

Implications of Cloud Computing for Residential Supports and Community Services

Jeffery Hoehl & Shea Tanis, Rapporteurs

Coleman Institute for Cognitive Disabilities
University of Colorado
Boulder, CO 80301

On October 12, 2011, the Coleman Institute for Cognitive Disabilities in partnership with the Administration on Developmental Disabilities through the State of the States in Developmental Disabilities project and the Silicon Flatirons Center for Law, Technology, and Entrepreneurship hosted a roundtable on “Implications of Cloud Computing for Residential Supports and Community Services.” The roundtable, held at the University of Colorado Law School in Boulder, Colorado, was a pre-conference event to the Eleventh Annual Coleman Institute on Cognitive Disabilities Conference “State of the States, State of the Nation: 2011, A National Conference on Cognitive Disability and Technology in a Challenging Economic Environment.” Invited participants to the roundtable included leaders in industry, higher education, information technology, public policy, and disability, as well as self-advocates, family members, providers of disability services, and directors of federal government agencies. The discussion explored how cloud computing could support the development of innovative, inclusive, comprehensive, and cost-effective residential supports and community services for people with cognitive disabilities. The roundtable participants were charged with framing an agenda that would allow policy makers, industry leaders, and disability advocates to explore how cloud computing could provide strategic opportunities to improve the lives of people with disabilities and their families and whose realization would generate partnership opportunities and address public policy issues.

Particular emphasis for the roundtable was placed on bringing a varied background of perspectives together. A combination of discussion formats was used to encourage open dialogue and the sharing of information including large group discussion, small breakout sessions, and demonstrations. The roundtable was also conducted under a modified form of the “Chatham House Rule.”¹ The Chatham House Rule is used at meetings or discussions to encourage openness and the sharing of information. The Rule itself reads, “When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.”²

¹ In Silicon Flatirons roundtable discussions and the resulting report or summary, the list of attendees and their affiliations is customarily published, see Appendix A, however, direct attribution of ideas is avoided in this paper.

² For more information, see the Chatham House website at <http://www.chathamhouse.org/about-us/chathamhouserule> (last visited Dec. 5, 2011).

The broad and diverse group of stakeholders and varied discussion formats were unique strengths of the roundtable. The goals for the breakout sessions were to identify opportunities, technical approaches, and organizational, legal and policy issues that would address the use of cloud computing with regard to technology for remote and mobile supports, and development of supports for more independent use of the web by people with cognitive disabilities. The larger group discussions allowed for the breakout sessions to be discussed in the context of broader efforts underway and to point out overlaps in areas where sharing knowledge across disciplines could be helpful. The roundtable outcomes were designed to help to inform future events related to these goals including the annual Coleman Institute for Cognitive Disabilities Conference that followed the roundtable on October 13, 2011.³ The Cloud Computing roundtable proper began with an introduction and welcome by Dr. David Braddock, Associate Vice President of the University of Colorado (CU) System and Executive Director of the Coleman Institute for Cognitive Disabilities, and by Dr. Clayton Lewis, Professor of Computer Science, Fellow of the Institute of Cognitive Science, and Scientist in Residence at the Coleman Institute for Cognitive Disabilities at CU. The introduction provided an informative basis for understanding where people with disabilities live, and an overview of the implications of cloud computing for the disability community. In an effort to enhance participant involvement, supportive documents regarding the proceeding topics were sent to all participants prior to the event. The following sections summarize the background documents and presentations.

Where People with Intellectual and Developmental Disabilities (I/DD) Live

The *State of the States in Developmental Disabilities* Project of National Significance has examined the determinants of public spending for I/DD services in the United States for 33 years. Through these in-depth analyses of federal, state, and local trends in spending and revenue the project has been able to examine longitudinal trends in family support, state fiscal effort, community living, private and public residential institutions, supported employment and the impact of federal and state fiscal policies on I/DD services. The project is funded in part by the Administration on Developmental Disabilities.

The information and data provided to the roundtable participants and presented by Dr. Braddock emanated from *The State of the States in Developmental Disabilities 2011 Monograph* (Braddock, Hemp, Rizzolo, Haffer, Tanis & Wu, 2011). People with I/DD live in a variety of settings; with family caregivers, in supervised residential settings, with a spouse, or in their own home. Figure 1 breaks down the total number of individuals with I/DD in the United States by living arrangement in 2009. The majority of people with I/DD live with family members (2.88 million), however, only 487,028 received cash subsidies or other forms of funding for family support services from State I/DD Agencies. In addition to an overall paucity of funding for family support services, the amount of funding per family and number of families supported varies significantly from state to state. For example in 2009 Arkansas, Alabama, and Nebraska reported the lowest percentages of family caregivers being supported by State I/DD Agencies at 2%, 3%, and 4% respectively while on the other end of the continuum, Wisconsin (34%), New Mexico (33%), and New York (33%) represent the highest percentages of family caregivers being supported by State I/DD Agencies.

³ The full agenda of the Eleventh Annual Coleman Institute Conference on Cognitive Disability and Technology is available at: http://www.colemaninstitute.org/Conferences/Coleman2011/agenda_11.php (last visited Dec. 5, 2011).

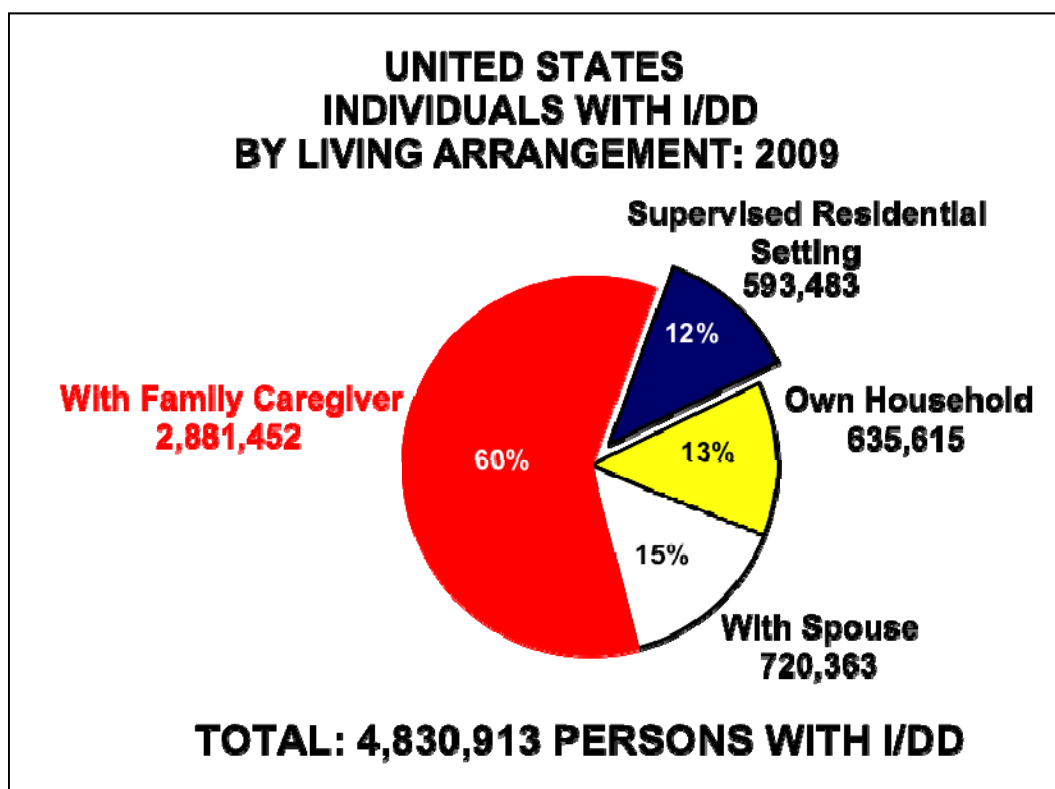


Figure 1: United States Individuals with I/DD By Living Arrangement in 2009

Also pertinent to the roundtable discussions was the breakdown of the number of people with I/DD served by residential settings in the U.S. (*Figure 2*). Of particular interest was the percent of total out-of-home placements in settings for six or fewer persons in the U.S., which constituted 75% of the total 593,483 persons with I/DD living in supervised residential settings. The states ranged from 33% of total out-of-home placements in settings for six or fewer persons in Mississippi to 98% of total out-of-home placements in Vermont. Fifteen states reported 90% or more of total out of home placements in six or fewer person settings. Participants were referred to the Coleman Institute for Cognitive Disabilities State of the States interactive website (<http://stateofthestates.org>) to examine their own state's profile of family support funding and percent of out-of-home placements for people with I/DD in six or fewer person settings. As a transition into the roundtable discussions, Dr. Braddock presented a list of innovative uses for cloud computing to support people with I/DD and their families such as community integration and transition, self-direction, health promotion and management, fiscal management, remote therapies/counseling, supported and customized employment, and family involvement and partnerships.

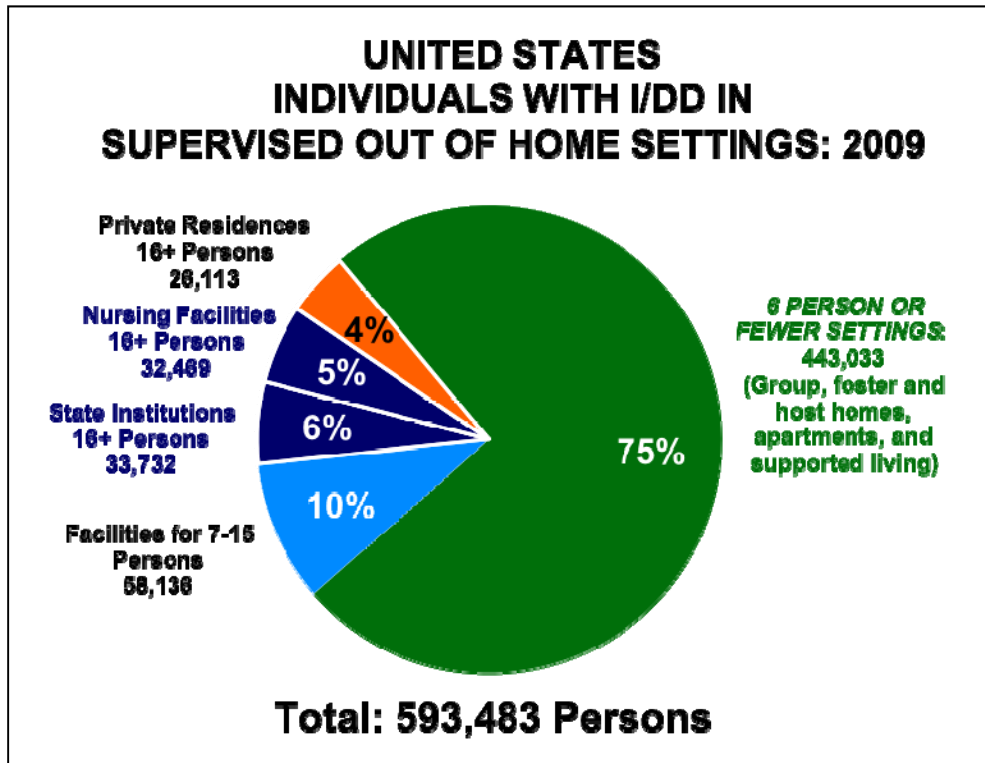


Figure 2: United States Individuals with I/DD in Supervised Out of Home Settings in 2009

Following the overview of where people with I/DD in the U.S. live, the floor was open to participant questions and discussion, and the group entertained the question: “Given the data provided, what will the future bring for residential supports and community services?” Participants noted the importance of the changing landscape of caregivers and modern definitions of families and the role these two factors would play in supporting the growing number of individuals with I/DD living in the family home. Historically parents, predominantly mothers, have been the primary caregivers for people with I/DD. However, with more and more women obtaining advanced degrees, gaining meaningful employment, and seeking employment out of necessity, the future composition of caregivers will likely broaden to include siblings, extended family members, and family friends.

On the discussion on employment out of necessity, a concern was raised about how to reach economically disadvantaged families who need services. During these economically challenging times, it was projected that more families will fall into relative poverty and be isolated from advances in technology supports. Thus, accessibility to broadband and its content will require extensive focus to help ensure that all individuals have capability to utilize the cloud.

Cloud Computing

Description of Cloud Computing

Prior to the roundtable, the participants received a handout with an overview of cloud computing. The overview defined cloud computing as people getting computing services by connecting over the Internet to computers operated by other people, rather than by using

application software or storage on their own computers. For example, online email services store mail “in the cloud” on computers operated by the email provider. Users access their email by using a Web browser but remote computers handle the data storage and computational work. Another example may be a cloud-based service that handles administrative tasks for an organization, such as billing or managing staff training. Because the data and programs needed to handle these services are stored on the service provider’s computers the end-users do not have to worry about backing up data, planning for increases in data storage capacity, updating software when new features are available or bugs are fixed, or the many other responsibilities associated with traditional software deployment and use by the consumer. But its transformative potential goes beyond these operational efficiencies. Cloud computing, because it is based on many users being connected, available, and active at one time, is an efficient way for users to connect with each other, communicating via text, voice, or video, sharing and creating content together.

Cloud technology makes it easier to obtain computing services, reduce costs, and increase quality because the service provider, rather than the end-users and organizations, specializes in the maintenance of the software. Since many of the costs of providing services, such as developing the necessary software, are independent of how many people and organizations use the service, costs can be further reduced as the number of users increases. The costs are divided up among more and more users, so each pays proportionately less.

Providing a cloud-based application through a web browser is known as Software as a Service (SaaS). The cloud also offers benefits in another paradigm, Infrastructure as a Service (IaaS), where organizations can choose not to own and operate their own computers and data storage. Rather, they could contract with an IaaS provider and use their infrastructure to support custom services. An organization would not need to employ their own staff to manage infrastructure computers, buy new computers when needed, etc., which in turn adds to cost savings. These saving originate in the IaaS provider’s ability to deliver storage and computing power more cheaply by dividing costs among many customers. Another model is Platform as a Service (PaaS), where the cloud provider offers a way for an organization to customize its infrastructure. The cloud becomes a development environment. For example, a symphony orchestra can add audio snippets from recent concerts to its website, and a method of buying tickets for upcoming concerts. A non-profit can add a way for supporters to sign up for a newsletter or make a donation. These features are no longer part of a separate website development effort, but are integrated into the management of the whole organization.

Cloud computing brings some challenges as well as advantages. Because organizations do not have physical control of their data, there can be security and privacy concerns. However, cloud providers may be able to provide better protections than some organizations can provide for themselves. There may also be legal issues triggered when information passes out of the direct control of a user.

Transition Zone for Cloud Computing

The cloud computing handout the participants received prior to the roundtable stated that cloud computing technology is already with us, and may not seem revolutionary. However, the summary also noted that many believe the evolution of the cloud will bring a transformative change that provides more and better services, and provide services more cheaply, in more places, with more convenience, to more people.

After the introduction of cloud computing, the participants discussed the current transitional state of cloud computing technology and its potential for greater utilization by people with cognitive disabilities. It was noted that the world would likely be hugely transformed but it is difficult to estimate the impact of cloud computing services cumulatively over time. Society is just beginning to understand what is possible with the technologies being created and cloud connected devices will continue to become increasingly powerful, more pervasive, and more connected. Consistent with the original vision of the Coleman Institute to embrace technology innovation to “promote the quality of life and independent living of people with cognitive disabilities,” cloud computing technology can advance the convergence of computing and communicating technology and keep stakeholders engaged with each other at all times. Social and biometric data can also be sent to the cloud and used, as one participant stated to, “turn disabilities into abilities as a prosthesis to life.” Content is also always available on the cloud with any device that can connect to the Internet. Unlike individual devices, which may be forgotten or lost, data on the cloud is pervasive and easily accessed by many devices.

Employment was also discussed as an area to be addressed by cloud technologies. The traditional view of a person sitting at a desktop to work is becoming an antiquated picture. Instead, mobile devices and non-traditional input are fundamentally changing our interactions with technology. Mobile devices connected to cloud technologies can assist with employment issues for people with cognitive disabilities by helping people navigate their day in the workplace, work more efficiently, help maintain context awareness, be helpful in unobtrusive ways, and improve social skills.

A member of the group mentioned that the context of stakeholders must be expanded for progress to be made. Many families and employers see cloud computing as a threat and view it as taking necessary supports away from those that need them. Research is needed to understand what stakeholder's perceptions exist and to communicate the benefit of cloud technology to disparate audiences. Participants discussed using social networking as a method to increase inclusion and to support job coaches with cloud-based tools when traditional supports are unavailable.

Cloud Technology Demonstrations

After discussing many of the possibilities and directions in which cloud computing could impact the lives of people with cognitive disabilities, participants gave several demonstrations presenting examples of current and upcoming technologies that utilize the cloud to provide services and supports.

Global Public Inclusive Infrastructure

One participant discussed the progress of the Global Public Inclusive Infrastructure (GPII) program.⁴ GPII aims to ensure that everyone who currently faces accessibility barriers can access the Internet and cloud-based resources in the future. Currently, many people need to have their computers configured for them. A major goal of GPII is to make devices more personal by including ways to locate technology and services a user needs in a particular context and help

⁴ For more information, see the GPII website at <http://gpil.net> (last visited: Dec. 5, 2011).

assure that devices automatically adapt to the user. This includes not just computers but all technology that surrounds us including appliances, kiosks, etc.

In the current marketplace, a small portion (approximately 10%) of the cost of producing software is given to the development of the product itself. The rest is spent on marketing, commercialization, and promoting a “push product.” GPII aims to reduce the cost of distributing software by creating a “pull market” where software and devices are “pulled” by the user based on personalized needs rather than “pushed” by a company. This will allow smaller companies to break into the marketplace and support the GPII objective to serve, what one participant suggested, as the “ultimate digital curb cut.”

With regard to global progress, in the United States the National Institute on Disability and Rehabilitation Research (NIDRR) is exploring a cloud computing project and in Europe the Cloud4All project has high expectation to move out to developing countries. The GPII is focusing on funneling evidence-based outcomes but acknowledges that there is a “valley of death” where funding exists for research and conceptualization of projects but does not always produce public distribution and support for them.

AbleLink Technologies

AbleLink Technologies⁵ demonstrated two applications that utilize cloud-based technologies to improve computer use for people with cognitive disabilities. The first, the *Endeavor* line of software, provides a simpler and easier desktop interface. The streamlined desktop includes a cognitively accessible browser as well as email personalization with speech synthesis for email and overall font size control. Content is pulled from the cloud to an individual's home screen, and is not based on a closed system, so that content can be gathered from multiple sources. The second application, *Visual Impact*, provides an interface to assist users with daily tasks. Step-by-step task instructions are provided to help users with daily activities such as preparing food, communicating with others, and handling medications. In both applications, the cloud is also used to administer and configure client interfaces.

Rest Assured

The *Rest Assured*⁶ system was also presented. It provides web-based support services for seniors and individuals with disabilities living at home. *Rest Assured* utilizes remote monitoring, live video feeds, and sensor data to support more independent living in a home. The system employs time-based alerts (such as alerting when the front door is open at night), inactivity alerts, easier video-conferencing use, and reminders on medication, meal preparation, or other daily tasks. The system uses the cloud to connect users with caregivers and family members.

Challenges to Cloud Utilization and Acceptance

Several concerns about cloud-based technologies were raised by the group throughout the discussions of cloud computing and the technology demonstrations. Privacy issues were raised

⁵ For more information, see the AbleLink Technologies website at <http://www.ablelinktech.com> (last visited Dec. 5, 2011).

⁶ For more information, see the Rest Assured website at <http://www.restassuredsystem.com> (last visited Dec. 5, 2011).

when discussing how, when, and under whose control sensor-obtained data and biometric information are sent to the cloud. Participants wondered who owns data when it is sent to cloud providers, especially in light of the aforementioned privacy concerns. Legal access and litigation issues included retrieving meaningful content from the cloud that is owned by other people; implications for First Amendment rights in the United States, and what rights people with disabilities have to the underlying content were discussed. Staffing and caretaking issues were considered in light of a projected doubling of the senior population in the next 40 years and the declining number of personal care providers potentially available in the near future. Independent use of technology was mentioned in response to the growing ubiquity of technology and concerns that people with disabilities will not always be able to rely on intermediaries to provide technology support. The need for clear and simple language was noted as an example of a challenge that would require ongoing dialog across disciplines to ensure consistency of vocabulary to further advance technologies. Finally, participants were concerned about whether the cloud could fully overcome digital literacy challenges faced by many people with disabilities.

Guidelines for Breakout Discussions

Following the morning's introductions, overview, and background presentations, the participants moved into assigned breakout groups; there, more intimate conversations were guided by three discussion prompts. The groups were to develop and explore opportunities for cloud computing to improve the lives of people with disabilities through raising strategic partnerships and addressing public policy issues. The first prompt focused on technology for remote support:

Budgetary pressures are compelling service providers to seek less labor intensive alternatives to traditional staffing. A number of groups are developing technologies that permit a single support person to monitor conditions and respond to requests from residents in multiple locations.

Two groups addressed this prompt. The second prompt focused on support for more independent use of the web by residents:

As in-person support becomes less common, residents will have increased need for information and services offered via the Web, and will need to become more independent in their use of the Web.

Another two groups addressed this prompt. The third and final prompt was centered on mobile support for independence:

There is an opportunity for residential supports to be extended by mobile access.

The fifth group addressed this prompt.

Each breakout group was given approximately two hours to engage in facilitated discussions regarding their topic area. Each group's members represented public policy, residential supports, technology and computer science, higher education, intellectual and developmental disabilities and self-advocates or family members. Facilitators from the partnering organizations and group-assigned recorders were identified. Recorders utilized the cloud to access a discussion template on Google Docs to help streamline the discussion and prepare for group presentations in the afternoon. The template outlined four sections: a) Opportunity – a description of the opportunity, why it was important, and what benefits or problem(s) it solved; b) Technical Approach – how the group proposed the opportunity could be accomplished; c) Organizational, Legal, and Policy Issues – what, if anything had to happen

under these headings to realize the opportunity; and d) Other Considerations – other important points that were discussed that did not fit into any of the above sections. Approximately fifteen minutes before the breakout sessions ended, the groups were instructed to identify their top two ideas to present to the larger group.

Overarching Themes

Across the five breakout groups, three broad themes were identified: a) opportunities for technology development and design; b) opportunities related to education, training, and outreach; and c) opportunities for financing new initiatives and partnerships.

Technology Development and Design

The group discussions often focused on the development of personal profiles that would be housed within the cloud for both accessibility and ease of utilization. These profiles would not describe the individual, but rather provide content and support in an accessible format beneficial to the user because it is personalized. The ideas formulated by the groups extended to the activities of the GPII initiative. Participants recognized that technology should not create complete dependency, but rather act as a “prosthesis for life” supporting people with various life-skills and activities. These profiles would instantly recognize and configure to the individual’s lifestyle and capabilities including what they needed when they needed it within a secure environment, and taking into consideration changes in a person’s profile across environments and activities. In addition, these profiles could identify and contact key members of the individual’s support network when engaging in particular activities if assistance was required. Participants emphasized that these creative ideas could only be realized through a trust network allowing the end-users to manage their own identities in a secure environment.

One mechanism for supporting the development of personal profiles would be to include existing profile structures such as electronic health records. One group presented the idea of developing a hologram for patients to include in their medical records that would tell their own life story. This would allow for patients to be viewed more holistically and would promote values of self-determination. Such an innovation could also be utilized by different populations including aging, mental health, and other disabilities thus increasing the market and partnering across disciplines. However, concerns about who would own the information if housed in the cloud and who could access the information were reiterated. Participants acknowledged that in order for such self-configuring personal profiles to exist in a secure environment, the cognitive disabilities community would need to be engaged in ongoing conversations and included in all stages of development.

The development of technologies to improve employment outcomes for people with I/DD was another topic discussed across the breakout groups. Opportunities to develop remote supports for job selection, job skill assessment, task completion, and time management were specifically addressed. These remote supports could enhance and support the work of qualified job coaches who face unmanageable caseloads and loss of funding. By utilizing the cloud, employers could better provide long-term work supports while fading-out job coach supports. The transitions into new employment situations can also be improved via cloud computing by changing an online environment little by little until it replicates the one an individual will have at

work. Participants noted that through the use of remote work supports via the cloud, businesses would have added economic incentive to support individuals with I/DD.

Education, Training, and Outreach

The breakout groups discussed several facets of education, training and outreach and how the cloud can be used to influence them. Just as the cloud can be used to provide remote support for employment, it can also be used to provide remote education and remote support for educational needs. The groups identified time management, remembering task steps, and sequencing of tasks as general educational goals that can be effectively supported remotely rather than in-person. The cloud can also facilitate training and independent living skills that caregivers would otherwise manage. Cloud technology can track where users are, what goals and preferences they have, the details of where they are going, how they will get there, how they are going to pay, and can therefore assist the user throughout a process and connect to remote support when needed. The remote support can be a known caregiver or it can be community-driven by gathering support from many individuals rather than just one. One group also addressed the need to redefine what “educational normalcy” is. With the capacity of the cloud, the goals of education are likely to shift from creating “human hard drives” to teaching the use of cloud technologies in context and emphasizing teaching to an individual's strengths.

A concern of several of the groups was that the cloud adds an additional layer of education as “digital literacy” that is required to operate cloud-based devices and technology. Learning to physically interact with devices requires additional education and support and learning how to ask for additional assistance must be handled across many life contexts. The implications of using the cloud must also include what information is necessary and what information should not be provided for the sake of privacy and security, especially on social networks. Additionally, concerns were raised about what happens when technologies go away. Dependence on devices can be problematic if they are lost, forgotten, break for any reason, are not available when expected, or become abandoned through lack of consumer interest or commercial support.

The needs of the larger context of use were also addressed by the breakout groups in terms of outreach and informing stakeholders. Moving to cloud-based technologies requires effort across many constituents including organizations such as the U.S. Chamber of Commerce, employers, unions, parents, and other caregivers. These organizations must be part of the transition process to assure safety, privacy, and accessibility to the technology. Additionally, stakeholders and end users often do not know what technologies are available and what capabilities they have. Groups suggested creating web services, open information architectures, and way finders that will help family members, people with disabilities, and community members connect to the information they need regarding available assistive technology (AT).

Financing New Initiatives and Partnerships

A large area of discussion for the participants was financing for future projects and technologies focused on disabilities and cloud computing. The groups noted that, traditionally, businesses have lacked an economic incentive to serve “small populations” such as people with cognitive disabilities. However, the cloud provides an economy of scale that can allow AT providers to potentially perform more effectively. Assistive technology includes not only

hardware, but software, maintenance supports and training. Strong business cases are needed for technology to integrate the needs of people with cognitive disabilities. There is currently a lack of business data confirming that cloud-based assistive technology can perform well economically; convincing data must be gathered. The metrics for doing so still need to be determined and strong evidence-based and rational approaches must be created and presented to businesses.

Overall, there were many suggestions that the funding of focused AT for people with cognitive disabilities must be decoupled from federal and state government funding. Current government reimbursement rules have supported expensive, dedicated AT products rather than less expensive mainstream products with accessibility features or applications that can be as or more useful to users with cognitive disabilities. Although one group suggested that grants could be concentrated on entrepreneurs rather than the education space, it was generally believed that AT-businesses must be self-sustaining. Suggestions for increasing self-sufficiency included adopting universal design principles, leveraging existing mainstream technologies, leveraging other disability communities (e.g. aging or behavioral health), exploring new business models, and exploring on a much grander scale with the cloud.

Community-based approaches were also discussed as a way to reduce reliance on government funding. Common-sourcing and cloud sourcing were suggested as alternatives where communities of experts and non-profit organizations develop technology much like open source software communities such as Wikipedia. Work is mostly supported by companies that pay full-time employees, but a large base of outside contributors can also supply effort effectively. The open commercial market can be leveraged through public/private partnerships that are already gaining momentum outside the government.

Taking Action

The last hour and a half of the day was dedicated to developing action steps that would stimulate the further development of opportunities of cloud computing for residential supports and community services presented by the breakout groups.

Priorities

Three priorities emerged from the group presentations: a) the collection and analysis of large-scale data on technology users (inclusive of cloud technology), b) the development of an inclusive accessible clearinghouse regarding available technologies, and c) the identification of creative and successful funding mechanisms to further advance innovation and to drive public policy.

After hearing and discussing the breakout group's presentations, the larger group worked to identify systems necessary for support of cloud computing for persons with cognitive disabilities. First there needs to be a clear and reliable understanding of the population and the potential market. For too long the field has relied on anecdotes and small quantitative and qualitative studies to guide development and policy on the use, and barriers of use, of technology by people with cognitive disabilities. Participants noted that there is currently a lack of concrete comprehensive data to effectively influence systems change. One participant noted that many people across the United States use screen readers, yet there are no valid and reliable data

regarding users, or the vast number of potential users. Participants proposed the implementation of large-scale data collection activities utilizing a common language across disciplines to better understand and describe assistive technology and cloud technology users (i.e. nature of disability, accessibility needs, AT or cloud use, current environments, support services, source[s] of funding, etc.).

In addition to information about users, the participants expressed the need for a clear understanding of the technologies available for potential and current users. The participants discussed the current challenges faced by potential users in gaining comprehensive, accessible, and unbiased information about available technologies. The group identified large gaps of knowledge in the field that, if filled, could support the acquisition of technologies and more effectively employ the latest advances in cloud computing technology. The goal of this initiative would be to have a single accessible clearinghouse of resources for users, family members, policy-makers, providers, researchers, and developers to search and gather information about the different types of technologies that are most compatible with users.

The participants agreed that the basis for gathering and analyzing such data would be to identify and obtain funding for cloud computing and technology innovations as well as to drive policy change in funding streams for the acquisition of technologies and programs for people with cognitive disabilities. There were extensive discussions about the current funding mechanisms available for people with cognitive disabilities to purchase or access technologies, predominantly funding from the Centers for Medicare and Medicaid Services (CMS) distributed through state disability specific Waivers. Discrepancies in funding rules and regulations across states and across Waivers were acknowledged. Participants' short-term goal was to identify states with creative methods that could be applied to fund technology and support innovation in other states. Out of that short-term goal the group hopes to address the long-term goal of influencing state funding rules and Waiver applications for disability supports and services. The participants proposed the development of a task force to create a letter or whitepaper that could be used by the roundtable participants to talk with legislators and agencies about funding issues and policies related to cloud computing and technology.

Finally, the group recognized the importance of moving beyond CMS specific funding and exploring cross-agency funding and public/private partnerships to transform systems and develop new cloud technologies. Public/private partnerships would not only foster dialog and enhance technology development but would bring together different communities of professionals to reach a larger and more diverse group of people with disabilities and their families.

Conclusion

The roundtable discussions covered a wide range of topics with national and international implications. The participants' agenda yielded several priorities necessary for cloud computing to improve the lives of people with disabilities. It was clear that more data and research would be required to fully understanding the technological needs of people with cognitive disabilities but that development of new cloud-based technologies for people with disabilities should progress immediately. Many of the existing technologies have much to offer people with disabilities, their families, and the range of other stakeholders.

Postscript

On October 13, 2011 the Eleventh Annual Coleman Institute on Cognitive Disabilities Conference “State of the States, State of the Nation: 2011, A National Conference on Cognitive Disability and Technology in a Challenging Economic Environment” was held at the Westin Westminster Hotel in Westminster, Colorado. At the conference three panel presentations referenced innovations of cloud computing in the context of supporting people with cognitive disabilities. The first panel, moderated by Sue Swenson, Deputy Assistant Secretary for Special Education and Rehabilitative Services, U.S. Department of Education, addressed the “State of the Nation in Disability: Federal Perspectives.” The panel included panelists Sharon Lewis, Commissioner from the Administration on Developmental Disabilities, U.S. Department of Health and Human Services and Charlie Lakin, PhD, Director of the National Institute on Disability and Rehabilitation Research, Office of Special Education and Rehabilitative Services, U.S. Department of Education. The second panel whose charge was to present a synopsis of the discussions at the Pre-conference Roundtable titled, “Cloud Computing and its Implications for Residential and Community Services” was moderated by Clayton Lewis, PhD. The panel featured Rodney Bell, Principal ASSET Consulting, LLC; William T. Coleman III, founding donor of the Coleman Institute for Cognitive Disabilities and partner at Alsop-Louie Partners; Mark Emery, Chief Executive Officer, Imagine! Colorado; Dale Hatfield, Senior Fellow, Silicon Flatirons Center for Law, Technology and Entrepreneurship, University of Colorado Boulder; and Jennifer Simpson, Senior Director, Telecommunications and Technology Policy, the American Association of People with Disabilities. Finally, Ann Cameron Caldwell, PhD Chief Research and Innovations Officer at the Arc of the United States moderated “Perspectives on Technology” examining technology solutions for employment, health, residential services and the challenges of reimbursement. The panel featured Jim Gardner, PhD. President and CEO of the Council on Quality and Leadership; Ari Ne’eman, Founding President of the Autistic Self-Advocacy Network and member of the National Council on Disability; Jo Ann Simons, President and CEO of the Cardinal Cushing Centers and Board Chair of the National Down Syndrome Society; Greg Wellems, Director of the Smart Home Initiative at Imagine! Colorado; and Dustin Wright, General Manager of Rest Assured, Inc.

Resource

Braddock, D., Hemp, R., Rizzolo, M. C., Haffer, L. Tanis, E. S. & Wu, J. (2011). *The state of the states in developmental disabilities: 2011*. Boulder: University of Colorado School of Medicine. (<http://stateofthestates.org>)

Appendix A
Implications of Cloud Computing for Residential Supports and Community Services
Roundtable Attendees
(Alphabetical by Last Name)

Enid Ablowitz	<i>Coleman Institute for Cognitive Disabilities</i>
Antranig Basman	<i>Fluid Project</i>
Rodney Bell	<i>ASSET Consulting, LLC</i>
Brad Bernthal	<i>CU Law School</i>
Peter Blanck	<i>Burton Blatt Institute, Syracuse University</i>
Cathy Bodine	<i>Assistive Technology Partners</i>
David Braddock	<i>Coleman Institute for Cognitive Disabilities</i>
Brian Brown	<i>AbleLink Technologies</i>
Ralph Brown	<i>CableLabs</i>
Ann C. Caldwell	<i>The Arc of the United States</i>
Bill Coleman	<i>Alsop-Louie Partners</i>
Geoff Cooper	<i>CaraSolva</i>
Doreen Croser	<i>Formerly AAIDD</i>
Dan Davies	<i>AbleLink Technologies</i>
Mark Emery	<i>Imagine! Colorado</i>
Cathy Enfield	<i>SABE</i>
John Foliot	<i>Stanford On-line Accessibility</i>
Jim Gardner	<i>The Council on Quality and Leadership</i>
Dale Hatfield	<i>Silicon Flatirons</i>
Richard Hemp	<i>Coleman Institute for Cognitive Disabilities</i>
Jeffery Hoehl	<i>Coleman Institute for Cognitive Disabilities</i>
Stephanie Kohl	<i>Mount Olivet Rolling Acres</i>
Tim Kral	<i>Oregon Rehabilitation Association</i>

Mandy Kretsch	<i>Imagine! Colorado</i>
Charlie Lakin	<i>NIDRR</i>
Sharon Lewis	<i>Administration on Developmental Disabilities, USDHHS</i>
Clayton Lewis	<i>Coleman Institute for Cognitive Disabilities</i>
Robert L. Metts	<i>University of Nevada, Reno</i>
Ari Ne'eman	<i>Autistic Self Advocacy Network</i>
Paul Nishman	<i>NISH</i>
Anna Noschese	<i>Silicon Flatirons</i>
Mike Paciello	<i>Paciello Group</i>
Renee Pietrangelo	<i>ANCOR</i>
Scott Robertson	<i>Pennsylvania State</i>
Cyndi Rowland	<i>Utah State</i>
Jo Ann Simons	<i>Cardinal Cushing Centers</i>
Jenifer Simpson	<i>American Association of People with Disabilities</i>
Jim Sullivan	<i>Coleman Institute for Cognitive Disabilities</i>
Sue Swenson	<i>Office of Special Education and Rehabilitative Services, U.S. Dept. of Education</i>
Lynne Tamor	<i>Center for Accessible Information</i>
Shea Tanis	<i>Coleman Institute for Cognitive Disabilities</i>
Jim Tobias	<i>Inclusive Technologies</i>
Jutta Treviranus	<i>Ontario College of Art and Design</i>
Gregg Vanderheiden	<i>TRACE, University of Wisconsin</i>
Greg Wellems	<i>Imagine! Colorado</i>
Dustin Wright	<i>Rest Assured</i>