



Frequently Asked Questions

What is the Qualcomm Tricorder X PRIZE competition?

The Qualcomm Tricorder X PRIZE is a \$10 million global competition where teams will compete to develop solutions capable of diagnosing a set of 15 conditions and capturing metrics for health. Conditions include common ailments and costly diseases, and range from strep throat to sleep apnea to colon cancer. Ultimately, this tool will measure and individual's health state through a plethora of wireless sensors, imaging technologies, and portable, non-invasive laboratory replacements. Ongoing measurement will enable collection of large volumes of data, enabling powerful computer algorithms combined with artificial intelligence to see patterns of sickness and health not previously possible.

Given that each team will approach the design and functionality of their individual solution uniquely, the physical appearance and functionality may vary immensely from team to team.

The competition actively avoids presupposing what the eventual winning design may entail. It is expected that teams will leverage existing mobile technologies to meet consumer preferences. This will be important because an important part of the final round of competition will be evaluating the user's experience. The only limit on a team's solution is that the mass of its system and components together is no greater than 5 pounds. Additionally, teams are expected to follow guidelines and protocols that help ensure that consumer safety is held in the highest regard. This includes avoiding harm from electrical energy, thermal energy, chemical exposures, needles, lancets, and infection.

The limitations set by this competition will force teams to make choices. Teams will have to consider such tradeoffs between weight, functionality, power requirements, battery life, screen resolution, artificial intelligence engine hosting and/or location, diagnosis capability, end consumer cost, and so on.

Beyond the weight requirement, there is no limit as to how many discrete components constitute a team's solution. For example, teams may use sensors that are attached to a phone-like control unit, worn by the consumer, or kept apart and reserved for occasional use or home monitoring. Similarly, teams may create a tool that has a large screen, a small screen, or perhaps even no screen (audio only).

The winner of the competition is expected to be the best combination of diagnostic technology and consumer preference.

Questions About The Need For the Qualcomm Tricorder X PRIZE

What is “de-skilling?”

De-skilling is the use of technology to measure a person’s health state so that diseases can be reliably made—meaning the basis for the diagnosis can be quantified, replicated and therefore be made with certainty. This contrasts with traditional diagnoses made by trained humans (doctors), which requires the limited resources of a skilled professional with years of expertise.

De-skilling is the process of taking a skill dependent on human expertise and replacing it with technology derived expertise.

Why is diagnosis the focus, and why is this important? Shouldn’t we be trying to cure diseases?

Diagnosis is usually the first step in healthcare. Once a diagnosis can be confirmed, therapy or treatment (including the appropriate drugs) can then follow. Unclear or imprecise diagnosis can result in ineffective therapy, since it could be treating the wrong disease.

Is empowerment the goal?

The Qualcomm Tricorder X PRIZE will empower, however, it will also go beyond empowerment – it will take the responsibility for success off the consumer and put it on the designer/manufacturer. It is the manufacturer’s job to make consumers want and want to use this device– in the same way it’s any manufacturer’s job to make you want and want to use any other product or service. If consumers don’t adopt and want to use the tool it’s certainly not their fault. Simply making information available to consumers is not expected to invoke any action.

So the main benefit is providing a lot of information, easily?

The Qualcomm Tricorder X PRIZE goes miles beyond just pumping out information never before available to the consumer. Health information must be understandable and presented in a format consumers like, understand and accept. If it looks like a computer programming report (i.e. like a laboratory report today) consumers are likely to reject the information.

Understandable and convenient accessibility to care is a reason for individuals to take earlier actions for health—before they are seriously ill.

Will the Qualcomm Tricorder X PRIZE solution manage electronic health records?

Cloud technology will be used to electronically collect, process/analyze and store information. However, the system is not meant to hold all of a consumer’s electronic health records (EHRs). Future versions are expected to have expanded functionality and could include EHR management.

Will the solution be as good as telemedicine?

The Qualcomm Tricorder X PRIZE will go beyond telemedicine. Telemedicine is passive in that it sends patient data more easily to the doctor so the doctor can better diagnose and manage the patient. Team systems will enable a consumer to be an active participant in their own health, and provides the information to them directly so they can determine the next steps and actions in their care.

Is gaming the primary means to get consumer motivation?

Gaming is one of many means to making the Qualcomm Tricorder X PRIZE solution engaging and interesting to consumers. Other means include links to social and support networks, where

people of similar profiles with similar disease/health states can compare themselves, as well as other mechanisms for entertainment, and crowd sourcing (a form of social network).

In the 3.5 years of the competition, electronic games as a means to encourage health will become more accepted. We expect teams to be leaders in this area due to the true consumer perspective required in the competition. Other means to engage consumers will emerge; teams will be recognized and rewarded for innovation and excellence in this area.

Can kids use the Qualcomm Tricorder X PRIZE?

Our target audience is early adopting consumers aged 25-65. However any consumer would be able to use the device. Kids are early adopters of technology and may be able to understand the information provided by a user-friendly system.

Questions About The Qualcomm Tricorder X PRIZE Solution

What will the Qualcomm Tricorder X PRIZE solution actually do?

The system will diagnose diseases, measure vital signs, and assess health state (both sickness and wellness) through single point-in-time as well as ongoing measurement. Teams will decide which technologies are integrated and how the diagnoses will be made.

If the system can diagnose strep throat, can it also prescribe my antibiotic?

Future versions will target a more mainstream audience in more countries, and will have expanded capabilities that could include prescribing drugs and other therapies for the conditions diagnosed. This more inclusive functionality is desirable to consumers but is not required for this first version of the device.

What technology is needed to build a Qualcomm Tricorder X PRIZE?

Teams are completely free to create a solution consisting of any combination of technologies. Among the technologies expected to be used are artificial intelligence, wireless sensing, rapid PCR, lab-on-a-chip, cloud computing and consumer entertainment technologies. Limitations on these solutions would involve safety and legally permissible considerations, as well as consumer privacy preferences.

Doesn't a lot of this technology already exist?

Yes, some of the technology exists today in some form. However, the Qualcomm Tricorder X PRIZE solution will pull these technology and user preferences together in one seamless, integrated system. This solution will also advance the sensing component of technology in different ways: smaller/lighter, cheaper, faster, better and truly never before seen, new technology. Integration involving this large amount of different components and disciplines is expected to be challenging, and is not available in today's systems.

Is the Qualcomm Tricorder X PRIZE an app?

It will be portable and may be presented or used on a cell phone similar to a mobile app, but the underlying technology goes moves into a new frontier by leveraging the capabilities of artificial intelligence and wireless sensors. This means that the information and diagnosis provided by a Qualcomm Tricorder X PRIZE is not a general; it will be actual diagnostic and health measures of a specific individual. On a portable device the interface with the consumer may look like an app; you just won't be able to see the innovative "engine" behind it.

Do the sensors have to be wireless?

No, there are no specifications as to how health data is collected. However due to consumer experience requirements it's unlikely that cumbersome and ugly wired sensors will be deemed acceptable by users.

Can the sensors be invasive? What is meant by "invasive?"

There is no requirement or limit on sensing; the X PRIZE Foundation defines the problems facing humanity and let teams create innovative, pioneering, and new solutions. "Invasive" means a device punctures the skin. For example, drawing blood is invasive but the accelerometer in your mobile phone is non-invasive. The competition does allow invasive measurement but it's unlikely it would be acceptable to a user, particularly if another team was able to develop a non-invasive method.

What is the difference between sensors and sensing? What is "sensing?"

Sensors are generally physical hardware. These are often used to collect health metrics and data about a person. The sensor can collect data for a short or long period of time. Sensing is the process of taking the data and interpreting it for patterns with complex software programs called algorithms.

Where will the sensors be located?

Teams determine which sensors and how many will be used in their Qualcomm Tricorder X PRIZE solution. Sensors can be worn on-body, can be placed near the consumer, can be in the consumer's environment, or anywhere else determined by the team to be feasible.

What is artificial intelligence and how is it used in the Qualcomm Tricorder X PRIZE?

Artificial intelligence or "AI" is the use of computers (machines) to think in place of humans. AI is a powerful tool that has been shown to exceed human capabilities in many cases. AI will be likely be used by teams to arrive at a diagnosis. AI can use a large database as its main source of information (such as every medical paper ever published, or the entire Gray's Anatomy). AI can also use information input by consumers such as age, gender, and a description of health state or symptoms. Either or both AI and sensor data can be used to arrive at a diagnosis.

How do the solutions actually make a diagnosis?

Each team can decide how this happens. However one way will be for the device to collect information from two sources to make a diagnosis: consumer metrics from sensing or other technology, plus information and responses from consumers to questions generated by the AI engine in the device. Each system's algorithm software will analyze this information and data patterns to determine the diagnosis.

Does the Qualcomm Tricorder X PRIZE solution replace an annual check up? It it meant for this once-a-year purpose?

It can, but this is expected to be much more than something you pull out of the drawer once a year. We are just starting to capture the power of health data measured on an ongoing basis. For example laboratory accuracy might be higher, but the lab only measures one time at one instant of a day, while a wireless sensor may be reading your health metrics for 6 consecutive days. In 6 days you'd know a vast amount more about your patterns, both normal and abnormal, than one point in time. This continuous data will be the means to see sickness and health, and

together with usability and convenience, individuals are expected to do “check ups” more frequently.

Is main feature is accuracy? Is this as accurate as a laboratory?

The main feature is not accuracy. In fact, we believe the solution needs to be accurate enough to ensure confidence and trust; it may or may not equal a gold standard laboratory result. Note that labs aren't 100% accurate, sensitive or specific; currently only 55% of people receive the correct screening, diagnoses, or treatment. The winner of the competition will be the teams that most reliably diagnose at set of diseases while providing the best consumer user experience.

Qualcomm Tricorder X PRIZE Market Questions

Who is the target audience?

The primary users are expected to be early adopter consumers age 25-65 who use a smartphone. The primary focus for teams is private industry, government and academic research centers, and individuals with knowledge/expertise in some component of the system's technology.

How much will it cost?

The competition leaves this business decision, as well as the decision to commercialize (or sell or license) up to each team. The competition is meant to demonstrate proof-of-concept. Teams own all of their intellectual property and rights related to their Qualcomm Tricorder X PRIZE solution.

Will insurance pay for the system?

This is a business decision that teams are free to make. Teams decide if the device will be sold to consumers in the same way an iPad or GPS system (cash payment), or if they will go through the process of getting insurance companies to pay.

When can I buy one in 3.5 years when the competition ends?

After 3.5 years the winners will be determined. At that time teams will each be able to decide when to pursue commercialization and how their device would be sold.

Who are the competitors to the Qualcomm Tricorder X PRIZE?

Today, there are no integrated mobile consumer devices that diagnose diseases and measure health state on an ongoing basis using wireless technology. This device is expected to create a new market by filling this market need.

How big is the market for a Qualcomm Tricorder X PRIZE solution?

For this first version of the solution, the market in the U.S. is expected consist mainly of early adopter consumers age 25-65 who use smartphones. Given the demand for both greater healthcare access and mobile consumer technology, this market is expected to grow rapidly. The global market for this type of solution is also expected to grow in the near future.

Qualcomm Tricorder X PRIZE Competition Questions

Will the competition use judges or measurement?

In the Qualifying Round of the competition, the X PRIZE judging panel will assess teams against the criteria for this round to determine the finalists. Criteria include a controlled demonstration of sensor performance for a subset of the conditions required in the Final Round. In addition, judges will evaluate teams' supporting studies, multimedia, prototypes, and proposed solution plans.

Users will wear, use and complete a comprehensive evaluation of the system. A scoring system that awards points for correct diagnosis and deducts points for incorrect diagnosis will be used in the Final Round. Correct diagnosis will be determined by comparing an individual's laboratory results and physician's evaluation to each system's diagnosis. The laboratory test and physician evaluation are used as today's "gold standard" and will be considered the correct answer.

The 5 teams that advance in the Final Round will those that provide the best user experience as determined by the evaluation of users themselves. Of these 5 teams that advance, the teams with the highest diagnostic scores will be eligible for purse prizes (see Competition Guidelines for complete requirements).

How many rounds of competition will be held?

The Qualifying Round will be held approximately Q1 to Q2 in 2014. Up to 10 finalist teams will advance.

The Final Round will be held approximately Q1 to Q2 in 2015. All teams will participate in a consumer usage and evaluation phase, and after this 5 teams will advance.

Which diseases must be diagnosed?

Teams must demonstrate the capabilities of their Qualcomm Tricorder X PRIZE solution in 3 categories of diseases, plus be able to continuously monitor vital signs. In the Final Round of competition, teams must diagnose all of a core set of diseases/conditions (including absence of disease). Teams must also diagnose a group of diseases/conditions from an elective set of diseases/conditions. For both of these disease sets teams will receive points for correct diagnoses and will have points deducted for incorrect diagnoses. The more points a team accumulates, the higher their overall accuracy. Teams must also capture data for vital signs and upload the information to the cloud in order to advance, as well as meet minimum scores.

How will the correct diagnoses be determined?

Correct diagnosis will be determined by conducting a comprehensive laboratory work-up and an evaluation of the lab results plus patient evaluation by an expert physician panel prior to use of a Qualcomm Tricorder X PRIZE system. The physician panel evaluation (plus lab results) will be used as the "gold standard" similar to how diagnosis is made today, and will be considered the correct answer.

How will user experience be determined?

Consumers will use Qualcomm Tricorder X PRIZE solutions for 3 days and complete a comprehensive evaluation of different aspects of each solution for usability, functionality,

convenience, ease of understanding, amount and depth of information, and particularly the appeal of the device to them.

Is this a global competition?

Yes; teams from around the world are expected to enter and compete in the Qualcomm Tricorder X PRIZE competition. The solutions developed in this competition will be targeted at U.S. consumers, however, we believe that this will pave the way for future versions of the system to be expanded to include consumers in many more countries.

What are the requirements for teams?

Teams will be required to submit a full application to compete, must be approved by the X PRIZE Foundation, must sign the Master Team Agreement, and must pay the entry fees in order to enter. Complete terms and requirements will soon be available on the website, www.QualcommTricorderXPRIZE.org

Is there an entry fee?

Yes, ranges from \$5,000 to \$25,000 per team. Fees will be lower for teams registering earlier in the competition.

What if there is a tie?

Tie breakers will be based on the consumer user experience as specified in the Master Team Agreement.

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