

- Problems and solutions in design (*continued*)
  - is prescriptive activity, 125
  - need for action, 125
  - no infallibly correct process, 123–4
  - process is endless, 123
- design solutions, 121–3
  - are often holistic responses, 122
  - are parts of other design problems, 122–3
  - can create design problems, 116–17
  - as a contribution to knowledge, 122
  - no optimal solutions, 121–2
  - numbers of different solutions, 121
- designing for the future, 112–14
  - 'Futureshock,' 113
  - technology changes, 113
- finding and solving problems, 117–18
  - example of Pompidou Centre, 117, 118f
- generators of design problems, 84–90
  - clients, 84–5
    - as creative partner, 85
    - range of ability, 84
  - designers, 87–8
    - seen as artistic, 87–8
  - legislators, 89
    - conflict with designers, 89
  - users, 85–7
    - communication gaps, 85, 86f
    - remoteness, 86–7
- non-committal design, 115–16
  - buildings must change, 116
  - flexible and adaptable, 115
- procrastination, 114–15
  - flawed strategy, 115
- throw-away design, 116
- Process of design, 31–49, 259–85
  - conversations,
    - with computers,
      - Artificial Intelligence, 284
      - computers knowledge of design, 282
      - design ideas not codable for computers, 285
      - frustration of designers with computers, 284
      - problems with CAD systems (computer aided design), 283–4
      - saving time, 282–3
    - with the drawing,
      - dialectics of sketching, 280
      - example of detail of balustrade, 279f, 280
      - icon trap, 280
      - 'unexpected discovery,' 281
      - and narrative, 267–9
        - example Parc de la Villette, Paris, 267, 268f, 269
  - and negotiations, 269–71
    - reconciliation of conflict, 269–70
    - transparency and panorama, 270–1
  - between people, designers,
    - drawings and computers, 265–6
  - as shared experience, 277–8
- definitions of design, 31–3
  - allowing for disparate and common features, 33
  - by an engineer, 32
- framing, 275–7
  - defined, 275–6
  - through the eyes of the user, 277
  - transparency and panorama, 276
- Intentions, Practices and Aspirations, 260f
  - and project management, 263–4
  - and synchronisation, 261, 262f
- laboratory studies, 41–4
  - architecture and science student groups, 43
  - division between analysis and synthesis in problem solving, 44
  - experimental situations, 42f
- primary generator, 46–8
  - comprising generator, conjecture, analysis, 46–7
- Darke's map of the design process, 46f
  - multiple generators, 48
- problem and solution view, 271–5
  - designers 'problem focussed,' 271
  - example of British Rail train, 272, 273f
  - importance of drawing and talking, 273
  - negotiating between solutions, 274–5
- realistic experiments, 44–5
  - bathroom requirements, 44
  - disaggregating the design process, 45
- route maps, 33–41, 48, 49f
  - accuracy, 40–1
    - theoretical and prescriptive, 40
  - generalised map, 38f
  - graphical representation, 40f
  - Markus/Maver map, 36, 37f, 38, 39
    - decision sequence, 37
    - return loops, 37, 38
  - negotiation between problem and solution, 48, 49f
- RIBA handbook, 34–6
  - four phases of work, 34, 35f
  - Plan of Work, 35–6
  - timing of activities, 34–5

- Process Protocol Salford University, 259  
 Pugin, A.W.N., 160, 161, 162
- Rae, J., 240  
 Rand, Paul, 96, 100, 176  
 Rathbone, R.R., 40  
 Requirements for designers, 12–14  
   ability to design, 14  
   aesthetic appreciation, 12–13  
   understanding needs of users, 13  
 RIBA see Royal Institute of British Architects  
 Ritchie, Ian, 171, 192, 250, 266, 267, 269, 276  
 Roe, A., 151  
 Rogers, Richard, 89, 107, 117, 118, 163, 164, 170, 238  
 Role of the designer, 17–30  
   craft design, 17–23  
     cartwheel, 21f, 22f  
     differences in design processes, 19–20, 23  
     igloo, 19f, 20f  
     marble machine, 18f  
   design by drawing, 26–7  
     advantages, 27  
     perceptual span, 26  
     types of drawings, 26  
   future roles, 28–30  
     conservative, 29  
     middle path, 30  
     revolutionary, 29–30  
   professionalisation of design, 23–5  
     and the Industrial Revolution, 24–5  
     separation of designing from making, 23–4  
   scientific design, 27–8  
     design methodology, 28  
     work by Alexander, 27–8  
   traditional design process, 25–6  
     individualism, 25  
 Rosenstein, A.B., 40  
 Roskill Commission, 78, 80, 238  
 Rowe, P.G., 47, 95, 215, 216  
 Roy, Robin, 92, 190, 191, 201  
 Royal Institute of British Architects (RIBA), 23, 24, 25, 29, 34–6, 165, 174, 257, 260  
   process map, 34–6, 260  
   views on cost-benefit analysis, 79–80  
 Royal Opera House, Covent Garden, 190  
 Ryle, G., 15, 130
- Sainsbury Wing of the National Gallery, London, 212, 213, 214f, 215f  
 St. Mary's Hospital, Isle of Wight, 241, 242f, 243f
- Savidge, R., 74  
 Scarpa, Carlo, 279, 280, 281  
 Scharoun, Hans, 97, 105  
 Schön, Donald A., 26, 265, 266, 269, 275, 276, 278, 281, 292, 293, 299  
 Severins bridge, Germany, 94, 95f, 96f, 194–5  
 Seymour, Richard, 9, 154, 172, 175, 176, 272  
 Seymour Powell (designers), 172, 175, 176  
 Sheffield University, 18  
 Simon, H.A., 134  
*Sketches of Thought* (Goel), 137  
 Soane, Sir John, 174  
 Spence, Sir Basil, 168  
 Spencer, C.P., 169  
 Stacey, M., 273, 274  
 Starck, Philippe, 10, 150, 208  
 Steadman, P., 173  
 Stephen, Douglas, 99  
 Stevens, S.S., 69, 70  
 Stirling, James, 160, 174, 183, 229, 249  
 Stirling and Wilford (architects), 84–5, 249  
 Strategy for design, 181–98 see also Process of design; Tactics for designers  
   brief for the designer, 182–3  
   central idea, 189–94  
     examples of the importance of, 190–4  
       Fitzwilliam College, 192–4  
       industrial design, 190, 191f  
       racing car design, 190–1  
       Royal Opera House, 190  
   heuristic strategies, 184–5  
     use of careful calculation or of 'rule of thumb,' 184–5  
   primary generator, 188–9, 194–8  
     crucial constraints, 196–7  
     examples of sources, 194–6  
       structural honesty, 195  
       vertebrate architecture, 195  
     guiding principles with local constraints, 189  
   life cycle, 197–8  
     analysis through synthesis, 197–8  
     starting again, 198  
   protocol studies, 183–4  
     analysis of video-recorded design protocols, 184  
   theory and practice, 181–2  
   three different approaches to one problem, 185–8  
     appearance to visitors, 187, 188f  
     environment as critical, 186f  
     importance of site, 187f  
*The Structure of Design Problem Spaces* (Goel and Pirolli), 287