

Can the P-CMM be Used to Implement Agile in Organizations?

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More and more organizations are adopting agile ways of working. The descriptions of agile methodologies provide guidance on how to manage on a team level, but there is limited information on changes needed at higher levels in the organizations. Also, agile assumes that an organization has a professional workforce that is managed and supported in such a way that it is able to do its work effectively. The People Capability Maturity Model® (P-CMM) helps organizations establish and improve that workforce, and assures the right conditions are established for teams to excel their performance. This article describes how to deploy the P-CMM to support agile. It provides a road map of P-CMM process areas that an organization can implement as a start, to reap quick business benefits. The process areas do not replace agile methods; they are used in addition to the agile methods to support their implementation. This article helps an organization focus on the critical people issues that need to be addressed when migrating to agile, such as communication, work environment, compensation, staffing, competency development, and culture. The changes themselves can be implemented in an agile way, enabling a flexible organization that is able to continuously improve.

Key words

agile, competency, culture, P-CMM, People-CMM, road map, skills, teams, workforce

SQP References

Integrating Improvement Initiatives:
Connecting Six Sigma for Software,
CMMI, Personal Software Process,
and Team Software Process

vol. 5, issue 4

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INTRODUCTION

More and more organizations are adopting agile ways of working. They see the benefits for teams—enabling them to continuously deliver working software on time—but they often experience difficulties interfacing agile teams with the existing organizations. There is a need for new ways of managing and steering these autonomous teams in the organization.

The descriptions of agile methodologies provide guidance on how to manage organizations on a team level, but there is limited information on changes needed at higher levels in the organizations, and most of what is available aims at smaller organizations. Also, agile assumes that an organization has a professional workforce that is managed and supported in such a way that it is able to do its work effectively. The People Capability Maturity Model® (P-CMM) (Curtis, Hefley, and Miller 2009) helps organizations to establish and improve that workforce, and assures the right conditions are established for teams to excel their performance.

This article first describes ideas on how to deploy the P-CMM to support agile teams. Since the P-CMM was developed independent from agile and before agile methodologies became available, interpretation is needed on how to deploy P-CMM in an agile context. To support using the P-CMM, the article provides a road map of P-CMM process areas that an organization can

implement as a start, to (using agile principles) reap quick business benefits.

The ideas proposed in this article are based on the author's experience with, and study of, literature on the P-CMM, agile, and related models like the CMMI. The ideas have been reviewed by people with significant experience with agile and/or the P-CMM. Their feedback has helped to select those P-CMM process areas that are expected to provide the most value to agile. To the author's knowledge, there is no publication yet on deploying the P-CMM for agile. The purpose of this article is to share initial ideas and experiences with agile and the P-CMM, and to get people to think about the possibilities of the P-CMM in the implementation of agile in organizations.

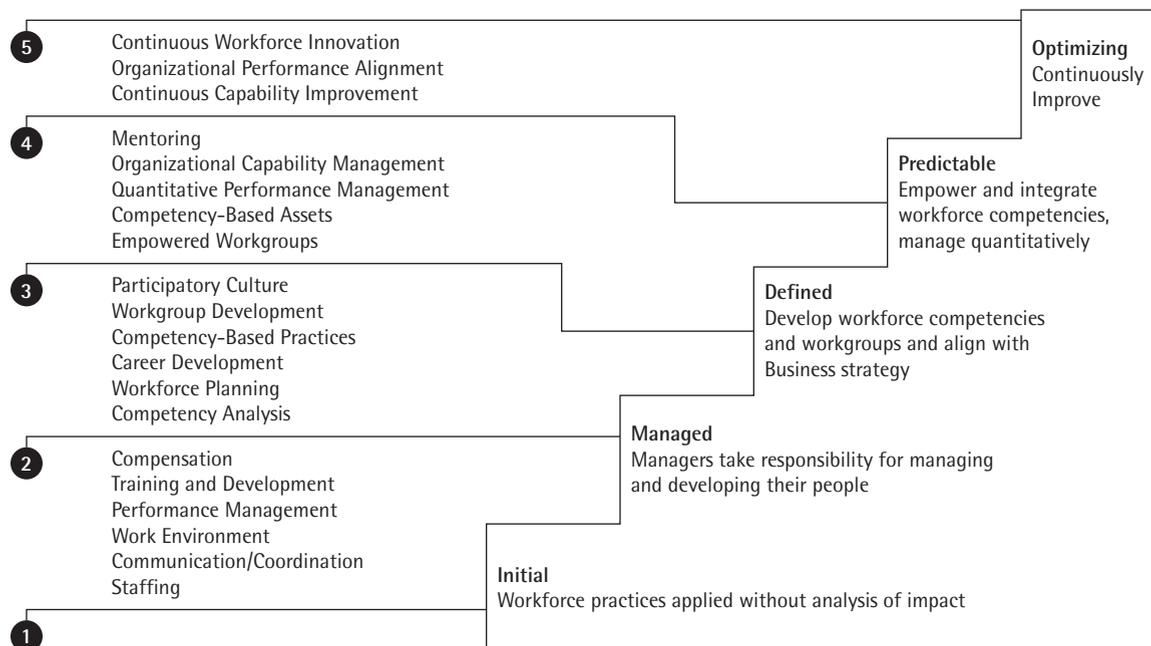
The process areas in this road map do not replace agile methods; the aim is to use them in addition to the agile methods to support their implementation. Also, implementing agile needs different disciplines and roles than those mentioned in most agile methods (like human resources and middle management), which are within the scope and purpose of the P-CMM. Finally, since the success of agile depends on having competent and skilled professionals, addressing people issues that are relevant for agile increases the acceptance and effective deployment of agile in organizations.

The P-CMM

The purpose of the P-CMM (Curtis, Hefley, and Miller 2009) is to support organizations in addressing critical people issues. The model has been available since 1995, and version 2.0 was released in 2001. It has a similar structure as the CMMI, consisting of five maturity levels with process areas. Each process area defines the goals that it aims to fulfill. A process area consists of a set of related practices. The P-CMM aims to support those responsible for managing and developing the workforce; these are typically the management and human resource functions in the organization (see Figure 1).

Since its release in 1995, the P-CMM has been used throughout the United States, Canada, Europe, Asia, Africa, Australia, and India to guide and conduct organizational improvement activities. While much of the early experience in applying the P-CMM was in the software and information technology industries, its use has now spread to a variety of industries, including business process outsourcing, hospitality, consulting, construction, insurance, pharmaceuticals, government agencies (including defense agencies), defense contractors, energy/utilities, and banking/financial services, as well as software development and management information systems (Curtis, Hefley, and Miller 2009, 84).

FIGURE 1 P-CMM process areas



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Agile Methodologies

Though some of the agile methods and principles have been around longer, the Agile Manifesto (Agile Alliance 2001), established in 2001, is generally considered to be a main milestone in the definition and deployment of agile. This manifesto defines the values and principles of agile methods and their purpose: “to uncover better ways of developing software by doing it and helping others do it.” Agile methods support teams and projects by providing principles, processes, techniques, and tools. This article considers agile methods for software development methods (such as extreme programming, Crystal, and so on) and project management methods (such as Scrum, agile project management, evolutionary development, and so on). It is not based upon any specific agile method, and examples related to several methods are used to show how agile can be performed in an organization.

An Agile P-CMM Road Map

Almost all of the process areas from the P-CMM are relevant for organizations that deploy agile methodologies. Many organizations that adopt agile, however, experience similar problems related to managing the workforce. Therefore, this article suggests a first set of P-CMM process areas that helps organizations get started and reap quick benefits by focusing on the main issues that hinder agile integration in organizations. The P-CMM road map for agile described in this article contains six process areas that cover the biggest and most experienced problems when migrating to agile. The road map supports starting with a large model like the P-CMM (see sidebar “What is a CMMI road map?”).

Some of the problems organizations that implement agile experience are (Berteig 2006; Eckstein 2004; Leffingwell 2007; Boehm and Turner 2005):

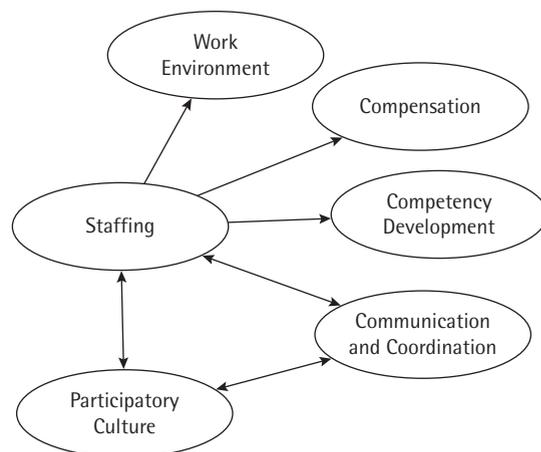
- Communication difficulties between new agile teams and the existing line organization
- Problems in fulfilling the higher work environment demands from agile teams
- Difficulties establishing ways to reward and support team culture, behavior, and results
- Assuring the availability of the right competencies and skills in time when teams need it
- Finding new ways to share and reuse knowledge and experience across teams
- Existing management styles that conflict with the agile principles

The P-CMM contains specific process areas that support these problems, and helps organizations manage the workforce and increase their ability to meet the agile demands. These process areas support the rollout and deployment of agile processes and methods so they can be used in addition to those processes and methods. Also, the process focuses on the organizational changes that are needed to migrate to agile, things that are often forgotten when an organization implements agile methods.

The main purpose of the P-CMM road map for agile is to focus on the main issues that need to be solved to ensure agile teams can deliver. This requires a small, action-focused set of process areas. The P-CMM road map for agile contains six process areas that cover the biggest and most experienced problems when migrating to agile.

The suggested process areas for a P-CMM road map for agile are shown in Figure 2. The core of the road map consists of three process areas—staffing, communication and coordination, and participatory culture. Staffing assures the availability of teams of professionals, communication and coordination assures they have the right information and are able to collaborate effectively, and participatory culture empowers teams and enables them to take effective decisions. The practices in these three process areas support each other and therefore should be aligned as much as possible. They are the base for three other process areas. Compensation rewards the teams for their contribution toward the company results, where work environment provides them with the means needed to work efficiently, and competency development enables them to continuously improve themselves to deliver value.

FIGURE 2 Process areas in the agile P-CMM road map



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The next sections describe the process areas from the road map, and explain how they can help organizations migrating to agile. Appendix 1 shows how the process areas from this road map relate to the problems that organizations experience when implementing agile.

The Process Areas

Staffing

The staffing process area assures the organization will have professionals with the required skills and competences, and that they are assigned to teams. Agile relies on above-average skilled and experienced professionals. Therefore, organizations need to understand the staffing needs by involving the team in staffing decisions. Where needed, candidates with the right agile knowledge and skills are recruited. Agile puts strong requirements on the so-called “soft skills” like communication, collaboration, and feedback; special attention is needed when recruiting new professionals. To create and maintain high-performing teams, it is important that teams are kept stable where possible and that changes to the teams are carefully managed, involving the team members as much as possible. For larger agile organizations working with multiple teams, it may be necessary to deploy specific methods for team composition, like Belbin. Finally, the organization should have insight into the needed capacity to assure the professionals working in the teams will be able to do the work within a 40-hour workweek.

One organization the author worked with found out that, due to frequent changes in the team composition, it had difficulty implementing effective teamwork. It focused on keeping stable teams. This turned out to be quite difficult initially. First, there was a shortage of people, so whenever a new project was started there was always pressure on the running projects to release people. Next, there often were priority changes in the projects, which made it difficult for lower-priority projects to keep people. Also, occasionally teams had a lack of specific knowledge and skills, so then the team itself requested to add somebody. The organization tried to manage team changes as much as possible, but even when it did it in a controlled way, it always had an impact on the team’s productivity, since a team had to stabilize after every change, which resulted in temporary performance dips. The organization came up with a solution—it defined fixed teams based upon product lines, and focused upon managing work packages

What is a CMMI road map?

CMMI road maps are a goal-driven approach to selecting and deploying relevant process areas from a Capability Maturity Model (CMM). The aim of a road map is to provide guidance and focus for effective adoption of a CMM. The road map approach was initially developed to support deployment of the continuous representation of the Capability Maturity Model Integrated (CMMI). Often, potential CMMI users did not select the continuous representation because they found it difficult to pick “the right set and order” of process areas for their situation. Therefore, they took the staged representation because they didn’t know where to start in the continuous representation. The CMMI Roadmaps report (Cannegieter et al. 2008) describes five different road maps to support and organization, based on their biggest need for improvement. This article uses the same approach to pick process areas from the P-CMM for organizations that want to deploy agile practices to enable effective and efficient implementation and institutionalization of those practices.

for the teams instead of managing team composition. The result was that teams became more coherent and better at managing and improving themselves. Team members got more chances to work together and build relationships. One drawback was that occasionally team members did not work together on tasks, since tasks that were not related were combined into a work package for a team increment in order to use the available capacity. But even in those situations, team members supported each other, and the team as a whole performed better. The organization learned that, though it is not easy to keep teams stable, it is possible and it can really give a performance boost to the teams.

Participatory culture

The participatory culture process area assures that agile teams are empowered and capable of making the decisions needed to be effective. To be able to make decisions, agile teams need to know the business goals and direction; their decisions should lead to business value. It should be clear which decisions agile teams are allowed and expected to take, and how these decision are related to the higher-level decisions in the

organization. There are several agile methodologies that describe how decisions should be taken (like Scrum, Crystal, and DSDM); they assure the professionals are sufficiently involved in the decisions, and as a result can assure they deliver what is decided. Agile coaches can assist teams and managers in implementing the agile decision structure, and assure the process will support the organization in meeting its business goals, and the teams in delivering value.

Communication and coordination

The communication and coordination process area assures that agile teams have the right information to organize their work, and are able to communicate and coordinate effectively with all stakeholders. Many agile teams have a lack of information regarding the organizational mission, strategies, and main results that are required. They are, however, expected to make decisions on what to develop and how, based upon what is required. This is a significant difference with the “traditional” organization, where line and project managers are responsible for these kinds of decisions, based on information they receive about organizational goals and work policies and processes. To empower teams, it is essential that they receive sufficient and timely information. Also, teams must be supported to develop their communication and coordination skills; agile expects them to be able to collaborate with their stakeholders and make decisions. Finally, in agile teams can raise impediments that hinder them in doing their work. These impediments must be taken up by the organization and need to be solved with sufficient priority to assure that teams can meet their commitments.

One way to improve team performance is to empower teams. The author remembers one organization that put much emphasis on informing its workforce and spreading information across the organization. The philosophy behind this was that, if teams have to make decisions, then they need to have sufficient information. So if one wants to improve team decisions, then one needs to increase the communication in the organization. Several managers experimented with sharing information using different means and settings. They would distribute e-mails to their employees, and arrange discussions in their department meetings on relevant topics. They also made it clear that if a team wanted certain information, the team could come forward and discuss it with them. Looking back, there were several situations where teams became more able to manage

their work, given the information they had. Managers saw that sharing information, which initially meant more work for them, improved collaboration within the teams, and between the teams and themselves, which saved them time. Based on the information, teams were able to handle situations in their work better, and where they could not solve the problems themselves, it was easier to discuss the problems with their managers to reach a solution.

Compensation

The compensation process area assures that individuals are rewarded for their contribution to and value for the organization. The biggest difference between agile and traditional organizations is that it is the teams that deliver value for their customers, and they deliver this value continuously in iterations. Reward systems need to support and stimulate team behavior. This implies that the organization as a whole must recognize the value delivered by the team, and adjust the compensation criteria to reward this. Since most compensation strategies are based on functions, responsibility and authority, and hierarchy, implementing agile usually has a great impact. Changes to the compensation strategy need to be developed, discussed, agreed upon, and communicated within the organization; perhaps a separate rewarding system for agile should be considered. It is important to communicate in such a way that professionals who are not working in the agile teams do not feel threatened by the changes, and are open to the new ways of compensation. Given the frequent delivery of agile, there may be a need to introduce compensation systems that reward the delivered value quickly. This could be a bonus system, variably salary depending on timely delivery of quality software that helps the users to become more successful. Finally, nonsalary-based reward mechanisms should be considered, defined, and deployed, such as public recognition of results, awards, team-building activities, memberships of professional communities, and, of course, managers who simply compliment teams on the results they reach. In the author's opinion, many organizations struggle to adopt their compensation systems to support agile, which can hamper team building significantly and make the implementation of agile less effective. This makes compensation a very important process area in this road map to agile. There is still a lot to learn about deploying compensation for agile, so it is important to share experiences and learn from each other wherever possible.

Work environment

The work environment process area assures that agile teams have the physical working conditions, tools, and resources needed to work effectively. Professionals in agile teams must be able to communicate and collaborate; therefore, they need a working space where they can share and improve their ideas on how to solve the problems at hand. In many larger organizations, agile teams are spread across locations, countries, and sometimes even time zones, or they need to collaborate and communicate with teams at different locations. This requires specific communication tools, like high-speed Internet connections, working spaces for both “loud work” and “silent work,” and sometimes even state-of-the-art tools like video walls and virtual working environments. An organization has to assure that these tools and needs are fulfilled, enabling teams to perform and deliver. Also, the organization needs to understand how agile teams work in practice and why, to assure that practices like planning games, stand-up meetings, and pair programming are accepted and supported by managers and supporting functions. Finally, given the high speed with which agile teams execute their iterations and change direction where required, organizations must assure they can deliver and support the work environment in a timely matter. Delivery times in agile organizations need to be significantly shorter to ensure the agile teams meet their iterative delivery dates.

Competency development

The competency development process area assures that professionals develop themselves continuously to be able to deliver value for the organization. Working in teams requires more generalists—professionals who are able to perform different activities (like design, coding, and testing)—so the activities can be taken up by more than one team member. Mechanisms like coaching and pair programming can be used by professionals to develop new skills on the job, but often training is also needed to assure that professionals have the required competencies. Feedback is essential to learn; teams deploy demo sessions to get feedback on the developed product, and they use retrospectives to look back on their ways of working in order to continuously learn and improve, both individually and as a team. To enable learning across teams and projects, mechanisms need to be established to exchange experiences and best (and worst) practices,

like communities of practices, knowledge management systems, recognized experts, and so on.

At one time, a team the author was working with lacked testing knowledge. It had one tester, who was the only person who could pick up engineering tasks with test work. In a retrospective, the team concluded that this did not work, and they decided that other team members would pick up testing engineering tasks, and do them paired/coached with the team member with test skills. Several team members developed their testing skills, and after some increments, they were able to pick up testing tasks. Occasionally, they still paired with the test member, or with other colleagues who had developed their testing skills, but that’s pairing, which is a “normal” agile practice. They went from apprentice to journeyman in a couple of increments, so by investing time in the development of a competency, the team members learned from each other and, as a result, became able to handle their work better.

The P-CMM road map for agile contains six process areas that cover the biggest and most experienced problems when migrating to agile. This does not mean that other process areas on level 2 and 3 are not relevant, but that the focus should be on those six areas to succeed. The underlying assumption is that process areas like career development are usually sufficiently institutionalized in organizations that decide to migrate to agile. The basic processes in training and development, workforce planning, and competency analysis can be used to support agile, assuming the organizations that migrate to agile are sufficiently familiar with these processes, and that the impact of implementing agile for the practices in these process areas are limited. agile migration will most likely impact practices from the process area’s competency-based practices, but this impact will be driven by the process area’s compensation and competency development; therefore, those two areas are included in the road map. Also, most of the activities from workgroup development are covered in the agile method (for example, Scrum); the assumption is that by applying the agile methods, the goals of that process area will be met. Assuming most organizations already focus on deploying the agile methods, the author excluded workgroup development from the road map. Finally, many of the agile methods include mechanisms for setting and agreeing upon expectations, and providing feedback on the actual performance, which covers the activities of performance management. So for similar reasons as

for workgroup development, the author excluded this process area from the road map.

There are some level 4 process areas that support further improvement of agile practices, such as competency integration, empowered workgroups, and competency-based assets. These process areas, however, require that level 2 process areas are sufficiently in place, and are therefore not recommended as a first step of the P-CMM for agile. Once P-CMM based improvements are making sufficient progress and are showing results, it becomes interesting to investigate and deploy these process areas.

The P-CMM is a staged model, which consists of five levels with process areas. It strongly recommends deploying process areas level by level, so first implementing all process areas from level 2, then for level 3, and so on. The road map described previously leaves out some process areas at level 2, based upon the assumption that most organizations deploying agile have those areas at least partly implemented, and experience little to no problems with the related practices. The main purpose of the road map is to focus on the main issues that need to be solved to ensure agile teams can deliver.

Deploying the P-CMM in an Agile Way

Even when using a road map with a limited set of process areas, the scope and impact of the changes needed to migrate an organization to agile will be significant. In most organizations, it is not feasible to make all changes at once. So, a mechanism is needed to gradually introduce the changes, and to assure that all changes will be institutionalized. A possible solution is to use the agile approach and implement the changes in a Scrum-like way. This approach has been used successfully to introduce changes in a large company, as described in *SPI: The Agile Way* (Linders 2009). A similar approach could be used with the P-CMM to migrate to agile.

A first step is to do an assessment with the P-CMM process areas from the road map. This assessment provides insight on the current state of practice in the organization. Based on the findings from the assessment, a prioritized list of changes is made. The changes are implemented in the organization by a multidisciplinary team. They are implemented in small iterations, and every iteration is finished with a retrospective to learn and improve.

This agile approach to SPI has several advantages. Working in iterations, with frequent priority setting,

increases the commitment to change. It also helps to adopt the SPI program to changes in the organization. The early feedback significantly decreases the lead time of the adoption of changes, and the quality of the changes. Finally, the agile SPI approach has some “golden rules” (Linders 2009) that help to improve continuously, and become even more effective.

In a P-CMM assessment one can ask questions like:

- How does one compose teams in the organization?
- How are teams involved in decisions in the organization?
- What means are used to distribute information in the organization to keep teams informed on relevant issues?
- How does the organization stimulate and reward team behavior?
- Which arrangements have been made to assure that teams have a suitable environment to work in?
- What are the possibilities for team members to develop and further improve competencies?

There are several kinds of assessments defined for the P-CMM based upon the Standard CMMI Assessment Method for Process Improvement (SCAMPI) (SEI 2006). The P-CMM road map described in this article can be assessed based on the different classes (A, B, or C) described in the SCAMPI method. In most cases, the choice would be to do a class C or B assessment, depending on the reliability and rigor that is required by the organization in the findings. If a capability level rating is required, then a class A assessment must be done.

CONCLUSIONS

In the author’s opinion, the P-CMM can be used to implement agile in organizations. The road map of the P-CMM process areas described in this article helps an organization focus on the critical people issues that need to be addressed when migrating to agile, such as communication, work environment, compensation, staffing, competency development, and culture. Several examples have been given in this article that show how the implementation of practices from the P-CMM has helped organizations to adopt agile practices and improve team performance even further. These changes can be implemented in an agile way, enabling a flexible organization that is able to continuously improve.

Appendix

Mapping between common problems implementing agile and the P-CMM road map for agile

Process area common problem	PA communication and coordination	PA work environment	PA compensation	PA staffing	PA competency development	PA participatory culture
Communication difficulties between new agile teams and the existing line organization	<ul style="list-style-type: none"> • Communicate vision and main results. • Enable raising impediments 	<ul style="list-style-type: none"> • Understand and visibly support agile ways of working 		<ul style="list-style-type: none"> • Stable teams 	<ul style="list-style-type: none"> • Communication and feedback 	<ul style="list-style-type: none"> • Empower agile teams • Improved decision taking
Problems in fulfilling the higher work environment demands from agile teams		<ul style="list-style-type: none"> • Environment for collaboration and communication • Shorten delivery times of tools and support to teams 				
Difficulties establishing ways to reward and support team culture, behavior, and results			<ul style="list-style-type: none"> • Reward systems based on value • Quick, frequent rewarding • Recognition of professionalism and results 			
Assuring the availability of the right competencies and skills, in time when teams need it	<ul style="list-style-type: none"> • Develop communication skills 			<ul style="list-style-type: none"> • Understand staffing needs • Recruit professionals with agile skills • Assure 40-hour workweek 	<ul style="list-style-type: none"> • Develop soft skills • Focus on creating generalists 	
Find new ways to share and reuse knowledge and experience across teams					<ul style="list-style-type: none"> • Mechanisms for learning across teams 	<ul style="list-style-type: none"> • Agile coaching

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Please join the discussion—we'd like to hear your feedback.

This is open until February 2011.

http://www.linkedin.com/groupItem?view=&gid=1159917&type=member&item=30001127&goback=%2Egmp_1159917