



Tell me more about...

Moving from paper based to Computer Based Testing

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Introduction

Testing is going high tech



In response to technological advances and the changing expectations of test takers, many private, public and not-for-profit sector organizations have moved from Paper Based Testing (PBT) to Computer Based Testing (CBT).

Many test takers can now enjoy the convenience of selecting a date, time and location for a wide range of tests, rather than having to travel potentially long distances to centrally located test centers on specific days of the year.

Organizations that have already moved or are moving their assessments to CBT, include ISACA, the Global Association of Risk Professionals, and the Washington State Office of the Insurance Commissioner regulatory exams. However, we know that some organizations still have reservations and have been more cautious about making the move to CBT.

This booklet aims to address any concerns and provide reassurance that it is possible to make the move to CBT in a way that is cost-effective, secure and scalable - regardless of the size of your organization, number of test takers, or security requirements.



Who uses CBT?

- ▶ Educational programs
- ▶ Admissions departments
- ▶ Certification and licensing bodies
- ▶ Corporate enterprise
- ▶ Government programs
- ▶ Publishers



What kind of tests is Computer Based Testing used for?



Nearly all tests that are completed with paper and pencil can be adapted for CBT.

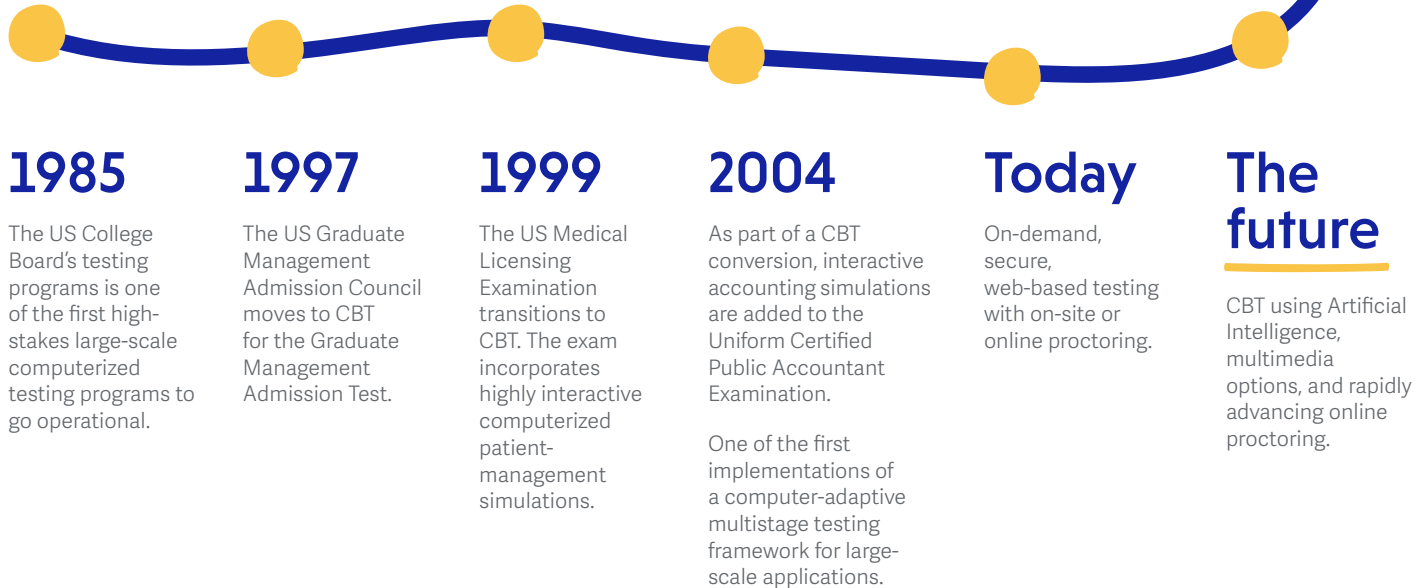


Why make the move *now*?

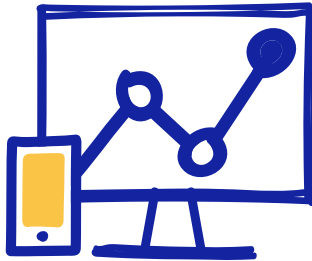
Recent technological advances, most notably the ability to move from fixed assessment windows to on-demand testing, have provided many more options to reach test takers. At the same time, technology has significantly increased the security and accessibility of online assessments.

CBT is not new. At PSI, we are highly practiced in the transition to CBT. We are experts in the delivery of CBT. And we know what to expect.

A brief *history* of CBT



What are the *benefits* of Computer Based Testing?

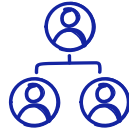


For more information read:

**Online
proctoring**



For *organizations*



- ▶ Secure testing
- ▶ Cost effective
- ▶ Flexible capacity to scale-up testing capabilities
- ▶ Greater geographical reach
- ▶ Streamlined test admin process
- ▶ Program differentiation
- ▶ Wide range of auto-marked item types

For *test takers*



- ▶ Convenient locations
- ▶ Flexible timing
- ▶ Increased choices for testing location, including home testing
- ▶ Potential for bring your own device (BYOD)
- ▶ Accessible
- ▶ Private
- ▶ Immediate results

A bit more about...

Security

Test security remains a perceived barrier for some organizations considering the move to CBT. These might be small or medium-sized organizations with stringent test-security requirements and limited budgets, as well as bigger organizations with large-scale, high-stakes programs.

For most organizations, the first step is a move to CBT in test centers, but advances in online proctoring have dramatically increased our ability to deliver secure online assessments. There are two options depending on your security needs:



Live online proctoring - a highly secure method of test delivery. No specialized hardware is needed and live online proctoring can take place on most devices with an internet connection, microphone and camera.



Record & review proctoring - ideal for organizations looking to increase test security, particularly those moving from non-invigilated tests. Record & review is suitable for low or medium-stakes testing, as well as a significant step up in security from an un-proctored test environment.

As well as developments in online proctoring, technological advances have improved our ability to deliver secure computer based testing, including features such as:

- ▶ ID checks, including multiple layers of identity verification
- ▶ Limiting item exposure, for instance through multiple test forms
- ▶ Varying test content, including Linear on the Fly Test (LOFT) that draws from an item pool to create a unique set of items for each test taker
- ▶ Data forensics
- ▶ Lockdown browser where test takers cannot access the internet, email, or other applications until the test is complete



For more information read:

**The future
of test security** ↗

A bit more about...

Flexibility & accessibility



On-demand testing in more convenient locations on specific days, the ability to take some tests at home, reduced travel, or lack of travel - all of these factors provide greater flexibility for test takers. Tests can be scheduled to fit around working life, study, caring responsibilities, and the complexities of modern life in general.

While being convenient for test takers, CBT can also increase the reach, market and revenue opportunities for organizations - and flexibility isn't only a benefit for test takers. With CBT, organizations are better able to scale up and scale down testing as needed. This is particularly relevant when it comes to large-scale testing programs, as well as multi-modal delivery options with online proctoring.

CBT also provides the opportunity to make adaptations for test takers in a less intrusive way. When individuals need more time to take a test for example, they aren't singled out for different treatment in a public setting, which may increase test anxiety.

A bit more about...

Data security & privacy



Data security and personal privacy are common concerns with computer based testing across all modes of delivery, but particularly where online proctoring is used. Transparent policies, clearly communicated and underpinned by effective data security technology are essential to reassure test takers.

You need to demonstrate that any test taker data captured is relevant to the test, proportionate to the risk, taken with consent, and lawful. Notably for international learners, you need to be certain that the test terms and conditions do not contravene local data laws. Data retention policies should also be clearly stated, for instance, at PSI we believe it is optimal for personal data to be held for a period of 90 days following the test.

In the case of online proctored tests delivered via BYOD, there is the additional concern of proctors having access to the test taker device. To address this, we use a secure lockdown browser that prevents the use of proscribed applications or internet access, and therefore protects the integrity of the test. This will never require remote access to a test taker's computer and removes any risk that a proctor could access sensitive information during security checks.





**"Transparent policies,
clearly communicated and
underpinned by effective
data security technology."**

What are the most common *concerns* about Computer Based Testing (CBT)?



Is ***CBT*** secure?

Yes. With the application of new technology - such as Linear on the Fly Test (LOFT) and lockdown browsers - CBT is often more secure than paper based testing.

With the technical solutions that allow you to easily change item selection and option order, rather than the fixed forms used in PBT, cheating is a lot more difficult. A computer is far better able than any human to truly randomize question and answer options in a test.

Additionally, with no need to ship test papers around the country, there's significantly less risk of physical security breaches and pre-knowledge with CBT than PBT.

Is **CBT** expensive?

Depending on the approach, the cost of CBT can be more or less than the cost of paper based testing. Particularly after initial set-up costs, savings can be found through either reduced item or test production costs, for example.

The ability to randomize test content automatically with CBT makes it much more cost effective than the work associated with manually creating alternate versions. Particularly useful when your test taker base is large and test content must be varied or changed regularly to ensure security.

In addition, many cost analyses fail to account for test taker opportunity costs associated with delays in testing, and the effects these delays have on the test taker's ability to pursue career or educational opportunities. For example, if a paper-and-pencil test is offered at a limited number of test locations on two annual test dates, test takers may incur high travel costs and forgo opportunities as a result of limited access to the test.



"Cost savings can be found through either reduced item or test production costs."

Will CBT limit my options when it comes to *item types*?

No. CBT overcomes the limitations associated with the automated marking of PBT, which typically demands multiple choice bubble answer sheets.

The move to CBT unlocks far more choice when it comes to item types. For example, answer matching/ ordering and fill-in-the-blank, as well as media-based formats such as drag-and-drop, image hot spots and reaction items.

More advanced option such as in-application software tasks and situational judgement questions facilitate performance-based testing, meaning that test takers can actually show you what they would do in a certain scenarios, rather than just tell you. This creates a more realistic testing environment with better assessment of the skills needed to be effective.



"A study of German medical school students found that test results from paper and computer versions did not differ."ⁱⁱ

Is the move to CBT *positive for test takers*?

The use of CBT is proven to reduce test anxiety in test takers. With more test dates available, for instance, there is less pressure to take a test when you are unwell or not performing at your best.

With a small number of test dates to choose from, more people are likely to know that you are taking a test. Reducing this visibility reduces anxiety levels. Equally, the need to travel long distances or fly can affect both anxiety and performance. And anyone who has sat a test in a packed exam hall knows that the pressure can be immense.

Does CBT affect *test performance*?

No. In multiple studies, test scores are consistent between CBT and PBT.ⁱ

A study of German medical school students, for example, found that test results from paper and computer versions did not differ. With students using the computer version needing significantly less time to complete the test. ⁱⁱ

CBT is shown to increase test takers' self-efficacy and motivation, stimulating participants to answer a CBT post-test with higher concentration (though importantly, not higher scores). ⁱⁱⁱ

Factoring in *cultural* differences



A bit more about... CBT in different geographies

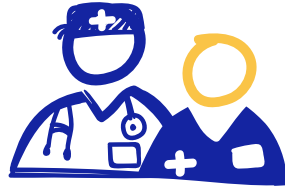
Historically, PBT has been seen to carry more weight and lend gravity to a credential - and in some parts of the world there remains a prestige associated with paper based tests.

With the expansion of CBT, this perception is changing fast. Test takers value the convenience and flexibility of CBT, and are starting to perceive organizations still using PBT as falling behind. These organizations are starting to open up and see that there is a better way.

However, for organizations that do wish to adopt both CBT and PBT, it is possible to develop a dual delivery program that effectively uses both modalities.

A bit more about...

CBT in different professions



Similarly, in more traditional professions, such as law for example, there can be a greater reticence to make the move to CBT. Again, this is likely to be based on the historic prestige of PBT, as well as a desire to stick to more traditional methods.

Up-and-coming test takers in these professions, particularly those who are digital natives, are starting to question this. Organizations that represent these professions will need to adapt to stay current and relevant with their market.







A bit more about...

CBT in different generations



Test takers across all generations are accustomed to using technology in everyday life, from smartphones and tablets to self-service machines in the grocery store. Equally, with so much more learning completed online, and educational resources becoming more digital from primary education to CPD, expectations have changed.

However, any concerns about digital literacy in specific groups - whether it's generation, profession, or nationality - should be addressed with:



Clear communication and detailed instructions

With online tutorials and a well-publicized helpline to reduce any potential impact on outcomes resulting from any digital divide.



Access to practice tests

To increase familiarity with the testing environment and substantially decrease test anxiety.



The latest technology

To ensure that the registration and testing process is as simple and seamless as possible.

Did you *know*?

1.

Read errors

It's very common for test takers to misalign the question sheet and their answer sheet with PBT. It just doesn't happen with CBT.



2.

Multiple-Choice and Multiple-Response

Delivering and scoring alternative item types is far easier with CBT. It is less confusing for test takers using CBT to respond to alternative item types than with a typical bubble answer sheet used in PBT. Furthermore, certain item types, like hot spots where a test taker clicks on a section of an image, are simply not possible with a bubble sheet.

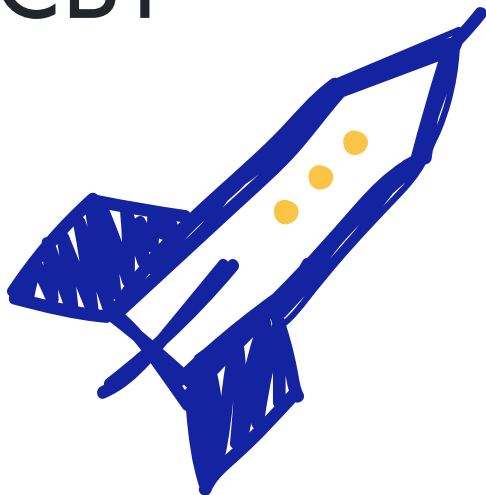
3.

Internet connectivity, computer access, and dual delivery

Where a test center environment is preferred, but more flexibility is required for test takers in remote locations, dual delivery is an option. This might involve test centers alongside home testing options, with live online proctoring.



The *future* of CBT



Artificial Intelligence (AI) and biometrics

AI is already being utilized in CBT to assist with ID authentication, aid in identifying suspicious behavior, and flag irregularities through data forensics. Voice recognition capabilities using AI are also improving, with the potential to increase accessibility by allowing test takers to take tests using voice only.



Multimedia

Testing that requires the use of images is far more cost-effective and consistent with CBT than printing and collating test papers, and this capability is extended with the introduction of video and audio elements. There are exciting opportunities ahead for delivering content using tools such as Virtual Reality headsets.

Alternative item types also include hot spots (clicking on an image to identify responses), drag-and-drop (including matching and sorting) and multiple choice multiple response questions (where more than one option must be selected).



Online proctoring

Developments in online proctoring allow you to be flexible, offer convenient scheduling and deliver strong support services. And COVID-19 has taught us that it is possible to effectively move to CBT side by side with online proctoring and move quickly.

We're also developing accommodations to improve accessibility with online proctoring. There is huge potential in using assistive software, such as speech-to-text or text-to-speech, or other accommodations within the test platform to support individuals with specific requirements.

In conclusion...

Testing has changed a lot during its history but the reasons for adopting CBT have remained the same for decades - fair and reliable testing delivered at scale.

The reservations of organizations who either partly or solely use PBT have been addressed in this booklet, and they should not be ignored. As with any change, the move from PBT to CBT must be managed carefully and communicated clearly. All of your users and administrators need to be comfortable with the move, and a high level of expertise is required to ensure the validity and integrity of your tests is maintained.

With best practice in place, it is possible for any organization, regardless of size and number of test takers, to make the move to CBT.





"With best practice in place, it is possible for any organization, regardless of size and number of test takers, to make the move to CBT."



Case study

Improving the scalability, security and availability of ISACA certification test delivery

Challenge

With 166,000+ certification holders and 140,000+ members in more than 180 countries, ISACA knew that its paper based testing model was outmoded. And that they needed to modernize and upgrade test delivery to CBT.



166,000+
certification holders

Outcome

PSI's innovative solutions, ability to provide services on demand, level of support, and high standards of security in item development and test delivery sum up why ISACA decided to partner with PSI.

Today, PSI provides multi-modal test administration (computer based/test center, online proctored), as well as test development, psychometric services including job analysis and standard setting for ISACA.

Results



Over 86%

of test takers rated the **location** Excellent or Good



Over 88%

rated the **scheduling process** Excellent or Good



88%

rated the **Candidate Information Guide** Excellent or Good



Over 86%

rated the **computer testing system** Excellent or Good



Over 90%

felt the **exam date and time** were Excellent or Good



90%

rated the **tutorial** Excellent or Good



Your trusted **testing partner**

Every day our clients support millions of people to realize their dreams, reach their potential, and improve their life chances. They care about their test takers – and we share that responsibility.

Our unwavering focus is on delivering frictionless and fair test taker experiences, without compromising test integrity, through...

Secure test delivery

- ▶ Authorized global **test center** network.
- ▶ Secure and scalable **remote testing** Live and Record & Review **online proctoring**.
- ▶ Flexible **multi-modal** test delivery.
- ▶ Testing **windows or continuous testing** on-demand.

Rigorous test development

- ▶ Legally defensible and **valid test content**.
- ▶ **Job analysis** and **test** content specification.
- ▶ **Subject Matter Expert** (SME) recruitment, training and management.
- ▶ Secure **item authoring, banking and test generation** software.

Expertise in testing science

- ▶ Experienced **psychometricians**.
- ▶ Specialist **test developers**.
- ▶ **Data forensics** and web crawling.

Our willingness to listen and adapt means clients can either benefit from a full testing service, or access solutions at any stage of their testing journey.

Dreams deserve

We understand every test is about more than the result. It's about a dream. A dream the test taker believes is worth striving for. And we believe that too. Their dreams deserve trusted science, technology and operational expertise. They deserve PSI.



PSI Dimensions™ In PSI Dimensions test taker portal, the entire process is streamlined for your test takers. From single sign-on and test booking to accessing support, managing tests and receiving results. By making test booking and management simple you don't just deliver an exceptional test taker experience, you also retain more people during the process. More tests booked, more tests completed. Your tests takers come back and new test takers are attracted by your enhanced reputation. Fully customizable, the test taker portal supports your testing programs – and your organization – to succeed and grow.



The PSI Bridge™ platform provides superior online proctoring - from customizable test security, identity authentication and multi-modal delivery, to custom reports and analytics. PSI Bridge™ works seamlessly with any test delivery system and supports every phase of assessment - from creation to results review.



24/7 test scheduling online and by phone. Test takers can select a convenient testing appointment, reschedule or cancel a test up to 48 hours before their desired start time.

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