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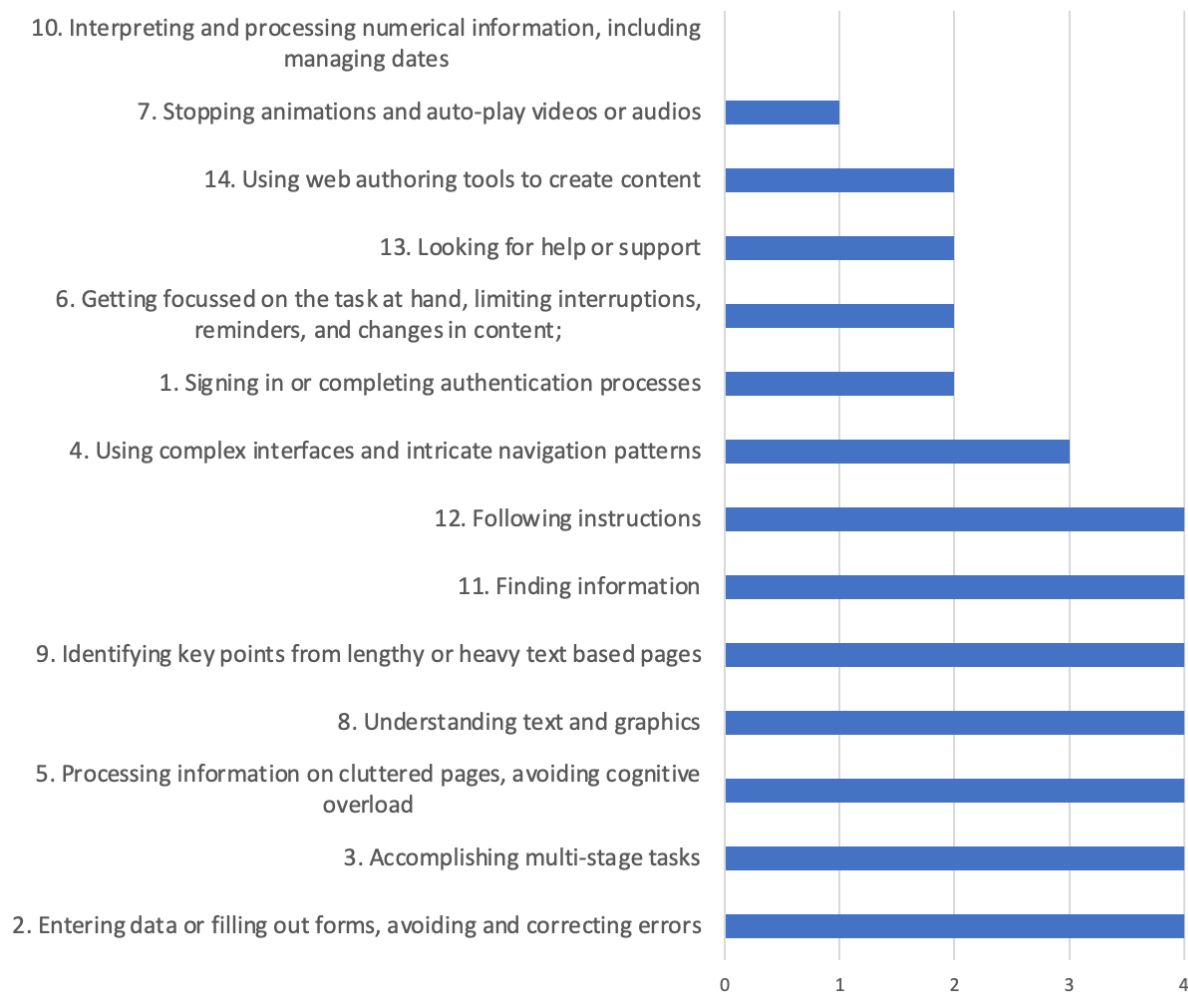
1 GENERATED RECOMMENDATIONS AND GUIDELINES

1.1 RESEARCHERS

The LIVE IT Project accomplished a lot across the four co-design labs in just 12 short months. However, we could not address all web accessibility challenges faced by people with cognitive disabilities in the time we had available to us. The chart below illustrates the extent to which the 14 challenges highlighted by the LIVE IT as essential to address were able to be addressed in the co-design lab sessions. We recommend that researchers use the LIVE IT validated scenarios as a starting point to investigate the following:

1) Web accessibility solutions for interpreting and processing numerical information. LIVE IT co-design labs were able to observe the difficulties faced by people with cognitive disabilities when accessing numerical web-based content such as tables and data dashboards. However, no suitable solutions were **identified**.

No. of Labs that Addressed Challenge



Supporting Data from Co-Labs:

20-year-old, female, third level student with dyslexia – “Yeah, it really would just sound like nonsense. Like, sometimes it would be like...um...it wouldn't even read some of the symbols, like. Then at different times to be like, “Arrow to the right.” When it would be something completely different. And Microsoft Edge...it was...some of it was a bit funny...but generally, it was a bit better to handle it. And then...because with ReadWrite Gold as well, if there was an equation, it could skip past it completely, and then when it got to the end of the page, it would go back and do it again. So didn't really follow in sequence.” (Interview, Irish Co-Lab)

2) Web accessibility alternatives to text. We live in a text-dependent society, and alternatives to text that maintain the same amount and quality of information as a particular text are needed.

The majority of the LIVE IT Project participants struggled with text in some way, and this is not a new phenomenon in the research. However, alternatives to text that are useful and relevant for people with cognitive disabilities still need attention and improvement.

Supporting Data from Co-Labs:

L and M (21 and 15, Autistic, “text avoiders” if possible) - Both sisters use social media and visual sites. They are distrustful and avoid heavy text-based material. Need lead in and slow introductions to new things, image-based signposting if possible. Concerned about difference, mental health, exclusion and online safety. (Fieldnotes, UK Co-Lab)

3) Web accessibility solutions via virtual reality. Participants frequently imagined virtual reality solutions to the challenges that they face using the web in their day-to-day lives. Researchers can use the LIVE IT Scenarios as a starting point for exploring the affordances of virtual reality. Alternatively, they can start their own participant-driven inquiry cycles!

Supporting Data from Co-Labs:

Need visual signposting and non-stressful introductions. Some experience severe stress and anxiety when presented with anything computer based. General enjoyment of computer games and visuals, roblox and similar. Prefer the physical world and face to face. Zoom, Facetime, WhatsApp and video calling popular when f2f not possible. All express concerns with Digital Access and relevance. (Fieldnotes, UK Co-Lab)

Several UK hackathon teams proposed virtual reality as a means for making the online world more accessible. (Presentation, [Link](#))

4) Immediate and imaginative solutions for PDF accessibility. The importance of PDF accessibility will be mentioned many times in this report. Researchers must devote attention to creating immediate and imaginative solutions for PDF accessibility.

Supporting Data from Co-Labs:

Participant K-a (Dyslexia, auditory, spatial and colour processing issues) -Read and Write good, Windows and Apple inbuilt tools useful. Has her own tools - Dragon, Grammarly Pro, also uses TextHelp and other similar software. Apple accessibility software also good. Uses block separators, mindmapping and font colour and background colour settings to help with colour processing disorder, also has spatial and auditory processing issues. (Fieldnotes, UK Co-Lab)

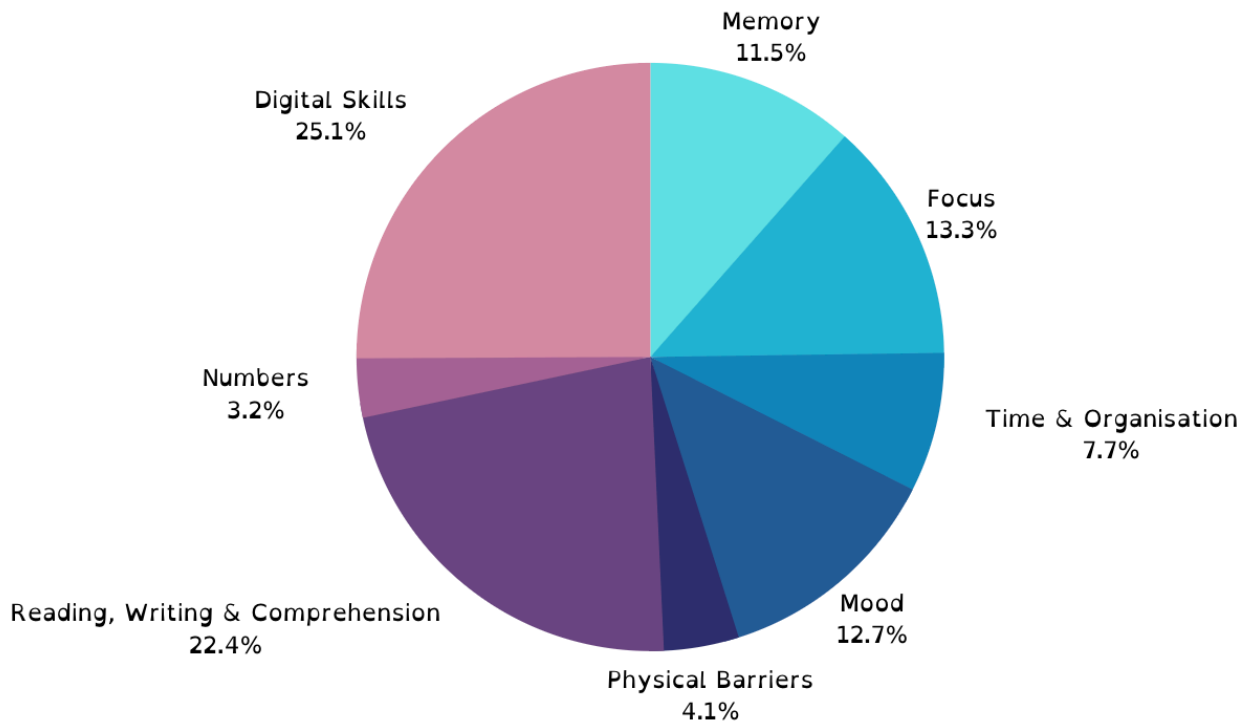
33-year-old, female, third level student with dyslexia – “T2S could not read the text in the PDF for me. And it took me a week to read it because it was in columns, and it was tiny letters that were distorted. And it took me about a week to read it with comprehension.” (Interview, Irish Co-Lab)

1.2 POLICYMAKERS

The LIVE IT Project participants with cognitive disabilities described and demonstrated a multitude of web accessibility challenges throughout the lifetime of the project. The chart below shows an overview of the challenges reported and/or demonstrated by participants by category. *Digital Skills* and *Reading, Writing and Comprehension* were the most frequently reported and/or demonstrated challenges. Therefore, the LIVE IT Project makes the following recommendations for policymakers:

1) Introduce and/or further support policy that fosters the development of digital skills in an inclusive and accessible way. Policymakers should include people with cognitive disabilities in the planning and implementation of such policy.

2) Develop and support policy that encourages the de-facto integration of non-text-based methods for communicating information at the same amount and quality as would be communicated via text. Again, policymakers should include people with cognitive disabilities in the planning and implementation of such policy.



Supporting Data from Co-Labs:

Participant J (18 - Dyslexic, Dyscalculia, colour and other processing issues – possibly Autistic – can't read) - "Colours eat the words. I can't read. Likes visual sites such as YouTube." (Fieldnotes, UK Co-Lab)

Only able to use and interested in YouTube and musical or image-based sites. Significantly challenged around logging on and access due to severe reading difficulties and associated anxiety. Needs help multiple times a day with logging on to SCT open access computers that require the input of a user id. Lo struggles to accurately copy username and passwords into log on fields and doesn't appear to realise when she has typed in incorrect characters or symbols. Password managers are not useful in this sort of public pc use scenario. (Fieldnotes, UK Co-Lab)

20-year-old, male, third level student with ADHD and speaks English as second language –
“Normally, what I would do is...for example, in an assignment, I need to do certain tasks. The first thing to do is if I don't know a certain concept, is just to quickly look it up on Wikipedia. From that, I just kind of like...uh...understand the main idea that is there. Then, I look it up on YouTube...for the same concept...as a description. There's nearly every single time a concept described in a certain way. And there's...at least in coding...tons of tutorials. So, in coding, it's a little bit easier, because there is a lot of concepts that are going to be easily available. Not even just tutorials...you have some blocks of code that you can just copy and paste, and it's explained quickly. However, with all other things, there's either going to be some YouTube videos, or some related content that just gets you like, kind of close. If that happens then, I have to go back to Wikipedia and just read until I understand *everything*. From that I could go back to the lecture, either notes, or just text. And then because I already know the 90% of the concept, I understand everything quite quickly. And then it takes less time, which is kind of like paradoxical because I just took around half an hour just researching everything...for just looking at...or to be able to read two pages.”
(Interview, Irish Co-Lab)

3) Support web accessibility with funding for training designers and developers. Standards and guidelines are not enough. All the data from the LIVE IT Project supports that claim. High quality web accessibility standards already exist, but designers (everyone from teachers to the researchers working on this project, to a small business owner creating a website, to professionals in web design) and developers (amateur, professional, and everything in between!) are constantly creating content, websites, PDFs, and applications that are not compliant. Additionally, the standards are continuously improving, which is a good thing, but that means the goal posts for accessibility are continuously moving. Funding for high quality, open access, and freely available training on how to create accessible web content is urgently needed.

4) Support web accessibility with funding for consistent and immediate PDF compliance. The European Union is committed to increasing equity in education and employment. One of the largest gatekeepers to education and employment is the ability to access and read PDFs. To support accessibility and equity in this area, a coordinated and well-funded effort to make all PDFs accessible as soon as possible.

Supporting Data from Co-Labs:

20-year-old, female, third level student with dyslexia – “Um...I mean, my least favorite part is reading papers. So, I just wish that there was a way that making them easier to read would be a thing, but like, obviously, you can't just magic my brain to work like normal brain. Um... something that makes it easier. Probably, yeah. Having, like, a proper tool that would read the articles aloud. Like, one that just works.” (Interview, Irish Co-Lab)

33-year-old, female, third level student with dyslexia and speaks English as second language – “It has a lot of glitches, so I only use the screenshot. But then I must manually mark the text that I want to read. And sometimes when it...there's like a picture in the middle of the text...and instead of marking the whole chunk if the picture has description, I must mark the chunk above mark the chunk next to the picture and mark that chunk below. And I cannot put it...I use...let's say for the longer texts that I can download in PDF I use the natural reader instead of text to speech. But that one has other glitches. So, the problem is recently, it's not recently about a year ago, it started ignoring everything that is in brackets. Okay. I can play it for you. I have one text here that it's...it's kind of it sounds weird when you read it.” (Interview, Irish Co-Lab)

5) Support web accessibility with funding for open access and free tools. The European Union is committed to increasing equity in education and employment. Another major gatekeeper to education and employment is the ability to access necessary features of all tools. Many tools, or elements of tools, exist behind a paywall. This further excludes those who need to use the tools to gain access to education or the economy.

Supporting Data from Co-Labs:

32-year-old, female, third level student with dyslexia – “I think like a lot more open access kind of stuff. I mean, it's great for me I'm at the university and I can get everything, and you know, through that. But I mean a lot of people aren't and I think it really would benefit their lives to be engaged in this kind of...to know what's available to them...and is well...yeah to know what's available as well as open access so that's the big thing.” (Interview, Irish Co-Lab)

Many tools were not free. *“Ohhh good idea... but not free of charge”*; *“Nice tool but we need to pay to access it”* (Fieldnotes, Greek Co-Lab)

Finally, based on what we have learned from the work done in the LIVE IT co-design labs and the baseline research conducted prior to implementing the labs, automated accessibility checkers are a great start but cannot be the only method for assessing web accessibility. Thus, we recommend that policymakers:

5) Develop and support policy that provides for continuous web accessibility assessment and improvement by and with people with cognitive disabilities. The LIVE IT scenarios can serve as an example of how to do this type of work with people with cognitive disabilities.

1.3 DESIGNERS AND DEVELOPERS

The most useful aspect of the LIVE IT Project for designers and developers is likely the website housing all the hackathon presentations. The hackathon presentations include the dreams, recommendations, and proposed web accessibility solutions developed by people with cognitive disabilities. This website was created by one of the UK Co-Lab participants, Julia. To view the hackathon presentations, follow this link: [Link](#)

1) Create accessibility tools that function in all European Union languages. One of the most common challenges faced across all project labs and hackathons was the inability of most tools to function in the desired language. Tools are created with an English-as-default perspective, and the European Union requires a different perspective.

Supporting Data from Co-Labs:

33-year-old, female, third level student with dyslexia – “The Irish part of it. It's just if the text is something that it does not recognize, then it then it compares it to the nearest thing that it thinks it is.” (Interview, Irish Co-Lab)

Portuguese hackathon teams consistently provided feedback that they could not use existing tools because the tools did not function in Portuguese. Their presentations can be found by following this link: [Link](#)

Greek hackathon teams and co-lab participants could not use existing tools because the tools did not function in Greek. (Fieldnotes, Greek Co-Lab)

Most of the tools of the Toolkit were in English, so they were unsuitable for use in the Greek population of PwCD. *“The problem is we cannot use many of the tools because they are in English and our people are not going to understand the guidelines, the use, even with us beside them”*; *“Excellent tool, but the problem is that it is only for English speakers”*; *“If only it was in Greek...”*; *“We tried it but it was in English, so it was not useful enough for us”* (Fieldnotes, Greek Co-Lab)

2) Create PDF accessibility solutions. We acknowledge that PDF accessibility has received a lot of attention, but PDFs are still largely inaccessible.

Supporting Data from Co-Labs:

One of the UK hackathon teams addressed PDF accessibility in their hackathon presentation. The presentation can be found by following this link: [Link](#)

The accessibility recommendations to be applied to create accessible digital projects are aggregated in the following list:

- Maintain clear contents, use simple layouts, leave spaces between elements, use not much text, try to include visual or audio supporting
- Consider people that do not speak English, but either way use always plain language

- Ensure ease of navigation / guide users to what is the required action from them and what they should do / how they should act
- Tools should be accessible from start to finish, meaning that the installation process and optimization / setting procedures should also be accessible
- Create free tools, ad-free, accessibility should not facilitate only people able to pay – including updates
- Ensure dictation is working, especially with people not being able to pronounce / articulate perfectly
- Create tools to facilitate interpretation and processing numerical information, dates, tables, calculation and other complex forms of content
- Create tools that are easy to use / easy to follow – direct users to next steps
- Create a cross-platform button that enables text-to-speech or dictation features
- Create tools that can generate abstracts from long dense contents
- Create tools that can read lips to facilitate direct conversations
- Create tools that blur background to help users focus on text reading
- Create tools that provide the feature of profile setting according to challenges or per diagnosis and customise all digital content according to profile selected
- Create tools that can remove, blur, or hide media such as pictures, ads, videos or animations
- Create tools to facilitate PDF accessibility and compliance to standards and protocols
- Create a virtual assistant that can be adjusted based upon different diagnoses, for example when a user faces memory challenges, the virtual assistant could be used as a reminder, when there are reading problems, the virtual assistant could easily read content on screen by just pressing a button
- Create tools with no errors, bugs – it confuses PwCD more and makes them feel responsible for the error
- Too many options and elements may as well be confusing, especially when not presented simply
- Integrate visual / layout tools with text-to-speech tools to motivate users to read along readers
- Make tools compatible with most browsers / operating systems
- Readers' speed should be adjustable when not already
- Readers should use more human voices and not robotic digital voices
- Text-to-speech tools should integrate translation mode for live translations
- Use audio / visual elements and instructions to support text-based content
- Use chatbots or helpdesk and FAQ whenever possible
- The harder the disability, the harder the solution needed, nevertheless it should be aimed
- Digital skills acquisition is important for caregivers that often act as mediators / training delivery provision to caregivers, but also offering of know-hows and tutorials to end-users

- PwCD are still dependent to their caregivers to interact with existing tools but that should change - self-esteem, independency and privacy issues are caused by the required constant presence of mediators to digital interactions
- The digital world must move towards an environment where accessibility tools would be pointless and useless – the digital world should be accessible without tools and assistants.

1.4 STAKEHOLDER - GENERATED RECOMMENDATIONS FOR DESIGNERS AND DEVELOPERS

Additionally, Pete Kercher, a UK-based LIVE IT supporting community-based partner, created a list of recommendations for the project partners. Pete’s recommendations for designers and developers are copied below.

Recommendations for Designers, Developers and Decision Makers

Although the principle stated focus of the LIVE IT Project was to provide input that may be of use in guiding the future work of the policy makers who sit in the European Parliament and, to a secondary extent, of researchers preparing to embark on more detailed research projects designed to build on the foundations sketched out in the short time available during the project’s lifetime, practical experience learned from practitioners who have been working for decades in the area of Design for All suggests that it would not be out of place to state some basic principles also in respect of the theory and working practice of designers, developers and decision makers.

Designers: The scenarios envisaged during the LIVE IT project focus on situations that can currently be considered to be substantially rather rare. As a consequence, they are usually treated as marginal when designers approach issues of mainstream usability. This is a self-perpetuating problem, however, in that their relevance to mainstream projects is dangerously underestimated in everyday design and implementation work, not only in the field of the relationship between people with cognitive disabilities and online media, but across the board, in the field of how people with any form of disability, whether physical or cognitive, relate to the artificial environment in which we all live to a greater or lesser extent.

The recommendation offered to practising designers in the light of the many years of experience of Design for All (represented by its ambassador Pete Kercher who was a subcontractor of LIVE IT) is that they study these scenarios with care, so as to employ the lessons that can be learned from them as extreme-case situations, whose inclusion in a mainstream design process is posited as the litmus test for true inclusion.

Rather than merely copying these scenarios, however, designers are invited to embark on a coherent process of user involvement, in accordance with the methodology of Design for All, as quoted in the Stockholm Declaration ([link](#)), which states that “Design for All is design for human

diversity, social inclusion and equality”, then goes on to expound on the methodology with these words: “The practice of Design for All makes conscious use of the analysis of human needs and aspirations and requires the involvement of end users at every stage in the design process”. This entails not only analysis, but a constant iterative process of consultation with those users who experience the most challenging situations in their interaction with the objective of the design process, since the ability to include such cases has been found to generate results that are also convenient, easier to use and thus beneficial to all mainstream users.

Developers: Every design process is a multifaceted partnership: while the designer acts as the leader of the process, the figure of designer should never be considered to be the sole figure of relevance. Just as an automobile designer would remain a theorist in the absence of the engineers who lend their expertise to translate the draft design into functioning models of good engineering, so a software designer must work in partnership with software developers and web designers must involve not only the end users mentioned in the previous section, but also the developers who work behind the scenes to codify the instructions elaborated by the designers.

Once again, the accent here is on conveying also to developers the important message that the scenarios experienced in the – albeit short – lifetime of the LIVE IT project are of vital interest when applied in a sense that is not sectoral, so does not focus solely on the specific user groups in question, important though their needs are, but mainstream in nature, in compliance also with the principles of Design for All.

Decision Makers: Decision makers are the third vital element of this trio: without their awareness, understanding and active participation, no truly inclusive design process can take place. The reasoning is straightforward: however good the designers, however competent the developers, the decision to give both figures the correct amount of freedom necessary to create a coherent inclusive design process rests with the decision makers, those who wield the economic and administrative power to make the vital difference.

The development of new, cutting-edge designs and the products that derive from them, both tangible and intangible, is often subject to enormous market pressures that impose haste. This haste is obviously the antithesis of a well-structured design process that features iterative user consultation as one of its most important tenets since consultation necessarily calls for a certain amount of time if it is to generate meaningful results. Never was the proverb “more haste, less speed” more relevant than in cases of hasty project developments that lead to products with a merely marginal appeal: they may be fast to market, but they are often fated to exclude large swathes of their potential users, so will be consigned to the oblivion of obsolescence far earlier than would be the case if users had been involved.

Decision makers must also be alerted to the importance of the economic argument for user involvement. Without it, the potential market for a product (whether tangible or intangible, a service or a system) will necessarily be curtailed to the median percentiles of those who have no difficulty using it and those who are willing and able to make the necessary adaptation in their

own habits and methods to take its poor, unfriendly design into account. All others will be excluded, together with the market revenue they bring with them. It is for this reason that decision makers must be included in the process of learning about inclusive design methodology.

In conclusion

It is the firm conviction of the LIVE IT Project that the value of its work lies not only in the immediately apparent results achievable in the short timeframe of the project's life cycle, but also in how these can be employed as examples of scenarios lying outside the range of the percentiles of the using public normally taken into consideration by designers, developers and decision makers in every design process (not only that of accessibility) and projected usefully onto the reality of a society, our society, in which the concept of mainstream is changing with staggering rapidity. It is in this respect that policy makers at the European Parliament can act to provide a legislative and financial framework that will enable this process to move forward at a sufficient rate to keep pace with this change.