

Vaja 2:  
Hierarhične metode  
s programom LogicalDecisions

# Namen in vsebina

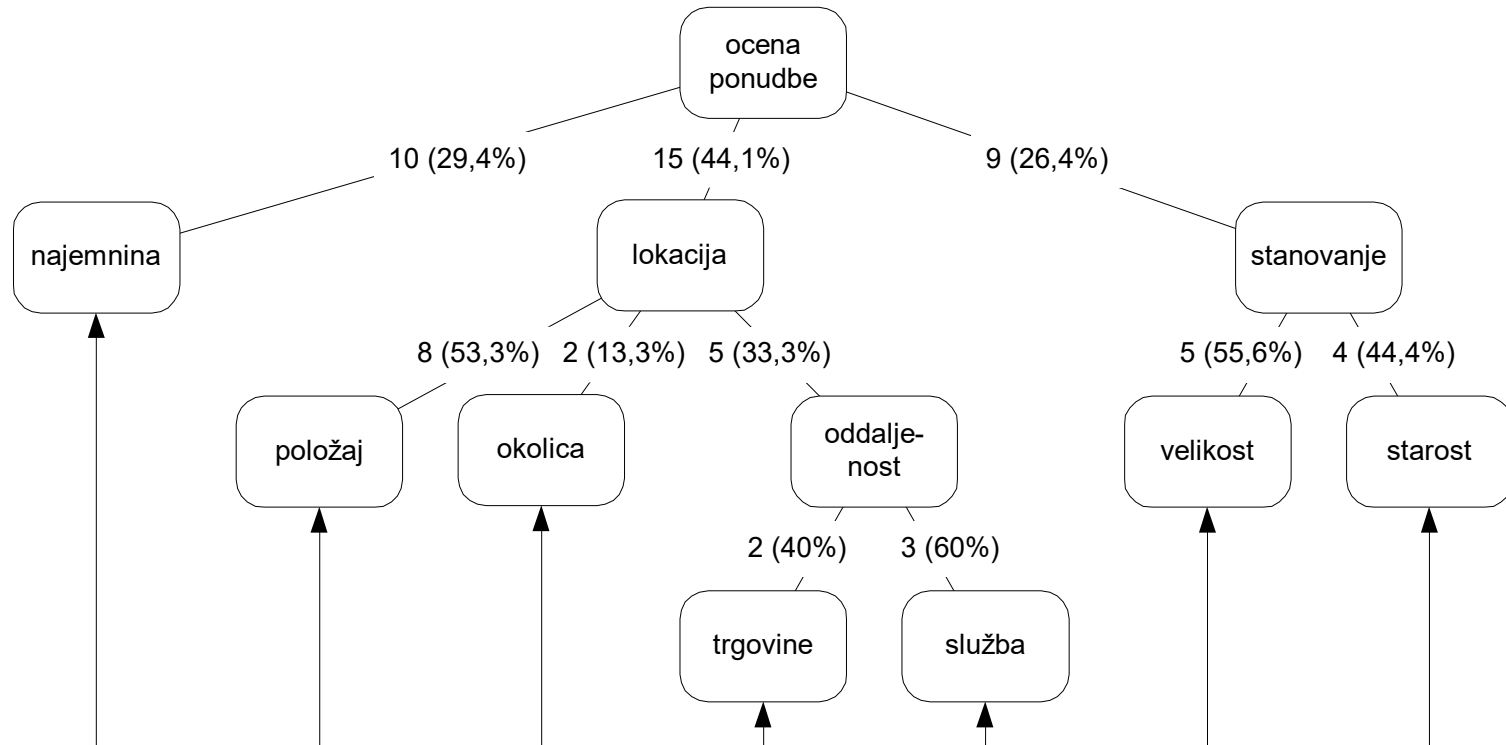
Prikaz in uporaba programov za delo s hierarhičnimi modeli:

- Logical Decisions <http://www.logicaldecisions.com/>
- DECERNS <http://decerns.com/>

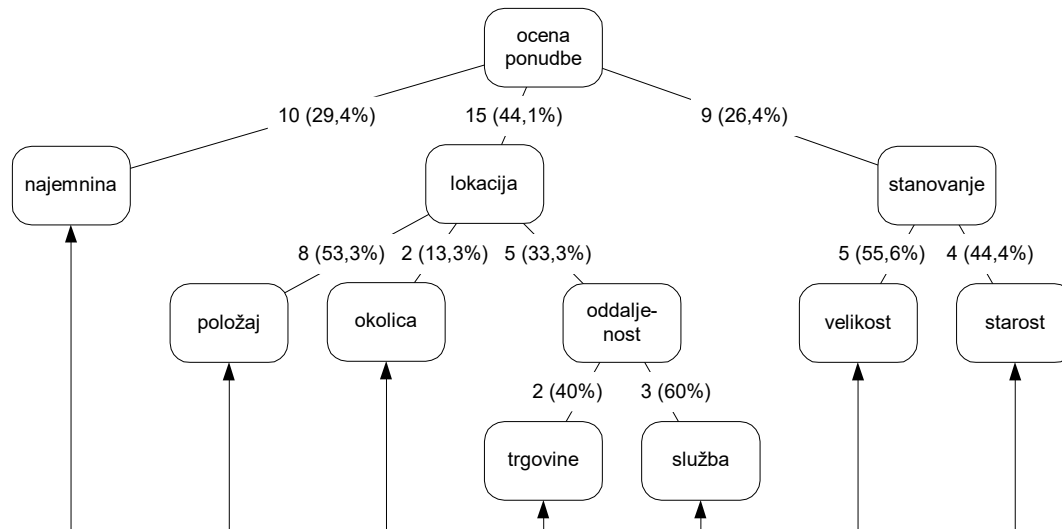
Metode:

- neposredno določanje uteži in koristnosti
- MAUT: uporaba mejnih vrednostnih funkcij
- AHP: primerjava atributov in alternativ po parih

# Primer: Stanovanje (iz predavanj)



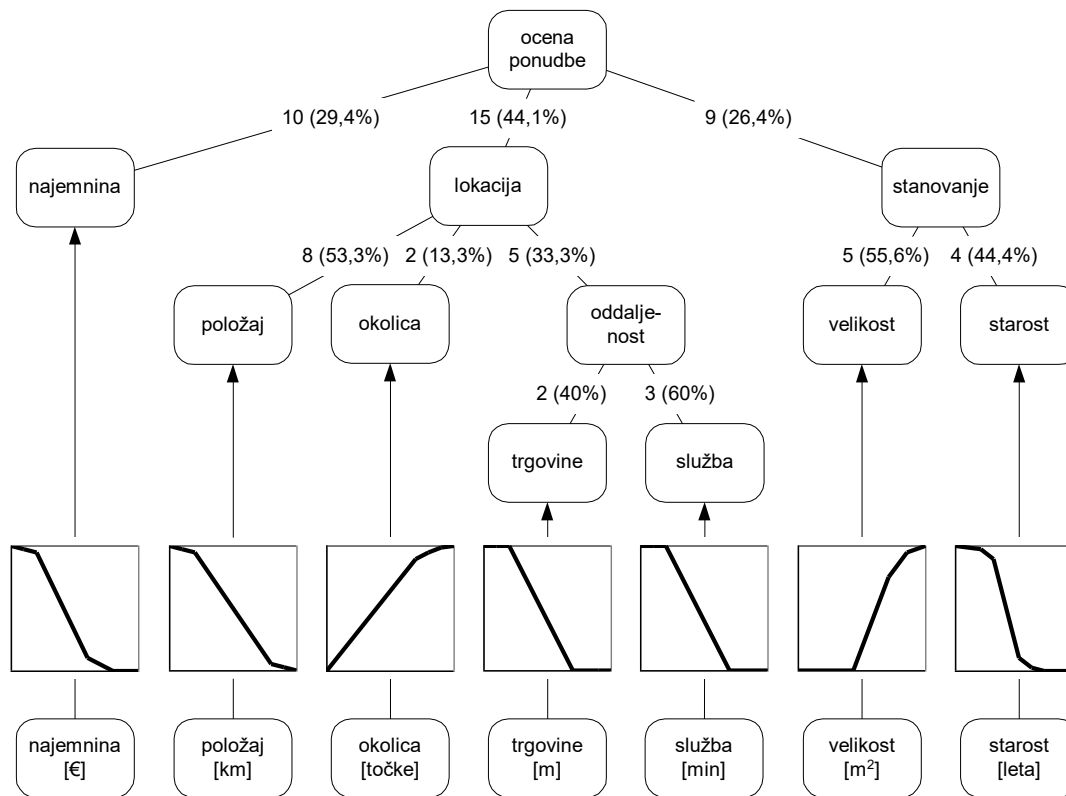
# Metoda 1: Neposredna



	najemnina	položaj	okolica	trgovine	služba	velikost	starost
garsonjera	0,1	1	0,13	0,8	0,7	0,2	0,15
prizidek	0,6	0,12	0,99	0,3	0,3	0,85	0,9

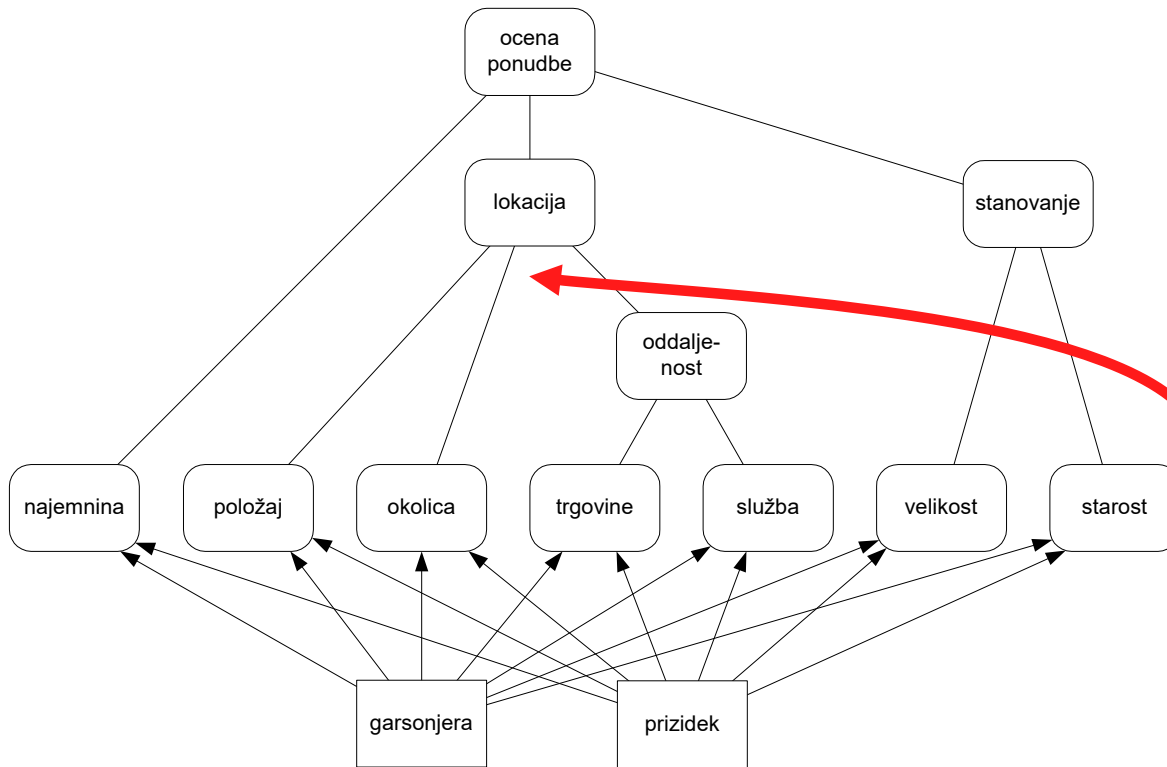
parameter	koristnost	
	garsonjera	prizidek
<b>ocena ponudbe</b>	<b>0,43</b>	<b>0,54</b>
najemnina	0,10	0,60
<b>lokacija</b>	<b>0,80</b>	<b>0,30</b>
položaj	1,00	0,12
okolica	0,13	0,99
<b>oddaljenost</b>	<b>0,74</b>	<b>0,30</b>
trgovine	0,80	0,30
služba	0,70	0,30
<b>stanovanje</b>	<b>0,18</b>	<b>0,87</b>
velikost	0,20	0,85
starost	0,15	0,90

# Metoda 2: MAUT



	najemnina	položaj	okolica	trgovine	služba	velikost	starost
<b>garsonjera</b>	600	0	1	100	10	35	20
<b>prizidek</b>	200	8	9	300	45	55	2

# Metoda 3: AHP



	<i>položaj</i>	<i>okolica</i>	<i>oddaljenost</i>	<b>utež</b>
<i>položaj</i>	1	5	3	<b>0,633</b>
<i>okolica</i>	1/5	1	1/3	<b>0,106</b>
<i>oddaljenost</i>	1/3	3	1	<b>0,260</b>

# Program Logical Decisions



**LOGICAL DECISIONS**  
Software for *more effective decisions*  
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## Software for more effective decisions

Logical Decisions provides innovative solutions for hard choices. Our state-of-the-art software package — Logical Decisions® for Windows — lets you evaluate choices by considering many variables at once, separating facts from value judgments, and explaining your choice to others.

Logical Decisions also provides consulting and training to help you get the most out of the software and to help you find creative and acceptable solutions to your most difficult decisions.

### What's New at Logical Decisions:

**Logical Decisions is now freeware!**

As of January 1, 2021 Logical Decisions will be completely free! The new version 8.0 will include all of the features of the professional, group, and portfolio versions. [Click here](#) to go to the download page.

Soon Logical Decisions will completely open source. Watch this page for more details.

- Windows, od 2021 brezplačen
- Program starejšega datuma
- Zelo zmogljiv, primeren bolj za analitike kot za „običajne“ uporabnike
- Podpira vse tri obravnavane metode (neposred., MAUT, AHP)
- in še mnogo več, npr.:
  - skupinsko odločanje („preference sets“)
  - vrednotenje z verjetnostnimi porazdelitvami

# Osnovni pogledi

StanovanjeDirect.ldw - Logical Decisions v8.0

File Edit View Assess Review Results

Facilitator

## Logical Decisions Facilitator

**LDW Steps**

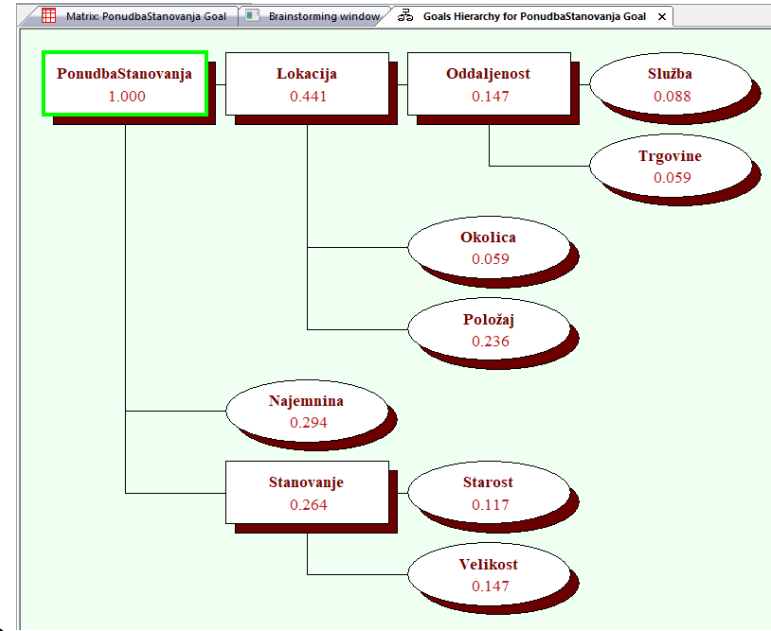
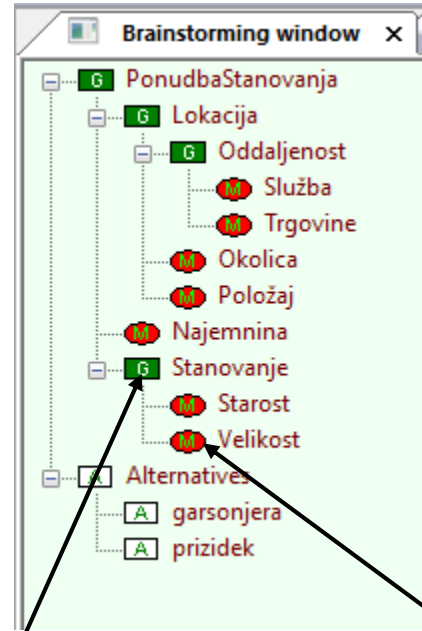
- Structure
  - Name the analysis
  - Brainstorming
  - Define Goals
  - Define Measures
  - Define Alternatives
- Assess
  - Assess Common Units
  - Assess Weights
  - Preference Sets

**Facilitator**

The Facilitator guides you through the process of creating and reviewing a Logical Decisions model. Click on an outline entry above to view its help summary or double click to start the activity. The outline follows the steps of

- 1) Structure - create the goals, measures and alternatives for your model
- 2) Assess - make the judgments needed to convert the raw levels for an alternative into an overall utility

[Detailed Help](#)



(G) Goal: izpeljani atribut

(M) Measure: osnovni atribut

	Najemnina	Okolica	Položaj	Služba	Starost	Trgovine	Velikost
garsonjera	0.1	0.13	1	0.7	0.15	0.8	0.2
prizidek	0.6	0.99	0.12	0.3	0.9	0.3	0.85



# Merske lestvice

preferenčna

Measure Properties

Name Scale Labels

Služba Measure

Use Labels

Units:

Most Preferred Level:  Alts. Most Preferred: 0.7

Least Preferred Level:  Alts. Least Preferred: 0.3

Upper Cutoff Level:  Number of Categories: 0

Lower Cutoff Level:

vrednostna

Measure Properties

Name Scale Labels

Služba Measure

Use Labels

Units:

Most Preferred Level:  Alts. Most Preferred: 10

Least Preferred Level:  Alts. Least Preferred: 45

Upper Cutoff Level:  Number of Categories: 0

Lower Cutoff Level:

diskretna  
„labels“

Measure Properties

Name Scale Labels

Tuji jezik Measure

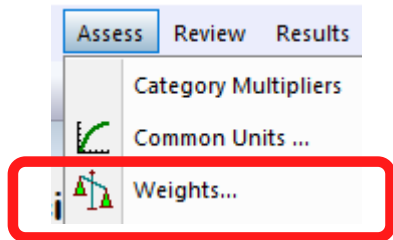
Use Labels Scale defined by labels

Use labels as flags   Don't show flags

Labels:

Obvezno urejena padajoče  
(obratno kot pri DEXiWin)

# Zajemanje uteži



Assess Weights

Weights Organize/Review Interactions

Goal:

- Lokacija
- Oddaljenost
- PonudbaStanovanja**
- Stanovanje

Weight Assessment Method:

- Smart Method (swing weights)
- Smarter Method (rank order centroid)
- Direct Entry (additive)**
- Tradeoffs
- Balance Beam
- Pairwise Weight Ratios
- Analytic Hierarchy Process (AHP)

Allow representatives for sub-goals

Status: Assessment Completed

Assess Reset

Assess Weights

Weights **Organize/Review** Interactions

PonudbaStanovanja
 

- Lokacija
- Oddaljenost
- Stanovanje**

Has a MUF  
 No MUF

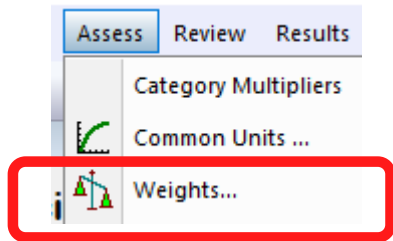
Key -  
 Green Check: Assessment complete  
 Red X: Assessment Incomplete  
 Grey Check: No assessment needed members in higher level MUF

Please directly enter the scaling constants for PonudbaStanovanja

Scaling constants will be adjusted to sum to 1.0

	Done	Cancel	
	Least Preferred Level	Most Preferred Level	Scaling Constant (Weight)
Lokacija Goal (Utility)	0	1	0.441441
Najemnina Measure (new units)	0	1	0.294294
Stanovanje Goal (Utility)	0	1	0.264264

# Zajemanje uteži



Assess Weights

Weights Organize/Review Interactions

Goal:

- Lokacija
- Oddaljenost
- PonudbaStanovanja**
- Stanovanje

Weight Assessment Method:

- Smart Method (swing weights)
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- Direct Entry (additive)
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- Balance Beam
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Allow representatives for sub-goals

Status: Assessment Completed

Assess Reset

Assess Weights

Weights **Organize/Review** Interactions

PonudbaStanovanja
 

- Lokacija
- Oddaljenost
- Stanovanje**

Has a MUF  
 No MUF

Key -  
 Green Check: Assessment complete  
 Red X: Assessment incomplete  
 Grey Check: No assessment needed members in higher level MUF

AHP Matrix for PonudbaStanovanja Goal

Done	I-max = 3.000 C.I. = 0.000 C.R. = 0	Lokacija	Najemnina	Stanovanje	
Cancel		Lokacija	0.441	1.500	1.670
		Najemnina	0.667	0.294	1.114
		Stanovanje	0.599	0.898	0.264

# Določanje vhodnih vrednosti

## Metoda 1: Neposredna

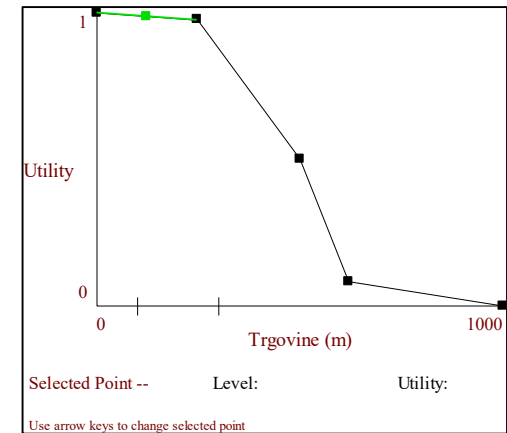
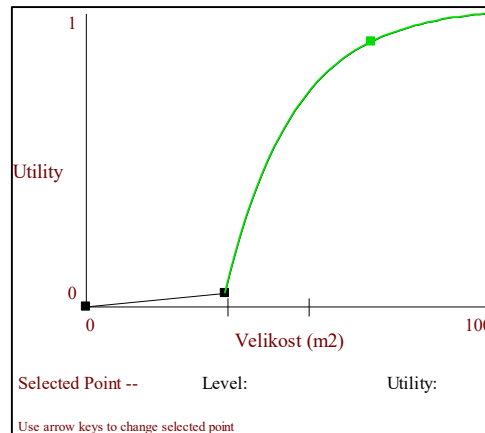
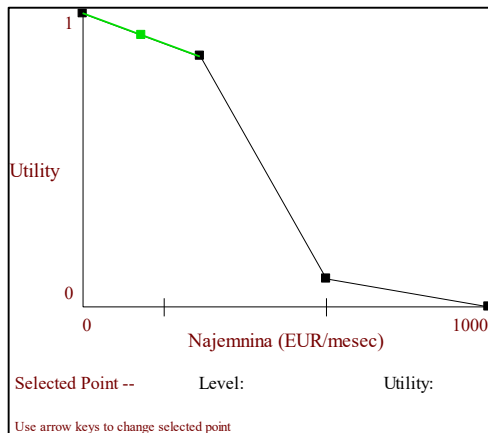
- Pri vseh atributih uporabimo preferenčne lestvice min=0, max=1
- Vrednosti  $\in [0,1]$  vpišemo v „Matrix...“

	Najemnina	Okolica	Položaj	Služba	Starost	Trgovine	Velikost
garsonjera	0.1	0.13	1	0.7	0.15	0.8	0.2
prizidek	0.6	0.99	0.12	0.3	0.9	0.3	0.85

# Določanje vhodnih vrednosti

## Metoda 2: MAUT

- Za vse vhodne attribute (M: Measures):
  - uporabimo dejanske zaloge vrednosti (npr. za *Trgovine*: most preferred = 0m, least preferred = 1000m)
  - Določimo SUF (Single-measure utility function, mejne vrednostne funkcije)
- V „Matrix...“ vpišemo dejanske vhodne vrednosti



Matrix: PonudbaStanovanja Goal x Goals Hierarchy for PonudbaStanovanja Goal Brainstorming window

	Najemnina	Okolica	Položaj	Služba	Starost	Trgovine	Velikost
garsonjera	600	1	0	10	20	100	35
prizidek	200	9	8	45	2	300	55

# Določanje vhodnih vrednosti

## Metoda 3: AHP

- Začnemo kot pri neposredni Metodi 1
- Za zajemanje uteži in koristnosti uporabimo „Assessment Method: Analytic Hierarchy Process“

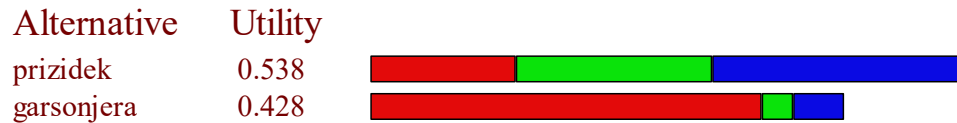
Matrix: PonudbaStanovanja Goal		Goals Hierarchy for PonudbaStanovanja Goal		AHP Matrix for PonudbaStanovanja Goal
Done	I-max = 3.000 C.I. = 0.000 C.R. = 0	Lokacija	Najemnina	Stanovanje
Cancel		Lokacija	0.441	1.670
		Najemnina	0.667	1.114
		Stanovanje	0.599	0.264

Matrix: PonudbaStanovanja Goal		Goals Hierarchy for PonudbaStanovanja Goal		AHP Matrix for Služba Measure
Done	I-max = 2.000 C.I. = 0.000 C.R. = 0	garsonjera	prizidek	
Cancel		garsonjera	0.500	1.000
		prizidek	1.000	0.500

# Vrednotenje in analiza alternativ

## Rank Alternatives

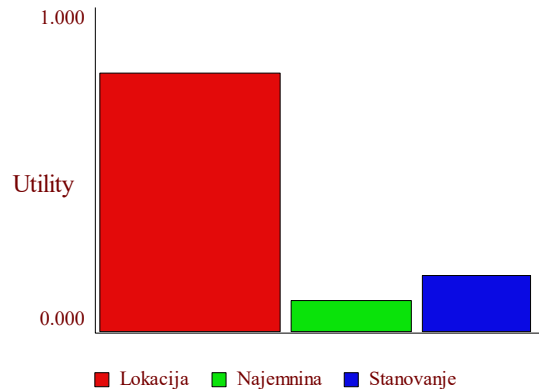
Ranking for PonudbaStanovanja Goal



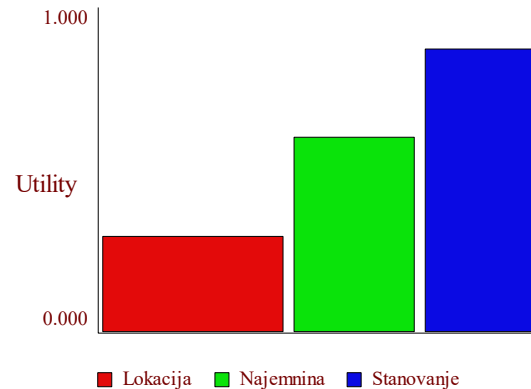
■ Lokacija ■ Najemmina ■ Stanovanje

## Graph an Alternative

Goal Member Utilities for garsonjera for PonudbaStanovanja Goal



Goal Member Utilities for prizidek for PonudbaStanovanja Goal

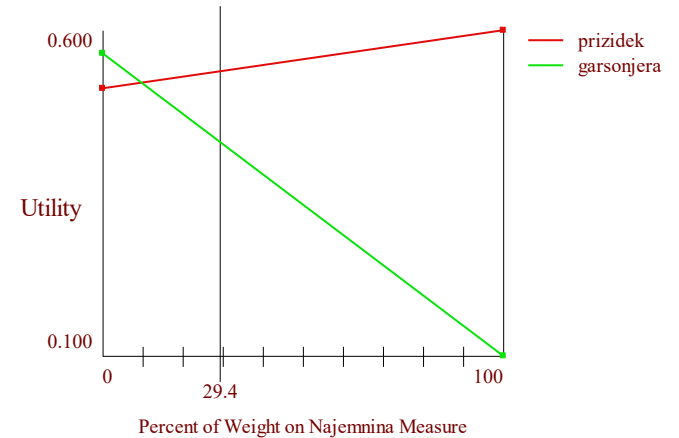


# Vrednotenje in analiza alternativ

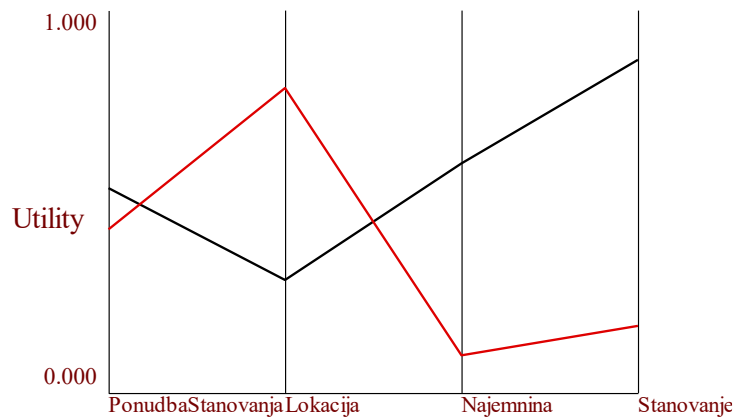
## Ranking Results Matrix

	PonudbaStanovje Goal	Lokacija Goal	Najemnina Measure	Stanovanje Goal	Položaj Measure	Oddaljenost Goal	Veilkost Measure	Starost Measure	Služba Measure	Trgovine Measure	Okolica Measure
Weight	1.000	0.441	0.294	0.264	0.236	0.147	0.147	0.117	0.088	0.059	0.059
prizidek	0.538	0.296	0.600	0.872	0.120	0.300	0.850	0.900	0.300	0.300	0.990
garsonjera	0.428	0.798	0.100	0.178	1.000	0.740	0.200	0.150	0.700	0.800	0.130

## Sensitivity Graph

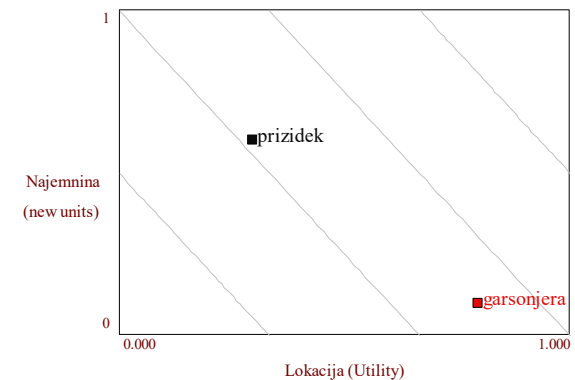


## Ranking Results Graph



## Scatter Graph

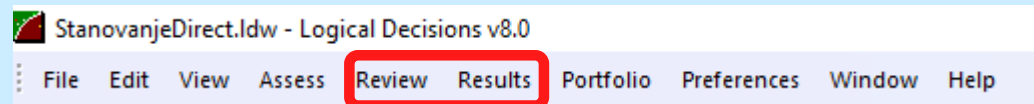
Scatter Diagram for NEW PREF. SET Preference Set






# Naloga 1: Razglejte se

1. Odprite StanovanjeDirect.Idw
2. Odprite in si oglejte vse tri osnovne poglede: *Brainstorming*, *Goals Hierarchy* in *Matrix*
3. Odkrijte, kako pridete do definicij merskih lestvic
4. Odprite okno *Assess Weights* in si oglejte, kako so definirane uteži vseh ciljev (G)



5. Oglejte si – in se „igrajte“ z – možnostmi v menijih *Review* in *Results*
6. Poskusite narediti vse grafikone, prikazane zgoraj na dveh straneh „Vrednotenje in analiza alternativ“

# Naloga 2: MAUT

1. Odprite StanovanjeMAUT.ldw
2. Poiščite vse razlike v primerjavi z Nalogo 1:
  - Preglejte vse merske lestvice. Opazite razlike?
  - Odprite okno SUFs  in si za vse (M) oglejte mejne vrednostne funkcije. Razumete, za kaj gre? Bi jih vi definirali drugače?
  - Poglejte „Matrix...“. V čem je bistvena razlika od prej?
3. Na modelu MAUT ponovite analizo rezultatov vrednotenja iz Naloge 1

# Naloga 3: Dotik AHP

V modelu StanovanjeMAUT.Idw določite uteži podrednih kriterijev kriterija PonudbaStanovanja z metodo AHP.

Korake do tja odkrijte sami.

Pazite na konsistentnost.

# Naloga 4: Razvoj novega modela

V programu Logical Decisions poskusite razviti nov model od začetka.

Za prvič priporočam nekaj enostavnega, na primer izbor zaposlitve na osnovi: plače, lokacije, vsebine dela in napredovanja.

