Understanding User Stories
Computational Linguistics in Agile Requirements Engineering

Garm Lucassen
November 30th 2017
Garm is 2 jaar en 4 maanden oud en schrijft zijn eerste tekst op een computer:

m

88888888

7m026

84

khbnjkvbbbbbmb, m, 

Overview

• How about user stories?
• Grimm User Stories
• Interactive Narrator
• Future work
Flashback to 2014…

Surely there’s a lot of work on user stories?
Except for Wautelet 2014!
Huge knowledge gap!

- **45%** of industry practitioners apply user stories (Kassab, 2015)

- Many industry books and articles

- Yet, **academically** little is known
Problems to solve

• Why are user stories **popular**?
• Why are user stories **effective**?
• Think of new **methods** to **improve** current state
• Create **tools** to support user story practice
“As a Visitor, I want to buy an event ticket”

“As a Visitor, I want to search for new events by favored organizers, so that I am the first to know of new events”

“As a Visitor, I want to be notified when an event is close to becoming sold out, so that I do not miss the event”
What is a user story?

• User stories represent customer requirements in a card, leading to conversation and confirmation (Jeffries, 2001)

• User stories only capture the essential elements of a requirement:
  - who it is for
  - what it expects from the system
  - why it is important (optional?)

• Simple format used by 70% of practitioners (Lucassen et al., 2016)

  As a [role], I want to [action] (so that [benefit])

  who  what  why

(Connextra)
Practitioners struggle

- Existing quality guidelines are insufficient and relatively unknown

- Some practitioners use INVEST (23.5%)
  - Highly positive of impact on productivity and quality
  - Battle-proven and effective
  - Non-specific
  - Not actionable
  - Still good to know!
  - Go beyond its six characteristics:
    - Independent
    - Negotiable
    - Valuable
    - Estimatable
    - Small
    - Testable
What is the Grimm Method?
The Brothers Grimm

- 1806: start collecting the best German folk tales

Cinderella  Hansel and Gretel  The Frog Prince
The Brothers Grimm

- 1806: start collecting the best German folk tales
- Did not come up with these stories themselves

Cinderella  Hansel and Gretel  The Frog Prince
The Grimm Process

1. **Invite** story tellers in their home

2. Transcribe and **edit** heavily

3. Include in their flagship product: *Grimm’s Fairy Tales*
User stories are similar

1. Talk to users or customers

2. Transcribe conversation and edit into user stories

3. Include in pied piper project: (i) refine, (ii) plan, (iii) develop
Practitioners struggle

• Only one person concerned with user stories
• Single point of failure -> insufficient QA
• 56% of user stories contained easily preventable errors (n=~1000)
• Consequence: wrong software
  - Rework
  - Late changes
  - Leads to project failure and cost overruns
Grimm Method
to the rescue

• The Quality User Stories Framework contains 13 quality characteristics for common issues
  - Based on 1000 user stories & literature
  - Derivable from user story text, ignores requirements management concerns

• Foster more conversation around user stories at every stage of user story lifecycle
  - Understand what kind of issues are possible
  - Empower everyone to identify issues pro-actively
  - Use terminology to convey problems

• Prepares user stories for advanced analyses
What is the Grimm Method?
Quality User Story Framework

User Story Quality

Syntactic
- Well-formed
- Atomic
- Minimal
- Conceptually sound

Semantic
- Problem-oriented
- Unambiguous
- Conflict-free
- Full sentence
- Estimatable

Pragmatic
- Unique
- Uniform
- Independent
- Complete
Example 1: syntactic
RQ3 - minimal

A user story contains nothing more than role, action and benefit

As an Event Organizer, I want to see the personal information of attendees (split into price levels). See: Mockup by Alice NOTE: - First create the overview screen

(Re)move unnecessary information

As an Event Organizer, I want to see the personal information of attendees

Rationale: unnecessary distraction, indicates creator did not think deeply
Example 2: *semantic*

RQ4 - conceptually sound

The action expresses a feature and the benefit expresses a rationale

As an Event Organizer, I want to open the event page, so that I can see the personal information of attendees
Example 2: semantic
RQ4 - conceptually sound

The action expresses a feature and the benefit expresses a rationale

As an Event Organizer, I want to open the event page, so that I can see the personal information of attendees.

ends becomes means

As a User, I want to see personal information of attendees, so that I know the demographical distribution of the event.

Rationale: actions that do not capture what the role truly wants omit important information. Who wants to open a page?
Example 3: *pragmatic*

RQ 11 - uniform

All user stories follow roughly the same template

1. As a Visitor, I want to create an account
2. As a Visitor, I want to reset my password
3. As a TicketExpert Manager, I receive an email notification when a new user is registered

\[ \downarrow \text{add ‘want to’} \]

As an TicketExpert Manager, I want to receive an email notification when a new user is registered

Rationale: structure of user story is necessary for quick overview of a set its dependencies and relationships
Grimm Tool
Grimm Tool Technology:  
Automatic Quality User Story Artisan

- Automatically assess user story quality
- Restrict ourselves to criteria with potential for $100\%$ recall:  
  **Perfect Recall Criterion**  
  (Daniel Berry et al., 2012)

- Well-formed
  Atomic
  Minimal
  Uniform
  Unique
Jira integration automatically posts comments.
Grimm Tool

Activity

Grimm User Story Review added a comment - 23 Aug 16 14:42

Grimm Reports: No action
It looks like you didn’t include an action. Are you sure this is a user story?
Suggestion: Add what you want to achieve

Grimm User Story Review added a comment - 23 Aug 16 14:42

Grimm Reports: No role
It looks like you didn’t include a role. Are you sure this is a user story?
Suggestion: Add for who this story is

Grimm User Story Review added a comment - 21 Apr 16 15:34

Grimm Reports: Not atomic
A user story should consist of only one feature. Avoid using conjunctions such as and or &.
Suggestion: As a Tenant, I want to resolve complaints without intervention from the superintendent and indicate why (optional)

Grimm User Story Review added a comment - 21 Apr 16 15:34

Grimm Reports: Not minimal
User stories should not include additional information hidden in brackets. Move this to the description, acceptance criteria or comments.
Suggestion: As a Tenant, I want to resolve complaints without intervention from the superintendent and indicate why (optional)
Why Grimm?

• Quality guidelines like **Grimm** and INVEST support **effectively working** with user stories

• Applying Grimm paves the way for **advanced analyses**
What is the Grimm Method?

Interactive Narrator

Overview zoom filter visualization

Stakeholders

User stories

Concepts, relationships

Grimm Tool

Reviewed user stories

Reviewed user stories

Visual Narrator
From user stories...

“As a [Visitor], I want to [search for new events by favored organizers], so that I [am the first to know of new events]”
.. to
As a person, I want to do something so that I obtain benefit.
1. Split on Indicator

Role  As a visitor,

Means  I want to choose an event

End  so that I can book a ticket for that event
2. Functional role

Role          As a **visitor**

Means         I want to choose an event

End           so that I can book a ticket for that event
3. Simplify the means

Role

As a **visitor**

Means

I want to choose an event

End

so that I can book a ticket for that event
3. Simplify the means

Role: As a visitor

Means: I want to choose an event

End: so that I can book a ticket for that event
As a visitor, I want to choose an event so that I can book a ticket for that event.
6. Main relationship

Role

As a visitor

Means

I want to choose an event

End

so that I can book a ticket for that event
7. Remaining information

Role: As a visitor

Means: I want to choose an event

End: so that I can book a ticket for that event
As a visitor, I want to choose an event so that I can book a ticket for that event.
7. Remaining information

Role: As a visitor

Means: I want to choose an event

End: so that I can book a ticket for that event
To obtain a holistic conceptual model of a requirements collection, we repeat the extraction method for every user story.
1. Split on Indicator

**Role**

As a visitor,

**Means**

I want to filter on event types

**End**

so that I can find announcements for events I might like
2. Functional role

Role: As a visitor

Means: I want to filter on event types

End: so that I can find announcements for events I might like
3. Simplify the means

Role
As a visitor

Means
I want to filter on event types

End
so that I can find announcements for events I might like
3. Simplify the means

Role: As a visitor

Means: I want to filter on event types

End: so that I can find announcements for events I might like
4/5. Main verb & main object

Role: As a visitor

Means: I want to filter on event types

End: so that I can find announcements for events I might like
6. Main relationship

Role

As a **visitor**

Means

I want to **filter on** event types

End

so that I can find announcements for events I might like

- Visitor
- Event
- Ticket
- Event types

- Choose
- Filter
- Book

- Has
- Is a
7. Remaining information

Role

As a **visitor**

Means

I want to **filter on** event types

End

so that I **can find** announcements for events that I might like

Diagram:

- Visitor
  - Choose
  - Book
- Event
  - Has
- Ticket
  - Event types
  - Filter
  - Is a
As a visitor, I want to filter on event types so that I can find announcements for events that I might like.
7. Remaining information

Role
As a visitor

Means
I want to filter on event types

End
so that I can find announcements for events that I might like
However…

Models can get BIG
Conflict detection

Use of Systems Administrator, System Administrator and Administrator
Duplicate prevention

Separate stories for:
- find flight
- search flight number
- look flight name
Ambiguity resolution
Incompleteness mitigation

Can search for data by type. But researcher cannot search?
Future work

• Machine Learning techniques

• Perfect Recall?

• Beyond User Stories
Beyond User Stories

*Inspired by insightful discussions with, critical feedback from and good questions by curious audiences*

- User Stories are *not universally applicable*
  - Technical requirements
  - Bugs
  - Requirements without a clear stakeholder

- Interesting *alternatives*:
  - Feature Driven Development (De Luca)
  - Job Stories (Klement)
  - The *whatever* approach? (everyone and no one)

- **When** is *what* approach suitable?
Alternative 1: technical ‘stories’

Feature Driven Development

By Jeff de Luca

- `<action> the <result> <by|for|of|to> <object>`
  - Estimate the closing price of stock
  - Generate a unique identifier for a transaction
  - Change the text displayed on a kiosk
  - Merge the data for duplicate transactions
Alternative 2: context-rich epics

Job Stories

By Alan Klement

• **Example**: When an item does not have an estimate or has an estimate I’m not happy with, I want to be able to restart the estimation process and notify everyone, so that the team knows a particular item needs to be estimated upon.
Agile Requirements Engineering

Epic / feature

Job Story

User Story

Partial requirement

Technical requirement

Task

FDD

Whatever
# Agile Requirements Engineering

<table>
<thead>
<tr>
<th>Granularity level</th>
<th>RE Format</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Epic / big feature              | Job Story | 1. Need as much context as possible  
                                |           | 2. Lightweight, yet exhaustive                                              |
|                                 |           | 3. Multiple stakeholders -> US inappropriate                              |
| User story / partial requirement| User Story| 1. One stakeholder                                                         |
|                                 |           | 2. If more, duplication is recommended                                    |
|                                 |           | 3. Easy to use                                                            |
|                                 |           | 4. Yet some structure for documentation                                    |
| Technical partial requirement   | FDD       | 1. Stakeholder unclear or unnecessary                                      |
|                                 |           | 2. Simple directive, instead of problem to solve                           |
| Bugs, team enhancements, tasks?| Whatever approach? | 1. Speed is of the essence                                                |
|                                 |           | 2. No clear stakeholder                                                    |
|                                 |           | 3. Documentation unnecessary                                              |
Thoughts?

- **Flexibility** is necessary: big feature or technical requirement with clear stakeholder? User story!

- Quality requirements? FDD *too lightweight*?

- Is the *whenever* approach always wrong?
Thank you!

Contact: g.lucassen@uu.nl || garm.lucassen@gmail.com
References


Respondents that follow **quality guidelines** are more positive. Respondents applying **INVEST** are even more positive.

<table>
<thead>
<tr>
<th></th>
<th>S1. Productivity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>8%</td>
<td>43%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>7%</td>
<td>19%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>10%</td>
<td>23%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S2. Quality</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>12%</td>
<td>25%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>5%</td>
<td>19%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>8%</td>
<td>23%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S3. Productivity – template</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>17%</td>
<td>35%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>14%</td>
<td>28%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>12%</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S4. Quality – template</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>19%</td>
<td>33%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>7%</td>
<td>21%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>10%</td>
<td>37%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S5. Productivity – guidelines</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>11%</td>
<td>65%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>7%</td>
<td>26%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>10%</td>
<td>52%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S6. Quality – guidelines</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>6%</td>
<td>69%</td>
</tr>
<tr>
<td>Yes, INVEST</td>
<td>5%</td>
<td>12%</td>
</tr>
<tr>
<td>Yes, self-defined guidelines</td>
<td>10%</td>
<td>38%</td>
</tr>
</tbody>
</table>