Appendix 2: Trend Diagrams
Visual representations of trends and concepts discussed in the report

1. Trend interconnections
2. Network revolutions
3. Information technology trends
4. Information sector trends
5. Information use and consumption trends
6. Global context
7. Environmental trends
8. Demographic trends
9. Inequality
10. Public sector trends
11. Education trends
12. Future of work
Early networks: shaped by nature

Circa 1450
- Printing Press
- Explosion of info
- Spread of knowledge
- Written word
- Destabilizing to powers of the day

Mid-19th century
- Railroad
- Faster transport & communication
- "Collapse of distance"

Mid-19th Century
- Telegraph
- And later, telephony
- Instantaneous communication at great distances
- Condensed time
- Separated info from physical "package"
- Enabled management of far-flung systems
- Enabled modern corporation

Network Revolutions

Net Rev #1

Net Rev #2

Net Rev #3

Net Rev #4

Network Revolutions are disruptive: creative and destructive
- Old industries & occupations disappear
- New industries & occupations form
- Fears of impact: on health, privacy, etc.
- "Immutable" facts challenged
- Economic incumbents often oppose innovations

Electronic communication
- Sound & image
- FCC created (1934)
- Radio & later TV
- Broadcast, cable
- Mass communication, shared experiences
- Centripetal → towards the center

Last several decades
- Digital tech & communication
- Diffused control & increased autonomy
- "Innovation without permission"
- Today the new info networks = the new economy

1. End of "tyranny of place"
2. Continual acceleration in pace of info use & transmission
3. Decentralization of economic & creative activity
FCC Telecom Act of 1996

Info Use Trends

Digital overload
- Concerns over youth "screen time" – Michelle Obama
- The downsides of multi-tasking
- Info overload and lower productivity
- Impacts on physical and mental health
- Seems to be narrowing in terms of internet access
- BUT still impacts those with lower income & education, higher age
- Not digitally connected = increasingly left out

Digital divide
- Even though new tech is being adopted *
  - we continue to watch traditional TV
  - we continue to read physical books
  - we continue to meet face to face
- Adoption speeds = different for different demographics

Things we used to do offline are moving online
- We continue to engage in communication (e.g., email, Facebook)
- We continue to engage in entertainment (e.g., gaming, TV)
- We continue to engage in learning (e.g., reading ebooks)
- We continue to engage in daily life (e.g., banking, dating, health)

Digital/physical life are increasingly integrated
- Augmented reality
- Multi-tasking
- Work
- Communication (e.g., email, Facebook)
- Entertainment (e.g., gaming, TV)
- Learning (e.g., reading ebooks)
- Daily life (e.g., banking, dating, health)

Increasing connectivity
- 85% in US are online
- Smart phones, apps
- Tablets, e-readers
- Social media

Privacy concerns
- Targeted advertising
  - Big data
    - Google, Facebook, etc.
  - Government access to tech company data on users
  - Cross-platform tracking and advertising
  - Geo-spatial privacy
- Increasing concerns over tech addictions
  - Recognized issue esp. in China, South Korea
- Internet, mobile phone, gaming, etc. addictions
- Digital diets, detoxes

There is a lag time ...

Even though new tech is being adopted ...

Environmental Trends

Drivers of environmental change
- Economic growth
- Debt/credit systems
- Population growth
- Industrialization, development
- Technology
- Use of energy resources
  - Resulting in:
    - Resource depletion
    - Energy source depletion
    - Pollution
    - Ecosystem degradation
    - Climate change

Various POVs
- A politically and culturally contentious topic
- Optimistic vs. pessimistic views of future
- Deep vs. surface approaches to change
- Small tweaks vs. systemic changes
- Ecological vs. environmental economics
- Sustainability vs. resilience (or both)
- Mitigation vs. adaptation (or both)

Library roles?
- "Greening the Library"
- Community sustainability
- Community resilience
- Transition initiatives
- Supporting community in disaster
  - Proactive
- Disaster training needed
  - Reactive
- "Prepare for the worst; hope for the best"

The Data shows...
- We're already living in "overshoot"
- Peak oil, Peak water, Peak ICT, etc.
- Human-related climate change
- Environmental footprints highly unequal
- We're not changing behavior fast enough to avert crisis
- Rise of "green tech" AND "brown tech"
- Environmental Kuznets curve = questionable
- Tech can mitigate AND increase environmental impact
- Economic growth = always good
- All can have US levels of resource use
- Energy sources are endless
- Population growth has no limits

Widely-held beliefs challenged...
Demographic Trends

Family structure:
- Increases in:
  - Age at first marriage, divorce
  - Non-marital childbearing
  - Co-habitation of young adults
  - Women hold 49.8% of all jobs
- Smaller households compared to 1900
- Recent rise in grandparent-headed households

US population is...
- Growing due to birth/death ratio & immigration
- Aging, in 2050 1 in 5 people will be 65 or older
- Becoming more racially & ethnically diverse
- Hispanics will make up 30% of US by 2050
- Asian, Native American, mixed race populations will increase
- South & West accounted for 2/3 of pop. increase from 1900 to 2000
- Northeast was and continues to be most population dense part of US
- California, Texas, Florida, and New York accounted for 39% of population increase in 20th Century
- In 1950 US became predominately metropolitan
- Most metropolitan growth has occurred in suburbs vs. central cities
- 62% of legal immigrants landed in CA, NY, TX, FL, IL, NJ
- Rural areas critical for climate, food resilience
- 3.8% of US adults identify as LGBT
- Face discrimination in workplace, healthcare, etc.
- 33 states have same-sex marriage bans
- 17 states support marriage equality
- Federal govt. recognizes same sex marriages

Millenials:
- Born between 1982 and 1993, 80 million people
- More liberal views, tend to vote Democratic
- More diverse, less religious, less military service
- Grew up with info tech
- Price and value conscious
- Value purpose over profit
- Face educational debt, poverty, unemployment

LGBT policy:
- 33 states have same-sex marriage bans
- 17 states support marriage equality
- Federal govt. recognizes same sex marriages
**Wealth & income gaps**
- At historic highs in the U.S.
- 80% of wealth is held by 20% of population
- Income gap has been rising since the mid-1970s
- Top 1% have seen 95% of income gains post-recession
- Wealth inequality is 2x greater than income inequality

President Obama, NYC Mayor DeBlasio outspoken on inequality...
... though some argue that inequality has increased under Obama
Occupy Wall Street, Pope Francis outspoken on inequality as well

**Concern over inequality**
- Many Americans believe inequality is an issue...
... though these views differ somewhat by income & politics
Public infrastructure & services support everyone

Senator Elizabeth Warren (D, MA):
“no one in the US got rich on their own”
New America’s Ann Marie Slaughter promotes: “leg up” state...
... invests in caring professions (teachers, social workers, etc.)

**Inequality**
- 14-16% poverty rate in 2012
- Fewer elderly poor than before (9.1% of people over 65)
- Child poverty persists (21.8% of children)
- Poverty for working age adults high (57% of poor)
- Poverty for Blacks lower than before (27.2% of Blacks)
- But, still higher than Whites (12.7% of Whites)
- Poverty rate for Hispanics = 25.6%
- South still region w/most poverty (home to 41.1% of poor in the U.S.)
- People with low incomes = less likely to be online at home

**Skills gaps**
- 36 million U.S. adults have...
  ... low literacy, numeracy or digital skills
- 63% of lower skill adults are employed
- One third born outside US
- Lower-skills linked to health issues, other issues
- More likely to be Black or Hispanic than White
- Racial differences remain even w/similar education
Education Trends

General
- Like other sectors, education is undergoing a huge shift
- From industrial age education to info age education
- New tech is playing a big role in driving this shift
- Education institutions are facing disruptive innovations
- Agile approaches to change are needed

Lifelong Learning
- Shift to self-directed, collaborative, life-long learning
- From episodic to continuous learning
- From education institutions to learning flows
- Blending of formal/informal learning
- From degrees to reputation metrics
- Cohort of "extreme learners"
- From lecture halls to collaborative spaces
- Shift to students as creators
- 3D Printing
- Virtual and remote labs

Collaboration
- From assigning to enticing with content
- From content conveyors to content curators
- Flipped classroom
- Open content, data, resources, transparency
- Mobile learning
- Cloud computing
- BYOD
- Social media is changing info behavior
- Virtual Assistants

Challenges
- Value of educators in an info-rich world?
- Competition from new models of education
- Keeping education relevant
- Low digital fluency of teachers/faculty
- Education culture resisting change & tech adoption
- Digital media for formative assessment
- Lack of rewards for teaching (higher ed)
- 36 million low-skill adults

Online education
- Online, collaborative, hybrid learning
- Working up and down the scale (ex: teaching 10 vs. 1000)
- Scaling teaching innovations
- Demand for personalized learning
- MOOCs are just the tip of the iceberg in terms of innovation
- Challenge of expanding access, Digital divide issues

Big Data
- Learning Analytics
- Data-driven learning & assessment
- Gaming & Gamification
- Quantified Self
- Privacy issues

Financial Challenges
- Rising cost of higher education
- Rising student debt
- Related to state budget shortfalls
- Cuts to public education
- Cuts to school libraries
- Increase in K-12 testing and assessment
- Opt-out movement

Policy Issues
- No Child Left Behind Act
- Rise of vouchers, charter schools
- Common Core standards
- Gates Foundation
Disruptive shifts:
- Extreme longevity - age of "un-retirement"
- Computational world - sensors & processing power
- Superstructured organizations - social technologies
  - Rise of smart machines
- New media ecology requires new literacies
- Globally connected world

Automation:
- Much work will be routinized, coded, dissected...
  - & done by machines
  - This includes managerial and white collar work
  - 47% of occupational categories at risk
  - Sometimes cheap labor will trump machines
- The "4-year career" & job-hopping
  - 40% self-employed, contract, freelance in 2020
  - 23% teleworked full or in part in 2013
  - New work spaces beyond the office

Desirable skills:
- Skills complementary with machine intelligence
  - Sensemaking
  - Novel & adaptive thinking
  - Transdisciplinarity
  - Social intelligence
  - Computational thinking
  - New media literacy
  - Design mindset
  - Cross cultural competencies
  - Cognitive load mapping
  - Virtual collaboration

Flexibility & volatility:
- Divide between "top earners" & the rest
  - Innovation hubs generate jobs for many
  - But cost of living increases drive people out
  - E.g. innovation jobs = good for many, but not all
  - Ex: Boston, San Francisco, Seattle
  - Other areas of the country = less well off

Income & geographic inequalities: