1 # From Capitalism to Knowledge Society

2 Part one, chapter one of Peter Drucker's *Post-Capitalist Society*

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10 WITHIN ONE HUNDRED FIFTY YEARS, from 1750 to 1900, capitalism and technology conquered the globe and created a world civilization.

11 Neither capitalism nor technical innovations were new; both had been common, recurrent phenomena throughout the ages, in West and East alike.

12 What was brand new was their speed of diffusion and their global reach across cultures, classes, and geography.

13 And it was this speed and scope that converted capitalism into "Capitalism" and into a "system," and technical advances into the "Industrial Revolution."

14 This transformation was driven by a radical change in the meaning of knowledge.

15 In both West and East, knowledge had always been seen as applying to being.

16 Then, almost overnight, it came to be applied to doing.

17 It became a resource and a utility.

18 Knowledge had always been a private good.

19 Almost overnight it became a public good.

20 For a hundred years – during the first phase – knowledge was applied to tools, processes, products.

21 This created the Industrial Revolution.

22 But it also created what Karl Marx (1818-1883) called "alienation," new classes and class war, and with them Communism.

23 In its second phase, beginning around 1880 and culminating around the end of World War II, knowledge in its new meaning came to be applied to work.

24 This ushered in the Productivity Revolution, which in seventy-five years converted the proletarian into a middle-class bourgeois with near-upper-class income.

25 The Productivity Revolution thus defeated class war and Communism.

26 The last phase began after World War II.

27 Today, knowledge is being applied to knowledge itself.

28 This is the Management Revolution.

29 Knowledge is now fast becoming the sole factor of production, sidelining both capital and labor.

30 It may be premature (and certainly would be presumptuous) to call ours a "knowledge society"; so far, we have only a knowledge economy.

31 But our society is surely "post-capitalist."

32 Capitalism, in one form or another, has occurred and reoccurred many times throughout the ages, in the East as well as in the West .

33 And there have been numerous earlier periods of rapid technical invention and innovation — again in the East as well as the West — many of them producing technical

changes fully as radical as any in the late eighteenth or early nineteenth centuries. *[1]

34 What is unprecedented and unique about the developments of the last two hundred fifty years is their speed and scope.

35 Instead of being one element in society, as all earlier capitalism had been, Capitalism — with a capital C — became society.

36 Instead of being confined, as always before, to a narrow locality, Capitalism — again with a capital C — took over all of Western and Northern Europe in a mere one hundred years, from 1750 to 1850.

37 Then, within another fifty years, it took over the entire inhabited world.

38 All earlier capitalism had been confined to small, narrow groups in society.

39 Nobles, landowners, the military, peasants, professionals, craftsmen, even laborers, were almost untouched by it.

40 Capitalism with a capital C soon permeated and transformed all groups in society wherever it spread.

41 From earliest times in the Old World, new tools, new processes, new materials, new crops, new techniques – what we now call "technology"– diffused swiftly.

42 Few modern inventions, for instance, spread as fast as a thirteenth-century one: eyeglasses.

43 Derived from the optical experiments of an English Franciscan friar, Roger Bacon (d.1292 or 1294), around 1270, reading glasses for the elderly were in use at the papal court of Avignon by 1290, at the Sultan's court in Cairo by 1300, and at the court of the Mongol emperor of China no later than 1310.

44 Only the sewing machine and the telephone, fastest–spreading of all nineteenth-century inventions, moved as swiftly.

45 But earlier technological change almost without exception remained confined to one craft or one application.

46 It took another two hundred years – until the early 1500s – before Bacon's invention had its second application: eyeglasses to correct nearsightedness.

47 The potter's wheel was in full use in the Mediterranean by 1500 B.C.; pots for cooking, and for storing water and food, were available in every household.

48 Yet the principle underlying the potter's wheel was not applied until A.D. 1000 to women's work: spinning.

49 Similarly, the redesign of the windmill around the year 800, which converted it from the toy it had been in antiquity into a true machine (and a fully "automated" one at that), was not applied to ships for more than three hundred years, after 1100.

50 Until then, ships used oars; if wind was used at all to propel them, it was as an auxiliary power, and then only if it blew in the right direction.

51 The sail that drives a ship works exactly the same way as the sail that drives the windmill, and the need for a sail that would enable a ship to sail cross-wind and against the wind had been known for a long time.

52 The windmill was redesigned in Northern France or in the Low Countries, both regions thoroughly familiar with ships and navigation.

53 Yet it did not occur to anyone for several hundred years to apply something invented to pump water and to grind corn — for use on land — to use offshore.

54 The inventions of the Industrial Revolution, however, were immediately applied across the board, and across all conceivable crafts and industries.

55 They were immediately seen as *technology*.

56 James Watt's (1736-1819) redesign of the steam engine between 1765 and 1776 made it into a cost-effective provider of power.

57 Watt himself throughout his own productive life focused on one use only: to pump water out of a mine – the use for which the steam engine had first been designed by Thomas Newcomen in the early years of the eighteenth century.

58 But one of England's leading iron-masters immediately saw that the redesigned steam engine could also be used to blow air into a blast furnace and bid for the second engine Watt had built.

59 And Watt's partner, Matthew Boulton (1728-1809), right away promoted the steam engine as a provider of power for all kinds of industrial processes, especially the largest of all manufacturing industries, textiles.

60 Thirty-five years later an American, Robert Fulton (1765-1815), floated the first steamship on New York's Hudson River.

61 Another twenty years later the steam engine was put on wheels and the locomotive was born.

62 And by 1840–or at the very latest 1850–the steam engine had transformed every single manufacturing process from glassmaking to printing.

63 It had transformed long-distance transportation on land and sea, and it was beginning to transform farming.

64 By then, it had penetrated almost the entire world — Tibet, Nepal, and the interior of tropical Africa being the sole exceptions.

65 The nineteenth century believed — and most people still believe — that the Industrial Revolution was the first time a

change in the "mode of production" (to use Karl Marx's term) changed social structure and created new classes, the capitalist and the proletarian.

66 But this belief, too, is invalid.

67 Between 700 and 1100 A.D. , two brand-new classes were created in Europe by technological change: those of the feudal knight and the urban craftsman.

68 The knight was created by the invention of the stirrup — an invention that arose in Central Asia around the year 700; the craftsman by the redesign of water wheel and windmill into true machines which, for the first time, used inanimate forces (water and wind) as motive power rather than human muscle.

69 The stirrup made it possible to fight on horseback; without it, a rider wielding lance, sword, or heavy bow would immediately have been thrown off his horse by the force of Newton's Second Law: "To every action there is an equal and opposite reaction."

70 For several hundred years, the knight remained an invincible "fighting machine."

71 But this machine had to be supported by a "military-agricultural complex"–something quite new in history.

72 Germans until this century called it a *Rittergut*, a knight's estate, endowed with legal status and economic and political privileges, and containing at least fifty peasant families or some two hundred people to produce the food needed to support the fighting machine: the knight, his squire, his three horses, and his twelve to fifteen grooms.

73 The stirrup, in other words, created feudalism.

74 The craftsman of antiquity had been a slave.

75 The craftsman of the first "machine age," the craftsman of Europe's Middle Ages, became the urban ruling class, the

"burgher," who then created Europe's unique city, and both the Gothic and the Renaissance styles that followed.

76 The technical innovations — stirrup, water wheel, and windmill — traveled throughout the entire Old World, and fast.

77 But the classes of the earlier industrial revolution remained European phenomena on the whole.

78 Only in Japan, around 1100 A.D. , did proud and independent craftsmen evolve, who enjoyed high esteem and, until 1600, considerable power.

79 But while the Japanese adopted the stirrup for riding, they continued to fight on foot.

80 The rulers in rural Japan were the commanders of foot soldiers — the *daimyo*.

81 They levied taxes on the peasantry but had no feudal estates.

82 In China, in India, in the world of Islam, the new technologies had no social impact whatever.

83 Craftsmen in China remained serfs without social status.

84 The military did not become landowners but remained, as in Europe's antiquity, professional mercenaries.

85 Even in Europe, the social changes generated by this early industrial revolution took almost four hundred years to take full effect.

86 By contrast, the social transformation of society brought about by Capitalism and Industrial Revolution took less than a hundred years to become fully effective in Western Europe.

87 In 1750, capitalists and proletarians were still marginal groups; in fact, proletarians in the nineteenth-century

meaning of the term, that is, factory workers, hardly existed at all.

88 By 1850, capitalists and proletarians were the dynamic classes of Western Europe, and were on the offensive.

89 They rapidly became the dominant classes wherever capitalism and modern technology penetrated.

90 In Japan, the transformation took less than thirty years, from the Meiji Restoration in 1867 to the war with China in 1894.

91 It took not much longer in Shanghai and Hong Kong, Calcutta and Bombay, or in the tsars' Russia. ¶¶¶

92 Capitalism and the Industrial Revolution — because of their speed and their scope — created a world civilization. *[2]

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94 [1] The best discussion of capitalism as a recurrent and fairly frequent phenomenon can be found in two works by the great French economic historian Fernand Braudel:

95 *The Mediterranean* (2 vols., first published in France in 1949 English translation, New York: Harper & Row, 1972);

96 and *Civilization and Capitalism* (3 vols., first published in France in 1979; English translation, New York: Harper & Row, 1981).

97 The best discussions of earlier "industrial revolutions" are *Medieval Technology and Social Change*, by Lynn White, Jr. (Oxford University Press, 1962);

98 *The Medieval Machine: The Industrial Revolution of the Middle Ages*, by Jean Gimpel (first published in France in 1975; English translation, New York: Holt, Rinehart & Winston, 1976);

99 and the monumental *Science and Civilization in China* by

the British biochemist, orientalist, and historian Joseph Needham (Cambridge University Press), publication of which began in 1954 with half of the planned twenty-five parts yet to appear.

100 What Needham has published so far has already completely changed our knowledge of early technology.

101 For earlier "industrial revolutions " see also my *Technology, Management and Society* (1973), especially Chapters 3 7, and 11.

102 [2] The best history of this development is *Prometheus Unbound*, by the Harvard historian David S. Landes (Cambridge University Press, 1969).

103

104 *The New Meaning Of Knowledge*

105 Unlike those "terrible simplifiers," the nineteenth-century ideologues such as Hegel and Marx, we now know that major historical events rarely have just one cause and just one explanation.

106 They typically result from the convergence of a good many separate and independent developments. ¶¶¶

107 One example of how history works is the genesis of the computer.

108 Its earliest root is the binary system, the realization of a seventeenth-century mathematician-philosopher, the German Gottfried Leibniz, that all numbers can be represented by just two: 0 and 1.

109 The second root is the discovery of a nineteenth century English inventor, Charles Babbage (1792-1871), that toothed wheels, that is, mechanics, could represent the entire decimal system and do all four elementary arithmetic functions: addition, subtraction, multiplication, and division — a genuine "computing machine."

110 Then in the early years of this century, two English logicians, Alfred North Whitehead and Bertrand Russell, in

their Principia Mathematica showed that any concept, if presented in rigorously logical form, can be expressed mathematically.

111 From this: discovery an Austro-American, Otto Neurath, working as statistician for the U.S. War Production Board of World War I, derived the idea, then brand new and heretical, that all information from any area is exactly the same when quantified, and can be treated and presented the same way (the idea, by the way, that also underlies modern statistics).

112 A little earlier, just before World War I, an American, Lee De Forest, had invented the audion tube to convert electronic impulses into sound waves, thus making possible the broadcasting of speech and music.

113 Twenty years later it occurred to engineers working at a medium-sized punch-card manufacturer, called IBM, that the audion tube could be used to switch electronically from 0 to 1 and back again. ¶¶¶

114 If any of these elements had been missing, there would have been no computer.

115 No one can say which of these was the essential element.

116 With all of them in place, however, the computer became virtually inevitable.

117 It was then pure accident that it became an American development — the accident of World War II, which made the American military willing to spend enormous sums on developing (quite unsuccessfully until well after World War II) machines to calculate at high speed the position of fast-moving aircraft overhead and of fast-moving enemy ships.

118 Otherwise the computer would probably have become a British development.

119 Indeed, an English company, the food producer and restaurant owner J. Lyons & Co., actually developed the first computer for commercial purposes that really

worked, the “Leo,” in the 1940s.

120 Lyons just couldn’t raise the money to compete with the Pentagon, and had to abandon its successful (and much cheaper) machine.

121 Many separate developments — most of them probably quite unconnected with each other — went into turning capitalism into Capitalism and technical advance into the Industrial Revolution.

122 The best-known theory — that Capitalism was the child of the “Protestant Ethic” — was expounded in the opening years of this century by the German sociologist Max Weber(1864-1920).

123 It has now been largely discredited; there just is not enough evidence for it.

124 There is only a little more evidence to support Karl Marx’s earlier thesis that the steam engine, the new prime mover, required such enormous capital investment that craftsmen could no longer finance their “means of production” and had to cede control to the capitalist.

125 There is one critical element, however, without which well known phenomena — capitalism and technical advance — could not possibly have turned into a social and worldwide pandemic.

126 That is the radical change in the meaning of knowledge that occurred in Europe around the year 1700, or shortly thereafter.

127 (This change is explored in some depth in my 1961 essay, “The Technological Revolution; Notes on the Relationship of Technology, Science and Culture,” reprinted in Technology, Management and Society (1972), and in my The Ecological Vision (New Brunswick, N.J. : Transaction Publishers, 1992).

128 There are as many theories as to what we can know and

how we know it as there have been metaphysicians, from Plato in 400 B.C. to Ludwig Wittgenstein (1889-1951) and Karl Popper (b. 1902) in our own day.

129 But since Plato's time there have only been two theories in the West — and since around the same time, two theories in the East — regarding the meaning and function of knowledge.

130 Plato's spokesman, the wise Socrates, holds that the sole function of knowledge is self-knowledge: the intellectual, moral, and spiritual growth of the person.

131 His ablest opponent, the brilliant and learned Protagoras, holds however that the purpose of knowledge is to make the holder effective by enabling him to know what to say and how to say it.

132 For Protagoras, knowledge meant logic, grammar, and rhetoric — later to become the trivium, the core of learning in the Middle Ages, and still very much what we mean by a "liberal education" or what the Germans mean by "Allgemeine Bildung."

133 In the East, there were pretty much the same two theories of knowledge.

134 Knowledge for the Confucian meant knowing what to say and how to say it as the route to advancement and earthly success.

135 Knowledge for the Taoist and the Zen monk meant self-knowledge, and the road to enlightenment and wisdom.

136 But while the two sides thus sharply disagreed about what knowledge actually meant, they were in total agreement as to what it did not mean.

137 It did not mean ability to do.

138 It did not mean utility.

139 Utility was not knowledge; it was skill — the Greek word is technē. ...

140 Unlike their Far Eastern contemporaries, the Chinese Confucians with their infinite contempt for anything but book learning, both Socrates and Protagoras respected technē.

141 (In fact, in the West contempt for skill was unknown until England's eighteenth-century "gentleman."

142 This contempt which reached such heights in Victorian England was surely little but a futile last-ditch defense against the gentleman's being replaced as society's ruling group by capitalist and technologist.)

143 But even to Socrates and Protagoras, technē, however commendable, was not knowledge.

144 It was confined to one specific application and had no general principles.

145 What the shipmaster knew about navigating from Greece to Sicily could not be applied to anything else.

146 Furthermore, the only way to learn a technē was through apprenticeship and experience.

147 A technē could not be explained in words, whether spoken or written; it could only be demonstrated.

148 As late as 1700, or even later, the English did not speak of "crafts."

149 They spoke of "mysteries" — not just because the possessor of a craft skill was sworn to secrecy but also because a craft by definition was inaccessible to anyone who had not been apprenticed to a master and thus learned by example.

150

151 *The Industrial Revolution*

152 But then, beginning after 1700 — and within an incredibly short fifty years — technology was invented.

153 The very word is a manifesto in that it combines "technē,"

that is, the mystery of a craft skill, with “logy,” organized, systematic, purposeful knowledge.

154 The first engineering school, the French Ecole des Ponts et Chaussees, was founded in 1747, followed around 1770 by the first School of Agriculture and in 1776 by the first School of Mining, both in Germany.

155 In 1794, the first technical university, the French Ecole Polytechnique, was founded, and with it, the profession of engineer.

156 Shortly thereafter, between 1820 and 1850, medical education and medical practice were reorganized as a systematic technology. ¶¶¶

157 In a parallel development, Great Britain between 1750 and 1800 shifted from patents as monopolies to enrich royal favorites to patents granted to encourage the application of knowledge to tools, products, and processes, and in order to reward inventors, provided they published their inventions.

158 This not only triggered a century of feverish mechanical invention in Britain; it put an end to craft mystery and secretiveness. ¶¶¶

159 The great document of this dramatic shift from skill to technology — one of the most important books in history — was the Encyclopedie, edited between 1751 and 1772 by Denis Diderot (1713- 1784) and Jean d’Alembert (1717- 1783).

160 This famous work attempted to bring together in organized and systematic form the knowledge of all crafts, in such a way that the nonapprentice could learn to be a “technologist.”

161 It was by no means accidental that articles in the Encyclopedie that describe an individual craft, such as spinning or weaving, were not written by craftsmen.

162 They were written by “information specialists”: people

trained as analysts, as mathematicians, as logicians — both Voltaire and Rousseau were contributors.

163 The underlying thesis of the Encyclopedie was that effective results in the material universe — in tools, processes, and product — are produced by systematic analysis, and by the systematic, purposeful application of knowledge.

164 But the Encyclopedie also preached that principles which produced results in one craft would produce results in any other.

165 That was anathema, however, to both the traditional man of knowledge and the traditional craftsman.

166 None of the technical schools of the eighteenth century aimed at producing new knowledge; nor did the Encyclopedie.

167 None even talked of the application of science to tools, processes, and products, that is, to technology.

168 This idea had to wait for another hundred years, until 1830 or so, when a German chemist, Justus von Liebig (1803-1873), applied science to invent, first, artificial fertilizers, and then a way to preserve animal protein: meat extract.

169 What the early technical schools and the Encyclopedie did do, however, was perhaps more important.

170 They brought together, codified, and published the technē, the craft mystery, as it had been developed over millennia.

171 They converted experience into knowledge, apprenticeship into textbook, secrecy into methodology, doing into applied knowledge.

172 These are the essentials of what we have come to call the "Industrial Revolution" — the transformation by technology of society and civilization worldwide.

173 It was this change in the meaning of knowledge which then made modern Capitalism inevitable and dominant.

174 Above all, the speed of technical change created demand for capital way beyond anything the craftsman could possibly supply.

175 The new technology also required concentration of production, that is, the shift to the factory.

176 Knowledge could not be applied in tens of thousands of small individual workshops and in the cottage industries of the rural village.

177 It required concentration of production under one roof.

178 The new technology also required large-scale energy, whether water power or steam power, which could not be decentralized.

179 But, though important, these energy needs were secondary.

180 The central point was that production almost overnight moved from being craft-based to being technology-based.

181 As a result, the capitalist moved almost overnight into the center of economy and society.

182 Before, he had always been "supporting cast."

183 As late as 1750, large-scale enterprise was governmental rather than private.

184 The earliest, and for many centuries the greatest, of all manufacturing enterprises in the Old World was the famous arsenal owned and run by the government of Venice.

185 And the eighteenth-century "manufactories" such as the porcelain works of Meissen and Sevres were still government owned.

186 But by 1830, large-scale private capitalist enterprise dominated in the West.

187 Another fifty years later, by the time Marx died in 1883, private capitalist enterprise had penetrated everywhere except to such remote corners of the world as Tibet or the Empty Quarter of Arabia.

188 There was resistance, of course, both to technology and to capitalism.

189 There were riots — in England, for instance, or in German Silesia.

190 But these were local, lasted a few weeks or at most a few months, and did not even slow down the speed and spread of Capitalism.

191 The machine and the factory system spread equally fast and equally without meeting much resistance, if any.

192 Adam Smith's Wealth of Nations appeared in the same year in which James Watt patented the perfected steam engine.

193 Yet the Wealth of Nations pays practically no attention to machines, factories, or industrial production.

194 The production it describes is still craft-based.

195 Even forty years later, after the — Napoleonic Wars, factories and machines were not yet seen as central by acute social observers.

196 They play practically no role in the economics of David Ricardo (17721823).

197 Neither factory workers nor bankers can be found in the novels of Jane Austen, England's most perceptive social critic at the turn of the nineteenth century.

198 Her society (as has often been said) is thoroughly "bourgeois."

199 But it is still totally pre-industrial, a society of squires and tenants, parsons and naval officers, lawyers, craftsmen, and shopkeepers.

200 Only in faraway America did Alexander Hamilton see very early that machine-based manufacturing was fast becoming the central economic activity.

201 But few even among his followers paid much attention to his 1791 Report on Manufactures until long after his death in 1804.

202 By the 1830s, however, Honore de Balzac was turning out bestselling novel after bestselling novel depicting a capitalist France whose society was dominated by bankers and by the stock exchange.

203 Another fifteen years later, the factory system and the machine are central in the mature works of Charles Dickens, and so are the new classes, the capitalists and the proletarians.

204 In Bleak House (1852-53), the new society and its tensions form the subplot in the contrast between two able brothers, both sons of the squire's housekeeper.

205 One becomes a great industrialist in the North, who plans to get himself elected to Parliament to fight the landowners and break their power.

206 The other chooses to remain a loyal retainer of the broken, defeated, ineffectual (but precapitalist) "gentleman."

207 And Dickens's Hard Times (1854) is the first and by far the most powerful industrial novel, the story of a bitter strike in a cotton mill and of class war at its starkest.

208 The unheard — of speed with which society was transformed created the social tensions and conflicts of

the new order.

209 We now know that there is no truth in the all but universal belief that factory workers in the early nineteenth century were worse off and were treated more harshly than they had been as landless laborers in the pre-industrial countryside.

210 They were badly off, no doubt, and harshly treated.

211 But they flocked to the factory precisely because they were still better off there than they were at the bottom of a static, tyrannical, and starving rural society.

212 They still experienced a much better "quality of life."

213 "England's green and pleasant land" which William Blake (1757-1827) in his famous poem The New Jerusalem hoped to liberate from the new "Satanic Mills," was in reality one vast rural slum.

214 (We should have known this all along, by the way.

215 In the factory town, infant mortality immediately went down and life expectancies immediately went up, thus triggering the enormous population growth of industrializing Europe.

216 But we also have the example of the Third World countries since World War II.

217 Brazilians and Peruvians stream into the favelas and barrios of Rio de Janeiro and Lima.

218 However hard, life there is better than in the impoverished Noreste of Brazil or on Peru's Altiplano.

219 Indians today say: "The poorest beggar in Bombay still eats better than the farm hand in the village.")

220 While industrialization, from the beginning, meant material improvement rather than Marx's famous "immiseration," the speed of change was so breathtaking as to be deeply traumatic.

221 The new class, the "proletarians," became "alienated," to use the term Marx coined.

222 Their alienation, he predicted, would make inevitable their exploitation.

223 For they were becoming totally dependent for their livelihood on access to the "means of production," which were owned and controlled by the capitalist.

224 This in turn — so Marx predicted — would increasingly concentrate ownership in fewer and bigger hands, and increasingly impoverish a powerless proletariat — until the day at which the system would collapse under its own weight, the few remaining capitalists overthrown by proletarians who "had nothing to lose but their chains." ¶¶¶

225 We know now that Marx was a false prophet — the very opposite of what he predicted has in fact happened.

226 But this is hindsight.

227 Most of his contemporaries shared his view of capitalism, even if they did not necessarily share his prediction of the outcome.

228 Even anti-Marxists accepted Marx's analysis of the "inherent contradictions of capitalism."

229 Some were confident that the military would keep the proletarian rabble in check, as was apparently the greatest of nineteenth-century capitalists, the American banker J. P. Morgan (1837-1913).

230 Liberals of all stripes believed that somehow there could be reform and amelioration.

231 But practically every thinking person of the late nineteenth century shared with Marx the conviction that capitalist society was a society of inevitable class conflict — and in fact by 1910, most "thinking people," at least in Europe (but also in Japan), were inclining toward Socialism.

232 The greatest of nineteenth-century Conservatives, Benjamin Disraeli (1804-1881), saw capitalist society very much as Marx did.

233 So did his conservative counterpart on the Continent, Otto von Bismarck (1815-1898); it motivated him, after 1880, to enact the social legislation that produced ultimately the twentieth-century Welfare State.

234 One conservative social critic, the nineteenth-century American novelist Henry James, chronicler of American wealth and European aristocracy, was so obsessed by class war and the fear of class war that he made it the theme of his most haunting novel, The Princess Casamassima.

235 He was writing it in 1883, the very year of Marx's death.

236

237 *The Productivity Revolution*

238 What, then, defeated Marx and Marxism?

239 By 1950, a good many of us already knew that Marxism had failed both morally and economically.

240 (I had said so already in 1939 in my book *The End of Economic Man*.)

241 But Marxism was still the one coherent ideology for most of the world, and for most of the world it looked invincible.

242 There were "anti-Marxists" galore, but, as yet, few "nonMarxists," that is, people who thought that Marxism had become irrelevant.

243 Even those bitterly opposed to Socialism were still convinced that it was in the ascendant."

244 (The father of Neo-Conservatism throughout the Western world, the Anglo-Austrian economist Friedrich von Hayek (1899-1992), argued in his *The Road to Serfdom* (1944) that Socialism would inevitably mean enslavement.

245 There was no such thing as “Democratic Socialism”; there was only “totalitarian socialism.”

246 But Hayek did not argue in 1944 that Marxism could not work.

247 On the contrary, he was very much afraid that it could and would work.

248 Yet his last book, *The Fatal Conceit* (University of Chicago Press, 1988), written forty years later, argues that Marxism could never have worked.

249 And by the time he published this book, almost everybody — especially in the Communist countries — had already come to the same conclusion.)

250 What, then, overcame the “inevitable contradictions of capitalism,” the “alienation” and “immiseration” of the laboring class, and with it the whole notion of the “proletarian”?

251 The answer is the Productivity Revolution.

252 When knowledge changed its meaning two hundred fifty years ago, it began to be applied to tools, processes, and products.

253 This is still what “technology” means to most people and what is being taught in engineering schools.

254 But two years before Marx’s death, the Productivity Revolution had already begun.

255 In 1881, an American, Frederick Winslow Taylor (1856-1915), first applied knowledge to the study of work, the analysis of work, and the engineering of work.

256 Work has been around as long as human beings.

257 All animals in fact have to work for their living.

258 And in the West, the dignity of work has been paid lip service to for a long time.

259 The second oldest Greek text, following the Homeric epics by only a hundred years or so, is a poem by Hesiod (fl.800 B.C. .) entitled Works and Days, which sings of the work of the farmer.

260 One of the finest Roman poems is Virgil's (70-19 B.C.) Georgics, a cycle of songs about the work of the farmer.

261 Although there is no such concern with work in the Eastern literary tradition, the emperor of China once a year touched a plow to celebrate rice planting. ¶¶¶

262 But in both the West and the East, these were purely symbolic gestures.

263 Neither Hesiod nor Virgil actually studied what a farmer does.

264 Nor did anybody else throughout most of recorded history.

265 (And there still is no history of work.

266 But then, despite all the philosophizing about knowledge, there is no history of knowledge, either.

267 Both should become important areas of study within the next decades or at least the next century.)

268 Work was beneath the attention of educated people, of well-to-do people, of people of authority.

269 Work was what slaves did.

270 The only way a worker could produce more was by working longer hours or by working harder.

271 Marx himself shared this belief with every other nineteenth-century economist and engineer. ¶¶¶

272 It was pure accident that F. W. Taylor, a well-to-do, educated man, became a worker.

273 Poor eyesight forced him to give up going to Harvard and instead to take a job in an iron foundry.

274 Being extremely gifted, Taylor very soon rose to be one of the bosses.

275 And his metalworking inventions made him a rich man very early.

276 What got Taylor to start on the study of work was his shock at the mutual and growing hatred between capitalists and workers, which had come to dominate the late nineteenth century.

277 Taylor, in other words, saw what Marx saw — and Disraeli and Bismarck and Henry James.

278 But he also saw what they failed to see: that the conflict was unnecessary.

279 He set out to make workers productive so that they would earn decent money.

280 Taylor's motivation was not efficiency.

281 It was not the creation of profits for the owners.

282 To his very death, he maintained that the major beneficiary of the fruits of productivity had to be the worker, not the owner.

283 His main motivation was the creation of a society in which owners and workers, capitalists and proletarians could share a common interest in productivity and could build a harmonious relationship on the application of knowledge to work.

284 The people who have come closest to understanding this so far are Japan's post-World War II employers and Japan's post-World War II union leaders.

285 Few figures in intellectual history have had greater impact than Taylor — and few have been so willfully misunderstood or so assiduously misquoted.

286 (In fact, no factually reliable biography was published until 1991, when *Frederick W Taylor: Myth and Reality* by Charles D. Wrege and Ronald J. Greenwood appeared (Homewood, 111.: Irwin).

287 In part, Taylor has suffered because history has proven him right and the intellectuals wrong.

288 In part, he is ignored because contempt for work still lingers, above all among the intellectuals.

289 Surely shoveling sand (the most publicized of Taylor's analyzes) is not something an "educated man" would appreciate, let alone consider important.

290 In much larger part, however, Taylor's reputation has suffered precisely because he applied knowledge to the study of work.

291 This was anathema to the labor unions of his day; and they mounted against Taylor one of the most vicious campaigns of character assassination in American history.

292 Taylor's crime, in the eyes of the unions, was his assertion that there is no "skilled work."

293 In manual operations, there is only "work."

294 According to Taylor's system of "Scientific Management," all work can be analyzed the same way.

295 Any worker who is then willing to do the work the way analysis shows it should be done is a "first-class man," deserving a "first-class wage" — that is, as much as or more than the skilled worker got with his long years of apprenticeship.

296 But the unions that were respected and powerful in Taylor's America were the unions in the government-owned arsenals and shipyards in which, prior to World War I, all peacetime defense production was done.

297 These unions were craft monopolies: membership in them was restricted to sons or relatives of members.

298 They required an apprenticeship of five to seven years, but had no systematic training or work study.

299 Nothing was ever allowed to be written down; there were not even blueprints or other drawings of the work to be done.

300 The members were sworn to secrecy and were not permitted to discuss their work with non-members.

301 Taylor's assertion that work could be studied, analyzed, and divided into a series of simple repetitive motions — each of which had to be done in its one right way, its own best time, and with its own right tools — was indeed a frontal attack on them.

302 And so they vilified him and succeeded in having Congress ban any application of "task study" in government arsenals and shipyards — a ban that prevailed until after World War II.

303 Taylor did not improve matters by offending the owners of his day as much as he offended the unions.

304 While he had little use for unions, he was contemptuously hostile to the owners; his favorite epithet for them was "hogs."

305 And then there was his insistence that the workers rather than the owners should get the lion's share of the revenue gains produced by "Scientific Management."

306 To add insult to injury, his "Fourth Principle" demanded that work study be done in consultation, if not in partnership with the worker.

307 Finally, Taylor held that authority in the plant must not be based on ownership.

308 It could be based only on superior knowledge.

309 He demanded, in other words, what we now call "professional management" — and that was anathema and "radical heresy" to nineteenth-century capitalists.

310 He was bitterly attacked by them as a "troublemaker" and a "socialist."

311 (Some of his closest associates, especially Karl Barth, Taylor's right-hand man, were indeed avowed "leftists," and strongly anti-capitalist.)

312 Taylor's axiom that all manual work, skilled or unskilled, could be analyzed and organized by the application of knowledge seemed preposterous to his contemporaries.

313 And the fact that there was a mystique to craft skill was still universally accepted for many, many years.

314 It was this belief that encouraged Hitler, as late as 1941, to declare war on the United States.

315 For the United States to field an effective force in Europe would require a large fleet to transport troops.

316 America at that time had almost no merchant marine and no destroyers to protect it.

317 Modern warfare, Hitler further argued, required precision optics in large quantities; and there were no skilled optical workers in America.

318 Hitler was absolutely right.

319 The United States did not have much of a merchant marine, and its destroyers were few and ludicrously obsolete.

320 It also had almost no optical industry.

321 But by applying Taylor's Scientific Management, U.S. industry trained totally unskilled workers, many of them former sharecroppers raised in a pre-industrial environment, and converted them in sixty to ninety days into first-rate welders and shipbuilders.

322 Equally, the United States trained the same kind of people within a few months to turn out precision optics of better quality than the Germans ever did — and on an assembly line to boot.

323 Taylor's greatest impact all told was probably in training.

324 A hundred years before Taylor, Adam Smith had taken for granted that at least fifty years of experience (and more likely a full century) were required for a region to gain the necessary skills to turn out high-quality products — his examples were the production of musical instruments in Bohemia and Saxony, and of silk fabrics in Scotland.

325 Seventy years after Smith, around 1840, a German, August Borsig (1804-1854) — one of the first people outside England to build a steam locomotive — invented the German system of apprenticeship, which combines practical plant experience under a master with theoretical grounding in school.

326 It is still the foundation of Germany's industrial productivity.

327 But even Borsig's apprenticeship took three to five years.

328 Then, first in World War I but above all in World War II, the United States systematically applied Taylor's approach to training "first-class men" in a few months' time.

329 This, more than any other factor, explains why the United States was able to defeat both Japan and Germany.

330 All the earlier economic powers in modern history — Great Britain, the United States, Germany — emerged through

leadership in new technology.

331 The post-World War II economic powers – first Japan, then South Korea, Taiwan, Hong Kong, Singapore – all owe their rise to Taylor's training.

332 It enabled them to endow a still largely pre-industrial and therefore still low-wage work force with world-class productivity in practically no time.

333 In the post-World War II decades, Taylor-based training became the one truly effective engine of economic development. ...

334 The application of knowledge to work explosively increased productivity.

335 (The term itself was unknown in Taylor's time.

336 In fact, it was still unknown until World War II, when it first began to be used in the United States.

337 As late as 1950, the most authoritative English dictionary, the Concise Oxford, still did not list the word "productivity" in its present meaning.)

338 For hundreds of years there had been no increase in the ability of workers to turn out goods or to move goods.

339 Machines created greater capacity.

340 But workers themselves were no more productive than they had been in the workshops of ancient Greece, in building the roads of Imperial Rome, or in producing the highly prized woolen cloth which gave Renaissance Florence its wealth. ...

341 But within a few years after Taylor began to apply knowledge to work, productivity began to rise at a rate of 3.5 to 4 percent compound a year – which means doubling every eighteen years or so.

342 Since Taylor began, productivity has increased some

fiftyfold in all advanced countries.

343 On this unprecedented expansion rest all the increases in both standard of living and quality of life in the developed countries.

344 Half of this additional productivity has been taken in the form of increased purchasing power; in other words, in the form of a higher standard of living.

345 But between one third and one half has been taken in the form of increased leisure.

346 As late as 1910, workers in developed countries still worked as much as they had ever worked before, that is, at least 3,000 hours a year.

347 Today, the Japanese work 2,000 hours a year, the Americans around 1,850, the Germans at most 1,600 — and they all produce fifty times as much per hour as they produced eighty years ago.

348 Other substantial shares of increased productivity have been taken in the form of health care, which has grown from something like zero percent of the gross national product to 8-12 percent in developed countries, and in the form of education, which has grown from around two percent of GNP to 10 percent or more.

349 Most of this increase — just as Taylor predicted — has been taken by the workers, that is, by Marx's proletarians.

350 Henry Ford (1863-1947) brought out the first cheap automobile, the Model T, in 1907.

351 It was "cheap," however, only by comparison with all other automobiles on the market, which, in terms of average incomes, cost as much as a twin-engine private plane costs today.

352 At $750, Henry Ford's Model T cost what a fully employed industrial worker in the United States earned in three to four years — for 80 cents was then a good day's wage, and

of course there were no "benefits."

353 Even an American physician in those years rarely earned more than $500 a year.

354 Today, a unionized automobile worker in the United States, Japan, or Germany, working only forty hours a week, earns $50,000 in wages and benefits — $45,000 after taxes — which is roughly eight times what a cheap new car costs today. ...

355 By 1930, Taylor's Scientific Management — despite resistance from unions and from intellectuals — had swept the developed world.

356 As a result, Marx's "proletarian" became a "bourgeois."

357 The blue-collar worker in manufacturing industry, the "proletarian" rather than the "capitalist," became the true beneficiary of Capitalism and Industrial Revolution.

358 This explains the total failure of Marxism in the highly developed countries for which Marx had predicted "revolution" by 1900.

359 It explains why, after 1918, there was no "Proletarian Revolution" even in the defeated countries of Central Europe where there was misery, hunger, and unemployment.

360 It explains why the Great Depression did not lead to a Communist revolution, as Lenin and Stalin — and practically all Marxists — had confidently expected.

361 By that time, Marx's proletarians had not yet become affluent, but they had already become middle class.

362 They had become productive. ...

363 "Darwin, Marx, Freud" form the trinity often cited as the "makers of the modern world."

364 Marx would be taken out and replaced by Taylor if there

were any justice in the world.

365 But that Taylor is not given his due is a minor matter.

366 It is a serious matter, however, that far too few people realize that the application of knowledge to work created developed economies by setting off the productivity explosion of the last hundred years.

367 Technologists give the credit to machines, economists to capital investment.

368 Yet both were as plentiful in the first hundred years of the capitalist age, before 1880, as they have been since.

369 With respect to technology or to capital, the second hundred years differed very little from the first one hundred.

370 But there was absolutely no increase in worker productivity during the first hundred years — and consequently very little increase in workers' real incomes or any decrease in their working hours.

371 What made the second hundred years so critically different can only be explained as the result of applying knowledge to work.

372 The productivity of the new classes, the classes of the post-capitalist society, can be increased only by applying knowledge to work.

373 Neither machines nor capital can do it.

374 Indeed, if applied alone, they are likely to impede rather than to create productivity (as will be discussed further in Chapter 4).

375 When Taylor started to study work, nine out of every ten working people did manual work, making or moving things; in manufacturing, in farming, in mining, in transportation.

376 The productivity of people engaged in making and moving things is still going up at the historical rate of 3.5 to 4 percent — and in American and French agriculture, even faster.

377 But the **Productivity Revolution is already over**.

378 Forty years ago, in the 1950s people who engaged in work to make or to move things were still a majority in all developed countries.

379 By 1990, they had shrunk to one fifth of the work force.

380 By 2010 they will form no more than one tenth.

381 Increasing the productivity of manual workers in manufacturing, in farming, in mining, in transportation, can no longer create wealth by itself.

382 The Productivity Revolution has become a victim of its own success.

383 From now on, what matters is the productivity of non-manual workers.

384 And that requires **applying knowledge to knowledge**.

385

386 *The Management Revolution*

387 When I decided in 1926 not to go to college but to go to work after finishing secondary school, my father was quite distressed; ours had long been a family of lawyers and doctors.

388 But he did not call me a "dropout."

389 He did not try to change my mind.

390 And he did not prophesy that I would never amount to anything.

391 I was a responsible adult wanting to work as an adult.

392 Some thirty years later, when my son reached age eighteen, I practically forced him to go to college.

393 Like his father, he wanted to be an adult among adults.

394 Like his father, he felt that in twelve years of sitting on a school bench he had learned little, and that his chances of learning more by spending another four years on a school bench were not particularly great.

395 Like his father at that age, he was action-focused, not learning-focused.

396 And yet by 1958, thirty-two years after I had moved from high school graduate to trainee in an export firm, a college degree had become a necessity.

397 It had become the passport to careers.

398 Not to go to college in 1958 was “dropping out” for an American boy who had grown up in a well-to-do family and done well in school.

399 My father did not have the slightest difficulty in finding a trainee job for me in a reputable merchant house.

400 Thirty years later, such firms would not have accepted a high school graduate as a trainee; they would all have said, “Go to college for four years — and then you probably should go on to graduate school.”

401 In my father’s generation (he was born in 1876), going to college was for the sons of the wealthy and a very small number of poor but exceptionally brilliant youngsters (such as he had been).

402 Of all the American business successes of the nineteenth century, only one went to college: J. P. Morgan went to Göttingen to study mathematics, but dropped out after one year.

403 Few of the others even attended high school, let alone graduated from it.*[1]

404 By my time, going to college was already desirable; it gave one social status.

405 But it was by no means necessary nor much help in one's life and career.

406 When I did the first study of a major business corporation, General Motors †[2], the public relations department at the company tried very hard to conceal the fact that a good many of their top executives had gone to college.

407 The proper thing then was to start as a machinist and work one's way up.†[3]

408 As late as 1950 or 1960, the quickest route to a middle-class income – in the United States, in Great Britain, in Germany (though no longer in Japan) – was not to go to college; it was to go to work at age sixteen in one of the unionized mass production industries.

409 There one could earn a middle-class income after a few months – the result of the productivity explosion.

410 Today these opportunities are practically gone.

411 Now there is practically no access to a middle-class income without a formal degree which certifies to the acquisition of knowledge that can only be obtained systematically and in a school.

412 The change in the meaning of knowledge that began two hundred fifty years ago has transformed society and economy.

413 Formal knowledge is seen as both the key personal and the key economic resource.

414 In fact, knowledge is the only meaningful resource today.

415 The traditional "factors of production" – land (i. e., natural resources), labor, and capital – have not disappeared, but they have become secondary.

416 They can be obtained and obtained easily, provided there

is knowledge.

417 And knowledge in this new sense means knowledge as a utility, knowledge as the means to obtain social and economic results.

418 These developments, whether desirable or not, are responses to an irreversible change: knowledge is now being applied to knowledge.

419 This is the third and perhaps the ultimate step in the transformation of knowledge.

420 Supplying knowledge to find out how existing knowledge can best be applied to produce results is, in effect, what we mean by management.

421 But knowledge is now also being applied systematically and purposefully to define what new knowledge is needed, whether it is feasible, and what has to be done to make knowledge effective.

422 It is being applied, in other words, to systematic innovation. *[4]

423 This third change in the dynamics of knowledge can be called the "Management Revolution."

424 Like its two predecessors – knowledge applied to tools, processes, and products, and knowledge applied to human work – the Management Revolution has swept the earth.

425 It took a hundred years, from the middle of the eighteenth century to the middle of the nineteenth century, for the Industrial Revolution to become dominant and worldwide.

426 It took some seventy years, from 1880 to the end of World War II, for the Productivity Revolution to become dominant and world-wide.

427 It has taken less than fifty years — from 1945 to 1990 — for the Management Revolution to become dominant and worldwide. ¶¶¶

428 Most people when they hear the word "management" still hear "business management."

429 Management did indeed first emerge in its present form in large-scale business organizations.

430 When I began to work on management some fifty years ago, I too concentrated on business management. †[5]

431 But we soon learned that management is needed in all modern organizations.

432 In fact, we soon learned that it is needed even more in organizations that are not businesses, whether not-for-profit but non-governmental organizations (what in this book I propose we call the "social sector") or government agencies.

433 These organizations need management the most precisely because they lack the discipline of the "bottom line" under which business operates.

434 That management is not confined to business was recognized first in the United States.

435 But it is now becoming accepted in every developed country. ¶¶¶

436 We now know that management is a generic function of all organizations, whatever their specific mission.

437 It is the generic organ of the knowledge society. ¶¶¶

438 Management has been around for a very long time.

439 I am often asked whom I consider the best or the greatest executive.

440 My answer is always: "The man who conceived, designed, and built the first Egyptian Pyramid more than four thousand years ago — and it still stands."

441 But management as a specific kind of work was not seen until after World War I — and then by just a handful of people.

442 Management as a discipline only emerged after World War II.

443 As late as 1950, when the World Bank began to lend money for economic development, the word "management" was not even in its vocabulary.

444 In fact, while management was invented thousands of years ago, it was not discovered until after World War II.

445 One reason for its discovery was the experience of World War II itself, and especially the performance of American industry.

446 But perhaps equally important to the general acceptance of management has been the performance of Japan since 1950.

447 Japan was not an "underdeveloped" country after World War II but its industry and economy were almost totally destroyed, and it had practically no domestic technology.

448 The nation's main resource was its willingness to adopt and adapt the management which the Americans had developed during World War II (and especially training).

449 Within twenty years — from the 1950s, when the American occupation of Japan ended, to the 1970s — Japan became the world's second economic power, and a leader in technology.

450 When the Korean War ended in the early 1950s, South Korea was left even more devastated than Japan had been seven years earlier.

451 And it had never been anything but a backward country,

especially as the Japanese systematically suppressed Korean enterprise and higher education during their thirty-five years of occupation.

452 But by using the colleges and universities of the United States to educate their able young people, and by importing and applying the concepts of management, Korea became a highly developed country within twenty-five years.

453 With this powerful expansion of management came a growing understanding of what management really means.

454 When I first began to study management, during and immediately after World War II, a manager was defined as "someone who is responsible for the work of subordinates."

455 A manager in other words was a "boss," and management was rank and power.

456 This is probably still the definition a good many people have in mind when they speak of "managers" and "management."

457 But by the early 1950s, the definition of a manager had already changed to one who "is responsible for the performance of people."

458 Today, we know that that is also too narrow a definition.

459 The right definition of a manager is one who "is responsible for the application and performance of knowledge."

460 This change means that we now see knowledge as the essential resource.

461 Land, labor, and capital are important chiefly as restraints.

462 Without them, even knowledge cannot produce; with out them, even management cannot perform.

463 But where there is effective management, that is, application of knowledge to knowledge, we can always obtain the other resources.

464 That knowledge has become the resource, rather than a resource, is what makes our society "post-capitalist."

465 This fact changes – fundamentally – the structure of society.

466 It creates new social and economic dynamics.

467 It creates new politics.

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469 [1] (In the novels of Edith Wharton, the chronicler of American society around 1910 and 1920, the sons of the old and rich New York families do go to Harvard and to Harvard Law School, but practically none of them then practices law. Higher education was considered a luxury, an ornament, and a pleasant way to spend one's early adulthood.)

470 [2] † Published in Concept of the Corporation (1946))

471 [3] †The story is told in the chapter "Alfred P. Sloan" in Adventures of a Bystander (1980, reissued 1991)

472 [4] For more on this, see my Innovation and Entrepreneurship (1986)

473 [5] † In The Practice of Management, which first established management as a discipline in 1954, most of the discussion is of business management, and so are most examples.

474

475 *From Knowledge To Knowledges*

476 Underlying all three phases in the shift to knowledge — the Industrial Revolution, the Productivity Revolution, and the Management Revolution — is a fundamental change in the meaning of knowledge.

477 We have moved from knowledge in the singular to knowledges in the plural.

478 Traditional knowledge was general.

479 What we now consider knowledge is of necessity highly specialized.

480 We never before spoke of a "man (or woman) of knowledge"; we spoke of an "educated person."

481 Educated people were generalists.

482 They knew enough to talk or write about a good many things, enough to understand a good many things.

483 But they did not know enough to do any one thing.

484 As an old saying has it: You would want an educated person as a guest at your dinner table, but you would not want him or her alone with you on a desert island, where you need somebody who knows how to do things.

485 But in today's university the traditional "educated people" are not considered "educated" at all.

486 They are looked down on as dilettantes.

487 The Connecticut Yankee at King Arthur's Court, the hero of the 1889 book by Mark Twain, was not an educated person.

488 He surely knew neither Latin nor Greek, had probably never read Shakespeare, and did not even know the Bible well.

489 But he knew how to do everything mechanical, up to and including generating electricity and building telephones.

490 The purpose of knowledge for Socrates, as said earlier, was self-knowledge and self-development; results were internal.

491 For his antagonist, Protagoras, the result was the ability to know what to say and to say it well.

492 It was "image," to use a contemporary term.

493 For more than two thousand years, Protagoras's concept of knowledge dominated Western learning and defined knowledge.

494 The medieval trivium, the educational system that up to this day underlies what we call a "liberal education," consisted of grammar, logic, and rhetoric – the tools needed to decide what to say and how to say it.

495 They are not tools for deciding what to do and how to do it.

496 The Zen concept of knowledge and the Confucian concept of knowledge – the two concepts that dominated Eastern learning and Eastern culture for thousands of years – were similar.

497 The first focused on self-knowledge; the second – like the medieval trivium – on the Chinese equivalents of grammar, logic, and rhetoric.

498 The knowledge we now consider knowledge proves itself in action.

499 What we now mean by knowledge is information effective in action, information focused on results.

500 These results are seen outside the person – in society and economy, or in the advancement of knowledge itself.

501 To accomplish anything, this knowledge has to be highly specialized.

502 This was the reason why the tradition – beginning with the ancients but still persisting in what we call "liberal education" – relegated it to the status of a technē, or craft.

503 It could neither be learned nor taught; nor did it imply any general principle whatever.

504 It was specific and specialized-experience rather than learning, training rather than schooling.

505 But today we do not speak of these specialized knowledges as "crafts"; we speak of "disciplines."

506 This is as great a change in intellectual history as any ever recorded.

507 A discipline converts a "craft" into a methodology – such as engineering, the scientific method, the quantitative method, or the physician's differential diagnosis.

508 Each of these methodologies converts ad hoc experience into system.

509 Each converts anecdote into information.

510 Each converts skill into something that can be taught and learned.

511

512 «§§§»

513

514 The shift from knowledge to knowledges has given knowledge the power to create a new society.

515 But this society **has to be structured on the basis** of knowledge as something specialized, and of knowledge people as specialists.

516 **This is what gives them their power**.

517 But it also raises basic questions — of values, of vision, of beliefs, of all the things that hold society together and give meaning to our lives.

518 As the last chapter of this book will discuss, it also raises a big — and a new-question: what constitutes the educated person in the society of knowledges?