APPENDIX A
INSTRUCTIONS FOR COMPLETING THE GITA BUSINESS CASE TEMPLATE

This research publication comes with a CD containing business case template files. The files are organized into two folders:

- The **Business Case Template** folder contains blank files for creating new, individual business case documents for each participant in a multi-agency project as well as blank files for creating new summary documents for multi-agency projects.

- The **Case Study** folder contains the financial details workbooks for the case study found in Appendix D of the research publication. These examples should help clarify the template instructions. The case study spreadsheets are password-protected, but users can save copies of them in order to experiment with the sensitivity analysis variables cited in the case studies.

The Business Case Template consists of three parts.

- **Part 1. Business Case Document**
  This is a Microsoft® Word document called **Business Case Template.dot**. This template includes headings for the various components of a multi-agency business case. The instructions for Part 1 explain what goes under each of the headings. Refer to the case studies in the research publication for examples.

- **Part 2. Financial Details Workbook**
  This is a Microsoft® Excel workbook with a series of worksheets that capture the financial details of a project from a single participant's perspective. These spreadsheets should be attached to the end of the business case document, and selected excerpts may be inserted into the text of the Microsoft® Word document. One workbook should be prepared for each participating agency.

  There are six different versions of the Microsoft® Excel Financial Details workbook. Three are for proposed (future) investments with project lives of 5, 10, or 20 years (called **Financial Details – Future5.xls**, **Financial Details – Future10.xls**, and **Financial Details – Future20.xls**, respectively). Three are for analyzing historical data for previous investments over a period of 5, 10, or 20 years (called **Financial Details – Past5.xls**, **Financial Details – Past10.xls**, and **Financial Details – Past20.xls**, respectively).

  The same template workbook should be used for each agency participating in the project.

  Part 2 of the instructions explains how to select and complete the appropriate workbook and

also how to adjust the project life to something other than 5, 10, or 20 years. The sample worksheets in the Case Study folder may help you interpret these instructions.

- **Part 3. Multi-participant Summary Workbook**
  This is a Microsoft® Excel workbook with two worksheets that consolidate the financial details for agencies participating in a project. These spreadsheets should be attached to the end of the business case document, and selected excerpts may be inserted into the text of the Microsoft® Word document.

  There are six different versions of the Microsoft® Excel Multiparticipant Summary workbook. Three are for proposed (future) investments with project lives of 5, 10, or 20 years (called **Multiparticipant Summary – Future5.xls**, **Multiparticipant Summary – Future10.xls**, and **Multiparticipant Summary – Future20.xls**, respectively). Three are for analyzing historical data for previous investments over a period of 5, 10, or 20 years (called **Multiparticipant Summary – Past5.xls**, **Multiparticipant Summary – Past10.xls**, and **Multiparticipant Summary – Past20.xls**, respectively).

  Part 3 of the instructions explains how to select and complete the appropriate workbook and also how to adjust the project life to something other than 5, 10, or 20 years. The sample worksheets in the Case Study folder may help you interpret these instructions.

  NOTE: These instructions assume the user has a working knowledge of Microsoft® Excel and can navigate with scrollbars to view large worksheets with "frozen" column and row title areas. The worksheets and workbook are protected to prevent users from inadvertently overwriting any formulas. Detailed unprotecting instructions are provided, but users should proceed with caution if they take these steps because many protected cells contain formulas and formula references which, if overwritten, will corrupt the financial analysis.

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PART 1. BUSINESS CASE DOCUMENT

The following instructions explain how to complete each section of a business case using the Microsoft® Word template file called **Business Case Document.dot**.

Creating the Document File

Double-click on the file **Business Case Document.dot** to open a new document file. Save the file with a name that follows your organization's file naming conventions.

Title Section

Type the project name in the title section of the document. Spell out the complete name of the project and, if there is an acronym or abbreviated project name, include this shorter name in parentheses after the full name[1].

Add the name or names of the analyst(s) that prepared the business case. Consider including job titles and department names.

Executive Summary Section

Skip the **Executive Summary** section until the rest of the business case is complete. Once you complete the remaining sections, add an executive summary with the following information:

- Short Project Description

- How the Project Supports the Mission and Goals of Participating Agencies

- Project Cost and Time to Complete

- Key Financial Indicators

- Key Strategic Benefits

- Conclusion Statement (Recommendation)

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[1] You can then use the shorter name or acronym throughout the body of the document.

Project Description Section

The description should include the following elements:

- Type of analysis (evaluation of proposed future investment or analysis of actual historical costs and benefits realized on a previous investment). An evaluation of a proposed future investment considers future costs and benefits. An analysis of actual costs and benefits realized on a previous investment considers historical costs and benefits. Do not blend historical (sunk) and future cash flows in a single business case. If the project is ongoing and you wish to document performance to date and then justify an additional investment, you will need to prepare two separate business cases. In the strategic analysis of the justification for future funding, you may wish to cite the results of the historical analysis.

- The full names (and, if desired, abbreviated names) for each agency that is participating in the project, along with a brief description of the role the agency will play.

- A discussion of commonalities in the mission and goals of the participating agencies, followed by an explanation of how the project supports these shared goals.

- Outline of the project scope, including planning, design, development, and implementation activities.

- Application areas addressed by the project.

You can use the following list of project application areas as a reference for defining your project. Refer to the research publication *Building a Business Case for Shared Geospatial Data and Services: A Practitioner's Guide to Financial and Strategic Analysis for a Multi-participant Program* for detailed descriptions and examples of each of these application areas.

- **Mapping and Data Access**
  Automated Map Production, Data Maintenance, and Data Access

- **Emergency Management and Security**
  Emergency Preparedness and Response/Critical Infrastructure Protection

- **Government Administration**
  Property Appraisal/Legislative (Voting) Districting/Tax Assessment

- **Quality of Life**
  Public Health and Safety/Community Services/Code Enforcement

- **Field Infrastructure Management**
  Management of Roads and Utility Lines/Capital Improvements/Maintenance

–   **Facility Management**
    Management of Plants, Buildings, and Property/Capital Improvements/Maintenance

–   **Service Delivery**
    Call Management/Outage Management/Dispatch

–   **Customer Relationship Management**
    Usage or Consumption Analysis/New Service Planning/Customer Compliance

–   **Engineering**
    Planning/Design/Construction/System Analysis/Network Modeling

–   **Land Management**
    Development Review/Zoning/Permitting/Land Use Analysis

–   **Regulatory Compliance**
    Permit Application/Monitoring Programs/Compliance Management

–   **Environmental Management**
    Natural Resource Preservation/Watershed Protection/Weather Monitoring

- Major purchases

- New job positions or reclassifications

- Clarification of related items and activities that are *not* included in the project

Project Schedule and Cost Section

Complete a Financial Details Workbook for up to 20 different participating agencies using Part 2 of these instructions. Each agency should use the same template file and should define the same project lifespan and same starting year. Departments within the same agency do not need their own workbooks.

If more than 20 agencies are participating in the project, create groupings of similar agencies, and prepare a workbook for each grouping. For example, if each local government in a state will participate in a project by contributing data to a central repository, a single workbook can be created to reflect the cash flows anticipated (or realized) for local governments. If some local governments will be contributing more types of data than others, it may be useful to create two local government groupings to reflect that participation of small contributors and major contributors. When preparing financial workbooks to analyze future cash flows for agency groupings, it may be possible to extrapolate the cash flows for the entire group by analyzing a representative sample of agencies in the group.

After completing the financial details workbooks for each participating agency or group, complete a Multi-participant Summary workbook using Part 3 of these instructions. Then, fill in the **Project Schedule and Cost** section with the following information:

- Date of project inception and the final year of project life designated for the financial analysis. You may wish to prepare a Gantt chart or similar graphical timeline to include as an attachment.

- Total cost of the investment. If you cite the present value (or inception year value) of the costs (from your Financial Analysis Worksheet), be sure to indicate that you are stating the investment *in Year XXXX dollars*. If you prefer to cite the cash flows in terms of the actual dollars to be budgeted for each year of the project life (or in terms of the actual expenditures for a previous investment), you can find this information on the Financial Summary worksheet within the Multi-participant Summary workbook and in greater details in the Contract and Procurement Costs Worksheet and Internal Labor Costs Worksheet of the individual Financial Details workbooks.

    Note any costs that will continue beyond the final year of the designated project life.

Financial Analysis Section

Cite the key financial indicators: Net Present Value (or Net Value stated in inception year dollars for a historical analysis), Return on Investment, Breakeven Year and Payback Period[2]. Provide the metrics from the Multi-participant Summary Workbook and indicate that these values reflect the financial performance of the entire investment rather than an individual agency's experience. You may also wish to cite the financial details for specific participating agencies. Examples of opening paragraphs:

- For a historical investment: This project's Net Value to date is $4,500,000, stated in 2001 dollars. The annual return on investment has been 17%. The project broke even in 2003, two years after project inception. Agency X has realized a net present value of $8,000,000 and broke even in 2004. Agency Y and Agency Z each realized a net present value of $1,000,000 and broke even in 2002. The remaining net benefits were realized by the other participating agencies.

- For a proposed future investment: The projected Net Present Value for this project is $4,500,000 with an estimated annual return on investment of 17%. This project is expected to break even within two years of the initial investment. Agency X anticipates a net present value of $8,000,000, and Agencies Y and Agency Z each anticipate a net present value of

[2] These indicators can be found on the Financial Analysis worksheet and also on the Project Setup worksheet in the Financial Details Workbook.

$1,000,000. The other anticipated net benefits are distributed among the other project participants.

- For a previous investment that did not break even: This project's Net Value to date is ($1,000,000) stated in 1999 dollars. This project has not yet broken even.

It may be helpful to copy and paste the Financial Summary Worksheets (from the Multi-participant Summary Workbook) and the Financial Analysis Worksheets (from the individual Financial Details Workbooks) into the text of your opening paragraph.

Sensitivity Analysis Subsection

Summarize the findings of your sensitivity analysis[3] under the Sensitivity Analysis subsection. Part 2 of these instructions explains how to conduct the sensitivity analysis. Examples of sensitivity analysis summaries include:

- If the application development effort is 50% more expensive than projected (i.e., cost overruns of 50%), the project's Net Present Value drops to zero, so it is essential to manage contract costs. If the project development schedule slips by 12 months, the labor savings due to reduced map production workload will be delayed by a year. This will reduce Net Present Value to $3,500,000, but the project will still break even in the second year.

- Although the project is not anticipated to break even, there is a possibility of a higher return if we are able to avoid a larger proportion of legal costs associated with infrastructure deterioration on or near others' property. If we are able to cut litigation fees by $200,000 annually (half our current spending) by Year 2 of the project, we will show a 6% return on investment.

It may be helpful to copy and paste your sensitivity analysis Financial Analysis Worksheets (or other sections of the workbooks you created for the sensitivity analysis).

Strategic Analysis Section

In the list below, review some examples of strategic (non-quantifiable) benefits for the application areas covered by your project. Mark the benefits that apply to your project (to assist you in completing the strategic analysis). Note any other strategic benefits for your project. Describe each of the strategic benefits in the Strategic Analysis section on the Business Case Document.

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[3] For analyses of past investments, you do not need to include sensitivity analysis.

Strategic Benefits (Examples by Application Area)

MAPPING AND DATA ACCESS
Automated Map Production, Data Maintenance, and Data Access

Strategic Benefit Examples

- Improve accuracy and completeness of spatial data

- Make information more accessible to the organization and the community

- Improve quality of decisions that rely on spatial data

EMERGENCY MANAGEMENT AND SECURITY
Emergency Preparedness and Response / Critical Infrastructure Protection

Strategic Benefit Examples

- Protect human life, public safety, private property, and critical public infrastructure - improvements to public safety and property as a result of better response, including avoided losses to people and property, reduced stress on medical and emergency response services

- Minimize the social and cultural impact of natural disasters and other emergencies - reduced time to restore services after a disaster and translate to benefits to the public (commercial activity restored, citizens able to return home, reduced need for social services with disruption ended)

GOVERNMENT ADMINISTRATION
Property Appraisal/Legislative (Voting) Districting/Tax Assessment

Strategic Benefit Examples

- More public involvement in redistricting efforts

QUALITY OF LIFE
Public Health and Safety/Community Services/Code Enforcement

Strategic Benefit Examples

- Reduce crime – quality of life, attractiveness to new development

- Improve public health – general productivity of citizens, quality of life

- Improve public goodwill and community attractiveness

Strategic Benefits (Examples by Application Area)

FIELD INFRASTRUCTURE MANAGEMENT
Management of Roads and Utility Lines/Capital Improvements/Maintenance

Strategic Benefit Examples

- Improve work force safety – employee morale, public goodwill

- Improve work force morale

- Improve public goodwill (more reliable service, reduced service interruption)

- Improve public safety (faster work site restoration) – (community appearance, reduced stress on medical and emergency systems)

FACILITY MANAGEMENT
Management of Plants, Buildings, and Property/Capital Improvements/Maintenance

Strategic Benefit Examples

- Improve work force safety

- Improve work force morale

- Improve public goodwill (more reliable service)

SERVICE DELIVERY
Call Management/Outage Management/Dispatch

Strategic Benefit Examples

- Improve public goodwill/customer service levels (faster response times, fewer transfers)

- Improve public health and safety through faster emergency response times

- Improve relationship with external agencies

Strategic Benefits (Examples by Application Area)
CUSTOMER RELATIONSHIP MANAGEMENT **Usage or Consumption Analysis/New Service Planning/Customer Compliance** *Strategic Benefit Examples* ▪ Improve public goodwill ▪ Improve public health and safety (cross-connection control programs)
ENGINEERING **Planning/Design/Construction/System Analysis/Network Modeling** *Strategic Benefit Examples* ▪ Improve public goodwill (reduce service disruption; reduce street cuts) ▪ Improve staff confidence in models, willingness to use models ▪ Improve public goodwill (by supporting modeling applications that improve customer service levels) – improved customer service (time to respond to complaints), compliance with regulatory guidelines ▪ Better overall design, better planned infrastructure
LAND MANAGEMENT **Development Review/Zoning/Permitting/Land Use Analysis** *Strategic Benefit Examples* ▪ Reduce private development costs (expedite review process; improve relationship with development community) ▪ More attractive community, better zoning
REGULATORY COMPLIANCE **Permit Application/Monitoring Programs/Compliance Management** *Strategic Benefit Examples* ▪ Improve public image (public goodwill) ▪ Improve relationship with regulators (increase opportunity to shape regulations)

Strategic Benefits (Examples by Application Area)
ENVIRONMENTAL MANAGEMENT **Natural Resource Preservation/Watershed Protection/Weather Monitoring** ***Strategic Benefit Examples*** ▪ Good citizenship (public goodwill from efforts to protect the environment) ▪ Healthier environment ▪ Wildlife preservation

Related Projects Subsection

If this project depends on (or depended on) other initiatives, or if it is (was) a prerequisite for future projects, cite these interdependencies in the strategic analysis.

Conclusion Section

For a proposed investment, the conclusion statement should recommend for or against the investment. For an analysis of a past investment, the conclusion should address lessons learned and/or summarize whether the project met expectations.

After completing the **Conclusion** section, remember to return to the **Executive Summary** section and summarize the findings.

Attach your completed financial worksheets to the business case template.

PART 2. INSTRUCTIONS FOR THE FINANCIAL DETAILS ATTACHMENT

The following instructions explain how to complete each of the financial details worksheets in the Microsoft® Excel workbook.

Choose a Financial Details workbook to reflect the investment timing (past or future) and the length of the project life to be analyzed (5, 10, or 20 years). You can customize the length of the project life if desired[4]. The names of the workbook templates indicate "Past" of "Future" followed by the project

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[4] It is easier to remove extra years than to add new ones, so if you want to customize the project length, start with a workbook that covers a longer period than what you desire. For example, if you want to analyze a 12-year project life, start with one of the 20-year workbooks.

life (5, 10, or 20). Open the desired template workbook and save it under the file name of your choice. For multiparticipant projects in which more than one agency invests, a separate financial details workbook should be completed for each agency. Use the same template to build each agency's workbook.

Project Setup Worksheet

Prepare for each financial analysis by completing the Project Setup sheet (first sheet) on your Financial Details workbook. Consult with the agency's Finance Department as needed to complete the Project Setup information.

- Enter the name of the project on the top line of the setup sheet.

- Enter the date you intend to complete and submit your analysis.

- Enter the name of the agency or group to which the financial details apply. This "participant name" will appear in the Multiparticipant Summary Workbook once the details workbook is stored and linked to the summary (see instructions in Part 3 for details.)

- The next section of the set-up sheet summarizes the key financial metrics. These values will change automatically as you enter data into the various worksheets. The cells will contain zeroes or related error messages (such as #DIV/0 or #VALUE) until you have completed subsequent worksheets in the workbook. These metrics are specific to the agency documented in the workbook. The metrics for the overall multi-participant project will likely differ from the metrics for each individual participant.

- Enter an average inflation rate for the project period. This inflation rate should reflect a general increase in the cost of goods and services, which may or may not be the same as the average rate of labor cost inflation within the organization for the same period. (There is an option further down the page to enter a different value for the inflation rate for internal labor costs.) The worksheet suggests a value of 2.5% for the general inflation rate, but you should replace this value with an inflation assumption authorized by your finance department. NOTE: It is acceptable to use different inflation rates within each agency's worksheet, but for the summary financial analysis, you will have to select one inflation rate for determination of the investment's discount rate.

  – *Suggestion for United States business cases:* Take the average of annual inflation rates reported by the federal government or other reliable source. For example, U.S. Consumer price index rates are available on-line from the Department of Labor Bureau of Labor Statistics at http://data.bls.gov. Following are annual percent changes in the broadest CPI measure for the last 10 years (retrieved from the BLS Web site):

1994	2.6%		1996	3.0%		1998	1.6%		2000	3.4%		2002	1.6%
1995	2.8%		1997	2.3%		1999	2.2%		2001	2.8%		2003	2.3%

The average inflation rate for this example is 2.5%.

– *Suggestion for Canadian business cases:* See Statistics Canada at http://www.statcan.ca for Canadian consumer price index data. For example, Statistics Canada reports that the October 2004 to October 2005 Consumer Price Index for the entire country is 2.6%, and the CPI for Alberta is 3.5%. Either of these numbers might be suitable for analyzing a short-term Alberta-based project that is completed sometime close to the year 2005. For longer term analyses, it would be appropriate to use an average of annual CPIs, which can be obtained for a small fee from the Statistics Canada Web site.

- Enter the annual cost of capital for purposes of calculating present values[5]. The worksheet suggests a value of 5%, but you should replace this value with an assumption authorized by your finance department.

- Type labels of your choice (such as calendar year or fiscal year labels) in each of the investment year columns. These labels will carry forward to the rest of the workbook[6].

- If you are using the standard project length in the workbook, skip the next two bullets.

- *If you need to reduce the length of the project,* you will first need to unprotect the setup worksheet[7]. Then, go to the *last* column in which project year labels are displayed and delete the entire column[8]. IMPORTANT: Delete from the end of the project life, not the

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[5] This is the annual rate of return that could be expected from an alternative investment that is forgone in order to fund the project being analyzed. Some organizations use the return on a secure investment like government bonds. The cost of capital is used to convert future cash flows into current (present) values and to convert historical cash flows into inception year dollars. Refer to the research publication for a more detailed explanation of the opportunity cost of capital.

[6] If the analysis covers a previous investment, the final year column should be the current or immediately completed fiscal year or the last year of the investment life. If the analysis covers a future investment, the first column should be the current fiscal year or the fiscal year that is about to commence. The analysis should cover either past years or future years, but not both.

[7] From the **Tools** menu, choose **Protection** and then choose **Unprotect Sheet**.

[8] Click inside the column header to highlight the entire column. Then, from the **Edit** menu, choose **Delete** and then **Delete Column**. Then, double-check the Project Life (for future projects) or Years Since Project Inception (for past projects) on the line directly below the year labels. It should have decreased by one for

beginning. Continue selecting and deleting columns until you have shortened the project life to the desired length. Then, re-protect the worksheet[9]. Repeat this process (unprotecting, deleting columns from the end, and reprotecting) for all the remaining worksheets in the workbook (except the current labor rates worksheet)[10].

- *If you need to <u>increase</u> the length of the project,* you will first need to unprotect the setup worksheet[11]. Then, go to the *last* column in which project year labels are displayed and copy the entire column[12]. Then, highlight the entire blank column immediately to the right of the column you just copied and paste[13]. IMPORTANT: Copy and paste the entire column, not just the year labels. There are hidden cells in the columns that are necessary for the financial calculations. Continue copying and pasting columns until you have increased the project life to the desired length. Then, re-protect the worksheet[14]. Repeat this process (unprotecting, copying and pasting columns from the end, and reprotecting) for all the remaining worksheets in the workbook (except the current labor rates worksheet)[15].

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each column you deleted. If this did not occur, you may not have highlighted/deleted the entire column. You can choose **Undo** from the **Edit** menu and try again.

[9] From the **Tools** menu, choose **Protection** and then choose **Protect Sheet**. Accept the protection options displayed.

[10] There are 29 productivity benefit detail sheets available in the workbook. If you are going to analyze internal labor costs and productivity benefits for fewer than 29 different job categories, you do not need to delete the extra columns from the extra benefit detail sheets. For example, if you only have 10 labor categories, then you only need to delete the extra columns from the first 10 productivity benefit detail sheets.

[11] From the **Tools** menu, choose **Protection** and then choose **Unprotect Sheet**.

[12] Click inside the column header for the last year label to highlight the entire column. Then, from the **Edit** menu, choose **Copy**.

[13] Click inside the column header for the first blank column after the year labels to highlight the entire column. Then, from the **Edit** menu, choose **Paste**. Then, double-check the Project Life (for future projects) or Years Since Project Inception (for past projects) on the line directly below the year labels. It should have increased by 1 for each column you added. If this did not occur, you may not have copied the entire column. You can choose **Undo** from the **Edit** menu and try again.

[14] From the **Tools** menu, choose **Protection** and then choose **Protect Sheet**. Accept the protection options displayed.

[15] There are 29 productivity benefit detail sheets available in the workbook. If you are going to analyze internal labor costs and productivity benefits for fewer than 29 different job categories, you do not need to copy and paste the new columns on the extra benefit detail sheets. For example, if you only have 6 labor categories, then you only need to copy and paste the extra columns into the first 6 productivity benefit detail sheets.

- Choose a method for determining future (or past) labor costs.   You may select different options for each agency in a multi-participant project:

  – The default for future projects is "Derived by Applying Inflation Rate to Current Costs." The default for past projects is "Derived by Applying Inflation Rate to Final Year Costs." These options apply the inflation rate from the Project Setup Sheet to the data on the Labor Rates sheet to estimate what labor costs will be in the future (or what they were in the past). You can change this default option by selecting an alternative from the drop-down list in this field.

  – An alternative to this method is "Derived by Applying Average Cost of Living Adjustment to Current (of Final Year) Costs." Choose this option if your internal labor costs are anticipated to grow (or actually grew) at a different rate than the general inflation rate (perhaps due to a wage freeze, long-term union contracts, or a market analysis and salary adjustment). If you choose this option, a label will appear to the immediate right of your selection to indicate the spot in which you should enter your organization's average annual cost of living adjustment or similar inflation percentage for internal labor costs.

  – A third alternative for future projects is "Independent of Assumed Inflation Rates." Choose this option if you want to manually enter estimated individual labor rates for each job category and each year of the project life[16]. If you choose this option, enter notes where indicated to explain the method you will be using to determine the labor costs.

  – For past projects, you may choose "Actual Historical Costs" if you want to manually enter actual burdened hourly rates or actual burdened annual costs for each job category and each year of the project life.

- Note any other assumptions in the Notes section of the setup sheet. You may wish to note your approach to accounting for productivity benefits. For example, you may indicate whether you will quantify all labor savings or only those that are realized as payroll reductions.

  At this point, you should also determine whether you will treat any of your internal labor costs as a negative productivity benefit. In other words, will you track internal labor for project development/support as negative savings on the productivity benefit detail sheets (i.e., subtract the internal labor costs from the productivity "savings" to reduce the stated benefit)? This has no effect on NPV but increases the ROI.

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[16] This option allows you to vary the rate of labor cost growth over the life of the project or across different job categories.

- This approach may be preferable for organizations that use program-based budgets and/or in situations where the staff involved with the internal labor costs would be (or would have been) retained regardless of the decision to proceed with the project. It may also be useful if you are going to limit benefit calculations to the elimination of FTEs from the budget, particularly if an ongoing internal labor cost of the project is counteracted by some labor savings for the same job category. By documenting the full savings on your benefit detail sheet and then documenting the internal costs as a negative benefit, you can arrive cleanly at the net eliminated FTEs. You may count some internal labor as a cost and other internal labor as a negative benefit. Be careful, however, to account for a particular internal labor effort on only one worksheet (*internal labor usage* or *productivity benefit detail*).

- You do not necessarily have to document this decision in your notes, but you may wish to discuss your approach with your finance department. Refer to the research publication for more details on internal labor costs and savings.

Financial Analysis Worksheet

This worksheet summarizes costs and benefits, converts them into present values using the cost of capital and inflation rate from the Project Setup Worksheet, and calculates the net present value (or net value in inception year dollars), annual return on investment, breakeven point, and payback period. All fields on this worksheet are calculated automatically. You can refer back to this worksheet as you complete the rest of the workbook to see how various assumptions affect the financial analysis.

Labor Rates Worksheet

Complete this worksheet in consultation with your human resources department. Starting at the top of the job categories list, complete one row for each job category affected by the project. You may leave blank rows at the bottom of the list. You may wish to combine multiple job titles into a single category if they have similar hourly costs or salaries. Do not cut and paste labor category names from one row to the next. Each row on the Labor Rates worksheet contains the following columns:

- Job Category – Job title or group of job titles with similar responsibilities and pay rates. Include categories that benefit from the project and categories that will contribute to (develop) the project.

- Average Hourly Rate ($/Hour) – The average hourly wage for positions in this category. For future projects, use the current year's rates. For historical projects, use the labor rates that were in effect during the last year of the project life (the last year labeled on the Project Setup Sheet). If the position is salaried, derive the hourly wage by dividing the annual salary by the typical hours in a work year.

- Fringe – This wage multiplier covers the cost of taxes, insurance, and related overhead items that contribute to the cost of employing someone in this category. Fringe rates typically range from 15% to 80%.

- Burdened Hourly Rate – This is automatically calculated as (Hourly Rate) X (1 + Fringe Rate)[17].

- Average Annual Regular Hours – The average number of base (regular time) hours worked by the position. For salaried positions, divide the average annual salary by the average hourly rate. For hourly wage positions, use the standard number of paid hours in a work year[18].

- Average Annual Cost Before Overtime – This is automatically calculated as (Average Annual Regular Hours) X (Burdened Hourly Rate).

- Average Annual Overtime Hours – Leave blank for salaried positions that do not receive overtime pay. For positions that qualify for overtime, list the average number of overtime hours worked annually by an individual in this job category.

- Average Overtime Multiplier – Leave blank for salaried positions that do not receive overtime pay. For positions that qualify for overtime, list the most common overtime multiplier (typically 1.5 for "time and a half" pay).

- Average Annual Cost of Position - This is automatically calculated as (Average Annual Cost Before Overtime) + [(Average Annual Overtime Hours) X (Burdened Hourly Rate) X (Average Overtime Multiplier)]

You can type over data in a job category row to change the name of a job category. Do not cut and paste job category names within the list. The following instructions explain how to add and delete rows in the job categories list (if you prefer not to leave blank lines or if you need more than 29 job categories). If you do not need to add or delete rows, you can skip to the next section (the Labor Cost Multipliers Worksheet).

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[17] If your organization has already established "standard internal billing rates" for your job categories, you may unprotect the Labor Rates workbook and manually enter these in the burdened labor rate column. This will overwrite the "base x fringe" formula. If you take this approach, you can leave the Average Hourly Rate and Fringe columns blank. Be sure to reprotect the worksheet when you are finished.

[18] This is typically 2080 hours in the United States and slightly less than 2000 hours in Canada. Consult your human resources department.

Deleting Job Category Rows

If you have fewer than 29 job categories, you may leave blank rows at the bottom of the list. If you prefer to delete unused rows from this worksheet, you must also delete them from all the remaining labor-related sheets.

To delete unused rows, begin by unprotecting the worksheet by selecting **Protection** – **Unprotect Sheet** from the **Tools** menu. Highlight an entire unused row by clicking in the row number label at the far left of the row. Then, choose **Delete** from the **Edit** menu. Be sure to delete the entire row. Continue deleting unused rows as needed. Then, re-protect the worksheet by selecting **Protection** – **Protect Sheet** from the **Tools** menu. Accept the protection defaults.

You will need to delete these same rows on the following worksheets: Labor Cost Multipliers, Internal Labor Usage, Internal Labor Costs, and Productivity Benefits.

If you have deleted unused rows, you should also delete the corresponding Productivity Benefit Detail worksheets. Start with the last of these sheets (#29). Unprotect the workbook by choosing **Protection** - **Unprotect Workbook** from the **Tools** menu. Then choose **Delete Sheet** from the **Edit** menu. Continue deleting productivity benefit detail worksheets as needed, and then reprotect the workbook by choosing **Protection** – **Protect Workbook** from the **Tools** menu. Accept the protection defaults.

Adding Job Category Rows

If you have more than 29 job categories, you may insert copied rows on the Labor Rates worksheet and all the remaining labor-related sheets. First, unprotect the Labor Rates worksheet by selecting **Protection** – **Unprotect Sheet** from the **Tools** menu. Highlight the entire last blank row in the job category list by clicking in the row number label at the far left of the row. Then, choose **Copy** from the **Edit** menu. Next, highlight the entire blank row immediately beneath the last job category line and choose **Copied Cells** from the **Insert** menu.

IMPORTANT: Be sure to use the Insert Copied Cells function rather than the Paste function; pasting will overwrite summary rows on some of the other worksheets.

Continue copying and inserting copied cells at the end of the list as needed. Fill in the names of the additional labor categories. Then, reprotect the Labor Rates worksheet by selecting **Protection** – **Protect Sheet** from the **Tools** menu. Accept the protection defaults.

Insert rows in the same manner on the following worksheets: Labor Cost Multipliers, Internal Labor Usage, Internal Labor Costs, and Productivity Benefits. NOTE: When inserting rows on the Internal Labor Costs and Productivity Benefits worksheets, highlight the yellow "Totals" row prior to inserting the copied cells; this will insert the new row immediately above the totals line. When inserting copied cells in these labor-related worksheets, double-check to ensure the proper job category name appears in the new row. If it does not appear, then you may not have copied the right

cell or inserted into the right area (the end of the list), and this can cause problems with calculations throughout the workbook. If the job category name does not appear as you entered it on Current Labor Rates, highlight and delete the row you just added and try again.

Once you have updated the labor-related worksheets with the new job category rows, you will need to create corresponding Productivity Benefit Detail worksheets. Open the last of these sheets (Productivity Benefit Detail-29). Unprotect the workbook by choosing **Protection** - **Unprotect Workbook** from the **Tools** menu. Then choose **Move or Copy Sheet** from the **Edit** menu. Scroll to the end of the "Before Sheet" list and highlight "Move to End," and click to check off the *Create a copy* box. Your new worksheet will be named *Productivity Benefit Detail (2)*. Right-click in the name tab at the bottom of this sheet to rename the worksheet (as Productivity Benefit Detail-30, Productivity Benefit Detail-31, etc.)

You will need to modify the formulas in each new Productivity Benefit Detail worksheet as follows: Unprotect the sheet by choosing **Protection** – **Unprotect Sheet** from the **Tools** menu. In the Job Category cell (Cell A1), increment the last number in the formula by 1. *For example, change* ="Job Category: "&'Current Labor Rates'!A30 *from detail sheet #29 to* ="Job Category: "&'Current Labor Rates'!A31 *on detail sheet #30.* Then, go to cell B2 and increment the formula's cell reference by 1. *For example, change* =IF('Productivity Benefits'!$B$31="per Hour","Hours","FTEs") *on detail sheet #29 to* =IF('Productivity Benefits'!$B$32="per Hour","Hours","FTEs") *on detail sheet #30.* Repeat this modification to all remaining formulas in row 2 (or copy the corrected formula and paste it into subsequent years' columns). Then, go to cell B18 and increment the formula's cell reference by 1. *For example, change* =IF('Productivity Benefits'!$B$31="per Hour","Total Hours Saved for this Job Category","Total FTEs Saved for this Job Category") *on detail sheet #29 to* =IF('Productivity Benefits'!$B$32="per Hour","Total Hours Saved for this Job Category","Total FTEs Saved for this Job Category") *on detail sheet #30.* Then reprotect the worksheet by choosing **Protection** – **Protect Sheet** from the **Tools** menu. Follow the same procedure to add more detail sheets as needed. Then, re-protect the workbook by choosing **Protection** – **Protect Workbook** from the **Tools** menu. Accept the protection defaults

Labor Cost Multipliers Worksheet

Once you have filled out all job categories on the Current Labor Rates worksheet, move to the Labor Cost Multipliers worksheet. For each job category, indicate whether you will calculate labor costs (and productivity benefits) on a *per hour* or *per FTE* basis[19]. The default value is per hour, but you

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[19] With the *per hour* method, you will estimate internal labor hours needed for project development as well as internal labor hours "saved" as a productivity benefit, and the workbook will use an hourly rate to determine the value of these invested (or saved) work hours. With the *per FTE* method, you will estimate the development work in terms of full-time positions dedicated to the project and will estimate productivity savings in terms of FTEs eliminated from the budget (or reassigned), and the workbook will use an annual burdened salary to calculate the value of this labor.

can choose *per FTE* from a drop-down list in each category. You can use different methods for different categories. You do not need to remove blank rows.

If you are electing to manually enter historical labor rates or future labor rates (as opposed to deriving them based on current rates and inflation), you will need to enter a rate for each project year for each job category on the Labor Cost Multipliers worksheet. You will need to unprotect the sheet to access these cells[20].

Internal Labor Usage Worksheet

Use this worksheet to capture all internal labor that will be treated as project costs. Do not include labor hours that will be treated as reduced or negative productivity benefits.

- The first two columns of this worksheet refer to the job titles and valuation methods you just entered on the Current Labor Rates and Labor Cost Multipliers worksheets.

- For each job category that works on project development or support, describe the nature of the work performed. Then, fill in usage measures for each year in which internal labor occurs for the job category. If you are using the *per Hour* valuation method, the usage measure is the total of all labor hours in that category in each year incurred[21]. If you are using the *per FTE* method, the usage measure is the total number of positions dedicated to the project in each project year.

- For job categories that do not help develop or support the project (but simply benefit from it), leave the Nature of Work and usage cells blank.

Internal Labor Costs Worksheet

This worksheet automatically calculates internal labor costs based on the usage recorded on the Internal Labor Usage worksheet and the labor cost multipliers for each job category. You cannot edit this sheet. However, if the costs seem out of line for a particular job category, you may wish to revisit the earlier labor worksheets to confirm that your usage estimates are consistent with your

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[20] Choose **Protection** – **Unprotect Sheet** from the **Tools** menu. Begin in cell E9 (the first year for the first job category), and enter either a burdened hourly rate (if using the *per hour* valuation method) or burdened annual labor cost (if using the *per FTE* method). Complete all cells (all years for all job categories). Then, reprotect the worksheet by choosing **Protection** – **Protect Sheet** from the **Tools** menu and accepting the protection defaults.

[21] If more than one person from the category is involved in the work, be sure to use the total hours for all positions/individuals as opposed to the average amount per person.

valuation method (i.e., you have estimated hours worked for the *per hour* method or dedicated FTEs for the *per FTE* method.)

Contract Costs Worksheet

- Complete the Contract Costs Worksheet.

- Review the various cost categories on the worksheet, and list all one-time and ongoing project costs in the appropriate category. List specific contracts or purchase orders if possible.

- For each contract or purchase order, specify dollar amounts in the year incurred. For historical cash flows, use the actual dollar amounts you spent for this project. For future cash flows, use future year dollars[22]. Include only those portions of a contract or purchase order that apply to this project. The worksheet will automatically calculate the total contract/procurement costs for each year of the project life.

- You may leave categories blank, and you may edit the names of the cost categories.

- If you wish, you may delete any categories that do not apply to your project or any unused rows within a category. To do so, unprotect the worksheet[23], highlight the row(s) you wish to delete by clicking on the row number label(s) at the far left of the row(s), and choose **Delete** from the **Edit** menu. Then, reprotect the sheet[24].

- If additional rows are needed, you may insert additional rows. First, unprotect the worksheet[25]. Then, highlight the row above which you want to insert a new row. Choose **Rows** from the **Insert** menu. When you have inserted all the rows you need, reprotect the worksheet[26].

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[22] Remember to consider the impact of inflation on future cash flows. For example, if you have an ongoing cost from an application service provider, you might anticipate annual fee increases when entering future year costs. If you anticipate purchasing equipment in future years, consider what the cost of that equipment will be at the time it is procured.

[23] Choose **Protection** – **Unprotect Sheet** from the **Tools** menu.

[24] Choose **Protection** – **Protect Sheet** from the **Tools** menu and accept the protection defaults.

[25] Choose **Protection** – **Unprotect Sheet** from the **Tools** menu.

[26] Choose **Protection** – **Protect Sheet** from the **Tools** menu and accept the protection defaults.

Productivity Benefit (Summary) Worksheet

This worksheet is for review purposes only. Return to this worksheet after you have completed all Productivity Benefit Detail worksheets (see below). The summary worksheet calculates productivity benefits based on the hours or FTEs recorded on the productivity detail worksheets and the labor cost multipliers for each job category. You do not need to enter any data on the summary sheet. However, if the benefits seem out of line for a particular job category, you may wish to revisit the earlier Labor Cost Multipliers worksheet and Productivity Benefit Detail worksheets to confirm that your savings estimates are consistent with your valuation method (i.e., you have estimated hours saved for the *per hour* method or FTEs eliminated for the *per FTE* method.)

Other Benefits Worksheet

In the list below, review the examples of **Other Quantifiable** (non-productivity) **Benefits** for the application areas covered by your project. Mark the benefits that apply to your project (to assist you in completing the Other Benefits worksheet). Note any other benefits for your project.

Other Benefits (Examples by Application Area)
MAPPING AND DATA ACCESS **Automated Map Production, Data Maintenance, and Data Access** *Other Benefit Examples* ▪ Reduce map production and distribution costs – avoid printing and shipping costs of distributing sets of map books. Calculate reduced investment in specialized plotting equipment. ▪ Reduce map editing costs – determine the contract cost savings for any external map editing being reduced. ▪ Avoid cost of liability for failure to provide infrastructure information to field personnel – estimate the cost if the buried infrastructure were damaged due to lack of access to maps.

Other Benefits (Examples by Application Area)

EMERGENCY MANAGEMENT AND SECURITY
Emergency Preparedness and Response/Critical Infrastructure Protection

Other Benefit Examples

- Reduce repair and service interruption costs associated with emergencies – calculate savings in avoided penalties for service interruptions to customers, income generated with faster service restoration, reductions in mileage and repair material costs due to better information prior to reaching emergency site.

- Maximize and expedite claim recovery – calculate potential for reduced time to process claims, determine value of having the cash sooner and estimate potential for increased claim recovery.

- Reduce cost of maintaining/staffing emergency operations centers and avoid/reduce other emergency preparedness costs through consolidation of roles/activities in the region – determine reduced operating costs for facilities excluding labor (covered in the Labor Productivity worksheet).

GOVERNMENT ADMINISTRATION
Property Appraisal/Legislative (Voting) Districting/Tax Assessment

Other Benefit Examples

- Increase tax revenues by identifying properties that are not on the tax rolls – determine potential extent of properties not on the tax rolls, estimate revenue that could be brought in by discovered properties.

- Increase rate-based revenues by identifying undocumented users – determine potential extent of undocumented users, estimate potential revenue from these users.

Other Benefits (Examples by Application Area)

QUALITY OF LIFE
Public Health and Safety/Community Services/Code Enforcement

Other Benefit Examples

- Raise property values by improving community livability – estimate potential increased tax revenue from increased property values.

- Secure/retain grant funding for community services programs – estimate value of grant funding. Estimate value of community services programs implemented (improved neighborhoods resulting in increased property values).

- Increase tax revenues by attracting new business – estimate potential increased revenue from new businesses.

- Reduce field infrastructure repair costs through more effective management of wild animal populations (e.g., armadillos, moles) that damage infrastructure – estimate potential savings from reduced mileage due to better route planning (labor savings should be picked up in the Labor Productivity worksheet).

- Reduce insurance rates – estimate potential reduction in insurance rates through provision of better information to insurance providers.

Other Benefits (Examples by Application Area)

FIELD INFRASTRUCTURE MANAGEMENT
Management of Roads and Utility Lines/Capital Improvements/Maintenance

Other Benefit Examples

- Reduce operations and maintenance costs by avoiding breakdowns and optimizing programmed activities (better planning and scheduling of proactive work, equipment take-downs, and routine repairs) – estimate potential non-labor savings from avoidance of breakdowns. Estimate increased revenue from having facilities operable more of the time (greater sales).

- Reduce cost of inventory by streamlining requirements for on-hand stock (supporting more just-in-time procurement) – consider potential reduction in capital expenses through reduction in inventory. Estimate potential savings due to reduced storage requirements.

- Reduce capital costs by extending asset life – estimate potential savings from avoidance of asset replacement.

- Reduce cost of line locate program by eliminating trips to locations that do not have assets – estimate non-labor component of this benefit from reduced vehicle costs.

- Reduce cost of special projects/repairs by sharing common costs with other agencies working in the area – reduced costs of trenching, backfilling, and pavement restoration.

Other Benefits (Examples by Application Area)

FACILITY MANAGEMENT
Management of Plants, Buildings, and Property/Capital Improvements/Maintenance

Other Benefit Examples

- Reduce operations and maintenance costs by avoiding breakdowns and optimizing programmed activities (better planning and scheduling of proactive work, equipment take-downs, and routine repairs) – estimate savings in equipment replacement costs due to fewer breakdowns, estimate potential increased revenue from having facilities operable more of the time.

- Reduce cost of inventory by streamlining requirements for on-hand stock (supporting more just-in-time procurement) – consider potential reduction in capital expenses through reduction in inventory. Estimate potential savings due to reduced storage requirements.

- Reduce capital costs by extending asset life – estimate potential savings from avoidance of asset replacement, including avoided costs associated with issuing bonds.

- Reduce operating costs by improving source quality (e.g., influent, power).

SERVICE DELIVERY
Call Management/Outage Management/Dispatch

Other Benefit Examples

- Reduce fees, fines, or damage mitigation costs associated with inadequate response times – estimate potential for avoided fees to regulatory agencies.

- Increase rate-based revenues by minimizing the length of service interruptions – estimate potential increase in revenue with reduction in service interruptions.

Other Benefits (Examples by Application Area)

CUSTOMER RELATIONSHIP MANAGEMENT
Usage or Consumption Analysis/New Service Planning/Customer Compliance

Other Benefit Examples

- Reduce fees, fines, or damage mitigation costs associated with interrupting service to special-needs customers – estimate potential savings in fines/fees related to service interruption.

- Reduce operating costs through more effective use of interruptible customer programs – estimate cost savings due to utilizing interruptible customers to avoid more general outages resulting in reduced revenues.

- Increase revenues by attracting and retaining more customers.

- Reduce wastewater treatment costs by improving influent quality and/or reducing illegal discharge to the sewer system.

- Reduce storm water system maintenance costs by reducing illegal discharges/dumping

- Increase revenues by expanding opportunities to sell/provide additional services and better targeting the new service offerings and marketing.

Other Benefits (Examples by Application Area)

ENGINEERING
Planning/Design/Construction/System Analysis/Network Modeling

Other Benefit Examples

- Reduce the cost of preliminary design by reducing/eliminating the need for *ad hoc* aerial photography and mapping.

- Reduce the cost of preliminary design by expediting/automating the production of alternative designs (reduced consulting fees).

- Reduce the cost of construction and/or land acquisition through design optimization and better site/corridor selection – evaluate the current costs for land acquisition and construction costs related to siting issues and make prediction of savings with improved information and analysis capabilities.

- Reduce cost of debt through more accurate long-term revenue forecasts – assess costs of current imprecise forecasting, estimate realistic level of improved forecasts, calculate effect of improved forecasting on debt.

- Increase rate-based revenues by ensuring there is sufficient capacity to meet demand – calculate impact of having to deny additional customers due to lack of capacity.

- Reduce cost of model maintenance by consolidating generalized and detailed models, eliminating redundant maintenance of node and link data, and/or reducing software license requirements – evaluate software licenses for potential redundancy and calculate savings by reducing number of licenses.

- Reduce cost of operations through more effective modeling – evaluate operating costs due to overbuilt or underbuilt systems.

- Reduce or delay capital costs through more thorough examination of alternatives (better models) – evaluate cases where capital costs might have been avoided with better GIS data and identify potential for avoiding these costs on future projects.

Other Benefits (Examples by Application Area)

LAND MANAGEMENT
Development Review/Zoning/Permitting/Land Use Analysis

Other Benefit Examples

- Avoid costs associated with duplicate or otherwise undesirable street names or addresses (e.g., avoid dispatch to wrong location and/or confusion of field personnel – affects costs associated with liability for incorrect/delayed dispatch).

- Increase business license revenues (more accurate license data).

- Increase tax revenues by expediting activities that raise property values.

REGULATORY COMPLIANCE
Permit Application/Monitoring Programs/Compliance Management

Other Benefit Examples

- Avoid or minimize fines by preventing violations – estimate extent of potential fines and calculate cost-avoidance.

- Reduce report development and submittal costs.

- Reduce cost of sampling/monitoring by optimizing routes and sample point selection - estimate savings in vehicle costs due to optimal routing.

ENVIRONMENTAL MANAGEMENT
Natural Resource Preservation/Watershed Protection/Weather Monitoring

Other Benefit Examples

- Avoid or minimize fines or restoration costs associated with environmental damage.

- Reduce production/treatment costs by anticipating uncontrollable conditions (e.g., weather) that affect operations.

- Reduce production/treatment costs by controlling land use and management (e.g., agricultural techniques, waste disposal methods, pesticide/herbicide use) that affect operations.

- Reduce reactive maintenance costs by assembling resources in advance of uncontrollable conditions (e.g., weather) that affect demand and/or operations.

Complete the Other Benefits worksheet.

- List each benefit noted in the previous table. Enter the dollars saved in the appropriate year columns[27].

- For historical benefits, use actual dollar amounts. For future cash flows, use future year dollars[28]. If a benefit depends on other investments outside the scope of this project, note that assumption in the benefit description, and adjust the dollar savings to reflect the probability that the outside investment will occur. If you are preparing analyses of both proposed investments, consider combining the investments into a single analysis[29].

- You may leave blank rows on this worksheet. If you prefer to delete unused rows, you can unprotect the worksheet[30], highlight the row(s) you wish to delete by clicking on the row number label(s) at the far left of the row(s), end choose **Delete** from the **Edit** menu. Then, reprotect the sheet[31].

- If additional rows are needed, you may insert additional rows. First, unprotect the worksheet[32]. Then, highlight the row above which you want to insert a new row. Choose **Rows** from the **Insert** menu. When you have inserted all the rows you need, reprotect the worksheet[33].

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[27] For evaluations of proposed future investments, you may wish to reduce the total dollars saved based on a less than 100% probability that the benefit will occur. If you choose to do so, make a note of your assumption in the description of the specific benefit. For example, if you estimate a savings of one million dollars due to lawsuit avoidance, but you believe the lawsuit was only a 25% possibility in the absence of the GIT investment, you should note this in the benefit description, note that $1,000,000 X 25% = $250,000, and show a benefit of $250,000 in the relevant project year. If you are citing cost-avoidance benefits in an analysis of actual benefits realized, you may also wish to adjust the dollar values based on the probability that the avoided event would have occurred in the absence of the GIT investment.

[28] Consider the impact of inflation on future benefits. For example, if you have an ongoing benefit from a reduction in contract data maintenance fees and you expect to use the same level of service each year, you may wish to anticipate an increase in savings (due to an increase in the annual fee) over the course of the project life.

[29] Alternatively, you may wish to run a sensitivity analysis on the dependent benefit.

[30] Choose **Protection** – **Unprotect Sheet** from the **Tools** menu.

[31] Choose **Protection** – **Protect Sheet** from the **Tools** menu and accept the protection defaults.

[32] Choose **Protection** – **Unprotect Sheet** from the **Tools** menu.

[33] Choose **Protection** – **Protect Sheet** from the **Tools** menu and accept the protection defaults.

- The worksheet will automatically calculate the total non-productivity benefits for each year of the project life.

Productivity Benefits Detail Worksheet(s)

In the following table, review the examples of Labor Productivity Benefits for the application areas covered by your project. Mark the benefits that apply to your project (to assist you in completing the Productivity Benefits Detail worksheets). Note any other productivity benefits for your project.

Labor Productivity Benefits (Examples by Application Area)
MAPPING AND DATA ACCESS **Automated Map Production, Data Maintenance, and Data Access** *Labor Productivity Benefit Examples* - Reduce map production and distribution costs – determine the avoided labor cost of printing and shipping annual sets of map books (in house) as well as saving of internal staff hours associated with the production of this map product. - Reduce map editing costs (internal productivity) – calculate savings by estimating reduction in labor per change order/work order multiplied by number of changes per year - Eliminate costs of research/reconciliation of inconsistent data – calculate hours currently spent on this effort, estimate a realistic level of improvement, and show the difference as a labor savings. - Reduce the cost of research and decision-making by expediting/facilitating access to critical information – calculate hours currently spent on this effort, estimate realistic level of improvement, and show the difference as a labor savings.

Labor Productivity Benefits (Examples by Application Area)

EMERGENCY MANAGEMENT AND SECURITY
Emergency Preparedness and Response/Critical Infrastructure Protection

Labor Productivity Benefit Examples

- Reduce repair and service interruption costs associated with emergencies – estimate the reduction in staff labor.

- Reduce the cost of preparing insurance claims – estimate the reduction in staff labor.

- Reduce cost of maintaining/staffing emergency operations centers and avoid/reduce other emergency preparedness costs through consolidation of roles/activities in the region – estimate labor savings from consolidation of operations center staffing.

GOVERNMENT ADMINISTRATION
Property Appraisal/Legislative (Voting) Districting/Tax Assessment

Labor Productivity Benefit Examples

- Increase productivity of appraisal staff – estimate potential time that could be saved by staff.

- Increase productivity of election planning/management staff – estimate potential time saved by staff.

QUALITY OF LIFE
Public Health and Safety/Community Services/Code Enforcement

Labor Productivity Benefit Examples

- Improve staff productivity by reducing travel time and numbers of trips – estimate potential savings in staff time.

- Reduce field infrastructure repair costs through more effective management of wild animal populations (e.g., armadillos, moles) that damage infrastructure – estimate potential reduction staff time required for repairs.

Labor Productivity Benefits (Examples by Application Area)

FIELD INFRASTRUCTURE MANAGEMENT
Management of Roads and Utility Lines/Capital Improvements/Maintenance

Labor Productivity Benefit Examples

- Improve field crew productivity by reducing travel time – estimate potential reduction in staff travel time.

- Reduce operations and maintenance costs by avoiding breakdowns and optimizing programmed activities (better planning and scheduling of proactive work, equipment take-downs, and routine repairs) – estimate potential savings from avoidance of breakdowns (staff time).

- Reduce cost of repair by expediting access to asset and maintenance information (faster repairs) – estimate potential reduction in time to make repairs.

- Reduce cost of capital project planning (better asset performance and condition information) – estimate potential savings in project planning cycle (reduced labor time).

- Reduce cost of line locate program by eliminating trips to locations that do not have assets – estimate potential savings from reduced staff time.

- Reduce cost of special projects/repairs by sharing common costs with other agencies working in the area – estimate potential labor savings from cost sharing (only digging once).

Labor Productivity Benefits (Examples by Application Area)

FACILITY MANAGEMENT
Management of Plants, Buildings, and Property/Capital Improvements/Maintenance

Labor Productivity Benefit Examples

- Reduce operations and maintenance costs by avoiding breakdowns and optimizing programmed activities (better planning and scheduling of proactive work, equipment take-downs, and routine repairs) – estimate potential savings from avoidance of breakdowns (staff time).

- Reduce cost of repair by expediting access to asset and maintenance information (faster repairs) – estimate potential reduction in time to make repairs.

- Reduce cost of inventory by streamlining requirements for on-hand stock (supporting more just-in-time procurement) – estimate potential for reduced storage facility staffing.

- Reduce operating costs by improving source quality (e.g., influent, power) – estimate staff time savings.

SERVICE DELIVERY
Call Management/Outage Management/Dispatch

Labor Productivity Benefit Examples

- Improve productivity of field crews through reduced travel time and reduction/elimination of duplicate work orders – estimate potential savings in labor time.

- Reduce cost of call management by reducing transfers and expediting call processing (internal productivity benefit and/or avoidance of new call taker positions) – estimate the labor hours or positions saved.

Labor Productivity Benefits (Examples by Application Area)

CUSTOMER RELATIONSHIP MANAGEMENT
Usage or Consumption Analysis/New Service Planning/Customer Compliance

Labor Productivity Benefit Examples

- Reduce wastewater treatment costs by improving influent quality and/or reducing illegal discharge to the sewer system. Model changes in wastewater treatment processes if there were no sudden loads to the system. Use results to estimate potential labor savings with greater equilibrium in system.

- Reduce storm water system maintenance costs by reducing illegal discharges/dumping. Model effects of illegal discharges on storm water system. Model system without illegal discharges. Estimate potential reduction in maintenance costs (staff time) without illegal discharge.

Labor Productivity Benefits (Examples by Application Area)

ENGINEERING
Planning/Design/Construction/System Analysis/Network Modeling

Labor Productivity Benefit Examples

- Reduce the cost of preliminary design by reducing/eliminating the need for *ad hoc* aerial photography and mapping – calculate the labor hours that would have been associated with managing the aerial photography and *ad hoc* mapping.

- Reduce the cost of preliminary design by expediting/automating the production of alternative designs (internal productivity improvement or reduced consulting fees) - calculate the savings in time for producing an alternative design multiplied by the optimum number of alternative designs.

- Reduce the cost of design by expediting access to relevant data (internal productivity) – estimate staff time savings.

- Reduce the cost of construction and/or land acquisition through design optimization and better site/corridor selection – evaluate current costs for land acquisition and construction costs related to siting issues and make prediction of labor savings with improved information and analysis capabilities.

- Reduce the cost of construction through more efficient inspections and construction management/coordination - estimate the time saved by providing data to inspectors in the field, including not only inspectors time but other staff time affected by this improvement.

- Reduce cost of model maintenance by consolidating generalized and detailed models, eliminating redundant maintenance of node and link data, and/or reducing software license requirements – calculate labor costs of maintaining redundant data.

- Reduce cost of communicating model results – calculate labor costs associated with this effort.

- Reduce cost of operations through more effective modeling – evaluate labor-related operations costs associated with overbuilt/underbuilt systems.

- Improve model accuracy and timeliness – estimate time saved through improved modeling, and determine labor saved as a result.

Labor Productivity Benefits (Examples by Application Area)

LAND MANAGEMENT
Development Review/Zoning/Permitting/Land Use Analysis

Labor Productivity Benefit Examples

- Reduce the cost of internal development review, permitting, and/or inspections (internal productivity) – estimate potential savings in staff time.

- Reduce the cost of joint development review (better regional communication – reduce lag time and additional reviews; productivity) – estimate potential savings in staff time.

- Avoid costs associated with duplicate or otherwise undesirable street names or addresses (e.g., avoid dispatch to wrong location and/or confusion of field personnel –estimate potential savings in staff time.

REGULATORY COMPLIANCE
Permit Application/Monitoring Programs/Compliance Management

Labor Productivity Benefit Examples

- Reduce the cost of assembling permit application/renewal documentation – estimate potential staff time savings.

- Reduce report development and submittal costs (productivity benefits of automated reporting) – estimate potential staff time savings from automated reporting.

- Reduce cost of sampling/monitoring by optimizing routes and sample point selection – estimate potential staff time savings.

Labor Productivity Benefits (Examples by Application Area)

ENVIRONMENTAL MANAGEMENT
Natural Resource Preservation/Watershed Protection/Weather Monitoring

Labor Productivity Benefit Examples

- Avoid or minimize fines or restoration costs associated with environmental damage – estimate potential labor savings due to avoiding environmental damage by modeling various damage scenarios and determining cost-avoidance opportunities.

- Reduce production/treatment costs by controlling land use and management (e.g., agricultural techniques, waste disposal methods, pesticide/herbicide use) that affect operations – model effects on production/treatment of uncontrolled conditions. Determine optimum control methodology from a variety of options. Estimate potential staff time savings versus less desirable options.

- Reduce reactive maintenance costs by assembling resources in advance of uncontrollable conditions (e.g., weather) that affect demand and/or operations – estimate potential savings from avoidance of assembling resources on an emergency basis (reduced labor).

Complete a Productivity Benefit Detail worksheet for each job category that will have productivity benefits. The Productivity Benefit Details sheets are numbered 1 through 29[34], and each displays one job category from your Current Labor Rates worksheet.

- Open the first Productivity Benefit Detail sheet. On the first line under Specific Productivity Benefits, describe the source of a productivity benefit experienced by this job category. If you are quantifying the value of hours saved for this job category[35], you may use the space in the Specific Benefit column to cite the hours saved per position and the total number of positions affected to arrive at a total hours saved.

  For each year of the project life, fill in the hours or FTEs saved as a result of this specific benefit[36, 37]. If you are quantifying hours saved, you should enter the total number of hours saved for all positions in this category. If you are valuing productivity gains strictly as FTEs eliminated, then enter the number of FTEs eliminated as a result of this benefit source. Use fractional FTEs only if you are eliminating part-time positions or you are eliminating a position in the middle of a particular year[38]. Repeat this process for additional sources of productivity benefits (each on a new line). If you are recasting an internal labor cost as a reduced productivity benefit, list the internal labor activity on a Specific Productivity Benefit line and enter the hours (or FTEs) as negative values.

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[34] You may have more or fewer detail sheets if you added or deleted them while preparing your Current Labor Rates worksheet.

[35] See instructions for the Project Setup worksheet for more details on decisions related to the quantification of labor savings.

[36] For evaluations of proposed future investments, you may wish to reduce the total hours or FTEs based on a less than 100% probability that the benefit will occur. If you choose to do so, make a note of your assumption in the description of the specific productivity benefit. For example, if you estimate a labor savings of 1600 hours per year due to elimination of manual research of utility availability, but you believe this benefit is only 75% likely to occur (pending the outcome of a city code amendment that is under review, for example), you would note this in the benefit description. Note that 1600 X 75% = 1,200, and show a savings of 1,200 hours in the relevant project years.

[37] You may use this worksheet to indicate hours or FTEs saved by avoiding the creation of new positions in a particular job category if these new positions would be required in the absence of the project under analysis. However, consult with your finance department regarding the total number of positions you are assuming would have been (or would have to be) created in the absence of the project.

[38] If you are eliminating an FTE as the result of multiple productivity benefit sources, you can list them all on one line, or you can itemize them and show fractional FTE savings. If you choose to show fractional FTE savings, check the Totals line at the end to ensure that your line items add up to whole FTEs (unless you need a fractional total to account for part time positions or mid-year elimination of an FTE).

- If you need more lines, you can insert rows above the totals line[39].

- Complete a Productivity Benefit Detail worksheet for each job category that benefited from (or will benefit from) the project. If there are no benefits for a particular category, simply leave the corresponding sheet blank.

- When you have completed all the detail sheets, return to the first Labor Productivity worksheet (the summary worksheet) to review the totals (see previous section).

Performing Sensitivity Analysis

If you are preparing an evaluation of a proposed future investment, you should run additional analyses to determine the sensitivity of your financial indicators to the values you have assumed (estimated) for key project costs and benefits.

- First, save a copy of your completed Financial Details workbook under a new name. The name of this copy should clearly indicate that the file is used for sensitivity analysis (to minimize risk of confusion with the original workbook).

- In the new copy of your workbook, modify a variable on which you wish to conduct sensitivity analysis. This may be the dollar value or the timing of one or more costs or benefits.

  – For example, if you projected internal labor usage at 2,000 hours, but there is a chance it may be as high as 6000 hours, modify the labor usage and review the impact on your financial indicators. If you anticipated an ongoing labor productivity benefit of two FTEs beginning in Year 2, but you may not be able to eliminate the FTEs until as late as Year 5, modify the appropriate Productivity Benefit Detail sheet to delay the labor savings.

  – You may wish to consider the high and low ends of the ranges for various estimates. For example, if you have a regulatory fine avoidance benefit of $50,000, but the fine could be anywhere from $10,000 to $100,000, look at the impact of using both the low and the high values. Refer to the research publication *A Practitioners Guide to Business Case Development and Return on Investment Methodology for Geospatial Information Technology* for more information about the reasons for sensitivity analysis.

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[39] Unprotect the sheet by selecting **Protection** - **Unprotect Sheet** from the **Tools** menu. Highlight the totals row by clicking on the row number label at the far left, and choose Rows from the Insert menu. When you are done inserting rows, choose **Protection** – **Protect Sheet** from the **Tools** menu and accept the protection defaults.

- Each time you change a variable, return to your Financial Analysis worksheet to see the impact on the key financial indicators. If you wish, you can save a separate workbook for each sensitivity analysis and attach this to your business case. Alternatively, you can simply make a note of the variable modified and the impact on the financial metrics.

- To run sensitivity analysis for the overall project, first complete the instructions in Part 3 to set up your original Multiparticipant Summary Workbook. Then, follow the instructions in Part 3 to create a "working copy" of the Summary Workbook in a separate directory from the one that holds your original summary analysis. Save copies of each of the participant workbooks in the working directory. With your Summary Workbook open, modify assumptions and variables in one or more of the participants' Financial Details workbooks. Check the Summary Workbook to see the impact on the financial matrics for the overall project.

PART 3. INSTRUCTIONS FOR THE MULTI-PARTICIPANT SUMMARY

The following instructions explain how to complete the Microsoft® Excel workbook that provides the Multi-participant Summary financial metrics.

Preparation

Complete Financial Details Workbooks for each participating agency using the same template. You can link up to 20 different individual workbooks to a Multiparticipant Summary Workbook[40].

Choose the multi-participant workbook template that reflects the investment timing (past or future) and the length of the project life (5, 10, or 20 years) that was used for the each of the Financial Details Workbooks. You can customize the length of the project life if desired[41].

When you open the Multiparticipant Summary Workbook, you will be asked whether you wish to update links. Click the **Don't Update** button[42].

From the **Edit** menu, choose the **Links** option. You will see a list of 20 linked data sources beginning with A.xls and running through T.xls. Select the first link (A.xls) and click the **Change Source** button. Use the file directory window to select the directory and file name of your first participant's Financial Details Workbook. Then select the B.xls link, and change the source to your second participant's Financial Details Workbook. Continue this process until you have linked all participants' workbooks[43].

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[40] If you have more than 20 participants that require separate Financial Details Workbooks, you can create multiple "Child" Multi-participant Summary Workbooks and link these to the "Parent" Summary Workbook. If you use this technique, the "child" summaries should all be based on the same template file. Be sure to include a group name at the top of the "child" summary setup sheet; this name will carry forward to the "parent" summary setup sheet.

[41] It is easier to remove extra years than to add new ones, so if you want to customize the project length, start with a workbook that covers a longer period than what you desire. For example, if you want to analyze a 12-year project life, start with one of the 20-year workbooks.

[42] You should not update links until you have defined your links to participants' Financial Details Workbooks and saved your summary. After setting up the summary, you may choose to update values from linked sources each time you open the summary (or at any time by going to the **Edit, Links** menu.)

[43] If you have more than 20 workbooks to link, first create "child" summaries by linking up to 20 Financial Details Workbooks to a Multiparticipant Summary template. Then, create the master Multiparticipant Summary and link it to the child summaries. When you change the source from the **Edit, Links** menu, you may choose either a Financial Details Workbook or a "child" Multiparticipant Summary Workbook. In either case, the linked workbooks must use the same project period and starting year.

IMPORTANT: Start with the A.xls link. The Multiparticipant Summary Workbook takes its year labels from this source.

IMPORTANT: The Multiparticipant Summary templates will open with worksheet protection turned off on the Project Summary Sheet so that you can easily create the links to the source Financial Details workbooks. You should protect this worksheet as soon as you have established the links so that you do not inadvertently overwrite a formula. From the **Tools** menu, choose the **Protection** option, and then choose **Protect Sheet**. Accept the default protection options and click **OK**.

NOTE: If you move or rename a participant's Financial Details Workbook after you have linked it to the summary, Microsoft® Excel will not be able to locate it and will prompt you to specify the source location the next time you update links. Follow the prompts to reestablish the link to the new source file path and name. You will have to unprotect the worksheet to update the link and then reprotect it afterwards.

You may add new participants at any time by unprotecting the summary sheet and using the **Links** option from the **Edit** menu to change the source for the next available link. Remember to reprotect the worksheet afterwards. If you had previously deleted the letter "label" for the new participant on the summary sheet, retype the label, and the participant's workbook information will appear.

Summary Setup Worksheet

Complete the Summary Setup sheet (first sheet) on the Multi-participant Summary Workbook.

- Ensure that the Summary Setup Sheet is protected. From the **Tools** Menu, choose **Protection**. If you see the option **Unprotect Sheet**, this indicates that the worksheet is protected; click anywhere in the body of the worksheets to leave the **Tools** menu. However, if you see the option **Protect Sheet**, then click on the **Protect Sheet** option, accept the default protection settings and click **OK** to finish protecting the worksheet.

- Enter the name of the project on the top line of the setup sheet.

- Enter the date you intend to complete and submit your analysis.

- Enter the name of the consortium that is supporting the project. If there is no formal group or consortium, use the **Delete** key to remove the contents of the consortium name cell. When the cell contents are deleted, the label at left will also disappear. It will reappear if you later decide to add a group name.

- The next section of the setup sheet summarizes the key financial metrics. These values will change automatically as you link and update participating agencies' Financial Details Workbooks. The cells will contain zeroes or related error messages (such as #DIV/0 or #VALUE) until you have linked at least one valid Financial Details Workbook. The metrics

on the Summary Setup sheet relate to the project as a whole and may differ from the metrics for each individual participant.

- Enter an average inflation rate for the project period. This inflation rate should reflect a general increase in the cost of goods and services. The worksheet suggests a value of 2.5% for the general inflation rate, but you should replace this value with an inflation assumption that is acceptable to the finance departments of participating agencies. NOTE: It is acceptable to use different inflation rates within each agency's individual Financial Details Workbook, but for the summary financial analysis, you will have to select one inflation rate for determination of the shared investment's discount rate.

- Enter the annual cost of capital for purposes of calculating present values[44]. The worksheet suggests a value of 5%, but you should replace this value with an assumption acceptable to the finance departments of each participating agency. NOTE: It is acceptable to use different costs of capital within each agency's individual Financial Details Workbook, but for the summary financial analysis, you will have to select one cost of capital for determination of the shared investment's discount rate.

- The project life is taken from the workbook you selected when you changed the source for the A.xls link. If the project life is different than the standard life of your template file, you will need to adjust the project length in your Multiparticipant Summary Workbook:

  - *If you need to reduce the length of the project,* you will first need to unprotect the setup worksheet[45]. Highlight rows 57 through 106 (rows 58 through 105 are hidden). Choose **Unhide** from the **Rows** option on the **Format** menu. Then, go to the *last* column in which project year labels are displayed, select the cells in rows 61 through 105 for each of the columns you wish to eliminate, and then clear the cells by going to the **Edit** menu and selecting **Clear**, **All**. IMPORTANT: Clear from the end of the project life, not the beginning. Then, re-hide the rows and reprotect the worksheet[46]. Next, go to the Financial Summary worksheet. Unprotect the worksheet, highlight the full columns you

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[44] This is the annual rate of return that could be expected from an alternative investment that is forgone in order to fund the project being analyzed. Some organizations use the return on a secure investment like government bonds. The cost of capital is used to convert future cash flows into current (present) values and to convert historical cash flows into inception year dollars. Refer to the research publication for a more detailed explanation of the opportunity cost of capital.

[45] From the **Tools** menu, choose **Protection** and then choose **Unprotect Sheet**.

[46] To re-hide the rows, highlight the entire row for rows 57 through 105, and then go to the **Format** menu and choose **Rows**, **Hide**. To reprotect the worksheet, go to the **Tools** menu and choose **Protection** and then choose **Protect Sheet**. Accept the protection options displayed.

wish to eliminate, and clear the cells by going to the **Edit** menu and selecting **Clear**, **All**
Then, reprotect the worksheet.

–   *If you need to <u>increase</u> the length of the project,* you will first need to unprotect the setup
    worksheet[47]. Highlight rows 57 through 106 (rows 58 through 105 are hidden). Choose
    Unhide from the **Rows** option on the **Format** menu. Then, go to the *last* column in
    which project year labels are displayed and copy the cells in rows 61 through 105[48].
    Then, click in the cell in row 61 that is immediately to the right of the column you just
    copied and choose **Paste** from the **Edit** menu. Continue copying and pasting cells until
    you have increased the project life to the desired length. Then, reprotect the worksheet[49].
    Next, go to the Financial Summary worksheet. Unprotect the worksheet, highlight the
    farthest data column to the right and copy it[50]. Paste directly in the column to its
    immediate right[51]. Repeat this process until you have added as many new columns as
    you need. Then, reprotect the worksheet.

- All of your linked financial workbooks will appear in the participant list on the summary setup
  sheet. The list includes an editable row label (A-, B-, etc.) and a read-only view of each
  participant's name, workbook file name, and key financial assumptions and metrics from each
  participant's internal analysis of the project.

- The Summary Sheet will warn you if there is a discrepancy between the summary project length
  or starting year and a participant's project length or starting year. NOTE: All participants'
  workbooks must use the same project length and starting year. Financial data cannot be
  consolidated properly if participants use different time periods. If you see this error message,
  adjust the year labels in the participant's Financial Details Workbook to match the standard for
  the project.

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[47] From the **Tools** menu, choose **Protection** and then choose **Unprotect Sheet**.

[48] Click the mouse on the cell in row 61 and, holding the button down, drag the highlight down to include the
cell in row 105. Then, from the **Edit** menu, choose **Copy**.

[49] From the **Tools** menu, choose **Protection** and then choose **Protect Sheet**. Accept the protection options
displayed.

[50] Click on the column header to select the entire column. Then choose **Copy** from the **Edit** menu.

[51] Click on the column header to select the entire column. Then choose **Paste** from the **Edit** menu.

- If you have linked fewer than 20 source documents, delete the unused letter labels in the participant list. This will clear the row. If you later decide you want to use that link for a new participant, you can retype the label, and the linked document data will reappear[52].

Financial Summary Worksheet

This worksheet summarizes costs and benefits for each participating agency, converts them into present values using the cost of capital and inflation rate from the Summary Setup Worksheet, and calculates the net present value (or net value in inception year dollars), annual return on investment, breakeven point, and payback period. All fields on this worksheet are calculated automatically.

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[52] If you choose to break the links to unneeded sources in the **Edit, Links** menu, the links cannot be reestablished, and you will have to create a new summary workbook if you ever want to add participants. It is better not to break the links.