Fig 7.4. Example of Cockpit Display Requiring Workload Management

There are several techniques that pilots can use to keep their workload under control in automated aircraft (Fig 7.4). Following SOPs will help prevent inadvertent selection of a flight mode, or incorrect altitude or waypoint selections. These and other possible results of not following SOPs will significantly increase workload, at least in the short term. Studies have shown that as workload increases above a certain threshold, performance decreases significantly.

Always prioritize the most important task and deal with it first. Delegate tasks when able. Even pilots flying single pilot IFR can benefit from delegating tasks to ATC or FSS. Another excellent delegation tool is the autopilot – delegate the "flying" to the autopilot but ensure that you are "managing" the aircraft's flight path.

One of the best methods to help manage workload is through preparation and planning. For example, use low workload times (cruise portion of flight for instance) to review and program the approach. Put an alternate approach in the secondary flight plan (if available) so that you do not have to go "heads down" in a busy terminal area if you are cleared to a different runway at the last minute. If marginal weather makes a diversion to the alternate a real possibility, program the routing to the alternate and the approach in use at the alternate along with the approach at destination.

See Chapter 2 for more information regarding workload management and communication techniques.

7.2.5 Communication Techniques

Intra-cockpit communications in automated aircraft are important especially for awareness of arming or engagement modes by calling out mode changes, target selections and flight management entries.

These standard calls should trigger the question "how do I want to fly now?" and lead to confirmation, crosscheck and back-up by the other pilot. SA will suffer if standard communications are not carried out in automated aircraft.

These are some of the calls that are normally required in automated aircraft: "check; checked; crosschecked; set; armed; engaged; activated and ON/OFF" (for a specific system).

7.3 Levels of Automation

7.3.1 Understanding Automation

Automation and advanced technologies can take many forms, from a simple GPS installation in a light aircraft, to sophisticated automated systems including automatic checklist and aircraft monitoring. The techniques required to operate these systems safely are similar no matter what the level of automation. To fly any aircraft safely, you must:

- Aviate
- Navigate
- Communicate
- Manage

Aviate

The pilot must be in control of the flight path of the aircraft at all times. The flight path cannot be delegated to automated systems, although it will often be best to use these systems (autopilot for instance) and monitor their effect on the aircraft flight path. If things don't go as expected, take over and ensure a safe situation. As a rule of thumb, the pilot is best at handling strategic (long-term) situations; while the automation will do best handling tactical (short-term) situations like heading, altitude and airspeed.

The safe and efficient use of automated systems such as autopilot, autothrust and FMS are based on the following technique:

Anticipate: Understand system operation and the results of any pilot action and be aware of any modes or targets being armed or engaged.

Execute: Carry out the necessary action to control the automation.

Confirm: Crosscheck and announce arming or engagement of all new modes or targets.

Navigate

Use the appropriate level of automation to navigate the aircraft where you want it to go – not where the automation was last programmed to take it. Be aware of flight mode changes and system logic that may have the aircraft fly where you don't want it (and where ATC did not clear you) to go (Fig 7.5).

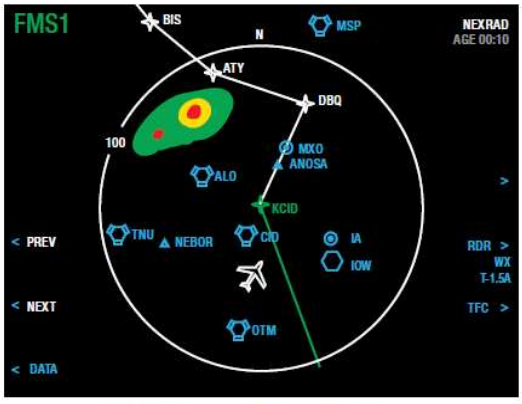

Fig 7.5. Example of Navigation Display Requiring Situaiton Awareness