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Are Domain Specific Models Easier to Maintain Than UML Models?

Professor Matti Rossi
Helsinki School of Economics

Contents

- DSM approach
- Comparing modeling approaches
  - UML and DSM
- Experimental task
- Results

What is DSM?

- **Domain-Specific Modeling (DSM)** support higher-level abstractions than General-Purpose Modeling languages (e.g., UML)
- DSM often includes code generation: automating the creation of executable source code directly from the DSM models.

How does DSM work?

- One expert defines a domain-specific language containing
  - domain concepts and rules
  - mapping from that to code
- The development team can use it in a case tool to:
  - make models
  - code is automatically generated from those models.
- Developers no longer need to solve the problem of manually mapping domain ideas into quality code by themselves, time after time.

Comparing DSM and UML approaches

- An empirical study compraring comprehension of models in maintenance
- Information systems students as subjects
- 64 subjects split randomly to UML and DSM groups
- Task:
  - Analyze changes needed to update a mobile system
  - Limited time
  - Predefined model and tasks

Modeling task

- Analysis of maintenance performance consisting of:

  1) the effort spent on understanding the artifact being changed and the impact of the proposed changes on the artifact, and

  2) the effort spent on incorporating changes

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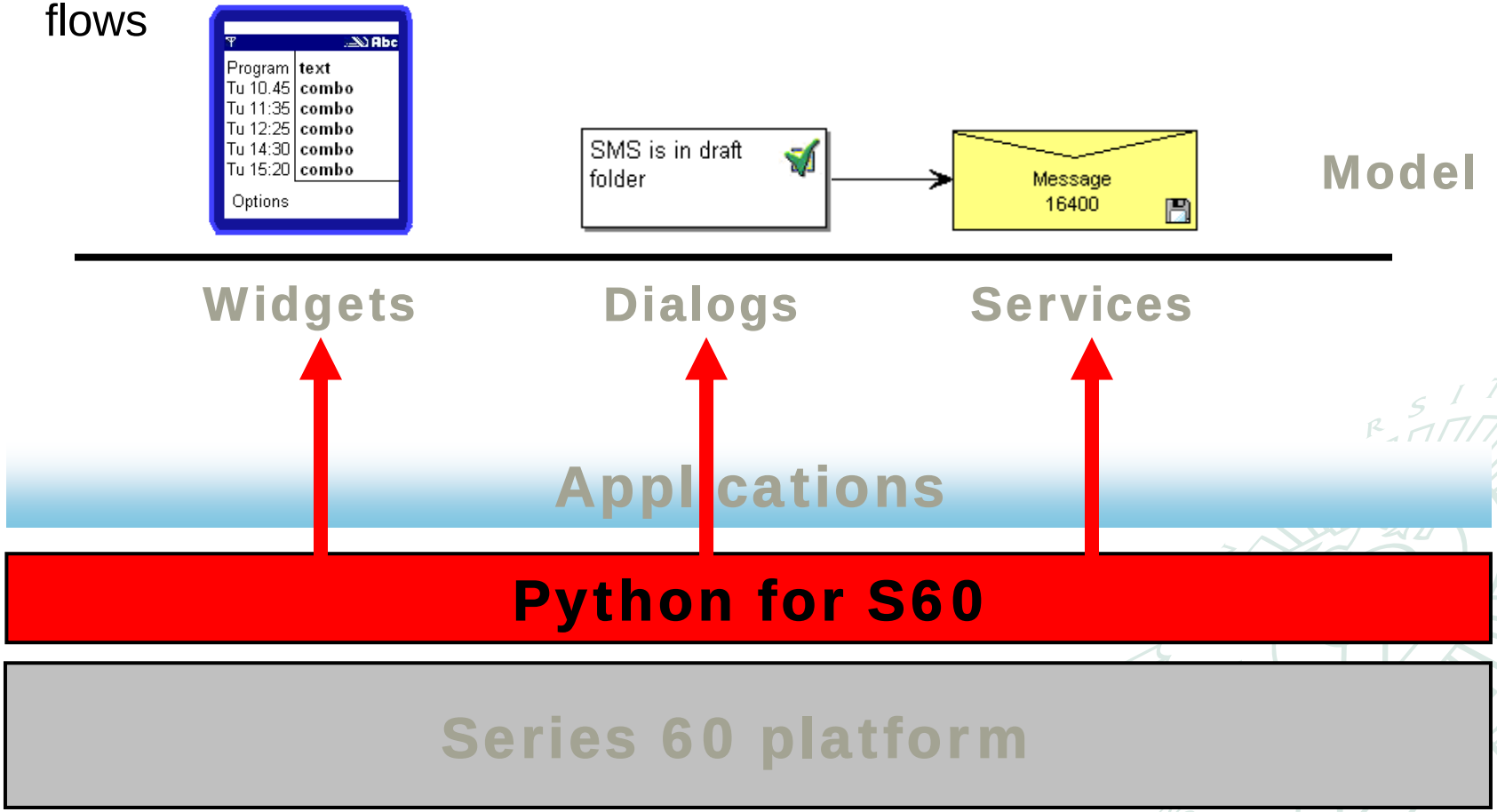
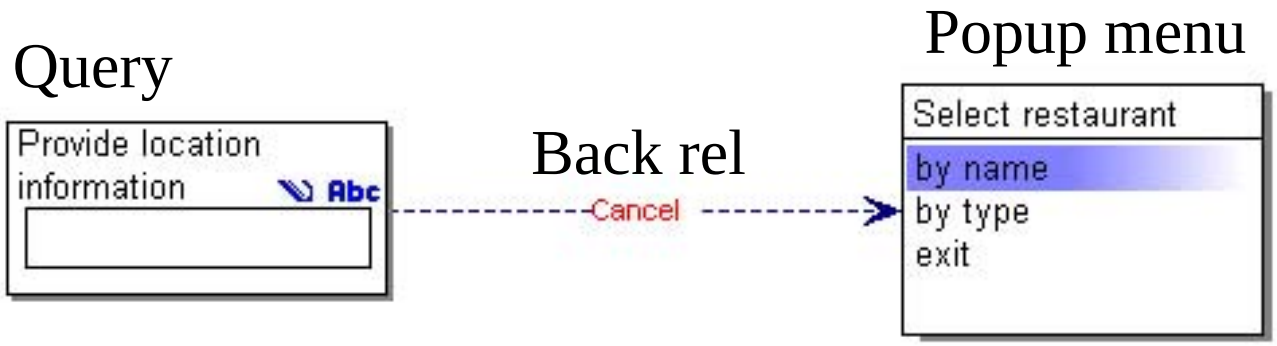
DSM and UML models

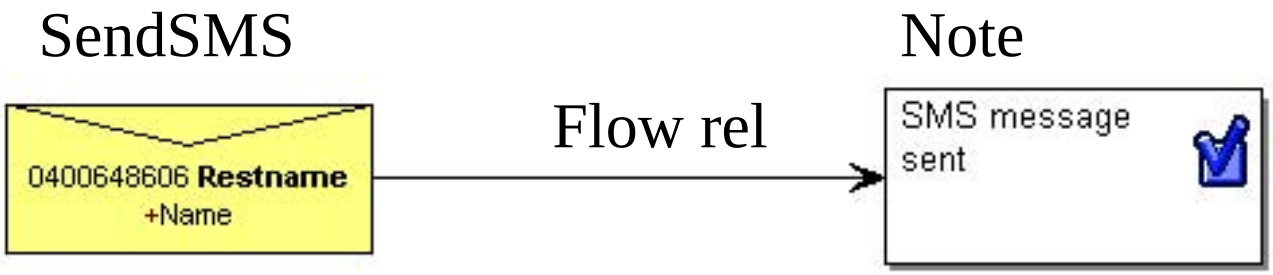
DSM for Series 60

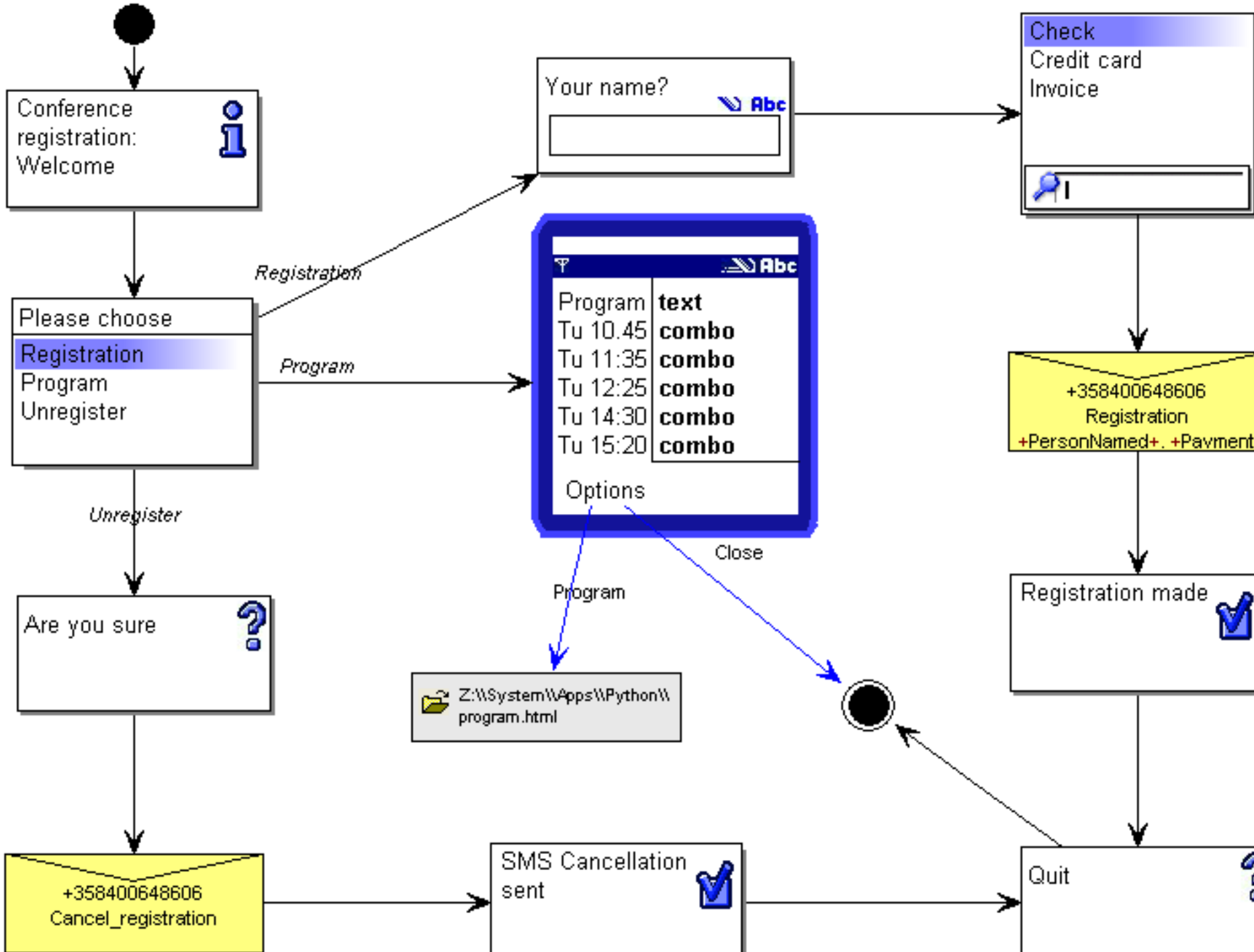
Developer designs models based on views, widgets, dialogs, services flows



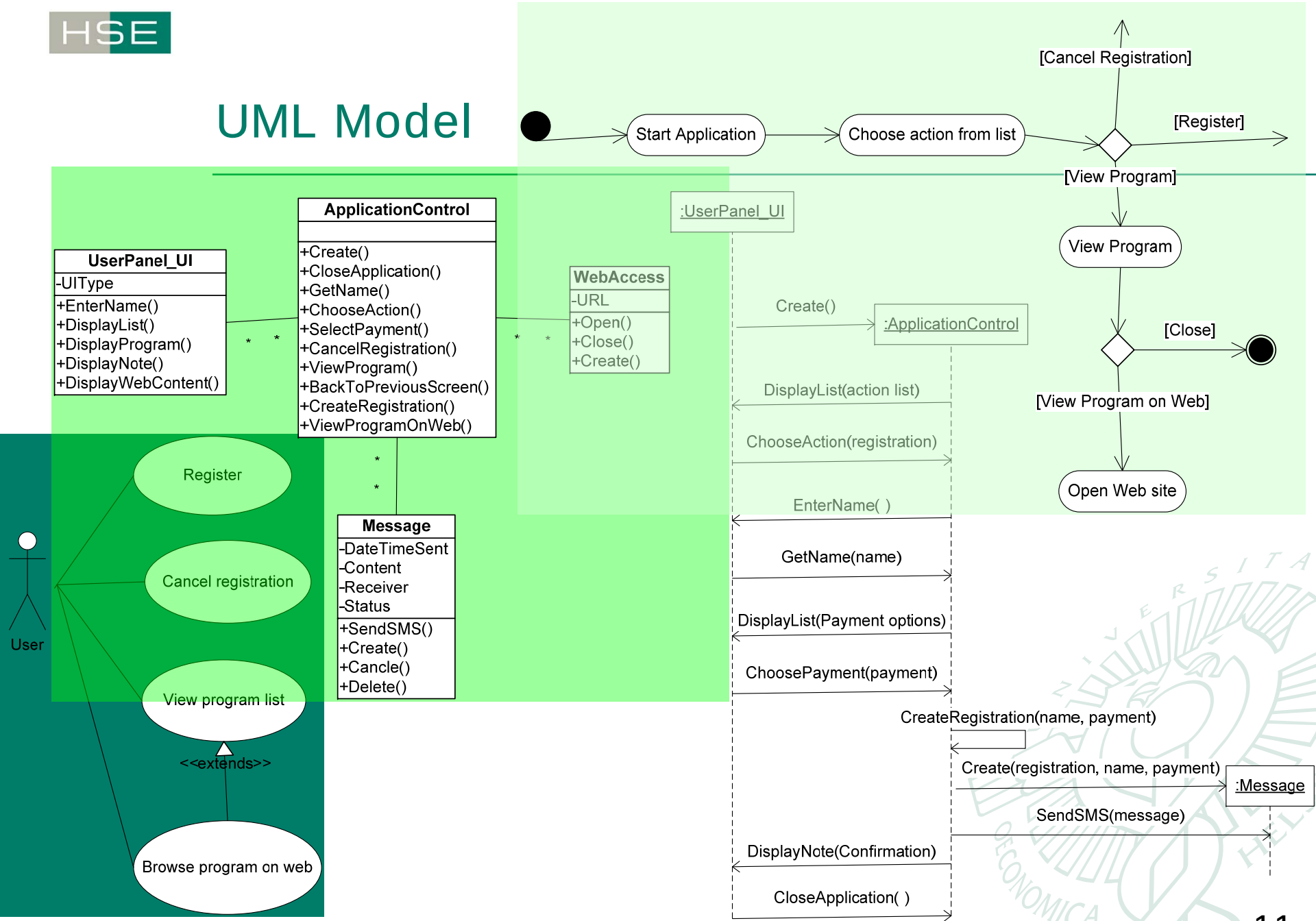
Object and relationship symbols






Conference registration: Welcome
Please choose
Registration
Program
Unregister
Registration
Program
Unregister
Your name?
Abc
Program text
Tu 10.45 combo
Tu 11:35 combo
Tu 12:25 combo
Tu 14:30 combo
Tu 15:20 combo
Options
Close
Program
Z:\\System\\Apps\\Python\\program.html
Check
Credit card
Invoice
+358400648606
Registration
+PersonNamed+. +Payment
Registration made
Quit
Are you sure
+358400648606
Cancel_registration
SMS Cancellation sent

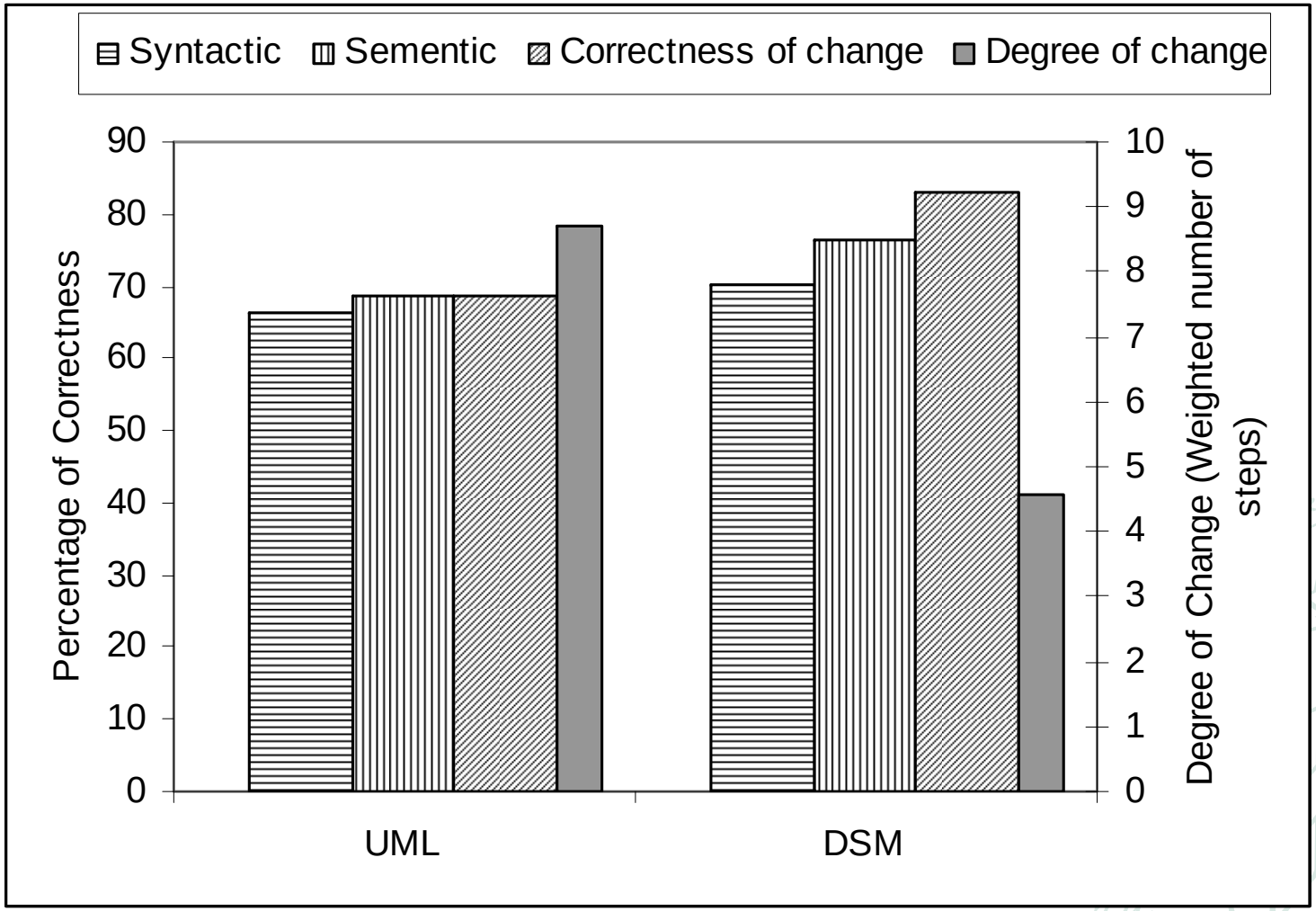
UML Model


Start Application
Choose action from list
[Cancel Registration]
[Register]
[View Program]
View Program
[Close]
[View Program on Web]
Open Web site
UserPanel_UI
-UIType
+EnterName()
+DisplayList()
+DisplayProgram()
+DisplayNote()
+DisplayWebContent()
ApplicationControl
+Create()
+CloseApplication()
+GetName()
+ChooseAction()
+SelectPayment()
+CancelRegistration()
+ViewProgram()
+BackToPreviousScreen()
+CreateRegistration()
+ViewProgramOnWeb()
WebAccess
-URL
+Open()
+Close()
+Create()
Message
-DateTimeSent
-Content
-Receiver
-Status
+SendSMS()
+Create()
+Cancle()
+Delete()
User
Register
Cancel registration
View program list
<<extends>>
Browse program on web
:UserPanel_UI
:ApplicationControl
:Message
Create()
DisplayList(action list)
ChooseAction(registration)
EnterName( )
GetName(name)
DisplayList(Payment options)
ChoosePayment(payment)
CreateRegistration(name, payment)
Create(registration, name, payment)
SendSMS(message)
DisplayNote(Confirmation)
CloseApplication( )

Size of the models

	UML	DSM
Design Models	1 class diagram 1 use case diagram 3 sequence diagrams 3 activity diagrams	1 DSM diagram
Size of Diagrams	4 classes 4 use cases 22 operations 29 messages in sequence diagrams 12 activities in activity diagrams	9 model elements

Degree of changes and % of correctness



Findings

	Proposition	Unit	UML	DSM	P value
H1	Syntactic accuracy	The percentage of correct answers	66.4	70.3	0.03
H2	Semantic accuracy	The percentage of correct answers	68.8	76.4	0.03
H3	Correctness of change	The score on the correctness of the changes made to the model (on a 100 point scale)	68.5	83.2	<0.01
H4	Degree of change	The weighted number of changes	8.7	4.6	<0.01

The correctness score of DSM models is 21% higher than that of UML

UML diagrams required nearly twice the number of steps when compared to DSM diagrams

Conclusions

- Our subjects had scored better in all tasks with DSM
- Statistically significant results
- Very little exposure to DSM in advance
- Results suggest that DSM models are easier to comprehend and maintain than UML models
- In practice this is compounded by the mapping from the model to executable

Mening?
¿Commentar?
Kommentteja?
Opinions?
Comments?

Frågor?
¿Preguntas?
Kysymyksiä?
Vragen?
Questions?

Contact Information

Matti Rossi

Helsinki School of Economics

P.O. Box 1210

FIN-00101 Helsinki

Finland

Email: matti.rossi@hse.fi

Phone: +358-9-43138996

Fax : +358-9-43138777

http://www.hse.fi/EN/HKI/R/Matti_Rossi/1_ContactInfo.htm