Decision Options, LLC

Do OPTIMA ™

Real Options modeler, solver and portfolio analyzer

Component of Decision Options System -

General purpose valuation, resource allocation and optimization software

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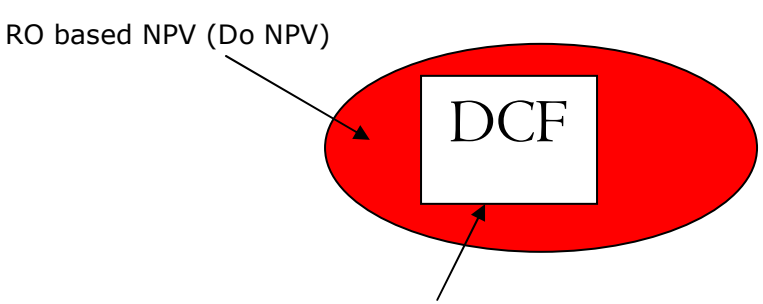
What is Real Options analysis (RO)?

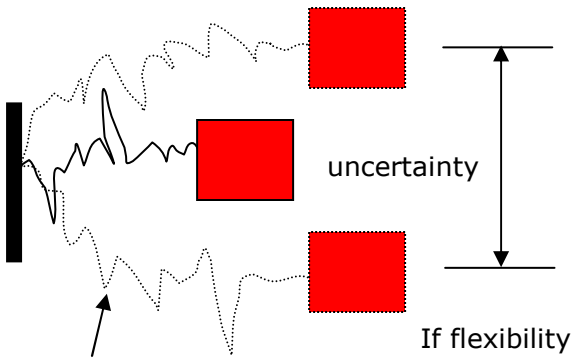
Real Options analysis is a generalized framework for the valuation of investment opportunities. "Generalized" means that it does not require the constraining assumptions that underlie the widely used Discounted Cash Flow (DCF) analysis. Valuation refers to the calculation of the intrinsic value (Net Present Value—NPV) by the use of well established economic principles. Investment opportunities refer to any decision or series of decisions that have costs and benefits over a period of time.

DCF based NPV is a sub set of RO based NPV (We call this Do NPV). DCF NPV has constraining assumptions that fall largely into two categories—Uncertainty and Flexibility. Uncertainty refers to the unpredictability of the future. Flexibility refers to the leeway decision makers have in selecting the timing, intensity and sequence of decisions. In DCF based techniques (including decision trees and scenario analyses), either one or both of these characteristics—(uncertainty and flexibility) are assumed not to exist. If uncertainty and flexibility are present (which is the case with most decisions), DCF based techniques will give erroneous results.

RO provides a generalized framework incorporating uncertainty and flexibility into decisions and is a more appropriate way to value investments



DCF NPV is a subset of Do NPV



If flexibility and uncertainty are present in decisions then DCF NPV will give erroneous

What is Do OPTIMA?

Do OPTIMA is a stand-alone component of the Decision Options System - A general purpose valuation, forecasting and optimization system. Do OPTIMA is a real options modeler, solver and portfolio analyzer. Although the primary motivation behind Do OPTIMA is RO, it also has other traditional techniques - DCF, Decision Trees and DCF NPV simulation - built into it, primarily for training purposes. This helps users of traditional techniques to slowly migrate into RO by appreciating the differences and the reasons for such differences.

Do OPTIMA uses EXCEL as a front end - for inputs and outputs. This means that the users can very easily link information to and from existing models and presentation templates. It is also built on the .NET framework allowing web services based server end with easy scalability in the enterprise.

Do OPTIMA has graphical modeling capabilities allowing users to easily draw out their decision problems using intuitive decision tree like structure. The outputs are provided in both graphical and numerical fashion allowing the users to quickly grasp the insights generated by the analysis.

Installation and implementation are quick and painless with one click setup on a PC running Windows 2000 or XP with EXCEL and a web connection.

- Excel based front end
- Graphical modeling of decisions
- Powerful Real Options solver
- Portfolio analysis
- Web Services for enterprise scale
- Decision trees, DCFNPV comparison
- Sensitivity and impact analysis
- Heuristics analysis
- Extensive graphical outputs

Installing Do OPTIMA

Place the Do OPTIMA CD in the drive and run setup.

First time you start the program, it will ask you for credentials including your name, company name and email. If you are given specific credentials, provide them. Otherwise, use the following:

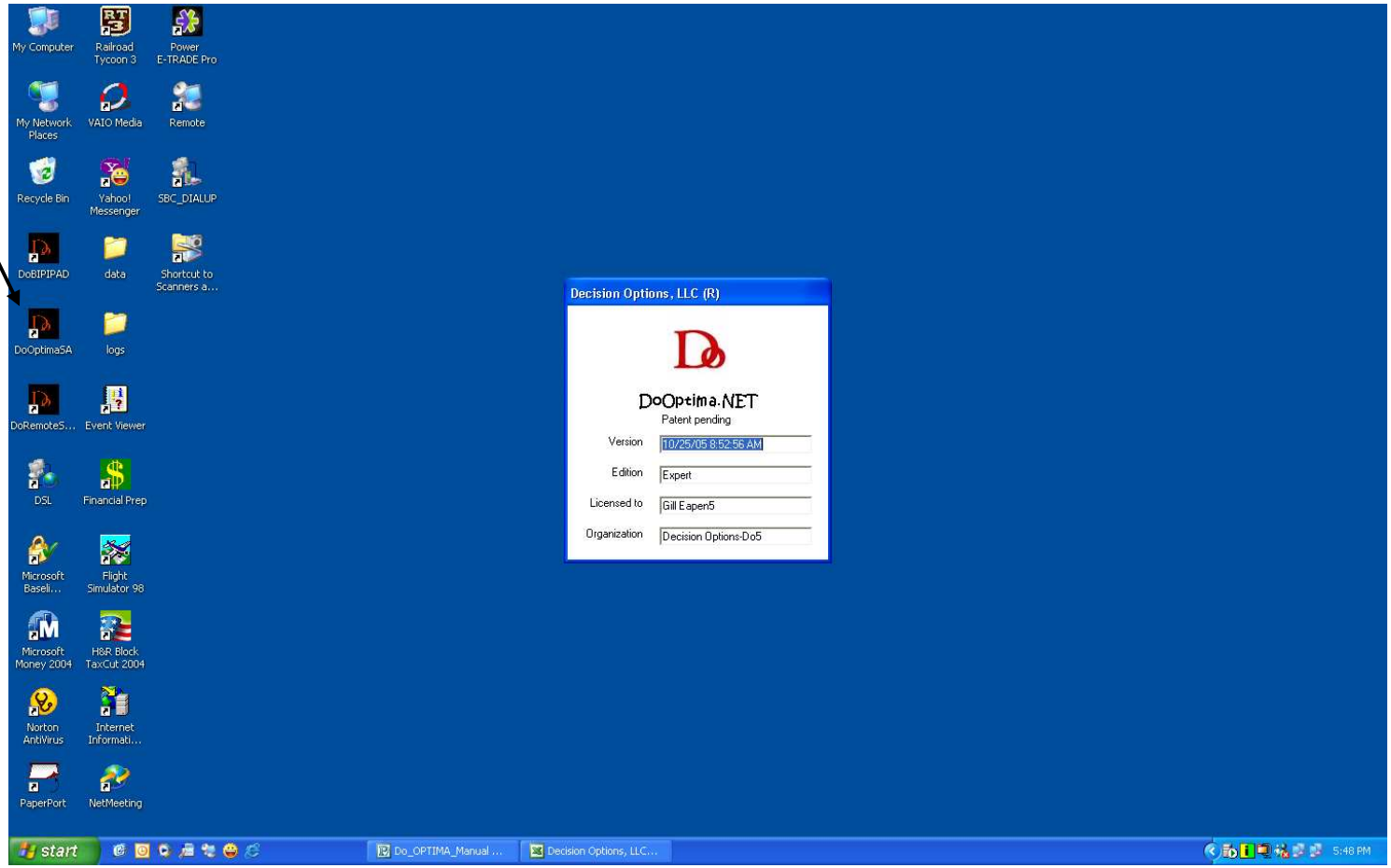
Your name = Do_YourName
Company Name = Do_CompanyName
Email = Do_Email

(please replace YourName, CompanyName and Email with appropriate information. This information will be used to write a local license on your computer and the licensing agreement will be between Decision Options and the details provided here.

Answer "YES" or "OK" to all prompts. Do not change the installation location if given a choice during the installation process. Accept the location suggested by the installation program.

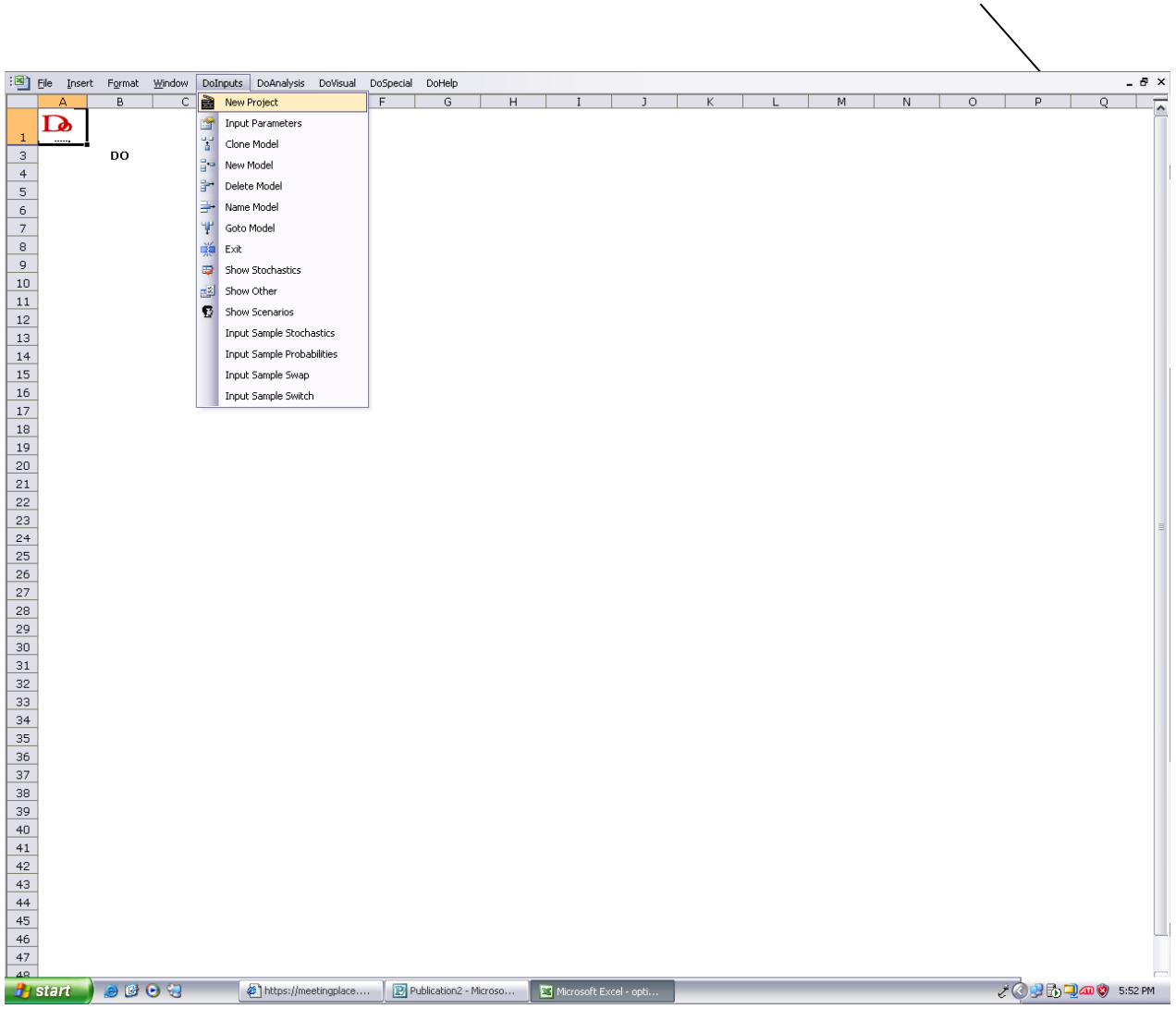
Initiating Do OPTIMA

Do OPTIMA (and EXCEL) starts up when you click on the Do ICON on your desktop / PROGRAMS folder



Staring a new problem

To start a new problem, click on DoInputs and the "New Project"



Solving a problem

Problem description:

A technology company is considering buying a patent from an inventor. The idea in the patent requires 1.5 - 5 years development (expected 3 years) with a total cost of $30 - $75 mil with an expected cost of approximately $50 mil. The company expects to break the development into three phases of similar duration and costs. They expect a technical success rate of 3 in 4 based on similar technologies in the past. The information about technical success is obtained as the company does development.

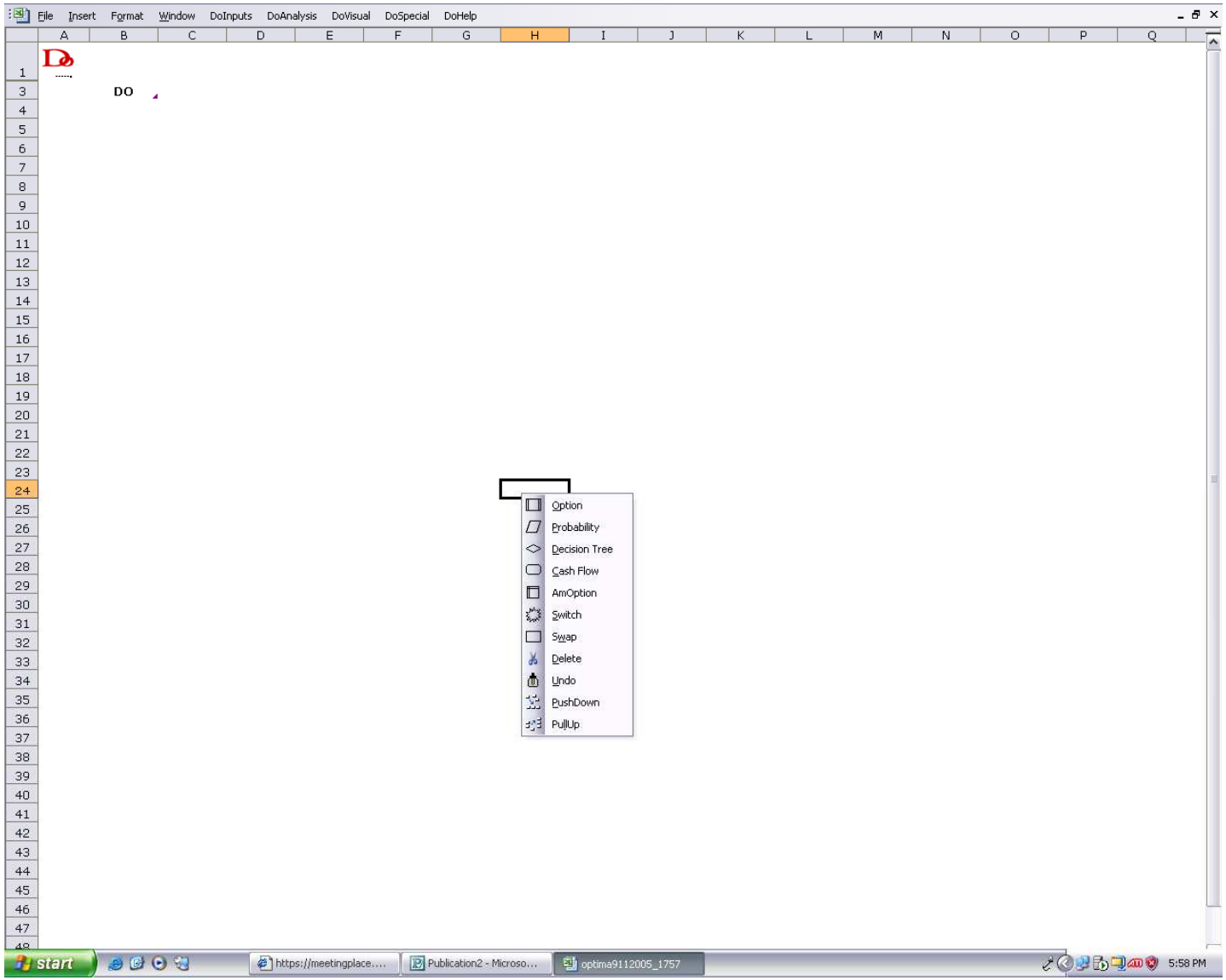
If the product succeeds, the product is expected to have a market value of $200 mil (a range of $50 mil—$500 mil). This is the NPV at market with the appropriate discount rate. Another model can be constructed to simulate this if the factors affecting market value need to be separately modeled (not explained here)

If the development fails in the last stage (but succeeded in the first two), the company can sell the idea to the Government for further research and enhancement. This will fetch $10 - $35 mil with an expected level of $20 mil. Administrative costs are expected to be $10 mil. The company may have 2 years to decide on this.

What is the value of this patent?

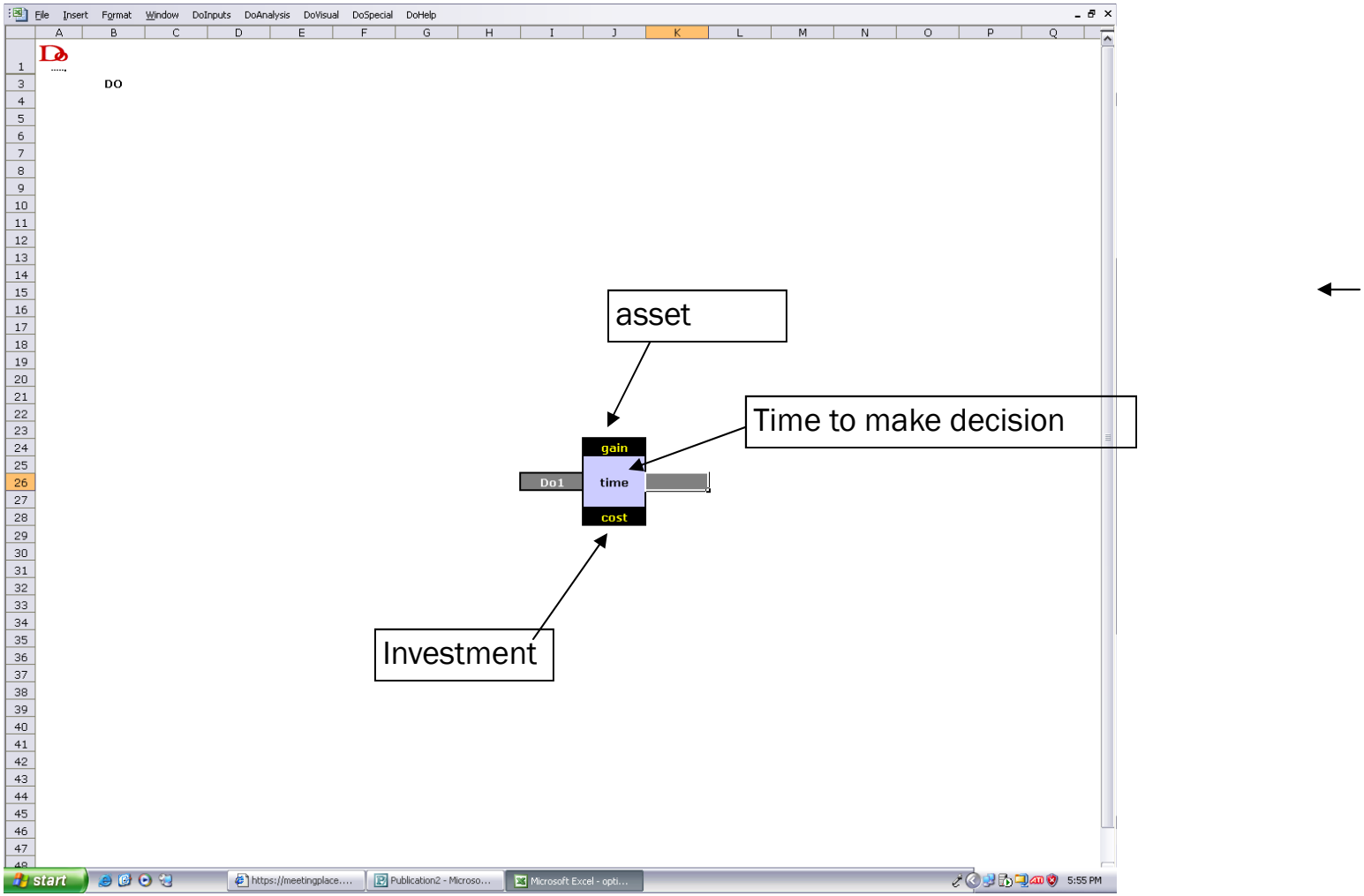
Introduce a model

Decision Options can be introduced in the Model Sheet by clicking on the right mouse button



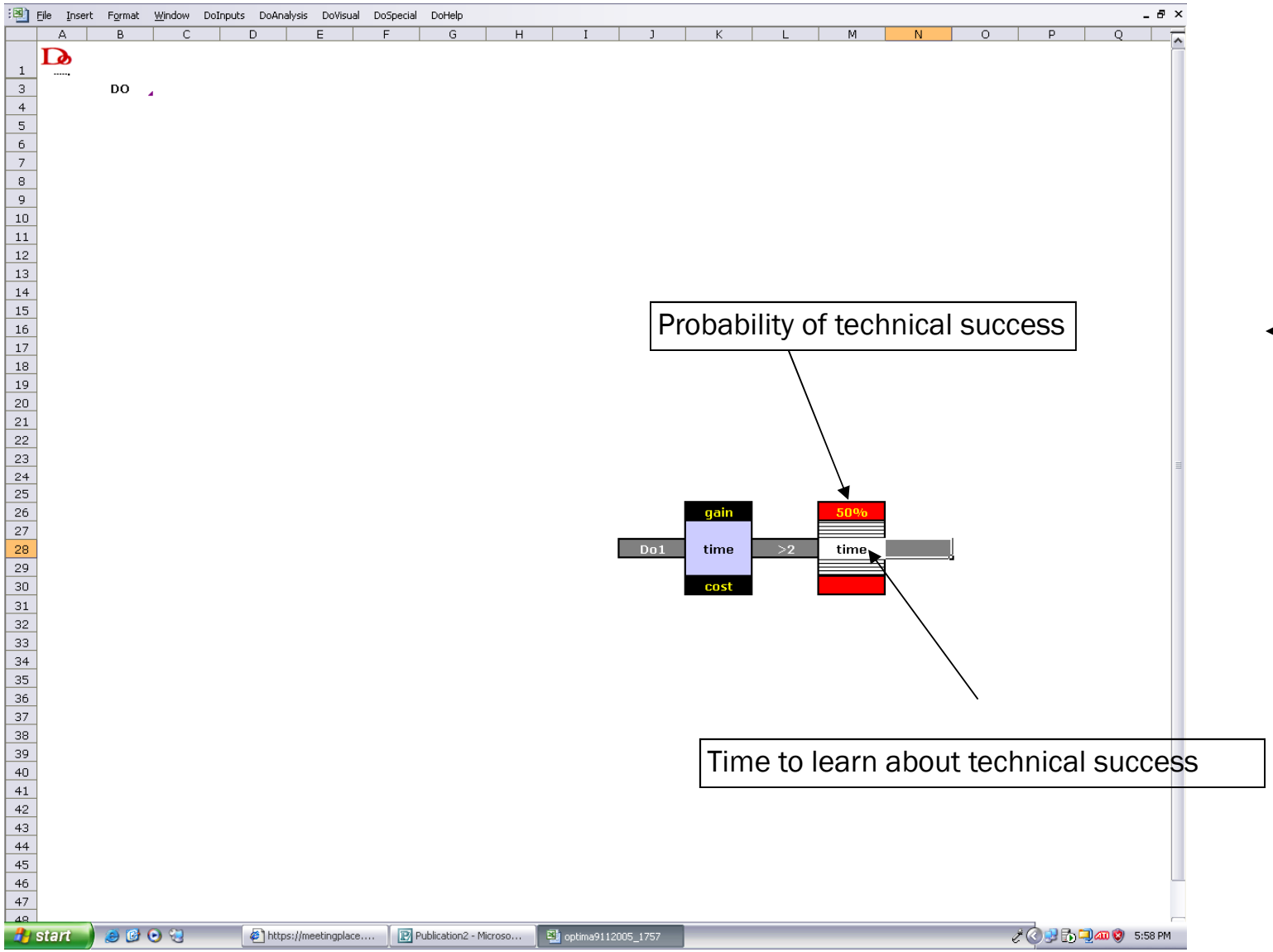
Introduce a decision option

An decision option can be introduced by clicking on the option key



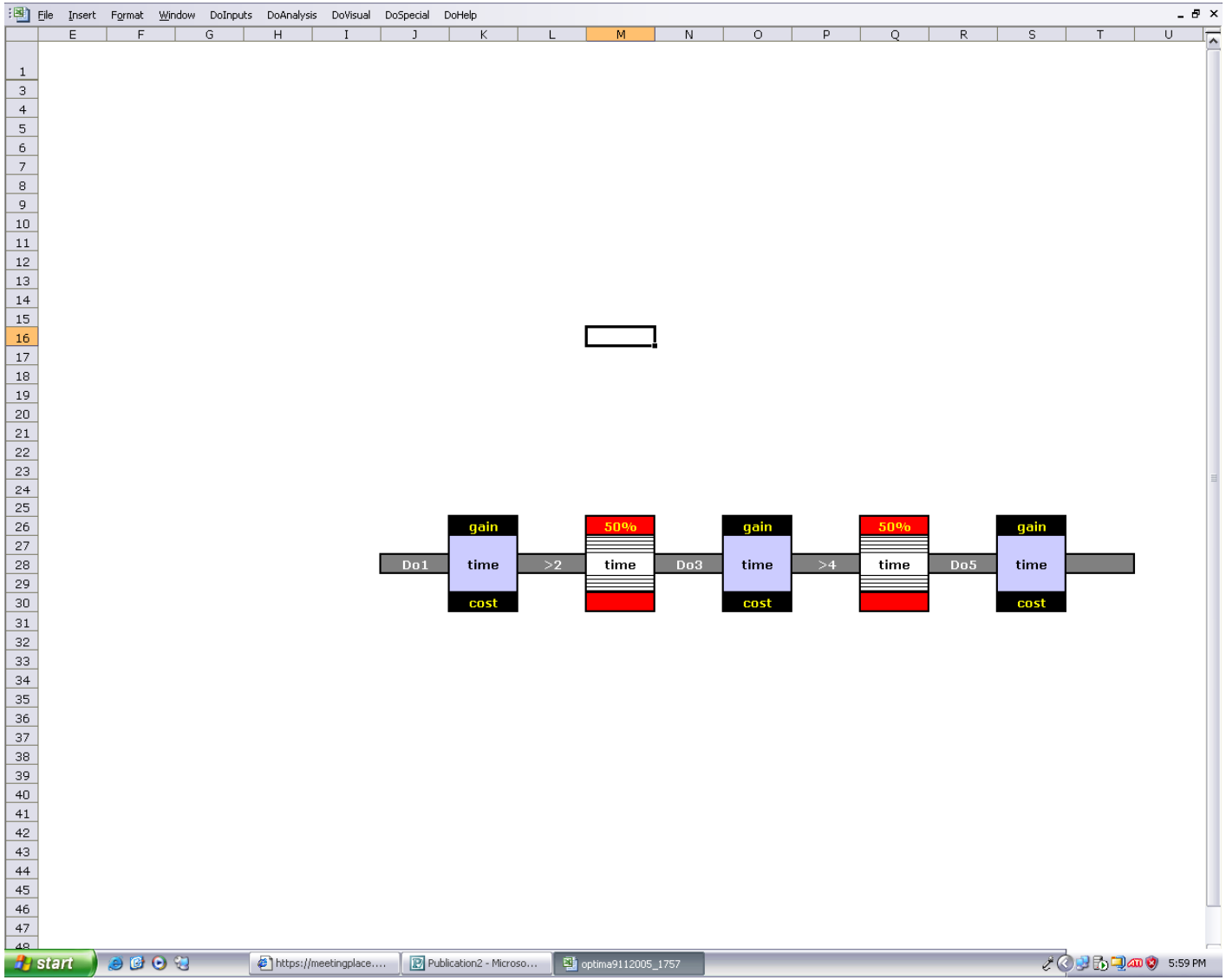
Introduce a technical outcome

A technical outcome can be created from clicking on the Chance key



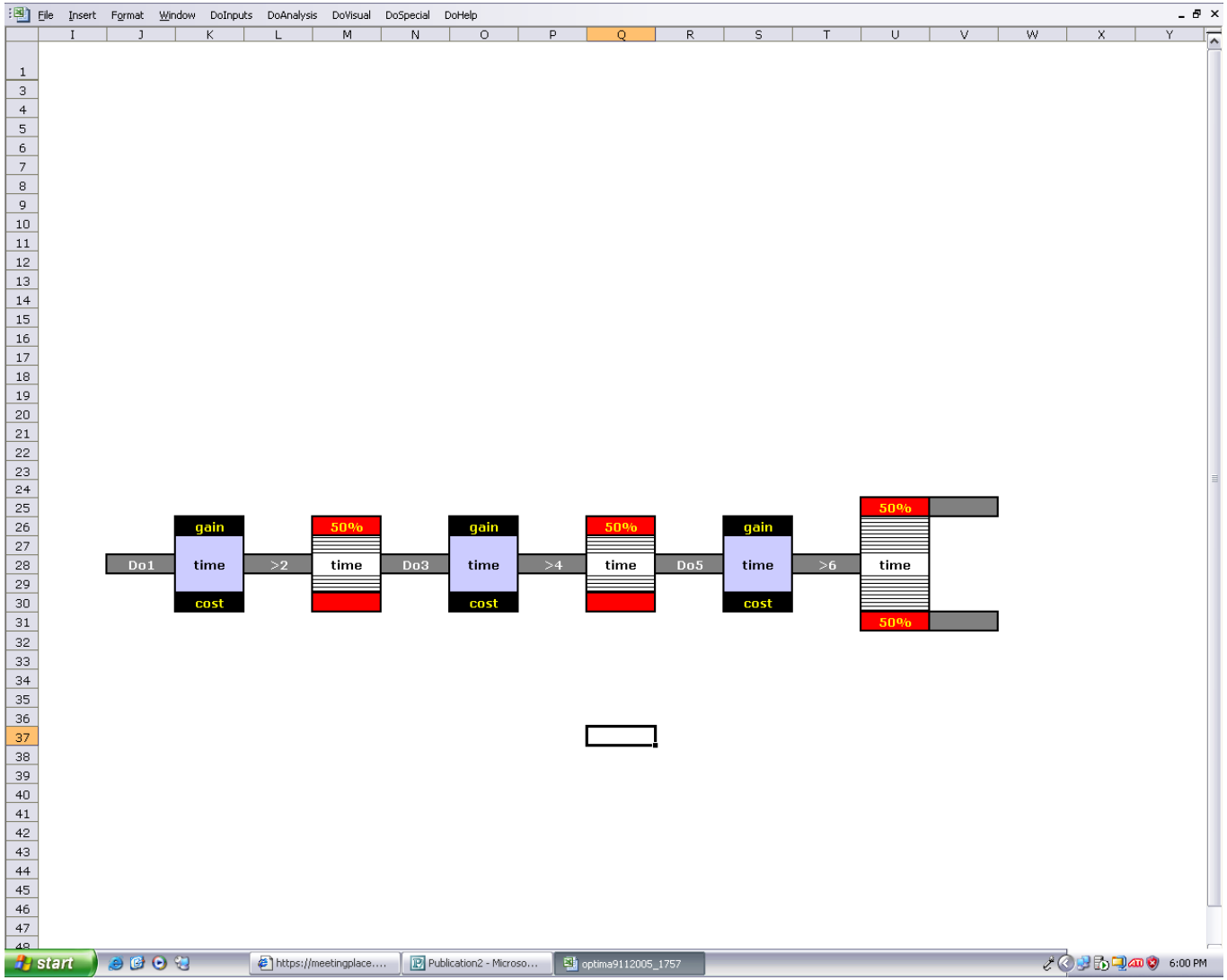
Create a three stage development process

Create a three stage development process by alternately clicking on option and chance keys

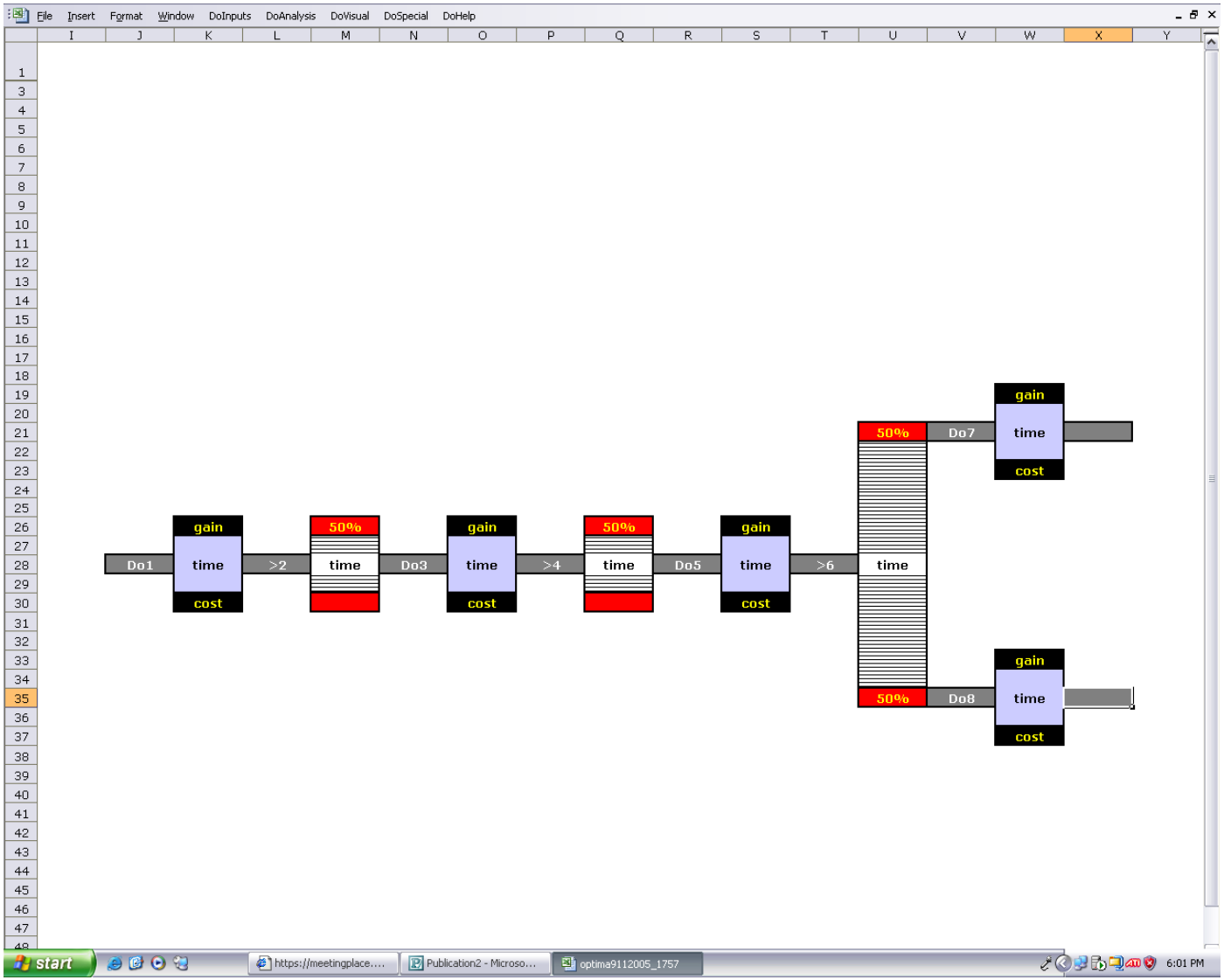


Create a decision tree at the end of the third stage to represent two choices

Click on the chance tree key to create a decision tree at the end of stage 3

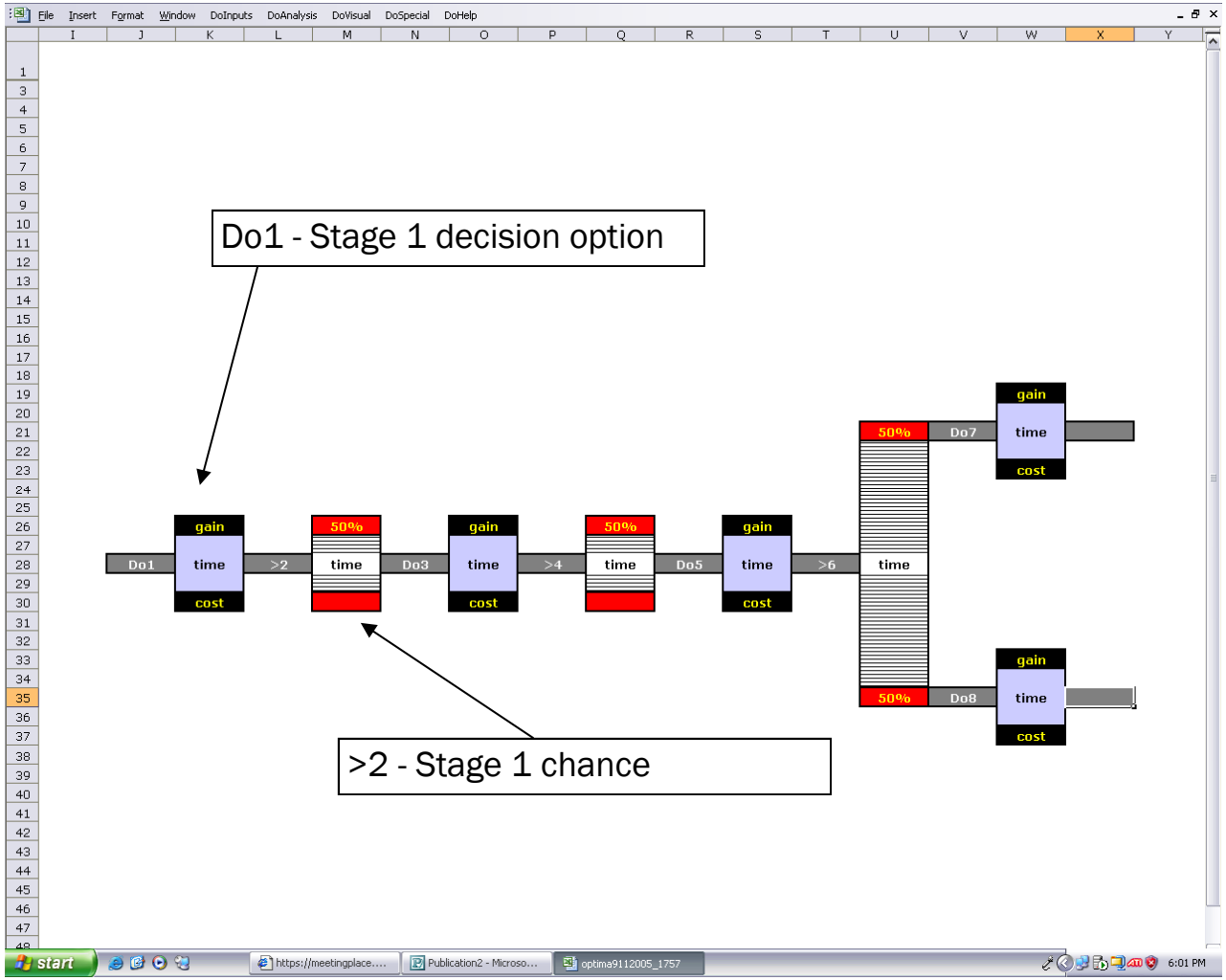


Create two additional decision options to represent choices



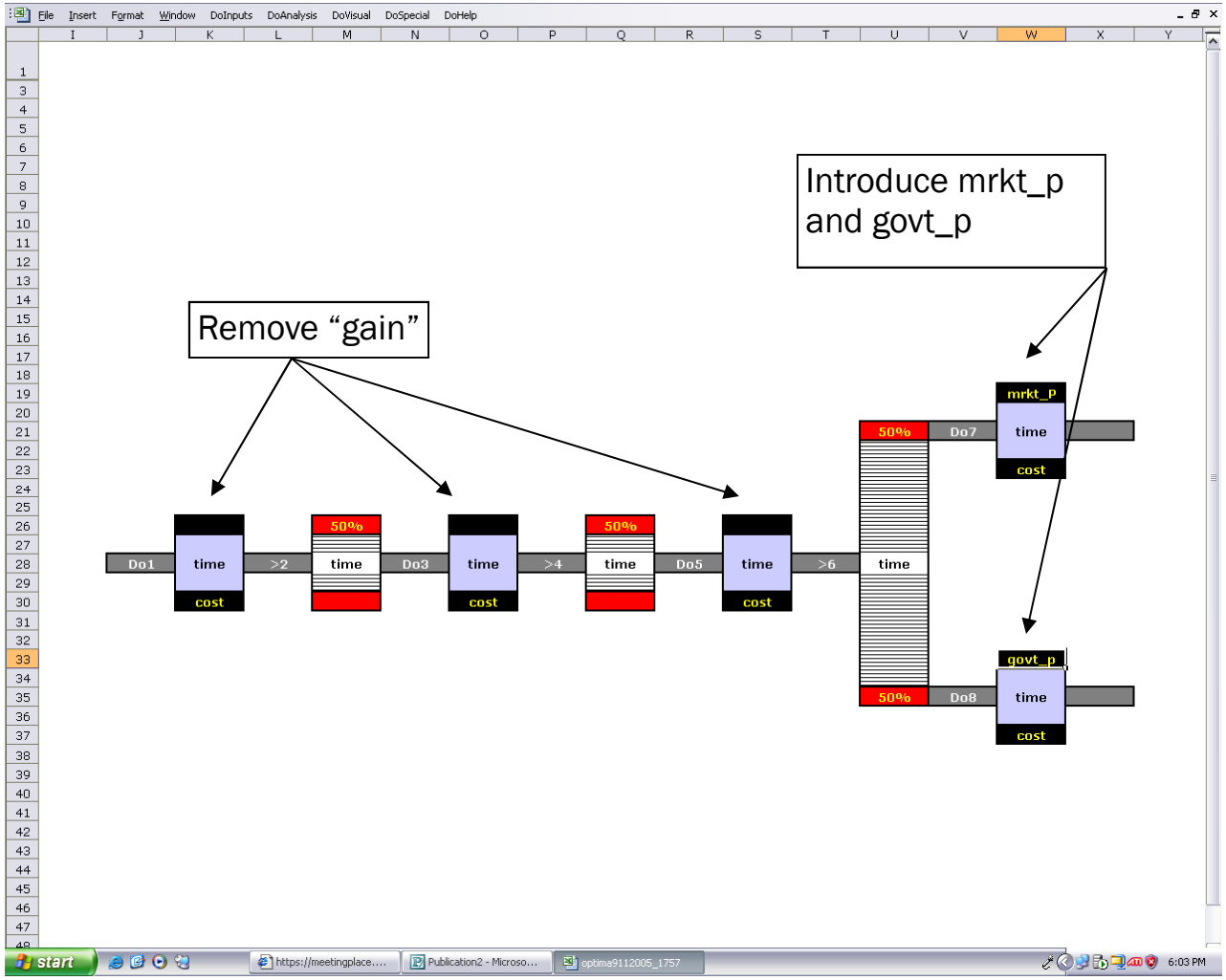
Change names of decision options and chances to be meaningful

Labels with ">" as the first character are typically used for chances. This is not necessary—any label is accepted. If the ">" character is used first, results here are not reported. We are typically interested in results at the decision options and not chances



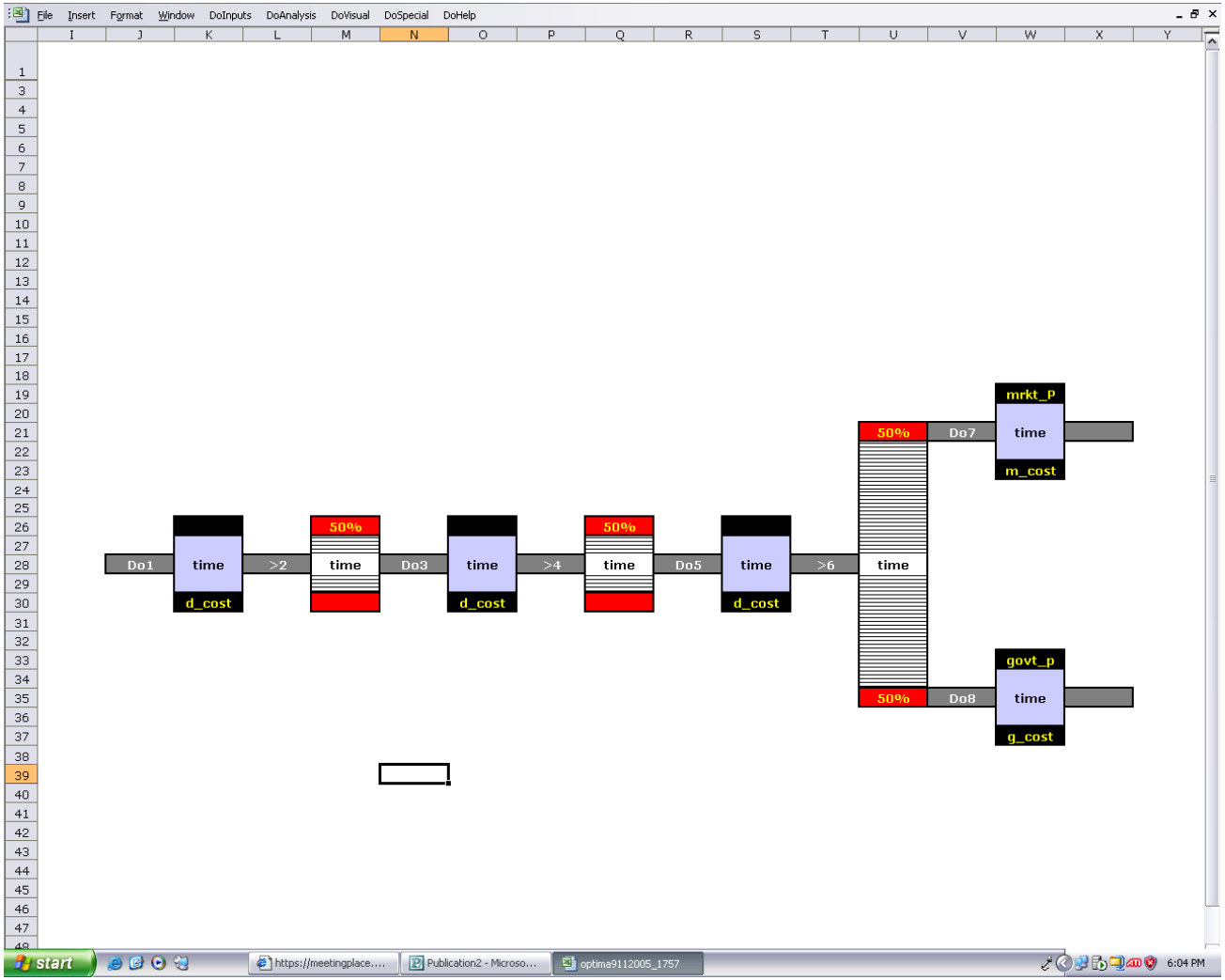
Provide names of assets (benefits) the company is likely to get

There are two possible benefits - The first one happens if the development project succeeds and the company is able to market it. The other (albeit a less profitable one) is the money the company may get from the government. Let's call the first one - mrkt_p (marketed product) and the other govt_p (government product). Remove "asst" from other decision options as there are not other benefits



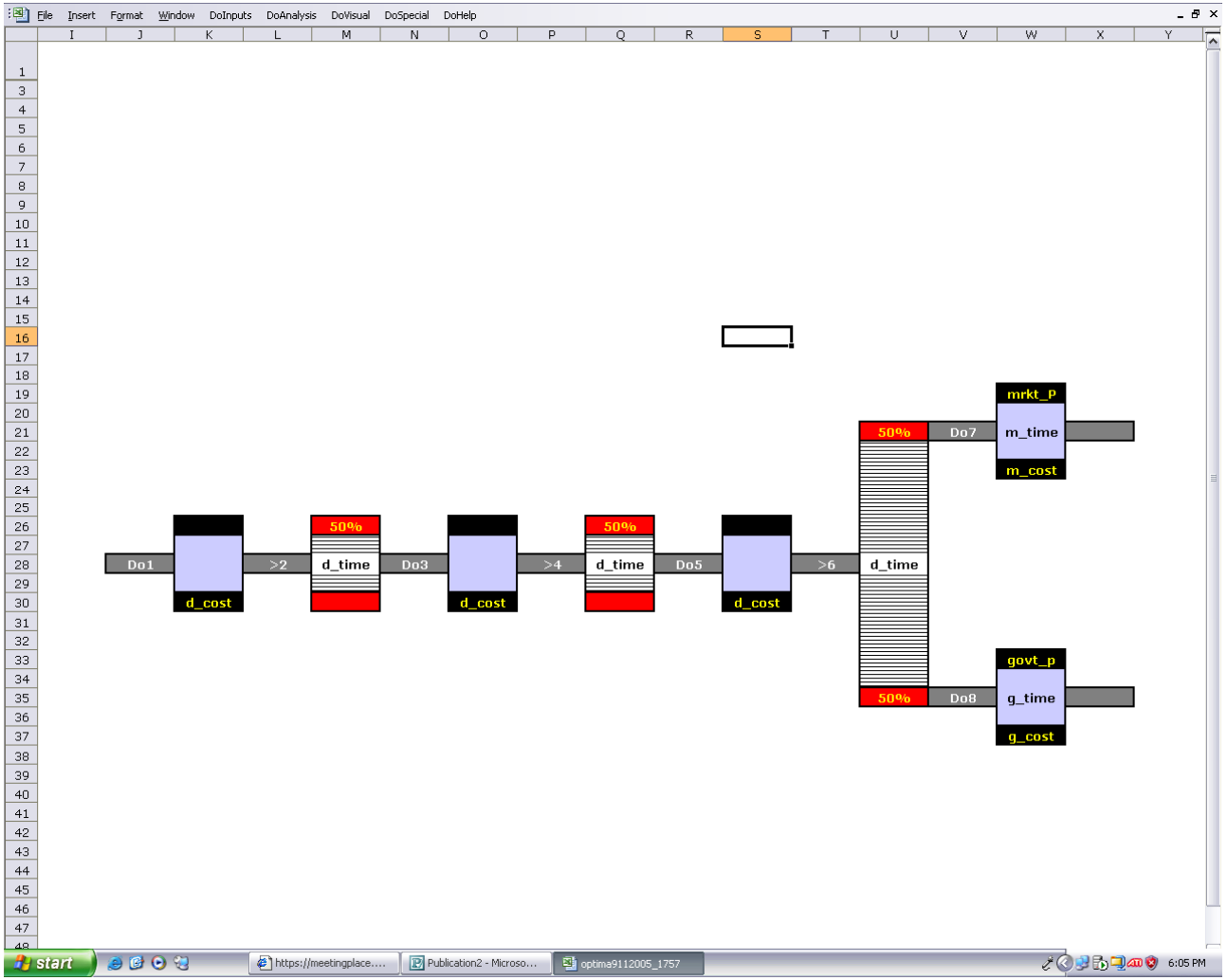
Provide names for costs at various decision options

Provide names for various costs at decision options. Since the costs of development are about the same in three stages, we represent this with the same label - "d_cost". Additionally, we introduce m_cost to represent marketing and administrative costs if development succeeds and g_cost for administrative costs if development fails in the last stage.



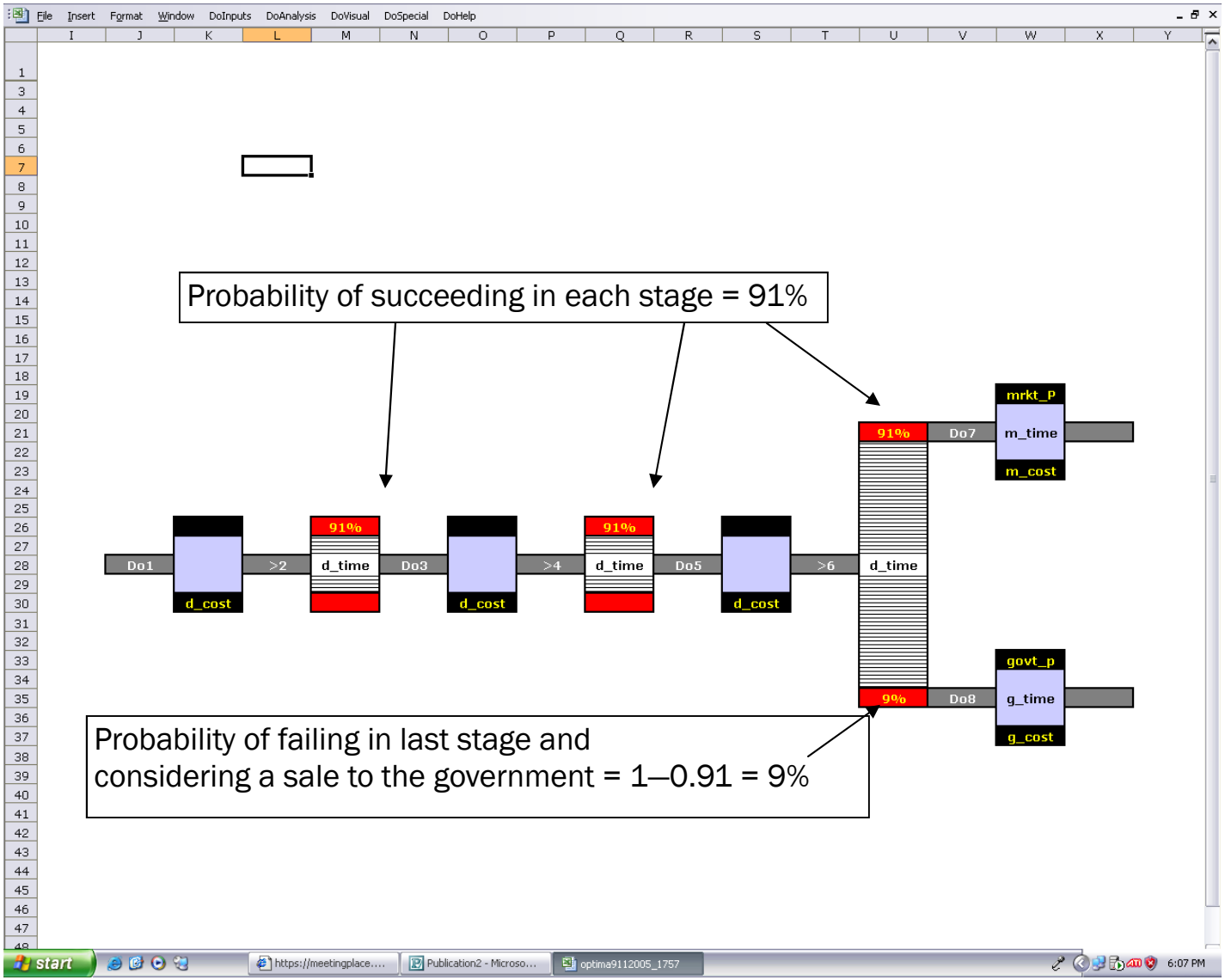
Provide time of decisions and technical outcomes

For simplicity, let's assume that we have to make decisions immediately after the technical outcome is known at each stage. Also assume that, we have some time to decide whether to market the product or sell to the government. Since the time of development is approximately the same in all stages, let's represent this with the same label - "d_time". Similarly m_time is the time to decide to enter the market and g_time is the time to decide to sell to the government



Provide probabilities of technical success

Since we expect an overall success of 3 in 4 in development and technical uncertainty is getting resolved over time, we break this down equally into the three stages = 0.75 ^ (1/3) = 91%

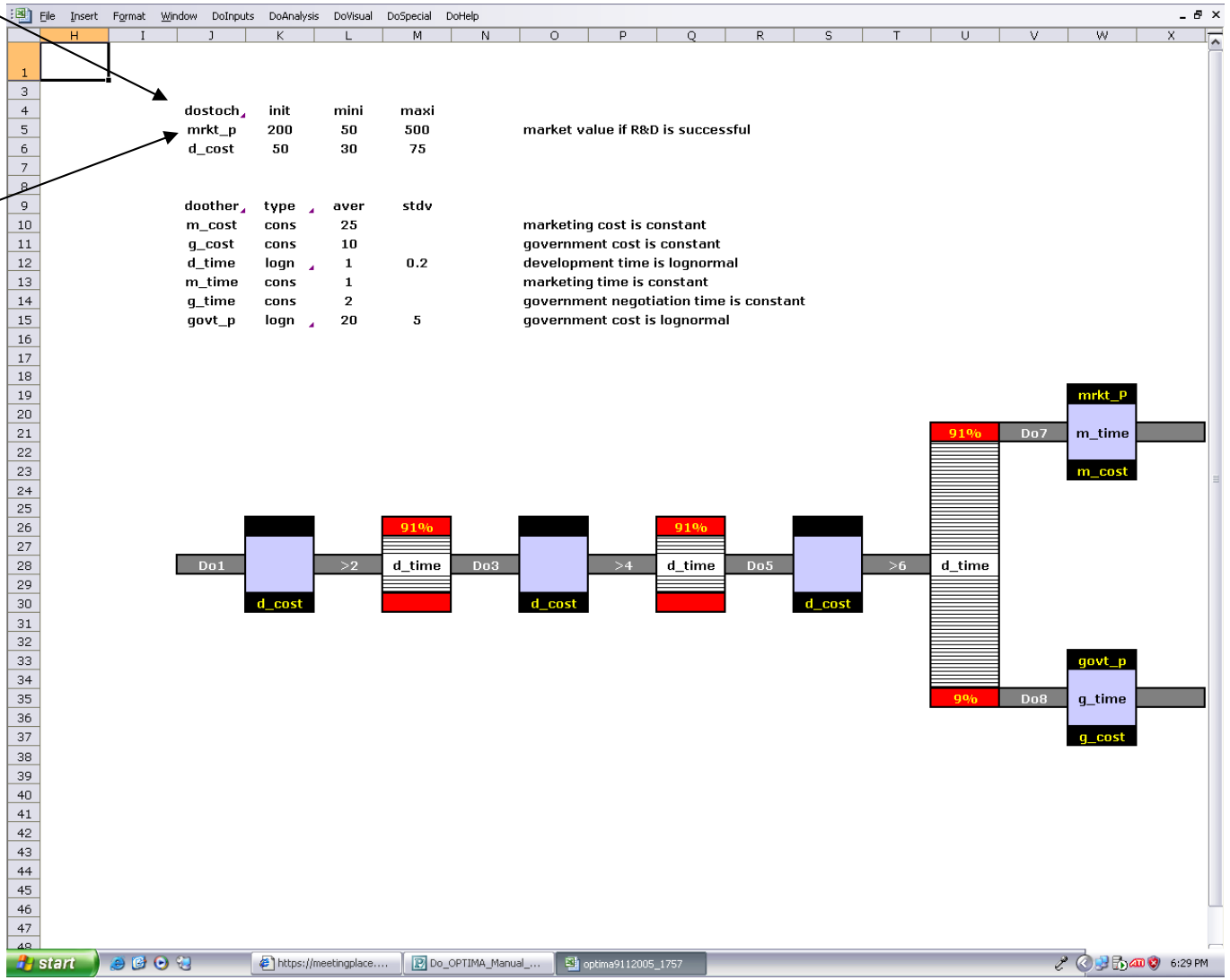


Representing a marketed asset—mrkt_p

DoStoch is a reserved term for DoOptima that represents a time series (or stochastic function)

These label represents initial expectation and minimum and maximum
For a detailed explanation of available labels click on "DoHelp" and then click on "Labels to be used in Stochastic Functions"

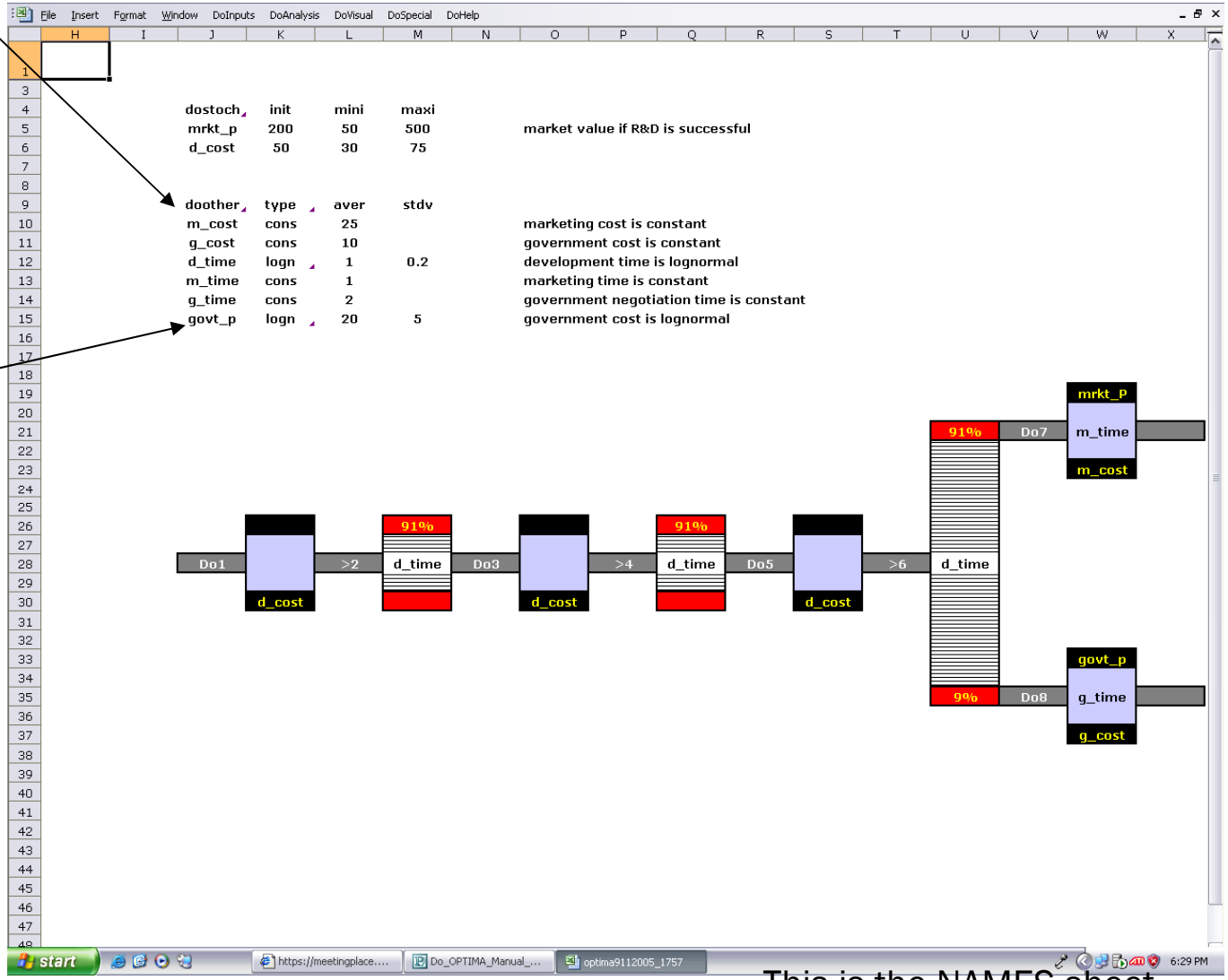
Values for mrkt_p



Representing a non-marketed asset—govt_p

DoOther is a reserved term for DoOptima that represents probabilistic functions or constants

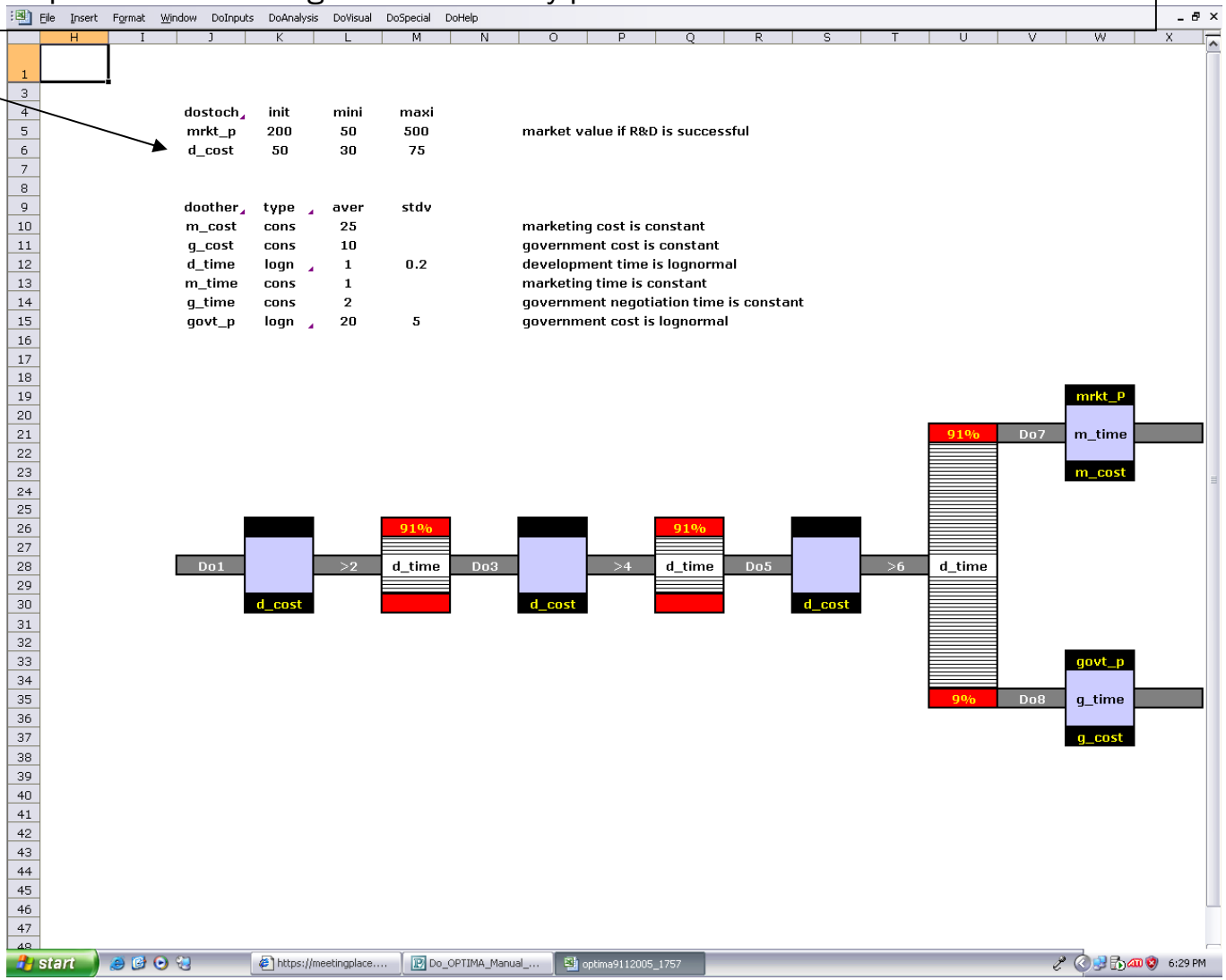
govt_p is modeled as a non-market asset that has a lognormal distribution with an expectation of $20mil and standard deviation of $5 mil — This represents a range of $10mil to $35mil



This is the NAMES sheet

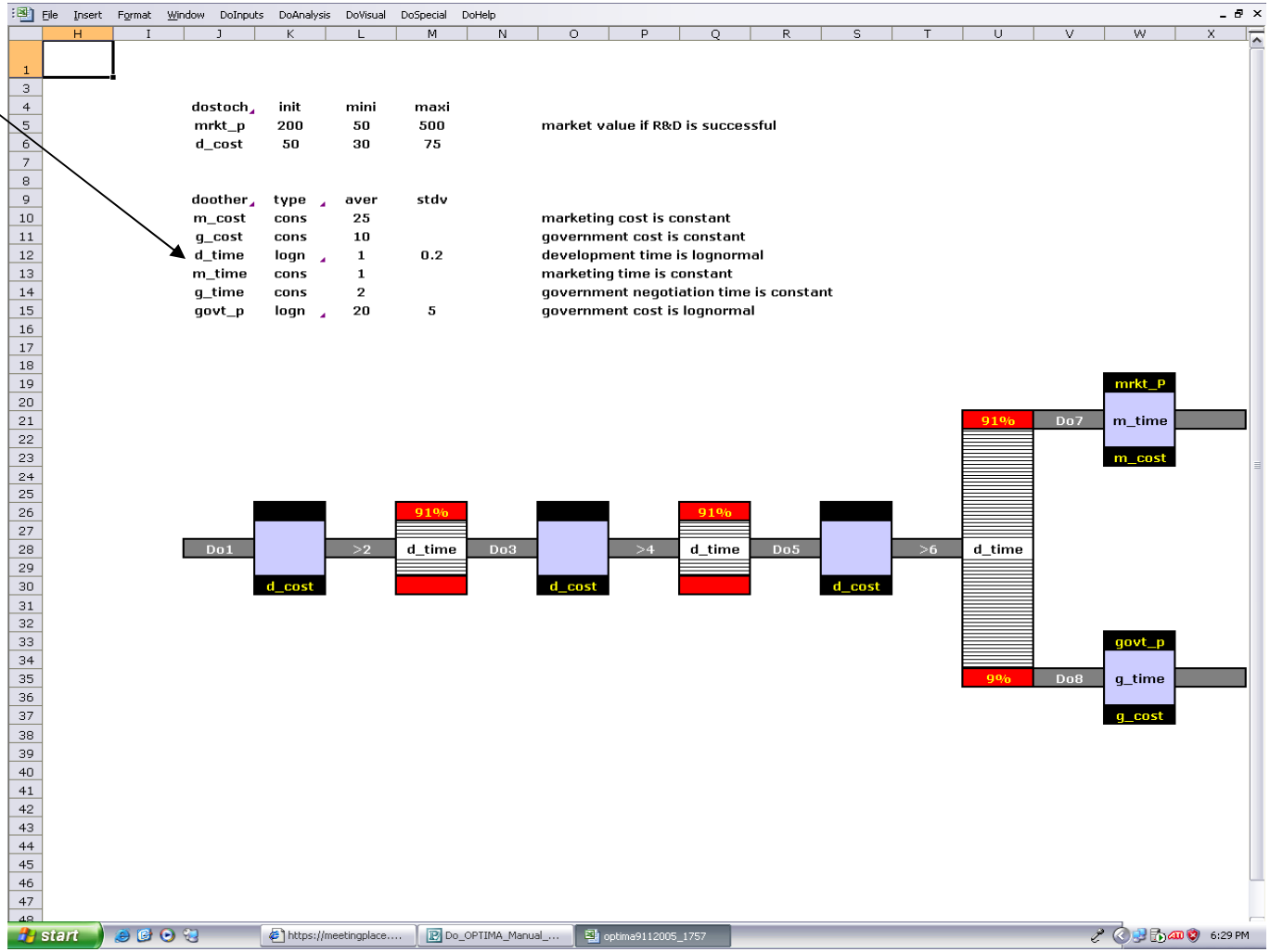
Representing a stochastic cost — d_cost

Development cost in each stage (d_cost) is represented as stochastic as information is gained in each stage about the cost of the next stage. A designation of "gbm" prescribes the stochastic nature of the cost. Expectation of $50 mil and standard deviation of $20 mil represents a range of $30 mil—$75 mil. This can be represented in a range or in a volatility parameter



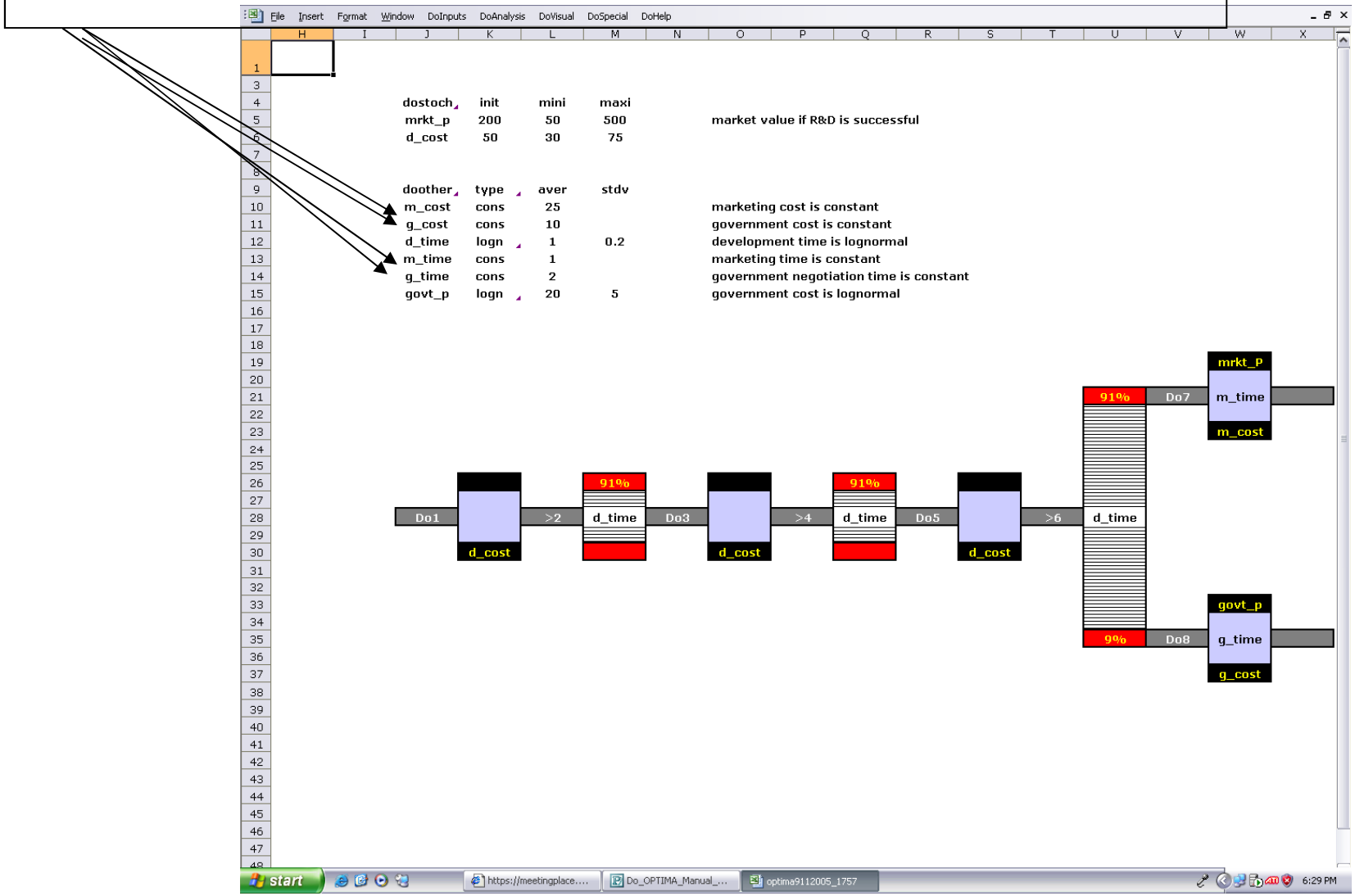
Representing a probabilistic time

Development time is represented probabilistically - A lognormal distribution with expectation of 1 year and standard deviation of 0.2 represents a range of 0.5 to 2 years



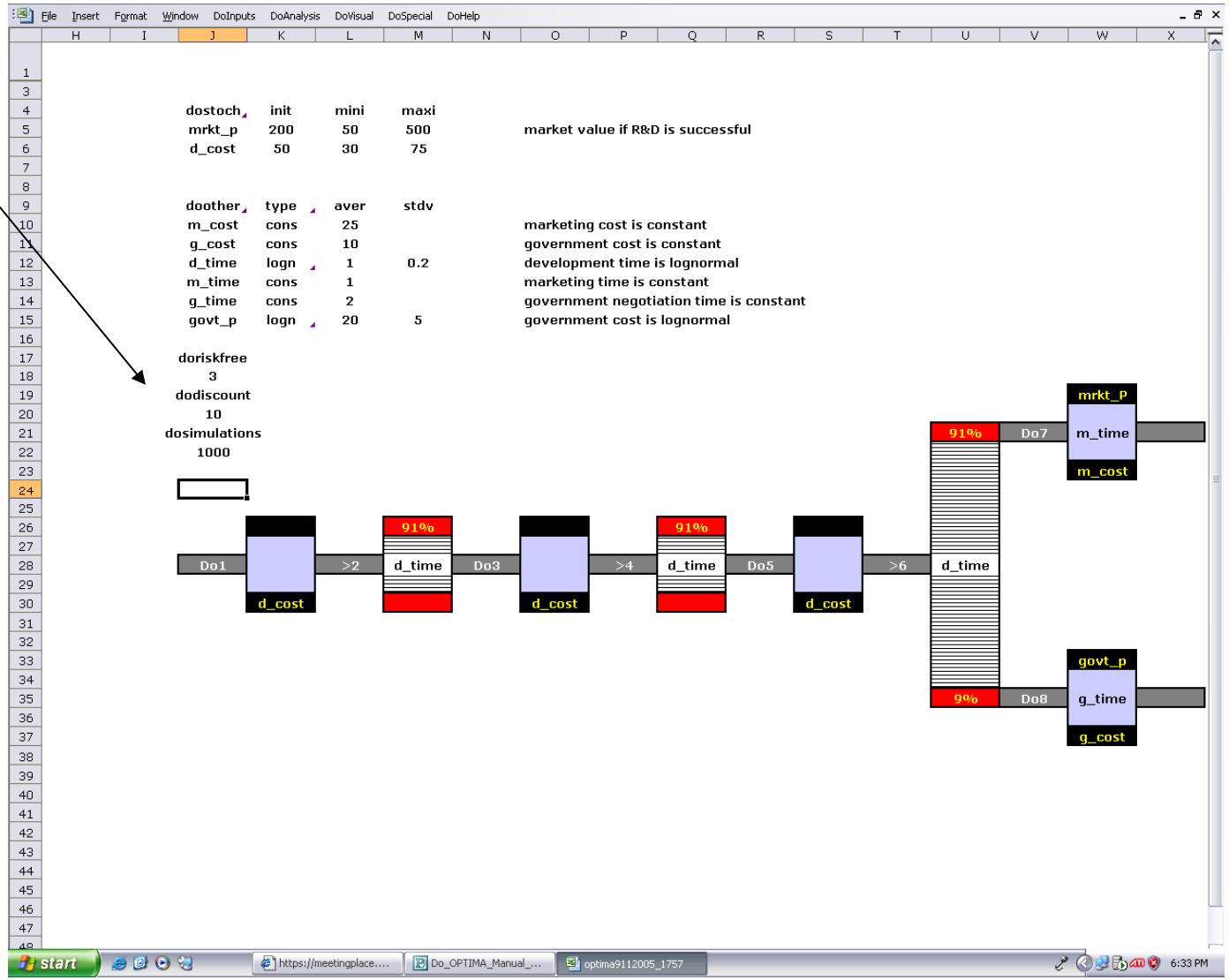
Representing deterministic variables

Launch costs (m_cost) and cost of dealing with the government (g_cost) are represented as constants (only for illustration). Similarly the time to make the launch decision as well the government sale decision are represented as constants



Describing global parameters

Risk free rate, Discount rate and number of simulations are defined this way

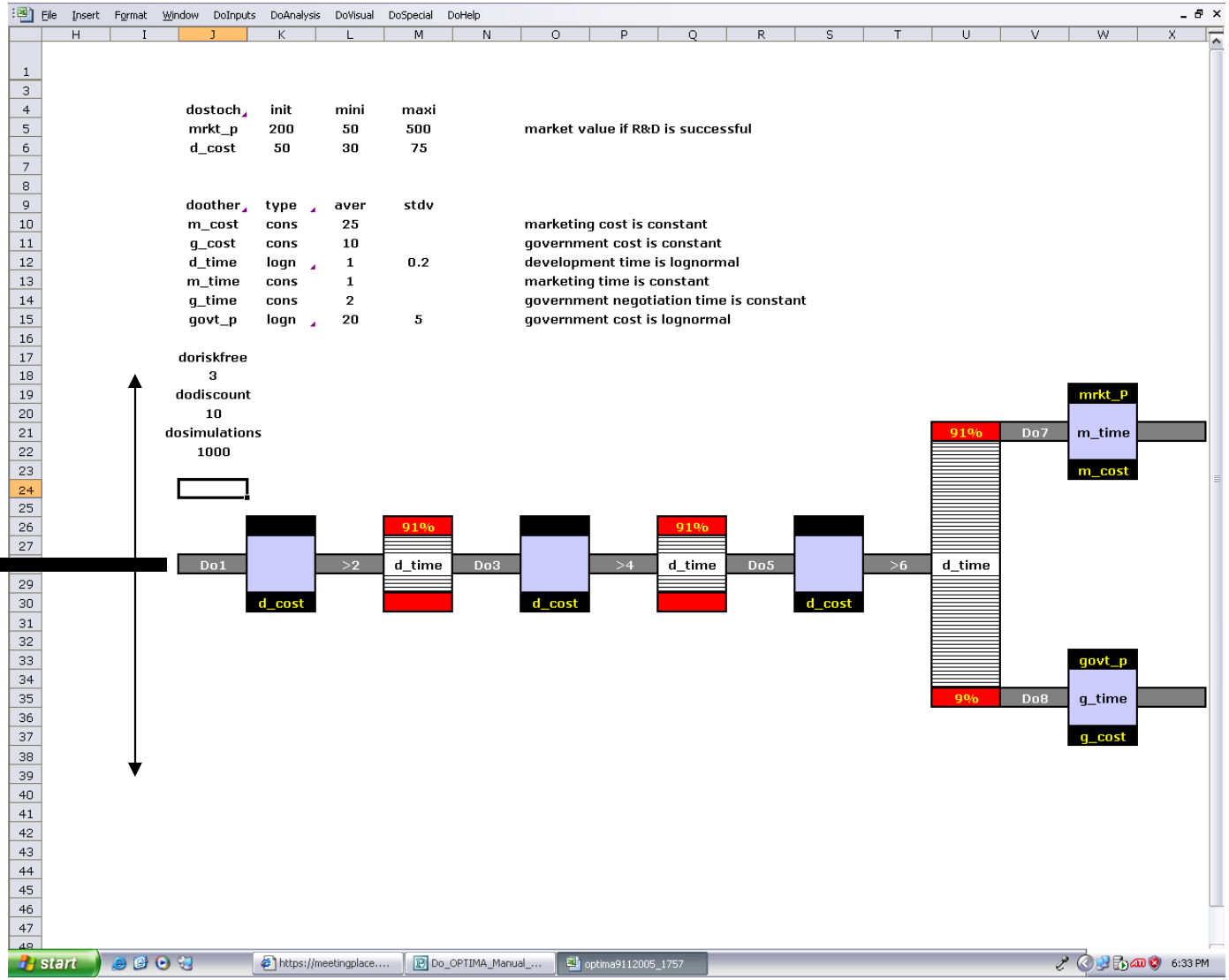


Defined areas for inputs and outputs

Area above the model is reserved for Inputs and area below the model are reserved for results

INPUTS

OUTPUTS

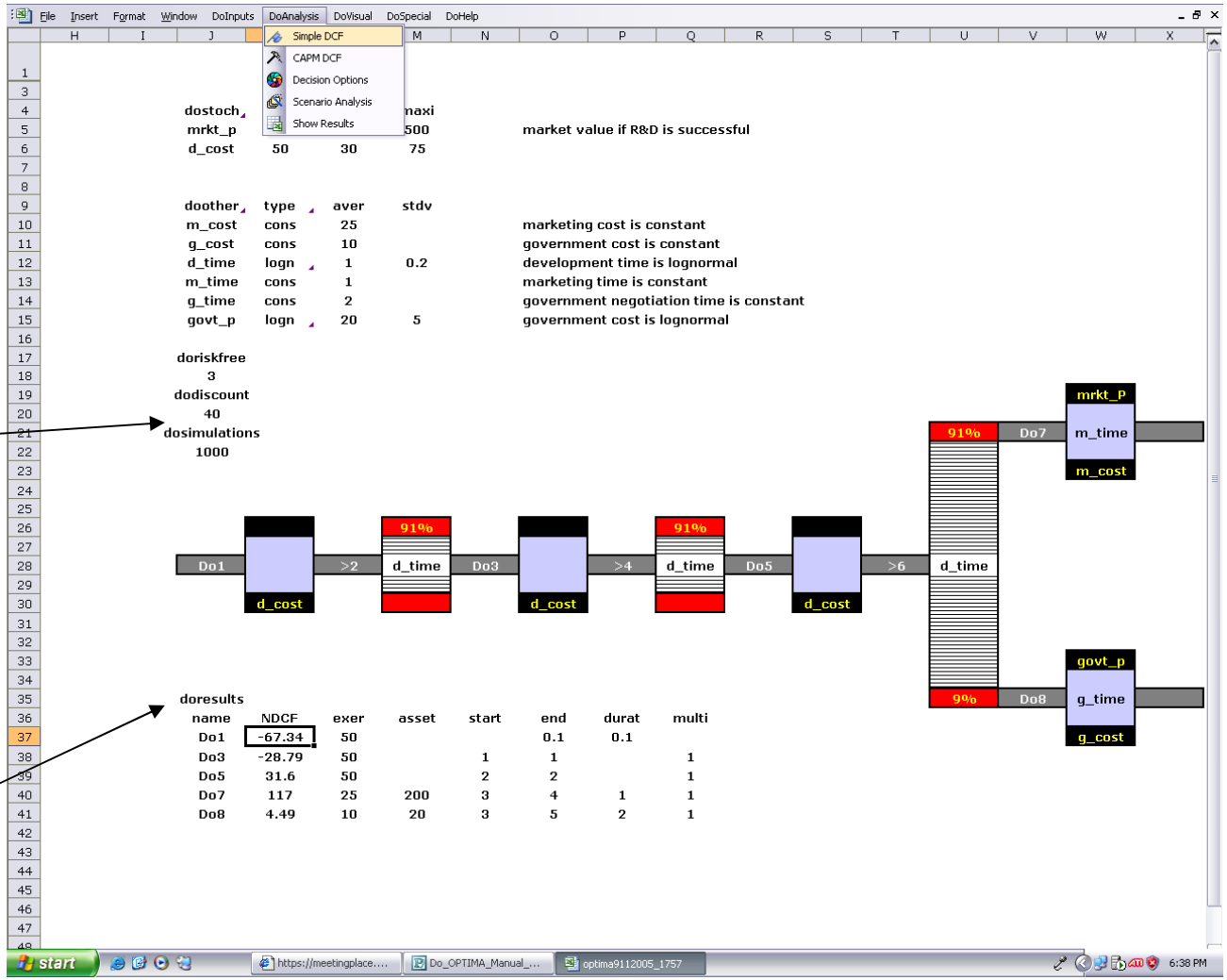


Running a simple DCF ignoring probability of technical success (Simple DCF)

The results are shown here—Using a high discount rate and ignoring the technical risk (as typical in the VC arena, we obtain a value of -$67 mil

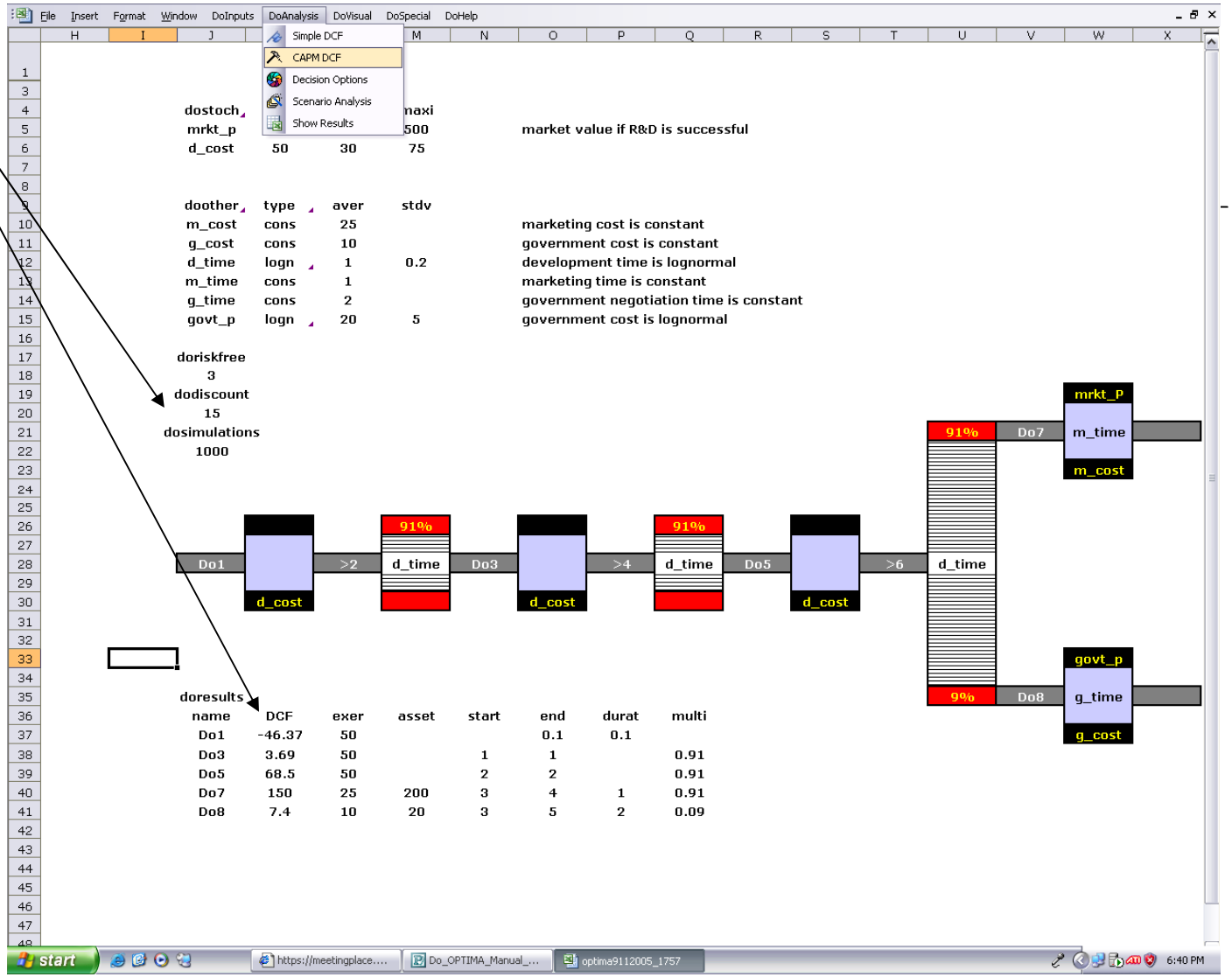
High discount rate of 0.4

"DoResults" specify where the results are to be reported



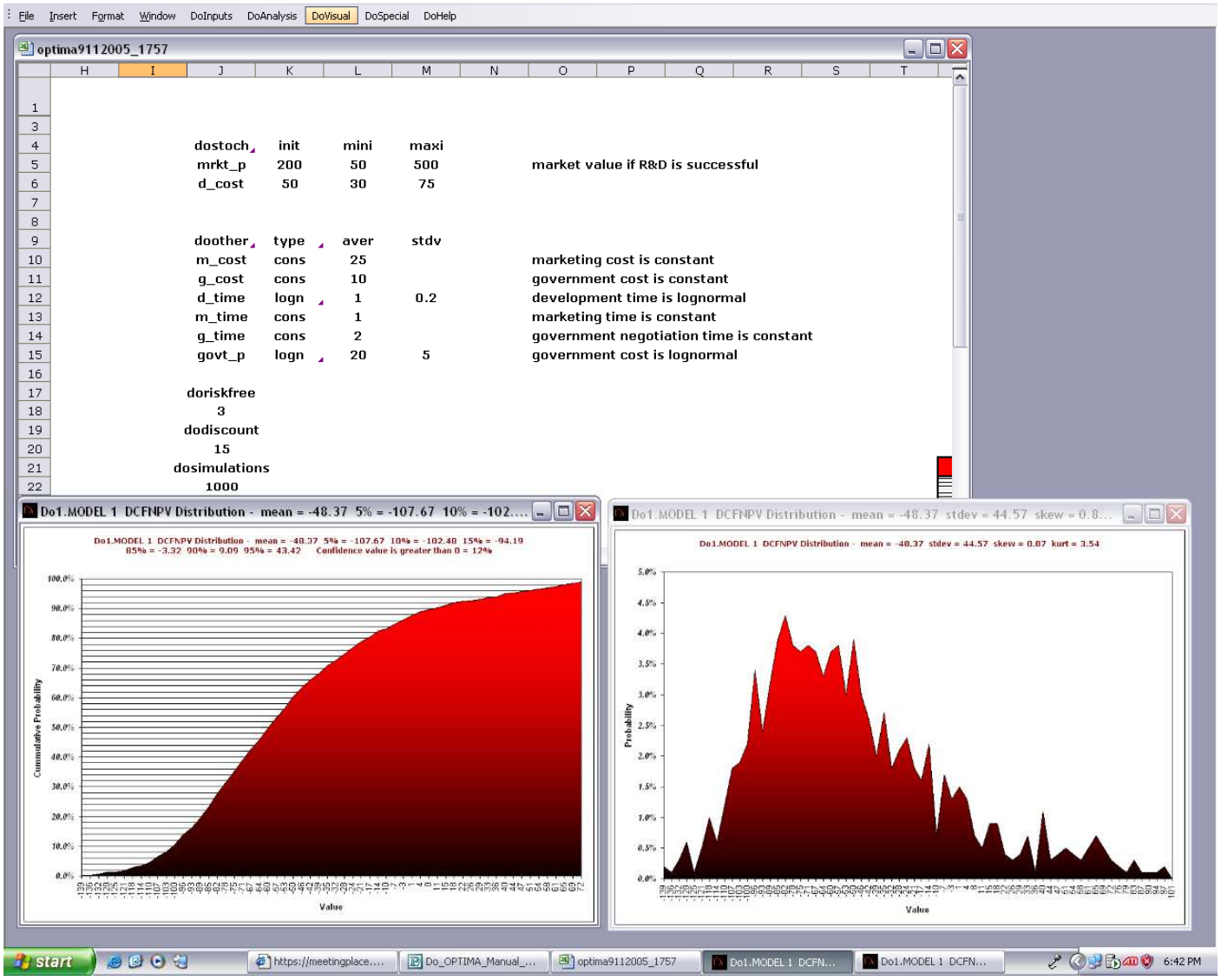
Running a traditional DCF with WACC (Traditional NPV)

Using a WACC of 15% and running a traditional DCF taking into account technical risk on cash flows, we obtain a value of -$46 mil



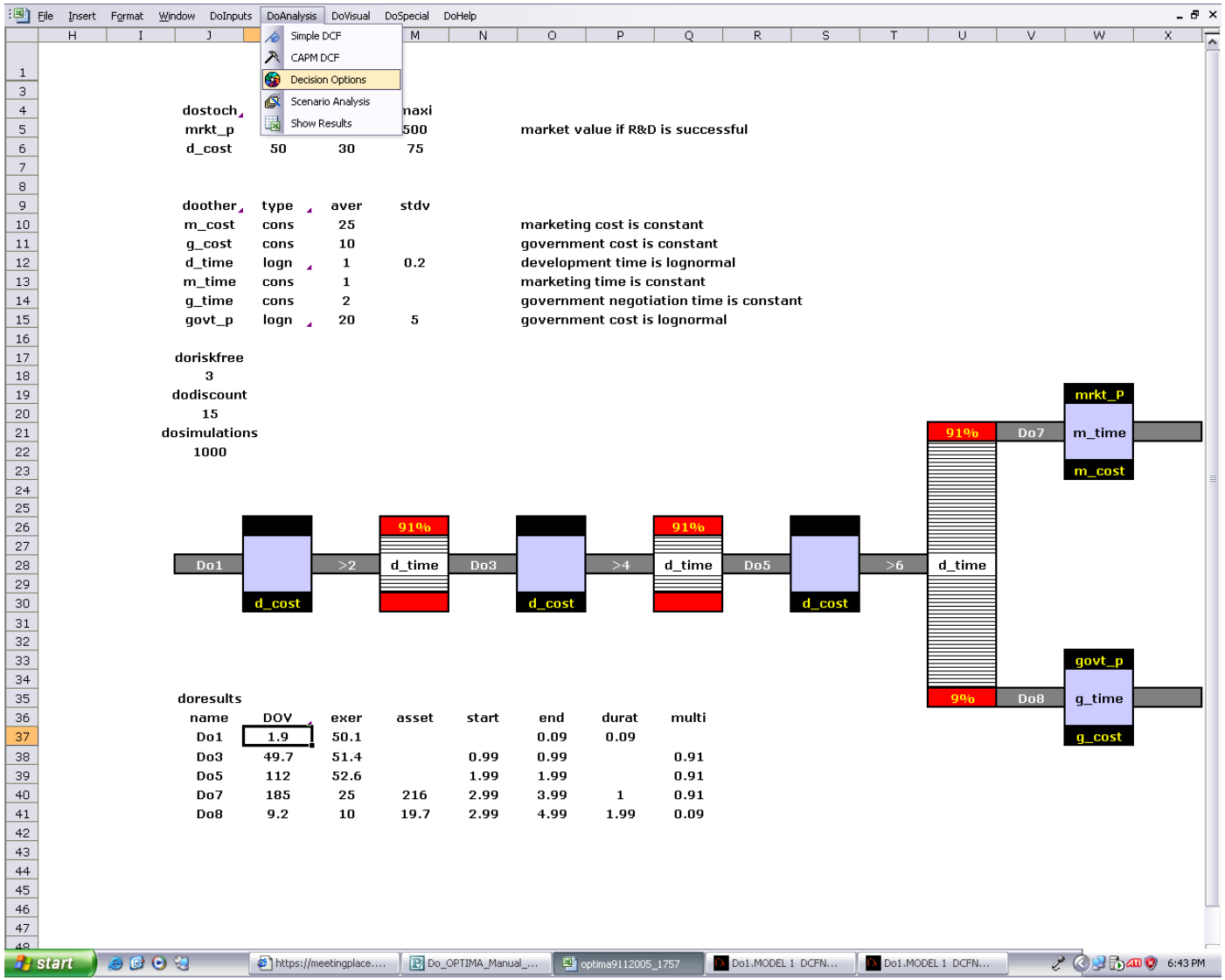
Running a DCF NPV simulation with WACC (Scenario analysis)

Using a WACC of 15% and running a traditional DCF taking into account technical risk on cash flows, and considering the costs and revenues to be probabilistic, a NPV simulation is conducted—Click "DCF Distribution" under "DoVisual"



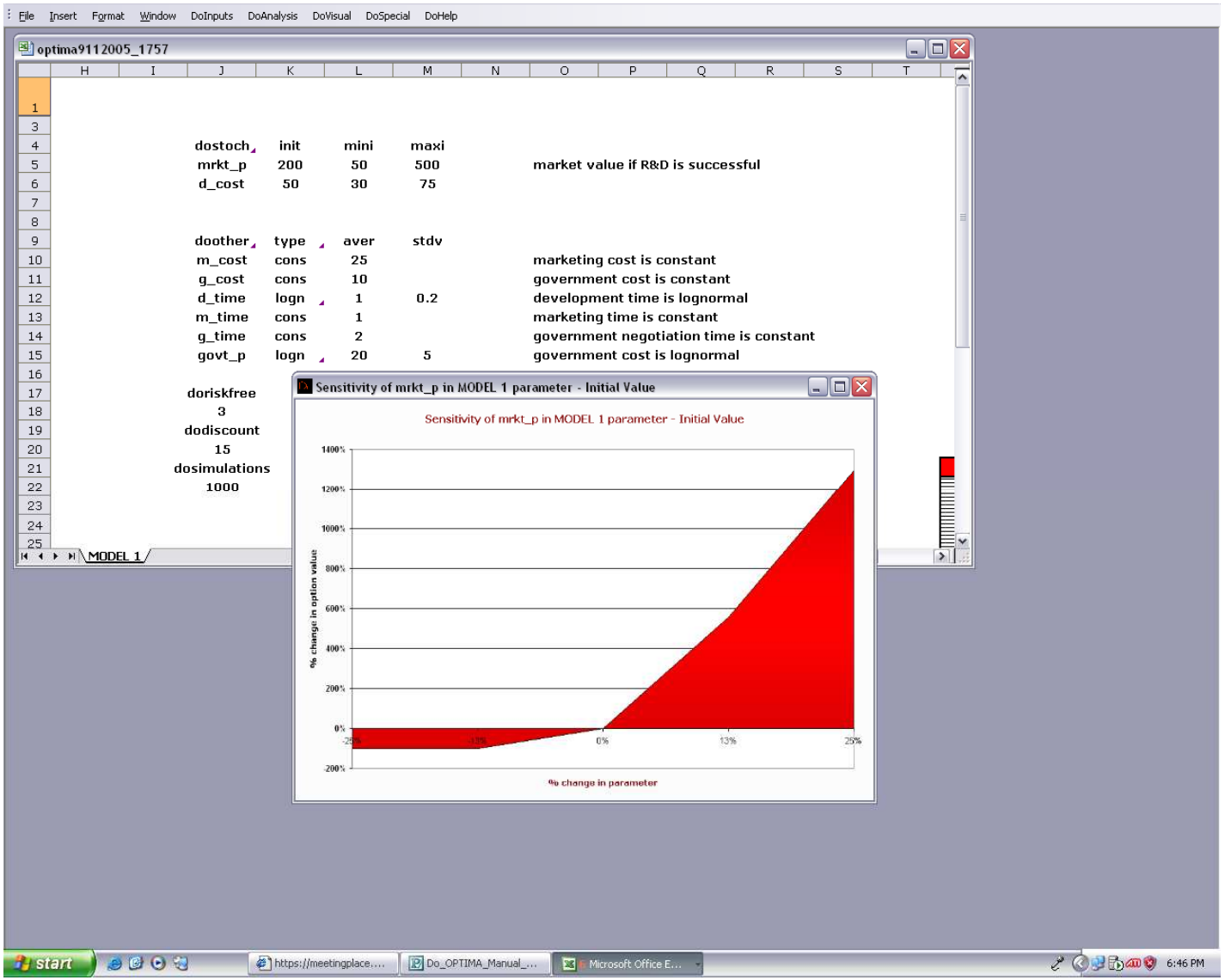
Running a Real Options analysis in risk neutral framework (Do NPV)

Decision Options value (considering uncertainty and flexibility) in risk neutral framework produces a value of $1.9 mil



Running a sensitivity analysis

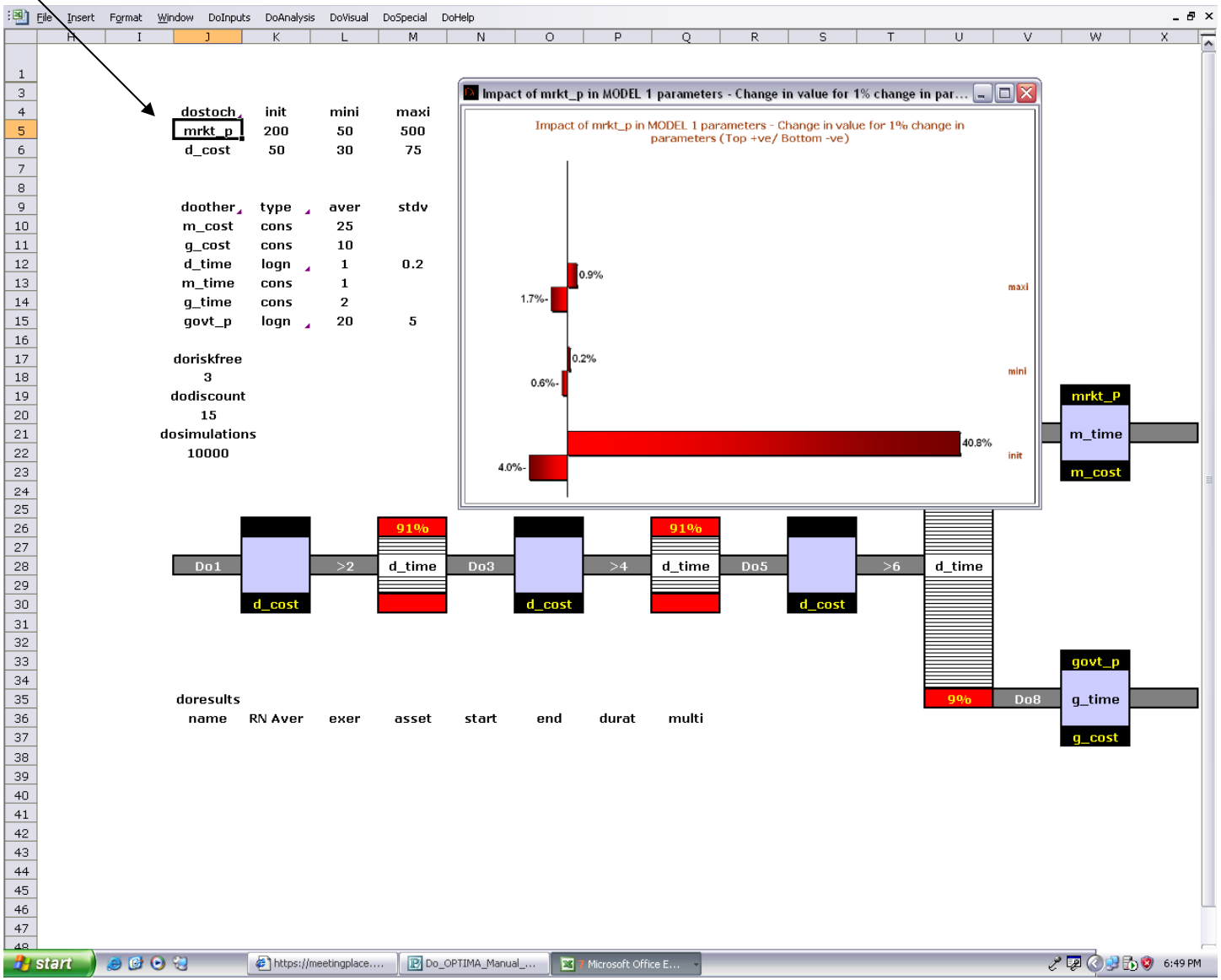
Choice under "Sensitivity" under "DoVisual"



Running an impact analysis

Choice under "Impact" in DoVisual

Select the stochastic function to conduct Impact analysis



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