



**Doing it for Real -
Experiences of reaching
CMMI® ML 4**

Ael's Journey Towards High Maturity

Ric Woodgate

What does reaching Level 4 bring?

- **Nothing**
 - Costs money to get there
 - Costs money to stay there
- **OK, perhaps a little**
 - Badge is good for Managing Directors and Marketing
 - Intelligent customers understand what it means
 - Some customers do allow some financial advantages for CMMI Level 4 & 5
- **So, why are we doing it?**



Presentation Summary

- **CMMI and other process standards**
- **Ael's Process Improvement programme**
- **Quantitative Results**
- **Nine key success factors**
 - Corporate Leadership
 - Integrated Team
 - Tool support
 - Time Blocking
 - Training
 - Belief
 - Challenge the accepted
 - Early Results
 - Keep it simple
- **Conclusions**

Maturity Models

- **CMMI is one of many Maturity Models**
- **Before we look at CMMI, let's see which others we could have chosen...**

The Maturity Maturity Model



- **Oblivious**

- At this maturity level, people are oblivious to even the idea of maturity. They say and do as they feel. Ideas of duty, responsibility, peer approval, societal norms, benefits, or ethics do not influence their behaviours. (Hey, that sounds like fun.)

- **Peter Pan**

- At this maturity level, people acknowledge the existence of "maturity" but want nothing to do with it. They simply refuse to grow up. (Hey, that sounds like fun too.)

- **Anal**

- At this maturity level, people seem to have their heads stuck somewhere. At this level people are sticklers, but no one knows what for. This level is better discussed in private.

The Maturity Maturity Model

- **Management By Objective**

- At this maturity level, people are fighting for their survival—clawing up the corporate mountain/molehill toward ever-retreating material success. They yearn for, clutch at, and then cling to arbitrary rules of behaviour as a coping mechanism against the post-neo-ex-modern angst that envelops them. Rewards and punishments guide their every action (see dilbert.com).

- **Five**

- At this final maturity level, people become reflective about the ethical, moral, and religious values they attach to their behaviours. They easily conform their behaviours to those values. Note that no one actually achieves this level unless they reside in a monastic cave carved into the east side of a mountain in southeast Mars.

- **Thus, the Maturity Maturity Model holds the key to understanding all other maturity models, and to increasing our own maturity through its clearly defined maturation-saturation process.**

Which Model Shall I Choose?

1. **Capability Maturity Model Integration (CMMI)**
2. Capability Maturity Model for Software (SW-CMM)
3. People Capability Maturity Model (P-CMM)
4. Software Acquisition Capability Maturity Model (SA-CMM)
5. Software Engineering Capability Maturity Model (SE-CMM)
6. Integrated Product Development Capability Maturity Model (IPD-CMM)
7. IT Service Capability Maturity Model (IT Service CMM)
8. Organizational Project Management Maturity Model (OPM3)
9. Services Maturity Model
10. Self-Assessment Maturity Model (SAMM)
11. Testing Maturity Model (TMM)
12. Web Services Maturity Model
13. Security Maturity Model (SMM)
14. Operations Maturity Model
15. e-Learning Maturity Model
16. eGovernment Maturity Model
17. Earned Value Management Maturity Model (EVM3)
18. Outsourcing Management Maturity Model
19. Change Proficiency Maturity Model
20. Performance Engineering Maturity Model
21. IT Architecture Maturity Model
22. Information Process Maturity Model
23. Project Management Maturity Model (PMMM)
24. Programme Management Maturity Model
25. Learning Management Maturity Model (LM3)
26. Automated Software Testing Maturity Model
27. Website Maturity Model
28. PM2 Maturity Model
29. Internet Maturity Model
30. Usability Maturity Model
31. Software Reliability Engineering Maturity Model
32. System Security Engineering Capability Maturity Model
33. Configuration Management Maturity Model
34. **Broccoli Maturity Model**

Complementary Initiatives

Business Improvement →

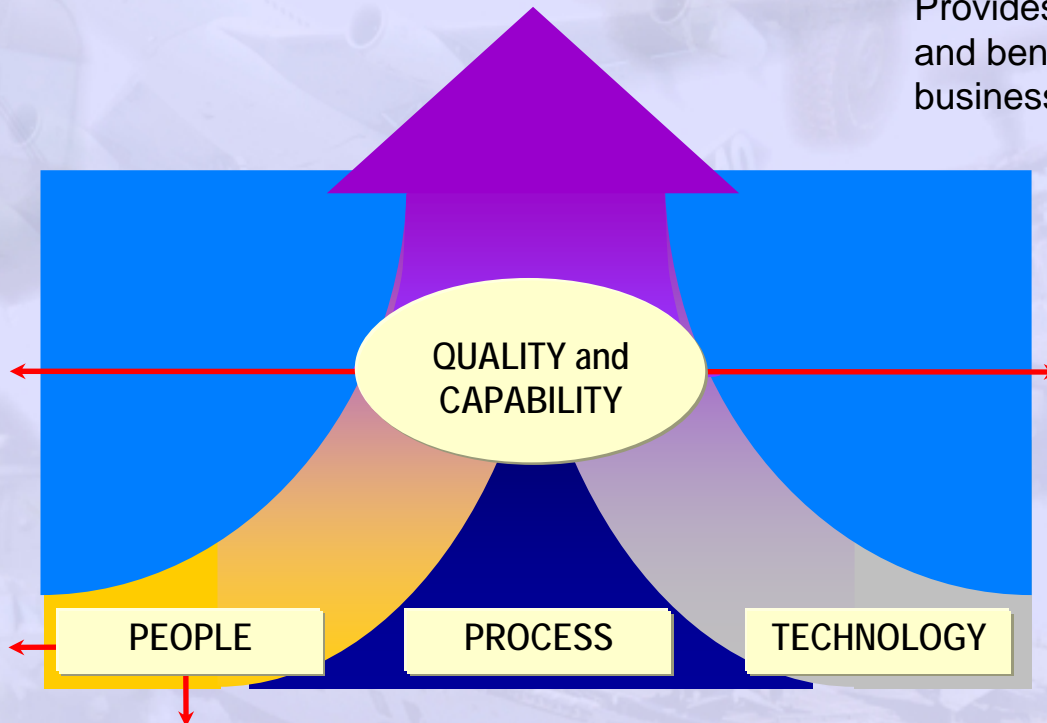
Business Excellence Model

Provides a tool for assessing and benchmarking overall business performance



ISO 9001:2000
Provides a means for accrediting Quality Management Systems to a recognised standard

Competency Frameworks
E.g. British Computer Society for Software



CMMI
Provides a framework of common process area practices for measuring, benchmarking and improving capability



Investors in People
Provide a means for improving organisational performance through the organisation's managers and staff



INVESTOR IN PEOPLE

Capability Maturity Levels

	PROJECT FOCUS		TRANSITION	ENTERPRISE FOCUS	
MATURITY LEVEL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
LEVEL DESCRIPTOR	PERFORMED	MANAGED	DEFINED	QUANTITATIVELY MANAGED	OPTIMISING
DELIVERY STATUS	Sometimes on time or cost, not often both	Getting better Quality improving	Predictable - to time and cost	Faster, Better, Cheaper	Fastest, Best, Cheapest World Class
PROCESS SUMMARY	Re-invention of the wheel	Individual Projects planned and tracked	Process definition at organisation level.	Measured and Controlled	Enterprise Integrated Continuous Improvement
PROCESS CONTROL	Chaotic	Reactive	Proactive & qualitatively predictable	Proactive & quantitatively predictable	Continuously Optimising

CMMI – Process Areas

Optimizing

Causal analysis & resolution
Organizational innovation and deployment

5

Quantitatively Managed

Quantitative project management
Organizational process performance

4

Defined

Decision analysis & resolution
Risk management
Integrated project management
Organizational training
Organizational process definition
Organizational process focus
Validation
Verification
Product Integration
Technical solution
Requirements Development

3

Managed

Configuration management
Process & product quality assurance
Measurement & analysis
Supplier agreement management
Project monitoring & control
Project planning
Requirements management

2

CMMI Participants - 2002



Sample of CMMI Users 2005



- **Siemens AG**
 - **Bosch**
 - **Marks and Spencer**
 - **Abbey National**
 - **HSBC (Software, India)**
 - **El Corte Inglés**
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- **Source: Software Engineering Institute List of Published Appraisal Results**

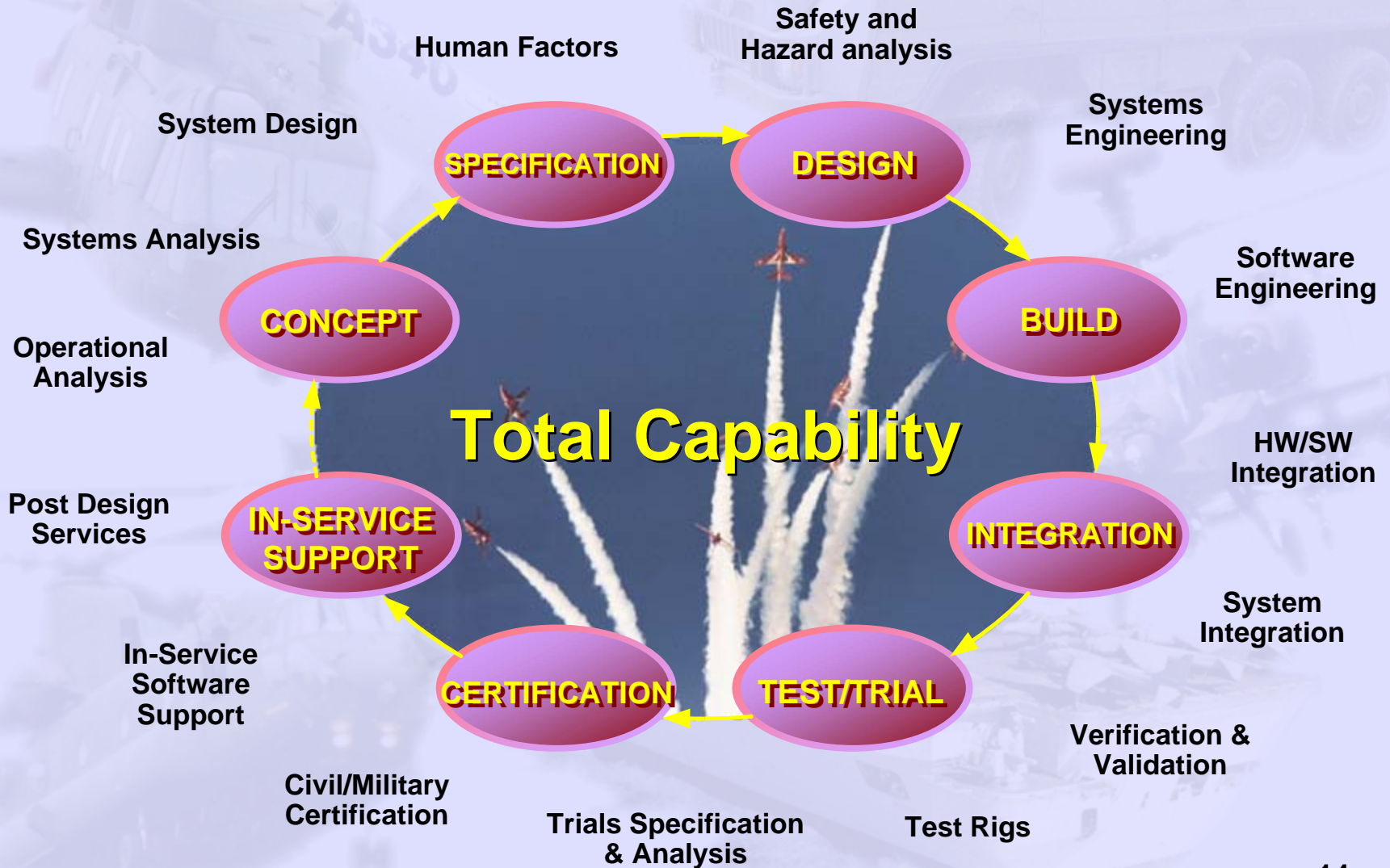
Who we are



“ A World Class provider of high integrity networked software solutions ”



What we do



Background

- **CMM Appraisal in 1997 - Level 2+**
- **Rapid growth in business hampered process improvement**
- **Business need for CMM not as strong as expected**

- **2001, Exec decision that drastic change was needed to take us towards Operational Excellence**

- **2002, expansion into USA refocused attention on CMMI[®]**
- **Related initiatives - Investors in people, ISO9001:2000 all required a culture of process improvement**
- **Belief that business improvements would come through process maturity**
- **Very strong encouragement from Ael Board (BAE SYSTEMS and GKN) to pursue CMMI[®]**

- **August 2002.** Baseline CMMI® Appraisal using Class B (early version of BAE Systems method)
- **August - December 2002.** Enhancement of Ael's business management system (BMS) to meet CMMI® and ISO9001:2000 requirements
- **December 2002.** Successful transition to ISO9001:2000 and AS9100:2001

- **April 2003.** Successful renewal of Investors in People
- **June 2003.** Completed roll out of full BMS into existing and new projects
- **July 2003.** Confirmation (By external Lead Appraiser) that BMS meets all CMMI® Level 3 requirements
- **July 2003 - October 2003.** Gathering evidence of use
- **October 2003.** External CMMI® Class B Appraisal confirmed Level 3 capability

- **January 2004 – June 2004.** Embedded CMMI® Level 4 processes into projects
- **June 2004 – November 2004.** Level 4 Processes fully deployed, appraisal planning and preparation
- **November 2004.** CMMI® Class A Appraisal to Level 4

SEI CMMI Data - Sep 2005



Country	Number of Appraisals	Maturity Level 1 Reported	Maturity Level 2 Reported	Maturity Level 3 Reported	Maturity Level 4 Reported	Maturity Level 5 Reported	Country	Number of Appraisals	Maturity Level 1 Reported	Maturity Level 2 Reported	Maturity Level 3 Reported	Maturity Level 4 Reported	Maturity Level 5 Reported
Argentina	10 or fewer						Korea, Republic of	30	Yes	Yes	Yes	Yes	Yes
Australia	14	Yes	Yes	Yes	Yes	Yes	Malaysia	10 or fewer					
Belarus	10 or fewer						Mexico	10 or fewer					
Belgium	10 or fewer						Netherlands	10 or fewer					
Brazil	10						New Zealand	10 or fewer					
Canada	10 or fewer						Philippines	10 or fewer					
Chile	10 or fewer						Portugal	10 or fewer					
China	62	Yes	Yes	Yes	Yes	Yes	Russia	10 or fewer					
Colombia	10 or fewer						Singapore	10 or fewer					
Czech Republic	10 or fewer						Slovakia	10 or fewer					
Denmark	10 or fewer						South Africa	10 or fewer					
Egypt	10 or fewer						Spain	10 or fewer					
Finland	10 or fewer						Sweden	10 or fewer					
France	26	Yes	Yes	Yes	No	Yes	Switzerland	10 or fewer					
Germany	16	Yes	Yes	Yes	No	Yes	Taiwan	18	No	Yes	Yes	No	No
Hong Kong	10 or fewer						Thailand	10 or fewer					
India	104	No	Yes	Yes	Yes	Yes	Turkey	10 or fewer					
Ireland	10 or fewer						United Kingdom	29	Yes	Yes	Yes	Yes	No
Israel	10 or fewer						United States	365	Yes	Yes	Yes	Yes	Yes
Italy	10 or fewer						Vietnam	10 or fewer					
Japan	100	Yes	Yes	Yes	Yes	Yes							



- **This year's aim was to reap the rewards of achieving Level 4**
- **We established quantitative management for support functions**
- **We targeted small projects and strategic product development programmes**
- **We also ensured that we had the appropriate technology and processes for the next few years (through the Organizational Innovation and Deployment Process, OID)**

- **We are planning to achieve Level 5 this year**
- **A Class B Appraisal was conducted at the end of 2005, with a team including BAE Systems National Security Solutions personnel, and internal team members, identifying the work needed to be done**
- **The 2006 plan is now in place, and we are working towards an autumn Class A Appraisal.**

Ael's reported benefits

- **2003 (Level 3)**
 - Movement of personnel across projects
 - Availability of data to identify problems
 - Organisation and resources for Process Improvement
- **2004 on (Level 4)**
 - Focus on collection, analysis and use of data
 - Clear plans for improving productivity
 - Everybody expects data to make decisions
 - Inclusion – entire organisation is within CMMI® improvement

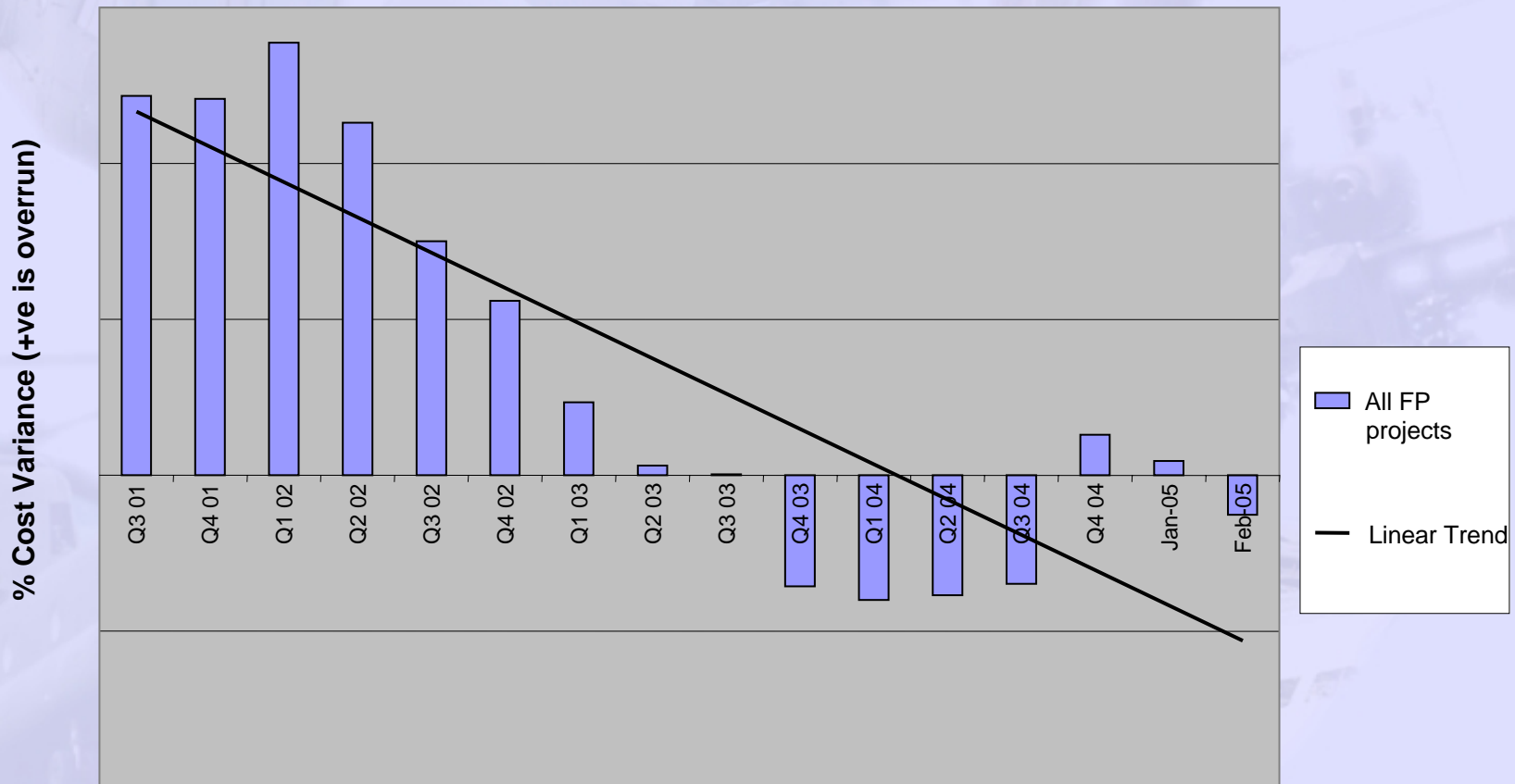
Standard CMMI® Benefits



- **Cost**
- **Schedule**
- **Productivity**
- **Quality**
- **Customer Satisfaction**
- **Return on Investment**
- **Refer to <http://www.sei.cmu.edu/cmmi/results.html>**

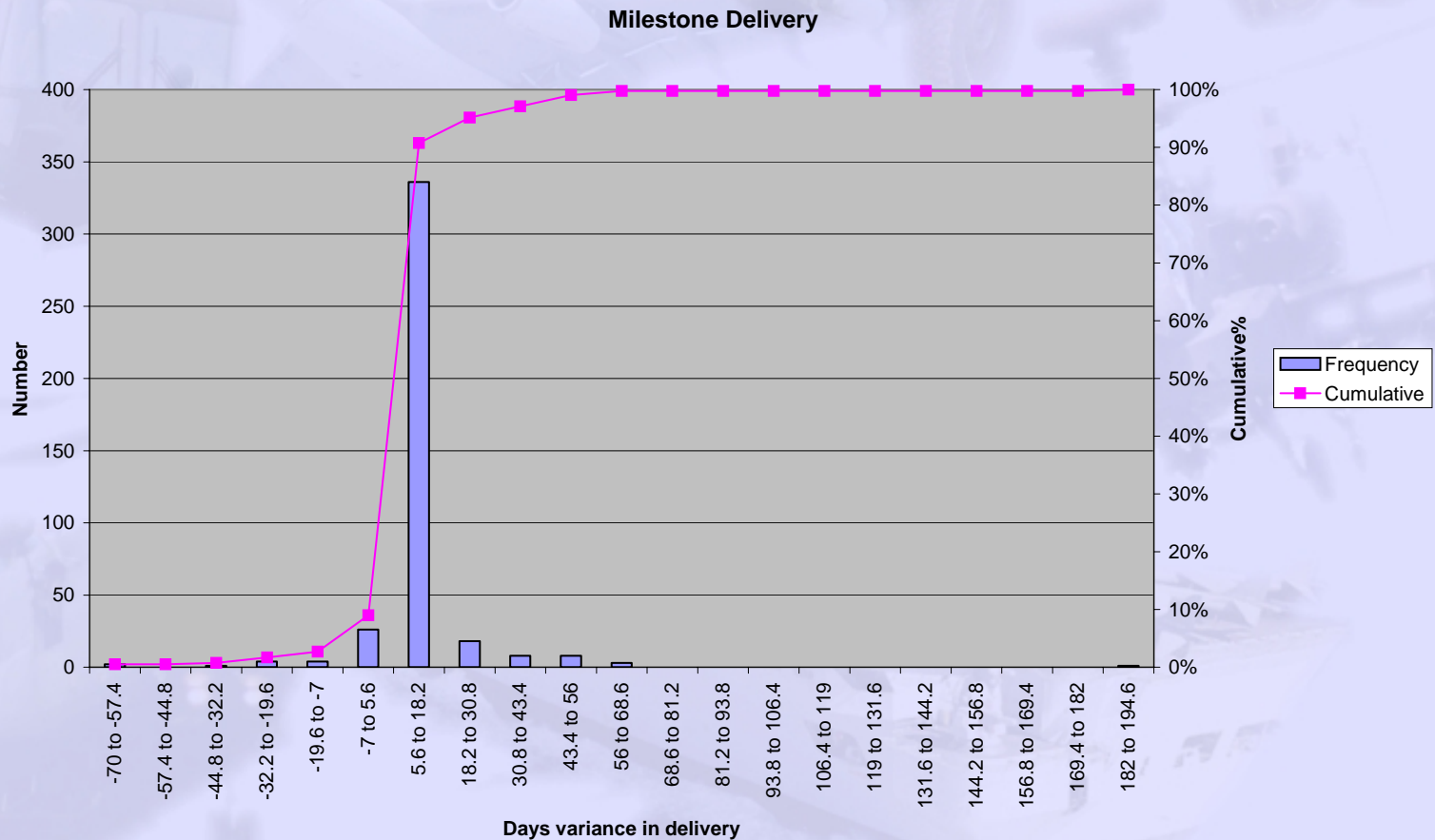
- **Costs are better controlled**

Fixed Price Project Cost Variance



Schedule

- Over 90% of milestones met within 18 days of due date

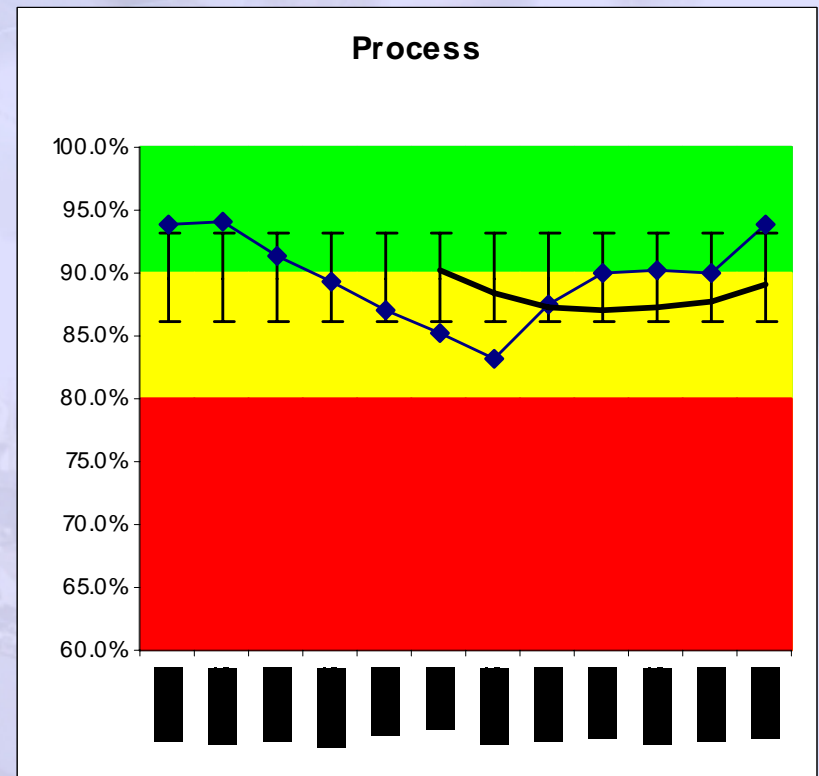
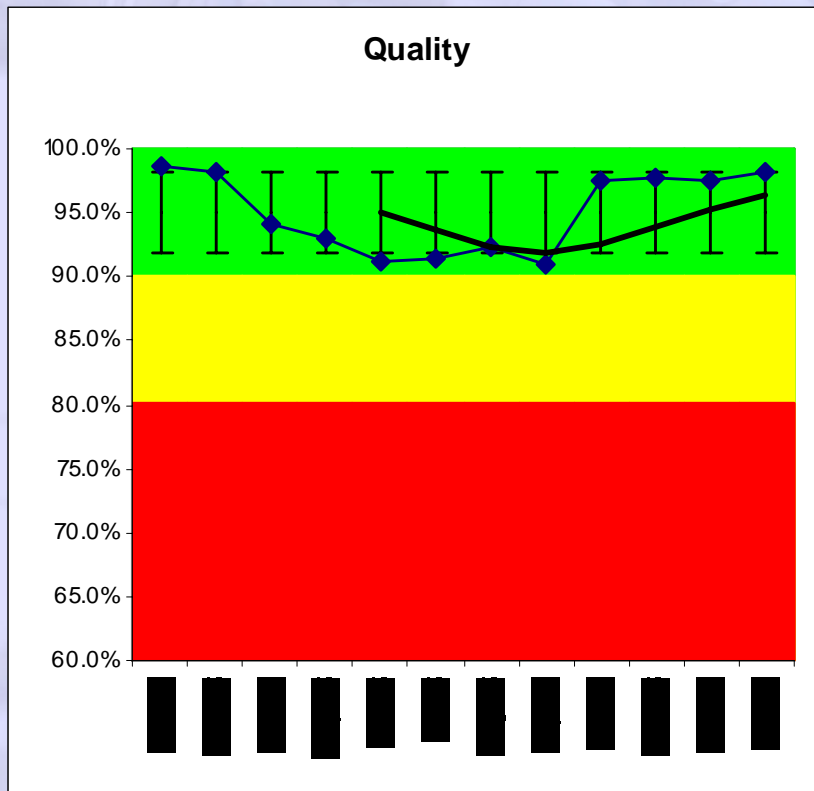


Productivity

- **We have established baselines, based on the whole lifecycle of a project**
- **We have a wide range of projects – different markets, different Safety Integrity Levels, different implementation methods and techniques**
- **We are not yet able to quantify productivity benefits associated with higher CMMI® levels**

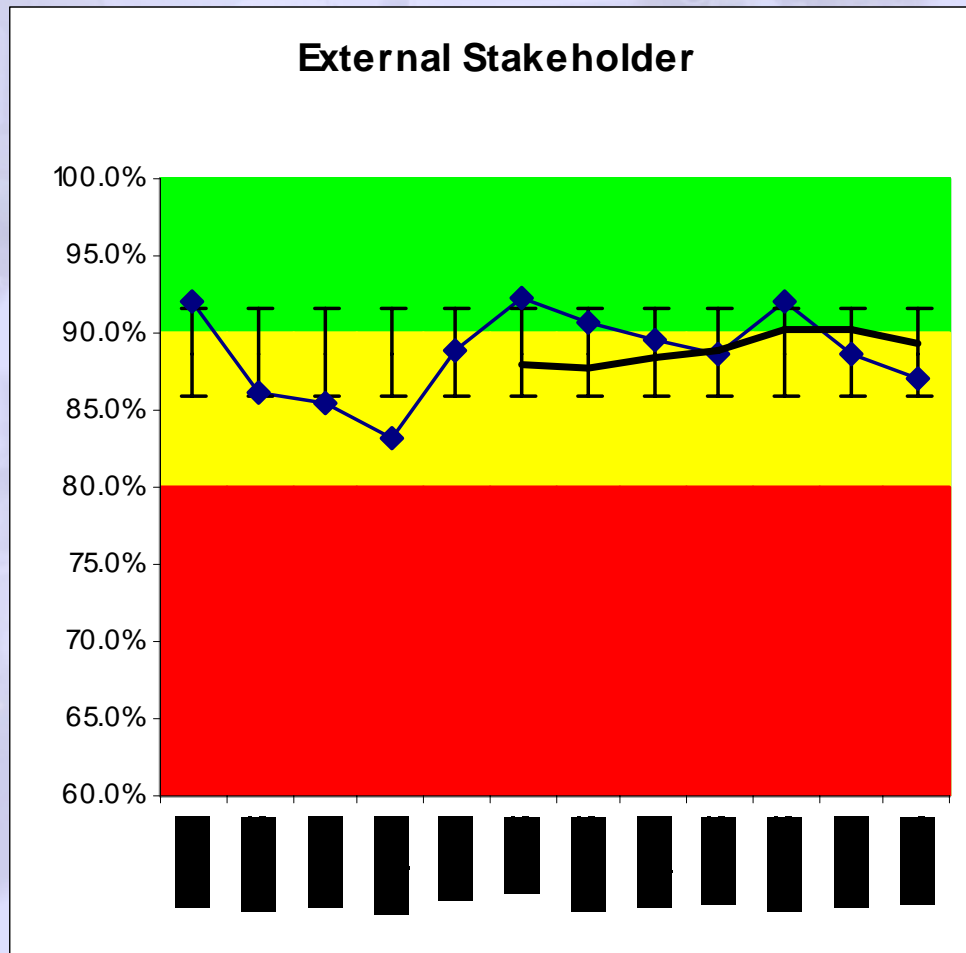
Quality

- Quality (based on actual or predicted defects), project traffic lights, weighted by effort



Customer Satisfaction

- Based on qualitative assessment by project, against defined criteria

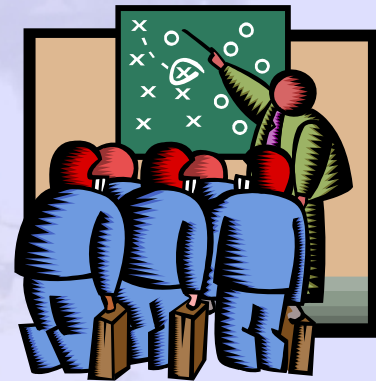


Nine key success factors

- **Corporate Leadership**
- **Integrated Team**
- **Tool support**
- **Block out time for Process Improvement**
- **Training**
- **Belief**
- **Challenge the accepted**
- **Early Results**
- **Keep it simple**

Corporate Leadership

- **Textbooks talk about ‘Corporate Sponsorship’**
 - This worked for CMM, where only the software department was involved
- **We strongly believe this is not enough for CMMI®!**
- **Top Management must believe sufficiently to push the activity forward**
- **All Departments must be committed**
- ***Ael has leadership from the MD, and strategic direction from the Board***



Integrated Team

- **Developing new processes is easy!**
- **Getting the right processes and tools depends on the end users being fully involved**
- **From day 1, there was a very close relationship between Operations and the process management team**
- **Over 30% of the company's engineering and project management resource is involved in developing or reviewing processes**
- **Our challenge now is to complete the roll out to the entire organisation – Finance, Infrastructure & Communications are now covered by the BMS**



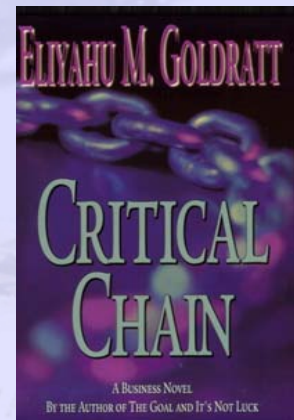
Tool support

- **Higher levels of CMMI® are all about managing using data. Our data comes from the following sources**
 - Technical: Change and defect metrics – Telelogic Change Synergy and DOORS
 - Management: Tasking - we use Change Synergy to manage task completion
 - Management: Effort - we use our Financial system (Costpoint) to capture data down to Work Breakdown Structure level
- **Tools enforce process - people are unaware that they are following the process**



Block out time for Process Improvement

- **Early in the work, we tried to use people on a part time basis**
 - Total failure - the read in time for process development is quite high, and part timers never get past this stage
 - Result - wasted money and time - no progress
- **Solution: Block out 1-2 Weeks of effort, and complete problems get solved.**
- **Good textbook on this timeshare problem is Critical Chain by Eliyahu Goldratt. Also an interesting way of managing time contingency on projects (...but that's another story!)**



Training

- **Make sure that new or changed processes are always accompanied by training (and that the changes are introduced in a controlled way)**
- **You can't expect people to "Read the Manual" (RTFM)**
- *We train all staff in the overall use of the BMS, through workshops run by Operations, not process, staff*
- *Project Teams walk through the process at the start of each phase*



- **CMMI® is about Change**
 - Culture
 - People
- **It is easy to become negative - change is hard**
- **Persevere - it will work!**
- ***To encourage achievement, Process Improvement is part of our appraisal process, and senior staff have a significant bonus target on CMMI® achievement***
- **“Change is inevitable – except from a Vending Machine”**

Challenge the accepted

- **Process Improvement using CMM is well established, but the approach is cumbersome - typical timescales for level changes are 2+ years**
- **“We’ve always done it this way”. CMMI® may well require a more radical approach to achieve results in a timely way**
- **We are trying to achieve results more quickly than others. So far, this approach is delivering benefits**
- ***Ael’s size is probably close to optimum for CMMI®***
 - ***Not too small, so formality required becomes an overhead***
 - ***Not too large, so resistance can be overcome quickly***
 - ***Staff are not embedded in departments, but are part of projects (however, a project culture does make the Level 2-3 transition more difficult)***

Early Results

- **In any business change activity, early results are crucial to maintain momentum**
- **As work progresses, regular updates provide visibility of the change programme**
- ***We successfully implemented an Open Access Agreement with Telelogic to ensure all projects have access to DOORS, CM and Change Synergy***
- ***We have moved project specific tools into a wider domain, and rewarded people who worked on these in their spare time***
- ***Regular e-mails, 4 large Notice boards, regularly updated***

Keep it simple

- **Do not craft the perfect solution**
 - It is easy to spend too much time, and it won't be right anyway
 - Get a version out to gain experience, and use feedback to improve it
- **Measures**
 - If you want to understand how something works – measure it
 - A simple measure can provide insight into process performance
- **Use the process users to improve the systems**
 - They understand the process!

How has CMMI® affected Ael?



- **Staff appreciate the consistency across projects**
- **Financial results so far indicate an improvement in both actual performance, and predictability**
- **Everybody talks about process**
- **“Now it gets interesting”. People are genuinely excited about what Level 4 and 5 will do for Ael**
 - **Engineers are attracted by the quantitative approach**

Conclusions

- **CMMI[®] is an excellent framework for process improvement across the whole business, not just software and systems engineering**
- **Business benefits of CMMI[®] are well proven, and we are seeing this reflected in our bottom line**
- **The whole company is behind CMMI[®]**

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