Harnessing the Power of the Crowd – the Next Generation for Software Outsourcing?

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Agenda

- Introduction

- Crowdsourcing Defined
  - Crowdsourcing in general
  - Crowdsourcing Software Development
  - Benefits and Challenges

- Crowdsourcing Examples

- Crowdsourcing Software Development Platforms

- Cost, Schedule and Quality Implications of Crowdsourcing
Crowdsourcing – the practice of using the crowd to solve a problem or accomplish certain tasks – has been around for a very long time.

Recent technology advances have created an environment where it is easy and effective to engage a community of interested persons to solve many types of problems:
- Design of software, logos, business cards, websites, etc
- Testing of software applications
- Documentation
- Funding and supporting innovative projects
- Solving complex mathematical and algorithmic challenges
- Creating new and innovative products within an existing product line

Many argue that effective and sensible applications of software development crowdsourcing create opportunities to improve cost, schedule and quality of software applications.

This paper discusses crowdsourcing, software development in a crowdsourcing platform and discusses cost and quality considerations while crowdsourcing.
Crowdsourcing Defined

- The expression Crowdsourcing was coined as a portmanteau (a linguistic blend of words) of the words crowd and outsourcing

- Crowdsourcing is a participative online activity in which:
  - Individual, institutions, nonprofits or companies propose the voluntary undertaking of a task or tasks of varying complexity and modularity to....
  - A group of individuals of varying knowledge, heterogeneity and number via a....
  - Open call issued online generally through a Crowdsourcing platform...

- Some well known examples in recent history
  - Wikipedia
  - Linux
  - Lays ‘Do yourself a flavor contest’

- Crowdsourcing can be....
  - Competitive – only selected participants will win, in highly competitive situations many will compete but only as few will win
  - Non-Competitive or Collaborative – groups of individuals work together to accomplish tasks
Crowdsourcing Defined (Continued)

- **Types of crowdsourcing:**
  - **Crowdfunding** – projects are funded by a large group of people who are interested in the project
  - **Crowdsourced design** – projects are funded to engage the crowd in an effort to design something (like a website)
  - **Crowdwisdom** – Users ask questions to the crowd (like Yahoo Answers) or corporations pose complex scientific or technical problems to take advantage of the knowledge of the crowd (like InnoCentive)
Crowdsourcing Definition (Continued)

- **Definitions**
  - Crowdworker – one who accepts an online crowdsourcing tasks and collaborates or competes for successful completion
  - Crowdsourcer – an organization or individual that proposed to have some or all of their tasks accomplished through crowdsourcing.
  - Crowdsourcing market place – environment or platform that acts as an intermediary between the crowdsourcer and the crowdworker through a platform for integration between the parties

- **Crowdsourcing vs Outsourcing**
  - Outsourcing involves outplacing of specific corporate tasks to a third party contractor or organization for a negotiated fee
  - Crowdsourcing involves tasks being allocated to an undefined group of unknown individuals who, when successful, are rewarded for their effort in performing the task
Crowdsourcing examples

- Waze.com – the masses contribute real time information about traffic conditions, location of speed traps, general travel time – this information is broadcast to all users

- Wikipedia – an encyclopedia written by people across the globe – both experts and amateurs.

- Kickstarter – more than $2.7B pledged to projects by a community of people interested in the projects – novels, art projects, movies, etc.

- Lego – users design new products that other users vote on. The idea with the most amount of votes is produced and the created receives 1% royalty on net revenue

- AirBnB – people who need a place to stay find people who have a place for them to stay via an online application
Crowdsourcing Benefits for Crowdsourcers

- Access to the collective knowledge of a large group of individuals with a wide diversity and breadth of ideas and knowledge
- Innovation on steroids – Optimizes creativity
- Cost savings – generally less expensive than hiring dedicated professionals
- Reduce overhead
- Rapid Acquisition – finding solutions that already exist
- Solution Diversity
- Solution Scalability
Crowdsourcing Benefits for Crowdworkers

- Economic – winners are paid for their solutions
- Social Recognition or Status within the community
- Acquisition of new knowledge in the field
  - Attempting contests where they need to learn new technologies
  - Through discussion boards with fellow contest participants
- Experience in their field
- Thrill of competition
Crowdsourcing Challenges

- Opening the door to the crowd will not only result in creative, innovative ideas, there will also likely be some half-baked ideas which require time and effort to review and evaluate.

- Too many chefs may create challenges to effective decisions and timely progress.

- Cheap labor may not be the best labor.

- Intellectual property issues.

- No contract – no consequences for non delivery.

- Schedule issues if no one signs up for certain tasks or they go unfinished.

- Quality Control.
Software Development Crowdsourcing

- Open call for participation in software development tasks including:
  - Concept
  - Requirements
  - Design
  - Coding
  - Testing
  - Documentation

- Instead of being accomplished by an on-premise or outsourced software development team – these tasks can be assumed by members of the general public who are part of the associated crowdsourcing platform community
Software Development Crowdsourcing

- Technology advances cry for new ways to develop software...
  - Cloud computing
  - Big Data analysis
  - Mobile Computing
  - Increased support for collaboration in software development

- Paradigm shift in the software development area of peer production software
  - Likely to become the next generation of outsource or off-shoring
Software Development Crowdsourcing

- How does it work?
  - Crowdsourcer develops a specification for the work desired and the associated tasks and deliverables
  - These tasks are published online via the Crowdsourcing platform to that platform’s community
  - In addition the amount of reward and required time frame for delivery are published as well
  - Community members accept tasks and begin work (potentially some intermediate back and forth for clarification)
  - Upon completion tasks are submitted
  - The one (or more) best solutions are selected and rewards are issue to the crowdworkers responsible for the winning solutions
Software Development Crowdsourcing Examples

- Harvard – a 2 week long TopCoder Marathon match resulted in a 976x increase to computation speed for algorithms for difficult genetics based challenges

- NASA – turning to the public for out-of-the-box thinking on topics such as a new algorithm to improve Robonaut’s tool to take advantage of materials found on asteroids, the moon or Mars

- Humana – used TopCoder to deliver an ASP.Net application revamping their website which had fallen behind industry standards – within 12 weeks they were able to better provide their customers with needed pharmaceutical services
Software Development Crowdsourcing Platforms

- Most software development crowdsourcing platforms focus on a single area of software development

- For Design there are platforms such as
  - DesignCrowd
  - CrowdSpring
  - 99Designs

- For Testing there are platforms such as
  - CrowdsourcingTesting
  - bugFinder
  - Mob4-hire
  - appStori (Beta testing and crowdfunding for new apps)

- TopCoder and GetACoder appears to be on of the few platforms that transcends the entire development process
Robonaut Vision Tool Manipulation

Marathon Match 91

Robonaut Bonus Round > Bonus Round

Register/Submit | Problem Statement | Standings/Registrants | Forum

Competition Overview

In TopCoder Marathon Match events, the system will be testing submissions for optimization according to the scoring criteria outlined in the problem statement that is associated with this event. Each event may have a different scoring mechanism. Competitors will have to understand the scoring mechanism in order to effectively compete. Participants may submit code written in one of the following languages: Java, C++, C# .NET, VB .NET, or Python.

Once the submission phase of a Marathon Match has ended, final testing will run and may take several days to complete. Upon completion of final testing, the final results will become available in the Marathon Match Archive on the web site. Competitors will be able to see the test case details, other competitors' submissions, and all final results. For rated events, the ratings will be adjusted once results are final.

For more details on the Marathon Match format, click here

Timeline

Registration & Submission

| Opens: 10.19.2016 21:00 EDT |
| Closes: 10.26.2016 21:00 EDT |

Content: Bonus Round
Problem: RobonautVisionR2
Problem Statement: ROUND 2 - Robonaut 2 Tool Manipulation Contest

Prize Distribution
The top 5 performers in the original 34-day contest (which ended on 2016-10-20 01:00:00 UTC) according to system test results will receive:
1. place: $4500
2. place: $2750
3. place: $1750
4. place: $500
5. place: $500

Bonus Opportunity
The winner of this original challenge will win an all-expenses paid trip to the 2016 Topcoder Open Finals in Washington DC November 1. As the TC06 finals, the winner will assist Topcoder in hosting the TC06 Marathon Competition finals on the Topcoder blog. In the competition in this contest, and so on.

Requirements to Win a Prize
Achieve a score in the top 5, according to system test results. Your system test score needs to be greater than 300000 in order to be eligible.

Within 7 days from the announcement of the challenge winners, submit a complete report at least 2 pages long outlining your final algorithm. The required content appears in the report section below.

If you place in the top 5 but fail to do any of the above, then you will not receive a prize, and it will be awarded to the contestant with the next best performance.
Cost and Quality Considerations

- Crowdsourcing creates an environment where some percentage of costs and schedule can be contained for a project.

- Organizations taking advantage of crowdsourcing opportunities can control cost and schedule for crowdsource tasks:
  - Prize amounts are given by the crowdsourcer.
  - Deadlines for completed deliverables are given by the crowdsourcer.

- Small projects where most or all of the tasks are crowdsourced will be able to determine project costs fairly well:
  - Though there should be consideration for managing the project, developing specifications, reviewing submissions, assessing quality, final integration or integration with other capabilities, etc.
  - There should also be considerations for situations where no one accepts a task or accepters fail to deliver a solution – these should be considered part of the risk of a cost assessment.

- Large projects should determine cost based on the capability to be delivered and discount for crowdsourcing tasks based on historical knowledge:
  - Review of completed tasks on TopCoder or some other platform provides good historical information about previous crowdsourced tasks.
Cost and Quality Considerations

- When using cheap labor – there is always a concern for quality.
  - In general crowdworkers do it for the experience and competition as well as the money, so high quality solutions are quite likely however....
    - Clear quality standard should be defined and enforced by the crowdsourcer with rewards only going to the highest quality solutions
    - Peer reviews of solutions should be an essential part of the review process
    - Historical data on quality is more illusive than for cost and schedule – organizations should strive to create their own quality metrics collections to better understand the quality risks when crowdsourcing on a particular crowdsourcing platform
Conclusions

- Crowdsourcing – while it’s been around for a long time – is still gaining traction – especially in the software development arena

- Crowdsourcing platforms exist for various software development tasks, and have been used successfully in various contexts
  - Lots of successes with web design and software testing
  - Lots of successes with solving complex technical and algorithmic problems

- Care should be taken when deciding to use crowdsourcing based on:
  - Criticality of the project to the business
  - Criticality of time to market for the project
  - Organization’s experience with crowdsourcing

- As with all software development endeavors it is important to assess the risks of the project in the context of history and experience
Q&A SESSION

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References


Backup Information
Crowdsourcing Design Platforms

- DesignCrowd – logo or website or any creative projects
  - Post a design contest ....
    - Posts a brief describing what they want designed – along with what they want to pay for the design
    - Designers read brief and start working
    - Get feedback, eliminate designs you don’t like, suggest changes
    - Select a design and the submitter(s) are compensated

- CrowdSpring – graphic design, website and mobile app design, product design
Crowdsourcing Test Platforms

- Crowdsourced Testing
  
  How it works in 3 steps

  1. Draft your test requirements
     - Only takes 2 minutes
  2. Submit your test request
     - Our professionals get to work
  3. Get rapid and reviewed results
     - Your developers can fix defects

- BugFinder
  
  - Define Projects
  - Projects are Managed by BugFinder
  - Review Bugs
  - Bugs are fixed by BugFinder Community
  
  Software is released

WHAT WE DO

BugFinders provides a wide range of testing services to help you manage every aspect of your websites, apps and wearables quality. Choose a service type below.

- Functional
- Usability
- Security
- Localization
- Lifestyle / IoT
- Accessibility
- In Live Performance
Software Development Crowdsourcing Platforms

- **TopCoder.Com**

  - Projects fall into one of the following tracks: Design, Development and Data Science. Within these tracks projects can be further characterized:
    - *Algorithms and Analytics*
    - *App Design and Development*
    - *App Modernization*
    - *Community Building*
    - *Innovation Programs*
    - *Staff Augmentation*

  - TopCoder presents challenges from their customers in one of the three tracks
    - *Real world systems are broken into task areas so the Crowdworker can work in areas they know best*
    - *Crowdworkers compete to develop the best solution in the given time frame*
    - *Also regular competitions (Single Round Matches) for fun and skill testing/development*

  - Despite the competition, an environment of collaboration exists as a community is developed – tips are shared among competitors via discussion forums

  - Peer review ensures that the solutions developed meet the highest quality standards
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