Tradition and technology is a subject that affects everyone who plays golf, and all of us who have a passion for the game. The following slides will provide an overview of the delicate balance between the advancement of the game and its enduring origins.

We will share background on this deep-rooted and timeless debate and cover the contributing variables to the arrival of the power game. We will also reconcile some of the available facts against perceptions, and discuss Titleist’s views on each of these issues.
The balance between tradition and technology is as old as the game itself. Probably the best example of this deep-rooted debate is the fallout between preeminent club and featherie ball maker, Allan Robertson and his apprentice, Tom Morris, in 1849.

Old Tom’s refusal to renounce the guttie marked the dissolution of his mentor and playing partnership with Allan, and underscores the point that during every era, there are those who resist evolution and change, and those who embrace technology as part of the game’s heritage.
After losing a match to Harry Vardon in 1910, two-time British Open Champion Willie Park Jr., reacted to the rubber-cored wound Haskell ball that pushed the gutta percha off the scene.

He said... “the principal topic of conversation was the standardization of the golf ball. When one sees the first hole, measuring 500 yards, driven with a drive and an iron shot, and 11 years ago, when I made the course, it took two full shots and a pitch to get on the green, it is surely time that something was done to prevent golf courses from being entirely spoilt.”
Tradition AND Technology? Or VERSUS?

“If the carrying power of golf balls is to be still further increased, all our golf courses will be irretrievably ruined as a test of the game....”

*Golf Illustrated* (1910)

The golf ball has been the flash point for emotions about the game’s Traditions and Technologies for the past 160 years.

On the one hand, no single product has democratized the game more than the golf ball. On the other hand there are those who hold the golf ball responsible for whatever ills, real or contrived, the game may be facing.

Since the golf ball cannot defend itself, it has become the golf industry’s convenient “scapegoat.”

**A WHOLE NEW BALL GAME**

**Grand Designs**

Today’s balls show forgiveness is not limited to woods and irons

As players whack it farther, critics bemoan distance

**Double whammy for golf ball**
“The game of golf has three problems: It’s too hard, it’s too expensive and it takes too long. If they dialed the golf ball back it would reduce all those costs. The costs of maintaining the golf course, the cost of land and all those things would be dialed back... there’s only one golf course in this country that is not obsolete to the pros and that’s Augusta National...”


One hundred years later, the argument by anti-technology activists continues.

And it is the golf ball, the orb that flies, that is identified as both the cause of the game’s distance gains and the solution to its “problems.”
The most stringently regulated piece of golf equipment

- Golf balls first regulated in 1921 (weight & size)
- USGA makes changes in weight/size in 1931 & 1932
- Velocity specifications in 1942
- Overall Distance Standard adopted in 1976
- Symmetry standard introduced in 1980
- ODS test tolerance reduced in 1984
- Phase II/ODS and symmetry test implemented in 2003

The line in the sand has been drawn

Yet the golf ball is not allowed to go uncontrollable distances. In fact, it is the most stringently regulated piece of equipment in the game's history.

In 1921, the ball was first regulated for weight and size with changes made again in 1931 and 1932. Titleist entered the golf ball business in 1932, so we have always operated within a regulated environment.
To understand the changes in how the game is played, it’s important to first understand how the game of golf has grown and how the game of golf is now the business of golf.
The Growth of Golf 1950-2018

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(Sources: NGF, SGMA, Sports Marketing Surveys, YANO Research, other local country sources)

In 1950, the beginning of the new decade post World War II, the game finds 8 million golfers playing on 10,000 golf courses with a total discretionary income spend on all things golf experience related of less than $1 billion.

In 1980, with the creation and growth of the western middle class and the growth of golf in Japan, among other variables of period prosperity, the metrics revealed 30 million golfers, over 20,000 golf courses and a total discretionary spend on the aggregate golf experience of $18-$20 billion dollars per year.

Nearly 40 years later, it is no longer just the game of golf. The game of golf has become the business of golf with 55 million golfers, over 33,000 golf courses and some $85-90 billion dollars per year spent on the aggregate golf experience.
The Growth of the Game Invites the Yardage Race

Additional golfers meant a need for additional golf courses.

Additional golf courses required land, capital, developers and architects.

Developers and architects needed a story to market their golf courses.

**Welcome to the Yardage Race Era**
The Yardage Race Era – 1950’s

Oakland Hills renovation, for 1951 U.S. Open, increases course to over 6,900 yards.

In the U.S., President Eisenhower helps democratize the game by playing 800 rounds during his two terms.

New American golf hero Arnold Palmer makes the game exciting to watch and inviting to play.

The arrival of televised golf brings the game into the homes of the newly formed middle class.

Electric and gas golf carts make their first appearance.

And a new term enters the golf course description vernacular - the “Championship” golf course.
In the 1960's, we see the first generation of two-piece construction distance golf balls with durable Surlyn covers.

In 1966, Golf Digest publishes its first golf course listing - America's 200 Toughest Courses - not greatest courses. It is a decision that will influence the industry and golf course design for the next five decades.

Cochran and Strobbs publish the Search for the Perfect Golf Swing, the first empirical and science based effort to understand the combination of the golfer, the golf swing, the golf club and the golf ball to produce the golf shot.

And in the U.S. we see the first sign of golf courses being used to sell real estate with the arrival of Sea Pines Plantation, a golf course centric, master planned community pioneered by developer Charles Fraser.
Golf ball breakthroughs in aerodynamics, fluid mechanics and wind tunnels all lead to another wave of golf ball inventions.

First generation launch monitors allow manufacturers, instructors and players to begin to unravel the mystery of the golf shot launch condition diagnostic.

And near the end of the decade, first generation metalwoods appear with a sense that a major paradigm shift is likely.
Golf course conditioning takes a major leap forward as the first tri-plex mowers are introduced, allowing for more efficient maintenance and lower grass heights.

Improved and upgraded graphite shafts become more firmly established with tour and club professionals, a necessary adoption stage before club heads can become larger and club lengths can become longer.

The decade ends with the controversy over box grooves which on the surface seems to be about the process of investment casting and the product that results but in reality the showdown is more about the ever present tension of golf’s traditions and golf’s technologies.
The oversized driver, first in steel and eventually in titanium, makes the product category a game changer of seismic significance.

Professional game opportunities attract the attention of better athletes, and fitness and conditioning become standard amongst the elite professional population.

Golfer launch condition optimization becomes even more efficient with continued invention and progress of now portable launch monitors.
The introduction of low spin, high performance, solid technology golf balls adds its contribution to the yardage race.

The game’s regulatory bodies, the USGA and R&A, affirm their right to rule the game and preserve the tradition and technology balance with an update to their Statement of Principles.

And the decade comes to a close having witnessed the most activist phase in the near 100 years of formal golf equipment regulation.
When Robert Trent Jones Sr. was commissioned to renovate Oakland Hills CC South - a 1918 original Donald Ross design - in anticipation of the 1951 U.S. Open, the game of golf entered the Yardage Race Era.

Using, for the first time, bulldozers and other earth moving equipment that had been developed to support the war effort, the course is lengthened to 6,930 yards, par is reduced to 70, and 30 to 40 bunkers are added.

A golf course that was once a bounce and roll Parkland architecture is converted to a ball in the air, carry to the green, diabolical design.
Fueling this idea of the Yardage Race Era, Golf Digest publishes its America's 200 Toughest Courses listing with the main criteria being length and difficulty.

75 of the first top 200 Toughest Golf Courses in 1966 were over 7,000 yards including two over 8,000 yards (Dubs Dread/8,101 and Runaway Brook/8,040 yards).

Soon thereafter, golf course owners, developers and architects want their golf course to be made longer and more difficult in order to make the coveted list, and use the recognition for marketing purposes.

The Yardage Race Era is now official.
Land developers saw golf courses as a way to reach the ever increasing middle class. They want both a name designer and diabolical difficulty to justify the steep initiation fee and premium attached to their lot sales or condominium offerings.

Professional players (Palmer, Nicklaus, Player and others) become golf course architects and they promise clients that they will design the most difficult course possible.

“Necessity is the Mother of Invention” (Plato) and nowhere is this more true than the golf industry’s reaction to the Yardage Race Era. Players at all levels need and want more distance so it’s no surprise that technology would evolve to satisfy this need.

The Yardage Race Era begets the need for additional distance ... and the need for additional distance begets the Arrival of the Power Game.
The Arrival of the Power Game

There's no doubt that the professional game today is different than when Old Tom Morris and Willie Park played.

The game has experienced a number of situation prompted and performance impacting paradigm shifts towards the "Power Game" over the past two decades, brought about by six separate and distinct dynamics and contributing variables.

- Oversize, thin face titanium drivers
- Lower spinning, high performance golf balls
- Improved golf course conditioning and agronomy
- Physiology of players (bigger, stronger)
- Technique and instruction
- Launch monitors and equipment customization
In the past 30 years, club heads have evolved from persimmon to stainless steel to titanium drivers.

Club head size also increased from 190cc to 460cc and the COR, the speed with which the ball leaves the clubface, has increased from .760 to .830.

The average length of the standard driver has increased from 43 \(\frac{1}{4}\) inches to 45 inches, while the average driver shaft weight has decreased by 25%.
The burgeoning size of driver club heads in the 1990’s helped boost distance in two ways.

First, thin faces of larger club heads produced a springlike effect that added yardage. Second, the drivers were more forgiving, enabling pros to swing harder without sacrificing distance on off-center hits. Lighter club heads also made longer shafts practical, adding even more distance.

The slope of driver head size nearly mirrors the slope of PGA Tour Average Driving Distance increases.

(Source: Darrell Survey. Average size in volume of driver club heads played on PGA Tour).
Over the past two decades, modern, adjustable club designs that feature increased MOI, coupled with longer, lighter shafts, have allowed tour players to be ‘dialed in’ to optimal driver launch conditions, contributing to longer, straighter distance.
Prior to the year 2000, amateur golfers had long preferred solid core “distance” golf balls. At that time, tour pros were still primarily playing soft, wound, liquid-filled center golf balls, because of the short game control, feel and workability they provided.

When low spin, high performance solid golf balls were introduced in the mid to late 90’s, pros started switching. The big jump came when Titleist introduced the Pro V1 golf ball in October 2000.

There was instant tour acceptance and near overnight conversion to multi-component urethane elastomer golf ball technology with the Titleist Pro V1. For the first time, tour players benefited from the low spin and distance of solid construction technology while retaining high spin, short game scoring performance and soft feel.
In 2000, only 27% of PGA Tour players were using solid core golf balls. By 2001, 84% of PGA Tour players had converted to solid core golf ball technology. This contributed to tour players' distance gains and at the same time, due to the media frenzy, exacerbated the perception of the ball as the sole cause.

Since 2005, every player on the PGA Tour has played a multi-layer solid core golf ball. Over the last 10 years, the average distance gain on the PGA Tour is only 3.7 yards.
The variable that seems to fly the most “under the radar” is golf course agronomy. Firm and fast is what the players want and the PGA Tour requires. Modern mowers let greenskeeping crews cut fairways as low as 3/16”.

PGA Tour Courses Firm and Fast
In a two decade period, as average fairway mowing height on courses hosting PGA Tour events has gotten shorter and tighter, average driving distance has climbed. Denser grasses, better irrigation, modern mowers and a desire to manicure fairways to what had historically been greens standards have significantly contributed to the increase in roll conditions.

Typical greens in the 1970’s rolled at 6.5 on the Stimpmeter compared with nearly 12.0 in 2017. Today, some fairways on Tour roll that fast.

(Source: T&L Magazine, 2003)
At the 2005 Open Championship at St. Andrews, for the first time, fairways were mowed with new Toro Greens mowers, cutting to 7 mm in length.

“We took a stimpmeter and did a bit of stimping on some pretty dried out ground and the 10th fairway was faster than the green... those balls getting up on the 18th were running the last 90 yards.”

*Peter Dawson, R&A Chief Executive*
*Golf Monthly UK, September 2005*

If there is a concern about the distance that the game’s greatest players are hitting the ball and marginalizing great courses, why break from tradition and start cutting fairways with greens mowers?
Modern day players on average are simply bigger, more powerful and more capable of hitting the ball farther than players from prior generations.

Dustin Johnson – 6’4”, 190 lbs.  Adam Scott – 6’0”, 180 lbs.
The majority of PGA Tour players are also into golf fitness, with regimens developed by trainers who help them perform like athletes.

From 1998 to 2008, our research shows the average PGA Tour club head speed increased by more than 6% (which equates to a potential increase of 12-15 yards off the tee), and this is prior to the ball ever being hit.

Since 2008, the average PGA Tour club head speed has increased an additional 1.2%.
The HealthSouth Sports Medicine Van debuted on Tour in 1986, providing pros a convenient place to work out. Player interest was modest until the late 1990’s, when Tiger’s fitness regime inspired many pros to work on their strength, flexibility and cardio-fitness. A second van was added in 2000, touching off another surge in usage.

In 1986, daily visits to the PGA Tour Fitness Van averaged 15 visits per day. In 2005, an average of 80 players frequented the Fitness Van daily, many accompanied by their personal trainers. This figure does not include the increase in off-site workouts by players with their trainers during tournament week.

Note the correlation between the driving distance increases and visits to the fitness van from 1986 to 2005 as players enhanced their strength, flexibility and endurance.

Today, there are a total of 4 fitness vans on the PGA Tour and Champions Tour that together average over 16,000 visits per year.

(Source: HealthSouth Physiotherapy, PGA Tour)
Just as equipment, agronomy, and fitness have evolved, so too has modern day instruction. It is not uncommon to see players’ swing coaches and sports psychologists with them at weekly events and major championships.

Butch Harmon & Dustin Johnson

Bob Rotella & Padraig Harrington
Launch monitor technology has allowed players to optimize both ball and club. At the game’s highest levels, this precision translates into maximizing their distance potential.
The evidence does not support that the game is harmed

- The Majors: Winning Scores
- The Majors: Course Yardage
- PGA Tour: Distance & Scoring
- PGA Tour: Correlation to Money Rank
- PGA Tour: Driving Distance vs. Money Rank
- Average USGA Handicap

We have yet to see any quantifiable evidence to suggest that the game is harmed. In the next slides, we will show some statistics from the major championships, PGA Tour average driving distances and statistical correlations, PGA Tour driving distance leaders vs. money rank, as well as average USGA handicap changes.

These facts refute the notion that the game of professional golf is experiencing some irreparable harm as a result of technology.
Over a 67-year span, winning scores at the majors have not drastically decreased and course yardages have stayed within a relatively tight range.

While Augusta National has been lengthened four times since 2000, venues that have hosted majors as far back as 1936, have been in excess of 7,000 yards.

Between 1960 and 2018, 30 U.S. Open Championships were contested at courses measuring over 7,000 yards, including 13 of the last 14. (2013 U.S. Open at Merion was 6,996 yards).
In 1953, Carnoustie hosted The Open Championship measuring 7,200 yards. The average length of Open Championship courses since 2000 is 7,198 yards.

Sixty-five years later, if championship courses are not significantly longer and scores are not significantly lower, where is the harm?
Average driving distance on the PGA Tour has increased by 33 yards since 1985, which is an average of less than 1% per year.

Yet, in spite of longer drives, scoring average has not improved significantly. In fact, scoring has remained relatively flat since 1990.
The average driving distance on tour is much closer to those ranked #50-#75 and #141-150 than those in the top 10. This indicates the increase in distance for the top 10 drivers on tour has outpaced the rest of the PGA Tour.

It may also explain why the media focuses on their “eye test” as they watch the top 10 longest drivers on tour hit 300 yard drives.

What many fail to acknowledge is that longer drives do not necessarily translate into lower scores or winning tournaments.
Only three of the top 10 driving distance leaders on the PGA Tour at the end of the 2018 season were inside the top 30 in the Official World Golf Ranking.

Four of the top 10 driving distance leaders were outside the top 50 in OWGR, three were outside the top 100, and two were outside the top 200.
The Men’s average USGA handicap in 1991 was 16.3. More than 25 years later, amateurs have lowered their handicap to 14.4.

The Women’s average USGA handicap in 1991 was 29.7. In 2016, it improved to an average of 26.1. Over the last two years, it increased to 26.4.

The NGF indicates that average score has not changed in the past 30 years: 98 (+/- 1 shot).

The game of golf is a test of skill for all levels of players. It continues to challenge the world’s best players and amateur golfers alike.
In 1998, the game’s regulatory bodies took steps to establish a maximum of how fast the golf ball could leave the driver clubface.

In 2002, the USGA and R&A updated their Statement of Principles, warning equipment companies that any additional advancements in technology would be seen as rendering an imbalance to the tenuous scale of skill and technology and mandate further regulatory intervention. Also in 2002, the maximum size of the driver head and the longest length of the driver were adopted.

In 2003, the golf ball test standards were updated. In 2006, a golf club Moment of Inertia maximum was established. And in 2010, both the volume and edge radius of golf club groove design was “rolled back,” further reducing the white space available for technology and invention.
The PGA Tour experienced the S-Curve of Invention application over the past decade. It progressed from the Breakthrough Phase (2000-2002), where golf equipment manufacturers and players refined the invention (first generation large headed titanium drivers and multi-construction solid golf balls) for maximum benefit and gain.

Shortly thereafter, golf experienced the Exponential Phase (2003-04), optimizing the distinctive benefits of the inventions. During this phase, a significant acceleration in incremental performance occurs for a finite period of time.

For the past 13 years, we have been experiencing the final or Mature Phase of the S-Curve. During this phase, the limits of technology are reached and the maximums of regulatory compliance are approached. Regardless of effort, past exponential improvements give way to small, if any, incremental advances.
Titleist believes there has been no evidence to suggest that the game is harmed.

During every era in the game’s history, there are those who have resisted evolution and change, and those who embrace change as part of the game’s heritage.
A Uniform Tournament Ball?

- The evidence does not support that the game is harmed
- **Uniform golf ball favors some players over others**

Yet some in the industry call for a “solution.” A uniform tournament ball is not a viable solution as it favors some players’ launch conditions over others. One ball does not fit all, any more than one driver with uniform specifications fits all players. Who makes the decision on the specifications of a uniform ball and whether it will optimize performance for a player like Rory McIlroy or Jim Furyk?

For those who propose a uniform ball that will benefit a lower swing speed player in order to achieve “equality,” why should the higher swing speed player be penalized or be required to make swing adjustments because he hits the ball farther? How is this a true test of skill? A player’s ability to choose and optimize equipment has been an intrinsic part of the game’s time-honored traditions.
Two sets of rules also opens a Pandora’s Box with regard to the regulation of equipment at the local, state, sectional and national levels. Golf is not so cleanly a professional game and an amateur game. Where does the distinction between professional and non-professional end at the U.S. national championships and Open Championships administered by the USGA and R&A?

Past experiences with two sets of rules, such as the R&A’s dealings with unlimited COR drivers but with competitive golf playing at .830 COR max, proved to be disastrous.

Playing by one set of rules, playing the same game, playing the same course and playing the same equipment are what make golf different. It is the essence of the game.

- The evidence does not support that the game is harmed
- Uniform golf ball favors some players over others
- Bifurcation is NOT in the game’s best interest

Bifurcation?
We do not believe that a golf ball rollback is a solution or even necessary. While some advocates think that this will impact the longest hitters, a rollback will more adversely impact shorter players.

A 10% rollback will mean less to a player like Rory McIlroy than it would for a player like Jim Furyk.

In theory, McIlroy’s driving distance average in 2018 would have gone from 320 to 288, compared with Jim Furyk’s going from 280 to 252.

• The evidence does not support that the game is harmed
• Uniform golf ball favors some players over others
• Bifurcation is NOT in the game’s best interest
• Rollback will more adversely impact shorter players
The evidence does not support that the game is harmed
Uniform golf ball favors some players over others
Bifurcation is NOT in the game’s best interest
Rollback will more adversely impact shorter players
Current regulations are sufficient...
Physics prevail.

The golf ball has been the most stringently regulated product in the history of the game, inclusive of an Overall Distance Standard (ODS). And the S-Curve invention reality means that the rules in place regulating both golf balls and golf clubs are more than adequate to contain any significant increases in distance caused by technological influences.

The line in the sand has already been drawn and the laws of physics have prevailed.
• The evidence does not support that the game is harmed
• Uniform golf ball favors some players over others
• Bifurcation is NOT in the game’s best interest
• Rollback will more adversely impact shorter players
• Current regulations are sufficient... Physics prevail
• **IF a “solution” is necessary, BALL ALONE is not the solution**

However, if the regulatory bodies determine that a “solution” is deemed necessary and seek to make changes, we strongly believe that you cannot roll back the incremental distance of the past 25 years by focusing on the ball alone given the six contributing variables to distance gains. When looking at equipment, it is shortsighted to focus on the ball alone or the club alone. Based upon our research, the contributions of ball and club are fairly equally weighted. Evaluating change in a holistic manner is prudent.
The game has been in constant evolution and growth for the past 275 years. During this period, the rules of golf have evolved through periods of adaption, consolidation, divergence and, eventually, unification.

There have been two forces responsible for this inexorable march.

The first force is embedded in the spirit of the game. A game that invites mastery, encouraging a process of best practice adoption, with an emotional allure to mimic players better than yourself...
The Game As We See It...Unification

“The second force has been the globalization of the game.

In 1927, American C.B. MacDonald, who built the first 18-hole golf course in the United States, said it as well as it could be said.

Multiple sets of rules, not unlike separate and distinct laws and statutes, impede cross border commerce and inhibit worldwide adoption.

In 2022, the MA and the USA established the newest transnational partnership with the founding of a joint bilateral association between the two golf associations, which will serve to facilitate and support the growth, development, and promotion of the game, as well as to enhance the overall experience for golfers and spectators alike.

For many years, the rules of golf have been a source of frustration for many golfers, who have found it difficult to play the game consistently. The rules have evolved over time, and while they have been modified to improve the playing experience, they have also become more complex, with many rules being introduced to address issues that have arisen in recent years.

One of the significant challenges facing golf today is the need for a unified set of rules. The current system of having multiple sets of rules, with each country or region having its own set, has created confusion and difficulty for players, spectators, and officials. The need for a unified set of rules is not only a matter of convenience, but it is also a matter of fairness, as it ensures that all players are playing under the same conditions.

In conclusion, the globalization of the game has brought many benefits, but it has also created challenges. The need for a unified set of rules is one of these challenges, and it is one that requires the cooperation of all stakeholders in the game. The benefits of a unified set of rules are clear, and it is time for the golf community to work together to achieve this goal.

“Golf is a world encircling game. One of its charms is no matter where you go, whether America, Asia, Africa, Australia, Europe or Scotland... the game is the same with only such rules as are necessary to govern the local situation.”

C.B. MacDonald (1927)
Technology has always been part of the game’s enduring traditions.

The growth of the game has been a byproduct of the continuing and ever-present balance between Tradition and Technology.

The growth of the game and the globalization of the game have been one and the same.

And none of this would have been possible if not for the inexorable march of the rules of game towards Unification, receiving the support of all of those who love the game and care about the game’s go forward viability.
Tradition & Technology – Preserving the Balance