The role of technology to discover and mine uranium deposits

A layered approach is applied to detect, map and mine uranium deposits in South Australia. Advances in technology allow increasing resolution for locating and mapping uranium ores, and improve economic efficiency of uranium recovery.

How are deposits of uranium found?
Uranium exploration takes place as a stepped process, graduating from regional to sub-regional to local (see table). Uranium is naturally radioactive, and this feature can be exploited during exploration by searching for radiation decay signatures.

How uranium deposits are detected and examined	
Regional exploration	Large scale (100s of kilometres) with 30 m resolution Maps an entire basin or region Example: airborne radiometric exploration
Sub-regional exploration	Medium scale 5-10 m resolution Investigates promising areas following regional surveys Example: seismic exploration
Local exploration	Low scale 10 cm resolution Allows mapping of the ore body in 2D or 3D Has sufficient level of detail for planning mining operations Example: borehole logging methods of exploration

What's the latest in uranium exploration for South Australia?
In 2011 Geoscience Australia released a comprehensive map of uranium mineralisation distribution in this state. Airborne radiometric data was collected from 95 000 km^2 over central-eastern South Australia, and has resulted in increased activity in uranium sub-regional and local exploration by several companies.

Why do geologists need such specific tools for uranium exploration?
Once a new uranium reserve is identified through regional and sub-regional exploration, geologists rely on local exploration data to identify the best process for collecting that uranium, and what associated costs will be. The amount and quality of data is paramount to plan mining activities with confidence, and for accuracy and success in uranium recovery.

How is new technology changing uranium exploration?
Technology for uranium exploration is evolving, leading to better and more efficient tools for identifying new deposits. Each tool has pros and cons relating to cost, time required and the resolution of the data it generates.

Technology for processing and modelling of uranium data is also improving. As a result, not only are new deposits being accurately identified, but existing geological databases are being reanalysed to uncover deposits of economic interest that had previously been unrecognised.

What does the future hold for uranium exploration?
The capacity of geologists to identify and mine as yet unidentified uranium deposits will rely on the development of new technologies able to locate deep bedrock deposits. The South Australia PACE 2020 plan for accelerated exploration is a key work program designed to drive forward mining exploration and development, promoting multidisciplinary mineral systems analysis, new geophysical surveying, innovative modelling and data analysis. These goals are to be achieved through the establishment of centres of excellence in South Australia.