AN E-LEARNING MATURITY MODEL?

Stephen Marshall & Geoff Mitchell
University Teaching Development Centre
Victoria University of Wellington, New Zealand
Stephen.Marshall@vuw.ac.nz
Geoff.Mitchell@vuw.ac.nz

Abstract

Although the adoption of e-learning is widespread among educational institutions, ensuring that it is both effective in delivering educational value and efficient in its use of organisational resources remains a difficult task. As many authors have argued, these difficulties arise because the creation, utilisation and support of e-learning facilities requires a balancing of tensions between technical, organisational and pedagogical considerations. The research to date has considered many excellent tools and techniques designed to address specific educational or technical needs. What has been lacking has been an overall framework for guiding adoption of e-learning and improving the processes surrounding it to ensure improvements in student learning outcomes. This paper suggests that what is needed is a process model that encourages the development of effective educational technology resources independent of technical platforms, organisational structures and pedagogical frameworks. In an effort to develop such a model, this paper considers the value of adapting an existing process model in the software engineering discipline, called the Capability Maturity Model (CMM). The paper presents an overview of the CMM and discusses its possible application to the domain of e-learning. It considers two possible applications for its use: as a guide to improving course level adoption of e-learning; and as a guide to institutional level adoption and integration of e-learning. The paper concludes with a discussion of the possible merits and pitfalls of using an adapted version of the CMM for e-learning.

Keywords

Institutional Frameworks, Capability Maturity Model, E-learning

Introduction

Universities and other higher education institutions continue to embrace new technologies in most aspects of the teaching and learning process (Ryan, Scott, Freeman & Patel, 2000; Bates, 2001). While considerable resources are expended on the development of flexible learning programmes, researchers in the field still argue that the value of educational technology has been patchy at best (Conole, 2001; Taylor, 2002). While some institutions have achieved considerable success, others have struggled to realise marginal adoption rates or attain limited educational value. The research suggests that the reasons for these limited successes are many and varied and reflect the complex nature of the problem (Kenny, 2001; Radloff, 2001). The creation, utilisation and support of flexible learning has invariably been a multi disciplinary activity (Inglis, Ling & Joosten, 1999), further exacerbating the tensions between technical, organisational and pedagogical considerations (Laurillard, 1993; Reid, 1999).

Initially grounded in the consideration of individual approaches, tools and techniques, there has been a growing recognition that e-learning initiatives need to adopt an institutional approach in order to fully integrate all of the necessary considerations (Reid, 1999; Holt, Rice, Smissen & Bowly, 2001). While pedagogical concerns rightfully maintain centre focus, academics are also recognising the need to consider issues like efficient use of scarce resources (Karelis, 1999), the scalability and transferability of solutions (Bain, 1999) and the demands of University management (Laurillard, 1997; Kenny, 2001). Institutional leaders are also recognising the need for a clear vision and integrated strategy for e-learning

that also addresses opportunities for collaboration with other institutions (Hanna, 1998; Reid, 1999). Underpinning many of our current concerns is the need for an institutional vision for e-learning that delivers real educational value and is sustainable in the longer term (Strauss, 2002).

The issue of sustainability and lasting value is one requiring increased attention (Laurillard, 1999). Many institutions caught up in the heady promises of the virtual campus are revisiting their decision to invest in this area (Strauss, 2002; Young, 2002). Higher education institutions are increasingly conscious of their level of investment in e-learning activities and are looking for clear evidence that identifiable value is being returned. Senior management teams are now more mindful of ensuring that the process of adopting e-learning delivers a quality experience for students and staff and allows their University to meet its social and governmental obligations.

Coupled with the challenge of sustainability have been the issues of ensuring good practice is transferred between staff and that collaboration occurs between institutions (Laurillard, 1999). This process is often exacerbated when different individuals, disciplines and institutions adopt differing pedagogical frameworks, differing technical platforms and organisational approaches to promoting e-learning. This situation often leaves both individuals and institutions looking for guidance on improving their e-learning processes.

We believe that what is needed is a process model of sufficient flexibility to guide the improvement of e-learning that still encourages the development of effective educational technology resources independent of technical platforms, organisational structures and pedagogical frameworks. In an effort to develop such a model, the authors have turned to the software engineering discipline. Software engineers have for some time recognised the limitations of traditional ad-hoc practices and developed a model for guiding improvements in their work in a way that still allows for flexibility of implementation, technology and business models. This method, known as the Capability Maturity Model or CMM (Paulk, et al., 1993), has developed into a well-recognised standard for guiding process improvements in organizations' software development processes.

The Capability Maturity Model

Based on the work of a software engineering pioneer, Watts Humphrey, the Capability Maturity Model was a response to what some researchers described as two decades of unfulfilled promises in the areas of productivity and quality gains (Paulk, Curtis, Chrissis & Weber, 1993). The model addressed problems that arose from organizations' inability to manage the software development process because they were constantly locked in to firefighting mode and unable to realise the benefits of better methods and tools.

The Capability Maturity Model is a 5 level model for judging the maturity of an organization's software development processes and for identifying the key practices or steps required to increase the capability or effectiveness of those processes.

The five levels of the model can be described as (Paulk, et al., 1993; Paulk, 1996):

1) **Initial**: The development process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends mainly on individual effort and heroics.
2) **Repeatable**: Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.
3) **Defined:** Management and development activities are documented, standardized, and integrated into a family of standard processes for the organization.
4) **Managed:** Detailed measures of the process and product quality are collected so that the process and product are understood and controlled.
5) **Optimizing:** Continuous process improvement is facilitated by feedback from the process and from piloting innovative ideas and technologies.

The original CMM (outlined above) was designed to deliver a number of different benefits, (Paulk, et al., 1993). At the simplest level, the model provides a road map for improving an organisations software development processes. The framework provides a series of signposts for moving from an ad-hoc

approach to software development to a more integrated and continually improving process. The model also provides a benchmark against which an organisation may evaluate its current capability, plan for, and measure future improvements. Equally it allows an organisation to compare its current capability with that of other organisations in its industry. This assists an organisation in identifying and prioritising necessary improvements in its current practices.

The last benefit provided by the model is that it identifies the essential key process areas necessary for the improvement of software development as defined by current professionals in the field. To develop the original CMM, the Software Engineering Institute at Carnegie Mellon University ran a series of workshops with industry and government participants to identify key factors affecting project success. The model was developed to frame these discussions and even today updates are reviewed by a body of over 500 practitioners and approved by an advisory board of 14 senior software engineering professionals. This means that the model provides an ongoing list of key practices and provides the software engineering industry with a common basis for the discussion and dissemination of good practice.

One of the main strengths of the model is that it supports process improvement without a reliance on any particular development methodology or organisational model. The CMM has been applied successfully with both an institutional focus, as well as at the personal level for improving individual development processes (Humphrey, 1994). This versatility has seen it adapted for use in a number of related areas including systems engineering, product development and, project management. The model has even been successfully adapted to the development of people capability (Curtis, Hefley & Miller, 2001) to assist in human resource management. In each of these areas, use of the maturity model has provided a framework against which organisational processes can be measured to ensure value is being delivered and that wide variations in performance are reduced. The consistency associated with performing the most effective processes supports the transfer of learning across projects (Herbsleb, Carleton, Rozum, Siegel, & Zubrow, D, 1994; Lawlis, Flowe & Thordahl, 1995).

Research (SECAT, 1998) has shown that the CMM models assist organisations that want answers to questions like:

- Is the organisation successful at learning from past mistakes?
- Is it clear that the organisation is spending limited resources effectively?
- Does everyone agree which problems within the organisation are the highest priorities?
- Does the organisation have a clear picture of how it will improve its processes?

It is clear that these questions are relevant in a wide variety of areas including e-learning. On this basis, it seems reasonable to ask whether the concept of a maturity model has relevance for the field of e-learning. Below we present an initial attempt to explore what an e-learning maturity model might look like and what it might mean for improving both individual and institutional processes for adopting and managing e-learning.

Application of the CMM to e-Learning

On the basis of the strengths of the software development CMM, we would suggest that the notion of a capability maturity model for e-learning presents a number of opportunities.

i. Firstly, an e-learning model could provide a road map for higher education institutions looking to improve their e-learning processes. Most academics are familiar with the ad-hoc approach to e-learning where development of resources and support of students have more to do with individual heroics than good institutional planning. While some tertiary education institutions have embraced e-learning in a major way, many are looking for a clear model to guide their ongoing development of resources and enhance their support processes. It is clear that a series of signposts or a map that might guide institutional planners in areas of resource allocation and staff and student support has some merit.
ii. An accepted framework might also provide academics with the necessary means to encourage greater institutional involvement and provide University management with the framework necessary to frame long term institutional planning.

iii. Support for institutional planning might be enhanced by the ability of an institution or even a school to benchmark its current capability in an effort to identify and prioritise necessary improvements in its current practices. The lack of a unifying framework for e-learning makes it difficult for institutions to compare themselves against other bodies in meaningful ways. Importantly the model would allow for different technical platforms, organisational models and pedagogical beliefs. This might aid inter- and intra- institutional collaboration by allowing entities to identify areas in which improvements may produce the most immediate value as well as establish a framework for collaboration on future initiatives.

iv. Perhaps most importantly, like the CMM, the model might form the basis for an ongoing discussion within the e-learning community with a view to identifying the key practices necessary for achieving improvements in e-learning activities.

In order to help the identification of those practices, we have reframed the CMM in the context of e-Learning in order to identify potential outcomes rather than define key activities that lead to these outcomes:

e-Learning Maturity Model: Framework	
Level	**Focus**
5: Optimising	*Continual improvement*
4: Managed	*Ensuring the quality of both the e-learning resources and student learning outcomes*
3: Defined	*Defined process for development*
2: Planned	*Clear objectives for e-learning*
1: Initial	*Ad-hoc processes*

The authors recognise that the value of this framework will be somewhat debatable, especially for those that advocate a more decentralised view on e-learning; however, this debate itself would seem a worthwhile outcome for considering the use of an adapted maturity model. Importantly, the model does not presuppose any particular pedagogical approach, but rather recognises that individual institutions need to consider and adopt pedagogies appropriate to their particular organisational context. The framework is designed to highlight the value of developing a clearly articulated approach for guiding the development of e-learning resources rather than require any particular approach. Another common criticism of process models is that an excessive focus on compliance loses sight of the importance of the context and outcomes, hopefully this can be avoided by the collaborative development of a rich ecology of outcomes as an initial starting point.

With this in mind, the following sections present a possible outline of what the model might look like and provides an indication of the outcomes for each level.

An Institutional Improvement Framework

At an institutional level, the emphasis of the model is on guiding improvements in e-learning that move from the realm of an ad-hoc process based on individual initiative to an integrated process that delivers demonstrable improvements in areas like student learning.

In adapting the model to the domain of e-learning we have suggested a number of changes. Firstly, we describe the levels as Initial, Planned, Defined, Managed and Optimised. Here there is a slight change to the second level to move away from the software engineering notion of repeatability to one that emphasises a planned rather than ad-hoc approach. We have also broken each of the levels down to reflect some of the key issues associated with e-learning. We have defined these areas as: student learning, resource creation, project management and support and organisational management. Breaking the levels down provides a more coherent approach to considering the complex array of outcomes that might occur in each of the levels. Table 1 below provides an overview of what we believe the outcomes of an e-learning maturity model might look like at the institutional level. It is worth stressing that we do not see this as a finished model but simply a basis for an emerging discussion and as such it does not define the key processes that would lead to the outcomes indicated.

Key Outcomes for Level 1: Initial*: No formal process*

Student learning

- Resource creation intended to address specific teaching goals informally identified
- Assessment unrelated to changes in teaching and learning processes
- No formal preparation made to facilitate introduction of the new resources
- Little or no consideration of pedagogical implications

Resource creation

- Resource development undertaken by individual staff
- No formal plans for the design and delivery of resources
- Little or no formal tracking of intellectual property of created material
- Technology decisions made for their own sake rather than being driven by principles and experience of educational design

Project, Support

- Limited peer support of resource creation in projects
- Poor or incomplete identification of financial and other requirements
- Little or no use made of specialised facilities for technical and pedagogical support

Organization

- Management oversight limited to financial reporting

Within this model, institutions at **level 1** are characterised by an ad-hoc approach to e-learning. Individuals developing material for narrowly defined purposes with only limited or unclear educational benefit drive the e-learning process. Academics are generally responsible for all aspects of resource creation with little peer support. Management of e-learning projects is generally restricted to achieving the most output for limited funding. The biggest cost factor is academics' time and there is little or no recognition for work done in terms of workload considerations or research outputs. Appropriate pedagogical models are not considered or utilised.

Key Outcomes for Level 2: Planned: *Deliberate process*

Student learning

- Specific areas of student need identified and addressed by academics
- Student learning evaluated upon delivery of the completed resources
- Informal use of standard pedagogical models

Resource creation

- Student and staff needs are taken into account when determining requirements

Project, Support

- Use of a consistent approach to the development of e-learning resources
- Developed plans for the creation of e-learning resources with identified goals
- Established educational objectives for resources

Organization

- Creation of resources is supported by academic management
- Course evaluations conducted to check student perceptions of success

Institutions at **level 2** have adopted a more planned approach to e-learning. Feedback gathered from end-of-course evaluations is used to refine the tools and techniques used. Development of resources is generally part of some overall plan with clearly identifiable goals usually based on an evaluation of e-

learning research literature. Despite the more planned approach, the value of e-learning is judged largely on student perceptions rather than measured educational outcomes. Specific pedagogical models informally identified or used without understanding their assumptions and limitations. Work is still generally undertaken by individual academics but may now be supported through access to small teaching grants. Recognition is now in the form of teaching awards but little consideration is given when developing workloads requirements or judging research outputs.

Key Outcomes for Level 3: Defined: *Structured and integrated process*

Student learning

- Strategies to address student needs reflected in University plans
- Course design practices are modified where necessary to reflect project outcomes and impact on student learning
- Pedagogial models formally identified for individual courses

Resource creation

- Intellectual property policies well defined
- Specifically tagged funding available to support resource creation

Project, Support

- Policies and standards for resource creation and delivery established
- A well-defined and documented process to create resources is established
- Specialized technical support and educational development expertise is available through centralised unit
- Peer reviews of resources are conducted

Organization

- Creation of useful resources is formally recognized by the organization and included in policies and procedures for promotion and tenure
- An organizational vision and strategy for e-learning is developed
- Development of an organization level approach to the integration of systems
- Organizational support programmes established for staff and students

Institutions at **level 3** have begun to integrate e-learning issues into the University teaching and learning or strategic plans, often developing an e-learning vision. Support of staff and students is generally facilitated and resourced through units or staff with specific responsibility for flexible learning initiatives. These units provide academics with access to specialist resources like educational developers, graphic designers and programming expertise. The use of specialists encourages a more standardised approach to developing resources and also the formal identification and use of appropriate pedagogical models for the course. At the institutional level there are moves to ensure integration of organisational data and systems. Specific funding is now available for e-learning projects and Schools have begun to recognise contribution to e-learning as part of workload considerations.

Key Outcomes for Level 4: Managed: *Organisational approach*

Student learning

- Student learning outcomes are formally evaluated
- Standard pedagogical approaches identified and documented

Resource creation

- Resources are managed as part of an organisational approach to content management
- Reusable intellectual property is identified and catalogued for reuse
- Student usability of the resources is regularly assessed

Project, support

- Project selection is based on detailed information about past projects
- Formal procedures exist for identifying resources that have reached the end of their life

Organization

- Clear educational effectiveness metrics and associated goals are established
- Organizational audits of e-learning performance regularly conducted

Institutions at **level 4** have developed useful criteria for evaluating e-learning in terms of improved student outcomes rather than just perceptions. Information on total cost of ownership, development costs and student usage is regularly collected and used as feedback for future projects to ensure maximal use of resources. Learning objects are catalogued and managed to assist use across the organisation with due consideration of intellectual property ownership. Development of reusable e-learning objects is recognised as part of academic outputs. The organization has identified a set of standard pedagogical approaches which are appropriate to the institutional learning context and graduate characteristics and has documented these for easy and effective use by staff.

Key Outcomes for Level 5: Optimised*: Continual improvement of educational effectiveness*

Student learning

- Improvements in educational effectiveness are regularly evaluated
- Evaluations based on a formal research programme
- Pedagogical models redeveloped to reflect changing environment and student needs

Resource creation

- New resource creation is driven by formally identified needs which are generated automatically by the strategic planning, operational monitoring and reporting processes in use
- Formal process for regular re-evaluation of resources in their learning contexts is used to identify needs for incremental improvement and ongoing maintenance support

Project, support

- Project metrics are used to evaluate and drive changes in methodology and resourcing
- Learning outcomes are used as the principle drivers for new project

Organization

- Improving organizational capability associated with inter University collaboration
- Regular external review of ongoing e-learning and resource creation strategy

Institutions at **level 5** have developed a programme for regularly auditing the educational effectiveness of e-learning initiatives. This evaluation is the basis of a formal research project that is designed to ensure continual improvement of e-learning and ensure that the learning outcomes are the principle drivers for any new project. The pedagogical models in use are regularly tested and improved as necessary to reflect the changing environment and outcomes of research and evaluations. Resource development and

development of support processes are now an inter university collaboration designed to maximise resource utilisation.

Each of these levels is designed to provide a view of an institution developing a more coherent and integrated approach to the development, utilisation and support of e-learning. For the sake of completeness the model should probably also have a level 0 that is indicative of a state where no e-learning activities are undertaken. Obviously the separation of these key outcomes is presently a relatively arbitrary approach based mainly on the authors' readings of the literature and experience with e-learning adoption across a number of Australian and New Zealand Universities. Despite this, we would suggest that the model provides a useful outline for consideration of the key processes that might lead to organisational improvement in the area of e-learning. Obviously the next step in the development of the model would be to establish a collaborative research programme designed to identify key activities undertaken by successful institutions that have lead to the improvements in e-learning outlined in the model.

Conclusions

As George Box (1979) said "all models are wrong; some models are useful". The paper demonstrates that it is possible to adapt the CMM to provide a road map to aid individual or institutional efforts aimed at improving organisational processes associated with e-learning. The real question is whether this is a useful process. We would suggest that while the models are incomplete they already offer some key benefits.

We believe that both these models provide a useful framework for encouraging improvements in e-learning. They have been used informally within the University Teaching Development Centre at Victoria University of Wellington as a guide for a number of useful activities:

- to frame the development of an e-learning training programme for staff;
- as a roadmap for staff looking to adopt or improve their use of e-learning;
- as a means of getting members of a school to agree on the directions for adopting e-learning;
- as a framework for the consideration of University infrastructure projects; and
- as a means of encouraging institutional support for e-learning.

It is hoped that a more formalised model developed through a joint research programme will assist in attracting management support for key e-learning improvement activities and may form the basis for formal agreements for intra-institutional collaboration. At the very least, the discussions and consideration of common goals should develop a sense of the different environments institutions are operating within and hopefully reduce an unnecessarily competitive culture while also establishing shared resources such as e-Learning object repositories.

It is important at this stage to identify an important caveat for the use of the models. One of the main criticisms aimed at any maturity model is the prescriptive nature of the framework. It is important that any use of the model avoid displacement of goals from the true mission of improving process to the artificial mission of achieving a higher maturity level (Bach, 1994). Clearly there will be a number of successful organisations undertaking e-learning initiatives who have not followed the process described in the model yet still achieve continual improvement in their processes. We would argue that the model provides a useful set of guides but that its use needs to be considered in the context of each institution's environment and particular approach to e-learning.

Finally, the frameworks presented here do not provide a list of the key processes necessary for improvements in e-learning but merely an indicative set of possible outcomes for defining each of the possible levels in a maturity model. Obviously, the next step in the development of the model would be to establish a collaborative research programme designed to identify key activities undertaken by successful institutions that have lead to the improvements in e-learning.

References

Bach, J. (1994). The immaturity of CMM. *American Programmer, 7*(9), 13-18.

Bain, J. (1999). Introduction to the special edition. Learner-centred evaluation of innovations in higher education. *Higher Education Research and Development, 18* (1), 57-75.

Bates, T. (2001). The continuing evolution of ICT capacity: The implications for education. *The Changing Face of Virtual Education*. (pp. 29-46). G. M. Farrel. Vancouver, Canada, The Commonwealth of Learning.

Butterfield, S., Prebble, T., Barnett, T., Brimblecombe, T., Campbell, N., Eadie, M., Higgens, A., Hinchcliff, J., Hond, R., & Keegan, T.T. (2002) *Highways and pathways: Exploring New Zealand's e-learning opportunities.* Report of the E-Learning Advisory Group

Box, G. (1979) Robustness in the strategy of scientific model building. In R. Launer, & G.Wilkinson (Eds.) *Robustness in Statistics*, cited by Temple, J (1998) Robustness tests of the augmented Solow model, *Journal of Applied Econometrics*, 361-75

Curtis, B., Hefley B., & Miller S. (2001). *People Capability Maturity Model® (P-CMM®) Version 2.0*, Software Engineering Institute, Carnegie Mellon.

Hanna, D. E. (1998). Higher education in an era of digital competition: Emerging organizational models. *Journal of Asynchronous Learning Networks, 2* (1), 66-95.

Herbsleb, J., Carleton, A, Rozum, J., Siegel, J., & Zubrow, D. (1994). *Benefits of CMM-based software process improvement: Initial results*, Software Engineering Institute, Carnegie Mellon.

Holt, Dale, Rice, M. Smissen, I., & Bowly, J. (2001). Towards institution-wide online teaching and learning systems: Trends, drivers and issues. In G. Kennedy, M. Keppell, C. McNaught & T. Petrovic (Eds.), *Meeting at the Crossroads: Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education*. (pp. 271-280). Melbourne, Biomedical Multimedia Unit, The University of Melbourne.

Humphrey, W. S. (1994). The personal software process. *Software Process Newsletter, Technical Council on Software Engineering, IEEE Computer Society, 13* (1), SPN 1-3.

Inglis, A., Ling P., & Joosten, V. (1999). *Delivering digitally: Managing the transition to the knowledge media*. London, Koogan Page.

Karelis, C. (1999). Education technology and cost control: Four models. *Syllabus Magazine, 12* (6).

Kenny, J. (2001). Where academia meets management: A model for the effective development of quality learning materials using new technologies. In G. Kennedy, M. Keppell, C. McNaught, & T. Petrovic (Eds.), *Meeting at the Crossroads. Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education*. (pp 327-334). Melbourne, Biomedical Multimedia Unit, The University of Melbourne.

Laurillard, D. (1993). *Rethinking University Teaching - a framework for the effective use of educational technology*. London, Routledge.

Laurillard, D. (1997). *Applying Systems Thinking to Higher Education*. Milton Keynes, Open University.

Laurillard, D. (1999). A Conversational Framework for Individual Learning Applied to the Learning Organisation and the Learning Society. *Systems Research and Behavioural Science, 16*, 113-122.

Lawlis, P. K. Flowe, R. M. & Thordahl, J. B. (1995). A correlational study of the CMM and software development performance,. *Crosstalk: The Journal of Defense Software Engineering, 8* (9), 21-25.

Paulk, M. C. (1996). Effective CMM-based process improvement. In *Proceedings of the 6th International Conference on Software Quality*, Ottawa, Canada.

Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability Maturity Model, Version 1.1. *IEEE Software, 10* (4), 18-27.

Radloff, A. (2001). Getting Online: The challenges for academic staff and institutional leaders. In G. Kennedy, M. Keppell, C. McNaught & T. Petrovic (Eds.), *Meeting at the Crossroads: Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education*, (pp 11-13), Melbourne, Biomedical Multimedia Unit, The University of Melbourne.

Reid, I. C. (1999). Beyond models: developing a university strategy for online instruction. *Journal of Asynchronous Learning Networks, 3* (1), 19-31.

Ryan, Y., B. Scott, Freeman, H. & Patel, D. (2000). *The Virtual University: The Internet and resource-based learning*. London, Kogan Page.

SECAT (1998). *Why Would You Want to Use a Capability Maturity Model*, Systems Engineering Capability Assessment & Training.

Strauss, H. (2002). The right train at the right station. *Educause Review*, (May/June), 30-36.

Young, B. A. (2002). The paperless campus. *Educause Quarterly, 25* (2), 4-5.

An e-Learning Maturity Model. Level 0: Not done at all Level 1: Ad-hoc processes Level 2: Clear objectives for e-learning Level 3: Defined process for development Level 4: Ensuring the quality of both the e-learning resources and student learning outcomes Level 5: Continual improvement. University Teaching Development Centre. Victoria University of Wellington http://www.vuw.ac.nz/utdc/. Marshall & Mitchell (2002) 18. Structure of the Model. Maturity Levels. Indicate Process Capability. Contain Key Process Areas. E-learning maturity model. From Wikipedia, the free encyclopedia. The E-learning maturity model (eMM) in software engineering is a model to assess the capability of electronic educational technology (e-learning) processes. YouTube Encyclopedic. 1/3.Â The eMM provides a set of thirty-five processes, divided into five process areas, that define a key aspect of the overall ability of institutions to perform well in the delivery of e-learning. Each process is selected on the basis of its necessity in the development and maintenance of capability in e-learning. All of the processes have been created after a programme of research and testing, conducted internationally. The E-Learning Maturity Model (eMM) provides a means by which institutions can assess and compare their capability to sustainably develop, deploy and support e-learning. The eMM is based on the ideas of the Capability Maturity Model and SPICE (Software Process Improvement and Capability dEtermination) methodologies. The underlying idea that guides the development of the eMM is that the ability of an institution to be effective in any particular area of work is dependent on their capability to engage in high quality processes that are reproducible and able to be extended and sustained as demand grows.