Innovation and Sustainability with Gold Cards

I am not a load factor - I am a free man

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ABSTRACT

An XP team delivers what the customer asks for and is collectively responsible for successful delivery. This can lead to two problems. The first is technical: there can be a lack of innovation because the customer does not necessarily explore options that are technically possible but not currently required. Consequently, cutting-edge knowledge may be slowly lost from the team. The second is personal: team members may not feel that they have individual recognition, and managers may find it difficult to assign credit for individual contributions because of collective responsibility.

Perversely, both of these problems are more noticeable as the team becomes more experienced at executing the XP process. At Connextra, we have experienced this effect over the last two years, and have successfully implemented a new practice called “Gold Cards” that addresses these issues. XP takes away the blame culture; Gold Cards promote a praise culture. Gold Cards allow developers time to explore technical possibilities in a controlled and focused way that leads to innovative stories which give team members a chance to be individually recognized. This has resulted in a noticeable increase in innovation and improved job satisfaction among developers.

Keywords
Extreme Programming, sustainability, cards, motivation, learning, continuous learning

1 INTRODUCTION

Connextra is a 2.5 year old company with 35 employees, working with Internet technologies. When the company was started, the founders were interested in using XP to create their first product. To this end, the company (right down to the design of the office) was based on XP principles.

The physical environment

One of the key XP principles is to program in pairs, and from the second week of development, convex desks were installed to facilitate side by side paired programming. There are no individual desks or computers, and so for access to e-mail there are some “web cafe” style machines where any developer can login as required. There are also several screened booths that are equipped with phones where personal calls can be made, or individual work can be performed. Furthermore, each developer has a locker where they can keep personal items.

20 Iterations and counting

We have been working in this environment for 20 iterations each lasting 3 weeks. Every morning we gather around a planning board and hold a standup meeting where we discuss the progress on yesterday’s tasks, select new partners, and focus on completing the remaining tasks in the iteration. We have found that we have become very good at this mode of work and have rarely missed a delivery target. In effect, we have really seen the benefits of applying the XP process to customer requirements.

Story Processing Machines

As a team, we have a real sense of accomplishment and are always striving to improve our velocity and deliver greater value to our customers. To this end we are constantly looking at our storyboard and trying to check off as many stories as possible. We have become a software factory in the true sense. Worryingly, we began to observe that we were missing something.

Religious Guilt

In conversations with colleagues in other companies, we noticed that we were missing the ability to sit alone at a desk and try out ideas, untroubled by the work of the rest of the team. These colleagues were able to “waste time” on non-deliverables without suffering from the “religious guilt” that such time was not contributing to the project velocity. In our working environment there were only 2 places to be legitimately for any length of time: 1) pairing at a development machine, or 2) at a “web cafe” machine, checking and replying to email. If you weren’t in either place you would feel that you were wasting time. There was no place to be where you could think of new things without feeling guilty. However, any development effort needs to look continually for innovations in technology and process, which often come from the lateral thinking of individuals, rather than a collective focus on task completion.

Spikes were a delay

Once the team had finished the iteration and were preparing for the next planning game, we found that we weren't always able to accurately estimate items being introduced in new user stories. In those cases we would take several days to spike potential solutions and play (to a limited extent) with new technologies. While this helped us give accurate estimates, unfortunately the users viewed it as an activity that was getting in the way of starting the next iteration. We also noticed that this time rarely allowed us to experiment with “blue sky” possibilities because our mind-set was constrained by the existing expectations of both customers and developers. Customers didn’t know what possibilities existed, while developers didn’t know whether they were feasible (if requested).

Positive Recognition

As we have been working together, we have formed a real sense of team. We pair with each other, share knowledge, and have a collective responsibility to make sure that the best job gets done. In a “no blame” culture there also needs to be room for positive contributions that don't detract from the sense of team. Many team members had some great ideas but found that there was no way to explore them without feeling that they were letting the rest of the team down. It is a perfectly human impulse to want to impress your peers with new ideas, but not at the expense of leaving other team members to bear the burden of finishing the committed work.

The dreaded review

As the company grew, more formal personnel procedures were introduced, part of which included a regular review process. This was viewed as a healthy addition to our working practice. However, in a team-based process like XP, it was difficult to point to specific achievements that would allow individuals to be recognized and rewarded. We tried agreeing on action points that would be reviewed in the next period, however in our software machine there was never a good way to make sure that these points were addressed adequately. Again, the religious guilt was kicking in.

Velocity was high, morale wasn't

At about the 15th iteration, we began to notice that while everyone was making sure that they contributed to the velocity, there was a certain sense of dissatisfaction with our success. We are all aware that every day there are new tools, new APIs, and new products that are all likely to have an impact on our business, and we all want to stay ahead of the curve. It's good for an individual’s skills to be able to practice new techniques, and good for morale to sort out aspects of the development environment that are annoying. Some of us tried to work on this stuff after working hours, however a full day of guilt-free paired programming is extremely tiring. An XP practice is the 40-hour week, and we were devoting this to task completion, leaving no room for individual achievements.

Remembering the old days

When you pair-program with people every day, you often reminisce about how it was in the “good old days”. Some of us tried working alone on pet projects after hours and reported back to the others that it was a useful reminder that paired programming is actually a more efficient way of working - you just need a reminder from time to time. Sometimes however, it is nice to work alone for a short duration and have the time to cover new material unhindered by a partner's questions. Furthermore, some days people just feel unsociable and want to work by themselves for a change.

Everything goes gold?

To address these issues we introduced a new practice that we call "Gold Cards". As we are used to planning and working using index cards, we decided that a special kind of card would be a suitable way to integrate a new approach to innovation and sustainability.

2 THE GOLD CARD SYSTEM

A Gold Card is an index card with a gold star on the top left hand corner, a developer’s name, and the month of validity written on it. Each developer is allocated two Gold Cards at the beginning of each calendar month, which makes managing and issuing the cards very easy. This allocation amounts to about 1/10th of a developer's time and is treated as a fixed overhead. Gold Cards can be used at any time during a month, but cannot be carried over into the next month. If a developer has any holidays booked in the allotted time period for the card, then we use an honour system where people pro-rata their Gold Card allowance, rounding to the nearest half day.

Each card grants the developer who has it, one day of work on a topic of their choice. An explicit aim of the scheme is for developers to try to convert their Gold Card work into stories. Ideally, topics should have some potential for business value, by:

- Creating new business opportunities through the exploitation of new technologies. These could become customer stories.
- Reducing cost by improving the efficiency of

the team, for example by developing new tools.

- Reducing risk by exploring new and alternative technologies.

Unlike development code that requires a pair, Gold Cards can be worked on alone or in a pair, the latter requiring both developers to use a Gold Card.

Recalculating the velocity

Having proposed the scheme to management, we agreed an allowance of 2 Gold Card days a month. To introduce Gold Cards, we needed to recalculate our velocity for the first iteration that included them (the 17th iteration). We calculated that 2 Gold Card days a month is approximately 10% of the working time available, if each month is taken as having approximately 20 working days. Thus, our new velocity was calculated as 90% of our previous velocity (meaning that our load factor has risen to take account of this extra overhead). We used this figure for the velocity in the next iteration and it worked out fine. In subsequent iterations, we have simply used our velocity from previous iterations (that include Gold Cards) without any further adjustments. Although there is no relationship with iteration length and Gold Card expiry times, we have found that the stability of our velocity has not been adversely affected and the simplicity of monthly allocations means that there is little overhead in running the scheme.

How to take a card

At the morning stand-up meeting, a developer can express their intention to take a Gold Card that day. It is usual to explain what they are going to investigate so that other people know what they will be doing and are able to make suggestions. Doing this helps make the system self-managing in that people will only take Gold Cards when it will not adversely impact the iteration. In practice, most Gold Cards are taken without difficulties. On the rare occasion that a large number of people have been inspired to step forward to use a Gold Card we have found that some team members have simply opted to use their card on an alternate day. Whole days of work are preferred in order to avoid fragmented working, but card allocation is reduced pro-rata with holidays taken in the month, so half days can occur.

Before starting work on a Gold Card, we encourage people to write on the card what they intend to achieve. At the end of a Gold Card day, the developer summarizes the results of their work on the company intranet (we use a Wiki based on Ward Cunningham's original Perl script [1]) and this forms a learning repository [3] for other developers to refer to or to contribute related ideas. The card itself is kept for the developer to produce at their next review.

Finally, at the next standup meeting a developer who has worked on a Gold Card will briefly summarize what they did and what future work or possibilities that Gold Card has created. Sometimes this summary may be a warning that the idea is one that should not be considered any further.

Although a developer chooses the topic for a Gold Card, they do not necessarily have to think of a topic themselves - a number of topics proposed by other developers, or even customers, are available. These are organized on sticky notes on poster boards to stimulate discussion and establish relationships among various ideas. We have four poster boards each covering a different topic area: New Technology, Tools, Cool Sidewize [5] Services, and XP Process. Each poster has an owner who encourages work in that area, maintains an overview of progress to date, ensures that work is not repeated, and also offers advice on any of the topics. The poster owner also offers a point of contact with the rest of the business to ensure that potential business value is not missed.

Developers who are unsure of how to spend a Gold Card can look at these posters for inspiration and can also discuss ideas at the stand-up meeting. We have noticed that many people begin to consider and discuss the work they will do a few days in advance. We also try to encourage each other to try out varied topics.

A Little History

The Gold Card system was partly inspired by the book "The Natural Advantage: Renewing Yourself" [2]. This book gave rise to the idea of how to allow developers to renew themselves but still give business benefit. In discussions between the authors we imagined a scheme akin to undergraduate professors posting ideas on their office doors to encourage students to choose interesting thesis topics. In our office the use of cards is pervasive even in other parts of the business, and so it seemed natural to use cards as a way of introducing this idea in an XP way[1]. With a basic proposal in place, we approached the CTO and described the aims and benefits of the scheme. These discussions were particularly helpful because we hadn't clearly defined the potential business benefits of the cards, and so it initially proved difficult to get his support. Once we adjusted the proposal to clearly state the rules for providing business value, we obtained his backing, and the idea was then easy to sell on to our users. We also conferred with the other developers on our team to make sure that the idea was addressing the issues that we had

[1] Originally we were going to call the scheme Green Cards, as this was a color of index card that had not yet been used in the company. Unfortunately, the day before launching the scheme, we discovered that our stationers had stopped supplying green colored cards. Inspired by a recent trip to a dentist who used gold stars on appointment cards, one author suggested that our Office Manager simply stick gold stars on white index cards so that we would have a ready supply.

observed. We launched the scheme with much fanfare, gold star badges and a presentation of the posters.

Observed Results

Having run the scheme for a few iterations, we have observed many examples of Gold Cards that have satisfied the aims of the scheme.

A Gold Card that created new business opportunities:

One of our current products, Sidewize [5], delivers contextually relevant information into a separate window from the user's web browser. A Gold Card was undertaken that investigated a new style of user interface for content delivery, where relevant information is shown directly in the browsed web page instead of a separate window. This work spanned two days of Gold Card time and the end product of the investigation was a working prototype of a new interface. This demonstrated that the technique was viable, formed a useful basis for demonstrations, and gave us enough knowledge to estimate subsequent stories.

A Gold Card that increased efficiency:

Our development environment is VisualAge for Java with a single code base for all developers. After completing some code, a pair releases it on the release machine. One time-consuming aspect of this was the need to load in all the classes that have changed in an open edition of a package, one by one before integrating and releasing them. VisualAge offers no built-in mechanism to support this integration activity, however it does provide a tool API through which operations can be automated. A Gold Card was completed that allowed a list of versioned classes to be loaded from a file. The resulting tool has increased speed and accuracy of the release process.

A Gold Card that reduced risk:

For historical reasons, our software has a dependency on the Microsoft JVM. Microsoft doesn't support Java after version 1.1 but Java development has moved on considerably since then. This represents a significant business risk. To reduce this risk, a Gold Card demonstrated the feasibility of replacing the Microsoft-specific Java code with native code, allowing us to use any JVM. This work has generated several new stories, which have been incorporated into our normal development effort.

We have been pleased that the results from many of the Gold Cards undertaken have inspired our users to propose stories that are related to Gold Card ideas. Furthermore, some of these stories have been given high priorities so that they have been scheduled into our development iterations.

Although we can only refer to 3 iterations worth of measured velocity data, our early indications are that we have not observed any additional decrease in project velocity. While we feel that the Gold Cards have been beneficial, we have not measured an increase in velocity. This is because the results of the Gold Cards have enabled us to estimate stories that were too risky to consider before, accept stories that previously we were unable to consider, or more optimistically estimate stories related to Gold Card topics. Unfortunately these improvements are not reflected in our project velocity.

While we have not yet had any employee reviews that have been able to use Gold Cards as a discussion point, our feeling is that we have observed individual contributions that would warrant recognition.

Finally, we have also noticed that the more junior programmers on our team have benefited from the scheme in a slightly unexpected way. The time alone gives them an opportunity to make mistakes, and learn from those mistakes, while alone without feeling embarrassed or restricted. These valuable lessons are then used when they return to work with a partner the following day. This effect has been a pleasant surprise to us.

Warnings

While the scheme has generally been a success, we have had a few teething problems.

There have been a few times when a Gold Card was not converted into a real story soon enough. This is noticeable when a single developer continues to work on the same topic continuously and results in a form of code ownership that is undesirable on an XP team. Fortunately this type of problem is quite easy to spot and deal with because developers only have 2 cards a month that they can use. In these cases we have made sure that everyone is aware of the danger of using a Gold Card in this way and have ensured that if the idea merits further work, a proper story card is written up, and the knowledge is spread through the team.

We have also had to make sure that our users are clear on the meaning of Gold Cards. In a few circumstances users have tried to request features by suggesting them as Gold Cards. While we are not averse to users contributing additional ideas we have had to make sure that they understand that Gold Cards may never necessarily be completed. If something is so important that it must be done, then it should be written as a proper story and prioritized with other stories in a planning game. Once this distinction had been made clear, and some of the results from previous Gold Cards had been observed, then this has not been a problem.

We have also found it important to monitor the use of Gold Cards to ensure that they are exercised evenly throughout the month by the team as a whole. We have had some situations where people have been unable to take their full allowance of Gold Cards due to too many of them being left until the end of the month. Circumstances have sometimes meant that the team couldn't afford to have everyone exercise their unused Gold Cards in the space of a few days. With a team of 10 developers, we need an average of one Gold Card to be exercised per day for the allocation to be spread evenly throughout a month. Fortunately, as the Gold Cards are pinned to the planning board along with user stories, it is easy to notice that they aren't being checked off at the correct rate.

3 COMPARISON WITH OTHER APPROACHES

There are approaches similar to Gold Cards, which we considered when devising the scheme.

The fact that a developer generally works alone on a Gold Card naturally prompts comparison with a developer acting as a Lone Ranger. The term Lone Ranger was coined to describe the role of a developer who has no partner in an odd numbered team. The Lone Ranger carries out tasks that are usually administrative in nature, and which the team has identified as needing doing but do not requiring a partner. For example, tasks such as checking for development tool and API updates or answering support questions. In contrast, Gold Card work is chosen by a developer.

Study groups [3] are an excellent way of spreading knowledge in a team. In study groups, developers optionally meet to discuss important technical topics. The use of Gold Cards and study groups are not mutually exclusive, however study groups do not address the issues of innovation and individual recognition that motivated the introduction of Gold Cards. While study groups are ideal for a team starting out with XP, we would introduce Gold Cards as a practice when indications of religious guilt are encountered.

Some teams do experimental and administrative tasks in the morning, and pair program in the afternoon [Arie van Deursen, personal communication, May 2001]. Gold Cards do not allow as much time for such activities, but do allow a developer to work for a whole day of their choice. This means that on a day when a developer really wants to explore something in detail, they have enough uninterrupted time to tackle a significant task. In our opinion Gold Cards are a much easier practice to sell to management. Furthermore they do not impose a time slot that could correspond to the most productive time of day. We would also envisage that the half day approach would need much more careful monitoring to prevent the adverse affects of code ownership.

At a company that two of the authors worked for (OTI [4]), developers were allowed to work on self-directed tasks on Friday afternoons. Although this is a simple scheme, there was no explicit mechanism for feedback from the results of the work undertaken, which reduced its benefits. In practice, Friday afternoons were not always available for self directed tasks because of pressures to finish work before the end of a week, or simply because inspiration for an idea had been lost by the time Friday arrived. Feedback from our team has indicated that the ability to pursue an idea when it is hot is important and very satisfying.

4 CONCLUSIONS

Our experience has shown that Gold Cards have increased innovation, improved efficiency and provided greater recognition and motivation for developers.

By setting aside time for legitimate investigations, Gold Cards have addressed the problem of developers feeling constrained to only think about current tasks. They have allowed for "Blue sky" experiments that have led to genuine business opportunities and new ideas that have inspired both developers and users alike. These investigations have also enabled us to estimate new development tasks more accurately.

Furthermore, tools created in Gold Card time have improved the efficiency of the development process, and addressed those issues that were most annoying to developers.

Finally, developers have enjoyed the time they've spent working on things that they have personally chosen, without feeling as if they are cheating on the team or detracting from the completion of customer's stories.

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