Homework questions IDEA QIP course - Hanson lectures

1. For each of the following applications, give two pros and two cons of NV centers compared to other systems:
a. sensing
b. quantum computing
c. quantum communication/quantum internet

2. Download the following four quantum teleportation papers:

Monroe, trapped ions: http://arxiv.org/abs/0907.5240
Rempe, trapped atoms: http://arxiv.org/abs/1212.3127
Zeilinger, photons: http://arxiv.org/abs/1403.0009
Hanson, NV centers: http://arxiv.org/abs/1404.4369

For each of these, answer the following questions:
a. what is the probability that teleportation succeeds per attempt?
b. what is the fidelity of the teleported states (conditioned on a sign of success)?
c. what is the rate at which teleportation succeeds?
d. what is the distance over which the quantum state is transferred? In other words, what is the distance between alice and bob when teleportation takes place? Be careful here: the moment of teleportation is the moment that Alice performs the Bell state measurement, thus collapsing the state (up to some rotation) onto Bob's qubit.