By its conventional definition, a photon is one unit of excitation of a mode of the electromagnetic field. The modes of the electromagnetic field constitute a countably infinite set of basis functions, and in this sense the amount of information that can be impressed onto an individual photon is unlimited. In this presentation, we describe how this large information content can be exploited for applications in quantum information science. As one example, we are developing a system to perform quantum key distribution at a high transmission rate by exploiting the transverse degree of freedom of the photon. Specifically, we aim to transmit more than one classical bit of information per photon by making use of this large information capacity. More generally, we describe how image formation making use of quantum states of light allows dramatic new possibilities in the field of image science. The field of quantum imaging strives to make use of the quantum aspects of light fields to achieve image formation with enhanced performance. One such example that we are studying is the possibility of performing imaging by impressing an entire image onto a single photon. We recently completed one study [1] that shows that by means of a holographic method we can discriminate between two objects even when they are illuminated by only a single photon. In a related study we have shown that we can discriminate among four objects using a single biphoton in a ghost-imaging configuration [2]. We have also studied [3] the properties of light fields with transverse distributions that impart orbital angular momentum (OAM) onto the photon. These OAM states constitute a complete basis, and thus any quantum image can be described in terms of these states. Our work has quantified the thought that these states can be used as effective carriers of quantum information [4].