Designing for uncertainty (Assumption-based design)

Assumption-based design creates an explicit, and auditable, link between the information available, the assumptions that are made based on this information, and design recommendations.

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Making decisions about the future direction of a product or service is not easy. Not only does it require commercial acumen and technical ingenuity, but it also requires an element of prediction – determining how the product or service will fit the future user and market needs.

Project teams can fall foul of one of two clear traps when deciding on the future direction for a product or service. Some teams limit the information collected, in favour of relying on intuition – progressing the design without a clear understanding of risk, while others collect too much, delaying decision making in a quest for clearer, more unequivocal, information. In the latter, there is a risk that analysis paralysis can set in – where decisions can be repeatedly deferred as additional questions are raised resulting in further research.

The pragmatic middle ground is to base decisions on a grounding of appropriate information, recognising when the information available is enough to progress for a given risk level. Perhaps more critically, the challenge is to ensure that the right information is sought.

While we cannot be certain of the future, we can make educated assumptions. Some assumptions will have high levels of certainty, others less so. Likewise, some assumptions will be critical to the design, others less so. Products stand the greatest chance of success if they are designed based on an explicit understanding of the assumptions that underpin key design decisions along with a description of their robustness and their criticality to the design. Furthermore, actively monitoring, and protecting, those assumptions plays an important role in increasing the likelihood of success.

Assumption-based design

The approach we have been refining over the past few years and describe as Assumption-based design creates an explicit, and auditable, link between the information available, the assumptions that are made based on this information, and design recommendations.

Understanding the links between information, assumptions, and design recommendations is critical. By linking assumptions to design recommendations, it is possible to understand which assumptions are more critical to the project, and which are less (or even irrelevant). Likewise, the information that is being used to direct future product recommendations can be explicitly highlighted.

When a rating of confidence is applied to the assumptions, the approach serves as a structured process for prioritising future research, focusing first on the assumptions that have significant sway on design direction and those with lower levels of certainty.

The process can be summarised as follows:
1. Record information and insights collected
2. Record assumptions made
3. Link assumptions to information and capture a rating of assumption confidence
4. Record recommendations made
5. Link recommendations to assumptions and capture a rating of recommendation confidence
6. Identify critical assumptions
7. Determine the required processes to confirm and monitor information and assumptions

Information

The type of information collected will be dependent on the type of product being designed. However, it is likely to include a mixture of factors that can direct innovation:

Needs
• Explicit stakeholder (end users, manufacturers, installers, maintainers, etc.) wants and needs

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• Latent stakeholder needs
• Market demands (e.g. regulatory requirements, cost models)

Technology
• Latest component availability
• Current R&D pipeline
• Predicted technological innovations and costings (extrapolation of trends)

Category trends
• Descriptions of current competitor products
• Intelligence around competitor pipelines (what they are talking about coming next)
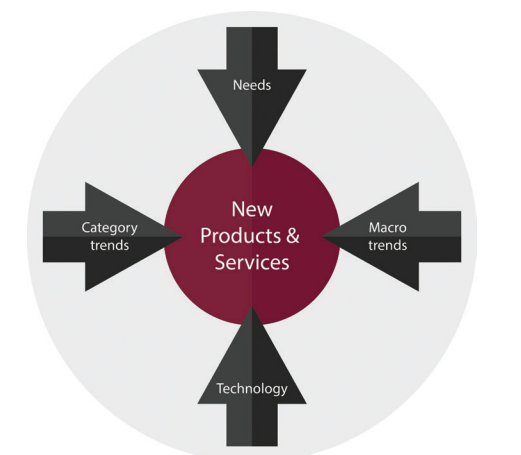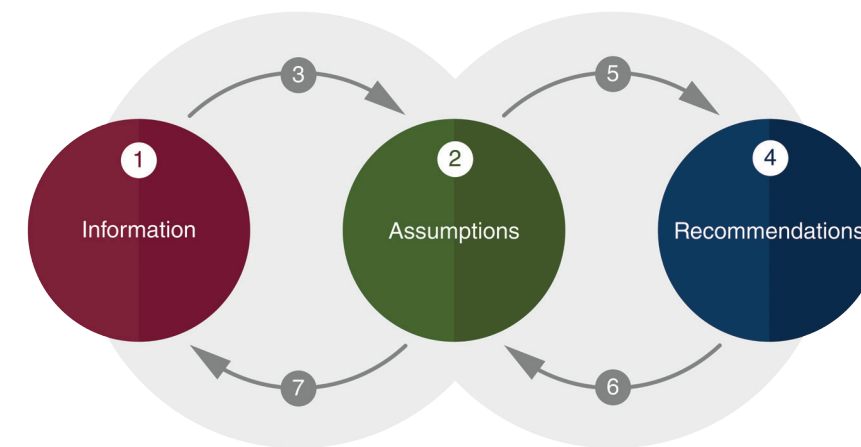• Patent searches and landscaping

Macro trends
• Trends from parallel worlds (what is happening in other markets that tend to cascade down)
• Broader trends (e.g. attitudes towards disposable plastics, views on cashless transactions)

Assumptions

Assumptions are made based on the interpretation of one or more pieces of information.

As an example, for a given product, a

number of information sources (such as 'voice of the customer' data and competitor portfolio mapping) may indicate the importance of a connected version of a product, leading to an assumption that a connected variant would be critical to the design.

We can be very confident about some of the assumptions that we make about a product or a service. Others can feel like little more than a guess. As such, it is important to have some way of capturing a description of their certainty, along with a link to the information source(s) used. This creates an auditable trail and allows assumptions to be revisited should the validity of an information source be subsequently questioned.

Recommendations

Recommendations can be treated in much the same way as assumptions. It is important to record what they are based upon, and the level of confidence in them. The adoption of a recommendation is likely to determine the importance of each of the linked assumptions

and, in turn, the associated information elements. This may lead to further research to confirm the information.

Continuing with the example of a need for a connected device, this is likely to lead to a recommendation to develop a connected variant of a product. However, it may be critical to re-test this assumption throughout the development process to ensure that the product being developed is indeed meeting the needs of the consumer.

Improving the model

Once all of the assumptions are listed out, and linked to recommendations and information, it is then important to understand which are the most critical to the success of the product or service. This allows critical assumptions to be monitored and a focus to be placed on the assumptions that are critical to product success. Critical assumptions can then be tracked, protected and hedged.

For example, if product success is linked to two core assumptions: that the product will have the lowest cost of goods (COGs) and that the cost will be a key driver in purchase decisions,

then it may be critical to monitor competitor portfolios and innovation pipelines (e.g. patent searches) to understand if they are developing technologies or processes that may give them a cost advantage.

Cost advantages can be protected by further reducing COGs through cost reduction exercises (making it harder for the assumption to fail).

It can also be hedged by ensuring that the product has added value to consumers that would allow it to be a viable proposition even if the assumption were to fail (no longer the lowest cost on the market).

Conclusions

Our experience is that assumption-based design provides a highly structured approach to product and portfolio planning. The explicit nature of the approach provides a clear audit trail for decision-making providing a more efficient, transparent, evidence-based process.

This not only helps to guide product development, but it also helps to reduce instances of ill-informed decision-making and analysis paralysis.

This is particularly relevant when initiating a product in the face of uncertainty. Rather than delaying project kick-off in pursuit of further information, this approach can be employed to start the project based on a clear understanding of the assumptions made, resulting in a specification that is refined over time and allowing timelines to be met, while still managing risk and uncertainty. |

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