

Origin/India and Software Process Improvement

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Ever since Watts Humphrey wrote his book 'Managing the Software Process', Software Process Improvement has become very important for Origin¹ and a lot of our customers. This paper focuses on our establishment in India, which now acts on nearly CMM level 3. The benefits of software development in India are adressed, as well as how Origin/India managed to nearly reach CMM level 3 within two years.

An introduction to Origin/India

At the moment, there is a growing trend towards transferring software development to countries like India. Having a location in India gives Origin the following advantages.

Professional education system

People are well educated. In India, there are about 150 universities and 460 institutes providing computer education at degree level. Leading up to this, there are about 1400 private training institutes for computer education. Another advantage of the education system is that all Indians fluently speak and write English.

Technical knowledge

The software engineers of Origin/India generally possess the same knowledge and maturity of IT technology (methods, tools, languages, development systems and techniques) as our Dutch software engineers.

Flexibility in capacity

There are about 115,000 engineering graduates leaving the universities every year, of which 20,000 are software engineers. Furthermore there is a pool of 130,000 professional software engineers who are contractable within a few days. Because of this availability of skills, the throughput time of projects can be reduced. This is becoming more and more important in

product development, because market share can be gained by early introduction onto the market.

High quality

The employees of Origin/India are very quality-minded. Origin/India has an ISO-9001 certificate and has been assessed nearly on CMM level 3. The number of software companies in India with certificates is not high, but increasing rapidly. Figure 1 shows this.

Figure 1: Number of certified Indian companies (situation end 1995)

Lower hourly rate than the companies in The Netherlands

However the hourly rate is increasing, so this is not the biggest advantage.

In the last few years Origin/India has achieved a market distribution as depicted in Figure 2.

¹Origin is the result of a merger per January 1st, 1996 of BSO/Origin and Philips Communications & Processing Services.

Figure 2: Market distribution Origin/India in percentages

Background of SPI in Origin/India

Most of the work done by Origin/India is in the form of fixed-price and fixed-time projects. The nature of the business that has been chosen means that there is a need to have a good and efficient process of producing the software. Our clients expect consistently high-quality deliverables and services from us; and within specified cost and time limitations. Therefore, Origin/India defined the following main objectives for the development process.

- It should ensure client satisfaction.
- It should produce consistently high quality deliverables.
- It should be simple and efficient and directed towards prevention of mistakes.

Origin/India has started the definition of the process based on their experience and the current best practices in their organization. As part of the definition, a mechanism for internal audits, project audits, and management reviews has been defined. The results of management reviews, internal audits and the quality measurements are used to evaluate and continually improve the quality system.

Origin/India's approach to SPI

ISO 9001 has been chosen as their standard for refining the definition of the process, which is also referred to as the documented quality system in ISO terms. ISO 9001 is a good standard, as it contains all the things necessary for an organization to function in a systematic way. Being a generic standard, it has been supplemented by ISO 9000-3, which contains guidelines specific to the software industry.

ISO 9001 contains a number of requirements that an organization has to satisfy and also be able to demonstrate to an external party (the certifying body), that the requirements are complied with. The requirements include definition of the organization's quality policy, the responsibilities and authorities of management, practices, methods, training, internal audits, and the improvement mechanism. It also is very flexible so that the organization can choose how it wants to define its quality system. Origin/India had an audit in June 1994 by KEMA N.V. of The Netherlands, which confirmed that Origin/India was in compliance with the ISO 9001 standards.

However, ISO 9001 has certain limitations. It has all the necessary elements, which makes it a good starting point, but it is limited as far as process improvements are concerned. Origin/India found that the Software Engineering Institute's (SEI) Capability Maturity Model (CMM) uses a structured approach to process improvement. The CMM identifies the key areas based on the organization's current maturity level. Since Origin/India was already an ISO 9001 compliant organization, CMM was the ideal approach to improve the software processes.

Origin/India and CMM Levels 2 and 3

An assessment of Origin/India with respect to CMM was carried out by an assessor from Origin/QMCC (Origin Quality Management Competence Center). The result is summarized in the Table 1.

CMM Level 2: Repeatable					CMM Level 3: Defined				
Key Process Area	NS	PS	MS	CS	Key Process Area	NS	PS	MS	CS
Software Requirements Management				2	Organization Process Focus			1	2
Software Project Planning			1	2	Organization Process Definition		1		1
Software Project Tracking and Overview			2	1	Training Program			1	2
Software Subcontract Management	n.a.	n.a.	n.a.	n.a.	Integrated Software Management		1		1
Software Quality Assurance			1	3	Software Product Engineering			1	1
Software Configuration Management				4	Intergroup Coordination				3
					Peer Reviews				2

Table 1: Origin/India's scores for the Key Process Areas at CMM Levels 2 and 3

The numbers in Table 1 indicate the number of goals in the Key Process Area: NS = Not Satisfied, PS = Partially Satisfied, MS = Mainly Satisfied, CS = Completely Satisfied.

Origin/India's plans for improvement

Origin/India plans to carry out improvement actions required for reaching level 3+ by the end of July 1996. To facilitate these actions, Origin/India has introduced the Software Engineering Process Group (SEPG), which will work under the guidance of their quality manager. A plan has been formulated based on the Origin/QMCC assessment. An assessment to confirm that Origin/India has reached level 3 will be carried out in November 1996.

Benefits to Origin/India and other Origin companies

Origin/India expects that by attaining a maturity level of 3+, Origin/India will be able to improve upon the client satisfaction levels, the quality of products that Origin/India deliver and also improve the profitability of projects. Origin/India has defined the following important measurements.

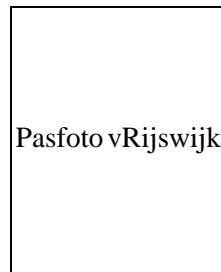
- Client satisfaction rating.
- Project size in lines-of-code and/or function points.
- Project effort in hours.
- Effort spent on correcting errors found during acceptance testing.

While these are the most important measurements which help in determining whether Origin/India has met their objectives, a number of other measurements, for example, effort spent per phase, effort spent on reviews and corrections, etc. help in fine-tuning the processes.

Origin companies could exploit the presence of a mature sister company to gain an unbeatable edge over the competition, in terms of quality as well as cost. They can also make use of the experience gained by Origin/India with respect to CMM, and move to a higher maturity level.

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