

OKLAHOMA INNOVATION INSTITUTE

Tulsa Regional **STEM** Alliance

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TULSA REGIONAL STEM ALLIANCE

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II. EXECUTIVE SUMMARY

A. STRATEGY FOR OII STEM ALLIANCE

The stated intent for the Tulsa Regional STEM (Science, Technology, Engineering, and Math) Alliance (TRSA) as articulated by the Oklahoma Innovation Institute is to

"...function as a convener, facilitator, collaborator and neutral umbrella organization to build and stimulate STEM activities in the Tulsa Region to create a true "STEM Education Ecosystem" from pre-K to high school students".

The founding visionaries of the TRSA funded and provided administrative and leadership support to craft the architecture of this new Tulsa asset, utilizing the Engineering Design Process (appropriately, the E in STEM). This process allowed an inclusive, transparent and collaborative team approach to ensure maximum level of participation with the intent for maximum potential for sustainability.

Stakeholder engagement around the initiative is strong. As of November 2, 2013, contributions and level of participation have included:

- 54 stakeholder online survey completions
- 43 stakeholder participants* at 4 full day Design Studio sessions (*part time and full time)
- 8 deep dive one-on-one interviews
- 75+ attendees to the inaugural TRSA kick off cocktail reception
- 10 attendees at the inaugural funders breakfast
- 100+ receiving multiple email updates on report of the progress involved in the Engineering Design Process
- Many hours of informal conversations over 3 months at a variety of regional and statewide community events

The founding stakeholders of the TRSA agreed that to succeed and deliver on its promise, the TRSA must be:

- **Inclusive** to ensure all impacted and concerned stakeholders would be at the table and have an equal voice
- Flexible in scope to be able to successfully meet the identified needs in the community
- Action-oriented and focused on getting things done
- Accountable and able to measure the impact of the work of the TRSA
- An Advocate for STEM teaching and learning to ensure that education policy initiatives on a local, state and federal level appropriately identify the needs and deploy vital resources responsibly and effectively to ensure every student has access to the best possible STEM education

The stakeholder Design Team collaborated on and produced the following Non-Negotiable Vision Statement and Design Principles to guide the work of TRSA:







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VISION STATEMENT

The Tulsa Regional STEM Alliance (TRSA) works as a catalyst to create a collaborative ecosystem that encourages business/industry and the education community to produce innovative pathways resulting in a highly skilled STEM workforce able to drive economic prosperity while meeting the needs of a globally competitive Tulsa region.

DESIGN PRINCIPLES

The Tulsa Regional STEM Alliance (TRSA) will...

- Stimulate regional economic prosperity & growth with an entrepreneurial STEM vision
- Engage partnerships to accelerate capacity and broaden opportunity
- Strive to make STEM literacy attainable and desirable for all
- Involve committed STEM stakeholders
- Deliver an Alliance that connects and leverages existing assets and develops new capacity to innovate, scale and sustain effective STEM teaching and learning and career pathways resulting in an innovative workforce
- Foster the development of socially responsible, values-based leaders and STEM workforce with a consciousness and eye toward a more contemporary Tulsa enabling the future while addressing the largest grand challenges
- Value and promote a STEM culture and a single community of practice from parents to educators to corporate leaders
- Ensure an evidence-based approach with measurable and sustainable results

B. 3 YEAR PLAN FOR TRSA

The Design Team identified the following areas of tactical concentration for the inaugural work of the TRSA (term of work included):

- Aggregate all existing STEM assets in the community with an eye toward creating a comprehensive repository of data to include measures of impact, cost, efficacy, potential for scale and gaps. (Year 1 primary data collection; ongoing)
- Devise a communication system that: (Year 1)
 - Attracts and Engages new potential stakeholders to the TRSA (continuous)
 - Informs the community at large about the importance of STEM to Tulsa and the available STEM assets in the region (continuous)
 - Broadcasts the STEM successes of the Tulsa Region to members of the community but also to government officials to help inform policy decisions (continuous)
 - Actively cultivates local media contacts to generate positive media mentions
- Codify the optimal governance structure (Year 1; Quarter 1)
- Refine the operational structure of the TRSA to support delivery of its Vision and Design Principles and support actual work around both: (Year 1: Quarter 1)







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- Grants/Sustainability Identify and support collaborative grant opportunities (such as US 2020) that respond to the "but for TRSA this would not have happened..." ethos (continuous)
- Scale Effective Programs Identify programs of excellence and work to provide the necessary support to scale the work and increase impact (continuous)
- Fill Gaps Identify and work to fill gaps in STEM assets in the region including seeking opportunities from programs of excellence in the global STEM community- (continuous)
- Iterate Continue to respond to the needs of the TRSA partners and community and evolve the work of the TRSA accordingly (continuous)

C. OPERATING PLAN FOR OII STEM ALLIANCE

The most pressing needs of TRSA are to:

- Endorse and activate the final approved blueprint
- Establish a budget and put necessary operational and organizational structure in place
- Hire the staff resources according to the plan
- Initiate a flow of work protocol
- Codify the process of vetting programs of consideration, including evaluation tools and standards as well as the "vetting team"
- Codify and publish the final organizational, operational and governance structures to ensure transparency and authority

III. BACKGROUND ON THE INITIATIVE AND LANDSCAPE OF THE TULSA REGION

A. BASIS FOR THE PROJECT

The Tulsa Regional STEM Alliance was conceived by The Oklahoma Innovation Institute. Oll is a 501(c) (3) not-for-profit enterprise committed to building an innovative economy in the Tulsa region with the central theme of "Research to High Impact Jobs". The Institute fosters collaborative research and development, STEM education, entrepreneurship, company creation and retention, life-long learning and creative, future-oriented thinking. These objectives are driven by private sector, government and philanthropic partnerships.

As a key component of achieving this vision, the OII Board believes that formation of an Alliance of like minded STEM focused leaders from throughout the Tulsa community as well as from the statewide education community will catalyze this mission through action oriented engagement that deliberately connects the rich array of community assets and works to identify and scale STEM programs of effectiveness and excellence.







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As envisioned by Oll:

The OII STEM Alliance will function as a convener, facilitator, collaborator and neutral umbrella organization to build and stimulate STEM activities in the Tulsa Region to create a true "STEM Education Ecosystem" from pre-K to high school students. Tulsa Research Partners (TRP) is the cornerstone program of the Oklahoma Innovation Institute that represents an historic, collaborative, multidisciplinary research partnership formed by the University of Tulsa, Oklahoma University-Tulsa, Oklahoma State University-Tulsa and Tulsa Community College. Through TRP, the Oklahoma Innovation Institute is providing Oklahoma's research community access to advanced tools and programs that will give them a significant competitive advantage in attracting and performing high tech research in Oklahoma. With the addition of the OII Tulsa Regional STEM Alliance program, OII will be able to assist TRP members in educating and preparing our next generation of scientists and researchers that will be able to take advantage of TRP's unique research resources and ultimately remain in Oklahoma. This STEM Alliance will truly enable OII to address the research and education needs of our community from both ends of this challenging equation.

B. THE LANDSCAPE IN OKLAHOMA AND TULSA

Although the Tulsa population does not necessarily mirror the statewide population, it is instructive to view the education landscape with a statewide lens as education policy is driven from the state level. Some key statistics that support the urgent need for mobilization in support of the proposed work of the TRSA:

- Oklahoma ranks 47th out of 50 in pupil test scores on standardized tests according to the National Assessment of Student Progress.
- Oklahoma ranks 40th out of 50 on per pupil spending in education based on an analysis of the 2010 United States Census.
- The Alliance for Science & Technology Research in America (ASTRA) ranks Oklahoma 39th in average 2010 ACT Math scores and 35th in its average ACT Science scores
- The American Physical Society Categorizes Oklahoma's performance in STEM education as "far below average" (with a science and engineering index of 2.01 on a scale of 1 to 5, and a national average of 2.58).
- Approximately 59.8% of Tulsa county high school graduates advance to post secondary courses of study compared with the statewide average of 54.7% and a national average of 66%.

Additionally, there is an alarming rate of attrition among STEM declared major students in the post secondary pipeline:

- 53,656 students enrolled (in public colleges) in STEM subjects in 2010-11 (OSRHE: Degrees of Progress", 2012 Annual Report)
- If ZER0 drop out or change subject, there would therefore be 53,656 STEM graduates after 5-6 years.
- However, in 2011-12 Oklahoma (public colleges) graduated 5,297 students in the same STEM disciplines.
- If you assume the same graduation rate for next 6 years, OK will have 31,782 STEM graduates.
- This represents a drop-out/diversion rate of 40%, slightly higher than the national rate of 38%

While there is substantial debate among educators and policy makers broadly on the factors that influence these numbers, (ie. Cost of Living Index impact on per pupil spending and state process for administering standardized tests/student advancement on test scores) there is consensus among the local TRSA stakeholders that within Tulsa the current education system is not graduating enough appropriately trained students to:

- Successfully pursue post secondary college or career training opportunities (many in STEM fields)
- Become the innovative entrepreneurs and community leaders of tomorrow that Tulsa needs to create a thriving economy

Overall Oklahoma students are slightly less likely to be interested in STEM courses of study and careers than the national average (24.9% in OK vs. 25.5% nationally) however they are more likely to express an interest in pursuing Engineering specifically chemical and/ or mechanical.

Source: Where are the STEM Students? Where are the STEM Jobs? 2012-2013 My College Options® and STEM connector®, 2013







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Many stakeholders involved in the Asset Survey and Design Studios indicated that they believe there is a persistent gap in attracting female and minority students into STEM programs of study with a pronounced drop off of interest and participation at around the middle school age. In this area, Oklahoma has already made some strides among minority populations (except females):

- Hispanic males in OK are significantly more likely to pursue engineering education and careers and since 2008 the rate of increased participation is growing faster than the US overall.
- African American students in OK are more likely than African American students nationally to indicate they plan to pursue careers in software design.
- Hispanic students in OK are more likely than Hispanics students nationally to express an interest in or plan to study Engineering

Source: Where are the STEM Students? Where are the STEM Jobs? 2012-2013 My College Options® and STEM connector®, 2013

Early Childhood Education: An Oklahoma Success Story Launched in Tulsa

Tulsa area billionaire philanthropist George Kaiser and the George Kaiser Family Foundation put their considerable funding and philosophical clout behind the cause of ensuring equal access to high quality early childhood education at a very young age arguing that the earlier intervention would ensure the most profound impact on school readiness for Oklahoma's most vulnerable children. This focused effort by a respected philanthropy attracted bi partisan and wide ranging support for a rich array of initiatives that are showing impressive strides in improved literacy among the state's youngest students. The work which has been building momentum since the efforts began in 2005 is beginning to bear significant fruit.

According to a report from The National Institute for Early Learning Education (NIEER) students enrolled in Oklahoma's early childhood education program showed statistically significant increases in math skills, vocabulary, and reading abilities. Dr. Cynthia Lamy, and other researchers at Rutgers University who studied the Oklahama program, note that, "The effects found in this study are the first link in a chain that produces the long-term school success and economic benefits documented by preschool studies that have followed children into adulthood". From the OK DOE Website: "Smart Start is Oklahoma's statewide early childhood initiative and serves as the state's Early Childhood Advisory Council. Smart Start Oklahoma seeks to provide better opportunities to the children and families in our state. Our mission is to lead Oklahoma in coordinating an early childhood system focused on strengthening families and school readiness for all children. We envision all Oklahoma children will be safe, healthy, eager to learn and ready to succeed by the time they enter school."

The political landscape of education in Oklahoma is somewhat unique in that the State Superintendent of Education is an elected official and not appointed by the governor (13 of the 50 states have an elected education official). Further, the current Governor has appointed a cabinet level position in STEM education, which, although under no formal authority to work with or support the mission of the Superintendent's office appears to have a cordial if not synergistic working relationship and both have identified STEM as a focus area. Additionally, an appointed Director of The Department of Career and Technology Education plays a critical role in advancing STEM education statewide.

In 2012, the Governor's Science and Technology Council drafted a report "One Oklahoma: A Strategic Plan for Science and Technology in Oklahoma". The Governor's Science and Technology Council wrote the report.

In the spring of 2013 and in response to the Governor's Report, the State Superintendent issued the "STEM Strategic Plan for a STEM state of Mind in Oklahoma" which was written by the Oklahoma State Department of Education STEM Team.







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The goal of the Governor's Report was "To enhance workforce development through the strengthening of STEM education programs at K-12 and college levels."

Out of that report, the Governor's Science and Technology Council made the following recommendations:

- 1 Recruit more highly qualified STEM teachers in common education and provide incentives, resources and assistance to those teaching STEM subjects:
 - Establish a career path for teachers
 - Create a system of sign-on bonuses for STEM Teachers
 - Create a system of differential pay for qualified STEM graduates
 - Create a system of summer academies for science teachers to learn how to conduct laboratories or practical demonstrations in the classroom
- 2 Establish a "STEM-ready" designation to identify those students who are ready to study for a STEM degree at College.
 - Ensure that those students who wish to pursue college education in STEM have taken the right courses and at the right level to enable them to succeed.
- **3** Create a statewide "distance learning "capability
 - Provide an opportunity for every high school to have AP calculus and physics regardless of the availability of onsite calculus- and physics-qualified instructors.
 - CareerTech Centers that have either an Oklahoma School of Science and Math or "Project Lead the Way" program to be host centers.
- 4 Develop a STEM strategy at the state level
 - Current extra-curricula STEM activities not coordinated
 - Recognize and use programs such as "Project Lead the Way", the Oklahoma School of Science and Math and its regional centers, Oklahoma After-School Network
 - Extend opportunities to all students throughout the state
- 5 Create a STEM Education and Industry Advisory Group
 - Creation of relevance to real careers in real industries
 - Develop, advocate for and execute partnerships between educators and key industry groups
- 6 Promote STEM education in Oklahoma
 - Establish a system of "STEM Communities" A "STEM Community" is one which prepares its students for STEM careers by aligning education, industry and the students with the requirements of careers in STEM industries. It creates a connection between the local communities and the statewide Oklahoma Industry Ecosystem.
 - Initiate a statewide marketing campaign to promote "A STEM State of Mind"







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STEM Workforce Demands of the Future

During the next decade, overall U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations.

- Between 2008 and 2018, new jobs in Oklahoma requiring postsecondary education and training will grow by 87,000 while jobs for high school graduates and dropouts will grow by 59,000.
- Between 2008 and 2018, Oklahoma will create 541,000 job vacancies both from new jobs and from job openings due to retirement.
- 308,000 of these job vacancies will be for those with postsecondary credentials, 172,000 for high school graduates and 61,000 for high school dropouts.
- Oklahoma ranks 38th in terms of the proportion of its 2018 jobs that will require a Bachelor's degree, and is 15th in jobs for high school dropouts

Source of data: Anthony Carnevale, Nicole Smith & Jeff Strohl, Georgetown University Center on Education and the Workforce publication Help Wanted: Projections of Jobs and Education Requirements Through 2018 June 2010.

Tulsa maintained a relatively steady economy through the great recession of 2008 and beyond. Although Tulsa did not participate fully in the boom years (including impact on real estate prices) it was also not as devastated by the "bust". The unemployment rate (September of 2013 Tulsa=5.4%, State of OK 5.3% vs. national average of 7.3%) trends well below the national average (peaking at just over 8.0% in 2010 vs. the national average of 10.0%) and slightly above the OK statewide average.

This indicator suggests that the coming national workforce trends which forecast that the demand for appropriately trained STEM workers will far exceed supply may be felt in Tulsa and Oklahoma sooner than the nation overall as the Tulsa economy has fewer unemployed workers to absorb the new jobs coming online. Of course, the real role of STEM is to ensure that the workers are trained, or retrained--- in the skills required for the available jobs. In that regard, the members of business and industry that have joined TRSA will be instrumental in shaping education content and context for the coming generation of Tulsa's workforce.

Tulsa Community Culture of Civic Engagement

The Tulsa region has a large and committed community of stakeholders from a rich spectrum of potential partners including:

- Government (both state and local)
- Business and industry
- Philanthropy
- Higher education
- Out-of school or informal education organizations/institutions
- Not for profits/ Associations or Affinity Groups
- K-12







The region has a robust and supportive culture of public/private partnerships that supports a wide array of areas of interest including the arts, education, and economic development, civic engagement among others. In fact the Tulsa Community Foundation has trademarked its tagline "Tulsa: America's Most Generous City" as a means to highlight the supportive and collaborative nature of the community at large in addition to its renowned generosity in the form of philanthropic support.

The TRSA stakeholders who have self identified and agreed to participate in the Alliance are overwhelmingly:

- Committed--attending multiple full day meetings and enthusiastically participating in electronic communication "round-tables"
- Excellent collaborators who already participate in other alliance-type organizations
- Leaders in some of the many STEM assets in the region
- Exceedingly deferential to the many members of the Alliance--there is an unusually high level of civility and respect among the members of the group.

C. STEM AS A CONTRIBUTOR TO ECONOMIC VITALITY

The One Oklahoma Report on Science and Technology provides a compelling argument that supports their assertion that STEM, with an emphasis on the S & T, is critical to ensuring economic vitality in the state:

"Economic development in the United States over the past 50 years or more has illustrated that a strong commitment to Science and Technology (S&T) is the most important key to building a better economy and quality of life for our citizens. Scientific discoveries and technological innovations have been consistently shown to be the fuels for economic growth and job creation and the drivers of economic prosperity. They are the vital elements for advances in energy security, food safety, aerospace and agriculture, to name but a few areas of importance to our state. To maintain leadership and/or to achieve growth in these areas, and in other new and exciting technology sectors such as biotechnology, natural gas production and use, and unmanned aircraft systems, Oklahoma needs to nurture an environment conducive to strong S&T growth and expansion. However, recent S&T indicators for the state show a steady decline in several vital statistics related to the strength of our S&T enterprise. The National Science Board's 2012 Science and Engineering Indicators analysis shows a steady, year-on-year decline in Oklahoma for measures such as:

- The number of Science and Engineering (S&E) degrees as a percentage of all degrees;
- Federal research and development (R&D) obligations in S&E fields;
- R&D as a percentage of the state's Gross Domestic Product;
- S&E Ph.D.s as a percentage of the workforce;
- Number of Scientists as a percentage of the workforce;
- S&E occupations as a percentage of the workforce;
- General employment in "high-tech" industry as a percentage of the workforce;

and many others. The above parameters represent a sampling of similar indices, all of which point to a steady decline in the state's S&T strength. This decline needs to be reversed in order for Oklahoma to benefit from today's modern high-tech economy and thus grow prosperity for our citizens. This in turn requires public and private strategic investment, and partnerships between the public and private sectors.







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The payoff for such investments is huge. Consider the following data from the Oklahoma Department of Commerce:

- The 2011 average per capita wage in Oklahoma was \$37,277 per year.
- S&T jobs across the nation average d \$74,958 per year over 2005-2008 more than twice the current average wage in Oklahoma.
- S&T jobs in Oklahoma have a 2011 average hourly wage of \$30.27.
- Non-S&T jobs in Oklahoma have a 2011 average hourly wage of \$16.08.
- Even without adjusting for inflation, S&T jobs in Oklahoma are projected to yield \$14.5 billion in wages by the year 2020

Investment in S&T generally pays off as has been demonstrated innumerable times in Oklahoma's and the nation's economic history. Table 1 illustrates the state's recent history in investment in S&T and the resulting Return on Investment (ROI), objectively estimated. Other states show similar returns; for example data for the State of Ohio indicate an ROI of 9.7 for that state's investment of \$681M through its Third Frontier Fund, attracting an additional \$4.1B in non-state funding and creating 41,300 jobs."

Further, in keeping with the mission set forth by OII to "build... an innovative economy in the Tulsa region with the central theme of Research to High Impact Jobs..." improving STEM education in the region has been identified as an area well suited to deliver on that mission.

D. ASSETS IN THE REGION (ASSET SURVEY/STAKEHOLDER DIALOGUES)

In an effort to construct an inventory of available STEM assets in the region, OII engaged TIES (The Teaching Institute for Excellence in STEM) to conduct multifaceted research to identify and catalog assets identified by key stakeholders in the community. The research elements included:

- An online survey (Approximately 112 stakeholders from business, higher ed, K12, non-profits, and local and statewide government were invited with 54 completions) Two, 2-day Design Studio sessions which were attended in aggregate by 43 community stakeholders (Most attending at least part time with several attending all 4 full days)
- Eight one-on-one "deep dive" phone interviews with key stakeholders (11 were attempted but scheduling conflicts prevented completion of all 11)
- Third party research into reported assets

OII Tulsa STEM Alliance Asset Sectors	Assets per Sector		
Business and Industry Partnership	13		
Education Partner	56		
Government Agency	9		
Higher Ed	16		
K-12	10		
Philanthropy	11		
Total	115		

TRSA REPORTED ASSETS

Sources: (1) TIES administered Asset Map Survey (2) Design Studios I & II (3) Deep Dive Interviews. All conducted between September 1-October 19, 2013.

The detailed list of identified Assets can be viewed here.







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Full results of the survey can be found at the following links:

- Brief Final Report
- Asset Survey Final Report Summary

E. NATIONAL, REGIONAL, AND LOCAL MODELS TO LEVERAGE

TIES utilized several models of like-minded organizations to inform the Design Studio Process and called on members of the Alliance to submit their recommendations for models based on fidelity to the established TRSA Design Principles endorsed by the group as well as based on their assessment of efficacy and appropriateness to the tasks identified.

The operational models most frequently identified for reference included:

Model	Description	Consideration for OII
STEMx	A membership network to collaborate on STEM and key national projects to advance STEM – Oklahoma is a member.	 A member model requiring a fee (which could create an undesirable sense of exclusivity) The goal of aggregating other established networks or leveraging existing assets was appealing
OSLN — Ohio STEM Learning Network	A Hub model to utilize platform schools to connect and accelerate innovative STEM practices within Ohio.	 The hub and spoke model may create silos and undesirable competition among the hubs Prototyping to facilitate scaling innovation is appealing
<mark>CSLNet-</mark> California STEM Learning Network	A State network focused on strengthening scientific, technical, and quantitative literacies within the K-14 STEM pipeline with a direct focus on workforce needs.	 A productive model of inclusion that works to support diversity of goals and gaps based on regional needs. Is managed by a core team organizational structure Includes statewide advocacy as a central mission
ECASE – Education Consortium for the Advancement of STEM in Egypt	A countrywide network of model STEM schools.	 Provided an interesting global view of education principles
SFN – STEM Funders Network	A network of education-focused philanthropies from across the nation with a common goal to advance STEM education by leveraging the collective voice, resources, and strategies of its members.	 Mesh Network model utilizing "innovation" rooms to run projects around critical "topics". Focus on engaging in high-impact projects no grant maker could undertake alone.
OII/TRP – Tulsa Research Partners	Collaborative, multidisciplinary research partnership formed by the UT, OU Tulsa, OSU Tulsa and TCC to provide research community access to advanced tools and programs that will give a significant competitive advantage in attracting and performing high tech research in Oklahoma	 Established and proven successful with founding members in TRSA Existing infrastructure and administrative resources that are a natural support for the work of the TRSA Synergistic mission with the TRSA







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In discussion of these models and other traditional organizational structures, the view of the TRSA Design Team in both Design Studio I and II was that the TRSA would need to be;

- **Inclusive** to ensure all impacted and concerned stakeholders would be at the table and have an equal voice
- Flexible in scope to be able to successfully meet the identified needs in the community
- Action-oriented and focused on getting things done
- Accountable and able to measure the impact of the work of the TRSA
- **An Advocate** for STEM teaching and learning to ensure that education policy initiatives on a local, state and federal level appropriately identify the needs deploy vital resources responsibly and effectively to ensure every student has access to the best possible STEM education

IV. STRATEGY OF THE TRSA

A. THE DESIGN STUDIO PROCESS IN SETTING THE STRATEGY FOR TRSA

The TRSA model was developed using the Engineering Design Process in a series of moderated Design Studios and supplemented with several key stakeholder deep dive interviews. In this process a large and inclusive pool of invited stakeholders participate in a series of facilitated collaborative group dialog sessions (The Design Studios). The participants in the process are known as "The Design Team". The invitation process is open and intended to create the largest and most diverse possible pool of participants – invitees are encouraged to bring other community members they believe would be beneficial to the process.

For the TRSA Design Studios, the database of invited stakeholders included members of each of the identified participant sectors (PK-12, business and industry, philanthropy, higher ed, education partners/associations/ community assets, informal and out of school assets and government). The invited participants were polled so that design studios could be scheduled on dates with the greatest possible participation rates.

The Design Studios were held over 4 days in September and October 2013 at the OII offices in downtown Tulsa. In aggregate 43 Oklahoma stakeholders participated in one or more days of the Design Studios.

The Engineering Design Process differs from a strategic planning process in that it is iterative and cyclical in execution, unlike strategic planning which tends to be linear. Utilizing the Design Studio Process in developing STEM Networks illustrates this point that the engineers at the table are typically comfortable with the Design Studio process and participate easily and non-engineers sometimes struggle with the process. The TRSA design studios generated similar reactions at the start of Design Studio I, but ultimately resulted in robust collaborator dialog and contributions among all participants with opposing points of view passionately argued and settled via mutually agreed consensus.

The Design Studios demonstrated a high level of commitment and engagement from all participating sectors.

The Design Studio Process and facilitation tools are best demonstrated in the materials provided to participants.

- Design Studio I Briefing Book
- Design Studio I Workbook
- Design Studio II Workbook







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B. VISION STATEMENT AND DESIGN PRINCIPLES

The foundational element that comes from the Design Studio Process is the collaboratively drafted Vision Statement and Design Principles. The participants spend the first Design Studio defining the TRSA by:

- Establishing the "non-negotiables"
- Identifying the pre-conceived notions/ constraints
- Crafting the mutually agreed language to guide all work of the TRSA
- Ensure that all stakeholder's enlightened self interest are met (The most successful networks thrive when everyone at the table feels they are "meeting their needs/serving their goals" out of the initiative.)

VISION STATEMENT

The Tulsa Regional STEM Alliance (TRSA) works as a catalyst to create a collaborative ecosystem that encourages business/industry and the education community to produce innovative pathways resulting in a highly skilled STEM workforce able to drive economic prosperity while meeting the needs of a globally competitive Tulsa region.

DESIGN PRINCIPLES

The Tulsa Regional STEM Alliance (TRSA) will...

- Stimulate regional economic prosperity & growth with an entrepreneurial STEM vision
- Engage partnerships to accelerate capacity and broaden opportunity
- Strive to make STEM literacy attainable and desirable for all
- Involve committed STEM stakeholders
- Deliver an Alliance that connects and leverages existing assets and develops new capacity to innovate, scale and sustain effective STEM teaching and learning and career pathways resulting in an innovative workforce
- Foster the development of socially responsible, values-based leaders and STEM workforce with a consciousness and eye toward a more contemporary Tulsa enabling the future while addressing the largest grand challenges
- Value and promote a STEM culture and a single community of practice from parents to educators to corporate leaders
- Ensure an evidence-based approach with measurable and sustainable results

V.TACTICS OF THE OII STEM ALLIANCE

A. KEY INITIATIVES OF THE ALLIANCE

The Design Team identified 3 main areas of tactical concentration for the start-up work of the TRSA:

- Aggregate all existing STEM assets in the community with an eye toward creating a comprehensive repository of Data to include measures of impact, cost, efficacy, potential for scale and gaps.
- Devise a communication system that:
 - Attracts and engages new potential stakeholders to the TRSA
 - Informs the community at large about the importance of STEM to Tulsa and the available STEM assets in the region







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- Deliberately engages the local media and cultivates positive press mentions
- Broadcasts the STEM successes of the Tulsa region to members of the community but also to government officials to help inform policy decisions
- Codify the optimal governance and operational structure of the TRSA to support delivery of its vision and Design Principles.

For each sector specific tasks are detailed in the Design Blueprint. Following summarizes the type of work for each focus area.

1. Aggregate all existing STEM assets in the community with an eye toward creating a comprehensive repository of Data to include measures of impact, cost, efficacy, potential for scale and gaps.

There is wide agreement that having access to reliable data will be beneficial in helping guide the work of TRSA. The four main categories of desired data are:

- Comprehensive Inventory of Current Tulsa Programs, including potential for resource allocation and deployment to identified areas of need. A group of Design Team members has already begun this task and a communal database is being populated and can be viewed here.
- Efficacy of Current Tulsa Programs (including number of students served and effectiveness)
- Defined Gaps or Areas of Need within Tulsa
- Inventory of Effective Programs being implemented with success elsewhere that may be adaptable to Tulsa

Current available data is believed to be inconsistently captured, analyzed and reported and perhaps more importantly, there is no one place where the available data can be accessed. In working to identify programs of promise and areas of greatest need, it was determined that the TRSA would become the clearinghouse for ALL area STEM data with a mission to:

- Collect all available primary and secondary data in the region relating to STEM education and workforce development programs
- Provide analysis of all available data and report findings using a consistent reporting format
- Create an easily accessible electronic clearinghouse for data
- Identify gaps in data reporting and suggest resources to conduct research to fill the gaps in knowledge

2. Devise a communication system that:

- Attracts and Engages new potential stakeholders to the TRSA
- Informs the community at large about the importance of STEM to Tulsa and the available STEM assets in the region
- Deliberately engages the local media and cultivates positive press mentions
- Broadcasts the STEM successes of the Tulsa Region to members of the community but also to government officials to help inform policy decisions

The lack of reliable available data is exacerbated by the lack of a uniform system for communicating both internally among key stakeholders and externally to the community at large. Currently there is no single place to find STEM programs, assets or activities to either attract student participation, community support and resources. The TRSA will construct a comprehensive communication platform to:







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- Maintain regular "reporting out" of TRSA activities to all internal TRSA stakeholders to nurture the momentum and as a means to invite reporting back of achievements creating a communications loop among all stakeholders
- Actively identify and engage local media partners in the activities of TRSA to secure positive media mentions and inform thought leaders of the STEM accomplishments in Tulsa
- Develop a communication outreach plan to ensure allied members of the TRSA (educators and administrators and other community leaders not included in the TRSA member database) are kept informed of the work and achievements of TRSA member organizations.
- Develop a comprehensive communication plan including social media to help keep the community informed about the achievements of TRSA member organizations

In light of the increased tensions among school districts and the OSDE as highlighted earlier, it is also incumbent on TRSA to act as a facilitator for constructive dialog among the parties. TRSA is in a unique position to capture and communicate the many varied successes of the Tulsa region including the school districts. Further, TRSA stands uniquely qualified to coordinate a well informed advocacy effort in support of effective STEM education initiatives and to ensure that reliable data are used for evaluation and to guide policy decisions.

3. Codify the optimal governance and operational structure of the TRSA to support delivery of its vision and Design Principles.

The council agreed to work on details of a governance structure that would:

- Facilitate continued collaboration among TRSA members
- Actively invite new and innovative programs for consideration
- Include a vetting process for TRSA endorsed work that ensures fidelity to the TRSA design principles and Vision
- Construct the organizational and reporting structure for staff to support the work of the TRSA

Formalize the financial needs and funding structure for the TRSA

- Codifying Governance Structure
- Data (collection, analysis and dissemination)
- Communication
- Development/Sustainability

VI. OPERATIONALIZING THE TRSA

A. ORGANIZATIONAL STRUCTURE

The goal of the TRSA organizational structure is to create an institution that is flexible and inclusive enough to welcome all stakeholders, yet includes sufficient structure and organizational support to facilitate and coordinate actual work. The Design Team agreed that the TRSA will need paid staff to support the volunteer work of the TRSA organization and to deliver several of the critical tools the TRSA will need to effectively and efficiently achieve its aspirations.

Therefore, TRSA working as a core team in Design Studio II conceived of a hybrid organizational structure that incorporates component parts from several common structures:

• Oversight and fiscal Management to be provided by the Oll. Administrative and coordination support including several paid staff (details below) will be housed in Oll offices and function as members of the TRSA leadership and staff.







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- Distributed Leadership in the form of a "Council"-This model is based loosely on structures common among some American Indian tribes that spread leadership roles among a relatively large number of stakeholders rather than conferring ultimate authority with one person or a small governing body. (This is especially appropriate for Tulsa as there is a large American Indian population in the state however; it is noteworthy that the American Indian population did not have a delegate involved in the Design Studio Process.)
- Active engagement and collaboration of TRSA partners in the form of a partial "mesh network" which is an aggregation of work programs that intentionally spread the individual opportunities in a mesh formation among the organizational framework to eliminate silos or other rigid structures that discourage collaboration. The opportunities or programs of interest will be generated organically by members of Council or any TRSA organization(s).

The draft organizational chart reflects potential mesh component topics (i.e. Grants, volunteer deployment, internships, advocacy etc.) however these will be populated by TRSA partners and are intended to be iterative and able to respond to Tulsa area needs in a real-time basis.

B. GOVERNANCE/MANAGEMENT AND OVERSIGHT

The Design Team Members from Design Studio II discussed a variety of governance structures and agreed in principle to the following:

Oll will:

- Provide Physical Space
- Act as Fiscal Agent/provide Fiscal Oversight (501c (3) status)
- Provide Strategic Guidance and Stewardship

The TRSA leadership and administrative staff will:

- Execute a sustainability/ advancement plan to ensure fiscal soundness
- Guide collaboration and vetting work of the Council
- Facilitate and coordinate the collection and reporting of aggregated local STEM programs
- Draft and execute communication plan
- Collect, analyze and report findings of programs
- facilitate and support work of grant writing team

The TRSA leadership "Council" will be made up of approximately 20 members with a minimum of 2 representatives each from each sector of member type:

- Philanthropy
- Business & Industry
- Higher Ed
- Pk-12 (to include both educators and administrators)
- Education Partner
- Informal or out of school







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The Council members will be self identified and will serve for a minimum of two years. It is understood that Council members are responsible for maintaining a productive working relationship with the TRSA and are tasked specifically with:

- Catalyzing participation and membership of community stakeholders into the TRSA
- Supporting initiatives of the TRSA
- Contributing to the work of the TRSA and supporting the Mission and Design Principles of the TRSA
- Bringing appropriate opportunities to the attention of the TRSA and contributing to the collaborative culture
- Providing advocacy for STEM regionally
- Participating in pre-determined meetings of the Council and TRSA
- Contributing to the effective working order of the TRSA Design Principles.

TRSA General members will be self-identified and will:

- Support initiatives of the TRSA
- Bring to TRSA Council opportunities of interest and, where feasible, shepherd these opportunities through a vetting and implementation process
- Participate in pre-defined meetings of the TRSA, as prescribed by the Council
- Contribute to the work of the TRSA and supporting the Mission and Design Principles of the TRSA
- Contribute to the effective working order of the TRSA Design Principles.

Although several of the TRSA Design Team members recommended against creating "another bureaucracy," the Design Team recognized the need for structure and support mechanisms to be put in place to facilitate the work of the TRSA. The TRSA, through OII, will provide staffing support, which is intended to catalyze and codify the work of TRSA.

Based on the discussions in the Design Studio meetings and the TRSA Governance Task Force meeting, the recommended organizational structure will include an OII appointed Senior Advisor to TRSA on Strategic Initiatives and a Program Director supported by 3 staff positions; 1. data analysis, architecture 2. Assistant project manager / program support and 3. marketing and communication support.



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OII SENIOR ADVISOR TO THE TRSA ON STRATEGIC INITIATIVES, SUSTAINABILITY AND

ADVANCEMENT (.5 FTE) Part Time Salary Range \$65,000-\$75,000*+ benefits

Overall Function: The OII Senior Advisor to TRSA on Strategic Initiatives, Sustainability and Advancement will have responsibility of ensuring the long term mission and fiscal health of the TRSA by developing and nurturing strategic initiatives and the strategic sustainability/advancement plan including working closely with the funders and the OII Board as well as the TRSA Staff and Council.

Key Responsibilities:

- Develop and maintain strong on-going relationships with local and state elected leaders, including the Governor, Chancellor of Higher Education and the Secretary of Science and Technology. Communicate regularly and directly with these individuals concerning TRSA plans, outcomes, successes and needs.
- Develop and maintain strong on-going relationships with regional school superintendents and principals from key schools. Communicate regularly and directly with these individuals concerning TRSA plans, outcomes and successes.
- Develop and maintain strong on-going relationships with regional STEM corporate CEO's. Communicate regularly and directly with these individuals concerning TRSA plans, outcomes, successes and needs.
- Design sustainability/advancement/development strategy for TRSA: Work with the management team to identify funds needed, preferred funding targets, and approaches
- Build a robust donor base: Develop and maintain key long-term relationships with donors and prospects
- Communicate and train: Train and mentor development staff and communicate fundraising goals and progress throughout TRSA

- Track record of successful strategic initiatives including planning and growth strategies.
- A high level of organizational and political sophistication, especially as it relates to connecting programs to funding, creatively generating other resources, and building collaborative and strategic partnerships.
- Significant Experience in Advancement/Development including successful and sustained relationships with key funders (8-10 years)
- Project Leadership: Experience in planning, leading, and managing projects, including coordinating with peers to achieve desired outcomes, and tracking and reporting on progress to board of directors
- Entrepreneurial Spirit: Takes initiative and actively seeks to deepen current donor relationships and to forge new ones. Nurturing "friend raising" as well as "fund raising" to gain mission support.
- Communications: Skilled in creating powerful, compelling written and oral communications. Ability to convey complex ideas through brief, simple materials. Experience and credibility when presenting materials to external audiences
- Influencing: Gets others to accept ideas by using convincing arguments, creates a win-win situation and responds appropriately to key stakeholders
- Collaboration: Effective at working with others to reach common goals and objectives
- Relationship Building: Skilled at establishing and cultivating strong relationships with peers, across different levels of the organization and externally







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PROGRAM MANAGER (.5-1 FTE) Part Time Salary Range \$40,000-\$50,000* + benefits

Overall Function: Reporting to The TRSA Council and ED of OII the Program Manager will be responsible for the operational success of TRSA programs and initiatives ensuring seamless team management and development, program delivery, and quality control and evaluation. In this newly established role, the Program Manager will manage a staff of 2-3.

Key Responsibilities:

- Cultivate existing relationships with stakeholders with the goal of ensuring sufficient engagement and access to services/resources
- Develop and implement strategies that will maximize the synergies among stakeholder programs
- Work with staff and stakeholder groups to develop objective performance measurements to ensure consistent, high-quality evaluation and goal setting.
- Instill a sense of accountability among team members by modeling tight oversight of individual and organization performance standards
- Create a balanced score-card and program dashboard; establish consistent, objective program performance standards of accountability

- Minimum of a BA
- At least 5 years of experience with three of those in a team management role
- Demonstrated success developing and evaluating program models, and selecting and successfully operationalizing innovative programs
- Proficient in using technology as a management reporting tool and experience working with information technology staff to develop and implement program evaluation systems
- Strong project management skills managing complex, multifaceted projects resulting in measurable successes and program growth
- Experience having worked with a high-performance, collaborative, constructive peer group
- Demonstrated results in managing through complex systems and proven experience negotiating win-win agreements
- Excellent verbal and written communication skills with exceptional attention to details
- Personal qualities of integrity, credibility, and a commitment to and passion for TRSA's mission.







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DATA ANALYSIS / ARCHITECT/ COORDINATOR (1-2 FT E) Salary Range \$50,000-\$70,000* +benefits

Overall Function: Reporting to the Program Manager the Data Analysis Coordinator is responsible for data collection, analysis and reporting functions at the TRSA. This position reports to the Program Manager and ED of OII works closely with other members of TRSA staff.

Key Responsibilities:

- Manages data collection, analysis and reporting activities for TRSA member institution's STEM Programs and TRSA program activities.
- Manages the collection of various performance metrics.
- Coordinates the collection, analysis and reporting on key program related data.
- Coordinates the collection, analysis and reporting on key comparative data across TRSA institutions.
- Prepares and updates the TRSA data almanac containing comparative data collected on a regularly scheduled basis.
- Manages ad-hoc, large-scale data collection and analysis for key stakeholder groups
- Advises and assists TRSA staff and stakeholder groups in developing data gathering and reporting tools that are used by various groups and committees.
- Collaborates with OII headquarters IT staff in developing databases and the acquisition of reporting and analysis tools to support.
- Prepares reports on spending and investments in various TRSA programs
- Develops recommendations on opportunities for collaborative purchasing based on analysis of targeted spend data. Prepares analyses of cost savings on collaborative purchasing activities.
- Supports RFP teams with pricing analysis and evaluation
- Creates periodic contract compliance reports and strategy agreements and identifies opportunities for improvement.
- Connects regularly with TRSA institutions to establish an information flow from them to the TRSA

- Bachelor's degree (preferably in Business, Information Systems, or related field).
- At least two or more years work experience in data analysis.
- Demonstrated ability to understand complex data relationships and manipulate large data sets using industry standard analysis tools.
- Ability to identify and interpret data trends from a wide variety of sources.
- Excellent written and verbal communication skills.
- Excellent organizational and teamwork skills; special emphasis on ability to work as part of creative team.
- Experience using Microsoft Office suite of products, SharePoint, and SQL.







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MARKETING AND COMMUNICATIONS COORDINATOR/ WEB DEVELOPER (.5-1 FTE)

Salary Range \$35,000-\$55,000 benefits

Overall Function: Reporting to the Program Manager the Marketing and Communications Coordinator's main purpose is to manage the creation and dissemination of content and information for the Tulsa Regional STEM Alliance Programs through digital marketing, content marketing, media relations and communications outreach. The Coordinator will focus on content and website management, stakeholder engagement and building brand awareness.

Key Responsibilities:

- Oversee the content development of the TRSA portal on the OII website, blog and social media channels
- Manage the creation, dissemination and archiving of TRSA content including press releases, blog posts, op-eds, video, audio, infographics, etc.
- Work with traditional and online media to identify stories, create angles, manage inquiries and build influential relationships
- Proactively seek opportunities for TRSA stakeholders to participate in conferences and secure speaking engagements
- Create strategic media outreach plans for TRSA announcements, events and project milestones
- Act as PR contact for TRSA and actively monitor and track relevant media stories
- Manage editorial/content calendar for TRSA and engage key internal and external stakeholders
- Act as marketing project manager for key TRSA projects and align marketing strategy with project goals
- Work with and convene communications, marketing and PR people from the TRSA institutions to coordinate messaging and event marketing

- Bachelor's degree, with a minimum of 3-5 years of relevant experience in Public Relations or Marketing.
- Solid working knowledge of WordPress, DruPal and HTML (or whatever is required of the OII site)
- Must have excellent interpersonal, oral and written communication skills
- Strong initiative and ability to handle multiple projects/roles in an evolving environment both individually and within a team
- Resilient, with the ability to work to deadlines and maintain high levels of professionalism while managing multiple demands
- Willingness to do what it takes to complete projects with a dedication to quality and innovative thinking
- Strong critical thinking and problem-solving skills with the ability to respond to crisis and mediarelated situations quickly, efficiently and effectively
- Ability to work collaboratively with TRSA stakeholders and OII staff to contribute to all team initiatives
- Previous experience with social media and blogging and managing social media campaigns and blogs a plus







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ASSISTANT PROJECT MANAGER (DATA & WEB PROGRAM SUPPORT) (1 FTE)

Salary Range: \$30,000-\$50,000 + benefits

Overall Function: The Assistant Project Manager (APM) supports all phases of the work of the TRSA and may be assigned specific programs as needed. This is a high-level administrative position that will function as a department assistant with increasing project management responsibility based on demonstrated ability.

Key Responsibilities: Primary duties include, but are not limited to the following:

- Assist in budget and schedule preparation and maintaining project timelines.
- Assist in timely response to requests from TRSA members on matters related to program support
- Create and maintain all project documentation via hard-copy & electronic files and filing systems
- Follow up with internal and external constituents as necessary
- Assist with grant management
- Assist in management of funder/donor database and donor acknowledgement letters
- Assist in management of website, constant contact, e-blasts, and social media
- Coordinate mail solicitations.
- Coordinate volunteers
- General office administration.
- Special Projects & Special Events
- Other duties as assigned

- Bachelor's Degree in relevant field and 0-2 years of experience in an assistant project or program management role
- Proficiency with Microsoft Office (Excel, Word, Outlook, etc.)
- Ability to work independently with minimal supervision
- Knowledge of community development programs and issues is desired although not mandatory
- Strong organizational skills
- Commitment to working within a team environment
- Ability to thrive in a dynamic fast paced environment
- Familiarity with grant management, and fundraising is a strong plus, along with previous administrative experience.
- Consensus-building and conflict resolution skills
- Excellent organizational and communication skills (both written and verbal).
- Time-management and project management skills.
- Professional attitude and workplace demeanor







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C. FINANCE AND BUDGET REQUIREMENTS

The draft preliminary budget will be refined by the OII appointed Senior Advisor to the TRSA on Strategic Initiatives and the Director of Programs in collaboration with the OII Board and the TRSA Council.

The following proposed budget is based on the following assumptions and leverages the budget assumptions of TRSA:

- 1. Staffing needs identified during the design work of the TRSA
- 2. Budget assumptions used from TRP
- 3. Regional lease costs for office space of \$13/sq. ft. and 100 sq. ft. of space needed per person and additional common space
- 4. Slightly higher communication needs than TRP because of the connectivity and communication required by TRSA
- 5. Utilization of OII existing resources
- 6. Small inflation rate for staff time.

The budget also assumes a set aside of funding to operationalize key activities within the TRSA. These activities could be strategic, programmatic, or geared toward grant needs. It is recommended that this fund initially be used to work with a consultant to identify and prioritize programming over the next 5 years.

Tulsa Regional STEM Alliance Budget Assumptions					
TRSA Staffing Requirements:	Total Budgeted Resources				
DIRECT STAFFING: (staffing budget numbers include est. salary + 30% for benefits)					
OII Appointed Senior Advisor to TRSA on Strategic Initiatives (50% FTE)	\$100,000				
Program Manager (50% FTE)	\$65,000				
Data Analysis / Architecture (100% FTE)	\$91,000				
Marketing and Communications Coordinator (.5-1 FTE)	\$71,500				
Assistant Project Manager (1 FTE)	\$65,000				
Grant Writers (Contract as needed)	\$50,000				
Subtotal Direct Staffing	\$442,500				
INDIRECT STAFFING (OII ALLOCATIONS):					
Executive Director - David Greer (25% TRSA)	\$27,866				
Administrative Assistant/Receptionist - Leanna Ameen (25% TRSA)	\$15,360				
TSC Director - George Louthan (10% TRSA)	\$10,240				
Sr. Program Officer - Nicole Verona (15% TRSA)	\$15,300				
Sr. Computer Administrator - Brady Deetz (20% TRSA)	\$15,030				
Web Developer (50% TRSA)	\$25,600				
Interns (50% TRSA)	\$15,000				
Subtotal Indirect Staffing	\$124,395				
Total Staffing	\$566,895				







TRSA FACILITIES AND OPERATIONS:				
Back Office and Accounting (\$1,500/mo.)	\$18,000			
Facility/Office Space	\$10,000			
Parking (3 X \$86/mo.)	\$3,096			
Telecommunications (\$200/mo.)	\$2,400			
Consultative Services & Projects	\$500,000			
Internet & Web Hosting	\$5,000			
Travel	\$8,000			
Office Supplies	\$2,000			
Materials & Printing	\$10,000			
IT Equipment	\$5,000			
Total Facilities and Operations	\$563,496			
Total Year 1 Expenses	\$1,130,391			
Total Year 2 Expenses	\$1,112,803			
Total Year 3 Expenses	\$1,134,411			
Total Year 4 Expenses	\$1,188,430			
Total Year 5 Expenses	\$1,242,450			
Total Funds Required for 5 yrs.	\$5,808,485			

FUNDING AND SUSTAINABILITY D.

The funding and sustainability for the TRSA is the responsibility of the Oll Appointed Senior Advisor to the TRSA working in collaboration with the Program Director and the TRSA Council and will include defined efforts in:

- Cultivating productive relationships with the key funders in the region and working with them to • identify appropriate levels of support for TRSA programs and initiatives
- Seeking and applying for appropriate grants
- On occasion holding fundraising events if deemed appropriate by the Council •
- Accepting contributions from member organizations (although no payment is mandatory for any • TRSA member)

VII. **SUMMARY NEXT STEPS**

A detailed description of the next steps is contained in the TRSA Design Blueprint. The Blueprint leverages the results of the work and findings from the asset survey, research, deep dive interviews, dialogues, and design studios. This "living" document is a schematic for the next steps of the TRSA and initially OII.