–3
  
- Valujet flight 592 incident 198–9
- viewpoint
  - and hindsight 24–5, 29
  - human error 225
  
- whistleblowers, safety 193
- work, variant images of 167–8, 193
- workload, new technology 149