The first miles towards software-fueled cars

April 18, 2018

Johannes Nicolai
Enterprise Solutions Engineering, GitHub

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The First Miles Toward Software-Fueled Cars

Driving lessons from OEMs, tiers and large IT companies

Johannes Nicolai
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German GitHub Giants (GGG)
Agenda

- **Introduction to GitHub and why we joined GENIVI**
- Driving lessons learned from GitHub largest customers in Germany
  - How to achieve management buy in for large transformations
  - The biggest misperception of inner sourcing
  - The cabin in the woods
  - Don’t treat your new platform like your old VCS
    - Helicopter vs cargo ship
- Why the journey is worth it
I have a confession to make …
How people build software

I drive a Prius…
How much does it cost to update maps of an IVI...
JUST USE YOUR CELL PHONE FOR NAVIGATION, IT’S CHEAPER AND MORE CONVENIENT
How people build software
Ohne Partner wird es schwierig

Eines ist in Zeiten des alles durchdringenden digitalen Wandels deutlich: Neue Geschäftsmodelle oder Produkte lassen sich nicht mehr im Alleingang entwickeln oder betreiben. Das wird auch langsam der Automobilindustrie klar. Sie hat lange versucht, sich gegen die neuen Player zu wehren, ist aber zu der Erkenntnis gelangt, dass man aus Feinden besser „Frenemies“ macht – also sie akzeptiert und mit ihnen am besten kooperiert, um neue Technologien voranzutreiben. Die Hersteller rund um den Globus müssen vor allem im Bereich neuer Mobilitätsdienstleistungen und -services verstärkt auf das Know-how aus der digitalen Welt bauen, um mit der rasanten Entwicklung überhaupt Schritt halten zu können. Ebenso können die jungen Big-Data-Player...
Form partnerships across and beyond the industry

Increasing complexity of the competitive landscape for individual mobility will force OEMs to compete on multiple fronts

Past: OEMs compete with one another

2030: OEMs compete in a complex market landscape

- Established suppliers
- Tier 1
- Tier 0.5
- Tier 1
- OEM
- Consumer electronics (Apple)
- Software (Google)
- e-hailing (Didi Kuaidi)
- Car sharing (Zipcar)
- Mobility providers
- Chinese OEM (BYD)
- Speciality OEM (Tesla)
- Emerging OEMs
- Tech giants

SOURCE: McKinsey
How people build software

Form partnerships across and beyond the industry

Exhibit 7

Increasing complexity of the competitive landscape for individual mobility will force OEMs to compete on multiple fronts

Past: OEMs compete with one another

2030: OEMs compete in a complex market landscape

SOURCE: McKinsey
https://github.com/apple
https://github.com/google

How people build software
How people build software

https://github.com/teslamotors
https://github.com/zipcar
How people build software

https://github.com/uber

- Uber
  - Open Source Software at Uber
    - http://www.uber.com

Repositories

- hyperbahn
  - JavaScript
  - ★ 258
  - 👍 27
  - Service discovery and routing for large scale microservice operations
  - Updated 20 seconds ago

- airlock
  - JavaScript
  - ★ 19
  - 👍 2
  - A prober to probe HTTP based backends for health
  - Updated 2 minutes ago
https://github.com/lyft

How people build software
https://github.com/car2go

Repository: openAPI

Documentation on the openAPI of the car2go system

Updated on Nov 18, 2015

This organization has no public members. You must be a member to see who’s a part of this organization.
https://github.com/bmwcarit
https://github.com/bsinno
How people build software

https://github.com/GENIVI
Why GitHub joined the GENIVI alliance
GitHub Special License Offer

- **Offer for GENIVI Members**
  - 10 free users of GitHub Enterprise (on-premise) or GitHub Business Hosted
  - 10% discount on additional users (11+)
  - New GitHub Enterprise/Business Hosted customers only
  - Offer expires October 15, 2018 (6 months)

For additional information, please contact:
Steve Crumb (GENIVI)
scrumb@inventures.com
or
Kim Sekulich (GitHub)
ksekulio@github.com
## GitHub Facts

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Founded</td>
<td>2008</td>
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<tr>
<td>Users</td>
<td>26M+</td>
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<tr>
<td>Universities</td>
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How software is built
Run GitHub on your own servers

<table>
<thead>
<tr>
<th>OPEN SOURCE</th>
<th>TECHNOLOGY</th>
<th>FORWARD THINKING ENTERPRISES</th>
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<tbody>
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• **Driving lessons learned from GitHub largest customers in Germany**
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  • The cabin in the woods
  • Don’t treat your new platform like your old VCS
    • Helicopter vs cargo ship

• Why the journey is worth it
How people build so
ft

Inner Source / Social Coding

Getting Started with InnerSource

Keys to collaboration and productivity inside your company

Andy Oram
What is Inner Source?

Applying the Philosophies and Practices of Open Source Development to the Enterprise
Why the journey is worth it

Benefits of Inner Sourcing …

Cross-team collaboration
Improved code quality
Developer happiness

Increased shipping velocity
Worldwide scalability
Transparency
Legacy tools vs modern tools used in Open Source
How does Inner Source work?

**Visibility**: all internal software projects are by default visible to all employees

**Fork/Branch**: anyone can create a copy of a project to make changes freely

**Pull Requests**: people outside a project team can suggest changes and contribute to the project

**Testing/CI**: every proposed change is automatically tested and the result is shown in the pull request

**Issues**: there is a public issue tracker in which everyone can submit a bug or ask a question

**Documentation**: all software projects include a Readme that describes what the software does, how to run it and how to contribute to it.
Companies doing Inner Source

- Samsung
- Netflix
- PayPal
- Walmart Labs
- Hewlett Packard Enterprise
- Zalando
- Accenture
- IBM
- Continental
- Black Duck
- Qualcomm
- Thomson Reuters
- SAP
- Deutsche Börse Group

how people build software

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Scientific Validation

Common pitfalls and challenges for Inner Source

• Culture change- It won't happen overnight and needs buy in on all levels

• Manager Fears
  • Fear of losing control (best developers contribute to other projects)
  • Fear of missing performance goals because of locally optimized metrics

• Developer Fears
  • Fear of doing development with the entire company watching
  • Fear of follow up / maintenance work / reviewing all day

• Legal - Sharing information and contributing to other projects has to be ok

• Architecture - The more modular, less coupled the software, the better
• Test automation - Investments into fully automating have to be made - agile practices help
Inner source is NOT about contributing to all kind of internal projects just because you can do so, but because your team is working on cross-functional features that need to change components out of your core team’s responsibility.

In a world before Inner source, you would have to wait for many product owners of other components to prioritise your request which may take forever or might never happen. Now, our teams can propose the needed changes themselves and most likely get them merged if they follow the contribution guidelines which are a mandatory part of every inner source project.

The best argument for Inner source is that other teams are motivated to make your own software better and less work stays on your plate.

Inner Source Evangelists at Zalando
Achieve top level management buy in
Achieve top level management buy in
GitHub is at the center of our DevOps toolchain and a critical technology in our movement to cloud computing.

– Andreas Preuss
How people build software

Achieve top level management buy in

**Timeline**

- **June**: Start of migration
- **July 11th**: PTI Conference Frankfurt
- **End August**: Planned finish date for majority of apps
- **November**: Open GitHub also for access from Internet
- **Mid June**: AWS Summit Frankfurt
- **Mid August**: Visits @ AWS Seattle and GitHub SF
- **September**: Supervisory Board meeting + demo
- **December**: Final conclusion of migration

SOURCE: HTTPS://JFCURRAN.GITHUB.IO/GITHUB-CONSTELLATION-MUNICH/INDEX.HTML
Agenda

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  • Don’t treat your new platform like your old VCS
    • Helicopter vs cargo ship

• Why the journey is worth it
Legacy VCS - Cargo Ship

SOURCE: HTTP://WWW.CORE77.COM/POSTS/45749/WHEN-CARGO-SHIPS-FAIL
Why are large binary files a problem in Git?

= 100 MB pre-compiled library

Source: https://speakerdeck.com/larsxschneider/git-lfs-how-to-handle-large-git-repos
Why are large binary files a problem in Git?

Clone: 301MB

Source: https://speakerdeck.com/larsxschneider/git-lfs-how-to-handle-large-git-repos
Why are large binary files a problem in Git?

**Clone:** 301 MB

* x

**Number of Engineers**

Source: https://speakerdeck.com/larsxschneider/git-lfs-how-to-handle-large-git-repos
How software is built

• https://conan.io
• Open Source (MIT)
• Python based
• Cross platform
  • Windows
  • Linux
  • Mac OS
  • Solaris
  • Free BSD
• cross compilation support (e.g. Raspberry PI / ARM)
Conan Package Manager Core Functionality

- retrieve all packages and their dependencies specified in a dependency file
  
  [requires]
  
  ZenGitHub/[^>0.9]@jonico/stable
  libgit2/[^>0.24.2]@paulobrizolara/stable
  bzip2/[^=1.0]@lasote/stable

- avoid long compile times

- avoid bloated Git repositories

- provide semantic versioning
Cargo Ship vs Helicopter

- Rare Release Events: Waterfall Methodology
  - Effort Peaks
  - High Risk

- Frequent Release Events: Agile Methodology
  - Smoother Effort
  - Less Risk

**VS**

Keep Everything in Version Control
Done Means Released
Don’t Check In on a Broken Build
Never Go Home on a Broken Build
Fail the Build for Slow Tests

**Only Build Your Binaries Once**

Deploy the Same Way to Every Environment
How software is built

**Embedded C/C++ CD-Pipeline**

- **GitHub**
  - $ git push
  - Git Repository with Conan Package Recipes + Jenkins / Appveyor / Travis Conan Build DSLs

- **Triggers**

- **Upload built packages**
  - JFrog Artifactory

- **Retrieve Conan deps**
  - JFrog Bintray

- **Publish**
  - Distribute globally

**DevOps**

- **Ops**
• Recap from last year’s Euroforum talk “Software is the new fuel”
  • Why GitHub joined the GENIVI alliance

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  • Achieve top management buy in for large transformations
  • Fighting the biggest misconception of inner source
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• Why the journey is worth it
What do those people have in common?

- basejumpa
- besessener
- RandomByte
- marti4ka
- drivingThrillhouse
- SWCraftsMan
- moltob
- zemunk
- matz3
- sengaya
- dannola
- tacurran
1. They all work for the German GitHub Giants
2. They work on complex problems

How people build software

--- Workflow and Tools ---

SW-Developers

Automotive Software Factory

Buildsystem

Caché+

Release Report

Generation

Release Tracking

Release Reporting

Network

Drive

Release Filing

[Project-]
documentation filing

Issue-Tracking

TASKS

Courage

How we work
with source code

Release Filing

github.conti.de

--- Standards ---

ISO26262 part 6
Functional Safety
Road Vehicles/
Software Engineering

IEEE-29119
Software and
Systems Engineering - Software Testing

Automotive
GitHubFlow

1.0.0

WORKING INSTRUMENTED AUTOMOTIVE DEVELOPMENT

--- LEGEND ---

: not affected by

: affected by replaced or adapted

--- Mainlines ---

How people build software

github.conti.de

organ: http://github.conti.de
3. They are passionate to teach their passion
How people build software

How you achieve top level management buy in
... tailored to their specific industry
... doing better workshops than any consultant
How people build software

Why the journey is worth it
4. They ignite other departments with their passion.
... and agile methodologies
Spreading the word internally ...
... and externally
Why the journey is worth it

Benefits of Inner Sourcing …

- Cross-team collaboration
- Improved code quality
- Developer happiness
- Increased shipping velocity
- Worldwide scalability
- Transparency
QUESTIONS?
Thank you!

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Contact us: help@genivi.org

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