



MASTER IN
COMPUTER
SCIENCE

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UNIVERSITÄT
BERN

Modeling requirements artifacts in an IDE

Master thesis, final presentation, FS2020

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Supervisors: Nitish Patkar, Nataliia Stulova, Andrei Chiş

Requirements

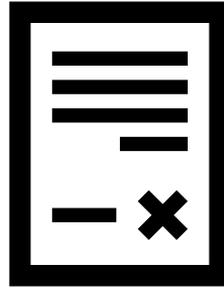


Establish a common
vision of the product

Requirements



Establish a common
vision of the product

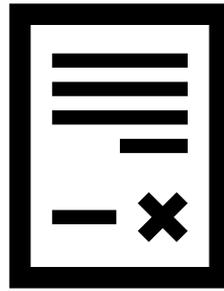


Act as a contract

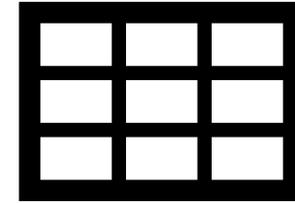
Requirements



Establish a common
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Act as a contract

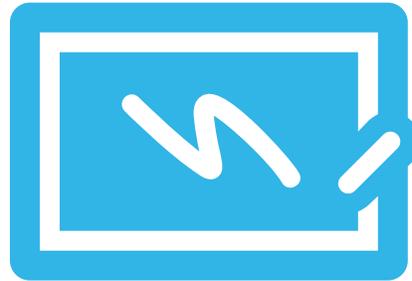


Various artifacts and
formats used

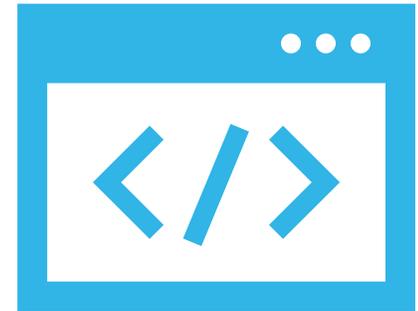
Requirements



Documents



Physical

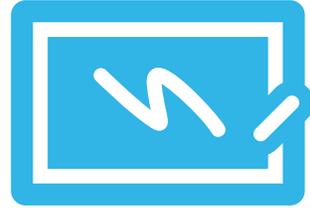


Software

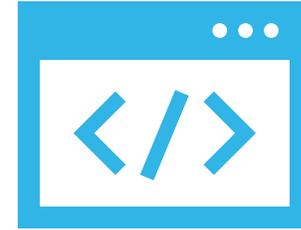
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Documents



Physical



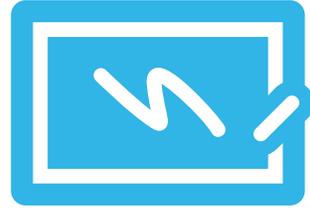
Software

Fragmented knowledge

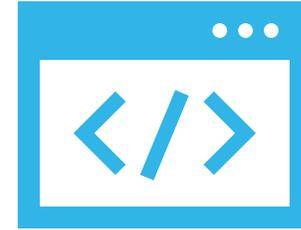
Requirements



Documents



Physical

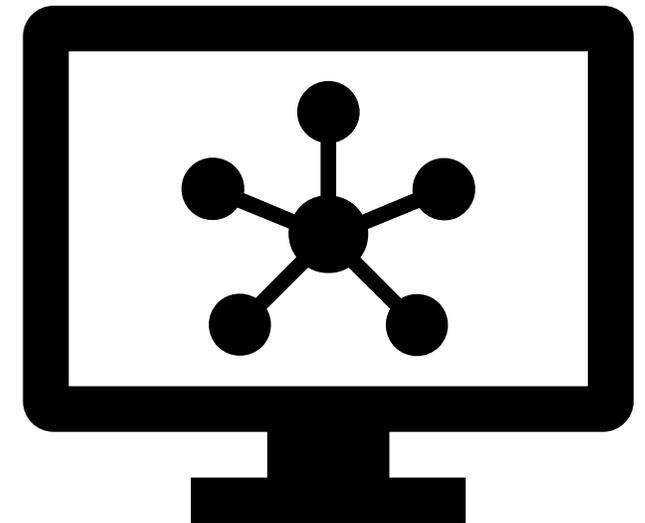


Software

Fragmented knowledge
Dynamic management

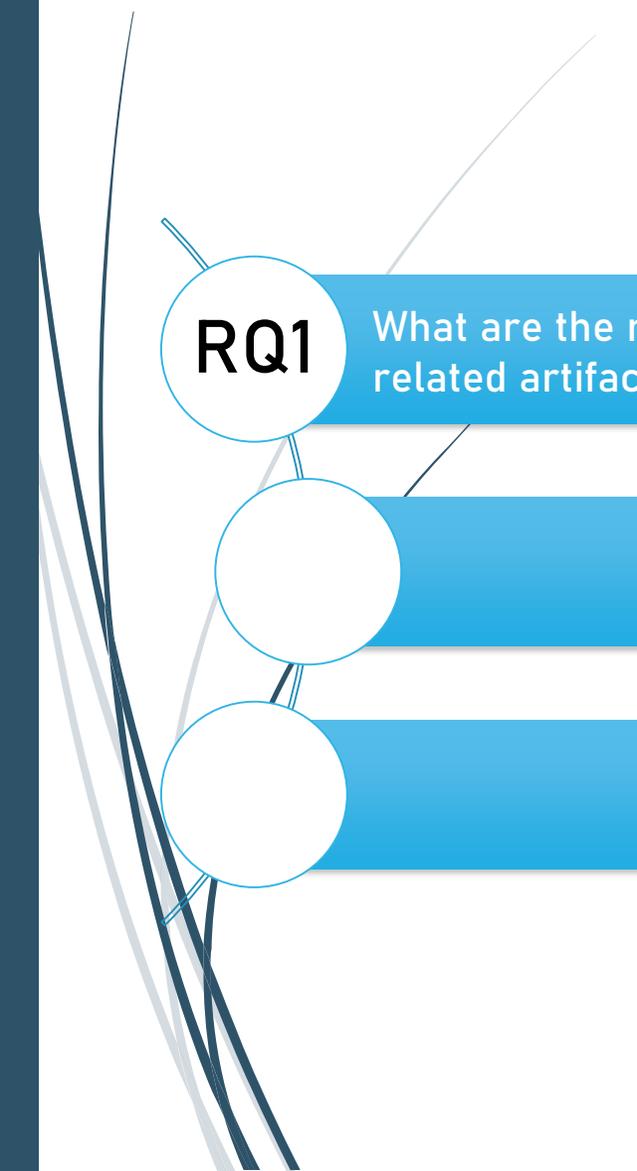
Centralized Requirements Management

- Integrate project artifacts into a single platform
- Model a selection of artifacts
- Workflows:
 - Creation, updating, removing artifacts
 - Navigation
 - Visualization





Research Questions



RQ1

What are the most commonly used requirements formats and related artifacts within the project development process?



RQ1 - Requirements Artifacts



**Analysis of RE
literature**



Extraction of
mentioned artifacts



Compilation of a list
of artifacts

RQ1 - Requirements Artifacts



Analysis of RE
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Extraction of
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Compilation of a list
of artifacts

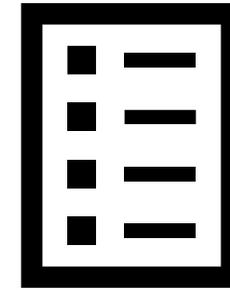
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Analysis of RE
literature



Extraction of
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Compilation of a list
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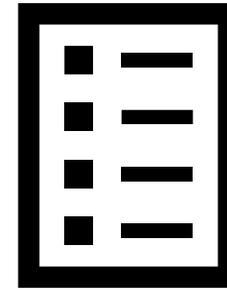
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Analysis of RE
literature



Extraction of
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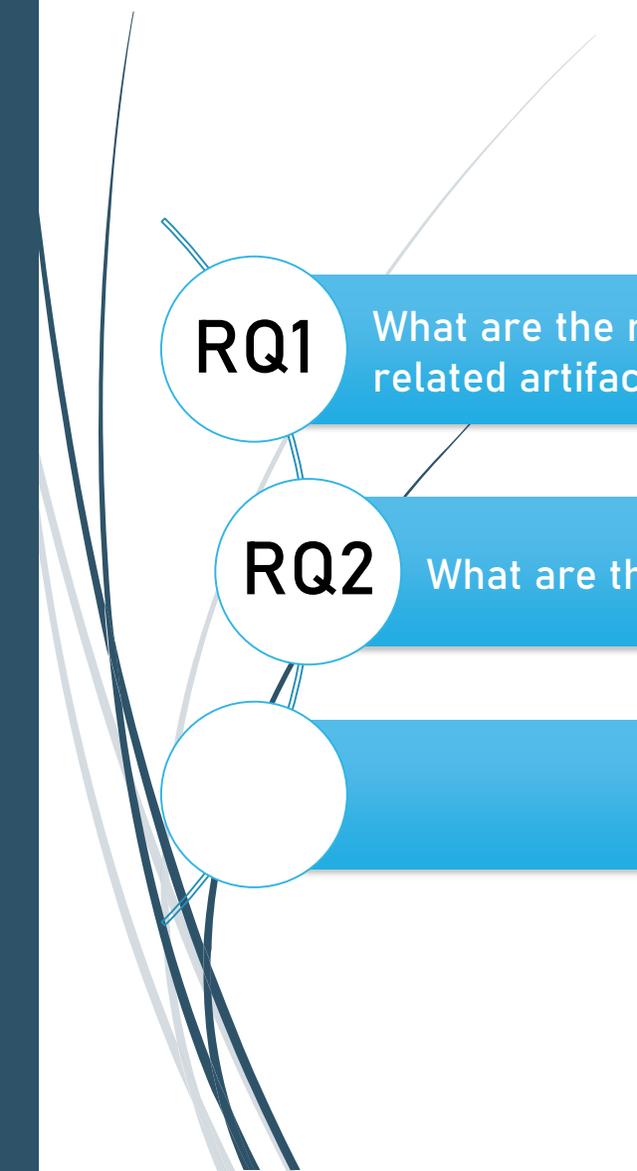


Compilation of a list
of artifacts

62 artifacts obtained



Research Questions

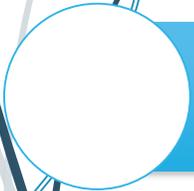


RQ1

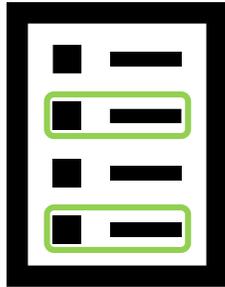
What are the most commonly used requirements formats and related artifacts within the project development process?

RQ2

What are the main characteristics of these artifacts?



RQ2 - Artifact Properties



**Classification
of collected
artifacts**



Analysis of
results



Extraction of
findings

RQ2 - Classification Dimensions

1. Format
2. Nature
3. Contains
4. Helps Create
5. SDLC Phase of Origin
6. SDLC Phase of Use

Format

Textual/Graphical/Mixed

As a <user>, I want to <perform action>, so that <goal>

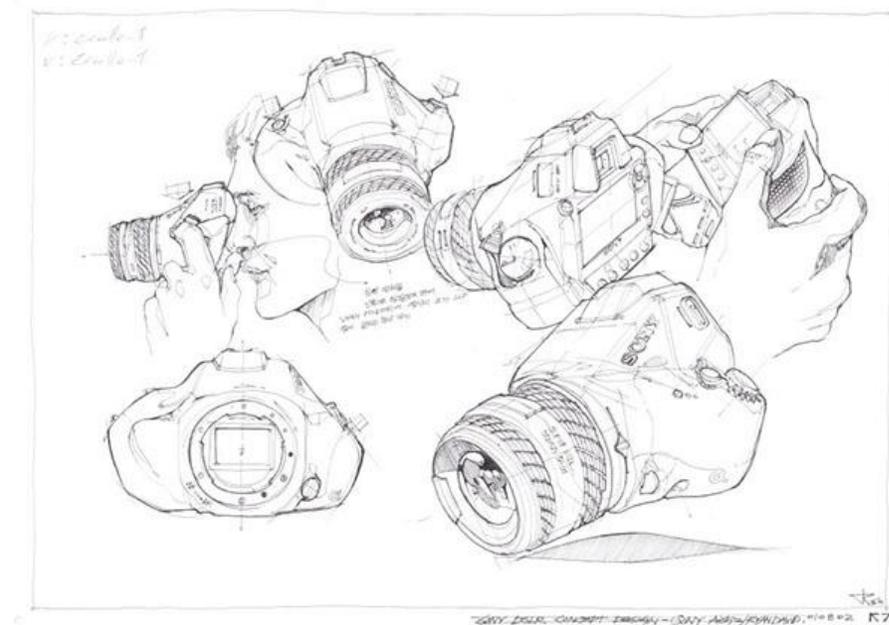
User Story - Textual

RQ2 - Classification Dimensions

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Format

Textual/Graphical/Mixed



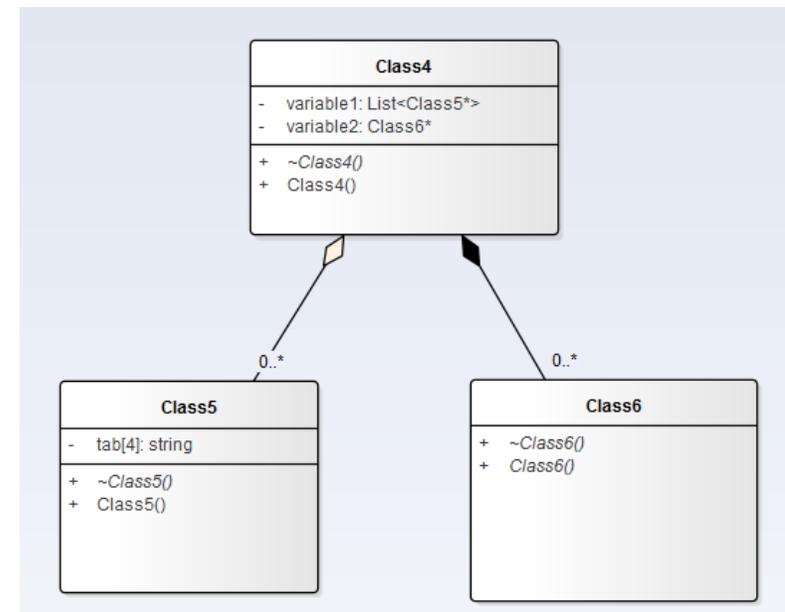
Sketch - Graphical

RQ2 - Classification Dimensions

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Format

Textual/Graphical/Mixed



UML Diagram - Mixed

RQ2 - Classification Dimensions

1. Format
2. Nature
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6. SDLC Phase of Use

Nature

Digital/Physical

User Story

As a potential customer

I want to read book reviews

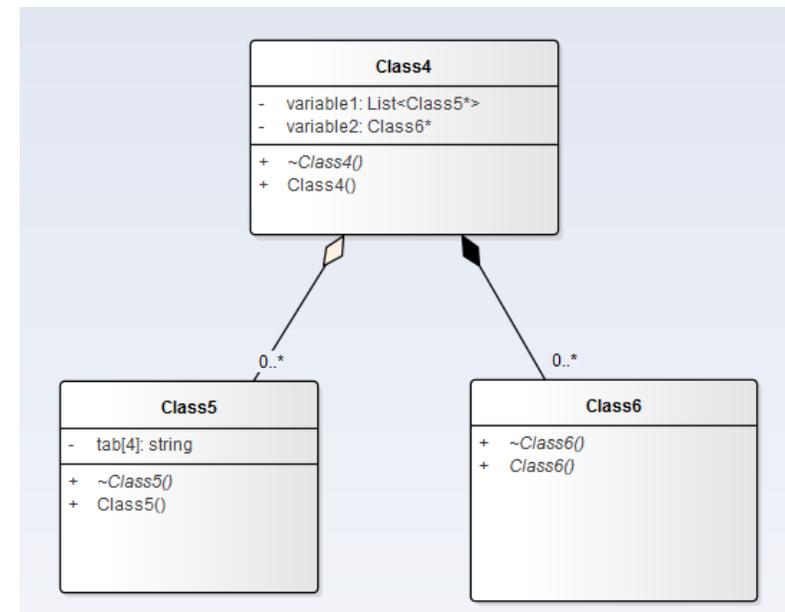
*So that I can decide which one
to buy*

Story Card - Physical

RQ2 - Classification Dimensions

1. Format
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6. SDLC Phase of Use

Nature
Digital/Physical



UML Diagram - Digital

RQ2 - Classification Dimensions

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4. Helps Create
5. SDLC Phase of Origin
6. SDLC Phase of Use

Contains

Other artifacts

User Story Map - Example

	Setup	Request		Approve		
Admin	Users mgmt.	Review request		Approve request	Reject request	
Employee		Create request	Submit request			Get status
High ↑ Priority ↓ Low	Add user	Via Web	Via Web	Via Web		
	Edit user	Via Mobile	Via Mobile	Via Mobile	Via Mobile	Via Mobile
	Remove user	Via Email	Via Email		Via Web	Via Web

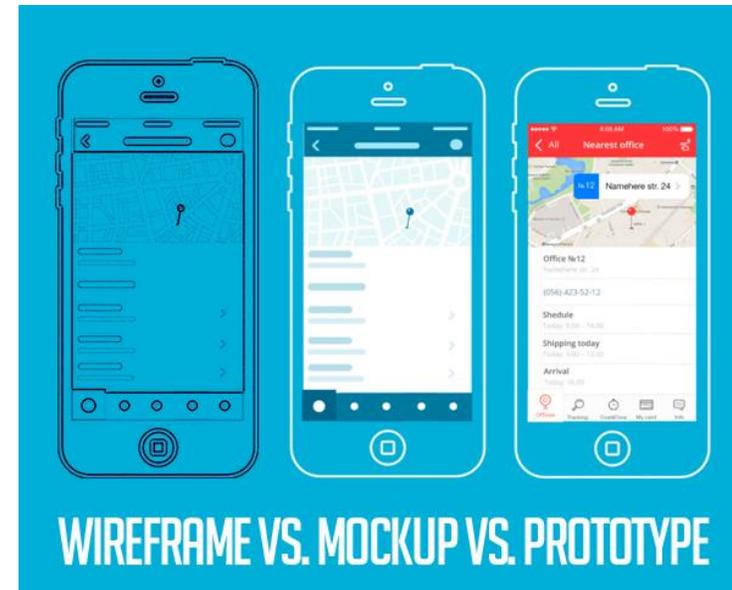
Story Map - contains user stories

RQ2 - Classification Dimensions

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6. SDLC Phase of Use

Helps create

Other artifacts



Wireframes → Mockups → Prototypes

RQ2 - Software Development Life Cycle (SDLC)



Requirements

- Requirements are elicited, collected and specified

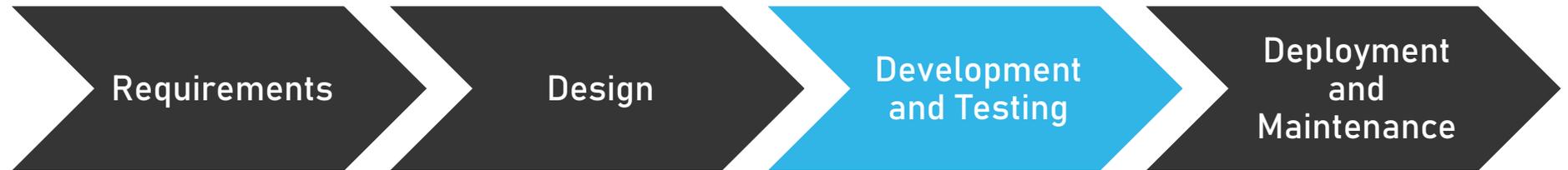
RQ2 - Software Development Life Cycle (SDLC)



Design

- The requirements are reasoned about; a solution is designed
 - Development process is structured

RQ2 - Software Development Life Cycle (SDLC)



Development and Testing

- The solution is developed
- Source code is created and tested

RQ2 - Software Development Life Cycle (SDLC)



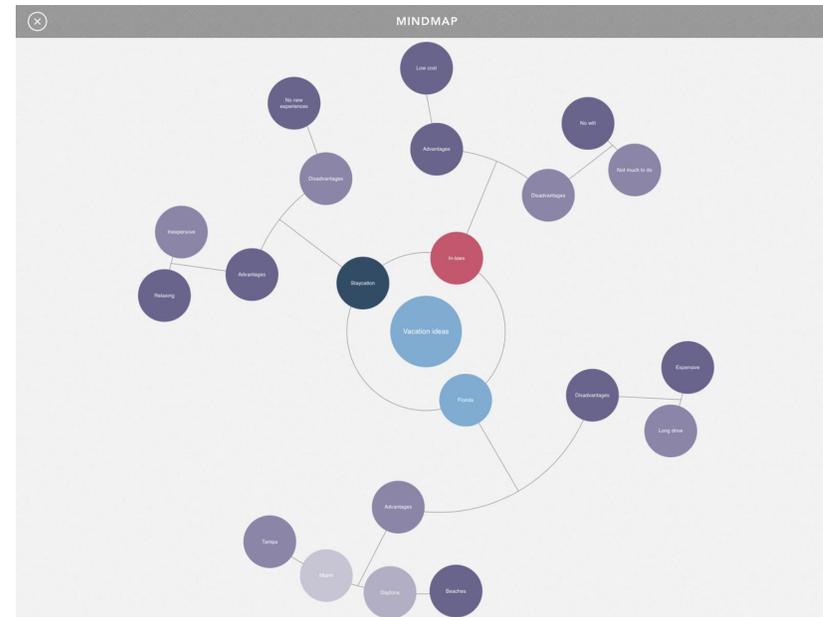
Deployment and Maintenance

- The solution is deployed
- Maintenance activities (e.g. bug fixing, usage reports)

RQ2 - Classification Dimensions

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6. SDLC Phase of Use

SDLC Phase of Origin

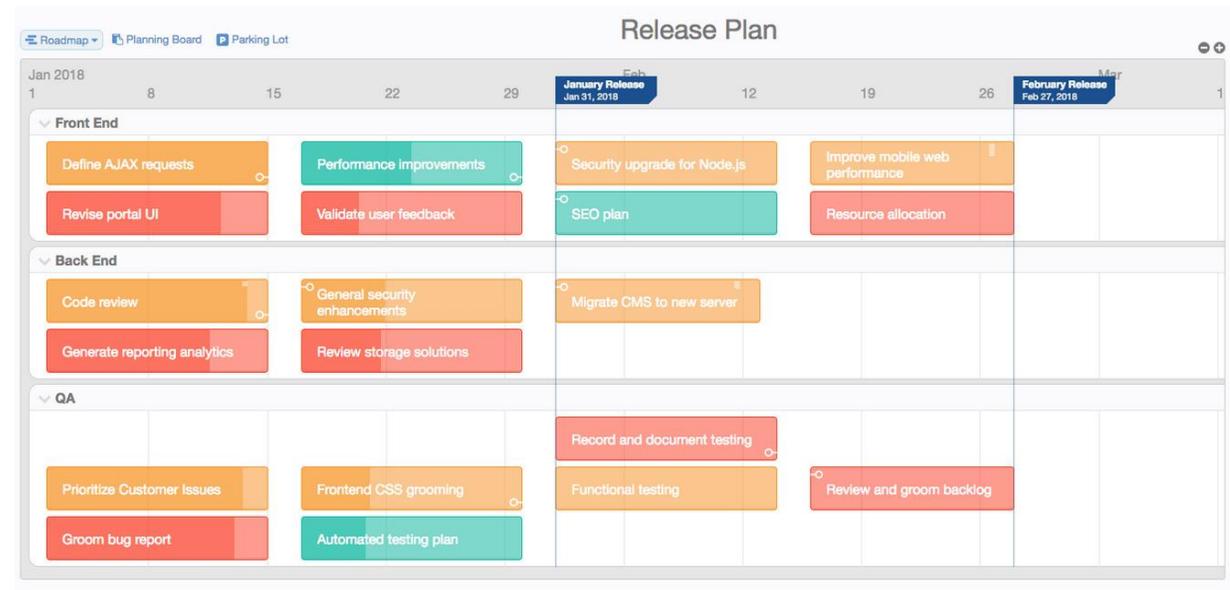


Mind Map - Requirements phase

RQ2 - Classification Dimensions

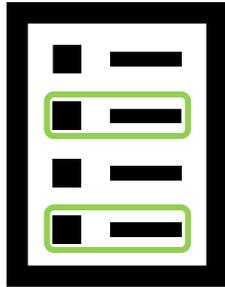
1. Format
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SDLC Phase of Use

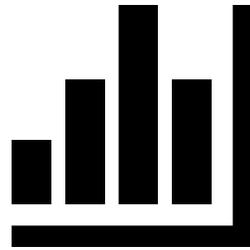


Release Plan - Development and Testing phase

RQ2 - Artifact Properties



Classification
of collected
artifacts

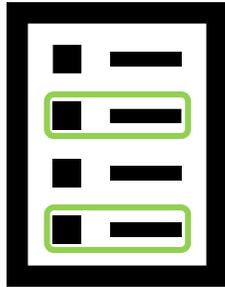


Analysis of
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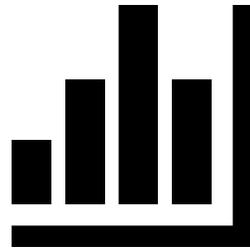


Extraction of
findings

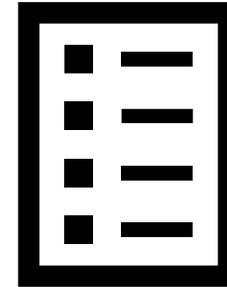
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Classification
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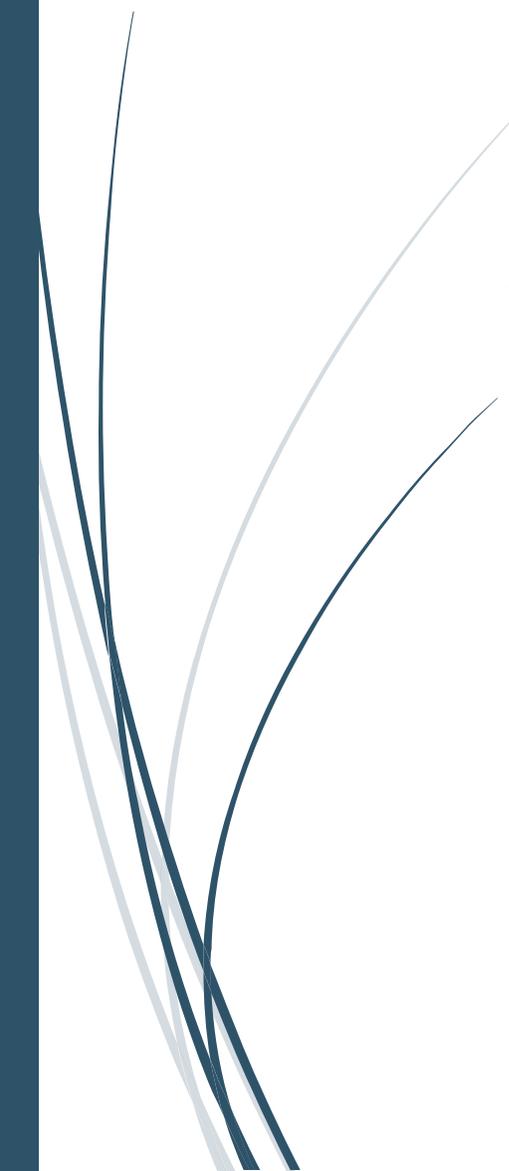


Extraction of
findings



RQ2 – Observations and Findings

Finding 1: A plethora of artifacts, with varying characteristics, are available to practitioners; these artifacts need to be easily accessible to stakeholders.





RQ2 – Observations and Findings

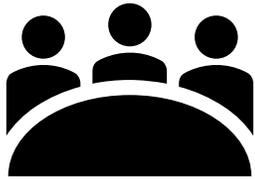
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62 artifacts extracted

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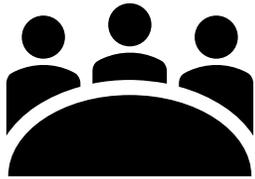


Stakeholder variety

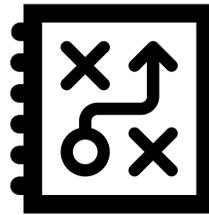
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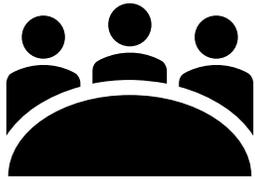


Supported activities

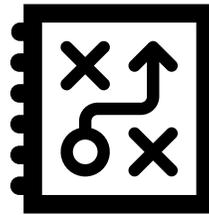
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Stakeholder variety



Supported activities



Tools and media

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Stakeholder variety



Supported activities



Tools and media

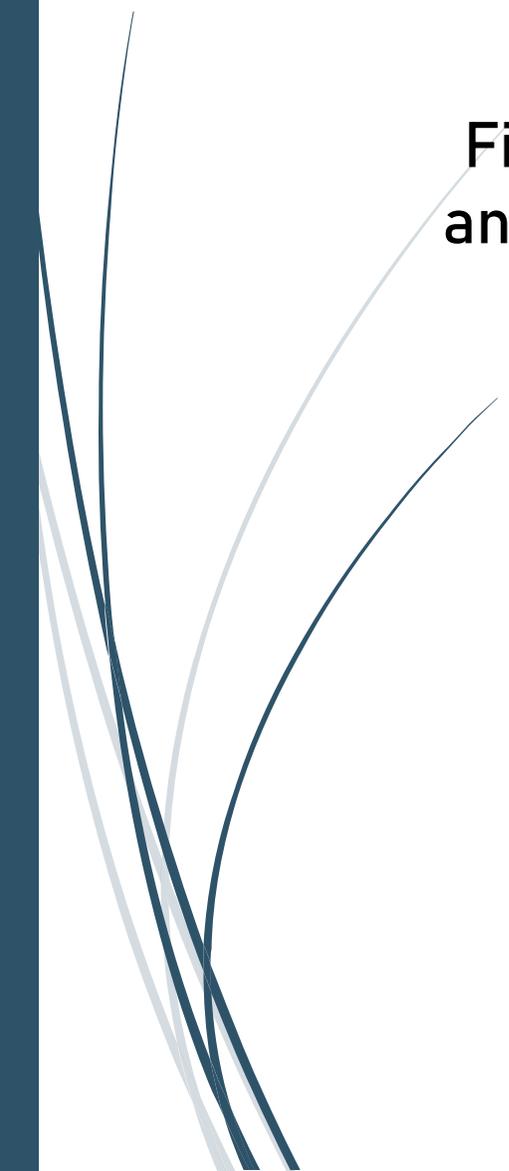
Harder to maintain the „big picture“ of a project



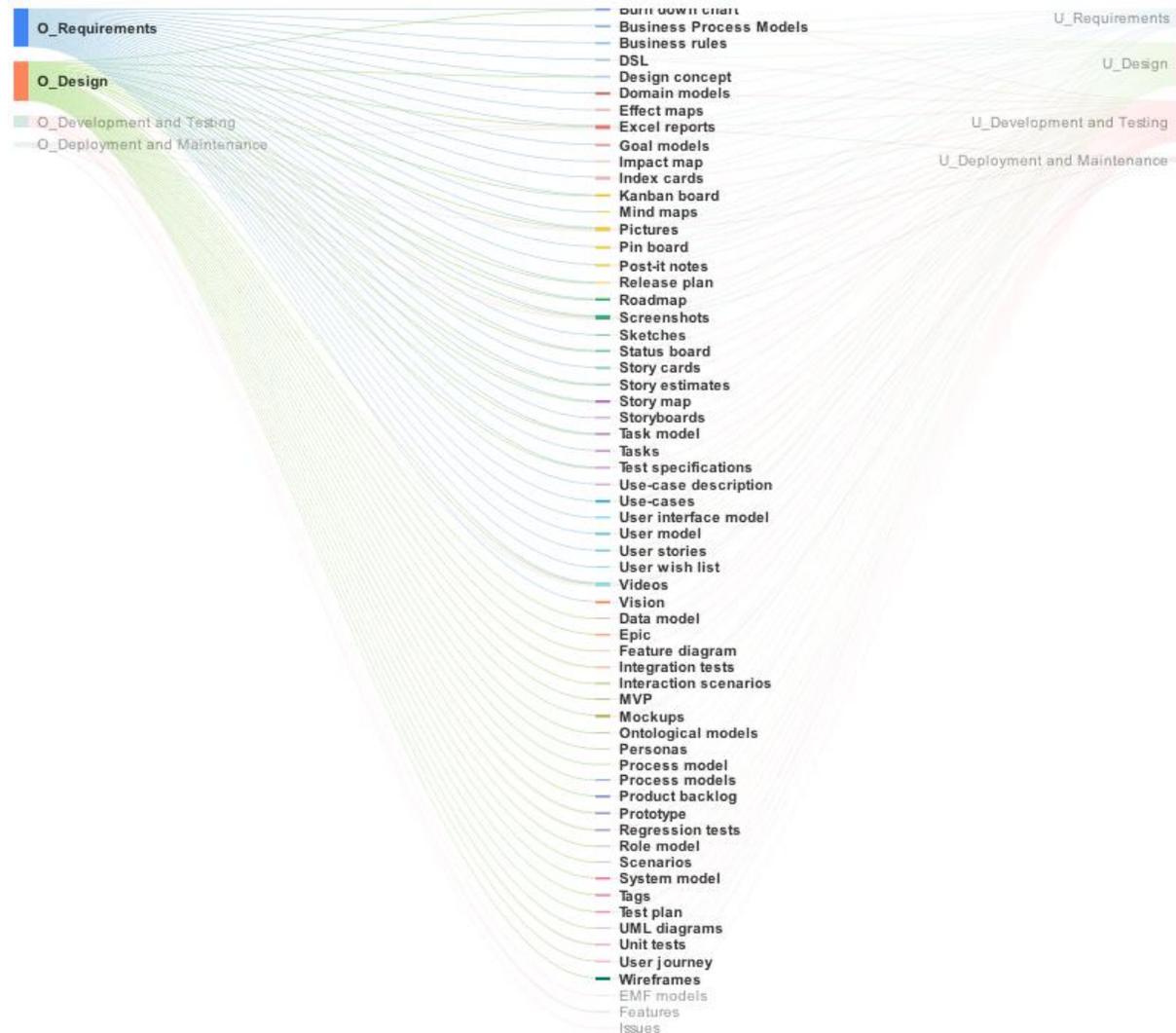


RQ2 – Observations and Findings

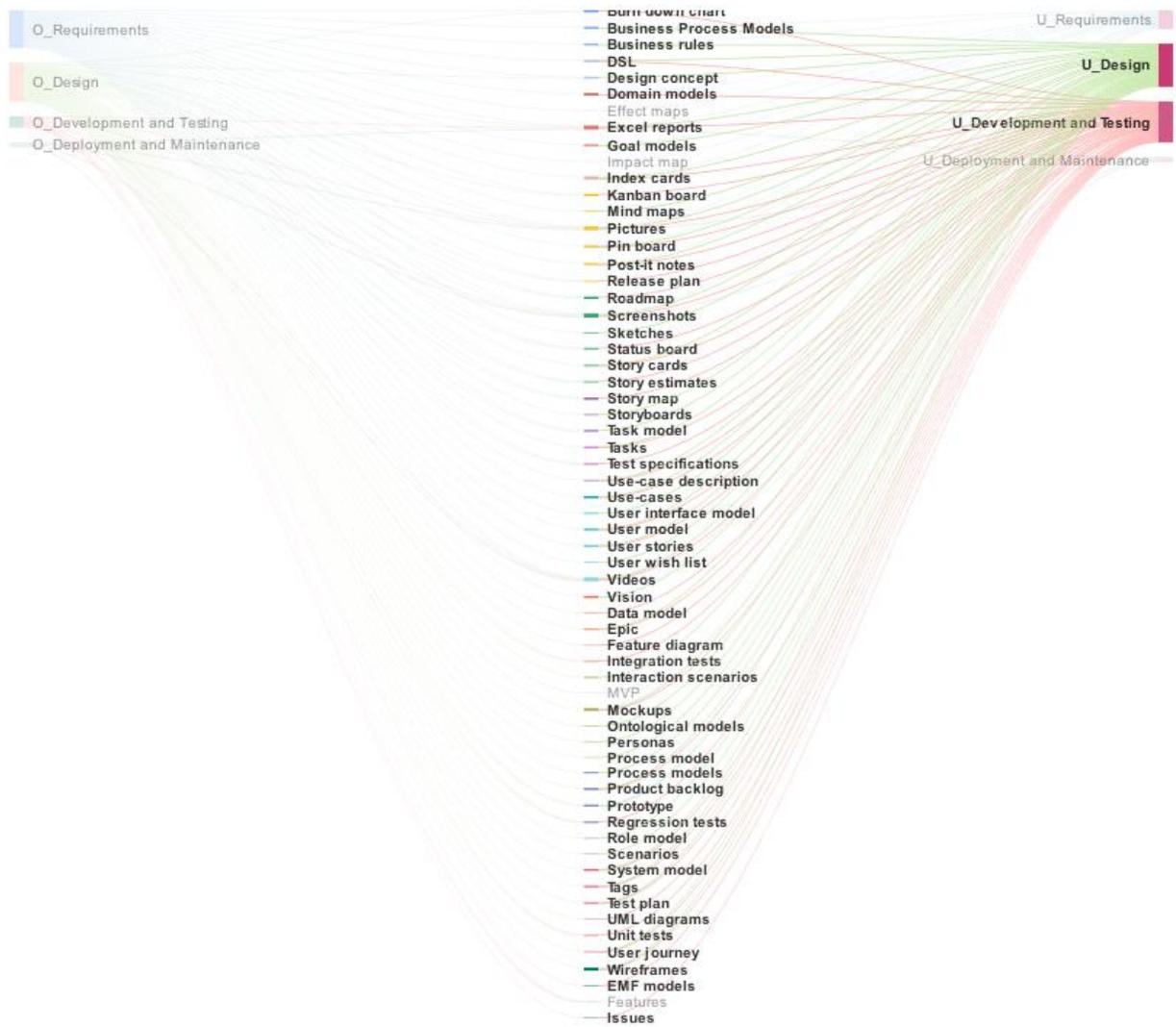
Finding 2: If artifacts are meant to be used by developers and designers, then they should be clear for these groups.



RQ2 - Observations and Findings

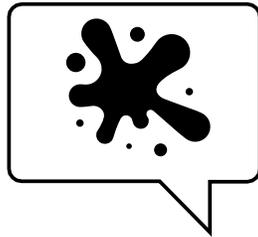


RQ2 - Observations and Findings



RQ2 – Observations and Findings

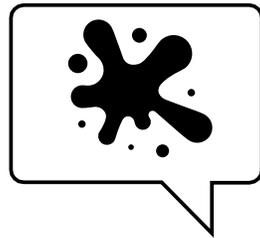
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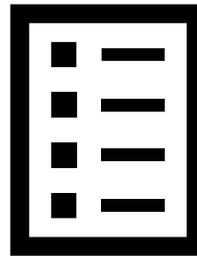
Vague and unstructured requirements are problematic for developers

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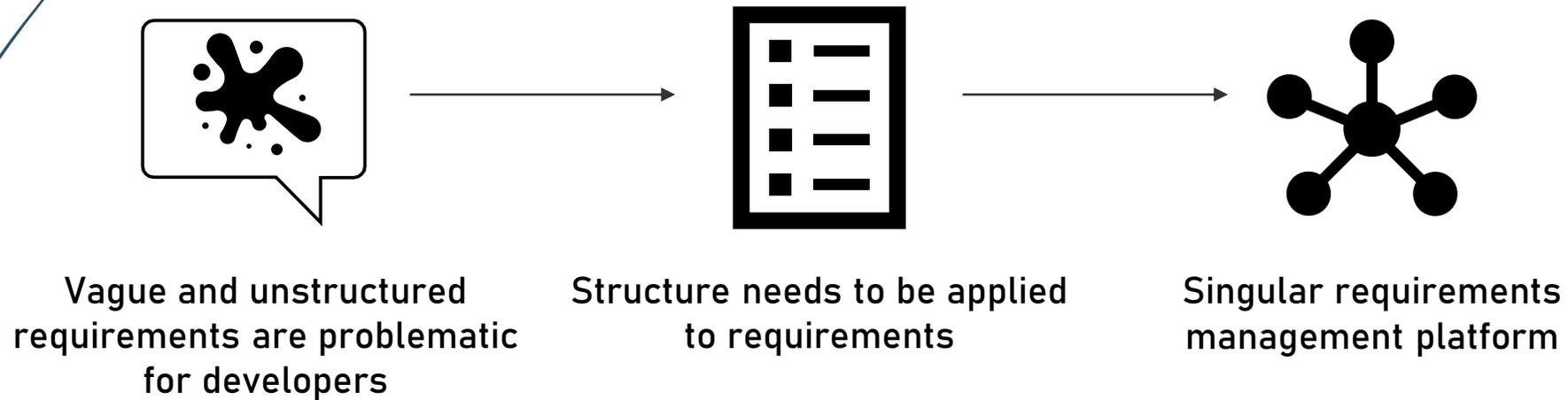
Vague and unstructured requirements are problematic for developers



Structure needs to be applied to requirements

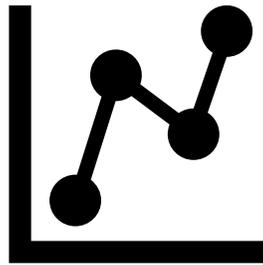
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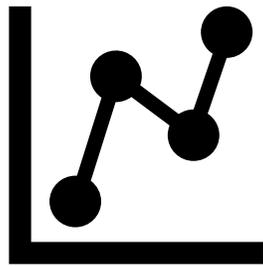
Finding 3: Reflecting requirements changes across artifacts can be challenging.



Requirements are subject to
change

RQ2 - Observations and Findings

Finding 3: Reflecting requirements changes across artifacts can be challenging.



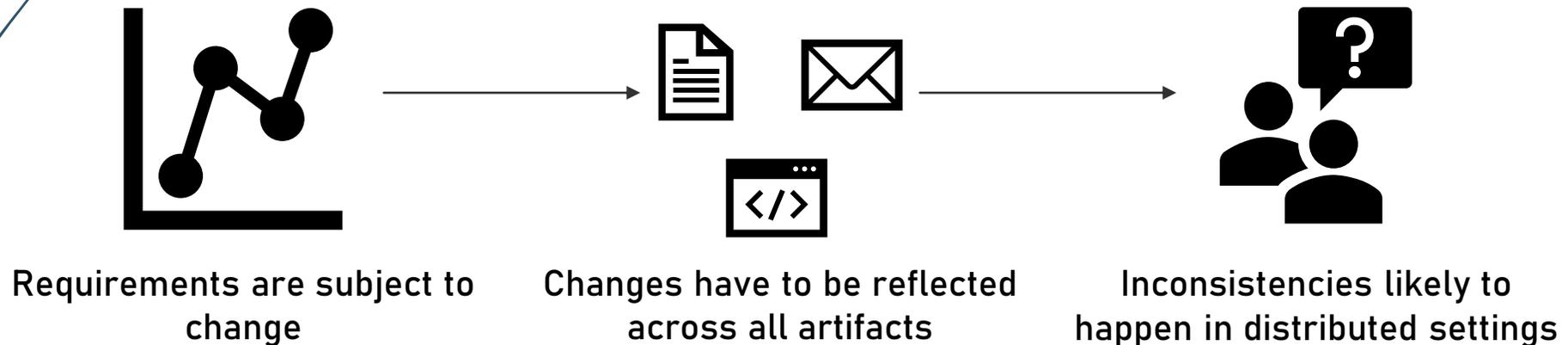
Requirements are subject to change



Changes have to be reflected across all artifacts

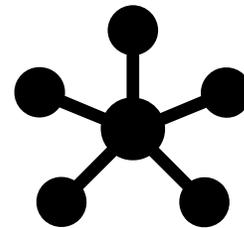
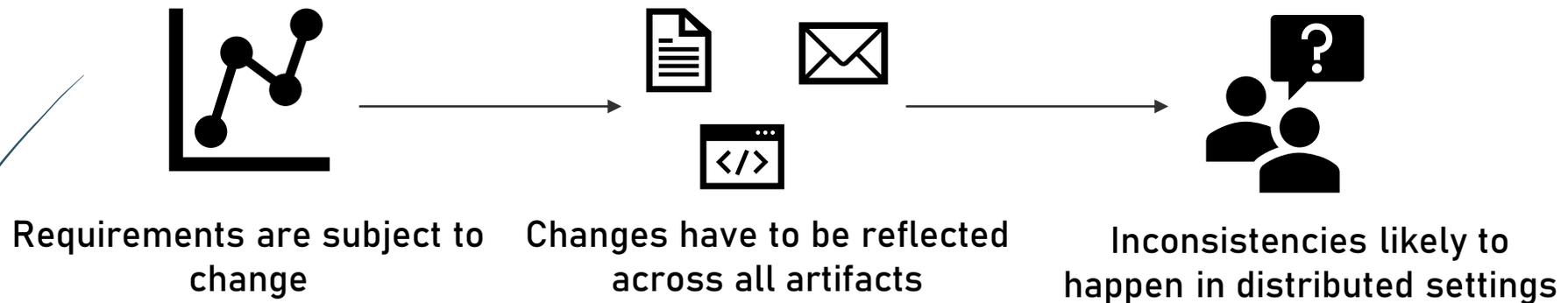
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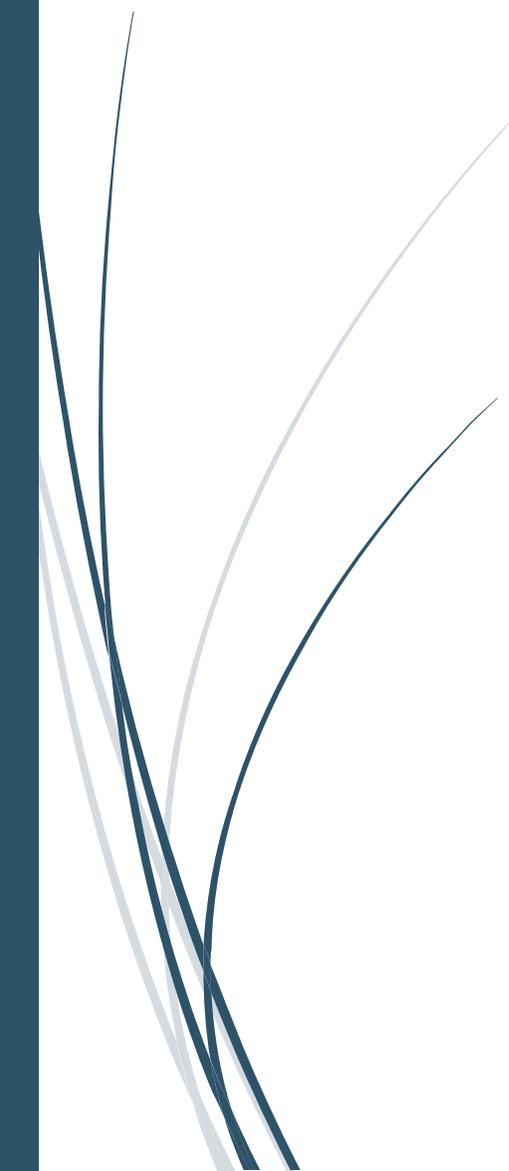
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Singular requirements management platform



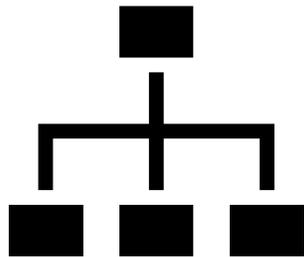
RQ2 – Observations and Findings



Finding 4: Artifacts have relations and dependencies; gaining an overview of the structure is important for understanding the complete requirements picture.

RQ2 – Observations and Findings

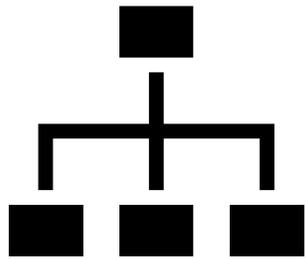
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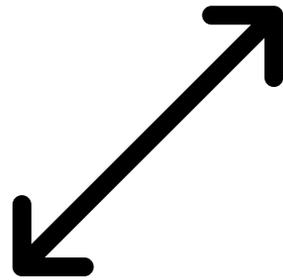
Artifacts often exist in hierarchies

RQ2 - Observations and Findings

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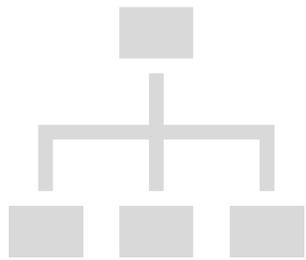
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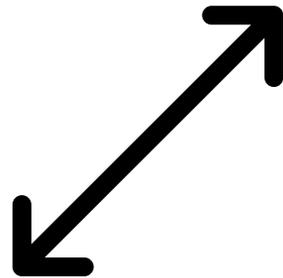
Linking of artifacts is cumbersome; lack of clear guidelines

RQ2 - Observations and Findings

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Artifacts often exist in hierarchies

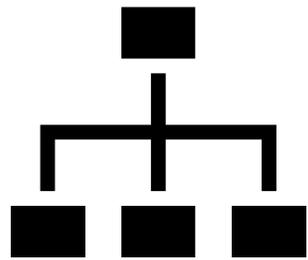


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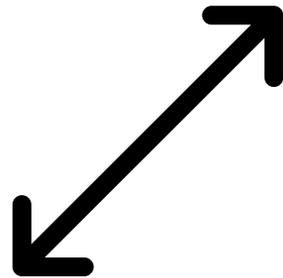
50% of the artifacts can help create others
(e.g. Epics to use cases)

RQ2 - Observations and Findings

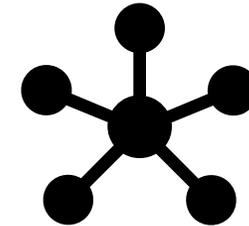
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Artifacts often exist in hierarchies



Linking of artifacts is cumbersome; lack of clear guidelines



Clear linking functions are needed



Research Questions



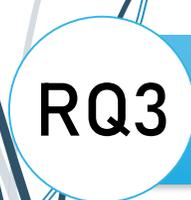
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RQ2

What are the main characteristics of these artifacts?

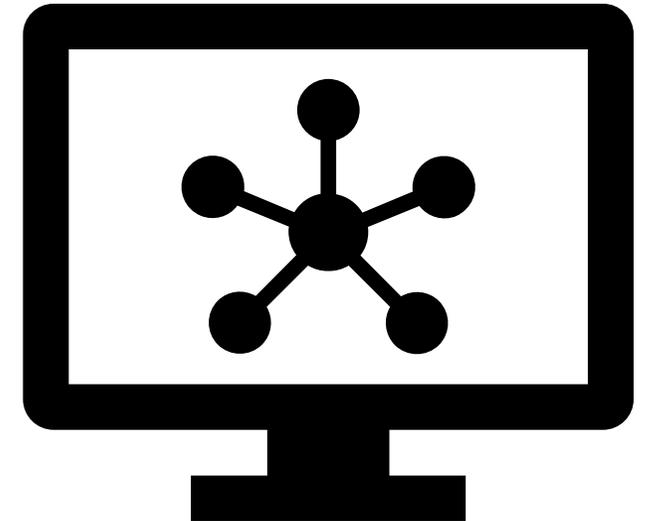


RQ3

What advantages do we gain if we specify and manage artifacts within a single platform?

Centralized Requirements Management

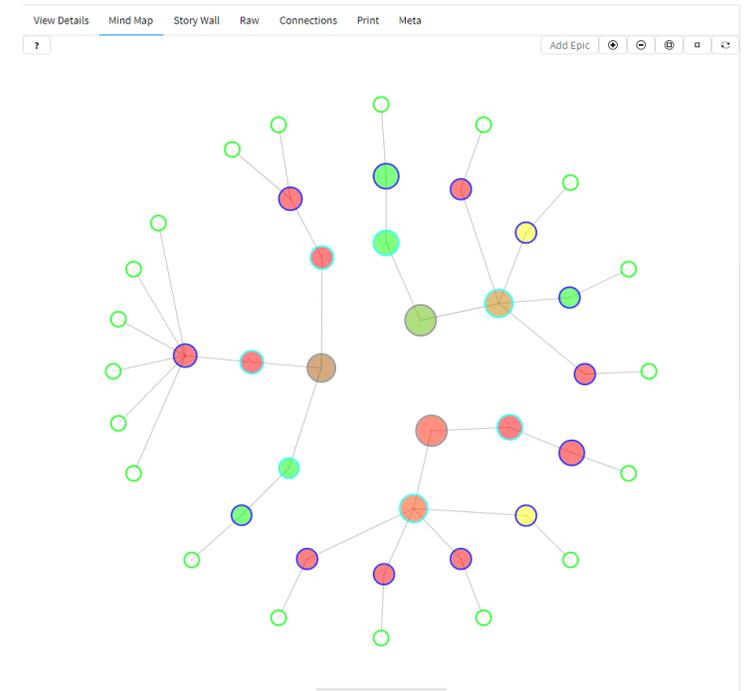
- Integrate project artifacts into a single platform (IDE)
- Model a selection of artifacts
- Workflows:
 - Creation, updating, removing artifacts
 - Navigation
 - Visualization



Moldable Requirements Manager (MReM)

- Tool for modeling and managing requirements
 - Based on Pharo, GToolkit
- Visual overview of the artifact structure
- Custom views, workflows for artifacts
- Linking requirements and source code

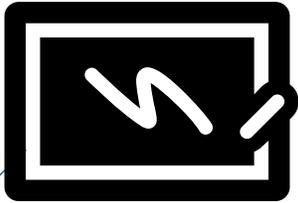
glamorous **toolkit**





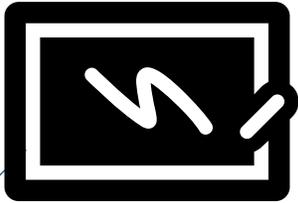
Live Demo

Future Work

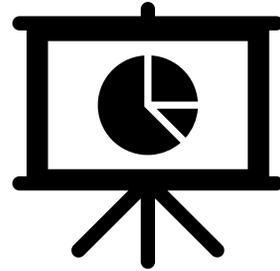


Modeling further
artifacts

Future Work

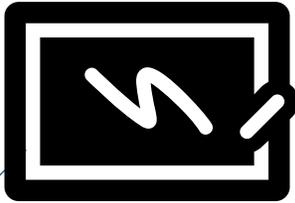


Modeling further
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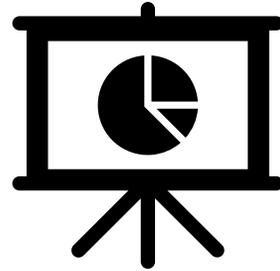


Different visualization
schemes

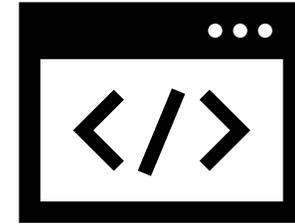
Future Work



Modeling further artifacts



Different visualization schemes



Support for data formats (e.g. ReqIF)



Questions?