Development of a project planning support tool with user centered design

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Planning. It might seems simple, because we do it everyday. Why are we developing a planning support tool then? In this article we are going to explain how complicated planning can be and show a prototype visualizing planning in detail.

I. PLANNING

Planning has always been an essential part in everyday life. Whether planning for today's lunch, a vacation or even a project, planning good could be the difference between a success and a complete disaster. How hard is it then? Let us take our example. If you are eating lunch with a colleague, then you both have to decide when to eat, where to eat and what to eat. That is three parameters to be decided and if you both agree then, the planning is successful. A vacation is a little bit harder. Imagine a family of five people, each with different interests. One wants to go to the beach, another wishes to visits temples and the third wants to go barhopping. Imagine all the things you can do on a vacation and you will easily have at least 25 parameters and remember everyone must be satisfied. Back to the topic, planning for projects is one of the most complex form of planning encountered this far. In a project, there are tasks comprising the whole project and persons to perform these tasks. Let us pretend that we have 10 tasks and 10 persons. A task can be assigned to a person in 10 different configurations and the next one the same. This results in $10^{10} = 10000000000$ different combinations. How do we find the best solution of these combinations?

II. ALGORITHM

A genetic algorithm was used to solve this problem. A genetic algorithm is a way to mimic the natural evolution process. For example, let's take the evolution process in humans. The offspring will get half the genetic code from one parent and half from the other parent, which will for example, make the offspring resistant to diseases. This applies for genetic algorithm as well. Firstly, a population of solutions is created by randomly assigning persons to tasks. Let us say, for the sake of simplicity that the population is two. The population of solutions are then combined to create new solutions, which is the offsprings. Each individual has a fitness score, which is the score of how well the solution solves the problem. The fitness score was based on how well their skill set matched the required skill set for the tasks and also taking into consideration that everyone should work equal amount of hours as possible. Only if the offspring have a higher fitness score than their parents are they allowed to "mate" in order to create new offsprings with even higher fitness score. This process is iterated until the fitness score does not increase anymore.

III. VISUALIZATION

Now that the algorithm is done and there is a good solution, it has to be visualized in order for an intended target group to use(in this case, this is project managers). Interviews were conducted in order to get a grasp of how project managers is interacting with their currently available software. Based on the interviews, a list of ideas were generated in order to decide the characteristics for the visualization. This resulted in creating a Gantt chart. A Gantt chart is a graph, displaying elements(tasks) comprising a project with a timeline as reference. This timeline can display time in days, weeks or months. The chart was done with the aid of Qlik sense, which is a business intelligence company working with data visualization and discovery.

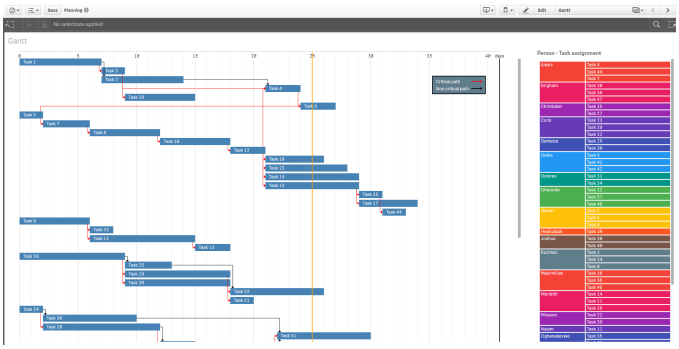

Fig. 1. The final version of the tool created.

IV. APPLICATION

The tool created has a couple of use cases. It can be used by a project manager to come up with a good configuration automatically assigned by the genetic algorithm. This means that the machine will do everything and a project manager can just sit back and relax. The main usage is for managers to click around and making discoveries in their projects. In addition, the tool can also be used as a means of communication, to figure out which persons that needs to collaborate more with each other.