**SAB’s Project Management Active Instructions Project**

**A Summary of Student Aircraft Builders (SAB)**

Student Aircraft Builders is an interdisciplinary undergraduate team at the University of Illinois that will construct and modify a general aviation kit aircraft. We aim to take home the Oskosh AirVenture 2014 Homebuilt Lindy Award. Named after aviation hero Charles Lindbergh, the Lindy Awards acknowledge the tireless effort to create an aircraft that is truly best of show. Upon successful certification of the aircraft, we hope to proceed with FAA authorized avionics modifications using inspiration from our academic background in engineering. Additionally, we have received interest in the use of our aircraft as a research platform for other projects on campus.

**A Summary of Project Management in SAB**

Project Management in SAB is not the same as typical project management found in other places. Project Management in SAB has the four following responsibilities:

* Interpreting factory instructions and technical drawings
* Creating airplane assembly instructions that are accessible for students
* Breaking down factory instructions so three people may build on the plane at once
  + Resource leveling (strategically planning so tools may be utilized to the best of our ability)
* Creating presentations to introduce builders to a part on which they will be working.

**Current Instruction System**

Project Management needs help breaking down factory instructions so that three people may build on the plane at once.

The current system has Project Management writing one set of master instructions that lists all steps as if the plane would be built by one person. From there, every step in the instructions is analyzed for three things:

* What steps must be completed before a step may begin?
* What tools does this step use?
* What parts are involved with this step?

After these three constraints are analyzed, Project Management plugs the information into Microsoft Project and breaks the master set of instructions into three sets of instructions. Each person who will be building on the airplane at a given time receives one set of instructions. If each builder completes steps at the rate predicted by Project Management, there should never be a problem of two builders needing to use the same part or tool.

**The Problem with the Current System**

Because the people building the airplane will have vastly different experiences with tools and sheet metal working skills, it is very hard for Project Management to accurately predict how long it will take a builder to complete a given step in the instructions. This makes it hard to craft instructions that ensure that builders do not run into problems sharing tools or parts.

Say that on any given day a builder gets much farther than anticipated in the instructions. The three sets of instructions are meaningless if the builders are not working at the same pace, because the instructions no longer insure that builders will not need to use the same tool. (Or work on the same part, or get to a step that depends on a step that is not completed yet.)

**The Fix (Active Instructions)**

This is where Project Management needs help. The solution described below will only work if it can be translated into code.

Before anything is imported into the system, Project Management has written a master set of instructions and relevant constraints.

But instead of writing three sets of static, printed instructions, a database of steps (and the constraints corresponding to each step) would be imported to the program. This database now holds all the steps (and corresponding constraints) necessary to complete the part. However, the database would only display steps that could be completed given the current state of constraints. For example, if step 3 needs to be completed before step 4, but steps 1-3 can be completed at the same time, the database only displays steps 1-3.

Each step can be in one of three states: Not started, in progress, and completed.To indicate that he or she is working on a specific step, a builder selects “in progress.” The act of selecting “in progress” would narrow the list of steps available to the next builder because the “in progress” step would involve a certain tool and part that would conflict with other steps. After selecting “in progress” the program would display the corresponding step number in the master instructions.

As soon as a builder finishes a step, he or she selects “completed.” By selecting “completed,” the list of available steps is widened because all steps that need the “in progress” step to be completed would become visible to the builder. (Also the tools and parts used for the “in progress” step will become available for all builders to use.)

All three builders would be selecting steps from the same offline computer (A laptop running Windows XP in our build area), so no mobile app or webpage would need to be created.

**Additions to the Active Instructions**

Some things that would be nice to incorporate into the program would be:

* After a step is selected, the computer prompts the user for their name so that we can track who is building on what parts.
* The computer determines the best next step. (This could be evaluated based on the number of steps that depend on the step in question.)
* Each step displays a link that will open up a folder on the computer with pictures of every part associated with that step.

**Why This Problem is Worth Your Time**

This system would solve the problem Project Management has with planning three sets of static instructions and would be used every day that people will be building on the plane. Your code is what allowed the construction of an aircraft by 60 people in under one year. You also have the advantages of a leadership position within a growing and diverse student club and have experience working in a coder-client relationship.