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# "Particle Physics Manager" Development Report

   For the six weeks of my studentship,  I was tasked with producing a prototype computer game as an outreach tool for GCSE or A-level students, explaining the concepts and history behind recent particle physics research by casting the player as the director general of a CERN-like site.  The game itself was based on a concept I created for a computational laboratory project in the previous year.

   In order to construct a user interface, I begun by familiarising myself with the QT4 integrated development environment for C++.  This software and library package was chosen for the ease of handling a graphical interface and the simplicity of running such an interface on various operating systems.  Additionally, I gave a short talk to members of the Particle Physics Group, explaining the proposed nature of the game and demonstrating the prototype version previously produced.  From the discussion that followed and in close consultation with my supervisors I produced a comprehensive design document that detailed both the proposed gameplay mechanics and the intended experience of the user in terms of transmitting physics information directly and through the decision points presented.

   A basic prototype was produced from the ideas generated in the design document, into which each proposed mechanic was added and developed.  By separating out unrelated elements of the game, such as the game logic to the user interface and the allocation of personnel to the financial overview, I was able to gradually build towards the full game in small steps.  This also allowed my supervisors to thoroughly test each new feature and provide feedback that was used to refine them further

   An example of this refinement can be seen in the presentation and interaction with the Research Assistant (RA) resource.  The design document describes the RA resource as being a more valuable than basic Postgraduate researchers with a single area of specialist knowledge, along with a sketch showing a possible interface layout using dials to represent the number of each specialism currently available for allocation to projects.  In recreating this layout, I decided that the dial-based output was not very clear, so began to explore the use of pie charts to relay the same information, although this still limited the number of different specialisms that could be simultaneously displayed.  One of my supervisors had the idea of physically moving the staff around the ongoing projects, which led to the use of drag-and-drop icons representing each RA.  The colour and shape of the icons was used to differentiate between specialist fields, along with a tooltip containing the name of the specialist field for reference.

   This system met the initial requirement of making the RAs feel distinct from the Postgraduate and Professor personnel resources the player also manages, as the Professors are individually named and detailed and the Postgraduate researchers are represented by a number alone.  Since each RA displays it's specialist field, it also removes the complication of displaying the number of each different RA type assigned to a project, many of which would be zero.

   By the end of the project, I had produced a working prototype containing at least basic versions of the features proposed in the design document.  The core elements missing from this prototype are in the areas of presentation, usability and fine balance.  Each of these elements will require an extensive amount of playtesting, both to evaluate the value of each choice presented by the game and to gauge the performance of unprepared users.