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What is the importance of analysis and design in software engineering?

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Les Foster, Software Engineer With Many Years of Experience

Answered June 10, 2018

Analysis & Design is supposedly what differentiates a good software process from “cowboy coding”. The analysis is (as the “lys” root implies) about breaking down something. In this case it is about breaking down the problem into manageable parts.

Design is about building something up. Here, we build up a solution, which will include whatever is relevant to the problem domain, such as models.

Cowboy Coding is about just writing the code without thinking about it too much. This is almost always a bad idea because solutions and problems usually involve more than just the small part you see. It’s akin to fixing a symptom of a longer-term disease. It might also be an “anti-pattern” whereby some ‘solution’ looks good over the short term but not over the longer term.

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of the system (its boundaries, etc.) and you can consider the "ilities" like performance, scalability, maintainability, etc.

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Even on a one person project you need to take time and do both. But what that really means depends on many factors. I'll cover a few here, but first let me say the type and depth of analysis, design effort, will vary from project to project.

At the outset of a project:

- Analysis is about truly understanding the problem, in depth. This includes a quantification of capacities, speed, security, latency, robustness and even the uncertainties that accompany a project. Each project will have a set of factors you need to consider carefully - hence analysis.
- Design is about choosing the architecture(s) and solutions appropriate to the problem. It may well result in the use of preexisting products and tools, so in this regard proper design is vital to cost savings. On the same theme, a robust design that accommodates the uncertainties recognized in analysis will also result in cost reduction and on-time solution delivery

performance is a well formed industry standard, then analysis could be a single step process. But if I give you a problem which is more appropriate to requirements prototyping then analysis will most likely be iterative.

Design involves making some fairly fundamental decisions about architecture and tools, but revisiting the design should always be possible. So you can't think of Design and ending much before completion of the project, but it should ramp down as the project progresses. You would hope.

In practical terms Analysis and Design have overlap. Sometimes that overlap can be quite significant as Design may include rapid prototyping which in turn may involve Customer interaction. If you have no need for a Customer exploration activity, this may not apply of course.

The skill sets will vary, especially on larger projects. During Analysis, for instance, I like to have System Test (Quality Assurance) deeply involved because the quantification targets are of prime concern to them in formulating meaningful test programs. For Design we need experienced people with architecture skills and with extensive tools knowledge. It's okay to juggle Designs until you embark on serious coding activities. Thereafter Design changes tend to be expensive.

The mistakes I commonly see are:

- Making design decisions without sufficient quantification from the Analysis activity.
- Thinking that Design extends into code development - it doesn't. Code development is almost always iterative and is really a process unto itself (as recognized by Agile and most current-generation methodologies)
- Failing to properly quantify deliverables during analysis which forces multiple redesign efforts
- Not having the people who do the analysis and design fully vested in the lifecycle of the product. The excuse I see most often is that architects and specialists are too valuable to be nailed on one project, one product but actually that's just a horrible mistake.

these activities but time and again I've seen these boundaries proven correct. The caveat? Well, each and every project is unique, different, so you can never allow dogma to dictate how you tune your methodology to the specific case-in-hand.

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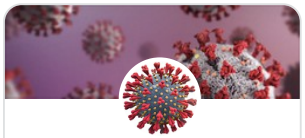

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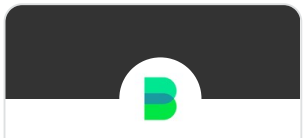

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wrong and you are building a well designed hammer to unscrew a door hinge. You just must know the problem from every angle, every user, every use case that can be identified. Every additional hour spent on analysis has a multiplier effect on development hours in the 3 to 1 range.

Design depends on analysis to set the stage. Tell me the story, how much, how many, how should I skin the cat? Every problem has multiple solu ... (more)

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In larger corporate settings, analysis and design are formal steps for creating something. Designing something that is consistent and reliable is part of the product lifecycle. These formal positions look for consistency and ensure the platform is built to scale well.

Either way, design is about choice and analysis is about confirmation. Can I design a scalable solution that removes worry from the customer? Can I measure how a system will grow when more users are active on the system? Can I design a user experience that engages new customers more quickly? Can I measure if the new onboarding sequence is improving customer experience?

Most formal software training courses ensure people have the skills to employ technology competently. Competence means we see the bigger picture and make choices that are appropriate to that knowledge. Analysis and design support us going forward, ensuring that we're competent in new environments, new technology stacks, and new challenges. Whether it's your official job or not, a good software engineer will pick up many analysis and design skills along the way.

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Answered June 9, 2018

Analysis of the requirements is the first step in software development. At the end of analysis, one should have architectural (programming language, paradigm, platform, and aspect independent) specification of : solutions for each use case, data/ops needed to compute those solutions, data-types, call dependencies, system elements like databases, web servers etc.

Design is the second step in development which consists of three parts: 1) defining the functional environment of each solution and how this environment is achieved i.e. navigation of environments. 2) application of aspects like concurr ... (more)

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"What is the importance of analysis and design in software engineering?"

Pretty much everything.

Without the analysis and design you won't get the desired product.

You are given a "marketing requires ...." but without the analysis and design, they could get a game like "tic-tac-toe" instead.

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