TEACHER RETIREMENT SYSTEM OF TEXAS MEETING BOARD OF TRUSTEES

AGENDA

February 14, 2018 – 10:00 a.m. February 15, 2018 – 8:30 a.m. February 16, 2018 – 8:00 a.m.

UT Rio Grande Valley, Ballroom Bldng 1201 W University Drive, Edinburg, Texas 78539

All or part of the February 14-16, 2018, meeting of the TRS Board of Trustees may be held by telephone or video conference call as authorized under Sections 551.130 and 551.127 of the Texas Government Code. The Board intends to have a quorum and the presiding officer physically present at the following location, which will be open to the public during the open portions of the meeting: 1201 W University Drive, Edinburg, Texas 78539.

NOTE: The Board may take up any item posted on the agenda during its meeting on Wednesday, February 14, 2018, or during the meeting on the following days, February 15-16, 2018, beginning at the time and place specified on this agenda.

The open portions of the February 14-16, 2018, Board meeting are being broadcast over the Internet. Access to the Internet broadcast of the Board meeting is provided at www.trs.texas.gov.

- 1. Call roll of Board members.
- 2. Consider Board administrative matters, including the following Jarvis Hollingsworth.
 - A. Approval of the December 14-15, 2017 proposed meeting minutes
 - B. Setting, rescheduling, or canceling future Board meetings.
- 3. Provide an opportunity for public comment Jarvis Hollingsworth.
- 4. Receive an overview of the Board meeting agenda and theme: *TRS: One Mission. Many Parts* Brian Guthrie.
- 5. Receive an update on the Many Parts and One Mission of TRS Customer Service –Janet Bray, Katrina Daniel, Rebecca Merrill and Barbie Pearson.
- 6. Consider Amendments to the Bylaws of the Board of Trustees of TRS Rebecca Merrill, Heather Traeger, and Amy Barrett.

- 7. Receive an update on the TEAM Program, Reset for Phase 2 Brian Guthrie and Chet Henry.
- 8. Receive a presentation on Capital Market Assumptions Steve Voss and Mike McCormick, Aon Hewitt.
- 9. Review and consider the TRS of Texas Experience Study Findings and Recommendations, including considering the Return Assumption Joe Newton and Dan Siblik, Gabriel, Roeder, Smith & Co.
- 10. Review the Pension Benefit Design Study and Proposed Update Caasi Lamb.

NOTE: The Board meeting likely will recess after the last item above and resume Thursday morning to take up items listed below.

- 11. Provide opportunity for public comment Jarvis Hollingsworth.
- 12. Receive an overview of the February 15, 2018 agenda Brian Guthrie.
- 13. Discuss investment matters, including the following:
 - A. Market Update Jase Auby;
 - B. Emerging Manager Annual Update; including consideration of a finding that deliberating or conferring on investment transactions or potential investment transactions in an open meeting would have a detrimental effect on the position of the retirement system in negotiations with a third person or put the retirement system at a competitive disadvantage in the market Sylvia Bell;
 - C. Industry Leadership: Building a World Class Investor Sacha Ghai, Bryce Klempner and Matt Portner, McKinsey and Company;
 - D. Building the Fleet: Becoming a Best-in-Class Global Institutional Investor
 Jerry Albright;
 - E. SPN Tactical Value Update Jerry Albright.
- 14. Receive a report on Portfolio Performance Measures, Issues and Practices Dr. Keith Brown.
- 15. Receive a presentation on fiduciary duties Overview of Trustee and Employee Ethics Policies Carolina de Onis and Heather Traeger; Steve Huff and Keith Johnson, Reinhart Boerner Van Deuren S.C.
- 16. Receive a report on *Why is the Healthcare Market Different from other Markets?* Katrina Daniel and Dr. Osama Mikhail, University of Texas Health Science Center.

17. Consider adoption of the notice of completed rule review for the 403(b) rules in Title 34, Part 3, Chapter 53 of the Texas Administrative Code – Rebecca Merrill.

NOTE: The Board meeting likely will recess after the last item above and resume Friday morning to take up items listed below.

- 18. Provide opportunity for public comment Jarvis Hollingsworth.
- 19. Receive an overview of the February 16, 2018 agenda Brian Guthrie.
- 20. Receive a report on TRS and State Street Bank partnership Ron O'Hanley and Andrew Erickson, State Street.
- 21. Receive a report on Value Add of Audit Amy Barrett and Jim Pelletier, The Institute of Internal Auditors.
- 22. Receive an overview of the TRS audit plan for FY18 and consider amendments Amy Barrett.
- 23. Receive a report on TRS Innovations: Looking Ahead Chris Cutler.
- 24. Receive an overview on Resource Planning: FY18 FY23 Brian Guthrie and Don Green.

The Board may convene in Executive Session under the following but not limited to:

- A. Texas Government Code, Section 551.071: Consultation with Attorney;
- B. Texas Government Code, Section 551.072: Deliberation Regarding Real Property;
- C. Texas Government Code, Section 551.074: Personnel Matters Relating to Appointment, Employment, Evaluation, Assignment, Duties, Discipline, or Dismissal of Officers or Employees including but not limited to the Executive Director, Chief Auditor Executive, Chief Investment Officer.
- D. Texas Government Code, Section 551.076: Deliberation Regarding Security Devices or Security Audits;
- E. Texas Government Code, Section 551.089: Deliberation Regarding Security Devices or Security Audits; or
- F. Texas Government Code, Section 825.3011: Certain Consultations Concerning Investments.

TAB 2

Minutes of the Board of Trustees

December 14 - 15, 2017

The Board of Trustees of the Teacher Retirement System of Texas met on December 14 - 15, 2017, in the boardroom located on the fifth floor of the TRS East Building offices at 1000 Red River, Austin, Texas. The following Board members were present:

Jarvis Hollingsworth, Chair

Joe Colonnetta
David Corpus
John Elliott
Greg Gibson
Christopher Moss
James D. Nance
Dolores Ramirez
Nanette Sissney

Others present:

Brian Guthrie, TRS Cliff Ansess, AQR Capital Management

Ken Welch, TRS

Don Green, TRS

Carolina de Onís, TRS

Kathy Huver

Katrina Daniel, TRS

Ann Fickel, TRTA

Jerry Albright, TRS Franklin Hopkins, Germer Beaman & Brown PLLC

Jase Auby, TRS Philip Mullins, TSEU

Amy Barrett, TRS Ted Melina Raab, Texas AFT Heather Traeger, TRS Eileen O'Grady, Unite Here

Chet Henry, TRS

Dan Junell, TRS

Katherine Farrell, TRS

Steve Huff, Reinhart Boerner Van Deuren

Steve Voss, Aon Hewitt

Dr. Keith Brown, Investment Advisor

Joni Tocani, CVSH

Sean Donovan, CVSH

Nancy Byler, TRTA

Ben Barnes, TRTA

Brock Gregg, TRTA

Taylor Jones, TSEU

Michael Johnson, Bridgepoint Consulting

Judy Holloway, TSEU

David Gonzales, Humana

Barbara Fetonte, TSEU

Mr. Hollingsworth called the meeting to order at 9:00 a.m.

1. Call roll of Board members.

Ms. Farrell called the roll. A quorum was present.

2. Consider the following administrative items – Chair:

A. Approval of the proposed October 27, 2017 Board meeting minutes.

On a motion by Mr. Moss, seconded by Dr. Gibson, the Board voted to approve the proposed minutes of the October 27, 2017 Board meeting with Mr. Hollingsworth, Mr. Nance and Ms. Sissney abstaining.

B. Excusing Board member absences from the October 27, 2017 Board meeting.

On a motion by Dr. Gibson, seconded by Mr. Elliott, the Board voted to excuse the absence of Ms. Charleston from October 27, 2017 Board meeting with Mr. Hollingsworth, Mr. Nance and Ms. Sissney abstaining.

C. Consider the election of the Board Vice-Chair.

Dr. Gibson nominated Ms. Ramirez to be the vice chair of the Board. Mr. Hollingsworth, hearing no other nominations, called for a vote. Ms. Ramirez was voted as vice chair by acclamation of the full Board.

D. Consider consenting to the Board Chair's appointment of committee members, and receive the Board Chair's public announcement of committee chairs.

On a motion by Mr. Moss, seconded by Mr. Corpus, the Board unanimously approved the proposed committee membership and chairmanship.

E. Setting, rescheduling, or canceling future Board meetings.

On a motion by Mr. Nance, seconded by Mr. Corpus, the Board unanimously approved the dates as proposed for the 2018.

3. Provide opportunity for public comment – Chair.

Ms. Diane Wuthrich, representing herself and retired teachers, expressed concerns regarding TRS investments, COLAs and healthcare issues facing retirees.

Ms. Kathy Huver, a retired teacher, expressed concerns regarding insurance. She questioned the role of the Board in determining insurance benefits, and why if a member opts out of insurance they cannot decide to opt back in unless there is a major life-changing event.

Mr. Tim Lee, Executive Director of Texas Retired Teachers Association (TRTA), expressed concerns regarding four areas: the Board's consideration of changing the discount rate and its assumed rate of return for the pension fund; the changes in health care and confusion about the premium structure at the beginning of the year, especially for those that are leaving; the policy rules that affect folks that are returning to work and the program known as optional retirement rules.

4. Receive a presentation on Making the Most When Market are Giving You the Least – Cliff Asness, Ph. D., AQR Capital Management.

Dr. Cliff Asness noted that the current market is a passive market and will be lower going forward. He said it is not a bubble but prices are high. He stated there is a difference between high and a bubble that simply cannot last.

Dr. Asness stated if one accepts the low return argument there are four possible things to do. He noted one is to be a passive investor, saying these will be expensive times. The second is add alpha, most organizations are adding as much alpha as they can proportional to their belief in alpha. The third is to add risk, lever the whole portfolio to some degree. The fourth option is, everything is worse right now so do more of it. Dr. Asness stated the key is not just how much risk you take but taking a different kind of risk. Dr. Asness further discussed risk, leverage and diversification.

5. Receive an update on the TEAM Program – Brian Guthrie and Chet Henry.

Mr. Brian Guthrie reported that in October, Phase 1 went live. He noted issues with going live, many of those deal with the delivery of benefits in terms of service and speed with processing refund claims in particular. He reviewed the history of TEAM and the different projects that encompass the entire TEAM program. He said now they are turning to a maintenance and enhancement effort with the new system. Along with Phase 2 of TRUST, scheduled to go live by August of 2019.

Mr. Guthrie reviewed the TEAM transparency report as of the end of October.

Mr. Guthrie then discussed the issues that have been identified in post go-live that were unanticipated. He said for example the amount of data received from the reporting entity partners is full payroll information regardless of whether they employees are eligible for TRS membership or not. He said this being the first time employers have had to submit this information, there was a lot of difficulty in getting all the information correct. When an error occurs the whole report is sent back to the entity to fix resulting in delays in getting reports completed. This has resulted in processing some refunds. Mr. Guthrie reported these delays have increased the call volume at a time when the call center is working with a new system, creating call length to be longer. This coupled with the change in health care going into effect January 1, and the call center is now experiencing unacceptable hold times. In response to Ms. Sissney's inquiry, Mr. Guthrie reported that Benefits and HIB teams are working together to cross-train, so that if someone in the pension center receives a health care call, they can handle it to some extent and vice versa. Ms. Barbie Pearson, addressing Mr. Hollingsworth's inquiry, stated there were identified times of year when the call volume peaked. She said peaks occur when a mass mailing is sent out such as annual statements in October and November.

Mr. Guthrie discussed the call volume, comparing October 2016 to October 2017, over 10,000 more calls were received. Mr. Welch discussed the areas affecting member experiences when coupled together have affected call volume and handle times. Mr. Welch stated the refund issue and the reporting issue are joined. He said they have called in prior coaches to assist reporting entities in processing reports in addition to increasing the overall number of coaches that work with reporting entities. Mr. Welch reported working with an advisory group to identify and

prioritize fixes that will provide the biggest bang for the buck and address those first. Mr. Welch also stated a class of 20 new employees hired for the call center. He described the job fair that was held over a weekend in the cafeteria to interview, perform background check and offer jobs in a much compressed time frame. Mr. Welch then reviewed issues centered around TRS-Care.

6. Receive a presentation from the TEAM Program Independent Program Assessment (IPA) Vendor – Michael Johnson, Bridgepoint Consulting.

Mr. Michael Johnson stated their focus is on the key risks associated with the program: schedule, quality, and cost. He said their score was different from the TEAM transparency was due to the scheduling outlook for Phase 2. He said the resources being consumed to address ongoing issues with current Phase 1 deployment are starting to consume resources that may be dedicated to Phase 2. As for quality, he said those resources being devoted to Phase 1 are not able to focus on Phase 2 quality. As for cost, he said they were within budget as it was originally laid out but it is difficult to determine due to legislative and health care changes that can drive costs to increase.

In response to Mr. Moss' inquiry, Mr. David Cook reported the relationship with the partners, Provaliant, Bridgepoint and DXC, were good.

7. Discuss the Executive Director's report on the following:

- A. Administrative operational matters, including updates on financial, audit, legal, staff services, board administration activities, special projects, long-term space planning, security, and strategic planning.
- B. Board Operational matters, including a review of draft agendas for upcoming meetings.
- C. Event notices or reminders; holiday and other schedules of interest; board member, employee or other individual recognitions; and expressions of thanks, congratulations, or condolences.

Mr. Guthrie provided general updates regarding various meetings and conferences. He announced Ms. Dolores Ramirez was named the chair of the Resolution Committee for NCTR, Dr. Greg Gibson was named a member of the Trustee Education Committee and Ms. Nanette Sissney was named a member of the Resolution Committee for NCTR as well. He also reported on being named the secretary-treasurer of NCTR, as well as being on the Executive Committee and serving as the liaison to the Legislative Committee of NCTR.

Mr. Guthrie announced TRS was named a Top Workplace in Austin for the sixth year in a row. He reported the Executive Committee had completed the review process.

Mr. Guthrie reported TRS rejoining the Council of Institutional Investors.

Mr. Guthrie provided a legislative update. He stated they were monitoring and assessing the impact of the proposed federal tax legislation regarding the Unrelated Business Income Tax (UBIT).

Mr. Guthrie reviewed recommendations resulting from the board operations Internal Audit consulting project. Which included recommendations on: timeliness of getting materials to Trustees, number of Board meetings, Board committee structure.

He reviewed his goals for the fiscal year and the timeline in which to deliver on each of the goals.

Mr. Guthrie concluded by noting an item to be discussed at the end of the day in executive session.

Mr. Hollingsworth then asked to take Agenda Item 12 out of order. Mr. Welch reported the information he was to discuss was conveyed during the TEAM presentation. However, he did have recognitions he would like to take up on the next day.

8. Consider the administrative appeal of Alice M. Jones-Smith – Carolina de Onis and Dan Junell.

Mr. Hollingsworth provided a brief background and laid out the issues before the Trustees in the administrative appeal. The first issue being whether TRS properly determined that Ms. Jones was revoked as the designated beneficiary of Mr. Phillips' death benefits when TRS received a certified copy of the divorce decree. The second issue being whether TRS breached its fiduciary duty owed to Ms. Jones when it requested a certified copy of the divorce decree from Ms. Jones.

Mr. Franklin Hopkins, representing Ms. Jones-Smith, provided arguments as to why she was wrongly denied the benefits of her ex-husband.

Ms. Carolina de Onis, representing TRS, argued that the Administrative Law Judge's decision, adopted by TRS' Executive Director, revoking the former spouse as the beneficiary was proper.

At 12:55 p.m., Mr. Hollingsworth announced without objection that the Board meeting would recess to go into executive session on agenda item number 8 under Section 551.071 and 551.089 of the Government Code to consult with legal counsel.

At 1:27 p.m., Mr. Hollingsworth reconvened the Board meeting in open session.

On a motion by Dr. Gibson, seconded by Mr. Corpus, the Board voted unanimously to affirm the executive director's decision denying the appeal and thereby deny payment of the death benefits to Ms. Jones.

On a motion by Dr. Gibson, seconded by Ms. Ramirez, the Board voted unanimously to authorize the Chair to sign an order on behalf of the Board.

9. Discuss the Third Quarter 2017 Performance Review – Steve Voss, Aon Hewitt.

Mr. Voss noted for this investment period TRS aggregate assets ended at an all-time high of \$146.3 billion. He said investment earnings were \$5.5 billion for the time period, a 3.9 percent

net rate of return. Mr. Voss reported for the one year return, 12.9 percent relative to the benchmark return of 11.2 percent, roughly 170 basis points of value added.

Mr. Voss stated for the asset allocation benchmarks TRS was not perfectly on target with each of the policy benchmarks. He said some were intentional and others were taking longer to phase into investments, he gave private assets as an example. He said the underweight for the past year for treasuries has been a negative 2.3 percent, which has had a half a percent impact in total for the past year. He also noted real assets had done exceptionally well.

Regarding risk-adjusted performance, Mr. Voss reported TRS was outperforming many of its peers. He noted volatility was at an all-time low, roughly at 5 percent.

At 1:40 p.m., Mr. Hollingsworth announced the Board meeting would recess for the day to reconvene on Friday, December 15, 2017 at 9:00 a.m.

The Board of Trustees of the Teacher Retirement System of Texas reconvened on December 15, 2017, in the boardroom located on the fifth floor of the TRS East Building offices at 1000 Red River Street, Austin, Texas. The following board members were present:

Jarvis Hollingsworth, Chair Joe Colonnetta David Corpus John Elliott Greg Gibson Christopher Moss James D. Nance Dolores Ramirez Nanette Sissney

Others present:

Brian Guthrie, TRS
Ken Welch, TRS
Don Green, TRS
Carolina de Onís, TRS
Katrina Daniel, TRS
Amy Barrett, TRS
Rebecca Merrill, TRS
Barbie Pearson, TRS
Richard Scheer, TRS
Jamie Pierce, TRS
Cindy Haley, TRS
Heather Traeger, TRS
Katherine Farrell, TRS

David R. Kelly
T. Karen Charleston
Joe Newton, GRS
Bill Hickman, GRS
Amy Cohen, GRS
Anne Lewis, TSEU
Philip Mullins, TSEU
Ann Fickel, TRTA
Henry Aerbold, PRB
Ted Melina Raab, Texas AFT

Mr. Hollingsworth called the meeting to order at 9:33 a.m.

1. Call role of Board members.

Ms. Farrell called the roll.

10. Provide opportunity for public comment – Chair.

Ms. Anne Lewis, representing Texas State Employees Union, expressed concerns regarding the Experience study, the timing of the study and the impact on the pension.

11. Recognize the service of R. David Kelly and T. Karen Charleston – Chair.

Mr. Hollingsworth stated it was a real pleasure to recognize and honor those that have volunteered their time for the members at the highest levels, trustees who have served. He stated today they will recognize two former trustees: Ms. Karen Charleston and David Kelly.

Mr. Hollingsworth read the following proposed resolution to the Board for adoption:

Whereas, T. Karen Charleston has served as a member of the Teacher Retirement System of the Texas Board of Trustees from September 2011 through November 2017, mindful of her duty as caretaker of a Trust to those who teach or otherwise serve our state's children and thereby shape its future; and

Whereas, she has provided leadership to the system during a time when the Retirement System grew to more than 1.5 million members and annuitants, management controls were strengthened, new investment allocations and procedures were adopted and implemented, the State Auditor's Office reports provided unqualified opinions with no material findings, and TRS annually received the Certificate of Achievement for excellence in Financial Reporting form the Government Finance Officers Associations; and

Whereas, she served TRS in numerous ways, including as chair of the Risk Committee and as member of Audit, Benefits and Budget committees, and as a member of the Resolutions Committee of the National Council on Teacher Retirement; and,

Whereas, she served on the Board at a time when TRS conducted an important legislative study on pension fund sustainability, which enabled the legislature to make modifications that made the Pension Fund actuarially sound, allowing for the first permanent cost of living increase for a majority of retirees in more than a decade; and

Whereas, she served on the Board during the time of TRS's 75th anniversary and joined other trustees in commemorating that special event; and

Whereas, she helped guide the agency through prudent oversight of Trust assets when the TRS Pension Fund grew from approximately \$107 billion in September 2011 to more than \$147 billion today; and

Whereas, she served as trustee and provided leadership and support to the TRS Enterprise Application Modernization, otherwise known as TEAM, which is on October 2 launched Phase 1, modernizing business processes and aging technologies to better serve a growing membership with changing expectations; and

Whereas, she always had the best interest of our members and retirees at heart, serving the educators of Texas, current, past and future, with a sense of responsibility, compassion and concern for all; and

Now, Therefore, be it Resolved that the Board of Trustees and staff of the Teacher Retirement System of Texas recognize the accomplishments and contributions of T. Karen Charleston on her valued contributions and express appreciation on behalf of TRS members, both present and future; and be it further resolved that a copy of this resolution is to be presented to T. Karen Charleston and entered into the record of the Board for December 15, 2017.

On a motion by Mr. Colonnetta, seconded by Mr. Corpus, the Board unanimously approved the resolution in honor of Ms. Charleston's service.

Mr. Hollingworth presented Ms. Charleston with the resolution and a flag flown over the Capitol in her honor. Ms. Charleston expressed appreciation to the trustees she served with and urged the new Trustees to listen and ask questions during their upcoming tenure.

Mr. Hollingsworth recognized R. David Kelly with the following resolution:

Whereas, R. David Kelly has devoted a decade of his life as a member of the Teacher Retirement System of Texas (TRS) Board of Trustees from November 2007 through November 2017, mindful of his duty as caretaker of a trust to those who teach or otherwise serve our state's children and thereby shape its future; and

Whereas, he provided leadership to the system during a time when the retirement system grew from approximately 1.2 million to more than 1.5 million members and annuitants; management controls were strengthened; new investment allocations and procedures were adopted and implemented; the State Auditor's Office reports provided unqualified opinions with no material findings; and TRS annually received the "Certificate of Achievement for Excellence in Financial Reporting" from the Government Finance Officers Association; and

Whereas, he served as chairman of the board from October 2009 to present; chairman of the Ethics and Compensation Committees; and as a member of the Audit, Benefits, Investment Management, Policy, Private Markets, Risk, and Executive Search Committees; and

Whereas, he helped guide the agency through prudent oversight of trust assets during a challenging period of extreme capital market volatility, including one of the nation's most serious recessions, when the TRS Pension Fund rebounded from \$67 billion in March 2009 to approximately \$147 billion at the end of his term; and

Whereas, he oversaw agency leadership in establishing several milestones, including the MyTRS member portal, the agency's 75th Anniversary, opening of TRS' first international office in London,

a social media program, a newly redesigned website, and the agency's first statewide student artwork contest; and

Whereas, with his investment experience and guidance, the agency restructured and expanded TRS' Investment Management Division, implemented leading-edge portfolio management strategies, guided development of a new asset allocation policy and entered into a series of innovative strategic partnerships, earning TRS numerous honors and a reputation as an investment industry leader; and

Whereas, he provided the vision, leadership and support to the TRS Enterprise Application Modernization (TEAM) Program, which on October 2 launched Phase I to modernize business processes and aging technologies, to more efficiently administer benefits through technology and better serve a growing membership with changing expectations; and

Whereas, his obvious preparation for each meeting was highly commendable and kept TRS staff on their toes; his sense of humor could also keep trustees and TRS staff guessing as to how many colors or configurations he might want for TEAM progress charts or whether he was really serious about holding a board meeting in San Antonio so he could visit Shamu; his charm, warmth and wit will be greatly missed; and

Now, Therefore, be it Resolved, that the Board of Trustees and staff of the Teacher Retirement System of Texas recognize the accomplishments and contributions of R. David Kelly during his highly regarded tenure as a TRS trustee and express appreciation on behalf of TRS members both present and future,

And be it Further Resolved, that a copy of this resolution be presented to R. David Kelly and entered into the record of the board for December 15, 2017.

Mr. Hollingsworth then presented Mr. Kelly with the resolution, a flag flown over the Capitol in his honor and a gavel presented from the Speaker of the House of the 85th Legislature, Joe Strauss, to David Kelly in recognition of his service as chairman of the Board.

Mr. Kelly stated he stood relieved from service because together the Trustees had built a culture of excellence, caring and family that has allowed them to serve their bosses, the citizens and teachers of the state. He said it was a unique privilege of his career and life to work with and be part of the family.

12. Receive the Deputy Director's report, including matters related to administrative, financial and staff services operations – Ken Welch.

Mr. Welch stated the majority of his report was covered the previous day. Mr. Welch described the Golden Apple Award as the most prestigious award within the agency that TRS employees can get. Mr. Welch introduced the recipients of the Golden Apple Award: La'Miracle Brown in health insurance area, Stephanie Scott-Rivera, in organizational change management, Stacy Saloukas, also in organizational change management, Cherie Steward, legal. Mr. Welch stated two other recipients who could not be there were Amy Brennan Luna, JAVA application programmer and Arlene Caballero in payroll department.

Mr. Welch then recognized Kyle Weigum, director of Enterprise Infrastructure Services, as receiving the Chief Information Officer Academy as one of the outstanding IT managers in the state this year.

Mr. Welch recognized Mr. Edward Esquivel, deputy director of customer service in the healthcare area, who is leaving to join one of our sister health care plan.

Mr. Welch reviewed agency activities such as the agency blood drive, SECC campaign, employee appreciation day and recognition.

13. Review the TRS Pension Trust Fund Actuarial Valuation as of August 31, 2017 – Joe Newton, Gabriel, Roeder Smith & Company.

Mr. Joe Newton provided background for the annual valuation. Mr. Newton discussed the key changes from last year. He stated the past year was a double digit return, 12.9%, that not only wiped out the deferred \$4.7 billion loss from the previous year but resulted in a billion dollar deferred gain. He reported the liability gained due to salary increases being slower than expected. He said there was a small liability adjustment from the TRS-Care changes. Mr. Newton stated the population growth, averaging 2 percent a year for the past 20 years, is an advantage other peer systems do not have.

Mr. Newton stated the unfunded accrued liability as \$35.47 billion, almost unchanged from last year. He discussed the various projections for the unfunded liability. He said if all assumptions are met and we earn 8 going forward the unfunded will get bigger before it turns over and starts coming down. Mr. Newton then discussed if everything remained constant but over time the fund earns 7.5 percent, just a half percent off, the unfunded liability in twenty years grows from \$30 billion to \$70 billion unfunded.

Mr. Newton stated the experience study is when the assumptions are reviewed. He said the Board made the decision to do it every four years, during an off legislative cycle so if any changes come out of the study, there are no new results coming forth in the middle of a legislative session. Mr. Newton then reviewed the general process of the experience study and the results. He said the assumption is chosen and set by the Board and he only certifies if the assumption is reasonable. In response to Mr. Hollingsworth's inquiry, Mr. Newton stated he did not see changes to most of the current assumptions such as the inflation, salary increase, or turnover. He said the biggest decision will be the investment return assumption. He said the return assumption must be reasonable and then discussed the definition and various elements of reasonable.

14. Receive the Fiduciary Review of Actuarial Assumptions – Steve Huff, Reinhart Boerner Van Deuren.

Mr. Steve Huff provided a presentation on the fiduciary process involved in reviewing actuarial assumptions. He said the process the Board follows is important because the process will demonstrate that the Board has followed a process that demonstrates its care, its loyalty and its prudence.

15. Review the TRS-Care Actuarial Valuation and Other Post Employment Benefit (OPEB) reports as of August 31, 2017, and receive an overview and update on TRS-Care and TRS-ActiveCare, including recognizing William Hickman's retirement – Joseph Newton; Amy Cohen and William Hickman, Gabriel, Roeder, Smith & Company

Ms. Amy Cohen provided an overview of TRS-Care. Aetna is currently the plan administrator for the self-funded medical plans. Humana took over on January 1, 2017 on administering the fully insured Medicare Advantage plans and Express Scripts as the pharmacy benefit administrator (PBM) for both the traditional and the Medicare Part D pharmacy plans in fiscal year 2017.

Ms. Cohen provided a historical look on the various programs funding and costs. She noted for FY17 there was \$1.35 billion in revenue coming into the plan. She reported \$1.6 billion of expenses last year. Looking forward to FY18, she said salary has increased from 2.2 percent to 2.65 percent, the state is going from 1 percent to 1.25 percent, active employees are staying at .65 percent of their salaries and districts are increasing their contributions form .55 percent to .65 percent. She noted beginning January 1, 2018, the retirees contributions will be changing. She stated there will be no plans offered at no cost to retirees. Ms. Cohen then reviewed the changes to the prescription drug plan.

Ms. Cohen discussed the fund balance noting the balance as being projected as negative beginning FY 2020.

Ms. Cohen then reviewed TRS-ActiveCare. The current benefit administrators are Aetna and CVS/Caremark. She reported revenues in FY 17 as \$1.9 billion and another \$230 million was received in HMO premiums which is passed through to the HMO Carriers. She said the expenses were \$1.73 in self-funded claims.

Mr. Joe Newton reviewed the other post-employment benefits (OPEB). Mr. Newton reported for the CAFR they need to assess a long-term liability on this program, TRS-Care. Also with the new accounting rules the liability, similar to the pension plan, now goes on the balance sheet of the school districts and the state based on their proportionate share of contribution efforts and projected contribution effort. Mr. Newton stated \$43 billion will be allocated out to the different entities based on their proportionate share of the total.

Mr. Hollingsworth noted Mr. Bill Hickman will be retiring. He presented Mr. Hickman with a certificate from the House of Representatives and a flag that was flown over the Capitol. Mr. Hollingsworth then read the following resolution into the record:

Whereas, William J. "Bill" Hickman deserves and receives the sincere thanks of all Texans for providing 32 years of calm, sincere and technically precise advice to the Teacher Retirement System of Texas;

Whereas, by assisting the agency and the legislature to conceive, enact, manage and maintain TRS-Care and TRS-ActiveCare, he has helped encourage people to work in public education, and

those public education employees have taught, developed and supported millions of students who have made Texas what it is today and what it will be tomorrow;

Whereas, Bill guided TRS to become one of the first entities in the nation to develop its own provider network to help members obtain efficient and quality health care, while helping TRS make wise use of taxpayer resources and helping with the health care providers build practices dedicated to serving the families of Texas public education employees;

Whereas, 30 years ago he pioneered the extensive use of health care claims and eligibility data to help TRS make sound decisions relating to quality coverage at affordable cost when such predictive analytics were extremely innovative;

Whereas, Bill assisted the 69th and 77th Texas Legislature to conceive and enact the TRS-Care and the TRS-ActiveCare programs; and

Whereas, he led the first of three certification studies performed prior to the acceptance of TRS-ActiveCare. Beginning with 1998-99 school year, he and his team reviewed health care benefit plans for 1,016 school districts representing 2,336 plans covering 407,840 employees in order to determine comparability to the health care coverage provided by state employees; and

Whereas, Bill assisted TRS in the implementation of a long-term care program in 2000; and

Whereas, during his assistance to TRS Bill helped select health care coverage vendors more than 30 times, and in 2012 he assisted TRS with the procurement of a Medicare Advantage insurer as well as Medicare Part D plan vendor which is estimated to have saved the TRS-Care program over \$100 million in expenditures in fiscal year 2013; and

Whereas, Bill and his team assisted TRS in studying the financial solvency of TRS-Care in three sustainability studies, with the first conducted in 2012 as a result of the 82nd Legislature, explored options including changes to state district active employees and three retiree contributions, changes in plan design and a review of a defined contribution approach, as well as conducting similar studies in 2014 and 2016 that led to significant program changes for the 2018 program year; and

Whereas, TRS-Care was originally intended to remain in place for only ten years but has instead been a positive addition to Texas public education for 32 years; and

Whereas, since inception, TRS-Care and TRS-ActiveCare have provided health care coverage for approximately 2 million Texans; and

Whereas, we estimate that Bill has contributed to more than 300 TRS Board meetings, as well as represented TRS-Care in 17 legislative sessions; and

Whereas, the people of Texas thank Bill, and the TRS Board of Trustees presents him with its permanent gratitude for having provided thoughtful analysis, innovation, and support to TRS in its mission to provide quality health care coverage so that the lives of our members and dependents will be better; and

Now, therefore, be it resolved that the Board of Trustees and staff of the Teacher Retirement System of Texas recognize the accomplishments and contributions of William J. Hickman and express appreciation on behalf of TRS members both present and future, and be it further resolved that a copy of this resolution be presented to William J. Hickman, and entered into the record of the Board for December 15, 2017.

On a motion by Mr. Moss, seconded by Mr. Corpus, the Board unanimously voted to adopt the resolution honoring Mr. Hickman's service. Mr. Hickman thanked the Board and noted it was a rewarding challenge and a real honor to do the work.

11. Recognize the service of R. David Kelly and T. Karen Charleston – Chair.

Mr. Guthrie noted that the Board had not voted on Mr. Kelly's resolution. Mr. Hollingsworth sought a motion to approve the resolution for former Trustee David Kelly.

On a motion by Mr. Corpus, seconded by Ms. Ramirez, the Board unanimously voted to adopt the resolution honoring Mr. Kelly's service.

16. Receive an update on TRS Care communications outreach – Katrina Daniel.

Ms. Katrina Daniel recognized the efforts of her staff in particular, Ms. Meaghan Bludau, the head of health care communications and informatics section. Ms. Daniel noted the TRS-Care plan underwent some tremendous changes this year and reviewed the communication efforts to inform the 270,000 retirees and their families who participate in the plan. Ms. Daniel reported on average 15 touch points per participant through direct mail, face-to-face meetings across the state, electronic communications, webinars, etc. Ms. Daniel reviewed the use of the outside vendor for the expected higher call volume.

17. Review the Comprehensive Annual Financial Report for fiscal year 2017 – Richard Scheel and Cindy Haley.

Mr. Richard Scheel presented the Comprehensive Annual Financial Report (CAFR) for FY 2017. He noted the CAFR is dedicated in memory of Ms. Anita Smith Palmer and her artwork is featured throughout this year's CAFR. Ms. Cindy Haley reviewed the healthcare portion and GASB 74 of the CAFR. She said the biggest change will be next year, when the employers present their liabilities on the balance sheet for the first time for the OPEB cost.

18. Review the reports of the Chief Financial Officer regarding expenditures, current financial review, and other financial matters involving TRS programs – Don Green.

Mr. Don Green provided the current budget status. He reported the fiscal year to date, two months, is in good shape. He noted that TRS was currently under the FTE cap of 524 at 500. In response to Mr. Hollingsworth's inquiry, Mr. Guthrie stated the open positions were related to high turnover in the call center, the hiring freeze and

19. Receive the report of the Investment Management Committee on its December 14, 2017, meeting – Committee Chair.

Mr. Colonnetta, the Committee Chair, provided the following report of the Investment Management Committee:

The Investment Management Committee met on December 14, 2017, whereby they approved the proposed minutes of the September 21, 2017 meeting. There were two presentations, the first of which was a review by the multi-assets strategies group, presented by Mohan Balachandran, Ashley Baum, Kyle Schmidt, and Matt Talbert. The final presentation was a review of the annual risk group update, given by James Nield and Mark Telschow.

20. Receive the report of the Risk Management Committee on its December 1, 2016, meeting. – Committee Chair.

Mr. Elliott, the Committee Chair, provided the following report of the Risk Management Committee:

The Risk Management Committee met on December 14, 2017. During that meeting the committee approved the proposed minutes from the September 21, 2017 meeting. At that time, the risk management and strategic planning staff provided a report on the enterprise risk management function, and that included an update on the stoplight report, the heat map, and in addition, the 16 risk assessments that had been completed during this period. That report was presented by Michelle Pagan and Heather Traeger.

- 21. Receive the report of the Policy Committee on its December 14, 2017, meeting and consider; proposed amendments to the General Authority Resolution, TRS Key Employee Determinations, or Mission Statement; and consider adopting the following new or amended TRS rules in Title 34, Part 3 of the Texas Administrative Code: Committee Chair.:
 - i. § 29.90, relating to Forfeiture of Certain Benefits Due to Criminal Offense.
 - ii. § 29.91, relating to Restoring Forfeited Benefits After Convictions is Overturned;
 - iii. § 41.1, relating to Initial Enrollment Periods for the Health Benefit Program under the Texas Public School Retired Employees Group Benefits Act (TRS-Care);
 - iv. § 41.5, relating to Payment of Contributions;
 - v. § 41.7, relating to Effective Date of Coverage;
 - vi. § 41.12, relating to Eligibility for the Alternative Plan for Medicare-Eligible Participants.

Mr. Corpus, the Committee Chair, provided the following report of the Policy Committee:

The Policy Committee met on December 14, 2017. The committee approved the proposed minutes of the September 21, 2017 meeting. The committee conducted the required comprehensive review of the TRS mission statement. The committee recommended wording changes to the mission statement.

The committee did not take up adoption of the notice of completed rule review of 403(b); instead, that item will be taken up by the full Board at the February meeting.

The committee conducted a comprehensive review of the TRS key employee determinations and recommended that the Board adopt staff proposed amendment to the determinations. The updates are needed to reflect staffing changes. The committee recommended that the Board adopt proposed amendments to the general authority resolutions which are also needed to reflect staffing changes. The committee also discussed the required comprehensive reviews of the trustee ethics policy and position description, the employee ethics policy, the conflict of interest disclosure statement, and the disciplinary action disclosure statement. The committee deferred discussing any proposed amendments to the policy until February when the matter will be taken up by the full Board.

Finally, the committee approved recommending to the Board adoption of the proposed new and amended TRS rules within Chapters 29 and 41 and Title 34, Part 3 of the Administrative Code. Concurrent with the recommendation, the committee provided direction that TRS was to suggest to the legislature clarification of the language underlying the rules in Chapter 29 as soon as practicable.

Mr. Corpus moved, and Board unanimously voted to adopt amendments to the TRS mission, as recommended by the Policy Committee, so that the mission statement reads as follows: "Improving the retirement security of our members by prudently investing and managing the Trust assets and delivering benefits that make a positive difference in their lives."

Mr. Corpus moved, and Board unanimously voted to adopt the proposed amendments to the general authority resolutions as recommended by the Policy Committee.

Mr. Corpus moved, and Board unanimously voted to adopt the proposed new and amended TRS rules within Chapter 29 and 41 of Title 34, Part 3 of the Administrative Code, as recommended by the Policy Committee.

22. Receive the report of the Audit Committee on its December 2, 2016, meeting – Committee Chair.

Mr. Moss, the Committee Chair, provided the following report of the Audit Committee:

The Audit Committee met at 8:00 a.m. on Friday, December 15, in the 5th Floor Boardroom. The State Auditor's Office staff presented the results for the audit of the TRS comprehensive annual financial report for fiscal year 2017. TRS received an unqualified opinion, the best available. They also presented the results of the incentive compensation plans for 2016 and the classification audit of information technology positions. Grant Thornton representatives presented the results of the TRS Investment Company financial statements for fiscal year 2017. TRICOT received an unqualified opinion.

Truven representatives presented the results of five audits of TRS-Care and TRS-ActiveCare health plan and pharmacy benefit administration claims. The chief compliance officer presented routine compliance reports. Internal Audit staff presented results of projects, including reports on TRS compliance, testing, follow up on outstanding audit and consulting recommendations, the internal audit annual report, and various administrative reports.

23. Review the report of the Chief Benefit Officer, and consider the following related matters – Barbie Pearson:

- a. Consider approving the list of members qualified for retirement for September through November 2017.
- b. Consider approving the minutes of the July and September 2017 Medical Board meetings.

Ms. Barbie Pearson stated she had two items for Board approval. The first item is the list of members qualified for retirement for September through November of 2017.

Mr. Moss made a motion, seconded by Dr. Gibson, and the Board unanimously approved the list of members qualified for retirement for September through November of 2017.

Ms. Pearson presented the second item for Board approval, the minutes of TRS Medical Board for July and September of 2017. Mr. Hollingsworth questioned if the Board was being asked to approve or accept the minutes. Mr. Guthrie stated that past procedure was for the Board to approve the minutes but will review statute and bylaws and report back.

Dr. Gibson made a motion, seconded by Ms. Ramirez, and the Board unanimously approved the minutes of TRS Medical Board for July and September of 2017.

24. Review the report of the General Counsel on pending and contemplated litigation, including updates on litigation involving benefit-program contributions, retirement benefits, health-benefit programs and open records – Carolina de Onis.

Ms. Carolina de Onis announced the successful conclusion of an important case. She said back in 2012 TRS sued the Office of the Attorney General of Texas on an open records matter involving the personal financial information of the then Chief Investment Officer of TRS and the former head of private markets. She reported a settlement with the AG was reached to retroactively apply subsequent legislation that made personal financial records submitted by TRS employees or other disclosures made for ethics purposes confidential.

7. Discuss the Executive Director's report on the following:

A. Administrative operational matters, including updates on financial, audit, legal, staff services, board administration activities, special projects, long-term space planning, security, and strategic planning.

At 1:10 p.m., Mr. Hollingsworth announced, without objection, that the Board would adjourn to an executive session on agenda item number 7A under Section 551.071 and 551.089 of the Texas Government Code.

At 1:21 p.m., Mr. Hollingsworth reconvened the Board meeting in open session.

25. Consider personnel matters in Executive Session, including the appointment, employment, evaluation, reassignment, duties, discipline, or dismissal of a public officer or employee – Chair.

This agenda item was not taken up.

26. Consult with the Board's attorney(s) in Executive Session on any item listed above on this meeting agenda as authorized by Section 551.071 of the Texas Open Meetings Act (Chapter 551 of the Texas Government Code) – Chair.

This agenda item was not taken up.

At 1:22 p.m., Mr. Hollingsworth adjourned the meeting.

APPROVED BY THE BOARD OF TRUSTEES OF THE TEACHER RETIREMENT SYSTEM OF TEXAS ON THE 14th DAY OF FEBRUARY 2018.

ATTESTED BY:		
Katherine H. Farrell	Date	
Secretary to the TRS Board of Trustees		

TAB 4



种

Overview

- February Board Meeting Theme.
- Review the New TRS Mission Statement.
- 2019 2023 TRS Strategic Plan's Goals and Objectives.
- Review TRS Management Continuity Program.
- Review of Agenda.





February Theme







TRS: One Mission. Many Hearts.







State Employee Charitable Campaign





Participation is up 12% over last year.

The average gift per employee was \$351.

We've exceeded our goal in four of the past five years.

TRS has raised \$600,000 for charities in the past five years. The great majority of it for local area charities.





TRS: One Mission. Many Parts.





TRS Mission Statement

Improving the retirement security of our members by prudently investing and managing the Trust assets and delivering benefits that make a positive difference in their lives.

December 2017





2019 – 2023 TRS Strategic Plan Goals and Objectives





TRS Strategic Plan 2019-2023 - Draft



GOAL 1

Sustain a financially sound pension system.

Objectives:

- Improve communication regarding pension funding needs.
- Increase identification of underpayments and collection of future contributions to TRS.
- Achieve the trust's actuarial assumed rate of return as measured on rolling 20-year periods.
- Improve information regarding the impact of changing pension plan design.



GOAL 2

Continuously improve our benefit delivery.

Objectives:

- Improve the customer service experience.
- Improve the quality of benefit estimates and timeliness of disbursements.
- Improve accuracy in employer reported data.
- Improve awareness of and modernize the 403(b) program.





TRS Strategic Plan 2019-2023 - Draft

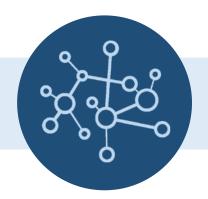


GOAL 3

Facilitate access to competitive, reliable health care benefits for our members.

Objectives:

- Improve communication efforts regarding health care funding needs.
- Increase the value of health care benefits.
- Improve the health of our members.



GOAL 4

Ensure that people, processes, and technology align to achieve excellence in the delivery of TRS goals.

Objectives:

- Attract, retain and develop a highly competent staff.
- Implement modern pension and benefit information systems that allow TRS staff to serve our members and deliver accurate benefits effectively and timely by August 2019.
- Implement modern health and benefit information systems that allow TRS staff to serve our members and deliver accurate benefits effectively and timely by August 2019. 10





TRS Strategic Plan 2019-2023 - Draft



GOAL 4

Ensure that people, processes, and technology align to achieve excellence in the delivery of TRS goals.

Objectives (cont'd):

- Advance and enhance IT systems and services.
- Continue to enhance a strong information security program to protect critical systems and data.
- Improve our enterprise-wide governance, strategic decision-making, business processes and technology alignment.
- Modernize TRS facilities and maximize space utilization.



GOAL 5

Promote purchasing selection practices that foster meaningful and substantive inclusion of historically underutilized businesses (HUBs).

Objectives:

Increase the number of utilized Historically Underutilized Businesses (HUBs).



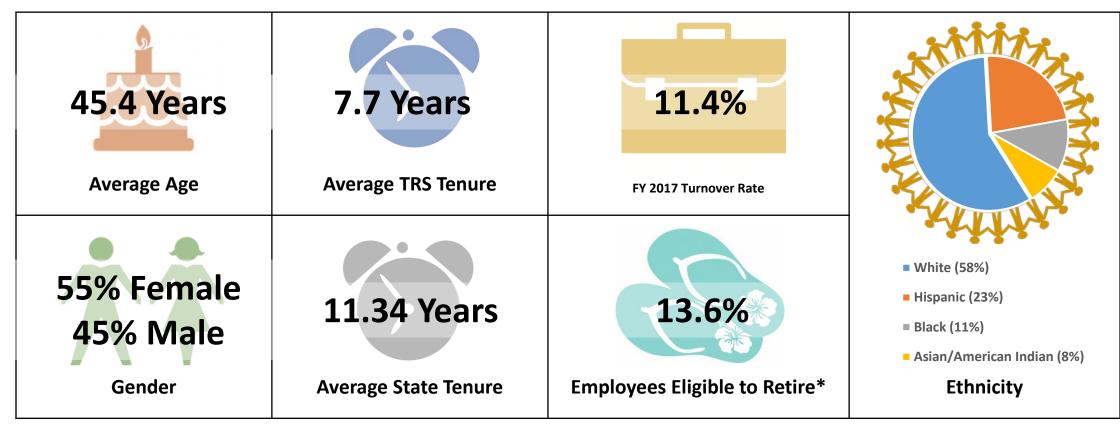


TRS Management Continuity Program to Meet Mission





TRS Employee Profile





*Note: Based on rule of 80



Retirement Eligibility Projections

Department	Retirement Eligibility Projections* Percent of TRS Employees Eligible to Retire as of:						
	January 2018		January 2020		January 2023		
	Eligible Employees	Percent Eligible	Eligible Employees	Percent Eligible	Eligible Employees	Percent Eligible	
Executive Division**	24	24.5%	27	27.6%	33	33.7%	
Investment Management	6	4.2%	8	5.6%	12	8.4%	
Benefit Services	20	10.6%	26	13.8%	39	20.7%	
Finance	14	16.7%	20	23.8%	31	36.9%	
Information Technology	21	19.6%	29	27.1%	39	36.5%	
Health and Insurance Benefits	4	11.4%	5	14.3%	5	14.3%	
Total	89	13.6%	115	17.6%	159	24.3%	
Executive Council Members	7	53.8%	7	53.8%	8	61.5%	

Notes:

^{**}Executive Division includes Legal Services, Internal Audit, Communications, Government Relations, Organizational Excellence, Project Management Office and Strategy Office



^{*}Estimates are based on the rule of 80 using active employees as of 12/31/2017 and includes return-to-work retirees.



Management Continuity Program

Position Planning

- 14 critical positions identified and profiled
- 3 cohorts of high potential employees identified
- Assessments, gap analysis, development plans and coaching of high potentials underway
- Facilitated by Emergent Execs

Leadership Development

- 4th TRS cohort
- Classroom style
 program combined
 with customized
 executive coaching,
 designed to assist
 TRS to equip, coach,
 and promote rising
 management talent
 and high performers
- Facilitated by Emergent Execs

Development Plans and Career Paths

- Organizational Excellence working to create pilot of updated individual development plans for employees
- Individual development plans correspond to career path goals and learning and development opportunities

Knowledge Transfer

 Knowledge transfer for critical positions ongoing





Agenda Highlights for Next Three Days





Agenda Highlights for Next Three Days

Wednesday, Feb. 14, 2018	Thursday, Feb. 15, 2018	Friday, Feb. 16, 2018
Customer Service Review	Investment Matters	State Street
Proposed Bylaw Amendments	Fiduciary Training	Value of Audit
Experience Study and Return Assumption	Healthcare Costs	Resource Review





Agenda for the Day, February 14, 2018



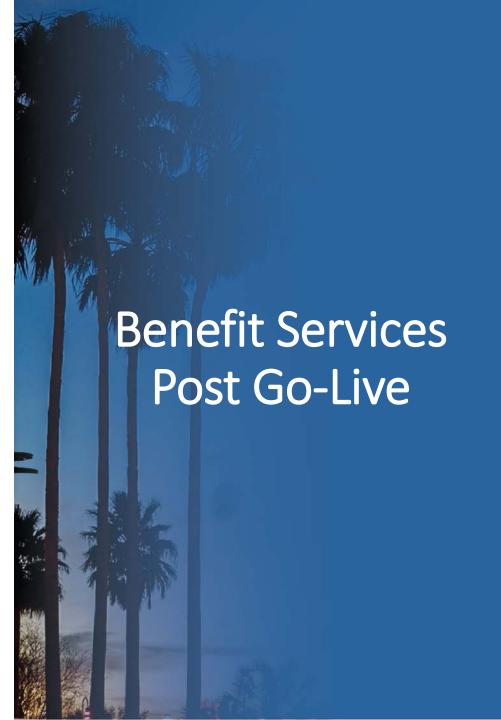


Agenda for February 14th, Wednesday

- 1. Call roll of Board members.
- 2. Consider Board administrative matters, including the following Jarvis Hollingsworth.
 - A. Approval of the December 14-15, 2017 proposed meeting minutes
 - B. Setting, rescheduling, or canceling future Board meetings.
- 3. Provide an opportunity for public comment Jarvis Hollingsworth.
- 4. Receive an overview of the Board meeting agenda and theme Brian Guthrie.
- 5. Receive an update on the Many Parts and One Mission of TRS Customer Service –Janet Bray, Katrina Daniel, Rebecca Merrill and Barbie Pearson
- 6. Consider Amendments to the Bylaws of the Board of Trustees of TRS Rebecca Merrill, Heather Traeger, and Amy Barrett
- 7. Receive an update on the TEAM Program, Reset for Phase 2 Brian Guthrie and Chet Henry.
- 8. Receive a presentation on Capital Market Assumptions Steve Voss, Aon Hewitt.
- 9. Review and consider the TRS of Texas Experience Study Findings and Recommendations, including considering the Return Assumption Joe Newton, Gabriel, Roeder, Smith & Co.
- 10. Review the Defined Benefit and Defined Contribution Report and Proposed Update Caasi Lamb.

TAB 5





TRUST Challenges

Service Standards History

How Are We Doing?

Challenges

Membership vs. Staff Growth

Immediate Needs

Customer Service Initiatives

**

TRUST Challenges

- End of Year Close-out
- Data Migration / Cut-over to TRUST
- Hurricane Harvey
- Refund Process Defects
- Bridging Issues
- RE Report Defects
- Delays in Posting Reports
- Slow adoption to TRUST
- Users performing tasks in legacy and TRUST







Member Service Performance Measure History

1995

Average Speed of Answer: 100% of calls answered in 2 minutes

1999

Compact with Texans

2015

Service Level: 80% of calls answered in 3 minutes





Member Service Measured

Average Handle and Hold Time (minutes)



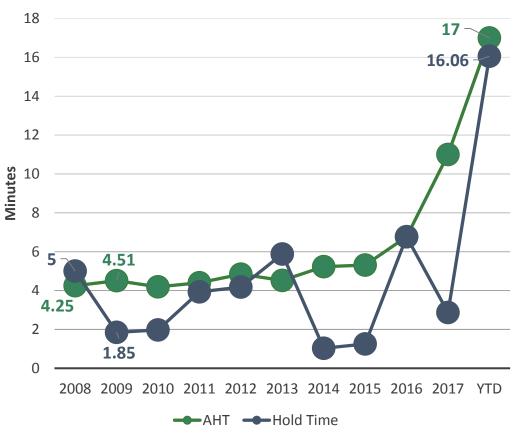
- Relationship
- Increasing since 2016
- Since Go-live
 - repeat calls regarding refunds
 - diffusing frustrations
 - retirement packet delivery time
- Duplicate Requests for Service
 - Social Media
 - TRS comments
 - Member email
 - Legislative requests



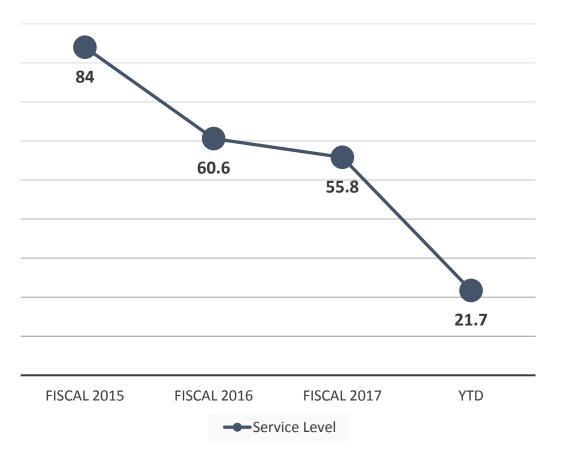


Member Service Measured

Average Handle and Hold Time (minutes)



Service Level

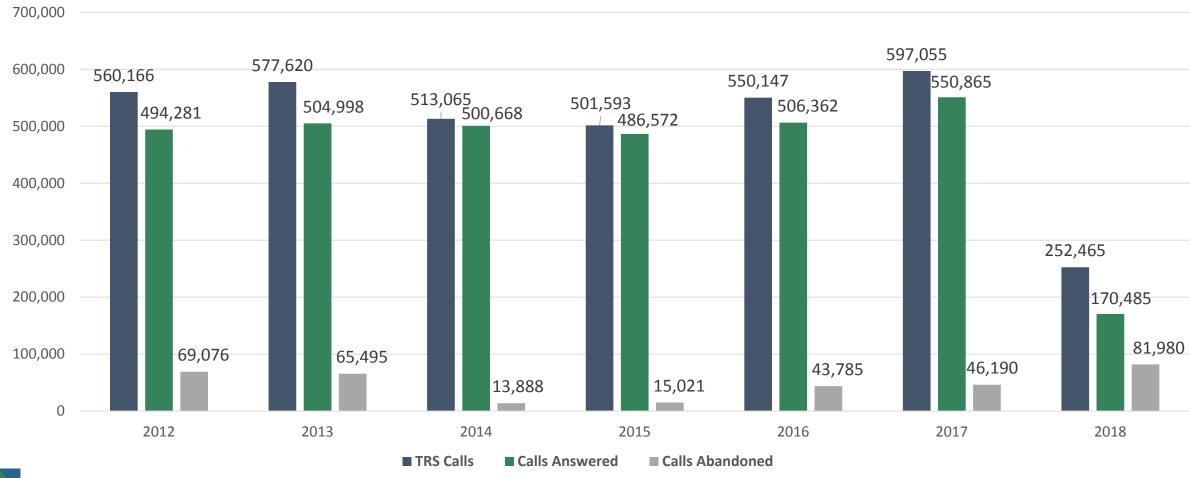






Benefit Services: Counseling

Member Service Calls

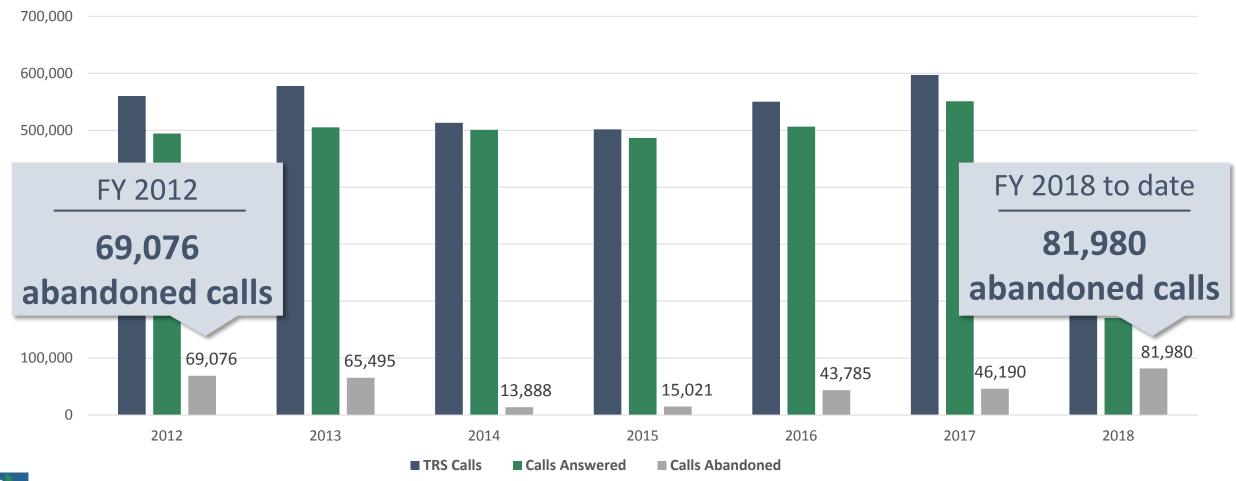






Benefit Services: Counseling

Member Service Calls

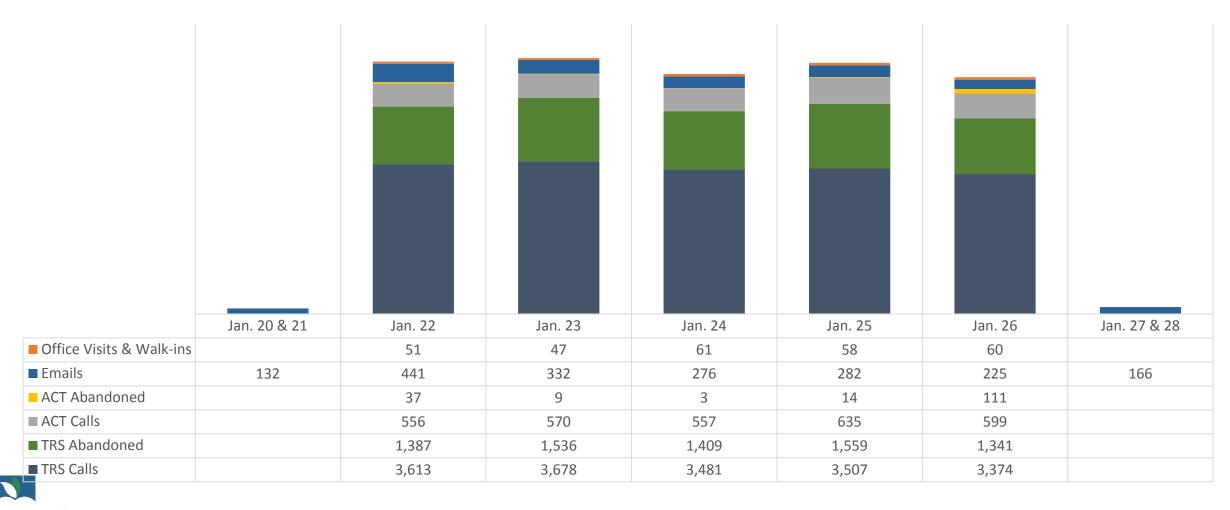






Benefit Services: Highest Call Volume Week

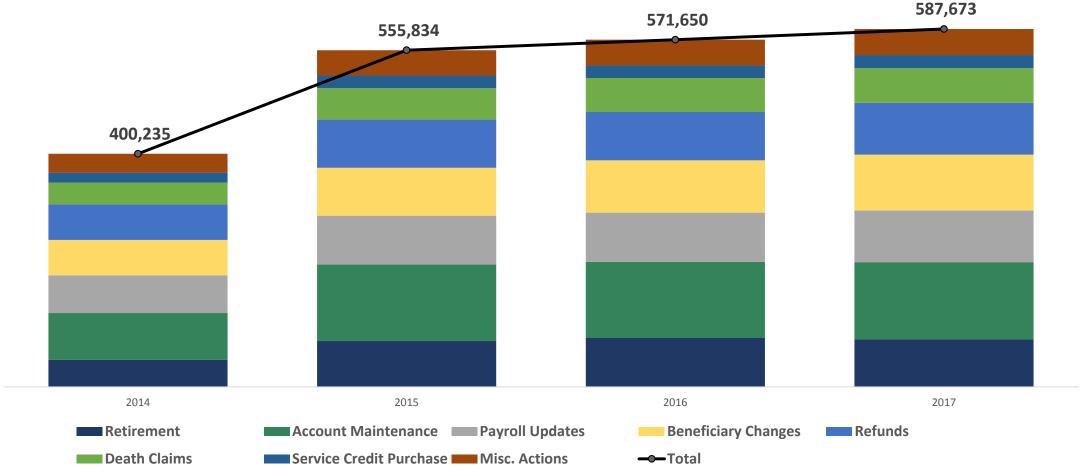
MEMBER SERVICE







Benefit Services: Benefit Processing







Benefit Services: Benefit Reporting

	TRAQS	TRUST Portal	Difference %
Validations	260	701	170 %
Regular Payroll - Records	6	3	-50%
Regular Payroll - Data Elements	92	117	1 27%
Employment after Retirement - Records	2	4	1 100%
Employment after Retirement - Data Elements	28	82	1 93%
Member Data - Records	8	6	-25%
Member Data - Data Elements	145	124	1 -14%





Benefit Services: Benefit Reporting

District Size by Number of Members	Sept. 2017 Average Number of Errors (TRUST)	Sept. 2017 Average Number of Warnings (TRUST)	Sept. 2016 Average Number of Errors (TRAQS)	Sept. 2016 Average Number of Warnings (TRAQS)
< 100	89.06	21.02	27.02	21.45
100 – 499	411.52	98.13	82.85	98.58
500 -1,000	960.36	231.82	259.42	251.72
> 1,000	7,547.05	1,458.02	1,141.88	1,383.32





Member Service Challenges

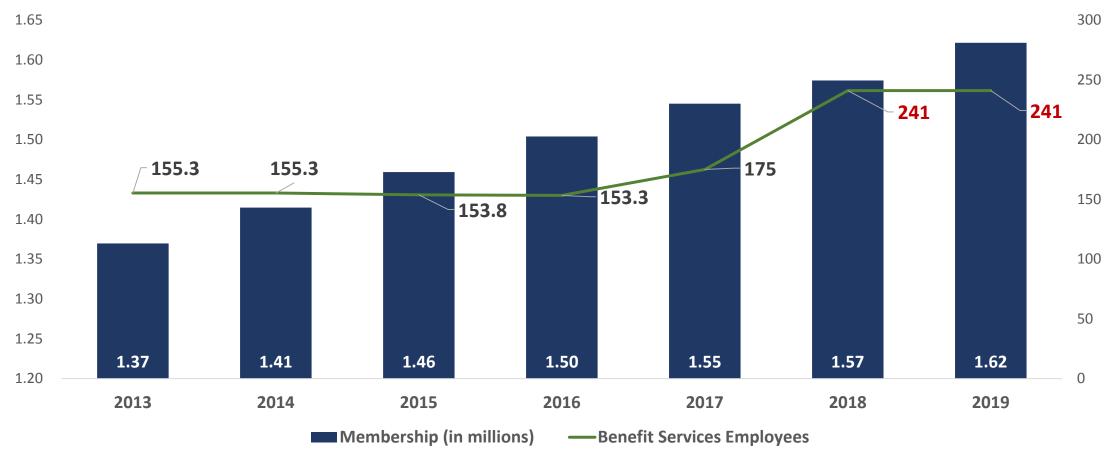
- Managing Member Expectations
 Post Phase 1 Go-live
- Increasing Hold Time
- Increasing Handle Time
- Call Volume Limits
- Duplicate Service Requests







Membership vs. Benefit Services Employee Growth







ICMI High Level Recommendations

TOP 5	High Level Overview				
	 Completely and accurately forecast all workloads 				
D 1 11 114 D: 1	Develop long-term capacity plans (12 month minimum)				
Recommendation #1: Rigorously engage a proactive planning	Hire the staff needed				
process and culture	 Formalize proactive planning process to ensure all non-productive activities occur at the optimal time 				
	 Adopt WFM Best Practices and formally re-launch WFM 				
	Hire the staff needed				
Recommendation #2:	Conduct pre-hire assessments				
Realign the contact center and support structure to improve	Enhance the current onboarding process				
scalability, efficiency and	Realign by function				
communication	 Centralize all shared service support functions 				
	Refocus supervisor duties				





ICMI High Level Recommendations

TOP 5	High Level Overview			
	 Clarify and communicate skill path, career path and development opportunities 			
Recommendation #3:	Provide ongoing development			
Enhance quality assurance and	Monitor all interactions and more often			
continuous improvement	Coach to the behavior, not the score			
initiatives	Identify opportunities to improve processes			
	Create a helpline for counselors to call when they have questions			
Recommendation #4:	Coordinate your customer access strategy			
Focus on right metrics, support	Establish and enforce service-level agreements with third-party providers			
with clear reporting and confident coaching efforts	Measure all channels			
	 Enhance formal and informal communication channels 			
	 Calibrate coaching with QA and supervisors 			





ICMI High Level Recommendations

TOP 5	High Level Overview			
	 Invest in updated and new technologies 			
	Prepare for remote work			
Recommendation #5: Address technology and facility	 Content provisioning for channels should ensure that members receive the same answer regardless of how they sought the information 			
issues	 Redesign space so that center operations are in a contiguous work space 			
	Locate supervisors in the center, near their teams			
	 Provide member meeting rooms in a less secured location 			





ICMI Recommended Staffing Level Plans

Benefit Services Division					
	Service Level Objective				
Position	80% in 180 Seconds	80% in 60 Seconds	Current TRS Staff	Difference	
Counselors (Office and Telephone)	75	82	62.8*	12-20	
Supervisors	5	6	4	1-2	
QA Specialists	3	4	2	1-2	
Trainer	2	2	1	1	
Workforce Team (Shared with HIB)	2	2	1	1	

Notes:

- Forecast is based on average hold time of 10.27 minutes (616 seconds)
- · Includes phone, office visits, and email activity
- There is potential to use new supervisors as quality assurance or trainers at the beginning of the expansion to support hiring and learning curve
- *Includes 11 additional telephone counselors hired in anticipation of vacancies





Department	Fiscal 2017	TEAM Funded	Projected Need	Total Fiscal 2018
Benefit Counseling*	77.5	0	31	108.5
Benefit Disbursements	8	1	3	12
Benefit Processing*	79.5	14	6	99.5
Benefit Reporting	10	7	4	21
Benefit Services Total:	175	22	44	241
Internal Audit (RE Audits)			9	9

^{*} Increases for department includes supervisor positions.



Staffing Strategy: Telephone Counselors

Phase	Group	Targeted Hire Date	Trained and on the Phones	Impact to Call Volume
Phase I	16 Telephone Counselors	April 16, 2018	May 28, 2018*	Improvements within first week after training completed; full impact by September 2018
Phase II	15 Telephone Counselors	June 11, 2018	July 23, 2018*	Continued improvements within first week after training completed; full impact by November 2018
Phase III (if needed)	Telephone Counselors (# TBD)	TBD	TBD	Will assess ongoing call volume

^{*}Timelines are dependent on the availability of classroom trainers and on-the-job coaches to shadow new staff. Once new employees are released to the phones they will still considered "in training" and require assistance.





Customer Service Initiatives

Initiatives to date:

- Paid overtime
- Cross training throughout Benefit Services
- ACT for Pension Calls
- New Hires completed training
- Communications on website and on hold recordings
- Service Delivery expectations updated
- Managing expectations of reporting entities





ACT Support for TRS

TRS is currently using contractors with Advanced Call Center Technologies (ACT) to support contact center operations:

- 13 26 contractors for Benefit Services (member calls & back office processing)
 - Member statements
 - Net Pay Change Letters & 1099R calls; address change request processing
 - Approx. 10,000 calls fielded





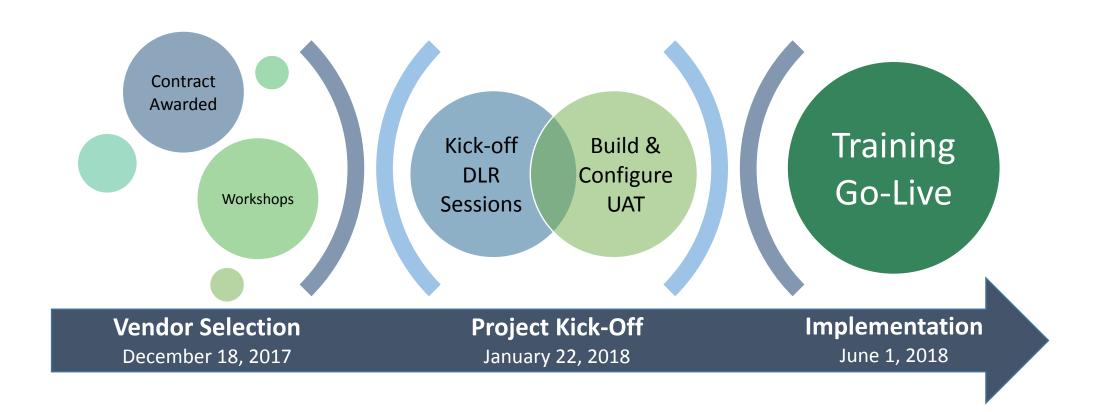
New Contact Center Overview







Call Modernization Implementation Plan







Health Insurance & Benefits

The most significant changes to TRS-Care—in the history of the program—took effect **January 1, 2018**, affecting **270,000 participants**.

December 31, 2017

Three to five plan options based on Medicare status

No premium for retiree-only coverage on TRS-Care 1

Not required to purchase Medicare Part B January 1, 2018

Single plan option based on Medicare status; Part B required

No \$0 premium option for retirees

Higher deductibles and out-of-pocket costs

Prescriptive Action

Provide information to educate and support decision-making

Increase customer service and support to meet demands

Ensure participants are in the plan they want







Nearly

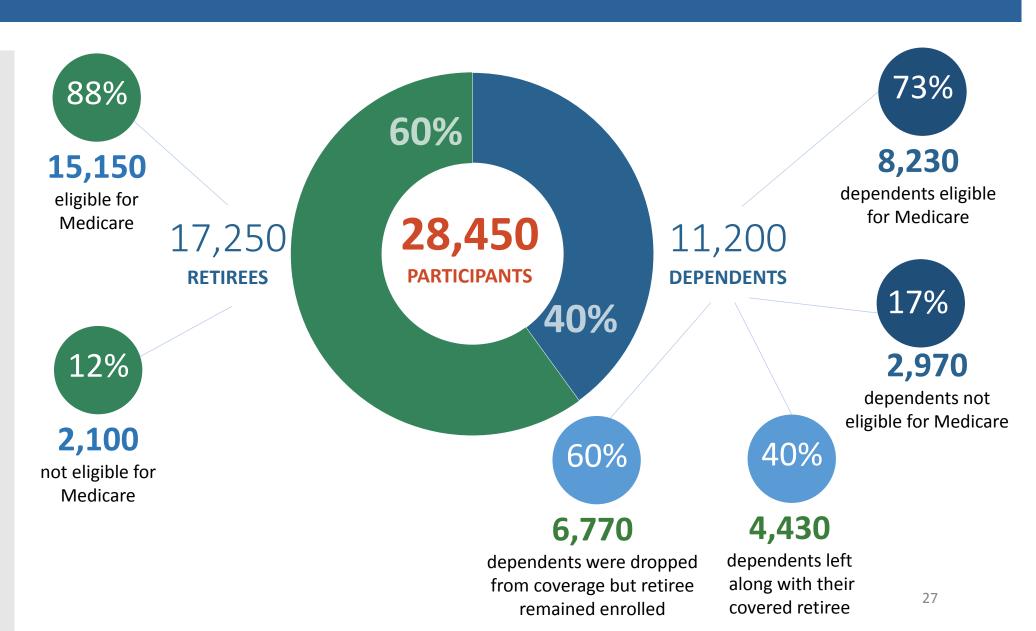
90%

of the roughly
270,000
population
stayed enrolled
in TRS-Care



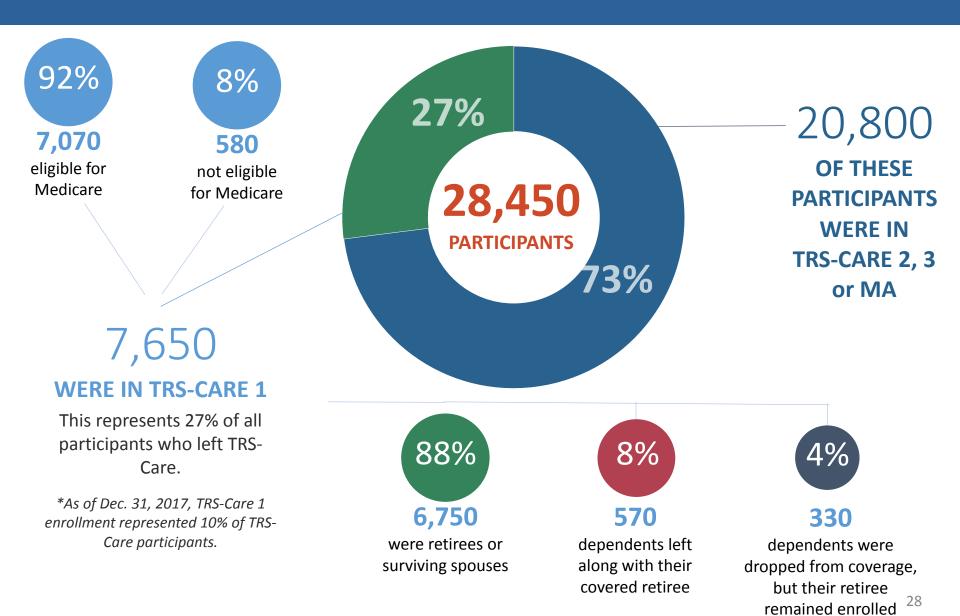


Of the 270,000 members, 28,450 participants chose to leave TRS-Care between September 1, 2017 and January 1, 2018





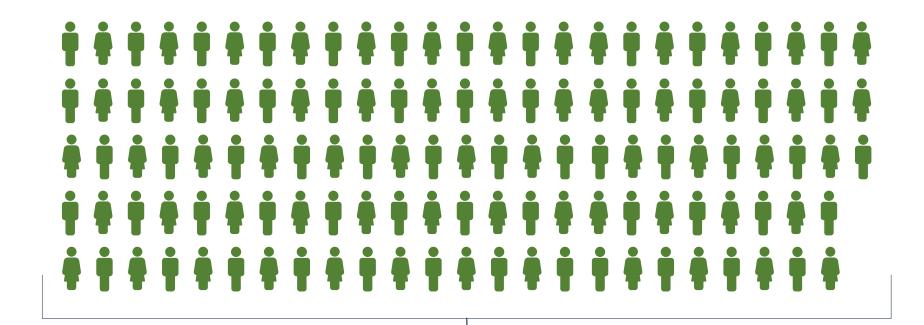
Of the 270,000 members, 28,450 participants chose to leave TRS-Care between September 1, 2017 and January 1, 2018





Successfully migrated those who stayed, 240,000+

to their new 2018 plans.







Go Live Timeline

Jan. 1, 12:00 a.m. Jan. 1, 1:00 p.m. Jan. 2, 12:30 p.m. Jan. 2, 6:00 p.m. Jan 3, 12:00 a.m.

- No issues reported from vendors
- 2,000
 prescription
 drug claims
 processed
 successfully by
 CVS and Silver
 Script
- Low number of calls received indicating smooth transition
- Nearly 7,000 prescription drug claims processed successfully
- Humana received 147 medical claims; few denied
- Aetna received
 9 medical
 claims; none
 denied
 (excludes auto-

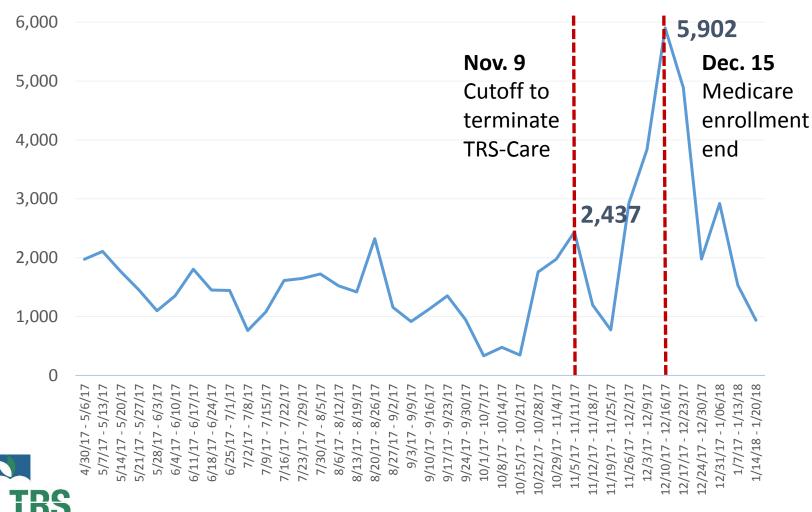
(excludes auto adjudicated)

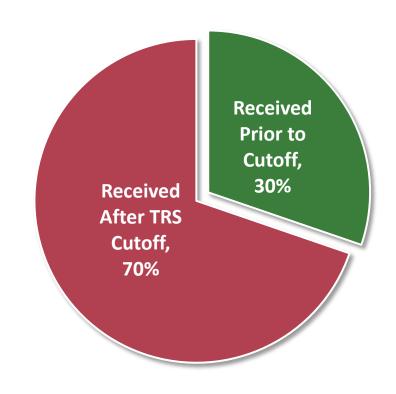




Timing of TRS-Care Termination Requests

CORRESPONDENCE RECEIVED BY WEEK

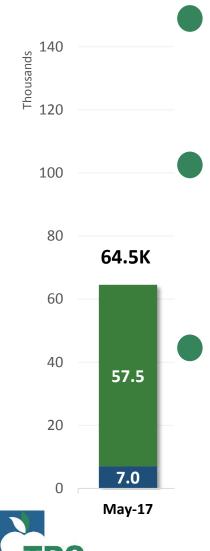








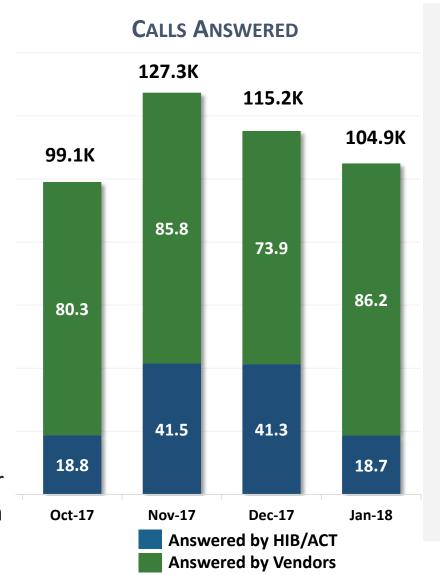
Unprecedented Call Volume

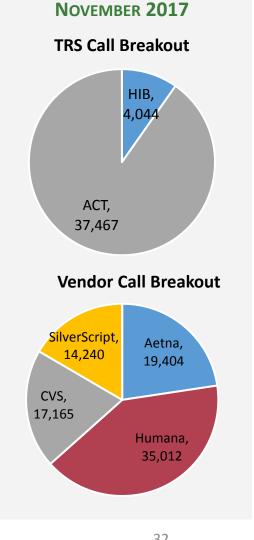


In October, December, and January, total calls answered neared or exceeded 100,000 each month.

Call volume peaked in November 2017. That month, the number of answered calls by HIIB/ACT and external vendors reached 127,332.

That is double the number of calls answered in May 2017 before the TRS-Care plan changes were passed. HIB and ACT's call volume in November was nearly 6 times higher than in May.







Mitigations and Remediation of Issues



COORDINATION

with CMS to ensure terminations (Medicare population)

 Worked with CMS to review populations.



INCREASED

speed on file transfers to vendors

- TRS sent files every other working business day between December 14 - 22.
- Between December 12 29,
 TRS sent enrollment files each day.
- TRS sent files to vendors again on January 3, 5 and 8.



FLEXIBILITY

of normal timeframes

Example: Permitting coverage to be retroactively terminated back to January 1, 2018.



CONTINUING

to review data post-migration

- Data conditioning.
- Long-term to apply lessons to HILOB.



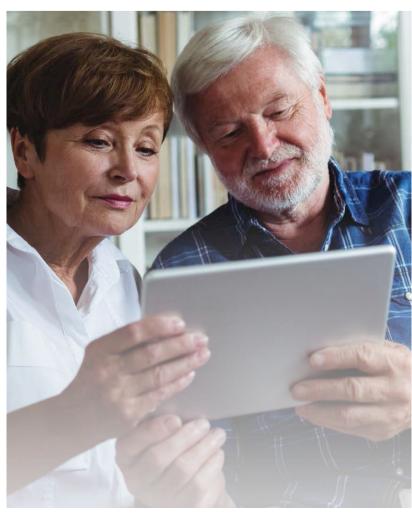
APPLIED

more resources to process disenrollments





Accomplishments



- **BENEFITS** loaded correctly and claims processing successfully on January 1, 2018.
 - On New Year's Eve and by noon of New Year's day.
- **POPULATION** remaining in TRS-Care were successfully auto-enrolled.
- SUCCESSFUL TRANSITION of care for complex, high-touch cases.
- **ALTERNATIVE PLAN POPULATION** identified and placed into plan.





Grace Period to Return to TRS-Care



Understanding
that some participants
may have terminated coverage
and now wish to return, TRS is
allowing
TRS-Care enrollees that
terminated coverage to
return to TRS-Care through
February 2018.

TRS is also
honoring requests
that came in through
January 15, 2018
for a January 1
effective date
(retro-terms).



Department	Fiscal 2017	TEAM Funded	Projected Need	Total Fiscal 2018
Operations and customer service	23	1	12	36
Finance	7		0	7
Communications and Data Informatics	5		1	6
HIB Total:	35	1	13	49



**

- CEM is a national pension administration benchmarking service.
- Custom peer group consists of 13 retirement systems.
- Survey provides peer comparison data on:
 - ✓ cost
 - ✓ service
 - √ complexity

PEER GROUP (sorted by size)	MEMBERSHIP (in 000's)				
	Active Members	Annuitants	Total		
CalPERS	875	651	1,526		
TRS	848	394	1,242		
Florida RS	626	424	1,051		
NYSLRS	526	441	967		
CalSTRS	429	281	711		
Ohio PERS	345	206	551		
Virginia RS	342	192	534		
Michigan ORS	217	265	482		
Washington State DRS	310	172	481		
Pennsylvania PSERS	254	225	479		
Wisconsin DETF	256	192	448		
Indiana PRS	247	153	400		
Oregon PERS	168	139	307		
PEER MEDIAN	342	225	534		
PEER AVERAGE	419	287	706		



Cost

- Low cost system, ranking in the bottom quartile of CEMs database.
- In FY 2016, the cost per active member and annuitant was \$35.
- Cost was \$59 below the peer average and \$92 below the CEM universe average of \$127.

Service

- Low service system.
- In FY 2016, the service score was 70 out of 100.
- Service score was below the peer median of 74.

Complexity

- Relative complexity score was below the peer average of 71.
- In FY 2016, the relative complexity score was 39 out of 100.







- Service levels are analyzed by activity.
- Data is collected on over 120 key performance metrics.
- Service scores for the various activities roll-up into a total service score.

Member **Transactions** Member Communications

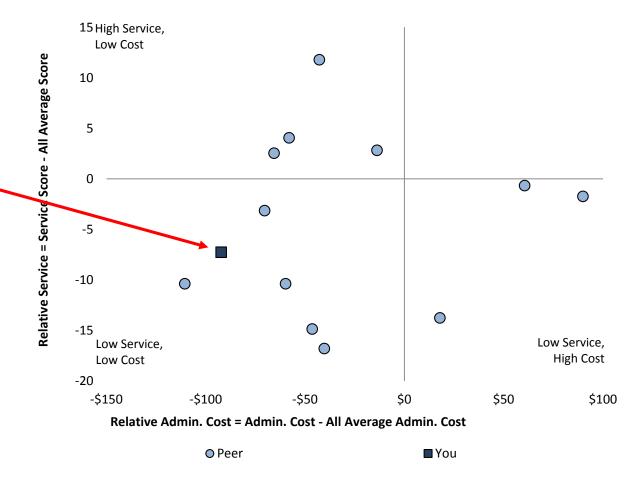
- Pension Payments
- Pension Inceptions
- Refunds, Withdrawals and Transfers-Out
- Purchases & Transfers-In
- Disability
- Call Center
- 1-on-1 Counseling
- Presentations & Group Counseling
- Written Pension Estimates
- Mass Communication (website, news & targeted communication, member statements)
- Satisfaction Surveying
- Disaster Recovery





Compared to our peers, TRS is a low service, low cost system.

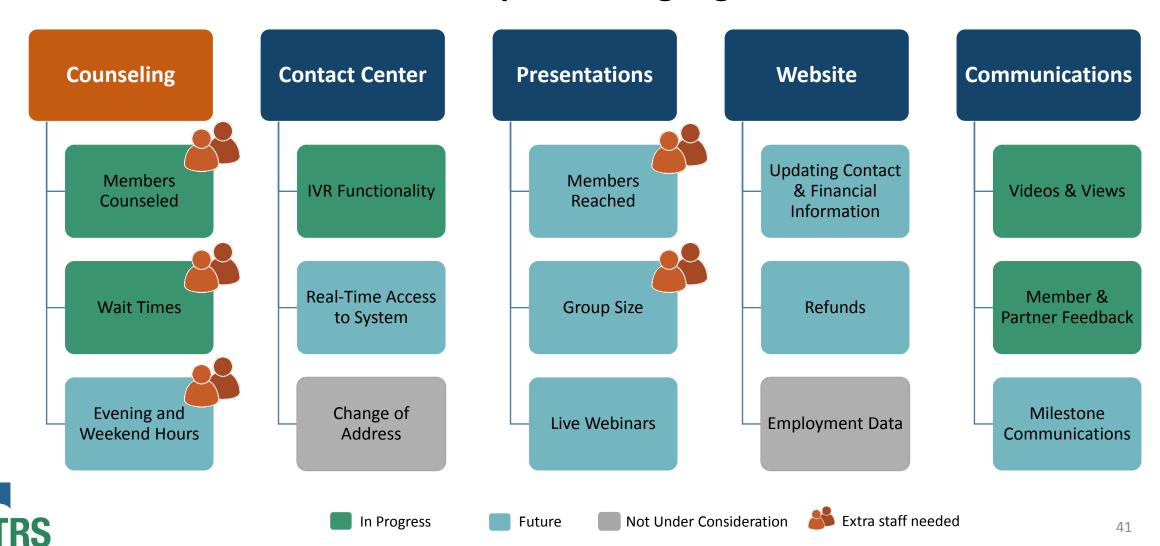
Relative Service versus Relative Cost

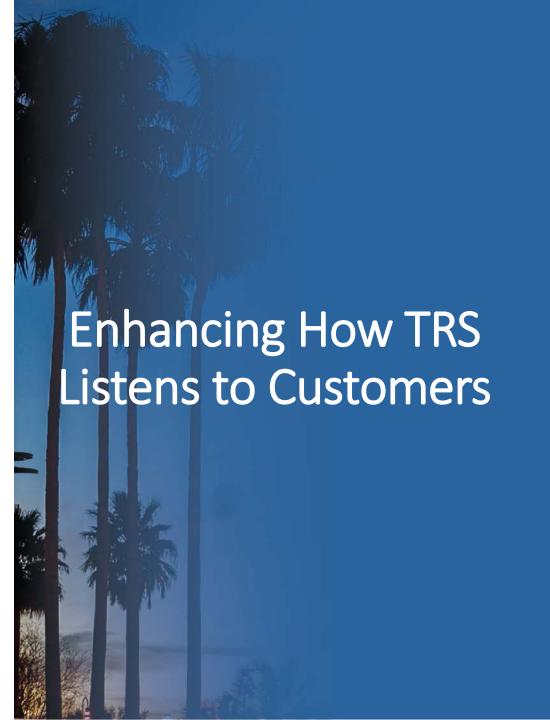






Peer Comparison Highlights





- Update the Compact with Texans*
- Provide the Board with updates on the reporting entity user group
- Discuss creating a new advisory committee or expand the mandate of the current Board Benefits Committee



Enhancing How TRS Listens to Customers

Update the TRS Compact with Texans

Customer Service Requirements

Publish on the TRS Compact with Texans web page the TRS customer service standards and principles, including procedures for responding to complaints and customer wait times for services and complaint response.

Proposed Updates

- Re-examine and refresh the customer service standards and principles on the Compact with Texans web page on the TRS web site; and
- Make the page easier to navigate and reach TRS via the page.



Enhancing How TRS Listens to Customers

Update the TRS Compact with Texans

Customer Service Requirements

Designate a customer relations representative who:

- coordinates customer service performance measures;
- gathers information and evaluations from the public about an agency's customer service; and
- responds to customer concerns.

Proposed Updates

- Re-designate the customer relations representative to a single TRS employee with broad purview of TRS activities;
- Publish an email address (in addition to mail and telephone) on Compact with Texans web page; and
- Describe on the Compact with Texans web page the process TRS uses to address complaints, including the process for elevating complaints with the TRS Board of Trustees.



TRS Compact with Texans: Updated Contact Form

TRS Compact with Texans

The Teacher Retirement System of Texas (TRS) is committed to achieving the highest levels of customer satisfaction by delivering services consistent with our mission and in a manner that actively encourages honesty, integrity, and ethical behavior among our employees. The Compact with Texans describes TRS' services, principles and process for filing complaints and requesting public information.

Response to Concerns & Complaints

Customer communications, including both complaints and concerns, are received by a knowledgeable representative who will respond to you by telephone, letter or email in a timely manner. The Customer Relations unit coordinates, assists with and follows up on complaint resolution within the agency. We consider a complaint as a communication that involves a dissatisfaction with TRS' actions or inaction in service. TRS strives to acknowledge all communications within five business days of receipt.

Customer Service Principles

TRS employees are committed to providing professional, accurate, timely, and cost-effective delivery of services and benefits to our members and annuitants. We strive to be sensitive, caring, and fair to those we serve and to our co-workers. We take pride in the work we perform, and we seek to continuously improve.

Customer Service Goals

- Take prompt, attentive action to address customer needs
- . Keep members and annuitants consistently and effectively informed of their benefits.
- . Follow through on tasks, meeting schedules and deadlines.
- . Use a considerate and tactful approach in serving customers.

Description of TRS Services

Our responsibilities include:

- · paying benefits to members and beneficiaries in a timely and efficient manner,
- . collecting member and state contributions and maintaining records of their accounts,
- maintaining records of financial transactions and reporting them to the state and TRS members,
- · investing the pension trust fund prudently to pay benefits;
- · administering the insurance plans and retirement plan.

The Benefits Division is responsible for the delivery of member and annuitant benefits. These include:

- · service retirement and related benefits,
- disability retirement and related benefits,
- · death and survivor benefits, and
- · health care and insurance benefits.

To Contact TRS:

All customer communications relating to TRS Compact with Texans may be directed to:

TRS Customer Relations

Teacher Retirement System of Texas

1000 Red River Street

Austin, Texas 78701-2698

Tel: 1-800-223-8778

Fax: 512-542-6529

Email: customer.relations@trs.texas.gov

Please fill out the following form:

CUSTOMER COMMUNICATIONS FORM:

stomer First and Last Name:	
Customer Phone:	
Customer Address:	
Your Email:	
ture of Complaint/Concern:	
ease type the highlighted cod	e below to submit your message.)



aptcha:	Z60	7

Submit





Enhancing How TRS Listens to Customers

Update the TRS Compact with Texans

Customer Service Requirements

Gather customer service input using surveys or focus groups that may include evaluation of TRS:

- Facilities and staff;
- Communications, brochures, and internet site;
- compliant handling process; and
- ability to timely serve customers.

Proposed Updates

- Review and refresh the TRS Customer Satisfaction Survey, including how survey participants are determined and the questions asked; and
- Consider focus groups for issues or projects that would benefit from direct stakeholder input.



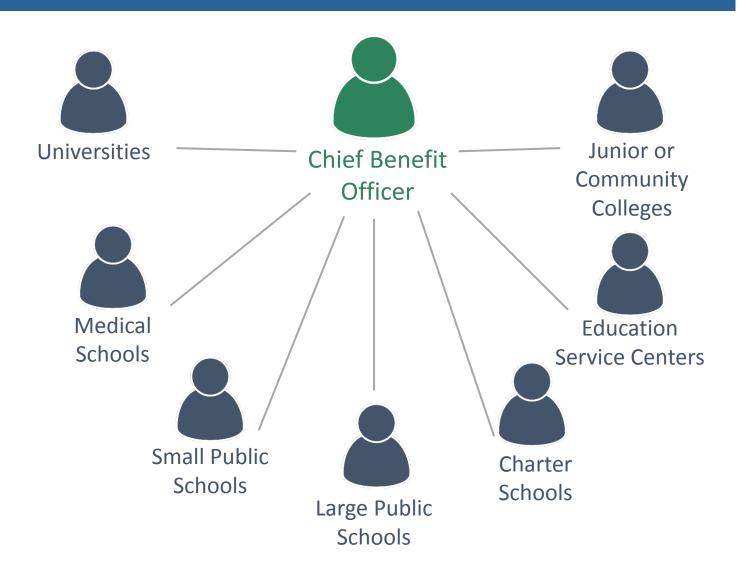
Enhancing How TRS Listens to Partners

Employer Advisory Group (EAG)

Purpose:

Advise TRS on issues dealing with employer payroll, benefit reporting, and ActiveCare for those entities that participate.

Work with TRS to jointly identify practical ways to comply with new laws, rules, and accounting requirements.







Enhancing How TRS Listens to Customers

Using an Advisory or Board Committee To Address Benefits and Customer-Service Issues:

Create new Board advisory committee

- Authority: § 825.114 (TRS law) and Chapter 2110 (general law) of the Texas Government Code and § 3.4 of the Board's Bylaws.
- Trustees would appoint up to 24 committee members, but committee would select its own chair under statute.
 Members could include individual TRS participants and representatives of reporting entities and member associations. Bylaws restrict membership to non-Board members.
- Committee would be created through rulemaking, with its purpose, tasks, and method of reporting clearly delineated. The committee could report quarterly to the Board about its activities. Board would need to decide if TRS would reimburse committee members' travel expenses.

Reconstitute the Board's existing Benefits Committee

- Authority: § 1.7(I) and Article 3 of the Board's Bylaws.
- Board Chair would appoint up to five Trustees with Board's consent and designate the committee chair.
- The Board could amend the Bylaws to enhance the committee's purpose and responsibilities to address customerservice and benefit-delivery issues.





	Dept. Headcount (filled)	New Hires	Separations and Transfer	Dept. Turnover Rate
FY 2015	63	12	11	17.5%
FY 2016	61	16	19	31.4%
FY 2017	62	11	14	22.4%
FY 2018 (YTD)	64	19	10	31.9% (projected)

^{*}Selected positions includes employees providing front line support in counseling roles. Does not include supervisors, managers, or other groups such as benefit reporting or data conditioning.

^{**}Turnover rate includes all employees who leave a specific team (e.g. counseling), or TRS



Organizational Change Management

Concerning signs we are seeing:	Solutions:
 Increased stress due to elevated workloads and longer wait times for members Decreased productivity (transition to new system) Additional stress related to mandatory overtime 	 One Mission, Many Parts communication campaign Enlist agency-wide assistance Outreach to recent retirees Research compensation enhancements Wellness committee campaigns
 Increase in calls passed to management Emotionally charged phone calls from members Employee relations issues 	 Visual aids to show progress in reducing call backlog and provide a sense of accomplishment Employee Assistance Program (EAP) onsite to help debrief after emotionally charged calls, or assist with stress management Specific training to aid in diffusing emotionally charged calls
Schedule adherence	Increase scheduling flexibilityIncrease remote work opportunities
 Decrease in departmental updates (e.g. hot topics, repetitive issues) 	 Ensure daily communication updates are delivered Enhance current BC communications with BC blog Resume monthly team meeting and quarterly updates





Organizational Excellence Staffing Projections for Benefit Services and HIB

Function	Current State*	Future State
Learning and Development	2.0	5.0
Talent Acquisition and Onboarding	0.5	1.5
Quality Assurance	3.5	7.5
Performance Excellence	1.5	2.5
Workforce Management**	1.0	2.0
Employee Relations/Special Leave	0.5	1.5

^{*}Numbers include an estimate of current resources supporting health care and benefit services



Projections are based on the assumption that Benefit Services will be hiring 44 additional staff and HIB will be bringing on 13 in the near future

^{**}This function is scheduled to be transferred after the call center modernization project. There is currently one employee in this position and requesting to an additional position.



Appendix

Changes to Compact with Texans





TRS Compact with Texans: Previous



TRS Compact with Texans

The Teacher Retirement System of Texas (TRS) is committed to achieving the highest levels of customer satisfaction by delivering services consistent with our mission and in a manner that actively encourages honesty, integrity, and ethical behavior among our employees.

Improving the retirement security of Texas educators by prudently investing and managing trust assets and delivering benefits that make a positive difference in members' lives.

Description of TRS Services

TRS has two core responsibilities — to deliver retirement and related benefits that have been authorized by the Texas Legislature, and to manage the trust fund that has been established to finance member benefits. TRS responsibilities include:

- · paying benefits as authorized by law to members and beneficiaries in a timely and efficient manner,
- · collecting member contributions and maintaining records of member accounts,
- collecting state contributions,
- · maintaining records of financial transactions and reporting them to the state and TRS members,
- investing the pension trust fund prudently to pay benefits provided by law;
- · administering the insurance plans, and
- · administering the retirement plan to promote an actuarially sound system.

These responsibilities are carried out by a staff of approximately 400 employees located at the system's offices in Austin, Texas. The agency is comprised of three major divisions — Benefits, Finance, and Investments — each of which is managed by a chief officer who reports to the agency's executive director.

The Benefits Division is responsible for the delivery of member and annuitant benefits authorized by law. These include:

- · service retirement and related benefits,
- · disability retirement and related benefits,
- · death and survivor benefits, and
- · health care and insurance benefits.

The **Finance Division** is responsible for maintaining an effective system of accounting, budgeting, and controls over TRS financial activities and for reporting the results of these activities in accordance with professional standards and legal requirements. The Finance Division also provides computer and staff services support for all divisions.

The **Investment Division** manages the investment of the system's funds in accordance with applicable constitutional and statutory provisions. Investment Division staff follow a clear philosophy and well-defined style and process to achieve desired long-term investment returns while controlling risk and managing costs.





TRS Compact with Texans: Previous

Customer Service Principles

TRS employees are committed to providing professional, accurate, timely, and cost-effective delivery of services and benefits to our members and annuitants. We strive to be sensitive, caring, and fair to those we serve and to our co-workers. We take pride in the work we perform, and we seek to continuously improve. We are open, responsive, and ethical in the conduct of business with members, annuitants, government officials, and the public

Customer Service Goals

- 1. Deliver timely and accurate member and annuitant benefits.
- 2. Keep members and annuitants consistently and effectively informed of their benefits.
- 3. Respond in a timely, courteous, and accurate manner to requests from members, annuitants, and the general public.
- 4. Regularly assess customer satisfaction among those we serve.
- 5. Achieve or exceed long-term investment returns in actuarial assumptions.

Annual Performance Standards

(This information is currently being revised.)

How to Obtain Information and/or File Complaints

Obtaining Information

TRS offers a toll-free telephone number (1-800-223-8778) so that members and the public may call the system to obtain information on weekdays between 7 a.m. and 6 p.m. TRS also operates InfoLine, a toll-free, automated telephone system, which provides members with immediate access to general information about TRS benefits on weekdays and weekends. Members may also access their account information by using a personal identification number (PIN) when calling the number listed above.

TRS information may also be obtained through the TRS Website, through a variety of printed materials and videotapes, and by attending TRS group presentations made throughout the state. Members are also invited to visit TRS offices located at 1000 Red River Street in downtown Austin. Those wishing to meet with a TRS counselor are encouraged to set up an appointment in advance by calling 1-800-223-8778.

Filing a Complaint

A formal procedure for receiving and responding to complaints has been established to ensure that complaints are addressed in a timely manner. TRS' complaint monitoring procedure considers a complaint as a communication that involves an expressed dissatisfaction with TRS actions or inaction. A complaint involves only matters about which TRS may make some change that helps with, solves, or modifies the concern. For example, a TRS complaint is not about a law over which TRS has no control. Also, a TRS complaint does not pertain to a matter which would properly be grounds for an administrative appeal — the law dictates those matters be handled through the Administrative Procedures Act. Finally, a complaint is not defined as a simple inquiry or concern that may be answered with a simple phone message or uncomplicated written response. TRS routinely assists members and others with such matters over the telephone and by mail.

All formal complaints are received by a TRS complaint officer who then refers them to the appropriate TRS chief officer for review and response. The complaint officer also maintains a log of all complaints and monitors progress in bringing them to resolution. Written complaints received by TRS are reviewed and responded to within 10 working days. If resolution is not possible within 10 working days, the written response to the complainant shall indicate when TRS expects to provide a resolution.





TRS Compact with Texans: Previous

All written complaints relating to TRS should be directed to:

Complaint Officer

Teacher Retirement System of Texas 1000 Red River Street Austin, Texas 78701-2698

Tel: 1-800-223-8778 Fax: 512-542-6529

Additional Information

For additional information regarding TRS services and its Compact with Texans, please contact Rhonda Price, TRS customer service representative, at the above address and telephone number or by email.





TRS Compact with Texans: Updated

2					M	yTRS R	Portal Careers	Contact Us
TRS TEACH	ER RETIREMENT SYSTEM OF TEXAS						SEARCH	Q
Home	About TRS	Active Members	Retirees and Beneficiaries	Reporting Entities	Investments	Pension Benefits	Health C Benefits	are

TRS Compact with Texans

The Teacher Retirement System of Texas (TRS) is committed to achieving the highest levels of customer satisfaction by delivering services consistent with our mission and in a manner that actively encourages honesty, integrity, and ethical behavior among our employees. The **Compact with Texans** describes TRS' services, principles and process for filing complaints and requesting public information.

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- · investing the pension trust fund prudently to pay benefits;
- · administering the insurance plans and retirement plan.

The Benefits Division is responsible for the delivery of member and annuitant benefits. These include:

To Contact TRS:

All customer communications relating to TRS Compact with Texans may be directed to:

TRS Customer Relations

Teacher Retirement System of Texas

1000 Red River Street

Austin, Texas 78701-2698

Tel: 1-800-223-8778

Fax: 512-542-6529

Email: customer.relations@trs.texas.gov

OR

Please fill out the following form:

CUSTOMER COMMUNICATIONS FORM:

Customer First and Last Name:			
Customer Phone:			
Customer Address:			
Your Email:			
Nature of Complaint/Concern:			
	//		
(Please type the highlighted code below to submit your message.)			
Captcha:	Z6C7F		

Submit





TRS Compact with Texans: Updated

The Benefits Division is responsible for the delivery of member and annuitant benefits. These include:

- · service retirement and related benefits.
- · disability retirement and related benefits,
- · death and survivor benefits, and
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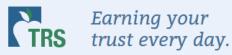
The Investment Division manages the investment of the system's funds, following a clear philosophy and well-defined style and process to achieve desired long-term investment returns while controlling risk and managing costs.

Annual Performance Standards

(This information is currently being revised.)

Requests for Public Information

Please follow the **Public Information Requests (pdf)** for instructions on how to submit a public information request to TRS.



1000 Red River St. - Austin, Texas 78701
For the Hearing Impaired: Dial Relay Texas 711
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Website Accessibility Statement | Privacy Policy | Contact Us |
Texas Homeland Security | Texas Online | Texas Veterans
Portal | State Website Linking and Privacy Policy | Where the
Money Goes | Legal Disclaimer | Reporting Fraud to the State
Auditor's Office







TAB 6





Proposed Bylaw Changes

 Reconstitute Audit Committee → Audit, Compliance and Ethics Committee ("ACE")

 Reconstitute Risk Management Committee → Strategic Planning Committee and transfer investment risk reporting to the Investment Management Committee.

• Expand purview of the Benefits Committee to include customer service matters.





Centralizing and Streamlining: Audit, Compliance, & Ethics

Reconstitute Audit Committee → Audit, Compliance and Ethics Committee ("ACE")

Rationale:

- Committee charge currently encompasses Compliance function, which includes management and oversight TRS Ethics Policies.
- Reflect current practices by which CCO/Compliance Counsel reports violations and other issues to Board.
- Implements Funston recommendation related to Compliance.
- Best practice for Compliance to have formal reporting to Board on certain issues.
- Provides an opportunity for regular committee reporting and oversight of ethics matters.
- As appropriate, items can be raised to the full Board.

Proposed Changes:

- Incorporate compliance functions throughout 3.1.1.
- Identify and affirm authority of CCO and Compliance staff.
- Incorporate reporting of compliance violations of Investment Policy Statement portfolio risk management standards.
- Create new Ethics Process subsection in 3.1.1(g), incorporating identical responsibilities of current Board Ethics Committee.





Improving Strategy Reporting: Strategic Planning Committee

Reconstitute Risk Management Committee → Strategic Planning Committee

Rationale:

- Provide a more focused forum for the Board to review and assess the TRS mission and vision statements.
- Enhance strategic planning and major projects reporting by dedicating a committee to address medium and longterm strategic planning for TRS, including the risks, opportunities, and major projects relating to strategy planning and execution.
- Provide a forum for the Board to provide input on the:
 - assessment of the internal and external forces and variables that impact TRS' strategic planning;
 - formulation and execution of strategic plan goals and objectives, including enterprise risk mitigation; and
 - alignment of the organization behind the agency's strategic plan goals and objectives, including alignment of major projects, resource allocation, and the Executive Director's goals and objectives.

Proposed Changes:

- Repurpose Risk Management Committee for Strategy and Major Projects.
- Investment Risk will transfer to the Investment Management Committee
- Enterprise Risk Management will be discussed in Strategy and Major Projects Committee as part of execution.





Centralizing and Streamlining: Investment Management Committee

Reconstitute the Investment Management Committee to Incorporate Risk Committee's Investment Functions

Rationale:

- The Investment Committee is best situated to review reports related to investment risk.
- Proposed transition will ensure the continued reporting of investment risk matters to the Board.
- As appropriate, items can be raised to the full Board.

Proposed Changes:

• Move investment risk reporting provisions currently in 3.1.7(a) and (b) of the Risk Committee to 3.1.4(f) and (g) of the Investment Management Committee.





Enhancing How We Listen: Benefits Committee

Expand the Benefits Committee to Include Customer Service Matters

Rationale:

- Enhance Board reporting and discussion on customer service matters, including options for improving the the member experience, key metrics, and peer comparison.
- Authority: § 1.7(I) and Article 3 of the Board's Bylaws.
- Board Chair would appoint up to five Trustees with Board's consent and designate the committee chair.

Proposed Changes:

• The Board could amend the Bylaws to enhance the committee's purpose and responsibilities to address customerservice and benefit-delivery issues.



TAB 7





Agenda

- Update on TRUST Phase 1 Go Live
- First TRUST Maintenance Release by TRS
- TEAM Program Dashboard
- TEAM Program Phase 2 Status
 - Line of Business
 - Contract changes and negotiation
 - HILOB
- TEAM Staffing and FTEs





Update on TRUST Phase 1 Go Live

Employer Reporting

- 96% of employers have completed September payroll report
- 82% of employers have completed October payroll report
- Number of days required for 50% of employers to complete monthly reports has reduced from 25 days to 13 days since Go -Live

Refunds

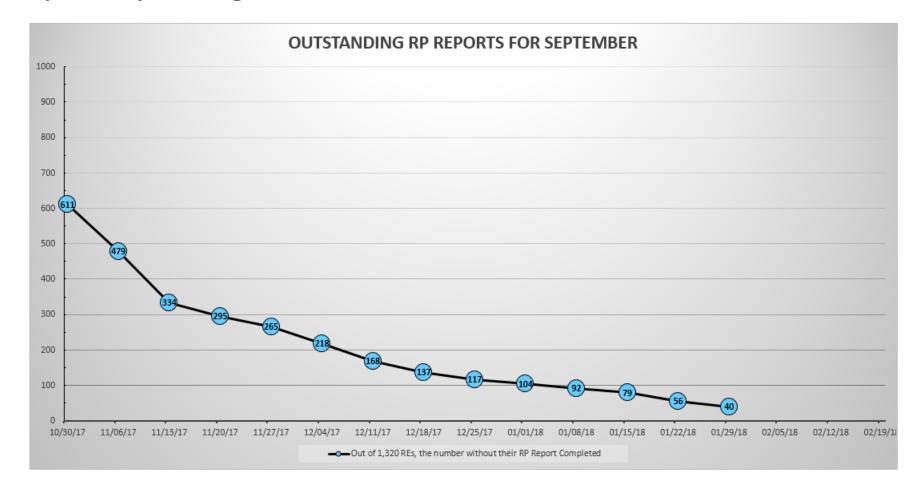
- Backlog of refunds being entered is gone
- Issued 12,269 Refunds since Go Live and 14,792 for the Fiscal Year to Date
- Oldest refunds in the queue needing to be entered are approximately 3 weeks
- Still hundreds of refunds waiting on September November reports to be completed from employers





Update on TEAM Phase 1 Go Live

Employer Reporting

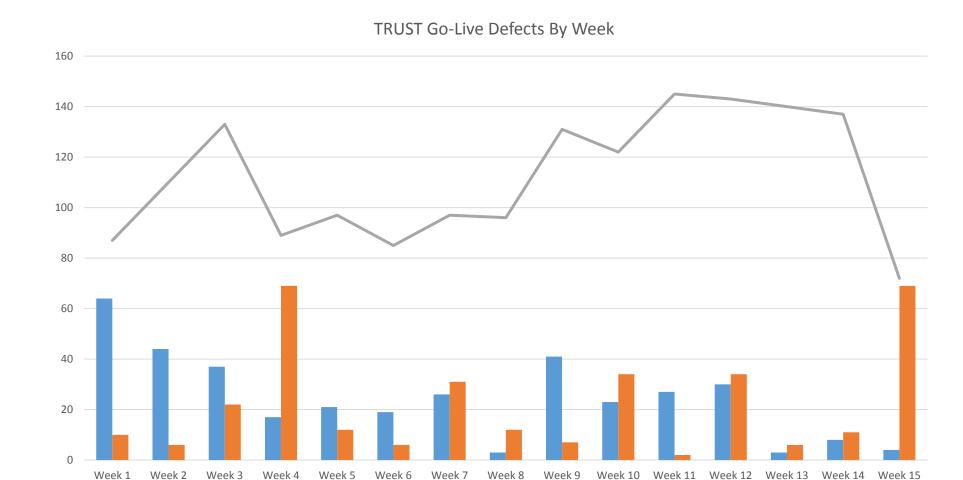






Update on TEAM Phase 1 Go Live

New Detected Defects



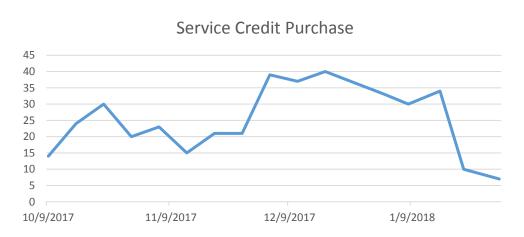
Defects Closed — Total Defects Open

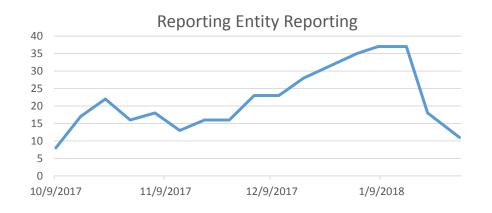




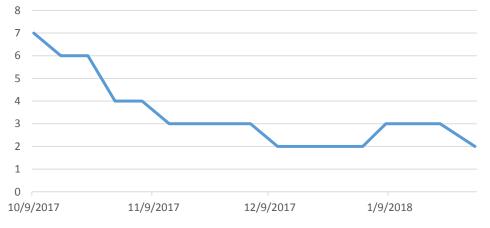
Major Defects By Functional Area















What's Good About The New System

- We focus a lot on what's wrong and what needs to be improved
- What's right?
 - Thousands of members have been able to get their refunds via Electronic Funds Transfer rather than paper check
 - Documents appear in imaging immediately
 - One source of data
 - RE Portal has prevented thousands of instances of bad data from coming into the system
 - TRS now has much better knowledge of when payments are negotiated
 - Overall Benefit Estimate process has gotten simpler and faster
 - More up to date information on service credit





First TRUST Maintenance Release by TRS

- Over 75 enhancements developed by TRS will be implemented in TRUST later this month
 - 21 Employer Reporting enhancements
 - 8 Refunds enhancements
 - 13 Service Purchase enhancements
- TRS Developers have already been working with DXC to fix defects during the Go-Live period
- We are very well prepared to maintain and enhance the TRUST Phase
 1 LOB system





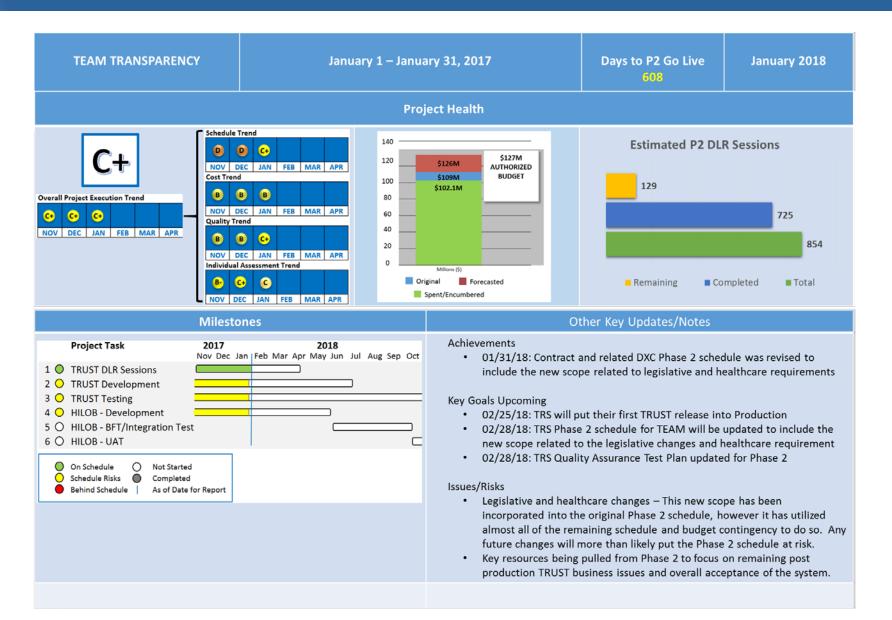
First TRUST Maintenance Release by TRS

- Some features in first release
 - Employer Reporting
 - Improvements to user interface that will have fewer clicks and less scrolling
 - Elimination of 8 workarounds for employers or TRS coaches
 - Improvements to searching
 - Service Credit Purchase
 - Improvements to allocating payments to service purchases
 - Contact Management
 - Frequently requested forms better organized and easier to access
 - Refunds
 - Improvements to workflow and error and status checking that will reduce some manual checks that the Refunds team has to perform





TEAM Program Dashboard







- Added Scope for Phase 2
 - Legislative changes from 2017 Legislative Session
 - Health Insurance finance functionality
- Additional scope consumed approximately 34 days of schedule contingency and cost an additional \$1.9 million





- Phased Implementation of Phase 2 Functionality
 - Web self service for service and disability retirement
 - This functionality will be delivered after Phase 2 Go Live
 - We don't want to launch all self service features at once
 - Various reports in different business areas
 - Reports will be designed after staff have used the system more
 - Fewer and simpler workflows

These were identified as part of lessons learned from the TRUST Phase 1 Cutover





- Health Insurance Line of Business (HILOB)
 - TRS developing new Health Insurance Line of Business (HILOB)
 - Project has been delayed as HIB staff have focused on addressing customer service issues relating to the 85th Legislative Updates
 - This has delayed progress and caused a missed milestone on Special Enrollment functionality, but team is still on track to meet August 2019 implementation date





TRUST Line of Business

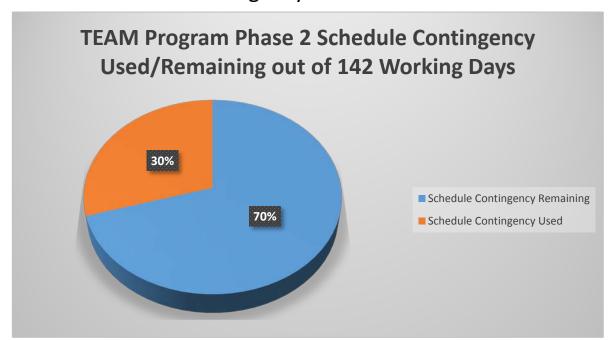


Phase 2 is slightly behind schedule. Available contingency remains but risk is increasing due to additional scope from the 85th Legislative Session regarding Benefits and Health Insurance changes. Quality concerns are an issue.

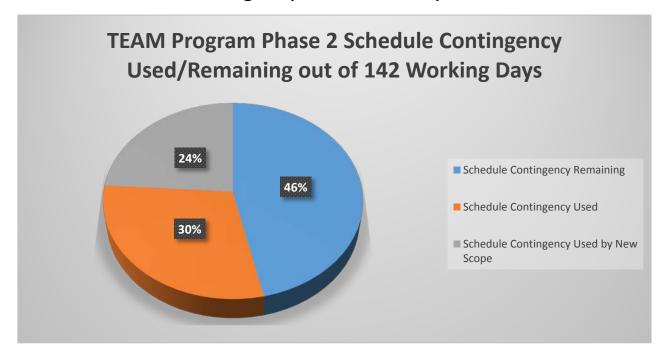




Schedule Contingency as of December 2017



Estimated Contingency as of February 2018



Phase 2 is slightly behind schedule. Available contingency remains but risk is increasing due to additional scope from the 85th Legislative Session regarding Benefits and Health Insurance changes. Quality concerns are an issue.





Current Resource Investment

Currently there are a total of 177 dedicated staff to TEAM including CAPPS and HILOB but not including other TRS staff who support TEAM.

The total cost is roughly \$20.9 million per year. For certain divisions, a significant portion of staff is charging to TEAM.

Division	Direct FTEs	Contractors	Total Headcount	% of TEAM Program
DXC		62	62	35%
Support	21	7	28	16%
Benefit Services	22	1	23	13%
Financial Services	9	3	12	7 %
IT Services	29	22	51	29%
Healthcare	1	0	1	1%
Totals	82	95	177	100%





TEAM Transition Challenges

- Legacy systems still operational = 2 LOB systems to support.
- Staff skills needed for legacy systems different from new systems; continuing need for talent development and management.
- TEAM 2.0 begins as soon as phase 2 ends; additional support needed to tie in financial systems (CAPPS) as well.
- External contracts for staffing will conclude in FY 2019.
- Proactive oversight and strategic reallocation of vacancies will allow management to accommodate changing staffing needs.





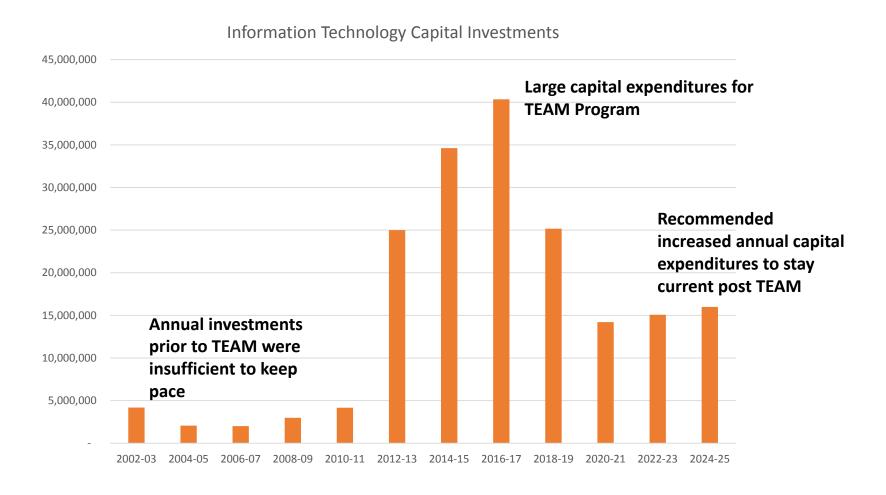
TEAM — Future State

- Keeping the TEAM positions will ensure the agency has the resources needed to meet business demands.
- Although the majority will be in IT, needs exist elsewhere to fully support a post TEAM environment with robust member services.
- Reduction of \$13.9 million per year (or 67%) in cost and roughly 95 contractors.





Information Technology Capital Investments





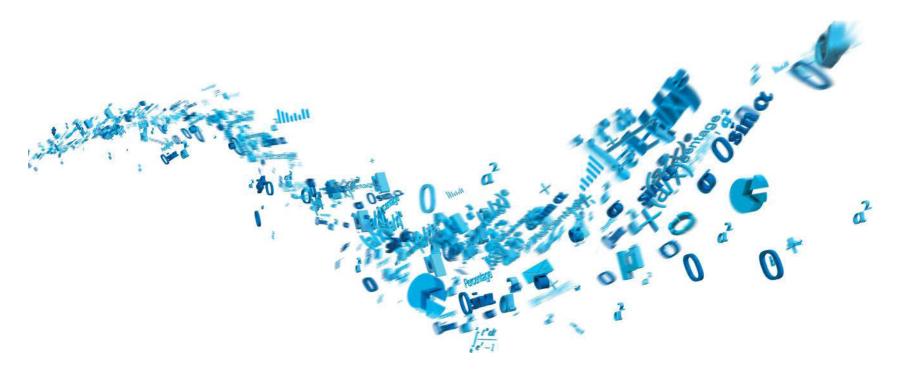


TEAM Program

Questions?



TAB 8



Teacher Retirement System of Texas February Board Meeting

Long-Term Portfolio Risk/Return Expectations February 14, 2018

Aon Hewitt

Retirement and Investment

Investment advice and consulting services provided by Aon Hewitt Investment Consulting, Inc., an Aon Company.



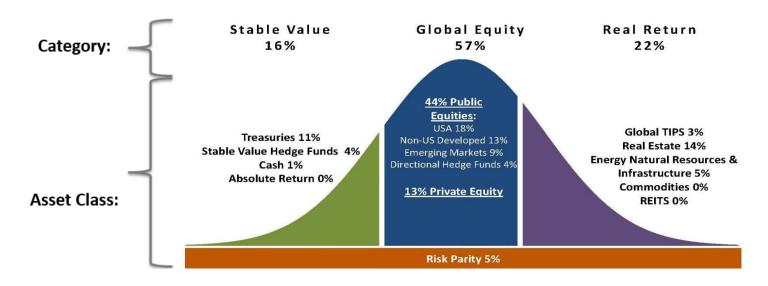
What Are Capital Market Assumptions And Why Do We Need Them

- What are they?
 - Aon Hewitt's asset class return, volatility and correlation assumptions
 - Long-term (10-year & 30-year), forward-looking assumptions
 - These are separate from our Medium Term views
 - Best estimates (50/50 probability of better or worse long-term results than expected)
 - Market returns: no active management value added or fees (other than hedge funds and private equity, where traditional passive investments are not available)
 - Produced quarterly by Global Asset Allocation Team
- Why do we need them?
 - Used by the actuary to project the funding circumstances of the Pension
 - Investment results are an important component of the Pension function
 - Allows for the evaluation of various asset mixes and their interaction with the liabilities of the Pension
 - Assist in the ongoing evaluation of expected risk premiums and the likelihood of being compensated for various risks



Overview

The table below reflects the TRS long-term asset allocation policy



- The following slides provide the expected risk and return for each asset class above as well as the expected distribution of outcomes for the Plan over time
- The final section of this document outlines our capital market assumptions, a broad overview of our methodology for creating them, and how our assumptions compare to other providers

Empower Results®

Capital Market Assumptions & Expected Results - Fourth Quarter 2017

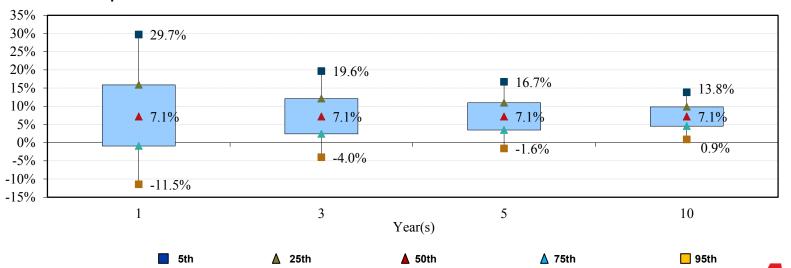
			10 \	⁄ear	30 \	/ear
TRS Asset Class	AHIC Asset Class	Policy	Expected Return	Expected Risk	Expected Return	Expected Risk
Stable Value						
Treasuries	Long Duration Government	11%	3.0%	9.0%	3.2%	11.0%
Stable Value Hedge Funds	Allocation based blend	4%	5.1%	7.6%	5.6%	8.1%
Cash	Cash (Government)	1%	2.0%	1.0%	2.6%	2.0%
Global Equity						
Public Equity						
USA	US market weighted blend	18%	6.4%	17.9%	6.5%	18.0%
Non-US Developed	Non-US Developed Equity	13%	7.2%	20.0%	7.2%	20.5%
Emerging Markets	Non-US Emerging Equity	9%	7.6%	27.0%	7.7%	27.5%
Directional Hedge Funds	Allocation based blend	4%	5.2%	11.2%	5.7%	12.8%
Private Equity	Private Equity	13%	9.1%	26.0%	9.4%	26.4%
Real Return						
Global TIPS	TIPS	3%	2.9%	4.5%	3.4%	4.5%
Real Estate & Other Real Assets	Private Real Estate (Core)	14%	6.4%	14.9%	6.4%	15.2%
Energy & Natural Resources	Infrastructure & Commodities	5%	8.5%	16.0%	8.5%	16.0%
Risk Parity						
Risk Parity	Risk Parity (10% Vol)	5%	5.5%	10.0%	5.9%	10.5%
Expected Results		100%	7.14%	12.6%	7.34%	12.8%



Forward-Looking Distribution of Expected Returns

- In any one-year period, the Trust Fund is expected to return between -11.5% and +29.7% with a 90% degree of certainty (the 95th and 5th percentiles)
 - There is a 50% probability that the return will be between -0.9% and +15.9% (the 25th and 75th percentiles)
- Over multi-year periods, there is a tighter band in the range of outcomes
 - Over a five-year period, there is a 90% chance that the annualized return will be between -1.6% and +16.7%, and a 50% chance that the annualized return will be between +3.5% and +11.0%

10 Year Assumptions





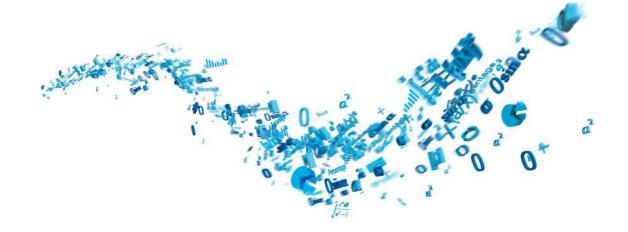
10 and 30 Year Probabilistic Returns

- The table below describes the probability of achieving specific levels of annualized return over 10 and 30 years
 - There is just under a 50% chance of achieving an annualized return of 7.25% over the next 10 year period
 - Over a thirty year period the probability of a 7.25% return is slightly above 50%

Range of Return Outcomes

	6.75%	7.00%	7.25%	7.50%	7.75%	8.00%
10 Year Horizon	54.0%	51.4%	48.9%	46.4%	43.9%	41.4%
30 Year Horizon	60.1%	55.9%	51.6%	47.3%	43.0%	38.8%





Capital Market Assumptions Background and Methodology



Coverage

Fixed Income	Equities	Alternatives	Macro Variables
Nominal Government Bonds	All major regions covered including Emerging Markets	Hedge Funds (7 Single Strategies; Fund of Hedge Funds; Broad Hedge Funds)	Inflation
Inflation-linked Government Bonds	U.S. Large and Small Cap	Real Estate (Total Market, Core and U.S. REITs)	Currency Movements
Corporate Bonds	Non-U.S. Developed and Emerging Markets	Private Equity	
High Yield Debt	Global Equity	Infrastructure	
Bank Loans	Equity Insurance Risk Premium (High Beta)	Commodities	
Emerging Market Debt (Hard, Local, Corporate)		Equity Insurance Risk Premium (Low Beta)	
Multi-Asset Credit			

Continually expanding coverage into sub asset classes and global markets



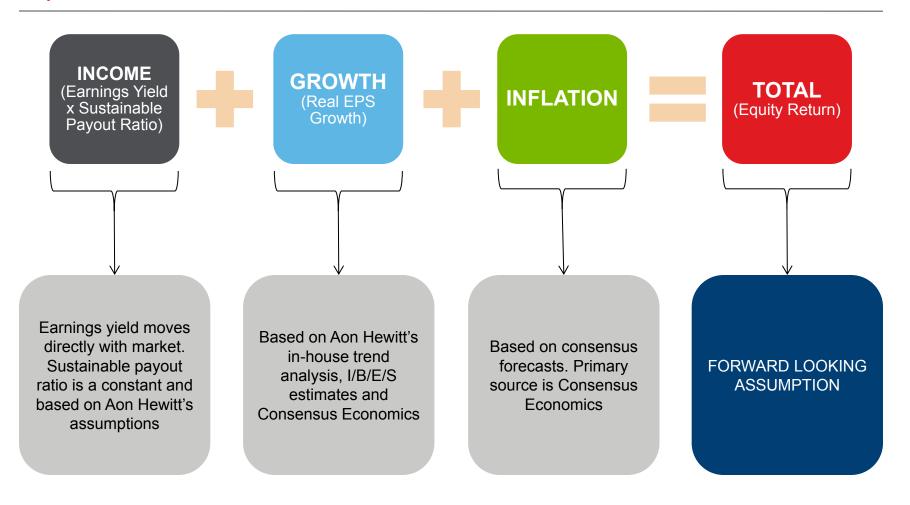
Inflation

- Common approach is to use market implied break-even inflation rates (the difference between yields on nominal and inflation-linked government bonds of equivalent maturity or duration)
- We do not believe that Break-Even Inflation is a good estimator of future inflation
 - Break-even inflation = Expected Inflation + Inflation Risk Premium (IRP)
 - Inflation is a risk for many investors and therefore a premium is demanded to protect against it. Therefore, we would expect IRP > 0 in the long-term
 - Break-even is affected by lots of things unrelated to inflation expectations
- Aon Hewitt Inflation assumption based on consensus forecasts
 - Principal source is Consensus Economics
 - Supplement with other sources (e.g., Philadelphia Fed)

Current 10-year Inflation forecast = 2.3%



Equities





Equity Return Assumption

	U.S. ⁽²⁾	U.K.	Europe ex U.K.	Japan	Canada	Switzerland	Australia	Emerging Markets
Earnings Yield * Sustainable Payout Ratio	2.6%	2.8%	3.3%	3.1%	2.9%	2.6%	3.3%	3.1%
Real Earnings Growth	1.8	1.6	1.4	1.4	1.8	1.5	2.0	2.1
Inflation	2.3	2.1	1.7	1.2	2.0	1.1	2.5	2.5
Methodological Differences ⁽¹⁾	-0.3	-0.2	-0.1	-0.3	-0.2	-0.2	-0.2	-0.1
Current Nominal Return Assumption (Local Currency)	6.3%	6.4%	6.4%	5.5%	6.6%	5.1%	7.6	7.6%

■ Current EAFE return in US dollar = 7.2%, Global Equity return in US dollar = 7.1%

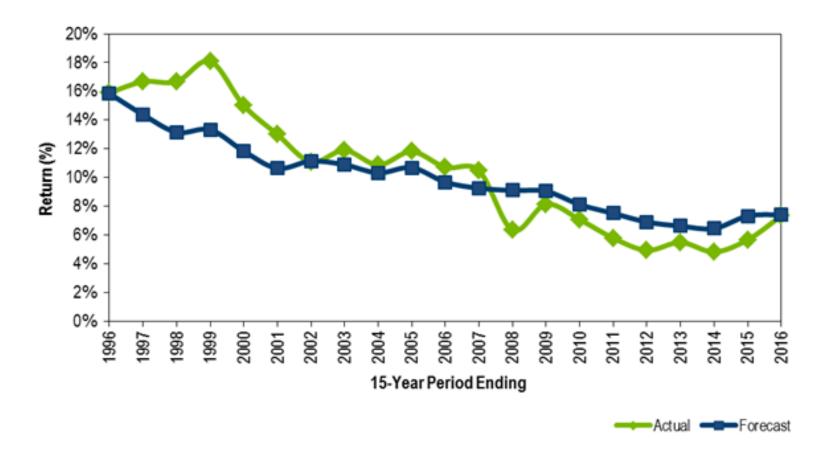


⁽¹⁾ Aon Hewitt model is a Discounted Cash Flow (DCF) model, not an additive building block model

⁽²⁾ Represents Large Cap

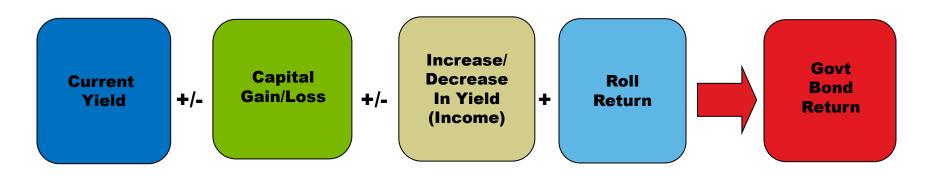
AHIC Historical CMA's versus Actual Experienced Returns

U.S. Equity Returns Over 15 years (Without Valuation Adjustment)





Government Bonds



- We start from the current yield curve for government bonds
- Using a simulation model, we combine the current yield curve with an assumption on the long-term behaviour of the yield curve to derive how yields are expected to evolve over time
 - Dominant driver of government returns is what is priced into the yield curve
- Total return assumptions are then derived from the forward looking yield curves
- A similar methodology is followed for inflation-linked bonds but based on real yields and incorporating our inflation assumptions



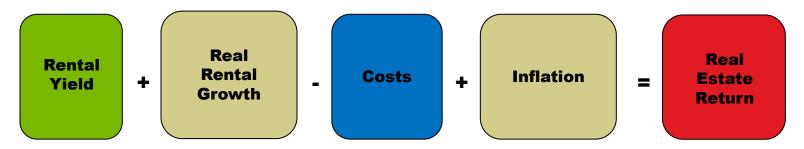
Intermediate (5-year Duration) Government Bond Return Assumption

Return Component*	Q4 2017	
Initial Yield	2.0%	Prevailing market yield
Capital Gain/Loss	0.0%	Projected yield increase results in projected capital losses. Long Duration bonds suffer larger losses than short
Increase/Decrease in Yield (Income)	0.3%	Projected yield increases leads to ability to reinvest at higher yields in future
Roll Return	0.1%	Roll return on rebalancing has a positive impact on the return assumption
Total 10-Year Return Assumption	2.3%	



^{*} Components do not sum perfectly to the total because of rounding and because they are medians, which are not additive.

Real Estate

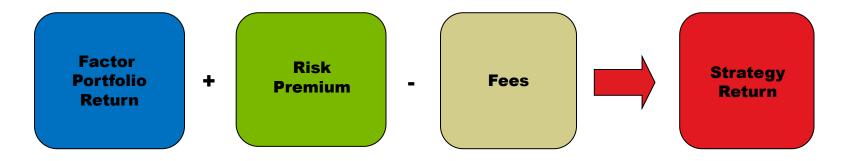


- Starting point is the rental yield each market is offering
- Real rental growth incorporates both a short term cyclical and long term aspect
 - We assume rents increase in line with consensus expectations over short term. In the long-term we assume rents grow in line with inflation
- Allow for unavoidable costs of direct real estate investment
- A real return assumption is calculated as the internal rate of return (IRR) of the projected cash flows (discounted cash flow analysis similar to equities)
- Nominal return is then calculated using our expected inflation
- No manager alpha as return assumption represents the real estate property market (and not real estate funds)

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Private Equity

- Return assumptions are formulated for each strategy (sub-sector) based on an analysis of the exposure of each strategy to various market factors with associated risk premiums
- Explicit fee assumptions are subtracted from expected returns; including base and performancebased fee/carry as appropriate



- Strategies include leveraged buyouts (LBOs), venture capital, mezzanine, and distressed investments
- Assumptions for a diversified (broad) private equity portfolio is aggregation of assumptions for these underlying strategies



Hedge Funds

- Granular modeling of hedge funds at the individual hedge fund strategy level. Assumptions exist for 7 single-strategy hedge funds, Fund of Hedge Funds, and Broad Hedge Funds (diversified portfolio of direct hedge funds)
- Unlike most other asset classes, manager skill (alpha) is allowed for. We also make allowance for fees
- Assumptions are developed in a three step process:
 - "Beta" component returns and risks formulated by factor analysis¹ of underlying building blocks of 7 individual hedge fund strategies. For example, equity long/short has net long position in equity markets
 - "Alpha" component returns and risks set with reference to total future volatility levels (of hedge fund strategy) and information ratios² (ratio of excess returns to excess volatility relative to a benchmark)
 - Explicit fee assumptions are subtracted from expected returns; including base and performance-based fee/carry as appropriate



¹ A multivariate regression analysis procedure to identify exposures to different factors. Hedge Fund strategy returns are used as dependent variable and asset class returns are used as the independent variables

² Incorporates both historical analysis and Aon Hewitt's forward-looking views of information ratios relative to factor portfolios

Volatility and Correlation

- We take a forward-looking view when setting volatility assumptions as opposed to using purely historic averages. The credit crisis demonstrated the dangers of relying solely on historical values.
- We consider:
 - Implied volatilities priced into option contracts of various terms
 - Historical volatility levels
 - The broad economic/market environment
- We assume that volatilities are not constant over time; we assume that the volatility of "risky" asset classes such as equities will be at historically high levels in the next few years before declining over time.
- For illiquid asset classes such as real estate, de-smoothing techniques are employed when assessing historic volatility levels.
- Correlation assumptions are formulated with reference to historic experience over different time periods and during different economic conditions
 - We take into account the fact that correlations are highly unstable over time and, in particular, we take into account the fact that correlations are very different in stressed environments



Fees

- Objective is to develop return assumptions that reflect the cost of implementing an investment program
- Liquid, publicly traded asset classes are investable passively at very low cost
 - Fee assumption is zero
- For asset classes such as emerging market debt which cannot be invested in passively at very low cost, it is assumed for modeling purposes that manager alpha is offset by fees
- For real estate there is an allowance for the unavoidable costs associated with investing in a real estate portfolio. These include property management costs, trading costs and investment management expenses.
- For hedge funds, private equity and infrastructure, explicit fee assumptions are subtracted from expected returns; include base and performance-based fee/carry as appropriate



Q4 2017 Assumptions (10-Year): Expected Nominal Correlations

Correlations	
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
1 Large Cap U.S. Equity	1.00 0.92 0.95 0.79 0.72 0.09 0.09 -0.05 0.05 -0.02 0.07 -0.12 0.60 0.39 -0.03 -0.03 0.00 0.42 0.41 0.46 0.69 0.55 0.68 0.55 0.39 0.66 0.32 0.69 0.38 0.05 0.56 0.91 0.52
2 Small Cap U.S. Equity	1.00 0.90 0.72 0.67 0.07 0.07 -0.06 0.04 -0.02 0.07 -0.12 0.56 0.36 -0.03 -0.03 0.00 0.39 0.38 0.41 0.63 0.51 0.63 0.50 0.36 0.61 0.27 0.65 0.35 0.04 0.51 0.84 0.47
3 Global Equity Including Small Cap	1.00 0.92 0.84 0.07 0.07 -0.05 0.05 -0.01 0.08 -0.12 0.65 0.41 0.16 0.14 0.00 0.47 0.46 0.56 0.67 0.54 0.66 0.53 0.39 0.63 0.39 0.67 0.37 0.07 0.62 0.87 0.49
4 International Equity	1.00 0.75 0.04 0.04 -0.04 0.04 -0.01 0.07 -0.10 0.58 0.37 0.41 0.35 -0.02 0.43 0.44 0.60 0.58 0.47 0.57 0.46 0.35 0.53 0.44 0.56 0.32 0.08 0.58 0.73 0.40
5 Emerging Markets Equity	1.00 0.06 0.06 -0.04 0.05 0.00 0.08 -0.10 0.65 0.37 0.18 0.16 0.01 0.48 0.47 0.52 0.50 0.40 0.50 0.40 0.32 0.49 0.31 0.53 0.29 0.06 0.60 0.66 0.37
6 Gov Cash	1.00 0.98 0.45 0.47 0.23 0.20 0.24 0.14 0.13 0.13 0.30 0.63 0.16 0.07 0.01 -0.01 -0.01 -0.01 -0.01 0.16 0.09 0.21 0.09 0.11 0.52 0.12 0.17 0.38
7 LIBOR Cash	1.00 0.45 0.47 0.23 0.20 0.23 0.14 0.14 0.12 0.29 0.62 0.17 0.07 0.01 -0.01 -0.01 -0.01 -0.01 0.15 0.08 0.21 0.09 0.11 0.51 0.12 0.17 0.37
8 TIPS	1.00 0.50 0.31 0.28 0.32 0.10 -0.05 0.08 0.14 0.23 0.14 0.03 -0.02 -0.11 -0.09 -0.11 -0.09 0.03 -0.02 0.18 -0.04 0.00 0.41 0.04 -0.01 0.12
9 Core Fixed Income (Market Duration)	1.00 0.84 0.86 0.74 0.33 0.18 0.20 0.36 0.61 0.49 0.20 0.14 0.07 0.06 0.07 0.06 0.08 0.04 0.08 0.04 0.06 0.17 0.29 0.09 0.18
10 Long Duration Bonds – Gov't / Credit	1.00 0.96 0.95 0.13 -0.04 0.18 0.32 0.53 0.34 0.08 0.07 -0.01 -0.01 -0.01 -0.01 -0.01 -0.01 -0.01 -0.02 0.01 -0.08 0.10 0.01 0.07
11 Long Duration Bonds – Credit	1.00 0.82 0.35 0.21 0.17 0.30 0.50 0.49 0.21 0.17 0.16 0.13 0.16 0.13 0.05 0.05 0.00 0.06 0.05 -0.07 0.31 0.09 0.10
12 Long Duration Bonds – Gov't	1.00 -0.14 -0.33 0.17 0.30 0.50 0.13 -0.08 -0.05 -0.22 -0.17 -0.22 -0.17 -0.03 -0.08 -0.03 -0.10 -0.04 -0.09 -0.16 -0.09 0.02
13 High Yield Bonds	1.00 0.77 0.18 0.19 0.12 0.73 0.62 0.57 0.65 0.52 0.64 0.52 0.26 0.40 0.38 0.45 0.26 0.20 0.91 0.56 0.34
14 Bank Loans	1.00 0.09 0.11 0.09 0.48 0.55 0.43 0.68 0.55 0.67 0.54 0.17 0.26 0.18 0.29 0.17 0.13 0.81 0.37 0.23
15 Non-US Developed Bond (0% Hedged)	1.00 0.96 0.30 0.22 0.21 0.51 0.03 0.02 0.03 0.02 0.00 -0.02 0.43 0.00 0.01 0.13 0.27 -0.01 0.03
16 Non-US Developed Bond (50% Hedged)	1.00 0.56 0.27 0.21 0.46 0.02 0.02 0.02 0.02 0.02 -0.01 0.40 0.00 0.03 0.18 0.27 0.01 0.09
17 Non-US Developed Bond (100% Hedged)	1.00 0.26 0.10 0.08 0.00 0.00 0.00 0.00 0.00 0.07 0.02 0.09 0.00 0.05 0.21 0.13 0.06 0.21
18 Hard Emerging Market Bonds	1.00 0.69 0.62 0.53 0.43 0.53 0.43 0.18 0.28 0.23 0.30 0.17 0.10 0.76 0.40 0.26
19 Corporate Emerging Market Bonds	1.00 0.61 0.58 0.47 0.58 0.46 0.16 0.26 0.26 0.28 0.15 0.09 0.73 0.38 0.22
20 Local Emerging Market Bonds	1.00 0.48 0.39 0.48 0.39 0.10 0.28 0.45 0.20 0.12 0.02 0.73 0.41 0.22
21 Hedge Funds Universe	1.00 0.73 0.99 0.73 0.26 0.45 0.29 0.47 0.25 0.03 0.69 0.63 0.33
22 Hedge Funds Buy List	1.00 0.73 0.99 0.21 0.36 0.23 0.38 0.21 0.03 0.56 0.50 0.27
23 Broad Hedge Funds - without fees (Universe)	1.00 0.72 0.25 0.44 0.28 0.46 0.25 0.03 0.69 0.62 0.33
24 Broad Hedge Funds - without fees (BuyList)	1.00 0.20 0.36 0.22 0.38 0.21 0.03 0.56 0.50 0.26
25 Core Real Estate	1.00 0.47 0.09 0.33 0.19 0.09 0.21 0.38 0.24
26 REITs	1.00 0.19 0.47 0.26 0.05 0.36 0.61 0.35
27 Commodities	1.00 0.11 0.08 0.40 0.37 0.30 0.22
28 Private Equity	1.00 0.32 0.05 0.37 0.64 0.36
29 Infrastructure	1.00 0.06 0.21 0.37 0.22
30 Inflation	1.00 0.14 0.09 0.20
31 Multi Asset Credit	1.00 0.51 0.31
32 Equity Insurance Risk Premium- High Beta	1.00 0.50
33 Equity Insurance Risk Premium- Low Beta	1.00



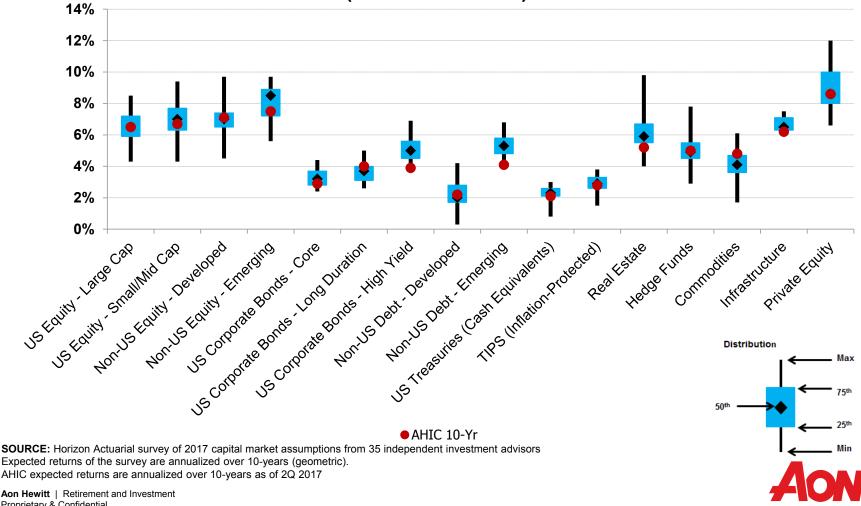
2017 Horizon Survey Results AHIC Capital Market Assumptions

- Long-term (10 and 30 year forecasts) forward-looking assumptions (asset class geometric return, volatility and correlations)
- Building Block approach. Primarily based on consensus expectations and market based inputs
- Best estimates of annualized returns (50/50 better or worse)
- Market returns: no active management value added (other than hedge funds and private equity)
- Net of investment fees



Ask 35 Consultants and...

Expected Geometric Returns by Asset Class (10 Year Forecast)



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Investment advice and consulting services provided by Aon Hewitt Investment Consulting, Inc., an Aon Company.

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AHIC Versus Peers (2017 Horizon Survey)—10-Year Forecast

	Horizon Survey 10 Year Horizon		AHIC 10 Year Forecasts		
Asset Class	Expected Return	Expected Risk	Expected Return	Expected Risk	Difference
US Equity - Large Cap	6.5%	16.6%	6.5%	17.0%	0.0%
US Equity - Small/Mid Cap	6.9%	20.2%	6.7%	23.0%	-0.2%
Non-US Equity - Developed	7.0%	18.9%	7.1%	20.0%	0.1%
Non-US Equity - Emerging	8.0%	25.4%	7.5%	30.0%	-0.5%
US Fixed Income - Core	3.2%	5.5%	2.9%	4.0%	-0.3%
US Fixed Income - Long Duration Corp	3.6%	10.4%	4.0%	11.0%	0.4%
US Fixed Income - High Yield	5.1%	10.6%	3.9%	12.0%	-1.2%
Non-US Fixed Income - Developed	2.2%	7.4%	2.2%	5.5%	0.0%
Non-US Fixed Income - Emerging	5.3%	11.8%	4.1%	13.0%	-1.2%
Treasuries (Cash Equivalents)	2.3%	3.0%	2.1%	1.0%	-0.2%
TIPS (Inflation-Protected)	2.9%	6.3%	2.8%	4.5%	-0.1%
Real Estate	6.2%	14.5%	5.2%	11.5%	-1.0%
Hedge Funds	4.9%	8.0%	5.0%	9.0%	0.1%
Commodities	4.1%	17.9%	4.8%	17.0%	0.8%
Infrastructure	6.7%	14.6%	6.2%	14.5%	-0.5%
Private Equity	9.0%	22.0%	8.6%	24.0%	-0.4%
Inflation	2.2%	1.7%	2.2%	1.0%	0.0%

Notes (Horizon Survey):

Source: Horizon Actuarial survey of 2017 capital market assumptions from 35 independent investment advisors Expected returns are annualized (geometric).

Notes (AHIC Forecasts):

AHIC Forecasts are for Q2 2017

US Equity - Small/Mid Cap forecasts represents AHIC forecasts for US Small Cap

US Fixed Income - Long Duration forecasts represents AHIC forecasts for Long Duration Credit

Non-US Fixed Income - Developed forecasts represents AHIC forecasts for Non-US Fixed Income - Developed (50% Hedged)

Non-US Fixed Income- Emerging forecasts represents AHIC forecasts for Non-US Fixed Income- Emerging Sovereign USD

Real Estate forecasts represents AHIC forecasts for Core Private Real Estate

Hedge Funds forecasts represents AHIC forecasts for Hedge Fund-of-Funds (Buy List)



AHIC Versus Peers: Observations

- Compared to 2016, 2017 survey results under the 10-year forecast indicate a slight decrease in return assumptions of both risky assets (equity-like) and fixed income asset classes
 - Equity return assumptions are lower by an average of 0.2%
 - Fixed income return assumptions are lower by an average of 0.3%
 - Alternative asset class return assumptions are lower by an average of 0.1%
- 2017 AHIC 10-year forecast assumptions tend to be lower than the survey average
 - AHIC equity assumptions are driven by market valuations, earnings growth expectations and assumed payouts to investors. Recent experience suggests strong equity market performance has been driven more by increasing valuations than increasing profits. As markets have become more expensive, our equity return assumptions have consequently fallen
 - AHIC fixed income assumptions reflect falling yields and flattening of yield curves during the first quarter of 2017
 - AHIC alternative asset class assumptions are generally lower due to methodological and inflation forecast differences compared to survey participant forecasts
- In conclusion, AHIC assumptions appear somewhat more conservative than peers included in the 2017 Horizon Survey of capital market assumptions



Leading Methodologies & Reasons for Differences

Leading Methodologies

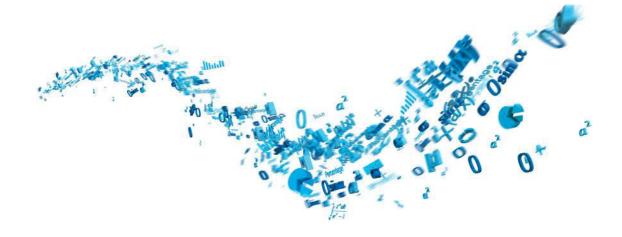
- Building Block
- Global Capital Asset Pricing Model (Global CAPM)
- Surveys
- Historical data (as a guide to future)
- Black-Litterman (combination of building block and CAPM)

Reasons for Differences

- Methodology
- Time Horizon
- Arithmetic vs. Geometric forecasts*
- Alpha (active management)*
- Inflation
- Investment Fees
- Asset class definition



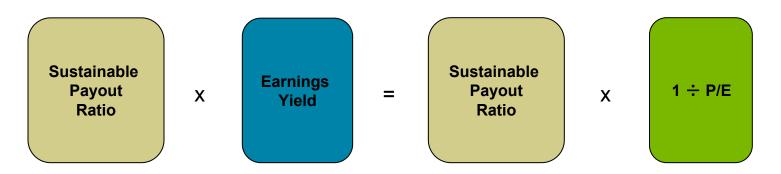
^{*} While some firms in Horizon survey responded with Arithmetic forecasts, the results have been converted to Geometric forecasts for comparison purposes. Additionally, the return expectations included in the Horizon survey are based on indexed returns (no "alpha"). However, AHIC return assumptions for certain asset classes include "alpha" or active management premium (e.g., Hedge Funds)



Appendix



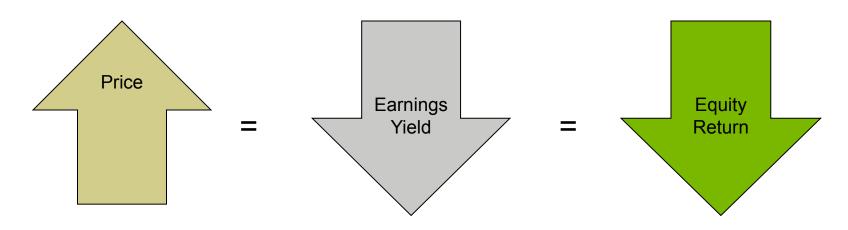
Equities: Initial Yield



- Earnings yields with assumed payout ratios provide a better basis for long-term equity return assumptions than dividend yields and share buy-backs
- Sustainable payout ratio is a constant = 50% (Developed markets) and 40% (Emerging Markets)
 - Not just dividends, allows for buybacks as well
 - Inclusion of buybacks shifts expected returns on equities upward



Equities: Market Movements Impact Return Assumptions



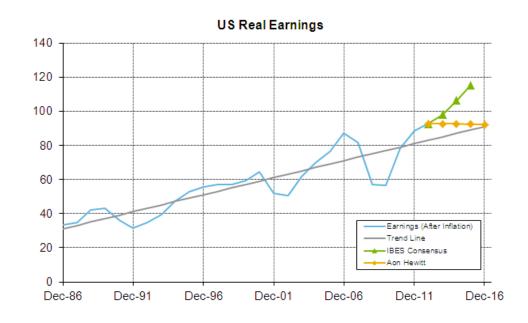
- Equity return assumptions rise (fall) as equity markets fall (rise)
- When equity market rises (falls), all else being equal
 - Price/Earnings Multiple (P/E) rises (falls)
 - Earnings Yield = $1 \div P/E$ falls (rises)
 - Equity return assumption falls (rises)
- Size of impact depends on valuation of market
 - Market moves have proportionately larger impact on cheaper equity markets



Equities: Earnings Growth

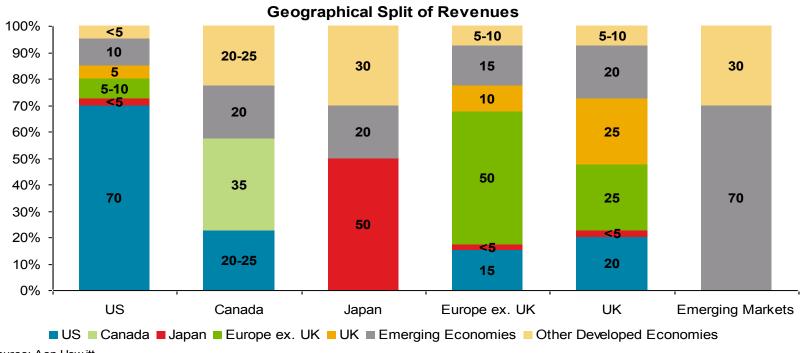
Earnings growth is 2-stage process:

- Near-term earnings growth assumption to capture cyclical aspects (reversion to mean)
 - We assume real earnings revert to trend in 2016
- Long-term earnings growth based on long-term GDP growth (by region)
 - Allow for geographic source of earnings
 - Longer-term growth
 assumptions have much larger
 influence than near-term
 growth assumptions and are
 relatively stable over time





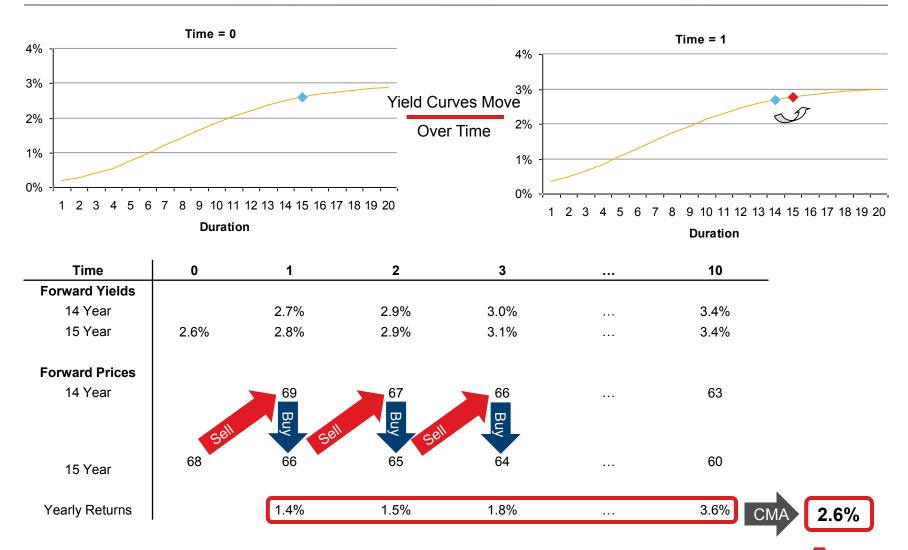
Equities: Geographical Split of Revenues



- Source: Aon Hew itt
- We do not assume a one-to-one relationship between a country's growth (GDP) rate and the longterm earnings growth potential of companies listed on the stock market within that country
- Equity markets depend on more than the domestic economy
 - E.g., Emerging markets are an important driver of profits earned in the developed world



Government Bond Return: Example (15-Year Duration)





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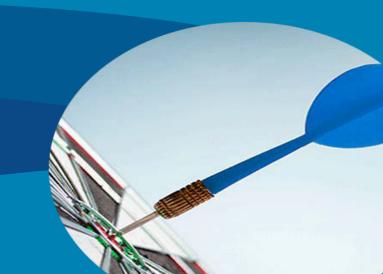


TAB 9



TRS of Texas
Experience Study Findings

February 14, 2018



Upcoming Experience Study: Purpose of Valuation

- The <u>primary</u> purpose of the annual actuarial valuation is to either (1) set or (2) assess the adequacy of the contribution policy
 - "Funding" or "contribution allocation procedure"
- The funding policy is the pattern of contributions, not necessarily the contribution in a given year
- For TRS, the funding policy has mostly a fixed contribution rate from members, employers, and the State



Outline of Current Assumption Set

- 8.00% investment return assumption
- 2.50% general inflation assumption
- 3.50% individual salary increase assumption
- 2.50% overall payroll growth assumption
- Mortality based on 2015 TRS study projected with Scale BB

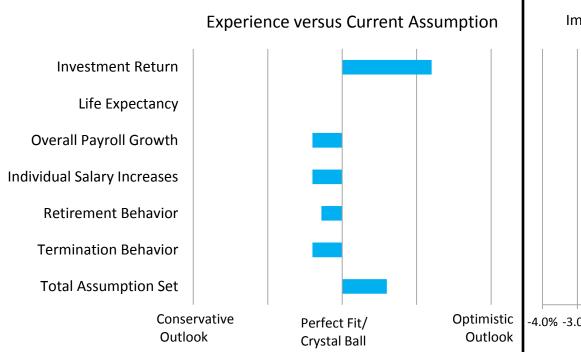


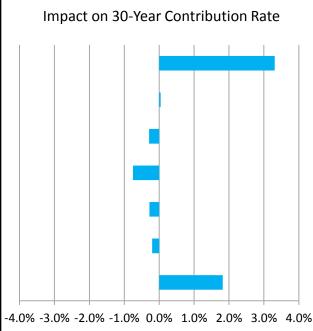
General Findings

- Future economic growth likely to continue to be suppressed compared to historical levels
 - Future price inflation, investment returns, overall wage growth, and individual salary increases are likely to be lower than currently assumed
- Retirees continue to live longer, but most of the increase in the experience already reflected in generational methodology
- Members are putting off retirement, likely to do so even more in the future with changes to TRS-CARE
- Members are turning over at a higher pace
- Most of the other assumptions continue to either be appropriate, or only need minor changes



Experience versus the Current Assumption Set





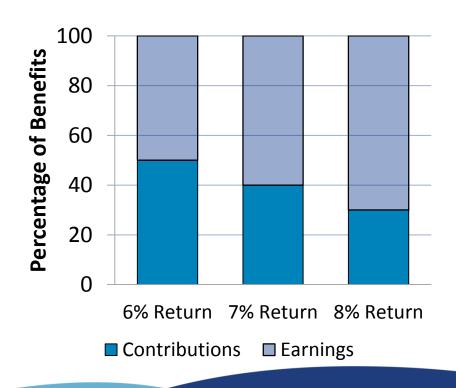


Per ASOP 27: Reasonable Assumptions

- An economic assumption is reasonable if
 - It is appropriate for the purpose of the measurement
 - It reflects the actuary's professional judgement
 - It takes into account historical and current economic data that is relevant as of the measurement date
 - It reflects the actuary's estimate of future experience
 - It has no significant bias (i.e., it is not significantly optimistic or pessimistic)
 - Although some allowance for adverse experience may be appropriate
- The standard explicitly advises an actuary not to give undue weight to recent experience
- In addition to each individual assumption meeting the standard, the assumption set as a whole must also meet the standard



- This assumption is used to predict what percentage of a future benefit payments will be covered by investment return and what percentage by contributions.
- Lower Returns/Higher Contributions

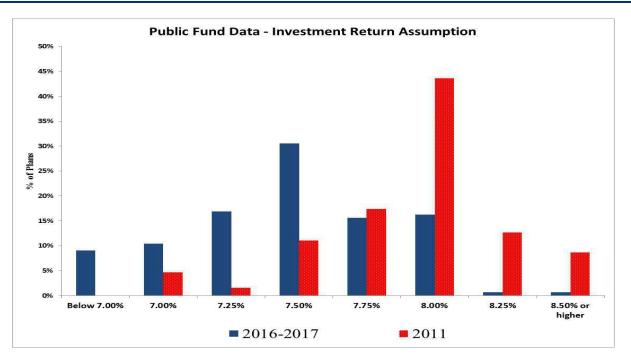




- The assumption selected should be reasonable
 - Not necessarily a single "correct" answer
- Assumption is selected using a process that considers:
 - TRS target asset allocation
 - Capital market expectations
 - Will use AON, in addition to several other independent sources
 - Utilize a building block approach that reflects expected inflation, real rates of return, and plan related expenses
 - Take into account the volatility of the expected returns produced by the investment portfolio
- Other factors to consider
 - Historical investment performance
 - Comparison with peers



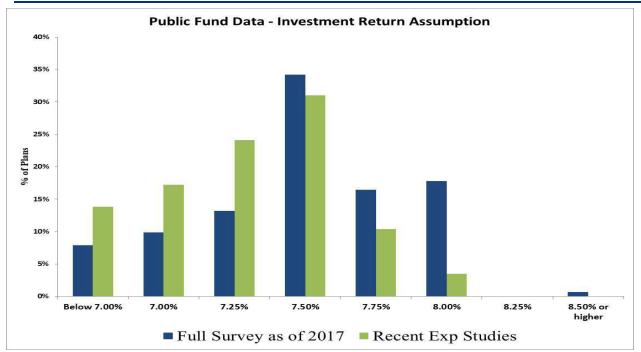
Comparison to Peers







Comparison to Peers



"Recent Exp Studies" is the compilation from Systems that have performed experience studies in 2016 or 2017



Capital Market Assumptions – Investment Consultants

- We performed the analysis using the current target asset allocation
- Projected real returns were developed using TRS' target investment allocation and 2017 capital market return assumptions developed by eleven investment consulting firms and a broader survey:
 - 7 have 7-10 year time horizons
 - 4 have 20+ year time horizons

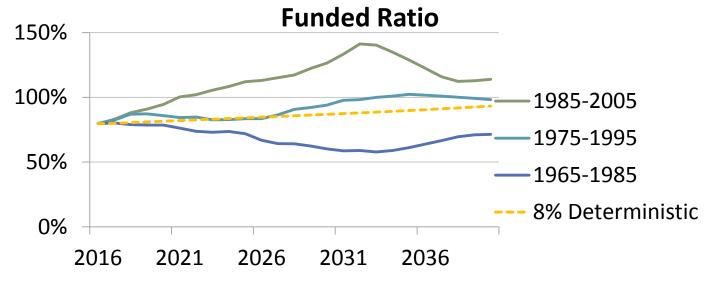


Time Horizons

- The duration of the liabilities (average interest discounted benefit payment) will occur 24 years from the valuation date
 - Or, if the liability stream of TRS were compared to a portfolio of bonds, it would behave similarly to a bond with a 24-year duration
- Also, we have shown in previous valuation material the impact order has on total asset accumulation, meaning poor returns over the short term will decrease the overall level of assets over time even if the longer term returns are closer to expected
- Thus, we believe the preferable time horizon for setting this assumption to be approximately 20-24 years, or in the range between the shorter term (10 year) and longer term (20-30 year) capital market assumptions



Impact of Order on Projection Scenarios Based on Select Recent Time Periods' Volatilities (From 2016 Valuation Presentation)



The above scenarios all achieve an 8% compound return over a 20-year period. Modeled returns each year are based on the actual historical pattern during the range provided, with an overall adjustment to achieve an 8% return.



Analysis: Provided by Aon (4th quarter 2017)

		10 Year	30 Year
	Long-Term	Expected	Expected
	Target Asset	Geometric Rate	Geometric
Asset Class	Allocation	of Return	Rate of Return
(1)	(2)	(3)	(4)
U.S. Equity	18%	6.4%	6.5%
Non-US Developed	13%	7.2%	7.2%
Emerging Markets	9%	7.6%	7.7%
Directional Hedge Funds	4%	5.2%	5.7%
Private Equity	13%	9.1%	9.4%
U.S. Treasuries	11%	3.0%	3.2%
Stable Value Hedge Funds	4%	5.1%	5.6%
Cash	1%	2.0%	2.6%
Global Inflation Linked Bonds	3%	2.9%	3.4%
Real Assets	14%	6.4%	6.4%
Energy and Natural Resources	5%	8.5%	8.5%
Risk Parity	5%	<u>5.5%</u>	<u>5.5%</u>
Gross Expected Return		7.14%	7.34%



Distribution of Expected Returns

7-10 Year Time Horizon

- Target Portfolio
- 2.30% Inflation
- Average Expected Real Return of 4.77%

Investment	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding	Probability of exceeding
Consultant	40th	50th	60th	8.00%	7.25%
(1)	(2)	(3)	(4)	(5)	(6)
1	5.6%	6.7%	7.8%	38.6%	45.3%
2	5.9%	6.9%	8.0%	40.1%	47.1%
3	6.1%	7.0%	7.9%	38.7%	47.1%
4	6.1%	7.0%	7.9%	39.2%	47.4%
5	6.1%	7.1%	8.2%	41.9%	49.0%
6	6.1%	7.2%	8.3%	42.6%	49.5%
7	6.4%	7.4%	8.5%	44.4%	51.9%
Average	6.06%	7.07%	8.09%	40.8%	48.2%



Distribution of Expected Returns

Longer Time Horizon

- Target Portfolio
- 2.30% Inflation
- 15-20+ year time horizons
- Average Expected Real Return of 5.02%

Investment	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding	Probability of exceeding
Consultant	40th	50th	60th	8.00%	7.25%
(1)	(2)	(3)	(4)	(5)	(6)
1	6.5%	7.2%	7.8%	37.4%	48.9%
2	6.6%	7.3%	8.0%	40.4%	50.5%
3	6.6%	7.4%	8.2%	42.1%	51.9%
4	6.6%	7.4%	8.2%	42.4%	52.1%
Average	6.59%	7.32%	8.05%	40.6%	50.9%



Range of Options

	Current Assumptions	Proposed Assumptions	Proposed Assumptions	Proposed Assumptions
	(1)	(2)	(3)	(4)
Investment Return Assumption	8.00%	7.50%*	7.25%	7.00%
UAAL (\$ Billions)	\$35.5	\$42.8	\$45.9	\$51.7
Actuarial Funded Ratio	80.5%	77.4%	76.1%	73.9%
Funding Period in years based on current funding levels	33	60	86	NA
Increase in Contribution Rate needed to have 30 year funding period	0.15%	1.38%	1.82%	3.05%
Additional Estimated FY18 Contributions	\$65m	\$599m	\$786m	\$1,323m
Funding Period with 1.5% additional contributions	19	29	35	54
Funding Period with 2.0% additional contributions	17	26	31	42

^{*}Inflation held at 2.5%, may not be a reasonable scenario



Actuary's Recommendation

- Based on this analysis, we recommend lowering the investment return assumption to 7.25%
 - 7.25% is close to the longer term expectation of 7.34% provided by Aon, but slightly lower to reflect the lower expectations over the shorter term
 - 7.25% is close to the median recently chosen by peer systems in the country
 - TRS has earned approximately 7.00% return over the last 20 years
 - The probabilities of achieving a 7.25% return do appear to be lower over the short-term, if the Board is uncomfortable with less than 50% probability over the next decade, it should consider 7.00%
 - Lowering the assumption will increase the probability of achieving the assumption over the long term and decrease the impact when the assumption is not achieved

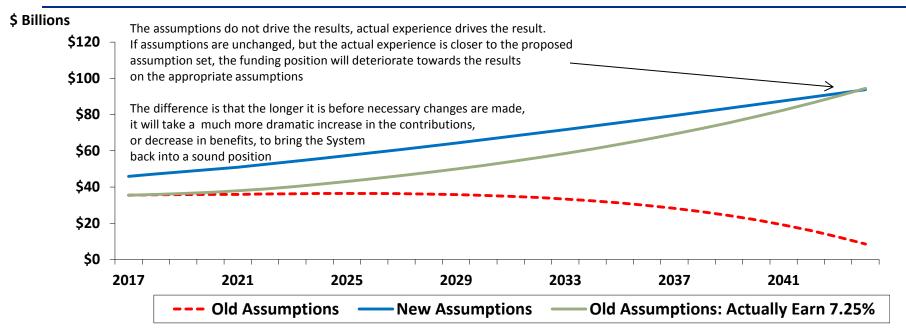


Summary of Recommendations

- Material Recommendations
 - Decrease nominal investment return assumption to 7.25%
 - Decrease inflation assumption from 2.50% to 2.30%
 - Payroll Growth Rate set to 3.00%
 - Inflation assumption plus 0.70%
 - Decrease ultimate productivity, promotion, and merit component of individual salary scale from 1.00% to 0.75% above inflation
 - Nominal decrease from 3.50% to 3.05%
 - Increase rates of turnover
 - Lower retirement probabilities
- Minor Recommendations
 - Increase life expectancy slightly



Projection of UAAL: Current vs Proposed Assumptions



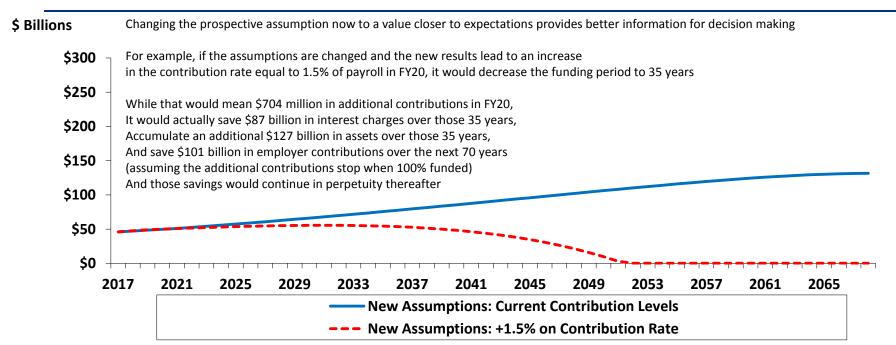
The above assumes all assumptions for the scenario exactly met, except at explicitly stated

Assumes no changes to benefit policy

Assumes current statutory contribution policy remains throughout period



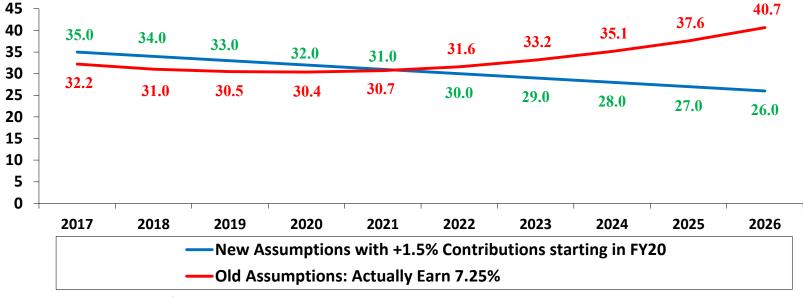
Projection of UAAL: Proposed Assumptions: Alternate Funding Policy



The above assumes all assumptions exactly met Assumes no changes to benefit policy



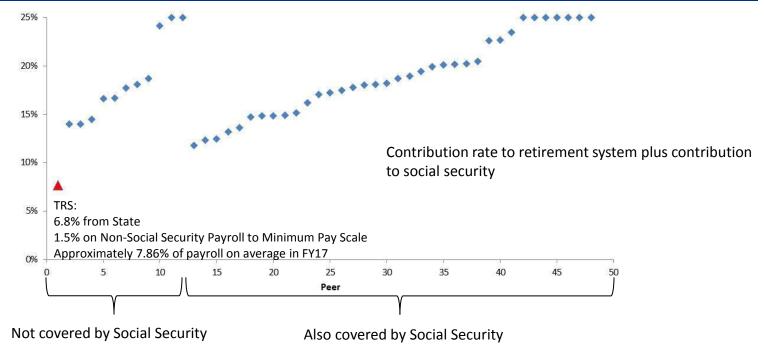
Projection of Funding Period: Impact of Funding Policy



The above assumes all assumptions for the scenario exactly met, except 7.25% actual earnings in both scenarios Assumes no changes to benefit policy



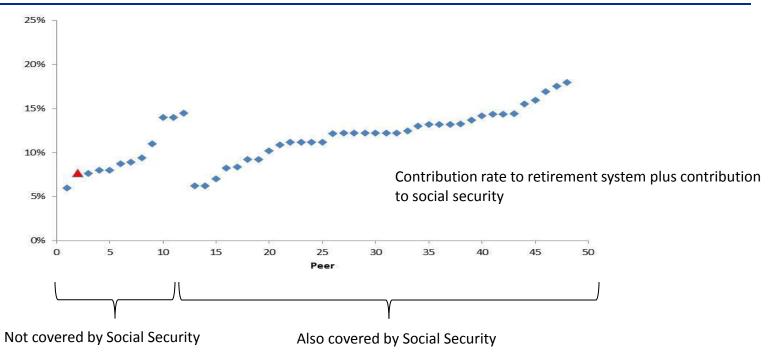
Peer Employer Contribution Rates by State: Teachers Plans







Peer Member Contribution Rates by State: Teachers Plans







Recent Peer Impact from Assumption Changes

Rate shown is combined from all sources Other Assumptions besides ROA also modified

Peer	ROA Before	ROA After	Actuarial Contribution Rate Before	Actuarial Contribution Rate After	Increase
TRS	8.00%	7.25%	15.6%	17.4%	1.8%
Α	8.00%	7.50%	19.9%	23.3%	3.4%
В	8.00%	7.50%	23.3%	26.4%	3.1%
С	7.50%	7.00%	27.8%	31.0%	3.2%
D	7.65%	7.00%	17.0%	24.0%	7.0%
E	7.50%	7.25%	19.1%	21.3%	2.2%



Actuary's Qualifications

- We believe the recommended set of actuarial assumptions should present a more accurate portrayal of TRS' financial condition and should reduce the magnitude of future experience gains and losses.
- The study was conducted in accordance with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board
- All signing actuaries meet the Qualification Standards of the American Academy of Actuaries



TAB 10





Overview

- I. History of Pension Benefit Design Study
- II. Modeling
- III. Major Findings
- IV. Outcome
- V. Study Update
- VI. Project Team
- VII. Proposed Timeline





History of Pension Benefit Design Study

- In 2011, TRS was directed by the Legislature to study the actuarial and fiscal impacts of potential changes to the pension plan, including:
 - changes to final average salary, retirement eligibility, and the benefit multiplier
 - moving to a hybrid plan or cash balance plan
- The study also discussed pension design issues such as:
 - balancing risk
 - providing adequate replacement income
 - offering value to members, the state, and other stakeholders
 - managing human capital
- Study released in September 2012.
- Enhanced national dialogue on DB/DC issues. Presented at NASRA and NCPERS.



Modeling

- The study modeled the following scenarios:
 - adding more money to the current plan
 - potential benefit changes to the current plan
 - cost and benefit levels of various retirement plans compared to the current plan using a "Targeted Benefit Approach" and "Targeted Contribution Approach"
 - value of a professionally managed fund and the impact on members in a selfdirected defined contribution plan



Modeling

RETIREMENT PLAN TYPE					
Cash Balance	Member receives pay and investment credits into a "virtual account." Contributions invested through TRS trust fund. At retirement, account balance can be annuitized.				
Side by Side Hybrid	Members and state contribute to both a small defined benefit plan and a small defined contribution plan with the idea that both plans, together, provide the targeted level of benefits. Defined benefit contributions are invested through TRS trust fund. The defined benefit is annuitized. Defined contribution investments are self-directed and are taken as lump sum at retirement.				
Capped Hybrid	Similar to side by side hybrid, but the state contribution is capped. All contributions from the members and the state go first towards paying the actuarially required contribution (ARC). Any remaining contributions after ARC is paid go toward defined contribution plan. Members are responsible for paying any portion of the ARC above the state's capped contribution.				
Pooled Defined Contribution	Like a traditional defined contribution plan but contributions are pooled and invested by TRS. Lump sum distribution is taken at retirement.				
Traditional Defined Contribution	Investments are self-directed and member must manage account for duration of retirement.				





Major Findings

The 2012 Pension Benefit Design Study found the following:

Unfunded Liability

• While the TRS Pension Fund can pay currently projected benefits through 2075, the state needs to begin addressing the unfunded liability. Delays will only increase costs.

Closing Current Plan • Moving new hires to an alternative plan will not eliminate existing liabilities. Closing the current plan would increase the unfunded liability by \$11.7 billion.





The 2012 Pension Benefit Design Study found the following:

Social Security

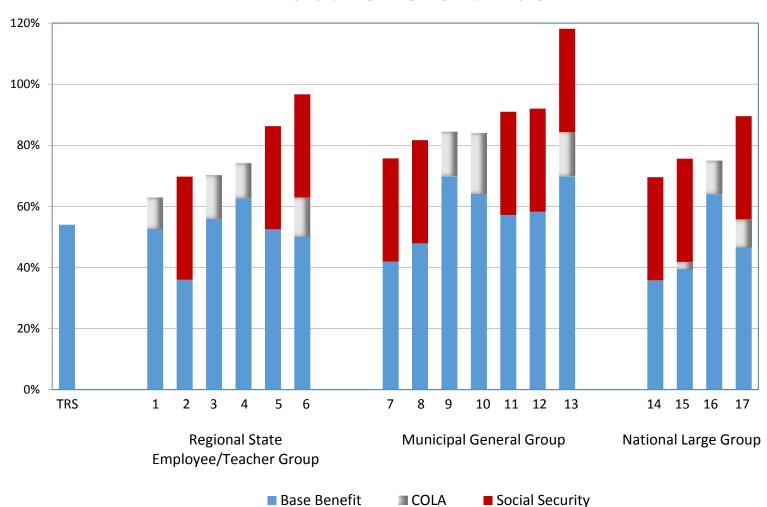
• 95% of public school TRS employees do not participate in Social Security; leaving the TRS benefit as their only lifetime annuity.

Value of TRS Benefit • The value of the retirement benefit available to TRS members is 36% less than the average benefits available to members of peer systems.





Relative Benefit Index







The 2012 Pension Benefit Design Study found the following:

Defined Contribution

 The majority of TRS members will do significantly worse investing on their own in a plan with a defined-contribution component.

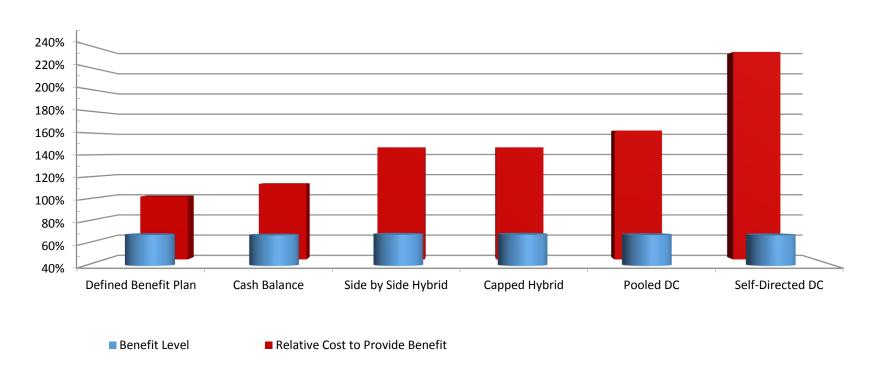
Lower Cost

 The defined benefit plan provides current benefits at a lower cost than alternative plans.





Targeted Benefit Approach



Source: Teacher Retirement System of Texas and Gabriel, Roeder, Smith and Company





The 2012 Pension Benefit Design Study found the following:

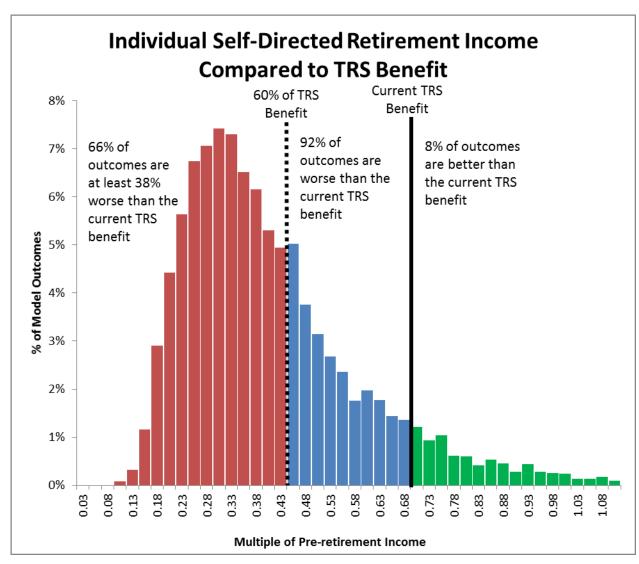
Lowered Benefits

• Other systems changing structures have lowered benefits to realize savings.

Levels of Risk • Alternative plan structures carry differing levels of risk for the state and TRS members.

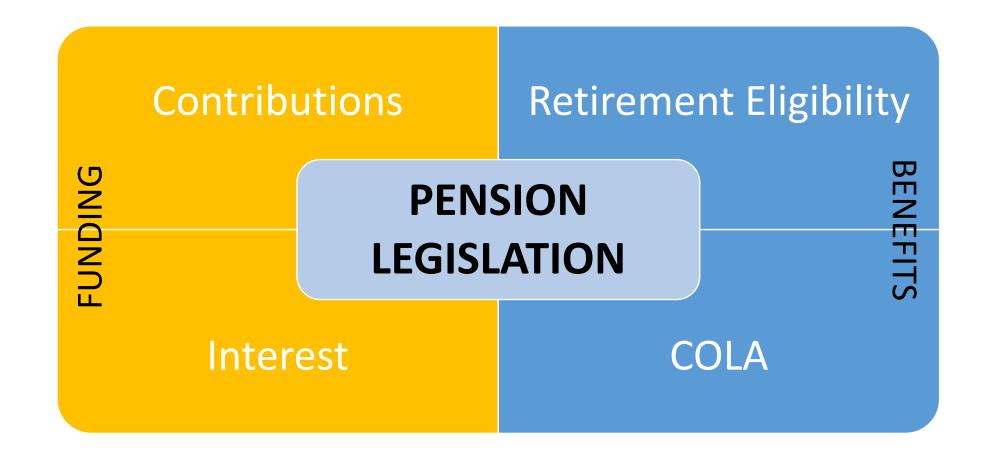








Outcome







Outcome

In 2013, pension legislation was enacted that made changes to both funding and benefits.

FUNDING

Increased the state contribution rate from 6.4% to 6.8% beginning in FY 14 and beyond.

Phased-in an increase to the member contribution rate over three fiscal years. Contribution rate increased from 6.4% to 6.7% in FY 15, to 7.2% in FY 16, to 7.7% in FY 17.

Authorized a new 1.5% payroll contribution beginning in FY 15 for school districts not participating in Social Security.

Tied any future reductions in the state contribution rate to member and school district contribution rates. If the state contribution rate is reduced, the contribution rates for members and school districts will be reduced by an equivalent percentage.

Reduced interest paid to members on withdrawn service from 5% to 2% prospectively.





Outcome

In 2013, pension legislation was enacted that made changes to both funding and benefits.

BENEFITS

Increased the normal retirement age to age 62 with the Rule of 80 and at least five years of service credit for all members not vested as of August 31, 2014 and new members on or after September 1, 2014.

Imposed a penalty of 5% per year for each year of retirement before age 62.

Provided a COLA of 3% (capped at \$100 per month) for annuitants who retired on or before August 31, 2004.

Established minimum age 62 for TRS-Care 2 or 3 with a grandfather for those who as of 8/31/2014 met the rule of 70 or had 25 years of service credit. Repealed during the 2017 legislative session.



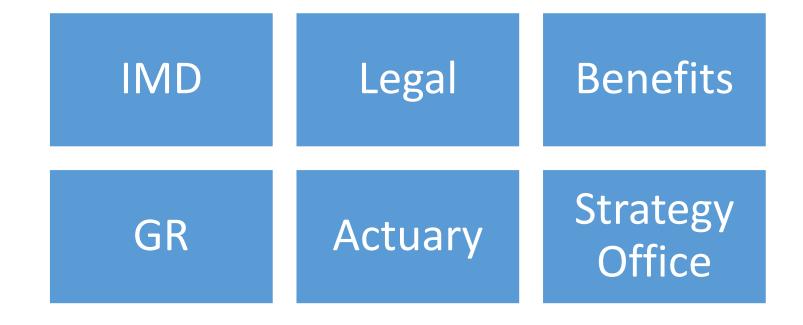
Study Update

- Why update the study now?
 - Prepare for the upcoming legislative session
 - Timely to refresh the data on the economic value of a defined benefit plan and examine other plan options
 - Share information on the impact of an increase in the contribution rate consistent with Legislative Appropriations Request
- The study will be updated to reflect current and expected market conditions as well as legislative and assumption changes.





Project Team







Proposed Timeline

January
Project kick-off

March-August

Engage stakeholders and update study









February
Receive input
from Board

September

Release study



TAB 12





Agenda for the Day, February 15, 2018





Agenda for February 15th, Thursday

- 11. Provide opportunity for public comment Jarvis Hollingsworth.
- 12. Receive an overview of the February 15, 2018 agenda Brian Guthrie.
- 13. Discuss investment matters, including the following:
 - A. Market Update Jase Auby;
 - B. Emerging Manager Annual Update; including consideration of a finding that deliberating or conferring on investment transactions or potential investment transactions in an open meeting would have a detrimental effect on the position of the retirement system in negotiations with a third person or put the retirement system at a competitive disadvantage in the market Sylvia Bell;
 - C. Industry Leadership: Building a World Class Investor Sacha Ghai, Bryce Klempner and Matt Portner, McKinsey and Company;
 - D. Building the Fleet: Becoming a Best-in-Class Global Institutional Investor Jerry Albright;
 - E. SPN Tactical Value Update Jerry Albright.
- 14. Receive a report on Portfolio Performance Measures, Issues and Practices Dr. Keith Brown.
- 15. Receive a presentation on fiduciary duties Overview of Trustee and Employee Ethics Policies Carolina de Onis and Heather Traeger; Steve Huff and Keith Johnson, Reinhart Boerner Van Deuren S.C.
- 16. Receive a report on *Why is the Healthcare Market Different from other Markets?* Katrina Daniel and Dr. Osama Mikhail, University of Texas Health Science Center.
- 17. Consider adoption of the notice of completed rule review for the 403(b) rules in Title 34, Part 3, Chapter 53 of the Texas Administrative Code Rebecca Merrill.



TAB 13 A

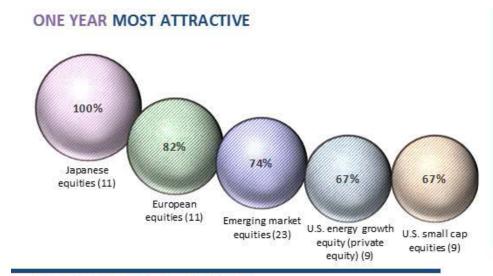


Executive Summary

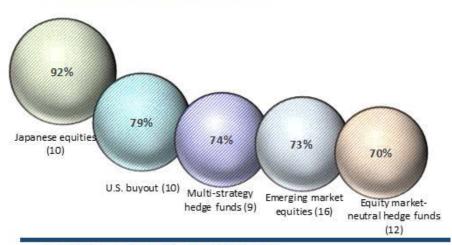
- The second half of 2017 was characterized by:
 - Lower than expected inflation and normal economic growth
 - Fed tightening of US monetary policy
 - Outperformance of Emerging Markets vs. Developed Markets
 - Considerable global market optimism driven by growth in earnings
 - Full employment recovery from GFC trough, particularly in the services sector
- In the first half of 2018, markets are focused on:
 - Increase in global growth, higher than previously expected
 - Expected global monetary policy tightening in developed market economies
 - o Emerging Markets to gain economic momentum over Developed Markets
 - o Global fiscal stimulus will encourage positive structural benefits
 - o Geopolitical issues, specifically the rise of populism and the North Korea threat
- In addition, each year we survey our network for its best ideas results are shown on the next page



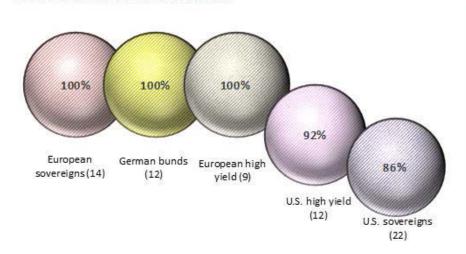
2018 Best Ideas Survey Results



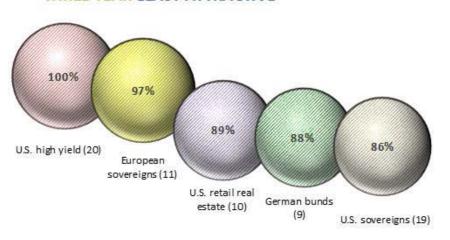




ONE YEAR LEAST ATTRACTIVE



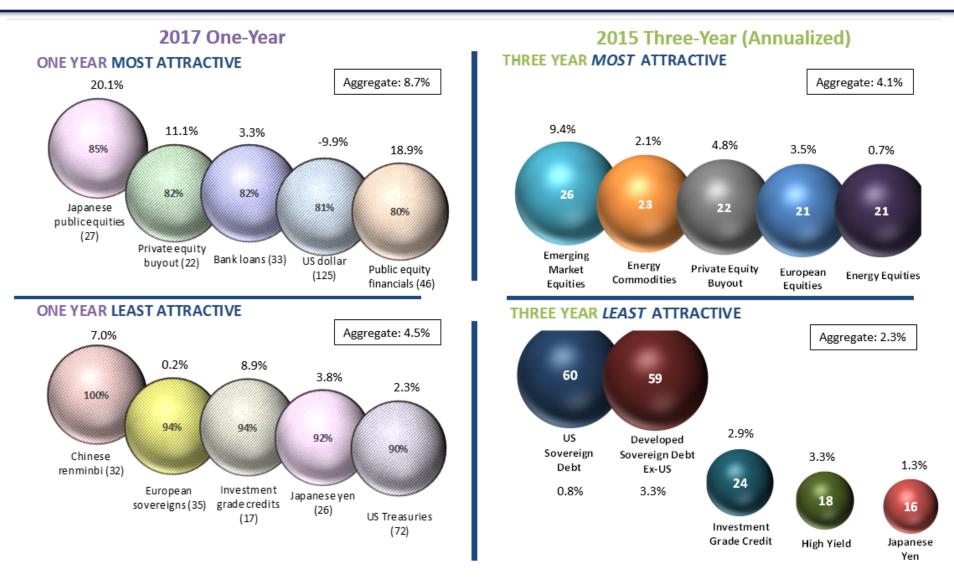
THREE YEAR LEAST ATTRACTIVE





Source: TRS IMD

2017 Best Ideas Survey Review



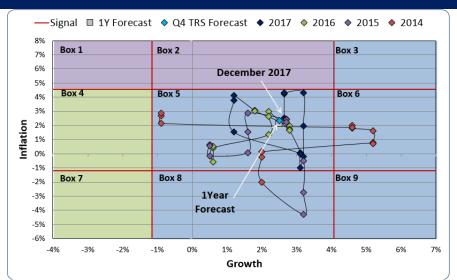


Source: TRS IMD

Macroeconomic Update

Inflation, Growth, LEI

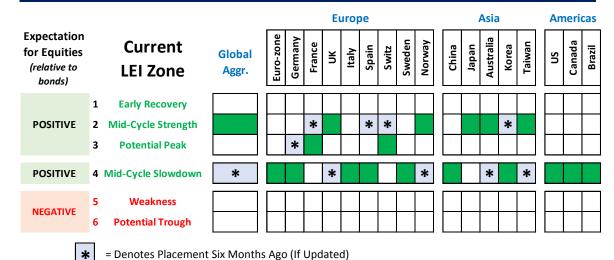
USA 9-Box



Global 9-Box

	June 2017	September 2017	December 2017
US	Box 5	Box 5	Box 5
Europe	Box 5	Box 5	Box 5
Japan	Box 5	Box 5	Вох 2
China	Box 5	Box 5	Вох 5
EM ex-China	Вох 8	Вох 5	Вох 5

Leading Economic Indicators



	10yr gov.	Equity Risk Premium		
Region	bond yields ²	Current	10-Year Average	
USA	2.4%	3.1%	4.6%	
Europe	0.4%	6.1%	6.6%	
UK	1.2%	5.7%	6.1%	
Japan	0.0%	6.7%	6.2%	
Emerging Markets	4.1%	3.8%	4.9%	

Government Bond Yields and ERP¹

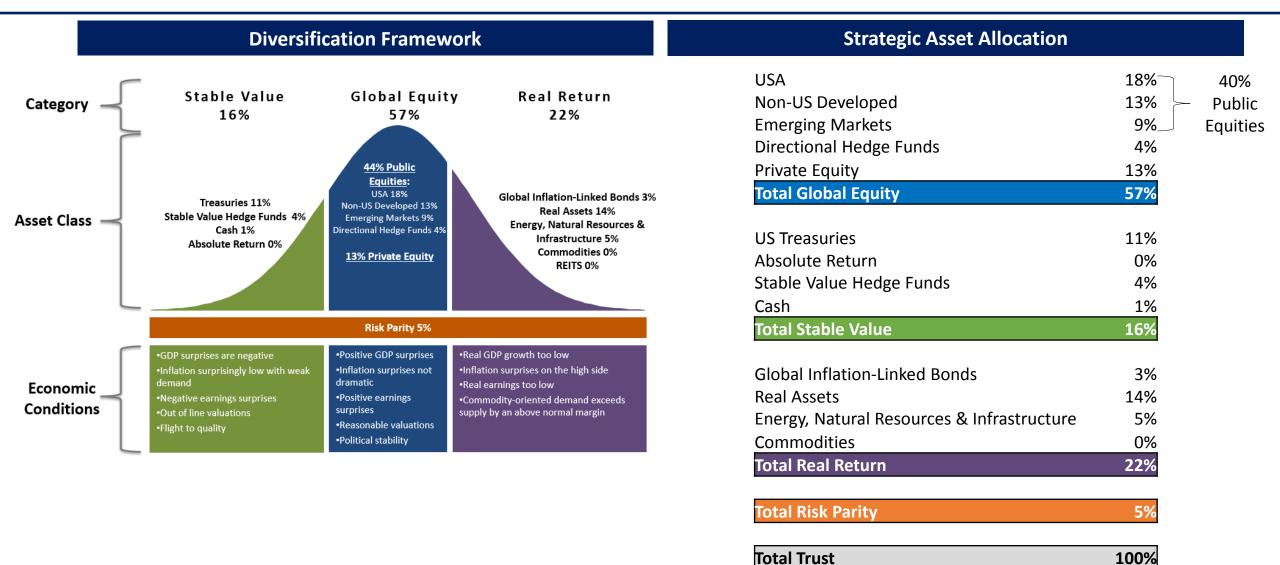


Source: Bloomberg, FactSet, TRS IMD, Blackrock as of 12/31/2017

 $^{^{1}}$ Equity Risk Premium is the Earnings Yield on the local market index less applicable 10yr gov. bond yield

² For USA, 10yr US Treasuries; for Europe, 10yr German gov. bonds; for Japan, 10yr Japanese gov. bonds; for EM, a blend of 10yr Chinese, South Korean, and Brazilian gov. bonds

TRS Strategic Asset Allocation



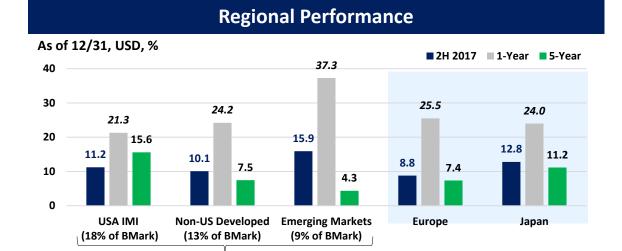


Source: TRS IMD

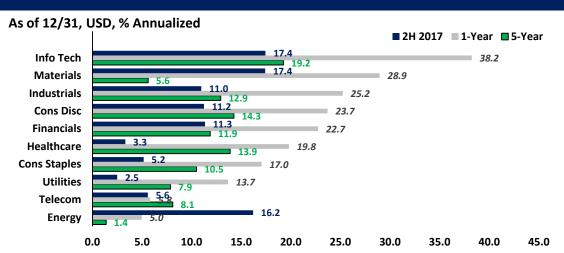
Public Equities

40% of TRS Policy Benchmark

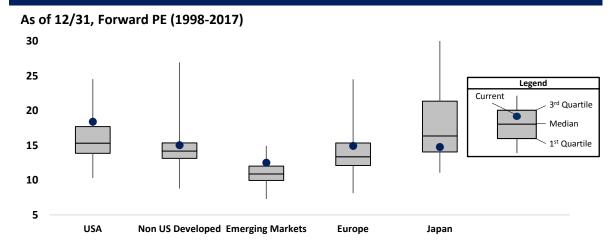
40% of Benchmark



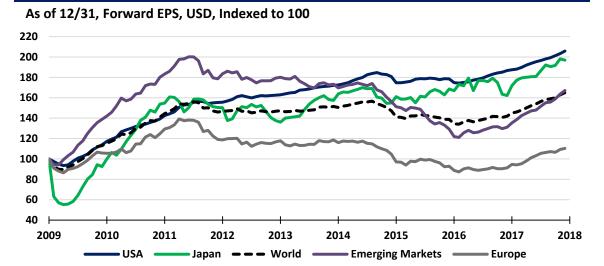
Global Sector Performance



Regional Valuations



Regional Earnings

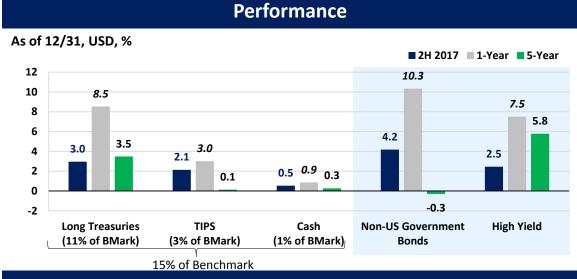




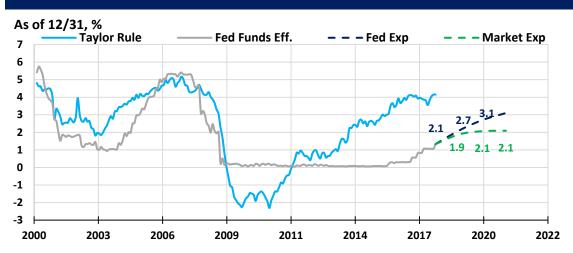
Source: Bloomberg, FactSet Note: All returns are in US Dollar terms

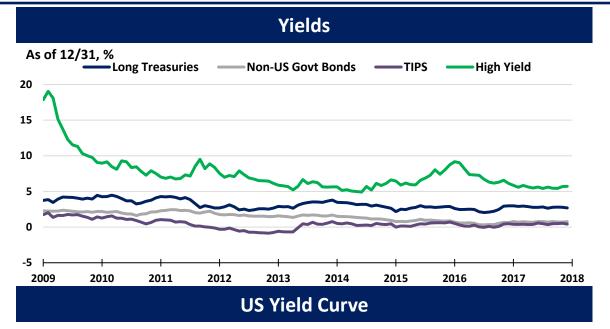
Fixed Income

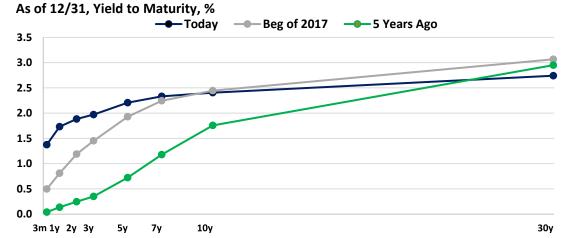
15% of TRS Policy Benchmark



Cash Rate¹







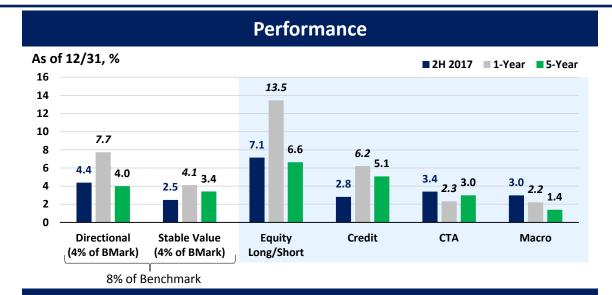


Source: Bloomberg, MSCI, FactSet (note all returns are in US Dollar terms)

¹Taylor Rule Definition: A central bank nominal policy rate set equal to a neutral real rate plus the current level of inflation, which responds to changes in the inflation gap (as measured by the difference between the current rate of inflation and the central bank's inflation target) and the output gap (as measured by the difference between NAIRU and the current unemployment rate).

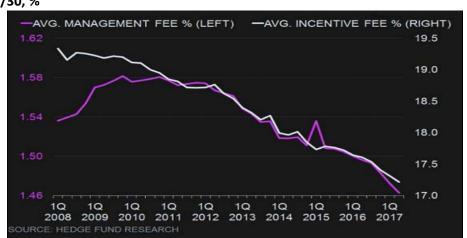
Hedge Funds

8% of TRS Policy Benchmark



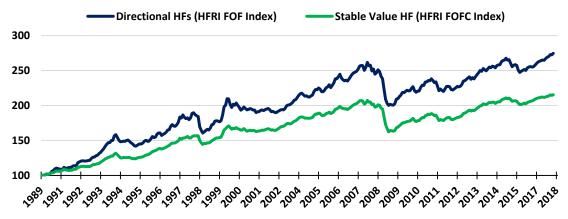
Average Hedge Fund Fees

As of 06/30, %



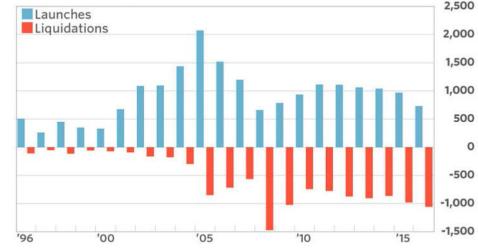
Alpha Versus Equivalent Risk Equity¹

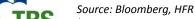




Hedge Fund Launches v. Liquidations

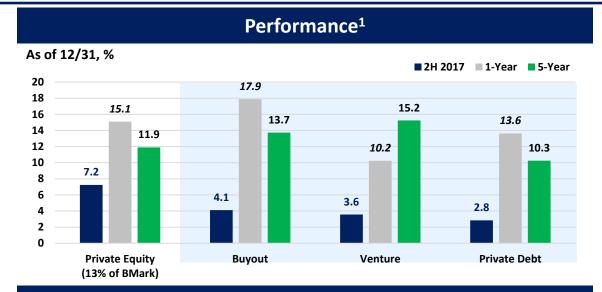
As of 03/31, Count of Launches v. Liquidations



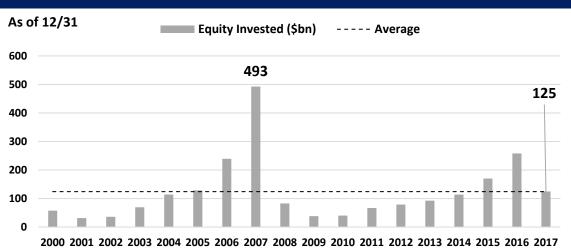


Private Equity

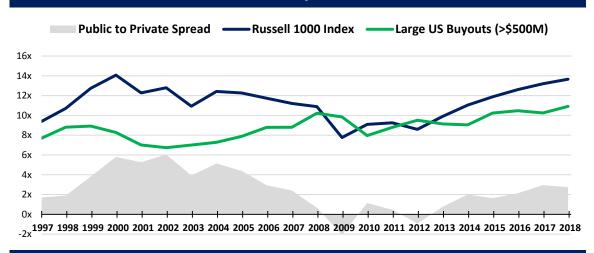
13% of TRS Policy Benchmark



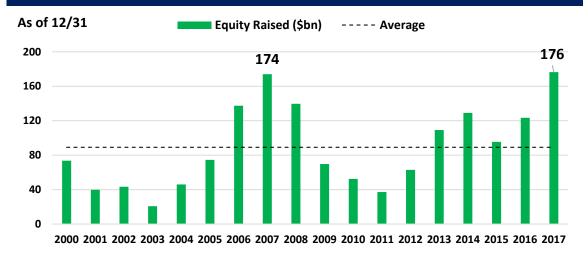
Transaction Volume



Multiples



Fundraising Activity





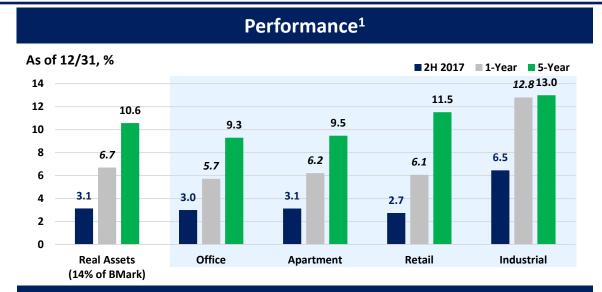
Source: State Street, Preqin, S&P, Dealogic

Market data for US Large Buyout Market unless specified otherwise

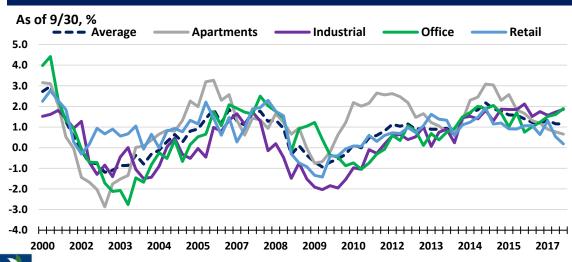
¹PE Benchmark performance shown as TWRs, PE Strategy performance shown as IRRs. For Strategy performance (Buyout, Venture, Private Debt), 12/31/2017 QTD is shown in place of 2H 2017.

Real Assets

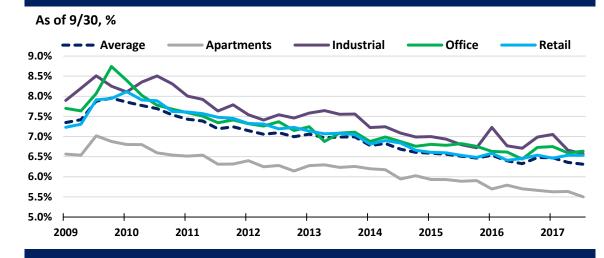
14% of TRS Policy Benchmark



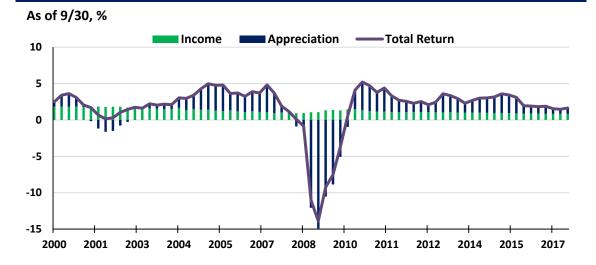
Income Growth

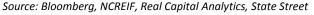


Cap Rates



Composition of Returns

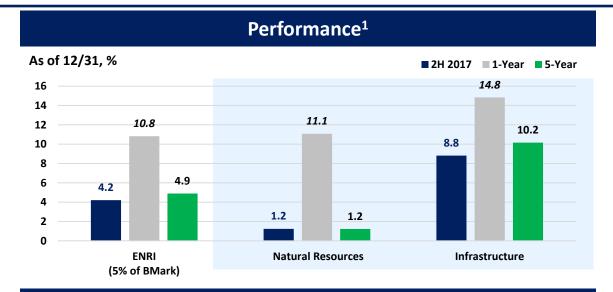




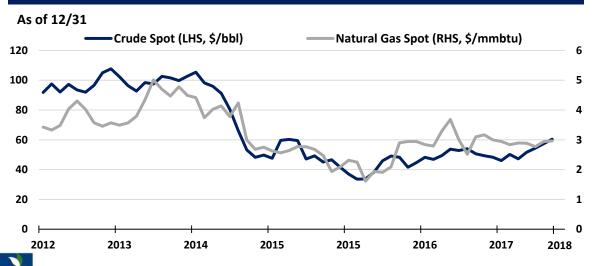
¹Property Type Return Indices are Property-level indices and do not reflect leverage or asset management fees, whereas NCREIF ODCE is a fund-level index and is levered and net of fees. Returns are for US-based properties only.

Energy, Natural Resources and Infrastructure

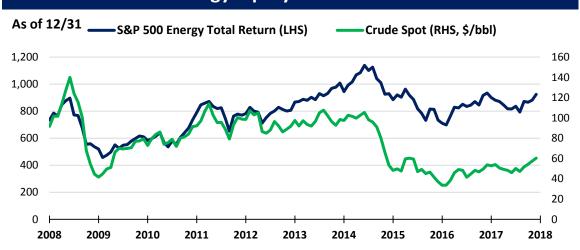
5% of TRS Policy Benchmark



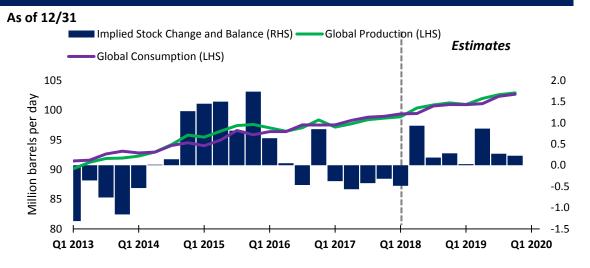


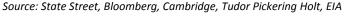


Energy Equity Performance



Oil Market Supply/Demand





¹ENRI Benchmark and Strategy (Natural Resources and Infrastructure) performance shown as 12/31/2017 TWRs.



Overview

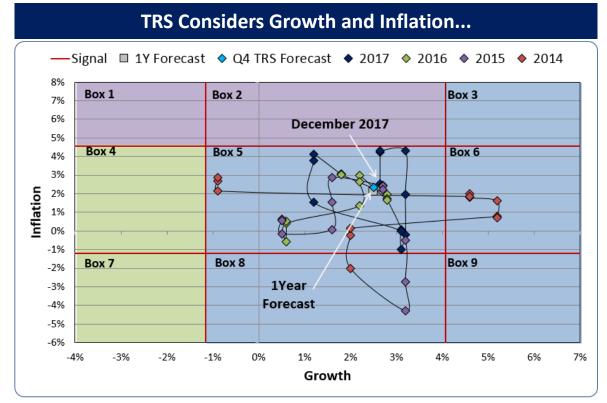
Growth is the Second Special Topic in Our Ongoing Series

	Special Topic	Date	
1	Recessions	September 2017	
		_	
2	Growth	February 2018	

	Upd	ate on F	Recessio	ons Spec	cial Topi	С	
As of 12/31							
Recession Da	shboard						
Start of	Yield	Inflation	Labor	Credit		Earnings	Housin
Recession	Curve	Trends	Market	Perform	ISM Mfg.	Quality	Marke
Nov-73	1	1	1	1	1		1
Jan-80	1	1	1	1	1		1
Jul-81	1	1	1	1	1		1
Jul-90	1	1	1	1	1	1	1
Mar-01	1	1	1	1	1	1	⇔
Dec-07	1	1	⇔	1	1	1	1
Present	1	⇧	⇧	1	1	1	1
	Key:	Recessio	nary 1	Expansio	nary 🖨	Neutral	



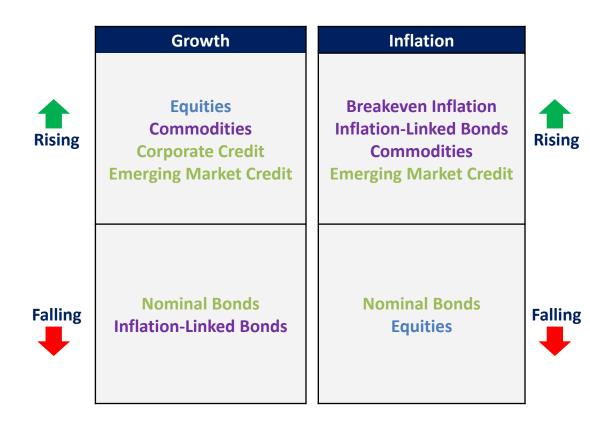
Growth and Inflation





...Because They Impact Our Asset Classes

Assets Expected to Do Well in Each Environment





Source: TRS IMD

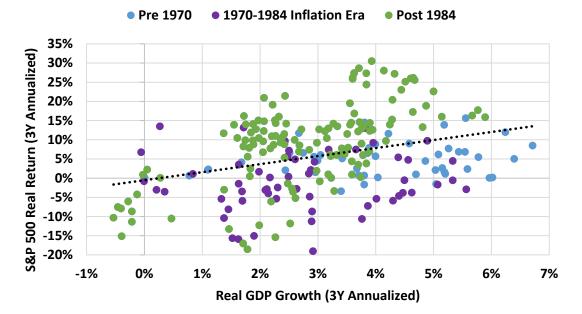
Equity Earnings Growth is Derived from Economic Growth

Economic growth is linked to the inputs in many asset class expected return models



For example, economic growth is a driver of equity earnings growth

S&P 500 Correlation	to Growth	to Inflation
Pre 1970	0.19	-0.55
1970-1984 Inflation Era	0.07	-0.19
Post 1984	0.62	0.06
Full Period (60 years)	0.35	-0.35





Experts Say Growth Will Continue in 2018

Earnings is the Primary Driver of Equity Performance

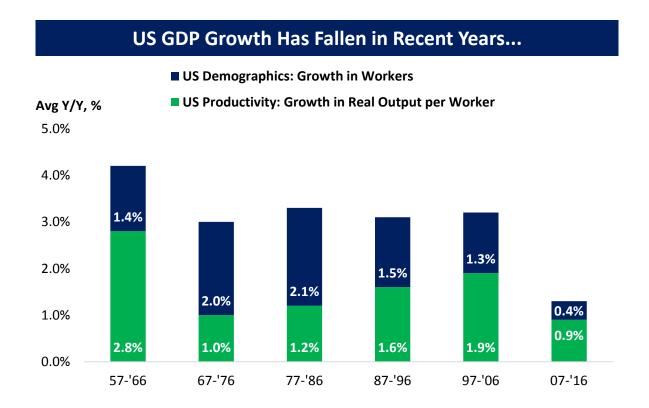
"The bull market will continue in 2018... [We] forecast above-trend US and global economic growth."





Source: Goldman Sachs

GDP Growth is Driven by Population and Productivity Growth



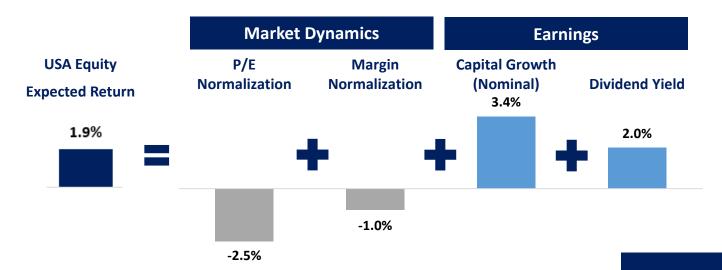
...But Emerging Markets Growth Remains Elevated Size of Bubble is % of Global Growth, Local Currency, % 12% Expected Nominal Return 9% 8% 6% 5% Taiwan **South Korea** 9.3% 8.8% China India South Africa 8.3% 8.0% Japan Europe 6.3% 6.8% Brazil **USA** 5.8% 5.5% 4% 2% 4% 6% 8% 10% 0% 12%

Region	Expected Nominal GDP Growth	Expected Nominal Return	Share of Global GDP Growth
USA	4.6%	5.5%	19.6%
Developed Markets			
Europe	3.9%	6.8%	12.8%
Japan	2.2%	6.3%	0.7%
Emerging Markets			
China	8.8%	8.3%	29.6%
South Korea	4.9%	8.8%	2.1%
Taiwan	3.7%	9.3%	1.3%
India	10.4%	8.0%	7.7%
Brazil	6.4%	5.8%	3.2%
South Africa	6.4%	7.0%	0.5%

Expected Nominal GDP Growth



Expected Returns are Linked to Growth



Market dynamics can improve expected return models

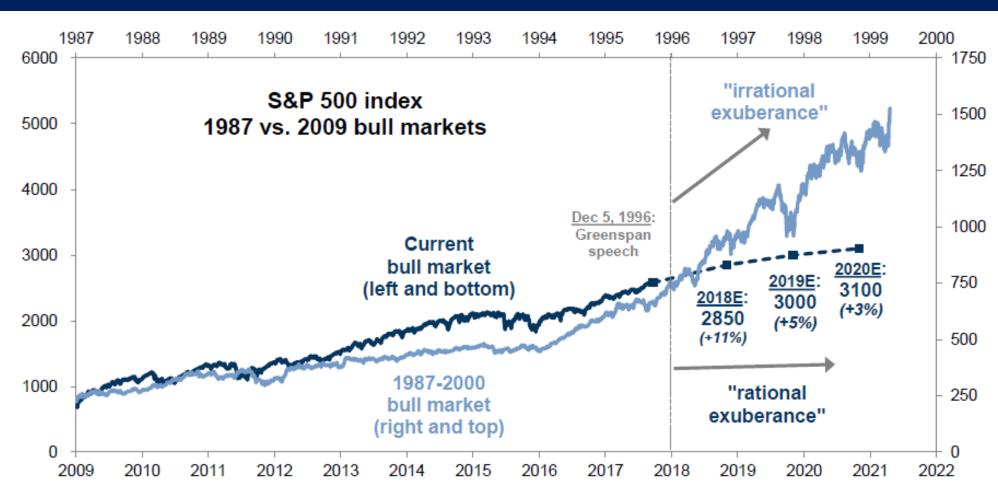
These models are accurate predictions of future returns over the long-term

7 Year Nominal Returns Annualized, As of 12/31, % Forecast Realized 25% 14.3% 10% 7.7% 7.7% 1.9% 7.7%



Speaking of Bull Markets...

...Are We Closer to 1996 or 2000?





Conclusion

Market Update

- 2017 was characterized by a steady macroeconomic backdrop and a healthy market rally fueled by strong earnings
- Over the first half of 2018, the market expects more of the same with a slightly higher expectation for growth

2018 Best Ideas Survey

- Top 5: Japanese Equities, European Equities, Emerging Market Equities, US Energy Growth Equity (PE), US Small Cap Equities
- Bottom 5: European Sovereigns, German Bunds, European High Yield, US High Yield, US Sovereigns

Special Topic: Growth

- Key economic indicators signal continued US expansion
- Market experts are projecting global earnings growth to remain above potential
- The Trust will benefit from real increases in economic growth; however, IMD will monitor for changes in economic indicators suggesting deceleration



TAB 13 B



Agenda

I. Executive Summary

II. Emerging Manager Program Overview

III. Emerging Manager Version 3.0 ("EM 3.0")



Executive Summary

Established in 2005

- Celebrating 12-year anniversary
 - Top five largest program in the US
- \$5.5 billion in emerging manager commitments since inception
 - o \$3.7 billion in committed capital from the EM Program
 - 49% to Minority and Women Owned managers
 - \$1.8 billion invested with EM Program graduates at Trust-level

Broadest Emerging Manager Program in the U.S.

- Four major private and public asset classes
- 11.8% 1-yr and 8.9% 3-yr net returns; above benchmarks
- Twelve managers graduated to Trust Premier List¹

Leveraging the GCM Grosvenor & Rock Creek Group Platforms

- TRS retains control and governance of the EM Program while also benefitting from an attractive and flexible fee structure
- Enhanced brand via a centralized interface and process
- Access to a broad spectrum of top emerging managers

Emerging Manager Version 3.0 ("EM 3.0")

- Launch a new \$1 billion EM Select program to target top performing, Private Markets emerging managers with a direct investment from the Trust
- Sustain the EM Program's relative size to the Trust
 - A \$2 billion EM Innovation program invested over the next 3-5 years targeting both product innovation and manager elevation
 - Establishes a sustainable investment in the EM program by growing TRS's commitment in line with the overall Trust
- Broadens the set of innovative structures available to invest with high quality emerging managers



EMERGING MANAGER PROGRAM OVERVIEW



Organizational Structure



Sylvia Bell Senior Managing Director, CPA MS, University of Florida

OPERATIONS



LeAnn Gola Senior Associate, CPA MBA, Texas State University

SECONDEE



Andrew Padilla Associate GCM Grosvenor

GCM GROSVENOR

PRIVATE MARKET ADVISORS



Derek Jones Managing Director GCM Grosvenor





Peter Braffman Managing Director GCM Grosvenor



PUBLIC MARKET ADVISOR



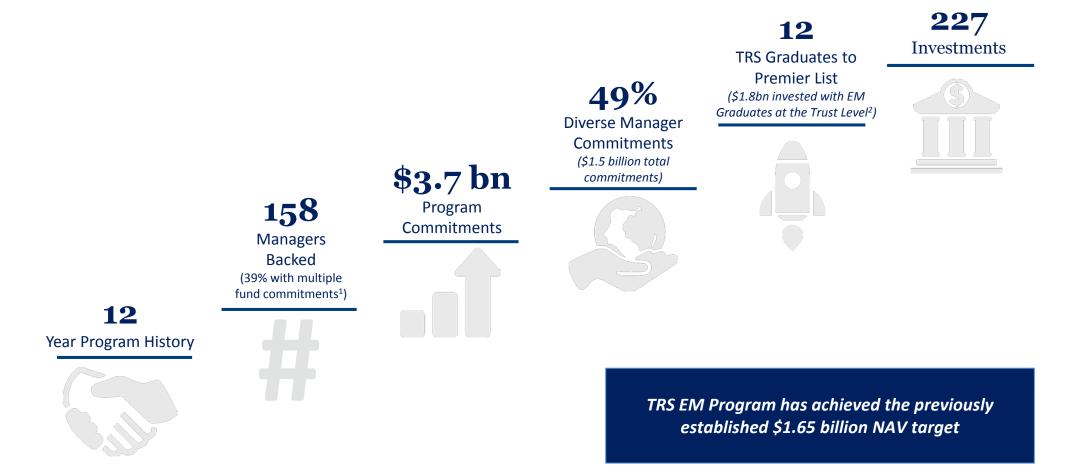
Afsaneh Beschloss President and CEO The Rock Creek Group

Rock Creek



EM Program Highlights

The EM Program has delivered net alpha while identifying and supporting the next generation of managers for the Trust.



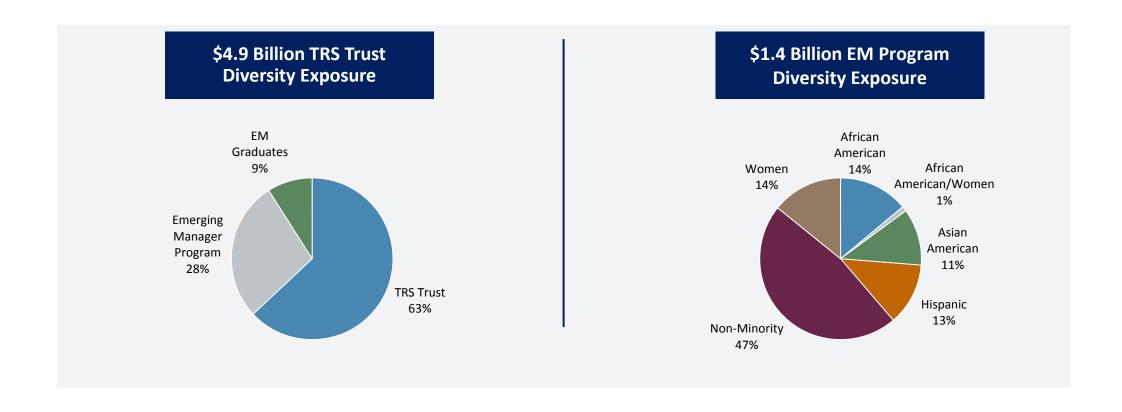


Source: State Street as of June 30, 2017.

¹Multiple commitments only applicable to Private Markets managers

Committed to Diversity

The EM Program comprises \$1.4 billion of the total \$4.9 billion of TRS exposure to diverse managers





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Program Accomplishments and Goals

2017 Accomplishments

- Outperformed Total Program benchmark, net of all fees
 - o Added alpha of 23 basis points on 1-year basis
 - Added alpha of 61 basis points on 3-year basis
- Achieved Capital Plan goals
 - Achieved the \$1.65 billion NAV target previously set for the Emerging Manager Program
- Hosted preeminent emerging manager conference with record attendance of over 1,000 people
- Integrated dedicated on-site GCM investment associate to TRS emerging manager team

2018 Goals

- Deliver net alpha utilizing qualified emerging managers across all asset classes
- Effectively allocate Trustee approved EM capital
- Identify and grow the next generation of managers for the Trust
- Additional funding to successful EM's in current portfolio
- Launch of EM 3.0

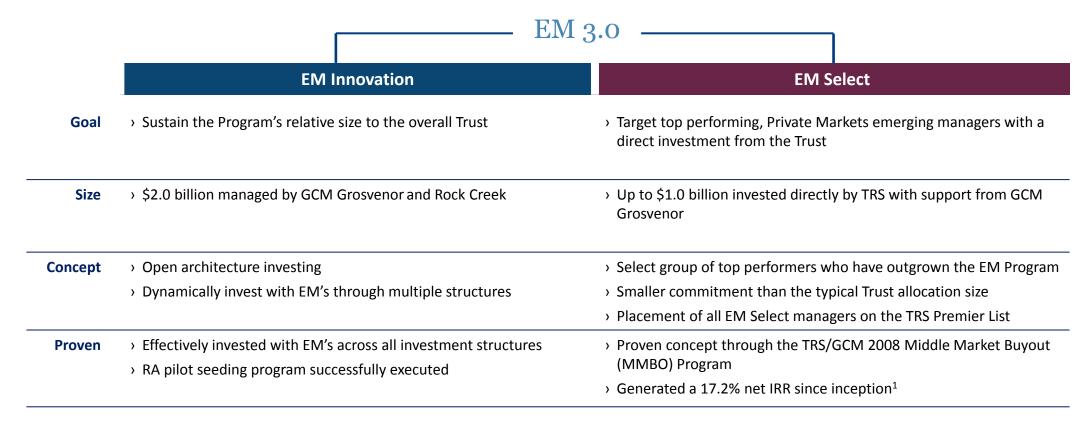


EM 3.0



What is EM 3.0?

A \$3.0 billion allocation to be invested over three to five years through the following two broad initiatives:

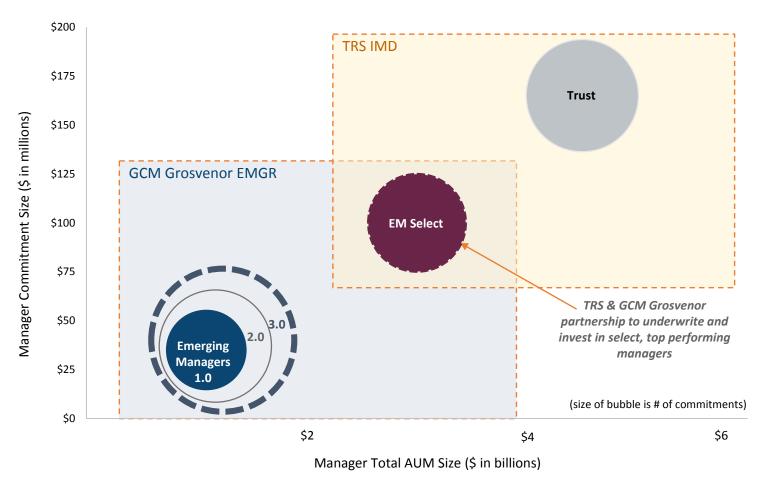


Up to 65% of EM 3.0 capital is expected to be funded by projected distributions from the existing EM Private Markets Program



Full Spectrum Emerging Manager Investing

EM 3.0 will allow TRS to expand their reach to new managers while also growing with exceptional performing mature emerging managers



With the implementation of EM 3.0, TRS will have established the most complete array of early and late stage emerging manager investment opportunities available in the market today



The Power of EM Select

Continue to invest with a select group of exceptional performers who have outgrown the EM Program with a smaller allocation than the typical TRS Premier List manager commitment.



Highly selective and concentrated investments

> Invest up to \$1.0 billion in both primary funds and co-investments with 6-10 managers over 3-5 years



Fuel principal investment deal flow

> Middle market managers require meaningful amounts of co-investment capital



Continuum of TRS investment programs

- > Effectively transition managers from GCM Grosvenor to TRS management
- > Allow time for managers to season and fully integrate into the TRS platform



The Flexibility of EM Innovation

Utilize open architecture investing across multiple structures in order to dynamically invest with emerging managers.

	Structure	EM Program Story
Fundless Sponsor	Joint Ventures	 Help early stage managers build a track record prior to raising their first fund Lower fee structures and greater LP control
First Time Fund	Seeding	 Provide JV capital that could serve as the seed portfolio in the first close of a fund Generate fee alpha by sharing in the economics of the GP
	Anchor	 Provide early and/or meaningful capital commitments to fund managers Receive preferential economics and greater influence over fund governance terms
	New Funds	 First time commitments to fund managers Managers with proven track records and attractive investment strategies
	Co-Investments	 Invest alongside existing EM Program managers into select investments Reduced fee structures and ability to target attractive investment opportunities
Mature Emerging Manager	Re-Up Funds	 Commitments to existing EM Program fund managers Scaled commitments to concentrate capital with top performers

Conclusion

- The EM 3.0 Program will further the reach and impact of the TRS Emerging Manager Program.
 - o Increased scale will provide impactful, innovative, and market-leading capital solutions to the emerging manager ecosystem
- \$3.0 billion commitment over the next three to five years
 - EM 3.0 promotes dynamic lifecycle investing through a continuum of investment programs
 - o Flexible, early-stage capital solutions include joint venture, seeding, anchor, first time fund commitment, and co-investments
 - Concentrate capital with proven re-up managers
 - Selectively support top performing select managers that have emerged from EM Program definitions
 - Effectively "bridge-the-gap" between EM Program and TRS Trust
 - Harvest principal investment deal flow
- EM 3.0 will showcase the TRS brand and solidify TRS' position as the market leading emerging manager program
 - o The most consistent emerging manager capital provider and widely regarded as a thought leader and product innovator



APPENDIX

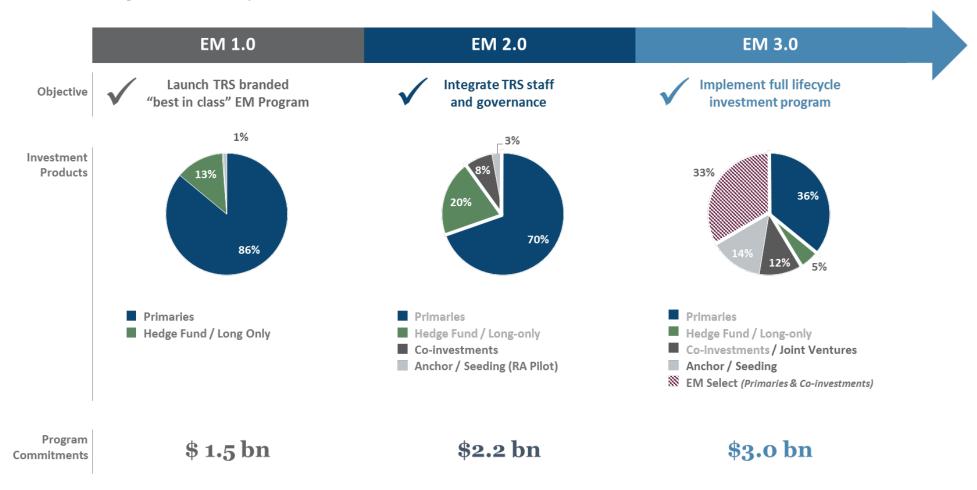


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EM Program Product and Manager Evolution

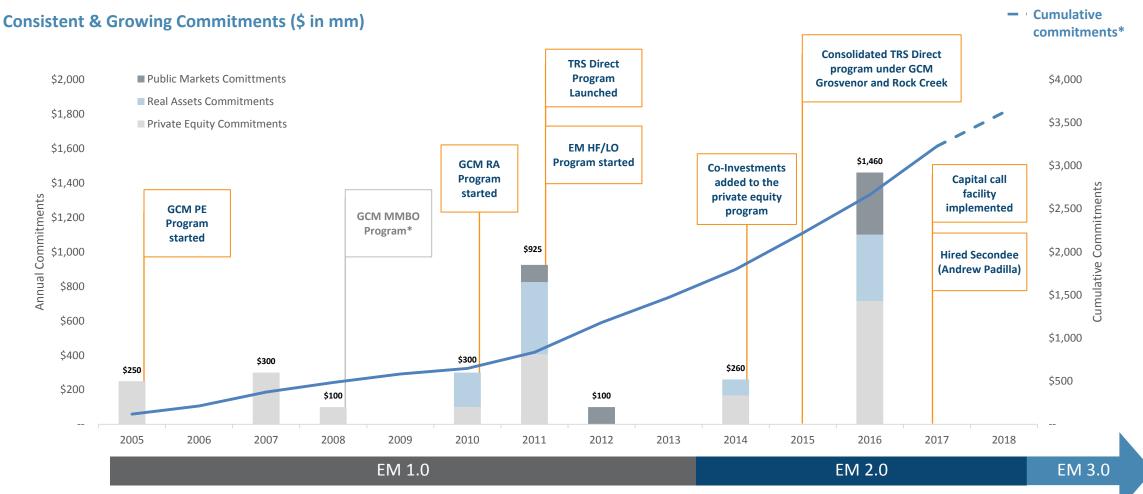
The TRS EM Program has a proven track record of innovation.





EM Program History

The EM Program's continued evolution and innovation has created the industry's most dynamic emerging manager program.





^{*}Annual commitments (bar chart) and cumulative commitments (line chart) exclude the \$300 million GCM MMBO Program.

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TRS Brand Leadership

Holistic approach and immediate implementation of product expansion and EM Select will distinguish TRS from its peer group.

We have built a strong foundation leading us to EM 3.0...



Product innovator



Partnership investing



Largest EM conference



Greater staff connectivity



Consistent & growing allocations

...which will solidify TRS' brand leadership in a competitive marketplace

EM 3.0

is the

Next Step



Top 5 largest EM investor



Source: TRS and most recent public plan filings.

Program Benefits to TRS

Active TRS guidance and governance on investment opportunities, annual allocations, and commitment pacing.

Diligence & underwriting Dedicated resources & Graduation to TRS Trust and co-investment flow **TRS** secondee **TRS IMD** Regular pipeline calls with TRS staff to review all **TRS-branded program** investment opportunities **GP** referrals and relationship management



TRS leverages the GCM & RCG platform while retaining control and flexible governance

TAB 13 C

Industry leadershipBuilding a world-class investor



February 2018

McKinsey introductions



Sacha GhaiManaging Partner of Toronto Office



Bryce Klempner
Head of US Institutional
Investor Practice



Matt Portner
Leader in Institutional
Investor Practice

Our firm in a nutshell

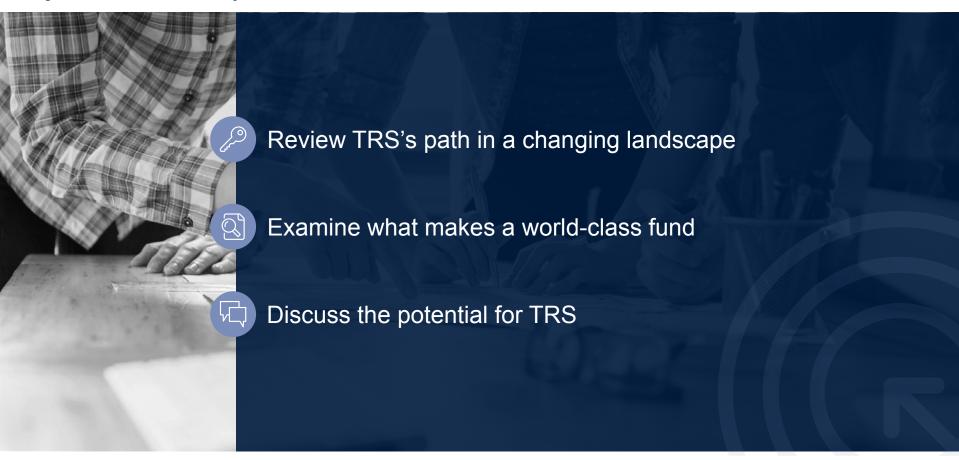
McKinsey & Company is a global management consulting firm, deeply committed to helping institutions in the private, public, and social sectors achieve lasting success. For over eight decades, our primary objective has been to serve as our clients' most trusted external advisor.

With consultants in more than 100 offices in over 60 countries, across industries and functions, we bring deep expertise to clients anywhere in the world.

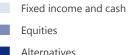
We work closely with teams at all levels of an organization to shape winning strategies, mobilize for change, build capabilities, and drive successful execution.

We serve most of the leading investment organizations around the world, including over 2/3 of the top 20 pensions and top 20 sovereign wealth funds

Objectives for today's discussion



Pension funds have become much more complex to manage





Funds were uncomplicated and able to generate required returns almost solely in fixed income

As fixed income returns declined, funds began to shift investments into public equities

World-class funds emerged, using innovative strategies to deliver market-leading returns

SOURCE: Pew Charitable Trust Report: State Public Pensions Investments Shift Over Past 30 Years; Tower Watson Global Pension Asset Study, multiple years

The external environment is a lot harder than it used to be



Interest rates have remained at historically low levels

 Nominal rates on 10-year government bonds fell from above 10% in 1980s to about 2% or lower today in many countries



Macroeconomic environment has become more challenging

- Highly uncertain investment and political landscape
- Increased market volatility



Funds are facing a prolonged period of lower returns

Forecasts for the next 20 years suggest 4.0% – 6.5% returns for US equities and 0% – 2.0% returns for US bonds

Against this backdrop, TRS has made significant strides



Assets reached over \$100B

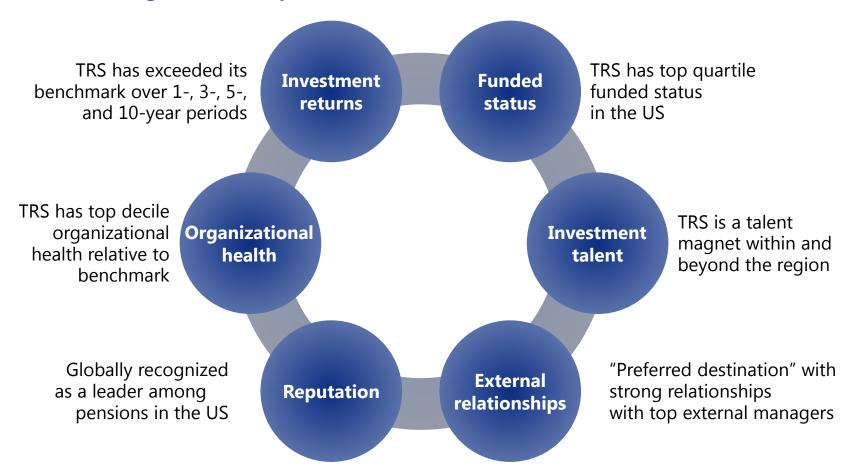
Portfolio mainly in public markets, with small allocations to private markets

Investment team began growing to support move into external management and private markets ~\$150B under management

Well-diversified portfolio, with strong capabilities across traditional and alternative asset classes

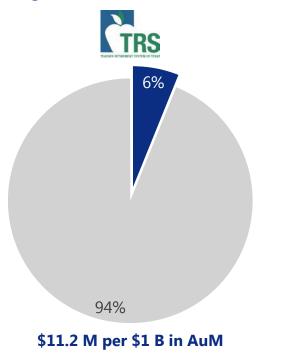
Among the best investment talent of any US pension fund

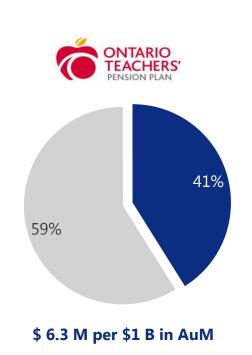
TRS excels along several key dimensions



Yet has a significant opportunity to manage its investment costs

Percentage of cost to internal and external







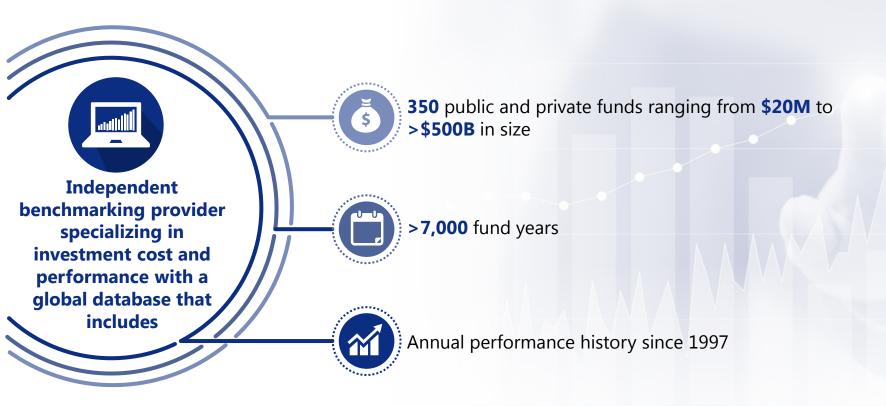


- TRS pays more than twice as much per dollar managed as OTPP -- even though OTPP's internal costs are significantly higher as a percentage
- OTPP can attract top-caliber talent due to more competitive pay
- OTPP has a 10% total return since inception
- TRS pays more to external managers

Ontario Teachers Pension Plan is a good point of comparison: a single-sponsor organization of similar scale, with extensive relationships with top external managers

SOURCE: OTPP and TRS Annual Reports

To better understand TRS's performance relative to peers, we used detailed data from CEM Benchmarking



SOURCE: CEM Benchmarking

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An endowment with friends in high-performing places

Development stages

Setting the foundation

Reorganized governance to ensure management team independence

Defining the strategy

Focused investment philosophy on superior external manager selection

Deploying at scale

Developed internal talent to foster long-term partnerships with preferred managers

Milestones

Appointed a CIO with authority to execute new vision for asset allocation

Devised strategy to forgo large allocations to stocks and bonds in favor of hedge funds, PE, and other alternatives

Actively managed all asset classes and hired fund managers to exploit market inefficiencies

Allocated ~50% of portfolio to illiquid assets, including leveraged buyouts, VC, and real estate

Focused investment team on evaluating opportunities uncovered by the farranging roster of external managers

Focused on developing internal talent, building out value proposition for junior talent

>12% net annual returns over the last 20 years

A sovereign wealth fund that knows where it has an edge

Development stages

Empowered leadership team to make independent, long horizon, commercial

Setting the foundation

investment decisions

Defining the strategy

Identified investment team's comparative advantages and began taking active positions

Deploying at scale

Developed internal talent and expanded investment team to scale the investment strategy

Milestones

Board appointed independent leadership team to develop and execute investment strategy

Ensured that 2/3 of portfolio assets invested passively, and active investment only taken when team is sure of long-term outperformance

Successfully introduced a reference portfolio approach to investing and launched a strategic tilting strategy

Identified areas of comparative advantage: agriculture and infrastructure and made direct investments

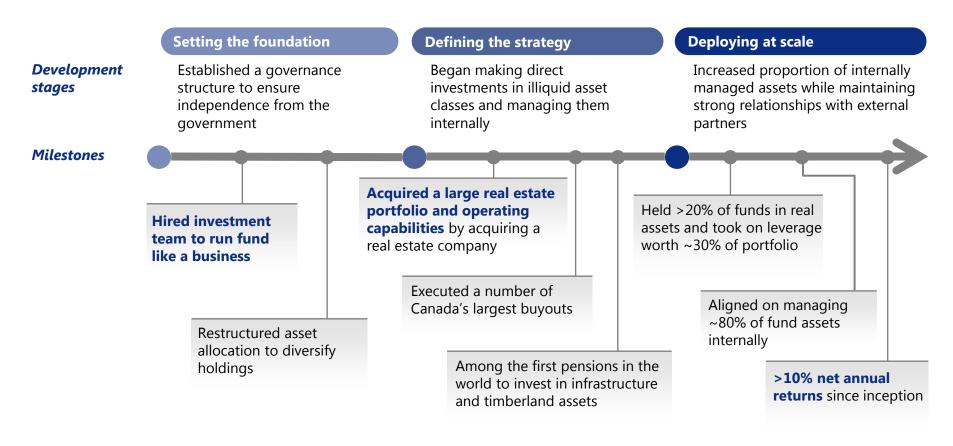
Diversified investments globally with <20% of assets domestically

Launched internal active equities team for better alignment and improved cost management

Continues to build internal capabilities and expand investment team

>10% net annual returns since inception

A pension that runs like a top private asset manager



TRS has the opportunity to unite elements of all 3 approaches

Excellence in... **TRS Innovations** TRS has led the industry in the development of the 'Strategic Partner Network' which has allowed **External** it to deliver strong returns with very attractive selection terms A 'next gen' institutional TRS is building out its risk-parity portfolio, investor designed to maximize risk-adjust returns while **Portfolio** optimizing continuing to perform well in construction across all down cycles levers of investment TRS has already begun to selectively internalize, **Internal** but significant potential remains, particularly in management? management high cost asset classes (e.g. alternatives)

TAB 13 D



Executive Summary

Goal: To effectively deploy TRS resources to produce strong investment returns for Texas educators

- TRS is currently at maximum resource capacity
- Growth of the Trust requires planning for incremental investment professionals and support personnel
- TRS is facing a lower return environment
- The investment management industry is competitive and peers are adopting the Texas Way
- TRS must implement innovative investment programs to sustain industry leadership



Executive Summary

Performance

Executive Summary

- TRS outperformed 60/40 by \$11 billion over the last 10 years
- TRS exceeded its benchmark over a 1-, 3- and 5-year period
- Top quartile risk-adjusted return over 3- and 5-year period among peers
- \$5.2 billion of dollar value add generated from a wide variety of profit centers over last 5 years

IMD Professionals

- 135 Professionals with 13 Years Average Experience:
 - 84 Master's Degrees
 - 47 CFA/CAIA Designations
 - o 4 PhD's
 - o 5 JD's
 - 21 Other Designations

Performance

	Trust Return	Benchmark Return	Alpha (bp)
1-Year	12.9%	11.3%	+160
3-Year	6.0	5.6	+44
5-Year	8.8	8.1	+71
10-Year	5.4	5.2	+23

IMD Awards & Recognition

- 13th Largest Pension Fund in the World
- Public Fund Manager of the Year (Institutional Investor)
- Risk Manager of the Year
- Numerous "Rising Star" awards by Investor Intelligence
- Three "Top 40 under 40" aiCIO award recipients
- 5-Time LP of the Year (PE and RE)
- "Change Maker of the Year" Award (IIA 2017)



The Original Ship

10 Year Evolution

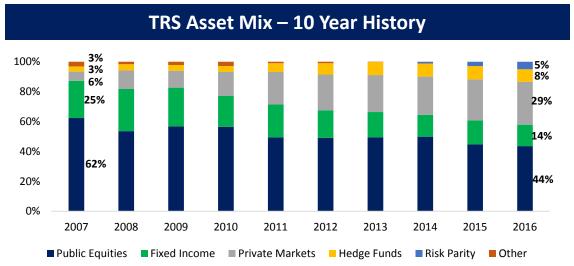
Summary

- TRS has evolved over the last 10 years resulting in:
 - More actively managed assets
 - More externally managed assets
 - Gained expertise of best practices from external managers in a variety of investment strategies
 - Increased internal investing capabilities such as Risk Parity and Quantitative Portfolios



TRS Active v. Passive – 10 Year History



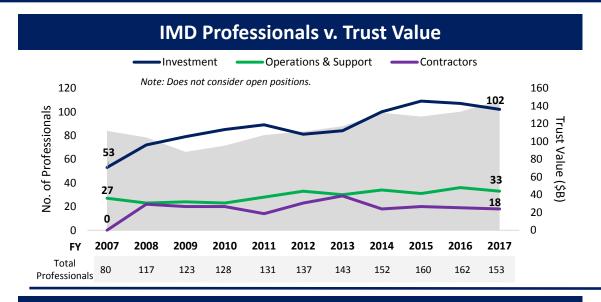


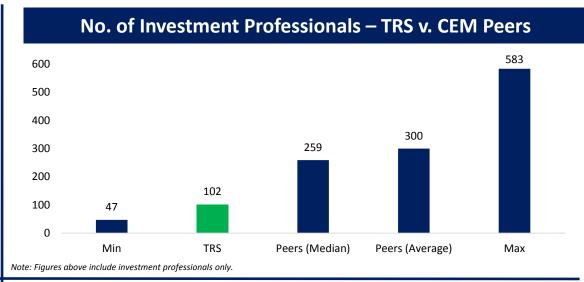


Source: TRS IMD

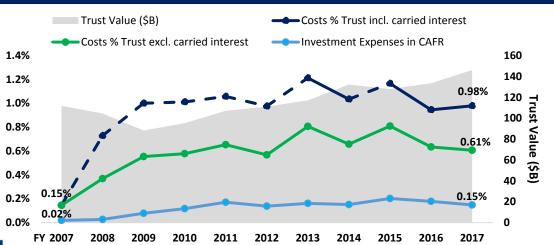
The Original Ship

10 Year Evolution









Source: TRS IMD, CEM Benchmarking 2016, CEM FTE 2017

¹Private markets carried interest expense is smoothed for periods where data is not available (2008-2013, 2015) and is marked with a dashed line.

Note: CEM is a alobal benchmarking consultant with an extensive database of institutional investor statistics.

5-Year Net Value Add v. Total Cost



The Next 10

• IMD is ready for its next evolution: Building The Fleet





Top 5 Priorities

Goals		#	Priority
Maintain Current Competitive Advantages and Total Returns for the Teachers of Texas		1	Improve retention of investment personnel
		2	Plan for scale of investment programs with Trust asset growth projections
		3	Increase dedicated operations and analyst support of investment personnel
Manage Cost Structures to Increase Net Alpha Generated by TRS Investment Programs		4	Increase internal management capabilities for cost effective investments in public market assets
		5	Increase principal investment capabilities in global private market assets



7

Command Ship

Summary

- "Command Ship" maintains central core functions with cruiser ships
 - Cruiser ships allow TRS to maintain competitive advantages while maximizing cost efficiencies
 - Accountability, autonomy and authority is maintained through communication to central command ship
- Develop systems to support organic Trust organizational growth
 - Increase organizational depth and capabilities
- Reduce cost of annual turnover
 - 8-12% over last 5 years is above industry standard

Structure

Command Ship Core Functions			
Asset Allocation	Risk Management		
Legal and Compliance	Investment Analytics		
Investment Operations	Governance		
Human Resources and Talent Development	Information Technology		
Finance	Audit		
Foreign Offices	Communications		

FY 2017 Personnel Mix

Personnel Type	TRS	Peers (Median)	Peers (Average)
Investment Professionals ex. Analysts	94	259	300
Investment Analysts	8	-	-
Investment Operations & Support	97	325	384
Investment Operations	19	111	123
IT/IS	16	95	137
Finance	11	38	36
Human Resources	4	17	25
Legal & Compliance	12	24	26
Audit	3	5	8
Other support services	32	35	29
Total	199	584	684



Source: TRS IMD, CEM FTE 2017

Subsidiaries

Summary

- Subsidiaries can be used to increase capabilities while managing cost structures
- Additional authority will be necessary to establish subsidiaries with the ability to operate broadly and efficiently
- With more flexible subsidiary structures, current investment structures can be improved
 - o Banner Oak
 - TRICOT

Illustrative Example: TRICOT Update

- TRICOT's goal was to generate 50% more deal flow
 - Since opening the office, TRICOT has reviewed 136 Principal Investment opportunities which is three times the deal flow in 2014/2015
- TRICOT was essential in TRS closing 5 investments totaling \$682 million
 - Approximately \$9 million in annual management fee savings alone (potential additional saving of over \$30 million in carry)

TRICOT Deal Flow Summary

Asset Class	# of Deals	Estimated TRS \$ Equity	Average Deal Size	% of Total Deal Count
Real Assets	73	\$7,649	\$105	53.7%
Private Equity	44	4,961	113	32.4
ENRI	8	613	77	5.9
Special Opps	7	1,006	144	5.1
Public Markets	4	640	160	2.9
Total	136	\$14,869	\$109	100%



Source: TRS IMD

Public Markets Cruiser Ships

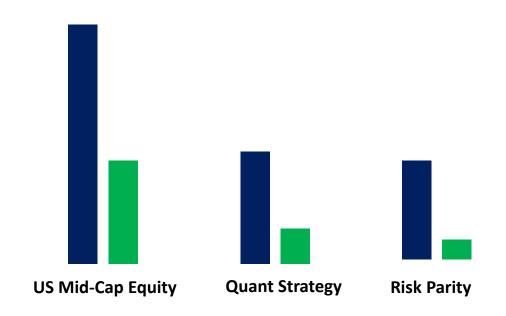
Summary

- Global Equities Best Practices and improved fee structures have and will reduce costs and increased internal management of assets
- Continue R&D to add strategies to internal portfolios
- Upgrade IT infrastructure to remain competitive within the investment management industry
- Increase coverage with expertise in global offices
- Create or grow unique investment programs such as special opportunities, alpha opportunities, and long-term holds

Illustrative Public Markets Cost Implementation

External Management Cost

Internal Management Cost





Private Markets Cruiser Ships

Summary

- Increase principal investments program as a "Preferred Destination" for attractive opportunities
- Obtain authority to invest in investment structures used by peers
- Increase capabilities across private markets
 - Board Participation
 - Subsidiaries and Operating Companies
 - Innovative Partnerships
 - Global Offices

CEM Private Markets Implementation

External Funds



1.0 personnel per \$1B AUM

Co-Investment



1.8 personnel per \$1B AUM

Direct Investment



4.6 personnel per \$1B AUM



Source: TRS IMD, CEM FTE 2017

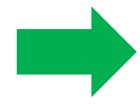
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Vision

Today

IMD has achieved its goal of modernizing its investment management division and has become the *top US pension fund*



Next 10 Years

IMD's goal is to become a **best-in-class global** investment management fund

Key Initiatives

- Pursuing niche strategies internally, such as select emerging managers, royalties, and special opportunities
- Close the gap on investment infrastructure demands (technology and operations)
- Increase capabilities across the Trust with additional Legislative and investment authority
 - Board Participation
 - Direct Real Estate Investments
 - Subsidiaries and Operating Companies
 - Innovative Partnerships
 - Global Offices



APPENDIX



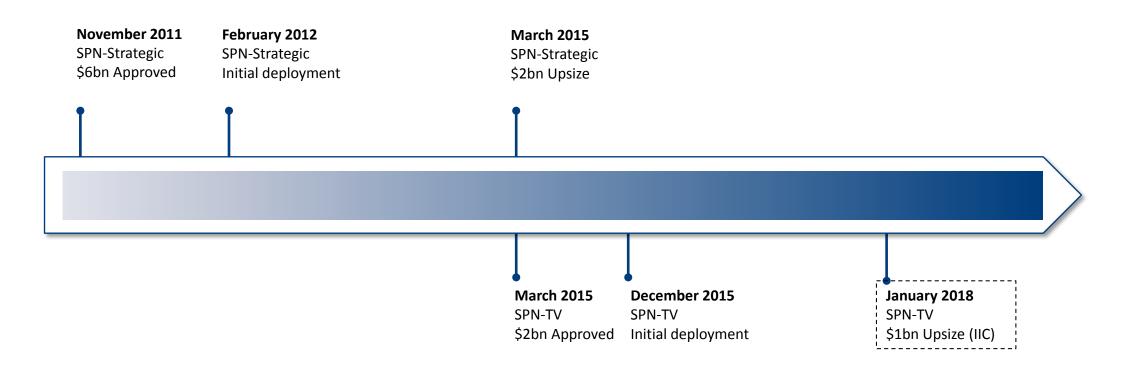
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TAB 13 E



Private SPN - History



SPN-Strategic

By Partner	Commit-\$	NAV	SI Net IRR
Apollo	4,010	1,824	9.7%
KKR	4,225	2,230	13.2%
Total SPN-Strategic	8,235	4,054	11.7%

SPN-TV

By Partner	Commit-\$	Net Invested	SI Net IRR
Apollo	1,000	729	18.7%
KKR	1,000	737	20.0%
Total SPN-TV	2,000	1,466	19.2%

SPN Co-invest

By Partner	Commit-\$	NAV	SI Net IRR
Apollo	463	418	25.0%
KKR	662	676	14.8%
Total SPN Co-Invest	1,125	1,093	16.8%



Tactical Value SPN - Executive Summary

- Original Thesis: The post-crisis evolution in banking created a favorable investment environment for non-traditional credit
 - 10-12% net returns that are accretive to the Trust
 - TRS was an early adopter of this asset class as an absolute return opportunity
 - Private lending has gained a lot of institutional attention over last 2 years
- Performance to date exceeds expectations and on track to achieve 10-12% returns
 - Early performance benefited from dislocated credit markets of 2016
 - The portfolio is fully committed, and near fully invested
- In January, the IIC approved a follow-on investment of \$1 billion
 - \$500 million to each partner within the SPN-TV portfolios and approved the recycling of profits
 - Original thesis continues to hold: The market opportunity is structural and expected to persist another 3-5 years
- The SPN-TV upsize is a key component in the allocation plan for Absolute Return discussed at the December 2017 board meeting
 - SPN-TV portfolio is an efficient structure to quickly deploy capital to the asset class
 - Portfolio structure already in place with "best-in-class" fees and structure



TAB 15





Agenda

I. Fiduciary Duties at TRS – Identification and Assurance

II. Ethics Policies – Daily Implementation and Execution

III. Trustee Guidelines – Keys to Satisfying Fiduciary Obligations





I. Fiduciary Duties – Identification and Assurance





GOAL: Encourage Ethical Decision Making to Satisfy Fiduciary Responsibilities

<u>Framework</u>

- Is it lawful and within the letter and spirit of our policies?
- Is it fair and honest?
- If challenged publicly, would I be comfortable sharing details?
- What would happen if everybody did it?
- Does this put long-term relationships at risk for short-term gain?





Foundation of Fiduciary Duty is Trust

• Duty of loyalty - act solely in the best interest of the fund and the TRS members, retirees, and beneficiaries.

• Duty of care - use reasonable efforts and diligence in serving the beneficiary; prudent person.





TRS Framework for Assurance

- Emphasizes importance of culture of ethical conduct and compliance
- Identifies and assigns responsibility for TRS functions throughout agency
- Adopts standards of conduct for execution of functions: Core Values and Ethics Policies
- Identifies TRS expectations for trustees and employees through adoption of policies, procedures and standardized processes
- Reinforces accountability with training, monitoring, and testing
- Obtains assurances through transparency, reporting and independent testing
- Provides mechanism for raising concerns regarding meeting fiduciary obligations





Assigning Responsibility for Fiduciary Duties

Mapping TRS Functions – The Board

- Establish and periodically review TRS mission
- Approve budget
- Adopt and periodically review rules, regulations, policies and bylaws
- Monitor and evaluate effectiveness of system
- Delegate authority to the staff through Executive Director
- Review investment performance, asset mix, portfolio characteristics, cash flow, transactions, and monitor compliance with investment policies and guidelines
- Consider appeals





II. Ethics Policies – Daily Implementation and Execution





Ethics Policies Framework

- 4 legged table increases stability of TRS program as a whole: Trustee,
 Employee, Contractors and Fraud, Waste and Abuse
- Comprehensive approach provides greater assurance to trustees and members/retirees
- Led by tone at top trustees
- Similar obligations imposed on employees, enhanced automation to assist with employee compliance
- Policies are not a complete statement of all fiduciary responsibilities





Ethics Policies Identify Primary and Common Categories of Fiduciary Responsibilities

- Incorporate adherence to laws, rules and policies
- Acting solely in the best interest of the fund and the TRS members, retirees, and beneficiaries (i.e., avoiding conflicts of interest)
- Acting with prudence, competence, independent, and objectivity
- Acting in a transparent manner
- Maintaining confidentiality
- Cooperating fully if questioned about an ethical matter related to TRS





Conflicts of Interest

- Trustees and Employees should make reasonable efforts to avoid conflicts and the appearance of a conflict
- Consult with designated persons (General Counsel, fiduciary counsel, Executive Director, Chief Compliance Officer)
- If not avoidable, disclose and cure
- Under state law, recusal may be insufficient in certain circumstances





Using Position to Obtain Improper Privileges

General Rule:

 Trustees and Employees should not use the status with TRS for financial gain, privileges, avoiding consequences of illegal acts, obtaining more favorable terms on loans or investments, or TRS benefits not available to others





Misusing TRS or State Resources

- Trustees and Employees should not use TRS facilities, equipment, or staff for personal benefit or for any commercial or political purposes, including providing to another person if not to be used for TRS purposes
- Trustees may use TRS resources that are reasonably necessary to support role on Board or attendance at meetings





Accepting or Soliciting Gifts and Benefits

- Trustees and Employees may not solicit or accept benefits or gifts from any donor except in certain limited circumstances; benefits include meals, transportation and lodging
- Trustees should consider appearance of impropriety even if otherwise allowed





Protecting Confidential Information

- Trustees and Employees must maintain confidentiality when required by law, policy or contract
- Trustees are subject to common law of fiduciary duty maintain confidentiality of TRS' confidential information; may not accept employment or engage in business or professional activity that could reasonably be expected to require or induce trustee to disclose TRS' confidential information; attendance at non-public TRS meetings and events





Personal Investments

- Trustees and Employees may not have personal investments, directly or indirectly, in entities that contract with TRS or private funds in which TRS invests or is in the process of investing, subject to limited exception; no use of personal knowledge of non-public TRS business in connection with investments for selves, family, business associates or friends
- Trustee investments may not create conflicts of interest that affect ability to function as trustees or create conflict between trustee's private interest and the public interest





Referrals for TRS-related Action

- Trustees and Employees should make investment-related referrals to CIO; all other referrals to Executive Director; referrals reviewed through business unit's existing operating standards and procedures without regard to source of referral
- Other trustees will be informed of any follow up communications made by a referring trustee if they are repetitive or raise concerns; individual trustees have no authority to legally bind TRS or the board





Communication Blackouts for Vendors Seeking Contracts

General Rule:

 Trustees should not privately communicate or meet with potential vendors during a procurement period on the subject of the procurement, including investment in a private investment fund during the decision-making period





Knowing When to Seek Advice – Disclosures

- Trustees should consult with TRS Legal & Compliance or fiduciary counsel regarding policy fiduciary duty implications related to major life events and unusual request or communications
- Employees should consult with supervisors, TRS Legal & Compliance or Executive Director





Co-fiduciary Responsibility

- Trustee may be liable for breaches committed by another fiduciary
- Trustee may be liable if knowingly participates in or undertakes to conceal an act or omission by another fiduciary that is a breach; fails to comply with fiduciary duties such that enables another trustee to commit a breach; has knowledge of a breach by another fiduciary and does not report (to Executive Director, General Counsel or fiduciary counsel)





III. Trustee Guidelines - Keys to Satisfying Fiduciary Obligations





Keys to Satisfying Fiduciary Obligations

All Trustees have the responsibility to:

- 1. Be prepared for and attend Board and Committee meetings
 - Work constructively with other trustees
 - Participate in discussions and decision making by the Board
- 2. Make informed decisions on a substantive basis through a prudent and transparent process, seeking expertise from staff and consultants as necessary
 - Respect the majority vote of the Board
 - Discharge duties solely in the interest of the members and beneficiaries
 - Vote as a fiduciary in the interest TRS as a whole





Keys to Satisfying Fiduciary Obligations

- 3. Respect co-trustees and the open meetings laws by not conducting meetings with or among a quorum of fellow trustees
- 4. Refrain from acting outside a Board or Committee meeting to inappropriately instruct staff or direct their work
- 5. Maintain confidentiality of member records and certain investment information
- 6. Seek consultation with TRS General Counsel or fiduciary counsel as necessary when certain common events occur



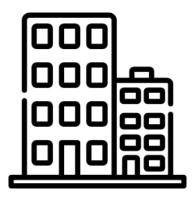
TAB 16

TAB 17



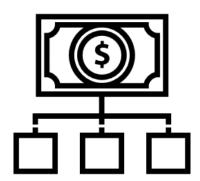


403(b) Program Stats



75 Certified Companies

62 have active registered products and investment options



10,694 combined

products and investment options on the active 403(b) Product List





5 year renewal for certification and product registration





Fees, Costs, & Penalties

Category	Pre Amendments	Post Amendments (Effective November 2019)
Maximum Allowable Surrender Penalty	Max 10 years (12 years with disclosure) & 10% penalty declining annually	No Change
Maximum Allowable Front-/Back-End Sales Load	6% Combined	Eliminate
Maximum Allowable Loan Initiation Fee	\$50	\$25
Maximum Allowable Annual Fixed Dollar	\$50	\$60
Maximum Allowable Annual Asset- Based	2.75%	Separate maximum asset-based fee caps tiered by asset class for variable annuities and mutual funds.
Other & Optional Fees	Allowable: No Cap	Allowable: Capped





Fees, Costs, & Penalties

- Used the Dollar Weighted Expense Ratio by Asset Class from 12/31/15 Morningstar Data plus either:
 - o 1.75% for administrative expenses for variable annuity products and investment options; or
 - o 1.50% for administrative expenses for non-annuity products and investment options.

Asset Class	Maximum Annual Asset-Based Fee Variable Annuity	Maximum Annual Asset-Based Fee Non-Annuity
Money Market	1.90%	1.65%
Diversified Bond	2.25%	2.00%
Asset Allocation	2.25%	2.00%
Large Cap U.S. Equity	2.25%	2.00%
Small/Mid Cap U.S. Equity	2.45%	2.20%
International Equity	2.55%	2.30%
Global Equity	2.55%	2.30%
Real Estate	2.60%	2.35%
Other	2.70%	2.45%



**

Timeline

Oct. 27, 2017

Rule amendments adopted by Board



Rule amendments effective, except for amended fee caps



Notice of closed rule review filed with Secretary of State



Amended fee caps take effect

















Nov. 22, 2017

Adopted rule amendments filed with Secretary of State



Requesting board to adopt order closing rule review



Stakeholder group kickoff 2021-2022

Next 403(b) rule review



TAB 19





Agenda for the Day, February 16, 2018





Agenda for February 16th, Friday

- 18. Provide opportunity for public comment Jarvis Hollingsworth.
- 19. Receive an overview of the February 16, 2018 agenda Brian Guthrie.
- 20. Receive a report on TRS and State Street Bank partnership Ron O'Hanley and Andrew Erickson, State Street.
- 21. Receive a report on Value Add of Audit Amy Barrett and Jim Pelletier, The Institute of Internal Auditors.
- 22. Receive an overview of the TRS audit plan for FY18 and consider amendments Amy Barrett.
- 23. Receive a report on TRS Innovations: Looking Ahead Chris Cutler.
- 24. Receive an overview on Resource Planning: FY18 FY23 Brian Guthrie and Don Green.

TAB 20



Agenda

Our Strategic Partnership

State Street	•000	Page 3
What We've Accomplished Together	0 • 0 0	Page 4
Our Partnership and Service Model Today	00•0	Page 6
Industry Trends and Our Future Together	$\bigcirc\bigcirc\bigcirc\bigcirc \bullet$	Page 9

Our Company Today **Strong Global Enterprise**

STATE STREET GLOBAL SERVICES.

Providing customized servicing solutions across traditional and alternative investments

- Assets under custody and administration of approximately \$32.1 trillion as of September 30, 2017
- One of the world's leading investment service providers
- Fund accounting and administration, custody, investment operations outsourcing, recordkeeping, performance and analytics, and transfer agency services

STATE STREET GLOBAL ADVISORS.

Investing responsibly to enable economic prosperity and social progress

- Proven experience, with approximately \$2.67 trillion in assets under management* as of September 30, 2017
- Access to a wide range of investment strategies across the risk/return spectrum
- With approximately \$589 billion* in global ETF assets under management, we have one of the broadest ranges of ETFs in the industry

STATE STREET GLOBAL MARKETS.

Creating access to alpha, insights, liquidity and financing by enhancing portfolio values

- Delivering investment research, foreign exchange trading and securities lending
- Providing liquidity across 34 international markets, with approximately \$3.64 trillion in lendable assets as of September 30, 2017
- \$21.1 trillion in foreign exchange and interbank volume traded in 2016

STATE STREET GLOBAL EXCHANGE...

Delivering new perspective and insight into risk management and investment strategy

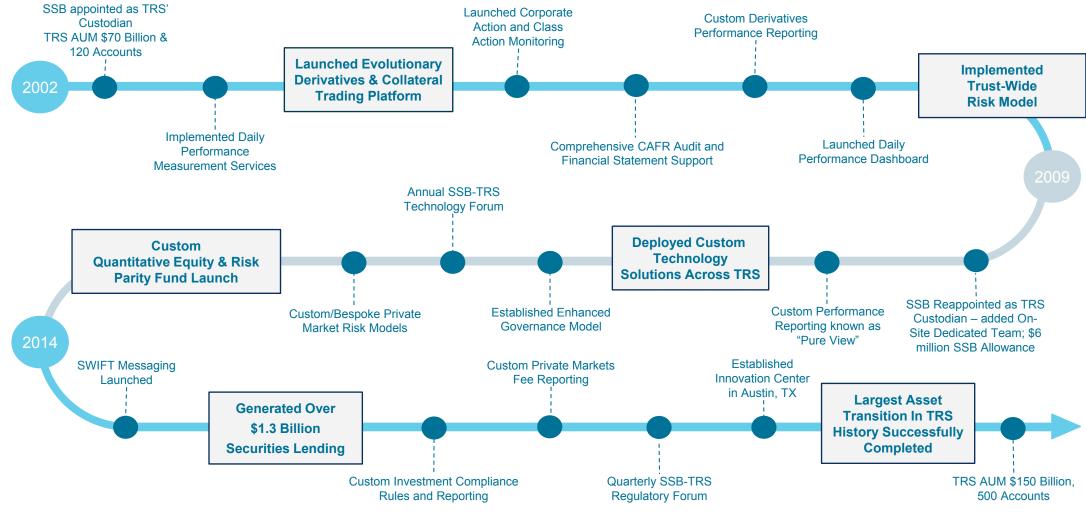
- Aligning research and advisory, portfolio performance and risk analytics, information and data management to deliver innovation
- Integrated solutions across the lifecycle of trades
- Customized and flexible multi-asset class products and services

^{*}AUM reflects approx. \$36.00 billion (as of September 30, 2017) with respect to State Street Global Advisors Funds Distributors, LLC (SSGA FD) which serves as marketing agent; SSGA FD and State Street Global Advisors are affiliated.



What We Have Done Together

A Tremendous History of Innovation & Growth





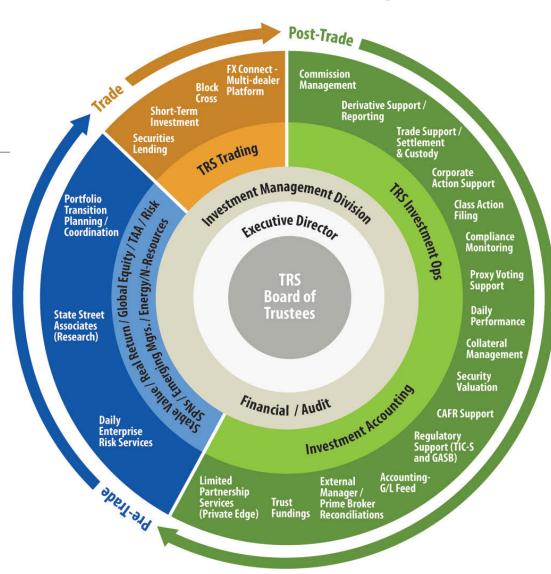
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State Street Supports the Full Life Cycle of TRS Investments

Cost Efficient, Risk-Controlled Services Support TRS at Each Stage and Across All Investments

- Trade automation and settlement across 35+ markets
- Integrated derivatives processing and collateral management
- Customized portfolio risk system
- Robust optimized investment accounting operations and reporting
- Custom performance measurement and analytics



- Custom private markets reporting and data management services
- Custom investment compliance rules and reporting
- Dedicated on-site SSB team
- Comprehensive governance model
- Leveraging SSB Information Technology across all asset classes and systems



What We Do Together

Broad and Deep Partnership Supporting TRS Growth at Scale

Equity, Fixed Income, FX, Cash

Derivatives and Collateral Management Private Markets

Performance, Risk, and Compliance Securities Lending Client Service and Relationship Management

Services

Scope

Trade Settlement, Daily
Accounting, Valuation,
External Manager
Reconciliations, General
Ledger, Custom
Reporting, Dedicated
SSB teams in Boston
and Sacramento

Trade Settlement, Daily
Accounting, Valuation,
Daily Collateral, Daily
Margin (3 FCMs)
General Ledger,
Custom Reporting,
Dedicated SSB teams in
Boston and Sacramento

GP Fund Set-Up,
Capital
Calls/Distributions and
Statement Processing
Including Annual
Financials and Capital
Accounts, Custom Data
Management, Dedicated
SSB team in Boston

Comprehensive and
Custom Risk, Daily
Performance Reporting
& Investment
Compliance Services,
On-Site Resources in
Austin and Dedicated
SSB Teams in Boston,
Kansas City, Dublin and
Poland

Integrated Securities
Lending Program
Providing Low-Risk
Incremental Returns,
Dedicated Cash
Collateral Account and
Portfolio Manager

Customized SLA-driven
Service and
Governance Model
Across TRS, On-Site
Resources in Austin and
Dedicated Resources in
Sacramento

 240,000 transactions annually with average market value over \$100 Billion

- 6,000 wires with annual value of \$24 Billion
- 23,000 positions priced and 480 NAVs strike on a daily basis

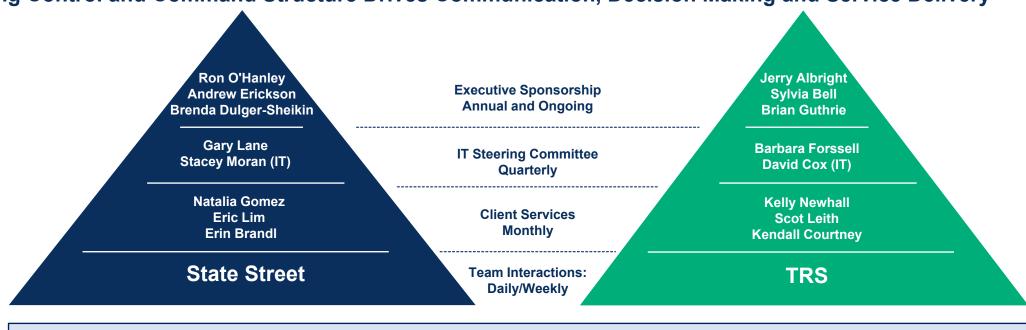
- Average notional value of \$30 Billion
- 7,800 swap and futures transactions annually
- 2,700 collateral management transactions annually
- Industry leading support for more than \$43 Billion
- 2,800 transactions processed annually
- Fully integrated with TRS front-office system (eFront)
- 80,000 positions processed daily for Risk
- 500 funds, 300 benchmarks & 1,000 aggregates processed for Performance
- 500 daily Investment Compliance checks

- \$1.3 Billion generated since 2002 for TRS
- In 2017, TRS earned \$62.2 Million
- In 2017, average onloan range between \$17.5 Billion and \$18.5 Billion
- Responsible for over 100 reporting deliverables
- Closed over 500 TRS inquiries annually
- Provides project management for IT and other custom TRS initiatives

Source; State Street Internal Data December 31, 2017



Strong Control and Command Structure Drives Communication, Decision Making and Service Delivery





Client Trade Support

Transaction Processing

Pricing

Corporate Actions

Reconciliations

Compliance

Performance

Risk Analytics

Securities Lending

Alternative Investmen Solutions

Derivatives Valuations

Contingent Labor Budget Management

Management

Collateral

Client Technology – Cli Experience

Relationship Management and Client Service

Daily Service and Technology Delivery

Anticipating TRS Needs



Requesting Feedback on Our Relationship Management and Client Service

Launched Independent C-Suite Level Engagement Study, including TRS

Migrating to a Client Driven Development Approach

Increased Frequency of Executive Level Feedback Loops

Joint Agenda Setting via Client Advisory Council



Improving Relationship and Service Models



Breaking down siloes

Empowering and upgrading the RM

Maintaining and planning for key talent

Flexibility in meeting client needs

Improving issue resolution



Achieving a Client Centric Culture



Be a strategic partner

Effectively communicate strategy and benefits to TRS

Innovate

Continuing to improve technology

Do all with a sense of urgency on behalf of TRS





Our Industry – Global Asset Owner Trends

Talent, technology and operational risk are the key areas to improve for asset owners at the global level.



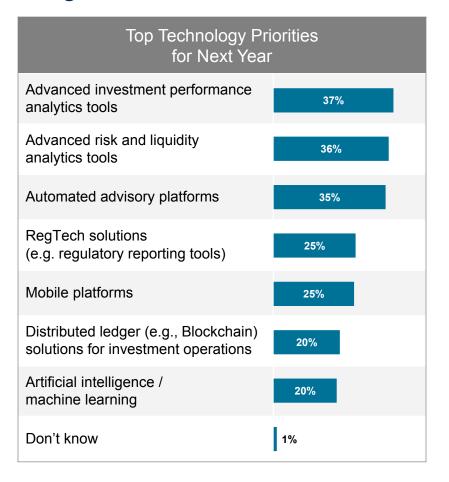
Performance (% rating 'highly effective')

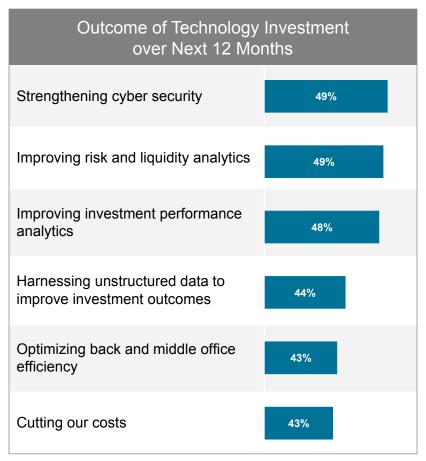
Source: State Street 2017 Growth Readiness Study



Our Industry – Innovation Strategy

Cybersecurity, risk, liquidity and investment performance analytics are the top technology priorities asset owners are pursuing.





Source: State Street 2017 Growth Readiness Study



Why is this partnership successful and positioned well for future?

TRS and State Street's Goals Aligned

TRS	State Street
 Requires efficient and cost effective outsourcing of investment operations middle and back office 	 Delivers large, experienced team, scalable processes, and technology for TRS
✓ Minimize investment operations risk	 Executes a highly optimized investment operation with robust relationship governance
✓ Requires high-touch collaboration	✓ Proven history of meeting TRS' needs since 2002
✓ Innovates in developing solutions to enhance competitive position	✓ Strong technology focus, including security, digitalization and data management

Appendices

Service Model Specifics by Area



Client Service Relationship Management

- Specialized Service Team Relationship Management, Client Service, Cash, Accounting, & Reconciliation services centralized under a single roof in Sacramento
- Team solely focused on your TRS requirements
- Relationship Governance Relationship Management focused on delivering TRS specific Service Level Agreement (SLA) & management of Key Performance Indicators (KPI)
- Organizational pairing to strengthen engagement across all critical specialties and levels
- Consultative Delivery Seasoned team with proven ability to drive innovative and value added operational change
- Direct access to progressive asset owner
 asset manager best practices
- Management of Contingent Labor
- Management of Weekly/Monthly Governance meetings





- Quarterly reporting tracking key performance operations Deliverables
- Oversight of 100 Reporting Deliverables through service level agreement management
- 20 accounts opened in fiscal year
- Over 1000 email queries per month
- 10-15% of IMD staff sourced via SSB Contingent Labor

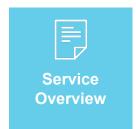


- Onsite client service is available on demand, streamlining the interaction with staff and understanding of TRS specific needs
- Support of custom requirements reporting current and future state



Equity, Fixed Income and FX Servicing

- Staff provide oversight for overall transaction flow and processing
- Liaise directly with specialized processing teams to help ensure TRS manual trade instructions processed
- Trade reporting, monitoring and joint resolution of trade settlement issues







Externally Managed Assets	Transactions (Nov 17)	
	Prior 12 months	Prior 3 Months
Equity	56,846	23,095
Forwards	272	100
Spots	10,628	4,435
TOTAL	67,746	27,630

- Over 160,000 internal and external transactions processed over last 12 months
- Market value of equity and FI transactions over \$8Bn last month

- Extra support deep dive on International Unmatched Trade
- CTS reaches out proactively to TRS on unmatched trades, negative positions, intra-day issues on trades
- Provide support to recommend best practice for format and settlement of complex transactions





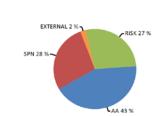
- TRS and SSB have deep understanding of public market mechanisms, both organizations and overall system capabilities. Together, meeting tight deadlines with minimal exceptions
- · With SSB's support, TRS has migrated its trade messaging process to SWIFT
- Data accuracy and consistency
- Partnering to adopt best practices in trade execution, we have jointly helped mitigate settlement risk through improved communication and the implementation of multiple automated trade solutions

Source: State Street Internal Data 11/2017

Derivatives Process and Servicing

- Derivatives transaction and lifecycle management for internal and external managers
- Derivatives valuations review and oversight
- Collaborate with internal State Street collateral management team to manage collateral and margin call processes
- Weekly metrics regarding trade timeliness and accuracy of transaction management discussed in joint State Street and TRS conference calls
- Joint State Street and TRS project and issue log

TRS's Strategic Partners Network, Risk, and Asset Allocation groups are heaviest users of derivatives with gross notional values totaling over \$30 Billion and up to 31% of the total portfolio



Gross Notional by Portfolio





Derivatives - Avg Monthly Transactions			
	TRS Mgrs	Ext. Mgrs	Total
SWAPS	25	115	140
Single Name Equity SWAPS	150	0	150
Futures	60	300	360
Options	10	20	30
Incoming/Outgoing Wires	50	50	100
Totals	295	485	780

- Enhanced daily holdings reporting adheres to new collateral management regulations
- Reconciliation of OTC holdings to Counterparties
- Detailed reconciliations to futures clearing brokers
- Partnership with TRS on shared daily logs to resolve outstanding items
- Very tightly controlled, efficient and timely margin and cash movement. All exchangetraded futures recons are done by SSB on T+0, allowing TRS and SSB to challenge the FCM before cash leaves TRS





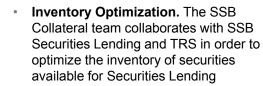
- Team of experienced subject matter experts servicing all derivative product types traded by TRS and their strategic partners
- Focus on strategic technology solutions such as electronic trade message delivery, to increase accuracy and timeliness
- Direct daily communication between State Street and TRS derivatives operations teams
- Very tightly controlled, efficient and timely margin and cash movement
- Working together, TRS and SSB are able to influence other large industry players to meet TRS business and operational needs

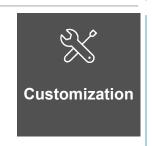
Derivatives Process and Servicing – Collateral Management

- CCAT capture and manage collateral conditions and terms from various TRS's various counterparties and appropriate the data into our core management platform
- Margin Call and Counterparty Management aggregate trade level data collaborating with our internal derivatives team and manage the end to end margin call process based on aggregated requirement data, aggregate collateral values and CCAT information which includes managing disputes
- Monitor Sufficient and Eligible Collateral systematic processes to ensure eligible collateral in collaboration with Securities Lending to ensure the assets posted as collateral are not favorable in the lending space



D	Customized Reporting sent daily
	that provides specific elements which
	defines current exposure at the
	counterparty level, upcoming income
	events, collateral tracking and a variety
	of information to TRS Ops to have a
	risk profile at the ready and on hand





Collateral Management (Monthly Averages)		
Calls Issued	46.33	
Calls Received	57.33	
Disputes	72.33	
Collateral Moves	52	
Totals	227.99	







- Outsourced operations (experience and connectivity to multiple market participants)
- Experienced team of middle and back office capabilities
- Infrastructure for scale and TRS experience in mind

Source; State Street Internal Data 11/2017

Private Markets

- Track GP Reporting of Capital Account and Financial Statements
- Daily Cash-adjusted Market Value Calculations
- Reconciliation of Outstanding Commitments
- Capture detailed Portfolio Company/Property Level information from quarterly Financial Statements
- Dynamic performance views and a drilldown to detailed cash activity and underlying portfolio company information
- Standard Cash Flow, Performance, and Underlying Holdings Report Templates and Interactive Views
- Centralized Document Management Library

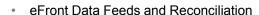


For TRS fiscal year 2017, internally managed private market investments accounted for \$43.8 Billion, 30% of assets under management.



Volume

	Transactions	New Commitments	Total Net Assets (\$B)
PE	1,259	21	18,390.48
RA	1,095	19	17,778.20
ENRI	430	7	5,649.96
SOP	56	6	540.51
TV	37	1	1,228.99
Other	5	1	196.90
Total	2,882	55	\$ 43,785.04



- Quarterly ILPA/QDIF Management Fee, Expense and Carried Interest Paid/Accrued Reporting
- TRS annual Incentive Compensation Calculation
- 4 monthly reconciliations of SSB data and eFront performance application data results in TRS Front Office Staff utilizing the most up to date performance data
- Knowledgeable, responsive partners on both sides solving management issues together
 - Dedicated service teams from both TRS and SSB
 - Mutual understanding of both organizations by both teams
- Understanding of system capabilities and data sources



- Full transparency into the historic cash flow, commitment, and performance results across all of TRS' partnership investments
- Fee Transparency Initiative with TRS, developed a database of ILPA/QDIF Fee Data including control reviews and automation to provide TRS with online access of GP provided template data
- Calculation of Incentive Compensation allowing independent checks and balances
- Operational efficiency and Governance





Accounting Operations

- Asset manager based controls increase oversight of your investment process
- Custom controls are established to cover TRS specific processing requirements
- Additional daily and periodic accounting controls allow for increased accuracy rates
 - Daily Cash Management
 - Daily Trade Oversight
 - Daily Income and Corporate Action Review
 - Daily Pricing Review and NAV Oversight





- 500 incoming/outgoing wires tracked on a monthly basis
- 23,000 positions priced daily and monthly
- · 480 daily NAVs calculated
- 186 monthly Investment Manager reconciliations

- Enhanced Daily Cash activity report
 & Wire Log
- Daily trade reconciliation and trade impact analysis
- Daily NAV benchmarking and attribution
- Custom Month End & Year End Reporting
- Daily Prime Broker reconciliation for US REIT and Alternative Risk Premia
- Integrated Tactical Asset Allocation and Integrated Risk Parity fund structures





- Accurate and timely Cash availability and sweep process
- Trade Date capture of all trades and impact analysis
- Daily NAV accuracy
- Audit and CAFR reporting support
- Enhanced reconciliation for long/short products and synthetic equities
- ITAA and IRP structures created to facilitate net trading in the market, reducing trade costs and lower gross leverage

Source; State Street Internal Data 11/2017

Performance and Analytics

- Daily Performance
- Data Feeds (3 feeds twice a day)
- Manager Reconciliation
- Monthly Plan Attribution
- Monthly Governance Meetings
- Quarterly Universe
- GASB 40
- Onsite Performance Client Service





- The SSB and TRS Performance teams provide robust reporting and data aggregation services. Through the use of formal reporting, data feeds, and online tools, Performance and Analytics team provides:
 - Returns on over 500 funds, 600 breakouts. 1,000 aggregates, and 300 benchmarks.
 - 10,000 lines of security data
 - Over 100 reports issued annually
 - Three data feeds sent twice/day; two additional feeds provided monthly

- Monthly Performance Reporting
- Invested to Total, negating the effect of cash
- CDS Reallocation
- Pure View Hierarchy
- CAFR & Governors Report Support
- ITAA performance recon of sub accounting to master accounts
- Management Committee
- Incentive Compensation Report
- Dashboard Flip
- Daily Futures Notionalization, greatly improving transparency, understanding of TRS leverage and risk management



- Evolutionary collaboration over the last nine years has resulted in greater transparency, timeliness, accuracy, efficiency and stronger controls in providing clean, clear, accurate, auditable and insightful performance data, analytics and reporting
- Knowledgeable and integrated onsite performance client service is available on demand, streamlining the interaction with investment staff
- Support of custom requirements of performance reporting current and future state
- Extremely timely information resulting from a 24-7 model whereby at almost any time of the day or night, someone from SSB is working on TRS performance data



Investment Compliance

Daily Investment Compliance Testing

- Investment Policy Statement Guidelines
- External Manager Guidelines
- SEC Requirements
- Ownership testing

- 500 daily compliance checks
- 170 monthly compliance checks





Total Trust Level	55
External Manager Accounts	371
Strategic Partners Network	74
Limited Partners	178
Total	678

Custom Reporting

- Asset Allocation Testing
- Counterparty Testing
- Leverage Testing
- Manager Organization Allocation Testing





- Enhanced calculation methodology based on best practices and TRS views
- Integration of compliance results data via iReports
- Compliance Dictionary that details test methodology

Risk Services

- Daily lookthrough on public assets
- Monthly lookthrough on total plan including private markets
- Multi-asset class support for equities, fixed income and derivatives
- On-site staff integrated into risk team



- 80,000 positions processed every day including:
 - Benchmarks
 - Lookthrough
- Dozen reports fed to compliance, TRS derivative team, and TRS risk staff

- Bespoke risk budgeting framework provides comprehensive approach for total plan risk management
- · Collaborative construction of private market models
- "Front end impact" analyzes major IIC deals and other decisions





Key

- This evolutionary collaboration has resulted in greater transparency, timeliness, accuracy and efficiencies
- Risk groups work as a team rather than as a software service
- SSB understands TRS portfolio and factors behind decision processes
- Enables TRS to react to market events smarter and faster
- Enables TRS to understand its total portfolio risk
- Means State Street understands and can anticipate TRS concerns
- Daily model, facilitates tight controls, timely and efficient understanding



Global Technology Services

- Maintain a clear understanding of TRS strategic direction and goals from a technology perspective
- Make State Street technology resources available to the fullest extent possible to TRS
- Provide TRS with streamlined access to technology across the organization by providing a single point of access to channel requests and inquiries
- Act as broker between TRS and State Street content experts, perform Analysis and reporting
- TRS knowledgeable technology experience manager



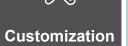


- 36 daily data feeds sent to TRS and trusted vendors
- · 9 monthly data feeds sent to TRS and trusted vendors
- 3 weekly data feeds sent to TRS and trusted vendors
- Data feed timeliness and accuracy levels exceed 99.99% consistently
- Monthly joint IT governance meetings
- Frequent touch points with TRS Investments and Enterprise Technology Teams

Expert team approach to "solution engineering"

 Creation of virtual teams of subject matter experts, delegating the right resources to provide the best solution







- IT Relationship Manager who thoroughly understands how SSB services support TRS objectives and can facilitate and advocate for TRS across SSB's technology teams.
- Provide critical project management services that bridge gaps that could exist between business and technology
- SSB willingness to embark on modern digital technology that transforms the way TRS consumes data so that TRS can make more timely and better informed investments decision.
- Proactive partnership gives TRS and SSB a competitive advantage

Provide a consultative approach with business orientation

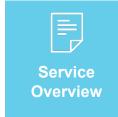
- Focus on value to business when developing or implementing technology solutions
- · The TRS IIS team engages SSB IT for a range of inputs from production issues to collaboration on strategic direction





Securities Lending

- Lending with State Street since 2002
- Acceptable forms of collateral are;
 - Cash: U.S. dollars only, invested in a TRS separately managed reinvestment pool, investments reviewed monthly
 - Non-Cash: U.S. Treasuries and Agencies only
- All loans are collateralized, U.S. loans at 102% & Non U.S. loans at 105%





- Total Historical TRS earnings are \$1.3 billion
- TRS receives 90% of all the generated earnings
- Average On Loan Balance Range = \$17.5 billion - \$18.5 billion
- 2017 TRS net revenue = \$ 62.2 million

- Custom TRS list of approved Borrowers and credit limits
- Indemnification against borrower default & against any principal loss on any cash investment in repo transactions





- Generate additional alpha on assets laying dormant in custody accounts
- Funds custody costs, contingent labor and other operational expenses
- Gain access to valuable short interest data to help assess if a long strategy is justified

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TAB 21





Overview of Internal Audit Value



- ✓ Report to the Nations on Occupational Fraud and Abuse: 2016
 Global Fraud Study by the Association of Certified Fraud Examiners
 (ACFE)
- ✓ Measuring Internal Audit Value: Perspectives from Stakeholders by The Institute of Internal Auditors (IIA)
- √ The Value of Internal Audit: Insight from Agency Leadership and Chief Audit Executives by the Texas State Agency Internal Audit Forum (SAIAF) Internal Audit Leadership Develop Program (IALDP)
- √ Key takeaways





Report to the Nations on Occupational Fraud and Abuse: 2016 Global Fraud Study*

Association of Certified Fraud Examiners (ACFE)







ACFE Global Fraud Study

Industry	Fraud Cases	Median Losses
Financial Services	16.9%	\$192k
Government	10.5%	\$133k
Healthcare	6.6%	\$120k

	Organizations With Internal Audit
Median loss per fraud	(\$92k)
Median fraud duration	(12 months)
Asset misappropriation frequency	(4.1%)
Fraud detected by Internal Audit	16.5%



Rationalization







Measuring Internal Audit Value:
Perspectives from Global Stakeholders

The Institute of Internal Auditors (IIA)





Internal Audit Stakeholder Study

The purpose of the Common Body of Knowledge (CBOK) stakeholder study is to gain a better understanding of global stakeholders' expectations with regard to Internal Audit's purpose, function and performance.

This study was developed in partnership between The IIA Research Foundation and Protiviti.







Key Themes



Internal Audit does many things well that could be considered foundational elements of assurance work.



There are opportunities for Internal Audit to add value to their organization by spending more time focusing on risk identification and management, in addition to assurance work.



Internal Audit should focus more on strategic risks, but exactly what stakeholders mean by that is less than clear or consistent.



Increased demands on Internal Audit will require CAEs to prioritize competing demands. Managing these conflicts requires strong relationship and communication skills.



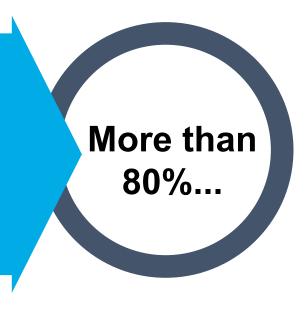
MARKS ON FOUNDATIONAL ELEMENTS



Foundational Elements, High Ratings

More than 80% of stakeholders agree or strongly agree that Internal Auditors:

- Assess areas or topics that are significant.
- Keep up to date with changes in the business.
- Sufficiently communicate audit plans.







Foundational Elements, High Ratings

Top three criteria (supported by 70% of respondents) used to evaluate the performance of Internal Auditors:

- Quality of audit work/reliable results.
- Usefulness of recommendations made.
- Timely communication of risks.







IS INTERNAL AUDIT EXPECTED TO MOVE BEYOND THE BASICS?



Assurance vs. Advisory

Many respondents note that they see value in advisory services. What should this non-assurance work cover?

- Identifying known/emerging risk areas.
- Facilitating/monitoring risk management.
- Identifying appropriate risk management frameworks.







AREAS—BEYOND ASSURANCE— THAT SHOULD BE IN SCOPE FOR INTERNAL AUDIT

Identify known and emerging risk areas 85% Facilitate and monitor effective risk management 78% practices by operational management Identify appropriate risk management 78% frameworks, practices and processes Consult on business process improvements 76% Alert operational management to emerging issues 74% and changing regulatory and risk scenarios Assurance on compliance with legal and 71% regulatory requirements 60% 65% 70% 75% 80% 85% 90%





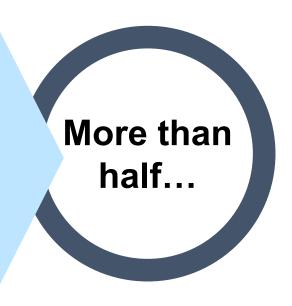
FOCUS ON WHICH RISKS?



Risk Is A Broad Term

Stakeholders say they want Internal Audit to add value by being engaged in risk-related activities. Which ones?

 More than half of our respondents want Internal Audit to be more active in assessing and evaluating strategic risks.







Role In Responding To Strategic Risks

Stakeholders were asked to choose the best avenue for Internal Audit to improve its role in responding to risks.

Focus on strategic risks as well as operational, financial, and compliance risks during audit projects.



Periodically evaluating and communicating key risks to the Board and Executive Management.





HOW CAN INTERNAL AUDIT BEST MANAGE THE COMPETING DEMANDS?



Stakeholder Expectations

Internal Auditors cannot do everything stakeholders expect.

Limited resources, potential conflicts to independence, and overlap with other functions' responsibilities.



CAEs have to decide what they can accomplish, and reconcile that decision with stakeholders.



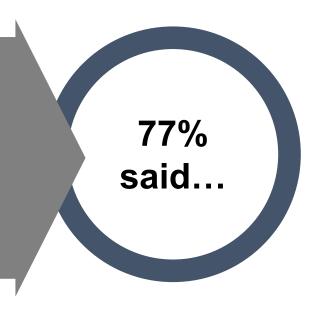
Stakeholders expect assurance but have an appetite for more advisory.



Expanded Internal Audit Capabilities

The survey asked stakeholders about the best way for Internal Audit to prioritize competing demands.

- The most popular option: CAE to build strong relationships with management.
- One would also expect strong relationships with board members to have the same appeal.





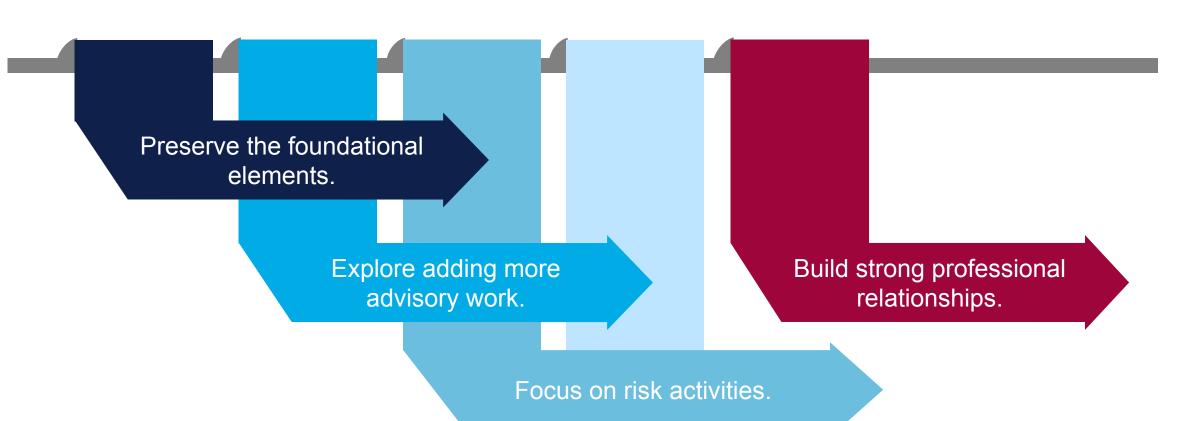
Best Strategies for Prioritizing Competing Demands







Key Takeaways



Connect the dots on strategic risks.





The Value of Internal Audit: Insight from Agency Leadership and Chief Audit Executives*

Texas State Agency Internal Audit Forum (SAIAF) Internal Audit Leadership Develop Program (IALDP) Cohort VIII, May 2017



*Survey of 10 Texas state agencies' leaders and chief auditors





Agency Leadership: Internal Audit Value





Chief Auditors: Internal Audit Value







Agency Leadership: Internal Audit Performance Measures



Chief Auditors: Internal Audit Performance Measures







TRS Assurance Examples

- Utilizing TRS's strategic plan and enterprise risk assessment as part of audit planning
- Aligning the internal audit strategic plan to TRS strategic plan and ED goals
- Executing annual audit plan and reporting on status quarterly
- o Identifying and reporting on key risks and controls during audits in conjunction with business units
- Making formal recommendations to improve controls in audit reports and informal recommendations as identified and requested
- Surveying clients on the usefulness of recommendations

TRS Consulting/Advisory Examples

- Participating in internal committees like the TEAM Steering Committee, Risk Oversight Committee, Internal Investment Committee, and quarterly meetings with healthcare vendors
- o Providing input into key policies such as the Investment Policy Statement and Incentive Pay Plan
- Consulting on operational matters, when requested
- Participating in reviewing key processes prior to implementation such as legislative changes or planned system controls

TRS Audit Administration Example

Conducting 360 evaluations of CAE and audit staff to assess strength of relationships







TRS: Internal Audit Performance Measures

- Performance measure to complete 80% of audit projects
- o Surveys to clients after each engagement about the audit process and usefulness of audit recommendations
- 360 surveys of CAE and audit staff performance
- Required defined audit objectives and scope prior to fieldwork start and included in audit reports
- o Professional staff have relevant credentials or are working towards them
- Peer review received every three years with no compliance deficiencies
- Audit plan changes based on risk







Key Takeaways

- ✓ Internal Audit departments reduce fraud risk
- ✓ Outside of fraud risk, value is difficult to measure quantitatively
- ✓ Qualitative measurements focus on the insight, objectivity, and risk mitigation recommendations brought by auditors
- ✓ Internal Audit and key stakeholders need to be in alignment and focus on the right risks

√TRS Internal Audit is well-positioned and resourced to help the organization

identify and mitigate risks in the future



TAB 22





Audit Plan: Pension Benefits and Employer Audits

The tables on this page and the following pages provide the name of each project, type of project, and preliminary scope of work to be performed. Scope of work will be finalized as part of each project's formal planning phase.

Title	Туре	Preliminary Scope
Annual Benefits Testing	Agreed-Upon Procedures	Recalculate a sample of benefit payments annually and determine whether documentation on file supports the calculation; scope in other tests related to benefits as agreed-upon with management
Employer Audits	Audit	Determine whether information reported to TRS is complete and accurate, especially in the areas of eligibility, compensation, contributions, surcharges (pension and healthcare)
Employer Data Analysis Testing	Agreed-Upon Procedures	Gather and use full payroll data to risk assess reporting entities for audit and to identify noncompliance with TRS Laws and Rules
TRS Reporting Entity Website Audit Information Update and Communication Activities	Advisory	Update audit-related information and tools on the TRS employer (reporting entity) website. Information may include self-audits, audit programs, audit results, technical guidance, and frequently asked questions about reporting entity audits





Audit Plan: Health Care

Title	Туре	Preliminary Scope
TRS-ActiveCare Billing, Reporting, and Exceptions Process Audit	Audit	Assess whether the billing process used by subcontractor results in bills that are complete and accurate; determine whether reporting entities are reconciling bills and reporting errors to subcontractor; assess the effectiveness of the exceptions process; assess the completeness and accuracy of reports provided to TRS by subcontractor and contractor including eligibility reports
TRS-Care and TRS-ActiveCare Vendor Procurement and Oversight Audit	Audit	Using recent healthcare procurements, validate that the processes were followed in accordance with the state procurement manual and TRS policies and procedures
Health Care Administrative Expenses audit	Audit	Validate completeness and accuracy of administrative expenses charged to TRS-Care and TRS-ActiveCare
TRS-Care Legislative Change Management Review	Consulting	Review legislative changes effective January 1 requiring programming changes by IT for accuracy
Health Care Vendor Update Meetings Attendance	Advisory	Attend quarterly meetings with health care vendors to understand results, issues, and TRS management's monitoring controls
Health Care Vendor Selection Observation	Advisory	Observe selection process of large vendor and service providers, when applicable





Audit Plan: Investment Management

Title	Туре	Preliminary Scope
Private Equity Management Fees and Carried Interest Desk Audits	Audit	Assess the accuracy of management fees and carried interest using information contained in Limited Partnership portals as a starting point and other information as needed
Performance Calculations Audit	Audit	Assess whether pension trust and incentive pay plan investment returns are accurate, consistent, and based on accepted industry performance standards
Quarterly Investment and Ethics Policies Compliance Testing	Agreed-Upon Procedures	Assess compliance with TRS ethics policies and the Investment Policy Statement (IPS) requirements; assess select operating procedures
Annual Testing of Investment Incentive Pay Plan	Agreed-Upon Procedures	Prior to payment, recalculate the investment incentive compensation award amounts to determine if they are calculated in accordance with plan provisions; reconcile performance to the service provider
Investment Committees Attendance	Advisory	Stay current on Investment Management Division initiatives by attending the Internal Investment Committee, Derivatives Operations, monthly staff, and other meetings such as the Annual Town Hall meeting and meeting with risk, compliance, and operations staff





Audit Plan: Finance and Staff Services

Title	Туре	Preliminary Scope
General Accounting Change in Management Audit	Audit	Determine whether key management controls are in place and functioning as intended. Key management controls could include account reconciliations, access controls, departmental policies and procedures, TRS-wide policies and procedures, segregation of duties, etc.
Capital Improvement Planning Process Review	Consulting	Review TRS' process for requesting and planning capital improvements and make recommendations for increased formalization
Comprehensive Annual Financial Report (CAFR) testing of annuity payments	Audit	Conduct pension benefits testing on behalf of the State Auditor's Office (SAO) to be used in completion of the CAFR audit
CAFR Audit Coordination (SAO, auditors)	Advisory	Coordinate activities of the SAO to ensure deadlines are met; coordinate quarterly update meetings with executive management and the SAO; maintain SAO document request SharePoint site; walkthrough CAFR development process and identify opportunities for efficiencies
CAPPS Implementation	Advisory	Participate in meetings associated with CAPPS and provide input into controls identification projects.
Teacher Retirement Investment Company of Texas (TRICOT) Financial Audit Coordination (Grant Thornton, auditors)	Advisory	Coordinate a financial audit of TRICOT, a wholly-owned subsidiary of TRS in London





Audit Plan: Executive

Title	Туре	Preliminary Scope
Board Reporting Process and Materials Review	Consulting	Walk through the process for developing board materials; interview staff about challenges with timely board reporting and provide suggestions for improving timeliness
Executive Incentive Pay Testing	Agreed-Upon Procedures	Independently recalculate executive incentive pay in order to test the accuracy of the calculation by management
Special Requests and Emerging Issues	Advisory or Consulting	Set aside time to address special requests and emerging issues during the year as requested by management
Meetings Participation	Advisory	Participate (non-voting) in various TRS-wide meetings such as Executive Council, Leadership Team, and Risk Oversight Committee





Audit Plan: TEAM and Technology

Title	Туре	Preliminary Scope
TEAM Independent Program Assessment (IPA) Vendor Support	Advisory	Coordinate and facilitate activities of the IPA vendor and ensure direct access to executive management and the board
TEAM Committees, Projects, and Controls Assessment Participation	Advisory	Participate in TEAM Executive Steering Committee (ESC) and other committees and requirements-gathering sessions in a non-voting capacity, and provide advisory services related to TEAM project activities as outlined in the TEAM charter of internal audit activities. Provide input into controls identification projects. In FY 17, Internal Audit participated in the following TEAM committees and projects: - Executive Program Oversight Committee (including TEAM budget) - Organizational Change Management Advisory Groups - Business Procedures and Training Project - Monthly meetings with TEAM program manager and DXC executives
Disaster Recovery, Network Penetration Tests; Security Risk Assessment Review	Advisory	Observe, obtain, read, and follow-up on any issues identified during the network disaster recovery, penetration tests, and the security risk assessment conducted by the TRS Information Security Officer





Proposed Changes to FY 2018 Audit Plan

Project	Change	Reason
TRS Investment Company of Texas (TRICOT) Cost-Benefit Audit	Add	Validate cost-benefit of TRICOT office since inception
General Accounting (GA) Change in Management Audit	Cancel	 Provide time for TRICOT audit Alleviate burden on General Accounting staff who are in process of implementing a new financial system (CAPPS)
Health Insurance Benefits (HIB) and Support Functions Resource Review (Consulting)	Add	 Validate resource request of health care function proposed to Board in June
Healthcare Administrative Fees Audit	Defer	Provide time for HIB resource review
TRS-ActiveCare Billing, Reporting and Exceptions Process; and, Eligibility and Enrollment Process Audit	Increase scope	Increase scope of audit to include the eligibility and enrollment process
Vendor Procurement Audit	Refine scope	 Expand procurement scope to include other divisions within TRS based on planning results and feedback Defer vendor oversight assessment to future
Benefit Disbursement Review (Consulting)	Add	 Identify fraud risk of misdirected payments Consult on any planned control changes proposed by management
Capital Projects Initiation Process Consulting	Defer	Provide time for Benefit Disbursement Review



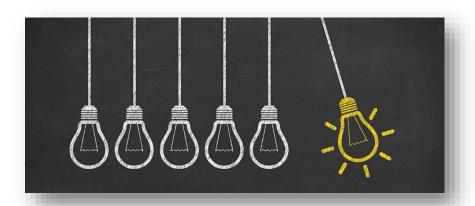
TAB 23





Innovation – What is it?

"Innovation is about identifying and putting new ideas, processes and/or technologies into action that creates measurable value and transforms the business in some significant way."

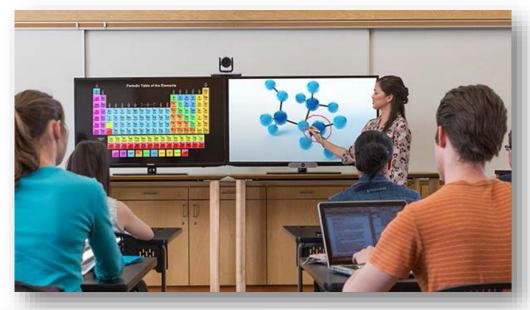






Why Innovation?



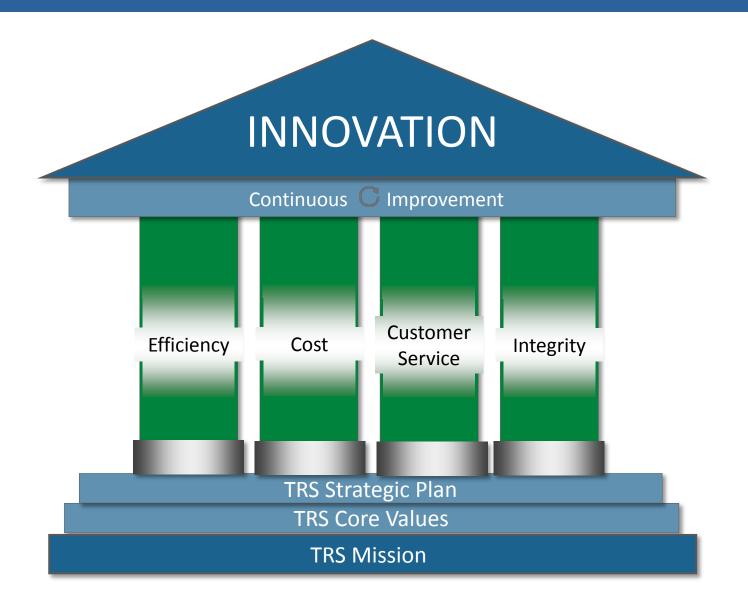








Pillars of Innovation







Innovation: Measuring Value

How will proposed **Innovation** improve our Strategic Objectives?







HBR-Innovation Landscape

The Innovation Landscape Map

When creating an innovation strategy, companies have a choice about how much to focus on technological innovation and how much to invest in business model innovation. This matrix, which considers how a potential innovation fits with a company's existing business model and technical capabilities, can assist with that decision.

DISRUPTIVE

REQUIRES NEW BUSINESS MODEL

- Open source software FOR SOFTWARE COMPANIES
- Video on demand FOR DVD RENTAL SERVICES
- Ride-sharing services
 FOR TAXI AND LIMO COMPANIES

ARCHITECTURAL

- Personalized medicine
 FOR PHARMACEUTICAL COMPANIES
- Digital imaging FOR POLAROID AND KODAK
- Internet search
 FOR NEWSPAPERS

ROUTINE

LEVERAGES
EXISTING
BUSINESS
MODEL

- A next-generation 3 series FOR BMW
- A new index fund FOR VANGUARD
- A new 3-D animated film FOR PIXAR

LEVERAGES **EXISTING**TECHNICAL COMPETENCES

RADICAL

- Biotechnology FOR PHARMACEUTICAL COMPANIES
- Jet engines
 FOR AIRCRAFT MANUFACTURERS
- Fiber-optic cable FOR TELECOMMUNICATIONS COMPANIES

REQUIRES **NEW**TECHNICAL COMPETENCES





Framework for Cost Optimization

Four paths that can be taken individually or together for compounding the effect



ifficant IT Savings Potenti: | & Business Reductions|

Use IT to Enable New, Digital Business Models

 Implement process improvement, business restructuring and innovation

;

Rationalize Application Portfolio; Reduce IT Complexity

 Implement cost-savings technologies in conjunction with the business

Consolidate, Virtualize; Exploit Outsourcing and Cloud

 Identify opportunities to reduce IT costs

Modest Savings Poi (IT Cost Reductid

Reduce Unit Costs via IT Procurement/Vendor Mgmt.

 Get the best pricing and terms for your IT purchases

- Deliver Different Units Reimagine business service delivery with technology (e.g., improve customer experience, new payment models)
- Reduce Number of Units Seek out opportunities to eliminate/reduce application footprint (and with it, infrastructure supporting these applications), while also evaluating underperforming projects in flight
- Deliver Units Differently Evaluate changes to service delivery across major domains looking for consolidation, streamlining or selective outsourcing opportunities
- Reduce Unit Cost Identify opportunities to reduce spend within existing vendor contracts and service delivery model



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Guiding Principles

Members First!

- Business strategy drive technologies; technologies don't drive the business
- Need to first understand business needs technology should be abstracted from the business discussion

Leverage Existing Technologies

 Minimize duplication of technologies, therefore eliminating duplication of effort Resist the "hot new thing" mentality. It's people and process that makes solutions work, not simply technology selection

Scale Though Governance and Strategic Focus

 Business and Technology maturity: Executive Project Oversight Committee (EPOC), Strategic Initiatives, Program Management Office (PMO), Enterprise Architecture, Data Governance, Information Security Advisory Board, and Release & Quality Management





Innovation – Looking Ahead



Digital Workplace



Work From Anywhere



Advanced Data Analytics



Adaptive Security Architecture



Enterprise Resource Planning





Digital Workplace

Vision

Transform the physical workplace by providing new virtual equivalent online services to enable new, more effective ways of collaborating to get work done; raising stakeholder engagement and agility; and offering more user-driven services and technologies.

Goals:

- Improve services to active members, retirees and healthcare participants
- Extend services and customer responsiveness through web-based delivery systems
- Enable customer access to information and services through online systems
- Provide virtual equivalent online tools and services for the way people work today
- Enhance collaboration across all investment groups
- Attract and retain top talent by providing a highly collaborative and modern work environment
- Improve business continuity and availability

- MyTRS Member Self-Service Portal
- E-signature
- Member on-line Chat
- Investment Division Digital Workplace Assessment
- Microsoft Office 365
- Logic Manager
- Online Board Elections
- E-Records Project
- New Office Space Transformation
- Organizational Change Management







Work From Anywhere

Vision

The ability to access and conduct TRS business from anywhere in the world in an efficient and secure manner across any work device.

Goals:

- Facilitate improved and more timely access to information for improved decision-making, efficiency and agility
- Enhance collaboration across all business units
- Remove barriers to gaining meaningful intelligence from data, for improved decision making
- Optimize limited resources by enabling employees to work from everywhere, using any device
- Attract and retain top talent by providing a highly collaborative and modern work environment
- Provide greater business continuity and availability to business resources

- Provide online access to office productivity tools
- Upgrade current legacy phone system to a more open standard
- Expand use and accessibility of our current virtual desktop environment
- Enhance our Telephone Call Center Technology providing full agent access from outside of TRS
- Provide ability to security access TRS information on non-TRS and mobile devices





Advanced Data Analytics

Vision

Leverage new technologies that use data to discover, acquire, analyze, visualize, and deliver business intelligence that leads to improved service delivery and alpha-generating investment decisions.

Goals:

- Drive enhanced decision-making and visibility of customer, partner, financial and investment data through improved access to information
- Increase the ability to acquire, organize and analyze data to deliver business insights and alphagenerating investment decisions
- Advance skills and capabilities to develop and exploit emerging data analysis technologies
- Turn insights into results that make data relevant, easy to consume, and improve the customer experience with TRS
- Improve employee productivity and customer satisfaction

- Implementation of Business Intelligence and Data Analytic platforms
- Enterprise data analytics
- Call Center Modernization Project
- Enterprise and Financial Data Warehouse
- Development of quantitative analysis expertise (advanced analytics, machine learning)
- Data Management and Governance





Adaptive Security Architecture

Vision

Implement a continuous and adaptive risk-based information security model to provide protection and prevention against constantly emerging and changing security threats.

Goals:

- Improve upon continuous protection of computer systems to harden, isolate, and prevent attacks
- Advance perimeter controls from informal, reactive responses to approaches that are agile and riskinformed
- Detect attacks beyond the perimeter controls to mitigate their consequences and duration
- Re-evaluate the cyber supply chain risks associated with investment services used by TRS
- Look for ways to increase and leverage latest encryption technologies
- Broaden use of Single Sign-on

- Live monitoring of computer applications beyond antivirus
- Inclusion of indicators of compromise provided by state and federal agencies
- Security information and event management alerts for potential fraud activity
- Blockchain crypto technologies
- Devote internal penetration tester to evaluate and improve security of investment services.
- Single Sign-on





Enterprise Resource Planning

Vision

Establish and streamline mission-critical business processes - such as financial reporting, budgeting, purchasing, contracts, asset management and HR management - providing an intergraded web-based management system.

Goals:

- Streamline mission-critical business processes such as financial reporting, budgeting, purchasing, contracts, asset management and HR management
- Streamline the annual CAFR process, minimizing manual processes
- Implement an integrated HR system that aligns learning and development, performance management, management continuity, recruiting, onboarding, and compensation systems
- Automate reporting processes, and provide real-time monitoring and analysis in a centralized dashboard
- Reduce redundancies and multiple system entry

- Central Accounting and Payroll Personnel System (CAPPS)
 - Financial Reporting & Budget
 - Purchasing & Contracts
 - Accounts Payable
 - Asset Management
- Cornerstone HR Management
 - Recruitment management
 - Learning management
 - Performance management
 - Succession Planning
 - Compensation management
 - HR planning and benchmarking
 - Data analytics







Innovation

"Innovation distinguishes between a leader and a follower." - Steve Jobs



"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."

- Albert Einstein





Appendix





Update on Innovations Presented in 2016

Description		Status	Estimated /Actual Implementation Date
1	Explore an automate tool to ensure accuracy and protect the Incentive Pay Calculation	2/2017	
2	Expand Use of ERM Technology Capabilities	This initiative is complete. LogicManager (LM) has been implemented for departmental program management as well as agency-wide use for business continuity, operational insurance and ERM (risk assessments, risk reporting, action item monitoring). General Accounting is implementing LM for the contract administration program. LogicManager will continue to be explored for utilization in other functional areas of TRS.	12/2017
3	Testing the Entire Population of Data in REs Audits	The approved Fiscal Year 2018 Annual Audit Plan includes an Internal Audit department activity for reengineering the Employer audit process. With the TRUST go-live in October 2017, Internal Audit is now evaluating Internal Audit's ability to use TRUST data in data analysis and employer report testing. Assessing the TRUST system edit checks and the use of related exception reports are included in Internal Audit's evaluation process.	9/2018
4	Development of a Financial Data Hub	The Financial Data Hub is now known as the Financial Data Warehouse (FDW) Accounting and financial reporting continue to provide requirements for evolving the platform. Also, the CAPPS project will require changes be made to the FDW. That effort is pending more detail from CPA. An IT Service Request is being created to track this effort.	9/2018





Update on Innovations Presented in 2016

Description		Status	Estimated /Actual Implementation Date
5	Expand the use of K2 Blackpearl for improved workflow automation	The following new K2 projects made it to production in Q4: - TRS Vehicle Registration Process - Records and SharePoint Request Tracking - TRS Benefit Reporting Log - Investment Management Training Request, Approval and Tracking (TRSU) - TRS Employee Recognition Award Workflow.	1/2018
6	Automate Board members Eligibility Assessment and Nomination Process	TRS exercise the option in its current contract with Election-America to have the company manage the process of collecting hard copy nominating petition forms as well as nominations submitted online in future TRS board elections. Communications will be working with Election-America to have everything ready by June 1, 2018, in time for the nomination process.	6/2018
7	Use In-House Resources for IT Security Monitoring	Currently 68 perimeter facing computers and servers are reporting log files to the TRS Security Information and Event Management. The Information Security department is on track expanding the deployment to mission critical server infrastructure. New reports based	
8	Implement HR Dashboard using Automatic Tool	TRS purchased Cornerstone, an integrated HRIS that will have reporting, data analytics, and dashboard functionality. Implementation will be begin late January 2018, and should be completed by fall 2018.	9/2018





Update on Innovations Presented in 2016

Description		Status	Estimated /Actual Implementation Date
9	Central Repository for Employee Information	The FSR project for CAPPS has started. The first phase is focusing on the financials (Finance department) and phase two will include HR starting September 2018.	9/2019
10	TEAM 2.0 - Continue Improving TEAM Program	The TEAM Program is not yet completed, but TRS has already started the Maintenance and Enhancement Phase of the TEAM LOB solution where TRS staff is enhancing the system. TRS staff have already developed over 75 enhancements to TRUST that will be released in late February with the first TRS Maintenance and Enhancement release. This marks the "unofficial" start of the enhancements in TEAM 2.0. These enhancements will continue after the end of the TEAM project in 2019.	8/2020
11	Expand the Use of E-Signature	The e-signature solution continues to integrate with TRUST Web Self-Service processes (from an application development perspective) based on the detailed TRUST requirements sessions which are still occurring. Some of the target processes for e-sign are Refunds, Beneficiary Designation, Retirement, Tax Withholding, Service Credit Transfer and Medical Board/Disability Retirement.	9/2019



TAB 24





Aligning Strategy and Resource Needs

Core functions presented strategic objectives and resource requests

Shared services used core function info, and their own objectives, to develop resource request

Goal was to identify:

- Preliminary 5-year resource needs
- Budget impact of additional resources
- Issues related to FTE Cap





Drivers for Future Resource Needs

Meeting the short-term and the longterm needs of the agency by:

Addressing immediate member service needs

Incrementally growing to better manage the member experience

Strategically transforming investment approach to become best-inclass global investor



Initiating five-year plan to be refined between now and April covering FY19-23.



Immediate Needs

 Members are reaching out more than ever due to healthcare changes.

• Providing exceptional customer service is affected by a variety of factors including the transition to TRUST.

 TRS is currently working overtime, reallocating resources, and outsourcing workload where appropriate and adding additional resources as needed.





Immediate Needs

Current State	
Answered Hold Time (on average for year to date)	Up from 4 to 16 min
Average Handle Time (AHT)	Up from 10 to 30 min
Call Volume (Call Center at full capacity since October 2, 2017)	Up 37% (Year over Year)
E-Mail Volume	Up 72% (Year over Year)
Core Processes (includes retirements, refunds, death claims, cost statements)	Average 15% annual growth since 2010
Documents reviewed and completed	47% growth since 2010

- Last legislative session saw largest number of healthcare program changes.
- Transitioned to full payroll data for employer reporting across 1,300+ reporting entities.
- Average handle time of a phone call has increased due to the complexity of the questions members are asking.





Immediate Needs

- In order to immediately address member needs, we must hire 54 member services professionals.
- These adjustments could result in TRS informing leadership offices that we will exceed the FTE Cap during FY19 as authorized by the appropriations act.
- All state agencies are authorized to exceed their FTE cap by up to 10% or 50 FTEs as outlined in the appropriations act.





 TRS has traditionally been a low-cost and low-touch provider compared to our peers, with the goal of providing exceptional member service.

• We are no longer able to provide excellent customer service while remaining low cost and low touch.

• Exceptional service necessitates increasing not only front line benefits staff but also enterprise-wide support services.





TRS membership continues to grow along with the demand for member services.

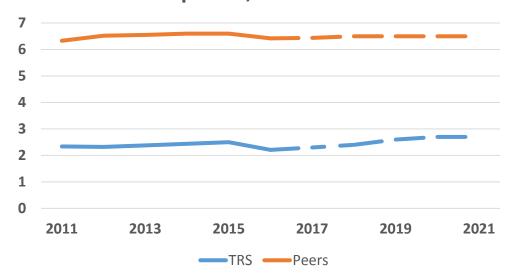
- Membership has grown at a historical annual average of 2.6% and is projected to surpass 2 million members in the next decade.
- During the current fiscal year, TRS expects to receive approximately 650,000 calls but is projected to answer only 450,000 calls based on current staffing levels.

	Year 2000	Year 2007	Year 2017	% Increase (2000 – 2017)
Total TRS Membership	968,249	1,201,038	1,545,057	60%
Trust Fund Value (billions)	\$ 90	\$ 112	\$ 147	63%
K-12 Enrollment	4,002,227	4,594,942	5,359,127	34%
Health Care Enrollment (TRS Care + TRS ActiveCare)	131,408	515,104	749,942	471%
Benefits Staffing	136.4	142.9	152.7	11%
Healthcare Staffing	10.9	18.6	34.3	68%
IMD Staffing	46.9	60.4	141.7	67%



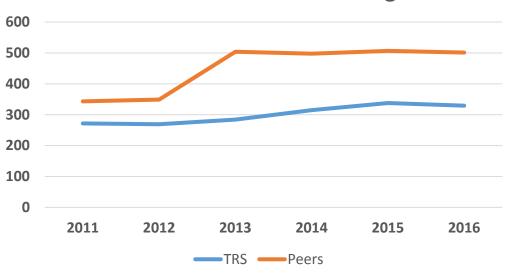


FTEs per 10,000 Members



- TRS has 2/3rds fewer FTEs per 10,000 members than its peers (2.2 in 2016)
- Projected to increase to 2.7 FTEs per 10,000 by 2020 with the additional resources added (compared to 6.5 for peers)

Benefits FTEs vs Peer Average



- TRS has 34% fewer benefit services FTEs than its peers in 2016 compared to 20% fewer than five years before
- Average annual growth of 3.9% in benefit services FTE count over period noted above





As TRS transitions to a post TEAM environment, our business needs are becoming increasingly complex.

- Changes to the retirement plan over the past decade have resulted in six tiers of membership whereas before there was only one tier – affects Benefit Services, IT, Legal and Communications.
- Complexities in investments require more operational support affects IMD, Legal, Financial Services, IT and Organizational Excellence.
- A need to manage complex data systems and an increased demand to secure these systems – affects Legal, IT, IMD and Financial Services.
- Changes to GASB standards and increased accountability expectations of reported data has increased workloads across the agency and for school districts

 affects Benefit Services, Financial Services, Legal and Internal Audit.



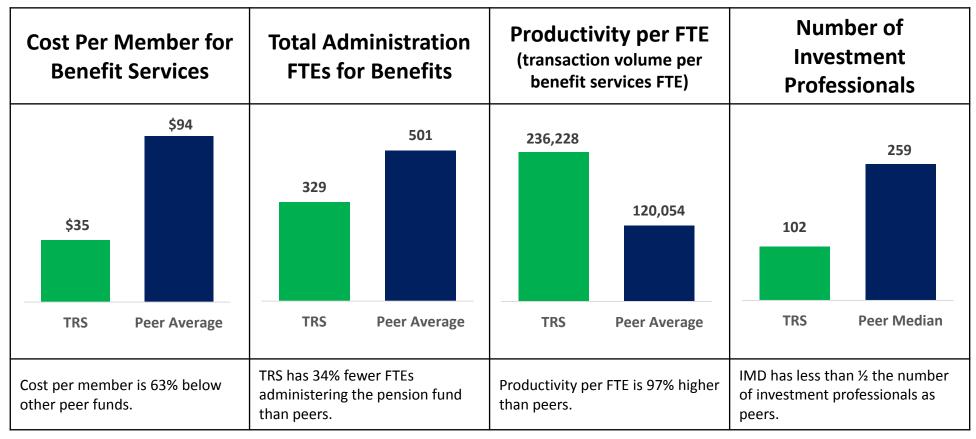


- In response to this, 82 <u>existing</u> personnel currently funded by TEAM will be redeployed to work on member services, continue the Project Management Office and Organizational Change Management; and support the maintenance and enhancement of the TRUST system (TEAM 2.0).
- External contracts for 95 staff will conclude in FY 2019.
- This could result in a legislative request because TEAM FTEs are not currently included in the FTE cap and will need to be going forward.





According to 2016 survey data from CEM compared to its peers, TRS spends less, has fewer FTEs, and is more efficient.





This chart includes only pension administration FTEs. The productivity per FTE metric includes both benefit counseling and processing. Examples of transactions are address changes, retirement estimates, refunds, service buybacks, etc.



Meeting the incremental growth needs of the organization and providing exceptional service entails:

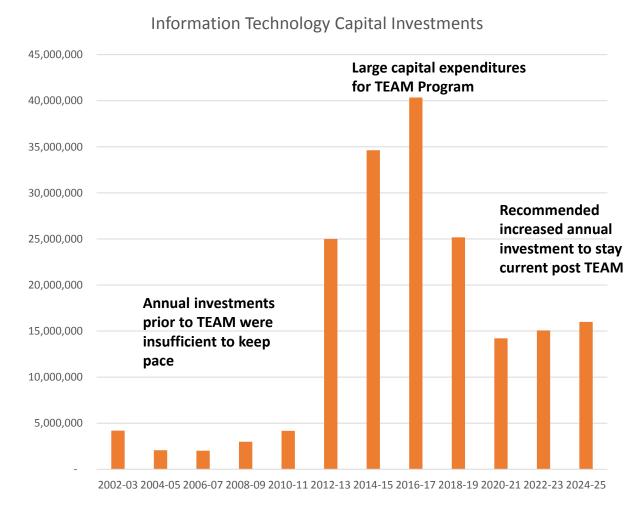
- Answering 80% of calls within 3 minutes while minimizing staff turnover.
- Only using contractors for peak/unusual call volume.
- Increasing capacity for office visits from 40 up to 96 daily appointments.
- Reducing number of reporting entity partners per coach from 150 to 75.
- Increasing data analytics expertise for healthcare.
- Improve member service experience by extending hours during the week and adding office counseling visits on Saturdays.





Meeting the incremental growth needs of the organization and ensuring TRS remains current and innovates also entails:

- Resources will be needed in future years to enhance and support systems and continue to stay current.
- We believe it to be less risky to invest more on an annual basis rather than spend \$100 million to catch up every 20 years.







• TRS can become a best-in-class global fund and increase net alpha by increasing the internal management of fund assets.

• This necessitates a strategic transformation to realign TRS's investing approach.

 Strategic change requires additional resources but will lead to potential savings in the form of lower external management fees.





- TRS has outperformed the standard 60/40 asset allocation model by \$11B over the last 10 years.
- TRS has done the following:
 - Outperformed its benchmarks generating \$5.2B in value over last 5 years
 - Employed fewer than half as many investment professionals as its peers according to CEM survey data
 - Evolved over the last 10 years resulting in:
 - More actively managed assets
 - More externally managed assets
 - Increased internal investing capabilities





Goals for Building the Fleet

- Maintaining current competitive advantages and total returns
- Manage cost structure to increase net alpha generated

Strategies

- Maintain competitive advantages while maximizing cost efficiencies
- Improve fee structures and increase internal management
- Upgrade IT infrastructure
- Increase coverage with expertise in global offices

Assumptions

Similar investment performance and alpha generated from management of assets

Opportunity

- Phase I (FY19-21) includes up to 60 FTEs for a savings of up to \$500M over three years.
- Phase II (FY22-23) includes up to 60 FTEs for a savings of up to \$1B over five years.





Adding more investment staff will create a demand for additional resources in the agency's support functions.

- Legal support will be needed to manage complex investments and ensure proper compliance.
- Information technology support will be needed to handle growing data analysis and security demands.
- Organizational excellence resources will be needed to effectively recruit and onboard talented staff.
- Financial systems support will be needed to ensure accuracy and meet agency and state reporting requirements.





Preliminary Resource Needs and Allocation

Immediate Need

- Benefits 44
- Healthcare 10

(FY18-19)

Keeping Pace

- Benefits 49 (22 TEAM)
- Healthcare 14 (one TEAM)
- TEAM 59
- IMD 23

(FY19-21)

Building the Fleet: Phase I

• IMD - 37

Shared Support – 28

(FY20-21)

Building the Fleet: Phase II

• IMD – 60

(FY22-23)

- Immediate needs are being addressed.
- Keeping pace over five years will prevent us from falling further behind and reduce our reliance on external contractors.
- Building the fleet over five years will generate net alpha, will help us meet long-term return assumption, and finance the additional cost of resources needed.



种

Facilities Impact

- Current facilities footprint will need to be evaluated to accommodate resource needs. Various options include:
 - A building remodel is planned for the 1-3 floors of the East Building to being this fiscal year which will ultimately result in the addition of 60-75 workstations.
 - Future plans potentially include remodeling of the West Building which should create additional workstations.
 - Work from home will become more frequent especially with the call center software modernization.
 - Current real estate investment in Austin gives the agency the option to lease space for staff which may result in lower occupancy expenses beginning as early as 2021.





Budget Timeline

February 2018

Discussion of potential agency resource needs for FY18 - FY23







First phase of additional benefit resources added for member services

Visit with legislative leadership about TRS additional needs

April 2018

Presentation on budget process

FY18 Mid-year budget review and includes potential amendment for healthcare funding







June/July 2018

Submit Strategic Plan for FY19 - FY23

Legislative Appropriations Request to Board for FY20-21

Approval of FY19 Operating Budget and potential fiduciary finding



September 2018

Joint Legislative/Governor Hearing

Potential Request to Exceed FTE Cap Letter to leadership offices for FY19

