Network Automation:
A world of misunderstandings ...
... and how you could avoid them

Henry Ölsner
Technical Consultant, NTT Germany AG & Co. KG
“There are only two hard things in Computer Science: cache invalidation and naming things.”

- Phil Karlton
Why are we here?

• What challenges are we facing when developing Network Automation Solutions?

• Use User-Story-Mapping (USM) to capture the end-user’s perspective

• Integrate Domain-Driven-Design (DDD) to establishes a common language inside and outside of your team

• How you can apply these principles
Who am I?

Henry Ölsner

- Guide our clients along their network automation journey
- Ideate, prototype and implement solutions for (network) automation

Technical Consultant @ NTT

16+ years in the network infrastructure industry

7+ years in network automation/software development
Challenges that we face when developing Network Automation Solutions
Challenges that we face when developing Network Automation Solutions

- Scalability
- Cross-functional teams
- „Break the silos“
- Expectations of end-users
Challenges that we face when developing Network Automation Solutions

- **Scalability**
- **Cross-functional teams**
- **“Break the silos“**
- **Expectations of end-users**

Delayed projects and insufficient results due to misunderstandings while using the solution!
Classic approach to avoid misunderstandings...

Requirements

Documentation
Classic approach to avoid misunderstandings...

Image source: [USM]
Chris and Marc‘s Automated EoL Reporting Solution
Who are Marc and Chris?

Marc

• Technical Manager for a Network Infrastructure Team
• Goals
  – Improve the productivity of his team
  – Improve the quality of the results

Chris

• Network Engineer
• Citizen Developer

Request from the procurement department to create an End-of-Life Dashboard for the entire network infrastructure
Marc’s challenges

• How should the solution look like?
• How to establish a common understanding with the end-users to create a tailored solution?
Marc’s challenges

- How should the solution look like?
- How to establish a common understanding with the end-users to create a tailored solution?

Apply User-Story-Mapping (USM)!
Why User-Story-Mapping?
Why User-Story-Mapping?

I'm glad we all agree.
Why User-Story-Mapping?
Why User-Story-Mapping?

I'm glad we all agree.

oh...

ah ha!
Why User-Story-Mapping?
How to create a first User-Story-Map?
How to create a first User-Story-Map?

Collect tasks/stories
How to create a first User-Story-Map?

Collect tasks/stories

Define activities
How to create a first User-Story-Map?

1. Collect tasks/stories
2. Define activities
3. Sort by time
How to create a first User-Story-Map?

1. Collect tasks/stories
2. Define activities
3. Sort by time
4. Prioritize
User-Story-Map for the Automated EoL Reporting Solution

Activities

- Onboarding
- Data Gathering
- External Integrations
- EoL Reporting
User-Story-Map for the Automated EoL Reporting Solution

Onboarding

Any User within the Corporate AD is authorized to log in

Data Gathering

When a user logs in, permissions are associated by the role
A NE can add, edit and delete a new device to the database
A NE can restart the data gathering for all devices
The System periodically rescans the inventory of the devices

External Integrations

All devices in Netbox should be automatically added to the local database

EoL Reporting

EoL Data from new hardware parts should be collected
A RU can see all devices that are currently affected by an End of Life
A RU gets a suggestion on the replacement of EoL Devices
An Excel report is periodically created and sent to the Procurement Department
User-Story-Map for the Automated EoL Reporting Solution

Roles

Activities

Tasks/Stories
# User-Story-Map for the Automated EoL Reporting Solution

## Roles

- **Any User**
- **Network Engineer (NE)**
- **Netbox**
- **Cisco Support APIs**
- **Procurement Department / Reporting User (RU)**

## Activities

1. **Onboarding**
   - Any User within the Corporate AD is authorized to log in
   - LDAPs is required
   - OAuth 2.0 Integration

2. **Data Gathering**
   - When a user logs in, permissions are associated by the role
   - When a new device is created, the hardware inventory should be discovered automatically
   - The EoL data are automatically associated to the device
   - When a device is deleted, all data should be removed from the local database

3. **External Integrations**
   - A NE can add, edit and delete a new device to the database
   - A NE can restart the data gathering for all devices
   - The System periodically rescans the inventory of the devices
   - How often?
   - Cisco Support APIs

4. **Cisco EoL Policy**
   - Cisco EoL Policy
   - What if a replacement is not available?
   - sent via WebEx chat

5. **EoL Reporting**
   - All devices in Netbox should be automatically added to the local database
   - EoL Data from new hardware parts should be collected
   - A RU can see all devices that are currently affected by an End of Life
   - A RU get a suggestion on the replacement of a EoL Devices
   - An Excel report is periodically created and sent to the Procurement Department

## Details

- Network Engineer (NE)
- Cisco Support APIs
- Procurement Department / Reporting User (RU)
Resulting structure of the User-Story-Map

- Use of the system over time
- Backbone
- Roles
- Activities
- Tasks/Stories
- Details

DEVNET-2241 © 2024 NTT DATA, Inc. | NTT Ltd. and its affiliates are NTT DATA, Inc. companies.
Benefits of User-Story-Mapping

- Create a common perspective to avoid misunderstandings
- Capture the end-user’s expectation
- Identify problems and solution options
- Define a first version
- Collect additional topics for later releases
There’s always more to build than you have people, time or money for. Always.

- Jeff Patton
Chris perspective
Chris challenges

- Handle external data sources
- Ensure that the results are consistent
- Work with different technical/non-technical stakeholders and a growing team
Chris challenges

- Handle external data sources
- Ensure that the results are consistent
- Work with different technical/non-technical stakeholders and a growing team

Apply (parts of) **Domain-Driven-Design (DDD)**
What is Domain-Driven-Design?

Domain knowledge -> Discovery

Mental model -> Design

Solution model -> Implementation

Code

Focus to create a model of the problem where the solution should be used
What is Domain-Driven-Design?
Strategic Design – Core Concepts

Bounded Context

Context

Component

Component
Strategic Design – Core Concepts

Bounded Context

Ubiquitous Language

Context

Component

Component

Team
(Domain Experts, Developers …)
Strategic Design – Core Concepts

**Bounded Context**
- Context Component
- Context Component

**Ubiquitous Language**
- Team (Domain Experts, Developers …)

**Model & Context Mapping**
- Context
  - ACL
- Context
  - OHS

ACL – Anticorruption Layer Context Mapping Strategy
OHS – Open Host Service Context Mapping Strategy
I have already created a script
I have already created a script

This is the Core Domain
First Modeling Session

Network Engineering

Device

Asset

Equal concepts!

Network Device

Asset
Anything that has a hostname

Part of the Device that has a model and serial number

Network Engineering

Device

Asset

Network Device

What is a Device?
Ubiquitous Language of end-users

What is the language within Procurement?

Hardware Component

Device

Network Engineering

Procurement

Required for the solution

Hardware that is identified by a Product ID

Asset

Network Device

Hardware Component

© 2024 NTT DATA, Inc. | NTT Ltd. and its affiliates are NTT DATA, Inc. companies.
Ubiquitous Language of end-users

What is the language within Procurement?

Mapping required!
Ubiquitous Language of Operations

Network Engineering

- Device
- Hardware Component
- Procurement

Operations

- Configuration Item (CI)

ACL

Where to get all Devices from my Network?

Subset of CI's are Network Devices

Network Device Asset

Hardware Component

D U

DEVNET-2241 © 2024 NTT DATA, Inc. | NTT Ltd. and its affiliates are NTT DATA, Inc. companies.
Ubiquitous Language of Operations

Operations
- Configuration Item (CI)

Network Engineering
- Network Device
- Hardware Component
- ACL

Procurement
- Hardware Component

Asset
- Network Device

Any Network Infrastructure Device that has a hostname

Rethink the Device and Hardware Component
Ubiquitous Language of the Cisco EoX API

Let's look at the Cisco EoX API 😊
Ubiquitous Language of the Cisco EoX API

Let's look at the Cisco EoX API 😊

An Open API and same components

Hardware that is identified by a Product ID

Operation
- Configuration Item (CI)

Network Engineering
- Network Device
- Hardware Component
- Product ID

Procurement
- Hardware Component
- Asset
- Network Device

Cisco EoX API
- EoX Policy
- Product ID

ACL
- D
- U
- SHO
CI maps to a Network Device

CI maps to a Network Device

Also identified by a Product ID

Product ID is identical

We can map the Asset to the Product ID somehow…
Benefits of Domain-Driven-Design

- Create a level playing field for Developers and Domain Experts
- Prevents unnecessary abstractions during the implementation
- Better UI/UX of the solution
- Solid model give Developers a foundation on what to work on while the team grows

...
“All models are wrong, some are useful.

- George Box
After the common understanding is established...

...define an appropriate solution
A world of misunderstandings ...
A world of misunderstandings ...
A world of misunderstandings ... and how you could avoid them!

Maintain a common perspective on what to achieve and how to use it

Iterate and refine...
How to apply this in your projects?
How to apply this in your projects?
How to apply this in your projects?
How to apply this in your projects?

- Short iterations that focus on specific problems
- Early feedback – frequent review cycles
- Knowledge acquisition is key
- Welcome changes during the project
Key Takeaways

Problem Domain

**What DDD and USM helps you to define**

Solution Space

**What Cisco DevNet can provide to you**
There are only two hard things in Computer Science: cache invalidation and naming things.

- Phil Karlton
Continue your education
Cisco Webex App

Questions?
Use Cisco Webex App to chat with the speaker after the session

How
1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install the Webex App or go directly to the Webex space
4. Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until February 23, 2024.

https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-2241
Fill out your session surveys!

Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live-branded t-shirt (while supplies last)!

All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at https://www.ciscolive.com/emea/learn/sessions/session-catalog.html
Thank you!

Join us for a coffee at the NTT DATA Coffee Lounge in the World of Solutions!

Together, we do it right.
## References & further reading

<table>
<thead>
<tr>
<th>Reference</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>[USM]</td>
<td>Patton, Jeff. User story mapping: discover the whole story, build the right product. First edition, O'Reilly, 2014</td>
</tr>
</tbody>
</table>