Table of Contents

1 Smart Cities and Connected Intelligence 1

1.1 Platforms, Smart Ecosystems and Connected Intelligence 1
1.2 What care has to be taken while Developing a Smart Ecosystem? 2
1.3 What are the changes can be brought about by the Platform given by a Smart City? 3
1.4 Are Smart Cities really needed? 4
1.5 How does IoT help in this? 6
1.6 How to build a successful Smart City? 7
1.7 Smart Cities and Connected Intelligence 8
1.8 How did the Digital Technology and Innovations Help Connectivity? 9
1.9 How to Transform Traditional Cities into Smart Cities? 11
1.10 Benefits of the use of Technologies in Smart Cities 13

1.10.1 Security 14
1.10.2 Water Management 15
1.10.3 Increasing Traffic Awareness in the City 16
1.10.4 Transport Services 18
1.11 Benefits of Connected Intelligence in a Smart City 20
1.11.1 Data-driven Decisions 20
1.11.2 Improved Engagement 21
1.11.3 Benefits to the Environment 21
1.11.4 Healthcare Services 22
1.11.5 Increased Digitalization 23
1.11.6 Improved Efficiency of Public Services and Utilities 24
1.11.7 Enhanced Infrastructure 24
1.11.8 Reducing Labor Intensive Tasks 25
1.11.9 Maintaining Environmental Balance 25
1.12 Impact of IoT in the Smart City Ecosystem 27

2 Connected Intelligence and Great Challenges of the 21st Century 29

2.1 What is Connected Intelligence? 30
2.2 Challenges posed by the 21st century 30
2.3 Artificial Intelligence 31
2.4 Complexity 32
2.5 Lack of Direct Communication 33
2.6 Data Integrity 33
2.7 Digital Transformation 34
2.8 Budget 34
2.9 Impact of Connected Intelligence in Smart Cities 36
2.9.1 Awareness Spaces 37
2.9.2 Engagement Spaces 39
2.9.3 Shared Spaces 42
2.10 Connected Intelligent Spaces 44
2.10.1 Impact of Connected Technologies in a Smart City 45
2.10.2 Identifying Garbage Disposal Times 46
2.10.3 Identifying Convenient Route 47
2.10.4 Exploring the Shortcomings of the Smart Cities Using Connected Intelligence and Technologies 49

2.10.5 Educating People and Engaging them 49
2.10.6 Infrastructural Changes 51
2.10.7 Power 52
2.10.8 Privacy and Data Security 53
2.10.9 Biased Data 53
2.11 Challenges and Opportunities 55
2.11.1 Population 55
2.11.2 Resources 56
2.11.3 What is Sustainable Development? 56
2.11.4 How to Implement Sustainable Development Strategies in the Context of Smart Development? 57
2.11.5 Reforestation 57
2.11.6 Transport Services 58

3 Smart Cities are Cyber-Physical Systems of Innovation 59
3.1 What is a Cyber-physical System? 60
3.1.1 CPSs in Manufacturing 61
3.1.2 CPSs in Healthcare 61
3.1.3 CPSs in Transportation Environment 62
3.1.4 CPSs in Agricultural Environment 62
3.1.5 CPSs in Computer Environment 63
3.2 How smart cities can be looked upon as cyber-physical systems? 64
3.3 Some Challenges that a smart city can face while working as a CPS 65
3.3.1 Reliability 66
3.3.2 Data Management 66
3.3.3 Privacy 66
3.3.4 Security 67
3.4 What we need to learn from this? 67
3.5 CPSs for the Development of Smart Cities 67
3.6 Challenges in Implementing CPS in Smart Cities 72
3.7 Security Issues in Cyber Physical Systems 72
3.8 Structural issues in the design of cyber physical systems: 74
3.8.1 Sensors 74
3.8.2 Actuators 75
3.8.3 Monitoring Devices 75

3.9 How to Ensure Safety and security of the Physical Devices? 76
3.9.1 Authentication Process 76
3.9.2 Cross Verification 77
3.9.3 Threat Analyzers 77
3.10 Limitations of the Security Programs 77
3.10.1 Time Constraints 78
3.10.2 Re-configuration 78
3.11 Solutions to Avoid Security Issues in the Cyber Physical Systems 79
3.12 Use of Digital Technologies 79
3.13 Advantages of CPS 80
3.13.1 Interaction Between Man and System 80
3.13.2 Flexibility 80
3.13.3 Dealing with Environment and other Uncertainties 81
3.13.4 Improvement in Performance 81
3.13.5 Scalable 82
3.13.6 Fast 82
3.14 Applications of CPS 82
3.14.1 Developing Green Buildings 83
3.14.2 Education 83
3.14.3 Structural Monitoring 84
3.14.4 Aeronautic Systems 84
3.14.5 Transport Systems 84
3.14.6 Robots 85
3.14.7 Medical Applications 85
3.14.8 Smart Grids 86
3.15 Disadvantages of CPS 86
3.15.1 Security issues 87
3.15.2 Costly 88
3.15.3 Disruption of the Infrastructure 88
3.15.4 Cyber Attacks 89
3.16 Internet of Things and CPS in smart city 89
3.17 Difference between IoT and CPS 90

4 Effectiveness of Smart City Solutions 93
4.17.1 Parking Solutions 94

4.17.2 Healthcare Solutions 94
4.17.3 Lighting Solutions 95
4.17.4 Data Management Solutions 96
4.17.5 E-governance Solutions 96
4.1 Building Effective Smart City Models 97
4.2 Implementation of Innovative Solutions in the Smart Cities 98
4.2.1 Top-down Approach 102
4.2.2 Comparison 102
4.2.3 Data Modeling 102
4.2.4 Training 103
4.2.5 Inclusion of People 103
4.3 Smart Cities and Connected Communities 103
4.4 Smart Cities of the Future 107
4.5 Smart Buildings 108
4.6 Smart Citizens 111
4.7 Challenges that a Smart City can face while Implementing Smart City Solutions 113
4.7.1 Infrastructural Issues 113
4.7.2 Security Issues 114
4.7.3 Privacy Issues 115
4.7.4 Engagement Issues 116
4.7.5 Social Inclusion 116
4.8 Effectiveness of Smart City Solutions 116
4.8.1 Collaboration 118
4.8.2 Standard Technology 119
4.8.3 Cyber Issues 119
4.8.4 Procurement of Funds 120
4.9 How to connect with the Local Communities of a city? 122
4.10 Who all can be a part of a Smart City Project? 122
4.11 How can Cities Develop Smart City Models without an Upfront Investment? 123
4.12 Smart Ecosystems and layers of Connected Intelligence 124
4.13 Connection of Technology and Smart Ecosystems 125
4.14 Framework of a Smart Ecosystem 126
4.15 Value Creators 127
4.15.1 Value Layers 128
4.15.2 Innovation Layer 128

4.15.3 Operations Layer 129
4.15.4 Financing Layers 129
4.15.5 Information Layer 129
4.15.6 Security Layer 129
4.15.7 Infrastructure Layer 129
4.16 Rise of Connected Cities 130
4.17 What is Connected Intelligence? 131
4.18 Why AI (Artificial Intelligence) layer is implemented in IoT? 133
4.19 Building a Smart Ecosystem in the age of connected Intelligence 136
4.20 Connecting Transport and Traffic Services 138
4.20.1 Security 140
4.20.2 Mobility Management 140
4.20.3 Creating a Solid Infrastructure 141
4.21 Age of Distraction and its connection with a Smart World 141
4.21.1 What is the age of Distraction? 142
4.21.2 What can be done to avoid the issue of Distraction? 143
4.22 Connected Intelligence and Sustainable Cities 147
4.22.1 Data Management 148
4.22.2 Enhancing Agricultural Production 149
4.22.3 Pollution created by Vehicles 150
4.22.4 Managing E-waste 151

5 Smart Growth: Externality Platforms and Disruptive Innovation 155

5.1 How do the Disruptive Technologies or Innovation make Cities more Livable? 156
5.2 Externalities & Smart Growth 157
5.3 What does Smart Growth Really Mean? 158
5.4 Connecting Innovation and Digital Worlds 159
5.4.1 How can Innovation and Digital Worlds be Connected Together? 160
5.5 Innovations using Digital Technology 161
5.6 Real challenge in Connecting Innovation and Digital Worlds 162

5.7 Connecting Innovation and Digital Technology in Different Environments 163
5.8 Transforming Ecosystem in the Digital Era 165
5.9 Bridging the gap between Innovation and Digital Technology 167
5.10 Engagement 169
5.11 Revolutionary ideas that could initiate the process of Smart Growth in Cities 171
5.11.1 Smart Transport and Electric Vehicles 171
5.11.2 Digital administration 173
5.12 Controlling Energy Consumption 175
5.12.1 Smart Healthcare Ideas 176
5.12.2 Smart Data Analytics 177
5.12.3 Smart Education 178
5.13 Impact of Smart Growth on the Workplace Trends 179
5.13.1 Using Personal Devices 180
5.13.2 Employee Satisfaction 180
5.13.3 Improving Cyber-security 181
5.14 Why is Disruptive Innovation Necessary? 182

6 Externality Platforms, Disruptive Innovation and Smart Growth 186

6.1 Why is study of Externalities Essential while planning a Smart City? 187
6.2 Economical Externality 188
6.3 Environmental Externality 189
6.4 Disruptive Innovation and its impact on growth of Smart Cities 190
6.5 Role of Partnerships in Implementing Disruptive Technologies 191
6.6 What is Creative Destruction? 192
6.7 What is a Disruptive Technology? 193
6.7.1 Rise of Artificial Intelligence 195
6.7.2 Self Driven Cars 196
6.7.3 Medical Technologies 196
6.7.4 Megapolis 197
6.7.5 Skype Translator 198
6.8 How to manage and Implement Disruptive Innovation? 198

6.8.1 Leadership Skills 199
6.8.2 Data Integration 200
6.8.3 Planning 201
6.9 Fundamentals of Disruptive Technologies 201
6.10 Is Disruptive Innovation Sustainable? 207
6.11 Challenges to Disruptive Innovations 209
6.12 How to Interpret Disruptive Innovation in the concept of Smart Cities? 212
6.12.1 Demographic Challenges 213
6.12.2 Technological Revolution 213

7 Safety and Security: Engagement Platforms and Social Innovation 216

7.1 Social Innovation in Smart Cities and Ecosystems 217
7.1.1 What is Social Innovation? 217
7.1.2 Connectivity 218
7.1.3 Date Integrity 219
7.2 Disruptive Technology and Security 219
7.3 Citizen Engagement & Social Innovation 220
7.4 People can be engaged through the following ways: 221
7.5 Why is Engagement Necessary for Social Innovation? 222
7.5.1 Understanding Social Issues and Needs 223
7.5.2 Innovative Ideas 223
7.5.3 Diverse Thinking 224
7.5.4 Changing Scenarios 224
7.6 Digital Social Innovation 225
7.6.1 Innovation 225
7.6.2 Social & Environment Issues 226
7.6.3 Digital Technologies 226
7.7 Examples of Digital Social Innovations 227
7.7.1 Fairphone 228
7.7.2 Opendesk 229
7.8 Need of Social Innovation in Smart Cities 229
7.9 How can a Social Innovation Project be feasible for Common People or Citizens? 230
7.9.1 What is Crowd Funding? 231
7.9.2 Leaderships and Strategy 232
7.10 A Smart City Ecosystem as an Innovation Model 233

7.11 Case study 235
7.12 What is Innovation in Tourism? 236
7.13 The Smart City Ecosystem of Montreal 237
7.14 Points of Discussion 239
7.15 Social Innovations in Smart Cities 241
7.16 Let us see some models of socially smart cities: 245
7.17 Owned City Model 246
7.18 Creative City 247
7.19 Resilient City 248

8 Cyber-Physical Spaces for Engagement, Social Innovation and Safe Cities 250

8.1 Cyber-physical Social Space for Engagement 252
8.2 Social innovation and cyber-physical space 254
8.3 Building City Intelligence 256
8.4 Relation Between Social Innovation and safety of Smart Cities 257
8.5 How can the Digital Technologies be used to make Smart Cities a Better Place? 259
8.5.1 Communication Technologies 260
8.6 IoT 261
8.7 Sensors 262
8.8 AI 262
8.9 Blockchain Technology 263
8.10 Geospatial Technology 265
8.11 How to make a smart city safe and secure with the help of Evolving Technologies? 266
8.11.1 Communications Network 267
8.11.2 Security 268
8.11.3 Intelligent Solutions 270
8.12 Importance of Data Analytics in Securing Premises of a city 272
8.13 Funding 273
8.14 Safe Cities in the Future 274
8.15 Direct Public Services and systems that can make city life a lot safer 276
8.15.1 Free WIFI connection 276
8.15.2 Centralized Operations 276

9 Sustainability: Awareness Platforms and Eco-Innovation 278

9.1 Sustainable Development Goals 279
9.2 Utilising the concept of IoT to develop Smart Cities 281
9.2.1 Empowering People 282
9.3 Sustainability Initiatives by Cities 282
9.4 Environmental Sustainability under the 'Smart Everything' Paradigm 284
9.5 Urban Development 285
9.6 Smart and Sustainable Cities 287
9.7 Eco-innovations in Smart Cities 291
9.7.1 Eco-friendly 292
9.7.2 Better Land use 293
9.7.3 Restoration 293
9.7.4 Transport Issues 295
9.7.5 Energy Efficiency 295
9.7.6 Improvement in Lives 296
9.8 Eco-innovations and Economic Growth 297
9.9 Ecological Awareness 297
9.10 CAPS 298
9.11 Challenges of Sustainable Development 299
9.11.1 Complexity 300
9.11.2 Governance 300
9.11.3 Unemployment 300
9.11.4 Expenditure 300
9.11.5 Time Constraints 301
9.11.6 Economy 301
9.11.7 Saving the Planet 302
9.11.8 Healthier Environment 302
9.12 Advantages of Eco-Innovation 303
9.12.1 Clean Image 304
9.12.2 Better usage of natural resources 305
9.12.3 Business Profits 305
9.12.4 Boost for Tourism 306
9.13 Eco-design 307
9.14 Conclusion 308
9.14.1 What is an Ideal Smart City? 309

9.15 Relation Between Smart Cities and Sustainability 312
9.15.1 Pollution 313
9.15.2 Depletion of Energy Resources 314
9.15.3 Well-being 315
9.15.4 Tourism 315
9.15.5 Cost 316
9.15.6 Focussed on Business 316
9.16 How can Smart City Infrastructure be used for Sustainable Development? 318
9.17 Using Technology for Overall Development 321
9.18 How to build trust among the Citizens? 322
9.19 Top Smart Cities of the world 324
9.20 Tokyo 324
9.21 London 325
9.22 New York 325
9.23 Zurich 326
9.24 Paris 327
9.25 Some key features of the Future Sustainable Cities 327
9.25.1 Finance 328
9.25.2 Networking & Training 329
9.25.3 Transport 329
9.25.4 Building Hubs 330
9.25.5 Eco-friendly Vehicles 330
9.25.6 Public Engagement and Collaboration 331
9.25.7 Smart Buildings 331
9.25.8 Bringing Cities Closer 332
9.25.9 Safer Cities 332
9.25.10 Energy 332
9.25.11 Food 333
9.26 Eco-innovations and Sustainability 334

10 Appendix 336
10.1 Appendix A 336
10.2 Appendix B 337

Index 338