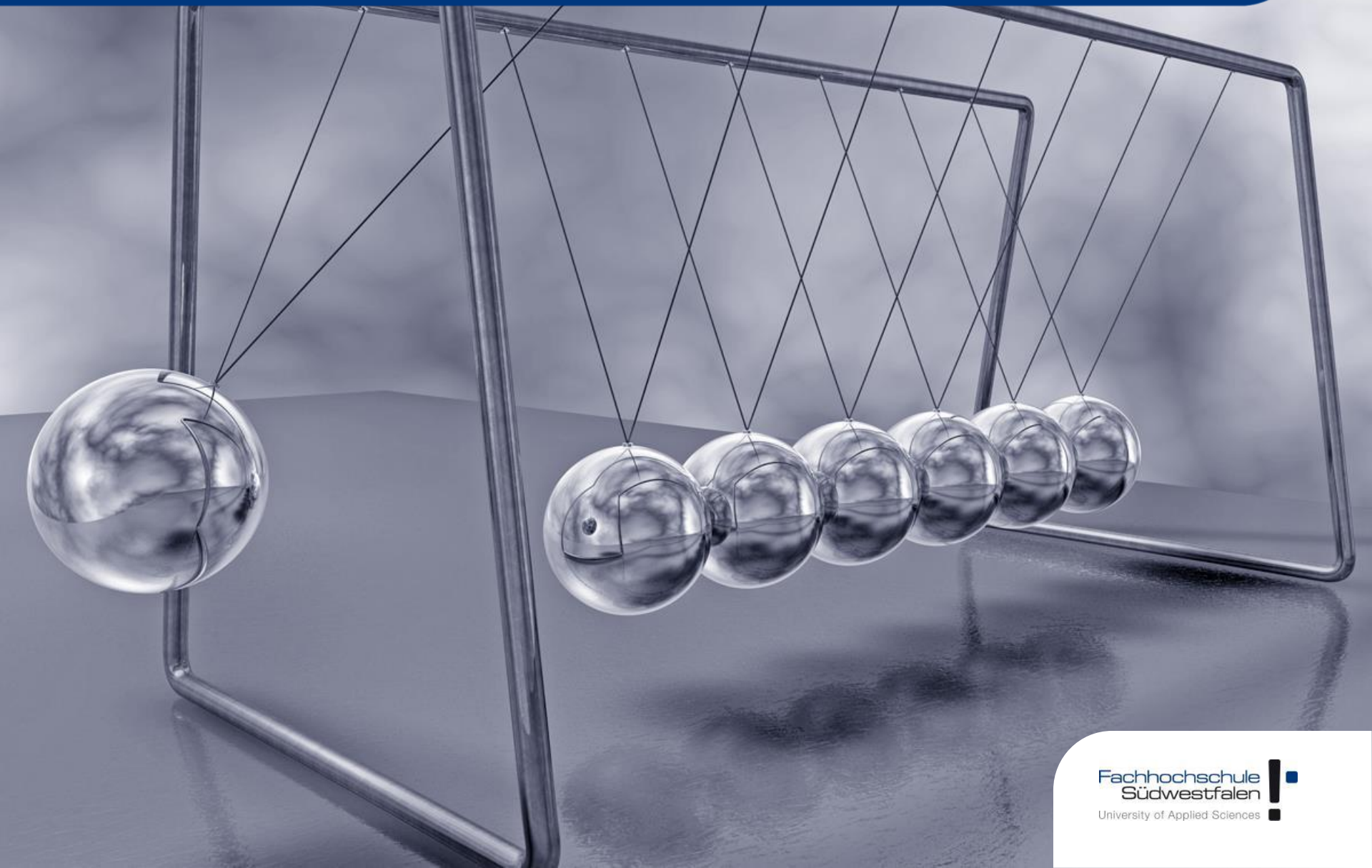
Problem Solving Using Spreadsheet Software – Block 3



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Introduction to Goalseek

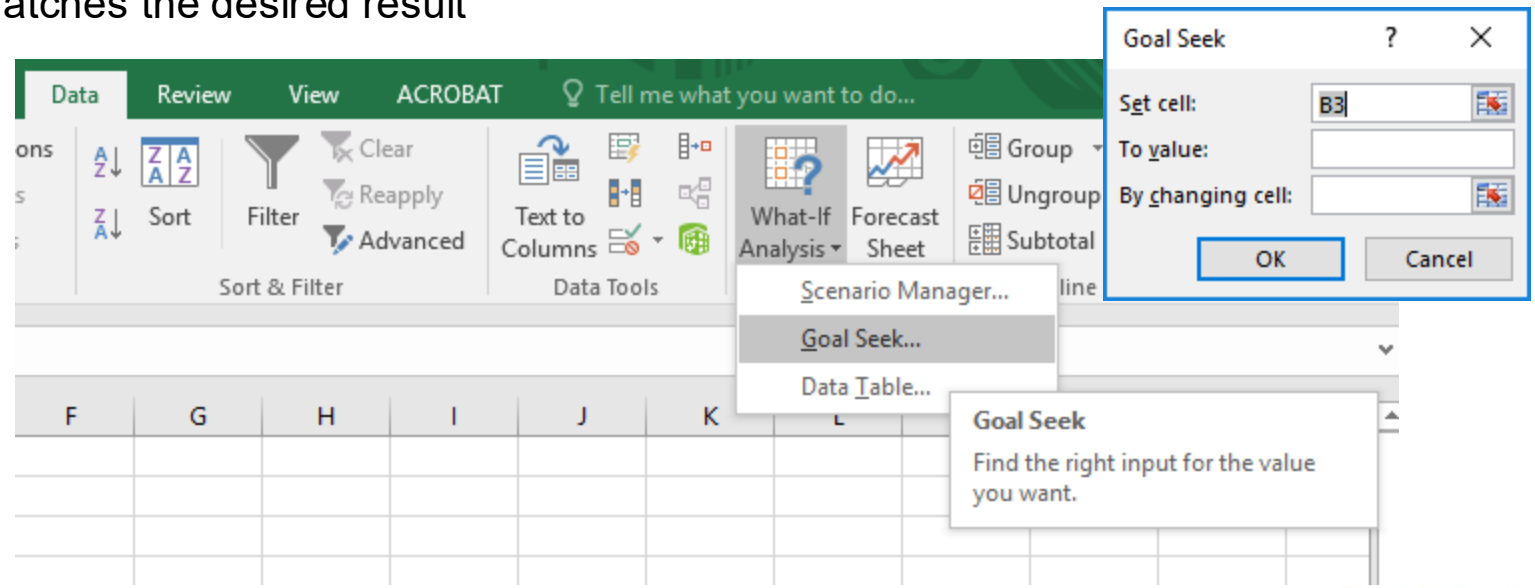
Introduction to Scenario Manager

Exercise: Build a project plan

Goal Seek can be used to find input values when you know the result (using trial-and-error)

- Assume you know the formula and the desired result, but
  - … you are missing one input parameter
  - … and the equation cannot be easily transposed

- Goal Seek applies a trial and error approach and changes one cell until another cell matches the desired result



Example: Interest rate (1/2)

- Assume you want to loan 100.000 USD/EUR for 15 years. You know that you can pay back 900 USD/EUR each year and want to know the interest rate for such a setup
- Open a new, blank worksheet
- First, add some labels in the first column to make it easier to read the worksheet
  - In cell A1, type Loan Amount
  - In cell A2, type Term in Months
  - In cell A3, type Interest Rate
  - In cell A4, type Payment
- Next, add the values that you know
  - In cell B1, type 100000. This is the amount that you want to borrow. Format as input field in the accounting number format
  - In cell B2, type 180. This is the number of months that you want to pay off the loan. Format as input field
  - Only format cell B3 as input field in percentages
  - In cell B4, type =PMT(B3/12,B2,B1). This formula calculates the payment amount. Format as output field in the accounting number format

Example: Interest rate (2/2)

- Because there is no value in cell B3, Excel assumes a 0% interest rate and, using the values in the example, returns a payment of 555.56 USD/EUR. You can ignore that value for now
- On the Data tab, in the Forecast group, click What-If Analysis, and then click Goal Seek
- In the Set cell box, enter the reference for the cell that contains the formula that you want to resolve. In the example, this reference is cell B4
- In the To value box, type the formula result that you want. In the example, this is -900. Note that this number is negative because it represents a payment
- In the By changing cell box, enter the reference for the cell that contains the value that you want to adjust. In the example, this reference is cell B3
- Click OK. Go seek now runs and finds the interest rate in B3 so that B4 equals -900

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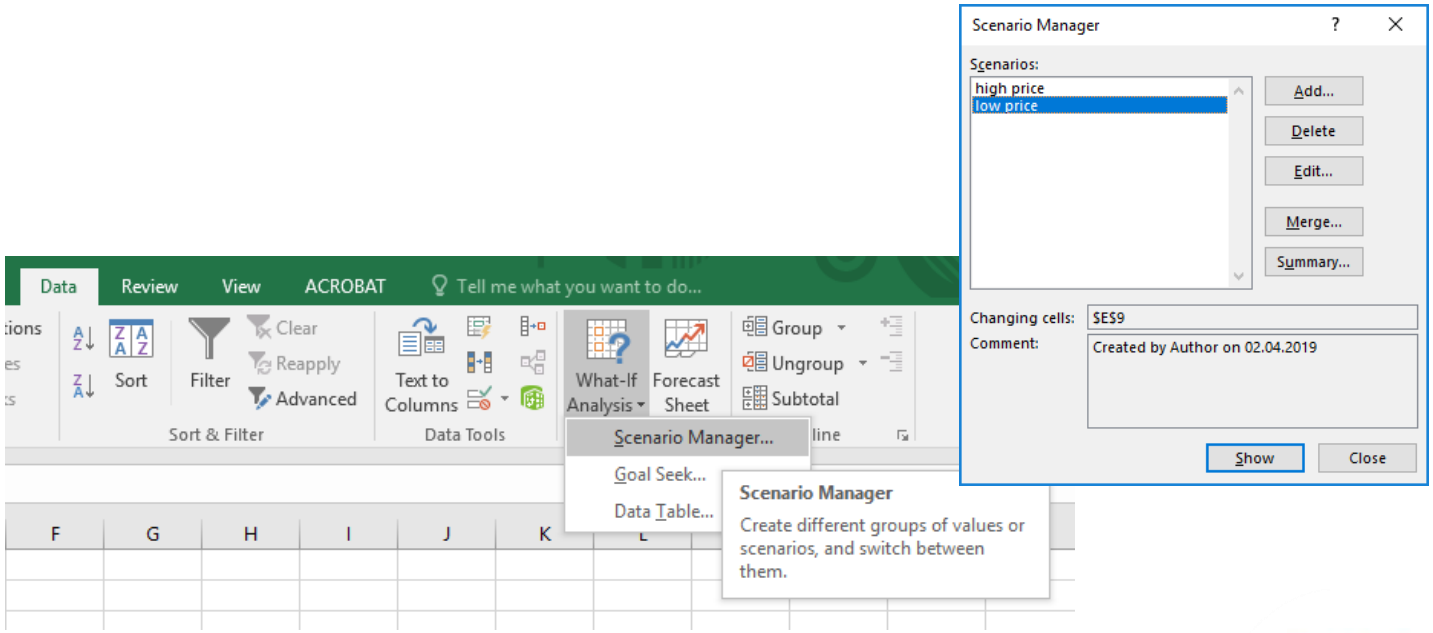
Introduction to Goalseek

Introduction to Scenario Manager and IF

Exercise: Build a project plan

Different scenarios can be analyzed using the Scenario Manager

- A Scenario is a set of values that Excel saves and can substitute automatically on your worksheet. You can create and save different groups of values as scenarios and then switch between these scenarios to view the different results
- After you have all the scenarios you need, you can create a scenario summary report that incorporates information from all the scenarios.



Example: Two scenarios for profit

- Assume you want to calculate the gross profit of an enterprise in two scenarios (best case and worst case scenario)
- Create a quick spreadsheet that calculates Gross Profit as Gross Revenue – Cost of Goods Sold

	A	B	C
1	*Scenario Manager Exercise*		
2			
3		Item	Value
4		Gross Revenue	
5		Cost of Goods Sold	
6		Gross Profit	- €
7			

- Open Scenario Manager
  - Add a worst case scenario with a Gross Revenue of 50,000 EUR and Cost of Goods Sold of 15,000 EUR
  - Add a best case scenario with a Gross Revenue of 150,000 EUR and Cost of Goods Sold of 42,000 EUR
- Create a Scenario Summary

Introduction to the *IF*-Function: One of the most popular functions in Excel

- The IF function allows you to make logical comparisons between a value and what you expect
- So an IF statement can have two results. The first result is if your comparison is True, the second if your comparison is False
- Syntax: =IF(<CONDITION>;<WHAT TO DO WHEN CONDITON MET>;<WHAT TO DO WHEN CONDITION NOT MET>)
- Exercise: open a new workbook
  - Create two spreadsheets
    - Rename Sheet1 to Project costs
    - Rename Sheet2 to Constants
  - Open the sheet Project costs
    - In cell A1, type Project
    - In cell B1, type Actual costs
    - In cell C1, type Over budget?
    - Add data for 3 projects in cells A2:B4 (with project names and actual costs in EUR of your choice)
  - Open the sheet Constants
    - In cell A1, type Budget
    - In cell B1, type 500
  - Open the sheet Project costs
    - In cell C2, type =IF(B2>'Constants'!B1;"Over budget";"Within budget")
    - Copy cell C2 to cells C3 and C4
  - Format all cells properly

! Save this workbook, we are using it again in a minute

? What would happen if we not use absolute references here?

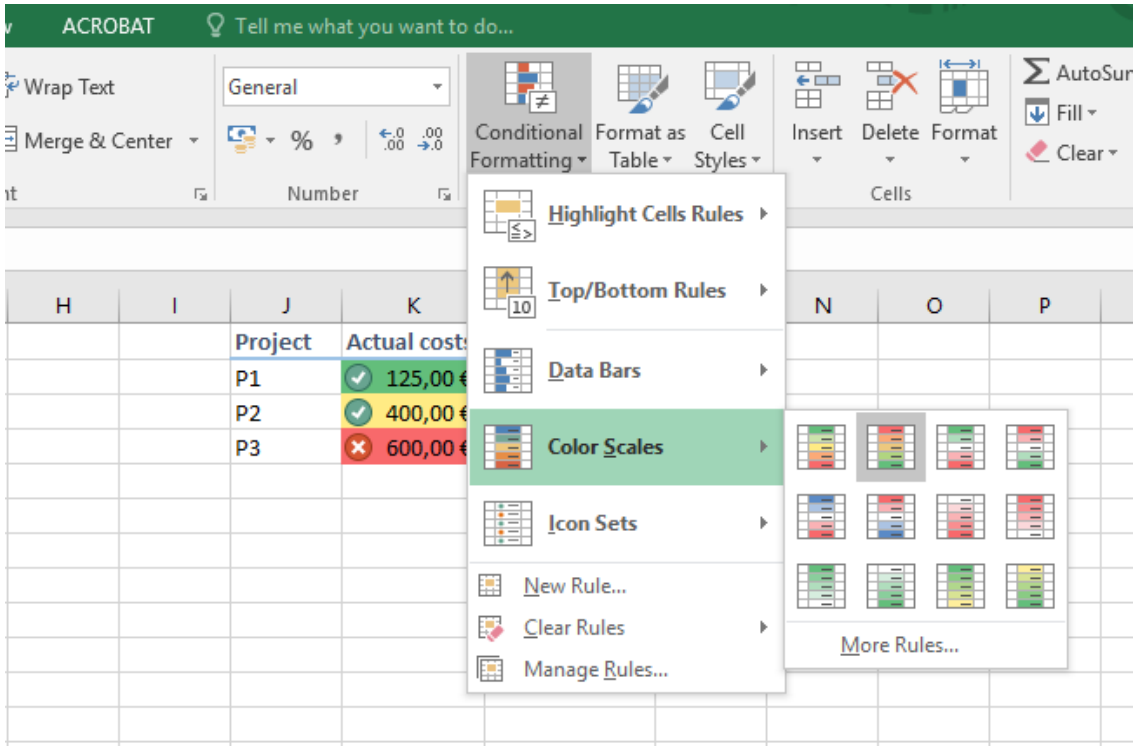
Example: Automatic evaluation in the New York Taxi Driver case (1/2)

- Open the solution for the New York Taxi Driver case from last class
- Go to the sheet results
- Delete the content of cell B7
- Include an IF statement that shows a textual evaluation of the profit difference, i.e., IF(Profit is equal, then display "Both scenarios are equal to one another", else display "Both scenarios are not equal to one another")

- Additional task: Nest two IF-formulas so that you have 3 cases
  - Scenarios are equal
  - Stay scenario is beneficial
  - Leave scenario is beneficial

Repetition: Conditional Formatting as a means to format spreadsheets based on data values

- Conditional formatting helps to visually explore and analyze data, detect critical issues, and identify patterns and trends
- Use the project cost data from before and add two conditional formats of your choice



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Example: Automatic evaluation in the New York Taxi Driver case (2/2)

- Open the solution for the New York Taxi Driver case from last class
- Use conditional formatting to highlight the favorable scenario in green on the results sheet

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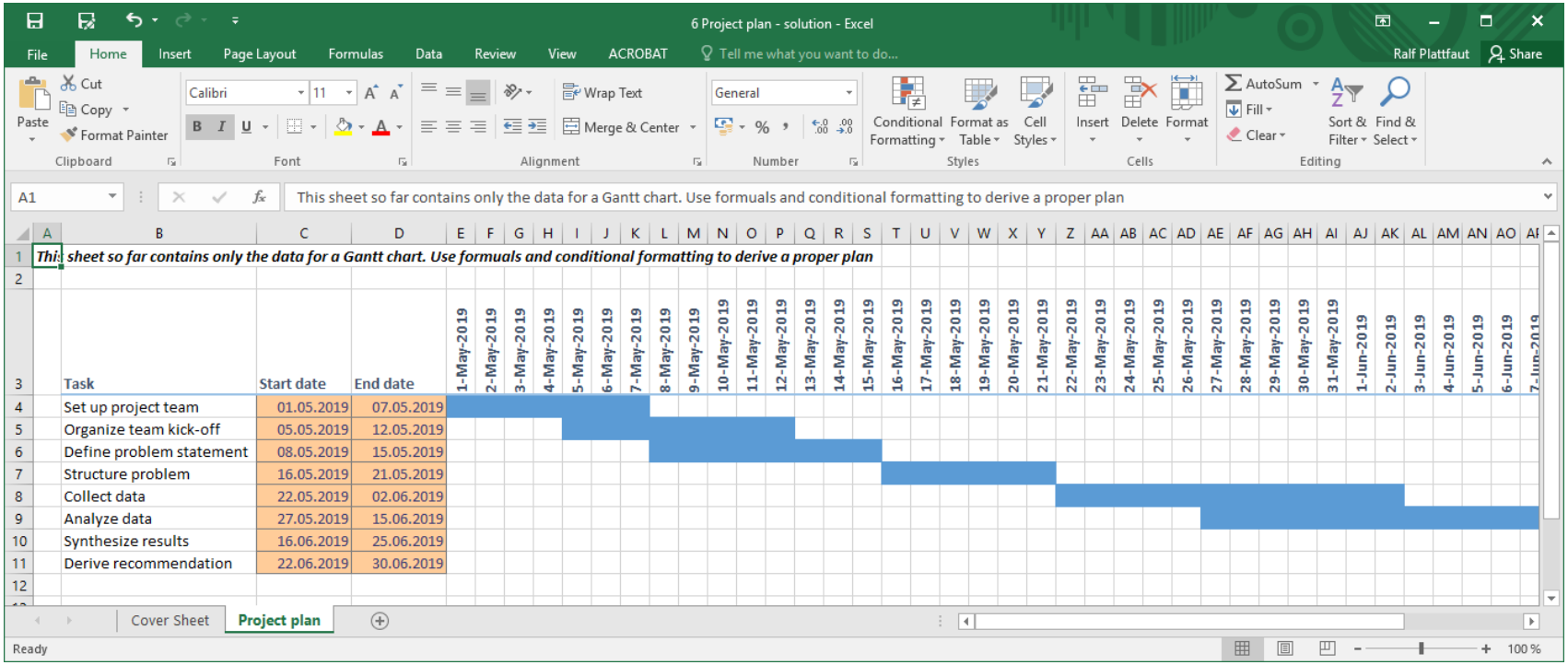
Introduction to Scenario Manager

Exercise: Build a project plan

Exercise for you: Build a simple Gantt chart in Microsoft Excel

- Open the project plan data sheet from Moodle
- Use the data to build a proper project plan/Gantt chart that looks as follows



- Hint: You can test for two conditions using the AND-formula (AND(Condition1,Condition2))