Guidance on Knowledge Management:

● **Old Engineers Won't be Around Forever:**
  - Engineers aged 50+ have legacy knowledge, for example:
    - Complex well completion/drilling practices (not just cookbook).
    - Familiarity with reservoir behavior.
    - Understanding of uncertainty.
    - Unconventional reservoir development (in particular, tight gas).

● **Reality Check: Perspectives of Young Engineers**
  - Engineers are expected to learn on their own... (paid to be functional...)
  - Engineers can expect to work 50-60 hours/week... (paid to work...)
  - Training and mentoring are essential... (obvious, but "I am too busy"...)
  - Technology = f(information access)... (information is not knowledge...)
  - Expertise = f(experience, mentoring)... (knowledge is from experience...)

● **Guidance: From an Old Engineer**
  - Find a mentor... (the older (and "crustier"), the better...)
  - Make a training/education schedule... (Get started NOW!)
  - Meetings are an opportunity to listen... (don't just go through agenda...)
  - List your biggest job challenges... (you can fix what you can't define...)
  - Prioritize your goals... (talk (directly and often) to your mentor...)
  - Take time away from the office... (go to the field or a conference...)
  - When all else fails, e-mail a expert... (but (please) be specific...)
Thoughts 15 Years Ago:

Survey Results — SPE North America Forum Series
*The Big Crew Change* — 10 August 2001

- Attract New Talent
- Global Workforce
- Future Competency
- Education/Training
- Knowledge Mgmt
- Industry Reputation
- Mgmt Accountability
- Work/Life Balance
- Demographics
- Prof. Societies
- Impact of Technology
- Safety/Environment
- Available Equipment

Percent of Responses
Where We Are: Mid-2014 to present

● Industry Perspectives:
  ■ The collapse in oil prices yielded > 200,000 job losses worldwide (Forbes).
  ■ Most of the downturn has affected the "unconventional" sector.
  ■ US Rig count is down by almost 1200 since December 2014.
    — Oil: Down by 1004 or -63.6% year-over-year.
    — Gas: Down by 157 or -44.9% year-over-year.
  ■ Large losses in service companies related to the well stimulation sector.
  ■ Deepwater projects are more likely to be deferred than abandoned.
  ■ Exploration activities are continuing — away from unconventionals.
  ■ Focus on "conventional/mature" fields (opportunities for older engineers).

● Academic Perspectives:
  ■ > 13,000 students in Petroleum Engineering in 2014.
  ■ Less than half of the B.S. graduates are receiving job offers in 2015.
  ■ Most recent "job opportunities" in banking, reserves, and related sectors.
  ■ Academia is struggling for engagement models with industry:
    — Unpaid internships (very unlikely due to liability).
    — Placement in field jobs (unlikely due to low activity).
    — ???

● Probable Scenario:
  ■ Price recovery should begin in mid-2016.
  ■ Hiring will follow.
  ■ Companies will be much more strategic about unconventional reservoirs.
  ■ Portfolios balanced with exploration, conventionals, and deepwater.
  ■ Academia will continue to try to reduce to sustainable enrollments.
  ■ There will continue to be very high "performance" stress on those employed.