The PRACTITIONER

Issue 19   February 2021

Spring is almost here!

Greetings, PDWG Team Members. February 2021 is here and already on the way out!!! March is on the way in and hopefully bringing spring weather right along with it.

This month's edition of the *Practitioner* takes a look at a couple of interesting KPMG surveys, courtesy of DOE's PM-30, Mel Frank. The surveys are of particular interest given they represent areas that DOE and contractors alike are looking to improve. And while the "Global Construction Survey 2016" is five years old, and we have not come as far along as we would have liked, the article is a perfect segue to the second survey, "Is your organization future-ready?" Excerpts from both surveys are provided in this newsletter.

Also, in the realm of behavior-based project management, author Josh Ramirez provides an introduction to earned value as an indicator of risky cultural issues. And we look at the top 10 root causes of project management failures.

Building a Technology Advantage

Harnessing the potential of technology to improve the performance of major projects
Global Construction Survey 2016

The scale, ambition and complexity of today's engineering and construction projects are nothing short of breathtaking.

The industry is constantly widening its vision and raising its game. Buildings are getting taller, our search for natural resources is taking us deeper, bridges are spanning longer, and the pace of change is such that technology projects are virtually obsolete as soon as they're completed. Operating at the forefront of some of the world's greatest challenges, construction is becoming greener and more sustainable, while continuing to improve social conditions and tackle human and natural disasters.

Technology plays an integral part in helping the industry realize these goals by enabling enhanced design, planning and construction. When applied effectively, technology can significantly boost a sector that for many years failed to improve productivity. Yet, despite

Building a Technology Advantage

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substantial investments in innovation, the construction industry is struggling to reap the full benefits of advanced data and analytics, drones, automation and robotics.

As companies strive to improve governance, risk management, project controls, and talent, the fundamentals of sound engineering, construction and project management processes remain the same. In this year's survey — the 10th edition — we continue to look at how to improve project delivery, but with the added perspective of a technology lens, to determine who's ahead of the game, who's behind the curve, and how all firms can harness the true potential of technology.

For the very first time, we've jointly surveyed both project owners and engineering and construction companies on a number of current issues to understand whether their views are aligned or whether there are marked differences.

We also feature interviews with two leading industry professionals, both with experience in large, global projects, who give their views on the benefits — and the limitations — of technology in enhancing project performance.

Technology inevitably brings disruption in its wake, at a speed that is likely to increase exponentially in the coming years. Owners and engineering and construction firms are charged with building the next generation's infrastructure. The quicker they can embrace the exciting potential of technology, the greater will be their collective contribution to business and to society.

Survey at a glance

How we compiled the questions:
— The quantitative survey was designed by a global steering team of KPMG engineering and construction professionals with extensive experience developing major projects

Who took part:
— 218 senior executives: 119 from major project owners, and 99 from a range of engineering and construction companies
— Participating organizations included both private (listed) companies and government agencies
— Respondents' companies' turnover ranged from less than US$1 billion to more than US$20 billion
— Owner entities came from many industries including energy and natural resources, technology and healthcare

What they're telling us: The industry is yet to fully embrace technology despite a rise in project complexity and associated risks, a mere 8 percent of respondents can be categorized as 'cutting-edge visionaries.' And just over 20 percent say they're aggressively disrupting their business models.

Building a Technology Advantage
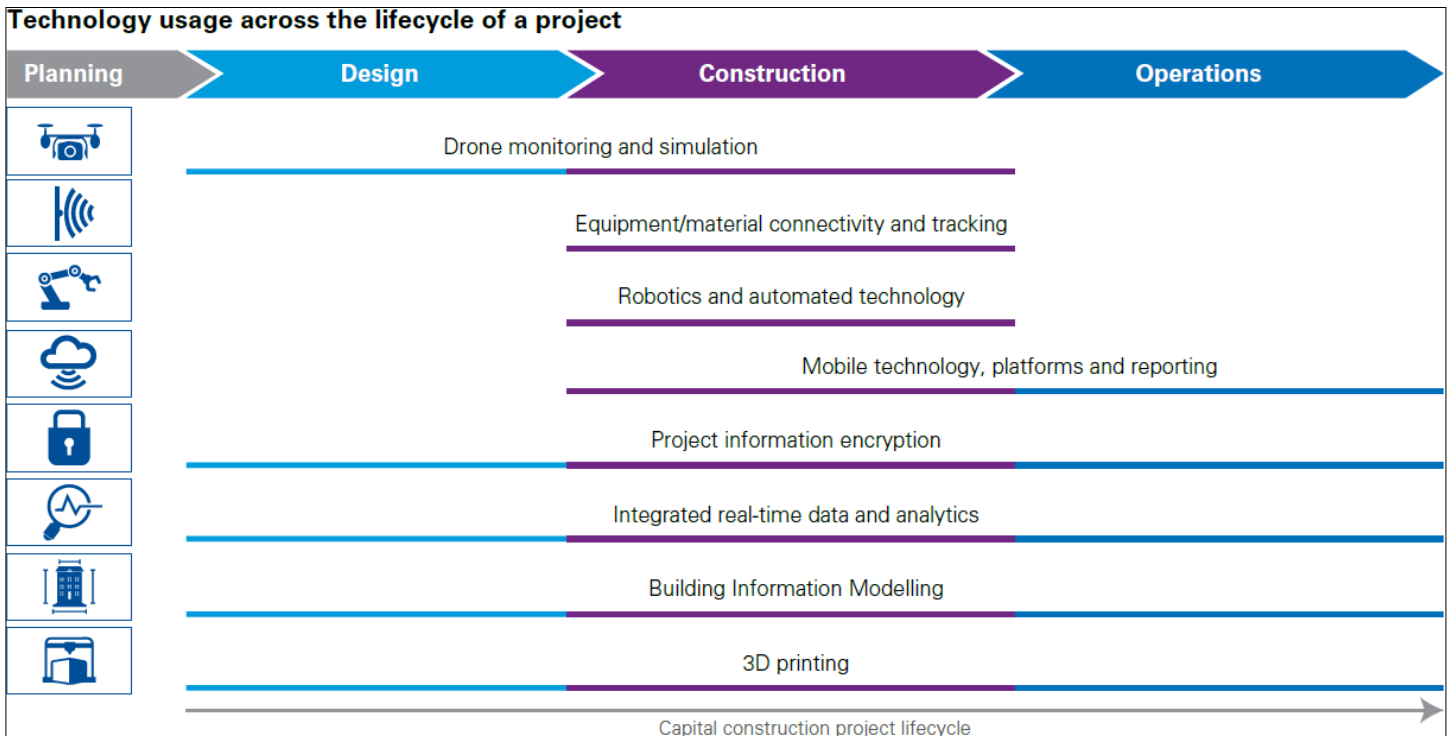
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Data volume is rising exponentially — but many are struggling to make sense of information They may have an impressive range of platforms and tools, but most respondents feel they lack the resources and skills to provide useful insights. And almost three-quarters don't use advanced data analytics for project-related estimation and performance monitoring.

Integrated, real-time project reporting is still a dream rather than a reality most executives in the survey say their organizations are held back by manual processes and multiple systems. Just 20 percent have a single, fully integrated project management information system (PMIS) across the enterprise.

There's more to come from mobile Although mobile technology has huge potential for construction projects, less than one-third of respondents say their organizations use it routinely — and a similar proportion have no mobile platforms.

…and there's still room for improvement in project management basics A majority of executives in this year's survey feel their organization's project controls are "optimized" or "monitored," but this hasn't halted the continued high rate of project underperformance. The inability to drive consistency across projects is part of the problem: just 27 percent say their companies have truly consistent controls globally. Respondents also recognize the benefits of Earned Value Management (EVM) as a way to measure cost and schedule performance; but a sizeable proportion — 41 percent — still don't use it.

Technology defined: In many cases throughout this report "technology" is referred to generally, but the chart below offers insight into what types of technology are being employed in engineering and construction, across the lifecycle of capital projects.

Technology usage across the lifecycle of a project

| Planning | Design | Construction | Operations |

- Drone monitoring and simulation
- Equipment/material connectivity and tracking
- Robotics and automated technology
- Mobile technology, platforms and reporting
- Project information encryption
- Integrated real-time data and analytics
- Building Information Modelling
- 3D printing

Capital construction project lifecycle

To access the complete report, please visit this link.

— Excerpts are ©2016, KPMG International

Future-Ready Index
Leaders and followers in the engineering & construction industry

Global Construction Survey 2019

"Is your organization future-ready?"

The Global Construction Survey 2019 is all about the future. In the following pages, you will find examples of how leading organizations are investing effectively in technology, people and project culture to become more future-ready.

And this year we have also introduced a new concept: the Future-Ready Index — a way for the industry and individual players to measure and benchmark their preparedness for what lies ahead. We also discuss the results and the subsequent implications and include a simple self-assessment tool to allow comparisons with your peers and provide a reference point for developing or enhancing your capital programs. Our Value map considers the potential value from investing in different technologies, while a Strategic roadmap plots a course to future-readiness.

Since our first Global Construction Survey in 2005, we have sought to create a collaborative and ongoing dialogue about the pressing issues facing the engineering & construction industry. Foremost among these is the challenge of improving our collective track record of delivering projects on time and on budget.

More recently, in response to how technology and innovation is impacting the industry, we took a closer and critical look at how it is embracing disruption. Our Global Construction Survey 2016 Building a technology advantage outlined a technology adoption spectrum showing a few 'cutting-edge' industry leaders and many laggards struggling to catch up with a new, digitally driven world.

As the pace of disruption accelerates, we continue to press owners and contractors on their response to the many threats and opportunities. Our Global Construction Survey 2017 *Make it, or break it*, urged a three-pronged approach to rationalizing governance and controls, optimizing human performance and innovating with technology. Reflecting on the past years, the industry has made many positive steps to address rapidly changing technology, increasingly complex and highly pressurized projects, and a widespread scarcity of talent.

Make it, or break it highlighted a perceived lack of urgency over the necessary changes and investment required to transform the fortunes of the industry. When you factor in some spectacular and very public project and company failures in 2018, then the overall picture is one of continued uncertainty. In this year's report, you will see how different players are addressing this uncertainty by answering three vital questions.

Is governance rationalization becoming a reality?

Project governance and controls remain the lifeblood of the industry — underpinning how engineering & construction companies and project owners plan and deliver capital projects. Since our 2017 survey we've seen progress, with 'old-school' static project manuals or 'binders' being replaced by digitized, automated controls monitored via dashboards on a real-time (or almost real-time) basis. Many leading organizations have already transformed — or are well on the way to

Future-Ready Index

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transforming — governance and controls, by rationalizing and digitizing their existing environment to reflect current project needs.

Is the technology breakthrough here?

We concluded our Global Construction Survey 2017 with some degree of hesitancy. The majority of participants acknowledged the importance and impact of technology and innovation, but few were adopting it significantly, with even fewer reaping the benefits. In 2019 we see a wide range of views: at one end of the spectrum, some contractors are loathe to invest unless clients demand and pay for specific technologies; at the other end, Suffolk's Chairman and CEO John Fish says: "We want to be a technology company that builds construction projects."

Is the human touch gaining hold?

Despite the acknowledged influence of robotics and automation, humans remain the heart and soul of projects. Forty-six percent of respondents say people are the most important factor in delivering successful projects — against 28 percent for technology and 26 percent for process and governance. Leaders may have continued concerns over the ability of the next generation to fully grasp the fundamentals of project delivery; but they don't feel this challenge can be solved purely by technology. Instead, there is a growing belief that the best way forward is to re-define project culture, train the next generation workforce on both technical and non-technical 'soft' controls, and increase investment in technological capabilities of newer recruits with guidance from more experienced workers.

The results of our Global Construction Survey 2019 indicate that we are moving in the right direction. The top 20 percent of 'future-ready' organizations appear to be embracing disruption from strategy to execution. Like pioneering companies in other sectors, they are learning how to pilot projects and 'fail fast', investing in innovation without fear or uncertainty.

Yet, despite this progress, we remain continually and sharply reminded of how risky our industry is, where one misstep can mean disastrous consequences for both project owners and contractors. As we prepare to transition leadership to the next generation, investments in technology and innovation should closely reflect your organization's future-readiness.

The remainder of the sector should, therefore, be asking themselves how they can elevate their game. Indeed, for those in the bottom 20 percent, the situation is considerably more urgent, if not existential. These companies face a race to go digital, to enhance their profitability and fend off competitive threats — including the possibility of takeovers.

As the future shows, the most forward-thinking organizations are not only equipped to excel in governance and controls, human

Future-Ready Index

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capital, and innovation and technology — they have also begun to integrate each of these capabilities.

About the survey

In this survey, you will find the perspectives of 223 people from engineering & construction companies and project owners from a variety of industries.

Many of the responses were gathered through face-to-face interviews in 2018/2019 with senior leaders — a large number of them chief executive officers. The vast majority of respondents are from organizations carrying out significant capital investment projects.

Survey at a glance

The Future Ready Index: "*Leaders and followers in the engineering & construction industry*"

Are capital project organizations making the right investments and following the right strategies to stay ahead of existing and new competitors and thrive?

As disruption and innovation continue to make the headlines, both contractors and owners face tough decisions on where to invest precious resources to achieve the greatest impact. The speed of change brings a huge promise of greater efficiency, precision and predictability. Project delivery alone has seen numerous new technology solutions promising to make delays and cost overruns a thing of the past.

But, as we envision a world of robots building infrastructure and 3-D printers producing flawless site-ready components, we must pause for thought. In many ways, the industry has stubbornly remained largely unchanged for decades.

Some are leaving their old ways behind and others are more constrained or tentative. KPMG's Future-Ready Index enables organizations to measure their preparedness for a disrupted future.

Building the Index

Governance and controls

The sophistication, maturity and fitness of the governance environment:

Fit-for-purpose management practices, processes and controls, applied consistently and monitored for effectiveness in terms of project outcomes

Agility to respond and change course in the face of evolving conditions and risks, based upon accurate, real-time reporting

A flexible approach to megaprojects, acknowledging their unique capital requirements, eclectic mix of third parties and demands on internal resources

Future-Ready Index

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Technology and innovation — Ability to use technology to drive performance:

- A robust and comprehensive technology strategy
- Willingness to experiment with new technologies, knowing that all investments carry a risk of failure
- A structured approach to innovation reflecting a culture that embraces fresh ideas and new ways of working

People — The 'fitness' of an organization's human capital:

- Attracting, developing and retaining future leaders and top talent
- Performance-based rewards and promotion aligned with strategic objectives
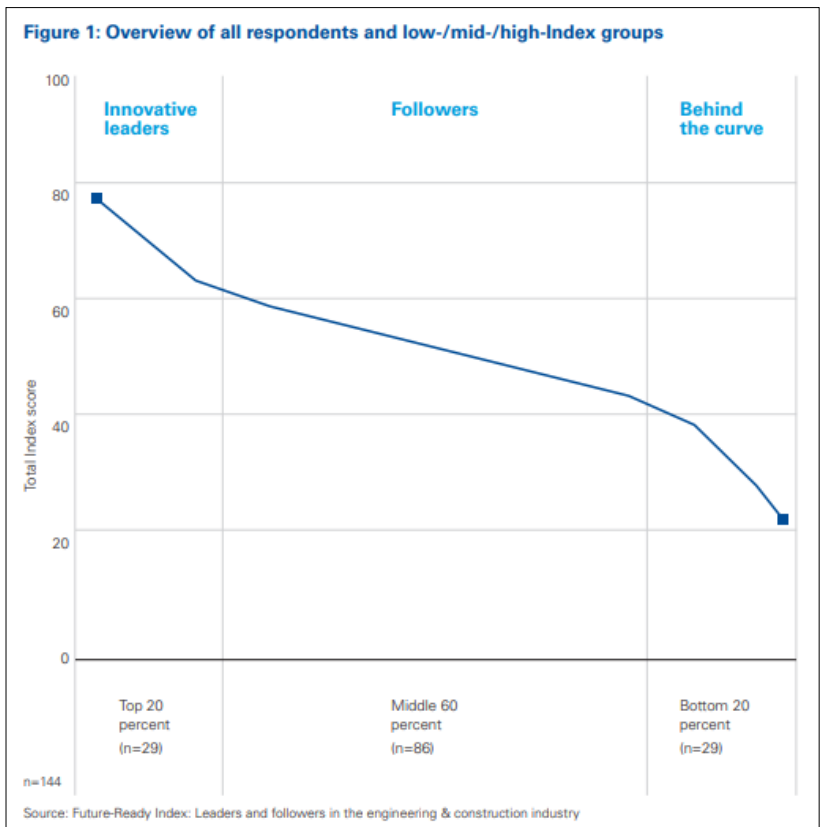- Communicating both strategic vision and project progress

Using the Index

The Future-Ready Index provides a consolidated worldview of the industry, and at the same time, enables comparison across regions and sectors, so contractors and owners can benchmark themselves against the industry as a whole or against select peer groups. Figure 1, at right, shows an overview of the segments our respondents landed in.

To access the complete report, please visit this link.

— *Excerpts are ©2019, KPMG International*

Figure 1: Overview of all respondents and low-/mid-/high-Index groups

Innovative leaders | Followers | Behind the curve

Total Index score

Top 20 percent (n=29) | Middle 60 percent (n=86) | Bottom 20 percent (n=29)

n=144

Source: Future-Ready Index: Leaders and followers in the engineering & construction industry

Behavior-Based Project Management

EV an Indicator of Risky Cultural Issues – An Introduction

By Josh Ramirez

Earned Value (EV) metrics are showing promise as not only an indicator of project performance measurement, but also as a gauge on identifying some human factors that are predictors of impending safety issues, risky mindsets, cognitive biases, and broader issues in the organizational culture.

The Government Accountability Office (GAO) states that biases in estimates can originate with pressure from management (social pressure), as well as other sources such as over-optimism, group think, dominating personalities, and inexperience (GAO: Young, Brown, & Blockwood, 2020). GAO further states:

> *Motivational bias is a source of bias that arises when [planners] feel threatened (whether justifiably or unjustifiably) if they give their true thoughts about a program. This threat is typically from fear of being punished by someone in authority.*
>
> *[Planners] are labeled trouble makers or are ostracized from the team if their worst case scenario is worse than management's opinion.*
>
> *[Planners] … exhibit social and institutional pressures to conform, perhaps to get consensus or to shorten the [planning] session.*
>
> *The organization … discourage[s] introducing a risk that has not been previously considered, particularly if the risk is sensitive or may negatively affect the program.*

Analysis was found that shows a connection between strategic misrepresentation (see definition at right) and normalization of deviance, which is the tendency of people in an organization to normalize behaviors over time as socially acceptable (Vaughan, 1998). As this normalization increases, it becomes increasingly acceptable (if not encouraged) in order to avoid uncomfortable realities. EV metrics can act as an indicator of issues that need further analysis, revealing potential areas of vulnerability in the organization. In short, EV has the potential to reveal risk in both project performance and safety.

In future issues, the *Practitioner* will have an in-depth look at the correlation between cultural environmental factors and weaknesses in risky mindsets in safety culture that can be brought to light through EV.

> — *Josh Ramirez is a project manager in the Washington River Protection Solutions' Earned Value Management System Compliance and Reporting organization, and a PhD candidate*

Strategic Misrepresentation

In planning and budgeting, the tendency for those presenting projects for approval knowingly to understate costs and overstate benefits. This is a matter of deliberate policy and thus distinct from optimism bias or simple miscalculation. Those who adopt such a policy would probably justify it as an expected part of the negotiation 'game' and argue that many worthwhile projects would never get approval if the true costs were revealed at the start.

— *from Oxford Reference*

It is Not One World — What We Do and How We Do it Matters!

Root Causes of Project Management Failures

While there are many causes of project management failings, these are some of the top 10 that lead to a project failures.

It is worth noting that one very important cause that is not on the list is the failure to perform thorough and effective root cause analysis (RCA) when issues or challenges are first encountered. RCA is often used as part of the post-mortem process. However, if RCA is effectively used at the first sign of trouble (as intended for earned value management variance analysis), significant project issues may be mitigated.

1. Poor Communications

Project management is all about good communications. You have to keep everyone informed about changes, assumptions, requirements, standards, budgets, costs, and the schedule. Developing a good visual management system is a tremendous benefit to any project manager. Paper systems in binders are a notoriously bad way to keep people informed. Consider Lean Daily Management System, dashboard, or an electronic one that everyone check into daily. Develop a good communication system and you won't have to worry about one of the causes of project management failures.

2. Poor Schedule or Resource Management (Mismanagement) resource management

Managing a project is really about managing the schedule, but a schedule is really a collection of resources that are being managed on a schedule. You increase the chances of having one of the cause of project management failures if you mismanage your resource schedule.

3. Weak Requirements Definitions (Leads to Inadequate Planning)

If you don't know where you are going then how do you know when you get there? A good project manager must know what the target is. Your project requirements are the target. One way of defining requirements is to describe what the end result looks like in measurable or object terms. Instead of requiring software to be friendly or easy to use, how about saying that it has to be simple enough that a 12 year old child can use it. We can argue about "easy to use" software but at least we now have an objective measure for our testing.

4. Inadequate Planning, Assumptions, Risks, or Resources

If you are planning a project, then you should be familiar with Murphy's Law, "If anything can go wrong it will" Projects are frequently impacted by risks, assumptions about resource usage, or plain old surprises. The traditional solution is to add safety time or buffers to tasks to allow for schedule slippage and unplanned events. There are a lot of reasons why this fails too. I would suggest implementing Critical Chain management to take more control over these buffers and prevent causes of project management failures.

Root Causes of Project Management Failures
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5. Use of New or Unproven Technologies/Methods
It can be so tempting to use the latest technology, or new method, but unless you are trained on the newest thing, all you are doing is introducing new risks. Projects have enough risks already without the need to introduce new risk from unproven technology.

6. Ineffective (or Nonexistent) Quality Controls
Quality control is a simple system of checks and balances to ensure you are delivering what the customer asked for in the first place. What kind of quality control are you using for your project management? Are you tracking every project management nonconformance? Charting to find trends? Taking action when the trend is outside the norm? Most projects have a system for correcting problems but this is not the same as a system of corrective action. Ineffective quality controls are definitely one of the causes of project management failures.

7. Managing Multiple Projects at Once or Multitasking Resources
It seems so obvious to recapture downtime and juggle a few extra tasks in the meantime. But multitasking introduces complexity and schedule risk, which can impact all projects involved. Less is more. Focus is power. You can actually increase your productivity by focusing on fewer projects.

8. Supply Chain Failures
Sometimes you have to contract out the work. But managing contractors has inherent risks too. Contractors may not have the skill level required for the task. Contractor's multi-task in order to stay busy, and multitasking introduces complexity and schedule risk. It sounds so easy to contract out some of the work to your supply chain but it actually adds to complexity (which can lead to causes of project management failures) unless you have clearly defined requirements agreed to first.

9. Scope Creep or Poor Impact Analysis
This happens on practically every project doesn't it? You start with a clear concept or at least you thought it was clear when you started. Then one thing leads to another and before you know it you are involved in a different project. That's scope creep. If we are doing "A", then we must do "B", and if we are do "B", then we have to also do "C". Clarifying the real requirements and performing a good project staffing impact analysis are two methods to solve this problem. Otherwise, scope creep will impact your schedule, your budget, and your resources.

10. Lack of Qualified Resources
"We will just have to make do" If you hear this then you know you are questioning your resources. Give the wrong task to the wrong person and you are impacting your project. This usually happens when we don't do capacity planning well and we find out that we lack enough experienced resources.

There you have it, the top ten causes of project management failures. Individually, you might be able to manage around any single cause but taken collectively, you will have a colossal project management failure. In fact, any two could seriously impact any project. Don't let this happen to you; learn how to prevent project management failures.

Source: Bizmanualz.com

Just for Fun: February's Notable Events and Famous Birthdays

1 — Actor Clark Gable (1901) and MMA fighter Ronda Rousey (1987) were born, and the space shuttle Columbia broke apart (2003)

2 — The Mexican-American War ended (1848), the first Groundhog Day was celebrated (1887), and actress Farrah Fawcett (1947), model Christie Brinkley (1954) and singer Shakira (1977) were born

3 — Baseball's National League was founded (1876), and rock stars Buddy Holly, Richie Valens and The Big Bopper were killed in a plane crash (1959)

4 — The American Revolutionary War officially ended (1783), **aviator Charles Lindbergh** (1902), civil rights activist Rosa Parks (1913), singer Alice Cooper (1948) and football star Lawrence Taylor (1959) were born, and Facebook was launched (2004)

5 — Baseball legend Hank Aaron was born (1934)

6 — Baseball legend Babe Ruth (1895), President Ronald Reagan (1922), and singer Bob Marley (1945) were born

7 — Author Charles Dickens (1812) and singer Garth Brooks (1962) were born, the Beatles played their first concert in the U.S. (1964), comedian Chris Rock (1965) and actor Ashton Kutcher (1977) were born, and the Soviet Union collapsed (1990)

8 — The Boy Scouts of America was founded (1910), and actor James Dean (1931), football player Julio Jones (1989) and basketball player Klay Thompson (1990) were born

9 — President William Henry Harrison was born (1773), **volleyball was invented** (1895), daylight saving time was instituted (1942), actor Joe Pesci was born (1943), the Hollywood Walk of Fame opened (1960), and the first American troops were sent to Vietnam (1965)
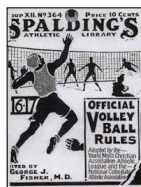
10 — The fire extinguisher was invented (1863), and golfer Greg Norman was born (1955)

11 — Inventor Thomas Edison (1847), actor Burt Reynolds (1936), singer Sheryl Crow (1962) and actress Jennifer Aniston (1969) were born, and the World Health Organization officially named the COVID-19 virus (2020)

12 — President Abraham Lincoln and biologist Charles Darwin were born (1809), the NAACP was founded (1909), and basketball legend Bill Russell was born (1934)

13 — TV host Jerry Springer (1944), basketball coach Mike Krzyzewski (1947) and football star Randy Moss (1977) were born

14 — St. Valentine was executed (270), Alexander Graham Bell invented the telephone (1876), and the St. Valentine's Day Massacre took place in Chicago (1929)

15 — Inventor Galileo Galilei (1564) was born, the Spanish-American War began (1898), the first Teddy Bear was made (1903), the U.S. figure skating team was killed in a plane crash (1961), **Canada adopted its maple leaf flag** (1965), and hockey star Jaromir Jagr was born (1972)

16 — Singer/politician Sonny Bono was born (1935) , Nylon was invented (1937), rapper/actor Ice T was born (1958), the 9-1-1 system went into service (1968), and football star Jerome Bettis was born (1972)

17 — Football legend Jim Brown was born (1936), the first weather satellite was launched (1959), and basketball legend Michael Jordan was born (1963)

18 — The first Academy Awards were announced (1929), the first 3-D movie opened (1953), actor John Travolta (1954) and rapper Dr. Dre (1965) were born, and racing legend Dale Earnhardt was killed (2001)

19 — **Thomas Edison invented the phonograph** (1878), and singer Smokey Robinson (1940), actor Jeff Daniels (1955), and singer Seal (1963) were born

20 — The U.S. Postal Service was established (1792), John Glenn became the first American to orbit Earth (1962), and basketball star Charles Barkley (1963), singer Kurt Cobain (1967), baseball star Justin Verlander (1983), and singer Rihanna (1988) were born

21 — The sewing machine was invented (1842), NASCAR was incorporated (1948), DNA was discovered (1953), actor Kelsey Grammer was born (1955), and Malcolm X was assassinated (1965)

22 — President George Washington was born (1732), the U.S. acquired Florida (1819), the Republican Party held its first national meeting (1856), basketball legend Julius "Dr. J" Erving was born (1950), the first Daytona 500 was run (1959), actress Drew Barrymore was born (1975), and **the U.S. Olympic hockey team beat the USSR in the "Miracle On Ice"** (1980)

23 — Plutonium was first produced (1941), the American flag was raised on Iwo Jima (1945), the first polio vaccines were administered (1954), and actress Dakota Fanning was born (1994)

24 — Andrew Johnson became the first U.S. president to be impeached (1868), and entrepreneurs Phil Knight (1938) and Steve Jobs (1955), and boxer Floyd Mayweather (1977) were born

25 — **Samuel Colt invented the revolver** (1836), the first American aircraft carrier was launched (1933), guitarist George Harrison was born (1943), and Cassius Clay (Muhammad Ali) knocked out Sonny Liston for the heavyweight boxing championship (1964)

26 — The Grand Canyon (1919) and Grand Tetons (1929) were established as national parks, singers Fats Domino (1928) and Johnny Cash (1932) were born, RADAR was first demonstrated (1935), and a terrorist bomb exploded at the World Trade Center (1993)

27 — The first Mardi Gras celebration in New Orleans was held (1827), and actress Elizabeth Taylor (1932) and football star Tony Gonzalez (1976) were born

28 — Hockey star Eric Lindros (1973) and singer Jason Aldean (1977) were born, and the first-ever NATO military action took place in Bosnia (1994)