

# TABLE OF CONTENTS

## PART 1.

### A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE (*PMBOK® Guide*)

|   |           |
|---|-----------|
| <b>1. INTRODUCTION .....</b>  | <b>1</b>  |
| <b>1.1 Overview and Purpose of this Guide .....</b>   | <b>1</b>  |
| <b>1.1.1 The Standard for Project Management .....</b>  | <b>2</b>  |
| <b>1.1.2 Common Vocabulary .....</b>  | <b>3</b>  |
| <b>1.1.3 Code of Ethics and Professional Conduct .....</b>  | <b>3</b>  |
| <b>1.2 Foundational Elements .....</b>  | <b>4</b>  |
| <b>1.2.1 Projects .....</b>   | <b>4</b>  |
| <b>1.2.2 The Importance of Project Management .....</b>   | <b>10</b> |
| <b>1.2.3 Relationship of Project, Program, Portfolio,<br/>            and Operations Management .....</b> | <b>11</b> |
| <b>1.2.4 Components of the Guide .....</b>  | <b>17</b> |
| <b>1.2.5 Tailoring .....</b>  | <b>28</b> |
| <b>1.2.6 Project Management Business Documents .....</b>  | <b>29</b> |
| <b>2. THE ENVIRONMENT IN WHICH PROJECTS OPERATE .....</b>   | <b>37</b> |
| <b>2.1 Overview .....</b>   | <b>37</b> |
| <b>2.2 Enterprise Environmental Factors .....</b>   | <b>38</b> |
| <b>2.2.1 EEFs Internal to the Organization .....</b>  | <b>38</b> |
| <b>2.2.2 EEFs External to the Organization .....</b>  | <b>39</b> |

|   |           |
|---|-----------|
| <b>2.3 Organizational Process Assets .....</b>                | <b>39</b> |
| <b>2.3.1 Processes, Policies, and Procedures .....</b>        | <b>40</b> |
| <b>2.3.2 Organizational Knowledge Repositories .....</b>      | <b>41</b> |
| <b>2.4 Organizational Systems .....</b>                       | <b>42</b> |
| <b>2.4.1 Overview .....</b>                                   | <b>42</b> |
| <b>2.4.2 Organizational Governance Frameworks .....</b>       | <b>43</b> |
| <b>2.4.3 Management Elements .....</b>                        | <b>44</b> |
| <b>2.4.4 Organizational Structure Types .....</b>             | <b>45</b> |
| <b>3. THE ROLE OF THE PROJECT MANAGER.....</b>                | <b>51</b> |
| <b>3.1 Overview .....</b>                                     | <b>51</b> |
| <b>3.2 Definition of a Project Manager .....</b>              | <b>52</b> |
| <b>3.3 The Project Manager's Sphere of Influence .....</b>    | <b>52</b> |
| <b>3.3.1 Overview .....</b>                                   | <b>52</b> |
| <b>3.3.2 The Project.....</b>                                 | <b>53</b> |
| <b>3.3.3 The Organization .....</b>                           | <b>54</b> |
| <b>3.3.4 The Industry .....</b>                               | <b>55</b> |
| <b>3.3.5 Professional Discipline .....</b>                    | <b>56</b> |
| <b>3.3.6 Across Disciplines.....</b>                          | <b>56</b> |
| <b>3.4 Project Manager Competences .....</b>                  | <b>56</b> |
| <b>3.4.1 Overview .....</b>                                   | <b>56</b> |
| <b>3.4.2 Technical Project Management Skills .....</b>        | <b>58</b> |
| <b>3.4.3 Strategic and Business Management Skills .....</b>   | <b>58</b> |
| <b>3.4.4 Leadership Skills .....</b>                          | <b>60</b> |
| <b>3.4.5 Comparison of Leadership and Management.....</b>     | <b>64</b> |
| <b>3.5 Performing Integration .....</b>                       | <b>66</b> |
| <b>3.5.1 Performing Integration at the Process Level.....</b> | <b>67</b> |
| <b>3.5.2 Integration at the Cognitive Level.....</b>          | <b>67</b> |
| <b>3.5.3 Integration at the Context Level .....</b>           | <b>67</b> |
| <b>3.5.4 Integration and Complexity.....</b>                  | <b>68</b> |

|  |            |
|--|------------|
| <b>4. PROJECT INTEGRATION MANAGEMENT .....</b>                             | <b>69</b>  |
| <b>4.1 Develop Project Charter .....</b>                                   | <b>75</b>  |
| <b>4.1.1 Develop Project Charter: Inputs.....</b>                          | <b>77</b>  |
| <b>4.1.2 Develop Project Charter: Tools and Techniques.....</b>            | <b>79</b>  |
| <b>4.1.3 Develop Project Charter: Outputs .....</b>                        | <b>81</b>  |
| <b>4.2 Develop Project Management Plan.....</b>                            | <b>82</b>  |
| <b>4.2.1 Develop Project Management Plan: Inputs .....</b>                 | <b>83</b>  |
| <b>4.2.2 Develop Project Management Plan: Tools and Techniques .....</b>   | <b>85</b>  |
| <b>4.2.3 Develop Project Management Plan: Outputs.....</b>                 | <b>86</b>  |
| <b>4.3 Direct and Manage Project Work .....</b>                            | <b>90</b>  |
| <b>4.3.1 Direct and Manage Project Work: Inputs .....</b>                  | <b>92</b>  |
| <b>4.3.2 Direct and Manage Project Work: Tools and Techniques .....</b>    | <b>94</b>  |
| <b>4.3.3 Direct and Manage Project Work: Outputs .....</b>                 | <b>95</b>  |
| <b>4.4 Manage Project Knowledge .....</b>                                  | <b>98</b>  |
| <b>4.4.1 Manage Project Knowledge: Inputs.....</b>                         | <b>100</b> |
| <b>4.4.2 Manage Project Knowledge: Tools and Techniques.....</b>           | <b>102</b> |
| <b>4.4.3 Manage Project Knowledge: Outputs .....</b>                       | <b>104</b> |
| <b>4.5 Monitor and Control Project Work .....</b>                          | <b>105</b> |
| <b>4.5.1 Monitor and Control Project Work: Inputs.....</b>                 | <b>107</b> |
| <b>4.5.2 Monitor and Control Project Work: Tools and Techniques.....</b>   | <b>110</b> |
| <b>4.5.3 Monitor and Control Project Work: Outputs .....</b>               | <b>112</b> |
| <b>4.6 Perform Integrated Change Control .....</b>                         | <b>113</b> |
| <b>4.6.1 Perform Integrated Change Control: Inputs .....</b>               | <b>116</b> |
| <b>4.6.2 Perform Integrated Change Control: Tools and Techniques .....</b> | <b>118</b> |
| <b>4.6.3 Perform Integrated Change Control: Outputs .....</b>              | <b>120</b> |
| <b>4.7 Close Project or Phase .....</b>                                    | <b>121</b> |
| <b>4.7.1 Close Project or Phase: Inputs.....</b>                           | <b>124</b> |
| <b>4.7.2 Close Project or Phase: Tools and Techniques.....</b>             | <b>126</b> |
| <b>4.7.3 Close Project or Phase: Outputs .....</b>                         | <b>127</b> |

|   |            |
|---|------------|
| <b>5. PROJECT SCOPE MANAGEMENT .....</b>                          | <b>129</b> |
| <b>5.1 Plan Scope Management.....</b>                             | <b>134</b> |
| <b>5.1.1 Plan Scope Management: Inputs .....</b>                  | <b>135</b> |
| <b>5.1.2 Plan Scope Management: Tools and Techniques .....</b>    | <b>136</b> |
| <b>5.1.3 Plan Scope Management: Outputs .....</b>                 | <b>137</b> |
| <b>5.2 Collect Requirements .....</b>                             | <b>138</b> |
| <b>5.2.1 Collect Requirements: Inputs .....</b>                   | <b>140</b> |
| <b>5.2.2 Collect Requirements: Tools and Techniques .....</b>     | <b>142</b> |
| <b>5.2.3 Collect Requirements: Outputs .....</b>                  | <b>147</b> |
| <b>5.3 Define Scope .....</b>                                     | <b>150</b> |
| <b>5.3.1 Define Scope: Inputs .....</b>                           | <b>152</b> |
| <b>5.3.2 Define Scope: Tools and Techniques .....</b>             | <b>153</b> |
| <b>5.3.3 Define Scope: Outputs .....</b>                          | <b>154</b> |
| <b>5.4 Create WBS .....</b>                                       | <b>156</b> |
| <b>5.4.1 Create WBS: Inputs .....</b>                             | <b>157</b> |
| <b>5.4.2 Create WBS: Tools and Techniques .....</b>               | <b>158</b> |
| <b>5.4.3 Create WBS: Outputs .....</b>                            | <b>161</b> |
| <b>5.5 Validate Scope .....</b>                                   | <b>163</b> |
| <b>5.5.1 Validate Scope: Inputs .....</b>                         | <b>165</b> |
| <b>5.5.2 Validate Scope: Tools and Techniques .....</b>           | <b>166</b> |
| <b>5.5.3 Validate Scope: Outputs .....</b>                        | <b>166</b> |
| <b>5.6 Control Scope .....</b>                                    | <b>167</b> |
| <b>5.6.1 Control Scope: Inputs .....</b>                          | <b>169</b> |
| <b>5.6.2 Control Scope: Tools and Techniques .....</b>            | <b>170</b> |
| <b>5.6.3 Control Scope: Outputs .....</b>                         | <b>170</b> |
| <b>6. PROJECT SCHEDULE MANAGEMENT.....</b>                        | <b>173</b> |
| <b>6.1 Plan Schedule Management .....</b>                         | <b>179</b> |
| <b>6.1.1 Plan Schedule Management: Inputs .....</b>               | <b>180</b> |
| <b>6.1.2 Plan Schedule Management: Tools and Techniques .....</b> | <b>181</b> |
| <b>6.1.3 Plan Schedule Management: Outputs .....</b>              | <b>181</b> |
| <b>6.2 Define Activities.....</b>                                 | <b>183</b> |
| <b>6.2.1 Define Activities: Inputs .....</b>                      | <b>184</b> |

|  |            |
|--|------------|
| 6.2.2 Define Activities: Tools and Techniques .....          | 184        |
| 6.2.3 Define Activities: Outputs .....                       | 185        |
| 6.3 Sequence Activities .....                                | 187        |
| 6.3.1 Sequence Activities: Inputs .....                      | 188        |
| 6.3.2 Sequence Activities: Tools and Techniques .....        | 189        |
| 6.3.3 Sequence Activities: Outputs .....                     | 194        |
| 6.4 Estimate Activity Durations.....                         | 195        |
| 6.4.1 Estimate Activity Durations: Inputs.....               | 198        |
| 6.4.2 Estimate Activity Durations: Tools and Techniques..... | 200        |
| 6.4.3 Estimate Activity Durations: Outputs .....             | 203        |
| 6.5 Develop Schedule .....                                   | 205        |
| 6.5.1 Develop Schedule: Inputs .....                         | 207        |
| 6.5.2 Develop Schedule: Tools and Techniques .....           | 209        |
| 6.5.3 Develop Schedule: Outputs .....                        | 217        |
| 6.6 Control Schedule .....                                   | 222        |
| 6.6.1 Control Schedule: Inputs.....                          | 224        |
| 6.6.2 Control Schedule: Tools and Techniques.....            | 226        |
| 6.6.3 Control Schedule: Outputs .....                        | 228        |
| <b>7. PROJECT COST MANAGEMENT .....</b>                      | <b>231</b> |
| 7.1 Plan Cost Management .....                               | 235        |
| 7.1.1 Plan Cost Management: Inputs.....                      | 236        |
| 7.1.2 Plan Cost Management: Tools and Techniques.....        | 237        |
| 7.1.3 Plan Cost Management: Outputs .....                    | 238        |
| 7.2 Estimate Costs .....                                     | 240        |
| 7.2.1 Estimate Costs: Inputs .....                           | 241        |
| 7.2.2 Estimate Costs: Tools and Techniques .....             | 243        |
| 7.2.3 Estimate Costs: Outputs .....                          | 246        |
| 7.3 Determine Budget.....                                    | 248        |
| 7.3.1 Determine Budget: Inputs .....                         | 250        |
| 7.3.2 Determine Budget: Tools and Techniques .....           | 252        |
| 7.3.3 Determine Budget: Outputs .....                        | 254        |

|   |            |
|---|------------|
| <b>7.4 Control Costs .....</b>                                      | <b>257</b> |
| <b>7.4.1 Control Costs: Inputs.....</b>                             | <b>259</b> |
| <b>7.4.2 Control Costs: Tools and Techniques.....</b>               | <b>260</b> |
| <b>7.4.3 Control Costs: Outputs .....</b>                           | <b>268</b> |
| <b>8. PROJECT QUALITY MANAGEMENT.....</b>                           | <b>271</b> |
| <b>8.1 Plan Quality Management .....</b>                            | <b>277</b> |
| <b>8.1.1 Plan Quality Management: Inputs .....</b>                  | <b>279</b> |
| <b>8.1.2 Plan Quality Management: Tools and Techniques .....</b>    | <b>281</b> |
| <b>8.1.3 Plan Quality Management: Outputs .....</b>                 | <b>286</b> |
| <b>8.2 Manage Quality .....</b>                                     | <b>288</b> |
| <b>8.2.1 Manage Quality: Inputs .....</b>                           | <b>290</b> |
| <b>8.2.2 Manage Quality: Tools and Techniques .....</b>             | <b>292</b> |
| <b>8.2.3 Manage Quality: Outputs.....</b>                           | <b>296</b> |
| <b>8.3 Control Quality .....</b>                                    | <b>298</b> |
| <b>8.3.1 Control Quality: Inputs .....</b>                          | <b>300</b> |
| <b>8.3.2 Control Quality: Tools and Techniques .....</b>            | <b>302</b> |
| <b>8.3.3 Control Quality: Outputs .....</b>                         | <b>305</b> |
| <b>9. PROJECT RESOURCE MANAGEMENT .....</b>                         | <b>307</b> |
| <b>9.1 Plan Resource Management .....</b>                           | <b>312</b> |
| <b>9.1.1 Plan Resource Management: Inputs.....</b>                  | <b>314</b> |
| <b>9.1.2 Plan Resource Management: Tools and Techniques.....</b>    | <b>315</b> |
| <b>9.1.3 Plan Resource Management: Outputs .....</b>                | <b>318</b> |
| <b>9.2 Estimate Activity Resources .....</b>                        | <b>320</b> |
| <b>9.2.1 Estimate Activity Resources: Inputs.....</b>               | <b>322</b> |
| <b>9.2.2 Estimate Activity Resources: Tools and Techniques.....</b> | <b>324</b> |
| <b>9.2.3 Estimate Activity Resources: Outputs .....</b>             | <b>325</b> |
| <b>9.3 Acquire Resources .....</b>                                  | <b>328</b> |
| <b>9.3.1 Acquire Resources: Inputs.....</b>                         | <b>330</b> |
| <b>9.3.2 Acquire Resources: Tools and Techniques.....</b>           | <b>332</b> |
| <b>9.3.3 Acquire Resources: Outputs .....</b>                       | <b>333</b> |

|  |            |
|--|------------|
| <b>9.4 Develop Team.....</b>   | <b>336</b> |
| <b>9.4.1 Develop Team: Inputs.....</b>                                   | <b>339</b> |
| <b>9.4.2 Develop Team: Tools and Techniques.....</b>                     | <b>340</b> |
| <b>9.4.3 Develop Team: Outputs .....</b>                                 | <b>343</b> |
| <b>9.5 Manage Team.....</b>  | <b>345</b> |
| <b>9.5.1 Manage Team: Inputs.....</b>                                    | <b>347</b> |
| <b>9.5.2 Manage Team: Tools and Techniques.....</b>                      | <b>348</b> |
| <b>9.5.3 Manage Team: Outputs .....</b>                                  | <b>350</b> |
| <b>9.6 Control Resources .....</b>                                       | <b>352</b> |
| <b>9.6.1 Control Resources: Inputs.....</b>                              | <b>354</b> |
| <b>9.6.2 Control Resources: Tools and Techniques.....</b>                | <b>356</b> |
| <b>9.6.3 Control Resources: Outputs .....</b>                            | <b>357</b> |
| <b>10. PROJECT COMMUNICATIONS MANAGEMENT .....</b>                       | <b>359</b> |
| <b>10.1 Plan Communications Management.....</b>                          | <b>366</b> |
| <b>10.1.1 Plan Communications Management: Inputs .....</b>               | <b>368</b> |
| <b>10.1.2 Plan Communications Management: Tools and Techniques .....</b> | <b>369</b> |
| <b>10.1.3 Plan Communications Management: Outputs .....</b>              | <b>377</b> |
| <b>10.2 Manage Communications .....</b>                                  | <b>379</b> |
| <b>10.2.1 Manage Communications: Inputs .....</b>                        | <b>381</b> |
| <b>10.2.2 Manage Communications: Tools and Techniques.....</b>           | <b>383</b> |
| <b>10.2.3 Manage Communications: Outputs .....</b>                       | <b>387</b> |
| <b>10.3 Monitor Communications .....</b>                                 | <b>388</b> |
| <b>10.3.1 Monitor Communications: Inputs .....</b>                       | <b>390</b> |
| <b>10.3.2 Monitor Communications: Tools and Techniques .....</b>         | <b>391</b> |
| <b>10.3.3 Monitor Communications: Outputs .....</b>                      | <b>392</b> |
| <b>11. PROJECT RISK MANAGEMENT .....</b>                                 | <b>395</b> |
| <b>11.1 Plan Risk Management .....</b>                                   | <b>401</b> |
| <b>11.1.1 Plan Risk Management: Inputs.....</b>                          | <b>402</b> |
| <b>11.1.2 Plan Risk Management: Tools and Techniques.....</b>            | <b>404</b> |
| <b>11.1.3 Plan Risk Management: Outputs .....</b>                        | <b>405</b> |

|  |            |
|--|------------|
| <b>11.2 Identify Risks .....</b>   | <b>409</b> |
| <b>11.2.1 Identify Risks: Inputs .....</b>                                   | <b>411</b> |
| <b>11.2.2 Identify Risks: Tools and Techniques .....</b>                     | <b>414</b> |
| <b>11.2.3 Identify Risks: Outputs.....</b>                                   | <b>417</b> |
| <b>11.3 Perform Qualitative Risk Analysis .....</b>                          | <b>419</b> |
| <b>11.3.1 Perform Qualitative Risk Analysis: Inputs.....</b>                 | <b>421</b> |
| <b>11.3.2 Perform Qualitative Risk Analysis: Tools and Techniques.....</b>   | <b>422</b> |
| <b>11.3.3 Perform Qualitative Risk Analysis: Outputs .....</b>               | <b>427</b> |
| <b>11.4 Perform Quantitative Risk Analysis .....</b>                         | <b>428</b> |
| <b>11.4.1 Perform Quantitative Risk Analysis: Inputs .....</b>               | <b>430</b> |
| <b>11.4.2 Perform Quantitative Risk Analysis: Tools and Techniques .....</b> | <b>431</b> |
| <b>11.4.3 Perform Quantitative Risk Analysis: Outputs .....</b>              | <b>436</b> |
| <b>11.5 Plan Risk Responses .....</b>  | <b>437</b> |
| <b>11.5.1 Plan Risk Responses: Inputs .....</b>                              | <b>439</b> |
| <b>11.5.2 Plan Risk Responses: Tools and Techniques .....</b>                | <b>441</b> |
| <b>11.5.3 Plan Risk Responses: Outputs .....</b>                             | <b>447</b> |
| <b>11.6 Implement Risk Responses.....</b>                                    | <b>449</b> |
| <b>11.6.1 Implement Risk Responses: Inputs .....</b>                         | <b>450</b> |
| <b>11.6.2 Implement Risk Responses: Tools and Techniques .....</b>           | <b>451</b> |
| <b>11.6.3 Implement Risk Responses: Outputs.....</b>                         | <b>451</b> |
| <b>11.7 Monitor Risks.....</b>   | <b>453</b> |
| <b>11.7.1 Monitor Risks: Inputs .....</b>                                    | <b>455</b> |
| <b>11.7.2 Monitor Risks: Tools and Techniques .....</b>                      | <b>456</b> |
| <b>11.7.3 Monitor Risks: Outputs .....</b>                                   | <b>457</b> |
| <b>12. PROJECT PROCUREMENT MANAGEMENT .....</b>                              | <b>459</b> |
| <b>12.1 Plan Procurement Management .....</b>                                | <b>466</b> |
| <b>12.1.1 Plan Procurement Management: Inputs.....</b>                       | <b>468</b> |
| <b>12.1.2 Plan Procurement Management: Tools and Techniques.....</b>         | <b>472</b> |
| <b>12.1.3 Plan Procurement Management: Outputs .....</b>                     | <b>475</b> |

|  |            |
|--|------------|
| <b>12.2 Conduct Procurements .....</b>                                   | <b>482</b> |
| <b>12.2.1 Conduct Procurements: Inputs .....</b>                         | <b>484</b> |
| <b>12.2.2 Conduct Procurements: Tools and Techniques .....</b>           | <b>487</b> |
| <b>12.2.3 Conduct Procurements: Outputs .....</b>                        | <b>488</b> |
| <b>12.3 Control Procurements .....</b>                                   | <b>492</b> |
| <b>12.3.1 Control Procurements: Inputs .....</b>                         | <b>495</b> |
| <b>12.3.2 Control Procurements: Tools and Techniques .....</b>           | <b>497</b> |
| <b>12.3.3 Control Procurements: Outputs .....</b>                        | <b>499</b> |
| <b>13. PROJECT STAKEHOLDER MANAGEMENT .....</b>                          | <b>503</b> |
| <b>13.1 Identify Stakeholders .....</b>                                  | <b>507</b> |
| <b>13.1.1 Identify Stakeholders: Inputs .....</b>                        | <b>509</b> |
| <b>13.1.2 Identify Stakeholders: Tools and Techniques .....</b>          | <b>511</b> |
| <b>13.1.3 Identify Stakeholders: Outputs .....</b>                       | <b>514</b> |
| <b>13.2 Plan Stakeholder Engagement .....</b>                            | <b>516</b> |
| <b>13.2.1 Plan Stakeholder Engagement: Inputs .....</b>                  | <b>518</b> |
| <b>13.2.2 Plan Stakeholder Engagement: Tools and Techniques .....</b>    | <b>520</b> |
| <b>13.2.3 Plan Stakeholder Engagement: Outputs .....</b>                 | <b>522</b> |
| <b>13.3 Manage Stakeholder Engagement .....</b>                          | <b>523</b> |
| <b>13.3.1 Manage Stakeholder Engagement: Inputs .....</b>                | <b>525</b> |
| <b>13.3.2 Manage Stakeholder Engagement: Tools and Techniques .....</b>  | <b>526</b> |
| <b>13.3.3 Manage Stakeholder Engagement: Outputs .....</b>               | <b>528</b> |
| <b>13.4 Monitor Stakeholder Engagement .....</b>                         | <b>530</b> |
| <b>13.4.1 Monitor Stakeholder Engagement: Inputs .....</b>               | <b>532</b> |
| <b>13.4.2 Monitor Stakeholder Engagement: Tools and Techniques .....</b> | <b>533</b> |
| <b>13.4.3 Monitor Stakeholder Engagement: Outputs .....</b>              | <b>535</b> |
| <b>REFERENCES .....</b>  | <b>537</b> |