Primary Modifications and Software Strengthening Include:

1. The Arm Force Field Plug-In has been renamed to Hand Force Acceptability Calculator
   a. In addition, their have been changes to the window layout to promote more intuitive use and work flow.
2. Camera
   a. The widget camera controls, previously displayed in the top left corner of the viewport were removed to match the implementation in Santos Pro

   b. The ability to parent world items to cameras was added, but cameras cannot be parented to other items.

   c. It is now possible to import and export camera settings. New cameras can be created with imported camera settings by selecting the Import External Camera button in the Viewport toolbar (note that it has a folder icon).

   d. If a camera in the expert pane is right clicked, its settings can be exported to a .cam file by selecting Save Camera Settings. Camera settings can be loaded onto the selected camera by clicking Load Camera Settings.

3. Avatars
   a. The names of the default avatars were renamed to the general form of Height in mm-Weight in kg-Gender.

   b. A new window, called the avatar selection window, was added. This window can be accessed under the Windows dropdown menu.
      i. Enables users to see what each available avatar looks like as well as see information about their default height, weight, gender, and closest anthropometry scaling percentile. Additionally, there is a button in the bottom right which enables users to add the currently displayed avatar to world.

   c. The default avatar eye range of motion was changed, and the manual eye movement function was updated to accommodate this change.
      i. Horizontal:
         1. Left Eye: -15 to 45 degrees
         2. Right Eye: -45 to 15 degrees
      ii. Vertical:
         1. Left Eye and Right Eye: -5 to 20 degrees

4. Model Import/Export
   a. The option to export models with materials was removed. Now, all models will export without materials.

b. Merge Export and Hierarchy Export can no longer be checked at the same time. These are two different processes, only one of which can be used at a time.

c. Import and Export now supports importing and exporting multiple world objects at once.

d. Objects may only be exported as .obj files.

5. Save and Load End Effectors
   a. The first location where this can be done is in the End Effector window in the Avatars' context window. This window functions the same as the AHP Window and will display the position of all end effectors currently on the selected avatar. These end effectors can be exported using the export button to a file with the type .eef. The Import button allows you to import .eef files and proportionally load them onto the selected avatar.

   b. This can also be done by right clicking an avatar and selecting either Export End Effectors or Import End Effectors.

6. Window Updates
   a. The Link Length window, accessible in the avatars' context windows, was updated to match the new formatting in Santos Pro. However, note that it is still disabled for use in Santos Lite.
      i. Disabled the event handlers and controls for some handlers in the link length window and made it so only the current height text box will update, not the sliders.
      ii. The ANSURII and NHANES link length scaling tables were added to replace the NASA and ISO link length scaling tables.

   b. The Joint Limits window, accessible in the avatars' context windows, was updated to match the new formatting in Santos Pro. However, note that it is still disabled for use in Santos Lite.

   c. Updated the Formatting and display style in the Joint ROM Visualizer
      i. The color palette was changed to a red/green palette.
      ii. The Joint ROM window was updated to have the same checking display system as in the Joint Torques visualizer.
      iii. The naming convention was also updated to match the naming system in the Joint Torques Visualizer. These joint names are more descriptive of the actual joints.

   d. Updated the formatting and functionality of the Joint Torques Visualizer
      i. The color palette was changed to a red/green palette.
      ii. Joint Torques Visualizer no longer automatically updates by default. It is set to pause by default.
      iii. A refresh button was added to the Joint Torques Visualizer when clicked, it will update the displayed torques to match the current avatar's posture.

e. Added a new vision display option in the Posture Window, which is accessible under the avatars' context window.
    i. The new vision display option is called Field of Focus (FOF). When its display check box is checked, it will project an ellipse from the avatar's selected eye. The horizontal and vertical angles of this projection can be adjusted by changing the Horizontal and Vertical Angle sliders.
    ii. Now, both Line of Sight and FOF can be displayed at the same time by checking both of their Display Vision checkboxes.
    iii. The color of the lines generated can be changed by manipulating the color properties under Edit --> Preferences.

f. A couple updates were made to the Library Window:
    i. There is now an object rename button listed in the toolbar of the library window that allows editable objects to be renamed. If an object cannot be renamed, it will either disappear from the toolbar or become disabled.
    ii. Avatars can be renamed by the user now.
    iii. The default library view has been set to List for all tabs except for grasps, which is set to Icon by default.
    iv. The List view was updated so that the width of the displayed column can be changed by dragging the vertical line displayed next to the top of the list.
    v. The details view was removed as an option.

g. The Object Scale Window, accessible under Windows, was updated so that the picker selection will automatically update to the most recently selected valid world object.

7. Background Image
    a. Images can now be loaded from any readable/writable location.

    b. When images are loaded in, they will initially be loaded in with the correct aspect ratio. However, note that if you change the window size of the Viewport, the aspect ratio will not update again.

    c. A Reset Background button was added, which will reset the background to the default Santos background.

    d. A Clear Background button was added, which will clear the santos background to a basic white background.

    e. A Recent Background Image button was added, which lists any background image that was previously loaded during the current session.

8. Expert Pane
    a. It is now possible to pick parents in the expert pane.

    b. If multiple items in the expert pane are selected, several of the common properties will be displayed. If edited, the edits will be applied to all of the selected objects.

9. Snapping Options
   a. A surface snapping option was added, which snaps the selected item to the surface of the closest object surface. However, note that if the item is not close enough to the item you are trying to snap to, it will not snap to the object.

   b. A rotation snapping option was added. When selected, an Angle box appears next to it, where the user can enter the angle increments they want to snap by. When an object is rotated with this option selected, the object will rotate by the selected increment.

Other Modifications and Software Strengthening of Note Include:

1. A bug where the avatar's strength percentile and gender would not actually update if adjusted in the posture window was resolved.

2. An update was made that makes the self-avoidance and obstacle avoidance properties specific to the avatar selected, rather than staying constant across all world avatars.

3. The min opacity on a model's context window was changed to 0, rather than 0.05.

4. The default opacity of marker target planes was changed to 0.

5. Point loads now have the capability to have visibility turned on or off.

6. The Motion Capture visualizer was disabled for use in Santos Lite, but the formatting was updated to match the recent changes made in Santos Pro.

7. A bug that occurred when switching to and from avatar eye view was resolved. Previously, a sight line would generate that would only disappear if a different vision target were defined.

8. Added a new unmodifiable property to marker targets that displays orientation in the expert pane.