Continuous Intelligence

Velocity Culture: “If you think your users are idiots, only idiots will use it”, Linus Torvalds 2005

Jan Vlietland (standing on the shoulders of giants)

Proceedings in Continuous Intelligence research

2018 version for Refsq
Key needs of the Software Industry

• The software market is evolving rapidly
• Requiring a continuous development of software professionals
• During BSc/MSc in Computer Science/Software Engineering: just 1 or 2 courses about Software Architecture, Requirements Engineering, Software Delivery, Software Development
• A need for additional continuous Post-Academic education and post-academic certification for software professionals
NISI mission

• Advancing the Dutch software industry by offering ways to continuously develop software professionals and migrating traditional workforce toward the software industry

• Actively stimulate social networking in the software industry and peer2peer knowledge sharing by face2face gathering

• Striving for a Dutch Software Industry that is among the best in the world

• Joint research programmes and post-graduate certification curricula
NISI agenda

- Cybersecurity & Continuous Intelligence
- Continuous Delivery 3.0
- Artificial Intelligence
- Software Product Management
- Software Business Development
- Blockchain Databases
- DevOps & Agile Scaling
- Agile Software Architectures & Eco-systems
Dr. Jan Vlietland, always passionate about software. Jan holds a PhD in Agile ecosystems, is business head of NISI and is working in the software industry for over 20 years.

Prof. Sjaak Brinkkemper is head of the faculty of Information and Computer Science and professor at Utrecht University, and NISI initiator.

Dr. Slinger Jansen is assistant professor at the faculty of Information and Computer Science of Utrecht University, and heads research at large software companies.
Agenda

1. Introduction
2. Continuous Intelligence concept
3. Demonstration
4. Continuous Intelligence process
5. Continuous Intelligence tooling
6. Closure
Continuous Intelligence defined

**Continuous Intelligence** is the automation of the software user tracking process, to enable software companies in developing software features that add the most value.

Example access [www.nisi.nl](http://www.nisi.nl) for a little experiment

Interesting read: [http://www.kde.cs.uni-kassel.de/hotho/pub/AWIC.pdf](http://www.kde.cs.uni-kassel.de/hotho/pub/AWIC.pdf)
Main Research Question

Premise: “Companies want to deliver the most needed software for the lowest possible price. For that it needs to know what is most needed.”

Main research question: “how to collect, analyze and present online information, to automatically identify the most needed software and prioritize software development activities”

Interesting read: http://www.kde.cs.uni-kassel.de/hotho/pub/AWIC.pdf
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Fast discover by experimenting
Objective Continuous Intelligence

Source: Rowley (2007), The wisdom hierarchy - representations of the DIKW hierarchy
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Continuous Intelligence Demo 1

www.hotjar.com
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The Software Development Process...

Requirements Engineering

Users → Backlog → Product Owner → Product → DevOps team

Scrum Master
...supported with Continuous Delivery Platform
...expanding to...

Automating the **Requirements Engineering** process

- Users
- Backlog
- Product Owner
- DevOps team
- Product
- Scrum Master
... Continuous Delivery 3.0
Continuous Intelligence topics

Data Collecting → Data Analyzing → Result Reporting → Continuous Planning

Data → Information → Knowledge → Wisdom
Typical Browser & App tracking

• URL extensions (e.g. Urchin Tracking Module)
• Mouse pointer or -touch data
• History records (e.g. Cookies, Flash cookies)
• Fingerprinting (IP address, Browser version, hardware info)
• Logging

Basic Browser information

- Cache-Control: max-age=0
- Connection: keep-alive
- Content-Length: 32
- Content-Type: application/x-www-form-urlencoded
- Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,/*;q=0.8
- Accept-Language: en-US,en;q=0.8
- Cookie: tico=vw4rz1ru0yryu; pico=vw4rz1ru0yryu; tpag=puqnhaw31qrpr; ppag=puqnhaw31qrpr; tcss=3gv2mpiuakctq; pcss=3gv2mpiuakctq
- Host: www.grc.com Referer: https://www.grc.com/x/ne.dll?rh1dkyd2 User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/45.0.2454.99 Safari/537.36
- Origin: https://www.grc.com
- Upgrade-Insecure-Requests: 1
- FirstParty: https://www.grc.com
- ThirdParty: https://www.grctech.com
- Secure: https://www.grc.com
- Nonsecure: http://www.grc.com
- Session: i0yalbs05l4ld

Source: https://www.grc.com/x/ne.dll?rh1dkyd2
Basic App tracking

• Nearly endless possibilities, as the App is installed on the device potentially accessing many sources, such as:
  – Address Book, Calendar, Call history, Geographical location, Moving sensors, Clipboard, SMS records, Email, Microphone, Camera, File system, Bluetooth

• Availability of data depends on Device security settings, usually allow all by default


Source: [http://www.appanalysis.org/](http://www.appanalysis.org/)
1. User enters Full Name and Email address
2. Newsletter is sent to users
3. User clicks the email
4. Web server records the Tracking code, IP address (and all other browser data that is sent)
Pong neural network: https://youtu.be/bPkWMICq2tc
Artificial Mario player: https://www.youtube.com/watch?v=qv6UVOQ0F44
Theory: https://en.wikipedia.org/wiki/Bayesian_network#Inference_and_learning
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Excel
Note: Cloud Analytics Services collect data at their premise, not yours!
Hotjar Tracking snippet

Source: http://developer.piwik.org/guides/tracking-javascript-guide
Google Cloud Products

- Adwords
- Analytics (basic visualization)
- Machine Learning (advanced analytics)
- Datastudio (visualization)
- Cloud Datalab (analytics)
- Big Query (collection)
Continuous Intelligence Tooling (and more)

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Research Avenues

**Avenue 1:** “Use Machine Learning to improve the Continuous Intelligence process and Requirements Engineering Process”

**Avenue 2:** “Use Machine Learning to improve the Continuous Planning process by automatically prioritizing Software Development Activities”

Interesting read: [http://www.kde.cs.uni-kassel.de/hotho/pub/AWIC.pdf](http://www.kde.cs.uni-kassel.de/hotho/pub/AWIC.pdf)
Information

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