Product Development in TANDBERG olve.maudal@tandberg.com

TANDBERG has never cared much about documentation, procedures, methodologies and risk reduction. However, we do care very much about our culture and our principles. This has enabled us to outperform all competition in the video conferencing and telepresence market during the last decade.

In retrospect, we realize that TANDBERG has for 10–15 years built a culture that is quite compatible with Agile and Lean ideas.

This talk will give a glimpse into how we do product development in TANDBERG R&D at Lysaker. I will show an example of how we developed a particular product with emphasis on software development, before I dive into the principles that we follow.

A presentation at Norwegian Developer Conference 2010 Track 3 (1500-1600) June 18, 2010

Disclaimer: This is an extremely subjective view of how we do product development in TANDBERG. Please do not assume that it is possible to generalize well over the examples given.



About me

1992-1995 BEng, Software Engineering, UMIST, Manchester
1995-1996 MSc, Intelligent Robotics, Dept of Artificial Intelligence, Edinburgh
1996-1996 Postgrad, Data Mining and Knowledge Discovery, NTNU, Trondheim
1996-2000 Schlumberger, developing systems for finding oil
2000-2004 BBS, developing systems for electronically moving money
2004-now TANDBERG, developing systems for effective communication between people

Active member of the vibrant geek community in Oslo. Eg, JavaPils, Smidig, JavaZone, XP Meetup, Cantara, Lean Meetup, Rubberducks and Oslo C++ Users Group, and a lot of other things. Also an active member of ACCU.

Blogs regularly on http://olvemaudal.wordpress.com/ and Twitter @olvemaudal

About TANDBERG

TANDBERG is the leading provider of telepresence, high-definition video conferencing and mobile video products and services. TANDBERG designs, develops and markets systems and software for video, voice and data. The company provides sales, support and value-added services in more than 90 co



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TANDBERG shipped it's first product, a picture telephone for ISDN in 1993. Since then TANDBERG has grown from a small startup based in Norway into an international company with ~1700 employees and a revenue of 900 MUSD in 2009. Dual headquarters in New York and Oslo.

Around 500 engineers works in R&D with product development, ~300 of them are based at Lysaker in Norway, but we now have also have R&D centres in Langley (UK), Ruscombe (UK), Bangalore (IN) and Hamilton (NZ).

www.tandberg.com

About TANDBERG, now part of

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www.tandberg.com

Breaking news (April 18, 2010): After a successful \$3.8 billion deal, TANDBERG is now part of Cisco Number of employees in TANDBERG R&D





-6

We develop and sell...



Meeting room systems



Telepresence systems



Personal systems



PC based solutions







Networking products





And a lot of other stuff











March 2010



"For most of my life I wanted a Porsche, now I think I want a Tandberg EX90 instead." Wainhouse Research



Video: The new way of working (2:00)

http://www.tandberg.com/media/index.jsp?id=1373



A case study:

TANDBERG Codec C90 - "The Saturn Project"



How did we do it?

Disclaimer:

The following description does not show how projects in Tandberg are typically developed, it is just an example of how a particular project actually did it. We think about every project, product and team as something unique, thus it does not make sense to create a particular procedure to follow.

Indeed, when it comes to product development, TANDBERG is "allergic" to corporate procedures. It is "unthinkable" that anyone outside a project or a team should impose a certain way of doing things, so we can not say "This is the way we do it", but you may look at a particular project and say "This is the way we did it".



C90 video (1:19)

http://www.tandberg.com/media/index.jsp?id=1312



C90 Features:

- realtime H.264 encoding/decoding
- full HD 1080p30, (4+4) concurrent streams
- 12 high definition video sources
- 8 high quality audio sources
- support for many-to-many communication
- Interoperability through H323 and SIP
- API for integration and remote control



C90 AUDIO EXTENSION BOARD

- analog amplification
- high quality AD and DA converters
- pure electronics, no processor/SW
- •717 components
- 6 layers



C90 VIDEO BOARD

- I0 Da Vinci DM6467 for video compression/ decompresion(I ARM, I dsp, 2 coprocessors),
- 5 Altera Cyclone III 120 for video scaling & composing(Nios II softcore 50 MHz)
- 15 Gbps video backplane
- 3.8 GByte DDR2 RAM
- 128 mbit x5 SDRAM
- 6097 components
- 30520 pins
- 22 layers
- 6490 nets



C90 MAIN BOARD

- I Altera Cyclone III 120 for Audio switching (Nios II softcore 50 MHz)
- 9 TI 6727, audio dsp for echo control, compression, decompression, +++
- PowerPC 8347, main processor, application software, networking, user interface
- 3543 components / 15659 pins
- I6 layers
- 3264 nets



C90 - from a geek point of view

- 10000+ components
- 44 (6+22+16) layers
- 56 processor cores
- several million lines of code (C and C++)

TANDBERG Codec C90

- Developed at Lysaker
- Started spring 2007
- First HW prototype arrived summer 2008
- Released late 2008 (~20 months of development)
- 2-3 people working with mechanics/design
- 4-5 people working with electronics/hardware
- 5-6 people working with FPGA development
- 40-50 people working with software development
- 4 people working with test developers
- I person working with approvals

Development Practices in the Saturn project

- Continuous planning
- Always attack high risks first
- Heavy focus on effective feedback mechanisms
- Visualization of actual status throughout project
- Teams: GUI, App, Protocol, Video, Audio, FPGA, Platform, QA, Support
- Parallel development
- Iterations and time-boxing
- Daily decision making assembly of elders
- Weekly rendezvous meetings
- Early and many prototypes



Software development in the Saturn project as seen from a developers point of view.




























Other aspects of the Saturn project:

- IRC channels
- free choice of development platform
- lot of energy spent on software emulator of actual hardware
- project manager is also configuration manager / build master
- static code analysis (Coverity)
- dynamic code analysis (valgrind)
- build system (genmake2, inhouse python)
- automatic deployment engine (ITVM, inhouse C#)
- automatic system testing (TNG, inhouse python)
- unit test framework (unittest, inhouse C and C++)
- module test framework (inhouse C++)
- code coverage (gcov)
- continuous integration system (matchbox, inhouse python)

Example of visual feedback (HTML pages used by all/most developers)

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As a software engineer joining TANDBERG...

No documentation

- No documentation
- No routines

- No documentation
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- Spectacular products

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- No integration period
- Spectacular products
- Fast deliveries
but then you start to notice...

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- Focus on important stuff
- Embedded slack
- Continuous planning
- Effective decisions
- Autonomous organisation
- Respect for the doers
- No integration period
- Spectacular products
- Fast deliveries
- Sustainable pace

... and while you still see the "negative" stuff, you will start to appreciate the "positive" stuff more.

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Observations from TANDBERG

- People communicate
- Focus on important stuff
- Embedded slack
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Focus on improving your skills of navigating chaos



Observations from TANDBERG

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Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools Working software over comprehensive documentation Customer collaboration over contract negotiation Responding to change over following a plan

> That is, while there is value in the items on the right, we value the items on the left more.

Kent Beck Mike Beedle Arie van Bennekum Alistair Cockburn Ward Cunningham Martin Fowler James Grenning Jim Highsmith Andrew Hunt Ron Jeffries Jon Kern Brian Marick Robert C. Martin Steve Mellor Ken Schwaber Jeff Sutherland Dave Thomas

The 7 Lean Software Development Principles

- Eliminate Waste
- Create Knowledge
- Build Quality In
- Defer Commitment
- Deliver Fast
- Respect People
- Improve the System

(Poppendieck)



VIKING LAWS

§1 BE BRAVE AND AGGRESSIVE

BE DIRECT GRAB ALL OPPORTUNITIES USE VARYING METHODS OF ATTACK BE VERSATILE AND AGILE ATTACK ONE TARGET AT A TIME DON'T PLAN EVERYTHING IN DETAIL USE TOP QUALITY WEAPONS

§2 BE PREPARED

KEEP WEAPONS IN GOOD CONDITIONS KEEP IN SHAPE FIND GOOD BATTLE COMRADES AGREE ON IMPORTANT POINTS CHOOSE ONE CHIEF

§3 BE A GOOD MERCHANT

FIND OUT WHAT THE MARKET NEEDS DON T PROMISE WHAT YOU CAN T KEEP DON T DEMAND OVERPAYMENT ARRANGE THINGS SO THAT YOU CAN RETURN

§4 KEEP THE CAMP IN ORDER

KEEP THINGS TIDY AND ORGANIZED ARRANGE ENJOYABLE ACTIVITIES WHICH STRENG-THEN THE GROUP MAKE SURE EVERYBODY DOES USEFUL WORK CONSULT ALL MEMBERS OF THE GROUP FOR ADVICE



TANDBERG

SPEED AND PRECISION

Simplify - focus - act - Approximately right rather than accurately wrong - Think

INTEGRITY AND ENTHUSIASM

Sense of humour · Honesty · High ethical standards · Excitement · Trustworthiness · Loyalty

EXCEED EXPECTATIONS

Personal initiative - Fighting spirit - Go the last mile

FUN AND PROFIT

Maximize long term shareholder value - Pass på penga -One for all, all for one - Energy

TANDBERG FIRST

First in user benefits • Innovative • "Kreativ galskap" • Understanding customer needs

SPEED AND PRECISION

Simplify - focus - act * Approximately right rather than accurately wrong * Think

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Lean * Software Development An Agile Toolkit



Forewords by Jim Highsmith and Ken Schwaber

The Aglie Software Development Series

Cockburn • Highsmith Series Editors

- Adapting agile practices to your development organization Uncovering and eradicating
- waste throughout the software development lifecycle
- Practical techniques for every development manager, project manager, and technical leader

Mary Poppendieck Tom Poppendieck











Lean Software Development An Agile Toolkit

La11ch1 NATIONA "The best current book on the changes reshaping TOYOTA PRODUCTION SYSTEM **Beyond Large-Scale Production** JAMES P. WOMACK, DANIEL T. JONES, HND DANS

A PROCESS OF ONGOING IMPROVEMENT Eli Goldratt has been described by Fortune as a "gurn to industry" and by Business Week as a "genius". His book, The Gool, is a gripping fastpaced business novel.

"Goal readers are now doing the best work of their lives." Success Magazine

"A factory may be an unlikely setting for a novel, but the book has been wildly effective Tom Peters

Eliyahu M. Goldratt and encos

EED TO KNOW ABOUT

IN JOE'S GARAGE

THE BEST-SELLING BUSINESS

NOVEL THAT INTRODUCED THE

THEORY OF

CONSTRAINTS AND CHANGED HOW

AMERICA DOES BUSINESS.

PIES SOL

SECOND REVISED EDITION

Lean Software Development An Agile Toolkit

La11ch1 NATIONA "The best current book on the changes reshaping TOYOTA PRODUCTION SYSTEM **Beyond Large-Scale Production** JAMES P. WOMACK, DANIEL T. JONES, HND DAME

A PROCESS OF ONGOING IMPROVEMENT Eli Goldratt has been described by Fortune as a "gurn to industry" and by Business Week as a "genius". His book, The Goal, is a gripping fastpaced business novel.

Eliyahu M. Goldratt antercos

EED TO KNOW ABOUT

IN JOE'S GARAGE

W. EDWARDS

DEMING

OUT OF

THE CRISIS

"Goal readers are now doing the best work of their lives." Success Magazine

> "A factory may unlikely settin novel, but th been wildly

Tom Pete



THE TANDBERG WAY

Product Development in TANDBERG

- No corporate standards or procedures
- Little documentation gives effective communication
- Treat engineers as professionals, not as resources
- Slack is embedded, and "skunk work" projects appreciated
- "Plans are nothing, planning is everything"
- No time recording, and we do not measure project cost
- To fail is OK, therefore we deliver spectacular stuff
- Doers are very much respected in Tandberg
- Autonomous organization
- Communication is a key skill for all our engineers
- We are fast and "sloppy"
- We release early and we release often
- Fun gives profit (not: profit, then fun)
- The company builds on trust











No corporate standards or procedures













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Itzhak Perlman plays Bazzini

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We follow principles, not processes!

Appendix

Some thoughts about negative and positive components

everything has a negative component ...



... as well as a positive component



so if you want to improve something...



... do **<u>not</u>** try to fix the negative stuff ...



... before understanding how it will affect the positive component



because you might end up by reducing the positive component by even more



while some organizations might have a profile like this



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the TANDBERG profile looks more like this



The TANDBERG culture has been extremely focused on improving things that we are already quite good at, and spend less time on worrying about things that "should" have been improved.







Managing your problems can only make you good, whereas building your opportunities is the only way to become great. (Collins, 2001)

Indeed, this is the signature of a GREAT organization



Indeed, this is the signature of a GREAT organization



and it explains why we are winning over and over again, even if it (to some) looks like the we are doing everything wrong.

Observations from TANDBERG

- People communicate
- Focus on important stuff
- Embedded slack
- Continuous planning
- Effective decisions
- Autonomous organisation
- Respect for the doers
- No integration period
- Spectacular products
- Fast deliveries
- Sustainable pace

What is Software Development all about


Few software projects are like running on a paved road where you can see the ...



... goal in the end of the road.

Most projects are more like...



extreme orienteering



with a group of people

in the dark



with only a sketchy map as guidance

Problems in software development usually multiply and gets worse by exerting more control...



The more you tighten your grip, Tarkin, the more star systems will slip through your fingers. (Princess Leia)