## Contents

Preface	.xiii
Chapter 1: Everything is becoming science fiction	1
Chapter 2: A machine that can make almost anything	7
Printing three-dimensional things The ten principles of 3D printing	11 20
Chapter 3: Nimble manufacturing: Good, fast, and cheap	.25
Somewhere between mass production and the local farmer's market The blank canvas of the 21st century	27 35
Chapter 4: Tomorrow's economy of printable products	45
Like ants with factories The experience economy A future economy of printable products	46 51 56
Chapter 5: Printing in layers	.65
A manufacturing process at heart Two families of printers Cleaning up design files The raw materials	65 68 77 81
Chapter 6: Design software, the digital canvas	85
A word processor for drawing Today's design software What you design is not (necessarily) what you print The next generation of design software: digital capture	85 91 100 102
	105
The printer of youth Tissue engineering CAD for the body The future	105 111 120 124

Digital gastronomy	130
Feeding the quantified self	142
Processed food	144
Chapter 9: A factory in the classroom	153
Make to learn: Children's engineering	154
Not a national crisis but learning should be enjoyable	161
Now let's see you draw that abstract equation on a graph	166
Barriers to classroom adoption	171
The road ahead	173
Chapter 10: Unleashing a new aesthetic	175
Computers that act like nature	176
Printing wavy walls and custom gargoyles	191
Chapter II: Green, clean manufacturing	. 197
A tale of two plastic toys	200
Greener manufacturing	202
3D printing a more beautiful landfill	206
Chapter 12: Ownership, safety, and new legal frontiers	217
Printing weapons, drugs, and shoddy products	218
Rip, mix, and burn physical things	224
Exclusivity vs. the freedom to innovate	230
Chapter 13: Designing the future	241
Tea. Earl Grey. Hot.	241
A bicycle for our imagination	243
The language of shapes	252
Changing the shape of design tools	260
Chapter 14: The next episode of 3D printing	263
The three episodes of 3D printing	265
Cofabrication of multiple materials	266
Moving from printing passive parts to active systems	271
The final episode—from analog to digital	275
Machines making machines	280
References	283
Index	291