Question 1.1 There are a large set of tools and platforms made available to control room operators each one bringing their own benefits. Is there a limit of tools per control room operator and how is it measured?

Indeed, there are large number of tools and platforms like – SCADA, PMU Visualization, forecasting, scheduling & reporting platforms, steady state & dynamic state study tools, EMS, contingency analysis tools, alarms, telecommunication sets, etc. These are kept at the disposal of the control room operators. These help them in augmenting their situational awareness, facilitate in taking well-informed decisions in Real Time. Though theoretically there are no limits of on the number of tools that may be kept at the disposal of the control room operators, there are some practical limitations. The following are proposed as some of the considerations:

- Presence of too many tools may be avoided as it could rather create distractions for the operators & shift focus from core functions. Need based tools may be provided from time to time. But their availability may be kept at an optimal level.

- As there are limitations in the number of audio and video alarms processed by a human brain. The number of alarms from the tools in a control room shall depend on the cognitive abilities of the operators. This has to be scientifically calculated based on the age, gender, ethnicity and cultural background. There shall be constant training programs to improve the cognitive abilities of the operators.

- Tools which are used for similar types of functionalities or which may affect control room operator's decisions may be avoided.

- Although large number of tools are available in the hands of the system operator, a limited number of them may be used in real time and rest of them may be used for pre-dispatch and post facto analysis of grid events by offline operators.