

# DEVELOPING COLLABORATIVE LEARNING AND ENTREPRENEURIAL CLIMATE –TEN YEARS OF ICT SHOWROOM

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## ABSTRACT

More than ten years ago, the Information and Communication Technology (ICT) education units of Turku University of Applied Sciences, University of Turku and Åbo Akademi University aimed at facilitating their faculty to create and develop project-oriented learning activities. The result of this CDIO-inspired initiative was ICT ShowRoom, an annual exhibition and competition event open for all student projects of the campus. Since then, there has been a series of successful ICT ShowRooms; the 10<sup>th</sup> anniversary event takes place in March 2017. The amount of student teams participating the event has grown and the quality of the projects has been clearly improved since the first rounds. Yet much has changed during these years – both in the global and regional education arenas. Different forms of collaborative learning, university-industry activities and startup entrepreneurship facilitation are much more strongly present in higher education than when the first ICT ShowRoom posters were designed. In this paper, we reflect the motivators behind the ICT ShowRoom collaboration and the goals it has aimed at over the years. Also the challenges and possible future directions of the joint venture are discussed. Is the ICT Showroom needed anymore? How does this discussion relate to the CDIO initiative and its future steps?

## KEYWORDS

Entrepreneurship, Capstone, ICT, Design-Build Projects, Student Competitions, Standards: 2, 5, 8, and 9

## INTRODUCTION

Project-oriented courses are important tools for learning core engineering knowledge, skills and attitudes. Getting the opportunity to familiarize oneself in a hands-on fashion with the product and system lifecycle development and deployment is vital for students. This way they develop product and system building skills and get to apply engineering science to practice (Crawley et al., 2007).

More than ten years ago, the ICT education units of Turku University of Applied Sciences, University of Turku and Åbo Akademi University seek joint ways to convince the faculty members and institutional administrators of the importance of creating learning activities of this type. The universities had decided to develop their cooperation by moving the activities of these three ICT units to a single building in 2006. This created a joint campus for students, faculty members and staff of all three departments. The joint campus and the different project-based courses offered by the units led to an initiative by the authors to find a way to promote student projects and, at the same time, to get both students and faculty members to become familiar with each other and the ongoing activities.

The decision was made to launch a joint competition between the student projects that focused not only on technical implementation details but also on the business ideas behind the projects, as well as on the presentation skills of the teams. The result of the brainstorming was the *ICT ShowRoom* – an exhibition and competition open for all student projects of the campus. The intention was to create an event with good spirit and a relaxed atmosphere – but still set up a real competition with an industrial jury and considerable prizes for the winner team. The marketing of the pilot implementation was started in late autumn 2007.

Since then, there has been a series of successful ICT ShowRooms; the 10th anniversary event took place in March 2017. The event has become an integral part of the academic year gathering students, staff and industrial representatives together. The amount of student teams participating in the event has grown and the quality of the projects has clearly improved since the first rounds. The early participants and competition winners have grown to experienced professionals many with entrepreneurial backgrounds. The early development steps and experiences of the ICT ShowRoom event and the different drivers behind it have been reported by Björkqvist, Roslöf and Virtanen (2009, 2012).

Yet much has changed during the years – both in the local, regional and global educational arenas. Different forms of collaborative learning, university-industry activities and startup entrepreneurship facilitation are much more strongly present in higher education than they were at the time when the first ICT ShowRoom took place. For example, the event was originally the only local venue for the students to present their projects to a larger audience including a clear twist of startup spirit. Today, there is a multitude of different student competitions, hackathons and innovation camps available.

In this paper, we reflect the original motivators behind the ICT ShowRoom collaboration and the development towards the goals it aimed at over the years. Also the challenges and possible future directions of the joint venture are discussed. Is the ICT Showroom needed anymore? How does this discussion relate to the CDIO initiative and its future steps?

## **BACKGROUND – ORIGINAL MOTIVATORS**

Åbo Akademi University had for many years had a project course, with the objective of performing a "large scale software project in a group". The challenge was that the students were unmotivated, they did not really see why they should invest a lot of their time in a project that had low visibility and only one or two lecturers as reviewers. In year 2007, the faculty was invited to a presentation event of the projects – immediately the projects attained a completely new level of student commitment. One of the projects of that year is actually a company today.

At the same time, the Information Technology education of three higher education institutions in Turku, Finland, moved under the same roof. The organizations were Åbo Akademi University, University of Turku and Turku University of Applied Sciences. All these institutions had ICT-related project courses facing similar challenges. The basic problem with the courses was the lack of student motivation for doing project work on a regular basis and delivering a final deliverable at the assigned time. Another challenge was that the general curriculums did not include education on project skills. Furthermore, some of the faculty members did not consider these project-based activities very important opportunities for learning.

Inspired by the experiences from the previously mentioned course, and the fact that we had all IT students under the same roof, the idea of a common project exhibition event was formed. Already from the beginning some basic concept where formed, some of which have disappeared and some have remained during the years. The original framework of the concept is illustrated in Figure 1 (Björkqvist, Roslöf and Virtanen, 2009). The basic concept was to invite student projects to a competition and an exhibition. The event was named "ICT ShowRoom", and the first event was held 7 March 2008. In March 2017, the 10 year anniversary event was held.

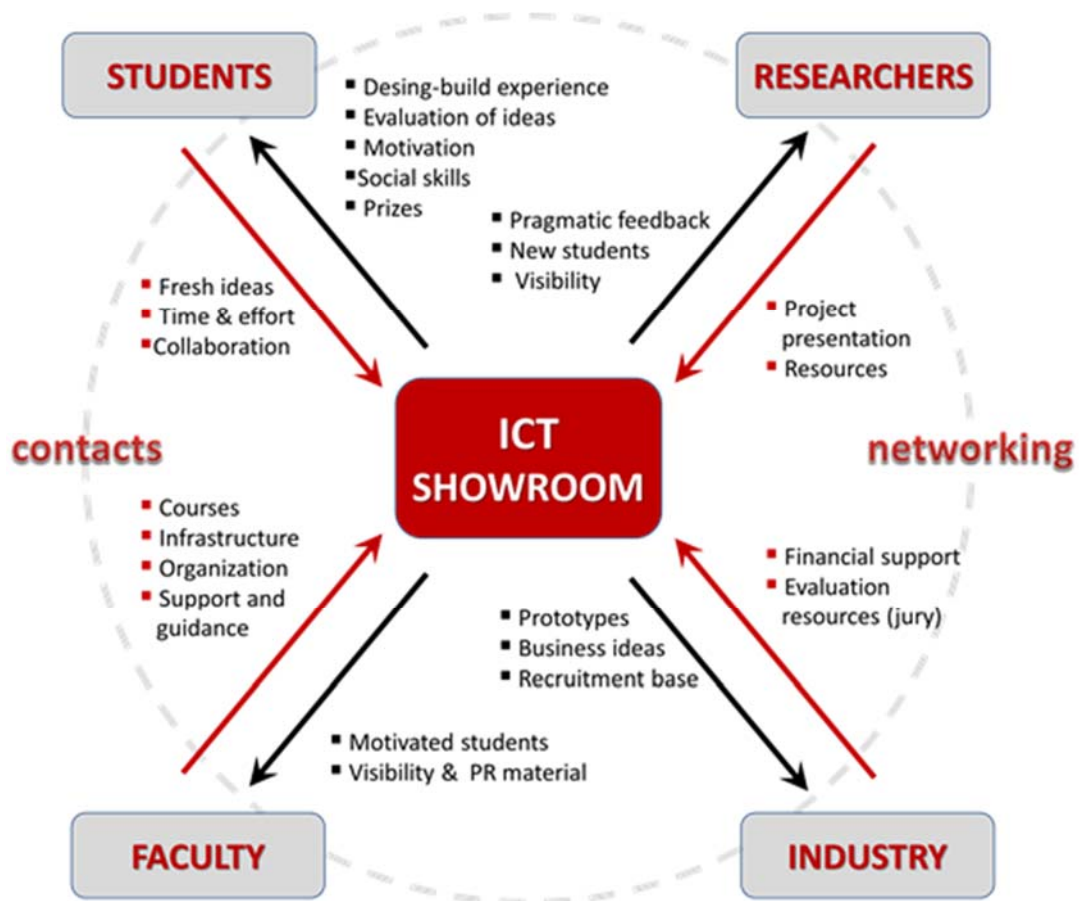


Figure 1. The original ICT ShowRoom concept framework (Björkqvist, Roslöf and Virtanen, 2009).

## ICT SHOWROOM CONCEPT IN A NUTSHELL

In short, the ICT ShowRoom is a one day event during which the local higher education students present their projects made during the past year as a part of coursework. The organizers provide a poster stand and a table for demonstrations. The student projects participate in a competition as part of the event. Although the event itself is rather short, the preparation to the exhibition is a vital part of the concept. The project groups in the participating institutions are informed about the future event early, and they are step by step coached towards the ShowRoom event that forms an important milestone of the projects of the academic year. The registrations to the event are done using a web based system, where the participants in the first stage register the project name, members, abstract and contact information. Later on, the posters are submitted via the same system, and then collectively printed at a print house by the organizers. In addition, a program leaflet and other documentation (team and jury instructions) are prepared in advance.

The ICT ShowRoom day starts before 9 AM with setting up the stands and preparing the demos for the audience and the jury members. The exhibition itself runs four intensive hours from 10 AM until 2 PM during which the event is visited by hundreds of participants – including other students, faculty members and industrial representatives. After the winners have been announced and the exhibition dismantled usually about 3 PM, it is time to head to an "after ShowRoom" party organized by the local student entrepreneurs association.

A group of local industry professionals both act as members in the jury and sponsor the prizes given to the winning team. The jury assesses the technical contribution and quality, commercialization potential and presentation of the student projects. The jury spends two hours in the event familiarizing themselves with the student projects, and discussing the ideas and solutions used in the projects with each student team. The jury members give immediate feedback to the students about their views on the operability and implementation of the project. The event also includes a public voting in which visitors of the event may vote their favourite presentation and technical content. A certificate of appreciation is given to the winning team of each category. One of the voters is randomly picked to win a prize.



Figure 2. Visual image of the ICT ShowRoom 2017.

## EXPERIENCES AND IMPROVEMENTS DURING THE YEARS

In general, already the first ICT ShowRoom event was considered successful and it was decided to be repeated the next academic year. In spring 2017, the 10<sup>th</sup> anniversary ICT ShowRoom took place.

### *Industrial jury*

One of the main ideas in the ICT ShowRoom event is the jury consisting of company representatives. The motivation is that the evaluation of the student project should be based on external judgement. This has shown to be a very successful element in the concept. The fact that faculty members do not participate in the decision making facilitates the mentor-oriented role of the project course teachers; they are 'on the same side with the students'. Also the opportunity (and requirement) to present the projects to potential future employers tends to motivate most of the students to use their full potential.

Also the jury members need to truly focus on the projects in order to be able to present a solid judgement. The jury is free to select the criteria they use, they but should be able to present these criteria to the students in the prize ceremony. During the years, the size of the Jury has remained almost the same, 4-8 persons. The companies represented since the start of the ICT ShowRoom are listed in Table 1. One company has participated in every event: Vaadin (former IT Mill). Vaadin is a major employer of our students.

Table 1. Companies represented in the ICT ShowRoom jury throughout the years.

| 2008   | 2009  | 2010   | 2011  | 2012  |
|--|---|--|---|---|
| <ul style="list-style-type: none"> <li>• Oy IT Mill Ltd</li> <li>• Ixonos Oyj</li> <li>• Nokia Oyj</li> <li>• Teleste Oyj</li> <li>• Turku Science Park</li> </ul> | <ul style="list-style-type: none"> <li>• eCraft</li> <li>• Oy IT Mill Ltd</li> <li>• Sanako Oy</li> <li>• Teleste Oyj</li> <li>• Turku Science Park</li> </ul>  | <ul style="list-style-type: none"> <li>• Oy IT Mill Ltd</li> <li>• Sanako Oy</li> <li>• Sofokus Oy</li> <li>• Teleste Oyj</li> </ul>   | <ul style="list-style-type: none"> <li>• DNA Oy</li> <li>• Ixonos Oyj</li> <li>• Logica</li> <li>• Sanako Oy</li> <li>• Turun seudun ohjelmistoyrittäjät r.y</li> <li>• Vaadin</li> </ul> | <ul style="list-style-type: none"> <li>• Logica</li> <li>• Moosedog</li> <li>• Nokia</li> <li>• Teleste</li> <li>• Vaadin</li> </ul>  |
| 2013   | 2014  | 2015   | 2016  | 2017  |
| <ul style="list-style-type: none"> <li>• Accenture</li> <li>• BoostTurku</li> <li>• ECraft</li> <li>• Hibox</li> <li>• Vaadin</li> </ul>                           | <ul style="list-style-type: none"> <li>• bambuser</li> <li>• BoostTurku</li> <li>• Cerion</li> <li>• Teleste</li> <li>• Vaadin</li> <li>• Walkbase</li> <li>• Varsinais-Suomen IT-yrittäjät ry</li> </ul> | <ul style="list-style-type: none"> <li>• Anders Innovation</li> <li>• BoostTurku</li> <li>• Cerion</li> <li>• Crosskey</li> <li>• Nortal</li> <li>• Teleste</li> <li>• Turku Science Park</li> <li>• Vaadin</li> </ul> | <ul style="list-style-type: none"> <li>• BoostTurku</li> <li>• Medbit</li> <li>• Sofokus</li> <li>• Teleste</li> <li>• Vaadin</li> </ul>  | <ul style="list-style-type: none"> <li>• AgentIT</li> <li>• Cadmatic</li> <li>• Progman</li> <li>• Sofokus</li> <li>• Staria</li> <li>• Vaadin</li> <li>• Wapice</li> </ul> |

## Prizes

The idea of the competition has remained to have only a sole winning team. The winner would get a price that is significant enough, is somehow "state of the art", and possibly inspires further engineering experimentation. The prizes are personal for each member of the team. The price has been aimed at 300 € per item, sponsored by the jury members and other industrial participants of the event. The prizes awarded are listed in Table 2. The prizes represents quite well the development of consumer electronics during the past 10 years.

Table 2. Prizes awarded to the winning team's members.

| 2008            | 2009                               | 2010                         | 2011                   | 2012                            |
|-----------------|------------------------------------|------------------------------|------------------------|---------------------------------|
| Nokia 810       | ASUS EEEPC                         | Buffalo                      | Galaxy S Smart         | Nokia Lumia 820                 |
| Internet tablet |                                    | Linkstation Duo              | Phone                  | Phone                           |
| 2013            | 2014                               | 2015                         | 2016                   | 2017                            |
| Nexus 7 tablet  | Bose<br>QuietComfort<br>headphones | Bower&Wilkins<br>T7 Speakers | Parrot AR.Drone<br>2.0 | Suunto Traverse<br>sports watch |

## Trends in the projects

During the years, we have collected titles, abstracts and posters of all the projects. Since 2015 we have also collected information on project type (technology used) and domain (business area targeted). From that information, we can directly derive some quantitative data, but also some qualitative data can be obtained. In Table 3, data for number of projects, number of people in the teams and number of companies represented are shown.

Table 3. Quantitative trends

|                        | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------------|------|------|------|------|------|------|------|------|------|------|
| # Projects             | 27   | 24   | 27   | 30   | 31   | 33   | 69   | 66   | 49   | 53   |
| # Research projects    | 15   | 14   | 10   | 12   | 8    | 10   | 7    | 0    | 0    | 0    |
| # Student participants | 174  | 135  | 163  | 167  | 134  | 189  | 374  | 358  | 268  | 317  |
| # Companies            | 5    | 8    | 13   | 13   | 11   | 10   | 9    | 9    | 8    | 9    |

During the ten years more than 2000 people have been involved in working on and presenting projects in ICT ShowRoom. This has, for sure, had some effect on the attitude to the ICT project work in the region. During the same time we have also seen a major change in the start-up culture in Turku, as in the rest of Finland. BoostTurku (<http://boostturku.com/>), a student startup society, gained momentum in 2011, with the event *Summer of Startups*. This was later rebranded to *Startup Journey*. The City of Turku, reorganized their startup-supporting activities into SparkUp (<http://www.sparkup.fi/en>), which today provides facilities for both staff supporting startups and the activities of BoostTurku. ICT ShowRoom has always been closely working together with BoostTurku and SparkUp.

From Table 3, we can see that the largest number of participating companies and organizations was during years 2010-2011. The number of companies sponsoring the events has been depending on the activity of the organizers, as participation in events like ICT ShowRoom is much driven by personal contacts. However, we also see a clear connection with the need for recruitment in companies and their involvement in ICT ShowRoom. Since

2015, the teams have classified their projects into technology and business domain. In Tables 4 and 5 the data is shown. Please note that the students can report the same project to several technologies/domains, hence sums of percentages are over 100.

Table 4. Reported technology used in projects (percentage of all projects that year).

|                  | 2015 (%) | 2016 (%) | 2017 (%) |
|------------------|----------|----------|----------|
| Cloud            | 2        | 4        | 1        |
| Desktop          | 41       | 35       | 26       |
| Embedded systems | 6        | 14       | 12       |
| Hardware         | 5        | 6        | 9        |
| IoT              | 3        | 8        | 5        |
| Mobile           | 56       | 47       | 26       |
| Web              | 35       | 37       | 20       |

Table 5. Reported domain of project (percentage of all projects that year).

|                         | 2015 (%) | 2016 (%) | 2017 (%) |
|-------------------------|----------|----------|----------|
| Business administration | 3        | 2        | 4        |
| Communication           | 3        | 8        | 8        |
| Education               | 15       | 31       | 17       |
| Games & entertainment   | 61       | 53       | 37       |
| Healthcare              | 20       | 18       | 9        |
| Infrastructure service  | 8        | 14       | 6        |
| Public service          | 11       | 20       | 8        |
| Sustainable development | 5        | 2        | 4        |
| Other                   | 12       | 16       | 8        |

We see that most projects are aimed for desktop, mobile and web, with similar figures for each year. During the years, there has been some technological changes in the environment. As iPhone was released in 2007, there has always been a number of apps targeting mobile phones. However, since Android has gained market shares, and today Android phones are very common among students, mobile apps today mainly target Android devices. Games & entertainment applications have been most popular in years 2015-2017, and this is similar to earlier years. However, it is worth mentioning that a game has not won ICT ShowRoom since the very first year. Even though it is not clear from the data, there has been an increase in the number of projects connected to topics in healthcare and education.

Table 6. Winners of ICT ShowRoom

|             |   |             |   |
|-------------|---|-------------|---|
| <b>2008</b> | Men vs. Women Quiz - A Facebook trivia application      | <b>2013</b> | Remote Alert Project - simple sense-and-report system             |
| <b>2009</b> | MOOR - system for handling orders in a restaurant       | <b>2014</b> | WHISPR - anonymous location based messaging app                   |
| <b>2010</b> | Signbook - International sign language video dictionary | <b>2015</b> | Celia Dyslexia - application that helps you identify dyslexia     |
| <b>2011</b> | Green Fus - follow-up system for alternative energy     | <b>2016</b> | Escflow - Food waste monitoring system                            |
| <b>2012</b> | Chilly Framework - versatile game development framework | <b>2017</b> | Kill the DJ - voting system for background music in public places |

In Table 6 the winners are listed. As organizers of the ICT Showroom event, having the opportunity to follow the work of the Jury, supported by the list of winners, we argue that what matters for attaining the interest of the jury is to do good solid work on a theme that inspires the students. Projects that have a logical role in the society and local environment also have an advantage. When it comes to quality of projects, we can generally see a solid improvement, and even more clearly, the quality of the presentation of the projects has improved significantly. The last two years, almost all projects have had good and clear presentation and demonstration at the ICT ShowRoom event.

### ***Improvements and challenges***

The original idea was that the research projects of the participating departments would be presented at the ICT ShowRoom exhibition as well (outside the student project competition). The motivation behind this was to improve the visibility of the state-of-the-art research topics among the students and, accordingly, make the research staff more aware of the students' achievements. However, this did not function very well. Despite extensive "internal marketing efforts" only a few research groups joined the event and, even if they did, they often just brought their posters on the wall and were not actively present at the event. Thus, the research project track was eventually removed from the event in 2015.

Every year, one of the goals has been to also attract local media to join the event and publish stories presenting the student projects. The results have varied significantly between the years. In some years there have been nice reports with photos in the main regional newspaper and news flashes in the local cable TV and radio stations meeting or even exceeding the visibility goals. Yet, some other times the event has received, in practice, no media coverage at all. The reason for this variation remains unclear; the process (press releases supported by the organizing institutions' media departments) has remained rather similar throughout the years. University internal media has noticed the event and the annual results nicely every year and the event seems to have found a well known place in the annual event calendar.

All the ten ICT ShowRoom events have been organized in the same premises. The ICT-City building that was originally built as the joint base of the higher ICT education of the city of Turku (previously called ICT House) has served as the venue from the very beginning. The practical arrangements have been smooth, usually just implementing small improvements each year based on the previous experiences. However, the ICT departments of the University of Turku and the Åbo Akademi University moved to another building recently and thus the original idea of a common arena for all the organizing departments is no longer present. The 10<sup>th</sup> anniversary event was still decided to take place in the traditional venue but this may change in the future.

As discussed above, the presence of the industrial participants is an important part of the event. The registration fees are used to cover the prizes and most of the direct organizing costs and, most significantly, the contribution of the industrial jury is a vital part of the concept. The amount of participating companies has varied from year to year (see Table 3) and sometimes it has required a lot of efforts to get enough companies to join. As one of the main motivators behind the companies' participation is recruitment needs, the economical situation of the region and its ICT-oriented businesses reflects the interests in the event.





Figure 3. Jury members discussing with a student project team at the ICT ShowRoom 2014.

### **THE FUTURE OF THE ICT SHOWROOM – WHAT NEXT?**

Since the very first ICT ShowRoom event, the environment has changed significantly. One of the original drivers behind the event was to facilitate the opportunities and importance of project-based learning and, not to forget, to boost entrepreneurial attitude among the ICT students. Today, the different organizations, including all the higher education institutions, are more start-up friendly than ever. There are several support functions available for entrepreneurship-minded students and, one could say, it is much easier to be driven into the start-up world than it was for ten years ago.

Also the world of project-based learning has changed a lot. Opinions judging industrially-oriented project courses as a waste of time are very rarely present at the university halls anymore. On the other hand, the scene is full of all types of project competitions, seminars, hackathons, game jams and innovation races. One could argue that participating in these types of events have become mainstream – or maybe even "old school" already. Has the ICT ShowRoom event served its purpose already? Yet, the event has become an integral part of the academic year of the ICT departments and the strengths are still valid. Project deadlines are kept very well, the industrial jury plays its role nicely, and many of the students are prepared to take the next step towards entrepreneurship after gaining some practice on a safer ground first.

So, the story of ICT ShowRoom will most probably continue to its second decade. The concept should still be developed in order to meet the current environment better. For example, there could be more social elements utilized already during the project year facilitating collaborative spirit among the project teams. The use of different social media streams or, for example, short video presentations instead (or supporting) the traditional static posters could be interesting options to consider.

Another challenge is connected to the main title and theme of the event and competition in general. The mission of ICT ShowRoom is to focus on projects in the ICT domain. Yet, this domain is very wide and it tends to connect to other fields faster and deeper than ever. On the other hand, many current project course frameworks do not limit the topics to ICT only but cover multiple disciplines instead. Thus, keeping the event's focus on ICT prevents the participation of some teams in the competition. The project course leaders are forced to find something else for those teams – or they start inventing new competitions with a general multidisciplinary focus. Should ICT ShowRoom take this role of a general student project innovation event; or should it keep its original mission?

## **CONCLUSIONS**

In this paper, ICT ShowRoom, an annual exhibition and competition event open for all ICT-connected student projects in Turku, Finland was presented. The event has been organized and developed for several years already; the 10<sup>th</sup> anniversary ICT ShowRoom took place in March 2017. The development and both the quantitative data and the qualitative analysis on the concept were presented and discussed. In short, the event has become an integral part of the academic year of the participating institutions, and it is well known on the local industrial arena and, especially, on the start-up entrepreneurs' scene.

Yet much has changed during these years both in the global and regional arenas. Different forms of collaborative learning, university-industry activities and startup entrepreneurship facilitation are much more strongly present in higher education than when the first ICT ShowRoom posters were designed more than ten years ago. Different innovation competitions and hackathons are frequently available for students interested in these activities. Even though ICT ShowRoom represents just another local implementation of active and integrated learning, one could argue that the discussion of the past and future development of the event has connections to the path of the CDIO Initiative as well. The once innovative and pioneering concept shall be ready to adapt to the changing environment – as one of the proofs that reaching the original goals are much closer today than they were at the beginning.

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