

When Agile Estimating is not Sufficient

- Five Collaborative Techniques to use for Estimating Software Projects Up Front

Kjetil Moløyken-Østfold – Conceptos.
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Agile development and estimation?

”-the concept of an overrun is not one typically found in agile development processes themselves, and precision estimation up front is not typically seen as a priority.”

- Comment from anonymous reviewer, Agile 2007, research track.

Main challenge

- It appears as if many books, papers and tutorials in the Agile community assumes:
 - A customer with no need for budget or schedule when starting a project.
 - No need for long term planning within the development team(s).
 - That minor estimates derived as you go (e.g. for sprints) are sufficient.

Agenda

1. Why estimation is also important in (most) Agile projects.
2. Outline of five collaborative techniques to use for estimating software projects up front:
 - Delphi.
 - Wideband Delphi.
 - Unstructured groups.
 - Statistical groups.
 - Decision markets.
3. Discussion.

Why estimation is also
important in (most) Agile
projects.

Software Project Overruns – Research findings

- About 70-80% of all projects encounter effort (cost) overruns¹.
- The average magnitude of effort overruns is 30-40%.
- Similar results for schedule overruns.

¹ Moløkken-Østvold, Jørgensen, Tanilkan, Gallis, Lien and Hove. *A Survey on Software Estimation in the Norwegian Industry*, In 10th International Software Metrics Symposium (METRICS 2004).

Software Project Overruns – Research findings (cont.)

- Similar findings in published research from several western countries¹.
- No apparent change the past 30-40 years, however, there are indications that agile and other non-sequential approaches are beneficial.
- Important: accurate numbers are difficult to provide.

¹ Moløkken-Østvold and Jørgensen. A Review of Surveys on Software Effort Estimation, In: IEEE International Symposium on Empirical Software Engineering (ISESE 2003), pp. 223-230, Rome, Italy, IEEE Computer Society, 2003.

Software Project Overruns – Important

- Projects with overruns are not necessarily failures.

And vice versa...

- Projects that deliver according to budget and schedule may suffer from:
 - Lack of customer satisfaction.
 - Lack of functionality.
 - Lack of quality.

What is an estimate?

- What is the purpose of the estimate?
 - Budget.
 - Most likely estimate.
 - Bid.
 - Price-to-win.
 - Planning estimate.
- Who is it for?
 - Internal estimates.
 - External estimates. Communicated to managers/customers etc.
- At what stage?
 - Bidding process or equivalent.
 - Planning phase.
 - Re-estimation(s).

Procuring Agile projects

- Concerns regarding estimation and contracts are frequently omitted in the agile literature.
- As described by Jamieson, Vinsen and Callender:
 - *“Software can be developed in-house, but is more often obtained from vendors either as a package or through bespoke software development services.”*
 - *“...contemporary agile methods of software development do not appear to consider the role of the procurement process in influencing success.”*

Estimating Agile projects

- Agile projects are hardly immune to overruns, delays and bad business decisions based on poor estimates.
- “Planning Poker” or similar techniques for estimating sprints or releases are important, but not sufficient.
- It is often necessary to provide a relatively accurate estimate of total project delivery schedule and costs at an early stage, due to:
 - Bidding.
 - Budgeting.
 - Staffing.
 - Scheduling.
 - Release planning.
 - All of the above...

Five collaborative techniques to use for estimating software projects up front

Why combine estimates?

- Obtain knowledge from various sources.
- Avoid extreme decisions.
- Synchronize perceptions about estimates and work at hand.
- Create ownership of estimates.
- Remove irrelevant information (if using moderator).
- Introduce a "devils advocate".

Pitfalls when combining estimates

- Passive participants.
- Depending on chosen method: political pressure (groupthink).
- Requires good moderators and experts.
- Time-consuming and costly (?).

An overview of some methods for combining estimates

<i>Method</i>	<i>Structure</i>	<i>Anonymity</i>	<i>Interaction</i>	<i>Overhead</i>
Delphi	Heavy	Yes	No	Major
Wideband Delphi	Moderate	Limited	Limited	Moderate
Planning Poker	Light	No	Yes	Limited
Unstructured groups	Light	No	Yes	Limited
Statistical groups	Light	Yes	No	Limited
Decision markets	Heavy	Yes	No	Moderate

Delphi

- The Delphi technique was developed by RAND as a method for eliciting and refining group judgment¹.
- Three main features:
 - Anonymous responses (questionnaires).
 - Iterations and controlled feedback (several rounds, with moderator).
 - Statistical group responses (final round is verdict).
- Scientific evidence is sparse
 - Indications that it outperforms statistical groups and unstructured interacting groups.
 - No conclusive evidence that it outperforms other structured group combination techniques.
 - No published studies from Software Engineering.

¹ http://www.rand.org/pubs/research_memoranda/RM5888/

Wideband Delphi

- The technique is a modification of the Delphi technique, developed by Boehm and Farquhar.
- Similar to the Nominal Group technique, also known as the estimate-talk-estimate technique.
- The experts meet for group discussions both prior to, and during, the estimation iterations.
- Lack of empirical studies.
- Inspiration for *Planning Poker*.

Unstructured groups

- Various types of unstructured groups exists.
 - Basically discussions with a group decision being made at the end.
 - Individuals *can* derive their own estimates before the discussion, this is recommended in order to mitigate pressure.
- Unstructured groups can outperform a Delphi group if the motivation and information sharing is adequate.
- In a previous study on software estimation, we found that:
 - Group estimates made after an unstructured discussion were less optimistic and more realistic then a statistical group.
 - The main driver was identification of additional activities and complexity.

Statistical groups

- In a statistical group, there is no interaction between the group members.
- Computing the mean or median of the different individual estimates will give us one estimate that is based on multiple estimates.
- Magne Jørgensen claims that taking a simple average often works as the best method for combining estimates.

Decision markets

- A decision market can be set up like a stock market:
 - Traders are invited to invest money in alternatives.
 - A trader holding a stock (decision) that becomes the actual outcome receives a fixed amount of money, prize or similar.
 - This results in higher stock prices for the alternatives that most people think will be the outcome.
- Surowiecki claim traders should be diverse in their backgrounds, independent of each other, and have relevant knowledge.
- Green, Armstrong and Graefe¹ claim that Delphi have advantages over decision markets, including:
 - Broader applicability.
 - Not vulnerable to speculation.
 - Requires fewer experts.

¹<http://forecastingprinciples.com/paperpdf/Delphi-WPlatestV.pdf>

Does long term estimates remove the “agility” of projects?

- No, because the agility can be preserved by:
 - Appropriate contracts (or similar for in-house development).
 - By adding/removing features and adjusting as you go.
 - Being adaptive.
- Collaborating on long term estimates is in line with the spirit of Agile!

Summary & questions

- Long term estimates are important in Agile projects due to aspects such as:
 - Economics.
 - Scheduling and resource allocation.
 - Motivation.
- There are cost efficient combination techniques for estimating projects up front, for an overview, see: <http://dx.doi.org/10.1016/j.jss.2008.03.058>
- More information: kjetil@conceptos.no
- Slides: www.conceptos.no/presentations/agile2008.pdf