Purposeful Innovation and the Seven Sources for Innovative Opportunity

Entrepreneurs innovate.

Innovation is the specific instrument of entrepreneurship.

It is the act that endows resources with a new capacity to create wealth.

Innovation, indeed, creates a resource.

34 There is no such thing as a “resource” until man finds a use for something in nature and thus endows it with economic value.

35 Until then, every plant is a weed and every mineral just another rock.

36 Not much more than a century ago, neither mineral oil seeping out of the ground nor bauxite, the ore of aluminum, were resources.

37 They were nuisances; both render the soil infertile.

38 The penicillin mold was a pest, not a resource.

39 Bacteriologists went to great lengths to protect their bacterial cultures against contamination by it.

40 Then in the 1920s, a London doctor, Alexander Fleming, realized that this “pest” was exactly the bacterial killer bacteriologists had been looking for—and the penicillin mold became a valuable resource. ‟

41 The same holds just as true in the social and economic spheres.

42 There is no greater resource in an economy than “purchasing power.”

43 But purchasing power is the creation of the innovating entrepreneur. ‟

44 The American farmer had virtually no purchasing power in the early nineteenth century; he therefore could not buy farm machinery.

45 There were dozens of harvesting machines on the market, but however much he might have wanted them, the farmer could not pay for them.

46 Then one of the many harvesting-machine inventors, Cyrus McCormick, invented installment buying.

47 This enabled the farmer to pay for a harvesting machine out of his future earnings rather than out of past savings—and suddenly the farmer had "purchasing power" to buy farm equipment. ...

48 Equally, whatever changes the wealth-producing potential of already existing resources constitutes innovation. ...

49 There was not much new technology involved in the idea of moving a truck body off its wheels and onto a cargo vessel.

50 This "innovation," the container, did not grow out of technology at all but out of a new perception of the "cargo vessel" as a materials-handling device rather than a "ship," which meant that what really mattered was to make the time in port as short as possible.

51 But this humdrum innovation roughly quadrupled the productivity of the ocean-going freighter and probably saved shipping.

52 Without it, the tremendous expansion of world trade in the last forty years—the fastest growth in any major economic activity ever recorded—could not possibly have taken place. ...

53 What really made universal schooling possible—more so than the popular commitment to the value of education, the systematic training of teachers in schools of education, or pedagogic theory—was that lowly innovation, the textbook.

54 (The textbook was probably the invention of the great Czech educational reformer Johann Amos Comenius, who designed and used the first Latin primers in the mid-seventeenth century.)

55 Without the textbook, even a very good teacher cannot teach more than one or two children at a time; with it, even a pretty poor teacher can get a little learning into the heads of thirty or thirty-five students. ‟

56 Innovation, as these examples show, does not have to be technical, does not indeed have to be a "thing" altogether.

57 Few technical innovations can compete in terms of impact with such social innovations as the newspaper or insurance.

58 Installment buying literally transforms economies.

59 Wherever introduced, it changes the economy from supply-driven to demand-driven, regardless almost of the productive level of the economy (which explains why installment buying is the first practice that any Marxist government coming to power immediately suppresses: as the Communists did in Czechoslovakia in 1948, and again in Cuba in 1959).

60 The hospital, in its modern form a social innovation of the Enlightenment of the eighteenth century, has had greater impact on health care than many advances in medicine.

61 Management, that is, the "useful knowledge" that enables man for the first time to render productive people of different skills and knowledge working together in an "organization," is an innovation of this century.

62 It has converted modern society into something brand new, something, by the way, for which we have neither political nor social theory: a **society of organizations**. ‟

63 Books on economic history mention August Borsig as the first man to build steam locomotives in Germany.

64 But surely far more important was his innovation—against strenuous opposition from craft guilds, teachers, and government bureaucrats — of what to this day is the German system of factory organization and the foundation of Germany's industrial strength.

65 It was Borsig who devised the idea of the Meister (Master), the highly skilled and highly respected senior worker who runs the shop with considerable autonomy; and the Lehrling System (apprenticeship system), which combines practical training (Lehre) on the job with schooling (Ausbildung) in the classroom.

66 And the twin inventions of modern government by Machiavelli in *The Prince* (1513) and of the modern national state by his early follower, Jean Bodin, sixty years later, have surely had more lasting impacts than most technologies. ‟

67 One of the most interesting examples of social innovation and its importance can be seen in modern Japan. ‟

68 From the time she opened her doors to the modern world in 1867, Japan has been consistently underrated by westerners, despite her successful defeats of China and then Russia in 1894 and 1905, respectively; despite Pearl Harbor; and despite her sudden emergence as an economic superpower and the toughest competitor in the world market of the 1970s and 1980s.

69 A major reason, perhaps the major one, is the prevailing belief that innovation has to do with things and is based on science or technology.

70 And the Japanese, so the common belief has held (in Japan as well as in the West, by the way), are not innovators but imitators.

71 For the Japanese have not, by and large, produced outstanding technical or scientific innovations.

72 Their success is based on social innovation. ...

73 When the Japanese, in the Meiji Restoration of 1867, most reluctantly opened their country to the world, it was to avoid the fates of India and nineteenth-century China, both of which were conquered, colonized, and "westernized" by the West.

74 The basic aim, in true Judo fashion, was to use the weapons of the West to hold the West at bay; and to remain Japanese. ...

75 This meant that social innovation was far more critical than steam locomotives or the telegraph.

76 And social innovation, in terms of the development of such institutions as schools and universities, a civil service, banks and labor relations, was far more difficult to achieve than building locomotives and telegraphs.

77 A locomotive that will pull a train from London to Liverpool will equally, without adaptation or change, pull a train from Tokyo to Osaka.

78 But the social institutions had to be at once quintessentially "Japanese" and yet "modern."

79 They had to be run by Japanese and yet serve an economy that was "Western" and highly technical.

80 Technology can be imported at low cost and with a minimum of cultural risk.

81 Institutions, by contrast, need cultural roots to grow and to prosper.

82 The Japanese made a deliberate decision a hundred years ago to concentrate their resources on social innovations, and to imitate, import, and adapt technical innovations—with startling success.

83 Indeed, this policy may still be the right one for them.

84 For, as will be discussed in Chapter 17, what is sometimes half-facetiously called creative imitation is a perfectly respectable and often very successful entrepreneurial strategy. ⎓

85 Even if the Japanese now have to move beyond imitating, importing, and adapting other people's technology and learn to undertake genuine technical innovation of their own, it might be prudent not to underrate them.

86 Scientific research is in itself a fairly recent "social innovation."

87 And the Japanese, whenever they have had to do so in the past, have always shown tremendous capacity for such innovation.

88 Above all, they have shown a superior grasp of entrepreneurial strategies. ⎓

89 "Innovation," then, is an economic or social rather than a technical term.

90 It can be defined the way J. B. Say defined entrepreneurship, as changing the yield of resources.

91 Or, as a modern economist would tend to do, it can be defined in demand terms rather than in supply terms, that is, as changing the value and satisfaction obtained from resources by the consumer. ⎓

92 Which of the two is more applicable depends, I would argue, on the specific case rather than on the theoretical model.

93 The shift from the integrated steel mill to the "mini-mill," which starts with steel scrap rather than iron ore and ends with one final product (e. g., beams and rods, rather than raw steel that then has to be fabricated), is best described and analyzed in supply terms.

94 The end product, the end uses, and the customers are the same, though the costs are substantially lower.

95 And the same supply definition probably fits the container.

96 But the audiocassette or the videocassette, though equally "technical," if not more so, are better described or analyzed in terms of consumer values and consumer satisfactions, as are such social innovations as the news magazines developed by Henry Luce of Time-Life-Fortune in the 1920s, or the money-market fund of the late 1970s and early 1980s. ...

97 We cannot yet develop a theory of innovation.

98 But we already know enough to say when, where, and how one looks systematically for innovative opportunities, and how one judges the chances for their success or the risks of their failure.

99 We know enough to develop, though still only in outline form, the practice of innovation. ...

100 It has become almost a cliché for historians of technology that one of the great achievements of the nineteenth century was the "invention of invention."

101 Before 1880 or so, invention was mysterious; early nineteenth-century books talk incessantly of the "flash of genius."

102 The inventor himself was a half-romantic, half-ridiculous figure, tinkering away in a lonely garret.

103 By 1914, the time World War I broke out, "invention" had become "research," a systematic, purposeful activity, which is planned and organized with high predictability both of the results aimed at and likely to be achieved. ...

104 Something similar now has to be done with respect to innovation. ...

105 Entrepreneurs will have to learn to practice systematic innovation. ...

106 Successful entrepreneurs do not wait until "the Muse kisses them" and gives them a "bright idea"; they go to work.

107 Altogether, they do not look for the "biggie," the innovation that will "revolutionize the industry," create a "billion-dollar business," or "make one rich overnight."

108 Those entrepreneurs who start out with the idea that they'll make it big—and in a hurry—can be guaranteed failure.

109 They are almost bound to do the wrong things.

110 An innovation that looks very big may turn out to be nothing but technical virtuosity; and innovations with modest intellectual pretensions, a McDonald's, for instance, may turn into gigantic, highly profitable businesses.

111 The same applies to nonbusiness, public-service innovations. ...

112 Successful entrepreneurs, whatever their individual motivation—be it money, power, curiosity, or the desire for fame and recognition—try to create value and to make a contribution.

113 Still, successful entrepreneurs aim high.

114 They are not content simply to improve on what already exists, or to modify it.

115 They try to create new and different values and new and different satisfactions, to convert a "material" into a "resource," or to combine existing resources in a new and more productive configuration. ‟

116 And it is change that always provides the opportunity for the new and different.

117 Systematic innovation therefore consists in the purposeful and organized search for changes, and in the systematic analysis of the opportunities such changes might offer for economic or social innovation. ‟

118 As a rule, these are changes that have already occurred or are under way.

119 The overwhelming majority of successful innovations exploit change.

120 To be sure, there are innovations that in themselves constitute a major change; some of the major technical innovations, such as the Wright Brothers' airplane, are examples.

121 But these are exceptions, and fairly uncommon ones.

122 Most successful innovations are far more prosaic; they exploit change.

123 And thus the discipline of innovation (and it is the knowledge base of entrepreneurship) is a diagnostic discipline: a systematic examination of the areas of change that typically offer entrepreneurial opportunities. ‟

124 Specifically, systematic innovation means monitoring seven sources for innovative opportunity. ‟

125 The first four sources lie within the enterprise, whether business or public-service institution, or within an industry or service sector.

126 They are therefore visible primarily to people within that industry or service sector.

127 They are basically symptoms.

128 But they are highly reliable indicators of changes that have already happened or can be made to happen with little effort.

129 These four source areas are:

130 - The unexpected—the unexpected success, the unexpected failure, the unexpected outside event;
131 - The incongruity—between reality as it actually is and reality as it is assumed to be or as it "ought to be";
132 - Innovation based on process need;
133 - Changes in industry structure or market structure that catch everyone unawares.

134 The second set of sources for innovative opportunity, a set of three, involves changes outside the enterprise or industry:

135 - Demographics (population changes);
136 - Changes in perception, mood, and meaning;
137 - New knowledge, both scientific and nonscientific.

138 The lines between these seven source areas of innovative opportunities are blurred, and there is considerable overlap between them.

139 They can be likened to seven windows, each on a different side of the same building.

140 Each window shows some features that can also be seen from the window on either side of it.

141 But the view from the center of each is distinct and different. ⁂

142 The seven sources require separate analysis, for each has its own distinct characteristic.

143 No area is, however, inherently more important or more productive than the other.

144 Major innovations are as likely to come out of an analysis of symptoms of change (such as the unexpected success of what was considered an insignificant change in product or pricing) as they are to come out of the massive application of new knowledge resulting from a great scientific breakthrough. ⁂

145 But the order in which these sources will be discussed is not arbitrary.

146 They are listed in descending order of reliability and predictability.

147 For, contrary to almost universal belief, new knowledge—and especially new scientific knowledge—is not the most reliable or most predictable source of successful innovations.

148 For all the visibility, glamour, and importance of science-based innovation, it is actually the least reliable and least predictable one.

149 Conversely, the mundane and unglamorous analysis of such symptoms of underlying changes as the unexpected success or the unexpected failure carry fairly low risk and uncertainty.

150 And the innovations arising therefrom have, typically, the shortest lead time between the start of a venture and its measurable results, whether success or failure.

151 # *Source: The Unexpected*

152 ## The Unexpected Success

153 No other area offers richer opportunities for successful innovation than the unexpected success.

154 In no other area are innovative opportunities less risky and their pursuit less arduous.

155 Yet the unexpected success is almost totally neglected; worse, managements tend actively to reject it. ⁂

156 Here is one example. ⁂

157 More than thirty years ago, I was told by the chairman of New York's largest department store, R. H. Macy, "We don't know how to stop the growth of appliance sales." ⁂

158 "Why do you want to stop them?"

159 I asked, quite mystified.

160 "Are you losing money on them?" ⁂

161 "On the contrary," the chairman said, "profit margins are better than on fashion goods; there are no returns, and practically no pilferage." ⁂

162 "Do the appliance customers keep away the fashion customers?"

163 I asked. ⁂

164 “Oh, no,” was the answer.

165 “Where we used to sell appliances primarily to people who came in to buy fashions, we now sell fashions very often to people who come in to buy appliances.

166 But,” the chairman continued, “in this kind of store, it is normal and healthy for fashion to produce seventy percent of sales.

167 Appliance sales have grown so fast that they now account for three-fifths.

168 And that’s abnormal.

169 We’ve tried everything we know to make fashion grow to restore the normal ratio, but nothing works.

170 The only thing left now is to push appliance sales down to where they should be.” [...]

171 For almost twenty years after this episode, Macy’s New York continued to drift.

172 Any number of explanations were given for Macy’s inability to exploit its dominant position in the New York retail market: the decay of the inner city, the poor economics of a store supposedly “too big,” and many others.

173 Actually, once a new management came in after 1970, reversed the emphasis, and accepted the contribution of appliances to sales, Macy’s—despite inner-city decay, despite its high labor costs, and despite its enormous size—promptly began to prosper again. [...]

174 At the same time that Macy’s rejected the unexpected success, another New York retail store, Bloomingdale’s, used the identical unexpected success to propel itself into the number two spot in the New York market.

175 Bloomingdale's, at best a weak number four, had been even more of a fashion store than Macy's.

176 But when appliance sales began to climb in the early 1950s, Bloomingdale's ran with the opportunity.

177 It realized that something unexpected was happening and analyzed it.

178 It then built a new position in the marketplace around its Housewares Department.

179 It also refocused its fashion and apparel sales to reach a new customer: the customer of whose emergence the explosion in appliance sales was only a symptom.

180 Macy's is still number one in New York in volume.

181 But Bloomingdale's has become the "smart New York store."

182 And the stores that were the contenders for this title thirty years ago—the stores that were then strong number twos, the fashion leaders of 1950 such as Best—have disappeared (for additional examples, see Chapter 15). ...

183 The Macy's story will be called extreme.

184 But the only uncommon aspect about it is that the chairman was aware of what he was doing.

185 Though not conscious of their folly, far too many managements act the way Macy's did.

186 **It is never easy for a management to accept the unexpected success**.

187 It takes determination, specific policies, a willingness to look at reality, and the humility to say, "We were wrong!" ...

188 One reason why it is difficult for management to accept unexpected success is that all of us tend to believe that anything that has lasted a fair amount of time must be "normal" and go on "forever."

189 Anything that contradicts what we have come to consider a law of nature is then rejected as unsound, unhealthy, and obviously abnormal. ...

190 This explains, for instance, why one of the major U.S. steel companies, around 1970, rejected the "minimill."[1]

191 Management knew that its steelworks were rapidly becoming obsolete and would need billions of dollars of investment to be modernized.

192 It also knew that it could not obtain the necessary sums.

193 A new, smaller "mini-mill" was the solution. ...

194 Almost by accident, such a "mini-mill" was acquired.

195 It soon began to grow rapidly and to generate cash and profits.

196 Some of the younger men within the steel company therefore proposed that the available investment funds be used to acquire additional "mini-mills" and to build new ones.

197 Within a few years, the "mini-mills" would then give the steel company several million tons of steel capacity based on modern technology, low labor costs, and pinpointed markets.

198 Top management indignantly vetoed the proposal; indeed, all the men who had been connected with it found themselves "ex-employees" within a few years.

199 "The integrated steelmaking process is the only right one," top management argued.

200 "Everything else is cheating—a fad, unhealthy, and unlikely to endure."

201 Needless to say, ten years later the only parts of the steel industry in America that were still healthy, growing, and reasonably prosperous were "mini-mills." ...

202 To a steelmaker who has spent his entire life working to perfect the integrated steelmaking process, who is at home in the big steel mill, and who may himself be the son of a steelworker (as a great many American steel company executives have been), anything but "big steel" is strange and alien, indeed a threat.

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204 [1] *On the "mini-mill," see Chapter 4.

205 It takes an effort to perceive in the "enemy" one's own best opportunity. ...

206 Top management people in most organizations, whether small or large, public-service institution or business, have typically grown up in one function or one area.

207 To them, this is the area in which they feel comfortable.

208 When I sat down with the chairman of R. H. Macy, for instance, there was only one member of top management, the personnel vice-president, who had not started as a fashion buyer and made his career in the fashion end of the business.

209 Appliances, to these men, were something that other people dealt with. ...

210 The unexpected success can be galling.

211 Consider the company that has worked diligently on modifying and perfecting an old product, a product that has been the "flagship" of the company for years, the product that represents "quality."

212 At the same time, most reluctantly, the company puts through what everyone in the firm knows is a perfectly meaningless modification of an old, obsolete, and "low-quality" product.

213 It is done only because one of the company's leading salesmen lobbied for it, or because a good customer asked for it and could not be turned down.

214 But nobody expects it to sell; in fact, nobody wants it to sell.

215 And then this "dog" runs away with the market and even takes the sales which plans and forecasts had promised for the "prestige," "quality" line.

216 No wonder that everybody is appalled and considers the success a "cuckoo in the nest" (a term I have heard more than once).

217 Everybody is likely to react precisely the way the chairman of R. H. Macy reacted when he saw the unwanted and unloved appliances overtake his beloved fashions, on which he himself had spent his working life and his energy. ₥

218 The unexpected success is a challenge to management's judgment.

219 "If the mini-mills were an opportunity, we surely would have seen it ourselves," the chairman of the big steel company is quoted as saying when he turned the mini-mill proposal down.

220 Managements are paid for their judgment, but they are not being paid to be infallible.

221 In fact, they are being paid to realize and admit that they have been wrong especially when their admission opens up an opportunity.

222 But this is by no means common. ...

223 A Swiss pharmaceutical company today has world leadership in veterinary medicines, yet it has not itself developed a single veterinary drug.

224 But the companies that developed these medicines refused to serve the veterinary market.

225 The medicines, mostly antibiotics, were of course developed for treating human diseases.

226 When the veterinarians discovered that they were just as effective for animals and began to send in their orders, the original manufacturers were far from pleased.

227 In some cases they refused to supply the veterinarians; in many others, they disliked having to reformulate the drugs for animal use, to repackage them, and so on.

228 The medical director of a leading pharmaceutical company protested around 1953 that to apply a new antibiotic to the treatment of animals was a "misuse of a noble medicine."

229 Consequently, when the Swiss approached this manufacturer and several others, they obtained licenses for veterinary use without any difficulty and at low cost.

230 Some of the manufacturers were only too happy to get rid of the embarrassing success. ...

231 Human medications have since come under price pressure and are carefully scrutinized by regulatory authorities.

232 This has made veterinary medications the most profitable segment of the pharmaceutical industry.

233 But the companies that developed the compounds in the first place are not the ones who get these profits. ‟

234 Far more often, the unexpected success is simply not seen at all.

235 Nobody pays any attention to it.

236 Hence, nobody exploits it, with the inevitable result that the competitor runs with it and reaps the rewards. ‟

237 A leading hospital supplier introduced a new line of instruments for biological and clinical tests.

238 The new products were doing quite well.

239 Then, suddenly, orders came in from industrial and university laboratories.

240 Nobody was told about them, nobody noticed them; nobody realized that, by pure accident, the company had developed products with more and better customers outside the market for which those products had been developed.

241 No salesman was being sent out to call on these new customers, no service force was being set up.

242 Five or eight years later, **another company had taken over these new markets**.

243 And because of the volume of business these markets produced, the newcomer could soon invade the hospital market offering lower prices and better services than the original market leader. ‟

244 One reason for this blindness to the unexpected success is that our existing reporting systems do not as a rule report it, let alone clamor for management's attention. „

245 Practically every company—but every public-service institution as well—has a monthly or quarterly report.

246 The first sheet lists the areas in which performance is below expectations: it lists the problems and the shortfalls.

247 At the monthly meetings of the management group and the board of directors, everybody therefore focuses on the problem areas.

248 No one even looks at the areas where the company has done better than expected.

249 And if the unexpected success is not quantitative but qualitative—as in the case of the hospital instruments mentioned above, which opened up new major markets outside the company's traditional ones—the figures will not even show the unexpected success as a rule. „

250 To exploit the opportunity for innovation offered by unexpected success requires analysis.

251 Unexpected success is a symptom.

252 But a symptom of what?

253 The underlying phenomenon may be nothing more than a limitation on our own vision, knowledge, and understanding.

254 That the pharmaceutical companies, for instance, rejected the unexpected success of their new drugs in the animal market was a symptom of their own **failure to know** how big—and how important—livestock raising throughout the world is; of their blindness to the sharp increase in demand for animal proteins throughout the world after World War II, and to the tremendous changes in knowledge, sophistication, and management capacity of the world's farmers. ...

255 The unexpected success of appliances at R. H. Macy's was **a symptom** of a fundamental change in the behavior, expectations, and values of substantial numbers of consumers—as the people at Bloomingdale's realized.

256 Up until World War II, department store consumers in the United States bought primarily by socioeconomic status, that is, by income group.

257 After World War II, the market increasingly segmented itself by what we now call "lifestyles."

258 Bloomingdale's was the first of the major department stores, especially on the East Coast, to realize this, to capitalize on it, and to innovate a new retail image. ...

259 The unexpected success of laboratory instruments designed for the hospital in industrial and university laboratories was a **symptom of** the disappearance of distinctions between the various users of scientific instruments, which for almost a century had created sharply different markets, with different end uses, specifications, and expectations.

260 What it **symptomized**—and the company never realized this—was not just that a product line had uses that were not originally envisaged.

261 It signaled the end of the specific market niche the company had enjoyed in the hospital market.

262 So the company that for thirty or forty years had successfully defined itself as a designer, maker, and marketer of hospital laboratory equipment was forced eventually to redefine itself as a maker of laboratory instruments, and to develop capabilities to design, manufacture, distribute, and service way beyond its original field.

263 By then, however, it had lost a large part of the market for good. ⁂

264 Thus the unexpected success is not just an opportunity for innovation; it demands innovation.

265 It forces us to ask, What basic changes are now appropriate for this organization in the way it defines its business?

266 Its technology?

267 Its markets?

268 If these questions are faced up to, then the unexpected success is likely to open up the most rewarding and least risky of all innovative opportunities. ⁂

269 Two of the world's biggest businesses, DuPont, the world's largest chemical company, and IBM, the giant of the computer industry, owe their preeminence to their willingness to exploit the unexpected success as an innovative opportunity. ⁂

270 DuPont, for 130 years, had confined itself to making munitions and explosives.

271 In the mid-1920s it then organized its first research efforts in other areas, one of them the brand-new field of polymer chemistry, which the Germans had pioneered during World War I.

272 For several years there were no results at all.

273 Then, in 1928, an assistant left a burner on over the weekend.

274 On Monday morning, Wallace H. Carothers, the chemist in charge, found that the stuff in the kettle had congealed into fibers.

275 It took another ten years before DuPont found out how to make Nylon intentionally.

276 The point of the story is, however, that the same accident had occurred several times in the laboratories of the big German chemical companies with the same results, and much earlier.

277 The Germans were, of course, looking for a polymerized fiber—and they could have had it, along with world leadership in the chemical industry, ten years before DuPont had Nylon.

278 But because they had not planned the experiment, they dismissed its results, poured out the accidentally produced fibers, and started all over again. ...

279 The history of IBM equally shows what paying attention to the unexpected success can do.

280 For IBM is largely the result of the willingness to exploit the unexpected success not once, but twice.

281 In the early 1930s, IBM almost went under.

282 It had spent its available money on designing the first electro-mechanical bookkeeping machine, meant for banks.

283 But American banks did not buy new equipment in the Depression days of the early thirties.

284 IBM even then had a policy of not laying off people, so it continued to manufacture the machines, which it had to put in storage. „

285 When IBM was at its lowest point—so the story goes—Thomas Watson, Sr., the founder, found himself at a dinner party sitting next to a lady.

286 When she heard his name, she said: "Are you the Mr. Watson of IBM?

287 Why does your sales manager refuse to demonstrate your machine to me?"

288 What a lady would want with an accounting machine Thomas Watson could not possibly figure out, nor did it help him much when she told him she was the director of the New York Public Library; it turned out he had never been in a public library.

289 But next morning, he appeared there as soon as its doors opened. „

290 In those days, libraries had fair amounts of government money.

291 Watson walked out two hours later with enough of an order to cover next month's payroll.

292 And, as he added with a chuckle whenever he told the story, "I invented a new policy on the spot: we get cash in advance before we deliver." „

293 Fifteen years later, IBM had one of the early computers.

294 Like the other early American computers, the IBM computer was designed for scientific purposes only.

295 Indeed, IBM got into computer work largely because of Watson's interest in astronomy.

296 And when first demonstrated in IBM's show window on Madison Avenue, where it drew enormous crowds, IBM's computer was programmed to calculate all past, present, and future phases of the moon. ...

297 But then businesses began to buy this "scientific marvel" for the most mundane of purposes, such as payroll.

298 Univac, which had the most advanced computer and the one most suitable for business uses, did not really want to "demean" its scientific miracle by supplying business.

299 But IBM, though equally surprised by the business demand for computers, responded immediately.

300 Indeed, it was willing to sacrifice its own computer design, which was not particularly suitable for accounting, and instead use what its rival and competitor (Univac) had developed.

301 Within four years IBM had attained leadership in the computer market, even though for another decade its own computers were technically inferior to those produced by Univac.

302 IBM was willing to satisfy business and to satisfy it on business' terms—to train programmers for business, for instance. ...

303 Similarly, Japan's foremost electronic company, Matsushita (better known by its brand names Panasonic and National), owes its rise to its willingness to run with unexpected success. ...

304 Matsushita was a fairly small and undistinguished company in the early 1950s, outranked on every count by such older and deeply entrenched giants as Toshiba or Hitachi.

305 Matsushita "knew," as did every other Japanese manufacturer of the time, that "television would not grow fast in Japan."

306 "Japan is much too poor to afford such a luxury," the chairman of Toshiba had said at a New York meeting around 1954 or 1955.

307 Matsushita, however, was intelligent enough to accept that the Japanese farmers apparently did not know that they were too poor for television.

308 What they knew was that television offered them, for the first time, access to a big world.

309 They could not afford television sets, but they were prepared to buy them anyhow and pay for them.

310 Toshiba and Hitachi made better sets at the time, only they showed them on the Ginza in Tokyo and in the big-city department stores, making it pretty clear that farmers were not particularly welcome in such elegant surroundings.

311 Matsushita went to the farmers and sold its televisions door-to-door, something no one in Japan had ever done before for anything more expensive than cotton pants or aprons. ...

312 Of course, it is not enough to depend on accidents, nor to wait for the lady at the dinner table to express unexpected interest in one's apparently failing product.

313 The search has to be organized. ...

314 The first thing is to ensure that the unexpected is being seen; indeed, that it clamors for attention.

315 It must be properly featured in the information management obtains and studies.

316 (How to do this is described in some detail in Chapter 13.)

317 Managements must look at every unexpected success with the questions:

318 (1) What would it mean to us if we exploited it?

319 (2) Where could it lead us?

320 (3) What would we have to do to convert it into an opportunity?

321 And (4) How do we go about it?

322 This means, first, that managements need to set aside specific time in which to discuss unexpected successes;

323 and second, that someone should always be designated to analyze an unexpected success and to think through how it could be exploited.

324 But management also needs to learn what the unexpected success demands of them.

325 Again, this might best be explained by an example.

326 A major university on the eastern seaboard of the United States started, in the early 1950s, an evening program of "continuing education" for adults, in which the normal undergraduate curriculum leading to an undergraduate degree was offered to adults with a high school diploma.

327 Nobody on the faculty really believed in the program.

328 The only reason it was offered at all was that a small number of returning World War II veterans had been forced to go to work before obtaining their undergraduate degrees and were clamoring for an opportunity to get the credits they still lacked.

329 To everybody's surprise, however, the program proved immensely successful, with qualified students applying in large numbers.

330 And the students in the program actually outperformed the regular undergraduates.

331 This, in turn, created a dilemma.

332 To exploit the unexpected success, the university would have had to build a fairly big first-rate faculty.

333 But this would have weakened its main program; at the least, it would have diverted the university from what it saw as its main mission, the training of undergraduates.

334 The alternative was to close down the new program.

335 Either decision would have been a responsible one.

336 Instead, the university decided to staff the program with cheap, temporary faculty, mostly teaching assistants working on their own advanced degrees.

337 As a result, it destroyed the program within a few years; but worse, it also seriously damaged its own reputation. ...

338 The unexpected success is an opportunity, but it makes demands.

339 It demands to be taken seriously.

340 It demands to be staffed with the ablest people available, rather than with whoever we can spare.

341 It demands seriousness and support on the part of management equal to the size of the opportunity.

342 And the opportunity is considerable.

The Unexpected Failure

Failures, unlike successes, cannot be rejected and rarely go unnoticed.

But they are seldom seen as symptoms of opportunity.

A good many failures are, of course, nothing but mistakes, the results of greed, stupidity, thoughtless bandwagon-climbing, or incompetence whether in design or execution.

Yet if something fails despite being carefully planned, carefully designed, and conscientiously executed, that failure often bespeaks underlying change and, with it, opportunity. ⁂

The assumptions on which a product or service, its design or its marketing strategy, were based may no longer fit reality.

Perhaps customers have changed their values and perceptions; while they still buy the same "thing," they are actually purchasing a very different "value."

Or perhaps what has always been one market or one end use is splitting itself into two or more, each demanding something quite different.

Any change like this is an opportunity for innovation. ⁂

I had my first experience with an unexpected failure at the very beginning of my working life, almost sixty years ago, just out of high school.

My first job was as a trainee in an old export firm, which for more than a century had been selling hardware to British India.

Its best seller for years had been a cheap padlock, of which it exported whole shiploads every month.

355 The padlock was flimsy; a pin easily opened the lock.

356 As incomes in India went up during the 1920s, padlock sales, instead of going up, began to decline quite sharply.

357 My employer thereupon did the obvious: he redesigned the padlock to give it a sturdier lock, that is, to make it "better quality."

358 The added cost was minimal and the improvement in quality substantial.

359 But the improved padlock turned out to be unsalable.

360 Four years later, the firm went into liquidation, the decline of its Indian padlock business a major factor in its demise. ‟

361 A very small competitor of this firm in the Indian export business—no more than a tenth of the size of my employer and until then barely able to survive—realized that this unexpected failure was a symptom of basic change.

362 For the bulk of Indians, the peasants in the villages, the padlock was (and for all I know, still is) a magical symbol; no thief would have dared open a padlock.

363 The key was never used, and usually disappeared.

364 To get a padlock that could not easily be opened without a key—the improved padlock my employer had worked so hard to perfect without additional cost—was thus not a boon but a disaster. ‟

365 A small but rapidly growing middle-class minority in the cities, however, needed a real lock.

366 That it was not sturdy enough for their needs was the main reason why the old lock had begun to lose sales and market.

367 But for them the redesigned product was still inadequate.

368 My employer's competitor broke down the padlock into two separate products: one without lock and key, with only a simple trigger release, and selling for one-third less than the old padlock but with twice its profit margin; and the other with a good sturdy lock and three keys, selling at twice the price of the old product and also with a substantially larger profit margin.

369 Both lines immediately began to sell.

370 Within two years, the competitor had become the largest European hardware exporter to India.

371 He maintained this position for ten years, until World War II put an end to European exports to India altogether.

372 A quaint tale from horse and buggy days, some might say.

373 Surely we have become more sophisticated in this age of computers, of market research, and of business school MBAs.

374 But here is another case, half a century later and from a very "sophisticated" industry.

375 Yet it teaches exactly the same lesson.

376 Just at the time when the first cohorts of the "baby boom" were reaching their mid-twenties—that is, the age to form families and to buy their first house—the 1973-74 recession hit.

377 Inflation was becoming rampant, particularly in housing prices, which rose much faster than anything else.

378 At the same time, interest rates on home mortgages were skyrocketing.

379 And so the mass builders in America began to design and offer what they called a "basic house," smaller, simpler, and cheaper than the house that had become standard. ‟

380 But despite its being such "good value" and well within the means of the first-time homebuyer, the "basic house" was a thumping failure.

381 The builders tried to salvage it by offering low-interest financing and long repayment terms, and by slashing prices.

382 Still, no one bought the "basic house." ‟

383 Most homebuilders did what businessmen do in an unexpected failure: they blamed that old bogeyman, the "irrational customer."

384 But one builder, still very small, decided to look around.

385 He found that there had been a change in what the young American couple wants in its first house.

386 This no longer represents the family's permanent home as it had done for their grandparents, a house in which the couple expects to live the rest of its life, or at least a long time.

387 In the 1970s, young couples were buying not one, but two separate "values" in purchasing their first home.

388 They bought shelter for a few short years; and they also bought an option to buy—a few years later—their "real" house, a much bigger and more luxurious home, in a better neighborhood, with better schools.

389 To make the down payment on this far more expensive permanent home, they would, however, need the equity they had built up in the first house.

390 The young people knew very well that the "basic house" was not what they and their contemporaries really wanted, even though it was all they could afford.

391 They feared therefore—and perfectly rationally—that they would not be able to resell the "basic house" at a decent price.

392 So the "basic house," instead of being an option to buy the "real house" later on, would become a serious impediment to the fulfillment of their true housing needs and wants. ⁂

393 The young couple of 1950 had still perceived itself as "working-class," by and large.

394 And "working-class" people in the West do not expect their incomes and their standards of living to rise materially once they are out of their apprenticeship and into a full-time job.

395 Seniority, for working-class people (with Japan being the major exception), means greater job security rather than larger incomes.

396 But the "middle class" traditionally can expect a steady increase in its income until the head of the household reaches age forty-five or forty-eight.

397 Between 1950 and 1975, both the reality and the self-image of young American adults—their educations, their expectations, their jobs—had changed from "working-class" to "middle-class."

398 And with this change had come a sharp change in what the young people's first home represented, and what "value" was connected with it. ⁂

399 Once this was understood—and all it took was to listen to prospective homebuyers for a few weekends—successful innovation came about easily.

400 Almost no change was made in the physical plant itself; only the kitchen was redesigned and made somewhat roomier.

401 Otherwise, the building remained the same "basic house" the homebuilders had not been able to sell.

402 But instead of being offered as "your house," it was offered as "your-first house," and as a "building block toward the house you want."

403 Specifically, this meant that the young couple was shown both the house as it was standing—that is, the "basic house"and a model of the same house in which future additions such as an extra bathroom, one or two more bedrooms, and a basement "family den" had been built.

404 Indeed, the builder had already obtained the necessary city permits for conversion of the "basic house" to a "permanent home."

405 Furthermore, the builder guaranteed the young couple a fixed resale price for their first house, to be credited against their purchase from his firm of a second, bigger, "permanent" home within five to seven years.

406 "This entailed practically no risk," he explained.

407 "The demographics were such, after all, as to guarantee a steady increase in the demand for 'first houses' until the late 1980s or 1990s, during which time the babies of the 'baby bust' of 1961 will have become twenty-five themselves and will start forming their own families." ...

408 Before this homebuilder transformed failure into innovation, he had operated in only one metropolitan area and was a small factor in it.

409 Five years later, the firm was operating in seven metropolitan areas and was either number one or a strong number two in each of them.

410 Even during the building recession of 1981-82—a recession so severe that some of the largest American builders did not sell one single new house during an entire season—this innovative homebuilder continued to grow.

411 "One reason," the firm's founder explained, "was something even I had not seen when I decided to offer first-time homebuyers a repurchase guarantee.

412 It gave us a steady supply of well-built and still fairly new houses that needed only a little fixing up and could then be resold at a very decent profit to the next crop of first-home buyers." ...

413 Faced with unexpected failure, executives, especially in large organizations, tend to call for more study and more analysis.

414 But as both the padlock story and the "basic house" story show, this is the wrong response.

415 The unexpected failure demands that you go out, look around, and listen.

416 Failure should always be considered a symptom of an innovative opportunity, and taken seriously as such. ...

417 It is equally important to watch out for the unexpected event in a supplier's business, and among the customers.

418 McDonald's, for instance, started because the company's founder, Ray Kroc, paid attention to the unexpected success of one of his customers.

419 At that time Kroc was selling milkshake machines to hamburger joints.

420 He noticed that one of his customers, a small hamburger stand in a remote California town, bought several times the number of milkshake machines its location and size could justify.

421 He investigated and found an old man who had, in effect, reinvented the fast-food business by systematizing it.

422 Kroc bought his outfit and built it into a billion-dollar business based on the original owner's unexpected success. ⁂

423 A competitor's unexpected success or failure is equally important.

424 In either case, one takes the event seriously as a possible symptom of innovative opportunity.

425 One does not just "analyze."

426 One goes out to investigate. ⁂

427 Innovation—and this is a main thesis of this book—is organized, systematic, rational work.

428 But it is perceptual fully as much as conceptual.

429 To be sure, what the innovator sees and learns has to be subjected to rigorous logical analysis.

430 Intuition is not good enough; indeed, it is no good at all if by "intuition" is meant "what I feel."

431 For that usually is another way of saying "What I like it to be" rather than "What I perceive it to be."

432 But the analysis, with all its rigor—its requirements for testing, piloting, and evaluating—has to be based on a perception of change, of opportunity, of the new realities, of the incongruity between what most people still are quite sure is the reality and what has actually become a new reality.

433 This requires the willingness to say: "I don't know enough to analyze, but I shall find out.

434 I'll go out, look around, ask questions, and listen." ...

435 It is precisely because the unexpected jolts us out of our preconceived notions, our assumptions, our certainties, that it is such a fertile source of innovation. ...

436 It is not in fact even necessary for the entrepreneur to understand why reality has changed.

437 In the two cases above, it was easy to find out what had happened and why.

438 More often, we find out what is happening without much clue as to why.

439 And yet we can still innovate successfully. ...

440 Here is one example. ...

441 The failure of the Ford Motor Company's Edsel in 1957 has become American folklore.

442 Even people who were not yet born when the Edsel failed have heard about it, at least in the United States.

443 But the general belief that the Edsel was a slapdash gamble is totally mistaken. ⁂

444 Very few products were ever more carefully designed, more carefully introduced, more skillfully marketed.

445 The Edsel was intended to be the final step in the most thoroughly planned strategy in American business history: a ten-year campaign during which the Ford Motor Company converted itself after World War II from near-bankruptcy into an aggressive competitor, a strong number two in the United States, and a few years later, a strong contender for the number one spot in the rapidly growing European market. ⁂

446 By 1957, Ford had already successfully reestablished itself as a strong competitor in three of the four main American automobile markets: the "standard" one with the Ford nameplate; the "lower-middle" one with Mercury; and the "upper" one with the Continental.

447 The Edsel was then designed for the only remaining segment, the upper-middle one, the one for which Ford's big rival, General Motors, produced the Buick and the Oldsmobile.

448 This "upper-middle" segment was, in the period after World War II, the fastest-growing part of the automobile market and yet the one for which the third automobile producer, Chrysler, did not have a strong entry, thereby leaving the door wide open for Ford. ⁂

449 Ford went to extreme lengths to plan and design the Edsel, embodying in its design the best information from market research, the best information about customer preferences in appearance and styling, and the highest standards of quality control. ⁂

450 Yet the Edsel became a total failure right away. ‟

451 The reaction of the Ford Motor Company was very revealing.

452 Instead of blaming the "irrational consumer," the Ford people decided there was something happening that did not jibe with the assumptions about reality everyone in the automobile industry had been making about consumer behavior—and for so long that they had become unquestioned axioms. ‟

453 The result of Ford's decision to go out and investigate was the one genuine innovation in the American automobile industry since Alfred P. Sloan, in the 1920s, had defined the socioeconomic segmentation of the American market into "low," "lower-middle," "upper-middle," and "upper" segments, the insight on which he then built the General Motors Company.

454 When the Ford people went out, they discovered that this segmentation was rapidly being replaced—or at least paralleled—by another quite different one, the one we would now call "lifestyle segmentation."

455 The result, within a short period after the Edsel's failure, was the appearance of Ford's Thunderbird, the greatest success of any American car since Henry Ford, Sr., had introduced his Model T in 1908.

456 The Thunderbird established Ford again as a major producer in its own right, rather than as GM's kid brother and a perennial imitator. ‟

457 And yet to this day we really do not know what caused the change.

458 It occurred well before any of the events by which it is usually explained, such as the shift of the center of demographic gravity to the teenagers as a result of the "baby boom," the explosive expansion of higher education, or the change in sexual mores.

459 Nor do we really know what is meant by "lifestyle."

460 All attempts to describe it have been futile so far.

461 All we know is that something happened. [1]

462 But that is enough to convert the unexpected, whether success or failure, into an opportunity for effective and purposeful innovation.

The Unexpected Outside Event

463

464 Unexpected successes and unexpected failure have so far been discussed as occurring within a business or an industry.

465 But outside events, that is, events that are not recorded in the information and the figures by which a management steers its institution, are just as important.

466 Indeed, they often are more important. ...

467 Here are some examples showing typical unexpected outside events and their exploitation as major opportunities for successful innovation. ...

468 One example concerns IBM and the personal computer. ...

469 However much executives and engineers at IBM may have disagreed with each other, there apparently was total agreement within the company on one point until well into the seventies: the future belonged to the centralized "main-frame" computer, with an ever larger memory and an ever larger calculating capacity.

470 Everything else, every IBM engineer could prove convincingly, would be far too expensive, far too confusing, and far too limited in its performance capacity.

471 And so IBM concentrated its efforts and resources on maintaining its leadership in the main-frame market. ...

472 And then around 1975 or 1976, to everybody's total surprise, ten- and eleven-year-old kids began to play computer games.

473 Right away their fathers wanted their own office computer or personal computer, that is, a separate, small, freestanding machine with far less capacity than even the smallest main-frame has.

474 All the dire things the IBM people had predicted actually did happen.

475 The freestanding machines cost many times what a plug-in "terminal" costs, and they have far less capacity; there is such a proliferation of them and their programs, and so few of them are truly compatible with one another, that the whole field has become chaotic, with service and repairs in shambles.

476 But this does not seem to bother the customers.

477 On the contrary, in the U.S. market the personal computers in five short years—from 1979 to 1984—reached the annual sales volume it had taken the "main-frames" thirty years to reach, that is, $15-$16 billion. ...

478 IBM could have been expected to dismiss this development.

479 Instead, as early as 1977, when personal computer sales worldwide were still less than $200 million (as against main-frame sales of $7 billion for the same year), IBM set up task forces in competition with one another to develop personal computers for the company.

480 As a result, IBM produced its own personal computer in 1980, just when the market was exploding.

481 Three years later, in 1983, IBM had become the world's leading personal computer producer with nearly as much of a leadership position in the new field as it had in main-frames.

482 Also in 1983 IBM then introduced its own very small "home computer," the "Peanut." ...

483 When I discuss all this with the IBM people, I always ask the same question: “What explains that IBM, of all people, saw this change as an opportunity when everybody at IBM was so totally sure that it couldn’t happen and made no sense?”

484 And I always get the same answer: “Precisely because we knew that this couldn’t happen, and that it would make no sense at all, the development came as a profound shock to us.

485 We realized that everything we’d assumed, everything we were so absolutely certain of, was suddenly being thrown into a cocked hat, and that we had to go out and organize ourselves to take advantage of a development we knew couldn’t happen, but which then did happen.” ⁂

486 The second example is far more mundane.

487 But is it no less instructive despite its lack of glamour. ⁂

488 The United States has never been a book-buying country, in part because of the ubiquitous free public library.

489 When TV appeared in the early fifties and more and more Americans began to spend more and more of their time in front of the tube—particularly people in their prime book-reading years, that is, people of high school and college age -“everyone knew” that book sales would drop drastically.

490 Book publishers frantically began to diversify into “high-tech media”: educational movies, or computer programs (in most cases, with total lack of success).

491 But instead of collapsing, book sales in the United States have soared since TV first came in.

492 They have grown several times as fast as every indicator had predicted, whether family incomes, total population in the "book-reading years," or even people with higher degrees.

493 No one knows why this happened.

494 Indeed, no one quite knows what really happened.

495 Books are still as rare in the typical American home as before.* (*This is also true of Japan, the country that, per capita, buys more books than any other and twice as many as the United States.)

496 Where, then, do all these books go?

497 That we have no answer to this question does not alter the fact that books are being bought and paid for in increasing numbers. ⁂

498 Both the publishers and the existing bookstores knew, of course, all along that book sales were soaring.

499 Neither, however, did anything about it.

500 The unexpected event was exploited, instead, by a few mass retailers such as department stores in Minneapolis and Los Angeles.

501 None of these people had ever had anything to do with books, but they knew the retail business.

502 They started bookstore chains that are quite different from any earlier bookstore in America.

503 Basically, these are supermarkets.

504 They do not treat books as literature but as "mass merchandise," and they concentrate on the fast-moving items that generate the largest dollar sales per unit of shelf space.

505 They are located in shopping centers with high rents but also with high traffic, whereas everybody in the book business had known all along that a bookstore has to be in a low-rent location, preferably near a university.

506 Traditionally, booksellers were themselves "literary types" and tried to hire people who "love books."

507 The managers of the new bookstores are former cosmetics salespeople.

508 The standing joke among them is that any salesperson who wants to read anything besides the price tag on the book is hopelessly overqualified. ⁂

509 For ten years now, these new bookstore chains have been among the most successful and fastest-growing segments in American retailing and among the fastest-growing new businesses in this country altogether. ⁂

510 Each of these cases represents genuine innovation.

511 But not one of them represents diversification. ⁂

512 IBM stayed in the computer business.

513 And the chain bookstores are run by people who all along have been in retailing, in shopping centers, or managing "boutiques." ⁂

514 It is a condition of success in exploiting the unexpected outside event that it must fit the knowledge and expertise of one's own business.

515 Companies, even large companies, that went into the new book market or into mass merchandising without the retail expertise have uniformly come to grief. ⁂

516 The unexpected outside event may thus be, above all, an opportunity to apply already existing expertise to a new application, but to an application that does not change the nature of the "business we are in."

517 It may be extension rather than diversification.

518 Yet as the above examples show, it also demands innovation in product and often in service and distribution channels. ⁂

519 The second point about these cases is that they all are big-company cases.

520 Of course, a good many of the cases in this book, as in any management book, have to be big-company cases.

521 They are the only available ones, as a rule, the only ones that can be found in the published records, the only ones discussed on the business page of newspapers or in magazines.

522 Small-company cases are much harder to come by and often cannot be discussed without violating confidences. ⁂

523 But exploiting the unexpected outside event appears to be something that particularly fits the existing enterprise, and a fairly sizable one at that.

524 I know of few small companies that have successfully exploited the unexpected outside event; nor does any other student of entrepreneurship and innovation whom I could consult.

525 This may be coincidence.

526 But perhaps the existing large enterprise is more likely to see the “big picture.” ⁂

527 It is the large retailer in the United States who is used to looking at figures that show where and how consumers spend retail dollars.

528 The large retailer also knows about shopping-center locations and how to get the good ones.

529 And could a small company have done what IBM did and detach four task forces of first-rate designers and engineers to work on new product lines?

530 Smaller high-tech companies in a rapidly growing industry usually do not have enough of such people even for their existing work. ⁂

531 It may well be that the unexpected outside event is the innovative area that offers the large enterprise the greatest opportunity along with the lowest risk.

532 It may be the area that is particularly suited for innovation by the large and established enterprise.

533 It may be the area in which expertise matters the most, and in which the ability to mobilize substantial resources fast makes the greatest difference. ⁂

534 But as these cases also show, being big and established does not guarantee that an enterprise will perceive the unexpected event and successfully organize itself to exploit it.

535 IBM’s American competitors are all big businesses with sales in the billions.

536 Not one of them exploited the personal computer—they were all too busy fighting IBM.

537 And not one of the old large bookstore chains in the United States, Brentano's in New York, for instance, exploited the new book market. ...

538 The opportunity is there, in other words.

539 It is a major opportunity, occurring frequently.

540 And when it occurs, it holds out great promise, particularly for existing and sizable enterprises.

541 But such opportunities require more than mere luck or intuition.

542 They demand that the enterprise search for innovation, be organized for it, and be managed so as to exploit it.

Source: Incongruities

An incongruity is a discrepancy, a dissonance,

between what is and what "ought" to be, or

between what is and what everybody assumes it to be.

We may not understand the reason for it; indeed, we often cannot figure it out.

Still, an incongruity is a symptom of an opportunity to innovate.

It bespeaks an underlying "fault," to use the geologist's term.

Such a fault is an invitation to innovate.

It creates an instability in which quite minor efforts can move large masses and bring about a restructuring of the economic or social configuration.

Incongruities do not, however, usually manifest themselves in the figures or reports executives receive and pay attention to.

They are qualitative rather than quantitative. ...

Like the unexpected event, whether success or failure, incongruity is a symptom of change, either change that has already occurred or change that can be made to happen.

Like the changes that underlie the unexpected event, the changes that underlie incongruity are changes within an industry, a market, a process.

The incongruity is thus clearly visible to the people within or close to the industry, market, or process; it is directly in front of their eyes.

557 Yet it is often overlooked by the insiders, who tend to take it for granted:

558 "This is the way it's always been," they say, even though "always" may be a very recent development. „

559 There are several kinds of incongruity:

560 - An incongruity between the economic realities of an industry (or of a public-service area);

561 - An incongruity between the reality of an industry (or of a public-service area) and the assumptions about it;

562 - An incongruity between the efforts of an industry (or a public service area) and the values and expectations of its customers;

563 - An internal incongruity within the rhythm or the logic of a process.

564 ## Incongruous Economic Realities

565 If the demand for a product or a service is growing steadily, its economic performance should steadily improve, too.

566 It should be easy to be profitable in an industry with steadily rising demand.

567 The tide carries it.

568 A lack of profitability and results in such an industry bespeaks an incongruity between economic realities. ‟

569 Typically, these incongruities are macro-phenomena, which occur within a whole industry or a whole service sector.

570 The major opportunities for innovation exist, however, normally for the small and highly focused new enterprise, new process, or new service.

571 And usually the innovator who exploits this incongruity can count on being left alone for a long time before the existing businesses or suppliers wake up to the fact that they have new and dangerous competition.

572 For they are so busy trying to bridge the gap between rising demand and lagging results that they barely even notice somebody is doing something different—something that produces results, that exploits the rising demand. ‟

573 Sometimes we understand what is going on.

574 But sometimes it is impossible to figure out why rising demand does not result in better performance.

575 The innovator, therefore, need not always try to understand why things do not work as they should.

576 He should ask instead: “What would exploit this incongruity?

577 What would convert it into an opportunity?

578 What can be done?”

579 Incongruity between economic realities is a call to action.

580 Sometimes the action to be taken is rather obvious, even though the problem itself is quite obscure.

581 And sometimes we understand the problem thoroughly and yet cannot figure out what to do about it. ...

582 The steel “mini-mill” is a good example of an innovation that successfully exploited incongruity. ...

583 For more than fifty years, since the end of World War I, the large, integrated steel mill in developed countries did well only in wartime.

584 In times of peace its results were consistently disappointing, even though the demand for steel appeared to be going up steadily, at least until 1973. ...

585 The explanation of this incongruity has long been known.

586 The minimum incremental unit needed to satisfy additional demand in an integrated steel mill is a very big investment and adds substantially to capacity.

587 Any expansion to an existing steel mill is thus likely to operate for a good many years at a low utilization rate, until demand which always goes up in small, incremental steps except in wartime reaches the new capacity level.

588 But not to expand when demand creeps up means losing market share, and permanently.

589 No company can afford to take that risk.

590 The industry can therefore only be profitable for a few short years: between the time when everybody begins to build new capacity and the time when all this new capacity comes on stream. ...

591 Further, the steelmaking process invented in the 1870s is fundamentally uneconomical, as also has been known for many years.

592 It tries to defy the laws of physics—and that means violating the laws of economics.

593 Nothing in physics requires as much work as the creation of temperatures, whether hot or cold, unless it is working against the laws of gravity and of inertia.

594 The integrated steel process creates very high temperatures four times, only to quench them again.

595 And it lifts heavy masses of hot materials and then moves them over considerable distances. ...

596 It had been clear for many years that the first innovation in process that would assuage these inherent weaknesses would substantially lower costs.

597 This is exactly what the "mini-mill" does.

598 A mini-mill is not a "small" plant; the minimum economical size produces around $100 million of sales.

599 But that is still about one-sixth to one-tenth the minimum economic size of an integrated steel mill.

600 A mini-mill can thus be built to provide, economically, a fairly small additional increment of steel production for which the market already exists.

601 The mini-mill creates heat only once, and does not quench it, but uses it for the rest of the process.

602 It starts with steel scrap instead of iron ore, and then concentrates on one end product: sheet, for instance, or beams, or rods.

603 And while the integrated steel mill is highly labor-intensive, the minimill can be automated.

604 Its costs thus come to less than half those of the traditional steel process. ⁂

605 Governments, labor unions, and the integrated steel companies have been fighting the mini-mill every step of the way.

606 But it is steadily encroaching.

607 By the year 2000, fifty percent or more of the steel used in the United States is likely to come out of mini-mills, while the large, integrated steel mills will be in irreversible decline. ⁂

608 There is a catch, however, and it is an important one.

609 A similar incongruity between the economic reality of demand and the economic reality of the process exists in the paper industry.

610 Only in this case, we do not know how to convert it into innovation and opportunity. ⁂

611 Despite the constant efforts of the governments of all developed and most developing countries to increase the demand for paper—perhaps the only objective on which the governments of all countries agree the paper industry has not been doing well.

612 Three years of "record profits" are invariably followed by five years of "excess capacity" and losses.

613 Yet we do not, so far, have anything like a "mini-mill" process for paper.

614 For eighty or ninety years, it has been known that wood fiber is a monomer; and it should not be too difficult, one would say, to find a plasticizer that converts it into a polymer.

615 This would convert paper-making from an inherently inefficient and wasteful mechanical process into an inherently efficient chemical process.

616 Indeed, almost a hundred years ago this was achieved as far as making textile fibers out of wood pulp is concerned—in the rayon process, which dates back to the 1880s.

617 But despite millions spent in research, nobody has so far found a technique to produce paper that way. ‴

618 In an incongruity, as these cases exemplify, the innovative solution has to be clearly definable.

619 It has to be feasible with the existing, known technology, and with easily available resources.

620 It requires hard developmental work, of course.

621 But if a great deal of research and new knowledge is still needed, it is not yet ready for the entrepreneur, not yet "ripe."

622 The innovation that successfully exploits an incongruity between economic realities has to be simple rather than complicated, "obvious" rather than grandiose. „

623 In public-service areas, too, major incongruities between economic realities can be found. „

624 Health care in developed countries offers one example.

625 As recently as 1929, health care represented an insignificant portion of national expenditure in all developed countries, taking up a good deal less than 1 percent of gross national product or of consumer expenditures.

626 Now, half a century later, health care, and especially the hospital, accounts in all developed countries for 7 to 11 percent of a much larger gross national product.

627 Yet economic performance has been going down rather than up.

628 Costs have risen much faster than services-perhaps three or four times as fast.

629 The demand will continue to rise with the steady growth in the number of older people in all developed countries over the next thirty years.

630 And so will the costs, which are closely tied to the age of the population. „

631 We do not understand the phenomenon.[1] But successful innovations, simple, targeted and focused on specific objectives, have emerged in Great Britain and the United States.

632 These innovations are quite different simply because the two countries have such radically different systems.

633 But each exploits the specific vulnerability of its country's system and converts it into an opportunity. ...

634 In Britain, the "radical innovation" is private health insurance, which has become the fastest-growing and most popular employee benefit.

635 All it does is to enable policyholders to be seen immediately by a specialist and to jump to the head of the queue and avoid having to wait should they need "elective surgery."

636 (Surgery for complaints that yield to surgery, will not improve without it, but are not "life-threatening."

637 Examples are cataracts, hip replacements and orthopedic surgery generally, or a prolapsed uterus.)

638 For the British system has attempted to keep health-care costs down by "triage" which, in effect, reserves immediate attention and treatment to routine illnesses on the one hand and to "life-threatening" ailments on the other, but puts everything else, and especially elective surgery, on hold with waiting periods now running into years (e. g., for replacing a hip destroyed by arthritis).

639 Health insurance policyholders, however, are operated on right away. ...

640 In contrast to Great Britain, the United States has so far tried to satisfy all demands of health care regardless of cost.

641 As a result, hospital costs in America have exploded.

642 This created a different innovative opportunity: to "unbundle," that is, to move out of the hospital into separate locations a host of services that do not require such high-cost hospital facilities as a body scanner or cobalt X-Ray to treat cancers, the highly instrumented and automated medical laboratory, or physical rehabilitation.

643 Each of these innovative responses is small and specific: a freestanding maternity center, which basically offers motel facilities for mother and new baby; a freestanding "ambulatory" surgical center for surgery that does not require a hospital stay and post-operative care; a psychiatric diagnostic and referral center; geriatric centers of a similar nature; and so on. ⁂

644 These new facilities do not substitute for the hospital.

645 What they do in effect is to push the American hospital toward the same role the British have assigned to their hospitals: as a place for emergencies, for life-threatening diseases, and for intensive and acute sickness care.

646 But these innovations which, as in Britain, are embodied primarily in profit-making "businesses," convert the incongruity between the economic reality of rising health-care demand and the economic reality of falling health-care performance into an opportunity for innovation. ⁂

647 These are "big" examples, taken from major industries and public services.

648 It is this fact, however, that makes them accessible, visible, and understandable.

649 Above all, these examples show why the incongruity between economic realities offers such great innovative opportunities.

650 The people who work within these industries or public services know that there are basic flaws.

651 But they are almost forced to ignore them and to concentrate instead on patching here, improving there, fighting this fire or caulking that crack.

652 They are thus unable to take the innovation seriously, let alone to try to compete with it.

653 They do not, as a rule, even notice it until it has grown so big as to encroach on their industry or service, by which time it has become irreversible.

654 In the meantime, the innovators have the field to themselves.

655

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656 [1] *This is brought out clearly in the best discussion of the health-care problem that has appeared so far, and the only one that looks at health care across national boundaries, in all developed countries. It is given in *The Economist* of April 29, 1984

The Incongruity Between Reality And The Assumptions About It

Whenever the people in an industry or a service misconceive reality, whenever they therefore make erroneous assumptions about it, their efforts will be misdirected.

They will concentrate on the area where results do not exist.

Then there is an incongruity between reality and behavior, an incongruity that once again offers opportunity for successful innovation to whoever can perceive and exploit it. ...

A simple example is that old workhorse of world trade, the oceangoing general cargo vessel. ...

Thirty-five years ago, in the early 1950s, the ocean-going freighter was believed to be dying.

The general forecast was that it would be replaced by air freight, except for bulk commodities.

Costs of ocean freight were rising at a fast clip, and it took longer and longer to get merchandise delivered by freighter as one port after another became badly congested.

This, in turn, increased pilferage at the docks as more and more merchandise piled up waiting to be loaded while vessels could not make it to the pier. ...

The basic reason was that the shipping industry had misdirected its efforts toward nonresults for many years.

It had tried to design and build faster ships, and ships that required less fuel and a smaller crew.

668 It concentrated on the economics of the ship while at sea and in transit from one port to another. ...

669 But a ship is capital equipment: and for all capital equipment the biggest cost is the cost of not working, during which interest has to be paid while the equipment does not earn.

670 Everybody in the industry knew, of course, that the main expense of a ship is interest on the investment.

671 Yet the industry kept on concentrating its efforts on costs that were already quite low—the costs of the ship while at sea and doing work. ...

672 The solution was simple: Uncouple loading from stowing.

673 Do the loading on land, where there is ample space and where it can be performed before the ship is in port, so that all that has to be done is to put on and take off pre-loaded freight.

674 Concentrate, in other words, on the costs of not working rather than on those of working.

675 The answer was the roll-on, roll-off ship and the container ship. ...

676 The results of these simple innovations have been startling.

677 Freighter traffic in the last thirty years has increased up to five-fold.

678 Costs, overall, are down by 60 percent.

679 Port time has been cut by three-quarters in many cases, and with it congestion and pilferage. ...

680 Incongruity between perceived reality and actual reality often declares itself.

681 But whenever serious, concentrated efforts do not make things better but, on the contrary, make things worse—where faster ships only mean more port congestion and longer delivery times—it is highly probable that efforts are being misdirected.

682 In all likelihood, refocusing on where the results are will yield substantial returns easily and fast. ⎓

683 Indeed, the incongruity between perceived and actual reality rarely requires “heroic” innovations.

684 Uncoupling the loading of freight from the stowing thereof required little but adapting to the ocean-going freighter methods which, much earlier, had been developed for trucks and railroads. ⎓

685 The incongruity between perceived and actual reality typically characterizes a whole industry or a whole service area.

686 The solution, however, should again be small and simple, focused and highly specific.

687 ## The Incongruity Between Perceived And Actual Customer Values And Expectations

688 In Chapter 3, I mentioned the case of television in Japan as an example of the unexpected success.

689 It is also a good example of the incongruity between actual and perceived customer values and customer expectations.

690 Long before the Japanese industrialist told his American audience that the poor in his country would not buy a TV set because they could not afford it, the poor in the United States and in Europe had already shown that TV satisfies expectations which have little to do with traditional economics.

691 But this highly intelligent Japanese simply could not conceive that for customers—and especially for poor customers—the TV set is not just a "thing."

692 It represents access to a new world; access, perhaps, to a whole new life. ‴

693 Similarly, Khrushchev could not conceive that the automobile is not a "thing" when he said on his visit to the United States in 1956 that "Russians will never want to own automobiles; cheap taxis make much more sense."

694 Any teenager could have told him that "wheels" are not mere transportation but freedom, mobility, power, romance.

695 And Khrushchev's misperception created one of the wildest entrepreneurial opportunities: the shortage of automobiles in Russia has brought forth the biggest and liveliest black market. ‴

696 These, it will be said, are again "cosmic" examples, not much use to a businessman or to an executive in a hospital, a university, or a trade association.

697 But they are examples of a common phenomenon.

698 What follows is a different case, in its own way equally "cosmic" but very definitely of operational significance. ...

699 One of the fastest-growing American financial institutions for the last several years has been a securities firm located not in New York but in a suburb of a Midwestern city.

700 It now has two thousand branch offices all over the United States.

701 And it owes its success and growth to having exploited an incongruity. ...

702 The large financial institutions, the Merrill Lynches and Dean Witters and E. F. Huttons, assume that their customers have the same values they have.

703 To them it is obvious, if not axiomatic, that people invest in order to get rich.

704 This is, after all, what motivates the members of the New York Stock Exchange, and determines what they consider "success."

705 However, this assumption holds true only for a part of the investing public, and surely not even for the majority.

706 They are not "financial people."

707 They know that in order to "get rich" by investing, one has to work full time at managing money and be pretty knowledgeable about it.

708 The local professional men, the local small businessmen, the local substantial farmers, however, have neither such time nor such knowledge; they are much too busy earning their money to have time to manage it. ...

709 This is the incongruity which the Midwestern securities firm exploits.

710 Outwardly, it looks just like any other securities firm.

711 It is a member of the New York Stock Exchange.

712 But only a very small portion of its business, around one-eighth, is Stock Exchange business.

713 It stays away from the items the big trading houses on Wall Street push the hardest: options, commodity futures, and so on, appealing instead to what it calls "the intelligent investor."

714 It does not promise—and this is a genuine innovation among American financial service institutions that its customers will make a fortune.

715 It does not even want customers who trade.

716 It wants customers who earn more money than they spend, which is typical for the successful professional, the substantial farmer, or the small-town businessman, less because their incomes are high than because their spending habits are modest.

717 And then it appeals to their psychological need to protect their money.

718 What this firm sells is a chance to maintain one's savings—through investment in bonds and stocks, to be sure, but also in deferred annuities, tax-sheltered partnerships, real estate trust, and so on.

719 The "product" the firm delivers is a different one and one that no Wall Street house has ever sold before: peace of mind.

720 And this is what really represents “value” for the “intelligent investor.” ⁂

721 The big Wall Street houses cannot even imagine that such customers exist since they defy everything the houses believe in and hold true.

722 This successful firm has now been widely publicized.

723 It is on every list of large and growing Stock Exchange firms.

724 Yet the senior people in the big firms have not yet accepted that their competitor exists, let alone that it is successful. ⁂

725 Behind the incongruity between actual and perceived reality, there always lies an element of intellectual arrogance, of intellectual rigor and dogmatism.

726 “It is I, not they, who know what poor people can afford,” the Japanese industrialist in effect asserted.

727 “People behave according to economic rationality, as every good Marxist knows,” as Khrushchev implied.

728 This explains why the incongruity is so easily exploited by innovators: they are left alone and undisturbed. ⁂

729 Of all incongruities, that between perceived and actual reality may be the most common.

730 Producers and suppliers almost always misconceive what it is the customer actually buys.

731 They must assume that what represents “value” to the producer and supplier is equally “value” to the customer.

732 To succeed in doing a job, any job, one has to believe in it and take it seriously.

733 People who make cosmetics must believe in them; otherwise, they turn out shoddy products and soon lose their customers.

734 People who run a hospital must believe in health care as an absolute good, or the quality of medical and patient care will deteriorate fast.

735 And yet, no customer ever perceives himself as buying what the producer or supplier delivers.

736 Their expectations and values are always different. ⁂

737 The reaction of the typical producer and supplier is then to complain that customers are “irrational” or “unwilling to pay for quality.”

738 Whenever such a complaint is heard, there is reason to assume that the values and expectations the producer or supplier holds to be real are incongruous with the actual values and expectations of customers and clients.

739 Then there is reason to look for an opportunity for innovation that is highly specific, and carries a good chance of success.

Incongruity Within The Rhythm Or Logic Of A Process

741 Twenty-five years or so ago, during the late 1950s, a pharmaceutical company salesman decided that he wanted to go into business for himself.

742 He therefore looked for an incongruity within a process in medical practice.

743 He found one almost immediately.

744 One of the most common surgical operations is the operation for senile cataract in the eye.

745 Over the years the procedure had become refined, routinized and instrumented to the point where it was conducted with the rhythm of a perfectly rehearsed dance—and with total control.

746 But there was one point in this operation that was out of character and out of rhythm: at one phase the eye surgeon had to cut a ligament, to tie blood vessels and so risk bleeding, which then endangered the eye.

747 This procedure was done successfully in more than 99 percent of all operations; indeed, it was not very difficult.

748 But it greatly bothered the surgeons.

749 It forced them to change their rhythm and induced anxiety in them.

750 Eye surgeons, no matter how often they had done the operation, dreaded this one, quick procedure. [1]

751 The pharmaceutical company salesman—his name is William Connor—found out without much research that an enzyme had been isolated in the 1890s which almost instantaneously dissolves this particular ligament.

752 Only nobody then, sixty years earlier, had been able to store this enzyme even under refrigeration for more than a few short hours.

753 Preservation techniques have, however, made quite a bit of progress since 1890.

754 And so Connor, within a few months, was able by trial and error to find a preservative that gives the enzyme substantial shelf life without destroying its potency.

755 Within a few years, every eye surgeon in the world was using Connor's patented compound.

756 Twenty years later he sold his company, Alcon Laboratories, to one of the multinationals for a very large amount. „

757 And another telling example: „

758 0. M. Scott & Co. is the leader among American producers of lawn-care products: grass seed, fertilizer, pesticides, and so on.

759 Though it is now a subsidiary of a large corporation (ITT), it attained leadership while a small independent company in fierce competition with firms many times its size, ranging from Sears, Roebuck to Dow Chemicals.

760 Its products are good but so are those of the competition.

761 Its leadership rests on a simple, mechanical gadget called a Spreader, a small, lightweight wheelbarrow with holes that can be set to allow the proper quantities of Scott's products to pass through in an even flow.

762 Products for the lawn all claim to be "scientific" and are compounded on the basis of extensive tests.

763 All prescribe in meticulous detail how much of the stuff should be applied, given soil conditions and temperatures.

764 All try to convey to the consumer that growing a lawn is "precise," "controlled," if not "scientific."

765 But before the Scott Spreader, no supplier of lawn-care products gave the customer a tool to control the process.

766 And without such a tool, there was an internal incongruity in the logic of the process that upset and frustrated customers.

767 Does the identification of such internal incongruity within a process rest on "intuition" and on accident?

768 Or can it be organized and systematized?

769 William Connor is said to have started out by asking surgeons where they felt uncomfortable about their work.

770 0. M. Scott grew from a tiny local seed retailer into a fair-sized national company because it asked dealers and customers what they missed in available products.

771 Then it designed its product line around the Spreader.

772 The incongruity within a process, its rhythm or its logic, is not a very subtle matter.

773 Users are always aware of it.

774 Every eye surgeon knew about the discomfort he felt when he had to cut eye muscle—and talked about it.

775 Every hardware-store clerk knew about the frustration of his lawn customers—and talked about it.

776 What was lacking, however, was someone willing to listen, somebody who took seriously what everybody proclaims: That the purpose of a product or a service is to satisfy the customer.

777 If this axiom is accepted and acted upon, using incongruity as an opportunity for innovation becomes fairly easy—and highly effective. „

778 There is, however, one serious limitation.

779 The incongruity is usually available only to people within a given industry or service.

780 It is not something that somebody from the outside is likely to spot, to understand, and hence is able to exploit.

781 ## *Source: Process Need*

782 "Opportunity is the source of innovation" has been the leitmotif of the preceding chapters.

783 But an old proverb says, "Necessity is the mother of invention."

784 This chapter looks at need as a source of innovation, and indeed as a major innovative opportunity. ⁂

785 The need we shall discuss as a source of innovative opportunity is a very specific one: I call it "process need."

786 It is not vague or general but quite concrete.

787 Like the unexpected, or the incongruities, it exists within the process of a business, an industry, or a service.

788 Some innovations based on process need exploit incongruities, others demographics.

789 Indeed, process need, unlike the other sources of innovation, does not start out with an event in the environment, whether internal or external.

790 It starts out with the job to be done.

791 It is task-focused rather than situation-focused.

792 It perfects a process that already exists, replaces a link that is weak, redesigns an existing old process around newly available knowledge.

793 Sometimes it makes possible a process by supplying the "missing link." ⁂

794 In innovations that are based on process need, everybody in the organization always knows that the need exists.

795 Yet usually no one does anything about it.

796 However, when the innovation appears, it is immediately accepted as “obvious” and soon becomes “standard.” „

797 One example has been mentioned earlier in Chapter 4.

798 It is William Connor’s conversion of the enzyme that dissolves a ligament in cataract surgery of the eye from a textbook curiosity into an indispensable product.

799 The process of cataract surgery itself was a very old one.

800 The enzyme to perfect the process had been known for decades.

801 The innovation was the preservative to keep the enzyme fresh under refrigeration.

802 Once that process need had been satisfied, no eye surgeon could possibly imagine doing without Connor’s compound. „

803 Very few innovations based on process need are so sharply focused as this one, in which formulating the need right away produced the required solution.

804 But in their essentials, most, if not all, innovations based on process need have the same elements. „

805 Here is another example of a similar process–need innovation. „

806 Ottmar Mergenthaler designed the linotype for typesetting in 1885.

807 During the preceding decades, printed materials of all kinds—magazines, newspapers, books—had all been growing at an exponential rate with the spread of literacy and the development of transportation and communication.

808 All the other elements of the printing process had already changed.

809 There were high-speed printing presses, for instance, and paper was being made on high-speed paper machines.

810 Only typesetting had gone unchanged from the days of Gutenberg four hundred years earlier.

811 It remained slow and expensive manual work, requiring high skill and long years of apprenticeship.

812 Mergenthaler, like Connor, defined what was needed: a keyboard that would make possible the mechanical selection of the right letter from the type-font; a mechanism to assemble the letters and to adjust them in a line; and—the most difficult, by the way—a mechanism to return each letter to its proper receptacle for future use.

813 Each of these required several years of hard work and considerable ingenuity.

814 But none required new knowledge, let alone new science.

815 Mergenthaler's linotype became the "standard" in less than five years, despite vigorous resistance from the old craftsmen-typesetters. ▪▪

816 In both these cases—William Connor's enzyme and the linotype machine—the process need was based on an incongruity in the process.

817 Demographics, however, are very often an equally powerful source of process need and an opportunity for process innovation. ▪▪

818 In 1909 or thereabouts a statistician at the Bell Telephone System projected two curves fifteen years ahead: the curve for American population growth and the curve for the number of people required as central-station operators to handle the growing volume of telephone calls.

819 These projections showed that every American woman between age seventeen and sixty would have to work as a switchboard operator by the year 1925 or 1930 if the manual system of handling calls were to be continued.

820 Two years later, Bell engineers had designed and put into service the first automatic switchboard. ...

821 Similarly, the present rush into robotics is largely the result of a process need caused by demographics.

822 Most of the knowledge has been around for years.

823 But until the consequences of the "baby bust" became apparent to major manufacturers in the industrial countries, especially in Japan and the United States, the need to replace semi-skilled assembly-line labor with machines was not felt.

824 The Japanese are not ahead in robotics because of technical superiority; their designs have mostly come from the United States.

825 But the Japanese had their "baby bust" four or five years earlier than America and almost ten years earlier than West Germany.

826 It took the Japanese just as long as it did the Americans or the Germans—ten years—to realize that they were facing a labor shortage.

827 But these ten years started in Japan a good deal sooner than in the United States, and in West Germany the ten years are still not quite over as these lines are being written. ...

828 Mergenthaler's linotype was also in large measure the result of demographic pressures.

829 With the demand for printed materials exploding, the supply of typesetters requiring an apprenticeship of six to eight years was fast becoming inadequate, and wages for typesetters were skyrocketing.

830 As a result, printers became conscious of the "weak link" but also willing to pay good money for a machine that replaced five very expensive craftsmen with one semi-skilled machine operator. ‟

831 Incongruities and demographics may be the most common causes of a process need.

832 But there is another category, far more difficult and risky yet in many cases of even greater importance: what is now being called program research (as contrasted with the traditional "pure research" of scientists).

833 There is a "weak link" and it is definable, indeed, clearly seen and acutely felt.

834 But to satisfy the process need, considerable *new knowledge* has to be produced. ‟

835 Very few inventions have succeeded faster than photography.

836 Within twenty years after its invention, it had become popular worldwide.

837 Within twenty years or so, there were great photographers in every country; Mathew Brady's photographs of the American Civil War are still unsurpassed.

838 By 1860, every bride had to have her photograph taken.

839 Photography was the first Western technology to invade Japan, well before the Meiji Restoration and at a time when Japan otherwise was still firmly closed to foreigners and foreign ideas. ‟

840 Amateur photographers were fully established by 1870.

841 But the available technology made things difficult for them.

842 Photography required heavy and fragile glass plates, which had to be lugged around and treated with extreme care.

843 It required an equally heavy camera, long preparations before a picture could be taken, elaborate settings, and so on.

844 Everybody knew this.

845 Indeed, the photography magazines of the time—and photography magazines were among the first specialty mass magazines—are full of complaints about the extreme difficulty of taking photographs and of suggestions what to do.

846 But the problems could not be solved with the science and technology available in 1870. ‟

847 By the mid-1880s, however, new knowledge had become available which then enabled George Eastman, the founder of Kodak, to replace the heavy glass plates with a cellulose film weighing practically nothing and impervious even to very rough handling, and to design a lightweight camera around his film.

848 Within ten years, Eastman Kodak had taken world leadership in photography, which it still retains. ‟

849 “Program research” is often needed to convert a process from potential into reality.

850 Again, the need must be felt, and it must be possible to identify what is needed.

851 Then the new knowledge has to be produced.

852 The prototype innovator for this kind of process-need innovation was Edison (see also Chapter 9).

853 For twenty-odd years, everybody had known that there was going to be an “electric power industry.”

854 For the last five or six years of that period, it had become abundantly clear what the “missing link” was: the light bulb.

855 Without it, there could be no electric power industry.

856 Edison defined the new knowledge needed to convert this potential electric power industry into an actual one, went to work, and had a light bulb within two years. ‟

857 Program research to convert a potential into reality has become the central methodology of the first-rate industrial research laboratory and, of course, of research for defense, for agriculture, for medicine, and for environmental protection. ‟

858 Program research sounds big.

859 To many people it means “putting a man on the moon” or finding a vaccine against polio.

860 But its most successful applications are in small and clearly defined projects—the smaller and the more sharply focused the better.

861 Indeed, the best example—and perhaps the best single example of successful process need-based innovation—is a very small one, the highway reflector that cut the Japanese automobile accident rate by almost two-thirds. ...

862 As late as 1965, Japan had almost no paved roads outside of the big cities.

863 But the country was rapidly shifting to the automobile, so the government frantically paved the roads.

864 Now automobiles could—and did—travel at high speed.

865 But the roads were the same old ones that had been laid down by the oxcarts of the tenth century—barely wide enough for two cars to pass, full of blind corners and hidden entrances, and with junctions every few kilometers at which half a dozen roads meet at every conceivable angle.

866 Accidents began to mount at an alarming rate, especially at night.

867 Press, radio and TV, and the opposition parties in Parliament soon began to clamor for the government to "do something."

868 But, of course, rebuilding the roads was out of the question; it would have taken twenty years anyhow.

869 And a massive publicity campaign to make automobilists "drive carefully" had the result such campaigns generally have, namely, none at all. ...

870 A young Japanese, Tamon Iwasa, seized on this crisis as an innovative opportunity.

871 He redesigned the traditional highway reflector so that the little glass beads that serve as its mirrors could be adjusted to reflect the headlights of oncoming cars from any direction onto any direction.

872 The government rushed to install Iwasa reflectors by the hundreds of thousands.

873 And the accident rate plummeted. …

874 To take another example. …

875 World War I had created a public in the United States for national and international news.

876 Everybody was aware of this.

877 Indeed, the newspapers and magazines of those early post-World War I years are full of discussions as to how this need could be satisfied.

878 But the local newspaper could not do the job.

879 Several leading publishers tried, among them *The New York Times*; none of them succeeded.

880 Then Henry Luce identified the process need and defined what was required to satisfy it. …

881 It could not be a local publication, it had to be a national one, otherwise, there would be neither enough readers nor enough advertisers.

882 And it could not be a daily—there was not enough news of interest to a large public.

883 The development of the editorial format was then practically dictated by these specifications.

884 When *Time* magazine came out as the first news magazine in the world, it was an immediate success. …

885 These examples, and especially the Iwasa story, show that successful innovations based on process needs require five basic criteria:

886 - A self-contained process;
887 - One "weak" or "missing" link;
888 - A clear definition of the objective;
889 - That the specifications for the solution can be defined clearly;
890 - Widespread realization that "there ought to be a better way," that is, high receptivity. ⁂

891 There are, however, some important caveats. ⁂

892 1. The need must be *understood*.

893 It is not enough for it to be "felt."

894 Otherwise one cannot define the specifications for the solution.

895 We have known, for instance, for several hundred years that mathematics is a problem subject in school.

896 A small minority of students, certainly no more than one-fifth, seem to have no difficulty with mathematics and learn it easily.

897 The rest never really learn it.

898 It is possible, of course, to drill a very much larger percentage to pass mathematics tests.

899 The Japanese do this through heavy emphasis on the subject.

900 But that does not mean that Japanese children learn mathematics.

901 They learn to pass the tests and then immediately forget mathematics.

902 Ten years later, by the time they are in their late twenties, Japanese do just as poorly on mathematics tests as do westerners.

903 In every generation there is a mathematics teacher of genius who somehow can make even the untalented learn, or at least learn a good deal better.

904 But nobody has ever been able, then, to replicate what this one person does.

905 The need is acutely felt, but we do not understand the problem.

906 Is it a lack of native ability?

907 Is it that we are using the wrong methods?

908 Are there psychological and emotional problems?

909 No one knows the answer.

910 And without understanding the problem, we have not been able to find any solution. ■

911 2. We may even understand a process and still not have the knowledge to do the job.

912 The preceding chapter told of the clear and understood incongruity in paper making: to find a process that is less wasteful and less uneconomical than the existing one.

913 For a century, able people have worked on the problem.

914 We know exactly what is needed: polymerization of the lignin molecule.

915 It should be easy-we have polymerized many molecules that are similar.

916 But we lack the knowledge to do it, despite a hundred years of assiduous work by well-trained people.

917 One can only say, "Let's try something else." ⁂

918 3. The solution must fit the way people do the work and want to do it.

919 Amateur photographers had no psychological investment in the complicated technology of the early photographic process.

920 All they wanted was to get a decent photograph, as easily as possible.

921 They were receptive, therefore, to a process that took the labor and skill out of taking pictures.

922 Similarly, eye surgeons were interested only in an elegant, logical, bloodless process.

923 An enzyme that gave this to them therefore satisfied their expectations and values. ⁂

924 But here is an example of an innovation based on a clear and substantial process need that apparently does not quite fit, and therefore has not been readily accepted. ⁂

925 For many years the information required by a number of professionals such as lawyers, accountants, engineers, and physicians has grown much faster than the capacity to find it.

926 Professionals have been complaining that they have to spend more and more time hunting for information in the law library, in handbooks and textbooks, in looseleaf services, and so on.

927 One would therefore expect a “databank” to be an immediate success.

928 It gives the professionals immediate information through a computer program and a display terminal: court decisions for the lawyers, tax rulings for the accountants, information on drugs and poisons for the physicians.

929 Yet these services have found it very hard to gather enough subscribers to break even.

930 In some cases, such as Lexis, a service for lawyers, it has taken more than ten years and huge sums of money to get subscribers.

931 The reason is probably that the databanks make it *too* easy.

932 Professionals pride themselves on their “memory,” that is, on their ability either to remember the information they need or to know where to find it.

933 “You have to remember the court decisions you need and where to find them,” is still the injunction the beginning lawyer gets from the seniors.

934 So the databank, however helpful in the work and however much time and money it saves, goes against the very values of the professional.

935 “What would you need me for if it can be looked up?” an eminent physician once said when asked by one of his patients why he did not use the service that would give him the information to check and confirm his diagnosis, and then decide which alternative method of treatment might be the best in a given case.

936 Opportunities for innovation based on process need can be found systematically.

937 This is what Edison did for electricity and electronics.

938 This is what Henry Luce did while still an undergraduate at Yale.

939 This is what William Connor did.

940 In fact, the area lends itself to systematic search and analysis.

941 But once a process need has been found, it has to be tested against the five basic criteria given above.

942 Then, finally, the process need opportunity has to be tested also against the three constraints.

943 Do we understand what is needed?

944 Is the knowledge available or can it be procured within the “state of the art”?

945 And does the solution fit, or does it violate the mores and values of the intended users?

946 ## *Source: Industry and Market Structures*

947 Industry and market structures sometimes last for many, many years and seem completely stable.

948 The world aluminum industry, for instance, after one century is still led by the Pittsburgh-based Aluminum Company of America which held the original patents, and by its Canadian offspring, Alcan of Montreal.

949 There has only been one major newcomer in the world's cigarette industry since the 1920s, the South African Rembrandt group.

950 And in an entire century only two newcomers have emerged as leading electrical apparatus manufacturers in the world: Philips in Holland and Hitachi in Japan.

951 Similarly no major new retail chain emerged in the United States for forty years, between the early twenties when Sears, Roebuck began to move from mail order into retail stores, and the mid-sixties when an old dime-store chain, Kresge, launched the K-Mart discount stores.

952 Indeed, industry and market structures appear so solid that the people in an industry are likely to consider them foreordained, part of the order of nature, and certain to endure forever. ▪

953 Actually, market and industry structures are quite brittle.

954 One small scratch and they disintegrate, often fast.

955 When this happens, every member of the industry has to act.

956 To continue to do business as before is almost a guarantee of disaster and might well condemn a company to extinction.

957 At the very least the company will lose its leadership position; and once lost, such leadership is almost never regained.

958 But a change in market or industry structure is also a major opportunity for innovation. „

959 In industry structure, a change requires entrepreneurship from every member of the industry.

960 It requires that each one ask anew: “What is our business?”

961 And each of the members will have to give a different, but above all a new, answer to that question.

962 ## The Automobile Story

963 The automobile industry in the early years of this century grew so fast that its markets changed drastically.

964 There were four different responses to this change, all of them successful.

965 The early industry through 1900 had basically been a provider of a luxury product for the very rich.

966 By then, however, it was outgrowing this narrow market with a rate of growth that doubled the industry's sales volume every three years.

967 Yet the existing companies all still concentrated on the "carriage trade." [1]

968 One response to this was the British company, Rolls-Royce, founded in 1904.

969 The founders realized that automobiles were growing so plentiful as to become "common," and set out to build and sell an automobile which, as an early Rolls-Royce prospectus put it, would have "the cachet of royalty."

970 They deliberately went back to earlier, already obsolete, manufacturing methods in which each car was machined by a skilled mechanic and assembled individually with hand tools.

971 And then they promised that the car would never wear out.

972 They designed it to be driven by a professional chauffeur trained by Rolls-Royce for the job.

973 They restricted sales to customers of whom they approved—preferably titled ones, of course.

974 And to make sure that no "riff-raff" bought their car, they priced the Rolls-Royce as high as a small yacht, at about forty times the annual income of a skilled mechanic or prosperous tradesman. ⁂

975 A few years later in Detroit, the young Henry Ford also saw that the market structure was changing and that automobiles in America were no longer a rich man's toy.

976 His response was to design a car that could be totally mass-produced, largely by semi-skilled labor, and that could be driven by the owner and repaired by him.

977 Contrary to legend, the 1908 Model T was not "cheap": it was priced at a little over what the world's highest-priced skilled mechanic, the American one, earned in a full year.

978 (These days, the cheapest new car on the American market costs about one-tenth of what an unskilled assembly-line worker gets in wages and benefits in a year.)

979 But the Model T cost one-fifth of the cheapest model then on the market and was infinitely easier to drive and to maintain. ⁂

980 Another American, William Crapo Durant, saw the change in market structure as an opportunity to put together a professionally managed large automobile company that would satisfy all segments of what he foresaw would be a huge "universal" market.

981 He founded General Motors in 1905, began to buy existing automobile companies, and integrated them into a large modern business. ⁂

982 A little earlier, in 1899, the young Italian Giovanni Agnelli had seen that the automobile would become a military necessity, especially as a staff car for officers.

983 He founded FIAT in Turin, which within a few years became the leading supplier of staff cars to the Italian, Russian, and Austro-Hungarian armies. ‟

984 Market structures in the world automobile industry changed once again between 1960 and 1980.

985 For forty years after World War I, the automobile industry had consisted of national supplier S dominating national markets.

986 All one saw on Italy's roads and parking lots were Fiats and a few Alfa Romeos and Lancias; outside of Italy, these makes were fairly rare.

987 In France, there were Renaults, Peugeots, and Citroens; in Germany, Mercedes, Opels, and the German Fords; in the United States, GM cars, Fords, and Chryslers.

988 Then around 1960 the automobile industry all of a sudden became a "global" industry. ‟

989 Different companies reacted quite differently.

990 The Japanese, who had remained the most insular and had barely exported their cars, decided to become world exporters.

991 Their first attempt at the U.S. market in the late sixties was a fiasco.

992 They regrouped, thought through again what their policy should be, and redefined it as offering an American-type car with American styling, American comfort, and American performance characteristics, but smaller, with better fuel consumption, much more rigorous quality control and, above all, better customer service.

993 And when they got a second chance with the petroleum panic of 1979, they succeeded brilliantly.

994 The Ford Motor Company, too, decided to go “global” through a “European” strategy.

995 Ten years later, in the mid-seventies, Ford had become a strong contender for the number one spot in Europe. ⁂

996 Fiat decided to become a European rather than merely an Italian company, aiming to be a strong number two in every important European country while retaining its primary position in Italy.

997 General Motors at first decided to remain American and to retain its traditional 50 percent share of the American market, but in such a way as to reap something like 70 percent of all profits from automobile sales in North America. ⁂

998 And it succeeded.

999 Ten years later, in the mid-seventies, GM shifted gears and decided to contend with Ford and Fiat for leadership in Europe—and again it succeeded.

1000 In 1983-84, GM, it would seem, decided finally to become a truly global company and to link up with a number of Japanese; first with two smaller companies, and in the end with Toyota.

1001 And Mercedes in West Germany decided on yet another strategy—again a global one—where it limited itself to narrow segments of the world market, to luxury cars, taxicabs, and buses. ⁂

1002 All these strategies worked reasonably well.

1003 Indeed, it is impossible to say which one worked better than another.

1004 But the companies that refused to make hard choices, or refused to admit that anything much was happening, fared badly.

1005 If they survive, it is only because their respective governments will not let them go under. „

1006 One example is, of course, Chrysler.

1007 The people at Chrysler knew what was happening—everybody in the industry did.

1008 But they ducked instead of deciding.

1009 Chrysler might have chosen an "American" strategy and put all its resources into strengthening its position within the United States, still the world's largest automobile market.

1010 Or it might have merged with a strong European firm and aimed at taking third place in the world's most important automobile markets, the United States and Europe.

1011 It is known that Mercedes was seriously interested—but Chrysler was not.

1012 Instead, Chrysler frittered away its resources on make-believe.

1013 It acquired defeated "also-rans" in Europe to make itself look multinational.

1014 But this, while giving Chrysler no additional strength, drained its resources and left no money for the investment needed to give Chrysler a chance in the American market.

1015 When the day of reckoning came after the petroleum shock of 1979, Chrysler had nothing in Europe and not much more in the United States.

1016 Only the U.S. government saved it. „

1017 The story is not much different for British Leyland, once Britain's largest automobile company and a strong contender for leadership in Europe; nor for the big French automobile company, Peugeot.

1018 Both refused to face up to the fact that a decision was needed.

1019 As a result, they rapidly lost both market position and profitability.

1020 Today all three -Chrysler, British Leyland, and Peugeot– have become more or less marginal. ...

1021 But the most interesting and important examples are those of much smaller companies.

1022 Every one of the world's automobile manufacturers, large or small, has had to act or face permanent eclipse.

1023 However, three small and quite marginal companies saw in this a major opportunity to innovate: Volvo, BMW, and Porsche. ...

1024 Around 1960, when the automobile industry market suddenly changed, the informed betting was heavily on the disappearance of these three companies during the coming "shakeout."

1025 Instead, all three have done well and have created for themselves market niches in which they are the leaders.

1026 They have done so through an innovative strategy which, in effect, has reshaped them into different businesses.

1027 Volvo in 1965 was small, struggling and barely breaking even.

1028 For a few critical years, it did lose large amounts of money.

1029 But Volvo went to work reinventing itself, so to speak.

1030 It became an aggressive worldwide marketer—especially strong in the United States of what one might call the "sensible" car; not very luxurious, far from low-priced, not at all fashionable, but sturdy and radiating common sense and "better value."

1031 Volvo has marketed itself as the car for professionals who do not need to demonstrate how successful they are through the car they drive, but who value being known for their "good judgment." ,,,

1032 BMW, equally marginal in 1960 if not more so, has been equally successful, especially in countries like Italy and France.

1033 It has marketed itself as the car for "young corners," for people who want to be taken as young but who already have attained substantial success in their work and profession, people who want to demonstrate that they "know the difference" and are willing to pay for it.

1034 BMW is unashamedly a luxury car for the well-to-do, but it appeals to those among the affluent who want to appear "nonestablishment."

1035 Whereas Mercedes and Cadillac are the cars for company presidents and for heads of state, BMW is rnuy macho, and bills itself as the "ultimate driving machine. ,,,

1036 Finally Porsche (originally a Volkswagen with extra styling) repositioned itself as the sports car, the one and only car for those who still do not want transportation but excitement in an automobile. ,,,

1037 But those smaller automobile manufacturers who did not innovate and present themselves differently in what is, in effect, a different business—those who continued their established ways—have become casualties.

1038 The British MG, for instance, was thirty years ago what Porsche has now become, the sports car par excellence.

1039 It is almost extinct by now.

1040 And where is Citroen?

1041 Thirty years ago it was the car that had the solid innovative engineering, the sturdy construction, the middle-class reliability.

1042 Citroen would have seemed to be ideally positioned for the market niche Volvo has taken over.

1043 But Citroen failed to think through its business and to innovate; as a result, it has neither product nor strategy.

The Opportunity

A change in industry structure offers exceptional opportunities, highly visible and quite predictable to outsiders.

But the insiders perceive these same changes primarily as threats.

The outsiders who innovate can thus become a major factor in an important industry or area quite fast, and at relatively low risk. ⁂

Here are some examples. ⁂

In the late 1950s three young men met, almost by accident, in New York City.

Each of them worked for financial institutions, mostly Wall Street houses.

They found themselves in agreement on one point: the securities business—unchanged since the Depression twenty years earlier—was poised for rapid structural change.

They decided that this change had to offer opportunities.

So they systematically studied the financial industry and the financial markets to find an opportunity for newcomers with limited capital resources and practically no connections.

The result was a new firm: Donaldson, Lufkin & Jenrette.

Five years after it had been started in 1959, it had become a major force on Wall Street. ⁂

1056 What these three young men found was that a whole new group of customers was emerging fast: the pension fund administrators.

1057 These new customers did not need anything that was particularly difficult to supply, but they needed something different.

1058 And no existing firm had organized itself to give it to them.

1059 Donaldson, Lufkin & Jenrette established a brokerage firm to focus on these new customers and to give them the "research" they needed. ...

1060 About the same time, another young man in the securities business also realized that the industry was in the throes of structural change and that this could offer him an opportunity to build a different securities business of his own.

1061 The opportunity he found was "the intelligent investor" mentioned earlier.

1062 On this, he then built what is now a big and still fast-growing firm. ...

1063 During the early or mid-sixties, the structure of American health care began to change very fast.

1064 Three young people, the oldest not quite thirty, then working as junior managers in a large Midwestern hospital, decided that this offered them an opportunity to start their own innovative business.

1065 They concluded that hospitals would increasingly need expertise in running such housekeeping services as kitchen, laundry, maintenance, and so on.

1066 They systematized the work to be done.

1067 Then they offered contracts to hospitals under which their new firm would put in its own trained people to run these services, with the fee a portion of the resultant savings.

1068 Twenty years later, this company billed almost a billion dollars of services. ...

1069 The final case is that of the discounters like MCI and Sprint in the American long-distance telephone market.

1070 They were total outsiders; Sprint, for instance, was started by a railroad, the Southern Pacific.

1071 These outsiders began to look for the chink in Bell System's armor.

1072 They found it in the pricing structure of long-distance services.

1073 Until World War II, long-distance calls had been a luxury confined to government and large businesses, or to emergencies such as a death in the family.

1074 After World War II, they became commonplace.

1075 Indeed, they became the growth sector of telecommunications.

1076 But under pressure from the regulatory authorities for the various states which control telephone rates, the Bell System continued to price long-distance as a luxury, way above costs, with the profits being used to subsidize local service.

1077 To sweeten the pill, however, the Bell System gave substantial discounts to large buyers of long-distance service. ...

1078 By 1970, revenues from long-distance service had come to equal those from local service and were fast outgrowing them.

1079 Still, the original price structure was maintained.

1080 And this is what the newcomers exploited.

1081 They signed up for volume service at the discount and then retailed it to smaller users, splitting the discount with them.

1082 This gave them a substantial profit while also giving their subscribers long-distance service at substantially lower cost.

1083 Ten years later, in the early eighties, the long-distance discounters handled a larger volume of calls than the entire Bell System had handled when the discounters first started. ...

1084 These cases would just be anecdotes except for one fact: each of the innovators concerned knew that there was a major innovative opportunity in the industry.

1085 Each was reasonably sure that an innovation would succeed, and succeed with minimal risk.

1086 How could they be so sure?

When Industry Structure Changes

Four near-certain, highly visible indicators of impending change in industry structure can be pinpointed. ⁂

1. The most reliable and the most easily spotted of these indicators is rapid growth of an industry.

This is, in effect, what each of the above examples (but also the automobile industry examples) have in common.

If an industry grows significantly faster than economy or population, it can be predicted with high probability that its structure will change drastically—at the very latest by the time it has doubled in volume.

Existing practices are still highly successful, so nobody is inclined to tamper with them.

Yet they are becoming obsolete.

Neither the people at Citroen nor those at Bell Telephone were willing to accept this, however—which explains why "newcomers," "outsiders," or former "second-raters" could beat them in their own markets. ⁂

2. By the time an industry growing rapidly has doubled in volume, the way it perceives and services its market is likely to have become inappropriate.

In particular, the ways in which the traditional leaders define and segment the market no longer reflect reality, they reflect history.

Yet reports and figures still represent the traditional view of the market.

This is the explanation for the success of two such different innovators as Donaldson, Lufkin & Jenrette and the Midwestern "intelligent investor" brokerage house.

1099 Each found a segment that the existing financial services institutions had not perceived and therefore did not serve adequately; the pension funds because they were too new, the "intelligent investor" because he did not fit the Wall Street stereotype. ⎓

1100 But the hospital management story is also one of traditional aggregates no longer being adequate after a period of rapid growth.

1101 What grew in the years after World War II were the "paramedics," that is, the hospital professions: X-Ray, pathology, the medical lab, therapists of all kinds, and so on.

1102 Before World War II these had barely existed.

1103 And hospital administration itself became a profession.

1104 The traditional "housekeeping" services, which had dominated hospital operations in earlier times, thus steadily became a problem for the administrator, proving increasingly difficult and costly as hospital employees, especially the low-paid ones, began to unionize. ⎓

1105 And the case of the book chains reported earlier (in Chapter 3) is also a story of structural change because of rapid growth.

1106 What neither the publishers nor the traditional American bookstores realized was that new customers, the "shoppers," were emerging side by side with the old customers, the traditional readers.

1107 The traditional bookstore simply did not perceive these new customers and never attempted to serve them. ⎓

1108 But there is also the tendency if an industry grows very fast to become complacent and, above all, to try to "skim the cream."

1109 This is what the Bell System did with respect to long-distance calls.

1110 The sole result is to invite competition (on this see also Chapter 17). ‟

1111 Yet another example is to be found in the American art field.

1112 Before World War II, museums were considered "upper-class."

1113 After World War II, going to museums became a middle-class habit; in city after city new museums were founded.

1114 Before World War II, collecting art was something a few very rich people did.

1115 After World War II, collecting all kinds of art became increasingly popular, with thousands of people getting into the act, some of them people of fairly limited means. ‟

1116 One young man working in a museum saw this as an opportunity for innovation.

1117 He found it in the most unexpected place—in fact, in a place he had never heard of before, insurance.

1118 He established himself as an insurance broker specializing in art and insuring both museums and collectors.

1119 Because of his art expertise, the underwriters in the major insurance companies, who had been reluctant to insure art collections, became willing to take the risk, and at premiums up to 70 percent below those charged before.

1120 This young man now has a large insurance brokerage firm. ‟

1121 3. Another development that will predictably lead to sudden changes in industry structure is the convergence of technologies that hitherto were seen as distinctly separate. ‟

1122 One example is that of the private branch exchange (PBX), that is, the switchboard for offices and other large telephone users.

1123 Basically, all the scientific and technical work on this in the United States has been done by Bell Labs, the research arm of the Bell System.

1124 But the main beneficiaries have been a few newcomers such as ROLM Corporation.

1125 In the new PBX, two different technologies converge: telephone technology and computer technology.

1126 The PBX can be seen as a telecommunications instrument that uses a computer, or as a computer that is being used in telecommunications.

1127 Technically, the Bell System would have been perfectly capable of handling this—in fact, it has all along been a computer pioneer.

1128 In its view of the market, however, and of the user, Bell System saw the computer as something totally different and far away.

1129 While it designed and actually introduced a computer type PBX, it never pushed it.

1130 As a result, a total newcomer has become a major competitor.

1131 In fact, ROLM, started by four young engineers, was founded to build a small computer for fighter aircraft, and only stumbled by accident into the telephone business.

1132 The Bell System now has not much more than one-third of that market, despite its technical leadership. ⁂

1133 4. An industry is ripe for basic structural change if the way in which it does business is changing rapidly. ⁂

1134 Thirty years ago, the overwhelming majority of American physicians practiced on their own.

1135 By 1980, only 60 percent were doing so.

1136 Now, 40 percent (and 75 percent of the younger ones) practice in a group, either in a partnership or as employees of a Health Maintenance Organization or a hospital.

1137 A few people who saw what was happening early on, around 1970, realized that it offered an opportunity for innovation.

1138 A service company could design the group's office, tell the physicians what equipment they needed, and either manage their group practice for them or train their managers. ⁂

1139 Innovations that exploit changes in industry structure are particularly effective if the industry and its markets are dominated by one very large manufacturer or supplier, or by a very few.

1140 Even if there is no true monopoly, these large, dominant producers and suppliers, having been successful and unchallenged for many years, tend to be arrogant.

1141 At first they dismiss the newcomer as insignificant and, indeed, amateurish.

1142 But even when the newcomer takes a larger and larger share of their business, they find it hard to mobilize themselves for counteraction.

1143 It took the Bell System almost ten years before it first responded to the long distance discounters and to the challenge from the PBX manufacturers. ...

1144 Equally sluggish, however, was the response of the American producers of aspirin when the "non-aspirin aspirins"—Tylenol and Datril—first appeared (on this see also Chapter 17).

1145 Again, the innovators diagnosed an opportunity because of an impending change in industry structure, based very largely on rapid growth.

1146 There was no reason whatever why the existing aspirin manufacturers, a very small number of very large companies, could not have brought out "non-aspirin aspinfl" and sold it effectively.

1147 After all, the dangers and limitations of aspirin were no secret; medical literature was full of them.

1148 Yet, for the first five or eight years, the newcomers had the market to themselves. ...

1149 Similarly, the United States Postal Service did not react for many years to innovators who took away larger and larger chunks of the most profitable services.

1150 First, United Parcel Service took away ordinary parcel post; then Emery Air Freight and Federal Express took away the even more profitable delivery of urgent or high-value merchandise and letters.

1151 What made the Postal Service so vulnerable was its rapid growth.

1152 Volume grew so fast that it neglected what seemed to be minor categories, and thus practically delivered an invitation to the innovators. ‟

1153 Again and again when market or industry structure changes, the producers or suppliers who are today's industry leaders will be found neglecting the fastest-growing market segments.

1154 They will cling to practices that are rapidly becoming dysfunctional and obsolete.

1155 The new growth opportunities rarely fit the way the industry has "always" approached the market, been organized for it, and defines it.

1156 The innovator in this area therefore has a good chance of being left alone.

1157 For some time, the old businesses or services in the field will still be doing well serving the old market the old way.

1158 They are likely to pay little attention to the new challenge, either treating it with condescension or ignoring it altogether. ‟

1159 But there is one important caveat.

1160 It is absolutely essential to keep the innovation in this area simple.

1161 Complicated innovations do not work.

1162 Here is one example, the most intelligent business strategy I know of and one of the most dismal failures. ‟

1163 Volkswagen triggered the change which converted the automobile industry around 1960 into a global market.

1164 The Volkswagen Beetle was the first car since the Model T forty years earlier that became a truly international car.

1165 It was as ubiquitous in the United States as it was in its native Germany, and as familiar in Tanganyika as it was in the Solomon Islands.

1166 And yet Volkswagen missed the opportunity it had created itself—primarily by being too clever. ...

1167 By 1970, ten years after its breakthrough into the world market, the Beetle was becoming obsolete in Europe.

1168 In the United States, the Beetle's second-best market, it still sold moderately well.

1169 And in Brazil, the Beetle's third-largest market, it apparently still had substantial growth ahead.

1170 Obviously, new strategy was called for. ...

1171 The chief executive officer of Volkswagen proposed switching the German plants entirely to the new model, the successor to the Beetle, which the German plants would also supply to the United States market.

1172 But the continuing demand for Beetles in the United States would be satisfied out of Brazil, which would then give Volkswagen do Brasil the needed capacity to enlarge its plants and to maintain for another ten years the Beetle's leadership in the growing Brazilian market.

1173 To assure the American customers of the "German quality" that was one of the Beetle's main attractions, the critical parts such as engines and transmissions for all cars sold in North America would, however, still be made in Germany, with the finished car for the North American market then assembled in the United States. ...

1174 In its way, this was the first genuinely global strategy, with different parts to be made in different countries and assembled in different places according to the needs of different markets.

1175 Had it worked, it would have been the right strategy, and a highly innovative one at that.

1176 It was killed primarily by the German labor unions.

1177 "Assembling Beetles in the United States means exporting German jobs," they said, "and we won't stand for it."

1178 But the American dealers were also doubtful about a car that was "made in Brazil," even though the critical parts would still be "made in Germany."

1179 And so Volkswagen had to give up its brilliant plan. ...

1180 The result has been the loss of Volkswagen's second market, the ...

1181 United States.

1182 Volkswagen, and not the Japanese, should have had the small car market when small cars became all the rage after the fall of the Shah of Iran triggered the second petroleum panic.

1183 Only the Germans had no product.

1184 And when, a few years later, Brazil went into a severe economic crisis and automobile sales dropped, Volkswagen do ...

1185 Brazil got into difficulties.

1186 There were no export customers for the capacity it had had to build there during the seventies. ...

1187 The specific reasons why Volkswagen's brilliant strategy failed—to the point where the long-term future of the company may have become problematical—are secondary.

1188 The moral of the story is that a "clever" innovative strategy always fails, particularly if it is aimed at exploiting an opportunity created by a change in industry structure.

1189 Then only the very simple, specific strategy has a chance of succeeding.

1190 The unexpected; incongruities; changes in market and industry structure; and process needs—the sources of innovative opportunity discussed so far in Chapters 3 through 6—manifest themselves within a business, an industry, or a market.

1191 They may actually be symptoms of changes outside, in the economy, in society, and in knowledge.

1192 But they show up internally. ...

1193 The remaining sources of innovative opportunity:

1194 - Demographics;
1195 - Changes in perception, meaning, and mood;
1196 - New knowledge

1197 are external.

1198 They are changes in the social, philosophical, political, and intellectual environment

1199 # *Source: Demographics*

1200 See Transition from internal to external

1201 I

1202 Of all external changes, demographics—defined as changes in population, its size, age structure, composition, employment, educational status, and income—are the clearest.

1203 They are unambiguous.

1204 They have the most predictable consequences.

1205 They also have known and almost certain lead times.

1206 Anyone in the American labor force in the year 2000 is alive by now (though not necessarily living in the United States; a good many of America's workers fifteen years hence may now be children in a Mexican pueblo, for example).

1207 All people reaching retirement age in 2030 in the developed countries are already in the labor force, and in most cases in the occupational group in which they will stay until they retire or die.

1208 And the educational attainment of the people now in their early or mid-twenties will largely determine their career paths for another forty years.

1209 Demographics have major impact on what will be bought, by whom, and in what quantities.

1210 American teenagers, for instance, buy a good many pairs of cheap shoes a year; they buy for fashion, not durability, and their purses are limited.

1211 The same people, ten years later, will buy very few pairs of shoes a year—a sixth as many as they bought when they were seventeen—but they will buy them for comfort and durability first and for fashion second.

1212 People in their sixties and seventies in the developed countries—that is, people in their early retirement years—form the prime travel and vacation market.

1213 Ten years later the same people are customers for retirement communities, nursing homes, and extended (and expensive) medical care.

1214 Two-earner families have more money than they have time, and spend accordingly.

1215 People who have acquired extensive schooling in their younger years, especially professional or technical schooling, will, ten to twenty years later, become customers for advanced professional training. ...

1216 But people with extensive schooling are also available primarily for employment as knowledge workers.

1217 Even without competition from low-wage countries with tremendous surpluses of young people trained only for unskilled or semi-skilled manual jobs—the surge of young people in the Third World countries resulting from the drop in infant mortality after 1955—the industrially developed countries of the West and of Japan would have had to automate.

1218 Demographics alone, the combined effects of the sharp drop in birth rates and of the "educational explosion"—makes it near-certain that traditional manual blue-collar employment in manufacturing in developed countries, by the year 2010, cannot be more than one-third or less than what it was in 1970.

1219 (Though manufacturing production, as a result of automation, may be three to four times what it was then.) ...

1220 All this is so obvious that no one, one should think, needs to be reminded of the importance of demographics.

1221 And indeed businessmen, economists, and politicians have always acknowledged the critical importance of population trends, movements, and dynamics.

1222 But they also believed that they did not have to pay attention to demographics in their day-to-day decisions.

1223 Population changes—whether in birth rates or mortality rates, in educational attainment, in labor force composition and participation, or in the location and movement of people—were thought to occur so slowly and over such long time spans as to be of little practical concern.

1224 Great demographic catastrophes such as the Black Death in Europe in the fourteenth century were admitted to have immediate impacts on society and economy.

1225 But otherwise, demographic changes were "secular" changes, of interest to the historian and the statistician rather than to the businessman or the administrator. ...

1226 This was always a dangerous error.

1227 The massive nineteenth-century migration from Europe to the Americas, both North and South, and to Australia and New Zealand, changed the economic and political geography of the world beyond recognition.

1228 It created an abundance of entrepreneurial opportunities.

1229 It made obsolete the geopolitical concepts on which European politics and military strategies had been based for several centuries.

1230 Yet it took place in a mere fifty years, from the mid-1860s to 1914.

1231 Whoever disregarded it was likely to be left behind, and fast. ...

1232 Until 1860, for instance, the House of Rothschild was the world's dominant financial power.

1233 The Rothschilds failed, however, to recognize the meaning of the transatlantic migration; only "riff-raff," they thought, would leave Europe.

1234 As a result, the Rothschilds ceased to be important around 1870.

1235 They had become merely rich individuals.

1236 It was J. P. Morgan who took over.

1237 His "secret" was to spot the transatlantic migration at its very onset, to understand immediately its significance, and to exploit it as an opportunity by establishing a worldwide bank in New York rather than in Europe, and as the medium for financing the American industries that immigrant labor was making possible.

1238 It also took only thirty years, from 1830 to 1860, to transform both western Europe and the eastern United States from rural and farm-based societies into industry-dominated big-city civilizations. ⎓

1239 Demographic changes tended to be just as fast, just as abrupt, and to have fully as much impact, in earlier times.

1240 The belief that populations changed slowly in times past is pure myth.

1241 Or rather, static populations staying in one place for long periods of time have been the exception historically rather than the rule.[1] ⎓

1242 In the twentieth century it is sheer folly to disregard demographics.

1243 The basic assumption for our time must be that populations are inherently unstable and subject to sudden sharp changes—and that they are the first environmental factor that a decision maker, whether businessman or politician, analyzes and thinks through.

1244 Few issues in this century, for instance, will be as critical to both domestic and international politics as the aging of the population in the developed countries on the one hand and the tidal wave of young adults in the Third World on the other hand.

1245 Whatever the reasons, twentieth-century societies, both developed and developing ones, have become prone to extremely rapid and radical demographic changes, which occur without advance warning. ‟

1246 The most prominent American population experts called together by Franklin D. Roosevelt predicted unanimously in 1938 that the U.S. population would peak at around 140 million people in 1943 or 1944, and then slowly decline.

1247 The American population—with a minimum of immigration—now stands at 240 million.

1248 For in 1949, without the slightest advance warning, the United States kicked off a "baby boom" that for twelve years produced unprecedentedly large families, only to turn just as suddenly in 1960 into a "baby bust," producing equally unprecedented small families.

1249 The demographers of 1938 were not incompetents or fools; there was just no indication then of a "baby boom." ‟

1250 Twenty years later another American President, John F. Kennedy, called together a group of eminent experts to work out his Latin-American aid and development program, the "Alliance for Progress."

1251 Not one of the experts paid attention in 1961 to the precipitous drop in infant mortality which, within another fifteen years, totally changed Latin America's society and economy.

1252 The experts also all assumed, without reservation, a rural Latin America.

1253 They, too, were neither incompetents nor fools.

1254 But the drop in infant mortality in Latin America and the urbanization of society had barely begun at the time. ...

1255 In 1972 and 1973, the most experienced labor force analysts in the United States still accepted without question that the participation of women would continue to decline as it had done for many years.

1256 When the "baby boomers" came on the labor market in record numbers, they worried (quite unnecessarily, as it turned out) where all the jobs for the young males would be coming from.

1257 No one asked where jobs would come from for young females—they were not supposed to need any.

1258 Ten years later the labor force participation of American women under fifty stood at 64 per cent, the highest rate ever.

1259 And there is little difference in labor force participation in this group between married and unmarried women, or between women with and without children. ...

1260 These shifts are not only dazzlingly sudden.

1261 They are often mysterious and defy explanation.

1262 The drop in infant mortality in the Third World can be explained in retrospect.

1263 It was caused by a convergence of old technologies: the public-health nurse; placing the latrine below the well; vaccination; the wire screen outside the window; and, of very new technologies, antibiotics and pesticides such as DDT.

1264 Yet it was totally unpredictable.

1265 And what explains the “baby boom” or the “baby bust”?

1266 What explains the sudden rush of American women (and of European women as well, though with a lag of a few years) into the labor force?

1267 And what explains the rush into the slums of Latin-American cities? ⁂

1268 Demographic shifts in this century may be inherently unpredictable, yet they do have long lead times before impact, and lead times, moreover, which are predictable.

1269 It will be five years before newborn babies become kindergarten pupils and need classrooms, playgrounds, and teachers.

1270 It will be fifteen years before they become important as customers, and nineteen to twenty years before they join the labor force as adults.

1271 Populations in Latin America began to grow quite rapidly as soon as infant mortality began to drop.

1272 Still the babies who did not die did not become schoolchildren for five or six years, nor adolescents looking for work for fifteen or sixteen years.

1273 And it takes at least ten years—usually fifteen—before any change in educational attainments translates itself into labor force composition and available skills. ⁂

1274 What makes demographics such a rewarding opportunity for the entrepreneur is precisely its neglect by decision makers, whether businessmen, public-service staffs, or governmental policymakers.

1275 They still cling to the assumption that demographics do not change—or do not change fast.

1276 Indeed, they reject even the plainest evidence of demographic changes.

1277 Here are some fairly typical examples. ...

1278 By 1970, it had become crystal clear that the number of children in America's schools was going to be 25 to 30 percent lower than it had been in the 1960s, for ten or fifteen years at least.

1279 After all, children entering kindergarten in 1970 have to be alive no later than 1965, and the "baby bust" was well established beyond possibility of rapid reversal by that year.

1280 Yet the schools of education in American universities flatly refused to accept this.

1281 They considered it a law of nature, it seems, that the number of children of school age must go up year after year.

1282 And so they stepped up their efforts to recruit students, causing substantial unemployment for graduates a few years later, severe pressure on teachers' salaries, and massive closings of schools of education. ...

1283 And here are two examples from my own experience.

1284 In 1957, I published a forecast that there would be ten to twelve million college students in the United States twenty-five years later, that is, by the mid-seventies.

1285 The figure was derived simply by putting together two demographic events that had already happened: the increase in the number of births and the increase in the percentage of young adults going to college.

1286 The forecast was absolutely correct.

1287 Yet practically every established university pooh-poohed it.

1288 Twenty years later, in 1976, I looked at the age figures and predicted that retirement age in the United States would have to be raised to seventy or eliminated altogether within ten years.

1289 The change came even faster: compulsory retirement at any age was abolished in California a year later, in 1977, and retirement before seventy for the rest of the country two years later, in 1978.

1290 The demographic figures that made this prediction practically certain were well known and published.

1291 Yet most so-called experts—government economists, labor-union economists, business economists, statisticians—dismissed the forecast as utterly absurd.

1292 "It will never happen" was the all but unanimous response.

1293 The labor unions actually proposed at the time lowering the mandatory retirement age to sixty or below. ⁍

1294 This unwillingness, or inability, of the experts to accept demographic realities which do not conform to what they take for granted gives the entrepreneur his opportunity.

1295 The lead times are known.

1296 The events themselves have already happened.

1297 But no one accepts them as reality, let alone as opportunity.

Those who defy the conventional wisdom and accept the facts—indeed, those who go actively looking for them—can therefore expect to be left alone for quite a long time.

The competitors will accept demographic reality, as a rule, only when it is already about to be replaced by a new demographic change and a new demographic reality.

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[1] Here the work of the modern French historians of civilization is definitive.

1302 ## II

1303 Here are some examples of successful exploitation of demographic changes. ⎓

1304 Most of the large American universities dismissed my forecast of 10 to 12 million college students by the 1970s as preposterous.

1305 But the entrepreneurial universities took it seriously: Pace University, in New York, was one, and Golden Gate University in San Francisco another.

1306 They were just as incredulous at first, but they checked the forecast and found that it was valid, and in fact the only rational prediction.

1307 They then organized themselves for the additional student enrollment; the traditional, and especially the "prestige" universities, on the other hand, did nothing.

1308 As a result, twenty years later these brash newcomers had the students, and when enrollments decreased nationwide as a result of the "baby bust," they still kept on growing. ⎓

1309 One American retailer who accepted the "baby boom" was then a small and undistinguished shoe chain, Melville.

1310 In the early 1960s just before the first cohorts of the "baby boom" reached adolescence, Melville directed itself to this new market.

1311 It created new and different stores specifically for teenagers.

1312 It redesigned its merchandise.

1313 It advertised and promoted to the sixteen- and seventeen-year-olds.

1314 And it went beyond footwear into clothing for teenagers, both female and male.

1315 As a result, Melville became one of the fastest-growing and most profitable retailers in America.

1316 Ten years later other retailers caught on and began to cater to teenagers—just as the center of demographic gravity started to shift away from them and toward "young adults," twenty to twenty-five years old.

1317 By then Melville was already shifting its own focus to that new dominant age cohort. ▪▪

1318 The scholars on Latin America whom President Kennedy brought together to advise him on the Alliance for Progress in 1961 did not see Latin America's urbanization.

1319 But one business, the American retail chain Sears, Roebuck, had seen it several years earlier—not by poring over statistics but by going out and looking at customers in Mexico City and Lima, So Paulo and Bogota.

1320 As a result, Sears in the mid-fifties began to build American-type department stores in major Latin-American cities, designed for a new urban middle class which, while not "rich," was part of the money economy and had middle-class aspirations.

1321 Sears became the leading retailer in Latin America within a few years. ▪▪

1322 And here are two examples of exploiting demographics to innovate in building a highly productive labor force.

1323 The expansion of New York's Citibank is largely based on its early realization of the movement of young, highly educated and highly ambitious women into the work force.

1324 Most large American employers considered these women a “problem” as late as 1980; many still do.

1325 Citibank, almost alone among large employers, saw in them an opportunity.

1326 It aggressively recruited them during the 1970s, trained them, and sent them out all over the country as lending officers.

1327 These ambitious young women very largely made Citibank into the nation’s leading, and its first truly “national” bank.

1328 At the same time, a few savings and loan associations (not an industry noted for innovation or venturing) realized that older married women who had earlier dropped out of the labor force when their children were small make high-grade employees when brought back as permanent part-time workers.

1329 “Everybody knew” that part-timers are “temporary,” and that women who have once left the labor force never come back into it; both were perfectly sensible rules in earlier times.

1330 But demographics made them obsolete.

1331 The willingness to accept this fact—and again such willingness stemmed not from reading statistics but from going out and looking—has given the savings and loan associations an exceptionally loyal, exceptionally productive work force, particularly in California. ...

1332 The success of Club Mediterranée in the travel and resort business is squarely the result of exploiting demographic changes: the emergence of large numbers of young adults in Europe and the United States who are affluent and educated but only one generation away from working-class origins.

1333 Still quite unsure of themselves, still not self-confident as tourists, they are eager to have somebody with the knowhow to organize their vacations, their travel, their fun—and yet they are not really comfortable either with their working-class parents or with older, middle-class people.

1334 Thus, they are ready-made customers for a new and "exotic" version of the old teenage hangout.

III

Analysis of demographic changes begins with population figures.

But absolute population is the least significant number.

Age distribution is far more important, for instance.

In the 1960s, it was the rapid increase in the number of young people in most non-Communist developed countries that proved significant (the one notable exception was Great Britain, where the "baby boom" was short-lived).

In the 1980s and even more in the 1990s, it will be the drop in the number of young people, the steady increase in the number of early middle-age people (up to forty) and the very rapid increase in the number of old people (seventy and over).

What opportunities do these developments offer?

What are the values and the expectations, the needs and wants of these various age groups?

The number of traditional college students cannot increase.

The most one can hope for is that it will not fall, that the percentage of eighteen—and nineteen-year-olds who stay in school beyond secondary education will increase sufficiently to offset the decline in the total number.

But with the increase in the number of people in their mid-thirties and forties who have received a college degree earlier, there are going to be large numbers of highly schooled people who want advanced professional training and retraining, whether as doctors, lawyers, architects, engineers, executives, or teachers.

What do these people look for?

1347 What do they need?

1348 How can they pay?

1349 What does the traditional university have to do to attract and satisfy such very different students?

1350 And, finally, what are the wants, needs, values of the elderly?

1351 Is there indeed any one "older group," or are there rather several, each with different expectations, needs, values, satisfactions? ⁂

1352 Particularly important in age distribution—and with the highest predictive value—are changes in the center of population gravity, that is, in the age group which at any given time constitutes both the largest and the fastest-growing age cohort in the population. ⁂

1353 At the end of the Eisenhower presidency, in the late fifties, the center of population gravity in the United States was at its highest point in history.

1354 But a violent shift within a few years was bound to take place.

1355 As a result of the "baby boom," the center of American population gravity was going to drop so sharply by 1965 as to bring it to the lowest point since the early days of the Republic, to around sixteen or seventeen.

1356 It was predictable—and indeed predicted by anyone who took demographics seriously and looked at the figures—that there would be a drastic change in mood and values.

1357 The "youth rebellion" of the sixties was mainly a shift of the spotlight to what has always been typical adolescent behavior.

1358 In earlier days, with the center of population gravity in the late twenties or early thirties, age groups that are notoriously ultra-conservative, adolescent behavior was dismissed as “Boys will be boys” (and “Girls will be girls”).

1359 In the sixties it suddenly became the representative behavior. ⁂

1360 But when everybody was talking of a “permanent shift in values” or of a “greening of America,” the age pendulum had already swung back, and violently so.

1361 By 1969, the first effects of the “baby bust” were already discernible, and not only in the statistics.1974 or 1975 would be the last year in which the sixteen- and seventeen-year-olds would constitute the center of population gravity.

1362 After that, the center would rapidly move up: by the early 1980s it would be in the high twenties again.

1363 And with this shift would come a change in what would be considered “representative” behavior.

1364 The teenagers would, of course, continue to behave like teenagers.

1365 But that would again be dismissed as the way teenagers behave rather than as the constitutive values and behavior of society.

1366 And so one could predict with near-certainty, for instance (and some of us did predict it), that by the mid-seventies the college campuses would cease to be “activist” and “rebellious,” and college students would again be concerned with grades and jobs; but also that the overwhelming majority of the “dropouts” of 1968 would, ten years later, have become the “upward-mobile professionals” concerned with careers, advancement, tax shelters, and stock options. ⁂

1367 Segmentation by educational attainment may be equally important; indeed, for some purposes, it may be more important (e. g., selling encyclopedias, continuing professional education, but also vacation travel).

1368 Then there is labor force participation and occupational segmentation.

1369 Finally there is income distribution, and especially distribution of disposable and discretionary income.

1370 What happens, for instance, to the propensity to save in the two-earner family? ...

1371 Actually, most of the answers are available.

1372 They are the stuff of market research.

1373 All that is needed is the willingness to ask the questions. ...

1374 But more than poring over statistics is involved.

1375 To be sure, statistics are the starting point.

1376 They were what got Melville to ask what opportunities the jump in teenagers offered a fashion retailer, or what got the top management at Sears, Roebuck to look upon Latin America as a potential market.

1377 But then the managements of these companies—or the administrators of metropolitan big-city universities such as Pace in New York and Golden Gate in San Francisco—went out into the field to look and listen. ...

1378 This is literally ho Sears, Roebuck decided to go into Latin America.

1379 Sears's chairman, Robert E. Wood, read in the early 1950s that Mexico City and So Paulo were expected to outgrow all U.S. cities by the year 1975.

1380 This so intrigued him that he went himself to look at the major cities in Latin America.

1381 He spent a week in each of them—Mexico City, Guadalajara, Bogota, Lima, Santiago, Rio, Sao Paulo—walking around, looking at stores (he was appalled by what he saw), and studying traffic patterns.

1382 Then he knew what customers to aim at, what kind of stores to build, where to put the stores, and what merchandise to stock them with.

1383 Similarly, the founders of Club Mediterranée looked at the customers of package tours, talked to them and listened to them, before they built their first vacation resort.

1384 And the two young men who turned Melville Shoe from a dowdy, undistinguished shoe chain (one among many) into the fastest-growing popular fashion retailer in America similarly spent weeks and months in shopping centers, looking at customers, listening to them, exploring their values.

1385 They studied the way young people shopped, what kind of environment they liked (do teenage boys and girls, for instance, shop in the same place for shoes or do they want to have separate stores?), and what they considered "value" in the merchandise they bought.

1386 Thus, for those genuinely willing to go out into the field, to look and to listen, changing demographics is both a highly productive and a highly dependable innovative opportunity.

1387 # *Source: Changes in Perception*

1388 ## "The Glass Is Half Full"

1389 In mathematics there is no difference between "The glass is half full" and "The glass is half empty."

1390 But the meaning of these two statements is totally different, and so are their consequences.

1391 If general perception changes from seeing the glass as "half full" to seeing it as "half empty," there are major innovative opportunities. ...

1392 Here are a few examples of such changes in perception and of the innovative opportunities they opened up—in business, in politics, in education, and elsewhere. ...

1393 1. All factual evidence shows that the last twenty years, the years since the early 1960s, have been years of unprecedented advance and improvement in the health of Americans.

1394 Whether we look at mortality rates for newborn babies or survival rates for the very old, at occurrence of cancers (other than lung cancer) or cure rates for cancer, and so on, all indicators of physical health and functioning have been moving upward at a good clip.

1395 And yet the nation is gripped by collective hypochondria.

1396 Never before has there been so much concern with health, and so much fear.

1397 Suddenly everything seems to cause cancer or degenerative heart disease or premature loss of memory.

1398 The glass is clearly "half empty."

1399 What we see now are not the great improvements in health and functioning, but that we are as far away from immortality as ever before and have made no progress toward it.

1400 In fact, it can be argued that if there is any real deterioration in American health during the last twenty years it lies precisely in the extreme concern with health and fitness, and the obsession with getting old, with losing fitness, with degenerating into long-term illness or senility. [11]

1401 Twenty-five years ago, even minor improvements in the nation's health were seen as major steps forward.

1402 Now, even major improvements are barely paid attention to. [11]

1403 Whatever the causes for this change in perception, it has created substantial innovative opportunities.

1404 It created, for instance, a market for new health-care magazines: one of them, American Health, reached a circulation of a million within two years.

1405 It created the opportunity for a substantial number of new and innovative businesses to exploit the fear of traditional foods causing irreparable damage.

1406 A firm in Boulder, Colorado, named Celestial Seasonings was started by one of the "flower children" of the late sixties picking herbs in the mountains, packaging them, and peddling them on the street.

1407 Fifteen years later, Celestial Seasonings was taking in several hundred million dollars in sales each year and was sold for more than $20 million to a very large food-processing company.

1408 And there are highly profitable chains of health-food stores.

1409 Jogging equipment has also become big business, and the fastest-growing new business in 1983 in the United States was a company making indoor exercise equipment. ‟

1410 2. Traditionally, the way people feed themselves was very largely a matter of income group and class.

1411 Ordinary people “ate”; the rich “dined.”

1412 This perception has changed within the last twenty years.

1413 Now the same people both “eat” and “dine.”

1414 One trend is toward “feeding,” which means getting down the necessary means of sustenance, in the easiest and simplest possible way: convenience foods, TV dinners, McDonald’s hamburgers or Kentucky Fried Chicken, and so on.

1415 But then the same consumers have also become gourmet cooks.

1416 TV programs on gourmet cooking are highly popular and achieve high ratings; gourmet cookbooks have become mass-market best-sellers; whole new chains of gourmet food stores have opened.

1417 Finally, traditional supermarkets, while doing 90 percent of their business in foods for “feeding,” have opened “gourmet boutiques” which in many cases are far more profitable than their ordinary processed-food business.

1418 This new perception is by no means confined to the United States.

1419 In West Germany, a young woman physician said to me recently: “Wir essen sechs Tage in der Woche, aber einen Tag wollen wir doch richtig speisen (We feed six days, but one day a week we like to dine).”

1420 Not so long ago, “essen” was what ordinary people did seven days a week, and “speisen” what the elite, the rich and the aristocracy, did, seven days a week. ‟

1421 3. If anyone around 1960, in the waning days of the Eisenhower administration and the beginning of the Kennedy presidency, had predicted the gains the American black would make in the next ten or fifteen years, he would have been dismissed as an unrealistic visionary, if not insane.

1422 Even predicting half the gains that those ten or fifteen years actually registered for the American black would have been considered hopelessly optimistic.

1423 Never in recorded history has there been a greater change in the status of a social group within a shorter time.

1424 At the beginning of those years, black participation in higher education beyond high school was around one-fifth that of whites.

1425 By the early seventies, it was equal to that of whites and ahead of that of a good many white ethnic groups.

1426 The same rate of advance occurred in employment, in incomes, and especially in entrance to professional and managerial occupations.

1427 Anyone granted twelve or fifteen years ago an advance look would have considered the "negro problem" in America to be solved, or at least pretty far along the way toward solution. ‴

1428 But what a large part of the American black population actually sees today in the mid-eighties is not that the glass has become "half full" but that it is still "half empty."

1429 In fact, frustration, anger, and alienation have increased rather than decreased for a substantial fraction of the American blacks.

1430 They do not see the achievements of two-thirds of the blacks who have moved into the middle class, economically and socially, but the failure of the remaining one-third to advance.

1431 What they see is not how fast things have been moving, but how much still remains to be done—how slow and how difficult the going still is.

1432 The old allies of the American blacks, the white liberals—the labor unions, the Jewish community, or academia—see the advances.

1433 They see that the glass has become "half full."

1434 This then has led to a basic split between the blacks and the liberal groups which, of course, only makes the blacks feel even more certain that the glass is "half empty." [...]

1435 The white liberal, however, has come to feel that the blacks increasingly are no longer "deprived," no longer entitled to special treatment such as reverse discrimination, no longer in need of special allowances and priority in employment, in promotion, and so on.

1436 This became the opportunity for a new kind of black leader, the Reverend Jesse Jackson.

1437 Historically, for almost a hundred years—from Booker T. Washington around the turn of the century through Walter White in the New Deal days until Martin Luther King, Jr., during the presidencies of John Kennedy and Lyndon Johnson—a black could become leader of his community only by proving his ability to get the support of white liberals.

1438 It was the one way to obtain enough political strength to make significant gains for American blacks.

1439 Jesse Jackson saw that the change in perception that now divides American blacks from their old allies and comrades-in-arms, white liberals, is an innovative opportunity to cieate a totally different kind of black leadership, one based on vocal enmity to the white liberals and even all-out attack on them.

1440 In the past, to have sounded as anti-liberal, anti-union, and anti-Jewish as Jackson has done would have been political suicide.

1441 Within a few short weeks in 1984, it made Jackson the undisputed leader of the American black community. ‟

1442 4. American feminists today consider the 1930s and 14Os the darkest of dark ages, with women denied any role in society.

1443 Factually, nothing could be more absurd.

1444 The America of the 1930s and 1940s was dominated by female stars of the first magnitude.

1445 There was Eleanor Roosevelt, the first wife of an American President to establish for herself a major role as a conscience, and as the voice of principle and of compassion which no American male in our history has equaled.

1446 Her friend, Frances Perkins, was the first woman in an American cabinet as Secretary of Labor, and the strongest, most effective member of President Roosevelt's cabinet altogether.

1447 Anna Rosenberg was the first woman to become a senior executive of a very big corporation as personnel vice-president of R. H. Macy, then the country's biggest retailer; and later on, during the Korean War, she became Assistant Secretary of Defense for manpower and the "boss" of the generals.

1448 There were any number of prominent and strong women as university and college presidents, each a national figure.

1449 The leading playwrights, Glare Booth Luce and Lillian Heliman, were both women—and Clare Luce then became a major political figure, a member of Congress from Connecticut, and ambassador to Italy.

1450 The most publicized medical advance of the period was the work of a woman.

1451 Helen Taussig developed the first successful surgery of the living heart, the “blue baby” operation, which saved countless children all over the world and ushered in the age of cardiac surgery, leading directly to the heart transplant and the by-pass operation.

1452 And there was Marian Anderson, the black singer and the first black to enter every American living room through the radio, touching the hearts and consciences of millions of Americans as no black before her had done and none would do again until Martin Luther King, Jr., a quarter century later.

1453 The list could be continued indefinitely. ⁂

1454 These were very proud women, conscious of their achievements, their prominence, their importance.

1455 Yet they did not see themselves as “role models.”

1456 They saw themselves not as women but as individuals.

1457 They did not consider themselves as “representative” but as exceptional. ⁂

1458 How the change occurred, and why, I leave to future historians to explain.

1459 But when it happened around 1970, these great women leaders became in effect “non-persons” for their feminist successors.

1460 Now the woman who is not in the labor force, and not working in an occupation traditionally considered “male,” is seen as unrepresentative and as the exception. ⁂

1461 This was noted as an opportunity by a few businesses, in particular, Citibank (cf.

1462 Chapter 7).

1463 It was not seen at all, however, by the very industries in which women had long been accepted as professionals and executives, such as department stores, advertising agencies, magazine or book publishers.

1464 These traditional employers of professional and managerial women actually today have fewer women in major positions than they had thirty or forty years ago.

1465 Citibank, by contrast, was exceedingly macho—which may be one reason why it realized there had been a change.

1466 It saw in the new perception women had of themselves a major opportunity to court exceptionally able, exceptionally ambitious, exceptionally striving women; to recruit them; and to hold them. ⁂

1467 And it could do so without competition from the traditional recruiters of career women.

1468 In exploiting a change in perception, innovators, as we have seen, can usually count on having the field to themselves for quite a long time. ⁂

1469 5. A much older case, one from the early 1950s, shows a similar exploitation of a change in perception.

1470 Around 1950, the American population began to describe itself overwhelmingly as being "middleclass," and to do so regardless, almost, of income or occupation.

1471 Clearly, Americans had changed their perception of their own social position.

1472 But what did the change mean?

1473 One advertising executive, William Benton (later senator from Connecticut), went out and asked people what the words "middle class" meant to them.

1474 The results were unambiguous: “middle class” in contrast to “working class” means believing in the ability of one’s children to rise through performance in school.

1475 Benton thereupon bought up the Encyclopedia Britannica company and started peddling the Encyclopedia, mostly through high school teachers, to parents whose children were the first generation in the family to attend high school.

1476 “If you want to be “middle-class,” the salesman said in effect, “your child has to have the Encyclopedia Britannica to do well in school.”

1477 Within three years Benton had turned the almost-dying company around.

1478 And ten years later the company began to apply exactly the same strategy in Japan for the same reasons and with the same success. ...

1479 6. Unexpected success or unexpected failure is often an indication of a change in perception and meaning.

1480 Chapter 3 told how the phoenix of the Thunderbird rose from the ashes of the Edsel.

1481 What the Ford Motor Company found when it searched for an explanation of the failure of the Edsel was a change in perception.

1482 The automobile market, which only a few short years earlier had been segmented by income groups, was now seen by the customers as segmented by “lifestyles.” ...

1483 When a change in perception takes place, the facts do not change.

1484 Their meaning does.

1485 The meaning changes from “The glass is half full” to “The glass is half empty.”

1486 The meaning changes from seeing oneself as “working-class” and therefore born into one’s “station in life,” to seeing oneself as “middle-class“ and therefore very much in command of one’s social position and economic opportunities.

1487 This change can come very fast.

1488 It probably did not take much longer than a decade for the majority of the American population to change from considering themselves “working-class” to considering themselves “middle-class.” [111]

1489 Economics do not necessarily dictate such changes; in fact, they may be irrelevant.

1490 In terms of income distribution, Great Britain is a more egalitarian country than the United States.

1491 And yet almost 70 percent of the British population still consider themselves’ working-class,” even though at least two-thirds of the British population are above “working-class” income by economic criteria alone, and close to half are above the “lower middle class“ as well.

1492 What determines whether the glass is “half full” or “half empty” is mood rather than facts.

1493 It results from experiences that might be called “existential.”

1494 That the American blacks feel “The glass is half empty” has as much to do with unhealed wounds of past centuries as with anything in present American society.

1495 That a majority of the English feel themselves to be “working-class” is still largely a legacy of the nineteenth-century chasm between “church” and “chapel.”

1496 And the American health hypochondria expresses far more American values, such as the worship of youth, than anything in the health statistics. ⁂

1497 Whether sociologists or economists can explain the perceptional phenomenon is irrelevant.

1498 It remains a fact.

1499 Very often it cannot be quantified; or rather, by the time it can be quantified, it is too late to serve as an opportunity for innovation.

1500 But it is not exotic or intangible.

1501 It is concrete: it can be defined, tested, and above all exploited.

The Problem Of Timing

1503 Executives and administrators admit the potency of perception based innovation.

1504 But they tend to shy away from it as “not practical.”

1505 They consider the perception-based innovator as weird or just a crackpot.

1506 But there is nothing weird about the Encyclopedia Britannica, about the Ford Thunderbird or Celestial Seasonings.

1507 Of course, successful innovators in any field tend to be close to the field in which they innovate.

1508 But the only thing that sets them apart is their being alert to opportunity. ...

1509 One of the foremost of today’s gourmet magazines was launched by a young man who started out as food editor of an airlines magazine.

1510 He became alert to the change in perception when he read in the same issue of a Sunday paper three contradictory stories.

1511 The first said that prepared meals such as frozen dinners, TV dinners, and Kentucky Fried Chicken accounted for more than half of all meals consumed in the United States and were expected to account for three-quarters within a few years.

1512 The second said that a TV program on gourmet cooking was receiving one of the highest audience ratings.

1513 And the third that a gourmet cookbook in its paperback edition, that is, an edition for the masses, had mounted to the top of the best-seller lists.

1514 These apparent contradictions made him ask, What’s going on here?

1515 A year later he started a gourmet magazine quite different from any that had been on the market before. ...

1516 Citibank became conscious of the opportunity offered by the moving of women into the work force when its college recruiters reported that they could no longer carry out their instructions, which were to hire the best male business school students in finance and marketing.

1517 The best students in these fields, they reported, were increasingly women.

1518 College recruiters in many other companies, including quite a few banks, told their managements the same story at that time.

1519 In response, most of them were urged, "Just try harder to get the top-flight men."

1520 At Citibank, top management saw the change as an opportunity and acted on it. ...

1521 All these examples, however, also show the critical problem in perception-based innovation: timing.

1522 If Ford had waited only one year after the fiasco of the Edsel, it might have lost the "lifestyle" market to GM's Pontiac.

1523 If Citibank had not been the first one to recruit women MBAs, it would not have become the preferred employer for the best and most ambitious of the young women aiming to make a career in business. ...

1524 Yet there is nothing more dangerous than to be premature in exploiting a change in perception.

1525 In the first place, a good many of what look like changes in perception turn out to be short-lived fads.

1526 They are gone within a year or two.

1527 And it is not always apparent which is fad and which is true change.

1528 The kids playing computer games were a fad.

1529 Companies which, like Atari, saw in them a change in perception lasted one or two years—and then became casualties.

1530 Their fathers going in for home computers represented a genuine change, however.

1531 It is, furthermore, almost impossible to predict what the consequences of such a change in perception will be.

1532 One good example are the consequences of the student rebellions in France, Japan, West Germany, and the United States.

1533 Everyone in the late 1960s was quite sure that these would have permanent and profound consequences.

1534 But what are they?

1535 As far as the universities are concerned, the student rebellions seem to have had absolutely no lasting impact.

1536 And who would have expected that, fifteen years later, the rebellious students of 1968 would have become the "Yuppies" to whom Senator Hart appealed in the 1984 American primaries, the young, upward-mobile professionals, ultra-materialistic, job conscious, and maneuvering for their next promotion?

1537 There are actually far fewer "dropouts" around these days than there used to be—the only difference is that the media pay attention to them.

1538 Can the emergence of homosexuals and lesbians into the limelight be explained by the student rebellion?

1539 These were certainly not the results the students themselves in 1968, nor any of the observers and pundits of those days, could possibly have predicted. ▪▪

1540 And yet, timing is of the essence.

1541 In exploiting changes in perception, “creative imitation” (described in Chapter 17) does not work.

1542 One has to be first.

1543 But precisely because it is so uncertain whether a change in perception is a fad or permanent, and what the consequences really are, perception-based innovation has to start small and be very specific.

Source: New Knowledge

Knowledge-based innovation is the “super-star” of entrepreneurship.

It gets the publicity.

It gets the money.

It is what people normally mean when they talk of innovation.

Of course, not all knowledge-based innovations are important.

Some are truly trivial.

But amongst the history-making innovations, knowledge-based innovations rank high.

The knowledge, however, is not necessarily scientific or technical.

Social innovations based on knowledge can have equal or even greater impact.

Knowledge-based innovation differs from all other innovations in its basic characteristics: time span, casualty rate, predictability, and in the challenges it poses to the entrepreneur.

And like most “super-stars,” knowledge-based innovation is temperamental, capricious, and hard to manage.

The Characteristics Of Knowledge-Based Innovation

Knowledge-based innovation has the longest lead time of all innovations.

There is, first, a long time span between the emergence of new knowledge and its becoming applicable to technology.

And then there is another long period before the new technology turns into products, processes, or services in the marketplace. ⁂

Between 1907 and 1910, the biochemist Paul Ehrlich developed the theory of chemotherapy, the control of bacterial microorganisms through chemical compounds.

He himself developed the first antibacterial drug, Salvarsan, for the control of syphilis.

The sulfa drugs which are the application of Ehrlich's chemotherapy to the control of a broad spectrum of bacterial diseases came on the market after 1936, twenty-five years later. ⁂

Rudolph Diesel designed the engine which bears his name in 1897.

Everyone at once realized that it was a major innovation.

Yet for many years there were few practical applications.

Then in 1935 an American, Charles Kettering, totally redesigned Diesel's engine, rendering it capable of being used as the propulsion unit in a wide variety of ships, in locomotives, in trucks, buses, and passenger cars. ⁂

1567 A number of knowledges came together to make possible the computer.

1568 The earliest was the binary theorem, a mathematical theory going back to the seventeenth century that enables all numbers to be expressed by two numbers only: one and zero.

1569 It was applied to a calculating machine by Charles Babbage in the first half of the nineteenth century.

1570 In 1890, Hermann Hollerith invented the punchcard, going back to an invention by the early nineteenth-century Frenchman J-M.

1571 Jacquard.

1572 The punchcard makes it possible to convert numbers into "instructions."

1573 In 1906 an American, Lee de Forest, invented the audion tube, and with it created electronics.

1574 Then, between 1910 and 1913, Bertrand Russell and Alfred North Whitehead, in their Principia Matheinatica, created symbolic logic, which enables us to express all logical concepts as numbers.

1575 Finally, during World War I, the concepts of programming and feedback were developed, primarily for the purposes of antiaircraft gunnery.

1576 By 1918, in other words, all the know!edge needed to develop the computer was available.

1577 The first computer became operational in 1946. ...

1578 A Ford Motor Company manufacturing executive coined the word "automation" in 1951 and described in detail the entire manufacturing process automation would require.

1579 “Robotics” and factory automation were widely talked about for twenty-five years, but nothing really happened for a long time.

1580 Nissan and Toyota in Japan did not introduce robots into their plants until 1978.

1581 In the early eighties, General Electric built an automated locomotive plant in Erie, Pennsylvania.

1582 General Motors then began to automate several of its engine and accessory plants.

1583 Early in 1985, Volkswagen began to operate its “Hall 54” as an almost completely automated manufacturing installation. „

1584 Buckminster Fuller, who called himself a geometer and who was part mathematician and part philosopher, applied the mathematics of topology to the design of what he called the “Dymaxion House,” a term he chose because he liked the sound of it.

1585 The Dymaxion House combines the greatest possible living space with the smallest possible surface.

1586 It therefore has optimal insulation, optimal heating and cooling, and superb acoustics.

1587 It also can be built with lightweight materials, requires no foundation and a minimum of suspension, and can still withstand an earthquake or the fiercest gale.

1588 Around 1940, Fuller put a Dymaxion House on the campus of a small New England college.

1589 And there it stayed.

1590 Very few Dymaxion Houses have been built-Americans, it seems, do not like to live in circular homes.

1591 But around 1965, Dymaxion structures began to be put up in the Arctic and Antarctic where conventional buildings are impractical, expensive, and difficult to erect.

1592 Since then they have increasingly been used for large structures such as auditoriums, concert tents, sports arenas, and so on. ⎓

1593 Only major external crises can shorten this lead time.

1594 De Forest's audion tube, invented in 1906, would have made radio possible almost immediately, but it would still not have been on the market until the late 1930s or so had not World War I forced governments, and especially the American government, to push the development of wireless transmission of sounds.

1595 Field telephones connected by wires were simply too unreliable, and wireless telegraphy was confined to dots and dashes.

1596 And so, radio came on the market early in the 1920s, only fifteen years after the emergence of the knowledge n which it is based. ⎓

1597 Similarly, penicillin would probably not have been developed until the 1950s or so but for World War II.

1598 Alexander Fleming found the bacteria-killing mold, penicillium, in the mid-twenties.

1599 Howard Florey, an English biochemist, began to work on it ten years later.

1600 But it was World War II that forced the early introduction of penicillin.

1601 The need to have a potent drug to fight infections led the British government to push Florey's research: English soldiers were made available to him as guinea pigs wherever they fought.

1602 The computer, too, would probably have waited for the discovery of the transistor by Bell Lab physicists in 1947 had not World War II led the American government to push computer research and to invest large resources of men and money in the work. ...

1603 The long lead time for knowledge-based innovations is by no means confined to science or technology.

1604 It applies equally to innovations that are based on nonscientific and nontechnological knowledge. ...

1605 The cornte de Saint-Simon developed the theory of the entrepreneurial bank, the purposeful use of capital to generate economic development, right after the Napoleonic wars.

1606 Until then bankers were moneylenders who lent against "security" (e. g., the taxing power of a prince).

1607 Saint-Simon's banker was to "invest," that is, to create new wealth-producing capacity.

1608 Saint-Simon had extraordinary influence in his time, and a popular cult developed around his memory and his ideas after his death in 1826.

1609 Yet it was not until 1852 that two disciples, the brothers Jacob and Isaac Pereire, established the first entrepreneurial hank, the Credit Mobilier, and with it ushered in what we now call finance capitalism. ...

1610 Similarly, many of the elements needed for what we now call management were available right after World War I. Indeed, in 1923, Herbert Hoover, soon to be President of the United States, and Thomas Masaryk, founder and president of Czechoslovakia, convened the first International Management Congress in Prague.

1611 At the ‘ame time a few large companies here and there, especially DuPont and General Motors in the United States, began to reorganize themselves around the new management concepts.

1612 In the next decade a few “true believers,” especially an Englishman, Lyndall Urwick, the founder of the first management consulting firm which still bears his name, began to write on management.

1613 Yet it was not until my Concept of the Corporation (1946) and Practice of Management (1954) were published that management become a discipline accessible to managers all over the world.

1614 Until then each student or practitioner of “management” focused on a separate area; Urwick on organization, others on the management of people, and so on.

1615 My books codified it, organized it, systematized it.

1616 Within a few years, management became a worldwide force. ...

1617 Today, we experience a similar lead time in respect to learning theory.

1618 The scientific study of learning began around 1890 with Wilhelm Wundt in Germany and William James in the United States.

1619 After World War II, two Americans-B.

1620 F. Skinner and Jerome Bruner, both at Harvard-developed and tested basic theories of learning, Skinner specializing in behavior and Bruner in cognition.

1621 Yet only now is learning theory beginning to become a factor in our schools.

1622 Perhaps the time has come for an entrepreneur to start schools based on what we know about learning, rather than on the old wives' tales about it that have been handed down through the ages. ⁂

1623 In other words, the lead time for knowledge to become applicable technology and begin to be accepted on the market is between twentyfive and thirty-five years. ⁂

1624 This has not changed much throughout recorded history.

1625 It is widely believed that scientific discoveries turn much faster in our day than ever before into technology, products, and processes.

1626 But this is largely illusion.

1627 Around 1250 the Englishman Roger Bacon, a Franciscan monk, showed that refraction defects of the eye could be corrected with eyeglasses.

1628 This was incompatible with what everybody then knew: the "infallible" authority of the Middle Ages Galen, the great medical scientist, had "proven conclusively" that it could not be done.

1629 Roger Bacon lived and worked on the extreme edges of the civilized world, in the wilds of northern Yorkshire.

1630 Yet a mural, painted thirty years later in the Palace of the Popes in Avignon (where it can still be seen), shows elderly cardinals wearing reading glasses; and ten years later, miniatures show elderly courtiers in the Sultan's Palace in Cairo also in glasses.

1631 The mill race, which was the first true "automation," was developed to grind grain by the Benedictine monks in northern Europe around the year 1000; within thirty years it had spread all over Europe.

1632 Gutenberg's invention of movable type and the woodcut both followed within thirty years of the West's learning of Chinese printing. ...

1633 The lead time for knowledge to become knowledge-based innovation seems to be inherent in the nature of knowledge.

1634 We do not know why.

1635 But perhaps it is not pure coincidence that the same lead time applies to new scientific theory.

1636 Thomas Kuhn, in his path-breaking book The Structure of Scientific Revolutions (1962), showed that it takes about thirty years before a new scientific theory becomes a new paradigm—a new statement that scientists pay attention to and use in their own work.

1637 ## *Convergences*

1638 The second characteristic of knowledge-based innovations—and a truly unique one—is that they are almost never based on one factor but on the convergence of several different kinds of knowledge, not all of them scientific or technological. ...

1639 Few knowledge-based innovations in this century have benefited humanity more than the hybridization of seeds and livestock.

1640 It enables the earth to feed a much larger population than anyone would have thought possible fifty years ago.

1641 The first successful new seed was hybrid corn.

1642 It was produced after twenty years of hard work by Henry C. Wallace, the publisher of a farm newspaper in Iowa, and later U.S. Secretary of Agriculture under Harding and Coolidge-the only holder of this office, perhaps, who deserves to be remembered for anything other than giving away money.

1643 Hybrid corn has two knowledge roots.

1644 One was the work of the Michigan plant breeder William J. Beal, who around 1880 discovered hybrid vigor.

1645 The other was the rediscovery of Mendel's genetics by the Dutch biologist Hugo de Vries.

1646 The two men did not know of one another.

1647 Their work was totally different both in intent and content.

1648 But only by pulling it together could hybrid corn be developed. ...

1649 The Wright Brothers' airplane also had two knowledge roots.

1650 One was the gasoline engine, designed in the mid-1880s to power the first automobiles built by Karl Benz and Gottfried Daimler, respectively.

1651 The other one was mathematical: aerodynamics, developed primarily in experiments with gliders.

1652 Each was developed quite independently.

1653 It was only when the two came together that the airplane became possible. ...

1654 The computer, as already noted, required the convergence of no less than five different knowledges: a scientific invention, the audion tube; a major mathematical discovery, the binary theorem; a new logic; the design concept of the punchcard; and the concepts of program and feedback.

1655 Until all these were available, no computer could have been built.

1656 Charles Babbage, the English mathematician, is often called the "father of the computer."

1657 What kept Babbage from building a computer, it is argued, was only the unavailability of the proper metals and of electric power at his time.

1658 But this is a misunderstanding.

1659 Even if Babbage had had the proper materials, he could at best have built the mechanical calculator that we now call a cash register.

1660 Without the logic, the design concept of the punchcard, and the concept of program and feedback, none of which Babbage possessed, he could only imagine a computer. ⁂

1661 The Brothers Pereire founded the first entrepreneurial bank in 1852.

1662 It failed within a few years because they had only one knowledge base and the entrepreneurial bank needs two.

1663 They had a theory of creative finance that enabled them to be brilliant venture capitalists.

1664 But they lacked the systematic knowledge of banking which was developed at exactly the same time across the Channel by the British, and codified in Walter Bagehot's classic, Lombard Street. ⁂

1665 After their failure in the early 1860s, three young men independently picked up where the Brothers Pereire had left off, added the knowledge base of banking to the venture capital concept, and succeeded.

1666 The first was J. P. Morgan, who had been trained in London but had also carefully studied the Pereires' Credit Mobilier.

1667 He founded the most successful entrepreneurial bank of the nineteenth century in New York in 1865.

1668 The second one, across the Rhine, was the young German Georg Siemens, who founded what he called the "Universal Bank," by which he meant a bank that was both a deposit bank on the British model and an entrepreneurial bank on the Pereires' model.

1669 And in remote Tokyo, another young man, Shibusawa Eichii, who had been one of the first Japanese to travel to Europe to study banking first-hand, and had spent time both in Paris and in London's Lombard Street, became one of the founders of the modern Japanese economy by establishing a Japanese version of the Universal Bank.

1670 Both Siemens's Deutsche Bank and Shibusawa's Daichi Bank are still the largest banks of their respective countries. ⎓

1671 The first man to envisage the modern newspaper was an American, James Gordon Bennett, who founded the New York Herald.

1672 Bennett fully understood the problems: A newspaper had to have enough income to be editorially independent and yet be cheap enough to have mass circulation.

1673 Earlier newspapers either got their income by selling their independence and becoming the lackeys and paid propagandists of a political faction—as did most American and practically all European papers of his time.

1674 Or, like the great aristocrat of those days, The ⎓

1675 Times of London, they were “written by gentlemen for gentlemen,” but so expensive that only a small elite could afford them. ⁂

1676 Bennett brilliantly exploited the twin technological knowledge bases on which a modern newspaper rests: the telegraph and highspeed printing.

1677 They enabled him to produce a paper at a fraction of the traditional cost.

1678 He knew that he needed high-speed typesetting, though it was not invented until after his death.

1679 He also saw one of the two nonscientific bases, mass literacy, which made possible mass circulation for a cheap newspaper.

1680 But he failed to grasp the fifth base: mass advertising as the source of the income that makes possible editorial independence.

1681 Bennett personally enjoyed a spectacular success; he was the first of the press lords.

1682 But his newspaper achieved neither leadership nor financial security.

1683 These goals were only attained two decades later, around 1890, by three men who understood and exploited advertising: Joseph Pulitzer, first in St. Louis and then in New York; Adolph Ochs, who took over a moribund New York Times and made it into America’s leading paper; and William Randolph Hearst, who invented the modern newspaper chain. ⁂

1684 The invention of plastics, beginning with Nylon, also rested on the convergence of a number of different new knowledges each emerging around 1910.

1685 Organic chemistry, pioneered by the Germans and perfected by Leo Baekeland, a Belgian working in New York, was one; X-Ray diffraction and with it an understanding of the structure of crystals was another; and high-vacuum technology.

1686 The final factor was the pressure of World War I shortages, which made the German government willing to invest heavily in polymerization research to obtain a substitute for rubber.

1687 It took a further twenty years, though, before Nylon was ready for the market. ...

1688 Until all the needed knowledges can be provided, knowledge-based innovation is premature and will fail.

1689 In most cases, the innovation occurs only when these various factors are already known, already available, already in use someplace.

1690 This was the case with the Universal Bank of 1865-75.

1691 It was the case with the computer after World War II.

1692 Sometimes the innovator can identify the missing pieces and then work at producing them.

1693 Joseph Pulitzer, Adolph Ochs, and William Randolph Hearst largely created modern advertising.

1694 This then created what we today call media, that is, the merger of information and advertising in "mass communications."

1695 The Wright Brothers identified the pieces of knowledge that were missing—mostly mathematics—and then themselves developed them by building a wind tunnel and actually testing mathematical theories.

1696 But until all the knowledges needed for a given knowledge-based innovation have come together, the innovation will not take off.

1697 It will remain stillborn. ⁂

1698 Samuel Langley, for instance, whom his contemporaries expected to become the inventor of the airplane, was a much better trained scientist than the Wright Brothers, As secretary of what was then America's leading scientific institution, the Smithsonian in Washington, he also had all the nation's scientific resources at his disposal.

1699 But even though the gasoline engine had been invented by Langley's time, he preferred to ignore it.

1700 He believed in the steam engine.

1701 As a result his airplane could fly; but because of the steam engine's weight, it could not carry any load, let alone a pilot.

1702 It needed the convergence of mathematics and the gasoline engine to produce the airplane. ⁂

1703 Indeed, until all the knowledges converge, the lead time of a knowledge-based innovation usually does not even begin.

What Knowledge-Based Innovation Requires

Its characteristics give knowledge-based innovation specific requirements.

And these requirements differ from those of any other kind of innovation. ⎓

1. In the first place, knowledge-based innovation requires careful analysis of all the necessary factors, whether knowledge itself, or social, economic, or perceptual factors.

The analysis must identify what factors are not yet available so that the entrepreneur can decide whether these missing factors can be produced—as the Wright Brothers decided in respect to the missing mathematics—or whether the innovation had better be postponed as not yet feasible. ⎓

The Wright Brothers exemplify the method at its best.

They thought through carefully what knowledge was necessary to build an airplane for manned, motored flight.

Next they set about to develop the pieces of knowledge that were needed, taking the available information, testing it first theoretically, then in the wind tunnel, and then in actual flight experiments, until they had the mathematics they needed to construct ailerons, to shape the wings, and so on. ⎓

The same analysis is needed for nontechnical knowledge-based innovation.

Neither J. P. Morgan nor Georg Siemens published their papers; but Shibusawa in Japan did.

1714 And so we know that he based his decision to forsake a brilliant government career and to start a bank on a careful analysis of the knowledge available and the knowledge needed.

1715 Similarly, Joseph Pulitzer analyzed carefully the knowledge needed when he launched what became the first modern newspaper, and decided that advertising had to be invented and could be invented. ⁂

1716 If I may inject a personal note, my own success as an innovator in the management field was based on a similar analysis in the early 1940s.

1717 Many of the required pieces of knowledge were already available: organization theory, for instance, but also quite a bit of knowledge about managing work and worker.

1718 My analysis also showed, however, that these pieces were scattered and lodged in half a dozen different disciplines.

1719 Then it found which key knowledges were missing: purpose of a business; any knowledge of the work and structure of top management; what we now term "business policy" and "strategy"; objectives; and so on.

1720 All of the missing knowledges, I decided, could be produced.

1721 But without such analysis, I could never have known what they were or that they were missing. ⁂

1722 Failure to make such an analysis is an almost sure-fire prescription for disaster.

1723 Either the knowledge-based innovation is not achieved, which is what happened to Samuel Langley.

1724 Or the innovator loses the fruits of his innovation and only succeeds in creating an opportunity for somebody else. ⁂

1725 Particularly instructive is the failure of the British to reap the harvest from their own knowledge-based innovations. ‟

1726 The British discovered and developed penicillin, but it was the Americans who took it over.

1727 The British scientists did a magnificent technical job.

1728 They came out with the right substances and the right uses.

1729 Yet they failed to identify the ability to manufacture the stuff as a critical knowledge factor.

1730 They could have developed the necessary knowledge of fermentation technology; they did not even try.

1731 As a result, a small American company, Pfizer, went to work on developing the knowledge of fermentation and became the world's foremost manufacturer of penicillin. ‟

1732 Similarly, the British conceived, designed, and built the first passenger jet plane.

1733 But de Havilland, the British company, did not analyze what was needed and therefore did not identify two key factors.

1734 One was configuration, that is, the right size with the right payload for the routes on which the jet would give an airline the greatest advantage.

1735 The other was equally mundane: how to finance the purchase of such an expensive plane by the airlines.

1736 As a result of de Havilland's failure to do the analysis, two American companies, Boeing and Douglas, took over the jet plane.

1737 And de Havilland has long since disappeared. ‟

1738 Such analysis would appear to be fairly obvious, yet it is rarely done by the scientific or technical innovator.

1739 Scientists and technologists are reluctant to make these analyzes precisely because they think they already know.

1740 This explains why, in so many cases, the great knowledge-based innovations have had a layman rather than a scientist or a technologist for their father, or at least their godfather.

1741 The (American) General Electric Company is largely the brainchild of a financial man. ...

1742 He conceived the strategy (described in Chapter 19) that made G.E. the world's leading supplier of large steam turbines and, therewith, the world's leading supplier to electric power producers.

1743 Similarly, two laymen, Thomas Watson, Sr., and his son Thomas Watson, Jr., made IBM the leader in computers.

1744 At DuPont, the analysis of what was needed to make the knowledge-based innovation of Nylon effective and successful was not done by the chemist who developed the technology, but by business people on the executive committee.

1745 And Boeing became the world's leading producer of jet planes under the leadership of marketing people who understood what the airlines and the public needed. ...

1746 This is not a law of nature, however.

1747 Mostly it is a matter of will and self-discipline.

1748 There have been plenty of scientists and technologistsEdison is a good example—who forced themselves to think through what their knowledge-based innovation required. ...

1749 2. The second requirement of knowledge-based innovation is a clear focus on the strategic position.

1750 It cannot be introduced tentatively.

1751 The fact that the introduction of the innovation creates excitement, and attracts a host of others, means that the innovator has to be right the first time.

1752 He is unlikely to get a second chance.

1753 In all the other innovations discussed so far, the innovator, once he has been successful with his innovation, can expect to be left alone for quite some time.

1754 This is not true of knowledge-based innovation.

1755 Here the innovators almost immediately have far more company than they want.

1756 They need only stumble once to be overrun. ⎓

1757 There are basically only three major focuses for knowledge-based innovation.

1758 First, there is the focus Edwin Land took with Polaroid: To develop a complete system that would then dominate the field.

1759 This is exactly what IBM did in its early years when it chose not to sell computers but to lease them to its customers.

1760 It supplied them with such software as was available, with programming, with instruction in computer language for programmers, with instruction in computer use for a customer's executives, and with service.

1761 This was also what G.E. did when it established itself as the leader in the knowledge-based innovation of large steam turbines in the early years of this century. ⎓

1762 The second clear focus is a market focus.

1763 Knowledge-based innovation can aim at creating the market for its products.

1764 This is what DuPont did with Nylon.

1765 It did not "sell" Nylon; it created a consumer market for women's hosiery and women's underwear using Nylon, a market for automobile tires using Nylon, and so on.

1766 It then delivered Nylon to the fabricators to make the articles for which DuPont had already created a demand and which, in effect, it had already sold.

1767 Similarly, aluminum from the very beginning, right after the invention of the aluminum reduction process by Charles M. Hall in 1888, began to create a market for pots and pans, for rods and other aluminum extrusions.

1768 The aluminum company actually went into making these end products and selling them.

1769 It created the market which, in turn, discouraged (if it did not keep out altogether) potential competitors.

1770 The third focus is to occupy a strategic position, concentrating on a key function (the strategy is discussed in Chapter 18 under Ecological Niches).

1771 What position would enable the knowledge innovator to be largely immune to the extreme convolutions of a knowledge-based industry in its early stages?

1772 It was thinking this through and deciding to concentrate on mastering the fermentation process that gave Pfizer in the United States the early lead in penicillin it has maintained ever since.

1773 Focusing on marketing—on mastery of the requirements of airlines and of the public in respect to configuration and finance—gave Boeing the leadership in passenger planes, which it has held ever since.

1774 And despite the turbulence of the computer industry today, a few leading manufacturers of the computer's key component, semiconductors, can maintain their leadership position almost irrespective of the fate of individual computer manufacturers themselves.

1775 Intel is one example. ...

1776 Within the same industry, individual knowledge-based innovators can sometimes choose between these alternatives.

1777 Where DuPont, for instance, has chosen to create markets, its closest American competitor, Dow Chemical, tries to occupy a key spot in each market segment.

1778 A hundred years ago, J. P. Morgan opted for the key function approach.

1779 He established his bank as the conduit for European investment capital in American industry, and furthermore in a capital-short country.

1780 At the same time, Georg Siemens in Germany and Shibusawa Eichii in Japan both went for the systems approach. ...

1781 The power of a clear focus is demonstrated by Edison's success.

1782 Edison was not the only one who identified the inventions that had to be made to produce a light bulb.

1783 An English physicist, Joseph Swan, did so too.

1784 Swan developed his light bulb at exactly the same time as Edison.

1785 Technically, Swan's bulb was superior, to the point where Edison bought up the Swan patents and used them in his own light bulb factories.

1786 But Edison not only thought through the technical requirements; he thought through his focus.

1787 Before he even began the technical work on the glass envelope, the vacuum, the closure, and the glowing fiber, he had already decided on a "system": his light bulb was designed to fit an electric power company for which he had lined up the financing, the rights to string wires to get the power to his light bulb customers, and the distribution system.

1788 Swan, the scientist, invented a product; Edison produced an industry.

1789 So Edison could sell and install electric power while Swan was still trying to figure out who might be interested in his technical achievement.

1790 The knowledge-based innovator has to decide on a clear focus.

1791 Each of the three described here is admittedly very risky.

1792 But not to decide on a clear focus, let alone to try to be in between or to attempt more than one focus, is riskier by far.

1793 It is likely to prove fatal.

1794 3. Finally, the knowledge-based innovator—and especially the one whose innovation is based on scientific or technological knowledgeneeds to learn and to practice entrepreneurial management (see Chapter 15, The New Venture).

1795 In fact, entrepreneurial management is more crucial to knowledge-based innovation than to any other kind.

1796 Its risks are high, thus putting a much higher premium on foresight, both financial and managerial, and on being market-focused and marketdriven.

1797 Yet knowledge-based, and especially high-tech, innovation tends to have little entrepreneurial management.

1798 In large measure the high casualty rate of knowledge-based industry is the fault of the knowledge-based, and especially the high-tech, entrepreneurs themselves.

1799 They tend to be contemptuous of anything that is not "advanced knowledge," and particularly of anyone who is not a specialist in their own area.

1800 They tend to be infatuated with their own technology, often believing that "quality" means what is technically sophisticated rather than what gives value to the user.

1801 In this respect they are still, by and large, nineteenth-century inventors rather than twentieth-century entrepreneurs. ...

1802 In fact, there are enough companies around today to show that the risk in knowledge-based innovation, including high tech, can be substantially reduced if entrepreneurial management is conscientiously applied.

1803 Hoffmann-LaRoche, the Swiss pharmaceutical company, is one example; Hewlett-Packard is another, and so is Intel.

1804 Precisely because the inherent risks of knowledge-based innovation are so high, entrepreneurial management is both particularly necessary and particularly effective.

The Unique Risks

Even when it is based on meticulous analysis, endowed with clear focus, and conscientiously managed, knowledge-based innovation still suffers from unique risks and, worse, an innate unpredictability. ⎓

First, by its very nature, it is turbulent. ⎓

The combination of the two characteristics of knowledge-based innovations—long lead times and convergences—gives knowledge-based innovations their peculiar rhythm.

For a long time, there is awareness of an innovation about to happen—but it does not happen.

Then suddenly there is a near-explosion, followed by a few short years of tremendous excitement, tremendous startup activity, tremendous publicity.

Five years later comes a "shakeout," which few survive. ⎓

In 1856, Werner Siemens in Germany applied the electrical theories Michael Faraday had developed around 1830 (twenty-five years earlier) to the design of the ancestor of the first electrical motor, the first dynamo.

It caused a worldwide sensation.

From then on, it became certain that there would be an "electrical industry" and that it would be a major one.

Dozens of scientists and inventors went to work.

But nothing happened for twenty-two years.

The knowledge was missing: Maxwell's development of Faraday's theories. ⎓

1818 After it had become available, Edison invented the light bulb in 1878 and the race was on.

1819 Within the next five years all the major electrical apparatus companies in Europe and America were founded: Siemens in Germany bought up a small electrical apparatus manufacturer, Schuckert.

1820 The (German) General Electric Company, AEG, was formed on the basis of Edison's work.

1821 In the United States there arose what are now G.E. and Westinghouse; in Switzerland, there was Brown Boveri; in Sweden, ASEA was founded in 1884.

1822 But these few are the survivors of a hundred such companies-American, British, French, German, Italian, Spanish, Dutch, Belgian, Swiss, Austrian, Czech, Hungarian, and so on—all eagerly financed by the investors of their time and all expecting to be "billion-dollar companies."

1823 It was this upsurge of the electrical apparatus industry that gave rise to the first great science-fiction boom and made Jules Verne and H. G. Wells best-selling authors all over the world.

1824 But by 1895-1900, most of these companies had already disappeared, whether out of business, bankrupt, or absorbed by the few survivors. ⁍

1825 Around 1910, there were up to two hundred automobile companies in the United States alone.

1826 By the early 1930s, their number had shrunk to twenty, and by 1960 to four. ⁍

1827 In the 1920s, literally hundreds of companies were making radio sets and hundreds more were going into radio stations.

1828 By 1935, the control of broadcasting had moved into the hands of three “networks” and there were only a dozen manufacturers of radio sets left.

1829 Again, there was an explosion in the number of newspapers founded between 1880 and 1900.

1830 In fact, newspapers were among the major “growth industries” of the time.

1831 Since World War I, the number of newspapers in every major country has been going downhill steadily.

1832 And the same is true of banking.

1833 After the founders—the Morgans, the Siemenses, the Shibusawas—there was an almost explosive growth of new banks in the United States as well as in Europe.

1834 But around 1890, only twenty years later, consolidation set in.

1835 Banking firms began to go out of business or to merge.

1836 By the end of World War II in every major country only a handful of banks were left that had more than local importance, whether as commercial or private banks. ⎓

1837 But each time without exception the survivor has been a company that was started during the early explosive period.

1838 After that period is over, entry into the industry is foreclosed for all practical purposes.

1839 There is a “window” of a few years during which a new venture must establish itself in any new knowledge-based industry. ⎓

1840 It is commonly believed today that that “window” has become narrower.

1841 But this is as much a misconception as the common belief that the lead time between the emergence of new knowledge and its conversion into technology, products, and processes has become much shorter. ⁂

1842 Within a few years after George Stephenson's "Rocket" had pulled the first train on a commercial railroad in 1830, over a hundred railroad companies were started in England.

1843 For ten years railroads were "hightech" and railroad entrepreneurs "media events."

1844 The speculative fever of these years is bitingly satirized in one of Dickens's novels, Little Dorrit (published in 1855-57); it was not very different from today's speculative fever in Silicon Valley.

1845 But around 1845, the "window" slammed shut.

1846 From then on there was no money in England any more for new railroads.

1847 Fifty years later, the hundred-or-so English railroad companies of 1845 had shrunk to five or six.

1848 And the same rhythm characterized the electrical apparatus industry, the telephone industry, the automobile industry, the chemical industry, household appliances, and consumer electronics.

1849 The "window" has never been very wide nor open very long. ⁂

1850 But there can be little doubt that today the "window" is becoming more and more crowded.

1851 The railroad boom of the 1830s was confined to England; later, every country had its own local boom quite separate from the preceding one in the neighboring country.

1852 The electrical apparatus boom already extended across national frontiers, as did the automobile boom twenty-five years later.

1853 Yet both were confined to the countries that were industrially developed at the time.

1854 The term “industrially developed” encompasses a great deal more territory today, however.

1855 It takes in Japan, for instance.

1856 It takes in Brazil.

1857 It may soon take in the non-Communist Chinese territories: Hong Kong, Taiwan, and Singapore.

1858 Communication today is practically instantaneous, travel easy and fast.

1859 And a great many countries have today what only very few small places had a hundred years ago: large cadres of trained people who can immediately go to work in any area of knowledgebased innovation, and especially of science-based or technology-based innovation.

1860 These facts have two important implications.

1861 1. First, science-based and technology-based innovators alike find time working against them.

1862 In all innovation based on any other source—the unexpected, incongruities, process need, changes in industry structure, demographics, or changes in perception—time is on the side of the innovator.

1863 In any other kind of innovation innovators can reasonably expect to be left alone.

1864 If they make a mistake, they are likely to have time to correct it.

1865 And there are several moments in time in which they can launch their new venture.

1866 Not so in knowledge-based innovation, and especially in those innovations based on scientific and technological knowledge.

1867 Here there is only a short time—the "window"—during which entry is possible at all.

1868 Here innovators do not get a second chance; they have to be right the first time.

1869 The environment is harsh and unforgiving.

1870 And once the "window" closes, the opportunity is gone forever. ...

1871 In some knowledge-based industries, however, a second "window" does in fact open some twenty to thirty years or so after the first one has shut down.

1872 Computers are an example. ...

1873 The first "window" in computers lasted from 1949 until 1955 or so.

1874 During this period, every single electrical apparatus company in the world went into computers- G.E. , Westinghouse, and RCA in the United States; the British General Electric Company, Plessey, and Ferranti in Great Britain; Siemens and AEG in Germany; Philips in Holland; and so on.

1875 By 1970, every single one of the "biggies" was out of computers, ignominiously.

1876 The field was occupied by companies that had either not existed at all in 1949 or had been small and marginal: IBM, of course, and the "Seven Dwarfs," the seven smaller computer companies in the United States; ICL, the remnant of the computer businesses of the General Electric Company, of Plessey, and of Ferranti in Great Britain; some fragments sustained by heavy government subsidies in France; and a total newcomer, Nixdorf, in Germany.

1877 The Japanese companies were sustained for a long time through government support. ...

1878 Then, in the late seventies, a second "window" opened with the invention of micro-chips, which led to word processors, minicomputers, personal computers, and the merging of computer and telephone switchboard. ...

1879 But the companies that had failed in the first round did not come back in the second one.

1880 Even those that survived the first round stayed out of the second, or came in late and reluctantly.

1881 Neither Univac nor Control Data, nor Honeywell nor Burroughs, nor Fujitsu nor Hitachi took leadership in minicomputers or personal computers.

1882 The one exception was IBM, the undisputed champion of the first round.

1883 And this has been the pattern too in earlier knowledge-based innovations. ...

1884 2. Because the "window" is much more crowded, any one knowledge-based innovator has far less chance of survival. ...

1885 The number of entrants during the “window” period is likely to be much larger.

1886 But the structure of the industries, once they stabilize and mature, seems to have remained remarkably unchanged, at least for a century now.

1887 Of course there are great differences in structure between various industries, depending on technology, capital requirements, and ease of entry, on whether the product can be shipped or distributed only locally, and so on.

1888 But at any one time any given industry has a typical structure: in any given market there are so many companies altogether, so many big ones, so many medium-sized ones, so many small ones, so many specialists.

1889 And increasingly there is only one “market” for any new knowledge-based industry, whether computers or modern banking—the world market.

1890 The number of knowledge-based innovators that will survive when an industry matures and stabilizes is therefore no larger than it has traditionally been.

1891 But largely because of the emergence of a world market and of global communications, the number of entrants during the “window” period has greatly increased.

1892 When the shakeout comes, the casualty rate is therefore much higher than it used to be.

1893 And the shakeout always comes; it is inevitable.

1894 *The Shakeout*

1895 The “shakeout” sets in as soon as the “window” closes.

1896 And the majority of ventures started during the “window” period do not survive the shakeout, as has already been shown for such high-tech industries of yesterday as railroads, electrical apparatus makers, and automobiles.

1897 As these lines are being written, the shakeout has begun among microprocessor, minicomputer, and personal computer companies—only five or six years after the "window" opened.

1898 Today, there are perhaps a hundred companies in the industry in the United States alone.

1899 Ten years hence, by 1995, there are unlikely to be more than a dozen left of any size or significance. ...

1900 But which ones will survive, which ones will die, and which ones will become permanently crippled—able neither to live nor to die—is unpredictable.

1901 In fact, it is futile to speculate.

1902 Sheer size may ensure survival.

1903 But it does not guarantee success in the shakeout, otherwise Allied Chemical rather than DuPont would today be the world's biggest and most successful chemical company.

1904 In 1920, when the "window" opened for the chemical industry in the United States, Allied Chemical looked invincible, if only because it had obtained the German chemical patents which the U.S. government had confiscated during World War I. Seven years later, after the shakeout, Allied Chemical had become a weak also-ran.

1905 It has never been able to regain momentum. ...

1906 No one in 1949 could have predicted that IBM would emerge as the computer giant, let alone that such big, experienced leaders as G.E. or Siemens would fail completely.

1907 No one in 1910 or 1914 when automobile stocks were the favorites of the New York Stock Exchange could have predicted that General Motors and Ford would survive and prosper and that such universal favorites as Packard or Hupmobile would disappear.

1908 No one in the 1870s and 1880s, the period in which the modern banks were born, could have predicted that Deutsche Bank would swallow up dozens of the old commercial banks of Germany and emerge as the leading bank of the country. ⁂

1909 That a certain industry will become important is fairly easy to predict.

1910 There is no case on record where an industry that reached the explosive phase, the "window" phase, as I called it, has then failed to become a major industry.

1911 The question is, Which of the specific units in this industry will be its leaders and so survive? ⁂

1912 This rhythm—a period of great excitement during which there is also great speculative ferment, followed by a severe "shakeout"—is particularly pronounced in the high-tech industries. ⁂

1913 In the first place, such industries are in the limelight and thus attract far more entrants and far more capital than more mundane areas.

1914 Also the expectations are much greater.

1915 More people have probably become rich building such prosaic businesses as a shoe-polish or a watchmaking company than have become rich through high-tech businesses.

1916 Yet no one expects shoe-polish makers to build a "billion-dollar business," nor considers them a failure if all they build is a sound but modest family company.

1917 High tech, by contrast, is a "high-low game," in which a middle hand is considered worthless.

1918 And this makes high-tech innovation inherently risky. ⁂

1919 But also, high tech is not profitable for a very long time.

1920 The world's computer industry began in 1947-48.

1921 Not until the early 1980s, more than thirty years later, did the industry as a whole reach break-even point.

1922 To be sure, a few companies (practically all of them American, by the way) began to make money much earlier.

1923 And one, IBM, the leader, began to make a great deal of money earlier still.

1924 But across the industry the profits of those few successful computer makers were more than offset by the horrendous losses of the rest; the enormous losses, for instance, which the big international electrical companies took in their abortive attempts to become computer manufacturers. ⁂

1925 And exactly the same thing happened in every earlier "high-tech" boom—in the railroad booms of the early nineteenth century, in the electrical apparatus and the automobile booms between 1880 and 1914, in the electric appliance and the radio booms of the 1920s, and so on. ⁂

1926 One major reason for this is the need to plow more and more money back into research, technical development, and technical services to stay in the race.

1927 High tech does indeed have to run faster and faster in order to stand still. ‟

1928 This is, of course, part of its fascination.

1929 But it also means that when the shakeout comes, very few businesses in the industry have the financial resources to outlast even a short storm.

1930 This is the reason why high-tech ventures need financial foresight even more than other new ventures, but also the reason why financial foresight is even scarcer among high-tech new ventures than it is among new ventures in general. ‟

1931 There is only one prescription for survival during the shakeout: entrepreneurial management (described in Chapters 12-15).

1932 What distinguished Deutsche Bank from the other "hot" financial institutions of its time was that Georg Siemens thought through and built the world's first top management team.

1933 What distinguished DuPont from Allied Chemical was that DuPont in the early twenties created the world's first systematic organization structure, the world's first long-range planning, and the world's first system of management information and control.

1934 Allied Chemical, by contrast, was run arbitrarily by one brilliant egomaniac.

1935 But this is not the whole story.

1936 Most of the large companies that failed to survive the more recent computer shakeout- G.E. and Siemens, for instance—are usually considered to have first-rate management.

1937 And the Ford Motor Company survived, though only by the skin of its teeth, even though it was grotesquely mismanaged during the shakeout years. ‟

1938 Entrepreneurial management is thus probably a precondition of survival, but not a guarantee thereof.

1939 And at the time of the shakeout, only insiders (and perhaps not even they) can really know whether a knowledge-based innovator that has grown rapidly for a few boom years is well managed, as DuPont was, or basically unmanaged, as Allied Chemical was.

1940 By the time we do know, it is likely to be too late.

1941 *The Receptivity Gamble*

1942 To be successful, a knowledge-based innovation has to be "ripe"; there has to be receptivity to it.

1943 This risk is inherent in knowledge based innovation and is indeed a function of its unique power.

1944 All other innovations exploit a change that has already occurred.

1945 They satisfy a need that already exists.

1946 But in knowledge-based innovation, the innovation brings about the change.

1947 It aims at creating a want.

1948 And no one can tell in advance whether the user is going to be receptive, indifferent, or actively resistant. ‟

1949 There are exceptions, to be sure.

1950 Whoever produces a cure for cancer need not worry about "receptivity."

1951 But such exceptions are few.

1952 In most knowledge-based innovations, receptivity is a gamble.

1953 And the odds are unknown, are indeed mysterious.

1954 There may be great receptivity, yet no one realizes it.

1955 And there may be no receptivity, or even heavy resistance when everyone is quite sure that society is actually eagerly waiting for the innovation. ...

1956 Stories of the obtuseness of the high and mighty in the face of a knowledge-based innovation abound.

1957 Typical is the anecdote which has a king of Prussia predicting the certain failure of that new-fangled contraption, the railroad, because "No one will pay good money to get from Berlin to Potsdam in one hour when he can ride his horse in one day for free."

1958 But the king of Prussia was not alone in his misreading of the receptivity to the railroad; the majority of the "experts" of his day inclined to his opinion.

1959 And when the computer appeared there was not one single "expert" who could imagine that businesses would ever want such a contraption. ...

1960 The opposite error is, however, just as common.

1961 "Everybody knows" that there is a real need, a real demand, when in reality there is total indifference or resistance.

1962 The same authorities who, in 1948, could not imagine that a business would ever want a computer, a few years later, around 1955, predicted that the computer would "revolutionize the schools" within a decade. ⁂

1963 The Germans consider Philip Reis rather than Alexander Graham Bell to be the inventor of the telephone.

1964 Reis did indeed build an instrument in 1861 that could transmit music and was very close to transmitting speech.

1965 But then he gave up, totally ciscouraged.

1966 There was no receptivity for a telephone, no interest in it, no desire for it.

1967 "The telegraph is good enough for us," was the prevailing attitude.

1968 Yet when Bell, fifteen years later, patented his telephone, there was an immediate enthusiastic response.

1969 And nowhere was it greater than in Germany. ⁂

1970 The change in receptivity in these fifteen years is not too difficult to explain.

1971 Two major wars, the American Civil War and the Franco- ⁂

1972 Prussian War, had shown that the telegraph was by no means "good enough."

1973 But the real point is not why receptivity changed.

1974 It is that every authority in 1861 enthusiastically predicted overwhelming receptivity when Reis demonstrated his instrument at a scientific meeting.

1975 And every authority was wrong. ‴

1976 But, of course, the authorities can also be right, and often are.

1977 In 1876-77, for instance, they all knew that there was receptivity for both a light bulb and a telephone—and they were right.

1978 Similarly, Edison, in the 1880s, was supported by the expert opinion of his time when he embarked on the invention of the phonograph, and again the experts were right in assuming high receptivity for the new device. ‴

1979 But only hindsight can tell us whether the experts are right or wrong in their assessment of the receptivity for this or that knowledge-based innovation. ‴

1980 Nor do we necessarily perceive, even by hindsight, why a particular knowledge-based innovation has receptivity or fails to find it.

1981 No one, for instance, can explain why phonetic spelling has been so strenuously resisted.

1982 Everyone agrees that nonphonetic spelling is a major obstacle in learning to read and write, forces schools to devote inordinate time to the reading skill, and is responsible for a disproportionate number of reading disabilities and emotional traumas among children.

1983 The knowledge of phonetics is a century old at least.

1984 Means to achieve phonetic spelling are available in the two languages where the problem is most acute: any number of phonetic alphabets for English, and the much older, forty-eight-syllable Kana scripts in Japanese.

1985 For both countries there are examples next door of a successful shift to a phonetic script.

1986 The English have the successful model of German spelling reform of the mid-nineteenth century; the Japanese, the equally successful—and much earlier—phonetic reform of the Korean script.

1987 Yet in neither country is there the slightest receptivity for an innovation that, one would say, is badly needed, eminently rational, and proven by example to be safe, fairly easy, and efficacious.

1988 Why?

1989 Explanations abound, but no one really knows. ⁂

1990 There is no way to eliminate the element of risk, no way even to reduce it.

1991 Market research does not work—one cannot do market research on something that does not exist.

1992 Opinion research is probably not just useless but likely to do damage.

1993 At least this is what the experience with "expert opinion" on the receptivity to knowledge-based innovation would indicate. ⁂

1994 Yet there is no choice.

1995 If we want knowledge-based innovation, we must gamble on receptivity to it. ⁂

1996 The risks are highest in innovations based on new knowledge in science and technology.

1997 They are particularly high, of course, in innovations in areas that are currently "hot"—personal computers, at the present time, or biotechnology.

1998 By contrast, areas that are not in the public eye have far lower risks, if only because there is more time.

1999 And in innovations where the knowledge base is not science or technology—social innovations, for instance—the risks are lower still.

2000 But high risk is inherent in knowledge-based innovation.

2001 It is the price we have to pay for its impact and above all for its capacity to bring about change, not only in products and services but in how we see the world, our place in it, and eventually ourselves. ‴

2002 Yet the risks even of high-tech innovation can be substantially reduced by integrating new knowledge as the source of innovation with one of the other sources defined earlier, the unexpected, incongruities, and especially process need.

2003 In these areas receptivity has either already been established or can be tested fairly easily and with good reliability.

2004 And in these areas, too, the knowledge or knowledges that have to be produced to complete an innovation can usually be defined with considerable precision.

2005 This is the reason why "program research" is becoming so popular.

2006 But even program research requires a great deal of system and self-discipline, and has to be organized and purposeful. ‴

2007 The demands on knowledge-based innovators are thus very great.

They are also different from those in other areas of innovation.

The risks they face are different, too; time, for instance, is not on their side.

But if the risks are greater, so are the potential rewards.

The other innovators may reap a fortune.

The knowledge-based innovator can hope for fame as well.

The Bright Idea

Innovations based on a bright idea probably outnumber all other categories taken together.

Seven or eight out of every ten patents belong here, for example.

A very large proportion of the new businesses that are described in the books on entrepreneurs and entrepreneurships are built around “bright ideas”: the zipper, the ballpoint pen, the aerosol spray can, the tab to open soft drink or beer cans, and many more.

And what is called research in many businesses aims at finding and exploiting bright ideas, whether for a new flavor in breakfast cereals or soft drinks, for a better running shoe, or for yet one more nonscorching clothes iron. ⁂

Yet bright ideas are the riskiest and least successful source of innovative opportunities.

The casualty rate is enormous.

No more than one out of every hundred patents for an innovation of this kind earns enough to pay back development costs and patent fees.

2021 A far smaller proportion, perhaps as low as one in five hundred, makes any money above its out-of-pocket costs. ‟

2022 And no one knows which ideas for an innovation based on a bright idea have a chance to succeed and which ones are likely to fail.

2023 Why did the aerosol can succeed, for instance?

2024 And why did a dozen or more similar inventions for the uniform delivery of particles fail dismally?

2025 Why does one universal wrench sell and most of the many others disappear?

2026 Why did the zipper find acceptance and practically displace buttons, even though it tends to jam?

2027 (After all, a jammed zipper on a dress, jacket, or pair of trousers can be quite embarrassing.) ‟

2028 Attempts to improve the predictability of innovations based on bright ideas have not been particularly successful. ‟

2029 Equally unsuccessful have been attempts to identify the personal traits, behavior, or habits that make for a successful innovator.

2030 “Successful inventors,” an old adage says, “keep on inventing.

2031 They play the odds.

2032 If they try often enough, they will succeed.” ‟

2033 This belief that you'll win if only you keep on trying out bright ideas is, however, no more rational than the popular fallacy that to win the jackpot at Las Vegas one only has to keep on pulling the lever.

2034 Alas, the machine is rigged to have the house win 70 percent of the time.

2035 The more often you pull, the more often you lose. ...

2036 There is actually no empirical evidence at all for the belief that persistence pays off in pursuing the "brilliant idea," just as there is no evidence of any "system" to beat the slot machines.

2037 Some successful inventors have had only one brilliant idea and then quit: the inventor of the zipper, for instance, or of the ballpoint pen.

2038 And there are hundreds of inventors around who have forty patents to their name, and not one winner.

2039 Innovators do, of course, improve with practice.

2040 But only if they practice the right method, that is, if they base their work on a systematic analysis of the sources of innovative opportunity. ...

2041 The reasons for both the unpredictability and the high casualty rate are fairly obvious.

2042 Bright ideas are vague and elusive.

2043 I doubt that anyone except the inventor of the zipper ever thought that buttons or hooks-and-eyes were inadequate to fasten clothing, or that anyone but the inventor of the ballpoint pen could have defined what, if anything, was unsatisfactory about that nineteenth—century invention, the fountain pen.

2044 What need was satisfied by the electric toothbrush, one of the market successes of the 1960s?

2045 It still has to be hand-held, after all. ...

2046 And even if the need can be defined, the solution cannot usually be specified.

2047 That people sitting in their cars in a traffic jam would like some diversion was perhaps not so difficult to figure out.

2048 But why did the small TV set which Sony developed around 1965 to satisfy this need fail in the marketplace, whereas the far more expensive car stereo succeeded?

2049 In retrospect, it is easy to answer this.

2050 But could it possibly have been answered in prospect? ...

2051 The entrepreneur is therefore well advised to forgo innovations based on bright ideas, however enticing the success stories.

2052 After all, somebody wins a jackpot on the Las Vegas slot machines every week, yet the best any one slot-machine player can do is try not lose more than he or she can afford.

2053 Systematic, purposeful entrepreneurs analyze the systematic areas, the seven sources that I've discussed in Chapters 3 through 9. ...

2054 There is enough in these areas to keep busy any one individual entrepreneur and any one entrepreneurial business or public-service institution.

2055 In fact, there is far more than anyone could possibly fully exploit.

2056 And in these areas we know how to look, what to look for, and what to do. ‟

2057 All one can do for innovators who go in for bright ideas is to tell them what to do should their innovation, against all odds, be successful.

2058 Then the rules for a new venture apply (see Chapter 15).

2059 And this is, of course, the reason why so much of the literature on entrepreneurship deals with starting and running the new venture rather than with innovation itself. ‟

2060 And yet an entrepreneurial economy cannot dismiss cavalierly the innovation based on a bright idea.

2061 The individual innovation of this kind is not predictable, cannot be organized, cannot be systematized, and fails in the overwhelming majority of cases.

2062 Also many, very many, are trivial from the start.

2063 There are always more patent applications for new can openers, for new wig stands, and for new belt buckles than for anything else.

2064 And in any list of new patents there is always at least one foot warmer than can double as a dish towel.

2065 Yet the volume of such bright-idea innovation is so large that the tiny percentage of successes represents a substantial source of new businesses, new jobs, and new performance capacity for the economy. ‟

2066 In the theory and practice of innovation and entrepreneurship, the bright-idea innovation belongs in the appendix.

2067 But it should be appreciated and rewarded.

2068 It represents qualities that society needs: initiative, ambition, and ingenuity.

2069 There is little society can do, perhaps, to promote such innovation.

2070 One cannot promote what one does not understand.

2071 But at least society should not discourage, penalize, or make difficult such innovations.

2072 Seen in this perspective, the recent trend in developed countries, and especially in the United States, to discourage the individual who tries to come up with a bright-idea innovation (by raising patent fees, for instance) and generally to discourage patents as "anticompetitive" is short-sighted and deleterious