The DBA portion of the plan, with background notes, is included below:

1- There are two separate data categories that SCC identifies in Oracle databases:

a. Setup data

b. Patient data

2- SCC uses Oracle Data Guard process to create an exact replica of your production database to HWUPG environment.

3- The replication process consists of the following steps:

a. The replication process starts by creating a bit by bit copy of the production database. This is called a physical standby, and it is by definition and result an exact copy of the production database. The Oracle standby creation will not finish correctly if the standby database is not EXACTLY identical, on a binary level to the original database.

b. After the standby is created in physical standby configuration, it is kept in synch with the production database by applying redo logs that have been sent over the network from the primary database. These logs have a System Control Number associated with each individual change to the database. Each SCN must be applied in order to keep the database consistent. In the case of a physical standby, the Oracle version must remain the same, since the database must be identical at a binary level. If the logs ever fail to apply, the database standby apply stops and the standby status is reported in the Oracle alert log as failed. As a physical standby, the database cannot be read or written to, except by the standby apply process.

c. The standby can be converted to a logical standby, which allows the database to be opened for read only by applications, and still be written to by the standby apply process. At this point, the database is no longer identical on a physical binary level, but is logically equivalent. There are advantages to this state, as the database can be read, and the standby database can be upgraded to a different version. At this point, the redo logs are still applied to the standby database, and the apply process still keeps track of the SCN number. Again, if the standby fails to apply, the standby status is broken and reported.

d. Once the standby is created, converted to logical, upgraded to a new Oracle version, and kept in synch, it is available to be activated as a primary database if necessary or desired (it doesn’t need to be upgraded to be available, but it can be without breaking a logical standby). This is what we do when the application starts using the standby on the upgrade hardware. At this point, the application can write to the database, so it is no longer logically equivalent to the original primary database. As such, if we want to have a standby again, it has to go back to item a. in this list, and be recreated as a physical standby, converted to logical, and upgraded again. Then it can be kept in synch until it is desirable or necessary to activate it again.

Note 1- The above process is the same process we use to keep an exact replica of your primary database from production MAINDB server to production AUXDB server.

Note 2- The logical standby database is a read-only database the same as on your production AUXDB server, where you run your on-demand and scheduled reports from.

Note 3- In order to make the database usable on HWUPG, DBA must convert the standby DB to active primary database on HWUPG MAINDB server.

Note 4- As soon as the replication process is stopped, the database in HWUPG environment is no longer in sync with the production database.

4- Naturally the moment DBA changes the standby database into an active primary database instance, the database in production will be different from the database on HWUPG environment. For this reason, the LIVE environment must be stopped before activating the LIVE database on the new hardware, and then the upgrade environment can be attached to the new database.

Note 1- The reason production will be different is that users are working and at each moment the contents of the database is being changed.

Note 2- In order to keep the databases from production fully & constantly in-sync with databases in HWUPG, we make the databases in HWUPG a read-only database.

Note 3- Making the production databases static translates into a complete downtime for all users – This is the only way to prevent them from entering even 1 byte of data. The application would need to be stopped for an extended period of time to compare the upgrade database to the primary. In addition, once the standby database is converted to logical standby, the address location of each record is subject to being different across the databases. This makes direct comparison of the databases on a file level impossible. The databases can be queried with SQL scripts or custom applications to compare the content of the databases on a logical level.

5- In preparation for Go Live event:

a. Once the HWUPG validation and failover tests are completed, to prepare for Go Live event, SCC will create a new replicated standby database from production MAINDB to HWUPG MAINDB.

b. SCC DBA team uses the same set of tools and utilities provided by Oracle (and already used in all the steps above) to make an exact match of the production database to HWUPG system.

c. The purpose of downtime during the Go Live is to make the production databases static so that DBA can then confirm the standby database on HWUPG system is an exact match to primary production database, and then activate that complete standby database as a primary active database on the new system, and give the system back to users.

d. From that moment forward, all the information changed or added will go to the database that is active on the new MAINDB server, while we leave the old systems down and disabled forever.

The process described above has been, is and will be the only process that SCC uses for hardware upgrade projects (initial steps & Go Live steps) as well as any case involving the need to create an exact replica of the databases, for example from production MAINDB to production AUXDB, or any other case involving creation and synchronization of databases.

SCC DBA team utilizes the tools and utilities built into Oracle Database that have been the standard technology used by Oracle DBAs in any industry.

To activate the new database on new hardware for the go live, the following will happen:

1) A new copy of the database must be generated as a physical standby, converted to logical and upgraded to 11.2.0.3.7, as described in action 2 above.

2) The current production environment must be stopped.

3) The setups from the upgrade environment will be copied to the new database.

4) The application environments will be connected to the new database as described in action 5 above and the software activated as the new production environment.