Abstract
In this paper we discuss the opportunities and challenges of the recently introduced Lean UX software development philosophy. The point of view is product design and development in a software agency. Lean UX philosophy is identified by three ingredients: design thinking, Lean production and Agile development. The major challenge for an agency is the organizational readiness of the client organization to adopt a new way of working. Rather than any special tool or practice, we see that the renewal of user-centered design and development is hindered by existing purchase processes and slow decision making patterns.

Author Keywords
User experience; Human-centered design; Lean UX.

ACM Classification Keywords
H.5.2. User-centered design.

Introduction
Rapid or agile development models [2, 7] have quickly gained prominence especially among smaller organizations. Through this time, it has become evident that the usability engineering tradition that paralleled the preceding software production paradigm soon became outdated. This has lead to the introduction of new agile, user-centered techniques (e.g. [8]).
However, none of these have reached the similar de facto standard status as the usability testing eventually did in the waterfall development process [12].

In this paper we discuss and critically reflect on a recent industry-borne proposal of user-centred design called Lean UX. This idea has been introduced through a series of online publications and a book [5], but not yet much examined in critical, academic forums. We will describe the philosophy and discuss the experiences of a medium-sized Finnish software consultancy that has been working to implement it.

Lean UX philosophy

Lean UX is defined as an approach for an extremely fast user-centered software development, especially for startups creating radically new products. It attempts to break away from the organizational silos and slow production cycles that characterize the waterfall software development process (see, e.g. [9, 14]). The Lean UX book authors [5] explicitly identify three main influences: the design thinking movement [3, 4], Lean startup method [11], and Agile software development [2]. The Lean UX philosophy is combination of these.

Principles and goals

The ultimate goal of the Lean UX process is to produce as quickly as possible and with the minimal resources a product that satisfies customer needs. This means avoiding a lengthy specification and development process that eventually leaves the user unsatisfied. Therefore, the process responsible for the work must be extremely effective and involve the minimum amount of wasted resources. It also means that it is best applicable to new product development projects, instead incremental improvements on legacy software.

Although Gothelf and Seiden [5] refuse to provide a dogmatic description of necessary standards of practicing Lean UX (indicating that there is none), they do describe fifteen principles that describe this approach. In brief, these emphasize the need for getting quickly started on building prototypes that can be tested out with the representative users, rather than putting effort into meta-level specification and design deliverable process. Lean development means doing things as small as possible, including small cross-functional, collocated development teams. The authors also highlight the importance of continuous involvement of user in the development cycle. Each development sprint should aim to produce a minimum viable product (MVP) that can be put to a test. Tests produce data for learning more about the design decisions and corresponding implementation plans.

After the publication of the book, in early 2014, the Internet community produced a Lean UX manifesto [15] (in the spirit of the Agile manifesto [2]). It puts out six key principles that describe the Lean UX way of working in contrast to the old ’standard’ model:

1. **Early customer validation** vs. releasing products with unknown end-user value
2. **Collaborative cross-functional design** vs. lonely hero design
3. **Solving user problems** vs. adding cool features
4. **Measuring key performance indicators** vs. undefined success metrics
5. **Applying appropriate tools flexibly** vs. following a rigid methodology
6. **Nimble design** vs. heavy wireframes or specifications
We believe these principles describing Lean UX are quite self-explanatory. We will only elaborate the point on collaborative design. The utilization of multidisciplinary teams indicates that all major stakeholders should be represented in the team. The professional titles of the team might include UX designer, UX researchers, software engineers, quality assurance, and product managers (or owners).

**Process**

The Lean UX book [5] provides some ideas for integrating this new process with existing Agile processes (especially SCRUM). For example, consider design and user involvement inside sprints. The sprints are connected to one another under different **themes**. Each theme can span several sprints. The theme begins with a sketching and ideation exercises that produce the skeleton of design output that is worked on during the following sprints.

During a two week development sprint, in which ‘user validation’ takes place every week at the end of week. The user tests and the development targets are specified at the start of each sprint. Test feedback is expected to call for revised design after each user test. This makes the user testing a continuous part of the process and presumable forces the development team to focus their efforts in fulfilling user stories that advance the product. Figure 1 visualizes the process.

**The user involvement and representation**

The key issue in involving user in agile design has been incompatible with the traditional waterfall model. The previous model suggested performing massive user tests after development has been frozen and the product is almost ready to launch. This has never been

**Figure 1:** The Lean UX activities inside a single sprint. They include setting hypotheses, developing a MVP, testing with users, and learning from the test feedback to improve design.
possible in Agile, which typically moves ahead much faster, for instance, in two week sprints during which the development restarts.

Lean UX attempts to incorporate user testing in each sprint. This means that instead of one big user test, there will be several small user tests, each targeting whatever new feature is being built in the sprint. This requires that the most important MVP features are prioritized so the user testing focuses on the core.

The thinking behind user testing follows the idea of hypothesis testing. The product under development is considered as a hypothesis of what the user might need. The user test attempts to show whether this assumption is valid or not.

Besides user testing, users are also otherwise represented in the development process. The suggested method is proto personas, which involves building hypothetical personas to be validated through interactions with people participating in tests. This deviates from the standard way of utilizing personas. We consider it somewhat problematic. Although it allows to quickly establish user representation, it builds upon potentially dangerous plain stereotypes and speculation, if the designers do not challenge their assumptions. It also may frame too narrow view of who the users are if room for new personas is not reserved.

Personas (or protopersonas) are actively utilized in user stories. User story is a de facto standard way of to describe system functionality in Agile. User stories refer to personas who desire to achieve identified goals through specific actions. Otherwise Lean UX utilized personas similarly to other approaches.

Experiences of adopting Lean UX

SC5 Online Ltd. is a Finnish company that helps our customers to take their business to all devices. Delivered enterprise-ready front-end solutions increase our customers’ sales in omni-channel businesses. IT agency focusing on the design and development of custom, adaptive web solutions. It employs 80+ people and serves a wide clientele of major Finnish companies whose business is in the Web and must support heterogeneous devices. In 2014, SC5 has sought to introduce elements of Lean UX to its client projects. Our goal has been to make our development processes more user-centered and establish new process competences. Lean UX was timely introduced and we decided to experiment with it. In the following we describe our experiences to illustrate possible a roadmap to adopt Lean UX.

Gothelf and Seiden describe several organizational shifts needed for implementing Lean UX. We consider them under two wide categories, team and organization level changes, and additionally discuss decision making power as a major hurdle for Lean UX deployment. We have collected the roadmap in form of a readiness checklist and a deployment packaged in the Figure 2.

On the team level, SC5 has already been using Agile SCRUM and Kanban development models in all applicable projects. This has been a helpful starting point, but some learning and unlearning has been necessary. On the learning side, the integration of Lean UX process has required us to pay more attention to the roles and skills of our development teams.

Our teams are typically relatively small (3-5 developers), sometimes stand alone, sometimes
integrated with client’s in house development teams. However, this means we cannot allocate people to all roles of an ideal Lean UX development unit (see previous page). Thus we have invested in teaching UI developers user research skills so they can take up the responsibilities of a UX researcher. They may seek support from a user research specialist, but resourcing has not this far enabled us to dedicate UX research specialists to projects. The proper deployment of the overall Lean UX process should be supported by a coach. Additionally, we have missed the involvement of a sales and client representatives in the development team and have sought to integrate that as well.

The unlearning needs refer to the mindset change towards continuous validation and the chance of invalidating an earlier design. It differs, for example, from the traditional SCRUM view that sees sprints as a delivery of potentially shippable product increments. In Lean UX, we have to take into consideration the possibility of immediate refactoring of design and code if the hypotheses turn out to be false.

For us, the team level development challenges have been somewhat easier to achieve than organizational changes. As the majority of the products we develop are owned by clients, we have started the process of converting clients from waterfall type of user-centered thinking towards Lean UX type of continuous user involvement. This idea has been easier to promote for clients that are already comfortable with SCRUM, particularly when the benefits of the approach are clearly articulated (e.g., in terms of time and money).

One major hurdle for us is the culture of outsourcing prevalent in Finland in which IT developments projects are executed in a piecemeal fashion. This means that design, development and user testing are separated by acquiring each of these services from a different provider. This is directly against the philosophy of Lean UX, which attempts to improve project efficiency by a closer collaboration of these three competences. The current practice means multiple hand overs and encapsulation of knowledge across remote people. For a development oriented company such as SC5 the situation is intriguing. Should we challenge existing providers in offering more comprehensive services or aim for collaborative integration of these functions together with providers of different services? This is of course ultimately a decision of the buyer, whose awareness of the downsides of the bit-by-bit acquisition practice we actively work to raise. We are actively promoting this message by providing our clients opportunity to learn about alternative processes, e.g. organizing workshops and offering free talks about it.

Finally, another challenge we face at client organizations, and which they face themselves, is the distributed decision making in product development. The startup mentality of Lean UX emphasizes the team autonomy not only in development but in design and business critical pivoting based on learning. This is a major problem for any big organization that typically involves the more stakeholders the closer the product under development is to the core business. A possible root cause may be in the distance of product and business units. We have not found any clear solution for the matter. Incorporating more definitive power over product decisions to a product owner who has the mindset and adequate attentional resources to support the team could solve many of the project problems.
Discussion
Changing the way we build software products and services has to change. Even from an agency point of view, wasting money and resources on projects that are delivered beyond budget and schedule – if ever, must eventually stop. This very rational idea has sparked interest in new project management practices, for instance, even US government is currently introducing Lean elements to their IT projects (see http://playbook.cio.gov/).

In this paper we have briefly described the Lean UX philosophy for integrating user-centered design activities into an agile software development process.

References

We also shared our own experiences on implementing this approach, especially on how to get started, what is on the way of it, and how to get past these obstacles. By presenting this paper in an academic conference, we hope to stir critical discussion on both what is the real contribution of this approach and how we might together with other organizations that share the overall vision move towards the goals – whether this mean implementing Lean UX together or finding new ways to achieve these ends. Overall, we hope to keep alive the discussion regarding Agile UCD/HCD practices which is dwindling despite its utmost centrality to the modern software industry!