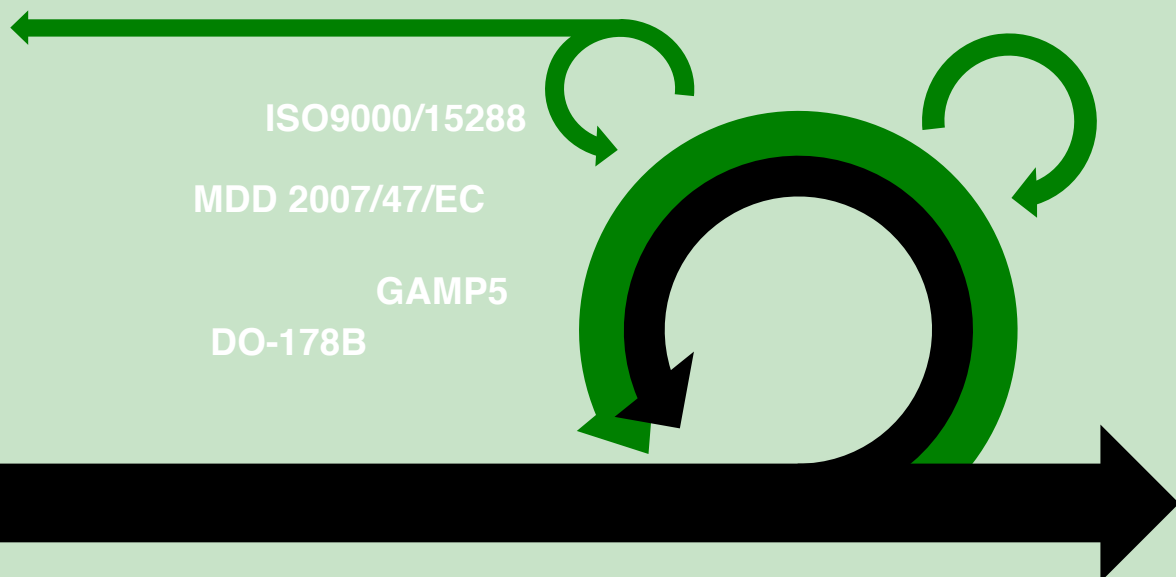


Scaling Software

ITEA2 — SCALARE Project Newsletter No. 1 — September 2014

FEATURE ARTICLE

How to tailor the agile Scrum framework to a regulated software development domain? // Page 8



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Inaugural Issue

SCALARE News & Events



SCALARE Kick-Off Meeting

The SCALARE project has officially started on December 3, 2013, during its kick-off meeting that took place in Galway, Ireland. The kick-off meeting was co-located with the 4th International Conference on Lean Enterprise Software and Systems (LESS). The meeting was attended by ten participants, with representatives from Softhouse, University of Lund, University of Limerick, Sony Mobile, Sigrun, QUMAS, Vitalograph, and Tieto.

New PhD Student joins SCALARE

In April 2014, Ms. Mehvish Rashid has joined Lero at the University of Limerick as a PhD student to work on the SCALARE project. Previously, Mehvish worked with IBM in Pakistan, and she received a MSc from Chalmers University. Elsewhere in this issue you can read Mehvish's introduction. We welcome Mehvish to the project!

Participants of the SCALARE Kick-Off Meeting. From left to right: Anders Sixtensson, Brian Fitzgerald, Martin Höst, Carl-Eric Mols, Klaas-Jan Stol, Sten Minör, Ryan O'Sullivan, John Burton, Ulrika Bergman, Anders Gustavsson.

FROM THE EDITOR

Welcome to the first issue of the Scaling Software Newsletter! Scaling Software, or SCALARE for short, is a project under the ITEA2 programme, and aims to support the European industry in managing its software scalability, not only in products but also processes and the software development organization. The project officially kicked off in December 2013, and will run a total of three years, until December 2016. In this issue, the SCALARE consortium is introduced, and the latest activities of the project partners are reported. This issue also features an in-depth case study from one of the partners, QUMAS, about the scaling of agile methods to regulated domains. I hope you enjoy this issue!

Klaas-Jan Stol
Editor-in-Chief
Scaling Software Newsletter

About ITEA

ITEA is the EUREKA Cluster programme supporting innovative, industry-driven, pre-competitive R&D projects in the area of Software-intensive Systems & Services (SiSS). SiSS are a key driver of innovation in Europe's most competitive industries, such as automotive, communications, healthcare, aerospace and consumer electronics. ITEA stimulates the creation of an open community of R&D actors, companies, research institutes and countries active in Software-intensive Systems & Services. As ITEA is a EUREKA Cluster, the community is founded in Europe based on the EUREKA principles and is open to participants worldwide. ITEA's mission is to be the recognised partner for European industry, optimising support for companies and R&D actors active in ITEA projects, thus making best use of funding made available by the ITEA supporting countries.

SCALARE Project Meetings

On 14th-15th May 2014, the SCALARE consortium held a project meeting to discuss progress of the project. This was the first project meeting since the kick-off meeting in December 2013. Some of the key achievements were version 0.1 of the Scaling Management Framework (SMF), which is currently actively being developed by partners in both Sweden and Ireland.

On 16th-17th September 2014, the SCALARE consortium will hold another project meeting to discuss progress of the project. Specifically, the activities over the last 9 months will be discussed and reviewed internally, and future activities for the next few months will be planned.

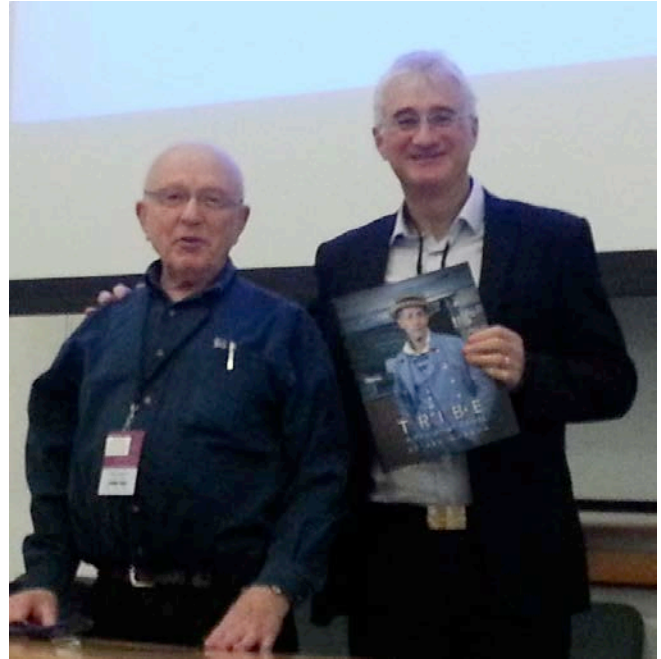
4th LESS Conference

The 4th International Conference on Lean Enterprise Software and Systems (LESS) was held from December 1-4 in Galway. The conference was chaired by Prof. Brian Fitzgerald from Lero, and attracted approximately 70 participants. The conference featured keynotes by Dr. Martin Curley (Intel) and Prof. David L Parnas, emeritus professor at the University of Limerick, workshops, and a technical program with practitioner and academic presentations. Professors Pekka Abrahamsson, Jan Bosch and Helena Holmström gave workshops. The conference proceedings have been published by Springer.

Industry Workshops

On December 3, 2013, Prof. Jan Bosch and Dr. Helena Holmström Olsson presented an industry workshop on the topic of *lean large-scale software development with continuous deployment*. The workshop was co-located with the LESS conference which was chaired by Prof. Brian Fitzgerald. Prof. Bosch and Dr. Holmström outlined their “Stairway to Heaven” model, and emphasized that many large companies such as Facebook can deploy new functionality several times a day.

On March 14, 2014, Prof. Brian Fitzgerald chaired an industry workshop on the use of agile methods in regulated domains. This workshop featured talks from three expert speakers on this topic: Ryan O’Sullivan from SCALARE partner QUMAS, based in Cork, spoke about the use of Scrum in their regulated domain (pharma/financial). Hakan Kleijn from



Prof. Brian Fitzgerald presents a gift to Prof. David L. Parnas after his Keynote at LESS 2013.

SCALARE partner Softhouse in Sweden also spoke about agile in the pharma sector, and Hans-Jürgen Kugler, from SCALARE partner Kugler-Maag in Germany spoke

about the use of agile methods in the automotive domain. Mr. Kugler reminded the audience of a time, approx. 10 years ago, when the use of agile methods was considered completely inappropriate by the automotive industry. The workshop was a great success, attracting over 25 participants. One of the participants complimented the speakers that the workshop had been “the best” he had attended.

A third workshop discussed the topic of “scaling down,” namely the use of agile methods in start-ups. This workshop, held in May 2014, featured talks from two expert speakers in this area: Gerard Hartnett from SCALARE partner Goshido, and Colm O’heocha, from AgileInnovation. This workshop was hosted at the Nexus Innovation Centre, located in the Tierney Building at the University of Limerick, where Lero is also based. The workshop was attended by approximately 30 people, many of whom are running start-ups.

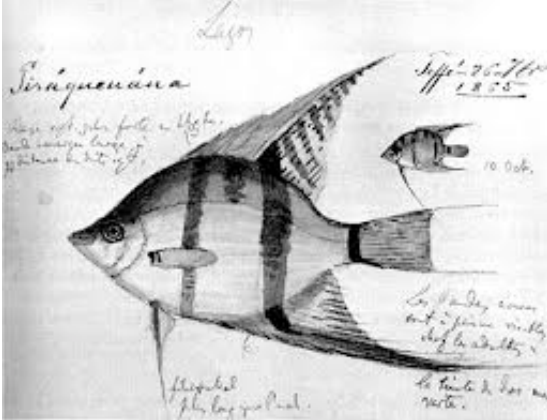
**“This was one of
the best
workshops I’ve
attended”**

**—Participant of the
Agile/Regulated domains
workshop**

History of the SCALARE Logo

The logo of the SCALARE project is derived from a drawing of the Pterophyllum Scalare, which was collected during the Thayer Expedition. The Thayer Expedition took place from April 1865 to August 1866, and took a route from New York to Brazil. The expedition, led by Louis Agassiz and financed

by Nathaniel Thayer, yielded a large collection of fishes that remained unstudied for years. Jacques Burkhardt was one of the assistants of Agassiz, and made the drawing of the Pterophyllum Scalare, and gave inspiration to the design of the SCALARE project logo.



Left: Drawing of the Pterophyllum Scalare by Jacques Burkhardt

Right: Cake with the SCALARE Logo to celebrate the project kick-off

Introducing Mehvish Rashid

I started my professional career as a software tester after my Bachelors in Computer Science from Pakistan. After gaining two years of Industrial experience, I started my MSc. in Software Engineering and Technology from Chalmers University of Technology in Sweden. The main area of research in master thesis was on Regression Testing in an industrial setting of Ericsson AB, Karlskrona. I further invested three years working in Software industry as a Test Specialist (IBM), and with academia. One of the initiatives worth mentioning is the ongoing establishment of Pakistan Software Testing and Quality Board (PSTQB) as a member board operating under International Software Testing Qualification Board (ISTQB).

My Ph.D in Lero will be based on SCALARE (SCALing software) an ITEA2 funded project where my work would be mainly related to scaling of software. Software now a day is from diverse domains e.g. automotive, security and safety systems, medical and regulated environment. With the arising complexity of software due to multiple factors the scaling challenges have also increased. Scaling itself is a multi - dimensional process that involves products, systems and services in one way or another are related to organizations and business domain which further has a close relevance to processes and methods. It is expected that following the ITEA roadmap a validation platform will be formulated through a significant number of case studies performed on industries following on similar goals of scaling. The lessons learned will facilitate to enhance the scalability platform. A scalability platform will be a major contribution of the project established on a systematic set of knowledge in various areas.



Mehvish Rashid

Introducing SCALARE

“Our organisation has become a software company. The problem is that our engineers haven’t realised that yet!” This is how the VP Research of a major semiconductor manufacturing company, traditionally seen as the classic hardware company, characterised the context in which software solutions were replacing hardware in delivering their products. This organisation knew precisely the threshold of reuse level for their hardware components before designing for reuse became cost-effective. However, no such sophistication was present in their software processes. Another example of software scaling in importance occurs in the medical device domain. Traditionally medical devices were primarily hardware with perhaps some embedded software. However, a 2010 EU Medical Device Directive classifies stand-alone software applications as active medical devices. Countless other scenarios are emerging, and it is difficult to find a market domain in which the innovation does not depend on software. Thus, we have a context where software, traditionally seen as secondary and a means to an end in many sectors, moves centre-stage. The implications of this global shift are frequently underestimated.

The goals of SCALARE are to support and enable industries to scale their software capability as software moves from secondary consideration to primary importance in delivering innovation and competitive products or services. This will be achieved through providing a Scaling Management Framework (SMF) for managing scalability (up, down and out directions) in three primary areas:

- Products, systems and services;
- Organisations and business domains;
- Processes and methods.

The SMF will focus on a number of business relevant issues within these areas, e.g., business models (including ecosystems) and organisational transformation (including value creation networks). The project seeks to balance product and service quality requirements with accelerated innovation drivers for enhanced and will incorporate new initiatives and tensions such as team empowerment and competition to co-opetition (ecosystem).

Other major outcomes of the

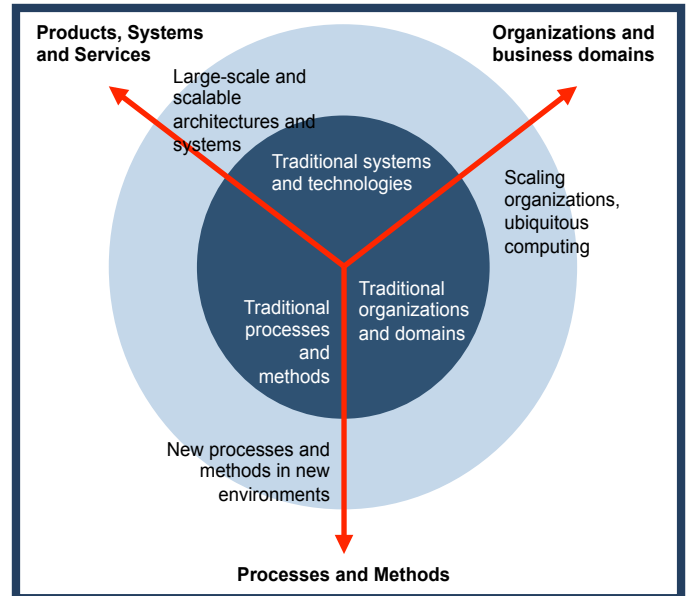


Figure 1. SCALARE focuses on scaling in three dimensions: (1) scaling products, systems and services; (2) organizations and business domains, and (3) Processes and methods.

SCALARE project will be validation the platform through a range of in-depth industrial case studies, and also through interactions with other

Our organisation has become a software company. The problem is that our engineers haven’t realised it yet!

relevant initiatives pursuing an Open Change Community to manage and enhance the scalability platform. This scaling phenomenon has not been studied in a unified manner up to now. The integration of services and a tool-set with concrete guidance on usage will thus be a unique value proposition to the European industry. An important part of the project is dissemination of these results, and building a community of practice will be key. Senior management across the SCALARE partners have expressed enthusiasm and commitment to the project.

Thus, improvements will occur in the Services, System and Software Creation (SSSC) and Infrastructures and Basic Services (IBS) domains. These intrinsic improvements will allow better service offerings to the Me, Group and Society domains outlined in the ITEA Roadmap. By establishing a systematic set of knowledge on software scaling in the various areas, the project will contribute significantly to the Engineering technology category.

Meet the SCALARE Team

Addalot

Addalot Consulting is a knowledge company with 25 years of documented experience and success in helping our clients to e.g. improved quality, faster delivery times and safer systems by ensuring effective system and software development processes. The company started as 1989 under the brand Q-Labs and was acquired by DNV in 2006. In 2011 the original part of Q-Labs performed a transfer to the new company Addalot. Focus of services has been similar and the current focus is on process improvement, product quality, open source software, supplier selection and functional safety.

Goshido

Goshido is based in Ireland (Limerick & Cork) and the USA (Boston). Goshido provides simple and powerful solutions that make it easier for people to work together. Goshido's software helps teams to execute projects – to keep all the moving parts moving.

Husqvarna

The Husqvarna Group is the world's largest producer of outdoor power products including chainsaws, trimmers, lawn mowers and garden tractors. The Group is also the European leader in consumer watering products and one of the world leaders in cutting equipment and diamond tools for the construction and stone industries.

Kugler-Maag

Kugler Maag Cie specializes in the systematic and effective improvement of business and product development processes, particularly where software-determined systems are concerned, as well as processes related to the provision of services. Our experts work with and focus on standards such as CMMI®, SPICE (ISO/IEC 15504), Automotive SPICE®, functional safety standards (IEC 61508, ISO 26262, EN 512x), ITIL, ISO27000, Lean Six Sigma and COBIT. Supported by

Kugler Maag Cie, your company will achieve measurable process improvements in terms of higher quality and reduced costs.

Lund University

Founded in 1666, Lund University is today one of the largest, oldest and broadest universities in Scandinavia and is consistently ranked among the world's top 100 universities. Lund University has an excellent academic reputation with a large number of visiting professors and international students. With eight faculties, the University's activities cover education and research in engineering, science, law, social sciences, economics, medicine, humanities, theology, fine arts, music and drama. Around 47 000

students study at the University, which has some 6 800 employees.

MAPCI

MAPCI is the Mobile and Pervasive Computing Institute that focuses on distributed cloud technology, a new area combining communications and software technologies, and take on the explicit role of a bridge-builder between existing mobile research centers in southern Sweden as well as with industry.

QUMAS

QUMAS delivers a closed-loop compliance model that standardizes and integrates the common elements of compliance tasks across the organization. Enterprises are able to



Figure 1: SCALARE partners are based in Germany, Ireland, Spain, and Sweden.

effectively converge all of their compliance programs onto a single platform, radically reducing the cost of compliance and creating competitive advantage. With its proven track record in two of the of the most stringently regulated industries – financial services and life sciences – QUMAS has proven that it is best positioned to provide centralized compliance for any company, regardless of industry. Its solutions ensure corporate compliance with the full spectrum of global regulations.

Sigrun

Sigrun – Software Innovation and Engineering Institute – is focussed on research-based software innovation. Sigrun is supporting companies and public organisations in becoming more efficient and competitive by bringing software research to practical use. Innovations and research results include software technology, software development methods and processes, software services and business models. Research are brought to practical use through innovation projects including participants from academia, product companies, consultant companies, and public organisations. The goal of innovation projects is to try out new technology, processes, or services in practice in an industrial or “real-world” setting.

Schneider Electric

Schneider Electric is a European multinational corporation that specializes in electricity distribution,

automation management and produces installation components for energy management. It is headquartered in Rueil-Malmaison, France and is also based at the World Trade Center of Grenoble. Schneider Electric is the project leader of the SCALARE project.

Softhouse

Softhouse Consulting is an independent IT consultancy founded in 1996. The company is today one of the leading Scandinavian suppliers of Lean Software Development. Softhouse Consulting are experts in software in many of its different forms and contexts. The company is expert in organising development work in such a way so as to achieve the best results. The company has just over 100 employees. We are located in Malmö, Karlskrona, Stockholm and Gothenburg. Ever since its founding in 1996 the company has grown continuously, and has been profitable every year.

Tieto

Tieto is the leading IT service company in Northern Europe providing IT and product engineering services. Our highly specialised IT solutions and services complemented by a strong technology platform provide our local and global customers tangible business benefits. Tieto are a trusted transformation partner and close enough to understand the individual needs of each and every customer. With about

18,000 experts, the company aims to become a leading service integrator creating the best service experience in IT.

University of Limerick

The University of Limerick (UL) is one of seven Universities in Ireland. It has about 12,000 students and 1,600 staff. UL have long been to the fore in the software engineering field. The premier International Conference on Software Engineering (ICSE) was hosted in Limerick in 2000, and David Parnas, one the founding figures in the software engineering field moved to Limerick in 2001 to take up the Chair in Software Engineering. The main unit involved in the SCALARE project is Lero, the Irish Software Engineering Research Centre.

Vitalograph

Vitalograph is a world-leading manufacturer of medical equipment, currently using traditional software development methods. One of the big challenges in their product development is a long time-to-market and general large overhead of regulations on the software development process, given their highly regulated development environment. To Vitalograph, the SCALARE project offers very significant opportunities to scale agile development methods to their regulated environment. Expertise found within the SCALARE consortium is an invaluable benefit to the company.

National Coordinators

Germany

Germany is represented by Hans-Jürgen Kugler from Kugler-Maag.



Ireland

Ireland is represented by Brian Fitzgerald, professor at the University of Limerick.



Spain

Spain is represented by Jesús Bermejo.



Sweden

Sweden is represented by Sten Minör from Sigrun.



Scaling Scrum to a Regulated Domain: The Case of QUMAS

This article is a shortened version of the paper "Scaling Agile Methods to Regulated Environments: An Industry Case Study," by B Fitzgerald, K Stol, R O'Sullivan and D O'Brien, published in ICSE 2013.

Brian Fitzgerald and Klaas-Jan Stol, Lero, University of Limerick
Ryan O'Sullivan, Joanne O'Driscoll and Donal O'Brien, QUMAS

The widespread penetration of agile methods is readily evidenced in a large-scale industry survey which reported that 80% of respondent organizations were following an agile approach. Agile methods were initially viewed as best suited to (a) small projects with (b) co-located teams and (c) non-critical projects. The first two of these constraints (small projects and co-located teams) have been addressed: several research studies have been published of agile adoption by large teams and in distributed environments. However, the final constraining characteristic, that of agile adoption in regulated environments, has yet to be addressed. A number of key agile advocates have argued that agile software development methods are best suited to non-critical

systems, such as automotive, aviation, financial services, food, medical devices, nuclear, pharmaceutical and railway. Agile methods and regulated environments are often seen as fundamentally incompatible. The reason for this can be traced to the Agile Manifest which identifies four fundamental value propositions for agile as:

1. Individuals and interactions **over** Processes and tools.
2. Working software **over** Comprehensive documentation.
3. Customer collaboration **over** Contract negotiation.
4. Responding to change **over** Following a plan.

While the agile advocates acknowledged the statements on the right as having value, they valued the statements on the left more. However, in regulated environments the statements on the right represent values which are of particular importance. Thus, an initial assessment might conclude that agile approaches and regulated environments are incommensurable.

The QUMAS SDLC

The QUMAS Scrum software development life cycle procedure is formally documented. All developers are required to read and sign an 'understood' declaration. The development process at QUMAS is directed by the Product

Council which consists of the relevant senior management from development and support, quality, sales and marketing. The purpose of the Product Council is to set overall objectives, approve key phases and make strategic decisions. They identify the personnel and resources required for the project management plan and timeline. The Council meets four times per year as standard. However, meetings can be called at any time to address major items as they arise.

Once product development is sanctioned by the Product Council, a product development team must be appointed. Each team member's name must be assigned when the team is formed. This is essential in order to identify the personnel resources required for the project management plan. The core team members are the Product Owner, the Scrum Master and the lead developer. The Scrum Master is responsible for progress and prioritization of work items on a day-to-day basis. The product development team will meet regularly to review implementation progress.

The augmented Scrum implementation for regulated environments (which we label *R-Scrum*) as enacted by QUMAS is presented in Figure 1. The shaded features are those enhancements added to the generic Scrum method to meet the compliance requirements of a regulated environment. Below we discuss these enhancements.

An initial assessment might conclude that agile approaches and regulated environments are incommensurable.

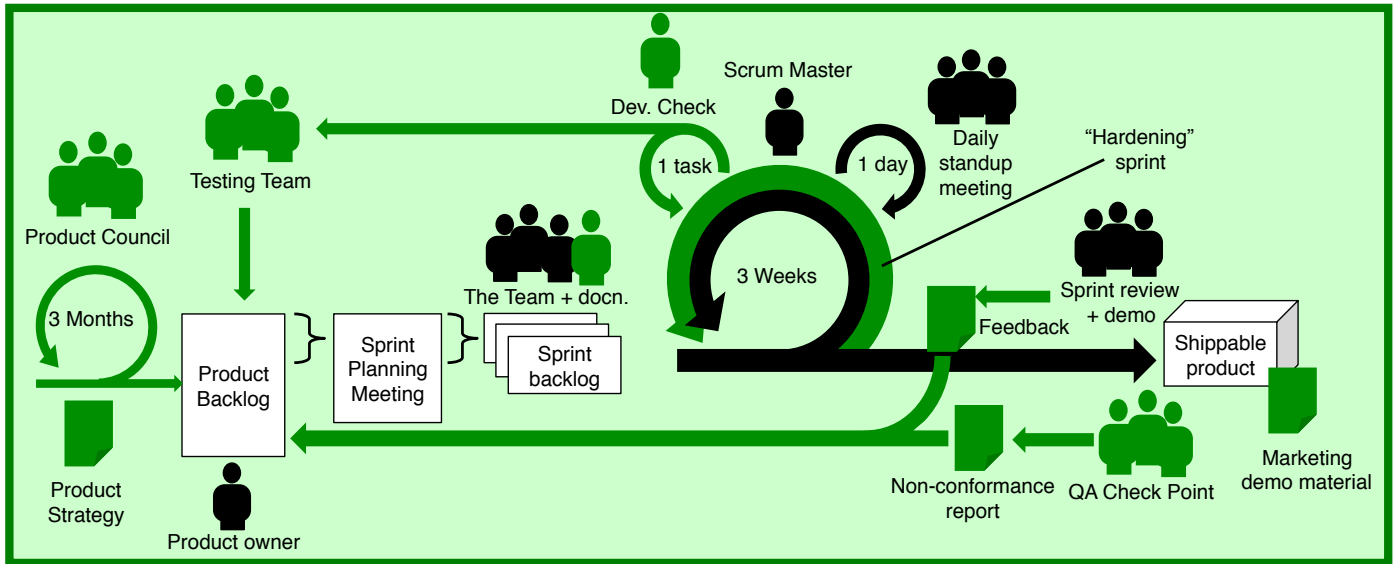


Figure 1. R-Scrum: Scrum for Regulated Domains. The standard Scrum framework elements are depicted in black, whereas the additional roles, artifacts and ceremonies are depicted in green.

Quality Assurance

QUMAS have a very strong internal quality management system and quality culture. The development workflow is formally defined in JIRA. All development sprints are audited by QA, who are independent of the development function, to ensure compliance with the defined procedure. These audits are completed within three days of the end of each sprint. This mode of “continuous compliance” means that QUMAS could “theoretically release after every sprint,” according to the VP Development and Support. Under the previous, waterfall-based development process, while each output produced was subject to QA review and approval, audits to approve releases were far less frequent, no more than once per year typically.

Development is also guided by templates which guide developers through the process. For example, a design template is automatically presented to developers on initiation of design tasks. This template identifies any related stories, a list of business rules that must be adhered to, any user interface issues and an explanation of fields within the user interface, user actions, access control, and error and exception handling.

Peer code review is also practiced and formally monitored in what is termed the “dev check” process. This ensures that the up-to-date design page is in Confluence, that code is checked in, coding standards are adhered to, and unit tests are run. Dev checks are performed for each task. Code refactoring is also systematically practiced. This is generally incorporated through refactoring stories. Sprint cycles at QUMAS typically follow three-week intervals. QA attend the sprint reviews and retrospectives and formally

approve every sprint cycle within two to three days of the end of the sprint. This requires the integration of all the requisite information to provide evidence of regulatory compliance subsequently. QA audits typically last a half-day and identify issues of non-conformance, or lack of traceability, or tasks not fully closed in line with predefined procedures, guidelines and sprint plans. Any issues are formally identified in a non-conformance report which includes a root cause analysis of non-conformance. This is fed back to the Product Backlog for resolution in a subsequent sprint. According to the VP Quality and CRM, the final QA release process is much more efficient than when following a waterfall process: “QA audits are done at the end of each sprint which allows for improved visibility, traceability and measurement so we have no unexpected exceptions to address at final release. We are just confirming the final release.” This mode of ‘continuous compliance’ is greatly facilitated by the traceability afforded by the toolset.

Safety and Security

Risk mitigation is facilitated greatly by the transparency of being able to ascertain project status at a glance and in realtime, the *continuous compliance* phenomenon discussed earlier. QUMAS also operate a four-stage prioritization scheme for tasks and bugs, ranging from priority P1 (critical) to priority P4 (cosmetic). This allows for better prioritization of key risk factors. In terms of product security, for example, the FDA require relevant regulated industry sectors to adhere and comply with the 21 CFR Part 11 regulation. In line with this regulation QUMAS software products

Continuous compliance means that QUMAS could theoretically release after every sprint.

automatically and securely binds the authenticated user's electronic signature and provides automatic required protection in the form of password expiration and unsuccessful logins. Full user audit trail capability is also provided in the product. In terms of process security, QUMAS have full audit trail visibility at all stages of the agile process, and only employees with the required security credentials can participate in the agile process.

Effectiveness

Effectiveness is about satisfying user needs and delivering high value with high usability to customers. Having the Product Council direct development ensures alignment with business strategy is formally considered at least once per quarter. Also, a documentation person is a member of the Sprint team ensuring a link between development and documentation and support.

Agile methods such as XP recommend an onsite customer; that is, co-location of developers and customers with a view to directly validating and prioritizing requirements. While QUMAS do not have an onsite customer typically, the surrogate for this role is the Product Owner. The Product Owner and Scrum Master are deeply involved in sprint planning and sprint review meetings, thus affording an opportunity at three-weekly intervals for detailed feedback on desirable functionality and how it should be prioritized from the customer perspective. Under the previous waterfall process, sales and marketing were consulted about requirements at the beginning of the project, and the resulting requirements specifications were rigidly adhered to during subsequent development phases.

The frequent delivery of working software inherent to the agile development process has also had major benefits for QUMAS. Because the software can exhibit functionality which has been prioritized, this can be demonstrated to customers early. For a newly developed product, several customers purchased the new software in advance of its formal release on the basis of the interim working functionality that could be demonstrated. This would not have been possible under the previous waterfall development process according to the VP Development and Support. However, in the spirit of satisfying customer requirements, QUMAS have committed to being reactive to the specific needs of these customers. Given the cadence of three-week sprints, QUMAS believe that customer requests could be implemented and delivered in about five to six weeks if necessary under the agile development process.

The agile development process also links validated builds of the software product with

Audits which used to take two days are now being completed in less than a day.

the relevant demonstration package test data. Pre-sales personnel can identify features they wish to demonstrate, select the appropriate validated build containing those features and the relevant demonstration package test data to show the new software to potential customers, and be confident that the demonstration will progress smoothly. This is a major benefit over the previous process. Previously, pre-sales personnel had to manually prepare demonstration material, which was a very time-consuming process. Furthermore, because of the inevitable likelihood of a greater prevalence of bugs in newer releases of software, pre-sales personnel tended to choose more stable software releases, perhaps more than six months old, when demonstrating to customers. As a result, newer functionality tended not to be included in those demonstrations.

As QUMAS produce software products for use in regulated environments they are subject to regular customer audit. The scope of these audits includes the QUMAS agile process for product development. The feedback from customers conducting these audits is that the time involved in performing the audit is greatly reduced as a result of the automated trace process. As the verification by the auditor of functionality implemented in the product via the agile process is now more effective and efficient, as the information is immediately retrievable in electronic format.

In order to verify that the agile process defined by QUMAS was in line with the expectations of their regulated customer base, QUMAS engaged with senior members of the GAMP EU and demonstrated the process. The feedback received was that the outlined process was deemed in accordance with the expectations of the industry.

Traceability

End-to-end traceability is a significant overhead in regulated environments. Traceability is often accomplished using spread-sheets which are printed and subsequently manually updated. Traceability is arguably the area in which the agile development process has had the most impact. The VP Development and Support characterized it as '*living traceability*' in that there is complete transparency into the development process at any point in time. In the past, documents and artifacts were produced periodically and collated to produce traceability evidence. Now there is full end-to-end traceability established by the toolset. Links are automatically established as developers check in code that implements a certain task. Should a developer check in

code without linking it to a task, then the dev check will identify this as an error. Initial requirements can be traced to stories, and in turn to tasks and sub-tasks, to design documentation, to source code, to code reviews, to builds, to unit tests, to rework and bugfixes, to function and system testing, to production code. The toolset can be interrogated to trace which build fixed which bugs and which build implemented which functionality.

QUMAS undergo external audits of their development process about once per month. The extra transparency afforded by the implementation of their agile development approach has engendered further confidence to the extent that audits may now take place without requiring the attendance of the Product Manager and Test Manager. According to the VP Development and Support, the absence of these managers would not have been contemplated when audits were taking place in the past. Furthermore, audits which used to take two days are now being completed in less than a day, often with no open issues to respond to, and resounding approval from audit assessors who appreciate the complete transparency and flexibility afforded by the living traceability allowing them to interrogate aspects of the development process at will.

Verification and Validation

Requirements are validated directly with the Product Owner at the start of each development sprint. Unit tests are generated as part of the coding tasks.

The unit tests are checked in with the functional code and therefore link to the code automatically. These tests are executed during the continuous build/deployment. The build automation is done via Bamboo, which also offers the option to invoke analytical tools, such as static code analyzers. Code changers and unit tests are run and changes to test results across builds can be easily linked to problematic check-ins of code. Unit tests are done within JIRA and functional tests are the responsibility of the test team using a specific quality center testing suite. In a typical build, a regression test suite of more than a thousand unit tests are run, which take 40 to 60 minutes to execute. This regressions test suite has been written by the developers over time, and new tests are added for new functionality and defect fixes. Any failures are recorded and emails are sent to the developers and Scrum Master. Continuous integration is implemented using the Bamboo tool. Every four hours the code base is monitored and any code check-ins trigger a new build at that point. Another tool that is integrated with Bamboo is NCover. This indicates the code coverage being tested and the goal in QUMAS is to achieve 80% coverage. Actual coverage can be monitored by NCover and presented in Bamboo reports.

A feature of the R-Scrum is the *'hardening sprint'* which is run to ensure release readiness before final release.

This ensures the shippable product versions from prior sprints can become a releasable product. QA will not sanction a release with any open issues. User documentation, structures on FTP site for customer download, marketing material etc. must all be integrated. At this stage, 'definition of done' must also include regulatory compliance. This reinforces the view that software development in regulated environments must satisfy two customers: the end-user and the regulatory bodies.

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Table 1. Key Findings of the Study

Table 1. Key Findings of the Study		
Quality Assurance	Time-to-market is a key constraint recognized by agile methods and the concept of delivering 'good enough' working software in an optimum timescale takes precedence over 'perfect' software.	Quality enhanced by: <ul style="list-style-type: none"> Product, release and sprint backlogs constantly validated with developers and customers. Continuous integration and systematic refactoring. QA function very supportive of agile process believing benefits outweigh inconvenience of changes to traditional working practices
Safety & Security	Agile thought to lack formal planning, risk mitigation.	<ul style="list-style-type: none"> <i>Continuous compliance</i> Risk also mitigated by <i>risk prioritization</i>-tackling the most significant risks first.
Effectiveness	Adherence to regulations and standards slows down development process and delivery speed to customer	<ul style="list-style-type: none"> Frequent releases enable pre-sales and early delivery to customer. Ability to rapidly respond to customer change request within 5 weeks. Active management allows the Scrum Master to correct course on a daily basis. Updates are visible in real time to all team members. Documentation person to ensure a link between development, documentation and support. Always up-to-date sales & marketing material.
Traceability	Lack of attention to documentation in agile inhibits traceability.	<ul style="list-style-type: none"> Powerful toolset providing extensive and automatic <i>living traceability</i>. Impact assessment of changes are easier to identify via the automated traceability. QA conducts internal audits much more often; external audits are much shorter and done without key staff.
Verification & Validation	Requirements specification is time-consuming, testing	<ul style="list-style-type: none"> Continuous integration supported by powerful toolset. Automated tests and automatic link to code facilitate easy coverage reporting.

Project Activities

Sony Mobile's Open Source Maturity Framework

Addalot has started a collaboration with Carl-Erik Mols from Sony Mobile to disseminate the Open Source Maturity Model that is developed and used within Sony Mobile to measure and improve their handling of open source. We are looking for pilot companies that have started the open source journey for collaboration. Contact even-andre.karlsson@addalot.se for further information.

SCALARE Features at the Lindholmen Software Day in Göteborg

Scalare and its Scaling Management Framework will be presented at the Lindholmen Software Day in Göteborg October 16 by Addalot at the Lindholmen Software Development Day a neutral arena for cross-industry knowledge sharing in software development. It is a collaboration between Ericsson, Chalmers, University of Gothenburg, Volvo Cars, Volvo Group, Cybercom, Knowit, Ascom, Swedsoft, Business Region Göteborg and Lindholmen Science Park. Please visit the website for more information: <http://softwareday.lindholmen.se/en>.

Softhouse's Agile Inception in 60 Minutes Whitepaper

“Agile Inception in 60 minutes” is a collection of strategies and techniques for accelerating business level output needed to initiate agile releases and/or projects. Whether your context is a single team or a multiteam, scaled delivery environment these agile inception strategies can help you with the crucial pre-release planning questions regarding the business model and product attributes that agile teams need in order to get off to a flying start. It can be downloaded from: <http://leanmagazine.net/agile/agile-inception-in-60-minutes-go-for-it/>.

Developing the Scaling Management Framework

SCALARE partners Sigrun and University of Limerick have been working on the development of the Scaling Management Framework (SMF). The SMF is one of the key deliverables of the SCALARE project, and aims to capture the essence of “scaling software” phenomenon. It does this by firstly identifying and modeling the relevant characteristics and scenarios that occur in the software industry, and subsequently capturing solutions that companies have successfully adopted and applied to “scale” their software development capacity, whether this be in the product, process or organizational dimension.

Case Studies

Numerous SCALARE partners are involved in conducting industry case studies, either to identify scaling characteristics and challenges, or to identify successful scaling solutions. These case studies provide valuable input in the development of the SMF, mentioned above. All case studies are currently ongoing – more information on the specific cases will be reported in further newsletters.

The SCALARE project has already delivered a number of case study reports and other relevant research output, of which the QUMAS article included in this newsletter is one. A complete list of published articles can be found in the “Publications” section in this newsletter.

SCALARE Website

The SCALARE Project website is located at <http://www.scalare.org>, and represents a One Stop Shop for all project-related information.

Publications

Journal Publications

X Wang, I Kuzmickaja, K Stol, P Abrahamsson and B Fitzgerald (2014) Microblogging in Open Source Software Development: The Case of Drupal Using Twitter, *IEEE Software*, July/August.

K Stol, P Avgeriou, MA Babar, Y Lucas and B Fitzgerald (2014) Key Factors for Adopting Inner Source, *ACM Transactions on Software Engineering and Methodology*. Vol. 23(2).

C Lindholm, J Pedersen Notander, M Höst (2014) A case study on software risk analysis and planning in medical device development. *Software Quality Journal* 22(3) pp. 469-497

Conference Publications

J Pedersen Notander, M Höst, P Runeson (2013) Challenges in Flexible Safety-Critical Software Development – An Industrial Qualitative Survey. *PROFES*, pp. 283-297

A Orucevic-Alagic and M Höst (2014) Network Analysis of a Large Scale Open Source Project, *Euromicro Conference on Software Engineering and Advanced Applications (SEAA)*

B Fitzgerald, M Musiał and K Stol (2014) Evidence-Based Decision Making in Lean Software Project Management, *36th International Conference on Software Engineering (Software Engineering in Practice track)*, Hyderabad, India.

K Stol and B Fitzgerald (2014) Two's Company, Three's a Crowd: A Case Study of Crowdsourcing Software Development, *Proceedings of the 36th International Conference on Software Engineering*.

B Fitzgerald, K Stol, R O'Sullivan and D O'Brien (2013) Scaling Agile Methods to Regulated Environments: An Industry Case Study, *Proceedings of the 35th International Conference on Software Engineering (Software Engineering in Practice track)*, pp. 863-872.

Publication Outlets

Many of the publications so far have been published in the top-tier outlets of the software engineering field, such as the International Conference on Software Engineering, which is the premier conference for software engineering research. Other articles have been published in the *ACM Transactions on Software Engineering and Methodology*, which is one of the two top-tier journals (besides *IEEE Transactions on Software Engineering*). Besides these scientific journals and conferences, SCALARE partners are also targeting practitioner-oriented outlets, such as *IEEE Software* magazine, which is widely read throughout the software industry. One of the deliverables is forthcoming in an edited book on software project management, which targets both academics and practitioners. More news will follow in the next newsletter!

Workshop Publications

K Stol and B Fitzgerald (2014) Researching Crowdsourcing Software Development: Perspectives and Concerns, in *First International Workshop on Crowdsourcing in Software Engineering (CSI-SE)* Hyderabad, India.

B Fitzgerald and K Stol (2014) Continuous Software Engineering and Beyond: Trends and Challenges, *1st International Workshop on Rapid and Continuous Software Engineering (RCoSE)* Hyderabad, India

K Wnuk, L Ahlberg and J Persson (2014) On the Delicate Balance between RE and Testing: Experiences from a Large Company, *IEEE 1st International Workshop on Requirements Engineering and Testing (RET)*

Write for Us!

Contributions to the Scaling Software Newsletter can be sent to Klaas-Jan Stol (klaas-jan.stol@lero.ie). We welcome experience and lessons learned reports, and case study reports.