

UEP USER GUIDE

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Quick Start	1
Purpose of UEP	2
Touring UEP	3

Quick Start

Utility Elicitation Program (UEP) is a web-based program to help the user determine his/her own utility function. An executive might also be interesting in calibrating the organization's risk policy.

UEP and some online resources are linked from:

<http://www.maxvalue.com/online.htm>.

If you are familiar with using utility functions, then you might want to read the white paper:

“Risk Policy as a Utility Function” (a pdf document)

or watch the video with the same name.

Two bound books provide more comprehensive discussion of decision analysis methods and decision policy:

Risk and Decision Analysis in Projects, 3.0 Edition

Decision Analysis for Petroleum Exploration, 3.0 Edition

Accessing EUP

Click the [Utility Elicitation Program](#) link.

UEP will work with most larger devices and browsers. Internet Explorer, Firefox, Chrome, and Safari seem to work fine.

My tech consultant and I are having some trouble with Microsoft Edge's and the positions of annotations on the chance node graphic.

UEP is offered free except to trainers and consultants, i.e., my competitors. Read the About text for a description of this restriction. Call or write if you are concerned about permission or to obtain authorization.

Of course, the user interface is intended to be intuitive. Short descriptions appear when hovering the mouse over buttons and text fields.

Two Functions

UEP online presently has only two functions:

- Question generation. Clicking Next Question will generate a random question of the question type, transaction perspective, output view, and currency settings.
- Solving. Entering an answer value will execute a routine that calculates the *risk tolerance coefficient* (r) that corresponds your answer. UEP will return either a value for r or a message if the answer is out of range or is invalid.

Purpose of UEP

The function of Utility Elicitation Program (UEP) is to assist you in determining your or your company's risk policy as a utility function.

The exponential utility function is featured, because of its *delta property* and other highly desirable features. Again, view or read "Risk Policy as a Utility Function" if you are unfamiliar with utility functions.

elicit: evoke or draw out a judgment from someone.

Commonly, in decision analysis, analysts or other persons are assigned to interview subject matter experts (SME's) to *elicit* their judgments about uncertainty inputs and other aspects of decision models. Decision makers' judgments are elicited about decision policy.

UEP focuses on one part of decision policy: *risk policy*. UEP features most-popular utility function shape, which has highly desirable characteristics. The exponential utility function requires only one parameter to completely define its shape scale. This serves as a complete risk policy for you or your organization. That parameter is the *risk tolerance coefficient* (r).

Rather than send someone interview you about your risk preference, I offer this little program to help you self-*elicit* your r value.

Your, or your company's, preference for risk—captured in the utility function—should be reasonably stable. It should not change unless there is a substantial change in wealth or situation.

With practice, using UEP, you may become reasonably "calibrated" in making consistent risk versus value trade-offs in your decision making. Expect that the r 's imputed by your answers will reasonably converge, perhaps similar to Figure 1, with practice and feedback.

Don't expect this to be easy: Most people have difficulty trading-off value vs. risk.

However, the point is not for you to become calibrated. Although your emotions about risk may change from day-to-day, your r should not be mood dependent. You want decision policy to be consistent. This policy should be established and reasonably stable across years in settled times. UEP will assist with the risk policy part.

A situation where someone might want to be calibrated about decision policy is when there isn't time for careful quantitative analysis. One example is a fast-paced negotiation with high impact potential outcomes. Other examples include bidding in a live auction and decision-making during a crisis.

Simulations are a way to train people to make good intuitive decisions in important, urgent situations. Decisions under simulated stressful conditions can be scored against values determined separately with decision policy, careful thought, and problem modeling.

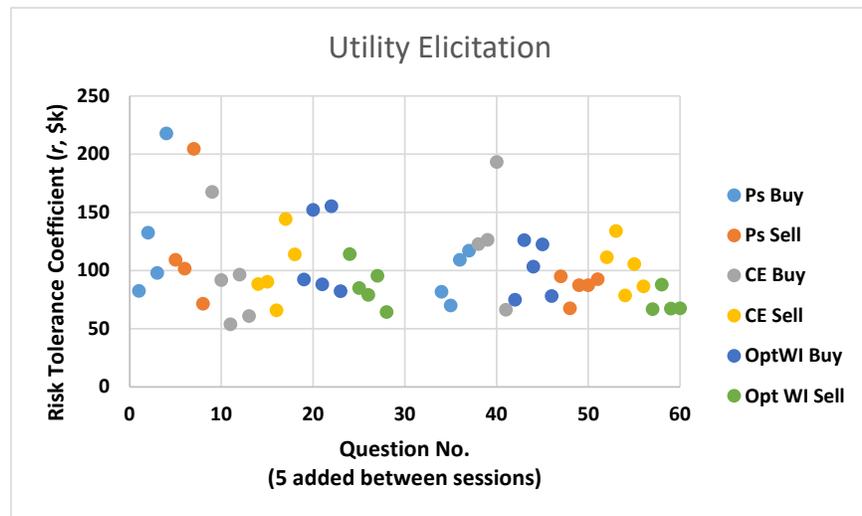


Figure 1. Example history of using UEP. The intent is that r values will converge with practice and experience. This chart is a mock-up example prepared with Excel.

Touring UEP

When the UEP web page opens, you will see a screen much like the Figure 2. Resizing the screen size and text size will rearrange the elements to fit—up to a point.

Several links at the top may be useful:

- Help. List and links to related resources.
- Symbols. List of symbols and abbreviations.
- About. Customary statement of the application's version and provenance.
- Revisions. Brief history and listing of recent enhancements and revisions.

Figure 1. Initial Screen.

The following topics describe UEP’s question options and operation.

Question Type

Conceptually, you could answer one question, and that would determine your risk tolerance coefficient (r). In using UEP, initially, you will likely find that your r 's vary considerably by potential outcomes, type questions, and presentation. Partly, the variance is due to framing, i.e., the way problems are presented.

All lotteries presented will have two possible outcomes: Success (NPV_S) or Failure (NPV_F).¹

For variety, hypothetical decision “lotteries” are generated in three Question Types:

- Ps Probability of success is the probability of NPV_S .
- CE Certain equivalent. Ps is provided. You will be asked to judge a cash-in-hand value of a lottery. For reference,

¹ We are planning to introduce an option to view continuous distribution outcomes. While more realistic to actual projects, this is unlikely to materially change your perception of risks and the r values that UEP captures.

the *EMV* is calculated for you. For a risk-averse person or organization, the *CE* is less than the *EMV*.

An occasional CE type question will have both outcomes with the same sign. In some cases, someone would have to pay *you* to take the risk, or you would pay someone to take the risk away (e.g., like buying insurance).

Share The Share question type asks you to judge what portion of a large, economic project you would like to have. What is the optimal *Share* you would choose to own?

The Question Type selection is made by clicking one of the “radio buttons.” At startup, UEP will randomly choose. As with any of these “controls,” you may hover the mouse cursor above for a brief description.

Perspective

Framing is a well-known cognitive bias. Here, you may select whether the lottery is worded in one of two contexts:

Buy You are buying or acquiring the risk project, investment, or asset. For a Share type question, you are entering or increasing a position in the risk.

Sell You are selling or disposing of the risk project, investment, or asset. For a Share type question, you are selling-off or reducing your position in the risk.

Currency Settings

Units Enter up to eight characters to label the *NPVs*, *r*, and *CE* units. Label your currency, e.g., \$, GBP, € Add a multiplier, such as 000, k, M, B.

The units label has no effect on calculations.

The startup default is “\$k”

Max Investment

In currency “units,” what is the largest investment that you would typically consider? This will be used as an approximate maximum *NPV* loss, at risk, when generating *NPV* failure amounts in candidate investments.

The startup default is 50 (\$k).

Changing currency Units or Max Investment may invalidate *r*'s produced from prior sessions.² So choose

² A tentative enhancement is for UEP to record session parameters, your answers, and the calculated *r*'s. This will be available for either viewing/printing in your browser or as some sort of file download.

your units carefully and remain consistent.

UEP does not save your ID or any of your session data. So if “\$k” aren’t the appropriate units and \$50k isn’t your maximum investment, then you will need to reenter these parameters at the start of each session.

Next Question

This button generates a random question in the form of the various settings, above. Figures 3a, 3b, and 3c show an example.

Utility Elicitation Program

[Help](#) [Symbols](#) [About Revisions](#)

Question Type Ps CE Share

Perspective Buy Sell

Currency Settings

Currency Units

Max Investment \$k

Suppose you considering selling your project or risky asset.

NPV of success = 86.7 \$k

NPV of failure = -17.32 \$k

$EMV > 0 \text{ $k if } P_s > 0.1665 = P_{sBE}$

What is the minimum P_s you would require to keep this project?

your answer

decimal fraction

risk tolerance coefficient \$k

Figure 3a. Text question framed by the blue brackets. Enter your answer in the “your answer” box and press <Enter> or click the “run” arrow button to compute. Your r for this project is returned in the “risk tolerance coefficient” box.

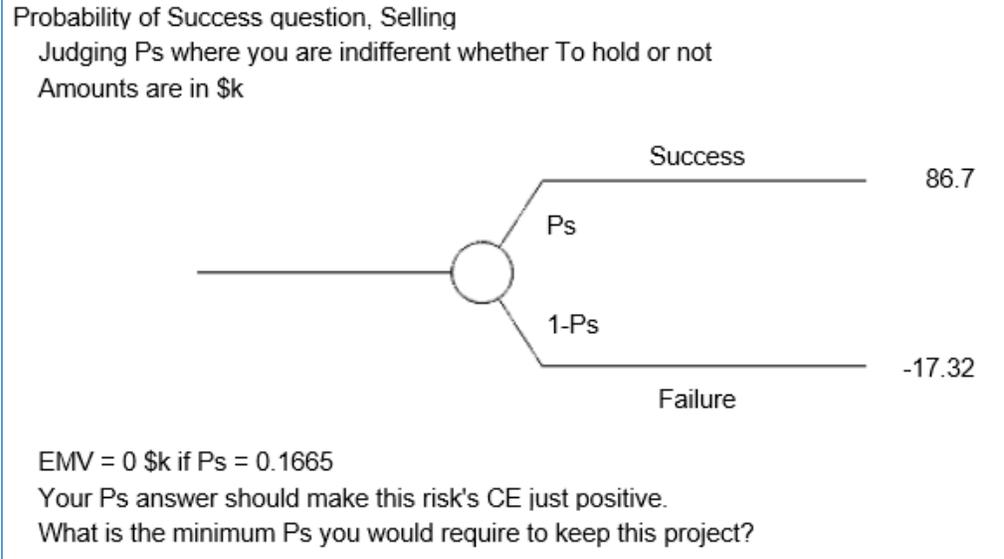


Figure 2b. Questions parameters around a chance node. This is the way to represent a risk event in a decision tree.

Ps	EMV	DROI	Ps 10X
1.00	86.7	.0	1.000
.95	81.5	.0	1.000
.90	76.3	.0	1.000
.85	71.1	4.1	1.000
.80	65.9	3.8	1.000
.75	60.7	3.5	1.000
.70	55.5	3.2	1.000
.65	50.3	2.9	.999
.60	45.1	2.6	.998
.55	39.9	2.3	.995
.50	34.7	2.0	.989
.45	29.5	1.7	.977
.40	24.3	1.4	.954
.35	19.1	1.1	.914
.30	13.9	.8	.851
.25	8.7	.5	.756
.20	3.5	.2	.624
.167	.0	.0	.515
.15	-1.7	-.1	.456
.10	-6.9	-.4	.264
.05	-12.1	-.7	.086
.00	-17.3	.0	.000

Figure 3c. Supplemental table. For different Ps answers, this table shows the project Expected Monetary Value (*EMV*), Discounted Return On Investment ($DROI = EMV / |NPV_f|$), and probability of success ($NPV > 0$) of a portfolio of 10 identical, independent projects (*Ps 10X*).

Your Answer

After you have read and have *carefully* considered the presented question, enter your numerical answer. Only risk-averse (conservative) values are acceptable. Outside these limits should generate a warning message. Acceptable answers will be in these ranges:

$$P_{BE} < P_s < 1 \quad \text{where } P_{BE} \text{ is the breakeven probability}^3 \\ \text{where } EMV = 0 \text{ (whatever currency)}$$

$$NPV_F < CE < EMV$$

$$0 < Share \leq 1$$

Risk Tolerance Coefficient

The textbox below Your Answer is where the calculated r result is presented, as shown in Figure 3a. If UEP was unable to calculate r , a popup message will explain the issue.

Supplement Information in Questions

Depending upon the question type, supplemental information is provided that may help (or may detract).

Ps Questions

“EMV is positive when $P_s > \#.##$ ”

The lower-bound is the breakeven probability, P_{BE} , mentioned above. Obviously, you aspire to make a profit, so your P_s answer should be higher than P_{BE} . The table shows this crossover point where $EMV = DROI = \$0$.

The table has recalculated $EMVs$ for example probabilities that you might answer. UEP won't like an answer than makes $EMV \leq \$0$.

$DROI =$ discounted return on investment $= EMV / NPV_F$

This is a popular ranking criterion for portfolio optimization when capital-constrained. **UEP assumes that you are not resource constrained.**

P_s 10X. What if you made ten investments, identical yet independent? What is the probability such a portfolio will have a positive NPV ? Some decision makers worry excessively about low P_s values, and this calculation may often sooth your fear.

CE Questions

EMV and $DROI$

P(profit with 10 like projects)

The outcomes are occasionally both positive or both negative. In these cases, P_s is the probability of the better outcome (NPV_S).

³ If $S = NPV_S > \$0$ and $F = -NPV_F > \$0$, then $P_{BE} = F/(F+S)$

The table adjusts values, having paid the *CE* (or, received if the *CE* is negative):

$$\text{Exposure} = NPF_S - CE$$

$$\text{Potential} = NPF_F - CE$$

Share Questions

EMV and *DROI*

P(profit with 10 like projects)

How much each .01 share obligates you to pay in *NPF_F*.

The table simply factors *NPF_S*, *NPF_F*, and *EMV* by *Share*.

Your comments, suggestions, and questions are welcome. Please contact:

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