Sub-millimeter resolution for neutron scattering can be obtained at present only with photographic methods using either neutron image plates, such as on the "Koala" quasi-Laue single crystal diffractometer at ANSTO, or neutron scintillators, as proposed for the new "Cyclops" quasi-Laue real-time diffractometer at ILL Grenoble [http://wwwold.ill.fr/dif/2000/CYCLOPS.pdf].

More than 30 years ago, Arndt and Gilmore already proposed using "A neutron television camera detector" for D8 at ILL, but although a similar machine became quite successful for X-ray crystallography, it was unfortunately not taken further for neutrons. Arndt's idea was very simple. A large area detector would be constructed using a neutron scintillator plate that would be scanned in real time by a TV camera. It took another 20 years before Wilkinson et al. built "A large image-plate detector for neutrons", the prototype of the ANSTO "Koala" and ILL "Ladi" and "Vivaldi" Diffractometers. Image-plate detectors are scanned in-situ but only after data accumulation periods of minutes or hours.

Scintillator detectors were also developed at ILL and elsewhere, but for neutron imaging rather than diffraction. As recently as 2005 a wet-film photographic technique with a neutron scintillator was still being used to align crystals using the quasi-Laue method. This was finally replaced by the dual video camera scintillator system "OrientExpress" that was not only much easier to use, but also two orders of magnitude more sensitive!

The new "Cyclops" machine presently being constructed at ILL by Photonic Science uses 16 high-resolution video cameras fibre-optically coupled to image-intensifiers to scan an almost 4π neutron scintillator in real time. Like "Vivaldi", the new machine will be ideal for surveys of the whole of diffraction space, but it should be a little more efficient, allowing real-time changes in temperature, magnetic field and pressure.

In the last year, video camera scanning of scintillators has been used by many neutron scattering laboratories to align crystals in the beam, replacing the old neutron Polaroid camera. These simple neutron cameras, developed recently at ILL, are now available commercially from NeutronOptics Grenoble [http://neutronoptics.com/].