

---

# Contents

---

<b>Foreword</b> . . . . .	vii
<b>Preface</b> . . . . .	xi
<b>Introduction</b> . . . . .	xxxii
<b>Chapter 1. Between Innovation in Process Engineering and Creativity</b> . . . . .	1
1.1. Innovations and process engineering . . . . .	5
1.2. Creativity . . . . .	9
1.2.1. Creativity and pedagogy . . . . .	18
1.3. Innovation and boundary objects . . . . .	20
1.4. Teleological approach, convergence, and interdisciplinarity . . . . .	29
1.5. A look back at the notion of convergence . . . . .	39
1.6. A look back at interdisciplinarity . . . . .	47
1.7. The models . . . . .	51
1.8. A little complexity . . . . .	53
1.8.1. Hyperobjects . . . . .	59
1.9. Reaching a decision . . . . .	60
1.10. Findings and proposals . . . . .	61
1.10.1. Technology: serve and/or partner . . . . .	64
1.10.2. How to do or not to do? . . . . .	72
1.11. Activities initiated from the “base” . . . . .	76
1.11.1. Framing elements . . . . .	76
1.11.2. Main results . . . . .	78
1.11.3. “Scientific excellence” . . . . .	89
1.11.4. Funding and research orientation . . . . .	90
1.11.5. Foresight, opportunities for the PE research unit . . . . .	91

---

1.11.6. Collective projects? Risky projects? . . . . .	93
1.11.7. Difficulties in the functioning of research. . . . .	97
1.11.8. Concluding elements . . . . .	101
1.12. Conclusion . . . . .	107
1.13. References. . . . .	118
<b>Chapter 2. Prospective Elements Applied to the Transformation of Matter and Energy . . . . .</b>	<b>149</b>
2.1. From a local to a more global approach . . . . .	162
2.2. Some reminders . . . . .	170
2.2.1. General framework . . . . .	170
2.2.2. In reality.... . . . .	175
2.3. Influential trends. . . . .	177
2.3.1. Socio-economic context . . . . .	178
2.3.2. Innovation and means/ways/needs to support it . . . . .	192
2.3.3. Exhaustion of reserves. . . . .	198
2.4. Scenarios for tomorrow. . . . .	212
2.4.1. Background information. . . . .	217
2.4.2. Introduction . . . . .	218
2.4.3. The four scenarios . . . . .	219
2.4.4. Blocking factors; probable scenario(s) . . . . .	235
2.4.5. Potential effects on the development of process engineering . . . . .	238
2.5. Conclusion . . . . .	244
2.6. References . . . . .	254
<b>Conclusion . . . . .</b>	<b>279</b>
<b>Index . . . . .</b>	<b>317</b>