

Informacioni sistemi

Računske vežbe:

URN i UML projektovanje

Doc. dr Valentina Nejkoć

valentina@elfak.ni.ac.rs

kancelarija 524

**Katedra za Računarstvo,
Elektronski fakultet, Univerzitet u Nišu**

User Requirements Notation (URN)



- **URN**

- ❖ Use Case Maps (UCM)
- ❖ Goal-Oriented Requirements Language (GRL)
- ❖ Kombinovanje UCM i GRL pomaže u povezivanju tekstualnih zahteva i dizajna sistema.

Šta je to UCM?

- **UCM je dijagram koji ima za cilj da povezuje ponašanje i strukturu sistema na eksplicitan i vizuelan način.**
- **UCM se sastoji od puteva koji su prva klasa arhitekturnih entiteta koji opisuju kauzalne veze između odgovornosti, koje su ograničene organizacionim strukturama apstraktnih komponenti.**
- **Putevi su scenariji koji veza između zahteva (različitih slučajeva) i detaljnog dizajna.**

UCM i UML dijagrami

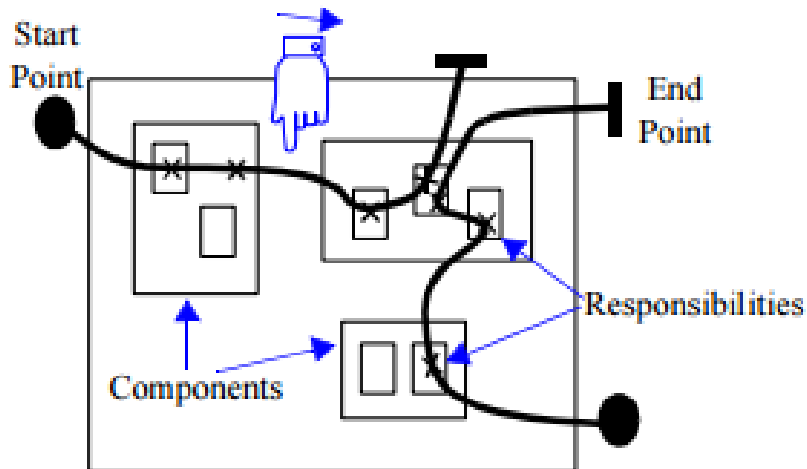
- **UCM dijagrami su slični UML dijagramima slučajeve (Use Case dijagramima) i oba se koriste u ranim fazama razvoja informacionog sistema.**
- **UCM je fleksibilniji od UML dijagrama aktivnosti i jednostavniji je i lakši za razumevanje**
- **UCM se može prevesti u UML sekvencijalni dijagram**

Konstruisanje UCM dijagrama

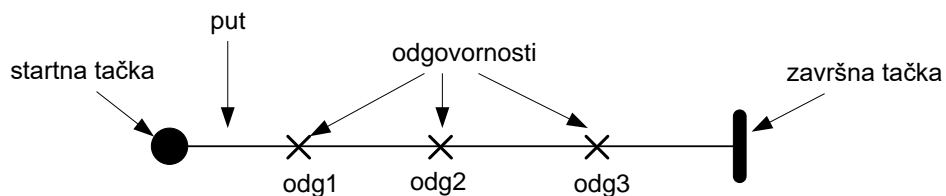
- **Šta nam je potrebno za konstruisanje UCM dijagrama?**

- ❖ Zahtevi sistema
- ❖ Odgovornosti koje predstavljaju funkcionalnosti sistema
- ❖ Specificiranje interfejsa između okruženja i sistema
 - Ova specifikacija vodi startnim i krajnjim tačkama odgovarajućeg slučaja sistema i odgovara razmeni poruka između sistema i okruženja. Poruke se dalje opisuju u modelima u okviru detaljnog dizajna, kao što je npr. UML Sekvencijalni dijagram.

● Elementi i komponente UCM dijagrama

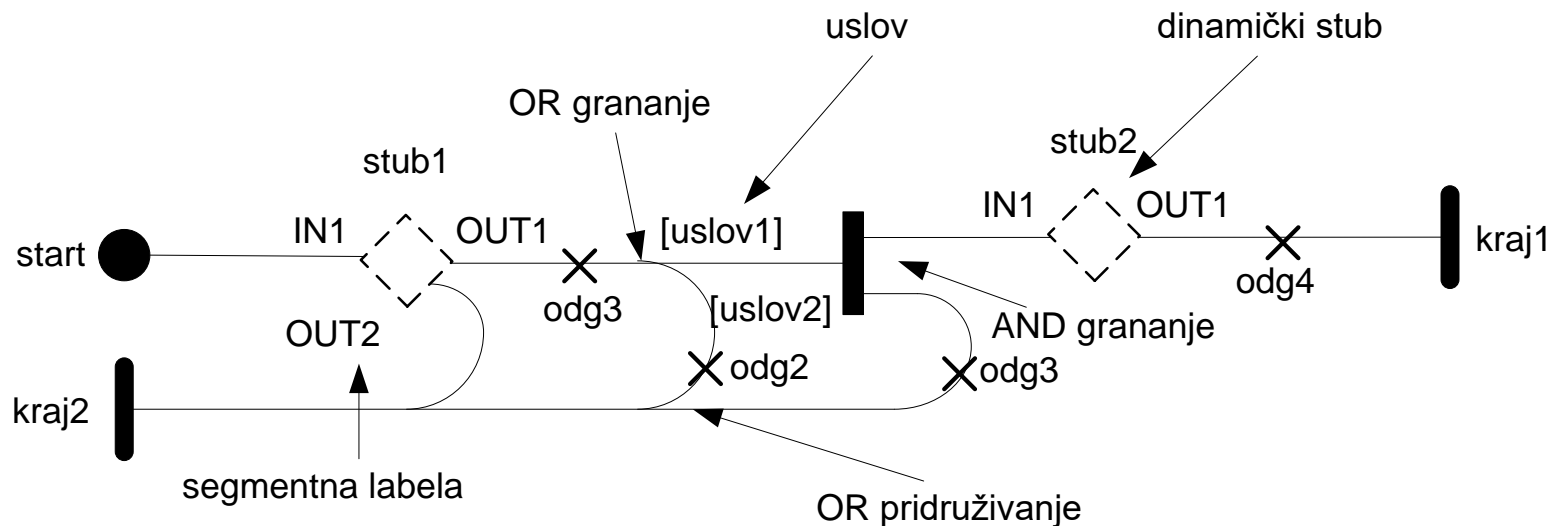


- ✓ startne tačke (start points)
 - predstavlja preduslov
 - grafička reprezentacija: popunjen krug
- ✓ odgovornosti (responsibilities)
 - predstavlja akcije, zadatke i funkcije koje treba izvršiti
 - grafička reprezentacija: oblik krsta
- ✓ krajnje tačke (end points)
 - Predstavlja rezultat ili završetak
 - grafička reprezentacija: oblik uspravnog štapa
- ✓ komponente
 - predstavlja objekte koji sačinjavaju sistem
 - grafička reprezentacija: pravougaonog je oblika



UCM notacija

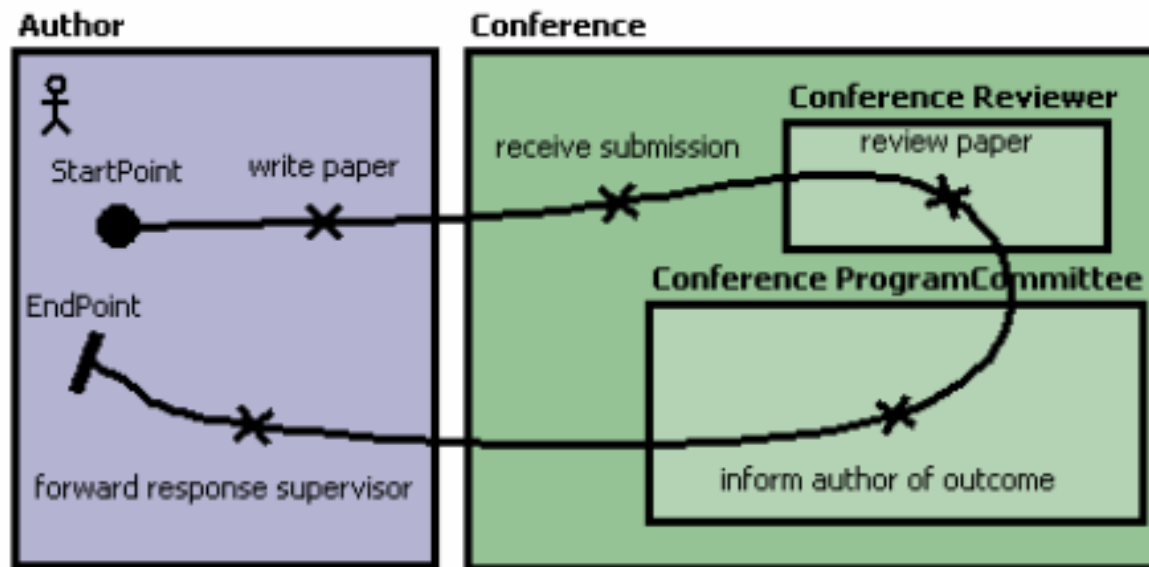
- **OR- pridruživanje (OR-join), OR- grananje (OR-fork), AND- pridruživanje (AND-join), AND-grananje (AND-fork), tajmer (timer), prekid (abort), tačka neuspaha (failure point).**



- **Primer jednostavnog Use Case-a**

Title: PaperSubmission

1. Author writes a paper
2. Conference receives submission
3. Conference Reviewer reviews the paper
4. Conference ProgramCommittee informs author of outcome
5. Author forwards response to supervisor

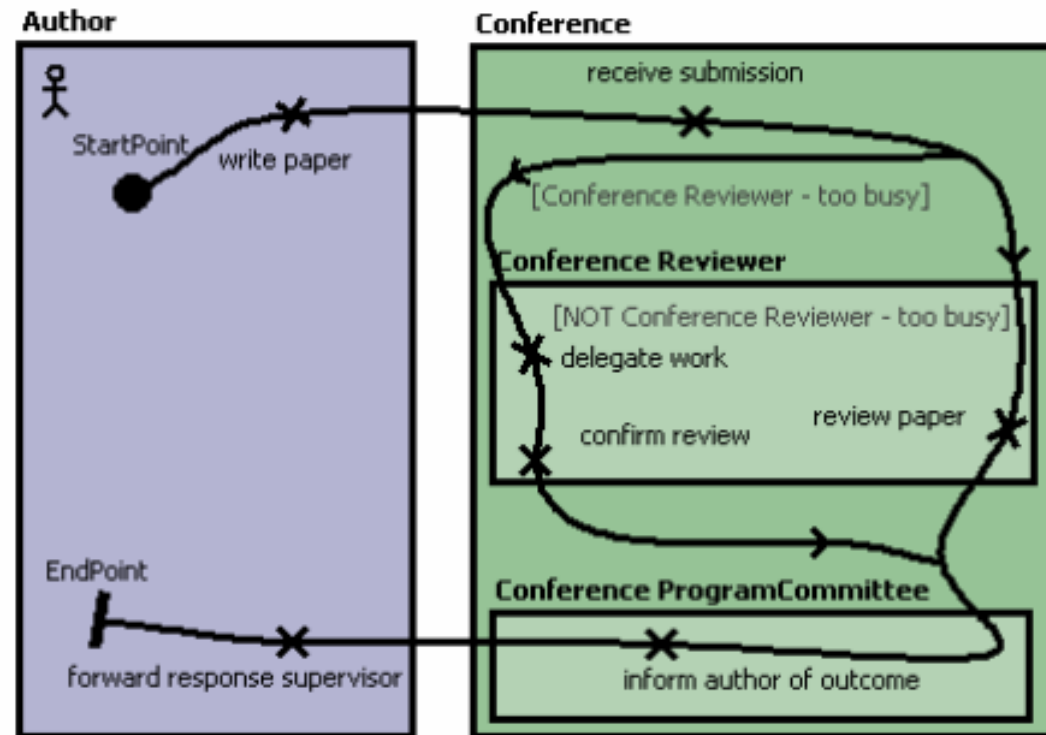


UCM primer

● Primer Use Case-a sa alternativama

Title: PaperSubmission

1. Author writes a paper
 2. Conference receives submission
 3. Conference Reviewer reviews the paper
 4. Conference ProgramCommittee informs author of outcome
 5. Author forwards response to supervisor
2. a. Conference Reviewer is too busy
2. a. 1. Conference Reviewer delegates work
2. a. 2. Conference Reviewer confirms review
2. a. 3. GOTO 4

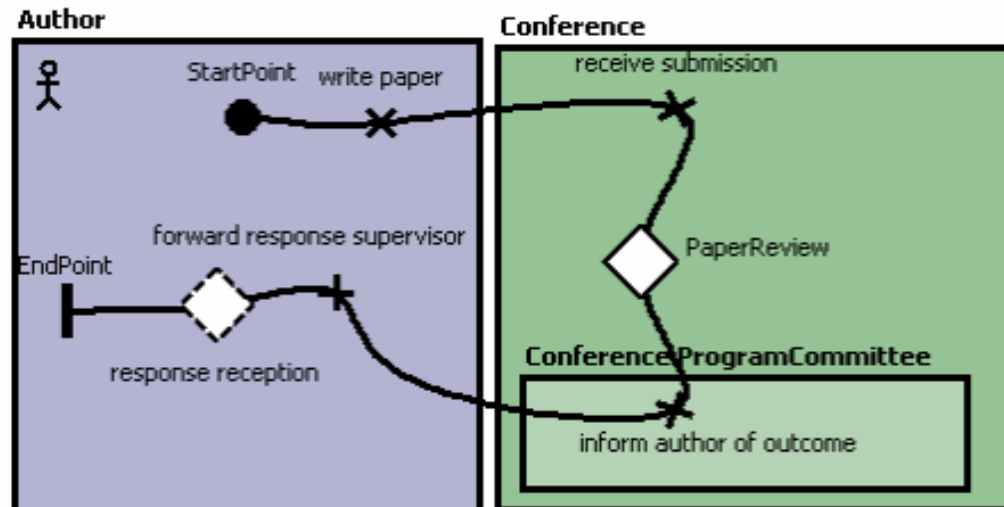


UCM primer

● Primer Use Case-a sa inkluzijom i ekstenzionom tačkom

Title: PaperSubmission

1. Author writes a paper
 2. Conference receives submission
 3. Conference Reviewer reviews the paper
 4. Conference ProgramCommittee informs author of outcome
 5. Author forwards response to supervisor
2. a. Conference Reviewer is too busy
2. a. 1. Conference Reviewer delegates work
2. a. 2. Conference Reviewer confirms review
2. a. 3. GOTO 4

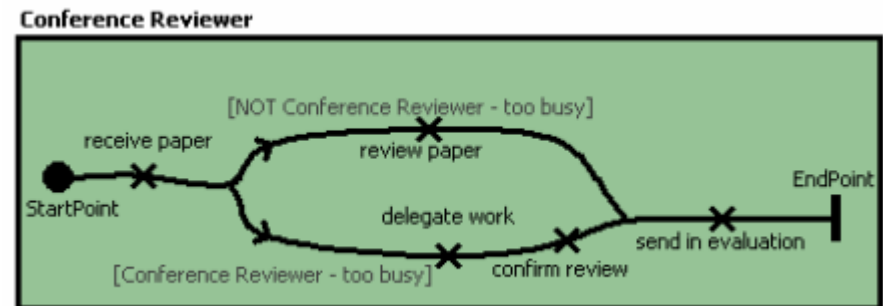


UCM primer

- **Primer Use Case-a sa uključenim Use Case-om**

Title: PaperReview

1. Conference Reviewer receives paper
2. Conference Reviewer reviews the paper
3. Conference Reviewer sends in evaluation
 1. a. Conference Reviewer is too busy
 1. a. 1. Conference Reviewer delegates work
 1. a. 2. Conference Reviewer confirms review
 1. a. 3. GOTO 3

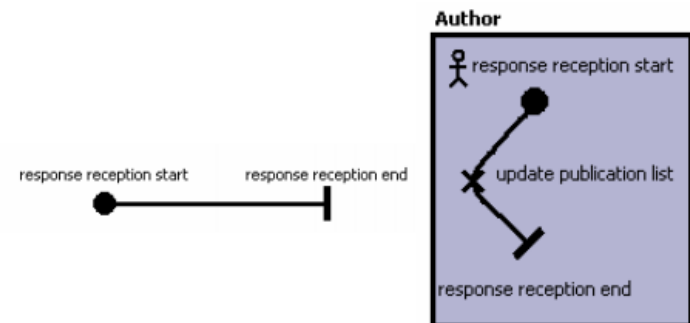


- **Ekstenzioni Use Case**

Title: PaperReception

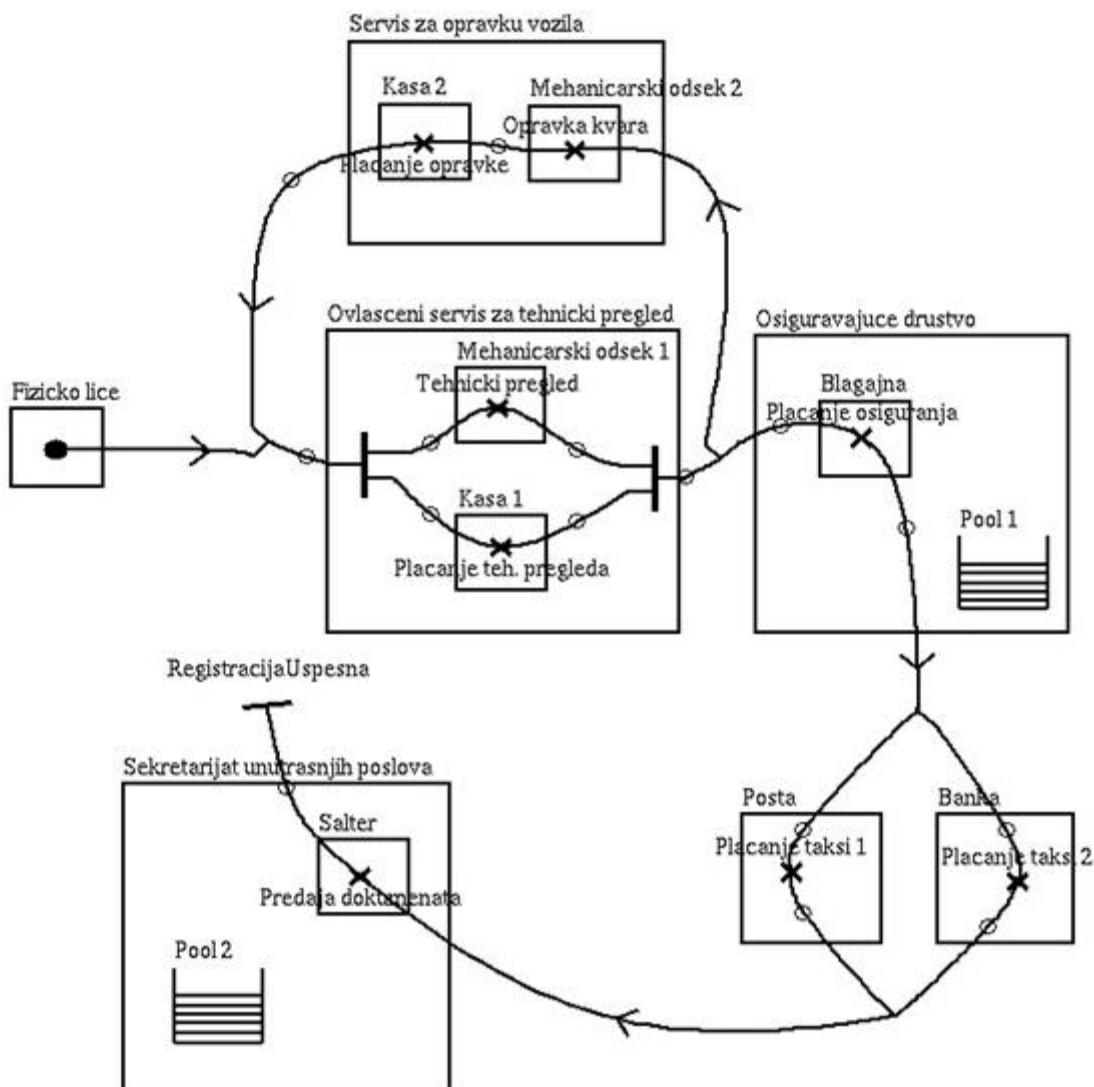
PART 1. At Extension Point response reception

1. Author updates publication list



UCM primer

UCM dijagram procesa registracije vozila



● Zašto GRL?

- ❖ Sistematično izvođenje zahteva iz ciljeva
- ❖ Ciljevi obezbeđuju obrazloženja za zahteve
- ❖ Struktura cilja obezbeđuje razumljivu strukturu za dokument o zahtevima
- ❖ Upotrebom alternativnih ciljeva poboljšanja obezbeđuju se da se alternativni predlog sistema istraži
- ❖ Formalizacija cilja obezbeđuje poboljšanjima da se pokažu korektnim i kompletnim.

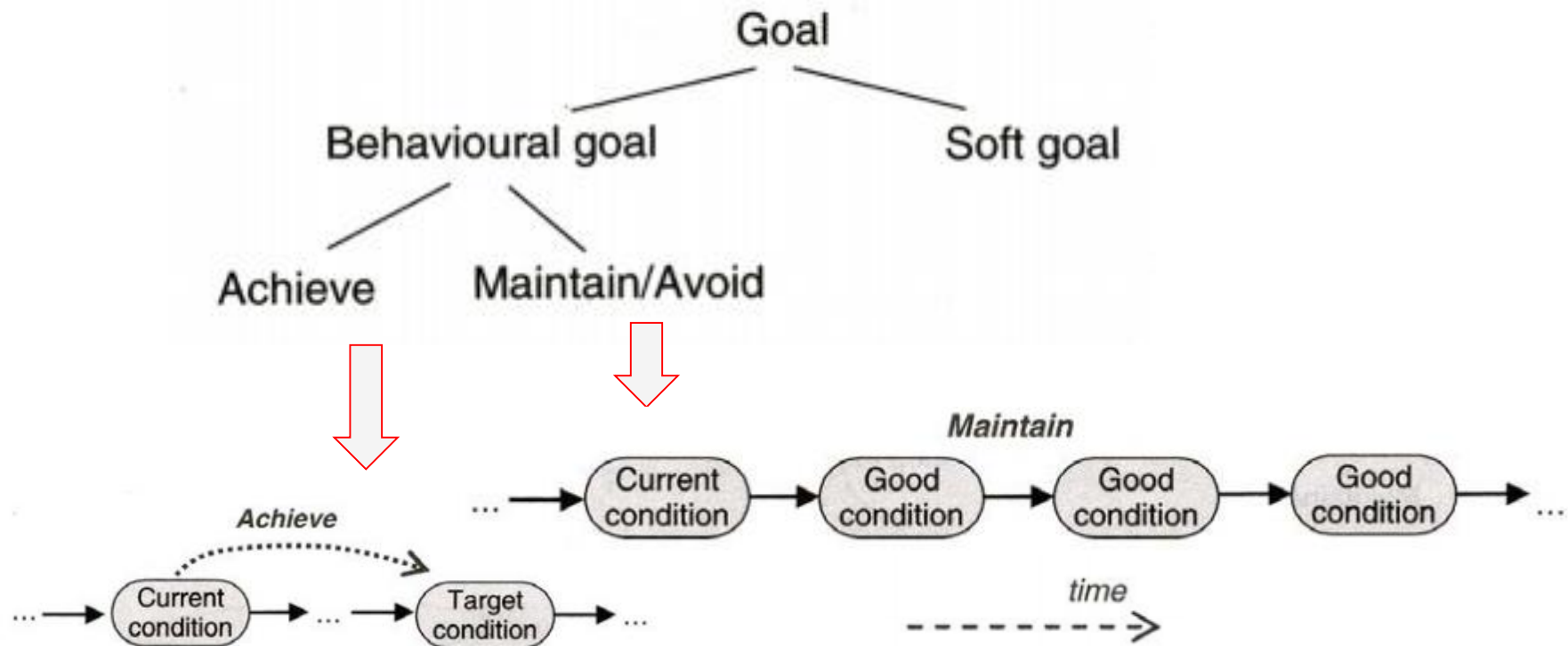
- ***Cilj (engl. goal)***

- ❖ je iskaz, koji opisuje neku situaciju za koju je poželjno da bude tačna, i koji sistem treba da zadovolji kroz kooperaciju njegovih agenata.

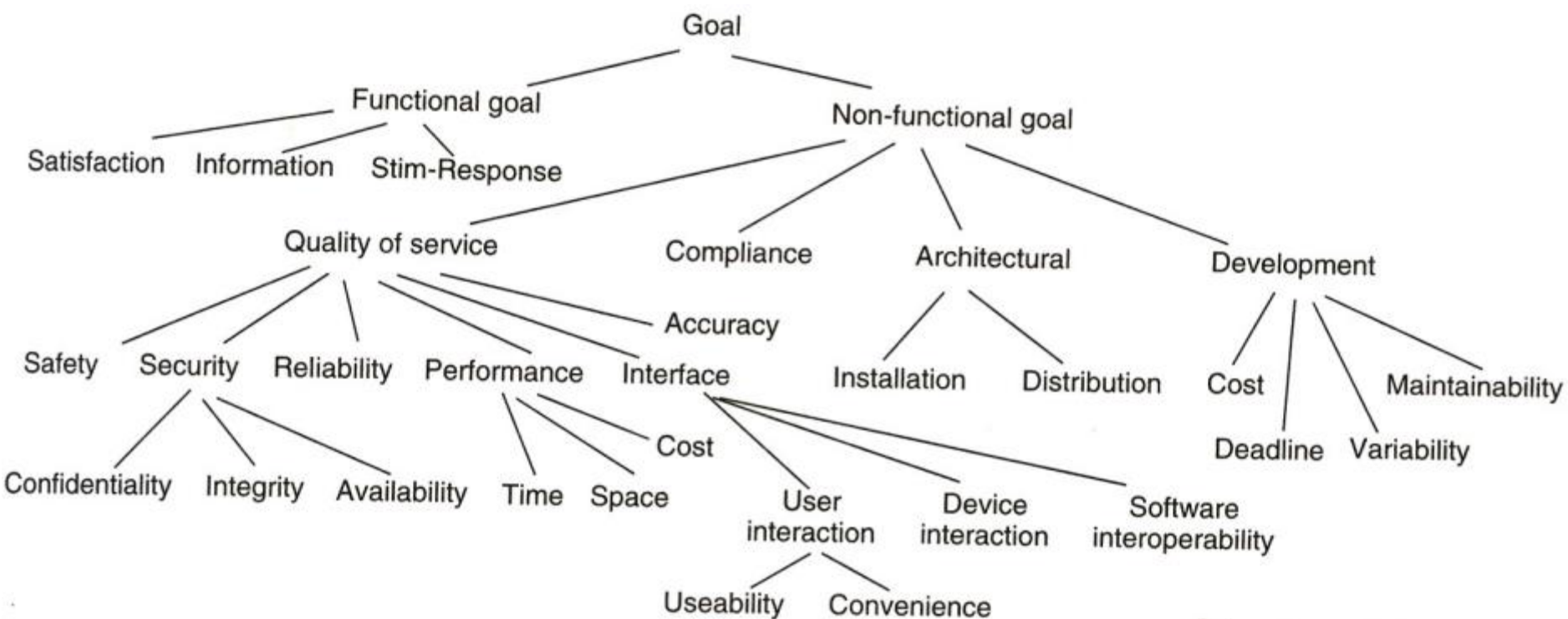
- ***Zahtev (engl. requirement)***

- ❖ je cilj pod odgovornošću jednog agenta

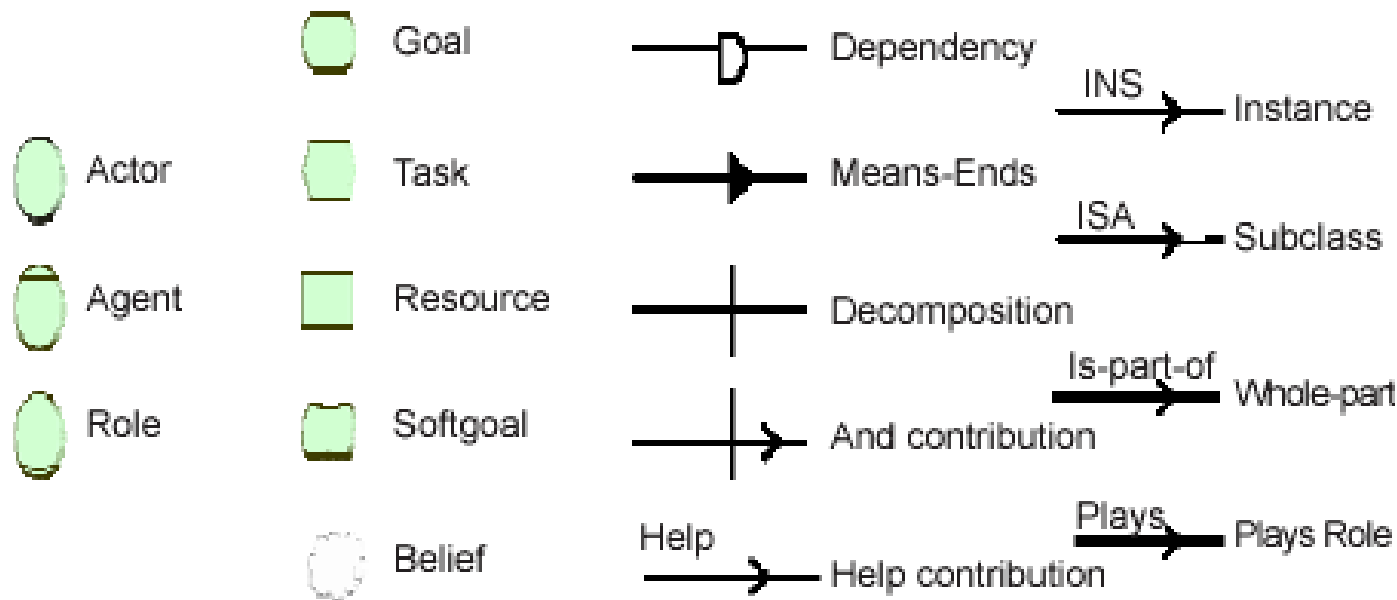
● Taksonomija cilja



Podela ciljeva -- zahteva



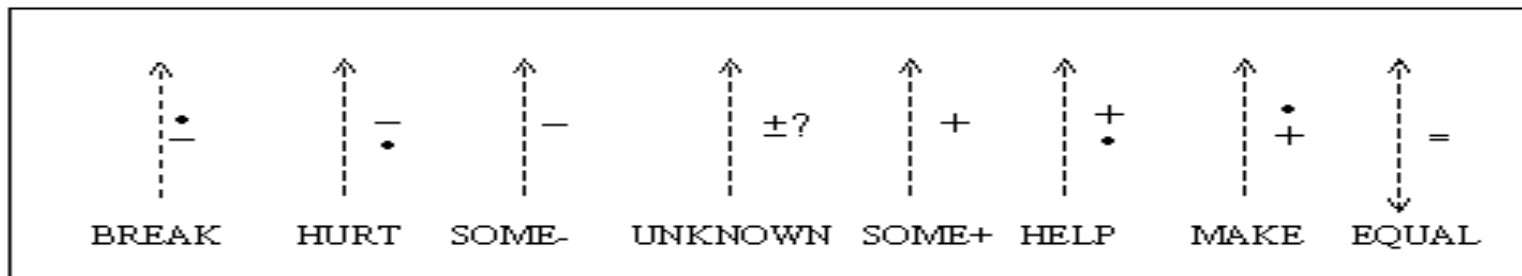
- **GRL je grafička notacija koja obezbeđuje rasuđivanje o nefunkcionalnim zahtevima.**



Veze doprinosa (Contribution Relationship)



Korelacione veze (Correlation Relationship)



Goals and Softgoals in GRL

Maximize Call Capacity [TDMA]

Narrowband & Wideband voice, data and image services be supported [TDMA]

Minimize Cost [TDMA]

SOFTGOAL MaximizeCallCapacity **OF** TDMA

ATTRIBUTE

Rates : “At least two times current capacity”

HOLDER IncomingCallServiceProvider

SOFTGOAL MinimizeCost **OF** TDMA

ATTRIBUTE

_Budget : “less than 500k\$”

HOLDER IncomingCallServiceProvider

GOAL

CallServicesBeSupported

“Both Narrowband and Wideband voice, data and image services be supported.”

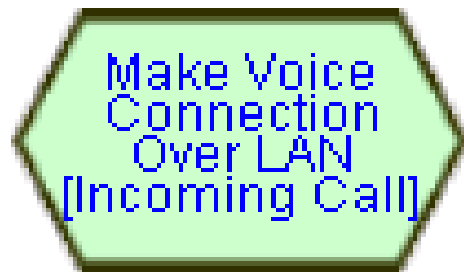
ATTRIBUTE

Object: TDMA

HOLDER

IncomingCallServiceProvider

Zadaci (tasks) u GRL-u



TASK

MakeVoiceConnectionOverLAN

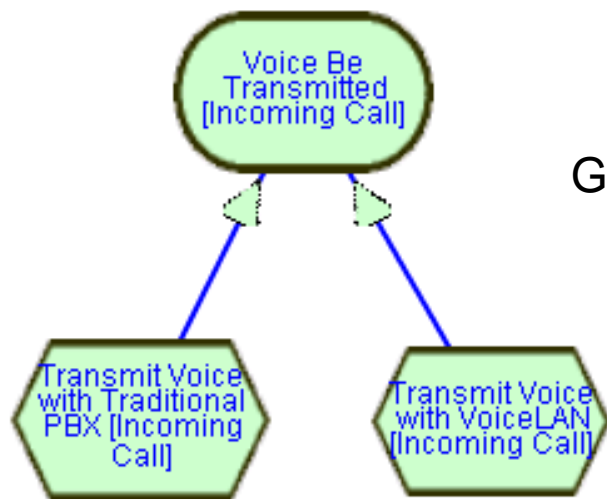
ATTRIBUTE

Object: IncomingCall

HOLDER

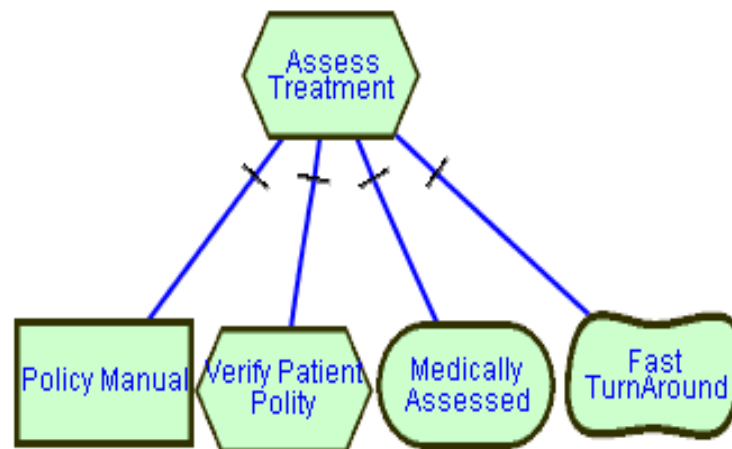
IncomingCallServiceProvider

Zadaci (tasks) u GRL-u

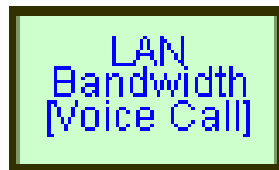


Goal Refinement: Means-ends Link

Task Refinement: Decomposition Link



Resource in GRL



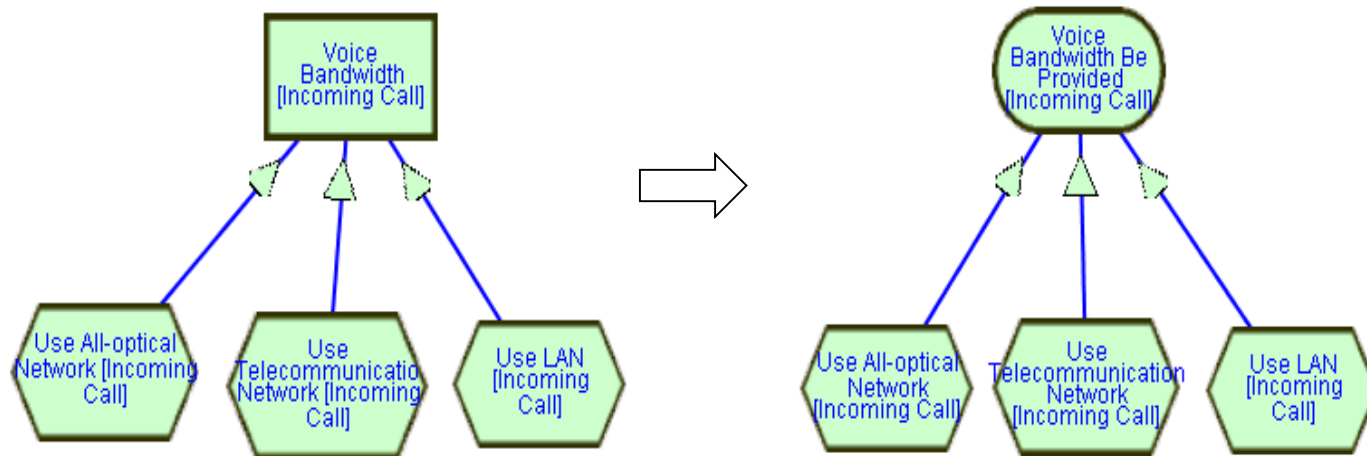
RESOURCE LANBandwidth

ATTRIBUTE

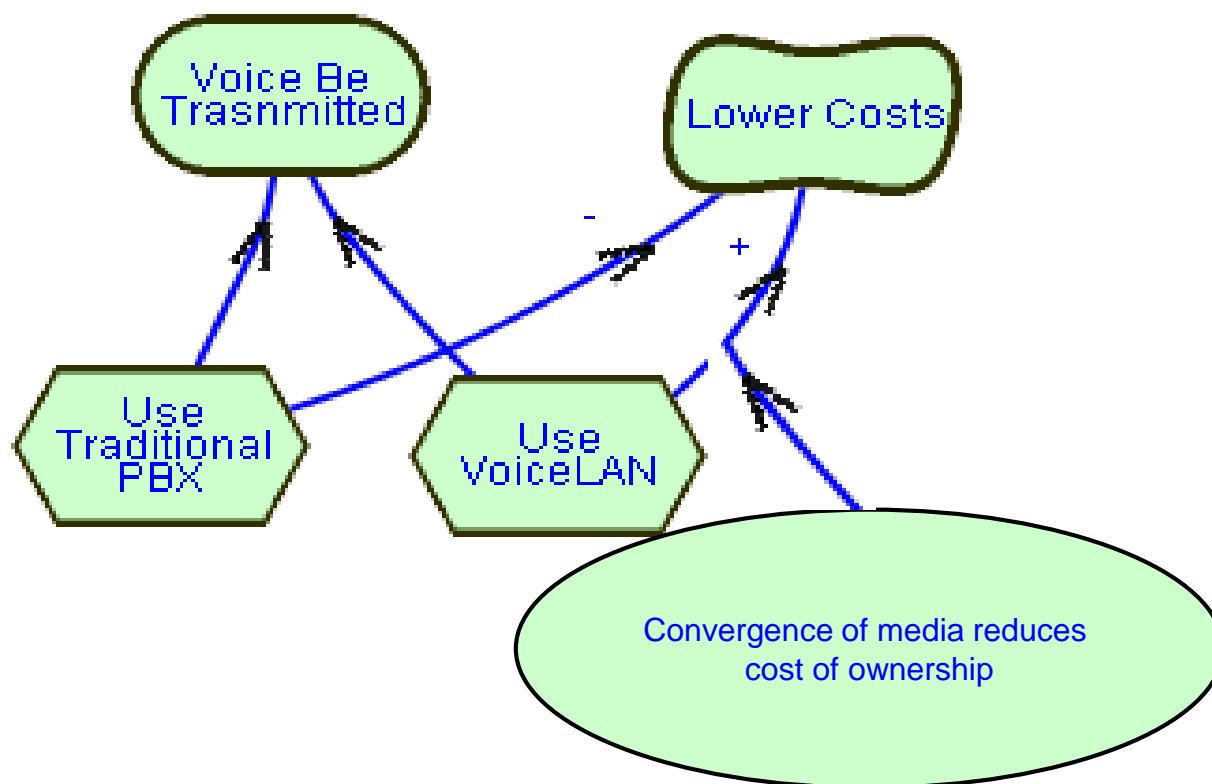
Object: VoiceCall

HOLDER

IncomingCallServiceProvider

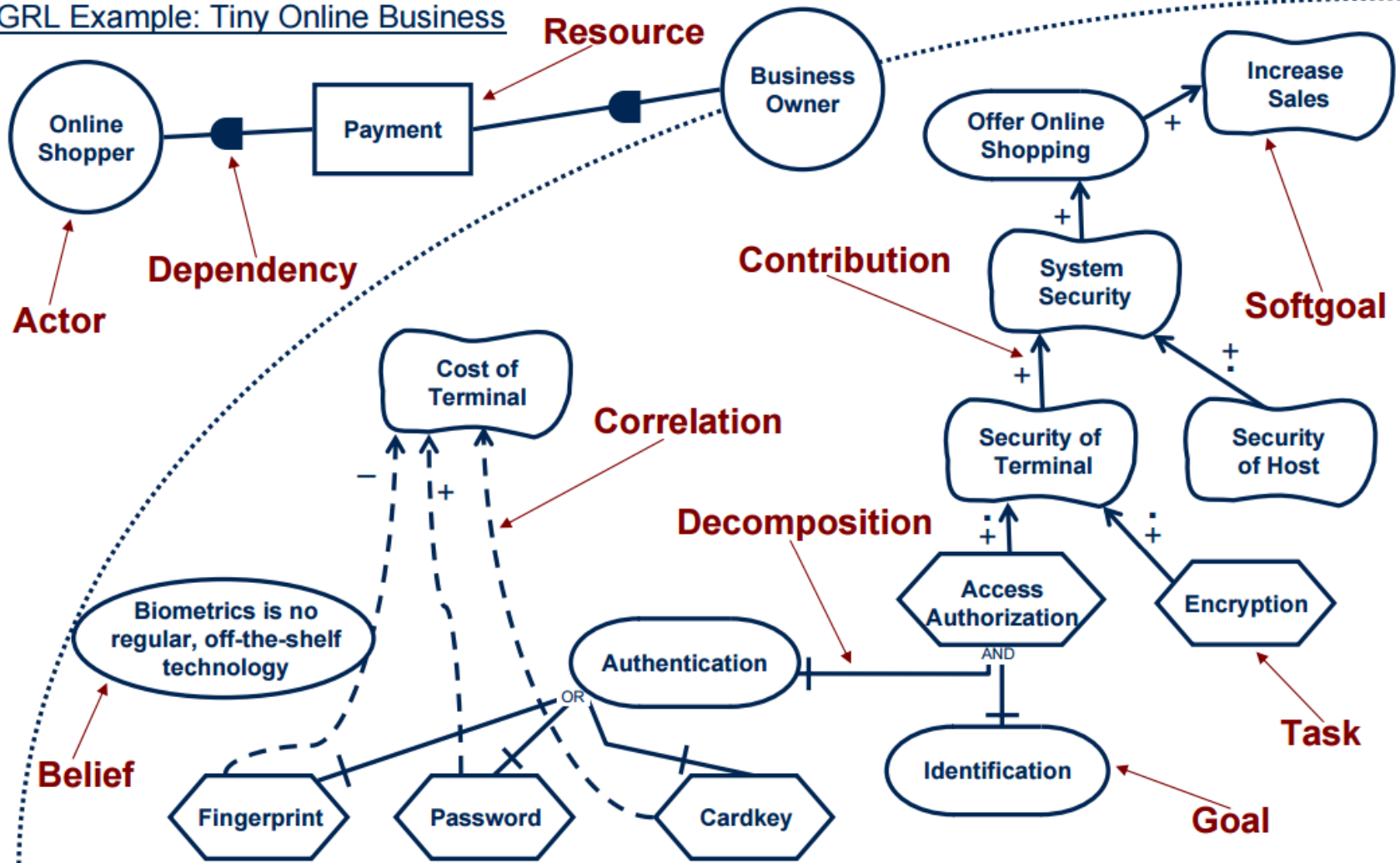


Uverenje (Belief) u GRL-u

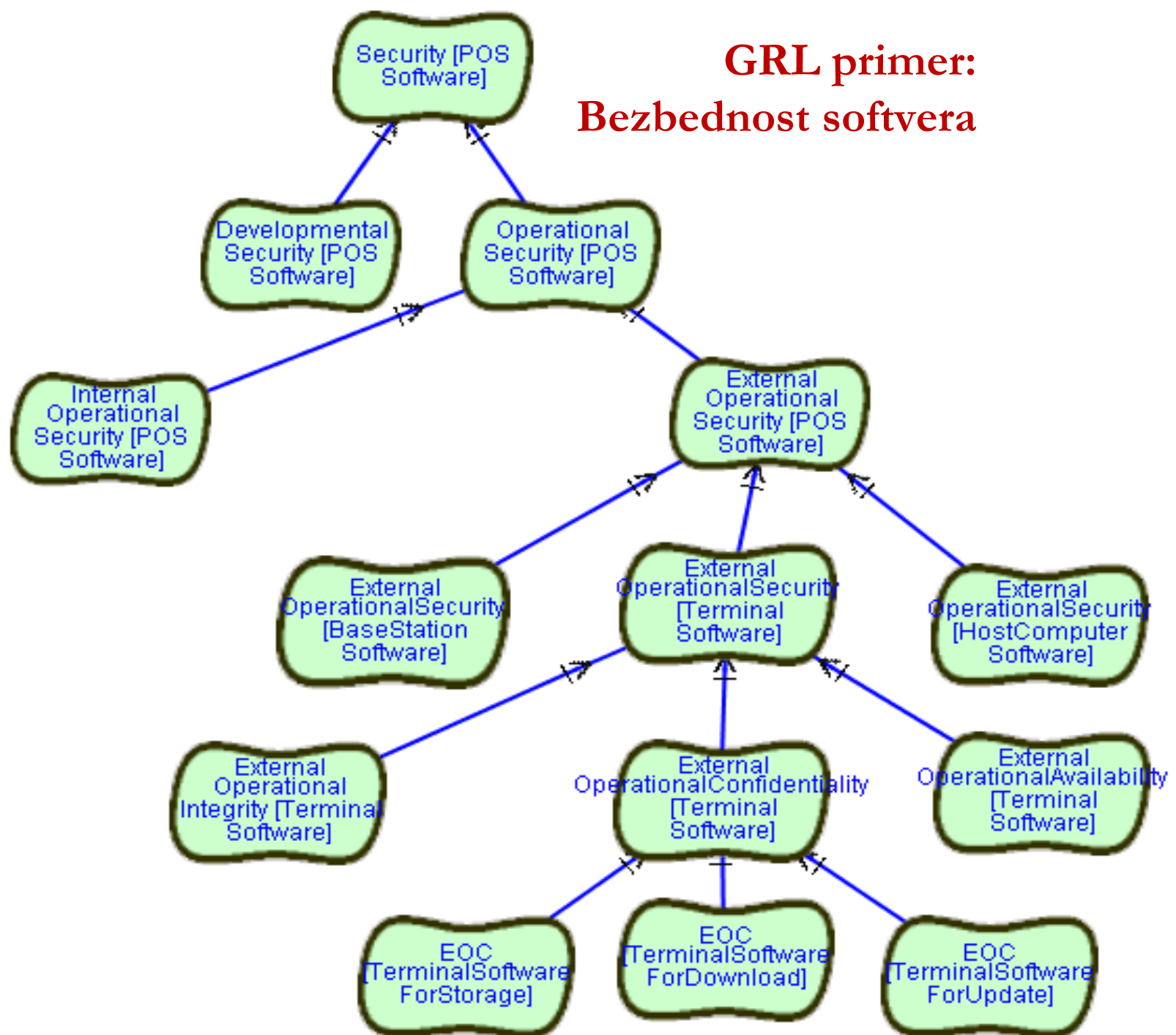


GRL primer

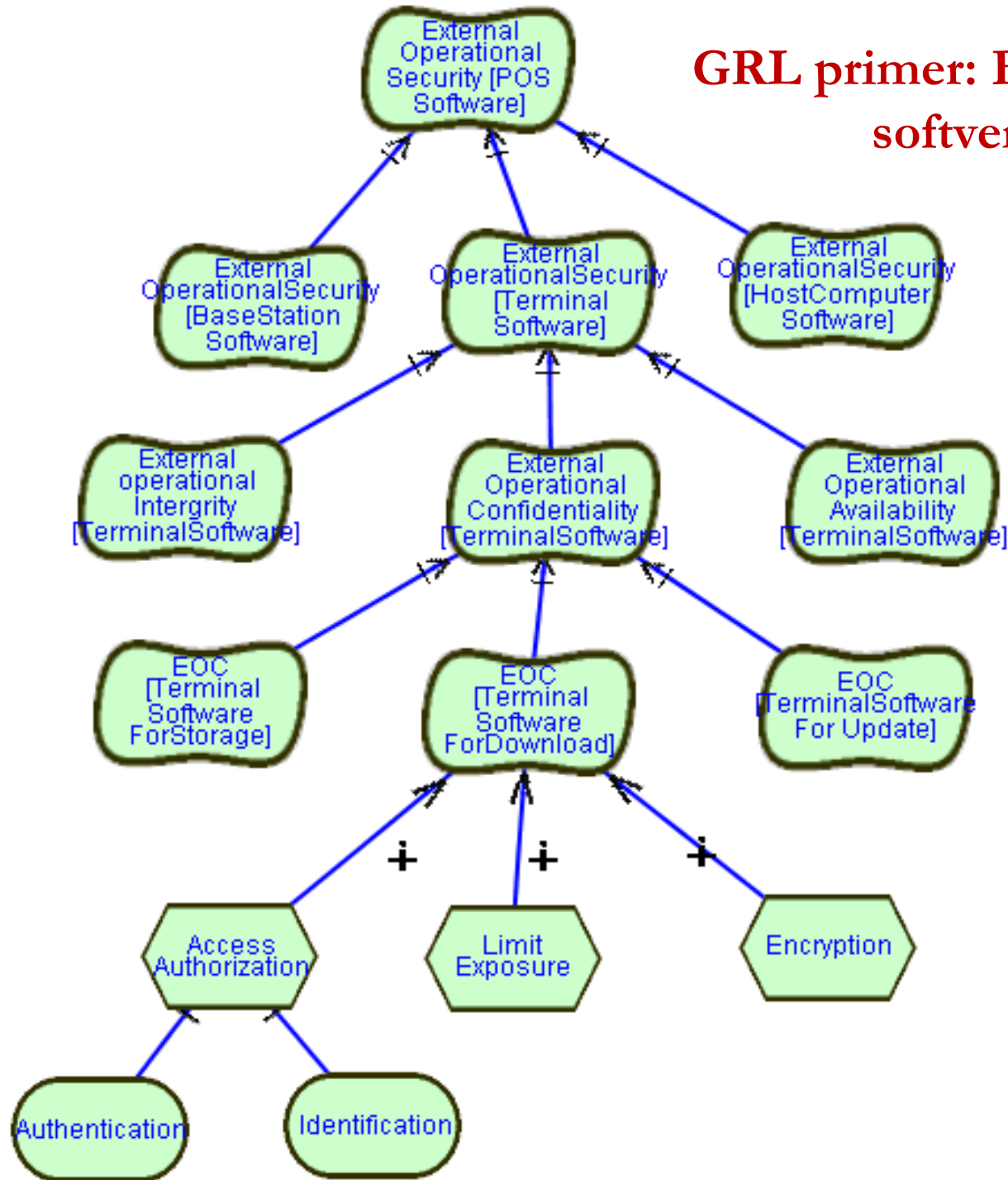
GRL Example: Tiny Online Business



GRL primer: Bezbednost softvera

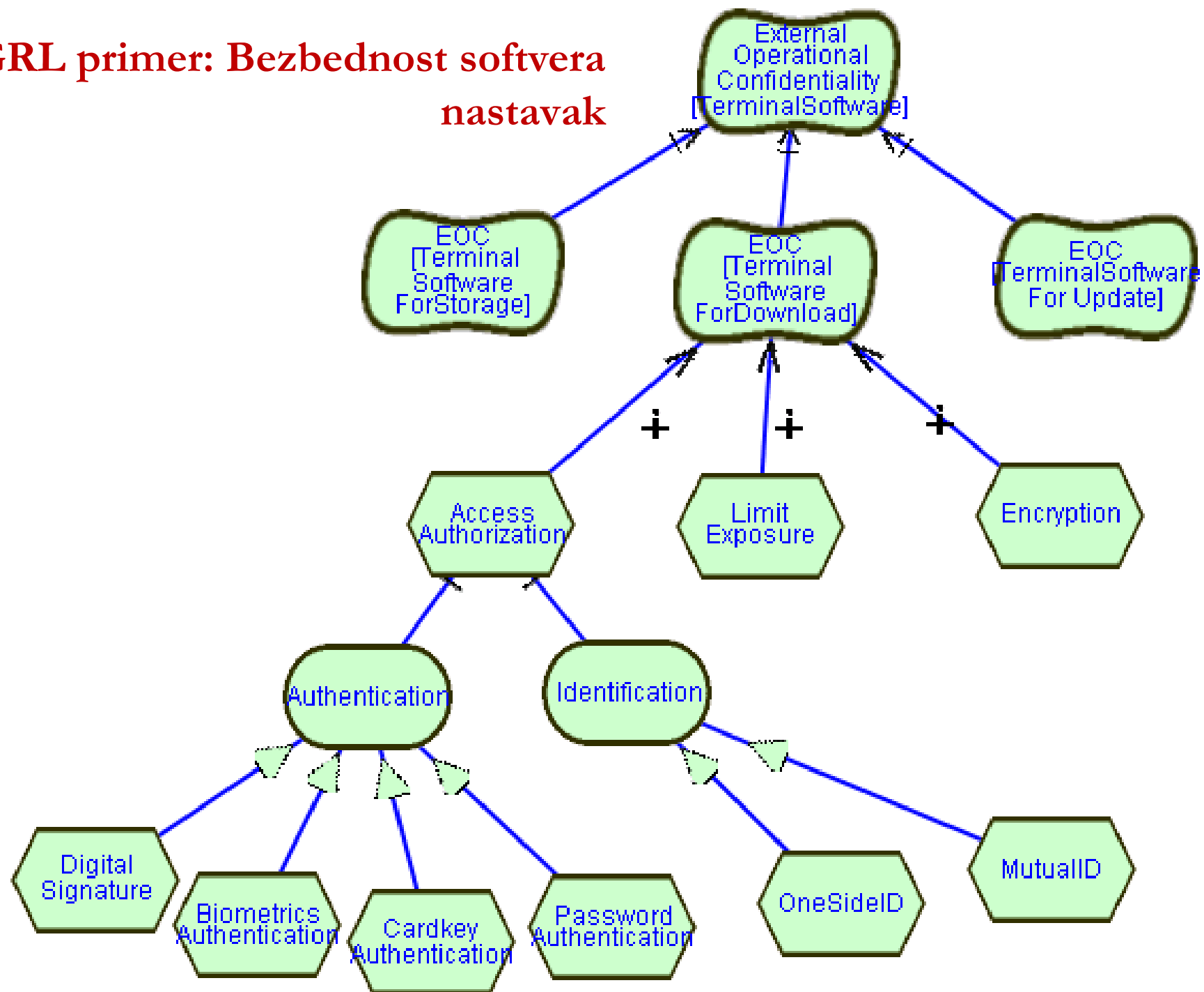


GRL primer: Bezbednost softvera nastavak

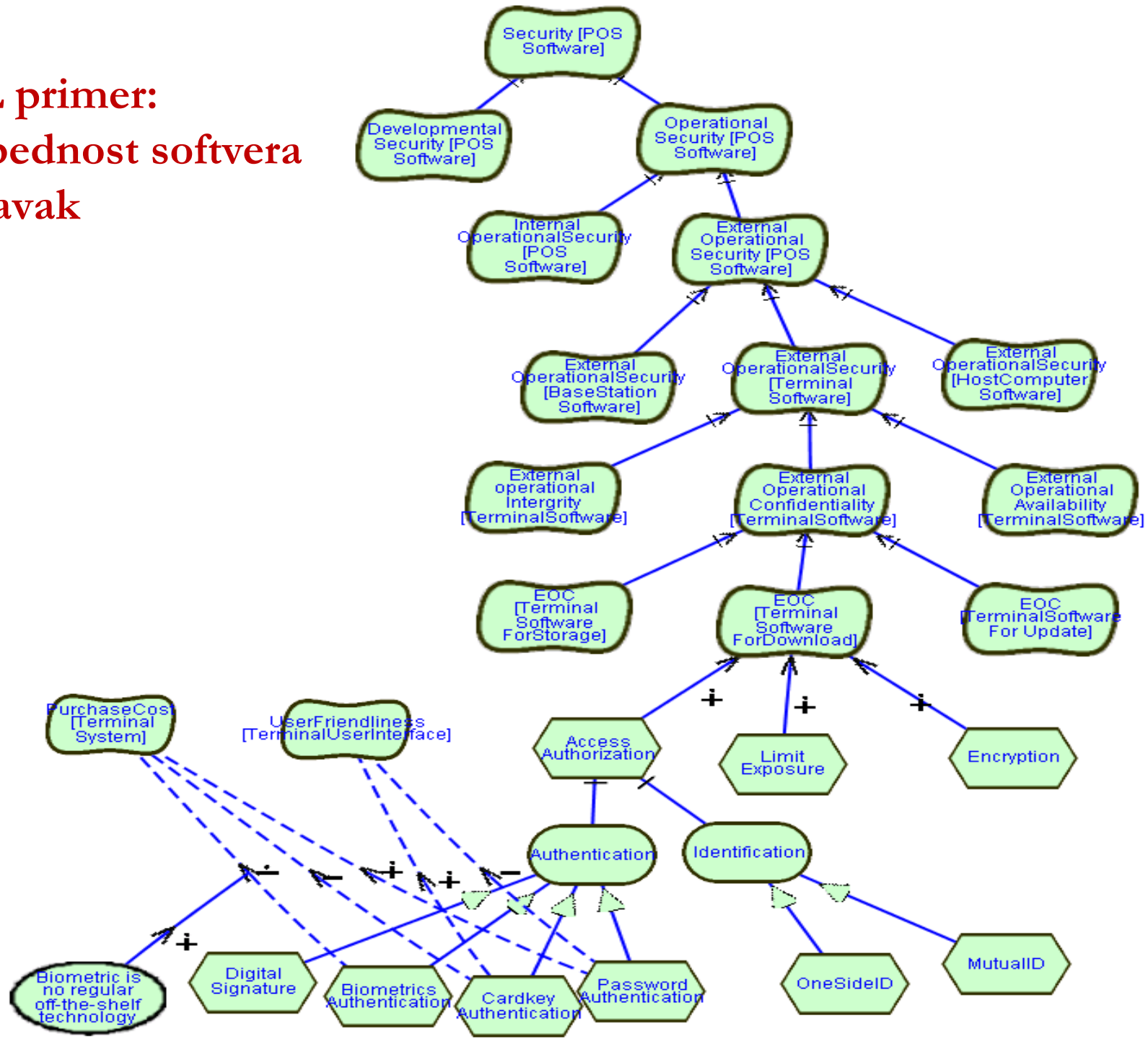


GRL primer: Bezbednost softvera

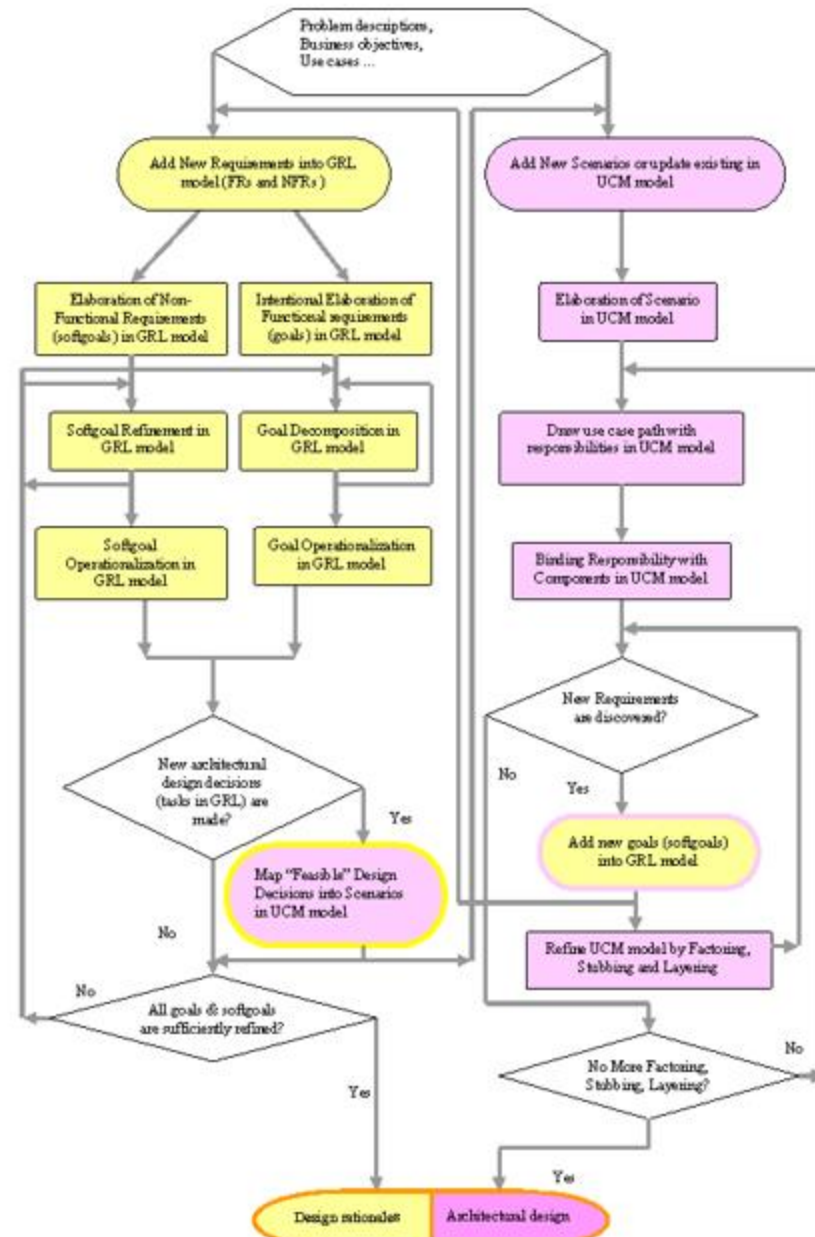
nastavak



GRL primer: Bezbednost softvera nastavak



Integracija GRL i UCM zasnovanog modelovanja



Problem descriptions,
Business objectives,
Use cases ...

Add New Requirements into GRL
model(FRs and NFRs)

Elaboration of Non-
Functional Requirements
(softgoals) in GRL model

Intentional Elaboration of
Functional requirements
(goals) in GRL model

Softgoal Refinement in
GRL model

Goal Decomposition in
GRL model

Softgoal
Operationalization in
GRL model

Goal Operationalization
in GRL model

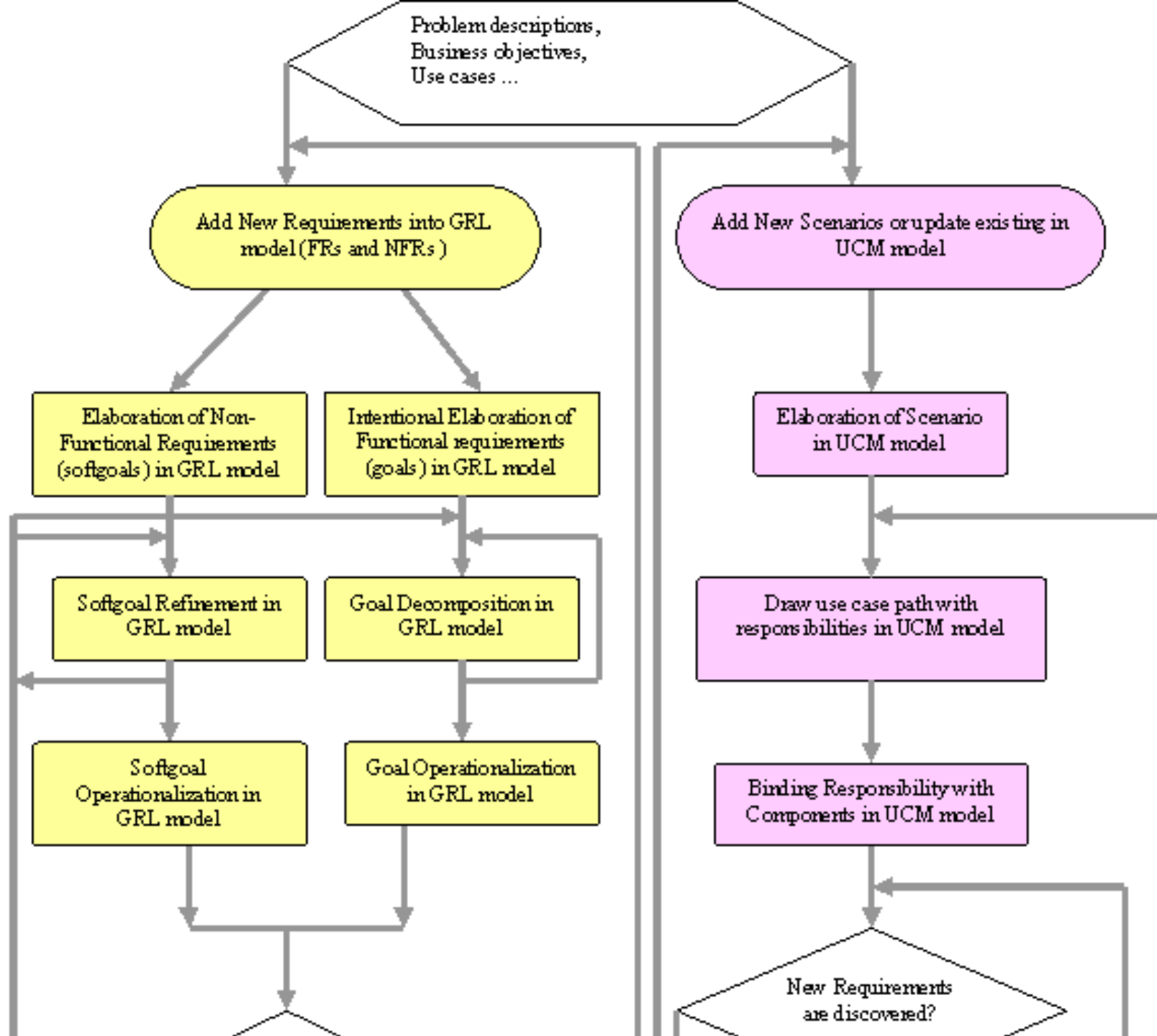
Add New Scenarios or update existing in
UCM model

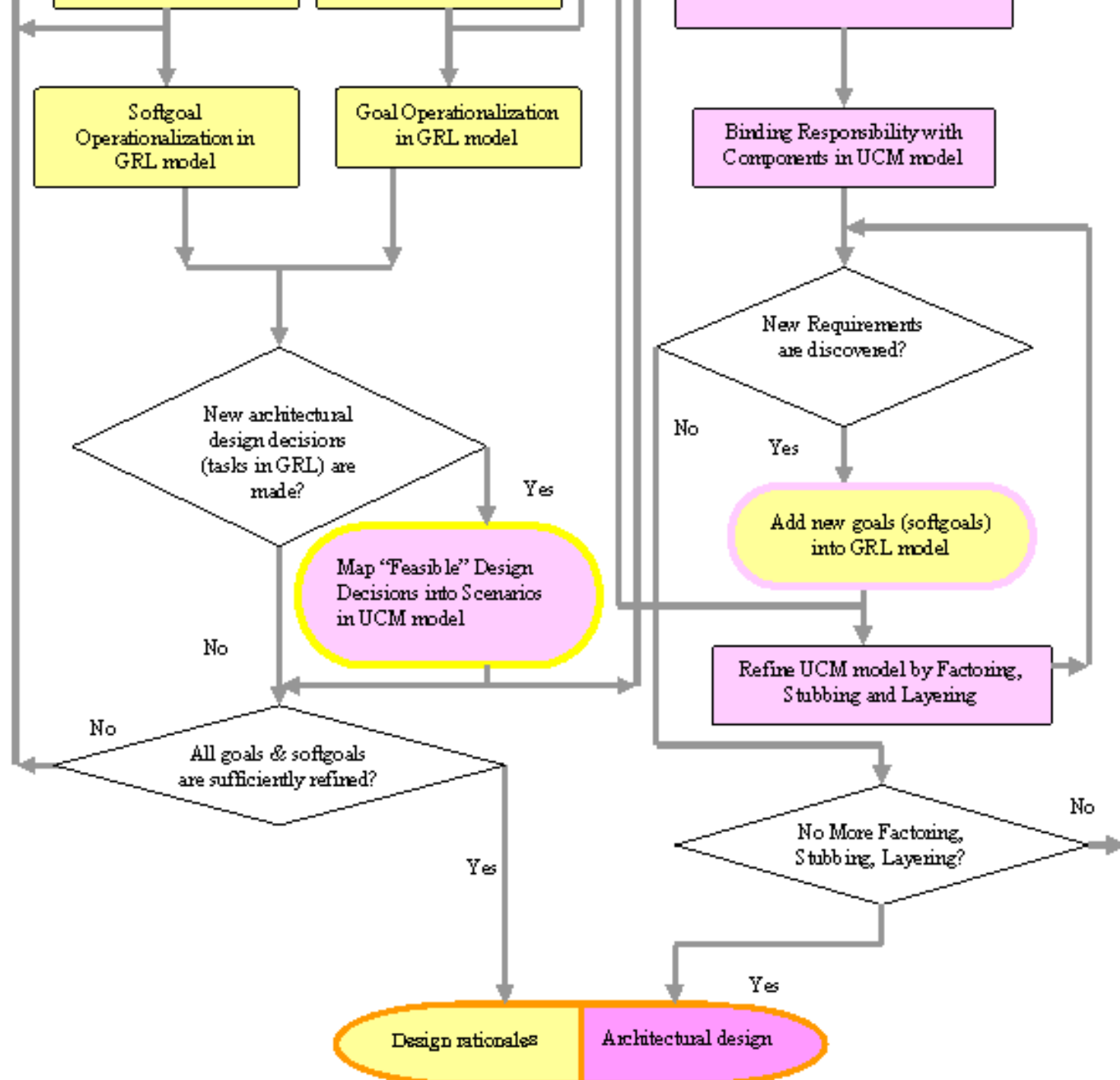
Elaboration of Scenario
in UCM model

Draw use case path with
responsibilities in UCM model

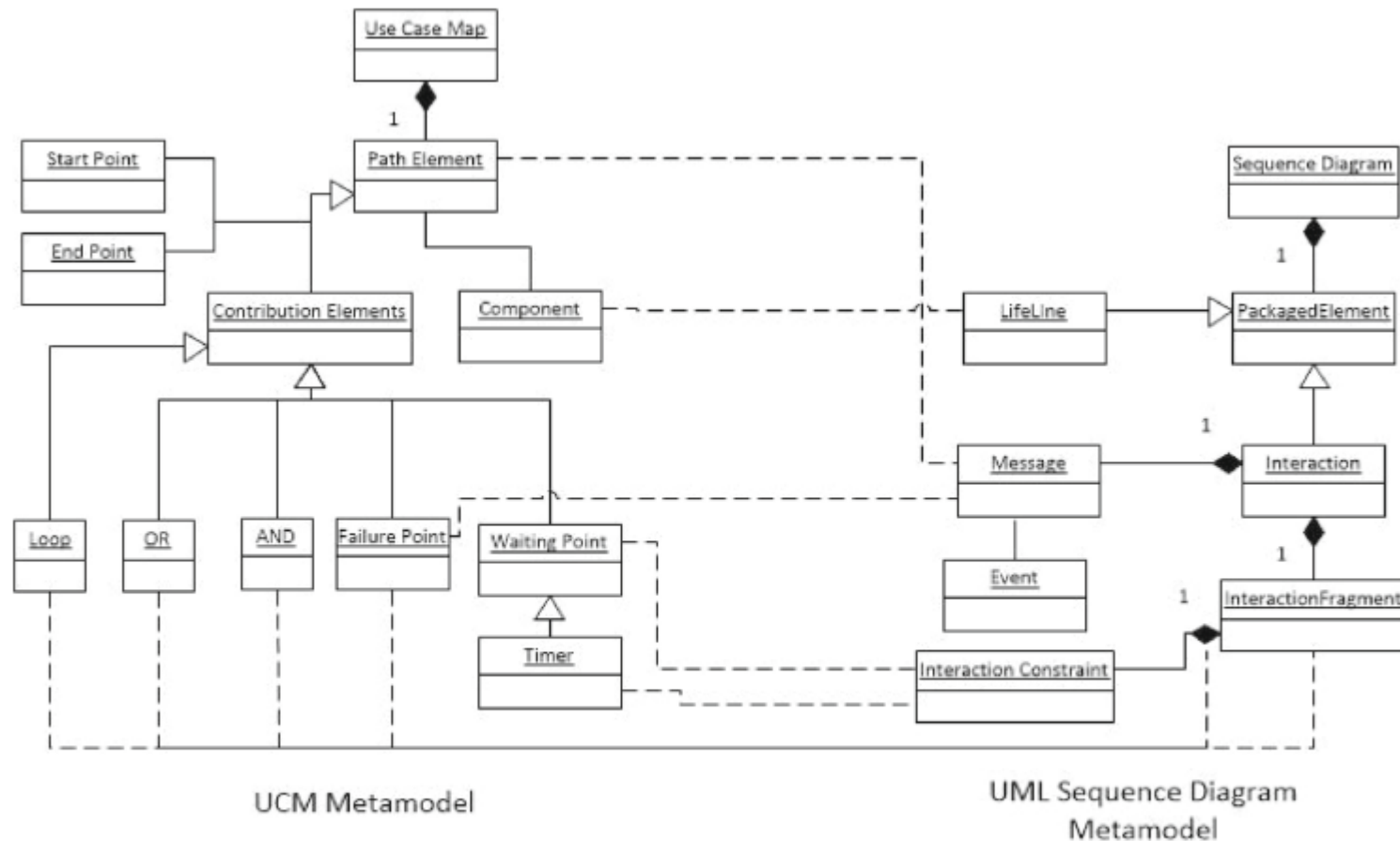
Binding Responsibility with
Components in UCM model

New Requirements
are discovered?





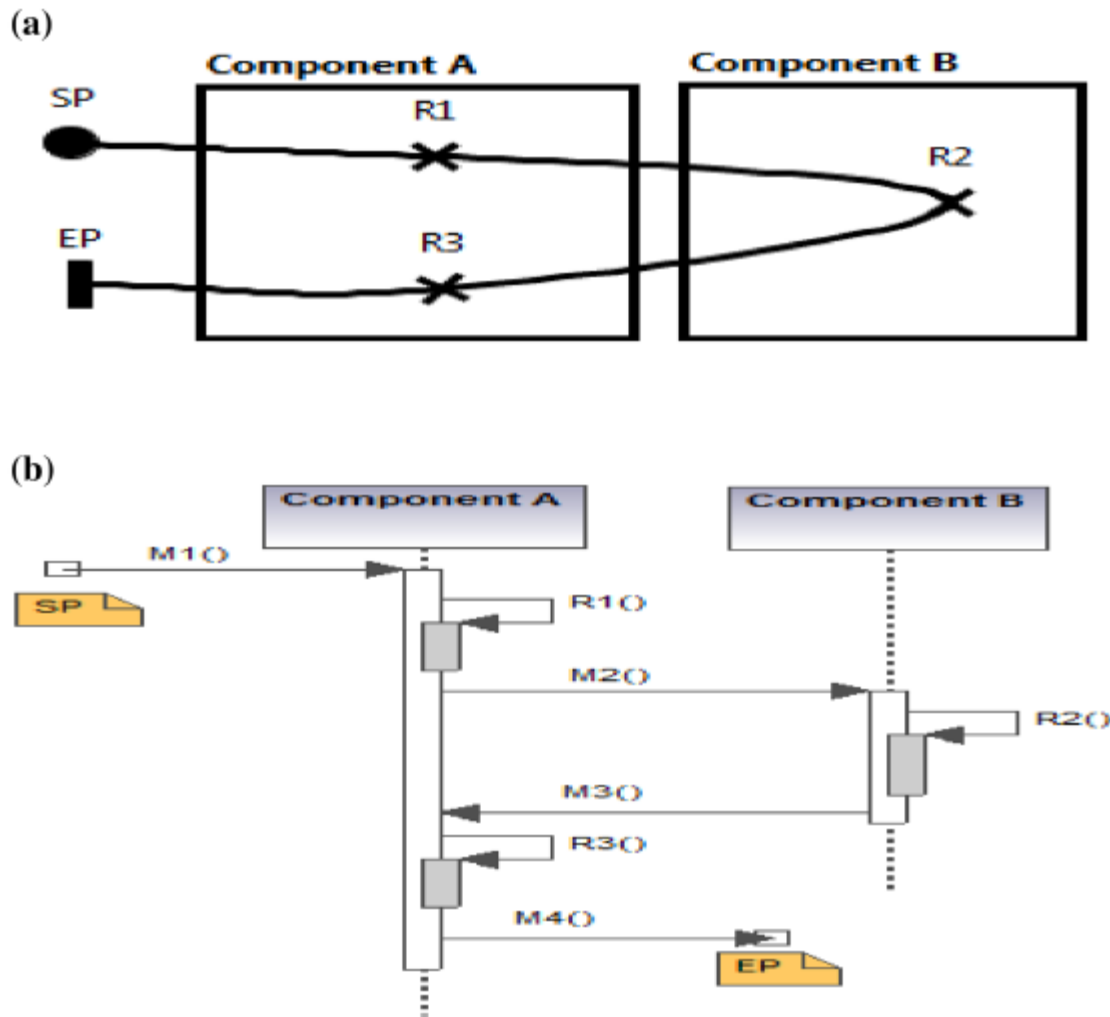
Generisanje UML Sekvencijalnog dijagrama (SD) iz UCM-a



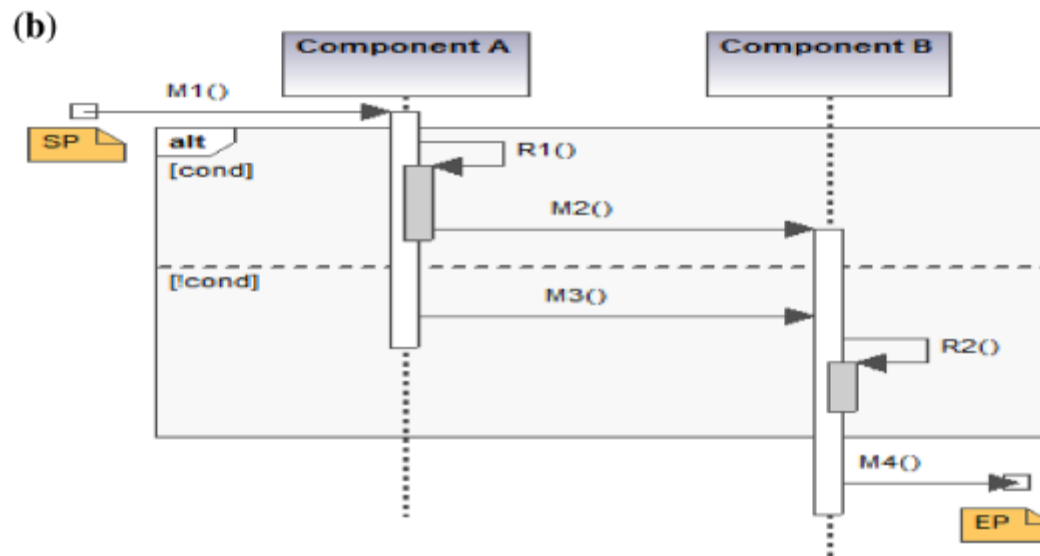
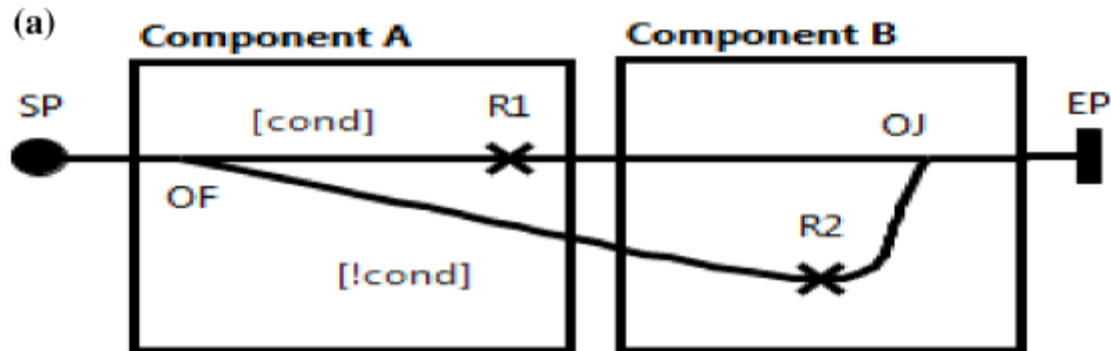
Legend

----- UCM to UML Sequence Diagram Transformation Relationships

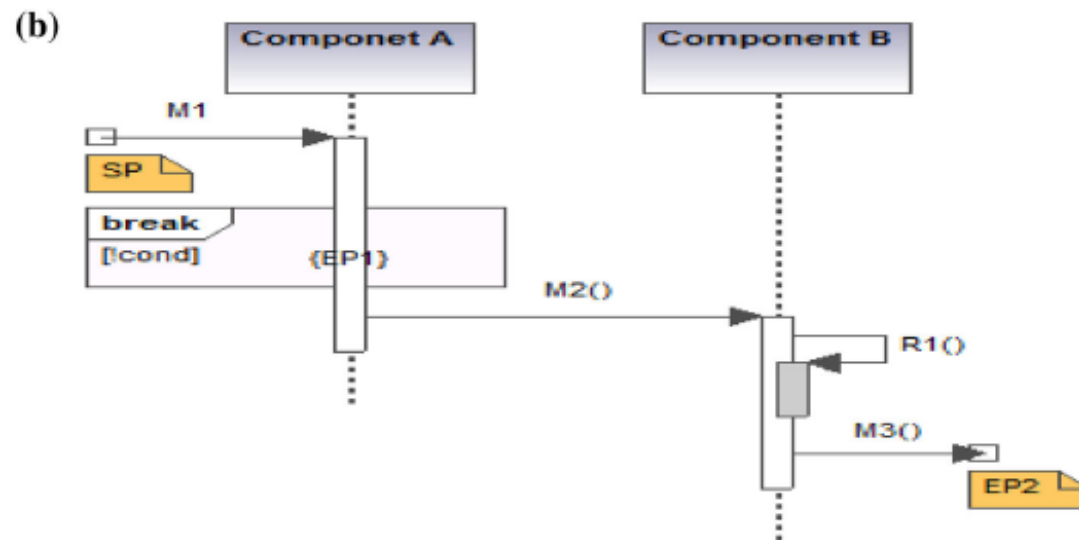
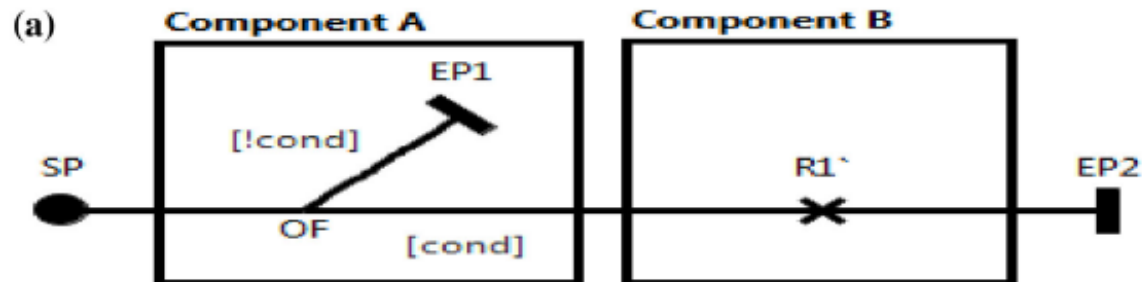
Mapiranje UCM na SD



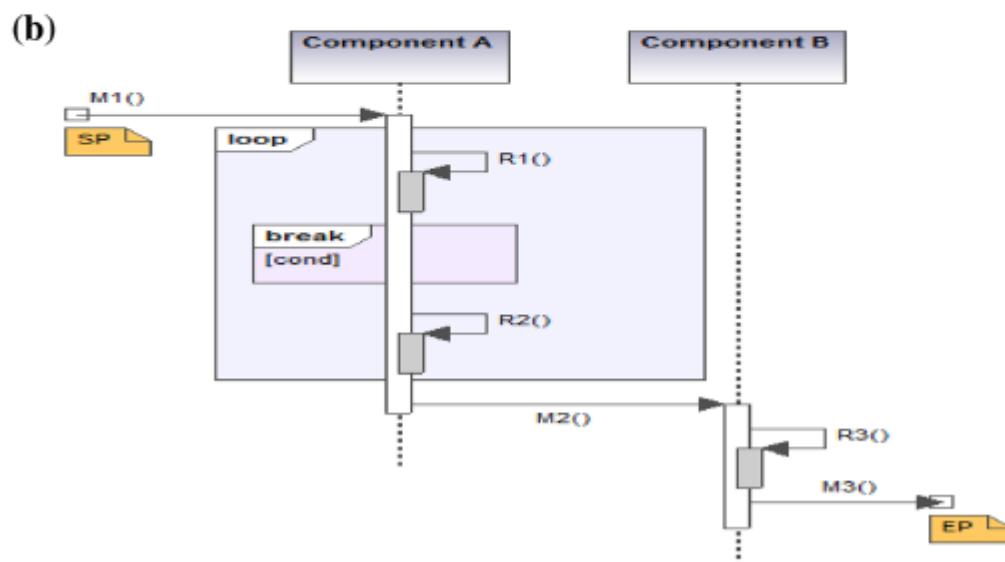
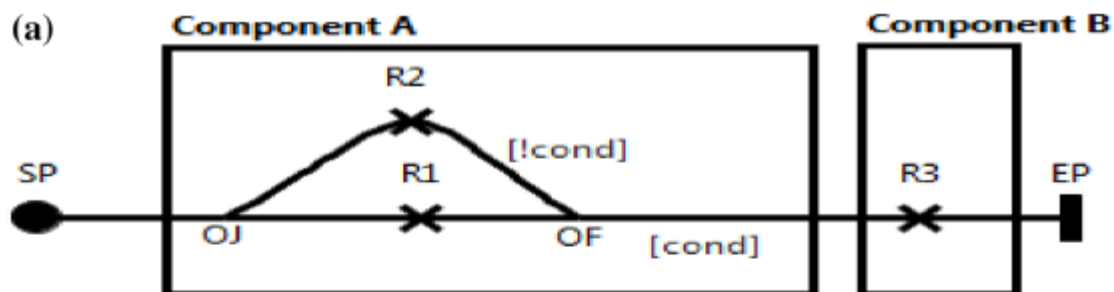
Mapiranje UCM na SD (OR fork-OF)



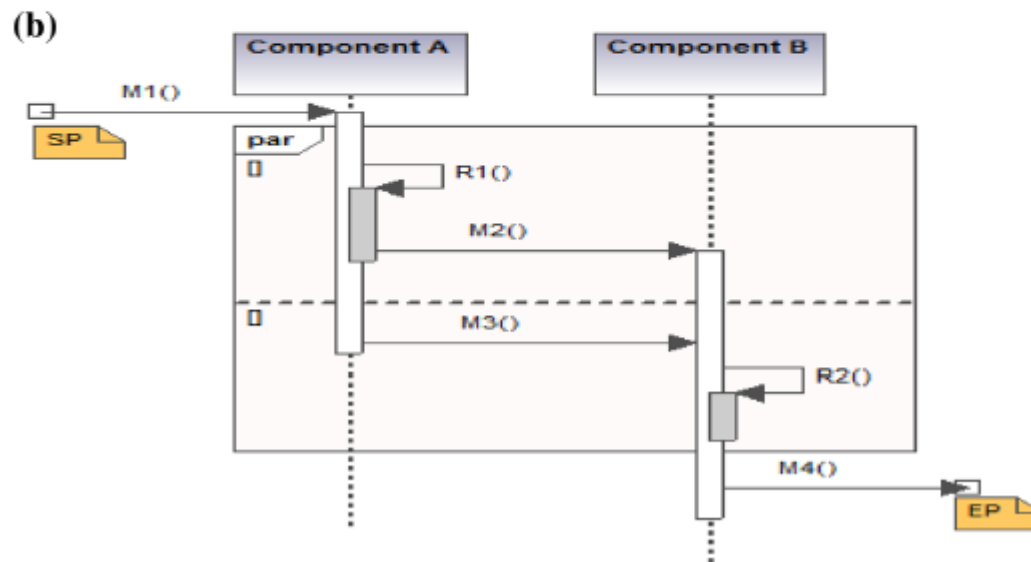
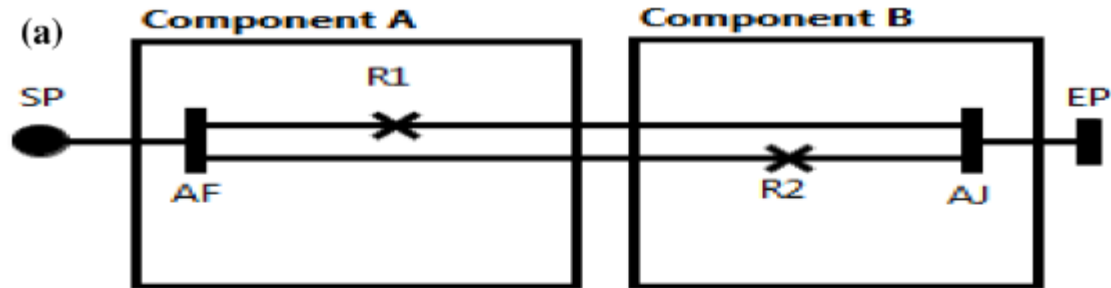
Mapiranje UCM na SD



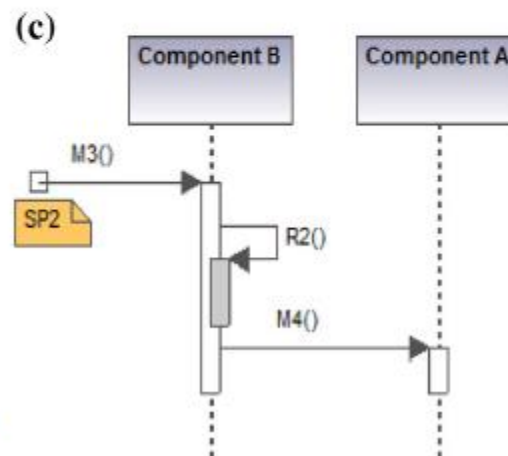
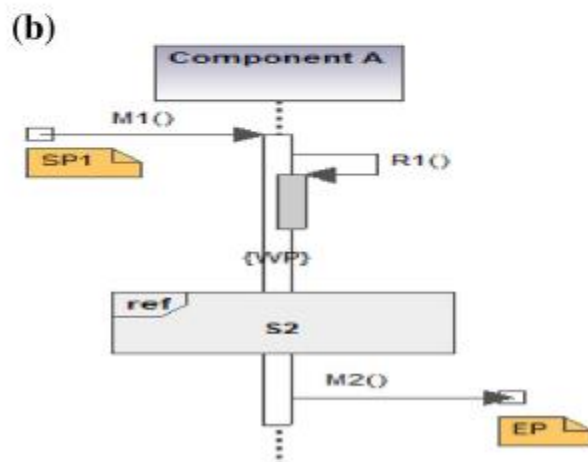
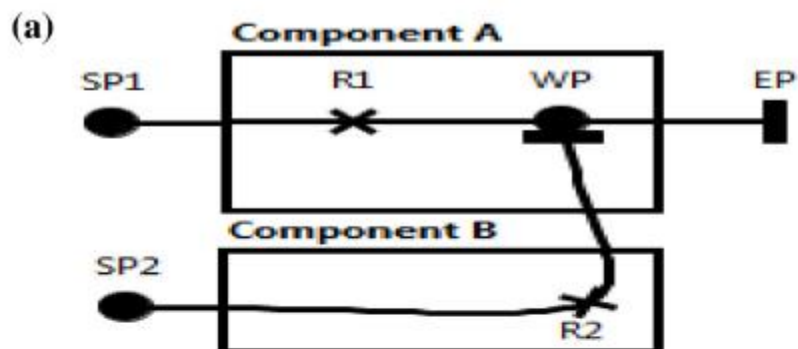
Mapiranje UCM na SD



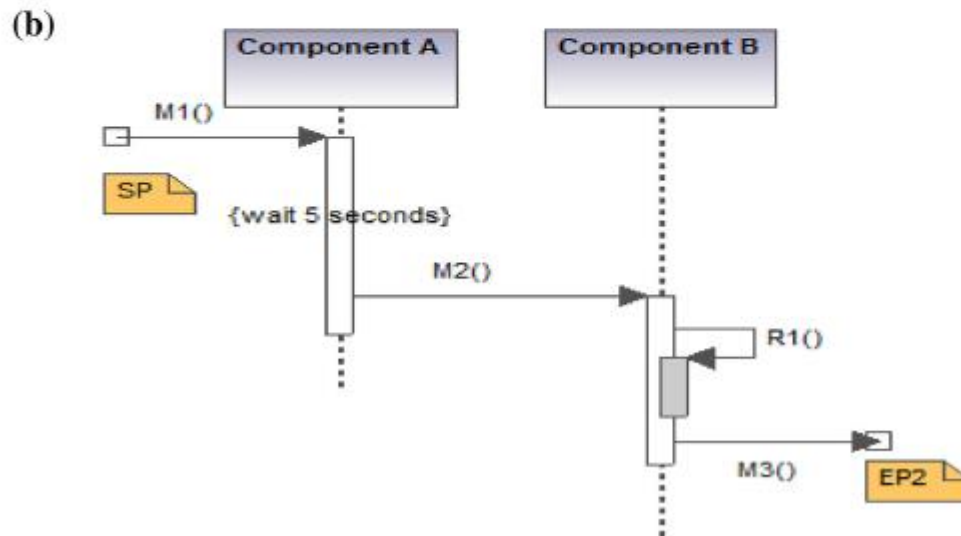
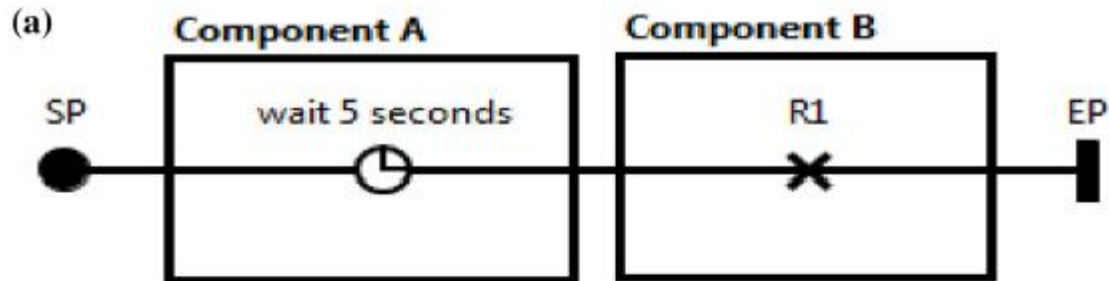
Mapiranje UCM na SD



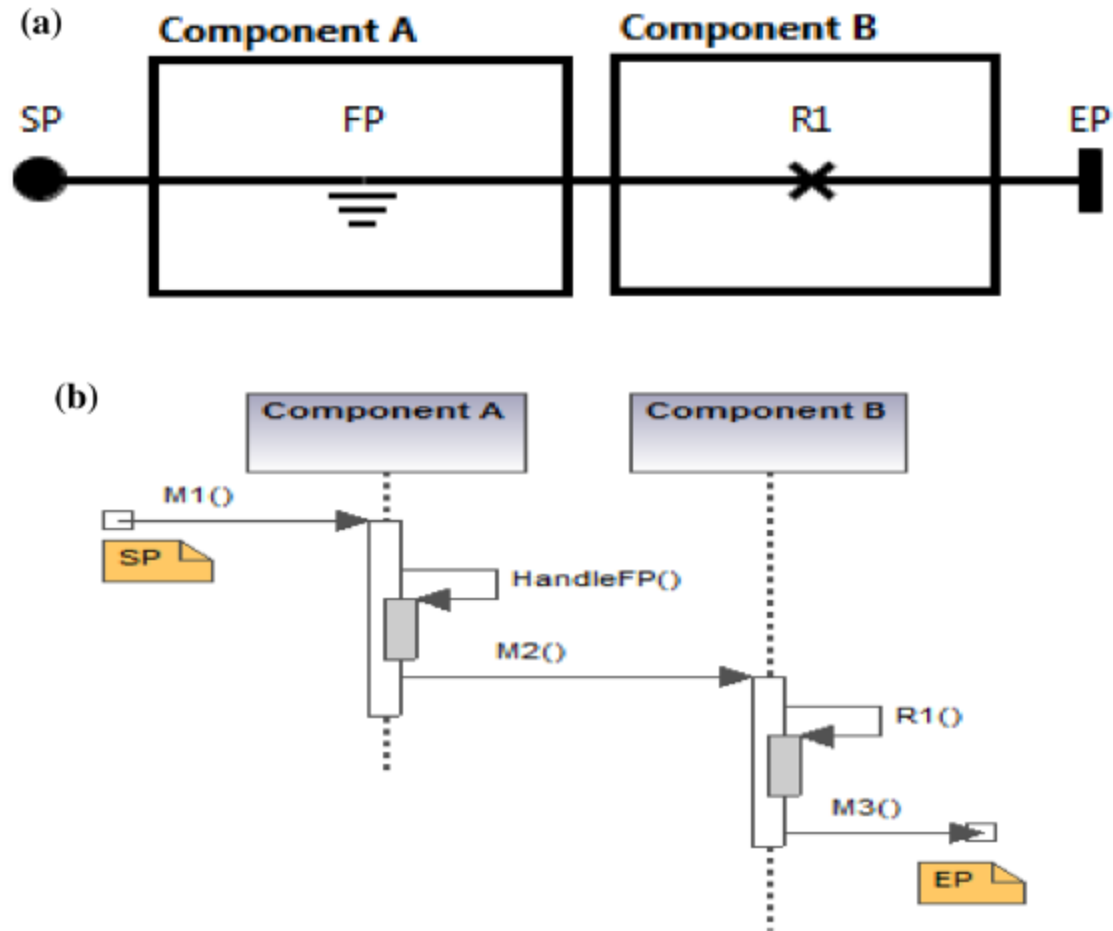
Mapiranje UCM na SD



Mapiranje UCM na SD

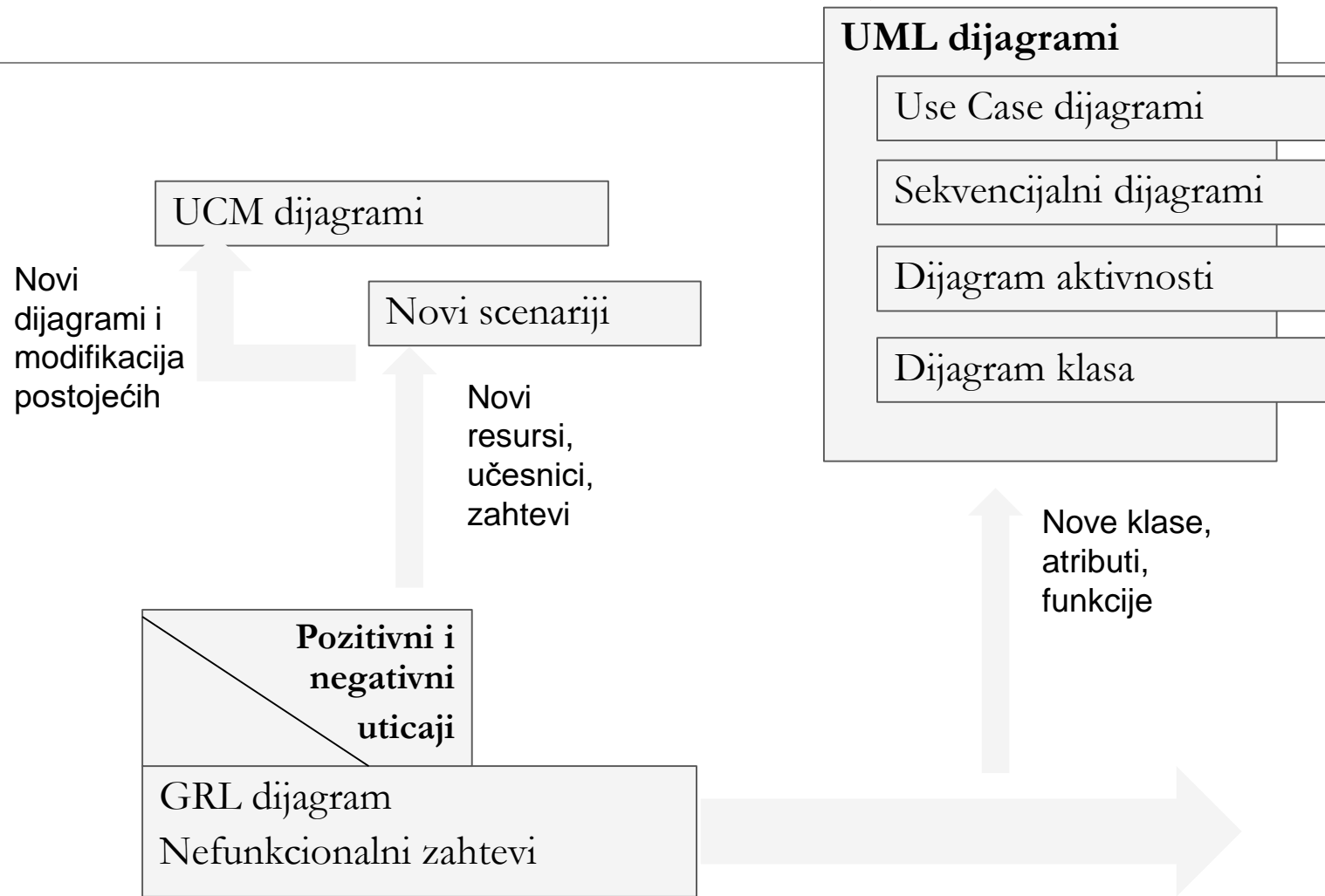


Mapiranje UCM na SD: Failure point (FP)

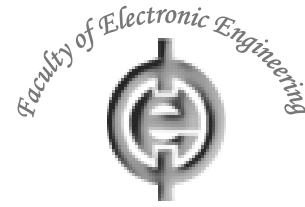




Rezime: Strategija razvoja informacionog sistema upotrebom URN, GRL i UML dijagrama



Alat za crtanje UCM i GRL: jUCMNav



- **Eclipse jUCMNav plugin**

- ❖ Uputstvo za instalaciju je u okviru prezentacije OVezebama.pdf
- ❖ Napomena: preduslov je instalacija Graphviz plugin-a

jUCMNav video-uputstva

- **Kreiranje puta, komponenti, stub i plugin mapa**
 - ❖ <https://www.youtube.com/watch?v=kuXvxmcfzh8>
- **Dodavanje grananja (forks) i spajanja (joins)**
 - ❖ <https://www.youtube.com/watch?v=LeDUx4TWyys>
- **Petlje i poboljšanje scenarija**
 - ❖ https://www.youtube.com/watch?v=hvNbLK_a7l4
- **Tajmeri**
 - ❖ <https://www.youtube.com/watch?v=9sUiym0SMT0>
- **Dinamički stub-ovi**
 - ❖ <https://www.youtube.com/watch?v=KA9eSqDj4Xc>

Automatsko prevođenje UCM u SD

- Eclipse ATL i GMF plug-in
 - ❖ Modeling deo u update-u za Eclipse
- UML editor u Eclipse-u:
 - ❖ UML 2 tool ili Papyrus



Install

Available Software

Check the items that you wish to install.



Work with:

Add...

Find more software by working with the ["Available Software Sites"](#) preferences.

type filter text

Name	Version
> <input type="checkbox"/> Mobile and Device Development	
▼ <input checked="" type="checkbox"/> Modeling	
<input type="checkbox"/> Acceleo	3.6.6.201610060831
<input type="checkbox"/> Amalgam Activity Explorer Developer Resources	1.7.0.201605311215
<input checked="" type="checkbox"/> ATL SDK - ATL Transformation Language SDK	3.6.0.v201505180909
<input type="checkbox"/> CDO Dawn SDK	2.1.100.v20160505-0538
<input type="checkbox"/> CDO Model Repository EPP	4.5.0.v20160607-1511
<input type="checkbox"/> CDO Model Repository SDK	4.5.0.v20160607-1511

Select All

Deselect All

8 items selected

Details

- ☒ Show only the latest versions of available software
- ☒ Group items by category
- ☐ Show only software applicable to target environment
- ☒ Contact all update sites during install to find required software

☐ Hide items that are already installed

What is [already installed](#)?



< Back

Next >

Finish

Cancel



Install

Available Software

Check the items that you wish to install.



Work with:

Add...

Find more software by working with the ["Available Software Sites"](#) preferences.

type filter text

Name	Version
<input type="checkbox"/> GEF (MVC) SDK	3.11.0.201606061308
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Notation SDK	1.10.0.201606071631
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Runtime	1.10.0.201606071959
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Runtime SDK	1.10.0.201606071959
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Tooling	3.3.1.201509291144
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Tooling - Runtime Extensions	3.3.1.201509291144
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Tooling - Xtend2 Support (Opti	3.3.1.201509291144
<input checked="" type="checkbox"/> Graphical Modeling Framework (GMF) Tooling SDK	3.3.1.201509291144

Select All

Deselect All

8 items selected

Details

☒ Show only the latest versions of available software

☐ Hide items that are already installed

☒ Group items by category

What is [already installed](#)?

☐ Show only software applicable to target environment

☒ Contact all update sites during install to find required software



< Back

Next >

Finish

Cancel

- **Kreiranje Java koda iz UML dijagrama klasa**

- ❖ **Papyrus UML 2 plugin**

- Uputstvo:

- <https://milanardeshana.wordpress.com/2016/03/16/how-to-install-papyrus-and-generate-java-code-in-eclipse-mars-2/comment-page-1/>

Generisanje Java koda

- **Kreiranje Java koda iz UML dijagrama klasa**

- ❖ **Papyrus Software Designer**

- dodatni plugin nad Papyrus pluginom
- Uputstvo: https://wiki.eclipse.org/Java_Code_Generation
- Instalacioni plugin link:
<http://download.eclipse.org/modeling/mdt/papyrus/components/designer/>

Install

Available Software

Check the items that you wish to install.



Work with:

Add...

Find more software by working with the "Available Software Sites" preferences.

type filter text

Name

Version

▼ ☒ Papyrus Designer Category

- | | |
|--|-------|
| <input type="checkbox"/> Papyrus base elements for code generation (Incubation) | 1.0.3 |
| <input type="checkbox"/> Papyrus C++ profile, view and code generation (Incubation) | 1.0.3 |
| <input type="checkbox"/> Papyrus IDL profile and code generation (Incubation) | 1.0.3 |
| <input checked="" type="checkbox"/> Papyrus Java profile, library and code generation (Incubation) | 1.0.3 |
| <input type="checkbox"/> Papyrus Qcompass designer, develop and deploy component based ap | 0.7.4 |
| <input type="checkbox"/> Papyrus Tracing support for Qcompass designer (Incubation) | 0.7.4 |

Select All

Deselect All

1 item selected

Details

<http://download.eclipse.org/modeling/mdt/papyrus/components/designer/>

☒ Show only the latest versions of available software

☒ Group items by category

☐ Show only software applicable to target environment

☒ Contact all update sites during install to find required software

☐ Hide items that are already installed

What is [already installed](#)?



< Back

Next >

Finish

Cancel

- Na osnovu teksta dobijenog zadatka (20p):
 - ❖ Izvršiti modeliranje pomoću UCM (5p) i GRL dijagrama (5p)
 - ❖ Izvršiti prevođenje UCM modela u UML UseCase dijagram i sekvencijalni dijagram (5p)
 - ❖ Nacrtati UML dijagram klasa i dijagram aktivnosti (5p)