Controlling User Experience through Policing in the Software Development Process

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ABSTRACT

Today the challenge in the mobile industry is User experience (UX), which is starting to affect software engineering processes. A common use or definition of the term UX is still not de facto defined. Industry and academy are both in agreement that UX definitely includes more than the previous usability definition. Our concern in this paper is how industry and manufacturers can manage to successfully get a UX idea into and through the software development cycle? Our discussion includes obvious components from usability and new UX components that are not taken into account by prevailing HCI approaches. We will discuss branding, trends and timing as vital components in that puzzle.

KEYWORDS

User Experience, usability, brand, trends, invention, software development process, mobile industry, software engineering, management

1. INTRODUCTION

Mobile phones have reached a point beyond the level where technical hot news are not enough to satisfy buyers, because today mobile devices also have to include the aspect of user experience. Apple's iPhone is one indication of this change. In recent years the mobile industry has put in a lot of efforts to grasp and develop products that can be claimed to be User Experience (UX) products. A mental shift from a usability focus toward a more UX driven requirement gathering focus and handling has occurred. One reason is that UX discourses has been ongoing for a long period, even though mostly connected to new services like web, multimedia and other media centric services. Interestingly, these are products that acquire a different experience than the mobile applications and services. Another related factor is today's improved hardware possibilities including their infrastructural developed support on the market.

Unfortunately we are convinced that many companies in the mobile sector still are stuck with outdated control mechanisms

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that do not adequately support the recently introduced UX focus. Today's prevailing product control mechanisms has a stronger relationship to software development costs and rationales than securing UX. Before returning to the issue of how to secure and control UX design decisions within today's prevailing product and software development approach we will sketch the UX scene and exemplify challenges following with it.

When Apple launched the iPhone the UX hype hit the roof. All competitors now saw a device with intuitive, simple finger touch interface, with fast and smooth transitions and excellent performance. This device created a lot of media as well as consumer attention even though targeting a high price range and offering for bindings to one operator to start with. It got promoted by operators without fulfilling their requirements, and operators even accepted a new economical model that would give Apple a percentage of operator's winnings. A development we have not seen earlier in the branch. Why did Apple's iPhone reach this high level of UX recognition and operator acceptance?

Symbian Ltd and UIQ Technology have for over a decade offered an OS and SW platform that support touch; and their licensees, SonyEricsson, and Motorola to mention some have launched series of different versions of phones on the UIQ platform. Touch enabled phone devices like e.g. the P800 to the latest P1i from SonyEricsson have sold in good numbers and created a lot of media covering but not close to what the iPhone did. Another company trying to gain market in the touch area is Neonode. They created a clear buzz around their product but had trouble reaching the big sales even with UX claims of their product. So why is it that well known and established companies, with long experience, don't get the same "buzz" around their products as Apple? And why doesn't new innovative and creative company like Neonode hit it of massively? What made the success possible for Apple's product iPhone? In our opinion it has to do with a number of connected reasons.

First, usability as a "hygiene" factor needs to be in place if we want to hit in a mass-market launch for a new type of device. Meaning that the functionality and performance of a device are things a user doesn't notice until they create annoyance. In this view, in a well worked up market, usability has become a dissatisfier [1]. In such market users will notice and complain about the product when the expected outcome or usage doesn't live up to their expectations. On the contrary, if the hygiene works the way it should, as expected, they won't praise the usability of it anyhow. We are convinced that most companies in

mobile industry are in control of the level of hygiene through applying HCI usability test methods (see [11] for example).

Second, total product design is another vital component. The product must be a throughout solid and attractive design, from hardware to software design. New and hot functionality is not enough anymore, today it is the design of the total experience that sells.

Third, the brand is an important part of the total product design, just as vital and important for success as is the design itself. We argue that this is one of the reasons explaining why Apple made a direct success with their iPhone and Neonode did not. New kids on the block always have a hard time, and have to make up an own role an identity to be both understood and accepted.

Fourth, trends need to be monitored and understood. How can you predict and take into account that a "fuzz" or "buzz" in a small group of people will turn into a mass market trend? How do you foresee and market that e.g. a mobile touch screen device will become a device in "every man's" hand instead of its initial status as status device in the pockets of the businessman tribe? Trend awareness and understanding about marketing, brands and target groups have always been important, but will in the mobile UX era be vital for success.

Fifth, timing is a vital component in a successful launch of a product? There is more than one understanding of timing. If you talk to product owners etc they will argue that if a specific device misses its target release window that device could and maybe should be cancelled. This is obvious and understandable, here we talk about a specific type of timing; the maturity of the market for a device with a specific functionality. When is a specific functionality or technology mature enough to be embraced and used without any hurdles or suspicion by the market and end users? Take the e-commerce adaptation as an example from the PC world. It took some years before users found e-commerce applications comfortable and secure enough to be used for paying stuff from the internet. This even though the technology, security solutions and infrastructure had been in place and worked a long time. Could this type of user phenomena be foreseen and taken to account when to launch a product at the optimal time?

Total design, brand, trends and adequate timing are subjects in need of further understanding within today's mobile industry; both concerning how to predict coming trends and brands, when to launch products, as well as how to secure and control the resulting UX designs throughout the software development process. Regarding the former challenge we lend at taking inspiration and borrow insights from the area of innovation. Knowledge about innovation processes and framework could be used to understand and prioritize actions to create and launch products in a successful manner. When it comes to the latter challenge, we present one solution in this paper. Our solution fits the established engineering idea of splitting product complexity into smaller manageable sub-functions, and working in multidisciplinary teams. In large software development projects this splitting approach has proven successful to cut time costs.

Below is provided a hierarchic map where we place the aspects discussed in this paper in relation to the following categories: User Experience, Market, Technology, and Software Development. Here it is possible to visualize relationships such

as: brands and trends exist on a market with potential consumers; brand and trend is part of the user experience that companies tries to design to pleasure users; successful match between these is highly dependent on adequate judgments of maturity and timing for a product. We can also see where the border of traditional usability efforts is today. We do not emphasize new or existing technology in this papers discussion, even though, we indicate the importance of timing and maturity also here. Our contribution called "Policing" can be found under the category Software Development under Methodology and Requirements Engineering fulfilling the role of monitoring and securing a holistic product view. The Software development methodology is in this paper refers to the engineering idea of splitting the product complexity into smaller more manageable sub-functions (and teams), i.e. a traditional software engineering development approach.
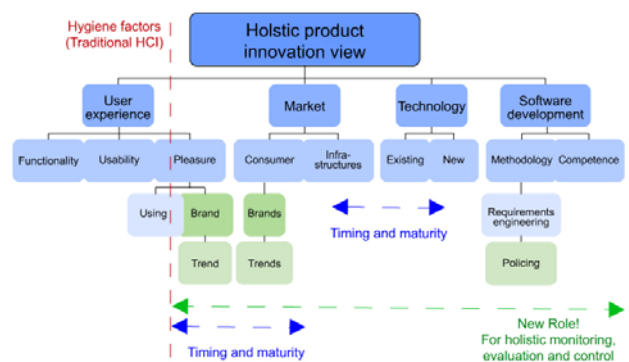

Figure 1.Overview and placement of discussed subjects

2. USABILITY AS HYGIENE FACTOR

The HCI community is nowadays agreeing that UX include more factors than defined in usability. Usability is an established part of software development even though maybe not as formalized as needed. UX on the other hand is not established throughout the development process and our belief is that when it is formalized and established it will change the way we understand and talk about requirement handling as well as product development processes and methods.

Usability as such in today's mobile business and product development is a thermometer that sets the "hygiene" level of a product. Users today take the "ease of use" part of product concepts for granted and will not praise the fact that a product or service has good usability. On the other hand users will complain loudly if the product doesn't live up to the expected level of hygiene. Usability has become a dissatisfier. Hence, the challenge for usability engineers is to collect dissatisfiers and feed them back as prioritized requirements. These will affect the product negatively if not treated as an important part of UX. In a sense dissatisfiers can be perceived as the base of UX. These are aspects of a product or service that just have to work and when they do they will not be noticed by the users. Examples of the areas we talking about here are responsiveness, snappiness, learnability and visibility, effectiveness, efficiency etc. Keep in mind that handling dissatisfiers is not enough to reach a decent UX level. To do that we need to understand what pleasures a user during both use and owning a product. When we understand above it will be possible to launch products with satisfying level of UX.

3. TRENDS AND BRANDS

Today we see trends in society that emerge from and support environmental concerns. We can also see an increase in tribing activities that in one level has to do with big movements of refugees moving to other part of the world, to find "shelter from the storm" in new countries. This has created a possible growth for national groups that use violence as a toll for securing their tribal belonging. The other level of tribal behavior has more to do with groups that have found new ways to indulge themselves in their hobbies/interests. Examples of this is the late middle-aged bikers living their teenage dream as they drive down the roads as aged "hell-riders" on their Harley Davidson's.

Leading trend institutes has identified trends that need to be understood and taken into account as important aspects to succeed when developing a product with high level of UX. Below you find some trends that one well known trend institute; Faith Popcorn's BrainReserve describe on their website [12] and as they find as necessary to know and beware of when you: look for a new positioning on the market, strategic development and new product or service.

99 lives: *Too fast a pace, too little time, causes societal schizophrenia and forces us to assume multiple roles*

Anchoring: *A reaching back to our spiritual roots, taking what was secure from the past in order to be ready for the future.*

Being alive: *Awareness that good health extends longevity and leads to a new way of life.*

Pleasure revenge: *Consumers are having a secret bacchanal. They're mad as hell and want to cut loose again.*

Small indulgences: *Stressed-out consumers want to indulge in affordable luxuries and seek ways to reward themselves.*

Cashing out: *Working women and men, questioning personal/career satisfaction and goals, opt for simpler living.*

Clanning: *Belonging to a group that represents common feelings, causes or ideals; validating one's own belief system.*

Cocooning: *The need to protect oneself from the harsh, unpredictable realities of the outside world.*

Fantasy adventures: *Modern age whets our desire for roads untaken.*

In the mobile business obvious trends are staying connected and sharing content, this simultaneously with being an assessor expressing belonging and social status. To capture these types of requirements and to be able to support these kinds of trends we need to involve more than traditional usability evaluation can offer; a new UX and innovation related perspective of capturing user requirements is needed. These factors also need to be translated and incorporated in new formalized methods in the process of product and software development.

Neonode relied on the existing touch screen market as entry for their products. To their disadvantage they did not have large enough credibility among users in the market of touch phones to become a truly market success from start. Apple's iPhone had both credibility and a successful touch screen product. A product that provided the user with intuitive and responsive use, a pleasurable experience concerning the overall design, together with the pleasure of owning and showing of it as an assessor. Besides this iPhone also supported the "Mac, Apple" tribe. This new product called iPhone could actually be claimed to help these users secure their status and existing as members of precisely this tribe. This is a group of users that committed themselves to Apple's specific brand and design, a consumer group that buys for reasons of precisely experience and design (that Apple products helps them to communicate) rather than for a specific set of functionality. The fact that Apple has a very strong brand could be the difference when it comes to success or not. User have expectations and/or and experiences of Apple as "the" design company whereby the company gets a competitive advantage over other on-a-technical-level-equal-companies. Apple has the knowledge and the company culture needed in order to "live the brand". Other less brand known companies has to rely on the product without any help from a brand expectation or experience. One reason to this could be as Richard Mulholland states in his article; Fuck. Love. Brand: [13] "You see, *"brand" is a word open too much interpretation, a corporate ID executive sees it as the face of the company they designed, HR sees it as the people, marketers see it as the marketing they create, and management thinks it's the physical manifestation of the mission, vision, and values. This is the problem, in order to build "X", all your builders need to first understand what "X" is and here's the thing, it ain't rocket science. Once we realize that the word "brand" is a place-marker, we simply need to find out what we're replacing."* From our point of view the strategic work of building up a brand needs to be integrated in all levels in a company, relate to vision, goals and be a vital part of a holistic product view.

4. THE TIMING COMPONENT

"The winner gets it all", "It's only first place that counts and will be remembered". These are expressions that color us from upbringing and society and in many respects also true on a tough market. The timing aspects of releasing a new product is in many cases as important as the product it self. The right timing will give an advantage against competitors. But it is hard to judge when to launch a product; users or consumers on a market must be mature enough to appreciate the product to its full extent. Its functionality could be too advanced or just a bad copy of already existing product. Symbian and UIQ has produced Touch supported Software platforms for mobile phones for many years and delivered to customers like SonyEricsson and Motorola. These products has sold good in the business segment of the mobile world. It could be claimed that Sony Ericsson and Motorola over the years of delivering phones with touch enabled screens actually created both the marketplace as well as the user acceptance and user mature-ness for touch phones. If we compare with Apple's iPhone that was a hit direct, they besides using their extremely strong brand (se previous section 4) delivered with a good timing in a mature enough touch market.

5. UX AND PREVAILING SD PROCESSES

Good UX understanding an input is one side of the coin, how to organize with respect this understanding and input is the other side. As previous argumentation revealed it has become more and more important to deliver UX products. This is not enough, these products has to be developed faster and faster, whereby it also becomes vital for an organization to continue to keep the development time short.

"Everything about mobile phone design and production has to be quick, so it's months from when there is an idea for a phone to the

roll out on the market," said James Marshall, Sony Ericsson's head of product marketing, who is in Las Vegas this week for the trade fair. "The market moves very quickly, so you have to minimize development times."[4]

One approach that many organizations, including UIQ Technology AB, have chosen to apply to both secure quality and focus on deliveries, and meet the time challenge is to work in parallel multidisciplinary teams (see Hellman and Rönkkö 2008 [11] for details). The solution is a typical software engineering solution, i.e. to make complex things manageable through splitting up the problem in separated parallel work tasks during the development process.

Engineers often approach complexity through splitting the product complexity into smaller more manageable sub-functions. In the end all the sub-functions are put together and a product appears, hopefully as the designer or the idea maker intended. Deviations from the intended product idea are handled through iterated defect reporting and defect handling until the product is judged to have sufficient product quality. Hence, monitoring product quality is conducted by processes in which milestone criteria are measured mainly by different ways of controlling defect levels and defect status. So far this approach has been sufficient enough when striving to secure a product's quality from a task and goal perspective (classic usability view from HCI), but still no guarantee for enhancing the user experience (that increases the chances of product success on the market). In the goal and task view three canonical usability metrics have dominated, i.e. effectiveness, efficiency and satisfaction. Where the latter, satisfaction, has been a term capturing the felt experience on a very high level, i.e. without further dividing it into its diverse constituent elements. Today the UX level of quality needs to be handled. Handling this quality forces us to divide satisfaction into other soft values such as exemplified by fun, pleasure, pride, intimacy, joy, etc. [8, 4].

A risk with dividing is that the product owners (often Product Managers whining the company) will have an even harder time knowing that the intended product is the one that will turn up when all "bits and pieces" are assembled again to constitute the product.

Figure 2 visualizes above described work in multidisciplinary teams. Here the separateness of a product vision into many divided requirements means risks of not monitoring UX in a holistic way; it also represent today's goal and task oriented development models. The outcome/product includes the risk of becoming something that was not intended.
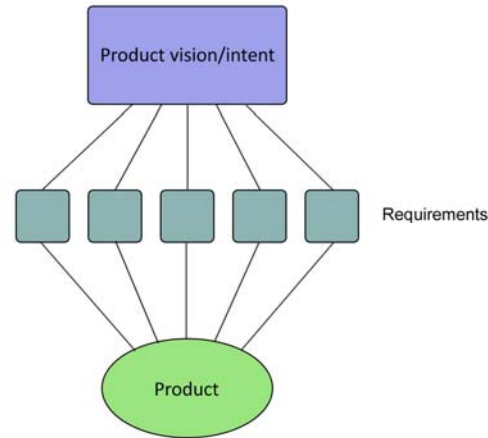

Figure 2. Split of product complexity

One problem that follows when splitting the product into smaller manageable sub-functions in the production process is the risk of losing a holistic product view. In the quality of user experience apparently small changes made in different subparts can actually constitute a huge user experience change when put together in the final product. It is also difficult to predict the effects of such separately handled changes. Applications in mobile products have in the past been more or less separate entities or islands in a product. And opportunities have existed for application designers and engineers to apply their own solutions and create their own application specific components with "isolated" specific behavior to support a use case (see [12] for an example). Such isolated behavior can and will be a big threat to the total UX of a product.

Pushing out ownership and responsibility to the separate parts is a common management strategy. It can be questioned if organizational models that push ownership out to the leaves in organization really are effective in the mobile industry? Doesn't this model encourages handling risks via a focus on each constituent part rather than a holistic view on the end product? Are there better and more efficient ways of making an idea appear in a product? Ways that could shorten the time to market, minimize the risk of fragmentation of the product, and in effective ways help organizations to prioritize and secure successful UX in products. Can we maintain a holistic perspective despite multiple splits of functionality during development? In this era with a growing need for high level monitoring of UX in products we are still left with the goal and task oriented development models. For the goal and task related usability paradigm dividing and delegating has been successful. Today we have to realize that good quality on different parts is not enough, not a guarantee for a successful product. In parallel with understanding and handling UX we need to find new ways to measure and monitor UX quality aspects during development. To support UX qualities efficiently a process with a clear product focus is needed in parallel with the up to today successful split application development approach. Otherwise, because of the prevailing task and goal tradition within software development, there is a risk that we talk about a holistic product view but in practice end up monitoring small identities. Still, we believe the engineering approach of separation is powerful and necessary in large projects. So - what are the possible approaches for ensuring an idea appears throughout the prevailing engineering approach of separating the development?

The introduction of an overall UX control process is the solution we advocate.

In order to secure the vision of product intent, in complex and multi requirement projects, the organization needs to acknowledge the need for what we call policing (actually having real cups in mind doing police(ing) work in the positive sense appreciated by citizens). Not just defect levels, but also and maybe even more important, the holistic product intent throughout the development cycle and in all different teams participating in the development process. This is needed to secure an efficient and effective way of working towards a successful product.

There is a risk of losing the UX intent of a product if no support structure is in place. In order to keep the organization "mean and lean" and at the same time deliver UX focused products we need to secure the vision of a product throughout the development process. Today many companies have developed methods to validate concepts of the final product with end users. UIQ technology AB uses for instance their UTUM method. [3], [10]. Unfortunately these kinds of validation activities are too often handled by and within a UI Design/Interaction Design group and not as part of the overall design process, e.g. as ad hoc help in the design work at different stages. Our suggestion is that companies organize in such a way so that UX requirements developed by end user understanding and use knowledge are monitored throughout the development cycle. This can be done by having UX guards in leading positions in the development process. People that monitor the holistic view of the product and who have the mandate take necessary actions whenever it is needed to secure the overall product intent.

6. POLICING UX

Even though most companies have both verbal and written UX statements and visions on their walls as lead goals for their business, an overall UX strategy are often missed out. A products quality definition is still related to different sub-levels, measurements and predictions of defects as criteria, and seldom includes usability and/or UX quality criteria. This means there is no connection or possible way of measuring the "temperature" of UX in the product during the development between vision and final product. There is also a embarrassing divergence between UX quality and existing product quality, meaning that we have processes and means from traditional software engineering to monitor product quality by defects, which do not constitute the wished for guarantee to achieving an envisioned high level of UX in the final product.

Therefore a complementary way to also inject UX quality assurance into the development process would be by:

1. Gaining acceptance of a **vision** through user research with end users by means of methods like early prototype testing.

2. **Policing** the vision throughout the development process by internal review methods to secure UX product quality. UX quality criteria and milestones should be included in an overall design process influencing the development process. A new quality assurance role needs to be created for UX experts to act as guardians for the UX quality.

3. **Validating** the product and evaluating the result against the vision, again by formalizing existing methods like UTUM [3], [10] in the development process. This is also visualized in figure 3.
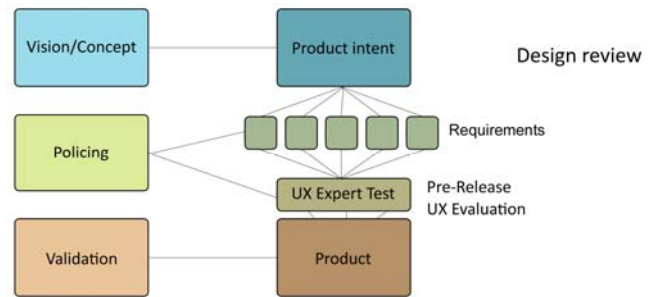

Figure 3. Policing UX requirements

An organizational set up like the one described in figure 3 would be a better guarantee that the product vision and intent is what will be delivered in the end compared with the organizational set up presented in figure 2. Meaning that the whole of the organization needs to understand and prioritize the end result. Project Managers need to acknowledge, understand and take these new UX criteria's into their plans. The way to secure product quality and to include UX into the product quality aspect has to be to introduce "UX guards" in all levels of development. Their role would need to be to police the fulfillment of the UX quality criteria in the process defined and decided checkpoints. These checkpoints could e.g. be expert reviews of requirements and expert UX reviewers to get the authority to set a pass/not pass stamp on the intended delivery. This needs to be agreed and formalized into the development process.

7. DISCUSSION

It is identified that the academic fields of Software Engineering (SE), Human Computer Interaction (HCI), and Participatory Design (PD) to a large extent developed divided from each other [Juristo et al. 2001, Kensing 3003]. Each area is highly challenging and has today decades of important documented knowledge; SE has significant successes in requirements gathering related to software development organization, HCI in usability evaluation and PD in techniques and methodologies for user participation. Industry has picked and applied parts from the different fields despite the academic separation. Five years ago a mix of the knowledge inherent in these fields was considered to provide a good enough foundation for building successful development process. In recent years the mobile industry has started to compete with what can be claimed to be User Experience (UX) products. Hence a fourth aspect called UX appears that also needs to be integrated on the top of these aspects.

When will the above mentioned areas develop to support also the understanding of UX, so that we can find better ways to capture and monitor when a market is mature enough for appreciating a product or service? We need to widen our understanding of users also in the UX aspect. Find ways to monitor UX requirements throughout the process. UX should be the backbone of product development today and not as in many cases something that is added as a final finishing procedure of a product. Such approach is just a "lipstick on a chicken" approach and will not lead to a

successful launch of a product. We need to change existing development processes to be built around UX definitions, and not just incorporate UX as add on to already existing processes. UX is a new perspective we have to apply in order to successfully launch products at the right point of time within an "open" market window; in which it supports new and existing trends, and of course deliver satisfactory levels of hygiene. Hence, UX will change how we perceive and perform product development.

As future work we will continue to look for inspiration and knowledge within the area of innovation. Denning and Dunham [2] make a clear distinction between invention and innovation meaning that invention is the idea as such but with the absence of adaptation applied. An innovation on the other hand is an invention that covers the entire way from idea to adaptation and sustainability of that idea making sure that all is done for that idea, artifact or process to make it successful in the intended marketplace. One indication of the power and control over user innovation is that companies like Apple with control over their products from hardware to software throughout the marketing process seem to have better chance than smaller not so well known companies that has to rely on the market allowance or a better chance than companies that uses sub-contracting as a way to produce their product? The WeBIS [5] project is a research attempt started in the spring 2008 that aim to address some of the in this paper mentioned innovation aspects, and also to create a user centric and user innovation driven method; a method to support early decision making, if an idea, product, service is worthwhile going for or if there are too high risk of failure.

8. CONCLUSIONS

Today we monitor and define product quality by measuring defects levels in different ways. This will still be needed but must be complemented by UX quality measurements. The product quality definition needs to be increased and widened to include measurements from the UX area and new quality criteria need to be accounted for with actually higher priority than previous sub-quality criteria. More organizational effort should be spent on developing Metrics and KPI's for monitoring and securing UX product quality.

When we decide to prioritize UX in products a new development approach is needed as well, this to ensure that the intended UX appears in products at the market. On a high level there needs to be a cultural shift into a more UX oriented and UX driven mentality within the whole product development organization. On an organizational level UX quality assurance needs to be established by recognizing and given authority to UX expertise that can secure the total UX product quality in all levels of development. In this paper we suggest UX "guardians", see figure 4 below, for policing the UX throughout the product development.
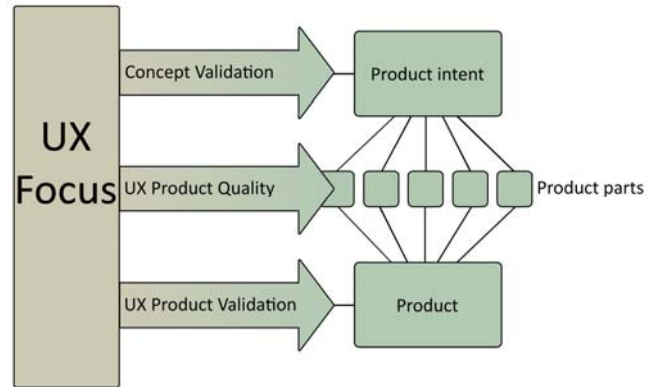

Figure 4. Focusing UX

In order to introduce this approach a cultural widening or increased knowledge among existing SWD roles of e.g. Project managers and Product Managers is needed in order to break the traditional cultural views of monitoring and planning project deliveries. We think it is possible and the suggested approach can be well integrated in traditional SWD processes, but emphasis the need for other competences and milestones than present today e.g. project Managers, UX experts, market experts & Product Managers and technical expertise have to cooperate to a much larger extent than in most large companies in mobile industry today.

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