Education and Business Style Innovation By COMSOL® Apps

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Abstract

1. Introduction
Computer science has become siginificant tool for design, research and development in many industries and universities. On high-level simulation area such as multiphysics simulation area where many physics are coupled, in general, only professionals could handle such state-of-the-art simulation. In order to shorten the period spent for design and R&D or education, it is strongly desired to innovate the style of these activities. COMSOL application (Apps) can be considered as a reliable tool for this innovation. Indeed, Apps can provide a simplified GUI for non-professional people. This means we can assign non-professional people to computation activity even if they do not know the way to use multiphysics analysis tools. However it seems that procedures by which developers of multiphysics simutation can tailor their Apps very easily, is not clear and therefore strongly desired.
In this research, we propose some prototype of COMSOL Apps and apply them to in-company training and assist educations in classroom of universities. It was shown that the proposed prototype is well organized and very useful to make Apps. We believe Apps will innovate education/training, and R&D as well as our business.

2. Proposed procedure for designing Apps
Procedure propsed here are as follows.
Step 1 Forms > New Form > OK to make form_1
Step 2 Duplicate form_1 to get form_n (n=2~N). The case of N=5 is explained here.
Step 3 Edit form_1 and select Form Collection
Step 4 Select form_2 to form_5 as Panes
Step 5 Edit form_n (n=2,3,4,5) and attach objects etc.
This procedure is simple and clear and is constructed with minimum steps which can be considered as a sufficient tool for education/training and rapid circulation of R&D. For manual-less usage of Apps, illustration by images sampled from experiment, power point or discussion on the whiteboard, is very useful. This also can be done on Apps with png images and the following simple steps.
Step 1 Prepare png-type file
Step 2 Libraries > Images > +(add) your png
Step 3 Edit form_i > Insert Object > Image > Select your png in Step 2

3. Application
First, we introduce an fundamental example. For non-professional or first-met-

computation people, explanation of the job sequence of CAE is very important. When clicking tabs, they automatically learn the standard job seqence from preprocessing, solving and postprocessing of CAE. Second example shows that we can use Apps for non-professional people belong to sales devision as in-company education. We constructed the system consists of COMSOL server within our KESCO's seminar room as shown in Fig. 1. It was shown that non-professional people can use Apps easily and we can save the time for education. Furthermore they eager to feed back to the lecturer about the Apps. In fact, we could improve the contents of Apps, e.g., with addition of tab for explanation of professional terms and tab for the explanation of fundamental equations. We discussed the formulation of the physics using the whiteboard, and then took the photo and convert it to png in order to attach it to the Apps. For education in the universities, it was found that Apps can save time for the explanation of GUI and students could try to tackle real computational science problem.

Figures used in the abstract

Figure 1: In-KESCO training for sales people by using Apps and COMSOL Server