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Using a Goal-Driven Approach to Structure User Story Sets

UU/SIKS Symposium on Natural Language in Requirements Engineering

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Background: User Stories as Artefacts for Requirements Representation in Agile Methods

- Agile methods in general and XP in particular use user stories (US) to collect user requirements
- These are mostly written in an informal manner; templates appeared over the years in the form:

As [the WHO], I want/want to/need/can/would like [the WHAT], so that [the WHY]



Examples of user stories:

- > As a user, I can backup my entire hard drive.
- As a power user, I can specify files or folders to backup based on file size, date created and date modified.
- As a user, I can indicate folders not to backup so that my backup drive isn't filled up with things I don't need saved.



Templates to Write User Stories

- Generic Structure: As [WHO], I want [WHAT], so that [WHY]
- User story templates proposed by Mike Cohn:

I as a **<role>**, I want **<function>**, so that **<business value>**.

As a **<type of user>**, I want **<capability>**, so that **<business value>**.

As a **<type of user>**, I want **<some goal>**, so that **<some reason>**. As a creator, I want to upload a video, so that any users can view it.

As a book buyer, I want to search for a book by ISBN, so that I can find the right book quickly.

As a user, I can indicate folders not to backup, so that my backup drive isn't filled up with things I don't need saved.

Open Issue in Agile Methods: How to Handle, Manage, Structure, (Re)present, Group, ... User Story Sets



http://agilecomplexificationinverter.blogspot.be http://agilecomplexificationinverter.blogspot.be http://agilecomplexificationinverter.blogspot.be



	A	В	С	D	Е	F
1	Project: SCRUM Test Project Query: Product Backlog					
2	Title 🔽	State 💌	Backlog Priority 🚽	Story Points 💌	Business Value 🚽	Iteration Path 🛛 💌
	As a Bank Customer I want to Register to the Online banking system					
З	so I can see my profile	Approved	9	5	9	\Release 1\Sprint 1
	As a registered online banking cuotomer I want to login to online					
4	banking system so that I can View my profile	Approved	9	5	9	\Release 1\Sprint 1
5	As a Logged in Customer I want to my Account Transactions	Approved	9	8	9	\Release 1\Sprint 1
6	As a Logged In Customer I want to Create a New Account	Approved	7	8	7	\Release 1\Sprint 1
7	As a Logged In Customer I want to Pay my Creadit Card instalments	New	5	8	5	\Release 1\Sprint 2
8	As a Logged in Customer I want to Pay my Mobile Bill	New	5	8	5	\Release 1\Sprint 2
9	As a Logged in Customer I want to See Currency Rates	New	5	5	5	\Release 1\Sprint 2
	As a Logged In Customer I want to Transfer Money between my					
10	accounts	New	4	8	4	\Release 1\Sprint 3
	As a Logged In Customer I want to Add Local & International					
11	Beneficiaries	New	4	13	4	\Release 1\Sprint 3
12	As a Logged in Customer I want to Change my Password	New	4	3	4	\Release 1\Sprint 2
	As a registered online banking cuotomer I want to recover my					
13	Password if I forget it	New	4	5	4	\Release 1\Sprint 3
14			Total	76		

3 	Talent Acquisition App Story Map			Got feedback?	No filter By sprint By version	+ Create epic
	TAL-3 Review Candidates	TAL-4 Phone Screens	TAL-5 On-site Interviews	TAL-32 Interview Huddle	TAL-31 Make Offer	TAL-7 Acceptance
	+ Create story	+ Create story	+ Create story	+ Create story	+ Create story	+ Create
<u>₽</u> ₽	TAL-21	TAL-16	TAL-13	TAL-10	TAL-25	TAL-39
000	As a Recruiter I can schedule phone screens for times the HM and Candidate are available TAL-40 As a Recruiter I can confirm with finance the salary range	As a Recruiter I can As a HM I can take notes on schedule phone access for applicates live phone	As an Interviewer I am	As a Hiring Manager I can	As a Hiring Manager I can	Issue without ep
ρī		screened	Candidate details and	for a phone screen	Candidate	TAL-28
3		TAL-40	Interview times	TAL-14	TAL-22	As a Candidate.
ę\$		TAL-15 As an Interviewer I participate in a Hiring Huddle to give feedback on the	As an Interviewer I can grade the Candidate and add notes	As a Recruiter the Candidate is added to the days guest list	TAL-34 As a	
			Candidate	TAL-36		
			TAL-23 As an Interviewer I get a reminder email with link to	As an Interviewer I participate in the hiring huddle for the Candidate		

Unifying User Story Models



US Templates

- US templates can be found in literature or are proposed by practitioners (notably into blogs)
- US templates introduce *Descriptive Concepts* into these templates in an ad hoc manner without defining them
- We thus dispose of templates with syntaxes associated to Descriptive Concepts but no semantics!
- Nevertheless, plenty of examples are always provided with the proposed templates.



Research Method



Descriptive Concepts

• Each instance of the following class is a descriptive concept candidate as a concept class for our future unified model

Descriptive_Concept
dimension : ENUM{WHO,WHAT,WHY} syntax : String semantic : String



Descriptive Concepts: Collected Syntaxes

• (number of occurrences found in formal sources + number of occurrences found in informal sources).

WHO	WHAT	WHY
Role $(13 + 31)$	Goal $(4 + 18)$	Business Value $(7 + 18)$
Type of User $(8 + 15)$	Something $(3 + 10)$	Benefit $(7 + 18)$
User $(0 + 10)$	Action $(4+7)$	Reason $(4 + 14)$
Actor $(0+6)$	Feature $(4 + 7)$	Goal $(3+6)$
System Role $(0 + 1)$	Function $(1+7)$	Achievement $(0 + 4)$
Persona $(0+1)$	Desire $(0+6)$	Rationale $(0+2)$
"x" $(0+1)$	Functionality $(1 + 4)$	Desire $(0+2)$
	Capability $(3 + 1)$	Outcome $(0 + 1)$
	Task $(1+2)$	Result $(0+1)$
	Activity $(1+2)$	"z" $(0+1)$
	Outcome $(0+2)$	
	Behaviour $(0+1)$	
	Description $(0+1)$	
	What $(0+1)$	
	"y" $(0+1)$	
Table 1. Inst	ances for Descriptive_Conce	ept and Related Syntax

Descriptive Concepts: Collected Syntaxes

- Descriptive Concepts with an insignificant number of instances were left out
- "Irrelevant" Descriptive Concepts (e.g. something, y, ...) were left out of the model



Descriptive Concepts: Collected Semantics

- For each descriptive concept, semantics were looked after
 - 1. In the i* modeling framework
 - 2. In the KAOS framework
 - 3. In the Business Process Modeling Notation Framework
 - 4. A glossary of requirements engineering terminology
- When a match was found respecting the priority, we proceeded to a preliminary adoption
- A first comparison was made between the semantics to evaluate overlaps/redundancy.
- Further evaluation was then done on the collected examples
- Non redundant relevant elements were included in the candidate model (see paper for full discussion of the elements)

Unified Model



wants/wants to/needs/can/would like



Adopted Semantics

- A role is an abstract characterization of the behavior of a social actor within some specialized context or domain of endeavor
- A task species a particular way of attaining a goal
- A capability represents the ability of an actor to dene, choose, and execute a plan for the fulfillment of a goal, given certain world conditions and in the presence of a specific event
- A hard-goal is a condition or state of affairs in the world that the stakeholders would like to achieve
- A soft-goal is a condition or state of affairs in the world that the actor would like to achieve. But unlike a hard-goal, there are no clear-cut criteria for whether the condition is achieved, and it is up to the developer to judge whether a particular state of affairs in fact achieves sufficiently the stated soft-goal



Preliminary Case Studies: US issued of ClubCar and CalCentral(1/2)

- ClubCar is a multi-channel application available as an Android application, SMS service and IVR system. Users of ClubCar are riders and/or drivers, they can register by SMS, voice or through the Android app. Roughly speaking the software allows drivers to propose rides and submit their details with *dates*, *times*, *sources* and *destinations* while riders can search for available rides. The project included a total of 28 US.
- CalCentral is an online system that delivers a unified and personalized experience to students, faculty and staff, facilitating the navigation of campus resources, delivering personal notifications from key campus systems, and supporting learning and the academic experience. US are used as requirement artifacts in the project; the list of 95 US.



Preliminary Case Studies: US issued of ClubCar and CalCentral(2/2)



Fig. 4. Elements Coverage in the Carpooling and CalCentral Case Studies

Creating Visual Models Based on User Story Sets: The Rationale Diagram



Placing the unified model in the US-based development



Towards a visual representation of User Stories

- US tagging with the unified model furnishes information on the nature and grain of the US elements
- We would like to use this information to graphically represent User Stories based on the former Unified User Story Model, so that we can *visualize* and *analyze* User Stories (*inter*)dependencies.



Rationale Diagram: i*-based Graphical Notation



Rationale Diagram: a modeling example

Dimension	Element	D_C Type
WHO	As a DRIVER	Role
WHAT	I want to register to the service	Task
WHY	so that I can propose ride to go from A to B	Hard-goal
WHO	As a DRIVER	Role
WHAT	I want to propose a ride from A to B with the price location and time of	Task
	departure, and number of seats available	
WHO	As a DRIVER	Role
WHAT	I want to log in to the platform	Capability
WHY	so that I can register to the service	Task
WHO	As a DRIVER	Role
WHAT	I want to select the ride characteristics	Capability
WHO	As a DRIVER	Role
WHAT	I want to confirm the proposal	Capability
WHO	As a DRIVER	Role
WHAT	I want the RIDER to be satisfied of my service	Soft-goal



Rationale Diagram: a Modeling Example

Contribution link(+,-)

Rationale Diagram: Identifying elements from EPIC US

• **EPIC**: top-level *Task* element not issued of the refinement of another *Task* element but that itself needs to be refined in more elements (WHAT Dimension).



Legend:



Rationale Diagram: Identifying elements from EPIC User Stories



Legend:





Integration of the Rationale Tree in the SCRUM Board and Propagation Algorithm Based on Business Value

Increase traceability and visibility on requirement elements across iterations and monitor the progress on multiple levels (i.e. the levels of the elements in the tree).



Rationale Tree: Application on a real life case study in the field of travel and expenses management.



(Preliminary) Results of the Real-Life Case Study

- Allows reasoning and evaluating the consistency in requirements
- Allows iterative planning based on business value
- Evaluation of the business value of elements starts with the fine-grained elements (presented at the top)

A full study of the results, lessons learned and threats to validity should still be performed!

Supporting CASE-Tool



Using the Rationale Tree for Generating an Agent-Based Design: Process Fragment Approach





wants/wants to/needs/can/would like



Creating Visual Models Based on User Story Sets: Generating a Use Case Diagram



User story modeling with Use-Case diagram

Mapping between user story elements and Use-Case diagram elements



Role -> Actor Hard-goal-> Use-CaseTask -> Use-Case



Capability ->X

Soft-goal

Soft-goal -> RUP/UML Business Goal

User story modeling with Use-Case diagram

User story set from ClubCar

			٦	
Dimension	Element	$D_C Type$		
WHO	As a DRIVER	Role		
WHAT	I want to register to the service	Task		
WHY	so that I can propose a ride to go from A to B	Hard-goal		
WHO	As a DRIVER	Role	\checkmark	
WHAT	I want to propose a ride from A to B with the price	Task	\bigcirc	
	location and time of departure, and number of seats		Ý	\frown
	available			
WHO	As a DRIVER	Role	\wedge .	
WHAT	I want to log in to the platform	Capability		being satisfie
WHY	so that I can register to the service	Task	Driver	of the service
WHO	As a RIDER	Role	Propose a	
WHAT	I want to be transported from A to B	Hard-goal	from A to B	
WHO	As a DRIVER	Role	end?	ò
WHAT	I want to confirm the proposal	Capability	4 exterio	$\underline{\vee}$
WHO	As a DRIVER	Role	a de tradicional de la construcción	
WHAT	I want the RIDER to be satisfied of my service	Soft-goal	Register	\wedge
			to the service	Didor
				Rider



Be transported from A to B

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User story modeling with Use-Case diagram

User story model with Use-Case diagram: Supporting CASE-Tool



Conclusion and Future Work



Conclusion

- We have build a unified model for user story templates with a limited set of concepts with defined syntax and semantics
- A User Story Set tagged using the unified model can be used for visual requirements representation
- The technique has been integrated in scrum approach and applied on a real life case
- The visual model can be used for forward engineering



Future Work

- The requirements modeling approach has been applied on case studies
 - a study of the success (and failure) criteria for its application can/should be performed
- A comparison between the rationale tree approach and the Quality User Story (QUS) framework developed at Utrecht University
 - Which approach is more efficient to report/detect defects or errors within user stories using the QUS framework and the rationale diagram?
 - Which approach is the most efficient to identify missing requirements?
 - Which approach allows to at best identify which functional and design choices best support the fulfilment of non-functional requirements.
 - Which approach best structures user stories into themes?



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