Life Extension

- Who delivers LE?
  - Doctors
  - Nurses
  - Pharmacists
  - New enhancement "schmoctors"
  - Gatekeeper groups
    - Gain extra influence
  - Robot medical treatment
    - Reduce costs, increase access
- Economy
  - Longevity dividend
  - Insurance
    - Pensions
    - Life
  - How rich are the old?
    - Running out of funds
    - Growing savings
    - Stuck with illiquid means
    - Inheritance patterns
  - Who pays for the treatment?
    - State
    - Private
      - Possible to mortgage for LE?
    - Other?
  - Expensive at first
    - Lead to resentment?
    - Disparities in access
    - Strong push to make cheaper
      - Technology driver
      - Public policy driver
  - LE might be a nasty surprise to many governments and businesses dependent on demographic assumptions
    - The sociological causes of ignoring LE
  - Leisure vs. work
    - "Wasting" one's life
      - When?
      - How?
  - Longevity bonds
  - People likely to desire LE
    - Willingness to pay for LE
    - Cmp. cosmetic surgery, nutrient supplements
  - Economic benefits of LE
    - Nordhaus: half of standard of living increase in US due to longevity increase
    - Longer education
      - More well-educated people in the marketplace
    - Longer working lives
      - Less physical demands
      - Retirement less appealing
- Motivation and psychology
  - Would LE give people more of a long view?
    - Long term investments
      - Entrepreneurs can be active longer
    - Sustainability as enlightened self-interest?
  - Medicalisation of life
  - Fear of death increase?
  - When and what is "old"?
    - Reinventing lifecourse
      - Social and life reinventions have already happened, e.g. the pill, changes in life expectancy
  - Plausibility and PR
    - Belief that it is possible
    - Primeval survivalism: drive to survive
    - People only think LE good if it happens in their lifetime
    - Transhumanist meme
      - Transhumanist lobbying
    - Medical expert opinions
    - Growing acceptance human enhancement helps acceptance LE
    - As public attitudes towards LE warm, governments will want to fund it
    - People often claim to be more negative and sceptical of technologies they do not have access to or do not think will come about.
  - Survival of the non-bored?
- Social issues
  - Need to get rid of institutional rigidities sensitive to demographic and longevity shifts
  - Why would elites try limiting access?
  - People want to retain family ties
    - The "double sandwich" family
    - The "beanpole" family
  - Young people fed up with older people
    - Ageing discrimination
    - Older blocking career paths?
      - "Century rule": have to step down after certain time?
      - Young seek careers in new niches
        - Young as entrepreneurs, old as business angels?
  - Children will study biology at school properly
  - Changing retirement age and benefits politically tricky
    - Deciding on gradual changes (e.g. a rise in retirement age over 30 years) possible, but depends on uncertain predictions
- Stakeholders
  - Military
    - Darpa: hibernation
    - Defence, security, surveillance
      - Anti-bioterrorism policies
  - Entrepreneurs
    - LE will be big business
    - Sell all forms of gerontotechnologies
  - Young people
    - Want to stay young
    - Not very concerned with ageing or LE
  - Insurance companies
  - Penal system
    - What is a "life" sentence?
    - Changes in crime structure
  - Governments
    - Want to minimize costs
      - Treatment expensive
      - Old people expensive
    - Want to maximize economic growth
    - Democratic: want to keep voters happy
  - Extension of sports people active career
  - Baby boomers
    - Big demographic with money and desire to live better
  - Developing nations
    - Will have greying problem soon
  - Pharma companies
- Opposition
  - Religious fundamentalism
    - Church less popular when less need believe in a hereafter
    - "Religion of Health"
  - Funeral homes
  - Status quo protection
  - Bioconservatives vs. bioliberals
    - Split in EU between bio-pro and bio-anti countries?
  - Malthusian doomsters
    - Problem for greens: opposing LE unpopular
  - Fears of overpopulation
  - Fears of pension disaster
- Research
  - Regulations
  - Scientific competition and prizes
  - One disease at a time or "coming out of the closet" about LE?
  - Web publication: faster progress
  - Organised support
  - Side effects of normal medical research could lead to LE
    - Diabetes research
    - Regenerative medicine
  - Synergies with other areas
    - Genomics
    - Nanotechnology
    - Biotechnology
    - Spin-offs?
    - Computing
      - Brute-force or evolutionary exploration of interventions in big simulations
    - AI
      - Human-level assistant AI increase researcher productivity
      - Creativity engines
- LE technology
  - Type of treatment
    - Pharmacological intervention
      - Price likely to go down
      - High demand
      - Impossible to regulate efficiently
    - Germline intervention
      - Slow effect on society, takes 60-70 years to have effect
      - Designer children debate
    - Set of treatments
      - Individualized
      - Service
      - Expensive
      - Clinical procedures easier to regulate
    - Anti-frailty treatments
      - No real LE, but increase quality of life
      - Big immediate impacts in society
      - Compete with "real" LE?
  - Timeframe
    - Sudden breakthrough
    - Slower progress than expected
    - Gradual development
    - Clear demonstrations
    - Slowing or stopping aging relatively slow to change demographics and greying
    - Societal response fast once belief that it works spreads
      - A "war on ageing"?
  - How often need to repeat the treatment?
  - Side effects?
  - Not static: technology will develop, and people will work hard to smooth rough corners
  - How cumbersome?
    - People willing to do much, but not everything for LE (cmp CR)
  - Squaring the survival curve or more variance?
    - Reducing morbidity current goal
      - People want more and healthier years, not just one
      - Unlikely to be acceptable to people once they experience sudden declines
    - More variance: more inequality among elderly, but possibly more acceptable
  - Will LE extend intellect and creativity as well as age?
  - If treating multiple causes, new ageing patterns may appear
- Demographics
  - Greying of society
    - Fewer young
      - Less crime
      - Less schools
  - Main cause decline in fertility, not low mortality
    - Changes in fertility have been fast and unexpected
    - Greying might suddenly stop
  - Extended life but limited reproduction-span?
  - Immigration and emigration
  - Prolonged fertility?
    - Gov. push for extended fertility to counter demographic decline
  - Too young and too old unlikely to support medium term research
  - Increasing population
    - Space migration
- Crises
  - Early disasters in LE development (e.g. dead patients)
  - Energy limited society
  - Global warming
  - Will LE be a priority in a crisis society?
  - Bird flu and other pandemics
    - Effect demographics?
- Globalisation
  - Nations bidding down ethics in order to attract R&D
  - Push to bring life extension to developing countries
    - Charities
  - China, India, Iran as major biotech players
    - Diabetes epidemic in China and India
  - Development will happen somewhere
- Singularity
  - Singularity 2030-2040?
  - Might make biological LE irrelevant
  - Accelerating technology
    - AI
    - Nanotech
    - Cognotech
  - Faster progress in all sciences
- Art and beauty
  - Art: new technologies for sensory perception and aesthetic appreciation
  - Abolition of gender roles
    - Transgender
    - Intersex
    - Postgenderism
  - Tech for increased sexual responsiveness, beauty, sexual diversity
- War on Aging
  - Success or failure?