

Memorandum 5

Meeting 4 Summary

SCENARIOS & IMPLICATIONS

In a slight change, participants continued the discussion of each of the four scenario’s implications. The discussion this time focused on modeling assumptions to lead into the next phase of scenario analysis. This also recognizes the scenarios haven’t been fully formed enough to begin thinking about recommendations, which was the original planned discussion.

Figure 1. Four Scenarios Formed from Axes of Uncertainty

		Incremental Change	← Axis 1 →	Transformative Change
← Axis 2 → Political Will / Collective Action Polarization	Strength in Numbers – Citizens have more say in the development and regulation of technology, their communities, the economy, and privacy. Focus is on deploying already existing technologies, as innovation has slowed.	Technopolitical Transformation – Citizens have more say in the development and regulation of technology, their communities, the economy, and privacy. Technological advances are actively directed toward achieving major societal goals.		
	Delayed Expectations – Political uncertainty, slow innovation, and lack of direction leads to economic stagnation. Long-anticipated technologies have been slow to roll out after hitting a few bumps in the road.	Technology in the Driver’s Seat – The private market has increasing control over technological development & deployment, the economy, and how communities grow and develop. Automation has upended work, transportation, and many other industries, leading to considerable worker displacement.		

During the fourth meeting, participants responded to nine questions. Each participant gave projections and responses related to one specific scenario.

1. Review implications and news headlines from meeting 3. What additions, revisions, or deletions do you suggest?
2. How will the region’s GDP grow relative to the U.S. and world economy?
3. How will the number of jobs in the region change?
4. What types of jobs will emerge or increase?

Connecting People, Places & Prosperity in Greater Philadelphia

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5. What types of jobs will decrease?
6. How will the region's demographics change?
 - a. Birthrates.
 - b. Lifespans.
 - c. Net migration.
7. How will the cost of driving change relative to the present day?
8. What will be the major story about changing land use patterns?
9. Has going through the modeling assumptions made you think of any other scenario insights we should consider?

Each of these scenario discussions are summarized in the following pages, including a summary of the discussion and charts with various projections.

Next Steps

Below is a summary of the steps involved in the Future Forces 2050 Scenario Planning exercise, with completed tasks greyed out. Meetings 1 and 2 focused on steps 1 through 4. Steps 5 through 7 were completed offline after the second meeting. Meetings 3 and 4 focused on step 8.

1. Define Research Statement
2. Brainstorm Future Forces
3. Short Presentations on Future Forces with Highest Knowledge Gaps
4. Vote for Working List Forces Most Probable and Relevant to Research Statement
5. Vote on Impact and Uncertainty for Top 20 Voting List Forces (identified in Step 4)
6. Use Impact-Uncertainty voting results to form axes of uncertainty.*
7. Use axes of uncertainty to form scenarios.*
- 8. Facilitated discussion on scenario recommendations.**
9. Model and develop scenario narratives.
10. Facilitated discussion of scenario implications.
11. Review draft report.
12. Publish final report and communicate key findings.

DVRPC will use the discussions from meetings 3 and 4, further research, and a series of modeling analyses to further develop each of the four scenarios. Additional discussions will be held at various forums and Futures Group events over the next several months. The first of these is called Merge Ahead: How Will Automated Vehicles Affect Vision Zero? It is planned for June 19, 2019 at DVRPCs offices. The discussion portion of this event will focus on the safety implications of automated vehicles in each scenario. More information about this meeting will be announced soon.

* DVRPC staff-led steps.

STRENGTH IN NUMBERS

- Where is tech on employment, distribution, consumption, point of sale?
 - All affect society, more education is required.
 - Social equity.
 - Retraining.
 - Training outside digital space.
- Local food production?
- Discussion was more at supply chains, really at all supply.
- State is incubator for regional economies.
- Microgrids, food systems, regional economies.
 - Need support from nation, states.
- Require common regional voice.
 - Regional funding mechanism.
 - Regional control.
 - Link regions but local empowerment.
 - Power of people's voices in regions more consistent.
 - Collaboration/Support between Regions.
 - Donors vs. Receivers
- Climate change is global.
 - Climate Change isn't reactionary, we are reactionary to climate change.
 - Costs of inaction must be considered
 - True costs- externalities.
- Structural
 - Add aging demographics impact.
- Growth tech.
 - List is heavy on vehicles.
- Rephrase/clarify long term training/education around employment/workers' needs.
- What are "individual" technologies? Should this be viewed from societal level?
- No discussion of ports- how will they innovate? Cite specifically every mode (airports, etc.).
 - Will ports be hindered by citizen involvement?
- Universal basic income: mid or long term?
 - Big change for an "incremental" scenario.
 - Universal basic equity.
- Implications of international efforts (China/Africa).
- Self-sacrificial leadership ("courageous" at all levels).
- Public transparency and civic awareness.
- Sensor systems are transparent and reach the public.
- Clarify "always a minority" – empower the people won't necessarily include all people, some will inevitably be exclude at least in short term.
- Our democratic system won't change.
 - Unable to match pace of development in centralized decision-making societies like China.
- People will act through employers/lobbyists rather than government (which millennials distrust).
- GDP:

- Converting space increases GDP.
- Pace- localized production and consumption.
- Reduced costs, increased GDP.
- Stable population, little immigration.
- 'Pace' is not a negative.
- Decrease in white collar jobs, more artisanal and services.
- Decrease in point of sales.
- Indexing to US vs. world- different.
- Will likely keep pace with nation, not world.
- Jobs
 - Tech community/larger employers are vibrant and bringing growth.
 - Potential loss of jobs to automation.
 - Reinvention of work.
 - Growth in education, government, finance, "fin/tech."
- Emerging/Increasing Jobs:
 - Management of automation- political action and government.
 - "single employers"/gig economy.
 - Healthcare.
 - Tech.
 - Engineering.
 - Social media "influencer" trend- crowdsourcing.
 - Blend of virtual/in-person activity (e.g., education).
 - Extreme customization (AV or personal driver depending on preference).
 - Real estate.
 - Need for civic/third/fourth places?
 - Transportation/drivers (could lead to increase in "other" jobs (e.g., drones).
 - Feeding the region.
 - Artisanal, service.
 - Rehabbing infrastructure.
 - Med jobs are service jobs.
 - Eds and Meds infiltrating region (not just Philadelphia).
 - Transportation is a connecting factor.
 - Lowering unemployment.
 - Adaptive reuse.
 - Scenario increases viability for employment.
 - Jobs decrease.
 - Industry continues.
 - Point of sale.
 - Civil Service- privatized.
 - Parking is vulnerable.
 - Trends in parking numbers and revenue.
 - Management level jobs – repurposed.
- Decreasing jobs:
 - Utility jobs.
 - Reduce white collar- accounting, law, insurance- can be automated/virtual due to improved access.
- Birth rates:

- Individualization and cost of living will disincentivize family creation
- Time for family or sharing of childcare responsibilities could promote growth in a “collective” society.
- Life spans:
 - Better diets, healthcare
 - Inequality will persist
 - Access is good but awareness and exposure to healthy habits needed
- Migration:
 - Low immigration, but increasing ages.
 - Immigration = increasing GDP.
 - Challenges keeping employees (Ed).
 - Little migration affects birth rates.
 - Immigration will be a driver post-Trump, but will require changes to civic engagement.
 - Lower cost of living as an attractor.
- Cost of Driving:
 - Electric and autonomous vehicles (tied to nation).
 - Auto ownership goes away.
 - Shared mobility of parking.
 - Costs just go up.
 - Mobility glut.
 - Decreased ownership.
 - Everyone making cars.
 - Simplicity.
 - Business productivity while driving.
 - Autonomous vehicles not workspace.
 - AI and race issues.
 - Long way to go for tech.
 - Costs of smaller commute less.
 - Commutes driving costs.
 - Shorter distance doesn’t mean costs decrease.
 - Tech driving costs of vehicles up, insurance up.
 - VMT taxes, carsharing tax -> cheaper now but will go up as gas tax goes down.
 - Tech in autos not as drastic.
- Changing Land Use:
 - Additional centers.
 - Need farms and ecosystem services.
 - Outer centers don’t need to come to Philly.
 - Lack of land.
 - Centralization with uneven decline unless courageous leadership prevents.
 - Citizen empowerment needed at all levels (bureaucracy).

TECHNOPOLITICAL TRANSFORMATION

- Inconsistencies in health between medium and long term in neighborhood household.
- Remove some negative/cynical under “things that don’t change.”
 - Wealth distribution.

- “Point of no return.”
- Move “travel changes” to medium or long term.
- Move “nomadic living” to long term
- Types of Jobs (Emerge/Increase):
 - Public administration/managers.
 - Traffic engineering with automated cars/vehicles.
 - Teaching.
 - STEM/tech- computer scientists/programming/robotics/developers.
 - Sales to sell tech.
 - National service corps.
 - Public relations “it wasn’t the robot’s fault.”
 - Delivery on demand/service-oriented, maybe by drone.
 - Repair and maintenance (possibly recycling) of high tech stuff- cars, buildings.
 - Coordinators/communications/collaborative/activism.
 - Re-trainers (from “current skills” to “future skills”).
 - Installing tech.
 - Humans to interpret data/big data/qualitative research.
 - More luxury services/fashion/design/personalized/customized.
 - More tour operators/“experiential”/hospitality.
 - Creativity.
 - More mental/behavioral health professionals (filling holes) due to lack of purpose without jobs.
 - Freelance and contract positions.
- Jobs that decrease:
 - Anything that can be automated – manufacturing.
 - Corporate-type jobs (administrative assistants, vice presidents).
 - Analysts/researchers (some replaced by algorithms)(but not qualitative research).
 - Filing.
 - Government could be streamlined – less in person (permit submissions).
 - Transportation (drivers, if automated – especially long haul).
 - Home health aides/medical assistants.
 - Retail (maybe) -> depends on increase in free time.
 - Cashiers replaced by kiosks/order online/self-checkout.
 - Gun manufacturing.
 - Opioid manufacturing.
- Birthrates:
 - Social trends will persist.
 - Fewer kids, wealthier societies have lower birthrates.
 - More educated = fewer births.
 - Immigration leads to crowded cities, alternate family structures, financial constraints (universal basic income).
- Life Expectancy:

- Health advances, healthy lifestyle (hike, meditate).
- Activist public sector changing.
- Asthma, pollution, safety.
- Identify external factors and do something about.
- All of above will happen but not so fast.
- Migration:
 - More from rural areas.
 - Connected, appealing.
 - Sanctuary city.
 - Multicultural gateway.
 - Philly region has comparative advantages and not as hot during climate change as regions farther south.
 - Climate change.
 - Move to areas without car, walk to conveniences.
 - People want to move away from metros because they can work anywhere with tech.
- Cost of Driving:
 - Gas costs, costs of EVs.
 - Need to impose fees to maintain infrastructure.
 - Tech expensive, inequities, transit infrastructure costs.
 - Walking/biking = cheap.
 - Tech gets better, fewer moving parts, e-vehicles = cheaper.
 - Reduced repair costs/fuel.
 - Rise of Uber/Lyft -> decreased car ownership.
 - What's the equitable way to pay?
- Changing Land Use patterns:
 - Centralization.
 - Density threshold- above it people do well. Underserved market for older traditional downtowns. Quality of Life. Density and connectivity.
 - Neighborliness, civic engagement.
 - Policy to preserve open space.
 - Other/Uneven patters of Land Use (one vote).
 - Polarization. Rittenhouse gets nicer, North Philly still struggles.
 - If region is doing well, people will gravitate but want outdoor space.
 - Polycentrism but more connected.
 - Economic integration.
 - Continuing of current trend.
 - Blurring into Lancaster/Lehigh.
- Other Implications to Consider:
 - What about global conflict/wars?
 - Major disasters (hurricane, flood) or man-made and plan for recovery efforts.
 - What is the role of law enforcement? Who keeps Technopolis safe and clean?
 - Deciding what gets monitored/who gets evicted from public space?

- Persistent inequality (race, class, gender) needs to be given consideration.
- Implications are different for different identities.
- What if nothing changes?
- What if return to cities was a blip?
- Tech allows rich to get richer.
- Will tech allow us to keep our bad habits?
 - Consumerism.
 - Driving.
- Scenario is predicated on civic education/engagement. What if schools don't teach civics? What if people don't vote/come to meetings/engage in discourse.

DELAYED EXPECTATIONS

- Medical technologies (e.g., gene therapy) fail to advance.
- New emerging tech impact.
- Affects public health and regional growth.
- Slow tech adoption with less public role = less collaboration/order around development of the tech (greed as driving form).
- Continued innovation, but unregulated.
- Tech is just finance-driven, equity/impacts not considered.
- Infrastructure planning less effective.
- Opportunity for infrastructure- light transit (buses and jitneys) in smaller non-coastal cities (Philadelphia unclear).
- Same old ground transportation, no new modes (big drones, etc.)- EV, EVTOL, Uber Elevate.
- 'Infrastructure run amok.'
- Continued inequality in localities/capacity- no redistribution as a county/municipality. Short term impact.
- Age cohort implications
- Does tech create more of a divide?
- Just letting technology happen.
- Climate change impacts.
 - Climate refugees.
- Market forces are driving innovation.
- Less regulation.
 - Retreat from government.
- Technologies are removing people from the equation, leading to more socioeconomic strife.
- Waning of carbon-based sources but more slowly under this scenario.
- Waste elimination is a growing issue.
- Less public investment (i.e., transit).
- Less control of information (i.e., cell phone data).
- More political inaction.

- Local political action/collective will fills in the gap from national level inaction but requires state or federal enabling legislation.
- Communities that welcome immigration will be stronger.
- Existing infrastructure to absorb climate refugees and immigration.
- Eds and meds will continue to drive job growth.
- Eds and meds are driven by demographics- aging population and upcoming demographic cliff vs. immigration filling in the gap.
- Increasing/Emerging Jobs:
 - More part-time service jobs, including health care.
 - Overall jobs decrease, part time higher share.
 - High skill, high wage jobs grow relatively (including meds).
 - Short term: construction/tech increase.
 - 'Grey' economy grows, disparities increase.
 - Urban agriculture.
 - Healthcare.
 - Food and experience based services.
 - Transportation and e-commerce.
 - IT.
- Decreasing Jobs:
 - Office real estate (conversion to mixed uses).
 - Manufacturing.
 - Certain professional services- attorneys, accounting, mortgage financial services, banking.
- Life span.
 - Different for people currently living in a neighborhood vs. who may live there in the future (gentrification may displace current residents).
 - Oil fields will close down -> better lifespan outcomes vs. more people living on contaminated soil, moving pipeline may exacerbate this problem.
- How will GDP grow?
 - Negative.
 - Already slow grow, so not in a position of strength (since this is a trend scenario).
 - Positive.
 - Better because current faster growth places are more vulnerable to climate change.
 - Current faster growth places will 'hit their own wall.'
 - Philly already an emerging draw.
 - Short term positive, long term negative.
- Changing Demographics:
 - Pop decrease... or increase? More poverty = more births.
 - Also less government family planning support.
- Cost of Driving:
 - Higher.
 - More private = more tolls and taxes.

- Stormwater impacts of climate change.
- What is infrastructure condition in the future?
- More local action (i.e., congestion pricing?).
- Electric grid improvements needed for electric vehicles.
- Electric vehicles will be bridge between electric grid and microgrids.
- Increased communal costs of moving from transit to private transit (i.e., Uber).
- Changing Land Use
 - Maintains status quo- suburbanization and urban core growth.
 - More segmentation across socioeconomic classes (continuing status quo).
 - Housing affordability.
 - Millennials' school decision (short term).
 - More recentralization by necessity.
 - Continued choices for more mixed/walkable center for those with means to make choice.
 - Uneven decline: maybe realistic under a pessimistic scenario.
 - Not mutually exclusive with more recentralization.
 - Not megasprawl, but leap frogged pockets?
 - Distressed neighborhoods continue private displacement.
 - Co-working.
 - Gentrification leads to more rural development and migrations.
 - Continuation of current trends for development.
 - Those doing well will continue to do so.
 - Those not doing well will be worse off.

TECHNOLOGY IN THE DRIVER'S SEAT

- Cadillac plans = 1%
- Our tech group disagrees that "Tech will eventually serve all people." This would only be the case if we had proactive action (Global Implications).
- Our tech group disagrees with "Loss of self-repair." We think people will be more thrifty and technology will be more adaptable (source of conflict).
- Sources of conflict- All are both medium and long term implications also, getting worse over time.
 - All are exacerbated by climate change.
- Education (+) more remote/virtual computer based learning or a new time of vo-tech. Company sponsored training to prep workforce in high school (high school-higher ed lines blurring). Results in shrinking of public schools (especially high schools).
- Densification of housing as people retreat from coastal areas and investment in centralized housing for more efficient transportation.
- Superbugs happen, antibiotics fail.
- How will the region's GDP grow?
 - Relative to US as a whole—not other metro areas—as metro areas will be stronger.
 - Nothing in Philly economy to make it grow faster- no regional strength relative to other metros.

- Other regions will be stronger than us.
- But GDP national number is not based on metros.
- Immigration – region is well positioned. Will drive need for basic services.
- What types of jobs will emerge or increase?
 - Software, data, robotics, high tech manufacturing – manage the machines. High skill jobs, tending to robots.
 - Mechanics and maintenance of high tech from engineering to manufacturing to health care.
 - Building wifi nets in buildings – requires a person.
 - Censoring web, removing bad stuff.
 - Person driving AI, gut check of AI (human gut check).
 - Big data, coding, warehousing, instructional design for online courses, arts, government WPA model or volunteer model, personal care, big tech, medical jobs for caregiving, life extension human augmentation, surgery, genetic engineering, maintenance of robots to serve physical cosmetic systems, engineering of physical infrastructure, construction and climate resiliency.
 - Cogs in larger machines.
 - Manual diverter.
 - Mechanical Turk.
 - Garbage collectors – jobs that people still need to do.
 - Freight logistics.
 - Engineers of every nature.
 - Water control technicians.
 - Makers of art and textiles.
 - Programmers.
 - Robotics and automated manufacturing.
 - Healthcare, meds, pharma, elder care.
 - Entertainment, augmented/virtual reality re: entertainment.
 - Lower wage jobs generally, jobs as a service rather than profession.
 - Nanotech.
- What type of jobs will decrease?
 - Manual laborers, driving (drivers), truckers, forklift drivers, some tech jobs- as more efficient.
 - Loss of driving/freight/trucking due to automation.
 - Parking lot attendees.
 - Administrative assistants.
 - Grocery store stockers/cashiers.
 - Higher education – moves online learning/tech, less teaching face to face.
 - More adjuncts, lower paying teaching jobs.
 - Education jobs.
 - Traditional office jobs.
 - Insurance- with universal coverage.
 - Traditional manufacturing.
 - Construction and real estate in current state (machines will do).
 - Transit.

- Labor union boss jobs.
- Meter maids- any verification activity.
- TSA- manual verification activities down to 1 percent of existing jobs.
- Government administration jobs.
- Legal support.
- Retail.
- Loss of higher wage/benefits jobs.
 - Mid-level white collar jobs will be outsourced to international.
 - Growing inequality, economic instability
- Birthrates:
 - Look at Japan.
 - Higher paid employees have fewer children.
 - Lower birth rates.
- Lifespans:
 - Fewer traffic fatalities.
 - Longer lifespans, less preventative care and more care for chronic conditions.
 - Better management of chronic conditions keep people alive but sick. Selling drugs is lucrative.
 - Tech in Driver's Seat corporations will have incentive to maintain machines of human cogs.
 - Disruptive to bottom line if people are sick, so more R&D.
 - Associated with growing inequality, shrinking lifespans due to problems.
 - Disruptions of antibiotics – less effective. Mutation of bacteria, epidemics.
 - Infectious diseases.
 - Climate change.
- Net regional migration
 - Immigration or emigration?
 - People moving toward cities.
 - Philly sited well for climate change.
 - Philly not landlocked.
 - We have room for growth.
 - UBI allows people to repopulate little towns.
 - Foreign immigration is challenged.
- Cost of driving
 - Gas costs up, all costs associated with driving will go up.
 - Tech in driver's seat will make costs go up (monopoly).
 - Lower costs due to automation.
 - More effective use of cars. Time sharing, per hour costs go down. Crashes go down, insurance costs go down.
- Major story about land use
 - Hub and spoke works best.
 - Most people will stay close to where they are.
 - Recentralize in a poly-centric way.

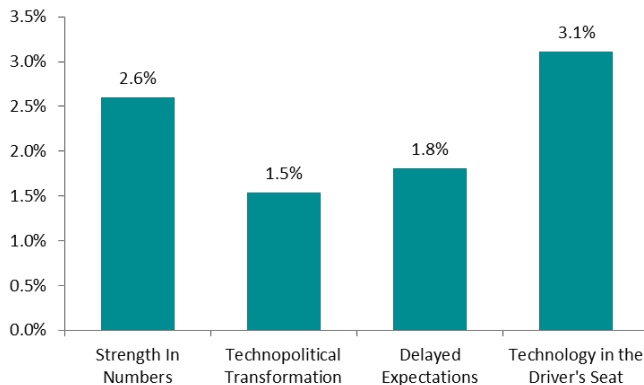
- Smaller towns and rust belt will fall behind due to lack of infrastructure and workforce.
- People want more walkable but not all downtown- smaller downtowns will also be strong but decline in rural areas.
- Desire for proximity.
- Continued poverty and wealth by neighborhood.
- Other scenario implications:
 - Decrease in crashes due to AVs – big deal.
 - Worker displacement- leads to social unrest, understand implications more.
 - International immigration in this scenario – implications need more investigation.
 - What industries are ripe for deregulation?
 - Where will wage taxes come from?
 - Trend for online learning- what happens relative to students that used to be here?
 - Immigration status question on census.
 - Prisoners counted but cannot vote- red districts.
 - [unclear] dependent- immigration, higher education (regional impact), medical services ([unclear] for more med jobs)
 - Tech scenario participants see mobility as a commodity, but this isn't included in proposed scenario forces, is this ok?
 - Growth tech is not inclusive of energy, pharma + medical, synthetic foods.
 - Would smart roads/infrastructure be one of the growth techs? We think yes.
 - Companies will become more innovative with reusing or repurposing equipment. Companies will have more ownership, offering subscription services. This is no longer a source of conflict (maybe neighborhood/household).
 - Major natural/manmade disasters.
 - Massive failure of existing infrastructure.
 - Bridges going out, tunnels failing.
 - Continued lack of maintenance.
 - Scalability of some technologies that don't pan out the way expected (AI, AVs).
 - No good business model -> no strong consumer base.
 - Lots of resistance from ordinary people.
 - Not wanting to give up control.
 - Less passive than scenario might dictate.
 - More acknowledgement of the need for a resistance movement.
 - Particularly strong in youth.
 - Continuing/strengthening of existing/current trends.
 - Other technologies (“wet tech”).
 - Healthcare, water, food, energy, waste.
 - Advancements here and volatility/risk will continue/increase.
 - We'll see changes in infrastructure and access: How do we get food, what we eat, more innovative energy sources (biofuels, etc.).

- Dystopian outcomes are certainly possible but nothing is certain. Planning, advocacy will become much more important in lessening inequality and shaping potential outcomes. We have some hope. Faith still lacking.

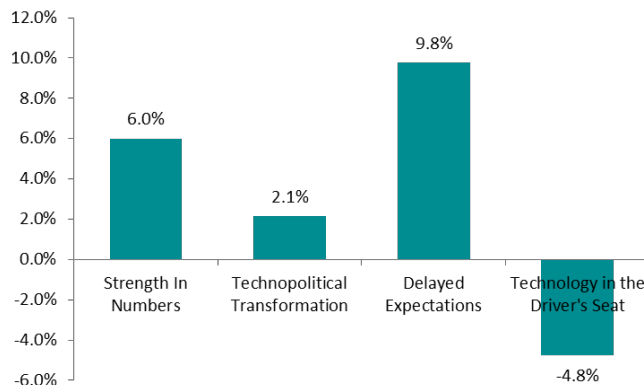
PROJECTION SUMMARY

The following charts average each participant's response to how GDP, jobs, demographics, driving costs, and land use will change over the region between the present and 2050. Each of these forecasts was done in isolation for only a single scenario. They were not a comprehensive look at all the scenarios together. Each forecast should be seen as relative to baseline projections.

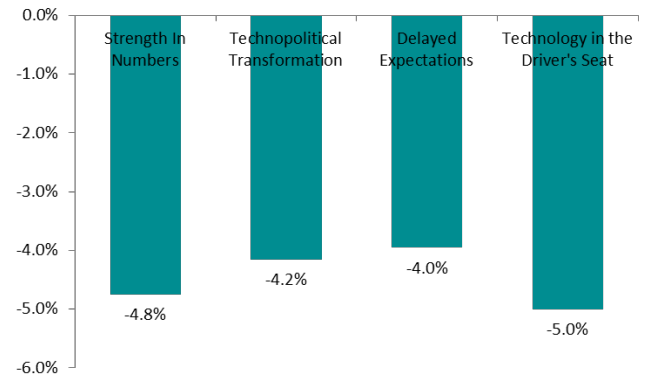
Question 2. How will the region's GDP grow relative to the U.S. and world economy relative to baseline projections?



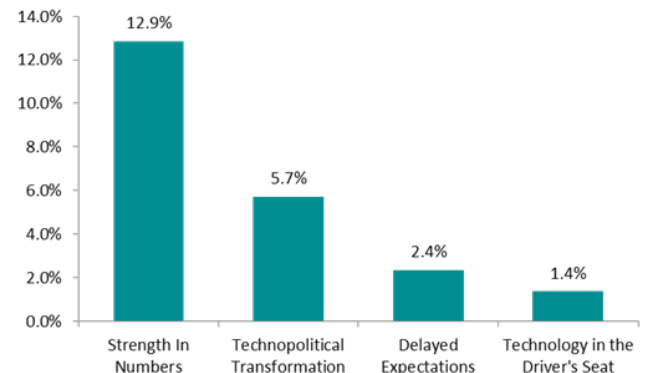
Question 3. How will the number of jobs in the region change (relative to baseline projections)?



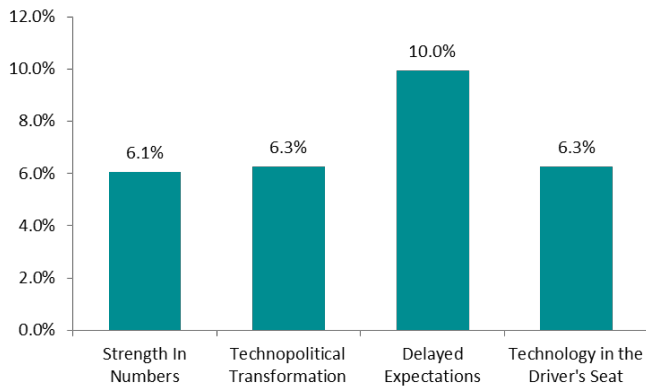
Question 6a. How will birthrates change relative to the baseline in this future?



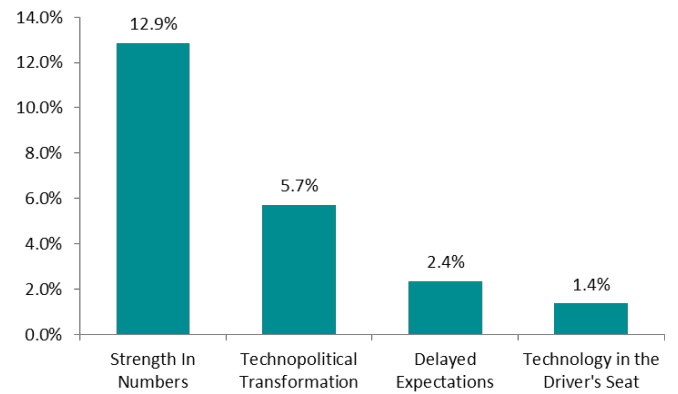
Question 6b. How will lifespans change relative to the baseline in this future?



Question 6c. How will net migration change relative to the baseline in this future?



Question 7. How Will the Cost of Driving Change Relative to Today?



Question 8. What Will be the Major Story About Changing Land Use Patterns?

